KWSSIP
Karachi Water & Sewerage Services Improvement Project

Final Report








October 2023

Environmental & Social Impact Assessment Report

MALIR BASIN WASTEWATER INTERCEPTORS AND TREATMENT PLANT

MMP
MM Pakistan (Pvt) Ltd.

Second Karachi Water & Sewerage Services Improvement Project [KWSSIP-2]

Environmental & Social Impact Assessment Report of Malir Basin Wastewater Interceptors and Treatment Plant

October 2023

Project Implementation Unit (PIU)
Karachi Water & Sewerage Services Improvement Project (KWSSIP)

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Environmental & Social Impact Assessment Report of Malir Basin Wastewater Interceptors and Treatment Plant

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Executive Summary

1. The Government of Sindh (GoS) through Karachi Water and Sewerage Corporation (KWSC) is planning to implement the second phase of the Karachi Water & Sewerage Services Improvement Project (KWSSIP-2) in various parts of Karachi. One of the planned KWSSIP-2 interventions comprises of laying interceptors to collect domestic sewage from the heavily settled banks of the Malir river and construction of a 180 Million Gallon Per Day (MGD) sewage treatment plant (TP-IV) to treat the collected sewage. This Environmental and Social Impact Assessment (ESIA) of the proposed project has been carried out to address the potential environmental and social impacts of the project in compliance with the Sindh regulatory requirements and the WB Environmental and Social Framework (ESF).

2. The overall E&S risk of SOP-2 is high considering that the environmental risk is substantial while the social risk is high, based on the internal E&S risk classification of World Bank. An ESIA was prepared for Malir Basin Wastewater Interceptors and Treatment Plant to assess the E&S risks associated with the construction and operation of this subcomponent and develop a corresponding ESMP to avoid or minimize the adverse impacts to the environmental and stakeholders.

3. The scope of the ESIA includes (i) review of the applicable national E&S legislative and policy, (ii) assess the existing physical, biological and socio-economic baseline conditions, (iii) Identify potential adverse and positive E&S impacts from all stages of the project, (iv) assess and compare different subproject alternatives in terms of E&S impacts, (v) identify stakeholders that are likely to be affected or have interest or a stake in the project, with emphasis on disadvantaged and vulnerable groups and carry out consultation to solicit their concerns regarding the project, and (vi) provide ESMP for all stages of the project as a tool for the implementation of the suggested measures, along with monitoring and evaluation mechanism with adequate resources including capacity building of implementing agencies.

4. The proposed project comprises of the following key components:

   - About 22 km long Wastewater Interceptors along the Malir River with Chambers for receiving sewage from 20 Sewer Connections
   - Connection of TP-II bypass line and Pump room (Non-operational Sewage Treatment Plant at Mahmoudabad) with the Malir Interceptors through a 2.5 km long Pipeline
   - Manholes for access and cleaning.
   - Sewage Treatment Plant (TP-IV) with a capacity of 180 MGD.

5. The implementation of proposed project will lead to following environmental and social benefits:

a) Environmental Benefits:

   - Removal of raw sewage from the Malir river will help clean the river water and revive aquatic ecology.
   - The quality of groundwater in the area is likely to improve once the river water is less polluted.
   - The treated sewage discharged will have positive impact on the Korangi Creek ecology.

- Disposal of treated water is expected to contribute to save mangroves from further destruction,
- Improved environmental conditions in coastal area will help maintain marine ecological balance, facilitate production of healthy seafood and contribute to saving the citizens from health hazards.

b) Social Benefits:

- Approximately 600 jobs will be created during the construction phase and 191 in the operations phase. Most unskilled positions will be sourced from the nearby residential areas, thereby sharing project benefits with communities.
- Removal of raw sewage from the Malir River will improve the overall hygienic condition of the area thereby improving the health conditions of the population. This in turn will reduce their expenditure associated with healthcare.

6. The potential adverse impacts and their mitigation measures are briefly discussed below.

- Lack of Environmental and Social (E&S) personnel's capacity or selection of environment non-responsive contractors may result in failure of Environmental & Social Management Plan (ESMP) implementation causing non-compliances. Before initiation of construction activities, the PIU will recruit qualified CSC and Contractors who are able to implement the Project's Environmental, Social, Health and Safety requirements as defined in the ESIA. Contractors with poor environmental, health, and safety management records will not be hired. Contractor will also recruit qualified and experienced E&S Staff in line with the ESIA requirements.
- Disturbance to livelihoods is the foremost potential socio-economic impact from the construction of the project, mainly associated with the agriculture being performed in the riverbed. The crops cultivated along the alignment of the interceptor could be directly affected due to construction activities. Consulted Project Affected Persons (PAPs) recognized that all the land they cultivate belongs to Government of Sindh. Since they are non-title holders, no land acquisition will be required; however, as per WB ESS 5, compensation will be paid for standing crops coming under the alignment and for other temporary structures such as cattle farms. The project will temporarily affect livelihood of 38 PAPs. Measure to address these livelihood impacts have been included in the Resettlement Plan (RP) – a stand-alone document prepared in accordance with the WB ESS5.
- OHS and CHS risks may arise due to the nature of construction works for workers as well as communities. During operations, TP-IV workers are also exposed to a variety of hazards. Mitigation measures include implementation of OHS Plans for construction / operational phases, CHS Plan during construction, implementing standard operating procedures and codes for working on live systems, providing proper training, and having adequate supply of Personal Protective Equipment (PPE). A Health & Safety Framework (by the World Bank E&S Safeguards Unit) will be followed by the PIU-KWSSIP and the Contractors.
- During construction phase the major waste streams will include Excavated Material from construction sites, Domestic Waste from construction camps, Hazardous Waste including used oil filters, used oils from workshop and small quantities of Medical Waste resulting from first aid treatments. A waste management plan will be developed by the Contractor prior to the start of construction for ensuring effective management of waste. Dry excavated material will be reused for backfilling to the maximum possible extent, while surplus dry excavated

material and wet excavated material will be managed through SEPA certified waste management contractors. During operations, the major waste streams will include dried treated Municipal Sludge from TP-IV and Domestic Waste generated by TP-IV Staff. Sludge will be recycled for use in horticulture and landscaping activities. For collection and disposal of domestic waste generated during both construction and operational phases, a Memorandum of Understanding (MoU) will be signed with SSWMB.

- Dust and Noise generation during construction could have impacts on the nearby sensitive receptors i.e. Salim Habib University – Korangi Creek, Karachi Public School (Play Area) – Bhittai Colony and Mohammadi Masjid / M.Y Clinic – Sidra Street (along Manzoor Colony Drain). Mitigation measures include; Control of dust and noise at source through standard abatement measures and deployment of barriers adjacent to these receptors during construction phase if needed.
- Traffic flow at Hussain Dadabhouy Road, EBM Causeway Road, Korangi Link Road, Allama Iqbal Road and Mahmoudabad Road could be affected due to use by construction vehicles. PIU / CSC / Contractors in collaboration with Sindh Traffic Police will devise a Traffic Management Plan (TMP) to minimize the expected disruption at the identified sections.
- Due to influx of labor and their accommodations in the construction camps, issues of Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) may arise. These risks are assessed as low due to communities being located away from construction camps. The PIU-KWSSIP has prepared a Gender Action Plan (GAP) that addresses these risks.
- Mangroves will not be affected by construction and operational phase activities of the project. To ensure further protection, SFD will be engaged by the PIU for periodic monitoring of mangroves during both phases. During the construction phase, the south-south western area of the TP-IV site will be completely cordoned off to restrict any access to mangroves. Similarly, awareness raising campaigns will be organized and signboards will be posted in the area for public awareness and restricting unsupervised public entry to mangroves.
- Odor generation from TP-IV could be expected during operational phase. The operators of the plant will control odor and associated issues such as ponding on filter media and breeding of filter flies through effective plant operations and maintenance of standard operating conditions.
- Workers and staff at TP-IV can be exposed to pathogens in sewage. Vectors for sewage pathogens include insects (e.g. mosquitoes, flies), rodents (e.g. rats) and birds (e.g. gulls). Comprehensive plan will be developed and implemented to manage and avoid the vector borne diseases, also considering the seasonality of the issue.

7. As part of the ESIA, an Environmental and Social Management Plan (ESMP) was developed to mitigate the identified environmental and social risks. In addition, a Stakeholder Engagement Plan, a Labor Management Procedure and a Resettlement Action Plan were developed for this project. A CESMP should also be developed by the contractors to demonstrate their approach to how to comply with the ESMP. An Environmental and Social Monitoring Plan was also developed to monitor and verify the effectiveness of the implementation of mitigating measures in terms of minimizing the negative impacts. The total estimated cost for the environmental and social management, monitoring and auditing during pre-construction, construction and O&M (annual

cost and will be updated for next upcoming years accordingly) comes to about **PKR 45.471 Million** excluding resettlement and compensation cost.

8. The proposed project is under the PIU of KWSSIP-2 during the pre-construction and design phase. The Project Director (PD) has the overall responsibility for the design and pre-construction requirements. During construction, the ESC will be responsible for the overall implementation of the ESMP, RP, and other related requirements. The operation of the project will be under the direct jurisdiction of Engineers and Plant Managers, who shall also be responsible for the monitoring and compliance to the ESMP.

9. A Grievance Redress Mechanism was developed to address any complaints or grievances that may arise during the implementation of the project. Separate Grievance Redress Committees are to be formed for the community, subproject and at the PUI level. The objectives of the GRM are (i) 3stablish an organizational structure to resolve any grievances from individuals and communities fairly and equitably, (ii) provide a platform for the aggrieved individual or community to deliver their grievances, (iii) ensure that affected communities and individuals are treated fairly at all times, (iv) identify flaws in the operational functions of the project and suggest corrective measures; and (v) ensure the sustainability of the project.

10. This ESIA report should be updated as needed due to changes in project design, baseline conditions or identification of potential new impacts.

1 Introduction

1.1 Background

1. The Government of Sindh (GoS), through the Karachi Water and Sewerage Corporation (KSWB), will be implementing the Second Karachi Water and Sewerage Improvement Project (KWSSIP-2) to improve the access to safe water supply and sewerage services in Karachi, Pakistan. This is the second project series (SOP-2) of the KWSSIP which will deepen the reforms commenced under SOP-1.

2. The SOP-2 has three project components: Component 1 will finance reform and capacity building measures, Component 2 will undertake selected infrastructure investments, thereby ameliorating water and sewer services in Karachi and increasing the city's resilience to water shortages, floods, and saltwater intrusion and lastly, Component 3 will fund project management and associated studies.

3. Under Component 2 of SOP-2 is the subcomponent Malir Basin Wastewater Interceptors and Treatment Plant (the "Project"). This subcomponent involves the construction of interceptor drains along Malir River and a 180 million gallons per day (MGD) Sewage Treatment Plant (TP-IV). This will collect and treat the sewage generated from left and right bank settlements of Malir River specifically in the entire District Korangi (Korangi, Landhi and Shah Faisal Towns), part of District Malir (Malir Town), part of District East (Jamshed Town) and Cantonment Areas including Faisal Cantonment and Korangi Creek Cantonment.

1.2 Purpose of the ESIA

4. The overall risk of KWSSIP SOP-2 has been classified as substantial for environment, and high for social which includes the risk for sexual exploitation and abuse and sexual harassment (SEA/SH). The overall E&S risk is therefore categorized as high thus, Environmental and Social Impact Assessment (ESIA) should be prepared.

5. This report is the ESIA for the Malir Basin Wastewater Interceptors and Treatment Plant , a subcomponent of KWSSIP SOP-2. The objective of this ESIA is to assess the environmental and social risks associated with the activities of this subcomponent and to develop an environmental and social management plan (ESMP) to minimize the impacts of the identified risks.

1.3 Scope of the ESIA

6. The scope of this ESIA are the following:

- Facilitate PIU of KWSSIP in ensuring environmental and social sustainability of the project;
- Establish a baseline of existing social and environmental conditions prior to project initiation by collecting secondary and primary data/information on physical, biological and socio-economic environment of the project area;
- Identify potentially significant environmental and social impacts (both positive and negative) during all stages of the project;

- Avoid, minimize, and suggest mitigation and compensation measures for significant adverse impacts;
- Conduct, record and report public consultation and participation with major stakeholders; and
- Provide Environmental and Social Management Plan (ESMP) for all stages of the project as a tool for the implementation of the suggested measures, along with monitoring and evaluation mechanism with adequate resources including capacity building of implementing agencies.

7. Besides this ESIA, a separate Resettlement Plan (RP) has also been developed for this project. Furthermore, the following documents prepared for the whole KWSSIP-2 project[1], also apply to the proposed project:

- Environmental and Social Commitment Plan (ESCP);
- Stakeholder Engagement Plan (SEP); and
- Labor Management Procedures (LMP).

1.4 ESIA Methodology

8. The study has been conducted in accordance with the applicable environmental and social policies, laws, guidelines, acts and legislations of the Government of Pakistan (GoP) and Sindh and the World Bank (WB) Environmental and Social Framework (ESF) and its relevant Environmental and Social Standards (ESSs).

9. The ESIA study was conducted based on field level primary data collection, review of secondary information, discussions with experts of various disciplines and consultations with the affected communities and institutional stakeholders. The methodology employed for the ESIA is discussed below.

1.4.1 ESIA Study Area

10. The area of influence (AoI) covers the areas that are likely be directly or indirectly impacted by the Project. The direct impact area (DIA) includes the construction sites of the interceptors and the treatment plant. The indirect impact area (IIA) includes the areas adjacent to the project construction sites that may experience the impacts of the construction or operation of the Project.

11. **Table 1-1** defines the Areas of Influence (AoI) considered for the assessment of impacts. The extent of the IIA has been determined by the reach of impacts such as noise and air pollution.

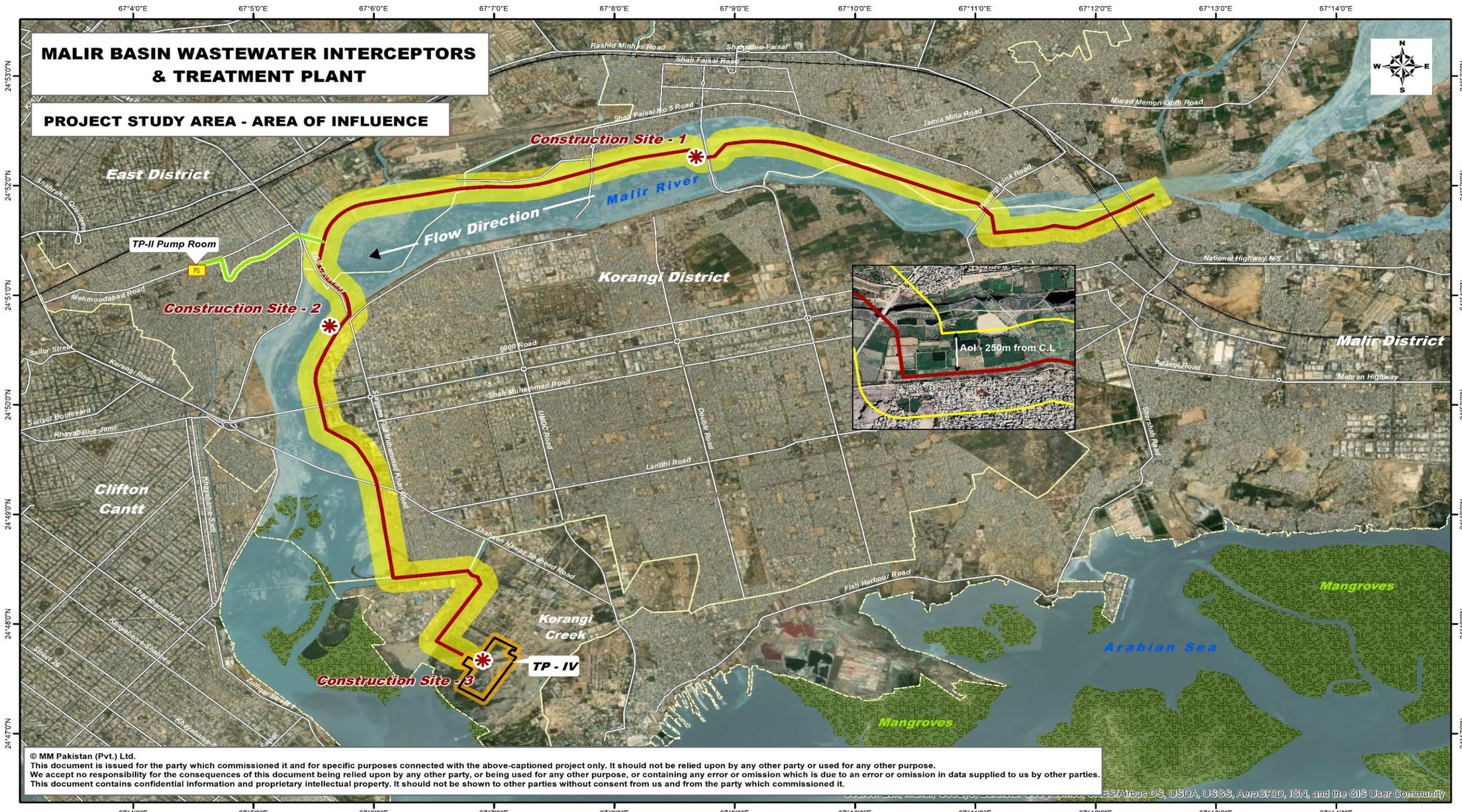
Table 1-1: Project Study Area –Area of Influence (AoI)

No.	Project Components / Sites	Direct Impact Area (DIA)	Indirect Impact Area (IIA)
1-	Interceptor spanning over 22 km stretch, starting from	Main construction / trenching area, space for the	500 m (250 m from the center line on both sides)

1 For other sub-projects under KWSSIP-2, a number of relevant E&S studies have been carried out including Ecological Assessment and Biodiversity Action Plan (BAP); ESIA for K-IV Augmentation Works; ESMPs and RPs for Water Supply and Sewerage in Additional Low-Income Communities (Katchi Abadis), Priority Sewer Network Rehabilitation and Extension and Rehabilitation of Wastewater Pumping Stations, Priority Water Network Rehabilitation and Extension, Reducing Energy Consumption, and Rehabilitation of Existing and Construction of New Filtration Plants.

No.	Project Components / Sites	Direct Impact Area (DIA)	Indirect Impact Area (IIA)
	Afridi Colony Area - Bin Qasim Town and terminating at TP-IV along with 20 Sewer Connections through Intake Structures	movement of machinery / dumper trucks and spaces for temporarily stocking the excavated material along excavated trenches.	
2-	TP-II bypass line and Pump room Connection with Interceptor spanning over 2.5 km stretch, starting from TP-II Pump Room and terminating at the Interceptor opposite Manzoor Colony Fire Station	Main construction area i.e. 210 m from TP-II Pump Room to Mahmudabad No. 04 Main Road, 300 m along Mahmudabad No. 04 Main Road till Street No. 17/D – Mahmoudabad and from there 380 m along the street till Manzoor Colony Drain, then 1.2 km along Manzoor Colony Drain till Manzoor Colony Fire Station and finally 410 m from fire station to across the Shaheed e Millat Road and Malir Expressway to Interceptor.	60 m (30 m from center line on both sides)[2]
3-	TP-IV Site	Main Construction Area spanning over approximately 0.429 Sq. km (106 acres)	100 m from the proposed treatment plant boundary wall on all sides
4-	Access roads	03 Access Roads leading to the project area that may face; increased traffic, dust, noise and safety impacts due to the movement of construction traffic during the project construction.	50 meter (25 m from the center line on both sides)

2 Due to narrow façade to façade width of the TP-II to Interceptor corridor



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Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP (Pvt.) Ltd. — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 **Coordinate System: UTM 42N**	**Legend** Construction Sites; Malir Wastewater Interceptor; TP-II to Malir Interceptor (MS-VI); Area of Influence (AoI) - 500m; TP II Pump Room; MS - VI - AOI 60m; TP - IV (AoI) - 100m; Treatment Plant - IV 2 1 0 2 km		**Drawn:** T. Noman **Checked:** M.A Shishmahal **Approved:** P. Anjum **Date:** 11/09/2023 **Scale:** 1: 55,000 **Sheet Size:** A3

Figure 1-1: Project Study Area – AoI

1.4.2 Primary Data Collection (Baseline Surveys)

12. Field surveys were carried out for the collection of primary environmental and social baseline data within the AoI from December 2021 and July 2022.

13. The environment surveys focused on the collection of site-specific baseline information of water quality, air quality, noise, traffic situation, land-use, sensitive receptors and presence of any historical / cultural / archaeological sites etc.

14. The ecological survey focused on the collection of baseline information on floral and faunal species. Detailed inventory has been prepared by the ecology team for the trees that are growing within the main construction areas and are required to be cut. Other vegetation growing in the AoI that will not be affected by the construction activities has also been recorded. The unidentified plants were photographed and identified using "PLANTNET[3]" software. Data on the fauna was gathered through random sampling and observations along the alignments, visual encounters, incidental observations and indirect methods such as recording pug marks.

15. Socio-economic baseline information has been obtained mainly through focus group discussions with male and female groups of the communities in the AoI. Social surveys were focused on aspects related to households, education, health situation, diseases, income, gender related problems, businesses, presence of social organizations and political patterns.

16. During the social surveys, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were conducted with sample population representing project affected parties and other interested groups along with extensive desktop data review. Women surveys have also been conducted and gender responses have been recorded to assess the socio-economic status of women in the project's AoI.

1.4.3 Secondary Data Collection and Analysis

17. This involved collecting information from the PIU KWSSIP and Technical Consultants regarding the proposed project activities. The design documents and feasibility reports have thoroughly been reviewed to understand the extent of construction works and their potential outcomes on the existing environment and social conditions.

18. Literature review has been conducted of the available environmental and social baseline information of the project area. The applicable provincial policies, guidelines, legislations and World Bank ESS (Environmental and Social Standards) were also thoroughly studied. Secondary data sources have been used to study the aspects including; climate, rainfall, temperatures, geology, soils; flora and fauna profiles, critical habitats / vegetation, any sites / structures / natural features having archaeological / historical / architectural / religious or cultural significance; and socio-economic and livelihood conditions in the project area.

3 PlantNet is an application that allows to identify plants simply by photographing them with smartphone. It allows to identify and better understand all kinds of plants living in nature: flowering plants, trees, grasses etc. PlantNet claims 99% accuracy identifying common species and overall 95% rate with a database of more than 10,000 plant species.

1.4.4 Reconnaissance Surveys, Delineation of the AoI and Environmental & Social Screening

19. Reconnaissance surveys have been carried out to assess the existing environmental and social conditions in the project area that may potentially be affected by the proposed project interventions. AoI has been decided by the consultant team based upon the assessment on possible reach of impacts and consultants past similar field experience. Screening has been performed to determine the significance of impacts, and the appropriate ESA instrument required for the project.

20. Applicable national and provincial legislation, international agreements, environmental guidelines both of SEPA and WB, and best industry practices have been reviewed to set environmental standards that PIU KWSSIP as the executing agency will adhere to during implementation of the project.

1.4.5 Stakeholder Consultations

21. At the outset of the project a process of stakeholder identification and analysis was undertaken in line with the KWSSIP-2 SEP guidelines to identify the range of affected and interested stakeholders and the most appropriate means of engaging with them. According to the SEP, consultations with Primary Stakeholders - Project Affected Parties such as local communities, community members and other parties, that may be subject to direct impacts from the Project and Secondary Stakeholders - Other Interested Parties such as Government Departments / Organizations and, have been required for the ESIA in a detailed manner.

22. Stakeholder identification and consultation were done as per the SEP of KWSSIP-2. The project stakeholders were identified during inception/scoping stage and meetings and digital communication were held with them during the field surveys to receive feedback on the anticipated environmental and social issues related to the project impacts and suggested mitigation measures. KWSSIP also wrote letters to the concerned departments for communicating project related information and soliciting their feedback. Outcomes of stakeholder consultations are detailed in Section – 9, Table 9-6.

23. AA stakeholder consultation workshop was also conducted to engage the concerned primary and secondary stakeholders including KWSC, PIU – KWSSIP, citizen groups, representatives of NGOs, Community Based Organizations (CBOs), civil society, Karachi Metropolitan Corporation (KMC), District Municipal Corporations, provincial Government Departments and representatives from Academia and Subject Specialists. The workshop was arranged on July 28, 2022 at Regent Plaza Karachi. About 70 representatives (of 47 entities) took part in the workshop. The consultation workshop was conducted in relation to information disclosure and stakeholder's engagement on KWSSIP-2 project.

1.4.6 Impact Identification and Risk Assessment

24. Potential impacts arising from each phase of the proposed project have been identified and assessed on the basis of field data, secondary data, expert opinions and examining previous similar projects in Pakistan. These include effects on physical, biological and socio-economic environment.

25. The methodology for assessing the risk level associated with each potential impact is presented below. Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring:

Risk = Likelihood × Consequence

Table 1-2: Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventive measures are not applied	3
Unlikely	May occur once or twice during the activity if preventive measures are not applied	2
Rare	Unlikely to occur during the project	1
(Adapted from: EPA Victoria, 2004. Site EMP Kit- Guidance Notes		

Table 1-3: Consequence Scale

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding communities. Occurrence will almost certainly result in the work being halted and a significant fine.	5
Major	The action will cause major adverse damage on the environment or surrounding communities. Occurrence may result in work being halted and a fine.	3
Moderate	The action will cause limited adverse impacts on the environment or surrounding communities, work is unlikely to be halted, fines unlikely.	2
Minor	No or minimal adverse environmental or social impacts; no likelihood of being fined.	1
(Adapted from: Environmental Management for Construction Handbook-Safeguards Unit Central & West Asia Department-ADB)		

Table 1-4:Risk Score Table

		Consequence			
		Catastrophic	**Major**	**Moderate**	**Minor**
Likelihood	Certain	**25**	**15**	**10**	5
	Likely	**15**	**9**	6	3
	Unlikely	**10**	**6**	4	2
	Rare	5	3	2	1
Risk	**Significant**	**15-25**			
	Medium	**6-10**			
	Low	**1-5**			

1.4.7 Recommendations for Mitigation Measures

26. Mitigation measures to minimize, eliminate or compensate the potential environmental and social impacts have been recommended. The mitigation measures have been recommended on the basis of past experiences, best industry practices, legislative requirements and professional judgment.

1.4.8 Environmental and Social Management Plan (ESMP)

27. An Environmental and Social Management Plan (ESMP) has been developed for effective implementation of the recommended mitigation measures. The ESMP includes controls to minimize the identified impacts and a monitoring program to monitor effects of mitigation measures implemented and residual impacts, if any, during implementation. The ESMP has identified roles and responsibilities of all concerned parties during the implementation of the project. It defines prequalification criteria and obligation of the contractors, institutional arrangements of all stakeholders, monitoring mechanism, and capacity building arrangements to effectively implement the mitigation measures and preventive actions identified during the ESIA study.

2 Policy, Legal and Administrative Framework

2.1 General

28. This Chapter summarizes the national and provincial legislation, the World Bank and other international environmental and social standards, and treaties relevant to this ESIA. The footprint of the Project is located in the administrative boundaries of Sindh province of Pakistan, therefore the rules, regulations and standards applicable in Sindh are applicable to this project. World Bank's EHS Guidelines shall also be followed during the project implementation.

2.2 Review of the National and Provincial Environmental Requirements

29. The applicable Environmental and Social (E&S) legislations and regulations are briefly described in **Table 2-1**.

Table 2-1: Applicable National and Provincial Acts

National/Provincial Acts (Year of implementation)	Relevance / Applicability
Sindh Environment Protection Act, 2014	Sindh Environmental Protection Act 2014 is relevant to the proposed project, requiring an Environmental Impact Assessment (EIA) to be prepared and submitted for this project for approval.
Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021	Environmental Assessment Regulations -- 2021 are applicable to the proposed intervention for Review of EIA and General Environment Approval, as the project falls under Schedule-III.
Sindh Environmental Quality Standards 2016	Standards set out in SEQS and relevant to the Project include: ◆ Municipal and liquid industrial effluents (32 parameters) ◆ Industrial gaseous emissions (16 parameters) ◆ Motor vehicle exhaust and noise (used and new vehicles) ◆ Ambient air quality (9 parameters) ◆ Drinking water quality (32 parameters) ◆ Noise (four zones during day and night). These standards are applicable for both construction and operational phases of the project.
Pakistan Climate Change Act 2017	Under the Pakistan Climate Change Act 2017, any intervention in the country must take measures for comprehensive climate change mitigations and adaptations in line with country level commitments to United Nations Framework Convention on Climate Change (UNFCCC) and therefore this is relevant.
Forest Act (1927) and the Forest Act (Sindh amendment) Act, 2012	The Forest Act of 1927 and its Sindh Amendment 2012 establishes the right of GoP and GoS to designate areas of reserved forest, village forest and protected forest. The act also restrict cutting of any trees that are the property of forest department. It has been confirmed through the site surveys that no protected forests are

National/Provincial Acts (Year of implementation)	Relevance / Applicability
	present within the Project AoI, however the act shall be applicable as the project shall require cutting of 37 nos. trees and the Contractor shall be required to take prior permissions and approvals from the forest department for cutting of trees
Sindh Plantation, Maintenance of Trees and Public Parks Ordinance, 2002	Under this Ordinance, prior permission from the Local Government Department (LGD - GoS) shall be needed for any tree cutting activity during the project construction. Since the project involves cutting of trees, prior permission and consent of the LGD – GoS shall be sought. Implementation of this law shall be mandatory at the project.
Antiquity Act (1975) and the Sindh Cultural Heritage (Preservation) Act, 1994	These Acts areas are applicable to the project and the Office of the Director General – Antiquities & Archaeology – GoS shall be informed in case of any resource found. As for now, there are no known antiquities in the project area; however, in case of chance find this act shall become relevant.
Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020	This act is relevant to the project as the faunal species detailed under **Section** Error! Reference source not found. could be encountered during construction activities, hence implementation of this law shall be mandatory during the construction phase of the project.
Factories Act, 1934 and The Sindh Factories (Second Amendment) Act, 2021	This is an act to consolidate and amend laws on labor rights and for matters connected to their safety, basic welfare facilities including living, food, occupational health including infectious diseases and protection from those infectious diseases; it also covers the work-related hazards and protection from those hazards, shelters facilities during rest time, restriction of working hours and holidays rules etc. The Sindh amended law is for the rights of labour working in the province of Sindh and shall be applicable to the proposed works.
The Sindh Occupational Safety and Health Act, 2017	This is a consolidated law for the OHS of the persons at workplace and to protect them against risks arising out of the occupational hazards; to promote safe and healthy working environment catering to the physiological and psychological needs of the employees at workplace and is relevant to the project
The Sindh Bonded Labour System (Abolition) Act, 2015	The Bonded Labour System (Abolition) Act defines the `Bonded Labour System' as a system of forced, or partly forced, labour under which a debtor enters, or is presumed to have entered into an agreement with the creditor. Adherence to the act shall be mandatory.

National/Provincial Acts (Year of implementation)	Relevance / Applicability
Sindh Minimum Wages Act, 2015 (Sindh Act No. VIII of 2016)	The Act provides for the regulation of minimum rates of wages and various allowances for different categories of workers employed in the project; various types of workers employed for the project will be paid accordingly.
Sindh Workers Compensation Act, 2015	This act is expedient to provide for the payment by certain classes of employers to their workers or their legal heirs of compensation for injury or death by accident. Implementation of the act at the project shall be mandatory.
Fatal Accidents Act 1855	This is an Act to provide compensation to families for loss occasioned by the death of a person caused by actionable wrong. For community related accidents, this law shall be applicable.
The Sindh Prohibition of Employment of Children Act, 2017	The Act prohibit and regulate employment of children less than 14 years and is applicable to the project and the Contractors and sub-contractors will have to comply with this Act.
The Protection Against Harassment of Women at the Workplace Act, 2010	The Protection Against Harassment of Women at the Workplace Act, 2010 is a legislative act in Pakistan that seeks to protect women from sexual harassment at their place of work, and equally applicable to this project.
Land Acquisition Act 1894 and The Land Acquisition (Sindh Amendment) Ordinance, 1992	Empowers the provincial government to acquire private land, from its legal owners, for projects in the national interest. The project does not require private land acquisition, however it will cause disturbance of livelihood to the communities utilizing patches of Malir riverbed for agriculture and cattle farming purposes. This act is however not applicable as the communities utilizing this land for their livelihood do not possess legal land ownership. They will however be compensated as per ESS 5 guidelines and an RP has been prepared for this purpose. **(Annexure 2-1)**
The Sindh Local Government (Amendment) Act, 2021	The LGA empowers the provincial governments to enforce laws for: ◆ Land use ◆ Conservation of natural vegetation ◆ Air, water, and land pollution ◆ Disposal of solid waste and wastewater effluents ◆ Public health and safety, including some provisions for environmental protection. Under the act, the local councils are authorized to restrict activities causing pollution. The Project will be required to follow the provisions of the Act to ensure:: prevention of air, water and land pollution, safe disposal of waste and implementation of safe work practices

National/Provincial Acts (Year of implementation)	Relevance / Applicability
Hazardous Substances Rules, 2014	The rule describes the procedure of handling, transportation and disposal of hazardous substances and hazardous waste. General safety precautions for handling hazardous substances as well as safety precautions for workers, and notification requirements in the event of an accident are also described in these rules. The proposed project might generate hazardous waste in the form of sludge from the wastewater treatment plan, fuel or chemical spills. Hence, the set Rules are applicable to the proposed project. Accordingly, the guideline for a Waste Management Plan has been developed aligned with these rules **(see Annexure 7-2)**
Building Code of Pakistan, 2007	The provision of Building Code of Pakistan shall apply for engineering design of building like structure and related components. The construction in violation of the Building Code shall be deemed as violation of professional engineering work. Moreover, a certificate for the proposed action will be obtained from Provincial Building Control Authority.

2.3 Comparison of SEQS and WBG EHS Guidelines Standards on Effluent Discharge

30. Design basis of TP-IV is provided as Error! Reference source not found.. Considering that the WBG EHS Guidelines are more stringent than SEPA, the same will be followed for treated effluent discharge into the sea.

Table 2-2: Design Basis of TP-IV (all values are in mg/l)

	Inflow (untreated)	Outflow (treated)	SEQS	WBG EHS Guidelines
Total Suspended Solids	200	50	200	50
Biochemical Oxygen Demand $(BOD)_5$	200	30	80	30
Chemical oxygen demand (COD)	500	125	400	125

2.4 Standards for the Use or Disposal of Sewage Sludge

31. Since local regulations or regulatory guidelines are absent for establishing standards governing the use or disposal of sewage sludge, the project's executing agency must adhere to the US EPA Standards (40 CFR Part 503) outlined in this section when designing and implementing the sewage sludge recycling or reuse process.

32. If bulk sewage sludge is applied to agricultural land, forest, a public contact site, or a reclamation site, the project must adhere to either of the following conditions:

33. The cumulative loading rate for each pollutant must not exceed the cumulative pollutant loading rate specified in **Table 2-3** below:

Table 2-3: Cumulative Pollutant Loading Rates

Pollutant	Cumulative pollutant loading rate (kilograms per hectare)
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2800

34. When bulk sewage sludge is applied to a lawn or a home garden, the concentration of each pollutant in the sewage sludge should not exceed the concentration limits outlined in **Table 2-4** below:

Table 2-4: Monthly Average Pollutant Concentrations

Pollutant	Monthly average concentration (milligrams per kilogram) - Dry Weight Basis
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2800

2.5 Comparison and Applicability of SEQS vs WHO / WBG Standards on Air Quality

35. Comparison of local and international air quality standards is provided as **Table 2-5**. The more stringent of the two shall be followed during the project construction and implementation. The stringent of the two are highlighted with green, which are applicable at the project.

Table 2-5: Comparison of Local and International Air Quality Standards

Pollutants	SEPA		WHO / WBG	
	Avg. Time	Standard	Avg. Time	Standard
SO_2	24 hrs	120 ug/m^3	24 hr 10 min	40 ug/m^3 500 ug/m^3
CO	8 hrs 1 hr	5 mg/m^3 10 mg/m^3	8 hrs	4 ug/m^3
NO_2	24 hrs	80 ug/m^3	24 hr	25 ug/m^3
O_3	1 hr	130 ug/m^3	-	-
SPM	24 hrs	500 ug/m^3	-	-
PM_{10}	24 hrs	150 ug/m^3	24 hr	45 ug/m^3
$PM_{2.5}$	24 hrs	75 ug/m^3	24 hr	15 ug/m^3

2.6 Comparison and Applicability of SEQS vs WHO / WBG Standards on Noise

36. Comparison of local and international noise standards is provided as **Table 2-6**. The more stringent of the two shall be followed during the project construction and implementation. The stringent of the two are highlighted with green, while the similar values are highlighted with yellow and these highlighted values are applicable at the project.

Table 2-6: Comparison of Local and International Noise Standards

Category of Area/Zone	Limit in dB(A) Leq			
	SEPA		WHO/ WBG	
	Day Time	Night Time	Day Time	Night Time
Residential area (A)	55	45	55	45
Commercial area (B)	65	55	70	70
Industrial area (C)	75	65	70	70
Silence zone (D	50	45	55	45

2.7 International Treaties and Conventions

37. The relevant international treaties and conventions to the project to which Pakistan is a party are as follows:

2.7.1 International Labour Organization (ILO) Fundamental Conventions – Ratified by Pakistan

38. The following ILO's fundamental conventions shall be applicable:

- Forced Labour Convention, 1930 (Convention No. 29)
- Freedom of Association and Protection of the Right to Organize Convention, 1948 (Convention No. 87)
- Right to Organize and Collective Bargaining Convention, 1949 (Convention No. 98)

- Equal Remuneration Convention, 1951 (Convention No. 100)
- Abolition of Forced Labour Convention, 1957 (Convention No. 105)
- Discrimination (Employment and Occupation) Convention, 1958 (Convention No. 111)
- Minimum Age Convention, 1973 (Convention No. 138) Minimum age specified: 14 years
- Worst Forms of Child Labour Convention, 1999 (Convention No. 182)

2.8 World Bank Environmental, Health and Safety Guidelines

39. World Bank Group's Environmental, Health, and Safety (EHS) Guidelines are applicable to the proposed project. In particular, the applicable guidelines for construction and operational phases of the project includes; the General EHS Guidelines (2007), the EHS Guidelines for Waste Management Facilities (2007) and the EHS Guidelines for Water and Sanitation (2007).

2.9 World Bank Environmental and Social Framework

40. The World Bank ESF sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of ten Environmental and Social Standards (ESS) that are designed to for environmental and social sustainability. Applicability of ESS on the project is given in **Table 2-7**.

Table 2-7: World Bank Environmental and Social Standards Applicable to the Project

Environmental and Social Standards		Description	Relevance with Project and Actions (to be) Taken
ESS 1	Assessment and Management of Environmental and Social Risks and Impacts	Identify, assess, evaluate, and manage environment and social risks and impacts in a manner consistent with the ESF. Adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities	◆ This ESIA has been conducted in compliance with this ESS. ◆ Project components were thoroughly screened to ensure that they are covered by and meet the requirements of ESS and Government laws and regulation ◆ E&S risks and Impacts have been identified in the ESIA based on surveys and consultations with primary stakeholders including communities and implementing agency ◆ Environmental and Social Management Plan (ESMP) has been prepared based on the screening outcome and impact and risk assessment in the ESIA. ◆ The ESIA will be disclosed both at the KWSSIP and at Bank's websites. ◆ PIU - KWSSIP shall implement an Environment and Social Commitment Plan (ESCP) and comply with its conditions during the project implementation. ◆ Monitoring and reporting on E&S performance will be carried out during implementation.
ESS 2	Labour and Working Conditions	Promote safety and health at work. Promote the fair treatment, non-discrimination, and equal opportunity of project workers. Protect project workers, with particular emphasis on vulnerable workers. Prevent the use of all forms of forced labour and child labour. Support the principles of freedom of association and collective	◆ Project will recruit direct (d(project managers and supervisors, who are employees of KWSSIP / KWSC), and contracted workers ((All workforce deployed by the Contractors including any sub-contractors, and the Project Supervision Consultant).).

Environmental and Social Standards		Description	Relevance with Project and Actions (to be) Taken
		bargaining of project workers in a manner consistent with national law. Provide project workers with accessible means to raise workplace concerns.	◆ Influx of migrant labour from other districts for construction works will be minimized by employing local workers. ◆ Labour Management Procedures (LMP) for KWSSIP-2 have been prepared to regulate working conditions and management of workers relation including worker specific Grievance Redress Mechanism (GRM), terms and conditions of employment, non-discrimination and equal opportunity, Sexual Exploitation and Abuse / Sexual Harassments (SEA/SH), protection of workforce, the prohibition of child / forced labor (including in source country and supply chain) and provision of OHS management
ESS 3	Resource Efficiency and Pollution Prevention and Management	Promote the sustainable use of resources, including energy, water, and raw materials. Avoid or minimize adverse impacts on human health and the environment caused by pollution from project activities. Avoid or minimize project-related emissions of short and long-lived climate pollutants. Avoid or minimize generation of hazardous and non-hazardous waste. Minimize and manage the risks and impacts associated with pesticide use. Requires technically and financially feasible measures to improve efficient consumption of energy, water, and raw materials, and introduces specific requirements for water efficiency where a project has high water demand.	◆ With respect to Resource Efficiency, the project preparation and the ESIA process have identified feasible measures for efficient (a) energy use; (b) water usage management to minimize water usage during construction, and maintain balance for demand of water resources; and (c) raw materials use by exploring use of local materials, recycled construction materials, use of innovative design so as to minimize project's footprints on finite water bodies. ◆ With respect to Pollution Management, as part of the ESIA process, prevention and management measures have been devised to offset risks and impacts of pollution from potential sources such as sludge from TP-IVIV; dust and emissions from operation of construction equipment, material haulage vehicles; wastewater from labour camps, construction camp; spillage or leakage during handling of

Environmental and Social Standards		Description	Relevance with Project and Actions (to be) Taken
			hazardous materials like petroleum fuel, battery wastes etc.; and disposal of wastes generated during project implementation period. ◆ Guidelines to Contractor / KWSC for preparing various construction / operational phase pollution prevention plans are provided in **Annexure 7-2**.
ESS 4	Community Health and Safety	Anticipate or avoid adverse impacts on the health and safety of project-affected communities during project life-cycle from routine and non-routine circumstances. Promote quality, safety, and climate change considerations in infrastructure design and construction. Avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. Have in place effective measures to address emergency events. Ensure that safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	◆ The project construction phase will involve (i) excavation work, construction debris handling and disposal; (ii) likelihood of increased construction related traffic and equipment at the 03 access roads near to settlements (iii) high dust levels from earthworks, high noise and emission level from traffic congestion; and (iv) sludge from the existing Manzoor Colony drain while laying the pipeline connecting TP-II bypass line and Pump room with the interceptor ◆ These impacts will be mitigated through suitable measures as incorporated in the ESMP and they will also be made an integral part of the Contractor's obligation as part of the Contractor's Site Specific Environmental and Social Management Plan (SSESMP) for Community Health and Safety. Contractor's SSESMP will also include an OHS plan, influx management plan, workers camp management plan, traffic management plan. ◆ The Contractor during construction phase and KWSC during operational phase shall use security arrangements and personnel to safeguard the installations, sites and

Environmental and Social Standards		Description	Relevance with Project and Actions (to be) Taken
			personnel with major site being the TP-IV during operations. ◆ The Contractor and KWSC shall be guided by the principal of proportionality and GIIP and the relevant laws related to hiring, rules of conduct, training and equipping such workers. The use of force in providing security shall not be permitted. ◆ During operations of TP-IV, KWSC will attempt to ensure that government security personnel are deployed and they act in the manner already described. ◆ Security Management Guidelines for Contractors and KWSC are included as **Section** Error! Reference source not found.
ESS 5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Avoid or at least minimize involuntary resettlement, avoid forced eviction, mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost and (b) assisting displaced persons in improving, or at least restoring, their livelihoods and living standards, improving living conditions of poor or vulnerable persons who are likely to be physically displaced and ensuring that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected.	◆ The project requires temporary land for the construction of interceptor, which will cause disturbance of livelihood to the communities utilizing patches of interceptor land for agricultural and cattle farming purposes. These people are non-title holders and do not possess any legal documentation of land ownership. An RP has been prepared to address these livelihood losses. (**Annexure 2-1)**
ESS 6	Biodiversity Conservation and Sustainable	Protect and conserve biodiversity and habitats. Apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an	◆ For project's construction phase, site clearance will involve removal of vegetation and trees. Compensatory tree plantation will be performed with the ratio of 10:1

Environmental and Social Standards		Description	Relevance with Project and Actions (to be) Taken
	Management of Living Natural Resources	impact on biodiversity. To promote the sustainable management of living natural resources.	◆ While clearing vegetation and excavation works, it shall be ensured that no wildlife is injured or killed. ◆ ESMP Cost includes provision for hiring of 02 nos. Ecologists in the Supervision Consultant's teams, who will identify project sites with the assistance of Contractor's EHS Site Staff where disturbance to wildlife could be expected. Both will devise the site-specific strategy for the protection of wildlife, provide awareness to the workers on work practices that ensure wildlife protection and monitor the work activities throughout. ◆ For the operational phase, the project will have positive impacts on Korangi Creek Mangroves Forests that will receive treated sewage from the TP-IV. The construction of the treatment plant has been designed in a way that it will not result in any cutting or disturbance to the mangroves. KWSSIP will engage Sindh Forest Department representative during construction phase monitoring.
ESS 10	Stakeholder Engagement and Information Disclosure	Establish a systematic approach to stakeholder engagement that helps proponent (KWSSIP) identify stakeholders and maintain a constructive relationship with them. Assess stakeholder interest and support for the project and enable stakeholders' views to be taken into account in project design. Promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle. Ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner.	◆ Extensive consultations with a wide range of stakeholders have been carried out following KWSSIP-2 Stakeholders Engagement Plan (SEP) guidelines while conducting this ESIA. ◆ SEP has been prepared for the entire KWSSIP-2 (including Malir Basin Interceptors and TP-IV Project) to comply with the ESS-10 requirements and it shall be followed throughout the project life-cycle.

2.10 Environment and Social Regulatory Authorities

41. A summary of the key E&S regulatory institutions and their relationship with the project in accordance with national, provincial, and international requirements is provided in **Table 2-8**.

Table 2-8: Roles of statutory organizations

Organization	Functions / Role
Sindh Environmental Protection Agency (SEPA)	◆ Regulating the environmental issues ◆ Reviewing and checking environmental assessment report prepared as per the legal requirements. ◆ Environmental approvals of the Project. ◆ Ensuring the implementation of government policies, during the project implementation. ◆ Ensuring compliance and reviewing the performance of environmental management plans implementation.
Labour & Human Resources Department, Sindh	◆ Guaranteeing the rights of the workers like the right to organize, the right to collective bargaining, participation in the affairs of the implementing agency, health & safety, minimum wages, compensation, etc., are followed in the project.
Social Welfare Department and Women Development Department – Sindh	◆ Transformation of the government into an organization that actively practices and promotes gender equality and women empowerment. ◆ Mainstreaming gender equality perspective across public policies, laws, programs, and projects by departments and agencies of the government with a focus on women empowerment. ◆ Looking after various marginalized segments of population such as poor, persons with disabilities, orphans, victims of violence and specifically women to ensure the welfare and support the marginalized group of society.
Workers Welfare Board -Sindh	◆ Provision of housing, education, health and other welfare facilities to the workers and their families. ◆ Promoting the same through projects.
Employees' Old Age Benefit Institute (EOBI)	◆ Making sure that workers are benefitted after retirement from the collected/raised funds.

3 Project Description

3.1 Project Background

42. Karachi is Pakistan's largest city along with its economic and financial hub, and main port[4]. It contributes the largest share of national tax revenues, industrial employment, manufacturing, and high-end services[5]. However, the water supply and sanitation facilities available currently to the city are inadequate.

43. The Malir Basin Interceptor and Sewage Treatment Plant (TP-IV) Project is part of the KWSSIP-2 which aims to collect and treat sewage within Malir Basin in Karachi. The project was designed considering the increase of population for the next 30 years.

44. The Project will include the following components. The project will serve the entire District Korangi (Korangi, Landhi and Shah Faisal Towns), part of District Malir (Malir Town), part of District East (Jamshed Town) and Cantonment Areas including Faisal Cantonment and Korangi Creek Cantonment.

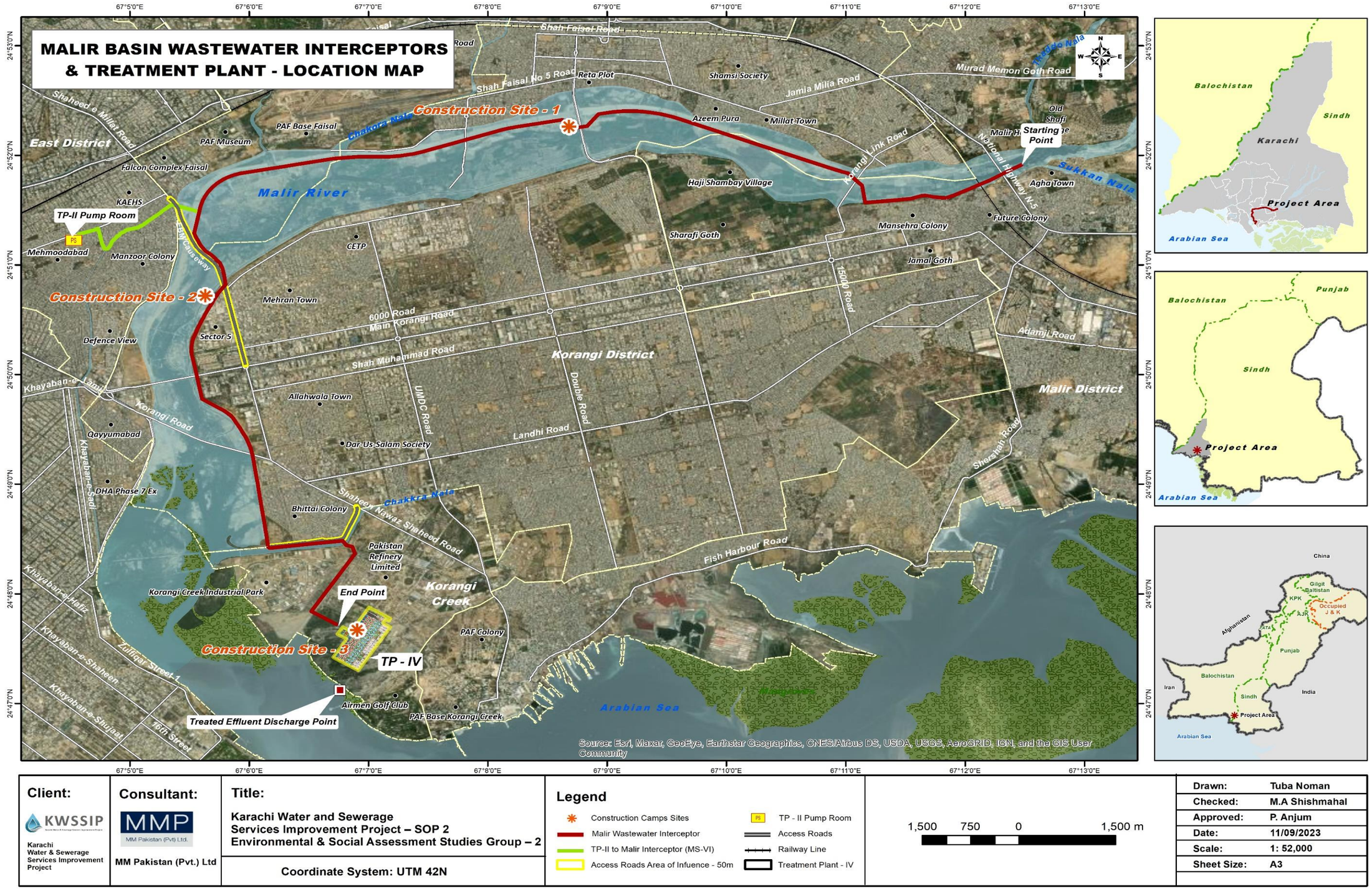
- 22 km sewer interceptor along Malir River to receive sewage from 20 sewer connections.
- Connection of the pumping station of the non-operational Sewage Treatment Plant in Mahmoudabad (TP-II) to Malir interceptor via 2.5 km sewer line.
- 180 MGD Sewage Treatment Plant (TP-IV)

3.2 Project Location and Area

45. As shown in **Figure 3-1**, the proposed Malir Basin interceptor will start at the left bank of Malir River near Afridi Colony Area - Bin Qasim Town in District Malir and will pass through the districts of Malir and Korangi and the cantonment areas in Faisal and Korangi Creek. The sewer pipe that will connect TP-II to the proposed Malir Basin interceptor is at the right bank of Malir River and will start at UC 05 Mahmoudabad, Jamshed Town, District East and will cross Shaheed e Millat Road and the under construction Malir Expressway.

46. The interceptor will convey the sewage in TP-IV for treatment. The proposed STP is located within the Korangi Creek Cantonment Area, nearly 2.5 km downstream of the Malir River junction with the Korangi/Gizri Creeks. The proposed STP site has a total land area of 121 hectares (including buffer zone) but the STP footprint will only occupy about 42.9 hectares. The treated effluent from TP-IV will be discharged in Korangi Creek.

[4] Pakistan Bureau of Statistics, 2017 census, provisional summary
[5] World Bank, Transforming Karachi into a liveable and Competitive Megacity – A City Diagnostic and Transformation Strategy, Washington DC, 2018; p.2



Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP (Pvt) Ltd — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 **Coordinate System: UTM 42N**	**Legend:** Construction Camps Sites; Malir Wastewater Interceptor; TP-II to Malir Interceptor (MS-VI); Access Roads Area of Infuence - 50m; TP - II Pump Room; Access Roads; Railway Line; Treatment Plant - IV 1,500 750 0 1,500 m	Drawn: Tuba Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 11/09/2023 Scale: 1: 52,000 Sheet Size: A3

Figure 3-1: Route of Malir Basin Wastewater Interceptor

3.3 Project Components

3.3.1 Malir Basin Interceptor

47. The proposed Malir Basin interceptor will be a rectangular cement concrete (RCC) box type with cast in-situ conduit and polyvinyl chloride (PVC) lining. It will have single and dual cell sections. Isometric View of a section of Proposed Interceptor is shown as **Figure 3-2**.

48. The width of the interceptor will vary between 2.1 m to 7.15 m while the depth shall be 1.6 m (minimum) from ground level at the starting point in Afridi Colony and 4.6 m (maximum) at its termination point at TP-IV. The sewage flow in the interceptor is through gravity with velocities ranging between 0.60 m/s to 0.30 m/s, depending on the flow of the incoming sewage. These velocities will be self-cleansing which will restrict settling of suspended organic solids as well as ensuring continuous flush-out of any settled organic matter.

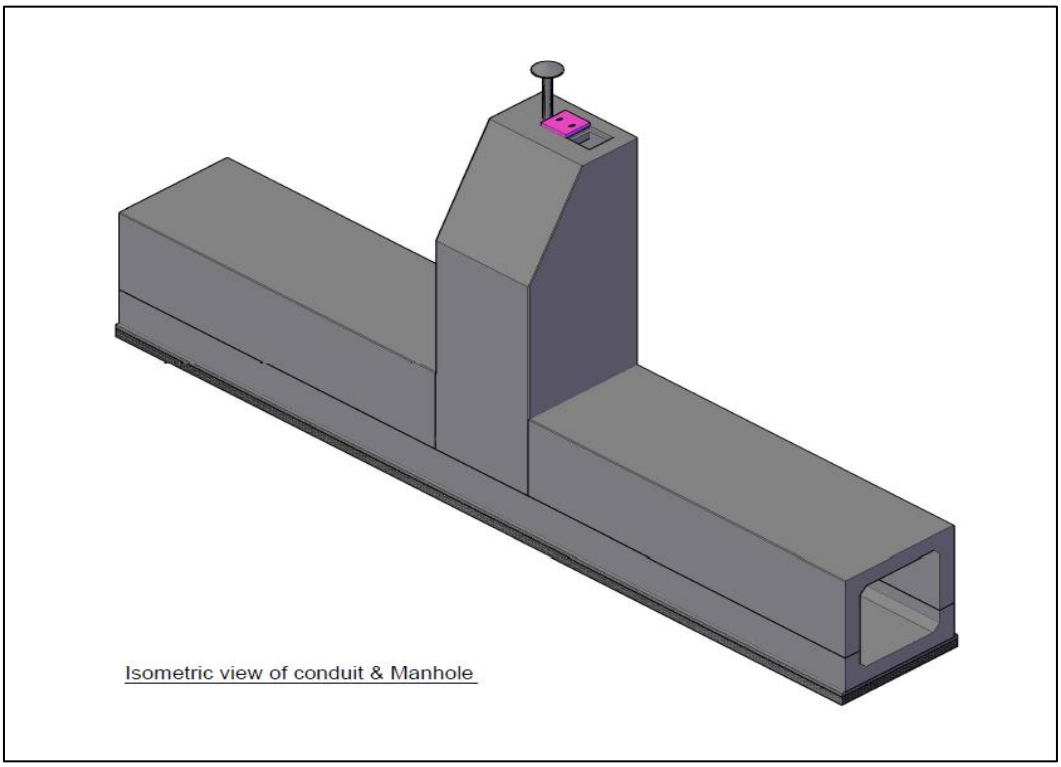


Figure 3-2: Isometric View of Malir Wastewater Interceptor with Manhole
Source: Process and Hydraulic Design Report – TP – IV

49. A total of 20 sewer pipes will be connected to the proposed interceptor through intake chambers. The proposed Malir Basin interceptor will collect sewage from the 18 existing sewer pipes along Malir River. At present, these sewer pipes collect sewage within their respective catchment areas and directly discharge the untreated sewage to Malir River. However, with the proposed interceptor, the collected sewage will be conveyed to the proposed TP-IV for proper treatment and disposal in instead. Additionally, the proposed sewer line in Landhi and Korangi Areas and in proposed sewer line in Bhittai Colony will be connected to the proposed interceptor. **Table 3-1** presents the list of sewer pipes that will feed sewage to the proposed interceptor while **Figure 3-3**

shows the layout. It is estimated the total catchment area of the 20 sewer pipes is about of 192 km^2.

50. The intake chambers will be equipped with screens to prevent solid wastes or other floating materials from entering the interceptor. The chamber will be constructed with appropriate height of approximately 3 m to accommodate peak sewage flow. Flows other than sewage from Malir River and Chakorra Nala as well as intrusion of any floodwaters will not interrupt the interceptor's sewage flow. The extra storm water during monsoon will pass over the slab of chamber to Malir river.

51. Schematic diagram of the interceptor showing main sewer inlet points is provided in **Figure 3-3**. Typical plan of proposed intake structures that will connect the sewer points to the interceptor is provided as **Figure 3-4**Error! Reference source not found..

Table 3-1: List of Sewer Connections Draining into the Interceptor

No.	Name of Sewer Connection	Chainage
1.	Thaddo Nala	Near 22+500
2.	Samdhani Drain	Near 21+500
3.	Kalenjar Hujra Drain	Near 21+500
4.	Sufi Razzaq Road – Mansehra Colony Drain	21+000
5.	Future Colony – Mansehra Road Drain	Near 21+000
6.	Jumma Goth (54-inch diameter) Drain	Near 19+000
7.	Gulistan e Malir (36-inch diameter) Drain	Near 19+500
8.	Jamia Malia Road Drain (From Malir 15)	17+500
9.	Azeempura Main from Rafha- e-Aam Society Drain	17+000
10.	Drain from Malir Trunk Sewer	16+500
11.	Drain from Green Town	Near 16+500
12.	Thanna Road – Shah Faisal Drain	15+000
13.	Shah Faisal Block 05 (32-inch diameter) Drain	Near 13+500
14.	Shah Faisal Block 5 A Nullah Drain	Near 13+500
15.	Chakora Nukkah Drain	11+500
16.	Pir Bukhari Nullah Drain	10+500
17.	Dada Bhai Drain	Near 9+000
18.	Rising Main Drain (Korangi Area)	7+000
19.	Proposed Sewer Line Drain (Landhi & Korangi Areas)	Near 6+000
20.	Proposed Sewer Line Drain (Bhittai Colony)	4+000

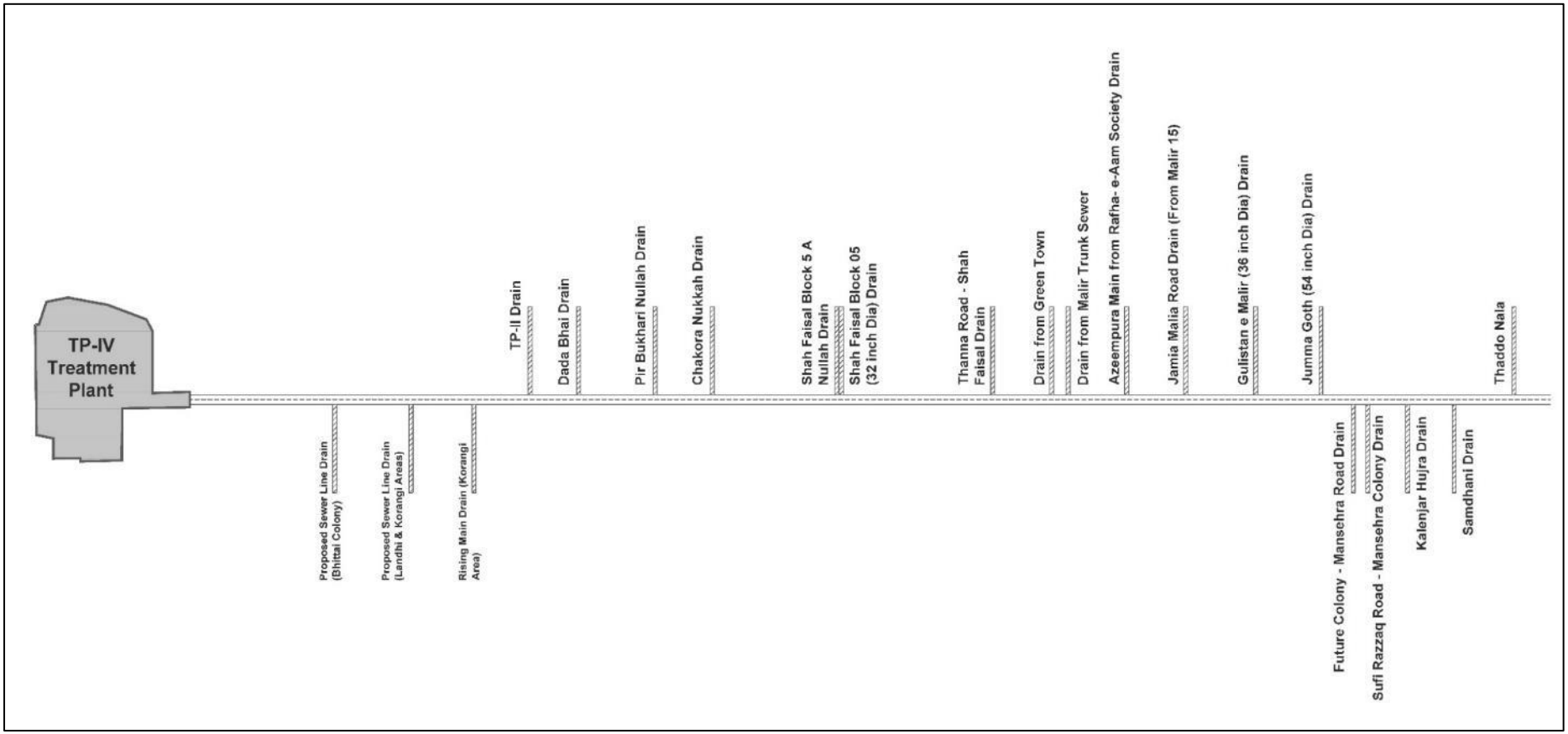


Figure 3-3: Schematic Diagram of Malir Basin Interceptor and Sewer Connection Points

Source: Process and Hydraulic Design Report – TP - IV

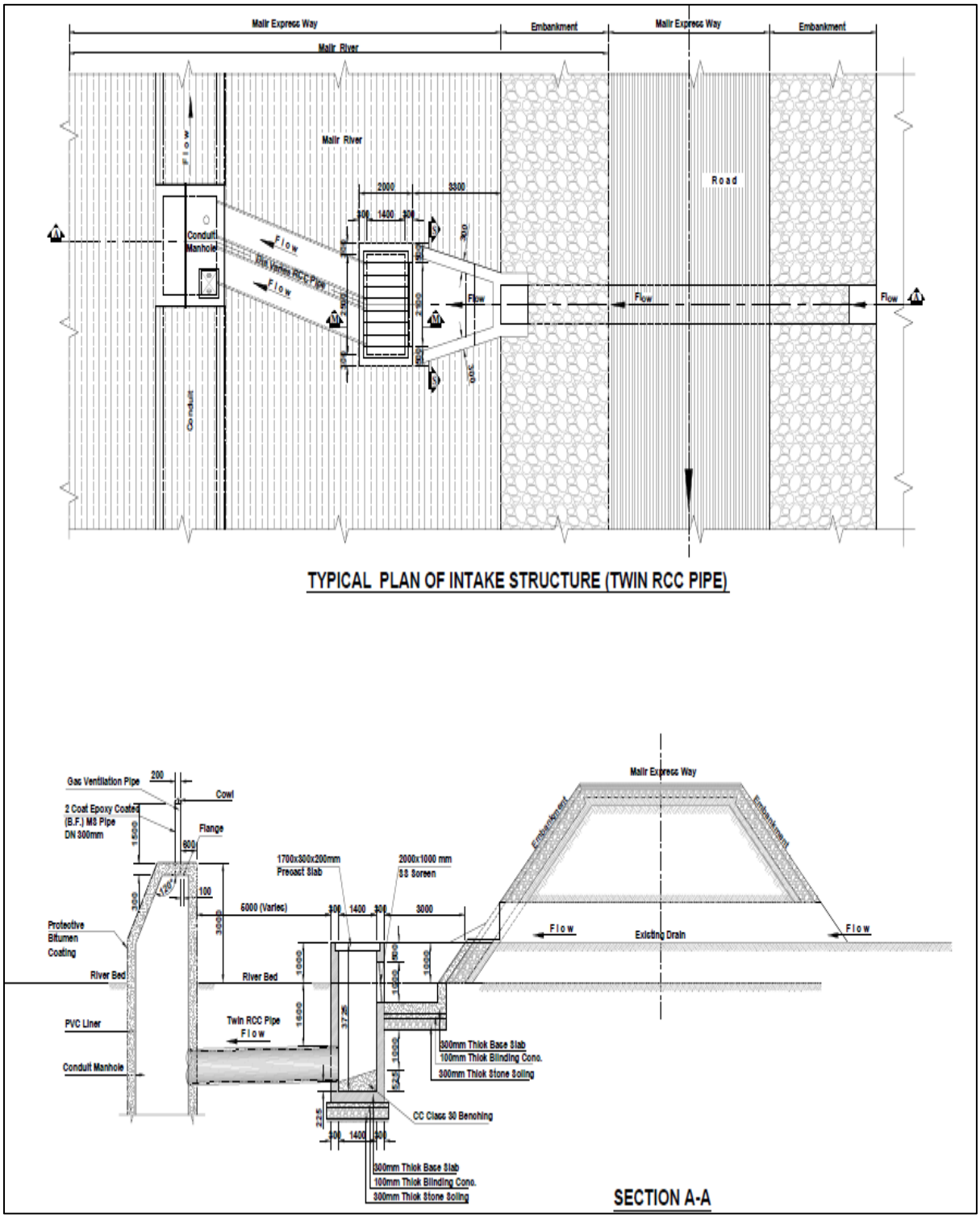


Figure 3-4: Typical Plan of proposed Sewer Connections Intake Structure

Source: Process and Hydraulic Design Report – TP - IV

52. To provide access for inspection and cleaning, around 124 manholes shall be provided at the interceptor. RCC/RCC with brickwork combination manholes shall be constructed. Typical cross section drawing of proposed RCC and Brickwork Combination Manhole is provided as **Figure 3-5**.

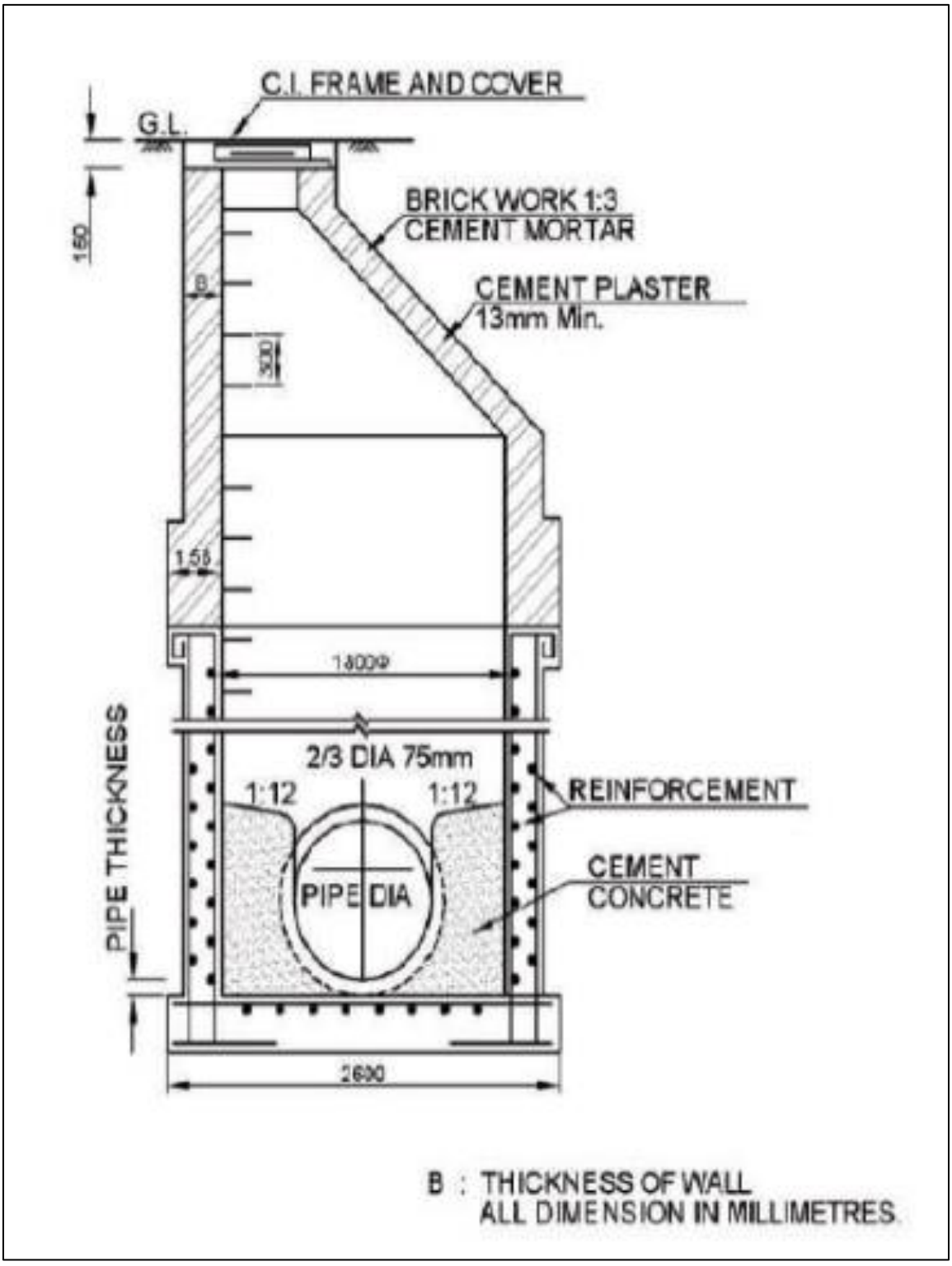


Figure 3-5: Typical Cross Section of proposed RCC and Brickwork Combination Manhole

Source: Process and Hydraulic Design Report – TP - IV

3.3.2 Sewer Connection from Sewage Treatment Plant – Mahmoudabad (TP-II)

53. The Sewage Treatment Plant – Mahmoudabad (TP-II), located at the right bank of Malir River, was constructed in 1963 with a capacity of 46 MGD. TP-II used to serve various eastern Karachi localities on both left bank of Malir River which includes Old city area, Clifton, Mahmoudabad,

Azam Basti, Dada Bhai town and Saddar and the right bank which includes parts of Korangi and Malir.

54. Sewage from the left bank of Malir River was previously pumped by the Korangi pumping station (PS-II) to TP-II on the opposite side of the river. However, this pumping operation was halted after the pipes installed in the river were damaged during a flood in 1974. Since then, the sewage from the left bank of the Malir/Korangi area, which amounts to approximately 15 to 20 MGD, has been discharged untreated into the Malir River.

55. TP-II is no longer operational for a long time due to various reasons such as lack of funds for KWSC to operate and maintain the plant. The heavy encroachments within the surrounding area of the plant site also became a challenge to KWSC in managing the treatment plant. The office buildings and treatment units are not working anymore. Only the pumping stations are operational which pumps the untreated sewage from TP-II to Malir River.

56. Under the proposed project, the sewage received by TP-II will be diverted to the proposed Malir Basin interceptor. A sewer HDPE pipe, with thickness of 1000 mm, will be installed to connect the pumping room of TP-II to the interceptor with a total length of 2.5 km. About 26 MGD of sewage will be collected from TP-II for treatment in TP-IV.

57. The starting point of this sewer pipe is the TP-II Pump Room, located in UC 05 Mahmoudabad, Jamshed Town, District East, will cross the Shaheed e Millat Road, and the Malir Expressway that is currently being constructed and it will terminate at the Malir Interceptor – Manhole No. 49 (near Chainage 9+500 / 9+000). This manhole is located approximately 400 m away from Manzoor Colony Fire Station. For most of its length (Approximately 1.2 km), the pipeline shall run inside the existing Manzoor Colony Drain, attached to the drain wall by means of bracings.

58. Figure 3-6 shows the connection of the proposed interceptor to TP-IV. To ensure the flow of sewage through gravity, the sewer pipe will be constructed under the right bank wall of Chakkora Nala. The depth at the inlet at TP-II pump room is 1.6 m while the depth at the discharge point at TP-IV is 4.6 m. This slope will ensure gravitational flow and self-cleansing velocity.

3.3.3 Malin Basin Sewage Treatment Plant (TP–IV)

59. TP-IV has a total design capacity of 180 MGD and is capable to treat the projected volume of sewage generated within the catchment areas up to 30 years. It is proposed that the treatment plant will have four treatment modules with capacity of 45 MGD each. The STP is designed to treat domestic wastewater only and the target effluent quality is based on the effluent standards of GoS and WBG as presented in **Table 3-2**.

Table 3-2: Design Parameters of TP – IV

Parameters	Value	Unit
Influent Flows		
Daily sewage flow (maximum day)	180	MGD
Peak Factor	1.5	-
Peak hourly flow	51,145	m^3/hr.
Influent Quality		

Parameters	Value	Unit
Total suspended solids, TSS	200	mg/L
5-day Biochemical oxygen demand, BOD5	200	mg/L
Chemical oxygen demand, COD	500	mg/L
Temperature, minimum	23	°C
Temperature, maximum	30	°C
Effluent Quality		
Total suspended solids, TSS	50	mg/L
5-day Biochemical oxygen demand, BOD5	30	mg/L
Chemical oxygen demand, COD	125	mg/L
Source: Process and Hydraulic Design Report – TP – IV		

60. To proposed treatment process that will be employed in the STP is the Trickling Filter aerobic treatment system. The following are the major components of the STP.

Table 3-3: Major Components of the Malir Basin STP (TP-IV)

Component	Specification
Coarse Screen Chamber	6 units
Fine Screen Chamber	11 units
Grit Chamber	7 units
Distribution Pit	4 units
Primary Sedimentation Tank	4 modules (4 units per module - total 16) x 45 MGD per module
Trickling Filters	4 modules (8 units per module - total 32) x 45 MGD per module
Humus/Secondary Sedimentation Tank	32 units x capacity
Combined Sludge Thickener	4 units x capacity
Anaerobic Sludge Digester	6 units x capacity
Sludge Drying Bed	16 units x capacity
Primary Sludge	

61. To following are the auxiliary equipment of the STP:

- Sewage Pumping Station
- Primary Sludge Pumping Station
- Humus Sludge Pumping Station
- Thickened Sludge Pumping Station
- Digested Sludge Pumping Station
- Distribution Pit
- Junction Pit

62. In addition, the following support facilities will be constructed within the proposed site of the STP:

- Administration Building

- Maintenance Building
- Workshop
- Powerhouse
- Sub-station
- Parking
- SCADA

63. The proposed site development plan of the proposed Malir Basin STP is presented in **Figure 3-7**.

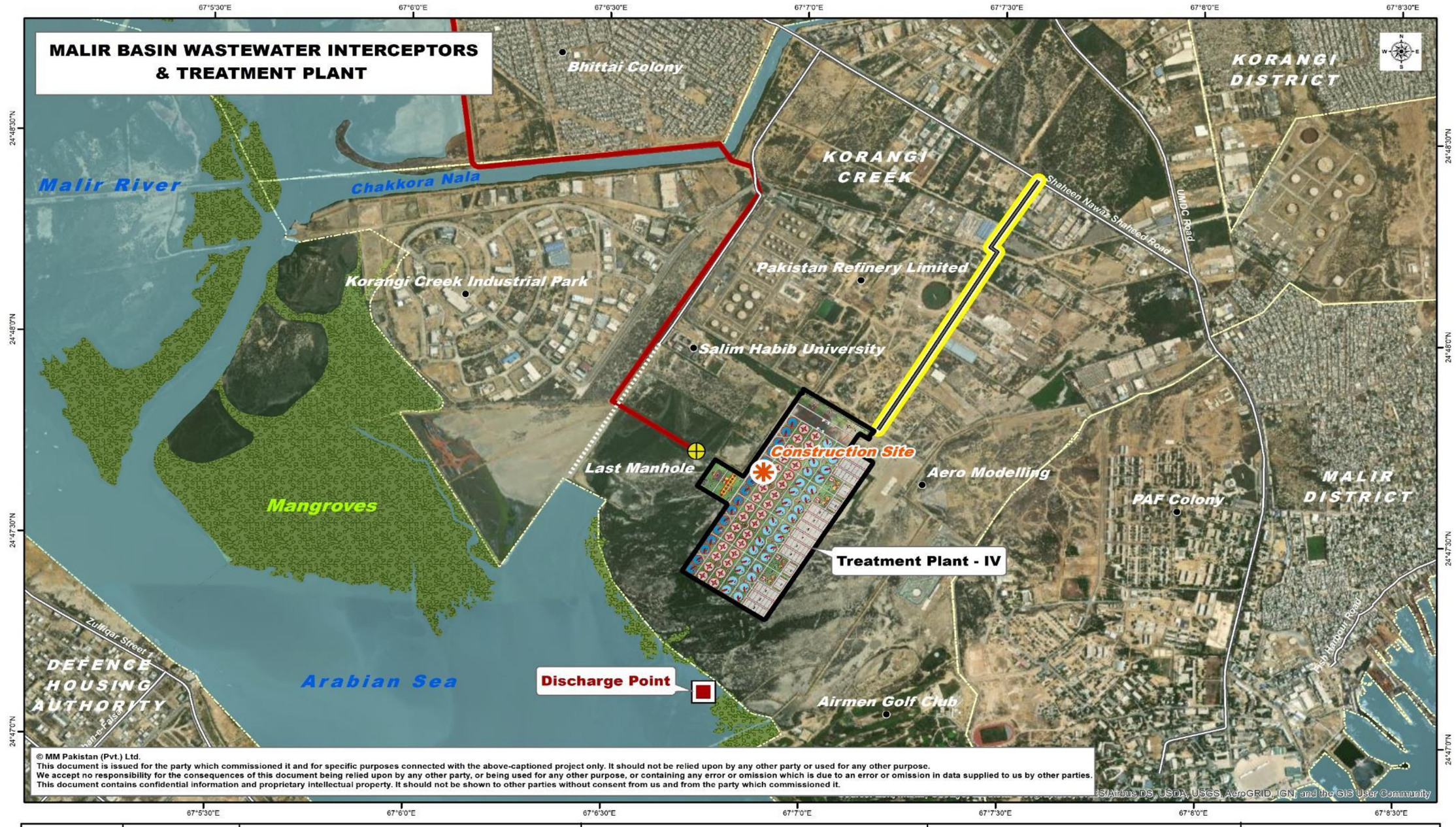
64. A complete storm water network shall be built to convey the storm water of TP-IV to the outfall structure.

3.3.4 Temporary Facilities during Construction

65. **Table 3-4** below outlines the approximate number of major machinery and vehicles that are envisaged to be required for the project construction works:

Table 3-4: Estimated Equipment and Machinery

S. No.	Machinery / Equipment	Quantity required*
1	Excavators	20
2	Batching Plants	1 (Outsourced)
3	Loaders	10
4	Power Generators	6
5	Rollers	4
6	Tractor Trolley	10
7	Compactor / Roller	10
8	Crane	2
9	Concrete Pump	6
10	Vibro Hammer	2
11	Watering Tanks (moveable)	10
12	Haulage Trucks	30
13	Cars / Pickups	20
* Number of machinery is indicative and can be changed subject to working schedule		
Source: MMP Project Experience		



Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP (MM Pakistan (Pvt) Ltd.) — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 Coordinate System: UTM 42N	**Legend:** Discharge Point; Construction Camps Sites; Malir Wastewater Interceptor; Access Roads / Area of Influence - 50m; Proposed Treatment Plant - IV Boundary	500 250 0 500 m

Drawn:	T. Noman
Checked:	M.A Shishmahal
Approved:	P. Anjum
Date:	12/28/2022
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Figure 3-6: Location of Proposed TP – IV Site

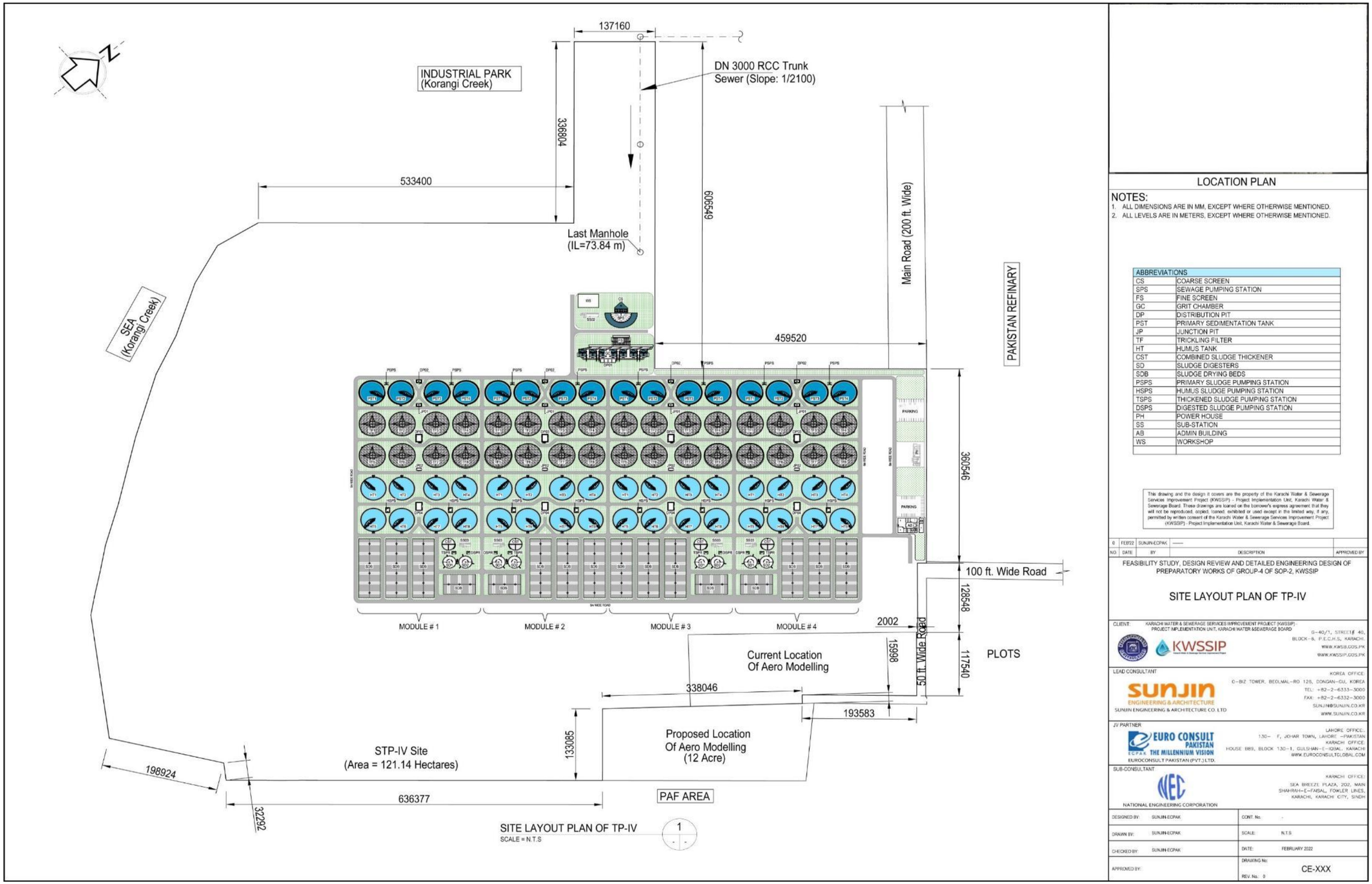


Figure 3-7: Proposed Site Development Plan of TP-IV

3.4 Process Design of TP-IV

66. The objective of TP-IV is to treat and ensure the safe disposal of the collected sewage of the Malir Basin interceptor to protect the public health and the environment. The proposed process flow diagram for TP-IV is presented in **Figure 3-8**.

67. As preliminary treatment, the sewage will undergo screening (coarse and fine) and grit removal. At the inlet of TP-IV, a mechanical coarse screen will be installed to remove the coarse solids found in the influent sewage. The sewage will then flow to the pumping pit then be pumped to another chamber with mechanical fine screens to further remove smaller particles then to the grit chamber. After grit removal, the sewage shall flow to the distribution pit to distribute the sewage to the four modules of STP.

68. In each module, the sewage will flow to the primary settling tank (PST) to remove the readily settleable solids and floating materials in the sewage. The effluent from the PST shall then enter the trickling filters for the removal of organic matters present in sewage. The oxygen shall be supplied through natural air draft.

69. From the trickling filter, the sewage will flow to the secondary settling tank to further remove suspended solids in the sewage by settling. Effluent from the secondary settling tank will flow to the outlet pit for discharge in the Korangi Creek, located approximately 400 m away from the southern boundary wall of TP-IV as shown **Figure 3-9**.

70. Sludge that settled at the bottom of the PST and secondary settling tank will be removed and pumped to the sludge thickeners. The thickened sludge shall be stabilized in the anaerobic sludge digester and will then be fed to the sludge drying beds for dewatering.

71. The dried sludge is proposed to be reused as fertilizer and soil improver for horticultural activities such as tree planting and landscaping since it contains high concentrations of valuable organic matter and nutrients such as nitrogen and phosphorus. The potential users of the sludge can be from the private sectors and/or government sectors such as the Park and Horticulture Department of Karachi Municipal Corporation (KMC).

72. Recycling of sludge shall be a condition of Public Private Partnership (PPP) arrangements for EPC contract of TP-IV. The sludge treatment methods will be finalized during detailed design stage to be carried out by the EPC contractor. The contractor shall finalize the modalities and procedures for the design and operation of the sludge recycling facility. The sludge quality testing shall be carried out before its utilization as fertilizer, and it shall also be tested periodically during the operational phase of the project by KWSC to ensure that the sludge generated at TP-IV is properly treated and fit for recycling.

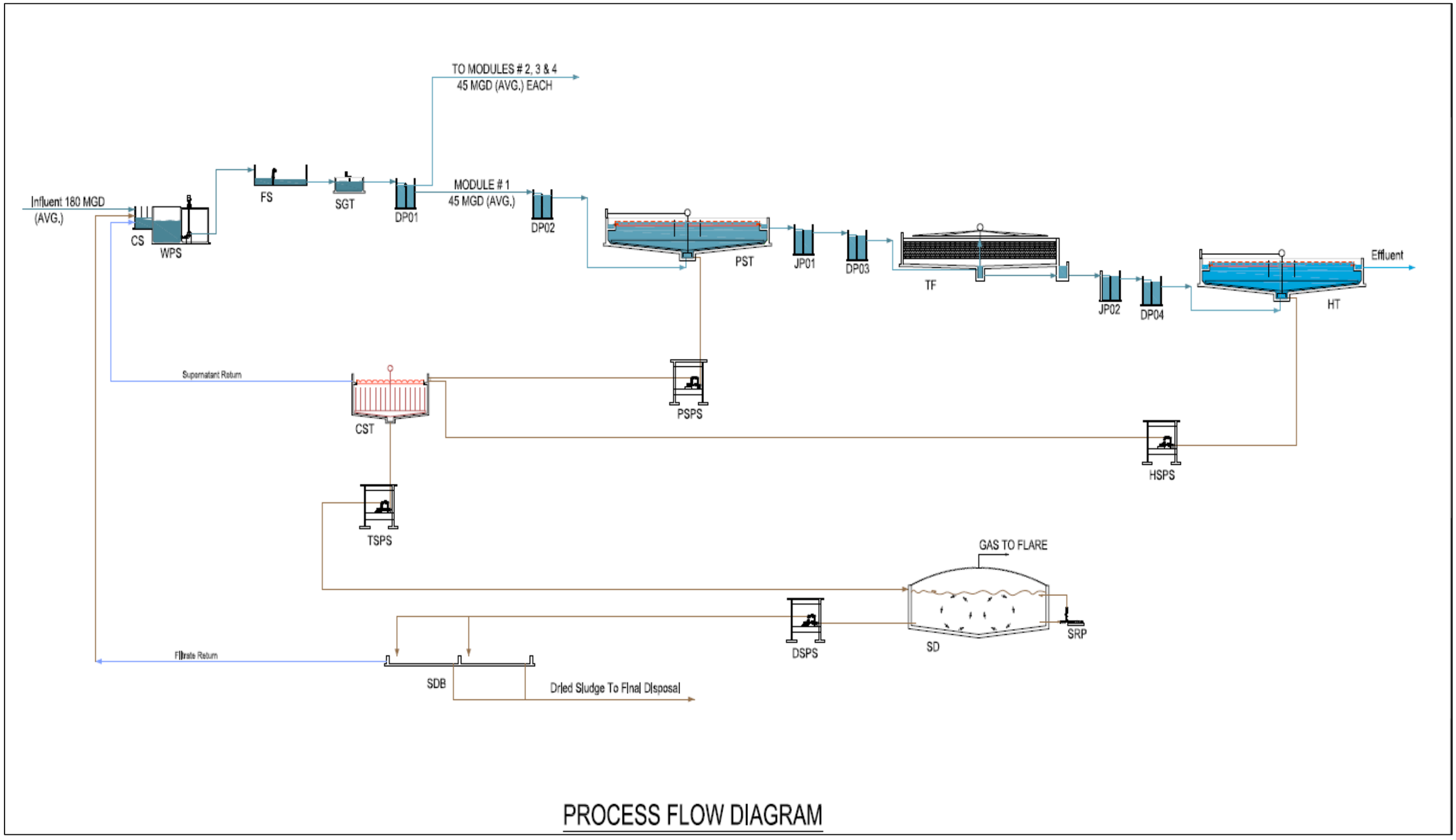


Figure 3-8: Process Flow Diagram of the proposed TP-IV

Source: Process and Hydraulic Design Report – TP - IV

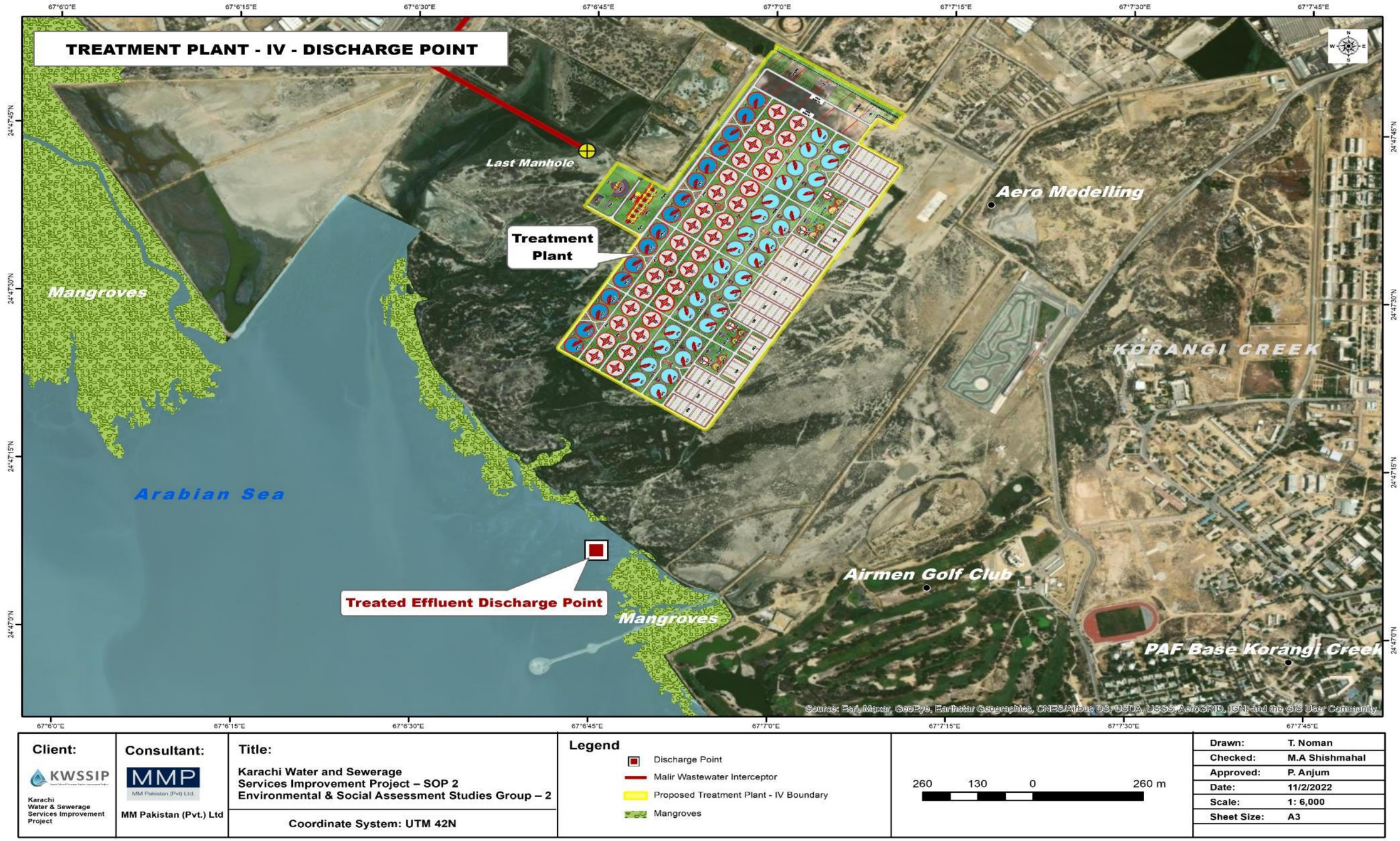


Figure 3-9: Treated Effluent Discharge Point

3.4.1 Preliminary Treatment

a) Coarse Screen Chamber

73. Mechanical coarse screens are provided at the inlet of TP-IV to remove large floating objects present in it prior to entering the wet well of raw sewage pumping station. This is to prevent clogging and damage to the subsequent process equipment that may affect the treatment process reliability and effectiveness.

74. The coarse screen chamber shall comprise of the following components:

- Influent Chamber - to dissipate the incoming sewage energy and to direct/distribute flow equally to all coarse screens.
- Screen Channels - These are provided with mechanically cleaned coarse screens. The sewage is to be screened in order to remove large floating objects present in it prior to entering the wet well of raw sewage pumping station.
- Effluent Chamber: This structure receives the screened sewage and direct it to next unit.

75. Each screen chamber shall be equipped with two coarse screens with bar spacing of 75 mm in series (1 +1 standby) and two sluice gates one at inlet and other at the outlet of each channel. At the top of the screening channels, RCC platforms, of adequate space shall be provided for manual cleaning of the screens, operation of the sluice gates and other purposes. Typical view of the coarse screens is shown in below **Figure 3-10**.

76. Removed floating material shall be stored in a covered 20-yard waste skip which shall be removed on weekly basis from the site through SEPA certified hazardous waste handlers, which shall be contracted for this job by the KWSC TP-IV Management.



Figure 3-10: Typical View of Coarse Screens

b) Raw Sewage Pumping Station

77. After screening, the sewage shall enter the raw sewage pumping station. The sewage flows to the wet well where it will be pumped to the second screening chamber. The pump used is housed in the dry well of the pumping station. A sump will also be constructed to collect the sewage from

leakage of pumps and piping and/or surface runoff. Bilge pumps, installed in the sump, shall pump the sewage in the sump back to the wet wells.

78. There will be two wet wells in the pumping station and each wet well will have 6 transfer pumps (4 duty + 2 standby) that are vertical type and dry mounted. Each transfer pump will have capacity of 1,777 liters per second and head of 15 m.

c) Fine Screen Chamber

79. The pumped raw sewage shall flow into another screening chamber which will be provided with mechanically cleaned fine screens. Similar to coarse screen chamber, the following are the components of the fine screen chamber components:

- Influent Chamber - to receive and direct/distribute flow equally to all fine screens.
- Screen Channels - provided with mechanically cleaned fine screens.
- Effluent Chamber - receives the screened sewage and direct it to next unit.

80. The fine screens will have clear openings of 15 mm and will be mechanically cleaned. To prevent clogs, the trapped objects must be removed regularly. This will be done through a mechanism fitted with these screens that shall rake off the screens. The debris shall be moved by an attached auger/screw press that will compact them and squeeze out any remaining water.

81. From there, the screenings shall be transferred to the same 20-yard waste skip (as for coarse screen unscreened material) which shall be removed from site on weekly basis through SEPA certified hazardous waste handlers, which shall be contracted for this job by the KWSC TP-IV Management.

82. Typical view of the fine screens is shown in below **Figure 3-11**.

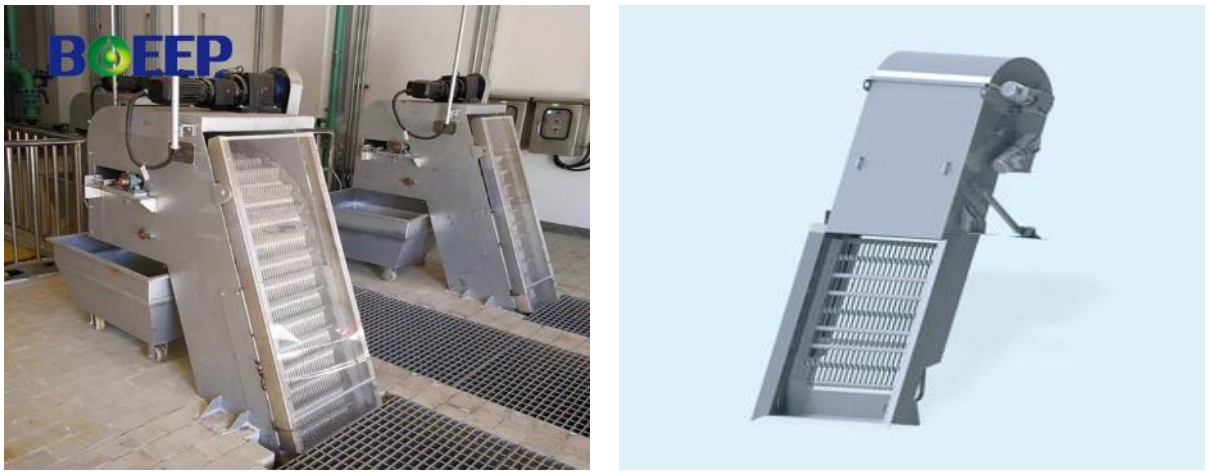


Figure 3-11: Typical View of Mechanically Cleaning Fine Screens

d) Square Grit Chamber

83. The next unit to fine screens is the grit chamber. Grits such as sand, gravel and other organic particles such as food waste must also be removed to prevent unnecessary abrasion and wear of mechanical equipment and accumulation of grit in the succeeding treatment process. From grit

chambers, the sewage shall flow to the Distribution Pit 1 (DP1) for distribution to the four treatment modules. Typical view of the grit chamber is shown in **Figure 3-12**.



Figure 3-12: Typical View of Grit Chamber

3.4.2 Primary Treatment

a) Primary Settling Tanks (PST)

84. From DP1, the sewage will flow to DP2 to distribute the sewage to the PSTs. Each treatment module will have four PSTs.

85. The main function of PST is to reduce the suspended solids of the sewage by allowing the solids to settle at the bottom of the tank. To remove the sludge at the bottom of the PST, a scrapper will be installed to scrape the sludge to the central sludge sump and be pumped to the sludge thickeners. Typical view of primary settling tank is shown in **Figure 3-13**.

86. The clarified sewage is collected through the overflow weirs and transported the junction pit 1 (JP1) then to DP3 for distribution to the trickling filters. The PST is estimated to have 55% TSS and 30% BOD & 25% COD removal efficiencies.



Figure 3-13: Typical View of Primary Settling Tank

3.4.3 Secondary Treatment

a. Trickling Filters

87. Trickling filters (TFs) is selected for the secondary treatment process of TP-IV. TFs is a fixed-be, biological reactor that contains filter media such as rocks, gravel, or preformed plastic filter media. Organisms that are attached in the media removes the organic matter of the sewage. The sewage from the primary sedimentation tank is trickled or sprinkled on top of the tank, passes through the filter media and comes in contact with the microorganisms that grow in the media. Typical view of trickling filter unit is shown in **Figure 3-14**.

88. The sewage is collected in the underdrain of the TF and will flow to the into JP-2 and then to the DP4 for distribution to the secondary settling/humus tanks.

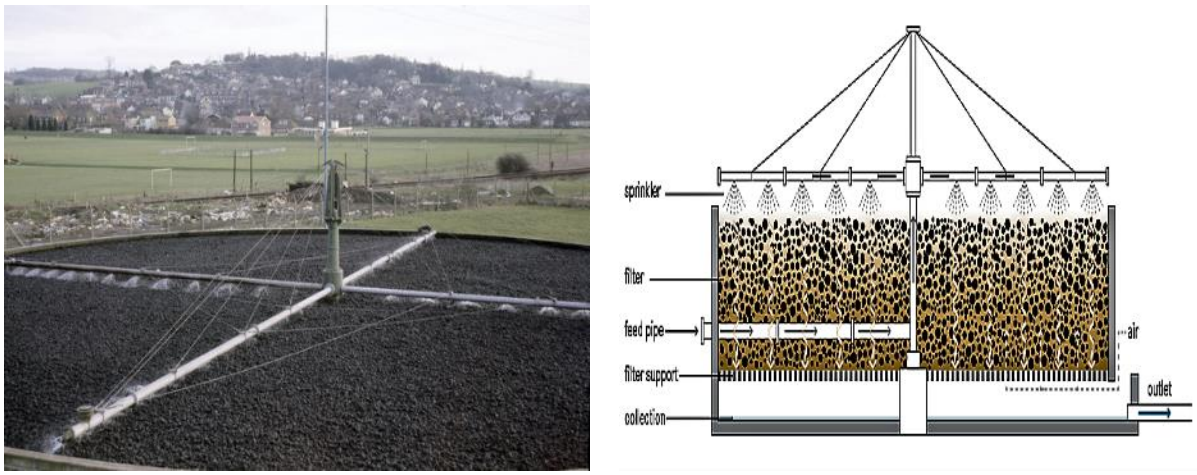


Figure 3-14: Typical View of Trickling Filter Unit

b. Humus Tanks/Secondary Settling Tank

89. The secondary settling tank/humus tank will allow the settling of the suspended solids at the bottom of the tank and produce a clarified effluent. Sludge that settled will be removed using a

sludge scraper. The treated and clarified effluent have discharged to Korangi Creek. Typical view of humus tank unit is shown in **Figure 3-15**.

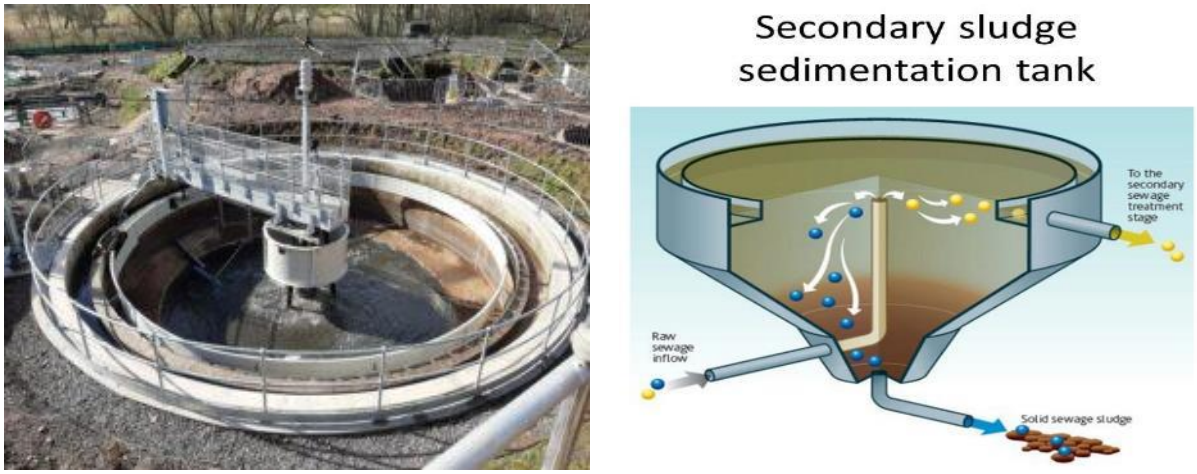


Figure 3-15: Typical View of Humus Tank Unit

3.4.4 Sludge Management and Recycling

90. About 240 m^3/day of sludge will be generated at TP-IV. Sources of sludge are from the primary and secondary settling tanks. The sludge will be partially treated onsite to reduce the water content of the sludge and make it more stabilized for easier transport. Dried sludge will be removed on daily basis and further transported for recycling as fertilizer/ soil improver in horticultural activities.

a) Sludge Thickeners

91. The operation of the PST and secondary settling tank will generate sludge. Sludge from these tanks shall be pumped to the combined sludge thickeners by means of their respective sludge pumps. The sludge thickener will separate the water and solid contents of the sludge. The supernatant or the water removed from the sludge shall be returned to the wet well of sewage pumping station.

92. The thickened sludge that settled at the bottom of the thickener will be collected mechanically, through a center-driven bottom truss with picket fences and fixed bridge-type sludge scraper, and will be pumped to the sludge digesters. A total of two (1 duty + 1 standby) screw centrifugal sludge pumps of 50 m^3/hr capacity will be installed in the thickened/digested sludge pumping room to transport the sludge to the digesters.

93. Typical view of sludge thickener unit is shown in below **Figure 3-16**.

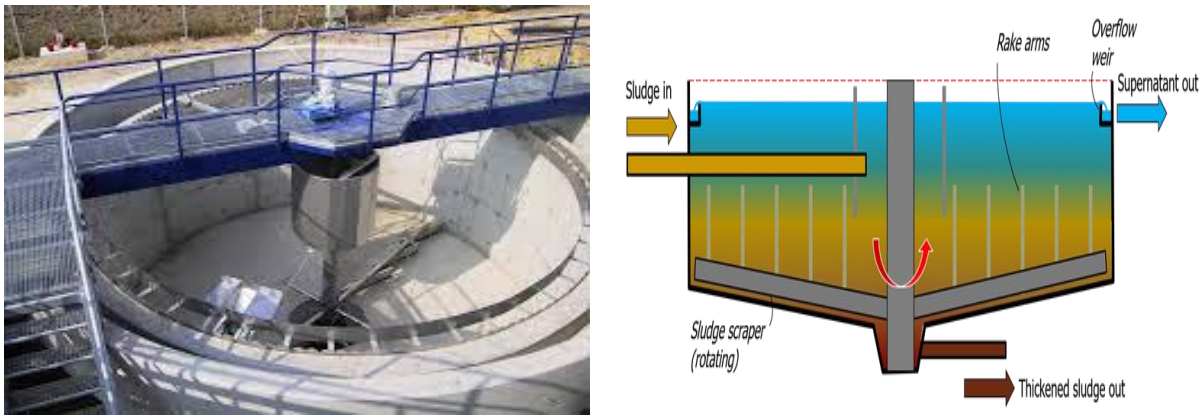


Figure 3-16: Typical View of Sludge Thickener

b) Sludge Digesters – Single Module (45 MGD)

94. The thickened sludge from sludge thickeners will be digested before final dewatering. The purpose of digestion is to stabilize the solids and bio-solids to reduce pathogens, eliminate odors and to inhibit or reduce the potential for purification. Anaerobic digestion is the most common method adopted for the stabilization of sludge in absence of any molecular oxygen.

95. The digesters will be equipped with specially designed mixing system. The biogas generated from the digestion will be sent to flare. Typical view of sludge digester unit with flare is shown in below **Figure 3-17**.

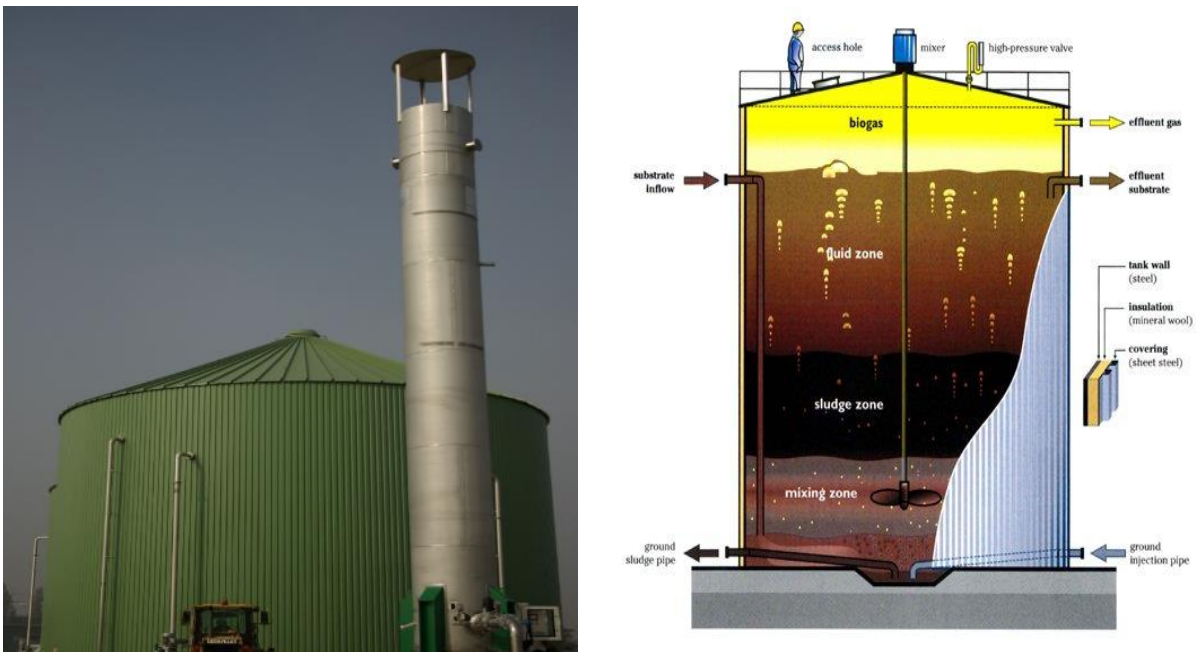


Figure 3-17: Typical View of Sludge Digester Unit

c) Sludge Drying Beds – Single Module (45 MGD)

96. From the sludge digesters the digested sludge will be pumped to sludge drying beds for dewatering. The filtrate water from sludge drying beds shall be pumped back to the coarse screen

chamber. As per Karachi climate, a drying time of 6 - 7 days shall be needed for adequate drying of the sludge at an application depth of 30 cm.

97. Belt filter press will also be provided to dry the sludge during the rainy and seasons, when outdoor drying may not be possible.

98. Design basis for sludge drying beds is presented in **Table 3-5** below, whereas typical view of sludge drying bed is shown in **Figure 3-18**.

Table 3-5: Design Basis for Sludge Drying Beds

Parameters	Value	Unit
Digested Sludge Data		
Combined sludge load	17,350	kg-TSS/d
Combined sludge flow	636	m^3/d
Design Criteria		
Drying period	6.6	Days
Application depth of sludge	0.30	M
Solid content after drying	30	%
Design of Sludge Drying Beds		
Total area of SDBs, required	500	mg/L
Number of SDBs	23	°C
Dimension of SDBs, adopted	30	°C
Source: Process and Hydraulic Design Report – TP – IV		

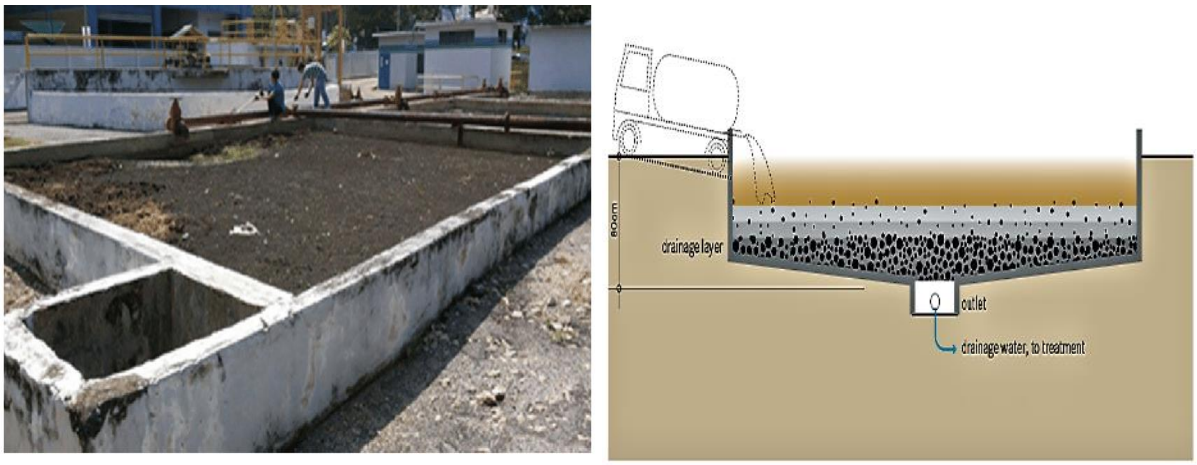


Figure 3-18: Typical View of Sludge Drying Bed

d) Sludge Transport

99. Dried sludge from Sludge Drying Beds (SDBs) shall be periodically removed and temporarily stored in Hook-lift Skips equipped with Lids. Filled skips shall further be transported through trucks for recycling purposes.

3.4.5 Tertiary Treatment Options

100. The project shall provide ample ground to explore the possibility to opt for water reuse of the treated effluent through Public Private Partnership intervention with potential revenue streams to utilize the wastewater after tertiary treatment from TP-IV to nearby located twin industrial areas of Landhi & Korangi.

3.5 Project Utilities

3.5.1 Water

101. The water requirement during the construction is estimated to be 60 m^3/day while during operation, the water requirement is about 9.25 m^3/day.

3.5.2 Power

102. The construction of the proposed project will require 3,000 kWh of power while during operation, the power requirement is 925 kWh.

3.5.3 Construction Materials

103. The list of construction materials, sources and quantities required for the civil works are described in **Table 3-6**.

104. Excavated materials estimated to be generated from construction activities is about 1,531,000 cubic meters (Technical Consultants). At maximum, the dry excavated material shall be reused for backfilling, whereas surplus dry excavated material as well as wet excavated material shall be managed and handled by SEPA certified waste management contractors to be engaged by the construction contractor with PIU approval.

Table 3-6: Sources of Raw Material for Project Construction

No.	Raw Material	Source	Approximate Quantities
1.	Rubble Stones for Soling	Available through many licensed crush plants located in Gadap Town, near Norther Bypass and other places of District Malir	20, 657 m^3
2.	Sand	Available through many licensed sand and gravel suppliers located in Gadap Town, other places of District Malir, in vicinity of M9 motorway and Hub area	5,783,682 m^3
3.	Cement	Ordinary Portland Cement and Sulphate Resistant Cement etc. are available at various cement plants located near Karachi e.g., Lucky Cement and Power Cement in Nooriabad, M9 Motorway	217,259 m^3
4.	Reinforcement steel	Reinforcement steel is locally available at steel re-rolling mills in and around Karachi e.g., Agha Steel, Aisha Steel etc.	22,000 ton

3.6 Project Activities

3.6.1 Pre-construction Phase

105. This will include securing of the necessary permits and clearances from the national government agencies.

3.6.2 Construction Phase

106. The activities to be conducted during construction phase of the project are discussed below.

a) Development of Construction and Labour Camps

107. One of the first activities to be completed by the Contractor shall be the establishment of the construction and labour camp. The Contractor will also establish construction yards and sites including material storage areas, offices, workshops etc.

108. The proposed locations of the construction camp sites are shown in Figure 3-1. Two labor camps are being proposed for the construction of the interceptor while one labor camp will be assigned for the construction of the proposed TP-IV.

109. The camp sites during the construction of the interceptor will be located in a local government-owned land and prior permission shall be taken from the department for the establishment of campsites at these locations. The proposed labor camp for the TP-IV will be located inside the proposed TP-IV site.

110. Each campsite will require about 1500 m^2 area. The construction activity will span over almost 18 months. During construction phase, an estimated 600 workers will be required and about 150 to 180 workers will temporarily reside in each of the three campsites.

111. The proposed site for the Contractor's camp shall include the following facilities. Typical layout plan for construction camp shown in the map attached as **Figure 3-19**.

Site	Facilities
Labour Campsite	◆ Accommodation ◆ Kitchen ◆ Dining area for Staff and Labour ◆ Sanitation facilities ◆ Septic tank ◆ Liquid and solid waste disposal facilities ◆ Generator(s), for operation when the power supply from the grid station was not available
Construction Campsite	◆ Uncovered material storage ◆ Covered material storage
Workshop Site	◆ Batching plant ◆ Material storage (including hazardous materials) ◆ Workshops ◆ Laboratory ◆ Site Offices ◆ Contractors accommodation ◆ Labour camp including welfare facilities such as kitchen & dining room ◆ Sanitation facilities ◆ Sewage disposal system ◆ Medical facilities ◆ Parking for vehicles and plant ◆ Generators

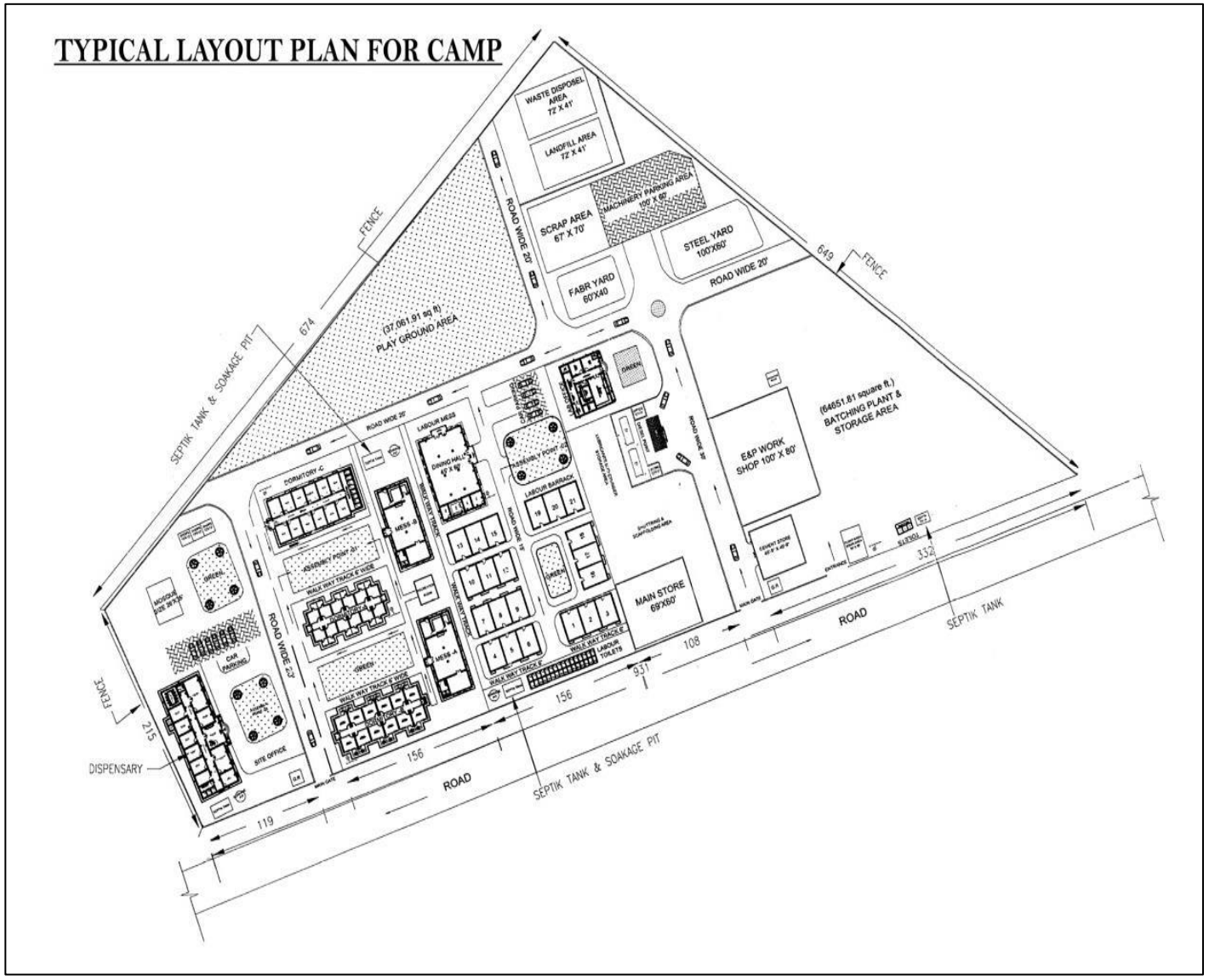


Figure 3-19: Typical layout plan for construction camp

b) Construction of Interceptor, Manholes and Sewer Connections

112. The following are the major civil works shall be involved in construction of the proposed Malir Basin Interceptor.

i. Minor Improvement of Access Roads

113. Two existing roads are proposed to be utilized as access roads for the construction machinery, material haulage and other construction vehicles to reach various sections of the interceptor alignment. These include the following:

- Road leading to the Interceptor alignment from Korangi Creek Road towards Chakra Nala Right Bank Road
- Road leading to the Interceptor alignment from EBM Causeway towards Malir Expressway

114. Both access roads are existing and being utilized by relevant government agencies and department. Road No. 01 is utilized by Korangi Creek Cantonment Board, KWSC and SSWMB for cleaning of adjacent Chakra Drain while Road No. 02 is being used by Malir Expressway/ Local Government Department as an access road for construction works. **Figure 3-20** shows the pictorial views of these access roads.

115. These roads are wide enough to accommodate the construction vehicles and machines. There are also no settlements located near these roads, However, minor works for strengthening these roads shall be performed where required.



Road No. 01: Road leading to the Interceptor alignment from Korangi Creek Road towards Chakra Nala Right Bank Road



Road No. 02: Road leading to the Interceptor alignment from EBM Causeway towards Malir Expressway Access Road

Figure 3-20: Interceptor Access Roads

ii. Trenching and Excavation

116. Open cut excavation shall be performed for major sections of the interceptor, while trenchless jacking will be employed for the proposed sewer line connection from TP-II to the proposed interceptor.

117. At maximum 8 m wide and 5.5 m deep, trench shall be excavated for the interceptor. The excavation shall be done with safe side slopes as per ground conditions and with sufficient margin for working on structural concrete. Excavation shall be carried out by excavators, and excavated material shall be temporarily piled at excavation sides.

118. Excavation activities will be conducted under various conditions, including both dry and wet conditions, particularly considering the proximity of certain sections of the interceptor alignment to the Malir River stream. To maximize efficiency and sustainability, the dry excavated material will be repurposed for backfilling in the embankment's shoulder areas. Any surplus dry excavated material, as well as material excavated under wet conditions, will be meticulously managed and handled through certified waste management contractors endorsed by SEPA (Sindh Environmental Protection Agency). The responsibility for securing these contractors and obtaining PIU (Project Implementation Unit) approval for this task will lie with the contractor, ensuring proper and compliant waste management throughout the project.

iii. Shoring

119. Provision of shoring required for supporting sides of trenches, bailing out of sub soil water and water from other source such as from Malir River or rainwater will be part of the contractor's scope. Submersible pumps shall be utilized for dewatering and will also be included in the contractor's scope.

iv. Levelling Course (PCC) for Cross Drainage Structure

120. The excavated pit shall be manually dressed in sufficient working space around the raft to be constructed. Fix forms like ISMC 150 or wooden planks at the edge as formwork. P.C.C shall be supplied from the batching plant through transit mixers. It shall be unloaded through chute/s, and then it shall be manually spread & compacted in a uniform layer of levelling course thickness. After the initial set, the concrete surface shall be sprinkled with water to save it from cracking. Curing shall be done by keeping it moist with Hessian cloth or by a continuous spray of water. After allowing it to gain strength over 24 hours, it shall be released for raft activities.

v. Box Culvert Raft Concreting

121. Concrete shall be supplied from batching plant through transit mixers. Concrete shall be poured into the foundation using direct chute or concrete pump as per accessibility. Chutes shall be made using M.S. sheets/CGI sheets supported by structural steel members. Chutes shall be placed with an appropriate slope so that concrete free flows. In case of concreting using chute, the same shall be made wet by water before pouring concrete over it for concrete to free flow. After final set mortar bunds shall be made for ponding of water, the sand layer is laid in bunds to retain water for the proper curing. Within 24 hours, concrete will gain sufficient strength, and de-shuttering shall be done carefully.

vi. Box Culvert Wall Reinforcement

122. Against the dowels left through the raft, balance reinforcement shall be tied for the predetermined lift to be concreted. Vertical rods shall be provided with required overlaps

as per construction drawings. Efforts shall be made to minimize overlaps. Horizontals shall be tied in position. Concrete cover shall be provided by Concrete cover blocks tied with reinforcement as required.

vii. Box Culvert Wall Concreting

123. The concrete mixed from centralized batching plant/s shall be delivered through transit mixers. It shall be placed manually or through crane + bucket/Concrete pumps as per site condition. Concrete shall be laid in 350-400mm layer and vibrated with needle (electrical/petrol/diesel) vibrators. It shall be ensured that concreting is continuous and completed in a single pour to minimize the number of cold joints. The exposed area of the walls shall be green cut to receive next lift concrete. Shear keys (Construction Joint) shall be formed as per the construction drawing.

viii. Manholes Construction

124. Construction of manholes shall involve the following steps:

- Excavation for manhole shall be done as per the dimensions and levels specified in the plan or drawings.
- Excavation width shall include the necessary working space for accessibility for the mason to work freely below the ground.
- Bed concrete shall be laid over which the manhole shall be constructed.
- In the case of loose soil, special foundations shall be constructed to support the manhole.
- Block masonry shall be performed, and the bricks of specified quality shall be used in the construction of manholes.
- The finishing of the brick masonry in the external face shall be finished smooth.
- The joint of the masonry and pipe shall be specially treated to make it perfectly leak proof.
- The excess shaft in the circular manholes shall be corbelled inwardly at the top to reduce its size to the cover frame to be fitted.
- The inside of the brick masonry of manhole shall be plastered with cement mortar.
- The inside plastered surface shall be waterproofed with a waterproofing agent.
- The channels and benching in a manhole shall be constructed using cement concrete.
- The finish for the channel and benching shall be smoothly and neatly finished.

ix. Connection with Incoming Sewer Points

125. Approximately 2-meter-wide and 4-meter-deep excavation will be made for the construction of the intake structures to connect the 20 sewer points with the interceptor. At locations where the alignment of interceptor shall run in parallel to the Malir Expressway, the interceptor shall be connected via intake structure with the sewage culverts provided in the Malir Expressway Alignment.

126. **Figure 3-21** shows some locations of the under construction Malir Expressway where culverts have been constructed for the sewage disposal into the existing Malir River, while **Figure 3-22** shows a A-A Section Drawing of sewer connection with Interceptor Culvert.



Figure 3-21: Sewer Culverts in Malir Expressway Alignment

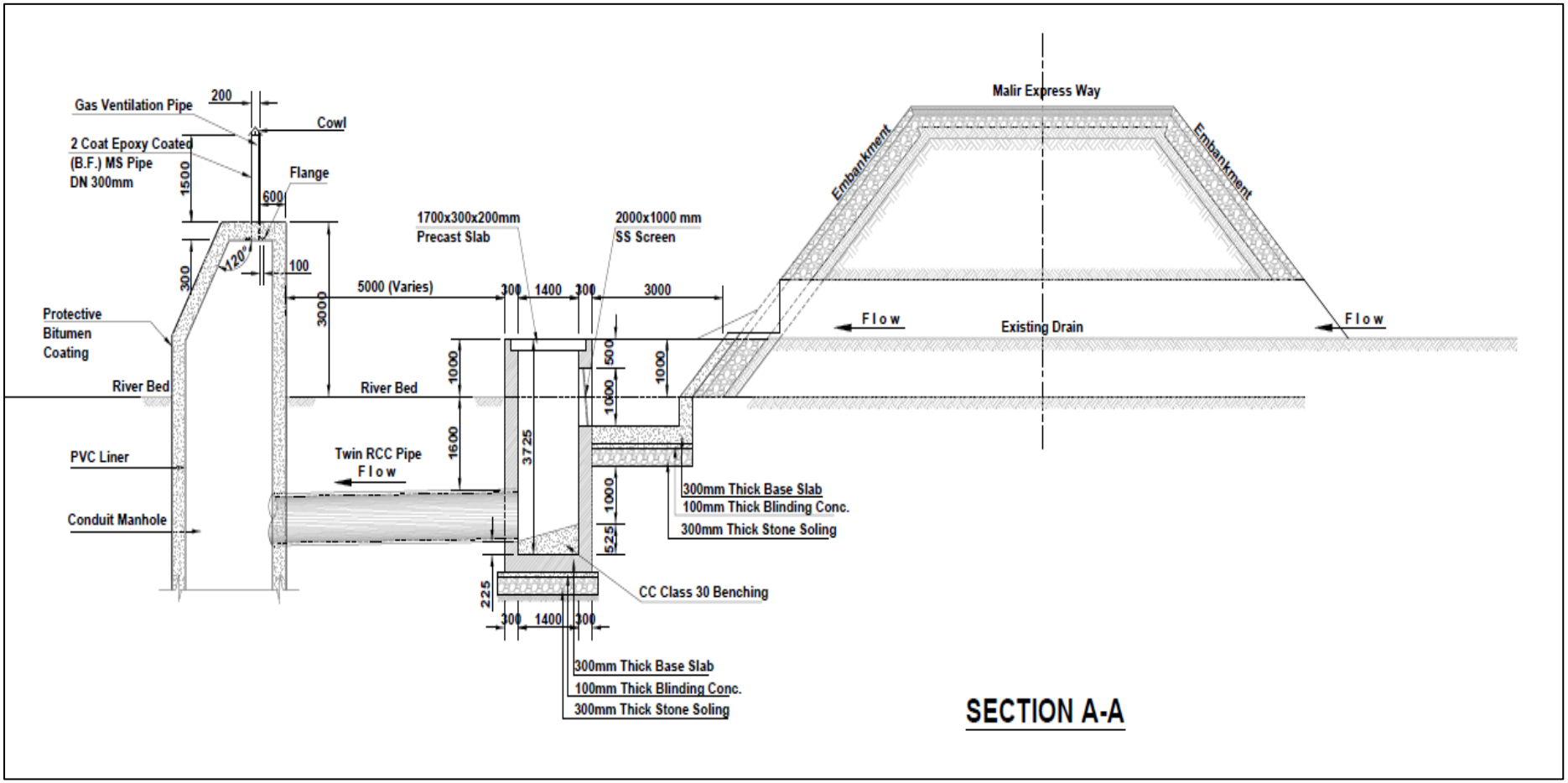


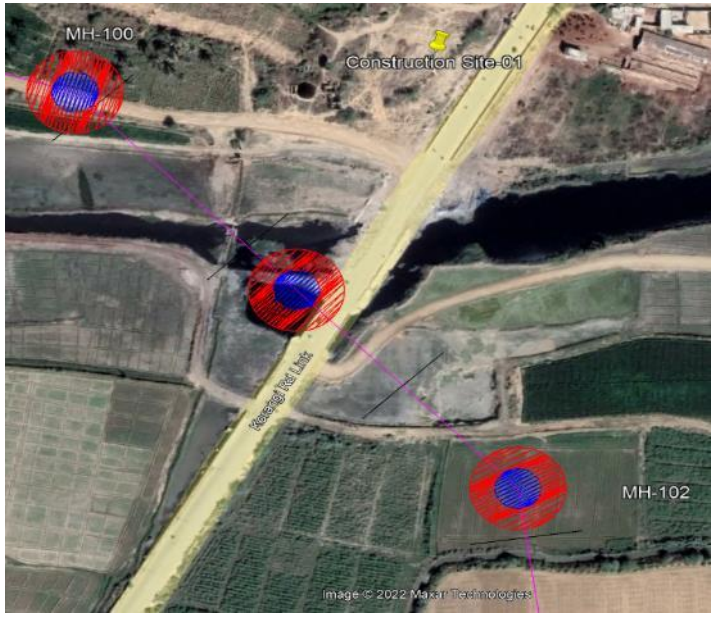
Figure 3-22: Intake Structure for Sewer Connection with Interceptor

x. Pipe Jacking at Roads and Pipelines Crossings

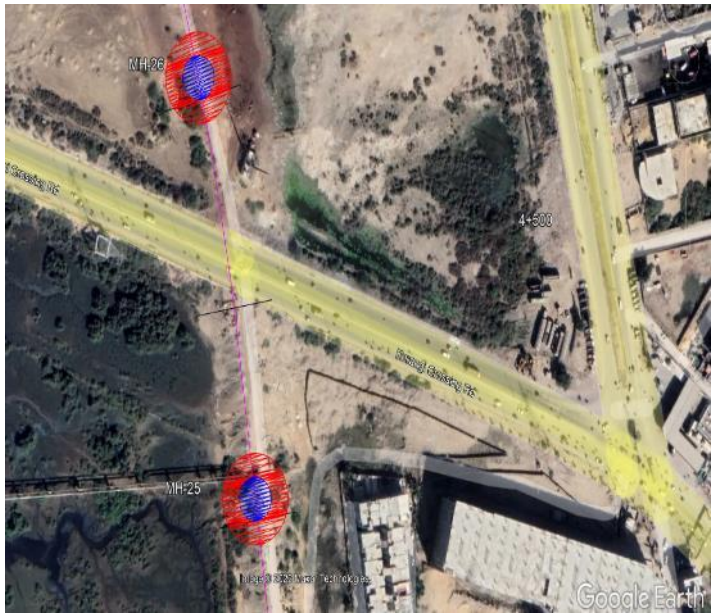
127. Pipe Jacking, a trenchless method excavation, will be employed for the construction of the interceptor box culvert where the alignment will cross the following major roads and two existing oil pipelines. The details of these locations are as follows **Table 3-7**.

- 27.31 m at Korangi Crossing
- 46.88 m at EBM Causeway
- 17 m at Jumma Goth Causeway (Korangi Link Road)
- 18 m at PARCO Pipeline
- 18 m at PRL Pipeline
- 60 m Shaheed e Millat Road and Malir Expressway near Manzoor Colony Fire Station

Table 3-7: Jacking Locations along Interceptor Route

No.	Jacking Locations	Map	Picture
1	Korangi Link Road (Jumma Goth Causeway) Crossing between MH 102 and MH 101.		

No.	Jacking Locations	Map	Picture
2	EBM Causeway (Surgeon Faiz Khan Rd) Crossing between MH 42 and MH 41.		

No.	Jacking Locations	Map	Picture
3	Korangi Crossing Road - Crossing between MH 26 and MH 25.		

No.	Jacking Locations	Map	Picture
4	NRL Lines Crossing near MH 25.		

No.	Jacking Locations	Map	Picture
5	PRL Lines Crossing between MH 18 and MH 17.		

No.	Jacking Locations	Map	Picture
6	EBM Causeway / Baloch Colony Road near Manzoor Colony		

c) Construction of TP-IV

i. Access Roads

128. The existing road leading to TP – IV Site from Pakistan Refinery Road along PRL Eastern Boundary is proposed to be utilized for the movement of construction machinery, material haulage and other construction vehicles to reach the TP-IV Site. This road is already being utilized by the nearby installations such as PRL and other smaller industrial/warehouse units located along the way. **Figure 3-23** shows the photo of this road. Minor works for strengthening this road will be performed where required.



Figure 3-23: Existing Access Road to TP– IV

ii. Site Preparation and Excavation

129. Site preparation activities will be done in the proposed site such as excavation and grading, slope stabilization, installation of retaining walls, access roadways, underground utilities and drainage systems, structural excavation and groundwater dewatering as necessary to support work conducted below the groundwater table.

130. Underground utilities and drainage systems will be installed in conjunction with the excavation and grading work. Soil removed in trench and utility tunnel locations will be removed from the site along with the remaining soil from structural excavation work using the same workforce and equipment. Material deliveries for utility installations will include periodic trucks carrying concrete utility structures (manholes and catch basins), drainage piping and other equipment associated with the underground work.

131. Construction of onsite access roadways will require importing quarry spalls or other appropriate roadway subbase. Final pavement of the onsite roads will not occur until late in the project to avoid damage to new pavement.

iii. Concrete Placing

132. When site grading and excavation have progressed to a point that large areas are at their final grade, work shall be initiated on building the plant. A layer of clean sub-base material, usually gravel, shall be placed to provide a good working surface for placing concrete. Foundations or base slabs, depending on the design, will then be constructed. Reinforcing steel (rebar) shall then be placed in the form or excavation. After placing any embedded items such as anchor bolts, drains, etc. the work shall be inspected and concrete shall be placed. Much of the concrete for the wastewater treatment plant shall be required for the treatment process tanks. These require multiple concrete pours for the base slab followed by the walls. Contractors will generally try to establish a flow to the work such that several work crews are placing foundations and base slabs, followed by crews placing walls and, where applicable, elevated slabs or roof slabs. For some foundations, concrete can be poured directly from the mixing trucks into the forms. However, most concrete will be placed by pumping the concrete, either with truck-mounted pumps or with boom trucks. In some cases, concrete shall be poured into buckets and the buckets shall be hoisted by a crane and dumped into place.

iv. Piping

133. An important component of treatment plant construction is the construction of utility tunnels or galleries. These galleries shall be provided for the piping and electrical systems between process units and shall be constructed early in the project along with the process unit foundations. Once built, supports for piping and electrical lines shall be erected and the utilities shall be installed. Again, contractors will truck initial supplies of piping and electrical conduit and wire. It is anticipated that an average of 2 to 3 flatbed or trailer trucks will arrive on site daily to deliver materials to support these operations.

v. Mechanical Equipment

134. After the treatment units are constructed and the concrete has cured, installation of equipment and process systems would begin. Equipment deliveries will be ongoing throughout the project but will increase as the various system components become ready for installation. A crane, forklifts, or other hoists will be required onsite to offload and install equipment. Crew sizes are expected to increase as the work diversifies into plumbing, electrical and other system installations. Staging and parking areas will increase during equipment installation to accommodate the added materials, supplies and workers. In addition, items that require on site fabrication will need sufficient site area for fabrication processes. The key activities in the installation of mechanical equipment start with concrete placement. Generally, bolts or plates are embedded in the concrete to provide fasteners for mechanical equipment. After delivery to the site, equipment is placed on the foundation, levelled and balanced, and finally grouted into place. Depending on the type of equipment, it is then connected to piping, ductwork, and electrical power /control systems as appropriate. For the most part, equipment will be delivered on standard sized flatbeds or trailer trucks. Oversized components may require special delivery procedures. As with any variance, the contractor must describe the delivery operations and the mitigation necessary to that operation. If deliveries are over-sized, it may be necessary to arrange for transport during off-peak hours or on a Sunday.

vi. Electrical Work

135. Electrical work for a treatment plant involves installation of the main substation equipment including transformers and switchgear. Electrical work includes tie-in to a main power service, as well as back-up services that can include alternate feeds and emergency generators. Conduit and cable trays shall be installed throughout the plant, primarily in the utility tunnels, to carry the conductors to various pieces of equipment that require electricity. Equipment primarily consists of the motors that run various parts of the plant and will range from 2-3 horsepower to over 200 horsepower. Cables shall be pulled from the power source and the motor control centres to each piece of equipment. Finally, cables shall be terminated both at the equipment and at the control panel and switching device from which the power is distributed.

vii. Instrumentation and Controls

136. Each piece of equipment in the treatment plant shall be monitored and controlled from a SCADA based centralized control console, located in the proposed administration building. To allow operators to see the status of each piece of equipment at any time, devices on the equipment shall be wired back to the central control panel. Controls can have multiple set points, different status denotations, and automated programs to optimize the plant operations. Systems can test the process effectiveness and adjust operating parameters to reduce power consumption, improve effluent quality, monitor odour, and many other functions.

viii. Support Facilities

137. There shall be two main support facilities for the treatment plant; the Administration building and the Maintenance Building. The administration building will provide offices, a laboratory, control room and employee amenities such as a lunchroom and showers. The building will be of block / concrete construction having necessary mechanical systems, electrical and plumbing works. The maintenance building will provide space for storage of spare parts and shop areas for repairing and maintaining the treatment plant equipment. This building shall also be a concrete construction with several bays with hoists and an overhead crane.

ix. Landscaping, Roads and Sidewalks

138. Installation of landscape features and final plant roads and sidewalks will be one of the last major activities. Previous earthwork activities will bring the entire site to near its finish grade. Any required topsoil will be placed as part of this final operation. The site will include significant landscaping features and landscaping will be extensive at the site. The contractor shall establish an on-site nursery and grow selected trees and shrubs that will be planted around the site.

3.6.3 Operation Phase

139. Each piece of equipment in the treatment plant will be monitored and controlled from a SCADA-based centralized control console, located in the proposed administration building. To allow operators to see the status of each piece of equipment at any time, devices on the equipment shall be wired back to the central control panel. Controls can have multiple set points, different status denotations, and automated programs to optimize the plant operations. Systems can test

the process effectiveness and adjust operating parameters to reduce power consumption, improve effluent quality, monitor odor, and many other functions.

140. Intake chambers shall be periodically cleaned manually. A plan shall be devised and implemented by the KWSC during the operational phase of the project for the periodic cleaning of intake structures to ensure toe smooth sewage inflow and restrict backflows.

141. Regular and planned inspection of the interceptor will be conducted to ensure that there no leaks along the alignment. The mechanical equipment of the STP and the pumping stations will also be inspected to ensure that all are functioning properly. If there are issues observed, repair will be implemented immediately.

3.7 Manpower Requirements

3.7.1 Construction Phase

142. Manpower requirement during construction is estimated to be about 600 persons for the construction of both interceptor and TP-IV.

3.7.2 Operational Phase

143. Estimated manpower requirement during operational phase of TP-IV is about 191 persons. Details are shown in **Table 3-8**.

Table 3-8: Sources of Raw Material for Project Construction

Category	Numbers	Category	Numbers
Management Staff		**Laboratory Staff**	
Plant Manager	1	Chemist	1
Mechanical Engineer	2	Assistant Chemist	2
Electrical Engineer	2	Laboratory Attendant	2
Shift Engineers	3	Operation Staff	
Shift Supervisors	3	Senior Operators	10
Mechanical Supervisor	4	Operators	20
Electrical Supervisor	4	Operators' Helpers	20
Stores Supervisor	4	Labourer and Coolies	40
Office Staff		**Maintenance Staff**	
Administration & Purchase Officer	2	Mechanic	4
Administration Assistants	2	Mechanic Helper	4
Finance Officer	1	Electrician	2
Accountants	1	Electrician Helper	4
Accounts Assistant	2	Equipment Cleaners	4
Charges Assessment Officer	1	Janitors	10
Charges Collection Assistants	4	Miscellaneous Staff	
Office Attendants	5	Light Vehicle Driver	4
Janitors for Plant Building	2	Tractor-Trolley Drivers	10
		Gardener	6

Category	Numbers	Category	Numbers
		Security Guards	5
Source: Process and Hydraulic Design Report – TP – IV			

3.8 Project Implementation Schedule

144. The project construction phase is expected to be completed within 18 months. The Construction schedule is provided as **Figure 3-24**.

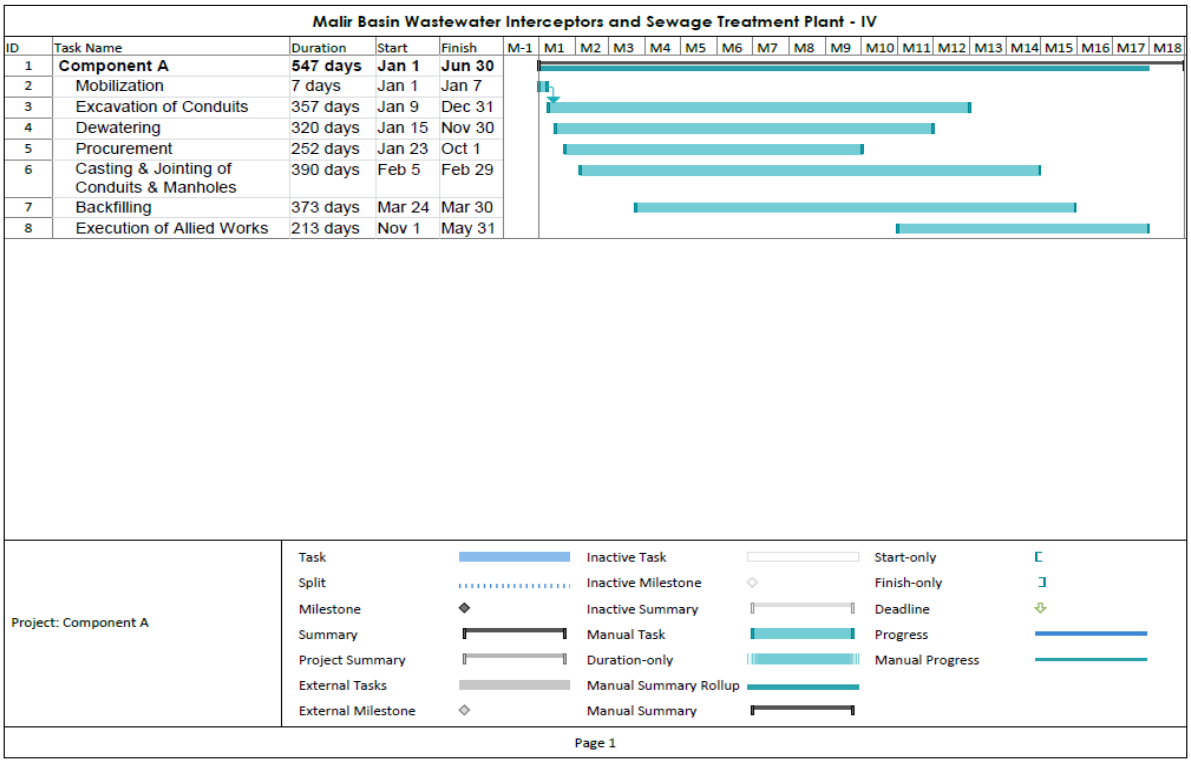


Figure 3-24: Construction Schedule for the Project

Source: Group 04 Technical Consultants

3.9 Project Cost

145. Total cost of the project is estimated to be **USD 199 Million**[6].

[6] Source: Project's PC-1 Documents

4 Environmental and Socio-Economic Baseline

4.1 Physical Environment of Project Area

4.1.1 Land Use

a) Interceptor and TP-II Bypass Line / Pump Room Connection

146. The main land use in 8.5 km out of the 22 km interceptor alignment is agricultural, the combined area of which is 14.2 hectares. Common vegetation in the river basin includes shrub trees and bushes. The lower portion of the basin has cultivated lands and vegetation, which gradually reduces towards the south. The land is affected by contaminated irrigation water.

147. Residential areas on both sides of the interceptor alignment include low-income settlements; these settlements span up to the Korangi Link Road. Further downstream is the lower middle to middle class settlements in Shah Faisal Town on the right bank, and the low-income settlements and small to medium industrial units on the left bank. Residential settlements from the EBM Causeway to Korangi Crossing Road are at a considerable distance from the riverbanks. Low to middle-income Bhittai Colony settlement is situated at the left bank from Korangi Crossing Road onwards. The Malir Expressway is in close proximity to the interceptor alignment, within the banks of Malir River.

148. The section of the project that extends from the TP-II Pump Room to the Interceptor is situated within the densely populated neighborhoods of Manzoor Colony and Mahmoudabad in Karachi. The area from the TP-II Pump Room to Manzoor Colony Fire Station falls within the residential and commercial land use categories. The segment from Manzoor Colony Fire Station to the interceptor traverses the Shaheed e Millat Road and the Malir Expressway. The landscape in this area is barren lands.

149. Views of major land uses are shown in **Figure 4-1** below.



Figure 4-1: Photos of Major Land uses along Interceptor and TP-II Connection Alignments

b) TP – IV Site

150. The TP-IV construction site spans an area of 42.9 hectares (106 acres) and is situated on flat terrain reclaimed from the Korangi Creek, which stretches over 20 kilometers. Korangi Creek is approximately 1,350 meters wide and 15 meters deep. The southwestern portions of the TP-IV site are influenced by tidal currents, leading to occasional inundation of seawater during high tide.

151. This site has a healthy green cover, predominantly characterized by halophytic plants, including various grasses, shrubs, and herbs. Given its proximity to the sea, the groundwater table in this area remains relatively high. The site itself comprises coastal salt marshes, with *Arthrocnemum indicum* as the dominant vegetation species.

152. The TP-IV site does not have any human settlements. Instead, it serves as a location for livestock grazing, with herds of camels often observed grazing both on the site and in its immediate vicinity. During a consultation meeting, a representative from the Sindh Forest Department (SFD) clarified that grazing activities by local herders in such extensive areas do not require specific permissions from the SFD. Furthermore, it was emphasized that the construction of the project will not adversely impact grazing activities, as ample alternate land areas are available near the TP-IV site. This ensures that the project's construction will have minimal impact on the existing grazing practices in the region.

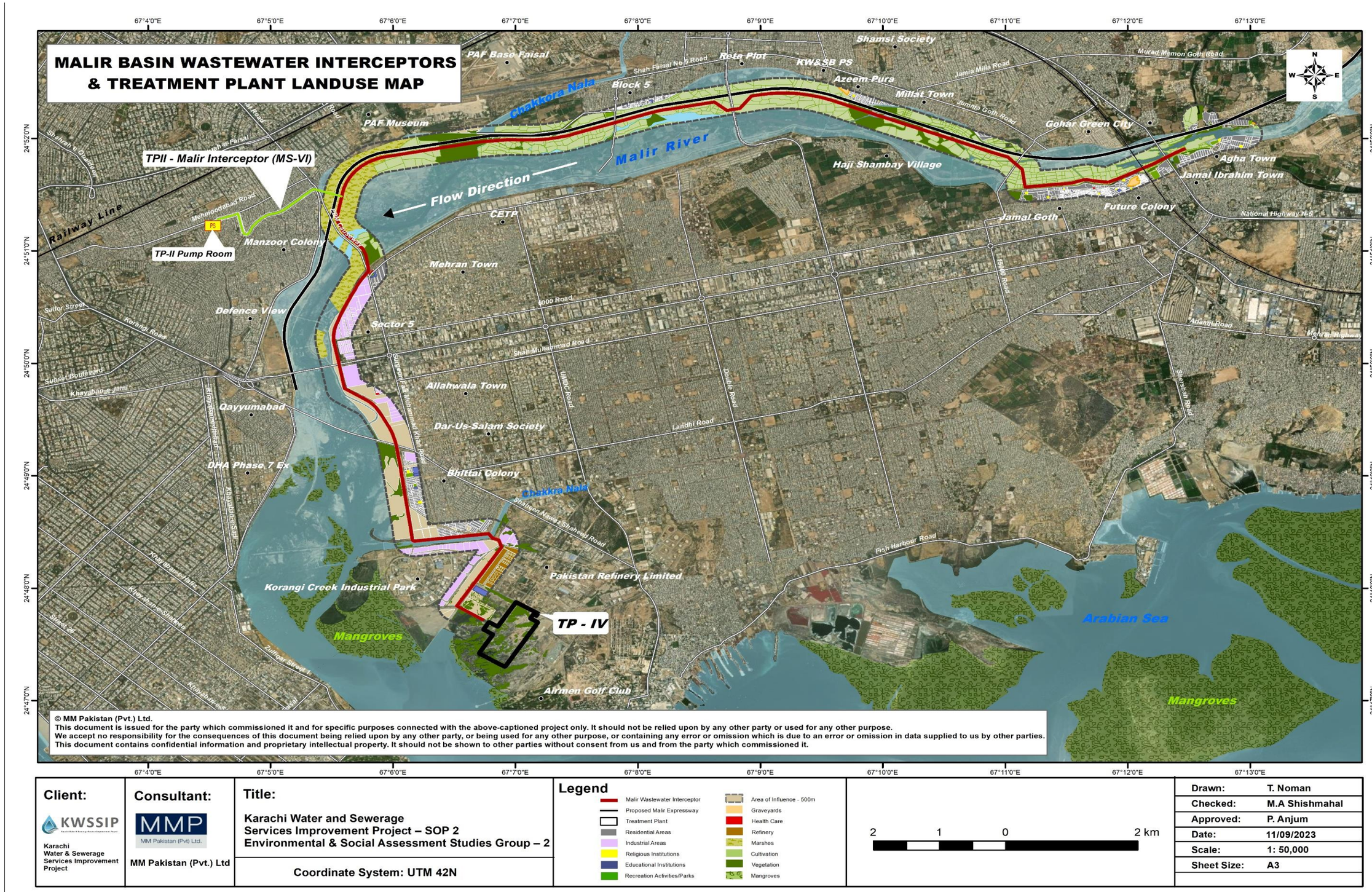
153. Some patches of mangroves are located along the left bank of Korangi Creek, south-southwest of the proposed TP-IV construction site. The Sindh Forest Department, Port Qasim Authority and Sindh Revenue Board are responsible for the protection and conservation of all the Indus Delta mangroves. Areas under the control of Sindh Forest Department and Port Qasim Authority are declared as "Protected Forests", whereas the area under the control of Board of Revenue is classified as "Government wasteland".

154. A 2.6-hectare (or 6.5 acre) patch of mangroves is located approximately 200 meters south-southwest of the TP-IV site. This mangrove area is under the jurisdiction of Sindh Forest Department and is composed almost entirely of *Avicennia marina.* Using ArcGIS, the density of the mangrove patch was estimated at 417 trees per acre, which categorizes the mangrove site into a forest area with moderate tree cover. The project will not have any impact on the mangrove area since the construction area is far from the site and the mangrove area is outside the AoI. The proposed effluent discharge point will not pose any impacts on the mangrove area since it is in an open marsh within Kolangi Creek, approximately 400 meters from the south-southwestern boundary of the TP-IV construction site. The project shall have positive impacts on the mangrove areas as the project aims to solve the problem of untreated wastewater discharge into Kolangi Creek.

155. **Figure 4-2** provides pictorial overview of TP-IV Site, **Figure 4-3** shows the land-use map of interceptor and TP-IV sites, while **Figure 4-4** shows the distance of the nearest mangroves patch from the boundary wall of TP-IV and the Discharge point for treated effluent.



Figure 4-2: Overview of TP-IV Site



Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP (Pvt) Ltd. — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 **Coordinate System: UTM 42N**	**Legend:** Malir Wastewater Interceptor; Proposed Malir Expressway; Treatment Plant; Residential Areas; Industrial Areas; Religious Institutions; Educational Institutions; Recreation Activities/Parks; Area of Influence - 500m; Graveyards; Health Care; Refinery; Marshes; Cultivation; Vegetation; Mangroves	2 1 0 2 km	Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 11/09/2023 Scale: 1: 50,000 Sheet Size: A3

Figure 4-3: Land use Map for the Project Area

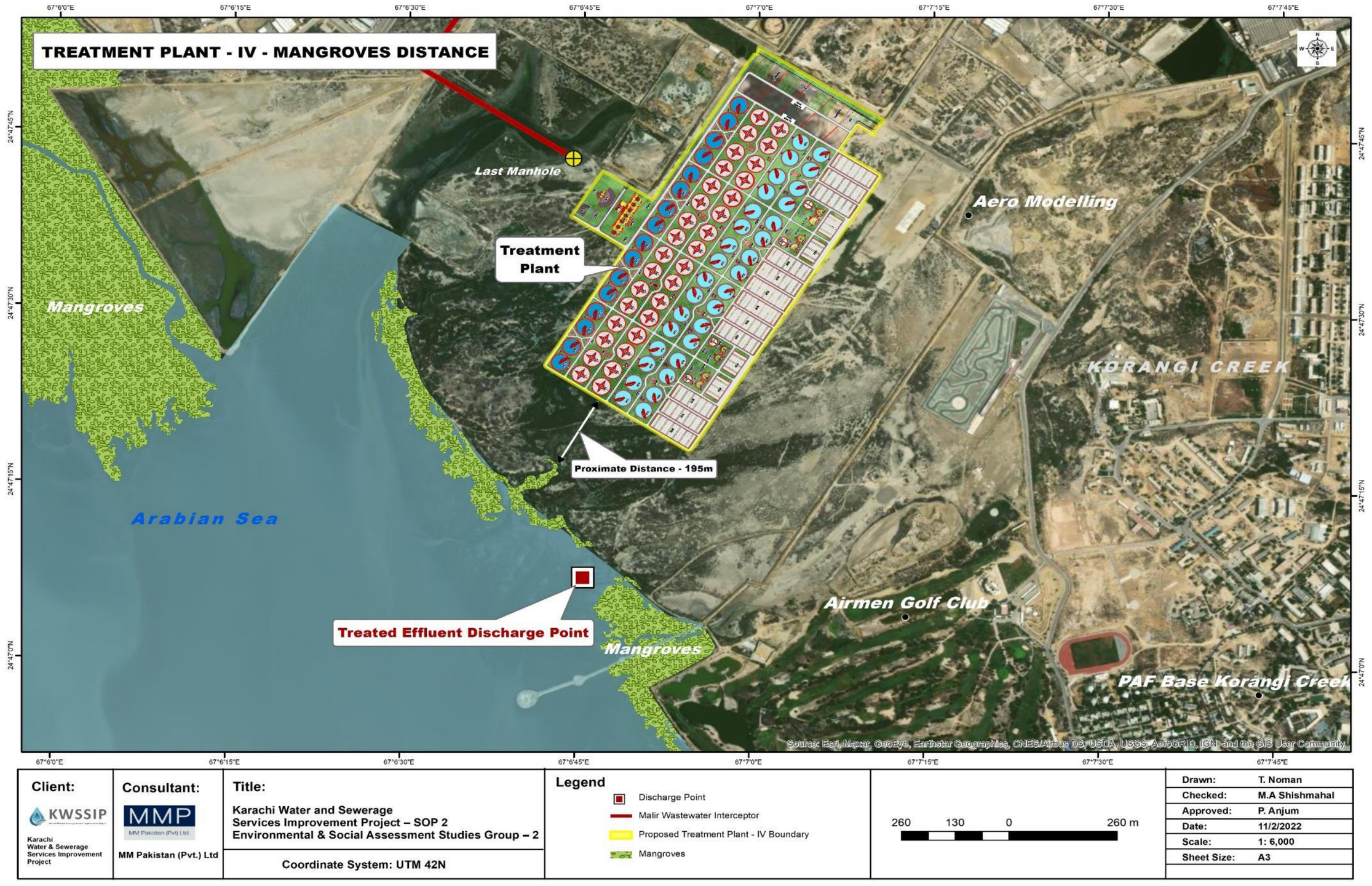


Figure 4-4: Distance of Mangroves from Boundary Wall of TP-IV

4.1.2 Geology/Topography

156. The interceptor is within the banks of Malir River. The central segment of the river basin exhibits a diverse composition of sedimentary deposits, including coarse conglomerates, sandstone, claystone, and limestone. In contrast, the lower plain of the river is characterized by alluvial deposits. The river assumes a wider, shallower, and braided course within the lower plain.

157. The surrounding catchment area presents challenging topography, featuring rugged terrain and rocky lands covered with sandy soil. To ensure structural integrity, engineering specifications have stipulated a bearing capacity of 4 tons per square foot (4 tons/ft²) and a subgrade modulus of 40,000 kilo-newton per square meter (40,000 km/m²) for depths exceeding 8 meters.

158. The EPC Contractor will conduct comprehensive assessments of soil strength throughout the construction phase. In case the strength of the soil fails to meet the required standards, the possibility of redesigning specific project sections will be explored. This proactive approach is essential to guarantee the project's stability and resilience against the various geological and soil conditions encountered during construction.

4.1.3 Hydrology

159. Malir River has a unique hydrological profile, characterized by the semi-arid climate and seasonal flow patterns. The river flows during the monsoon season, typically from July to September. Outside the monsoon season, the river has reduced or intermittent flow, occasionally drying up in certain stretches.

160. The hydrology of the river is linked to its catchment area, encompassing urban and suburban regions in Karachi. Rapid urbanization and infrastructure development have altered the flow dynamics, leading to occasional flash floods during heavy rainfall events.

161. Aside from the hydrological dynamics, the impact of sewage flow in Malir River should also be considered. Sewage and wastewater discharge into the river has become a significant concern due to rapid urbanization and population growth of Karachi.

Flooding

162. The interceptor alignment near Korangi Crossing Road and EBM Causeway is susceptible to flash floods caused by heavy rains. The most recent occurrence of flooding was recorded in July 2022. **Figure 4-5, Figure 4-6,** and **Figure 4-7** provide an overview of the latest flood situation recorded at these two locations.



Figure 4-5: Flood Points at Korangi Crossing Road and EBM Causeway

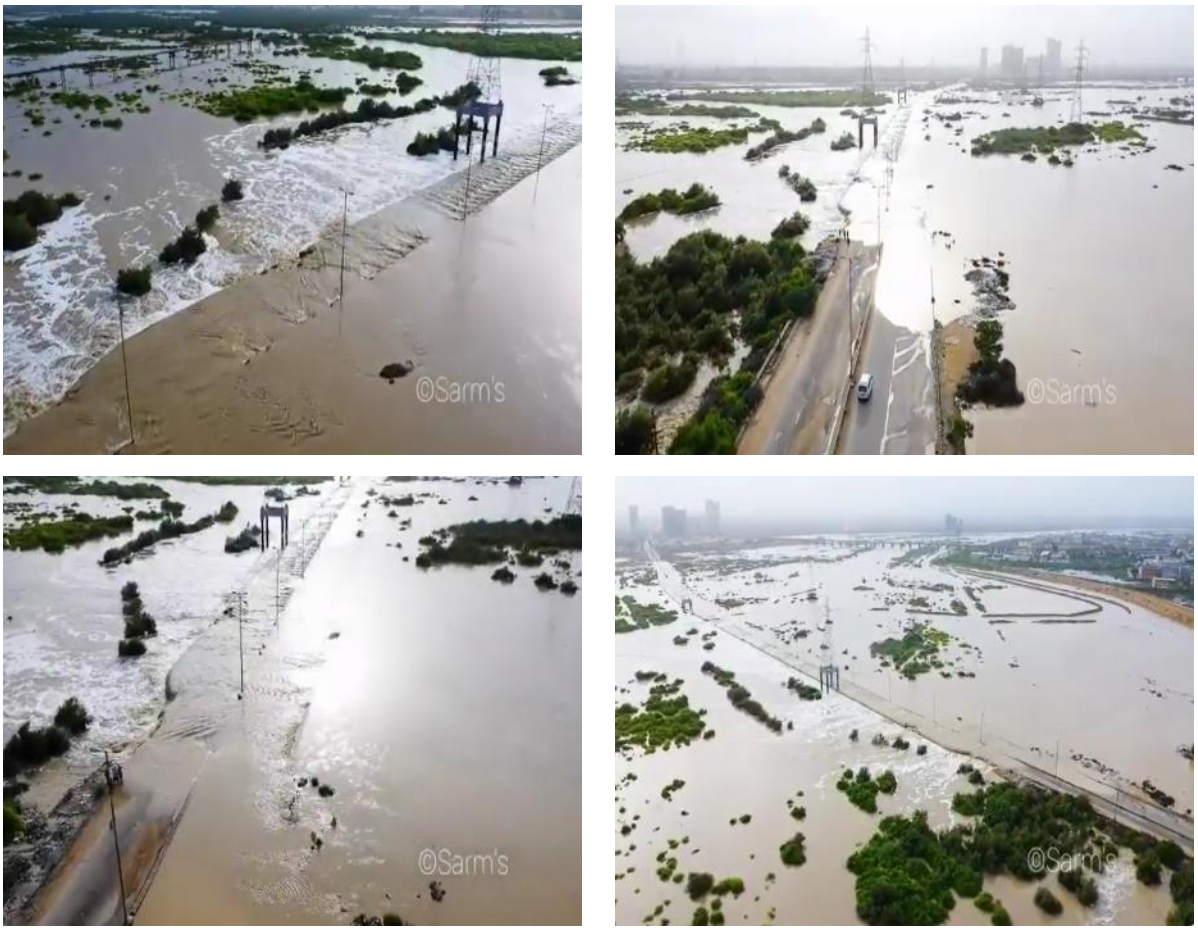


Figure 4-6: Flood Situation at Korangi Crossing Road (27 July 2022)

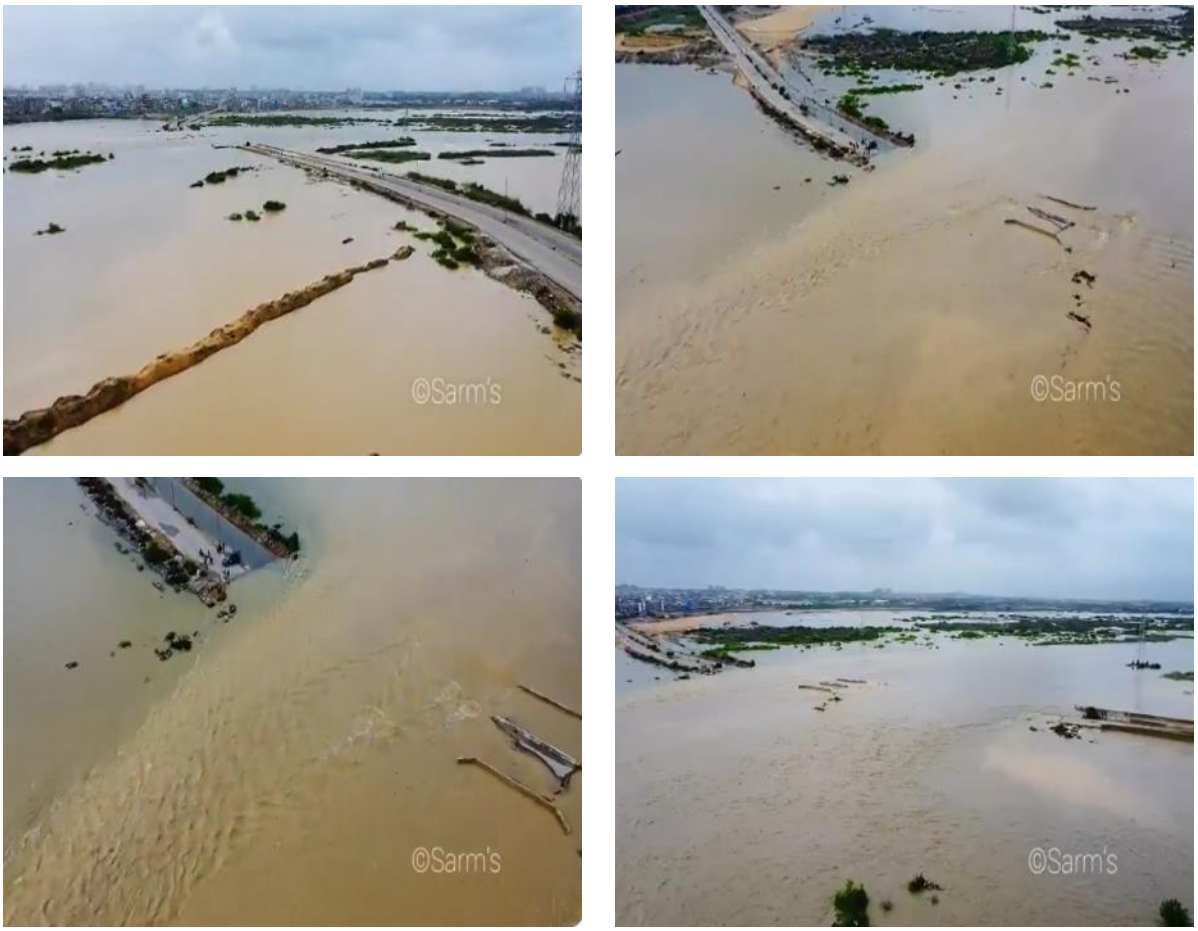


Figure 4-7: Flood Situation at EBM Causeway (27 July 2022)

163. To avoid Impacts of flooding on the sections of interceptor alignment near Korangi Crossing and EBM Causeway, construction works shall be scheduled during the dry season, and it shall be ensured that all the construction activities are completed well before monsoon. Standard methods for preventing flooding of construction sites shall also be employed which include flood barriers and walls, as well as channels to divert water from flooding.

164. During the operations phase, river flow during wet weather and flash flooding considerations have been kept in the design of interceptor and TP-IV. The depth of Interceptor at these locations shall be between 8m to 13m from the bed level. Moreover, interceptor manholes shall be 3m high from bed level to avoid being submerged during the flash floods. In addition, bitumen waterproofing shall also be done for the conduit and the manholes. TP-IV site will be provided with adequate storm water protection measures such as flood barriers and walls to protect from intrusion of storm water.

4.1.4 Climate

165. According to the Koppen Climate Classification, the project area is situated within the Subtropical – Arid Climate Zone characterized by mild winters and hot summers. The climate in the project area is significantly influenced by its proximity to the coastline, leading to prevailing sea breezes and generally high relative humidity levels. The wind rose diagram (**Figure 4-8**) illustrates that for more than half of the year, including the monsoon season, prevailing winds blow from the

southwest to the west. During the winter months, the wind direction shifts towards the east and northeast. Throughout the rainy season (July and August) the region experiences consistently overcast skies accompanied by generally light to heavy rainfall, which is influenced by the monsoon weather system.

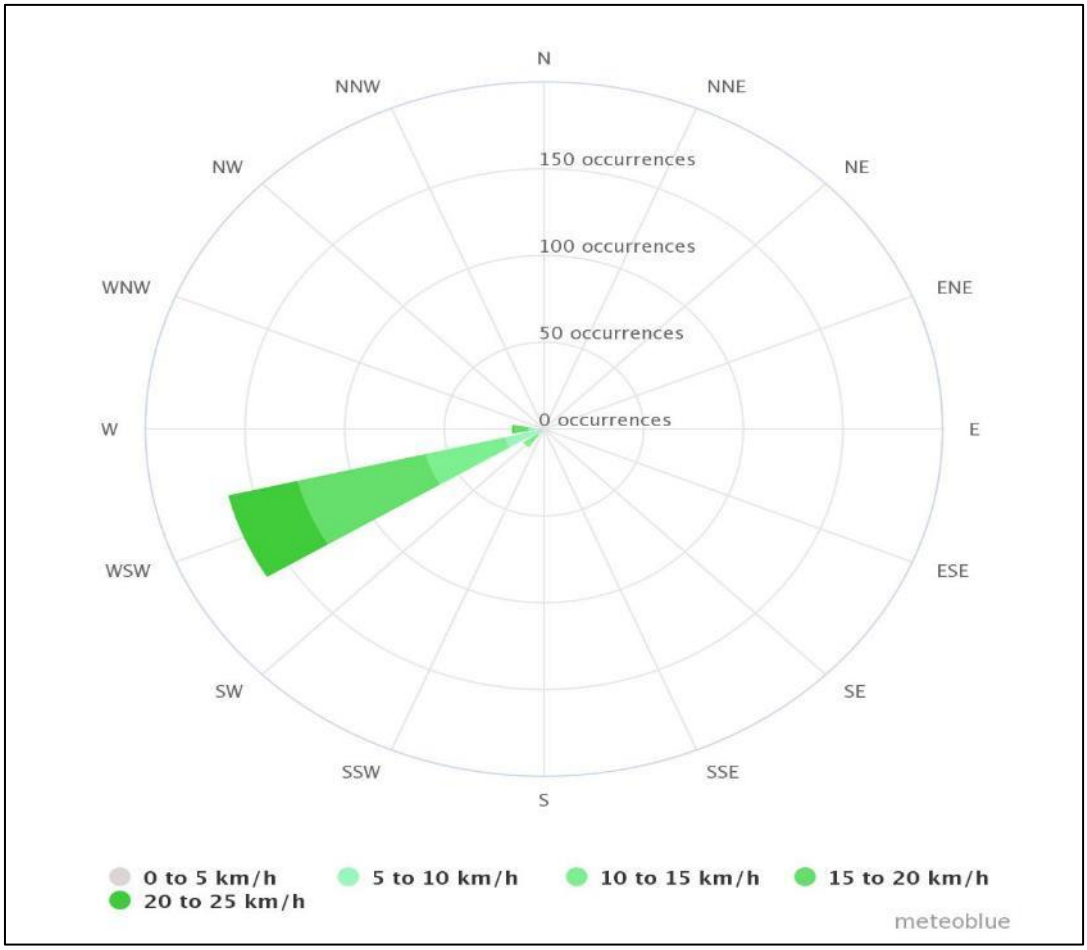


Figure 4-8: Wind Direction in the Project Area

4.1.5 Temperature

166. Temperature data from the nearest weather station from January 2012 to June 2022 reveals distinct seasonal variations. January and December are the cooler months, with daytime temperatures between 28°C to 31°C and nighttime temperatures from 7°C to 8°C. The warmest months are from April to June, with daytime temperatures between 40°C to 41°C and nighttime temperatures from 21°C to 26°C. The historical temperature data is in.

Table 4-1: Monthly Average Temperatures in the Project Area

Month	Maximum Average Temperatures (°C)	Minimum Average Temperatures (°C)
January	28.5	8.2
February	32.3	11.5
March	37.8	14.5
April	41.1	20.6
May	41.3	25.5
June	40.5	26.4
July	37.1	25.8
August	36.5	25.1
September	38.6	23.8
October	38.7	17.1
November	35.3	12.6
December	31.5	7.2
Source: PMD – Jinnah IAP (Jan 2012 to Jun 2022)		

167. Over the past few years, there has been a notable increase in the frequency of heatwaves in Karachi and its surrounding areas, particularly during the months of May through September. A heatwave is characterized by the occurrence of unusually hot, humid, or dry conditions persisting for three to five consecutive days during the summer season. One of the most devastating heatwaves in Karachi was from June 17 to 24, 2015, resulting in a loss of more than 1,200 lives.

168. To address the potential risks associated with heatwaves, the Pakistan Meteorological Department (PMD) issues early warnings when a heatwave is anticipated in the city. Given that heatwaves can render on-site workers susceptible to heat-related illnesses such as heat strokes, it is imperative that necessary mitigation measures are implemented throughout the project phases to safeguard the well-being of the workforce. Comprehensive details regarding these measures can be found in **Chapter 6** of this report.

4.1.6 Rainfall

169. The annual precipitation in the last five years (Table 4-2) reveals significant variability, with relatively low precipitation in 2018 (3.56mm) followed by substantial increase in subsequent years. Precipitation surged to 463.81 mm in 2019, 427.77 mm in 2020, 473.45 mm in 2021, and 769.65 mm in 2022. Additionally, there was a significant increase in the number of rainy days from four in 2018 to 33 to 56 days over the subsequent years.

170. These variations prove the significance of understanding local weather patterns and its potential impacts on the project activities across the region. Control measures at the excavation sites to safeguard the workers and the community shall be considered. Details of relevant mitigation measures are provided in **Chapter 6** of the report.

Table 4-2: Annual Precipitation (2018-2022)

Year	Annual Precipitation (mm)	Number of Days with Rain
2018	3.56	04
2019	463.81	56
2020	427.77	42
2021	473.45	33
2022	769.65	49

4.2 Environmental Quality

171. Air, Noise, and Water quality monitoring were done at three locations from February 17 to 20, 2022. Monitoring points were selected based on their proximity to the core project intervention areas, as well as to the nearby residential settlements or sensitive receptors. Monitoring locations are shown in **Figure 4-9.**

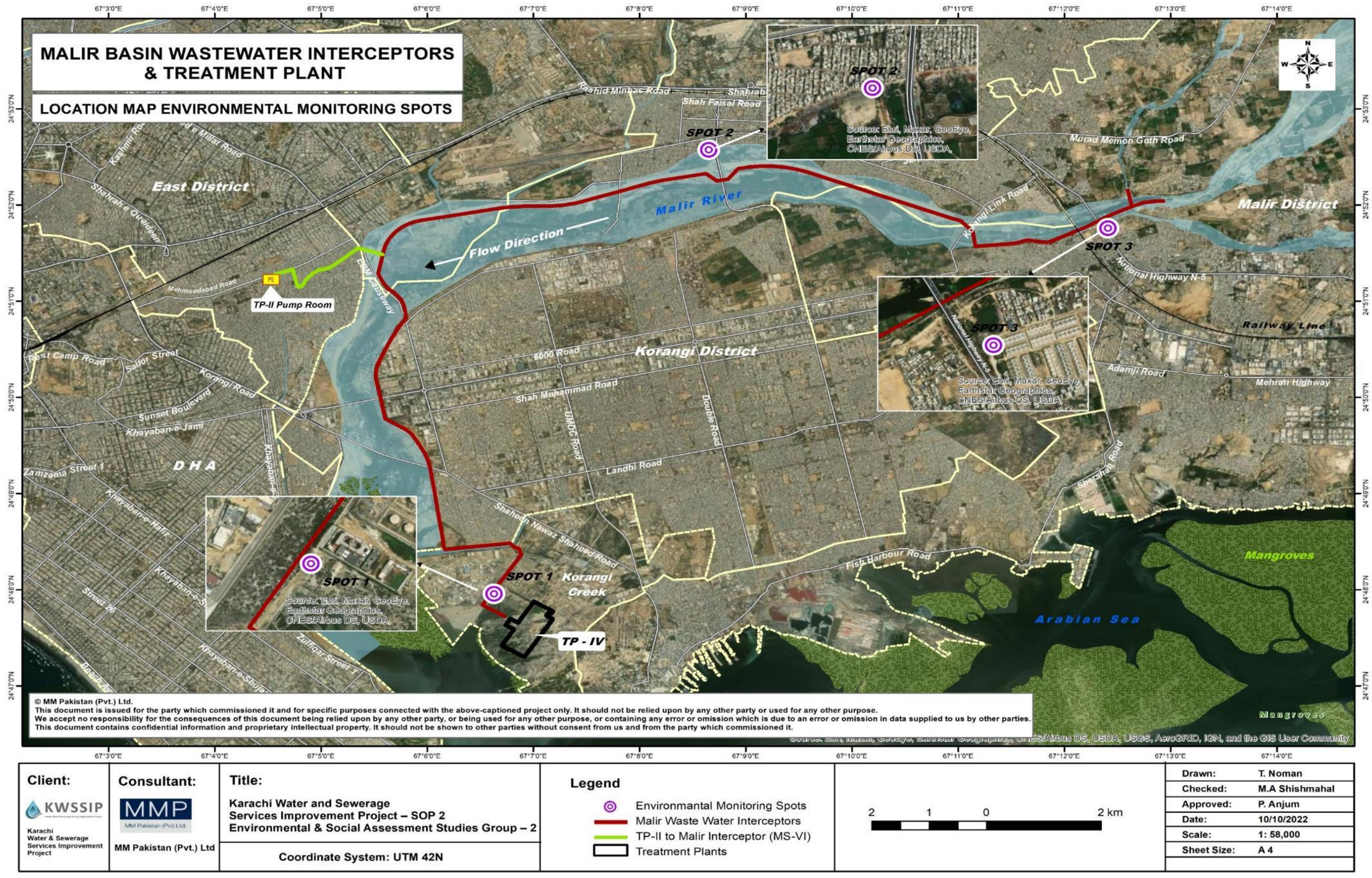


Figure 4-9: Environmental Monitoring Locations

4.2.1 Air Quality

172. Sampling was performed for a 24-hour period at each site following the Sindh EQS for ambient air. **Table 4-3** shows the observed average concentrations of ambient air quality parameters and compares these with the SEQS / WBG standards.

Table 4-3: Ambient Air Quality Level

S. No.	Measuring Parameter	Unit	SEQs / WBG Limit 2	Monitoring Values		
				Point-1	Point-2	Point-3
1	Nitrogen Oxide (NO)	(µg/ m³)	40	Nil	37.5	20.8
2	Sulfur Dioxide (SO2)	(µg/ m³)	40	Nil	8.3	4.2
3	Carbon Monoxide (CO)	(mg/m³)	4 (for 8 hrs)	Nil	0.75	2
4	Suspended Particulate Matter (SPM)	(µg/m³)	500 µg/m³	225	264	270
5	Particulate Matter (PM2.5)	(µg/m³)	15	17.21	25.50	40.42
6	Particulate Matter (PM10)	(µg/m³)	45	18.83	29.38	54.79
7	Ozone (O3)	(µg/m³)	130	18	20.75	17
8	Lead (Pb)	(µg/m³)	1.5	0.43	0.29	0.8

Point # 1: Adj. Salim Habib University – Korangi Creek (N 24.799280 E 67.110500)
Point # 2: Reta Plot Residential Settlement - Near Shah Faisal Bridge at Malir River (N 24.876197 E 67.144185)
Point # 3: River Valley Township – Near National Highway (N5) Bridge Malir River (N 24.862628 E 67.206837)

173. Results of the air quality monitoring indicated compliance with the applicable provincial standards. Occasional visible dust emissions observed along the various segments of the interceptor alignment were attributed to vehicular traffic on unpaved roads. Volume of traffic along these locations were generally low. Consequently, it is anticipated that construction traffic during the project will not significantly exacerbate the existing traffic conditions and significantly affect the air quality in the project area.

4.2.2 Noise

174. Noise at the sites was monitored over a 24-hour period. The results have indicated noise levels exceeding the prescribed limits for nighttime readings in residential areas. For daytime measurements, one location recorded noise levels higher than the limits, while the other two locations were near the limit values. These findings are presented in

175. **Table** 4-4.

176. Given that the baseline noise levels are already trending towards the higher end, the project is committed to the strict implementation of noise control measures. This proactive approach is intended to prevent any exacerbation of the existing baseline noise conditions and ensure compliance with relevant noise standards.

177. Photographs of the monitoring activities are shown in **Figure 4-10Error! Reference source not found.**.

Table 4-4: Noise Monitoring

Parameters	Units	SEQS	Monitoring Locations		
			Adj. Salim Habib University – Korangi Creek	Reta Plot Residential Settlement - Near Shah Faisal Bridge at Malir River	River Valley Township – Near National Highway (N5) Bridge Malir River
Noise	dB(A)	Day Time *55*	53.35	51.95	62.17
		Night Time *45*	47.3	45.5	49.9

178. Monitoring photographs are shown as **Figure 4-10**.



Figure 4-10: Different Views of Environmental Monitoring

4.2.3 Groundwater Quality

179. Groundwater sampling and analysis were conducted following the established APHA methods. The results of this monitoring, which are presented in Table 4-5, were compared against the relevant Sindh Environmental Quality Standards (SEQS) and World Bank Group/World Health Organization (WBG/WHO) standards, with preference given to the more stringent standards for comparison purposes. The analysis reveals presence of bacterial contamination in all three samples, while all other parameters tested were found to be within the established limits. However, the Total Dissolved Solids (TDS) level at point 2 exceeded the prescribed limits.

180. Sources of drinking water in these areas are primarily groundwater bores. Given the proximity of the monitoring locations to the Malir River, which carries untreated sewage and industrial wastewater, it is highly likely that the nearby aquifers have been affected by bacterial contamination. As a result, residents in these areas, like many lower-middle to middle-class neighborhoods in Karachi, often resort to purchasing mineral water for drinking purposes. The implementation of the project is expected to have positive impacts on groundwater quality. The role of the interceptor in containing sewage flow and channeling it to the treatment plant will reduce the likelihood of sewage seepage into groundwater aquifers.

Table 4-5: Groundwater (Drinking Water) Quality Results

S. No	Measuring Parameters	Unit	Testing Method	SEQs Limits	Results		
					Point-1	Point-2	Point-3
1	Color	TCU	Pt-Co	< 15 TCU	6	2	<1
2	Taste	Taste	Sensory Evolution	Objection/Non-Objection	Non-Objection	Non Objection	Non Objection
3	Odor	Odor	Sensory Evolution	Objection/Non-Objection	Non Objection	Non Objection	Non Objection
4	Turbidity	NTU	APHA-2130	< 5 NTU	1	ND	<1
5	Total Hardness as CaCO3	mg/l	APHA-2340	< 500	135	165	150
6	Total Dissolved Solids (TDS)	mg/l	APHA-2450C	< 1000	321	2265	351
7	pH @ 25°C	pH	ASTM-1293	6.5 - 8.5	7.78	7.17	7.53
8	Aluminum (AL)	mg/l	ASTM D-857	<0.2	0.1	0.085	0.04
9	Antimony (Sb)	mg/l	APHA 3111 Sb	<0.005	Nil	Nil	ND
10	Arsenic (Ar)	mg/l	Merck Kit Method	0.01	Nil	Nil	0.022
11	Barium (Ba)	mg/l	APHA-D3651	0.7	Nil	Nil	0.019
12	Boron (B)	mg/l	APHA 4500-B	0.3	Nil	Nil	0.09
13	Cadmium (Cd)	mg/l	ASTM D-3557	0.003	Nil	Nil	0.01
14	Chloride (Cl^-)	mg/l	APHA 4500-Cl^-	< 250	76.43	175.6	69.4
15	Chromium (Cr)	mg/l	APHA 3500-CrB	< 0.05	Nil	Nil	0.021
16	Copper (Cu)	mg/l	Test Kit Method	2	Nil	Nil	0.61
17	Cyanide (Cn)	mg/l	APHA 4500 CN	<0.05	Nil	Nil	0.013
18	Fluoride (F)	mg/l	APHA 4500 F^-	< 1.5	0.81	0.951	0.61
19	Lead (Pb)	mg/l	APHA 3500 Pb B	< 0.01	Nil	Nil	ND
20	Manganese (Mn)	mg/l	APHA 3500 MnB	< 0.5	Nil	Nil	0.29
21	Mercury (Hg)	mg/l	Test Kit Method	< 0.001	Nil	Nil	ND

S. No	Measuring Parameters	Unit	Testing Method	SEQs Limits	Results		
					Point-1	Point-2	Point-3
22	Nickel (Ni)	mg/l	APHA 3500 Ni	< 0.02	Nil	Nil	0.009
23	Nitrate (N03)	mg/l	Test Kit Method	< 0.50	Nil	Nil	ND
24	Nitrite (NO2)	mg/l	Test Kit Method	< 3	Nil	Nil	ND
25	Selenium (Se)	mg/l	APHA 3500 Se	0.01	Nil	Nil	ND
26	Residual Chlorine	mg/l	Test Kit Method	0.2 - 1.5	0.45	0.32	0.29
27	Zinc (ZN)	mg/l	APHA 3500 Zn	3	1	1	2
28	Fecal Coliforms	Count/ml	APHA 922 B	0 Per 100 ml	Nil	Nil	ND
29	E Coli	Count/ml	Total Viable Count	0 Per 100 ml	Nil	Nil	2
30	Total Bacterial Count	Count/ml	APHA 922 B	0 Per 100 ml	18	13	1
31	Pesticides	mg/l	Kit Method	0.001	Nil	Nil	3
Point # 1: Adj. Salim Habib University – Korangi Creek (N 24.799280 E 67.110500) Point # 2: Reta Plot Residential Settlement - Near Shah Faisal Bridge at Malir River (N 24.876197 E 67.144185) Point # 3: River Valley Township – Near National Highway (N5) Bridge Malir River (N 24.862628 E 67.206837)							

4.2.4 Water Quality of Korangi Creek

181. A water sample from Korangi Creek was analyzed. Access to the TP-IV discharge point was not possible due to security restrictions by PAF and high level of creek water due to high tide. Therefore, a sample was collected from the right bank of Korangi Creek near Creek Garden, Zulfiqar Street DHA Phase 08 – Lat 24.7854 Lon 67.0913. The sample was compared to the SEQS 'Sea Water Discharge' Parameters. Results are shown in **Figure 4-11** below. Results indicate higher levels of BOD_5, COD, TSS and other pollutants, which indicates the degraded quality of water at Korangi Creek.

Water Analysis Report

Ref no:	NESC/EHS-0043/JULY-22	**Reporting Date**	4-Aug-22
Client	M.M.Pakistan (Pvt) Ltd		
Address	3rd Floor, Dolmen State, Union Commercial Area, Shaheed-e-Millat Road		
Sample	Waste Water	**Quantity Of Sample**	1000 ml
Sampling By	NESC Field Supervisor	**Sampling Methodology**	Grab
Samplinig Date	27-Jul-22	**Analysis Type**	Chemical/Physical
Sample Received	27-Jul-22	**Location Of Sampling**	Korangi Kreek

S.No	Measuring Perameters	Unit	Methods	SEQs Limits	Result	Remarks
1	Temperature	°C	APHA -2550-B	< 3°	26	OK
2	pH @ 25 ^{0}c	pH	AST-D-1293	6 to 9	6.6	OK
3	Biochemical Oxygen Demand (BOD)	mg/l	APHA-5210	80	331	High
4	Chemical Oxygen Deman (COD)	mg/l	AST-D-1252	150	992.52	High
5	Total Suspended Solids (TSS)	mg/l	APHA-25400	200	1200	High
6	Total Dissolved Solids (TDS)	mg/l	APHA-2540	3500	10500	High
7	Oil and Grease	mg/l	ASTM-D-4281	10	102	High
8	Phenolic Compounds as Phenols	mg/l	ASTM-D-1781	0.1	0.1	OK
9	Chloride (as Cl^{-})	mg/l	ASTM-D-1512	1000	13127.135	High
10	Flouride (as F^{-})	mg/l	APHA-4500-F	10	158	High
11	Cynide (as CN^{-})	mg/l	APHA-4500-E	1	0.25	OK
12	An Ionic Detergents as (MBAS)	mg/l	APHA-5540-C	20	16	OK
13	Sulphates ($So4^{2-}$)	mg/l	ASTM	600	2.64	OK
14	Sulphide (S^{2-})	mg/l	APHA-4500-S^{2}	1	NIL	OK
15	Ammonia (NH_3)	mg/l	APHA-4500-NH_3	40	0.005	OK
16	Pesticides	mg/l	Kit Method	0.15	ND	OK
17	Cadmium (Cd)	mg/l	APHA-3500-Cd	0.1	0.001	OK
18	Chromium (Cr)	mg/l	APHA-3500-Cr	1	0.08	OK
19	Copper (Cu)	mg/l	APHA-3500-Cu	1	0.045	OK
20	Lead (Pb)	mg/l	APHA-3500-Pb	0.5	0.15	OK
21	Mercury (Hg)	mg/l	Strip Method	0.01	0.004	OK
22	Selenium (Se)	mg/l	APHA-3500-Se	0.5	0.19	OK
23	Nickel (Ni)	mg/l	APHA-3500-Ni	1	0.002	OK
24	Silver (Ag)	mg/l	APHA	1	ND	OK
25	Total Toxic Metals	mg/l	Calculated	2	0.99	OK
26	Zinc (Zn)	mg/l	APHA-3111-B	5	0.006	OK
27	Arsenic (Ar)	mg/l	Kit Method	1	0.017	OK
28	Barium (Ba)	mg/l	APHA-3500-Ba	1.5	0.008	OK
29	Iron (Fe)	mg/l	APHA-3500-Fe	8	0.001	OK
30	Manganese (Mn)	mg/l	APHA-3500-Mn	1.5	0.01	OK
31	Boron (B)	mg/l	APHA-4500-B	6	3.13	OK
32	Chlorine (Cl)	mg/l	APHA-4500-Cl-G	1	3500	High

Figure 4-11: Results of Water Quality Monitoring of Korangi Creek

4.3 Ecological Environment

182. The existing flora and fauna within the study area was determined through detailed field assessments carried out on the following dates:

- December 22 to 23, 2021
- January 18 to 25, 2022
- June, 13 to 15 2022
- July 19, 2022

4.3.1 Flora

183. The natural vegetation in the Malir River is found to be fragmented due to encroached crop fields and encroachment of residential structures on the embankment. Overall, the river itself and its adjoining areas on the banks support a variety of vegetation consisting of bushes, shrubs, trees, agricultural crops, and vegetables, among others.

184. A detailed inventory of trees that will be cut was done. Flora species were identified through visual observations; plants that were not identified were photographed and identified using PLANTNET software[7].The natural vegetation within AoI (both DIA and IDA) was recorded through direct observations. Vegetation growing in the AoI if the Interceptor are listed in **Table 4-6**.

Table 4-6: Vegetation Growing within the AoI

S. No.	Species	Common Name	IUCN Status
Trees			
1.	*Azadarichta indica*	Neem tree	LC
2.	*Cocos nucifera*	Coconut	NE
3.	*Conocarpus lancifolius*	Damas	LC
4.	*Cordia myxa*	Lesora	LC
5.	*Corymbia citriodora*	Lemon scented tree/safeeda	LC
6.	*Melia azedarach*	Bakain	LC
7.	*Parkensonia aculeate*	Palo Verde	LC
8.	*Phoenix dactylifera*	Khajoor	LC
9.	*Pithecellobium dulce*	Jungle jalebi	LC
10.	*Prosopis glandulosa*	Honey Mesquite	LC
11.	*Acacia nilotica*	Kikar	LC
Shrubs			
1.	*Abutilon indicum*	Kanghai	NE
2.	*Arthrocnemum indicum*	(Saltwort),	NE
3.	*Calotropis procera*	Akk	NE
4.	*Datura alba*	Tooh	NE
5.	*Prosopis juliflora*	Keekar	NE
6.	*Ricinus communis*	Castor bean	NE
7.	*Salvadoa persica*	Khabar	LC
8.	*Solanum albicaule*	Bittersweet	NME
9.	*Tamarix aphylla*	Lai	NE
10.	*Withania coagulans*	Indian rennet	NE
11.	Ziziphus nummularia	Jungli Beer	NE
Herbs			
1.	*Aerva javanica*	Booh	NE
2.	*Amaranthus virdis*	Slender amaranth	NE
3.	*Caroxylon imbricatum*	Saltwort	NE
4.	*Corchorus olitorius*	Jute mallow	NE

[7] PlantNet is an application that allows to identify plants simply by photographing them with smartphone. It allows to identify and better understand all kinds of plants living in nature: flowering plants, trees, grasses etc. PlantNet claims 99% accuracy identifying common species and overall 95% rate with a database of more than 10,000 plant species. PlantNet application is uses in the following sequence:

S. No.	Species	Common Name	IUCN Status
5.	*Haloxylon stocksii*	Khar, Sajji	NE
6.	*Heliotropium indicum*	Indian turnsole	NE
7.	*Suaeda fruticosa*	Shrubby seablite	NE
Grasses			
1.	*Chloris Barbata*	Swollen fingergrass	NE
2.	*Cynodon dactylon*	Khabal	NE
3.	*Cyperus rotundus*	Nut grass	LC
4.	*Dactyloctenium aegyptium*	Crow foot grass	NE
5.	*Desmostachya bipinnata*	Half grass /Dabh	LC
6.	*Phragmites australis*	Reed/ kaano	LC
7.	*Sorghum halepense*	Johnson grass	NE
8.	*Sporobolus sp*	Smut grass	LC
9.	*Typha latifolia*	Broadleaf cattail	LC

185. The TP-IV construction site that spans over an area of 42.9 hectares (106 acres) is a flat land located at the left bank of Korangi Creek, nearly 2.5 km downstream where the Malir River joins Korangi/Gizri Creeks. The site is influenced by the seawater at high tide and generally barren with loamy sand soils. The following species were recorded:

a. **Trees:** *Conocarpus lancifolius*, *Acacia nilotica (*Kikar*), Prosopis juliflora* (Jangli Kiker*)*

b. **Shrubs:** *Aerva javanica* (Aerva javanica), *Arthrocnemum indicum* (Saltwort), *Prosopis glandulosa* (Mesquite), *Tamarix dioica* (Lai), *Salvadora persica* (Khabbar-shrubby)

c. **Grasses/Sedges:** *Aeluropus lagopoides* (grass of salt deserts), *Scirpus sp. Desmostachya bipinnata* (Dab), *Phragmites australis, Typha sp.* (Catail).

186. The creek system is also characterized by mangroves, which is discussed in detail in **Section 4.2.4** of this report. Mangroves will not be disturbed or cut.

4.3.2 Fauna

187. Data on fauna was gathered through random sampling, visual encounters, incidental observations, and recording of pug marks in the Area of Influence (AoI). Avifauna survey was conducted through recognition of bird calls, line transect, and point count method. Birds identified in the field were confirmed using the handbook for bird identification (Grimmett *et al.*, 2008). The conservation status of faunal species was checked using the IUCN Red List of Endangered Species. The map showing locations of the faunal surveys is in **Figure 4-12**.

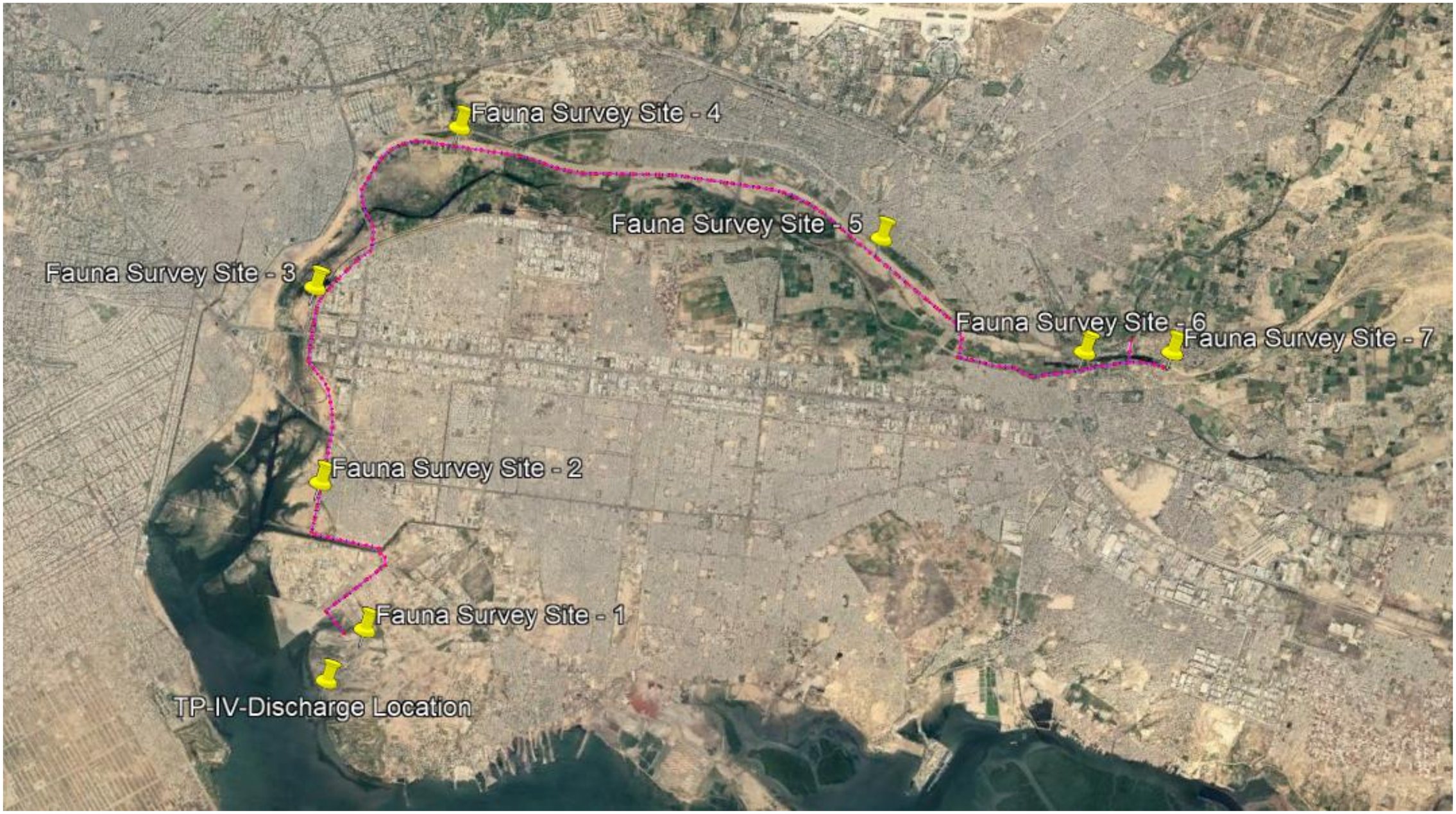


Figure 4-12: Locations of faunal surveys in the AoI

4.3.3 Terrestrial Mammals

188. A total of 11 species of mammals were recorded during the ESIA field visits. All recorded mammals are common in the area. These species may be encountered during clearance of vegetation and excavation. No significant impacts on the recorded species as these can naturally disperse to another habitat during construction activities.

189. A complete list of the mammalian species observed in the project area is given in **Table 4-7**.

Table 4-7: List of mammalian species observed/reported in the project area

No.	Common Name	Scientific Name	Occurance			Listing
			Common	Less Common	Rare	IUCN Red list
1.	Asiatic Jackal	*Canis aureus*		x		LC
2.	Balochistan Gerbil	*Gerbillus nanus*		x		LC
3.	House Mouse	*Mus musculus*	x			LC
4.	Five stripped-palm Squirrel	*Funambulus pennantii*	x			LC
5.	Long-eared desert Hedgehog	*Hemiechinus collaris*	x			LC
6.	Small Indian Mongoose	*Herpestes javanicus*	x			LC
7.	Indian Crested Porcupine	*Hystrix indica*	x			LC
8.	Indian Gerbil	*Tatera indica*	x			LC
9.	Little Indian field Mouse	*Mus booduga*	x			LC
10.	Indian Grey Mongoose	*Herpestes edwardsi*	x			LC
11.	House Rat	*Rattus rattus*	x			LC

4.3.4 Reptiles

190. A total of 10 reptile species were recorded in the project area, nine of which are common while one, the Indian/Bengal Monitor, is less common. The Indian Fringe-toed sand lizard and Indian garden lizard are commonly found in arid habitats. Snakes are also common in dry and vegetative areas. The species of reptiles survive in disturbed environment as well. The project activities may disturb the species. However, these species can adapt to changes in their habitat.

191. A complete list of reptiles observed / recorded during the ESIA is given in **Table 4-8**.

Table 4-8: List of Reptiles Observed / Reported in the Project Area

No.	Common Name	Scientific Name	Listing		
			WP Act	IUCN Red list	CITES Appendix
1	Indian Spiny-tailed Lizard	*Uromastyx hardwickii*	x		II
2	Indian Cobra	*Naja naja naja*			II
4	Indian Fringe-toed Sand lizard	*Acanthodactylus cantoris cantoris*			
5	Indian/Bengal Monitor	*Varanus bengalensis*	x		I
6	Saw scaled Viper	*Echis carinatus pyramidum*			
7	Garden Lizard	*Calotes versicolor*			
8	Krait	*Bungarus caeruleus*			
9	Sindh Sand Gecko	*Crossobamon orientalis*			
10	Spotted Indian House Gecko	*Hemidactylus brookii brookii*			

4.3.5 Avifauna / Birds

192. The project areas is composed of various habitats that supports a variety of resident and migratory avifauna. The seasons/perennial wetlands are located in the depressions of Malir River Basin and in pond areas of dams upstream in Thaddo and Malir. The rocky and sandy areas around the dams, as well as the catchment areas serve as habitat for different avifauna; these areas are located away from the AoI. Agricultural areas within the riverbank and along fringes of embankments provide food and shelter for several species.

193. The project area is a blend of different habitats (highly degraded) but still supports a variety of avifauna; both resident and migratory. The seasonal / perennial wetlands are located especially in depressions of Malir River Basin and pond areas of dams upstream at Thaddo and Malir. The rocky and sandy areas around these dams and their catchment areas are habitat of different fauna and those are not being considered here due to their location away from area of influence. The agricultural fields inside riverbank and along fringes of embankments provide food and shelter to several species, which have adapted with human settlements. Of the avian species, none may be regarded as the key species of the project.

194. 46 bird species were recorded in the broader project area, 14 of which are migratory while 32 are resident species. 11 of the species, which include raptors, egrets, and herons, are under the mandate of Sindh Wildlife Protection, Preservation, Conservation, and Management Act (2020). None of the identified avifauna species are on the IUCN Red List. However, four migratory species are listed on CMS appendices, while five are listed on CITES.

195. The birds observed in the project area is provided in **Table 4-9**. The common birds in the project area are Black Drongo, Blue Rock Pigeon, Common Myna, Bank Myna, Crested lark, House Sparrow, and Black Kite. Less common and rare birds include Grey Partridge, Pied Wagtail, and Yellow Wagtail.

196. All bird species were recorded in the broader area of Malir River, not specifically on or along the project AoI. Due to the distance of the habitat from the project area, no bird species are expected to be disturbed by the construction activities.

Table 4-9: Birds in the Project Area

No.	Common Name	Scientific Name	Status		Listing			
			Migratory	Resident	WPO/Act	IUCN Red List	CMS Annendix	CITES
1.	Bank Myna	*Acridotheres ginginianus*		x				
2.	Black Drongo / King Crow	*Dicrurus macrocercus*		x				
3.	Black headed Gull	*Larus ridibundus*	x					
4.	Black Kite	*Milvus migrans*		x	P			II
5.	Black-winged Stilt	*Himantopus himantopus*	x				II	
6.	Blue Rock Pigeon	*Columba livia*		x				III
7.	Bluethroat	*Luscinia svecica*	x					
8.	Brahminy Kite	*Haliastur indus*		x	P			II
9.	Cattle Egret	*Bubulcus ibis*		x	P			III
10.	Collared Dove	*Streptopelia decaocto*		x				
11.	Common Babbler	*Turdoides caudatus*		x				
12.	Common Sandpiper	*Actitis hypoleucos*	x					
13.	Common Starling	*Sturnus vulgaris*			P			
14.	Crested Lark	*Galerida cristata*		x				
15.	Great White Egret	*Egretta alba*	x		P			
16.	Grey Partridge	*Francolinus pondicerianus*		x				
17.	Gull Billed Tern	*Gelochelidon nilotica*	x		P			
18.	Hoopoe	*Upupa epops*		x				
19.	House Crow	*Corvus splendens*		x				
20.	House Sparrow	*Passer domesticus*		x				
21.	Indian Crow Pheasant	*Centropus sinensis*		x				
22.	Indian Myna/Common Myna	*Acridotheres tristis*		x				
23.	Indian Pond Heron	*Ardeola grayii*		x	P			
24.	Indian Robin	*Saxicoloides fulicata*		x				
25.	Indian Sand Martin	*Riparia paludicola*		x				
26.	Intermediate Egret	*Egretta intermedia*	x					
27.	Jungle Babbler	*Turdoides striatus*		x				
28.	Koel	*Eudynamys scolopacea*		x				
29.	Little Egret	*Egretta garzetta*		x	P			
30.	Little Grebe	*Tachybaptus ruficollis*		x				

No.	Common Name	Scientific Name	Status		Listing			
			Migratory	Resident	WPO/Act	IUCN Red List	CMS Appendix	CITES
31.	Little Green Bee-eater	*Merops orientalis*		x				
32.	Little Stint	*Calidris minuta*	x				II	
33.	Little Tern	*Sterna albifrons*	x				II	
34.	Marsh Harrier	*Circus aeruginosus*	x		P			II
35.	Pied Bushchat	*Saxicola caprata*		x				
36.	Purple Sunbird	*Nectarinia asiatica*		x				
37.	Redshank		x		P		II	
38.	Red-vented Bulbul	*Pycnonotus cafer*		x				
39.	Red-wattled Lapwing	*Hoplopterus indicus*		x				
40.	Reef Heron	*Egretta gularis*		x	P			
41.	River Tern	*Sterna aurantia*		x				
42.	Whiskered Tern	*Chlidonias hybridus*	x					
43.	White / Pied Wagtail	*Motacilla alba*	x					
44.	White-breasted Kingfisher	*Halcyon smyrnensis*		x				
45.	White-cheeked Bulbul	*Pycnonotus leucogenys*		x				
46.	Yellow Wagtail	*Motacilla flava*	x					

4.3.6 Protected Area & Critical Habitats

197. The mangrove area located along the left bank of Korangi Creek is considered as a protected area under the Sindh Forest Department, Port Qasim Authority, and Sindh Revenue Board. Areas under the control of Sindh Forest Department and Port Qasim Authority are declared as "Protected Forests", whereas the area under the control of Board of Revenue is classified as "Government Wasteland". Details of the mangrove areas are discussed in **Section 4.1.1 (b)**.

198. The SFD shall be part of the regular monitoring activities to ensure that the project will not pose any adverse impacts on the mangrove area. The project shall have positive impacts on the water quality in Korangi Creek.

4.3.7 Trees and Vegetation to be Cleared

199. 57 trees growing in the Direct Impact Area (DIA) will be cut prior to the construction activities. The tree species are commonly found in the area and none are of critically endangered. These include eight neem trees, 13 coconut palms, and 20 kikar (*Acacia nilotica*), among others. Details of these trees are provided in **Section 6.2.6**. The contractor shall be required to plant 10 trees for every tree cut or uprooted. Prior to construction activities, suitable spaces for compensatory tree plantation will be identified by the PIU KWSSIP in consultation with Local Government Department, Forest Department, Parks and Horticulture Department – KMC, and District Municipal Corporations (DMCs). A Compensatory Tree Plantation Plan providing details on

different aspects of compensatory plantation and to be followed by the contractor is attached as **Annexure 4-1**.

200. Aside from trees, shrubs including *Salvadoa persica and Calotropis procera* growing along the interceptor alignment adjacent Chakora Nala and *Aerva javanica and Arthrocnemum indicum* growing at TP-IV shall be cleared. All these shrub species are common in the area. However, the contractor shall be required to compensate the clearing of these shrubs through plantation of ornamental shrubs at areas to be specified by the PIU at the time of project execution.

201. Details on the clearance of vegetation related to agricultural activities are provided in the Resettlement Plan attached on this report as **Annexure 2-1**.

4.4 Social Environment

202. A household survey was done to determine the socio-economic condition in the area. **Table 4-10** lists the 11 settlements situated within the Area of Influence (AoI) for the project, as well as the respective towns, districts, household sizes, population sizes, and sampling sizes. The project area falls in districts Malir, Korangi and East Karachi.

203. The questionnaire is provided in **Annexure 4-2**. With the absence of data on actual households in each locality, random reconnaissance surveys were conducted in each settlement. Five to ten residents were engaged to estimate average household sizes. Sample sizes for each settlement were calculated based on information provided by residents. Primary data was collected from the communities through formal and informal consultations with Project-Affected Parties and other Interested Parties. A significant portion of the population live with their extended families primarily due to factors such as poverty and family bonds.

204. Aside from the household survey, review of secondary data and rounds of public consultation were also done.

Table 4-10: Sample-Size Distribution

S. No	Settlements	Town	District	Household	Population	Number of Participants
1.	Agha Town	Bin Qasim	Malir	400	4,000	10
2.	Hamal Goth	Gadap	Malir	150	1,500	12
3.	Mansehra Colony	Landhi	Malir	5000	45,000	12
4.	Mansehra Colony -2	Landhi	Malir	5000	35,000	11
5.	Reta Plot	Shah Faisal	Korangi	20000	100,000	10
6.	Roshan Abad	Shah Faisal	Korangi	3000	50,000	9
7.	Mahmoudabad	Jamshed	East Karachi	24000	97,000	12
8.	Haji Ahmed Baloch	Shah Faisal	Korangi	13	150	9
9.	Sharafi Goth	Landhi	Malir	800	5,600	8
10.	Jalal Murad Goth	Landhi	Malir	200	1,700	12

S. No	Settlements	Town	District	Household	Population	Number of Participants
11.	Shambay Goth	Landhi	Malir	275	2,000	10

4.4.1 Demographics

a) Ethnicity

205. Majority of the respondents are from the Pathan ethnic group, followed by Baloch and Sindhi Jokiyo (**Table 4-11**).

Table 4-11: Ethnic Structure

S. No	Ethnic Group	Numbers	%
1.	Pathan	45	39.1
2.	Baloch	30	26.1
3.	Sindhi Jokhiyo	21	18.3
4.	Syed	03	2.6
5.	Mallah	02	1.7
6.	Gujjar	02	1.7
7.	Other	12	10.4
Total		**115**	**100**

b) Language

206. Urdu, Pashto, and Sindhi are the predominant languages within the Project Area. These languages not only hold cultural significance but also play a pivotal role in facilitating effective communication and engagement with the local community.

4.4.2 Housing

207. Most respondents (71.3%) reside in homes they own, while 28.7% live in rented houses within the project area. A mixed housing pattern is evident in the Project Area, with 60.9% of respondents residing in 'pacca'[8] houses constructed using durable materials. 30.4% of respondents have 'semi-pacca' houses, which are built using brick masonry with mud mortar. Only 8.7% of respondents mentioned living in 'katcha'[9] houses, constructed from mud and straw. The types of houses in the Project Area are detailed in **Table 4-12**.

Table 4-12: Housing Construction Pattern

S. No	Type of House	Numbers	%
1.	Pacca	70	60.9
2.	Semi Pacca	35	30.4
3.	Katcha	10	8.7
Total		**115**	**100**

[8] Structure made of concrete blocks, reinforced and cement
[9] Structure made of mud and stone / bricks

4.4.3 Economic Condition

a) Local Economy

208. Proximity to industrial areas has created employment opportunities for a significant portion of the population residing in the vicinity. Landhi and Korangi are the nearest industrial areas located in proximity to the project area. Many individuals from Hamal Goth, Roshanabad, Jalal Murad Goth, and Mansehra Colony are employed as drivers, gardeners, sweepers, and security guards, while women often work as housemaids.

209. Communities residing near the riverbed of Malir River are actively engaged in livelihood activities related to agriculture and livestock farming. This reflects their connection to the land and their reliance on these traditional practices for livelihood and sustenance.

210. Poverty is pervasive in majority of the settlements within the AoI. Majority of the residents are laborers, daily wage workers, rickshaw drivers, and small shop owners. For many of the residents, including the vulnerable groups, access to basic services such as healthcare, clean drinking water, and proper road infrastructure is limited.

b) Agriculture

211. Agricultural activities are well-documented in specific areas adjacent to the Malir River, namely Haji Shambay Village, Jalal Murad, Sharafi Goth, and Roshanabad. Irrigation for crop cultivation relies on the waters of the Malir River. Wheat is cultivated during the Kharif season, while vegetables and fodder crops are grown during the Rabi season.

c) Employment

212. The analysis of occupational status in **Table 4-13** reveals a multifaceted economic landscape within the project area. It demonstrates the existence of various livelihoods among the respondents. Most respondents are laborers (38%), which is likely due to the nearby industrial areas. This is followed by small businesses/shopkeepers (20%), private employees (18%), and farmers (10%). It is evident that the occupation of the people residing in the area is greatly influenced by the environment. There are a number of laborers and private employees that work in the nearby industrial areas, while farmers are dependent on the irrigation provided by the Malir River.

Table 4-13: Occupational Status

S. No	Occupational Status	Numbers	%
1.	Small Business/ Shopkeeper	23	20
2.	Labour	44	38
3.	Driver	5	4
4.	Private Job (Nearby Industrial Areas)	21	18
5.	Govt. Job	8	7
6.	Farming / Agriculture	11	10
7.	Other	3	3
Total		**115**	**100**

d) Income and Expenditure

213. Analysis of the monthly income distribution (**Table 4-14**) reveals important insights into the economic landscape of the population in the project area. A significant portion of the respondents (34.8%) reports monthly income below PKR 17,500, suggesting the presence of a lower-income sector in the community that may require livelihood support. Most respondents (42.7%) are in the middle-income group, earning between PKR 17,501 to PKR 30,000. A smaller percentage of the respondents represent the moderate to upper-middle class, the higher-income groups.

214. Based on the income distribution, the area is composed mostly of the lower-income and middle-income sectors. There is a need for a nuanced approach to development, and support for initiatives that cater to the economic challenges faced by these income groups.

Table 4-14: Monthly Income of the Respondents

S. No	Average Monthly Income (Rs.)	Numbers	%
1.	Up to 17,500	40	34.8
2.	17,501 - 30,000	49	42.7
3.	30,001 – 50,000	14	12
4.	50,001 – 75,000	07	6
5.	75,000 – 100,000	04	3.5
6.	Above 100,000	01	0.9
Total		115	100

215. Household expenditure is proportional to the income, as 20.9% of respondents spend below PKR 17,500 and 54.0% spend between PKR 17,501 to PKR 30,000 monthly (**Table 4-15**).

Table 4-15: Monthly Expenditure of the Respondents

S. No	Expenditure	Numbers	%
1.	Up to 17,500	24	20.9
2.	17,501 - 30,000	62	54
3.	30,001 – 50,000	17	14.8
4.	50,001 – 75,000	10	8.7
5.	75,000 – 100,000	01	0.9
6.	Above 100,000	01	0.9
Total		**115**	**100**

4.4.4 Social Infrastructure and Services

216. The respondents' access to basic services is summarized in **Table 4-16.** The survey highlights the strengths and areas for improvement in the provision of basic services.

217. All households have access to electricity. However, the reliability and consistency of power supply must be examined. 83.5% of households have access to water supply through water tankers. About 71% of households are connected to the sewerage system, while 95.7% have access to healthcare facilities. 100% of the respondents have access to education.

Table 4-16: Social Infrastructure

S. No	Facility	Numbers	%
1.	Electricity	115	100
2.	Water Supply	96	83.5
3.	Sewerage	82	71
4.	Dispensary/ hospital	110	95.7
5.	School	115	100
6.	Metaled Roads	90	78.3
7.	Graveyard	115	100

218. It was observed that the impact areas are facing challenges related to the availability and access to healthcare facilities. Unsanitary living conditions and a lack of access to clean drinking water in Hamal Goth and Sharafi Goth have emerged as significant contributors to various health issues. Private clinics are available in these settlements, while government health facilities are located 1.5 km to 4 km away. Agha Town and Hamal Village lack access to medical stores, limiting residents' ability to obtain emergency or prescribed medications.

4.4.5 Transportation and Traffic

219. **Table 4-17** describes the mode of transport used by the respondents. The community employs various modes of transportation for their daily commutes including local buses, auto-rickshaws, cars, motorbikes, and pickups. Many individuals in the area frequently utilize their own motorbikes and cars for short-distance travel. However, for longer journeys within Karachi city, public transport becomes the preferred choice for many residents, resulting in a dual approach to transportation where both personal and public modes are commonly utilized.

Table 4-17: Mode of Transport

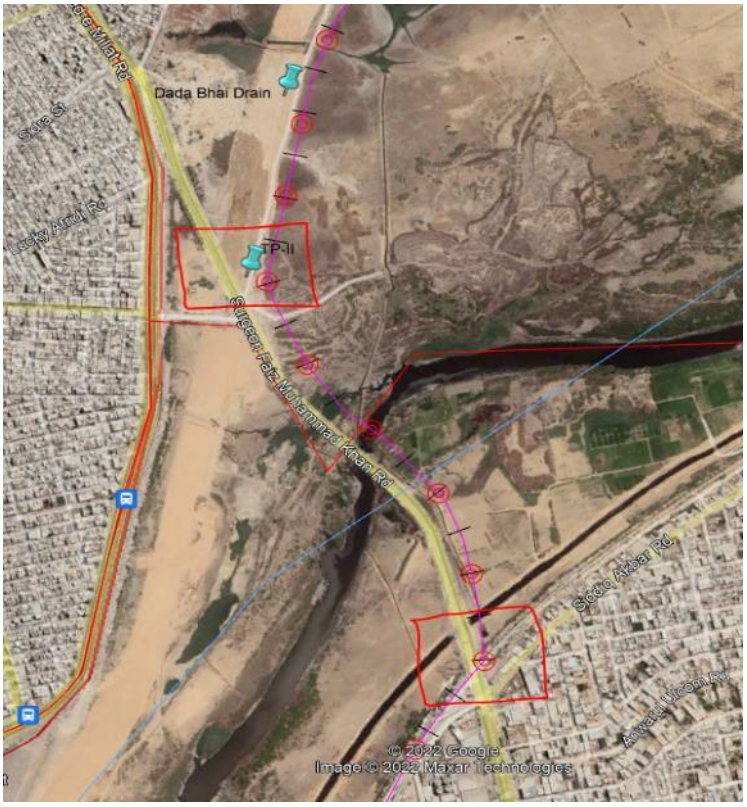
S. No	Mode of Transport	Numbers	%
1.	Public	40	34.8
2.	Personal	75	65.2
Total		**115**	**100**

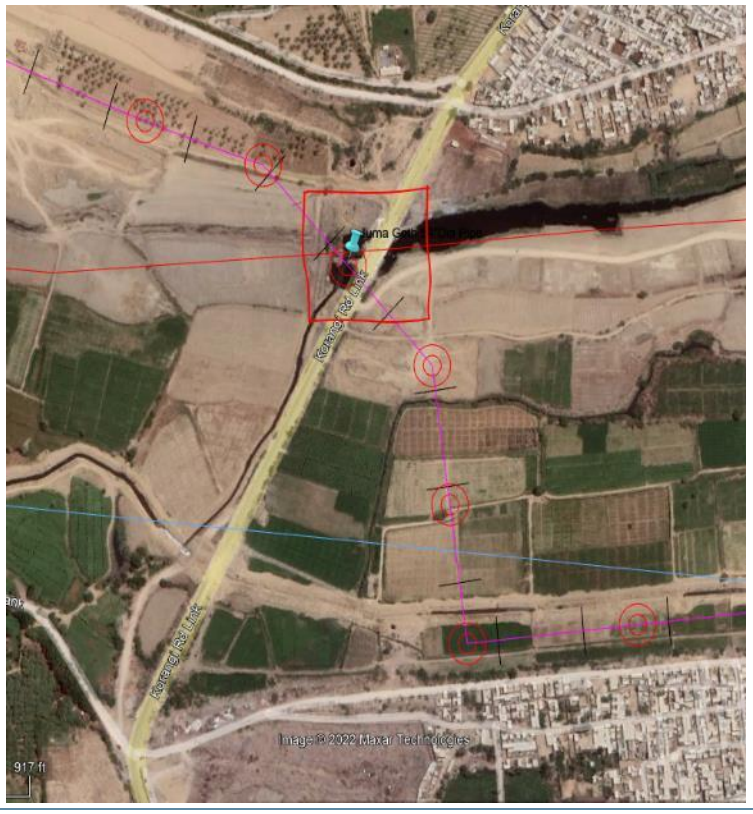
220. Sections of three major roads and two connecting roads in the vicinity of the project will be briefly used during construction for the following purposes:

- To move from one side of the interceptor alignment to the other,
- To access the TP-IV construction site, and
- To access the TP-II connection project area

221. Roads to be used are shown in **Table 4-18**.

Table 4-18: Roads to be Used during Construction Phase

S. No.	Location	Location Map
1.	Korangi Crossing or Hussain Dadabhoy Road	
2.	EBM Causeway or Surgeon Faiz Mohammad Khan Road	

S. No.	Location	Location Map
3.	Korangi Link Road or Jumma Goth Causeway	
4.	Allama Iqbal Road and Mahmoudabad Road	

222. An assessment of traffic was done based on the following sources:

- Real-time crowdsourcing data[10] showing typical traffic flow profile at the main and connecting roads, and
- Traffic count surveys (October 2021) performed at 11 locations for the Malir Expressway Project, including EBM Causeway (Surgeon Faiz Mohammad Khan Road) and Korangi Link

[10] Google Maps Platform – Traffic Layer

Road (Jumma Goth Causeway). Korangi Road near Brooks Chowrangi was also considered as it is in proximity to Korangi Crossing (Hussain Dadabhoy Road).

4.4.6 Assessment Based on Real-time Data

223. Assessment based on real-time data is as follows:

S. No.	Location	Traffic Flow Analysis
1.	Korangi Crossing (Hussain Dadabhoy Road)	Traffic flow for most part of the day remains normal. Slightly reduced flows occur between 8:00 am to 11:00 am and between 4:00 pm to 8:00 pm.
2.	EBM Causeway (Surgeon Faiz Mohammad Khan Road)	Traffic flow for most part of the day remains normal. Slightly reduced flows occur between 8:00 am to 11:00 am and between 4:00 pm to 8:00 pm.
3.	Korangi Link Road (Jumma Goth Causeway)	Traffic flow throughout the day remains normal.
4.	Allama Iqbal Road and Mahmoudabad Road	Traffic flow for most part of the day remains slightly reduced. Between 6:00 pm to 9:00 pm, traffic at both roads is slow with occasional congestion.

4.4.7 Assessment Based on Traffic Count Study

224. The traffic counts at the three roads were done for three days. Vehicles were categorized into: Motorcycles & Rickshaws, Passenger Cars, Public Transport (i.e., minibuses and buses), and Trucks. **Table 4-19** shows the traffic counts for each direction at these three roads. Based on the traffic count details, it was found that most of the traffic flow at these roads consists of passenger cars and motorcycles.

Table 4-19: Directional traffic counts at three locations (Vehicles per day)

S. No.	Locations	Directions	Motorcycle	Rickshaw	Cars	Hiace	Mini Bus	Large Bus	Truck 2-Axle	Truck 3-Axle	Truck 4-Axle	Truck 5-Axle	Truck 6-Axle	Total
1	Korangi Road Near Brooks Chowrangi	Shan Chowrangi to Brooks Chowrangi	11,635	3,610	9,232	1,612	938	287	213	359	586	82	104	**28,658**
		Brooks Chowrangi to Shan Chowrangi	38,804	7,178	19,778	2,776	1,674	600	318	590	965	136	191	**73,010**
		Total (Both Directions)	50,439	10,788	29,010	4,388	2,612	887	531	949	1,551	218	295	**101,668**
2	EBM Causeway	EBM CAUSEWAY TO BROOKS CHOWRANGI	78,450	6,532	17,049	3,091	95	78	587	881	1,468	70	139	**108,440**
		BROOKS CHOWRANGI TO EBM CAUSEWAY	84,853	5,758	18,158	2,264	104	63	541	812	1,353	38	235	**114,179**
		Total (Both Directions)	163,303	12,290	35,207	5,355	199	141	1,128	1,693	2,821	108	374	**222,619**
3	Shah Faisal to Main	SHAH FAISAL TO MURTAZA CHOWRANGI	109,045	10,714	21,456	3,506	394	380	428	642	1,069	180	283	**148,097**

S. No.	Locations	Directions	Motorcycle	Rickshaw	Cars	Hiace	Mini Bus	Large Bus	Truck 2-Axle	Truck 3-Axle	Truck 4-Axle	Truck 5-Axle	Truck 6-Axle	Total
	Korangi Road	MURTAZA CHOWRANGI TO SHAH FAISAL	124,151	9,061	19,229	3,037	345	96	538	806	1,344	70	164	**158,841**
		Total (Both Directions)	233,196	19,775	40,685	6,543	739	476	966	1,448	2,413	250	447	**306,938**

4.4.8 Source of Drinking Water

225. The scarcity of clean and safe water emerges as a significant challenge faced by residents in the Project area, particularly affecting Mansehra Colony, Roshan Abad, Sharafi Goth, and Shambay Goth. Water supply is often inadequate in many areas and the water quality is poor, rendering it unpotable. Despite the poor water quality, residents are compelled to use this water due to the high cost of water tankers. The affordability and reliability of tanker water is also challenging, with issues such as unavailability of tankers due to high demand and price fluctuations, causing further difficulties in accessing clean and safe water. This underscores the urgent need for addressing water scarcity and quality issues by the relevant authorities to ensure the well-being and health of the local population. **Table 4-20** shows the source of water for domestic use. The findings of the study indicate that most of the residents of the area rely upon the government water supply.

Table 4-20: Source of Drinking Water

S. No	Water Supply Source	Numbers	%
1.	Water supply from KWSC	99	86.1
2.	Tanker	16	13.9
Total		**115**	**100**

4.4.9 Sewerage System

226. The existing sewerage system in the project area is in a dire state, with even light rains causing flooding in narrow streets of the localities. Overflowing sewerage lines and absence or poor condition of drainage systems frequently result in stagnant water in the streets, creating unsanitary conditions for residents. To address these issues, settlements in the area established their own pipe and open sewerage systems that directly discharge effluent into the Malir River. Many households have flush-type latrines connected to these community sewerage systems.

4.4.10 Safety

227. Safety in the project area has improved in the recent years as crime rates have decreased, particularly in settlements such as Mahmoudabad and Mansehra Colony. There are a few cases of theft and other petty street crimes.

4.4.11 Mechanism of Conflict Resolution

228. Conflict resolution may be coursed through the police and government judiciary system, or through mutual understanding (“jirga” or council of elders). People in the project area are generally peaceful, although there have been disputes among individuals or groups.

4.4.12 Sites of religious significance

229. No site of religious significance was found in the alignment of Malir Basin Wastewater Interceptor and Treatment Plant project

4.4.13 Awareness and Acceptability Regarding the Proposed Project

230. As shown in **Table 4-21,** 80% of the respondents have prior knowledge of the Project. Their awareness can be seen as a positive indicator of community engagement and interest in the project's objectives and potential benefits. All respondents, irrespective of their prior knowledge, were proactively briefed about the comprehensive features and advantages of the proposed Project. This approach to community engagement ensures that all residents have access to vital project information, fostering transparency, participation, and informed decision-making in favor of the Project.

Table 4-21: Awareness about the Project

S. No	Awareness of the Project	Numbers	%
1.	Yes	92	80
2.	No	23	20
Total		**115**	**100**

231. **Table 4-22** presents the acceptability of the project among the respondents. Most of the respondents support the project (97.4%), emphasizing the need for its implementation. The respondents recognize the benefits the project can bring to the community. However, a small minority expressed their reservations due to potential disruption of their livelihood, which rely on the cultivation of vegetables irrigated with sewerage water. The Resettlement Plan (RP) of the project has provisions for such concerns to ensure that the affected individuals are adequately compensated for any losses incurred due to the project implementation.

Table 4-22: Acceptability of the Proposed Project

S. No	Acceptability of the Proposed Project	Numbers	%
1.	Yes	112	97.4
2.	No	03	2.6
Total		115	100

4.4.14 Sensitive Receptors

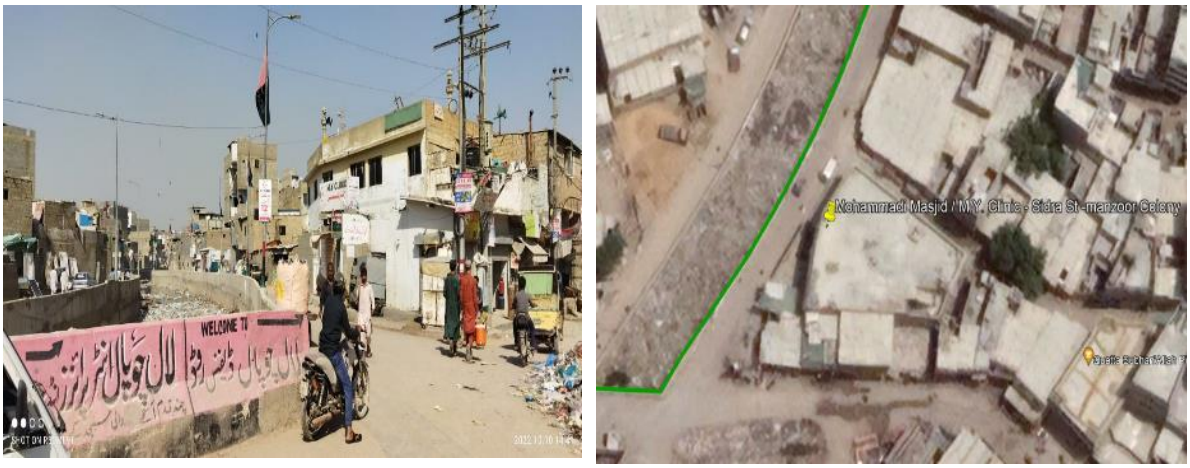
232. Several sensitive receptors were identified in the vicinity of the project areas. These include the following:

a. **Salim Habib University – Korangi Creek:** Situated approximately 40 meters away from the Interceptor Alignment and roughly 400 meters from TP-IV North-Eastern boundary wall.

b. **Karachi Public School (Play Area) – Bhittai Colony:** Located about 60 meters from the Interceptor Alignment.

c. **Mohammadi Masjid / M.Y Clinic – Sidra Street (along Manzoor Colony Drain):** Positioned approximately 8 meters from the pipeline connecting TP-II Pump Room to the Interceptor.

233. To safeguard these sensitive receptors from potential disturbances arising from construction activities, comprehensive noise and dust control measures will be implemented. These measures will include, but are not limited to, the use of noise barriers, scheduling construction activities during less disruptive hours, regular watering to suppress dust, and the deployment of dust screens where necessary. Additionally, continuous monitoring and adherence to established environmental guidelines will be upheld to ensure the protection and well-being of the nearby communities and institutions. Photographs of these receptors taken from locations near the interceptor alignment, as well as their corresponding location maps, are provided as **Figure 4-13** for reference.



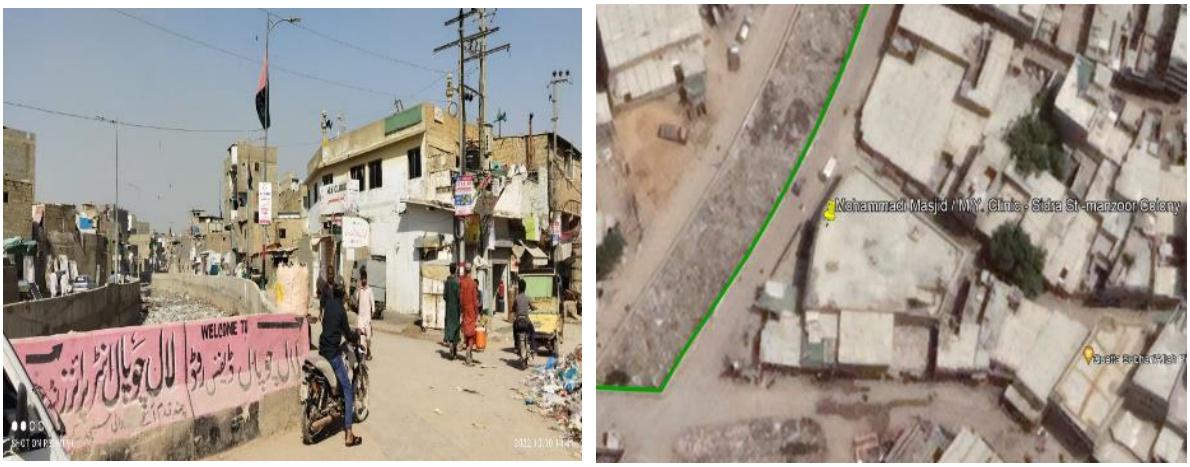
TP-II – Interceptor Pipeline on the Left (inside Manzoor Colony Drain) and Mohammadi Masjid / M.Y Clinic – Sidra Street on the Right



Interceptor Alignment on the Left beyond the Tree Line and Salim Habib University on the Right



Interceptor Alignment on the Right beyond the retaining wall and Karachi Public School (Play Area) Boundary Wall on the Left



TP-II – Interceptor Pipeline on the Left (inside Manzoor Colony Drain) and Mohammadi Masjid / M.Y Clinic – Sidra Street on the Right

Figure 4-13: Sensitive Receptors along the Interceptor Alignment and TP-II Connection Pipeline

4.4.15 Women

a) Women Participation in Daily Activities

234. **Table 4-23** indicates the participation of women in various daily activities. The findings illustrate the diverse roles and responsibilities that women undertake within the community, highlighting both their significant contributions to household and childcare duties, and their emerging presence in employment outside the home.

Table 4-23: Women Participation in the Various Activities

Activity	Respondents (#)	Percentage (%)
Household	59	81.9
Child caring	33	45.8
Livestock	2	2.7
Farming	1	1.4

Activity	Respondents (#)	Percentage (%)
Employment	5	6.9

b) Level of Education

235. The educational attainment of female respondents is presented in **Table 4-24**. 55.5% of the 72 female respondents are uneducated, indicating that a substantial portion of the population has limited or no access to formal education. 26.4% reached primary level, while 9.7% completed middle school. The percentages diminish for higher levels of education, with 2.7% having attained Matriculation, Higher Secondary School Certificate, or Bachelor of Arts qualifications.

236. The data highlights urgent need for educational initiatives and programs that target female residents, especially those at the primary and middle school levels, to address the prevalent issue of low literacy rates. Bridging this education gap is essential for empowering women, enhancing their quality of life, and promoting overall community development.

Table 4-24: Level of Formal Education of Female Respondents

Education Level	Respondents (#)	Percentage (%)
Primary	19	26.4
Middle	07	9.7
Matric	02	2.7
Higher secondary school certificate	02	2.7
Bachelor of Arts (BA)	02	2.7
Masters of Arts (MA)	0	0
Un-educated	40	55.5
Total	**72**	**100.0**

c) Age composition

237. **Table 4-25** shows the distribution of the age of the respondents. 34.7% of the respondents are between ages 31-35 years old, 26.4% are between ages 36-40 years, while 16.7% are 41 years old and above.

Table 4-25: Age Composition of Female Respondents

Categories (Age)	Respondents (#)	Percentage (%)
16-20	03	4.2
21-25	04	5.5
26-30	09	12.5
31-35	25	34.7
36-40	19	26.4
41 and Above	12	16.7
Total	**72**	**100.0**

d) Decision Making Process

238. While many women are actively involved in discussions concerning significant matters such as property transactions, education, and marriage, the final decision-making authority is often the male head of the family. This indicates the persistence of traditional gender roles and power

dynamics within households. Additionally, a small number of female respondents have property ownership rights, representing economic empowerment among some women in the community. These findings reflect the broader conditions and gender dynamics in the project area, suggesting the importance of addressing gender disparities and promoting women's equitable participation in decision-making processes as part of community development initiatives.

e) Concerns on the Project and Way Forward

239. The concerns raised by local women regarding project activities are indicative of their active engagement and their aspirations for improved living conditions. These issues emphasize the importance of addressing the community's needs and priorities in the planning and implementation of the project.

Timely Construction: The request for expeditious construction aligns with the desire to minimize disruption to daily life. Faster construction can alleviate inconveniences caused by extended project timelines.

Health and Education Facilities: Women's demands for better health facilities in local hospitals and improved educational facilities in schools reflect their commitment to the well-being and education of their families. Addressing these needs can enhance the overall quality of life in the community.

Safe and Sufficient Drinking Water: The call for safer and more abundant drinking water highlights a critical necessity for the community. Ensuring access to clean and ample drinking water is essential for public health and well-being.

Employment Opportunities: Recognizing the unemployment rate among educated women, offering opportunities during project execution can contribute to economic empowerment and community development.

Skill Development: Enhancing the skills of women engaged in embroidery work through livelihood development centers can promote income generation and economic independence.

Water Delivery Concerns: The negative impact of water delivery via tankers on road infrastructure and road safety is acknowledged. This highlights the need for more sustainable and efficient water delivery solutions.

Reforming KWSC: The call for comprehensive reforms in the Karachi Water and Sewerage Corporation (KWSC) suggests a desire for a more effective and accountable water and sewerage service provider. Autonomy and improved service delivery can address longstanding issues in this sector.

4.4.16 Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) and Gender Based Violence (GBV)

240. The feedback given by female respondents during the survey on Gender-Based Violence (GBV), Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) provides insights into the socio-cultural context and challenges faced by women in the communities:

Tribal Practices: In villages such as Agha Town, Mansehra Colony No. 1 and 2, and Hamal Goth, where the Pathan and Hazara communities are predominant, tribal practices play a

significant role in preventing issues on SEA/SH. These practices contribute to community cohesion and security.

Barriers to Education: Challenges related to education, particularly for girls, exist in areas like Mansehra Colony No. 1 and 2 due to the distance of schools and limited access to public transportation. This can result to girls being confined to their homes, affecting their access to basic services. Cultural practices like Purdah (veiling) and restricted movement further compound this situation.

Low Incidence of Sexual Harassment: Residents report that sexual harassment is not common in the area. However, domestic violence, while not reported during the surveys, is recognized as a potential issue.

Harassment in Industries: In the Reta Plot area, female industrial workers face harassment but often do not report it due to fear of losing their jobs, highlighting the vulnerability of working women in certain employment settings.

Low Literacy Rates: In Mansehra Colony, low female literacy rates are documented, partly due to the prevailing cultural norms that discourage girls from leaving their homes for educational purposes.

Limited Property Ownership: Women in the consulted villages participate in household decisions, but they have limited involvement in major property transactions and often lack property ownership rights, reflecting gender disparities in property matters.

Security Concerns: In Haji Shambay Goth and Jalal Murad Colony, women do not face specific restrictions, but some security concerns, such as theft incidents, have led them to avoid going outside alone.

5 Analysis of Alternatives

241. This chapter presents an analytical overview of the different alternatives considered for the proposed Malir Basin Interceptor and STP. The purpose of assessing various alternatives is to methodically compare viable alternatives to the proposed project site, design technology and operation. The alternative project activities which have been considered and the reasons for their rejection are discussed below.

5.1 No Project Option

242. Without the project, the volume of untreated sewage discharged to Malir River will increase over the years. This will lead to further degradation of the water quality of the Malir River which may also have negative impacts to the health of the public who are using this river as their water source.

5.2 Route Alternatives

243. Two alignments, as shown in Figure 5-1 and Figure 5-2, were considered for the interceptor. Both the alignments run along Malir River. Based on the assessment conducted, Alignment No. 1 was identified to be more feasible due to the following reasons:

- Easy to be aligned with the under construction Malir Expressway.
- Socially and environmentally feasible, providing opportunity of utilizing already built Malir Expressway access roads and campsites locations for the project, avoiding additional E&S impacts due to the construction of new access roads and land clearance for campsites.
- Allow easy connectivity with the sewer connections, especially those located on the right bank of Malir River as provision of culverts has already been kept in the Malir Expressway design.

5.2.1 Alignment Selection Details

244. The selection of Alignment No. 01 for the interceptor along the Malir River, as opposed to Alignment No. 2, is based on several important environmental and social considerations, discussed as follows:

a) Alignment with the Under Construction Malir Expressway:

- **Feasibility:** One of the primary reasons for choosing Alignment No. 01 is its compatibility with the under-construction Malir Expressway. This alignment takes advantage of the existing infrastructure, making it more feasible and cost-effective. Aligning the interceptor with the expressway streamlines construction efforts and reduces the need for extensive modifications or adjustments.
- **Reduced Environmental Impact:** By aligning with the Malir Expressway, the project minimizes the disturbance to the natural environment. Construction along the same path as the expressway avoids the need for additional land clearing, reducing habitat disruption and preserving local ecosystems. This alignment choice demonstrates a commitment to environmentally responsible development.

b) Social and Environmental Feasibility:

- **Utilizing Existing Infrastructure:** The utilization of already built Malir Expressway access roads and campsites for the interceptor project offers significant advantages. It not only reduces construction costs but also minimizes social and environmental impacts. These sites are likely to have been selected with environmental and social considerations in mind during the expressway's planning and construction, further enhancing the alignment's suitability.
- **Avoiding New Access Roads:** Selecting Alignment No. 01 eliminates the need to create new access roads, which can have adverse effects on local communities and ecosystems. The construction of new access roads often results in land clearance, which can disrupt natural habitats, increase sedimentation in nearby water bodies, and potentially displace or inconvenience nearby residents.

a- Sewer Connectivity:

- **Culvert Provision:** The decision to align the interceptor with the Malir Expressway also takes into account the existing infrastructure for sewer connections. The design of the Malir Expressway already includes provisions for culverts, which can facilitate easy connectivity for the interceptor project. This alignment choice ensures efficient integration with sewer systems, particularly on the right bank of the Malir River, where existing infrastructure can be leveraged without further disruption.

245. In summary, Alignment No. 01 for the interceptor along the Malir River has been selected primarily because it offers practical advantages in terms of cost-effectiveness, reduced environmental impact, and minimized disruption to local communities. By aligning with the under-construction Malir Expressway and utilizing existing access roads and campsites, the project demonstrates a commitment to both environmental conservation and the welfare of the surrounding social environment. Additionally, the provision of culverts in the Malir Expressway design further supports the ease of integration with existing sewer connections. Overall, these considerations contribute to Alignment No. 01 being the preferred choice from both environmental and social perspectives.



Figure 5-1: Alignment 1 for Interceptor (Selected Route)



Figure 5-2: Alignment 2 for Interceptor

5.3 Treatment Process Alternatives

246. The factors considered in the selection of the treatment process for TP-IV is presented in **Table 5-1**.

Table 5-1: Governing Factors for the Selection of Treatment System

Major Criteria	Sub Criteria	Description
Ecological (Primary)	Nature & Strength of Sewage and Removal Efficiency	The applicable physical, chemical and biological treatment processes are primarily governed by the nature of pollutants to be removed and their strengths in the sewage. It has been considered essential that the selected treatment system should ensure the required pollutant removal efficiencies.
Economic	Cost – Capital and O&M	The selected system should be the least cost alternative, keeping in view both capital as well as operational costs, within the range of technically feasible options.
	Equipment	The selected system should require minimum mechanical equipment and that the equipment should be available in local market.
Technical	Reliability	The selected treatment system should allow enough resistance to shock loads (sudden surges in sewage flow, characteristic or any toxic substance concentrations) and the treated effluent quality should not be affected.
	Compatibility	The treatment system operations should be well adapted to the existing conditions and also has the provision of future expansion.
	Operational Skills	The proposed system should be simple and the skills required for the routine O&M should be available locally, with minimum frequent training needs.
Environmental	Physical Constraints – Land Requirement	The selected treatment system should be easily compatible and efficiently operate-able keeping in view the available land and topography of the site.
	Energy Consumption	The selected treatment system should be energy efficient.
	Nuisance	The degree of odour and noise nuisance caused by the selected treatment system should be below the nuisance threshold.
	Safety	The selected treatment system should ensure occupational, human and environmental safety and offer maximum benefits to the environment.

247. Different biological treatment processes for the removal of organic matter in the sewage were considered and assessed using the criteria mentioned. The results of the comparison are presented in **Table 5-2.**

Table 5-2: Comparison of Various Treatment Technologies under TP-IV Conditions

Facultative Ponds	Trickling Filters	Complete Mix Aeration Lagoons	Activated Sludge	Rotating Biological Contactors	Anaerobic Ponds	Up-flow Anaerobic Sludge Blanket
Maximum BOD_5 Removal (%)						
60	75 – 85	70 – 80	> 90	90	50 – 55	50 – 60
✗	✓	✗	✓	✓	✗	✗
Land Requirement (Hectares)						
318	8.7	85	8.8	8.5	25	7
✗	✓	✗	✓	✓	✓	✓
Reliability & Resistance to Shock Loads						
high	moderate to high	moderate to high	high	moderate to low	low	Low
✓	✓	✓	✓	✗	✗	✗
Equipment & Energy Requirement						
none	moderate	high	high	moderate	Low to none	Low
✓	✗	✗	✗	✗	✓	✓
Implementation – Construction / O&M Ease						
moderate / high	moderate	moderate / low	moderate / low	moderate	moderate / high	moderate
✓	✓	✗	✗	✓	✓	✓
Aesthetic (Nuisance)						
moderate odor & insect issues	moderate insect issues	sever noise & aerosols issues	varying noise & aerosol issues	moderate insect issues	sever odor, color & insect issues	sever odor and color issues
✗	✓	✗	✓	✓	✗	✗
Environmental & Occupational Safety						
moderate to low	moderate	moderate to high	moderate to high	high	low	Low
✗	✓	✓	✓	✓	✗	✗
Compatibility to Current and Future Conditions						
low	high	moderate to low	high	moderate	low	moderate
✗	✓	✗	✓	✗	✗	✗
Sludge Production and Management Requirement						
low	moderate	high	high	moderate to high	low	Low
✓	✓	✗	✗	✗	✓	✓
Overall Remarks						
✗	✓	✗	✓	✗	✗	✗

248. As shown, trickling filters and activated sludge systems were favorable to be employed in the STP. Considering this, the following treatment systems were considered for TP-IV.

a) Alternative A: Trickling Filter System

249. This option comprises of screen chamber (coarse), sewage pumping station, screen chamber (fine), grit chamber, primary settling tanks, trickling filters and secondary settling tanks. Schematic of Alternative A is shown in **Figure 5-3**.

250. In this option, organic matter and suspended solids in the sewage are removed in the sedimentation tanks and tricking filters. Trickling filters is an aerobic treatment system which consist of a filter medium that can be made of a bed of rock, slag or plastic cover where the sewage is trickled or spray. The microorganisms attached in the filter media are used to removed the organic matter from the sewage.

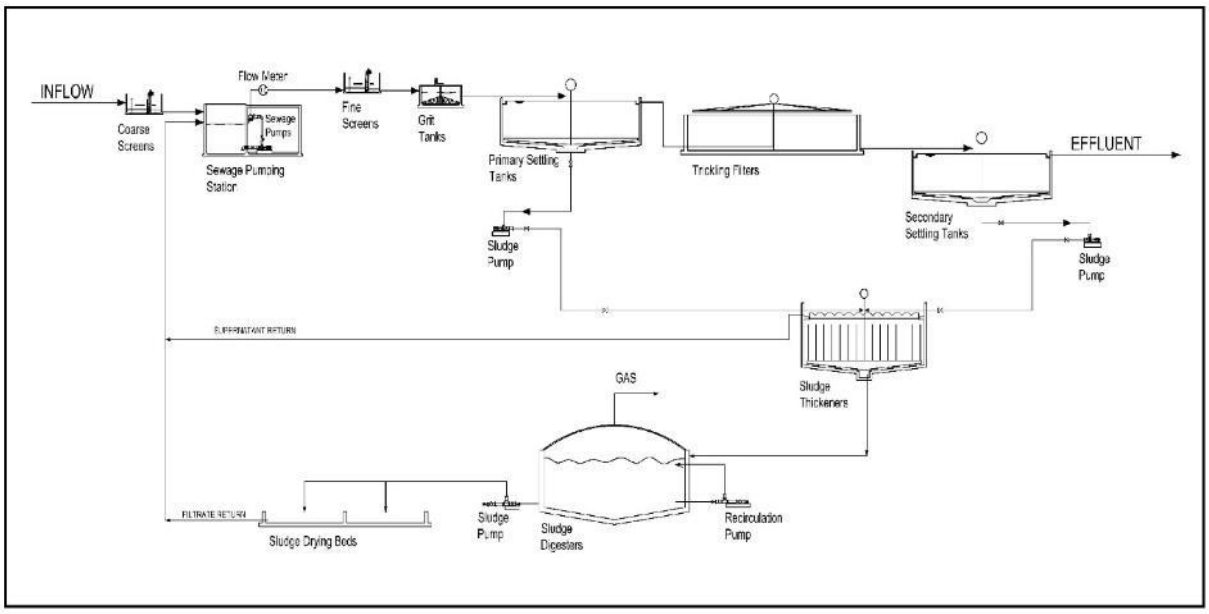


Figure 5-3: Schematic of Alternative A

b) Alternative B: Activated Sludge System

251. This option comprises of screen chamber (coarse), sewage pumping station, screen chamber (fine), grit chamber, aeration tanks and secondary settling tanks. Schematic of alternative B is shown in **Figure 5-4**.

252. This option uses activated sludge system to remove the biodegradable organic matter and suspended solids in the sewage. The conventional activated sludge is an aerobic, continuous-flow system where wastewater is fed into an aeration basin and mixed with 'activated microorganisms' resulting in mixed liquor. The principal role of micro-organisms in the activated sludge process is to convert dissolved and particulate organic matter, measured as BOD_5, into cell mass. After specific retention time, the treated wastewater passes into secondary clarifier where sludge is allowed to settle. A portion of settled sludge is recycled back to the anaerobic tank to maintain the required activated sludge concentration while the remaining is wasted to maintain required solids retention time for effective organic removal.

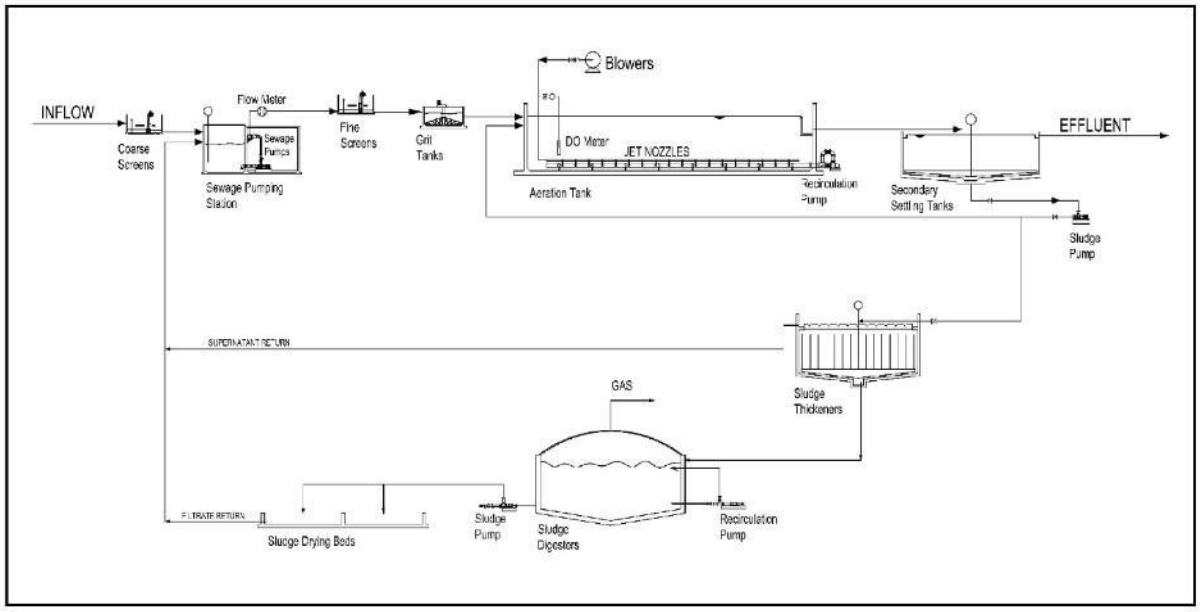


Figure 5-4: Schematic of Alternative B

c) Alternative C: Moving Bed Biofilm System

253. This option comprises of screen chamber (coarse), sewage pumping station, screen chamber (fine), grit chamber, moving bed biofilm reactors (MBBR) and secondary settling tanks. Schematic of Alternative C is shown in **Figure 5-5**.

254. The MBBR is an aerobic system that uses biofilm carrier media for the substrate removal in the wastewater. These carriers are designed to have a high surface unit per volume to provide enough area where the microorganisms can attach and grow to carry out the treatment. The carrier media are kept suspended by a diffused air aeration system for the aerobic process or by mechanical mixing system for the anoxic or anaerobic process. Unlike the activated sludge process, MBRR does not recycle activated sludge however, MBBR processes are still capable to provide similar BOD and nitrogen removal treatment performance as activated sludge process.

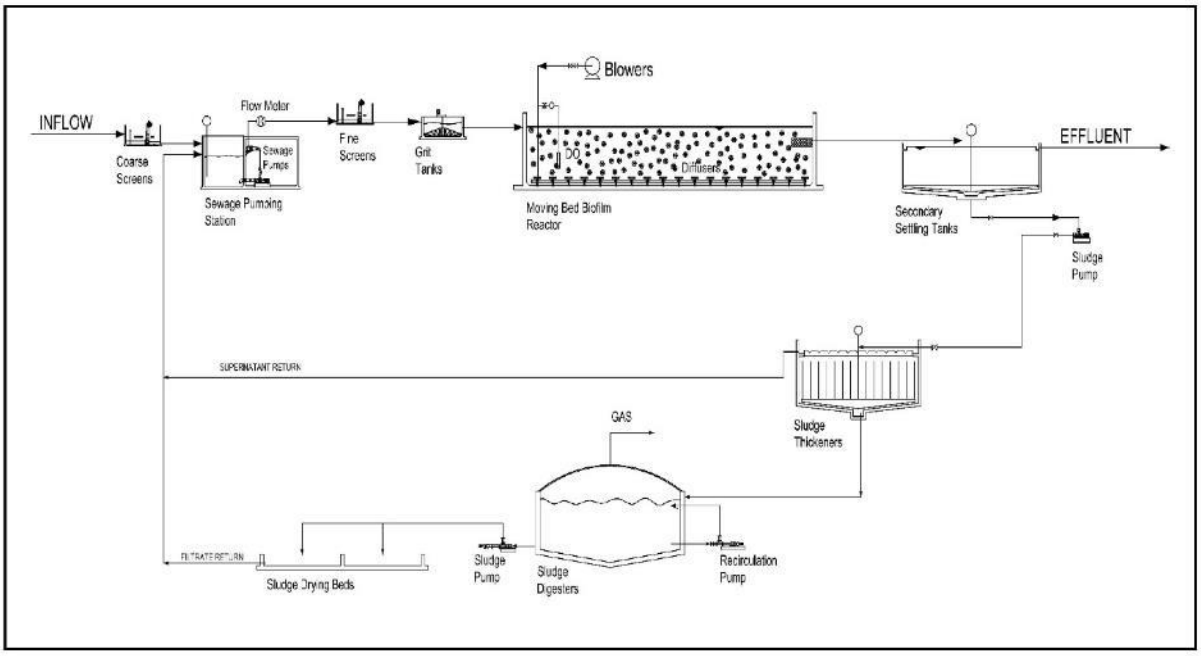


Figure 5-5: Schematic of Alternative C

255. To further compare the alternatives, capital cost and annual operation and maintenance cost were estimated. **Table 5-3** present the preliminary capital cost estimates and annual O&M costs for each option for total flow of 180 MGD.

Table 5-3: Preliminary Capital &Annual O&M Cost Estimates for 180 MGD

Treatment Component	Treatment Alternatives (Rs. Million)		
	A	B	C
Capital Cost			
Total Capital Cost for 180 MGD	21,210	25,539	23,332
Annual O&M Cost			
Total O&M Cost for 180 MGD	406	1,159	1,159

256. Based on the assessment conducted, the combination of Tricking Filter with Primary Settling (Alternative A) was found to be most suitable for TP-IV in terms of technical performance, environmental sustainability and economic viability. This combination has a simple design, low running cost, small footprint, good organics removal and energy efficiencies.

6 Environmental and Social Risks and Impacts

6.1 Introduction

257. This chapter identifies and assesses the potential impacts of Malir Basin Interceptor and TP-IV Project on physical, biological and socio-economic environment that could arise during pre-construction (design), construction and operational phases of the project.

258. The Malir Basin Interceptor and TP-IV Project is expected to have negative impacts and threats, due to the nature of the construction activities, but is also expected to be beneficial to the people within Karachi City by providing treatment to sewage generated within Malir Basin.

259. The results of the E&S risk assessment conducted for the proposed Malir Basin Interceptor and TP-IV project is shown in **Table 6-1**.

Table 6-1: Summary of E&S Risk Assessment of the Proposed Malir Basi Interceptor and TP-IV

Environmental and Social Risks and Impact	Project Phase	Risk Assessment			Description
		Likelihood	Consequence	Risk Rating	
ESS 2: Labor and Working Condition					
Occupational Health and Safety	Construction	Certain (5)	Major (3)	Significant (15)	Construction workers are exposed to occupational health and safety risks and hazards when performing construction activities such as excavation, micro tunnelling, operation of heavy equipment and machines, labor works, civil works and others.
	Operation	Likely (3)	Major (3)	Medium (9)	Workers are exposed to occupational health and safety hazards related to the O&M of the STP and interceptor specially during collection of screened wastes, repair of leaks and overflows and sludge management.
Labor risks	Construction, Operation	Certain (5)	Major (3)	Significant (15)	Workers are exposed to labor risks such as child and forced labor, GBV, discrimination, SEA/SH and labor exploitations.
ESS 3: Resource Efficiency and Pollution Prevention Management					
Resource efficiency	Construction	Likely (3)	Minor (1)	Low (3)	Non-renewable materials such as water (~60 m^3/day), rubble stones (20,657 m^3), sand (~5,783,682 m^3), cement (~217,259 m^3), reinforced steel (~22,000 ton) and fuel will be used during construction.
	Operation	Likely (3)	Minor (1)	Low (3)	The operation will require 9.25 m^3 per day of water and 925 kWh per day of power.
Soil Contamination	Construction	Likely (3)	Moderate (2)	Medium (6)	• Soil will be exposed to erosion due to removal of vegetation, excavations for laying the interceptor, construction camps and workshops. • Erosion may increase during intense rainfall events.

Environmental and Social Risks and Impact	Project Phase	Risk Assessment			Description
		Likelihood	Consequence	Risk Rating	
					• Contamination of soil may also be caused by oil spills or uncontrolled runoff from equipment washing yards. • Improper disposal of solid wastes and wastewater from the workers' camps.
	Operation	Certain (5)	Major (3)	Significant (15)	Improper disposal of the solid wastes collected from the intake structures of the interceptor and bar screens from the STP may cause contamination of soil. Sludge generated in the STP may contain heavy metals and if used in horticulture activities, it may cause soil contamination.
Pollution of Water Resources	Construction	Certain (5)	Moderate (2)	Medium (10)	Runoff from the construction works area may contain increased loads of sediments, suspended solids and other contaminants which will increase the pollution load of the available water resources in the project area. The following are the potential sources of pollution of water sources: • Discharge of untreated wastewater from contractors' camps and construction site • Oil and chemical spills • Dumping of wastes from contractors' camps and construction site
	Operation	Unlikely (2)	Moderate (2)	Low (4)	Discharge of effluent from TP-IV that is not compliant with the standards.

Environmental and Social Risks and Impact	Project Phase	Risk Assessment			Description
		Likelihood	Consequence	Risk Rating	
Air Pollution	Construction	Certain (5)	Major (3)	Substantial (15)	The use of vehicles, heavy equipment and generator sets will emit gaseous air pollutants such as carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). Earthmoving activities and excavation will generate dusts. This may cause nuisance and respiratory stresses to vulnerable groups such as children and elderly.
	Operation	Unlikely (2)	Moderate (2)	Low (4)	Operation of standby generator will have air emissions.
Noise	Construction	Certain (5)	Moderate (2)	Medium (10)	The noise may be produced due to the operation of construction machinery and other equipment. Sources of noise during construction are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers, asphalt plants and other equipment. This may cause disturbance to the activities in the mosques, schools and households within AoI.
	Operation	Rare (1)	Minor (1)	Low (1)	The operation of the standby generator will generate noise.
Construction Wastes	Construction	Certain (5)	Major (3)	Substantial (15)	Domestic solid wastes will be generated by the workers in the contractors' camps. Improper storing of kitchen and food wastes may attract rodents and other pests.

Environmental and Social Risks and Impact	Project Phase	Risk Assessment			Description
		Likelihood	Consequence	Risk Rating	
					Construction wastes will be generated. These wastes can also be hazardous. Improper storage and disposal of these wastes may cause pollution to soil and in water, if dump in water bodies.
Screenings, solid wastes from workers and sludge	Operation	Certain (5)	Major (3)	Substantial (15)	Wastes removed in the bar screens and intake structures of the interceptor, wastes generated by the workers and sludge from the STP may cause pollution to soil and water if not properly disposed.
ESS 4: Community Health and Safety					
Traffic	Construction	Likely (3)	Moderate (2)	Medium (6)	The following construction activities may cause/increase traffic within the AoI: • Passing of construction vehicles and machinery in the proposed access roads • Pipe jacking in Korangi Link Road, EBM Causeway, Korangi Cros Road, NRL lines crossing, PRL lines crossing, and Baloch Colony Road. • Open cut excavation along the interceptor alignment • The delivery of construction materials onsite, use of heavy equipment and the storage of excavated materials onsite Aside from traffic generation, these activities may also cause road accidents and road damages.
	Operation	Unlikely (2)	Moderate (2)	Low (4)	Repairs and maintenance of the interceptor may cause localized traffic in the area.

Environmental and Social Risks and Impact	Project Phase	Risk Assessment			Description
		Likelihood	Consequence	Risk Rating	
					Transport of dewatered sludge from STP to end-users.
Community Health and Safety Risks	Construction	Certain (5)	Major (3)	Substantial (15)	Community health and safety risks include (i) Exposure to dusts and air emissions from the construction site may cause respiratory distress most especially to the vulnerable groups such as children and the elderly (ii) Pedestrians or vehicles passing by may accidentally fall in the excavated areas especially during at night (iii) Exposure to hazardous materials and wastes. The community may also be exposed to communicable diseases, vector-borne diseases and water-borne diseases due to the influx of workers.
	Operation	Certain (5)	Major (3)	Substantial (15)	The reuse of sludge in horticulture activities may expose the end-users to excreta-related pathogens and heavy metals that may be present in the sludge.
Odor	Operation	Likely (3)	Moderate (2)	Medium (6)	Operation of the STP and removal of screenings in the interceptor may generate foul odor and can cause nuisance to nearby community.
Vibration	Construction	Likely (3)	Moderate (2)	Medium (6)	Construction activities may generate vibration that may cause structural damage to the nearby buildings and may also cause disturbance to the activities of the community within AoI.
Social Conflict, GBV, SEA/SH	Construction, Operation	Certain (5)	Major (3)	Substantial (15)	During the construction phase of the project, conflicts may arise between labor force and local community, including the risk of SEA/SH and GBV.

Environmental and Social Risks and Impact	Project Phase	Risk Assessment			Description
		Likelihood	Consequence	Risk Rating	
ESS 5: Land Acquisition, Restriction on Land Use and Involuntary Resettlement					
Resettlement	Construction	Certain (5)	Major (3)	Substantial (15)	The project will directly affect 38 PAPs that include eighteen farmers, one owner of a pottery shop, six owners of livestock sheds and thirteen farm workers.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources					
Biodiversity Flora	Construction	Certain (5)	Major (3)	Substantial (15)	Construction of the interceptor will require removal of about 57 trees and shrubs. However, these are common and are not environmentally critical.
ESS 7: Indigenous People					
Indigenous People	Construction, Operation			Not applicable	There are no tribal or indigenous people within the AoI.
ESS 8: Cultural Heritage					
Cultural Heritage	Construction			Not applicable	There are no cultural heritage, archeological sites or buildings located in the AoI which is listed in 'Cultural, Tourism, Antiquities and Archives Department – Government of Sindh (GoS) – List of Heritage Buildings' or 'UNESCO World Heritage list'.
ESS 10: Stakeholder Engagement and Information Disclosure					
Stakeholder engagement	Construction	Likely (2)	Minor (1)	Low (2)	The project-affected population and sensitive receptors are not aware of the proposed project.

6.2 Anticipated Potential Impact Related to ESS

6.2.1 Impacts related to Assessment and Management of Environmental and Social Risks and Impacts (ESS 1)

260. The construction activities of the proposed Malir Basin Interceptor and TP-IV project are anticipated to have high environment and social risks but with minimal significant residual environmental or social risks. This ESIA was developed for the Malir Basin Interceptor and TP-IV project. This contains the identification and assessment of potential impacts relevant to the construction and operation of the project and the corresponding environmental and social management and monitoring plans. The potential impacts of the project to vulnerable groups and identified sensitive receptors were also incorporated in the ESIA.

261. The environmental and social management plan (ESMP) contains the mitigating measures that should be implemented to minimize and/or avoid the adverse impacts of the project. However, there is a risk that the contractors may not implement or comply with these management plans during construction.

262. Appropriate E&S personnel are essential to implement, supervise, and monitor the ESMP, Occupational Health and Safety (OHS) Plan, Community Health and Safety (CHS) Plan and other plans specified in this document. E&S personnel in the required numbers and with the required skillsets are necessary at PIU, CSC and Contractors' level. Lack of E&S personnel's capacity or selection of environment non-responsive contractors may result in failure of ESMP implementation and non-compliances. Inadequate resources will lead to major impacts and risk in the physical, biological and social environment and eventual non-compliances with ESMP requirements.

263. If there are new hazards or risks encountered during the actual construction, the risk assessment should be reviewed and if necessary, be updated, and applicable mitigating measures should be applied.

264. Applicable permits and clearances are required to be secured from government agencies, including the Sindh Environmental Protection Agency (SEPA) and the relevant District Municipal Corporations (DMCs). Without the necessary permissions from these government agencies, the project cannot be implemented. Failure to obtain the required consents, permits, and other appropriate regulatory clearances in a timely manner may result in work stoppages and delays.

6.2.2 Impacts related to Labor and Working Conditions (ESS 2)

a) Occupational Health and Safety

265. Construction workers may be exposed to the following risks and hazards when performing construction activities such as excavation, pipe jacking, operation of heavy equipment and machines, labor works, civil works and others.

- Over-exertion and ergonomic injuries and illnesses due to repetitive motion, over-exertion and manual handling.

- Poor housekeeping such as excessive waste debris, loose construction materials and liquid spill may cause slips and falls of the workers.
- Physical injuries from falling in excavated areas.
- Accidents can occur when workers come into contact with vehicles or equipment during the mobilization and use of materials and equipment.
- Exposure to chemicals and hazardous materials and wastes
- Eye injury, burn and electrocution from hot work
- During summer season, workers will have to work in extreme hot weather conditions which can bring heat stress
- Potential health and safety risks may also arise from dust, pollutants, noise and vibration generated from construction activities.
- For the construction of the sewer line from TP-2 to the interceptor, the pipeline will pass along the Manzoor Colony drain. This may expose the workers to vector-borne diseases and foul odors from the sewage in the drain.

266. Operation and maintenance of the interceptor and STP may also pose occupational health and safety risks to the workers.

- Cleaning and maintenance of the inceptors will involve entry into confined spaces which includes manholes, sewers, interceptor, wet wells, digesters, and pump stations.
- Workers can be exposed to the pathogens that the sewage may contain during operation of the STP, repair of leaks and overflows and cleaning of sewers/interceptor.
- Workers may contract water-borne and vector-borne diseases during cleaning and maintenance of the interceptor, sewer lines and STP.
- Solid wastes collected from cleaning the interceptor, screening solids and sludge from the STP may also contain pathogens.
- Methane generated from the anaerobic digestion of sludge may lead to fire and explosion if not properly contained specially since there is a nearby refinery.
- The workers are exposed to hazards of slippery walkways and falling during inspection of the STP tanks.
- The operation of STP may generate foul odors which may cause nuisance to the workers.
- Processing of sewage can generate bio-aerosols which are suspensions of particles in the air consisting partially or wholly of microorganisms, such as bacteria, viruses, molds, and fungi. These microorganisms can remain suspended in the air for long periods of time, retaining viability or infectivity.

b) Labor and Working Condition

267. The workers may be exposed to the following labor risks:

- Child labour impact might arise during construction stage, as large number of skilled and unskilled labour will be required by the contractor for the construction activities of the proposed project.
- Forced labour and/or human trafficking.

- GBV might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others.
- SEA/SH against women might occur as a consequence of mixing of men and women at the construction site.
- Labour exploitation such as unpaid and/or incorrect payment of wages by employer, poor working conditions

268. Communicable diseases such as COVID-19 may be introduced due to influx of outside construction workers. Also, inappropriate camp management may lead to discomfort among workers.

269. The workers may also be exposed to vector-borne and water-borne diseases due to poorly designed and maintained labor camps, sanitation facilities and unsafe drinking water. Communicable diseases such as HIV/AIDS and other sexually transmitted diseases may also spread due to labor influx if the laborers are not medically examined.

6.2.3 Impacts related to Resource Efficiency and Pollution Prevention Management (ESS 3)

a) Resource Efficiency

270. Construction materials include rubble stones, sand, cement, water and reinforced steel. Almost all the materials to be used are non-renewable and therefore, their sustainable use is necessary. Fuel will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to help to reduce air emissions/pollutants.

271. O&M activities of the STP and interceptor will also require the use of water for cleaning of the facilities and domestic use of workers. It will also require power to operate the STP and pumping stations.

b) Soil Contamination

272. During the construction phase, spills of fuel, lubricants and chemicals can take place while transferring from one container to another or during refueling. Spills could also occur during maintenance of equipment and vehicles or through leakages from static equipment and vehicles. Excavated materials may also contain heavy metals and may contaminate the soil within the storage area. Improper management and disposal of solid wastes and domestic wastewater generated in the workers' camps may also cause soil pollution.

273. Sewage collected may contain solid waste. Screens are installed in the intake structures of the interceptor and in the inlet of the STP to prevent these solid wastes from entering the treatment system. However, these wastes should be regularly removed from the screens to avoid blockage or clogging at the entry points. These wastes may also contaminate the soil if not properly disposed.

c) Pollution of Water Sources

274. The proposed interceptor alignment is near the Malir River. There are also nearby streams such as the Thaddo Nala, Sukkan Nala, Chakora Nala and Chakkra Nala. The proposed site of TP-IV is also near the Korangi Creek. Water quality of these water bodies may get contaminated during construction.

- Domestic wastewater will be generated in the workers' camps. Discharge of untreated wastewater will pollute the nearby water bodies.
- Since the proposed project will entail excavation activities, surface run-off from these areas may increase suspended solids of the nearby water bodies.
- Dewatering activities during rainy season from excavated areas may contain suspended solids and oil and grease, and if disposed of untreated may affect the quality of nearby water bodies.
- Oil spills/leaks from heavy equipment and vehicles may also contaminate the water sources.
- Improper management of solid wastes and hazardous wastes may also contaminate the water bodies.

275. The discharge point for the effluent of TP-IV is in Korangi Creek. If the collected sewage is not properly treated before disposal, this may cause degradation of the water quality of Korangi Creek. Leaks and overflows from the interceptors and/or STP may also cause contamination of ground water and nearby water bodies.

d) Air Pollution

276. Movement of construction vehicles and excavation works for interceptor installation and treatment plant construction could result in generation of dust. Dust could cause nuisance and respiratory diseases to the identified sensitive receptors in proximity to the project sites and reduction of visibility, if adequate mitigation measures are not applied. However, the impacts of dust emissions shall mostly be limited to the work areas and its surroundings. Aside from dust, gaseous emissions from heavy equipment, vehicles and generator sets that will be used in the construction site will produce short-term impacts on the ambient air quality. An increased concentration of carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) may be realized in the ambient air. This impact will only be temporary.

e) Noise

277. Construction activities will involve use of construction equipment and machinery such as excavators, cranes, power generators, loaders and dump trucks etc. which will generate high noise levels when in use. The cumulative effects from several machines can be significant and may cause nuisances to the sensitive receptors, if adequate mitigation measures are not applied. However, these increased noise levels will prevail only for a short duration during the construction phase.

278. The estimated noise that will be generated by each construction equipment is listed in **Table 6-2**.

Table 6-2: Noise Generated by Construction Equipment

S. No.	Equipment	Noise dB(A) at 15ft from Source
1	Wheeled loading	90
2	Grader	90
3	Vibration pavement roller	86
4	2-wheel vibration pavement roller	81
5	3-wheel pavement roller	81
6	Tire pavement roller	76
7	Bulldozer	86
8	Wheeled pneumatic dredger	84
9	Sprayer	87
10	Power generator	98
11	Impact drill	87
12	Impact pile driver	112
13	Truck	92
14	Concrete mixer	91
15	Concrete pump	85
16	Mobile lift	96
17	Pneumatic hammer and rock crusher	98
18	Breaker	84
19	Pneumatic spanner	95

Source: Quagliata, A., Ahearn, M., Boeker, E., Roof, C., Meister, L. & Singleton, H. (2018). Transit Noise and Vibration Impact Assessment Manual (No. FTA Report No. 0123).

f) Construction Waste Generation

279. During construction phase, major waste streams will include construction wastes, domestic wastes from construction camps, hazardous wastes including used oil filters, used oils from workshop and small quantities of medical wastes resulting from first aid treatments. Wastes from the contractors' camps include papers, plastic containers, food wastes, kitchen wastes and other domestic solid wastes. Construction wastes include insulation, nails, electrical wiring, rebar, wood, plaster, scrap metal, paper bags, cement, bricks and excess excavated material. It is estimated that about 1,531,000 cubic meters of excavated materials and 328,200 kg of domestic wastes from the construction camps will be generated during the whole duration of construction.

280. Another important waste stream that might be generated is from sewer pipe laying through Manzoor Colony drain to TP-2 pump room with the interceptor. This work may require dredging of the drain and removing of sewage sludge.

281. Improper disposal of these wastes may cause pollution of soil and water bodies. Storing of kitchen and food wastes from construction camps can serve as breeding grounds for the disease spreading vectors and rodents.

282. Improper disposal of construction waste can also lead to nuisance and hazards towards environment and local population.

g) Wastes during Operation

283. During operation, it is estimated that about 240 m^3/day of sludge will be generated in the STP and about 191 kg/day of domestic solid wastes will be generated by the workers. Screenings from the interceptor and STP will also be collected in the intake structures and screens as part pf the maintenance activities.

284. Sludge from TP-IV is expected to contain valuable organic matter and essential nutrients like nitrogen and phosphorus. With this, it is being proposed to reuse the dewatered sludge in horticultural activities as soil conditioner and/or fertilizer. This will reduce the use of chemical and artificial fertilizers for such activities. However, the sludge may also contain heavy metals such as lead (Pb), cadmium (Cd), mercury (Hg), arsenic (As), chromium (Cr), copper (Cu), zinc (Zn), nickel (Ni), selenium (Se), and molybdenum (Mo). If not properly treated, the reuse of sludge may induce soil contamination when applied to the land.

6.2.4 Impacts related to Community Health and Safety (ESS 4)

a) Employment and Economic Opportunities

285. The project will create significant temporary employment for construction workers, maintenance, support, administrative, security and project management staff. Majority of project staff are expected to be recruited locally from within the native/local workforce. It is expected that around 600 workers are required during the construction period.

286. The O&M of the Malir Basin Interceptor and TP-IV will also require about 193 workers. Qualified local workers will be prioritized during hiring.

287. The influx of workers may also provide business opportunities to the local community to meet the daily requirements of the workers such as selling of food, housing rental and other services to the construction workers.

b) Traffic Generation

288. The crossing of the interceptor through major highways (Korangi Link Road, EBM Causeway, Korangi Crossing Road, Baloch Colony Road) may cause severe traffic congestion and/or road closure which will cause significant impact on the road users during excavation and pipe jacking. The delivery of construction materials to the construction site may also increase the traffic within the area.

289. During operation, localized traffic can be experienced in areas near the manholes during inspection, cleaning and/or repair of interceptor. Dewatered sludge from the STP will also be transported via dump trucks to the end-users. This may also increase the vehicular activities within the site.

c) Road Safety and Damage

290. The construction activities and vehicular movement at construction sites and access service roads may also result to roadside accidents particularly the local communities who are not familiar with presence of heavy equipment and machinery.

291. The construction activities may also deteriorate the existing condition of the roads. The passing of delivery trucks and heavy equipment across the roads may also cause road damages.

d) Disruption and Competition to Basic Services

292. Influx of these workers could affect project areas negatively in terms of excessive utilization of public infrastructure, utilities, housing and social dynamics if labour camps are not sited properly. The presence of construction workers and service providers (and in some cases family members of either or both) can generate additional demand for the provision of public services, such as water, electricity, medical services, transport, education and social services. This is particularly the case when the influx of workers is not accommodated by additional and separate supply systems.

293. Quality of water resources available in the nearby local communities may also get contaminated due to the construction activities, oil spillage and leakage.

e) Community Health and Safety Risks

294. The local community may be exposed to the health and safety risks associated with the construction activities such as the following:

- Poor storage of materials, equipment and other obstructions in public areas, including inadequate control of waste materials, may cause slips, trips and falls.
- Exposure to dusts and air emissions from the construction site may cause respiratory distress most especially to the vulnerable groups such as children and the elderly.
- Pedestrians or vehicles passing by may accidentally fall in the excavated areas especially during at night
- Exposure to hazardous materials and wastes
- Generation of noise from the construction activities

295. Unsanitary management of the camp sites and improper management of domestic solid wastes may cause the spread of vector-borne and water-borne diseases among the workers and local communities.

296. Labor workers with different transmittable diseases may cause spreading of those diseases in the local residents. The influx of people may bring communicable diseases to the project area, including STDs, or the incoming workers may be exposed to diseases to which they have low resistance. Workers with health concerns relating to substance abuse, mental issues or STDs may not wish to visit the project's medical facility and instead go anonymously to local medical providers, this can result in an additional burden on local health resources.

297. During O&M of the interceptor, manholes will be opened to access the interceptor. This is to collect screenings and/or to repair if there are any damages. This may pose falling hazard to the public if not properly barricaded.

298. Screenings collected from the interceptor and STP may attract vectors and rodents and serve as breeding grounds which may lead to the spread of vector-borne diseases.

299. The anaerobic digestion of sludge will generate methane gas and may cause fire and explosion if not safely handled.

f) Flooding from Overflow in Interceptor and/or STP

300. Blockage of solid wastes in the interceptor or may cause overflow of sewage along the alignment. Overflow of sewage in the STP may also happen if the influent volume is not monitored and controlled. These may cause localized and temporary flooding in the area.

g) Health Risks from the Reuse of Sludge

301. The users of the sludge for horticultural activities are exposed to excreta-related pathogens and heavy metals that may be present in the dewatered sludge of the STP.

h) Foul Odor Generation

302. The operation of the STP may generate foul odor if not operated and maintained correctly. Cleaning of interceptors (i.e., removal of screenings) may also emit foul odors. This may can be a nuisance to the community.

303. Odor at trickling filter STPs is usually generated due to excessive organic load causing anaerobic decomposition in filter media and due to inadequate ventilation[11]. Complaints could potentially arise once the plant becomes operational, particularly if the trickling filter plant undergoes anaerobic conditions.

- Ponding on Filter Media could happen due to excessive biological growth or foreign matter in or on the filter.
- Breeding of Filter Flies (*Psychoda*) due to inadequate filter media moisture[12].

304. Additionally, odour issues may emerge from the combustion of methane gas released from the sludge digesters.

i) Disturbance and Structural Damages from Vibration

305. Vibration generated by construction activity may cause disturbance to the sensitive receptors such as schools and mosques.

[11] https://www3.epa.gov/npdes/pubs/trickling_filter.pdf
[12] ibid

306. Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile.

j) Social Conflict

307. The community living in and around the project site comprises of people from various ethnic and religious backgrounds. However, no major conflicts were reported in the communities along the religious or ethnic lines. Therefore, there is little chance of any major cultural differences or conflict between the Contractor's workforce and the local inhabitants. Nevertheless, there are generic risks common to this type of project which can cause community unrest or dissatisfaction such as:

- Jobs being seen to be given to 'outsiders'.
- Lack of communication and information.
- Poor timing or planning of engagement activities.
- Expectations being unrealistically high with regards to project benefits and employment generation due to false or misleading information disclosure .
- Benefits being slow to materialize due to project delays or other reasons.

k) Increased risk of GBV and SEA/SH

308. The influx of workers and service providers into communities may increase the rate of crimes and a perception of insecurity by the local community. Such illegitimate behavior and crimes can include theft, GBV, substance abuse, sexual assault and human trafficking.

6.2.5 Impacts related to Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

309. The project will directly affect 38 PAPs that include eighteen farmers, one owner of a pottery shop, six owners of livestock sheds and thirteen farm workers.

310. Based on the information provided by the focal persons, visual observations, and public consultations, it is concluded that no AED has been carried out in the zone of impact of the proposed project since October 2018. No AED is expected to be carried out in the project's zone of impact as this zone is clear of any encroachments.

6.2.6 Impacts related to Biodiversity Conservation and Sustainable Management of Living Natural Resources

a) Tree Cutting

311. About 57 trees located along the interceptor alignment will be cut to give way to the construction of the interceptor. Details of the trees to be cut are presented in **Table 6-3** below. As shown, there are no trees that are ecologically important as per IUCN.

312. Other than trees, shrubs will be cleared including *Salvadoa persica and Calotropis procera* are growing along the interceptor alignment adjacent Chakora Nala and, *Aerva javanica and Arthrocnemum indicum* growing at TP-IV.

Table 6-3: Trees to be Removed along the Proposed Interceptor Alignment

No.	Species	Trees Count	Coordinates		Common Name	IUCN Status
			N	E		
1	*Azadarichta indica*	5 1 1 1	24.866602 24.872345 24.863805 24.860553	67.121017 67.145104 67.183803 67.194329	Neem Tree	LC
2	*Cocos nucifera*	13	24.864284	67.182503	Coconut	NE
3	*Conocarpus lancifolius*	10	24.800000	67.110659	Damas	LC
4	*Acacia nilotica*	20	24.793175	67.116011	Kikar	LC
5	*Melia azedarach*	1	24.873292	67.155203	Bakain	LC
6	*Phoenix dactylifera*	1	24.870518	67.164871	Khajoor	LC
7	*Pithecellobium dulce*	1	24.860286	67.196279	Jungle Jalebi	LC
8	*Ficus religiosa*	2 1	24.861996 24.865900	67.201476 67.209429	Peepal	LC
	Total	**57**				

313. During operation, the effects of treated effluent discharge on mangroves will be highly positive as the creek will be fed with treated sewage rather than the current disposal of untreated wastewater.

b) Disturbance to Fauna

314. Habitat of fauna species is expected to be disturbed due to cutting of trees. These fauna species may also be affected due to noise pollution as a result of vehicular movement and installations of machinery during the construction phase. However, by nature, these species may migrate to another habitat.

6.2.7 Impacts related to Indigenous People (ESS 9)

315. There are no tribal or indigenous people within the AoI.

6.2.8 Impacts related to Cultural Heritage (ESS 8)

316. No impacts on cultural heritage sites are anticipated as there are no cultural heritage, archeological sites or buildings located in the AoI which is listed in 'Cultural, Tourism, Antiquities and Archives Department – Government of Sindh (GoS) – List of Heritage Buildings' or 'UNESCO World Heritage list'.

6.2.9 Impacts related to Stakeholder Engagement and Information Disclosure

317. Before the start of project implementation, awareness shall be provided to the local population through Focus Group Discussions (FGDs), pamphlets etc. regarding the proposed project. Regular interaction shall be kept with the local population by the PIU, CSC and Contractor's Social Safeguard Teams throughout the construction period to keep them aware about the status of project activities. Important information needed to be disseminated to the people includes the following:

- Overview and objectives of the proposed project;
- Preliminary and/or final detailed design of proposed project components;
- Potential environmental and social impacts (positive and negative) of the project, and the proposed mitigation measures for the perceived negative impacts; and
- Grievance redress mechanism and contact details of the project.

7 Environmental and Social Management Plan

7.1 Introduction

318. This chapter presents the Environmental and Social Management Plan (ESMP) which details the mitigating measures that will be implemented to avoid or minimize the potential adverse impacts of the project and the monitoring plan to monitor and evaluate the effectiveness of the actual implementation of the mitigating measures.

319. The main objectives of the ESMP are:

- To provide mitigation measures and a corresponding implementation phase for each impact identified;
- To ensure that all necessary corrective actions are carried out in time to counter any adverse environmental and social impact;
- To ensure the regular monitoring of factors which may affect the safety of the environment under a systematic monitoring approach;
- Define the roles and responsibilities of the project Proponent and Contractor(s) in order to effectively communicate environmental and social issues among them;
- Provide a procedure for timely action in the face of unanticipated environmental situation;
- Provide a monitoring mechanism in the form of an environmental and social monitoring program, which includes monitoring parameters, monitoring frequency to ensure that all the mitigation measures are completely and effectively implemented;
- Provides estimation of environmental and social cost for the implementation of ESMP;
- Define the requirements necessary for documenting compliance with ESMP and communicating it to all the concerned regulatory agencies; and
- Provide other plans considering the project specific requirements.

7.2 Environmental and Social Mitigation Plan

320. The mitigating measures for the identified environmental and social risks, including risks to vulnerable groups and sensitive receptors, were detailed in the environmental and social mitigation plan. In addition, the followings plans and procedures were also developed for the project to manage the social risks.

- Stakeholder Engagement Plan
- Labor Management Procedure
- Resettlement Action Plan

321. The contractors will be responsible for implementation of measures to avoid or minimize adverse environmental and social impacts during construction. Contractors are required to prepare a Construction ESMP (CESMP) demonstrating the manner in which they will comply with the requirements of ESMP before mobilization, and obtain approval from the ESC and SC.

Table 7-1: Environmental and Social Management Plan

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
Pre-Construction Phase				
Permits, NOCs and Clearances	Applicable permits and clearances are required to be secured from national agencies prior the start of construction activities.	◆ Coordinate with the national agencies and comply with the requirements. ◆ Undergo ESIA Approval Process in line with Review of SEPA IEE/EIA Regulations 2021 to secure NOC ◆ Submit formal letters from PD/PIU to the relevant departments requesting permits and approvals for the tree cutting.	PIU, CSC	PIU
Land Acquisition and Involuntary Resettlement	The project will directly affect 38 PAPs that include eighteen farmers, one owner of a pottery shop, six owners of livestock sheds and thirteen farm workers	A Resettlement Plan (RP) is prepared and will be implemented for the project-affected people. Compensation and assistance will be paid to the PAPs in accordance with the RP. Construction activities at the interceptors will not commence until all the compensation and assistance have been paid to the PAPs.	PIU, CSC	PIU
Labor Risks	Contractors will hire skilled and unskilled workers. Labor risks may include child and forced labor, discrimination.	A Labor Management Procedure (LMP) will be prepared to manage the identified labor risks such as child and forced labor, SEA/SH, labor disputes and others and also the community health and safety risks. The LMP details the approach that will be implemented to meet the national requirements such as Sindh Prohibition of Employment of Children Act, 2017 and the objectives of the WB ESS 2: Labour and Working Conditions and WB ESS 4: Community Health and Safety. The key highlights of the LMP on how to address the issues of child and forced labour,	Contractor	PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		labour influx, GBV, SEA/SH, occupational health and safety, and trafficking will be included in the bid documents for the contractors.		
Stakeholder Engagement	Awareness of the public regarding the proposed project	◆ Stakeholder Engagement Plan shall be implemented ◆ PIU, CSC and Contractor to ensure public consultations and participation of stakeholders throughout the project lifecycle. ◆ Stakeholder engagement to be carried out in a meaningful and inclusive way, providing access to remedy.	PIU, CSC	PIU
Construction Phase				
Occupational health and safety	Workers are exposed to occupational health and safety risks of construction activities.	The contractors will be required to prepare and implement an OHS management plan for the construction activities in accordance with national / local regulatory framework such as 'Sindh Occupational Safety and Health Act, 2017', the WBWB Environmental and Social Standards specifically 'ESS-2: Labor and Working Conditions, WB Health and Safety Framework and World Bank EHS Guidelines on Construction and Decommissioning Activities. The OSH management plan shall include safety protocols and SOPs for various construction activities, OHS personnel, training, OHS risk assessment and preparation of risk matrix, JHAs, inclusion of OHS aspects in method statements, safety audits, reporting, others. The following are to be considered in the OSH program. ◆ Conduct a project H&S risk assessment for all the activities of the entire project prior to	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		the commencement of the works focusing the OHS and CHS; ◆ Designate an OHS officer(s) as per the working staff at site with specified responsibilities to supervise all the construction activities at the proposed project site; ◆ Provide OHS training and basic medical training to specified work staff, and basic medical service and supplies to workers; ◆ Layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; ◆ Work safety measures and good workmanship practices ◆ Provision of PPEs to all the workers, visitor and staff in the vicinity of project area; ◆ Provision of sufficient and clean drinking water and sanitation facilities to workers; ◆ Reduce the work hours of workers during extreme hot working environment and heat waves; ◆ Proper fuel and chemical storage area will be provided; ◆ Preparation of emergency response and recovery plan ◆ The working hour and age of labor and staff will be in compliance with the Sindh Factories		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		Act 2021. Overtime working shift will be allowed to the workers as per prevailing clauses of Sindh Factories Act 2021; ◆ Feasible working conditions such as healthy environment, workplace safety, provision of recreational activities and adequate medical/first aid facility at site; ◆ Ensure that the site will be restricted for the entry of irrelevant people particularly children, disabled and elderly peoples; ◆ Adequate lightning devices, barriers, yellow tape and safety signage will be posted. ◆ At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital.		
Labor Conditions	Workers are exposed to labor risks such as the following: ◆ GBV might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. ◆ SEA/SH against women might occur from mixing of men and women at the construction site. ◆ Labor exploitation such as unpaid and/or incorrect payment of wages	◆ A Labor Management Procedure (LMP) will be to manage the identified labor risks such as child and forced labor, SEA/SH, labor disputes and others and also the community health and safety risks. ◆ The key highlights of the LMP on how to address the issues of child and forced labour, labour influx, GBV, SEA/SH, occupational health and safety, and trafficking will be included in the bid documents. ◆ Gender Action Plan prepared for KWSSIP will be implemented.	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	by employer, poor working conditions	◆ A separate SEA/SH Action Plan will be prepared and implemented. ◆ Training will be given to all construction workers, alongside the implementation of strict measures and punishments in case of any sexual assaults, or GBV. ◆ Provisions of gender disaggregate bathing, changing, and sanitation facilities ◆ Construction camps will be built at the designated areas; ◆ Contractor shall develop a Code of Conduct (COC) for all site personnel. All site personnel shall sign this COC and abide by it. Any violation of the COC will lead to strict punishment including termination of employment. ◆ Use of drugs and alcohol will not be allowed at the work/construction site; ◆ Carrying weapons into the workplace premises will be prohibited; ◆ Appropriate fencing, security check points, gates and security guards will be provided at the construction sites to record entry and exit of workers, staff and visitors		
	Workers are exposed to health risks of labor relating to HIV/AIDS and other sexually transmitted diseases	◆ To prevent the spread of communicable diseases due to the temporary influx of workers during construction, the following are to be implemented: ♦ Provide surveillance and active screening and treatment of workers	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		♦ Undertake health awareness and education initiatives among workers ♦ Train health workers in disease treatment ♦ Immunization program and providing health service		
	Exposure to vector-borne diseases at construction camp dues to unsanitary conditions	◆ Provision of hygienic and sanitary contractors' camp with access to safe drinking water and sanitation facilities ◆ Proper and regular cleaning, housekeeping and management of the constructors' camp. A dedicated cleaning staff for maintaining the cleanliness at the campsites will be provided. ◆ To prevent the spread of vector-borne diseases, the following measures will be implemented: ♦ Maintain the camp sites in sanitary conditions; ♦ Implement solid waste management plan; ♦ Elimination of unusable impoundment of water ♦ Implementation of integrated vector control programs ♦ Educating project personnel and area residents on risks, prevention, and available treatment ◆ Implementation of Camp Management Plan, Labour Management Plan (LMP), and ECP 14.	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
Resource efficiency	Resources that will be used include construction materials, water and fuel. Construction material to be used for construction activities includes coarse aggregates, fine aggregates, asphalt, cement, reinforced and structural steel. Almost all the materials to be used in the construction are non-renewable and therefore their sustainable use is necessary for the future use.	◆ Efficient and well-maintained equipment and machinery will be used. ◆ Implement energy and water conservation measures. ◆ Train workers on energy and water conservation measures. ◆ Plan for reuse of construction waste materials can be formulated. ◆ Use of solar panels at camp sites to conserve energy.	Contractor, CSC	PIU, TPV
Soil	Soil erosion from excavation activities. Soil can be contaminated due to ◆ Improper management of wastes ◆ Oil spill/leaks from heavy equipment and vehicles ◆ Chemical leaks ◆ Disposal of untreated wastewater Excavated material may also be contaminated.	◆ Stored excavated/fill material will be covered ◆ The Contractor will be required to reuse the excavated soil for backfilling as much as possible unless the soil is considered not suitable for filling ◆ Safety Data Sheets will be strictly followed during handling and storage of chemicals; ◆ All maintenance activities of heavy equipment and vehicles will be done in a designated area with cement flooring; ◆ Non-bituminous wastes from construction activities will be dumped in approved sites, in line with the guidelines for dump sites, and must be covered; ◆ Washing yards will be paved to avoid seepage of runoff from the yard; ◆ Controlling runoff volumes and intercept runoff before it leaves the site;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations will be avoided; ◆ Contractor to prepare and implement Spill Prevention Plan, A spill kit should be always available onsite. ◆ All the construction vehicles, equipment and power generators will be regularly inspected, properly maintained to ensure that there are no leakages from their engines and mechanical parts. ◆ Trays will be provided and used during refuelling, maintenance of construction vehicles/equipment and under the parked vehicles and equipment if there are any leakages. ◆ Fuels, lubricants and chemicals to be stored onsite should be in covered bounded areas, underlain with impervious lining. Gensets shall also be placed at impervious floors bunded with parapet walls. ◆ Collected spilled material / contaminated soil to be disposed-off through SEPA certified waste handlers. ◆ Implementation of ECP 2: Fuels and Hazardous Goods Management and ECP 5: Soil Quality Management		
Water sources (river, nullah, groundwater)	Surface run-off from excavated areas may increase suspended solids of nearby water bodies.	◆ Excavated materials/stockpile will not be placed adjacent to the rivers and nullahs;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Storm water runoff originating from stockpiles should be directed to, and/or controlled by a suitable sediment trap. Temporary silt traps or sedimentation basins along the drainage leading to the water bodies will be installed;		
	Discharge of untreated wastewater from constructors' camp and construction site will contaminate the receiving water body	◆ Wastewater from washing of vehicles or equipment will not be directly discharged in any water source or the storm drainage ◆ Provision of sanitary toilet facilities in the constructors' camp ◆ All the effluents will be discharged into existing sewerage system as per the requirements of stringent environmental quality standards. ◆ Septic tanks will be constructed to provide primary treatment after which the wastewater will be discharged into existing sewerage network system with the prior approval of KWSC. ◆ Liquid waste from the concrete batching plant will be collected from source by a designated tanker, and taken off-site for proper disposal;	Contractor, CSC	PIU, TPV
	Oil/chemical spills/leakage may impact the water quality	◆ Oils, fuel and chemicals must be stored at bunded storage areas; ◆ Drainage from fuel storage tank locations, refuelling areas, and equipment service areas will be segregated from other runoff; discharge will be routed through an oil/water separator; and	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ All maintenance activities of heavy equipment and vehicles will be done in a designated area with cement flooring; ◆ Contractor to prepare and implement Spill Prevention Plan, A spill kit should be always available onsite.		
Air	Earth-moving activities and excavation will generate dusts. Dust can cause nuisance, reduction of visibility and may cause respiratory diseases	◆ Regular water sprinkling on the site and access roads will be carried out to suppress excessive dust emission(s). The frequency of water sprinkling will be increased in summer season as per the requirement. ◆ Material storage yards will be located at least 500 meter downwind from populated areas, nesting place of birds and contractor's camps to minimize the impact of dust emissions; ◆ Storage pile activity (i.e. loading and unloading) will be confined to the downwind side of the storage pile. This practice applies to areas around the storage pile as well as the pile itself. Storage piles will also be located away from downwind site boundaries and sensitive receptors; ◆ Excavated materials will always be covered and will be immediately removed onsite. ◆ Excavated site shall be immediately restored after laying of the interceptor conduit ◆ Asphalt, hot mix and batching plants will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce level of dust emissions;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ The vehicles carrying construction materials and the construction material storage areas will be covered with tarpaulin; ◆ Vehicle speed in the project area will be prescribed not more than 20 km per hour and controlled accordingly especially near the sensitive receptors; ◆ Tires of all the vehicles leaving the site will be washed at designated washing area in vehicle parking lots. No earth, mud and dust will be deposited on the public road ◆ Implementation of ECP 7: Topsoil Management, ECP 9: Air Quality Management		
	Operation of heavy equipment and vehicles will generate gaseous emissions.	◆ All vehicles, machinery, equipment and generators used during construction activities will be kept in good working condition, properly tuned and maintained in order to minimize the exhaust emissions and subsequent impacts ◆ Personal Protective Equipment's (PPEs) like masks, goggles which are suitable for specific jobs will be provided to workers and visitors.	Contractor, CSC	PIU, TPV
Noise	Operation of heavy equipment and vehicles will generate noise. Exposure to too much noise is a hearing hazard to workers and communities.	◆ Stakeholders within AoI will be notified before commencement of excavation operations; ◆ Regular maintenance of the machinery, equipment, and vehicles shall be carried out to minimize the noise levels. All machinery, equipment, and vehicles shall have a definite	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		maintenance schedule and be maintained by the Contractor. ◆ Construction equipment and vehicles will be fitted with effective silencing apparatus where necessary ◆ Environmental measures such as noise barriers, etc., shall be constructed for the identified sensitive receptors before commencement ◆ Horns will not be used unless it is necessary to warn other road users or animals of the vehicle's approach; ◆ Avoid construction activities during the nighttime near residential areas; ◆ Contractors will comply with submitted work schedule, keeping noisy operations away from sensitive receptors; implement regular maintenance and repairs; and employ strict implementation of operation procedures; ◆ Sensitize truck drivers to avoid hooting, especially when passing through sensitive receptors such as mosques, churches, residential areas educational institutions and hospitals; ◆ Locating the concrete mixing and materials shipment yards at least two kilometres away from sensitive receptors such as residential areas, schools, and hospitals, will also help reduce local noise levels; ◆ The plants and equipment used for construction will strictly conform to noise		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		standards specified in the stringent environmental quality standards; ◆ Implementation of ECP 10: Noise and Vibration Management		
Construction waste	Improper disposal of construction wastes (hazardous and non-hazardous) may cause soil pollution and water bodies. Improper disposal of construction waste can also lead to nuisance and hazards towards environment and local population. Storing of kitchen and food wastes from construction camps can serve as breeding grounds for the disease spreading vectors and rodents. Sewage sludge from Manzoor Colony drain will also be removed as part of the sewer pipe laying from TP-II to interceptor.	As part of the CESMP, a general (non-hazardous) waste management plans should be implemented at the construction site and camps and should contain the following provisions. ◆ Implementation of waste segregation (biodegradable and non-biodegradable) policy for all construction and operations personnel; ◆ Provision of solid waste handling and storage facilities, such as color-coded trash cans in common areas and strategic locations; ◆ Designate a temporary storage area for the domestic and construction wastes; ◆ The recyclable wastes, such as paper, plastics, and metals, shall be sorted accordingly and maximum efforts will be made to recover and recycle excess concrete, spilled concrete dust, sand and aggregate; ◆ The residual and other general solid wastes shall be disposed in their appropriate bins and in accordance with the local solid waste collection schedule ◆ Wastes generated from the camp site will be disposed of at SSWMB and KMC approved sites; ◆ Burning of waste will be prohibited;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Construction workers and supervision staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste; ◆ The contractor will develop specific environmental management plans for asphalt plants and concrete batching plants. These plans will incorporate the general measures as applicable to the entire project, but will also have focused mitigations for solid waste from these plants; A hazardous waste management plan should also be formulated and implemented: ◆ Proper containers must be used for each type of hazardous waste that will be generated. The container must also be closed and sealed and be properly labelled. ◆ Do not store incompatible hazardous wastes near each other. ◆ Hazardous wastes storage and labelling shall comply to the national requirements. ◆ The transport, treatment and disposal of the hazardous wastes shall only be done by licensed service providers. Dry excavated material shall be reused for backfilling, whereas surplus dry excavated material as well as wet excavated material shall be managed and handled through SEPA certified waste management contractors.		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		Implementation of ECP 1: Waste Management, ECP 2: Fuels and Hazardous Goods Management and ECP 7: Topsoil Management.		
Community Health and Safety	The crossing of the interceptor through major highways and roads may cause sever traffic congestion and possible road closure during construction. Delivery of construction materials onsite will generate traffic within the AoI. Excavation, stacking of material and other construction activities along the congested intra city road will also cause traffic congestion during construction phase	◆ The contractor will be responsible for the submission of a final Traffic Management Plan (TMP) to SC for clearance, liaise with Traffic Police Department. The TMP must comprise the following: ♦ Define scope of area that will be affected by construction activities; ♦ Provide sequence of construction operations; ♦ Describe when each phase will commence and finish; ♦ Provide duration of work; and ♦ Note proposed hours of work activity on the site. ◆ The public will be informed early on any closure/diversions of the roads; ◆ The prior notice will be publicized so that the heavy traffic will be managed in during this activity along the identified road crossings. The tunnel boring activity will be conducted in fast track and lane wise mode to avoid the complete and lengthy blockage of the roads; ◆ All deliveries, either inbound or outbound of the construction site, may be done during off-peak hours and at designated delivery hubs located near the construction site to prevent blockage of traffic flow along public roads;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Construction vehicles, machinery and equipment will be parked at designated areas to avoid un-necessary congestions along the roads; ◆ Earth material and pipes will be offloaded and stockpiled at designated areas to avoid unnecessary narrowing and disturbance along the roads; ◆ The traffic control as devised in TMP will be implemented. These control measures will contain details of temporary diversions, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for transport of hazardous material and arrangement of flagmen; ◆ Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and workers at night; ◆ The Contractor will ensure that the diversion and detour is always maintained in running condition, particularly during the intense rainfall events to avoid disruption to traffic flow; ◆ All the construction activities including material, and waste and surplus soil stocking will be confined to the road carriageway by the Contractor, to the minimum possible extent. In addition to that proper barricading will be provided;		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Contractor will adopt best construction practices i.e. vertical cutting approach with proper shoring and bracing, to limit the width of trench excavation; ◆ Traffic controls and diversions marked with signs, lights and other measures (flags) will be provided		
	Construction activities and vehicular movement at construction sites and access service roads may result in roadside accidents and road damages.	◆ Emergency response plan shall be prepared for any traffic accident during construction. In case of community related accident, compensation shall be paid in accordance with Fatal Accidents Act 1855. ◆ The construction activities will be planned and managed in close consultation with these stakeholders to minimize the vulnerability of above impacts on these sensitive receptors; ◆ Contractor to ensure that all the vehicle drivers and equipment operators have valid licenses and proven competency for their work. ◆ Special arrangements will be ensured to the accessibility and safety of the educational institutes which cater to toddlers and young kids. Workers will not be allowed to crowd together in the surroundings, and working during the peak time (school start and closure time) will be avoided; ◆ The speed of the vehicles will be controlled (at 30 to 40 km/hr) to reduce the probability of severe accidents, debris flows and dust	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		emission which can harm the educational and health institutions; ◆ Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work and restore the disturbed area to its original conditions; ◆ At work site, public information and caution boards will be provided including contact for public complaints.		
	Quality of water resources available in the nearby local communities may get contaminated due to the construction activities, oil spillage and leakage.	◆ Oils, fuel and chemicals must be stored at bunded storage areas; ◆ Drainage from fuel storage tank locations, refuelling areas, and equipment service areas will be segregated from other runoff; discharge will be routed through an oil/water separator; and ◆ All maintenance activities of heavy equipment and vehicles will be done in a designated area with cement flooring;	Contractor, CSC	PIU, TPV
	Exposure to dusts and air emissions from the construction site may cause respiratory distress most especially to the vulnerable groups such as children and the elderly. Exposure to hazardous materials and wastes	◆ Regular water sprinkling on the site and access roads will be carried out to suppress excessive dust emission(s). The frequency of water sprinkling will be increased in summer season as per the requirement. ◆ Material storage yards will be located at least 500 meter downwind from populated areas, nesting place of birds and contractor's camps to minimize the impact of dust emissions; ◆ Storage pile activity (i.e. loading and unloading) will be confined to the downwind	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		side of the storage pile. This practice applies to areas around the storage pile as well as the pile itself. Storage piles will also be located away from downwind site boundaries and sensitive receptors; ◆ Excavated materials will always be covered; ◆ Asphalt, hot mix and batching plants will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce level of dust emissions; ♦ The vehicles carrying construction materials and the construction material storage areas will be covered with tarpaulin; ♦ Vehicle speed in the project area will be prescribed not more than 20 km per hour and controlled accordingly especially near the sensitive receptors; ♦ Tires of all the vehicles leaving the site will be washed at designated washing area in vehicle parking lots. No earth, mud and dust will be deposited on the public road		
	Pedestrians or vehicles passing by may accidentally fall in the excavated areas especially during at night	◆ Construction areas to be properly barricaded and marked with warning tapes. ◆ Barricades will be provided to prevent public access to all areas where construction works are on-going; ◆ Attach warning signs, blinkers to the barricading to caution the public about the	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		hazards associated with the works, and presence of deep excavation; ◆ Excavation shall be provided with guard rails and toe boards or similar where it is possible to fall 2 m or more and barriers shall be placed at least 1 m away from the edge of the excavation. ◆ Minimize the duration of time when the trench is left open through careful planning; plan the work properly from excavation to refilling and road relaying; Excavations and trenches to be reinstated as soon as the work in that particular section is completed ◆ Ramps will be placed in front of schools and houses gates so that accidents due to slips can be avoided; ◆ Provide safe pedestrian walkways at the identified sensitive receptor locations to allow safe entry and exit to the visitors, especially women, children, elderly, patients. Walkways will be properly barricaded, where necessary provided with guardrails and made prominent by installing signs and reflective tapes. ◆ Adequate lighting to be installed at excavated areas and trenches during night. ◆ Preparation and implementation of emergency response plan		
	The local community may be at risk of contracting various communicable diseases.	◆ Labor camp will be established preferably at a reasonable distance from the residential area	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Labor management plan (as per the LMP of KWSSIP-2) will be formulated by Contractor to minimize the adverse impacts on local communities and workers. Preference will be given to any KWSC facility where the camp can be established without causing any hindrance or disturbance to the workers and residents of that facility; ◆ Trainings, awareness and campaigns will be conducted for workers and surrounding communities on awareness and prevention of COVID-19 and HIV/AIDS. Guidelines to combat with COVID-19 ◆ Provide proper and free HIV/AIDS and STDs health screening and counselling for site workers and community members		
	Unsanitary management of the camp sites and improper management of domestic solid wastes may cause the spread of vector-borne and water-borne diseases among the workers and local communities.	◆ Provision of hygienic and sanitary contractors' camp with access to safe drinking water and sanitation facilities ◆ Proper and regular cleaning, housekeeping and management of the constructors' camp. A designated cleaning staff will be provided in the campsites. ◆ To prevent the spread of vector-borne diseases, the following measures will be implemented: ♦ Maintain the camp sites in sanitary conditions; ♦ Implement solid waste management plan;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		♦ Elimination of unusable impoundment of water ♦ Implementation of integrated vector control programs ♦ Educating project personnel and area residents on risks, prevention, and available treatment		
	Vibration generated by construction activity may cause disturbance to the sensitive receptors such as hospitals, schools and mosques. Vibration may cause structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile	To minimize vibrations, machines should be mounted on shock-absorbing mountings, such as cork or reinforced concrete foundation or a floating isolated foundation set on piles, depending on the machinery. Reduction of working hours and/or introduction of short breaks during working days may also lessen the consequences of vibrations ◆ The construction activities will be planned and managed in close consultation with the stakeholders of social sensitive receptors to minimize the vulnerability of above impacts on these sensitive receptors; ◆ The working space will be shifted to other side of the sensitive receptor which are situated within 5-13m distance from the centre line of the proposed route; ◆ Schedule the major construction activities such as excavation, trenching and pipe laying during off-peak hours to avoid the disturbance on the educational institutes and hospitals;	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	During the construction phase of the project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, difference in cultural values may also cause discomfort to local residents.	◆ Communities will be informed and consulted before commencing works inside or near the communities ◆ An effective GRM has been established for the project to resolve all issues related to the community. A separate Grievance Redress Committee for GBV cases has also been established. ◆ Create awareness among workers on proper sanitation and hygiene practices to endorse proper health and maintain good housekeeping practices at all project sites	Contractor, CSC	PIU, TPV
	The influx of workers may increase the crime rate within the locality including GBV and SEA/SH.	◆ Special arrangements will be ensured to the accessibility and safety of the educational institutes which cater to toddlers and young kids. Workers will not be allowed to crowd together in the surroundings and working during the peak time (school start and closure time) will be avoided; ◆ During the construction phase, mobility of workers in the nearby areas will be strictly restricted by the contractor to avoid any inconvenience to the local communities especially women's; ◆ Alternative routes for pedestrian will be provided to avoid mixing of women with workers ◆ Project staff will be trained on the prevention of Sexual Exploitation, Gender Based Violence and Abuse (SEA) / Sexual Harassment (SH).	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Develop a Code of Conduct (COC) for all site personnel. All site personnel shall sign this COC and abide by it ◆ Prohibiting drugs, alcohol, weapons, and ammunition on the worksite among personnel ◆ PIU has prepared a Gender Action Plan for the entire KWSSIP. The relevant aspects of this Plan will be implemented for the proposed project.		
Biodiversity	About 57 trees located along the interceptor alignment will be cut to give way to the construction of the interceptor. Shrubs will be cleared along the interceptor alignment and within TP-IV site	◆ A tree plantation plan will be formulated with the recommendations and technical support of concerned Departments (KMC, Park and Horticulture Department, Sindh Forest Department) which will be implemented during construction phase ◆ A project specific Compensatory Tree Plantation Plan shall be prepared by the Contractor based upon the Tree Plantation Plan ◆ Seed supply, nursery, watering and any other necessary arrangements will be put in place for maintaining the trees planted under compensatory plantation, at least for five years. Contractor shall be responsible for maintaining the trees during the Contract Period and Defect Liability Period; after that, the trees shall be handed over to the relevant departments which own the land for compensatory plantation sites. ◆ Trees that will be cut is limited to DIA only	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Replacement of cut trees (1:10) ◆ Suitable space for tree plantation shall be identified by the PIU in consultation with Local Government Department, Forest Department, Municipal Corporations, and Cantonment Boards etc. before clearance of trees. ◆ The contractor shall also compensate the cutting of shrubs in the project's DIA through plantation of ornamental shrubs at the areas to be specified by the PIU ◆ While clearing vegetation and excavation it shall be ensured that no wildlife get injured or killed. ◆ Mangroves present outside the southern edge of the TP-IV site to be maintained as out-of-bounds area for the construction crew ◆ Workers to be provided with adequate knowledge regarding protection of flora and fauna, and relevant government regulations		
	Disturbance of fauna species due to noise generated and dust emissions.	◆ Implementation of noise and dust mitigating measures as discussed above ◆ In case of appearance of any endangered/threatened wildlife species respective regulatory authority must be informed as early as possible.	Contractor, CSC	PIU, TPV
Cultural Heritage Site	Chance find	◆ Train the workers on chance find procedures. ◆ In case of chance find, the following measures shall be strictly adopted by the Contractor:	Contractor, CSC	PIU, TPV

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		♦ Strictly follow the protocol by coordinating immediately with PIU and Directorate General of Antiquities and Archaeology – Cultural, Tourism, Antiquities and Archives Department (GoS) for any suspicion of chance finds during excavation works; ♦ Stop work immediately to allow further investigation if any finds are suspected; and ♦ Request authorized person from the Archaeology Department to observe when excavation resumes for the identification of the potential chance find, and comply with further instructions. ◆ Implementation of ECP 17: Cultural and Religious Issues		
Operation				
Occupational Health and Safety	Workers can be exposed to the excreta-related pathogens during the removal of screenings and operation and maintenance of the STP. Fire and explosion from the methane generated in the anaerobic sludge digester. During inspection and maintenance of tanks, workers are exposed to hazards of slippery walkways and falling.	◆ An OHS Management System will be established and implemented describing SOPs, roles and responsibilities, training needs, emergency response procedures, and reporting and documenting needs. ◆ An Environment, Health and Safety (EHS) Officer will be designated on site; ◆ Railing around the tanks and pits will be installed. All path, walkways, staircases, ladders and platforms will be provided and made suitable for the tasks to be undertaken;	KWSC	KWSC

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Foul odors will be generated if the STP is not properly operated and maintained.	◆ Encourage/require all workers to wash their hands right after activity. Provide access to handwashing facilities with water and soap. ◆ Strict use of PPE by all personnel (especially staff working in laboratory/chemical building, maintenance and workshop) ◆ Conduct toolbox meeting at the start of every shift. ◆ Mandatory and regular training of all employees, including sub-contractors, on Health and Safety Practices for STP and its auxiliary facilities. ◆ Emergency plan (including fire management) to be developed and implemented; appropriate fire extinguishers to be placed at prominent locations. ◆ First aid facilities to be established onsite; ◆ Availability of and vehicles to bring any injured employee to the nearest hospital in cases of accidents ◆ Mandatory reporting of all accidents or incident of near misses and immediate adoption of corrective measures ◆ TP-IV Management to provide all the necessary financial and manpower resources for the implementation and enforcement of OHS plan; ◆ Implement effective and proper housekeeping. ◆ Heat levels to be monitored and spot checks to be done during summer months.		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Guardrails installed around all process tanks and pits. ◆ Workers working near water bodies and tanks to be provided with lifeline, Personal Flotation Device (PFD), rescue buoys and throw bags; ◆ Valves will be provided in the tanks to prevent accidental flooding during maintenance; ◆ Provision and use of fall protection equipment during work at heights; ◆ Work areas to be maintained to minimize slipping and tripping hazards; ◆ Monitor flaring of methane ◆ Provide workers with immunization.		
	Cleaning and maintenance of the inceptors will involve entry into confined spaces. Workers can be exposed to the excreta-related pathogens during the removal of screenings and cleaning and maintenance of the interceptor. Workers may contract water-borne and vector-borne diseases during cleaning and maintenance of the interceptor, sewer lines.	◆ An OHS Management System will be established and implemented describing SOPs, roles and responsibilities, training needs, emergency response procedures, and reporting and documenting needs. ◆ Workers involved in the cleaning and maintenance of interceptor shall be provided proper PPE, training on how to use it, and hand washing arrangements. ◆ Include in safety training program for workers, safe handling and personal hygiene practices to minimize exposure to pathogens and vectors.	KWSC	KWSC

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Encourage/require all workers to wash their hands right after activity. Provide access to handwashing facilities with water and soap. ◆ Implementation of a confined spaces entry program consistent with applicable accepted standards. ◆ Provide workers with immunization. ◆ Mandatory health and medical check-ups for all sanitary workers working in cleaning of pumping stations and sewers. ◆ Positive-pressure self-contained breathing apparatus (SCBA) or positive-pressure air-line units with an emergency egress bottle to be used in any known or suspected H2S environment. ◆ Appropriate H2S warning signs to be posted in areas with potential H2S exposure.		
Labor and Working Conditions	Workers are exposed to labor risks such as the following: ◆ GBV might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. ◆ SEA/SH against women might occur from mixing of men and women at the construction site. ◆ Labor exploitation such as unpaid and/or incorrect payment of wages	◆ A Labor Management Procedure (LMP) will be to manage the identified labor risks such as child and forced labor, SEA/SH, labor disputes and others and also the community health and safety risks. ◆ The key highlights of the LMP on how to address the issues of child and forced labour, labour influx, GBV, SEA/SH, occupational health and safety, and trafficking will be included in the bid documents. ♦ Gender Action Plan prepared for KWSSIP will be implemented.	KWSC	KWSC

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	by employer, poor working conditions ◆ Labor risks may include child and forced labor, discrimination	♦ A separate SEA/SH Action Plan will be prepared and implemented. ♦ Training will be given to all workers, alongside the implementation of strict measures and punishments in case of any sexual assaults, or GBV. ♦ Provisions of gender disaggregate bathing, changing, and sanitation facilities ♦ Use of drugs and alcohol will not be allowed at the work/construction site; ♦ Carrying weapons into the workplace premises will be prohibited;		
Soil	Soil contamination may be caused by: ◆ Improper disposal of screenings from interceptor and STP ◆ Improper disposal of solid wastes generated by workers. ◆ Disposal of sludge contaminated with heavy metals.	◆ Develop and implement solid waste management plan. Provide training to workers on proper solid waste management and disposal. ◆ Develop and implement sludge management plan. ◆ Sludge quality testing at regular intervals before its utilization as fertilizer.		
Water	Disposal of sewage that is not properly treated may cause degradation of the water quality of Korangi Creek. Leaks and overflows in STP and interceptor can contaminate groundwater and nearby water bodies.	◆ Develop and implement O&M Manual for the STP and interceptor. The manual shall detail the maintenance activities and frequencies to ensure that all project components are working properly. ◆ Conduct regular inspection of the interceptor and STP.		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Regularly remove the screenings in the intake structures of the interceptor and STP. ◆ In case of breakdown/malfunctioning of main equipment, standby equipment to be used, as provided in the design. ◆ Operators to be trained at least once every quarter on the SOPs in case of emergencies and/or plant failure ◆ Preventive maintenance on a pre-defined frequency with required spare parts available at the premises ◆ Emergency response procedures to be prepared and O&M staff to be trained on these procedures		
Air	A standby diesel generator will be used during maintenance activities. The operation of the generator will have gaseous emission from fuel burning.	◆ Ensure proper maintenance of the genset ◆ Provide stack with enough height to ensure the dispersion of gas emission ◆ Use of genset with low emissions	KWSC	KWSC
Noise	The operation of the generator may generate noise.	◆ Ensure proper maintenance of the genset ◆ If possible, provide enclosure to genset ◆	KWSC	KWSC
Wastes	Sludge from the STP will be generated and may contain heavy metals. Screenings will be collected in the intake structures. Solid wastes will be generated by the workers.	◆ Develop and implement solid waste management plan. Provide training to workers on proper solid waste management and disposal. ◆ Develop and implement sludge management plan. Sludge quality testing at regular intervals before its utilization as fertilizer. ◆	KWSC	KWSC

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
Community Health and Safety	Interceptor blockage and breakage or overloading of STP may cause localized and temporary flooding in the area.	◆ Conduct regular inspection and maintenance of the interceptor. ◆ Intake chambers to be cleaned periodically to clear any clogging/blockages ◆ Develop and implement emergency response plan. ◆ Monitor the inflow of sewage in the STP.	KWSC	KWSC
	End-users of sludge for horticultural activities are exposed to excreta-related pathogens and heavy metals that the sludge may contain.	◆ Conduct sludge quality test in terms of excreta-related pathogens and heavy metals before transporting the sludge for reuse. ◆ Raise awareness to end-users on the safe reuse of sludge. ◆ Conduct Sanitation Safety Planning ◆	KWSC	KWSC
	Screenings collected from the interceptor and STP may attract vectors and rodents and serve as breeding grounds which may lead to the spread of vector-borne diseases.	◆ Waste material removed from the interceptor and STP to be disposed through SEPA certified hazardous waste handlers.	KWSC	KWSC
	During cleaning and maintenance of interceptor, manholes will be opened. This may pose falling hazards to the public.	◆ Provide proper barricade and safety signage and warnings ◆ Barricades will be provided to prevent public access to all areas where maintenance activities are on-going	KWSC	KWSC
	Foul odor generation from STP operations.	◆ Daily inspection of Trickling Filters for signs of ponding, uneven flow distribution, clogging, vibration, leakage, filter flies and unusual odours. ◆ Monitor flaring of methane		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	In case there is a need to repair pipes or cleaning of interceptor, temporary traffic in the area may be experienced. Transport of dewatered sludge from STP to end-users will also add to the vehicular activities in the area.	◆ Develop and implement traffic management plan ◆ Any closure of the roads (especially main roads) and deviations/diversions proposed will be informed to the riders through standard signs and displays; ◆ Conduct repair activities during non-peak hours	KWSC	KWSC

7.2.1 Construction Management Plan

a) Contractors' Qualification

322. It will be ensured that all contractors and subcontractors hired under the Project are conversant with local and WB E&S requirements. PIU-KWSSIP will give preference to the contractors having ISO certifications (ISO 9001; ISO 14001; and / or ISO 45001) during prequalification or technical evaluation of contractors.

323. Contractors' past performance in Environmental and Social (E&S) management will be a mandatory criterion for shortlisting. The E&S performance track record of contractors will carry significant weight. This criterion is essential to ensure that selected contractors have a proven history of responsible and compliant E&S practices.

324. Contractors will be required to provide documented evidence of their previous projects' E&S performance, including their compliance with relevant regulations, safety records, community engagement efforts, and adherence to E&S management plans. The evaluation will be based on a transparent scoring system, where each contractor's performance will be quantified and considered in the shortlisting decision.

b) Inclusion of ESMP, ESHS and Community Development / CSR Conditions in the Bidding Documents

325. To make Contractors fully aware and responsible for ensuring ESHS compliance, this ESMP with all its requirements, the following conditions in particular and all other relevant conditions in line with 'WB – Procurement of Works & User's Guide – Updated January 2017, will be made part of the bidding documents:

- The Contractor shall obtain (at its cost) an Environmental, Social, Safety and Health (ESHS) Performance Security for compliance with the Contractor's ESHS obligations.
- The Contractor shall be required to declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any environmental, or social, or health or safety requirements or safeguard or related to sexual exploitation and abuse and gender-based violence in the past five years.
- The Contractor shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP) which includes but not limited to; Mobilization strategy, Strategy for obtaining consents/permits, Traffic management plan, Waste management plan, workers camp management plan etc. and a Strategy for marking and respecting work site boundaries etc.
- The Contractor shall recruit qualified and experienced Environment, Health, Safety and Social Staff with relevant educational background and experience for each site to manage E&S aspects of the project.
- The Contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. Contractor will hire at least 60% people who live within close proximity to the Project Area.
- Inclusion of a community development component in the Contract document, which could involve funding or supporting educational initiatives by the Contractor, like schools, literacy programs, or scholarships for girls and women, introducing skill development, vocational

training, or income-generation programs tailored for women to enhance their economic and social status.

- The ESMP of the Project along with the ECPs and occupational hazards and risks will be included in the contractors' bid documents. The technical specifications of the bid documents will clearly state that the contractor needs to comply with the mitigation and control measures provided in the ESMP, ECPs, OHS Plan, World Bank Group EHS General Guidelines and SEQS
- Provision related to SEA/SH/GBV will be incorporated in the bidding document.
- The Contractor shall be required to ensure compliance of 'Code of Conduct' signed by each of its employees / workers. The issues to be addressed in the Code of Conduct shall include the following:
  - Compliance with applicable laws, rules, and regulations of the jurisdiction
  - Compliance with applicable health and safety requirements (including wearing prescribed PPEs, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
  - The use of illegal substances
  - Non-Discrimination (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction)
  - Interactions with community members with respect
  - Sexual harassment (for example to prohibit use of language or behaviour, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
  - Violence or exploitation (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favours or other forms of humiliating, degrading or exploitative behaviour)
  - Protection of children (including prohibitions against abuse, defilement, or otherwise unacceptable behaviour with children, limiting interactions with children, and ensuring their safety in project areas)
  - Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
  - Avoidance of conflicts of interest (such that benefits, contracts, or employment, or any sort of preferential treatment or favours, are not provided to any person with whom there is a financial, family, or personal connection)
  - Respecting reasonable work instructions
  - Protection and proper use of property
  - Duty to report violations of this Code
  - Non retaliation against workers who report violations of the Code.

326. Payments to contractors will be linked to environmental, health and safety performance, measured by completion of the prescribed environmental and social mitigation measures in the site specific ESMP (SSESMP) and control measures described in the OHS plan. In addition, for any non-compliance causing damages or material harm to the natural environment, workers,

public or private property or resources, the Contractor will be required to either remediate / rectify any such damages in a timeframe specified by and agreed with the CSC, or pay the cost (as assessed by IA) of contracting a third party to carry out the remediation work. For repeated non-compliance the Contractor will be penalized; penalty will be 3% of the total Civil Works in the Instruction of Payment Certificate (IPC). The penalty will be imposed after all contractual instruments are applied and a Non-compliance Report (NCR) is issued by the CSC / Engineer.

c) Criteria for the Selection of Sub-Contractors

327. The Contractor shall ensure that following criteria is followed for the selection of any sub-contractor, to make sure their ability of implementing ESHS requirements:

- All ESF / ESS Requirements applicable on the main Contractor shall also be applicable to the hired Sub-contractors.
- Sub-contractor should have proven experience in providing services for a minimum of 5 years with successful ESHS management.
- The sub-contractor shall provide the following:
- Details of company information with organization structure, list of manpower with the Curriculum Vitae (CVs) of key personnel, plant and machinery list mentioning year of manufacturing, support agencies, other facilities and resources.
- Details of completion of similar type of projects within last five years indicating their brief scope of work, value of work, contractual duration, actual completion of project, client's name, contact details of that client, safety appreciation or compliance certification or inspection of plant and machineries, EHS statistics, Loss Time Injuries (LTI) graph etc.
- Details of typical project planning and execution methodology.
- Details of current commitments – List of all the jobs under execution with the value of the job and percentage completion with particular emphasis on project of similar magnitude carried out.
- Details of EHS policy, safety manual, safety plan and implementation procedures in-line with internationally accepted practices along with the statistics for last four years.
- Details of quality assurance and quality control practices currently in place.
- Details of documents in support of Health, Safety, Environment and Quality [HSEQ] performance.
- Details of insurance of employee policy, medical evaluation including drug testing policy.
- Details of safety and security evaluation policy.
- Copies of ISO 9001, 14001, Occupational Health and Safety Assessment Series (OHSAS) 18001 or any other accreditation and certification as applicable.

d) Environmental and Social Code of Practices for Construction

328. The environmental and social codes of practice (ECPs) are generic, non-site-specific guidelines for the construction phase. The ECPs consist of environmental and social management guidelines and OHS practices to be followed by the contractors for sustainable management of all environmental, social, health and safety issues. The ECPs are listed below and details are presented in **Annexure 7-1.**

- ECP 1: Waste Management
- ECP 2: Fuels and Hazardous Goods Management
- ECP 3: Water Resources Management
- ECP 4: Drainage Management
- ECP 5: Soil Quality Management
- ECP 6: Erosion and Sediment Control
- ECP 7: Topsoil Management
- ECP 8: Topography and Landscaping
- ECP 9: Air Quality Management
- ECP 10: Noise and Vibration Management
- ECP 11: Protection of Flora
- ECP 12: Protection of Fauna
- ECP 13: Road Transport and Road Traffic Management
- ECP 14: Construction Camp Management
- ECP 15: Cultural and Religious Issues
- ECP 16: Construction and Operation Phase Security

e) Site Specific Environmental and Social Management Plan (SSESMP)

329. The Contractor will prepare a SSESMP demonstrating the manner in which they will comply with the requirements of Site-Specific Management Plans, ECPs and the mitigation measures proposed in this ESIA Report. The SSESMP will be submitted before the start of any construction activities and be approved by the Engineer. The SSESMP will form part of the contract documents and will be used as monitoring tool for compliance. Violation of the compliance requirements will be treated as non-compliance leading to the corrections or otherwise imposing penalty on the contractor.

330. Contractor will be required to prepare SSESMP along with the ECPs, prior to his mobilization and commencement of construction works, for approval of PIU and CSC. The key sub-plans are described below:

- Material Transportation Plan will be prepared by the contractor to prevent accidents during transportation. The plan should address specific details on the site conditions, the exact route to be followed and the conditions of the road. The Contractor will propose alternative routes for review and approval by the Engineer. A commitment must be made by the Contractor to repair the road to its original condition, if any local road is damaged due to the heavy loaded traffic of the Project.
- Pollution Prevention Plan will be prepared as part of SSESMP and implemented by the contractors on the basis of the ECPs and WBG EHS Guidelines. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.
- Construction Camp Management Plan will be prepared as part of SSESMP by the contractor based on ECP 14. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal. The Plan will be submitted to the CSC for their review and approval before camp establishment.

- Emergency Preparedness Plan will be prepared by the contractor after assessing potential risks and hazards that could be encountered during construction.
- Communication Plan to deal with the interaction of the community, complaints management, workers recruitment, notice of works and workers conduct with locals.

f) Construction Occupational Health and Safety Plan

331. The Contractor will also prepare an OHSOHS plan for managing the identified hazards and control measures. The OHS plan shall comply with ESS2, World Bank General Environmental Health and Safety Guidelines, WB Health & Safety Framework South Asia Region (SAR); Sindh Occupational Safety and Health Act, 2017, Sindh Labour Acts, ILO Code of Practices 1992 and Good International Industry Practices (GIIP) . Review and update of the OHS plan will be done when there is a change in the scope of construction methodology/technique based on site condition, or following significant OHS hazard or a major accident.

g) Job Hazard Analysis

332. Job hazard analysis (JHA) will be conducted by Contractor for each construction component focusing on job tasks as a way to identify hazards before they occur. It will focus on the relationship between the worker, the task, the tools, and the work environment. After identifying uncontrolled hazards, steps will be taken to utilize hierarchy of control: elimination, substitution, engineering controls, administrative controls and personal protective equipment, to minimize them to an acceptable risk level. The JHA will be one of the major components Contractor's health and safety management system. The JHA will be conducted for:

- Jobs with the highest injury or illness rates;
- Jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents;
- Jobs in which one simple human error could lead to a severe accident or injury;
- Jobs that are new or complex to the construction or have undergone changes in construction processes and procedures; and
- Jobs complex enough to require written instructions.

h) EHS in Method Statement

333. The Contractor will include an EHS Chapter in each Method Statement. This EHS section will be based on the JHA and other provisions of OHS Plan and environmental issues of the site and specific to construction methods. This section will be reviewed and approved by the EHS Specialists of the Engineer/CSC. Each revision of the method statement shall also be reviewed and approved by the EHS Specialists.

i) Site Engineer's EHS Oversight

334. EHS shall be made also a key responsibility of site engineers.

335. Training program will be devised by CSC on engineers' oversight in EHS and will be offered by EHS specialists of CSC to address EHS immediately when identified and raise it to EHS

specialists if further action is required. The training on engineers' oversight shall convey the following messages:

- Engineers would assume greater responsibility for overseeing the EHS as part of their daily routine work,
- Engineers would review and approve each site's readiness to commence the work as per the design specifications, certifying whether Contractors are meeting the requirements of the Method Statements, and withholding funds from them that are not complied with.
- Engineers would impose financial penalties on the Contractor with non-existent or non-compliant EHS matters; and
- Engineers will assist workers in recognizing environment friendly and safe work measures and procedures necessary to protect the natural environment and occupational health and safety of workers and prevent illnesses, injuries and fatalities during construction.

7.3 Environmental and Social Monitoring Plan

336. The objectives of environmental and social monitoring plan during the construction and O&M phases are as follows:

- Monitor the actual project impacts on physical, ecological and socio-economic receptors;
- Recommend mitigation measures for any unforeseen impact or where the impact level exceeds the anticipated level in the ESIA;
- Ensure compliance with legal and community obligations including safety during construction and O&M phases;
- Ensure the safe disposal of excess construction materials, solid waste, water and wastewater and gaseous emissions;
- Appraise the adequacy of the ESIA with respect to the project's predicted long-term impacts on the area's physical, ecological and socio-economic environment;
- Evaluate the effectiveness of the mitigation measures proposed in the ESMP and recommend improvements in ESMP, if required; and
- Compile periodic incidents / accidents data to support analyses that will help to minimize future risks.

337. PIU of KWSSIP will be responsible for all the monitoring activities. All the findings and results in the form of monitoring report will be finally shared with respective SEPA as well as WB as per the reporting mechanism.

7.3.1 Compliance Monitoring

338. The compliance monitoring will be conducted by the E&S Staff of SC. Various aspects of the ESMP compliance monitoring will be to:

- Systematically observe the activities undertaken by the contractor(s) or any other persons associated with the proposed project;
- Verify that the activities are undertaken in compliance with the ESMP;

- Document and communicate the observations to the ESC of PIU, so that any corrective measures, if required, can be taken in a timely manner;
- Maintain a record of all incidents of environmental and social significance and related actions and corrective measures;
- Maintain contact with the communities, solicit their views and concerns, and discuss them during the monthly meetings; and
- Prepare periodic reports of the environmental and social performance of proposed project

Table 7-2: Environmental and Social Monitoring Plan

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
Construction Phase						
1	Effluent Quality	Effluent disposal arrangements at camp and office sites	All workers camp / office sites	Visual Inspection for checking any bypasses or leakages	◆ Daily ◆ Monitoring and reporting on monthly basis during the construction stage.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
2	Drinking Water	SEQS Drinking Water Quality Parameters.	Worker Camps, Office Sites and Kitchen / Mess Areas	Water sampling and laboratory analysis	◆ Once before the start of construction by activity monitors and reported; and ◆ On quarterly basis during the construction.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
3	Soil Quality	Incidents of oil, fuel and chemical spills	All work areas, machinery parking areas, generator installation sites and workshops	◆ Visual Inspection ◆ Recording	◆ Daily ◆ Monitoring and reporting on monthly basis during the construction stage.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
4	Noise Pollution	Day and night time noise monitoring in dBA Leq. as per stringent	Sensitive Receptors near Interceptor Alignment & TP-IV, 02 Baseline	Monitoring of noise level at site.	◆ Once before the start of construction by activity monitors and reported; and	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
		environmental quality standards	Monitoring Locations and 03 locations at Work sites (to be decided by CSC / PIU)		◆ On Monthly basis during the construction (spot measurement regular daily basis keeping in view the day-to-day application of different heavy noise causing equipment by the contractor).	SC during Construction Phase
5	Air Pollution	◆ Nitrogen Oxide (NO) ◆ Sulphur Dioxide ◆ Carbon Monoxide (CO) ◆ Suspended Particulate Matter (SPM) ◆ Particulate Matter (PM2.5) ◆ Particulate Matter (PM10) ◆ Ozone (O_3) ◆ Lead (Pb).	Alignment & TP-IV and 02 Baseline Monitoring Locations: ◆ Salim Habib University – Korangi Creek ◆ Karachi Public School – Bhittai Colony ◆ Near Reta Plot Residential Settlement ◆ Near River Valley Township	Ambient air quality monitoring.	◆ Once before the start of construction by activity monitors and reported; and ◆ On quarterly basis during the construction.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
6	Dust emissions	◆ Dust ◆ Particulate Matter (PM2.5) ◆ Particulate Matter (PM10)	Sensitive Receptors near Interceptor Alignment & TP-IV and 02 Baseline Monitoring Locations: ◆ Salim Habib University – Korangi Creek ◆ Karachi Public School – Bhittai Colony ◆ Near Reta Plot Residential Settlement ◆ Near River Valley Township	Ambient air quality monitoring	◆ Daily ◆ Monitoring and reporting on monthly basis during the construction stage.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
7	Ecological Resources	◆ Existing vs Planned Tree Cutting ◆ No. of Trees Planted under Compensatory Plantation Scheme ◆ Growth / Maintenance / Care of planted trees	All Project Sites and Compensatory Plantation Sites	Visual checks to ensure that only marked trees are cut within the project corridor. Monitoring of Wildlife / birds hunting. Inventory of existing	◆ Once before the start of construction by activity monitors and reported; and ◆ On quarterly basis during the construction.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
				trees, cut trees, and planted trees.		
8	Public Infrastructure	Disturbance or damage to public infrastructure	Proposed project routes. ◆ Public infrastructures within the AoI. These structures will be verified prior to the start of construction.	Random visits and consultations with vulnerable.	Prior to the start of construction. Reporting will be done on the basis of RP recommendation.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
9	Grievances from workers	◆ Numbers of grievances ◆ Types of grievances ◆ Appropriate close-out measures and actions to prevent recurrence ◆ Grievances closed out within timeframes	◆ Affected Communities	Community consultations.	◆ Daily ◆ Monitoring and reporting on monthly basis during the construction stage.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
10	Waste Management	◆ Inspection of solid waste generation, collection, storage, recycling and disposal	◆ All Project Sites, camps, focusing on areas where waste is stored / located	Visual Observations, Monitoring and Audits	◆ Review the waste management stream before start of the project; ◆ Monitoring and reporting on monthly	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
		◆ Recording volumes of excavation and spoil generated, reused, sold, stockpiled by location ◆ Recording waste volumes by type and site (kitchen and domestic, medical, batteries, electrical equipment, tires, rags, paper, scrap metal wastes etc.) ◆ Recording the final disposal of each waste stream ◆ Calculating rate of waste reuse / recycling ◆ Recording storage, transport and disposal costs			basis during the construction stage;	
11	Labor and working conditions	As per the LMP of KWSSIP-2 which include but not limited to OHS, hygiene facilities,	◆ Main project area	Visual Observations, Incident/accident register Monitoring and Audits	◆ Monitoring and reporting on monthly basis during the construction stage;	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
		appropriate camps area, etc. Grievances from workers	◆ Construction camps and Offices. ◆ Equipment yards.	Grievance Redress/Social Complaint Register		SC during Construction Phase
12	Community Health and Safety / Construction Traffic Management and Safety / Access to Receptors	◆ Status of Barricading at Trenches and Excavations ◆ Status of Pedestrian access ◆ Piling-up of excavated material and pipes along trenches ◆ Safety signs ◆ Status of traffic diversions ◆ Road safety incidents records ◆ Lighting arrangements ◆ Provision of safety equipment and materials at sites ◆ Number of related grievances	All Project Area	Visual Observations, Vehicle Log Books, Monitoring and Audits	◆ Monitoring and reporting on monthly basis during the construction stage.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
13	Social aspects including GBV and other Grievances	◆ Status of worker's interaction with public, nearby communities. ◆ Investigation of any SEA/SH incidents reported / communicated by workers or registered by communities in GRM ◆ Number of related grievances	All Campsites and Project Sites	Visual Observations and consultations, Grievance Redress/Social Complaint Register, Monitoring and Audits	◆ Monitoring and reporting on monthly basis during the construction stage;.	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
14	OHS; CHS; accidents and incidents	◆ Number of unsafe acts/incidents, near misses, first aid injuries, work- related illness, lost time incidents, fatalities ◆ Number of training sessions, toolbox talks risk assessments. ◆ PPEs use and violations	◆ Main project area ◆ Construction camps and Offices. ◆ Equipment yards.	◆ Visual Observations and consultations, Grievance Redress/Social Complaint Register, Incident/accident register, Monitoring and Audits	◆ Monitoring and reporting on monthly basis during the construction stage	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
15	COVID-19	◆ Number of COVID-19 tests ◆ Number of workers vaccinated ◆ Audit of provisions and equipment	◆ Main project area ◆ Construction camps and Offices. ◆ Equipment yards.	◆ Observations and consultations, Grievance Redress/Social Complaint Register, Monitoring and Audits	◆ Monitoring and reporting on monthly basis during the construction stage	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
16	Chemical Storage and Handling	◆ Safety Data Sheets, Leakage and spills, Segregated handling and storage of chemicals, availability of fire extinguishers,	◆ Main project area ◆ Construction camps ◆ Equipment yards.	◆ Visual Observations, Chemical Storage inventory, ◆ Incident/accident register, Monitoring and Audits	◆ Monitoring and reporting on monthly basis during the construction stage	◆ Contractor during Construction Phase ◆ Compliance monitoring lies with SC during Construction Phase
17	Resettlement	Implementation of RP	Entire project area	◆ Visual observation; ◆ Official record of RP activities	◆ Prior the start of construction	◆ SC
O&M Phase						
1	Treated Effluent Quality	TSS, BOD_5, COD.	TP-IV Site	◆ Visual checks of laboratory activities	Daily	◆ KWSC during O&M Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
				◆ Discrete grab sampling and laboratory testing of water samples by SEPA approved Laboratory for monitoring.		
2	Sludge Quality	◆ Heavy metals ◆ Pathogens (i.e., Total coliform)	TP-IV Site	◆ Visual checks and monitoring of laboratory activities ◆ Discrete grab sampling and laboratory testing of sludge samples by SEPA approved Laboratory for monitoring. ◆	Daily	◆ KWSC during O&M Phase
3	Sludge Management	◆ Sludge transfer for recycling. ◆ Laboratory analysis of sludge to check its quality	TP-IV Site	◆ Visual inspection ◆ Review of records	Daily	◆ KWSC during O&M Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
		◆ Inspection of Sludge Drying Beds / Sludge Skips ◆ Status of sludge piled up in SDBs and plant's premises. ◆ Recording sludge volumes generated and recycled.				
4	Odor Generation / Pathogens / Vectors	◆ Visual Inspection of TFs to check ponding and vectors accumulation. ◆ Comprehensive plan to manage and avoid vector borne diseases.	TP-IV Site	◆ Visual inspection ◆ Review of records	Daily	◆ KWSC during O&M Phase
5	Waste Management	Inspection of screenings and waste disposal accordance with Waste Management Plan	◆ Offices and Buildings ◆ TP-IV site ◆ Interceptor site	◆ Visual Observations, Monitoring and Audits	Monthly	◆ KWSC during O&M Phase
6	Labor Management and Working Conditions	As per the LMP of KWSSIP-2 which include but not limited to OHS, hygiene facilities, appropriate camps area, etc.	◆ TP-IV site	◆ Visual Observations, ◆ Incident/accident register	Bi-annually	◆ KWSC during O&M Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
				Monitoring and Audits		
7	Traffic Safety and Management	As per the TMP which include but not limited to the observation of traffic congestion at bottleneck areas, provision of signs and signal, vehicular inspection, driving safety protocols, etc.	◆ Maintenance sites	◆ Visual Observations, Vehicle Log Books, Monitoring and Audits	◆ Every activity ◆ Bi-annual reporting	◆ KWSC during O&M Phase
8	Social aspects including GBV and other Grievances	Social and cultural conflicts, SEA/SH complaints, grievances related to livelihood impacts, child abuse, etc.	◆ TP-IV Site	◆ Visual Observations and consultations, Grievance Redress/Social Complaint Register, Monitoring and Audits	Monthly	◆ KWSC during O&M Phase
9	OHS; CHS; accidents and incidents at TP-IV	♦ Implementation Status of OHS Management Plan ♦ Availability of Specified Fire Extinguishers	◆ TP-IV Site	◆ Visual Observations and consultations, Grievance Redress/Social Complaint Register,	Monthly	◆ KWSC during O&M Phase

S. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
		♦ Provision and Utilization of PPEs by Workers ♦ Posting of Safety Data Sheet (SDS) for Sodium Hypochlorite.		Incident/accident register, Monitoring and Audits		
10	Chemical Storage and Handling	◆ Safety Data Sheets, Leakage and spills, Segregated handling and storage of chemicals, availability of fire extinguishers,	TP-IV Site	◆ Visual Observations, Chemical Storage inventory, ◆ Incident/accident register, Monitoring and Audits	Monthly	◆ KWSC during O&M Phase

7.4 Reporting and Documentation

339. Contractor shall prepare monthly reports detailing the progress and efforts of Contractor on the implementation of Project's Environmental, Social, Health and Safety (ESHS) Safeguards Requirements included in the ESA and ESMP. The PIU - ESSU with assistance from CSC and Contractors will also produce quarterly reports.

340. **Contractor's Monthly ESHS Reports:** The monthly reports shall provide detailed account of implementation status on the mitigation measures as suggested in the ESMP and updates on the outcome of the field inspections carried out by the Contractor ESHS Teams and status / results of ESHS Monitoring as required under Monitoring Plans. Report shall also provide details on trainings conducted by the Contractor during the reporting month and details of complaints registered at Project's GRM and actions taken by the Contractor for resolution of complaints.

341. **CSC's Monthly ESHS Reports:** Based on the Contractor's Monthly Reports, the CSC in their Monthly Report shall validate the information provided in the Contractor's report, indicate the gaps, their own field observations and evaluation of Contractor's performance on implementing project's ESHS safeguards. CSC Monthly Reports shall also provide details on Corrective Action Plans (CAPs), agreed timelines for resolution of active ESHS issues, status of penalties imposed by the CSC on Contractor for continual non-compliances and way forward suggested by the CSC. The report shall also provide expert analysis on the adequacy of trainings organized by the Contractor, advise for the Contractor regarding realignment of training program, independent analysis on GRM activities and details / outcomes of stakeholders engagement activities carried out during the reporting month.

342. **PIU's Quarterly Progress Reports on Environment, Social, Health and Safety Management:** The reports shall be prepared by the PIU with assistance from CSC and Contractors. The report shall provide detailed account of quarterly ESHS Safeguards implementation status, mitigation measures and preventive actions undertaken, environmental and social monitoring activities conducted, details of monitoring data collected, analysis of monitoring results particularly the non-compliances, recommended mitigation and corrective measures, GRM data, stakeholders engagement activities, ESHS trainings conducted, and environmental and OHS regulatory violations observed. The monitoring reports will be submitted to the SEPA as well if required under ESIA Approval Conditions.

343. **PIU Reporting to WB:** PIU shall prepare and submit quarterly monitoring reports to the Bank throughout Project implementation, on the environmental, social, health and safety (ESHS) performance of the Project, including but not limited to the implementation of the ESCP, status of preparation and implementation of E&S instruments required under the ESCP, stakeholder engagement activities, functioning of the grievance mechanism and other aspects that the reporting would need to consider, as relevant. PIU shall also submit to the Bank the Contractor's and CSC's monthly reports on ESHS performance in accordance with the metrics specified in the respective bidding documents and contracts.

344. Moreover, PIU will promptly notify the Bank no later than 48 hours after learning of any incident or accident related to the Project which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers, including, inter alia, cases of sexual

exploitation and abuse (SEA), sexual harassment (SH), and accidents that result in death, serious or multiple injury or other examples of incidents and accidents, as appropriate for the type of operation. Incident report should provide sufficient detail regarding the scope, severity, and possible causes of the incident or accident, indicating immediate measures taken or that are planned to be taken to address it, and any information provided by any contractor and/or supervising firm, as appropriate.

345. **Project's Environmental, Health and Safety Completion Report:** At the end of construction, the PIU - ESSU shall submit a Project Completion Report on ESHS Aspects which will summarize the overall environmental and social impacts / risks occurred during the project implementation, efforts and measures taken for mitigating or offsetting the impacts, constraints / limitations faced during execution for resolving any particular ESHS issues, overall ESHS performance of Contractor and CSC and lessons learnt.

7.5 Indicative ESMP Implementation Costs

346. Detailed cost estimates for Contractor's staffing, implementation of mitigation measures, preventive actions, and monitoring are presented in **Table 7-3**. Total indicative cost of ESMP implementation is about **PKR 45.471 Million**.

Table 7-3: ESMP Implementation Cost

S. No	Description	No	Samples	Frequency/ Months	Rate/Unit	Amount (PKR)
A – Pre-Construction Phase						
1	Air Monitoring (Ambient Air)-24 Hrs as per SEPA standards	1	3	One time	50,000	150,000
2	Vehicles, Generators and other emitting sources of fumes	1	3	One time	50,000	150,000
3	Noise Quality (24 hours specified in SEQS) – Pre-Construction Phase	2	3	One time	10,000	20,000
4	Waste Water samples collection and Laboratory analysis (SEQS parameters) - Construction Phase	1	3	One time	50,000	150,000
					Total – A	**470,000**
B – Construction Phase (Implementation Phase)						
5	Environmental Engineer	1		18	200,000	3,600,000
6	HSE Officer	2		18	150,000	5,400,000
7	Gender/GRM Officer	1		18	150,000	2,700,000
8	Flag man	8		18	50,000	7,200,000

S. No	Description	No	Samples	Frequency/ Months	Rate/Unit	Amount (PKR)
9	Air Monitoring (Ambient Air)-24 Hrs as per SEPA standards	6	3	Quarterly	50,000	900,000
10	Vehicles, Generators and other emitting sources of fumes	6	3	Quarterly	50,000	900,000
11	Noise Quality (24 hours specified in SEQS) – Purchase of Decibel meter	1		One time	10,000	10,000
12	Waste Water samples collection and Laboratory analysis (SEQS parameters) - Construction Phase	6	3	Quarterly	50,000	900,000
13	Fixed cost at project sites (PPEs, In-house, Shoes, Safety helmets, Gloves, googles, Harness belts, Jackets, septic tanks, installation of safety barriers)	18		Monthly	500,000	9,000,000
14	Precautionary Boards	18		Monthly	150,000	2,700,000
15	Loader for movement of Safety Equipment with POL and driver	2		Once	1,200,000	2,400,000
16	Provision of First Aid Facility including medicine	18		Monthly	50,000	900,000
17	Capacity Development Trainings: ESHS Management, Occupational & Community Health and Safety, Disease Prevention, Maintaining Community Values – Pre - Construction Phases	18		Monthly	50,000	900,000
18	Fire Safety Equipment, Installation of Noise / Safety Barriers, Signage, Site Waste Management (Bins / Skips) etc.	1		Once	500,000	500,000
19	GRM Misc	18			50,000	900,000
20	Water Sprinklers	Lum Sum				2,000,000
					Total – B	**40,910,000**
					Total Amount (A – B)	**41,380,000**
				Escalation and Contingencies on -B	**10%**	**4,091,000**
					Grand Total	**45,471,000**

8 Information Disclosure, Consultation and Participation

8.1 Overview

347. For effective stakeholders' engagement at KWSSIP-2, Stakeholder Engagement Plan (SEP) was prepared in line with the ESS-10: Stakeholder Engagement and Information Disclosure. This SEP was the reference for the identification of relevant stakeholders, public consultation, and information disclosure.

8.2 Stakeholders Identification and Analysis

348. In line with the SEP, the three categories of stakeholders in the Malir Basin Interceptor and Wastewater Treatment Plant Project are outlined below. Stakeholder identification and consultation were done in accordance with the SEP of KWSSIP-2.

8.2.1 Primary Stakeholders – Project Affected Parties and Vulnerable Groups

349. Project Affected Parties include the project owner (KWSC, PIU of KWSSIP), 38 PAPs and communities in the AoI that will be the direct beneficiaries of the project, as well as those that could be affected by environmental and social impacts such as social and cultural issues, noise, dust and increased vehicular traffic, among others.

350. The vulnerable or disadvantaged groups relevant to the project include women, elderly, persons with disability, minorities (i.e., ethnic, religious, women), low-income households, women/child headed households, and transgender persons.

8.2.2 Secondary Stakeholders - Other Interested Parties

351. Interested parties under this category includes the following:

- SEPA;
- SSWMB;
- Revenue Department;
- KMC, DMCs, and Local Councils;
- Forest Department of Sindh;
- Sindh Wildlife Department;
- Livestock & Fisheries Department;
- Archaeological Department;
- Civil Society Organizations (CSO) and Community Based Organizations (CBO);
- Academia and Subject Specialists;
- Labor and Human Resource;
- Social Welfare Department;
- Women Development Department;
- Donor Agencies; and

- Press and Media.

352. Details on the roles and responsibilities of the concerned secondary stakeholders are given in the following **Table 8-1**.

Table 8-1: Role and Responsibilities of Project's Secondary Stakeholders

Project Stakeholders	Roles and Responsibilities
Sindh Solid Waste Management Board (SSWMB)	◆ Regulate control or inspect the source points of generation, accumulation, transfer, recycling, trading of solid waste. ◆ Supports, promote, administer, execute, and implement schemes for undertaking any commercial or business enterprise which may benefit the management of waste.
Sindh Environmental Protection Agency	◆ Issuance of NOC for the construction and operation phases of the project. ◆ Supervise the compliance of ESMP and NOC provision during the construction and operation stages of the project.
Forest Department	◆ Protection, improvement and maintenance of existing trees ◆ Advise on location and type of trees for compensatory plantation
Wildlife Department	◆ To save and protect wildlife
Revenue Department	◆ Provide and verify land ownership data which include but not limited to the ownership record, land categorization and price details.
KMC and DMC	◆ Planning development and maintenance of Karachi roads, bridges, streetlights, storm water drains, land control/ removal of encroachment, solid waste management, municipal watch and ward, firefighting, traffic engineering, charged parking, etc.
Political Parties	◆ The city mayor, to be elected by the citizenry through the local elections, will likely be from a political party. The working of KWSC and KWSSIP falls under the mandate of the mayor.
Local Councilors	◆ Key link between constituents, city legislature, and executive branch of government.
Civil Society Groups (CSG) and (CBOs)	◆ Identification of project-related environmental and social issues ◆ Identification of mitigation measures and solutions to ensure community issues, including those of vulnerable / disadvantaged groups are adequately addressed. ◆ Identification of solutions for environmental and social sustainability of the project
Cantonment Boards	◆ Manage public services, environmental development, and land use in their jurisdictions.
Academia and Subject Specialists	◆ Identification of project-related environmental and social issues and concerns ◆ Identification of solutions for environmental and social sustainability of the project that are technically sound and cost-effective

Project Stakeholders	Roles and Responsibilities
Labor and Human Resource	◆ Enforcement of labor laws ◆ Promotion of healthy labor management and conditions ◆ Monitoring of labor working conditions ◆ Implementation of labor standards ◆ Address grievances of labor force ◆ Maintain the minimum wages rates and impose restriction of child labor
Social Welfare Department	◆ Social protection including institutional care, skill development, and rehabilitation. ◆ Provide welfare services
Women Development Department	◆ Address concerns of women related to the project ◆ Create employment opportunities ◆ Training and capacity building of women
Communities and project Affected Persons	◆ Participation in social impact assessment surveys, Consultation, and Focus Group Discussions ◆ Identification of project impacts, specific community concerns/suggestions from community leaders, male and female community members ◆ Identification of mitigation measures and solutions for enabling win-win solutions ◆ Supervision and disbursement of resettlement cost to APs.
Vulnerable / Disadvantaged Groups	◆ Identification of project impacts on vulnerable / disadvantaged groups ◆ Identification of mitigation measures and solutions to ensure vulnerable / disadvantaged groups are not adversely affected
Beneficiaries of the project	◆ Identification of issues. suggestion and coordination for improvement of the project design ◆ Support for implementation and aftercare of the project ◆ Identification of project-related environmental and social issues ◆ Identification of positive solutions for environmental and social sustainability of the project that are technically sound and cost-effective ◆ Aftercare of the project
Donor Agencies	◆ Compliance with Environmental and Social Safeguards of Unilateral and Multi-Lateral Development Agencies ◆ Lessons from previous/on-going development projects in the project-affected districts

8.2.3 Disadvantaged / Vulnerable Individuals or Groups

353. Vulnerable segment of society that exists in the Project Area include:

- Elderly employees and citizens;

- Disabled employees and citizens;
- Minorities (ethnic, religious, women);
- Low-income households;
- Women/child headed households; and
- Transgender persons.

354. Nearly all vulnerable segments have been consulted during the surveys; concerns of these groups were recorded.

355. Vulnerable groups within the communities affected by the project will be further identified and consulted through dedicated means during the stakeholder engagement process. Regular meetings and consultations will be conducted, following the guidelines outlined in the Stakeholder Engagement Plan. This approach ensures that the concerns of vulnerable individuals and groups are heard and taken into account throughout the project's lifecycle, allowing for equitable participation and consideration of their unique needs and perspectives.

8.3 Consultation Participation Process

356. The project intends to utilize various methods of engagement that was used as part of its continuous interaction with project stakeholders. For the engagement process to be effective and meaningful, a range of various techniques applied that were specifically tailored to the identified stakeholder groups in line with the SEP. For ascertaining the perceptions of different stakeholders about the project consultations/ meetings were carried out at following two levels:

- Consultations with Secondary Stakeholders - Other Interested Parties
- Consultations with Primary Stakeholders – PAPs and Vulnerable / Disadvantage Group

357. The stakeholder's engagement has been carried out in line with the requirements mentioned under Annexure – II of SEP (Planned Stakeholders Engagement Activities - Stage 1 - Project Design).

8.4 Consultations with Secondary Stakeholders - Other Interested Parties

358. Other Interested Parties - Secondary stakeholders identified, in the form of departmental stakeholders such as non-governmental organizations, government departments, and utility departments, were not only approached separately for the project's consultations, but also invited for a stakeholder consultation session, arranged to allow for all these departments to gather, and facilitate a meaningful dialogue on the project, and obtain their feedback on the project.

359. All relevant Government Departments/Organizations were invited in the consultation session where they were informed of the project in detail and requested to share their concerns and suggestions. Local representatives of all other stakeholder groups were also invited to the consultation session to encourage a collaborative and inclusive approach which include the stakeholders from the civil society sector, academia and media representatives.

8.5 Consultations with Primary Stakeholders - Project Affected Parties

360. Affected Parties include local communities, community members and other parties that were subject to direct impacts from the project. The public consultations have been arranged through Participatory Appraisal (PA) method. Participation mechanism and consultative process included: Information sharing, dissemination of information regarding impacts of the projects on social life and people in the project AoI, benefits of the project and participation of stakeholders in the project related activities, where their feedback were ultimately being incorporated back into the project design to the extent deemed possible.

361. For the public consultations, following steps were adopted:

a) Consultations with Beneficiaries

362. Consultations were conducted with beneficiaries of the project and will continue during the ongoing project stages and the project implementation to achieve the desired objectives. Public consultations organized at different locations in the project area along the route.

b) Consultations with Project Affected Parties

363. In order to align with international standards and good practice, local level engagement was provided to all PAPs likely to be affected during the ESIA process. Apart from those potentially affected communities and their representatives, the vulnerable and disadvantaged people within these communities (people who would not normally be involved in decision-making) were also engaged.

364. The main purpose of the consultation exercise was to disseminate project information to relevant stakeholders and solicit their feedback received at an early stage regarding potential issues and concerns based on the current project concept and design features. Identification of stakeholders is one of the major steps for designing an effective consultation process. For this purpose, several site visits were carried out by E&S team to identify the relevant stakeholders for consultation.

365. Consultation meetings were conducted with the identified stakeholders. The stakeholders were briefed about background and scope of the project at the beginning of the meeting sessions. Concerns and suggestions of the respondents were noted down by the team and pictures of the session were taken with the consent of the stakeholders. If the interviewees had any queries regarding the project, the team responded to their queries during the session.

c) Methods of Public Consultation

366. The following methods were used for public consultation with project stakeholders in order to ascertain their stakes regarding project implementation. The views of the beneficiaries were formally recorded. The locations selected randomly situated near the proposed route of the road.

- Formal Group Meetings
- Informal Group Meetings
- Individual meetings
- Focused Group Discussions (FGDs)

- Gender Consultations

d) Categories of Stakeholders Contacted

367. Different categories of stakeholders which include but not limited to the residents, farmers, business/ shop owners, government and private servants, drivers, labor and women were contacted during consultations.

8.5.1 Community Consultations

368. Consultations mainly in form of "Focus Group Discussions" (FGD) with Primary Stakeholders in randomly selected communities along the Malir River, Chakora and Chakra drains were carried out at public places. It was important to provide meaningful input for the public into the decision-making process through consultation. It was helpful to create a strong foundation for long-lasting and trustful relationships between the project and the stakeholders. It was helpful for the organizations enhance risk management and have better project outcomes. Local and traditional leaders, representatives of the communities, potential vulnerable groups such as women and youth has been consulted to understand their specific issues and concerns. This will enable meaningful participation. The findings and recommendations has been discussed and disclosed in an open and transparent manner with the communities in order to solicit their comments and suggestions in the studies.

369. During consultation participation of women was also ensured. On the whole there were 115 male and 72 female participants of consultation meetings. In some areas women consultations was not allowed.

370. The complete settlement wise list of participants and their details are provided in **Annexure 8-1** and Photographs are provided in **Annexure 8-2.** Details regarding livelihood compensation to the identified 38 PAPs have separately been covered under RP of the project attached as **Annexure 2-1**.

371. Consulted communities includes the following (**Table 8-2**).

Table 8-2: Consulted Communities

S. No	Settlements	Town	District	Household	Population	Number of Participants
1.	Agha Town	Bin Qasim	Malir	400	4,000	10
2.	Hamal Goth	Gadap	Malir	150	1,500	12
3.	Mansehra Colony	Landhi	Malir	5000	45,000	12
4.	Mansehra Colony - 2	Landhi	Malir	5000	35,000	11
5.	Reta Plot	Shah Faisal	Korangi	20000	100,000	10
6.	Roshan Abad	Shah Faisal	Korangi	3000	50,000	9
7.	Mahmoudabad	Jamshed	East	24000	97,000	12
8.	Haji Ahmed Baloch	Shah Faisal	Korangi	13	150	9

S. No	Settlements	Town	District	Household	Population	Number of Participants
9.	Sharafi Goth	Landhi	Malir	800	5,600	8
10.	Jalal Murad Goth	Landhi	Malir	200	1,700	12
11.	Shambay Goth	Landhi	Malir	275	2,000	10

8.5.2 Feedback and Concerns from the Communities

372. Participants were first briefed about the project objectives and major interventions associated with the project implementation. Afterward, people were asked to express their views regarding various activities of the proposed project. In general participants appreciated the project and offered comments & suggestions to enhance the expected environmental and social benefits and to mitigate the adverse impacts. The community perception of the project is very good but most of the people wish to enhance the availability of water through sustainable and safety manner. They also are worried about the shortage of water. The digest of major issues raised by communities during meetings are given in Error! Reference source not found.. The stakeholders requested the concerned authorities to ensure the project was beneficial for the concerned communities.

8.5.3 Consultations with Secondary Stakeholders - Other Interested Parties

373. The consultant environmental and social team visited various secondary stakeholders offices for information disclosure and getting feedback. They were briefed on the ESIA process, the proposed project, proposed interventions and the potential negative and positive impact of the project on the area's environment and concerned communities. It was important not to raise community expectations unnecessarily or unrealistically during the stakeholder consultation meetings in order to avoid undue conflict with local people or government administration. The issues recorded in the consultation process were examined and validated and are addressed in the ESIA report. The discussion with institutional stakeholders was mainly focused on following aspects:

- Baseline environmental and socio–economic conditions of the project area
- Expected impacts of project on natural and social environment
- Mitigation of adverse impacts associated with project

374. The public sector representatives of the different line departments expressed their complete support and efforts towards the project development and mentioned the intent to ensure the project was completed at the earliest to the highest quality standards. In addition, these officials expressed the commitment to ensuring the support and would adhere to all environmental and social compliance standards with no leniency in this regard to be expected from the relevant Government line departments.

375. The digest of comment and suggestions received by the departments are given in **Table 8-5**, whereas, complete list of offices visited and official consulted is provided **Table 8-3** below:

Table 8-3: Consultation with Secondary Stakeholders - Other Interested Parties

S. No	Department/ Organization	Name	Designation
1.	Agriculture Department, Malir	Abdul Ghani Arbani	Deputy Director
2.	Health Department	Dr. Mohammad Khan	A.D.H.O
3.	Cantonment Board, Korangi Creek	Mohammad Zarin	Sub-Engineer
		Ms. Sanna	Superintendent
4.	DMC, Korangi	Sajjida Qazi	Administrator
		Zohaib Hassan	Deputy Administrator
5.	KMC, Korangi	Mohammad Parvez-ud-Din	A.D.D
		Muhammad Ammar	Administrator
		Saleem Raza	Deputy Director
6.	Taxation, Encroachment Department, Malir	Shamsher Khan	Sub Inspector
7.	TMO, Malir	Sohail Ahamed	Executive Engineer
8.	KWSC-TP II	Abdullah Siddiqui	Assistant EXEN
9.	Wildlife Department	Adil Khan	P.S
10.	Fisheries Department	Dr. Mohammad Asim Karim	Deputy Director
11.	DMC, Malir	Riaz Ahmed Khatri	Administrator
12.	Health Department, Malir	Dr. Maqbool Ahmed	A.D.H.O
13.	District Management, Korangi	Saleem ullah Odho	Deputy Commissioner
14.	Water Board, Karachi	Shahzad Mashkoor	Assistant Executive Engineer
		Muhammad Amir	A.A
15.	Public Health Engineering Department	Muhammad Bakhash	Research Officer
16.	Urban Resource Center (NGO)	Mohammad Younus	Director
17.	Chinoot Hospital (NGO)	Rizwan Ahmed	Administrator
18.	Agha Khan Institution (NGO)	Faheem Ahmed	Supervisor
19.	SOS village (NGO)	Ghazala Farooqi	Assistant Director
20.	Focal person of MNA Agha Rafiullah	Israr Khan	Public Representative
21.	SEPA	Shoaib Qureshi	Assistant Director

8.5.4 Women Consultation within Project Area

376. Besides male members, consultations with female members of the communities were also carried out in project area during the ESIA study. Conducting women consultations in the project is a challenging task. However, the process was carried out by holding consultation sessions with women of local communities randomly. A participatory and consultative approach was employed for information gathering and data collection. A deficiency of suitable capacity, skill and experience, and limited opportunities and time for working in these sectors, remain challenges for women's participation in development. Female participants were first briefed about the project objectives and interventions and then were requested to give their views. Women's main concerns

were generally related to the existing hardships they are facing. The comments and suggestions received by the female members of the communities are given in **Table 8-4**.

Table 8-4: List of visited Settlements

S. No.	Settlements	Town	District	No. of Participants
1.	Agha Town	Bin Qasim	Malir	10
2.	Hamal Goath	Gadap	Malir	14
3.	Mansehra Colony -2	Landhi	Korangi	12
4.	Reta Plot	Shah Faisal	Korangi	08
5.	Roshan Abad	Shah Faisal	Korangi	10
6.	Haji Ahmed Baloch	Shah Faisal	Korangi	07
7.	Mahmoudabad	Jamshed	East	11

Table 8-5: Summary of Consultation Meetings Outcomes

Stakeholder	Summary of Key Issues Raised	Responses
Agha Town	Local people should be preferred when hiring	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people from the Project Area.
	What are the Project activities that could affect the environment and people?	The query has been responded with describing major components of the project and their functioning. The possible environmental impact of the project shall be related to air quality, noise impacts on nearby sensitive receptors, Impacts on landscape features, Impacts on soil related to the modification of the local topography (excavation and spoil disposal), Direct and indirect impacts on ecology, few trees will be cut and Social impacts associated with Employment generation (positive) and community health, safety and well-being after project completion (positive).
	Farmer showed their concern about the potential effect of the ◆ Groundwater aquifer Pollution ◆ Surface water pollution, ◆ adverse effect on the natural fertility of soil due to deposition of industrial waste.	The following mitigation measures (also detailed in **Chapter 6**) will address the issues of concern: ◆ Hazardous materials are not allowed to be discharged on the ground. ◆ Proper waste disposal system to be implemented to minimize pollution and SEPA certified waste handler will be hired to handle domestic and hazardous waste. ◆ All fuel, oils, chemicals, hydraulic fluids and hazardous waste will be stored on impervious flooring in a bunded storage. ◆ Optimize use of resources (oil, water, etc.) to minimize the amount needed.

Stakeholder	Summary of Key Issues Raised	Responses
		◆ GoS is working on other projects (Combined Effluent Treatment Plants) to treat industrial waste has been planned, this will have positive effect on soil.
	Natural resources, particularly soil and water, may be affected and reduce productivity in agriculture and jeopardize long-term sustainability.	GoS is working in providing water to the area through various schemes, including concept of tertiary plant to reuse TP IV treated water. Disuse of sewerage water for agriculture may improve the health of the produce users. It may be easier to market the produce that uses Malir river water only. The farmers' health expenses will also come down. Reduction in agricultural productivity does not fall within the ambit of this report however EPC contractor may take this up as a part of Corporate Social Responsibility (CSR) and undertake studies to come up with alternatives.
Hammal Goth	Concerns about reduction in water quantity, that will lead to financial difficulties for the local communities and it will increase the cost of agriculture in general, especially vegetables crops and decreased water quantity may also damage the standing crops.	Crops are currently grown with untested sewage water mixed with Malir river water. The mixture may be dangerous for health so after the successful implementation of the project the remaining Malir river water might become safer once the sewer water is taken out of the system. Specific studies may be needed address the concern raised by farmers to come up with acceptable alternatives.
	The community desire to receive regular updates on the project development from the relevant government departments.	The consultation process will be on-going process. The EPC contractor will maintain an awareness campaign as part of SEP (discussed in **Section 8** and **Table 8-6**)
	In all of the project areas except the Hamal village and Agha Town, water is scarce and communities have to buy water for drinking and other uses.	Water scarcity will be addressed through the implementation of KWSSIP. GOS's is considering further treatment (tertiary) to reuse the treated water from TP-IV. **Chapter 6** covers impacts and mitigation
	Some participants expressed that the relevant Government departments must ensure that their staff is cooperative with the general public.	Measures will be included in the GRM and institutional arrangements to ensure that the project management staff remains accessible and facilitative to the community (addressed in SEP as detailed in **Chapter 8** and **Table 8-6**.
	The local representatives of the community requested to raise awareness of pollution, industrial waste, and mitigations.	The EPC contractor will carry out an awareness campaign as part of SEP (**Chapter 8** and **Table 8-6**)
Mansehra Colony	There is a need to help communities understand, participate in all activities related to	This has been addressed in SEP and problems may be addressed via the robust Grievance Redress Mechanism

Stakeholder	Summary of Key Issues Raised	Responses
	this project, increase civic engagement in addressing their concerns and facilitate collaboration among local and regional entities to address their problems.	
	How was the Project assessed?	The appraisal is included in the ESIA. The assessment included: ◆ Establishment of the baseline to understand current conditions at and around the proposed Project site (**Chapter** Error! Reference source not found.**4** ◆ Prediction of impacts, Identification of mitigation measures to be included in the design, procedures, development and management of the Project (**Chapter 6**). ◆ **Chapter 9** covers GRM
	The communities of the project area requested that consultant may identify issues and opportunities, and best management practices for pollution and industrial waste control.	◆ Jobs will be provided to project area residents (nearby). ◆ Pollution will be mitigated as discussed in **Chapter 6** of this report ◆ Preferred use of sludge will be recycling (fertilizer for tree planting, landscaping or use for cement factory etc. ◆ GoS is working on other CETPs to treat industrial waste
Shambay Goth	Bird life has decreased due to pollution and loss of suitable wetland and reed bed habitat.	The project does not envisage any negative impacts on wet land.
	The farmers living on the banks of the River complained about pollution. When used for irrigation the river water is blamed for poor crop yields. Similarly, animals that are watered in the river often fall ill, and are subject to skin and liver disease. The people involved in these activities are also thought to suffer from a higher incidence of skin disease.	In principle once sewage water is sent for treatment in closed pipes any pollution and it's after affects to nearby residents will cease from this source. The river water on the other hand should be much cleaner without being mixed with sewerage. Furthermore, GoS in its other projects is constructing CETP to tackle issues related to treatment of industrial waste **Chapter 6** also covers impacts and mitigation
	Concern about the deteriorated water quality due to industrial waste that could impact drinking water and reduced capacity in wells.	This project will improve water quality as mixing of water with sewerage will reduce or cease altogether. Regarding industrial waste concerns, GoS is working on treatment plant for industrial waste (CETP).

Stakeholder	Summary of Key Issues Raised	Responses
	What job opportunities will there be for young people?	There will be some beneficial impacts through the creation of employment during construction and operation.
	Farmers expressed concern about the economic impact on their farms. Concerns focused on whether property values would be reduced and whether their agricultural products would be decreased.	GoS via other projects will be providing water and CETP will reduce industrial waste in Malir River. To review all concerns and alternatives other studies may need to be sanctioned. The EPC contractor may consider to take this up as part of CSR
Reta Plot	Concerned authorities should enhance the quality of health and education facilities in the project area.	Noted and will be communicated to the relevant departments
	Availability of safe drinking water is big challenge for the project communities and they want to request the concerned authorities to provide safe drinking water.	This project will improve water quality by stopping mixing of water with sewerage. Whereas provision of safe water is not within the purview of this project, however supply of safe water is part of GOS other projects
	Ensure the project was beneficial for the concerned communities.	Comment has been incorporated in this table. Opportunities have been discussed in detail in **Chapter 7**.
	Deficiency of health and education facilities, especially for women in the project area.	The project should have a direct impact in improving health within the project area. Concerns regarding education and gender issues have been noted and will be forwarded to the concerned departments.
Mansehra Colony-2	The community complained about dumping of tons of solid waste and its burning. This is a big hazard for the residents and it has caused fatalities especially amongst children.	Existing issues related to solid waste dumping and burning is not within the purview of this project, however GOS is working on this. EPC contractor will be bound to manage project related waste in a responsible manner and no dumping or burning will be allowed.
	This dumping side has become a big mountain and when it is burnt, it produces a big smoke which lead to problem in respiratory system and effects to eyes sight	Health issues caused by existing solid waste dumping and burning is not within the purview of this project, however GOS is working on this. No burning of waste will be allowed under the project.
	Peoples do not have the dumping or sold waste collection facility, therefore, they dump it in the river and it also causes diseases and mosquitoes which lead to malaria and diarrhoea	Issues related to vector borne disease caused by existing solid waste dumping in the river bed is not within the purview of this project, however GOS is working on this. No dumping of solid waste from the project will be allowed in the area.
Roshanabad	The project communities do not have easy access to the health facilities specifically females, as it is difficult to travel to Jinnah	Noted to be communicated to the relevant authorities.

Stakeholder	Summary of Key Issues Raised	Responses
	hospital for medical services and other private hospitals are unaffordable	
	The communities have also requested for the easily access to the educational facilities, because private schools charge unaffordable fee.	Noted to be communicated to the relevant authorities.
	People of area have also taken interest in the project as it has a positive side. Especially the covered waste water conveyance system which is safer for kids who play near the open drains causing many accidents.	Positive comments
Jalal Murad Goth	People consider that this project will provide a positive outcome and are also hopeful that it may also provide safe drinking water to them	If the tertiary treatment plant comes into use then the community's expectations may be met. However, it should be noted that GoS and WB are working on other projects that will provide safe drinking water to Karachi.
	People complained about quality of water received via piped water supply. Many people buy either bottled water or treated water from reverse osmosis (RO) plants	GoS and WB are working on other projects which will address the issue regarding water supply. Furthermore, once sewerage water is conveyed to treatment plant via closed HDPE pipe, mixing of this water with piped water will cease thus improving water quality. Comment has been incorporated in this **Table 8-5**.
	Is there any traffic management plan to be established during construction to avoid access problem?	Traffic management plan will be established during the construction work.
Mahmoudabad	Will construction occur in the day time?	Majority of construction activities will occur during the daytime, although there may be a need for some night-time activities. Noisy construction activities will be limited to daytime periods only.
	The poor people living in squatters have no affordability to buy mineral bottled water, RO plant water or even small vendor supplied water. They consume whatever water is available, either piped water or groundwater	GoS and WB are working on other projects which will address the issue regarding water supply.
	People complained that they are denied supply of piped water, as their basic human right, and this water is stolen and sold to them on exorbitant prices.	KWSSIP as a whole is a project to address the issue regarding water supply. Furthermore, If the tertiary treatment plant comes into use then some of the communities' expectations may also be met from this source.

Stakeholder	Summary of Key Issues Raised	Responses
All Communities	People are strongly against "water supply via tankers" as they are major source of road accidents and degradation of roads	As above
	Massive reforms are needed in KWSC and it should be an autonomous organization which must provide due services and charge with appropriate billing with people	KWSSIP project as whole is designed to address these issues. For the current project, **Chapter 10** of this report covers institutional arrangements in details.
	People are also wary of Karachi's water share being provided to Bahria Town.	KWSSIP project as whole is designed to address these issues. For the current project, **Chapter 10** of this report covers institutional arrangements in details.
	People welcome KWSSIP project and advised that minimum land acquisition and forced eviction should be practices	No land acquisition is involved in the project. Restoration or improvement in living standards and incomes is part of this project. Asset and income losses are going to be compensated accordingly and these are covered in the RP prepared for the project.
	Queries about whether there are going to be improvements made to existing local roads.	There is no provision of road improvement in this project
	Concerns over ownership of land to be impacted and compensation to the affected people.	The Resettlement Plan has been prepared and compensation for all affected assets and loss of income will be paid accordingly.
	Queries about local employment opportunities.	Local employment opportunities will be provided and the contractor will be asked to hire most labor force from close proximity of the project area. This recommendation is included in **Chapter 7** and the ESMMP.
Sharafi Goth	Concerns about the risk of resettlement, especially for land poor communities located in the project area.	RPRP has been prepared and compensation for temporary loss of income will be made along with compensation for loss of any assets.
	Concerns about the Projects impact on local drinking water quality.	The project will have a positive impact on drinking water quality by eliminating mixing of sewerage with drinking water. Comment has been incorporated in the ESIA report
	Issue of potential local employment opportunities.	This recommendation is included in the ESIA **Chapter 7** and the ESMMP. The contractor will be contractually bound to disclose the "Recruitment Policy" and ensure its implementation.
	Concerns about increased water shortages within the local area.	Water supply to the area may be improved by the tertiary treatment plant being planned to reuse TP-IV treated water and other schemes to improve water supply. Comment has been incorporated in the ESIA report.

Stakeholder	Summary of Key Issues Raised	Responses
Haji Ahmed Baloch	Whether local labour resources will be used during construction and operation phases of the Project	The contractor is contractually bound to disclose the "Recruitment Policy" and implement it. Most of the unskilled workforce will be from project area
	Concerns over the impact of the Project on local economic activity such as the agriculture and grazing at Malir River	Currently in the project area, sewer water is used for the agriculture which is harmful for the human and animal health. After the project, Malir river water without sewerage will be available. This will have positive effects on health. However additional studies may be initiated to mitigate the concern raised regarding agriculture.
	It must be ensured through efficient implementation of the proposed interventions that they receive unpolluted water for their domestic and agriculture use.	Efficient implementation of the project is expected. GoS is working on various schemes to provide unpolluted water to Karachi.
	The decreasing fresh water is hazards for local communities	GoS is working on various schemes to provide unpolluted water to Karachi.
	Share responsibility and accountability for accomplishing Malir River and waste and sewerage management among all levels government and with all communities of the project area.	This project after implementation will improve Malir river water and sewerage management. Comment have been incorporated in this **Table 8-5**.
Agriculture Department, Malir	Local characteristics of land and amount of water available for agriculture is strongly affecting the livelihood of the communities. In areas where surface water is unavailable because of prior allocation or seasonal fluctuations, ground water is not utilized. The farmers use polluted water for vegetable crop. This can result in the death of local vegetation and there is water borne diseases everywhere.	This project will play a role in reducing water borne diseases with conveyance of piped sewerage transfer, thereby reducing the mixing of sewerage with drinking water. When untreated sewage water will no longer be available the vegetation will only receive seasonal Malir river water and thus having positive effects.
	Much of the land currently under agriculture is deteriorating due to polluted industrial waste. Natural resources, particularly soil and water, are being seriously affected and reduce productivity and jeopardize long-term sustainability.	This project is dealing with construction of piped sewerage conveyance system. This will reduce pollution of Malir river and the soil and improve the general health. Other studies will need to be undertaken to resolve the issues related to: Industrial waste entering Malir river.
	The decreasing water quantity continues to be a major threat to land eco-systems around the study area. The quality of water is	GoS is working on providing more water and reducing pollution as part of other schemes. Principally the agriculture is being undertaken on GoS lands illegally. Studies

Stakeholder	Summary of Key Issues Raised	Responses
	getting vastly deteriorated due to industrial waste and carelessness to the environment	need to be conducted to take up these issues.
	Some agricultural areas along and near the Malir River would experience large reductions in nutrients, and impacts to agriculture productivity and the problem for livelihood of the people in those areas would be high.	GoS land being used illegally by farmers using sewerage water that is not tested and may be hazardous. After the project completion Malir river water without sewerage water will still be available. The produce may be more acceptable. To review all concerns and alternatives other studies may need to be sanctioned.
Health Department	There is no impacts on community health, safety and security that are predicted. However the Project proposes risks that need to be managed and mitigated. It helps to reduce health, safety and security risks that the project activities may have on the local community.	Once sewerage waste water is conveyed via closed pipes then intermingling with drinking water will be eliminated or reduced. Overflowing of sewerage is a health hazard and this too will be eliminated thereby reducing health risks. Closed pipes will stop injury and fatality of children falling into drains and improve safety and security of the project area.
Cantonment Board Korangi	The consultant will need a formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects.	The whole ESIA process being undertaken is a testament to this intention. The mitigation and monitoring measures mentioned in the ESIA along with stakeholder engagement, sharing documents on web site. Public hearing etc. are designed to make the system robust from the start.
	How much noise will be produced?	Unmitigated noise impacts during construction are likely to be significant especially for receptors close to the project boundary, therefore, mitigation such as noise barriers, fine-tuned equipment etc. will be implemented during project construction. During operation, noise levels will meet international standards and are expected to be minimal.
	The control over local water resources has always had important political and social implications, and any alteration in supply, access, or quality can have reverberations throughout a local society, town or, indeed, a region. The Malir River have always been "socially neutral" areas, providing unrestricted access to the river stream for transportation, for water and all its uses, and for social intercourse.	This project does not plan any changes other than construction of Wastewater Interceptor along Malir River, and Sewerage Treatment Plant (TP-IV). The sewerage will be conveyed through closed pipes and polluted sewerage water will no longer go into Malir river. As such there will be no change to fresh water resources and intermingling of ground water with sewerage water will also stop thus improving groundwater quality. Other schemes being planned will improve water supply and quality. Therefore the item under discussion does not apply.

Stakeholder	Summary of Key Issues Raised	Responses
DMC, Korangi	DC Korangi expressed concerns about rivers beings converted into drains:: "Malir and Lyari Nadi (river) are not drains and due to mismanagement and no extensive research beforehand the sewerage lines are misplaced that is the reason the rivers are now destroyed". The whole framework of Karachi sewerage system should be revised with proper cleaning of sewerage lines and rules and regulations on industries to treat their waste before disposing off	The proposed project has been initiated by Karachi Water and Sewerage Corporation (KWSC) to raise its operational capacity and to deliver safe, reliable water and sanitation services while ensuring its sustainability.
	Only 27% of Korangi district has access to the water supply. In the meeting it was suggested that to improve Karachi water supply distribution a reservoir of about 1km should be made between Lyari to Malir nadi	The suggestion is good but not in the purview of this project. GoS as part of other projects is planning to supply safe water to Karachi.
	Encroachments should not be compensated in resettlement according to Sindh revenue and land act; only tax payers and legal citizens of Karachi getting effected by KWSSIP should be compensated. If the water is provided on subsidized rates and quality, all people will pay their bills	The project will follow guidelines of World Bank and the Resettlement Plan prepared for the project will be followed. Water rates will follow direction given by KWSC
	The challenge now is to provide the appropriate tools to those who wish to undertake environmental and social impact assessment in these types of projects.	The ESIA report clearly mentions all the tools required to assess issues encountered in these types of projects and some responses are mentioned in this **Table 8-5**.
KMC, Korangi	Decision-makers should have knowledge of negative impacts and actions to reduce them.	The ESIA lists the negative impacts and their mitigation and public hearing will also provide further opportunities to interested and affected parties to comment.
Taxation, Encroachment Department, Malir	The division of responsibilities for Malir River and its allied work among all stakeholders needs clear definition.	The ESIA mentions the institutional arrangement delineating the responsibilities in **Chapter 10**. **Chapter 7** covers environmental and social management plan (ESMP)
TMO, Malir	Share responsibility and accountability for accomplishing Malir River and waste and sewerage management among all	The ESIA mentions the institutional arrangement delineating the responsibilities in **Chapter 10**.

Stakeholder	Summary of Key Issues Raised	Responses
	levels government and with all communities of the project area.	
	Communities and decision-makers should have access to information about future challenges.	Comment has been incorporated in the ESIA report World bank Environmental and Social Safeguard ESS 10 covers the full disclosure activities. The ESIA will be placed on web site and a public hearing is planned so all interested parties will have access to information
Wildlife Department	These kinds of projects invariably result in many far-reaching ecological changes. Some of these benefit human population, and the long-term productivity of the agriculture sectors themselves as well as the natural resource base. The benefits cover the entire range of environmental components, such as soil, water, air, energy, and the socio-economic system.	The ESIA has covered ecological changes and soil, water, air, energy, and the socio-economic system etc. Further many opportunities will be available to discuss anything specific that has been left out of the discussion in the Public hearing by SEPA and SEP planned as discussed in detail in **Chapter 8** and **Table 8-6.**
Fisheries Department	Polluted and low volume of water is adversely affecting the aquatic ecosystem. High level of dangerous industrial waste choke the fish gills resulting in mortality. The spawning habitat of the fish are eliminating and food chain is disturbing due to pollution of algae from the stones and macro invertebrates living underneath the stones in upstream and coastal areas. Comprehensive data on fish fauna of River should be collected and if necessary, fish and macro invertebrate sampling form River upstream should be carried out.	Malir ESIA's spatial boundaries do not go to the area that is upstream and as such response to this concern is not within the purview of this report.
	The low water and pollution travel routes of long-distance migratory fish is completely finish, and those fish species would be extirpated or their populations would be reduced to such a low level that they would no longer be an important part of the capture fisheries in the region.	Malir ESIA is regarding sewerage conveyance and treatment plant. The project will improve the quality of water left in Malir river. However low level of water and the subject under discussion are essentially part of other studies that the GoS may wish to take up.
	KWSSIP is much needed due to the fact that the existing water and sewerage system has failed	Positive comment

Stakeholder	Summary of Key Issues Raised	Responses
	to meet the requirements of the city.	
DMC, Malir	The water shortage should be addressed immediately to counter the water delivery via tanker. Nala / Nullah system was preferred and when asked about the disadvantages they said "every system have pros and cons but nala system is best for Karachi.	The water shortage issues are being addressed by GoS and WB as part of other projects. Regarding the system for conveyance of sewerage various alternatives have been discussed in detail in **Chapter 5**.
Health Department, Malir	Sewerage system has failed and the rising trend of increasing rainfall in Karachi has made matters worse	KWSSIP has been initiated by KWSC to raise its operational capacity and to deliver safe, reliable water and sanitation services while ensuring its sustainability. Effects of rising trend in rainfall are not within the purview of this project, however various schemes are underway to improve the sewerage system.
District Management, Korangi	The ESIA study provides opportunity to demonstrate ways in which the environment may be improved as part of the development process.	Positive comment
Water Board, Karachi	There should be reservoirs on specific distances, and from those reservoirs the water should be distributed.	This is a good suggestion but not within the purview of this study. Water supply improvement is being addressed in KWSSIP.
Public Health Engineering Department	Organized support is a necessary element to carry out and participate in effective project management and clear Malir River from polluters especially industrial waste.	**Chapter 7** covers ESMP. However, it should be noted that GoS is working on other projects in which Combined Effluent Treatment Plants (CETP) to treat industrial waste has been planned
Urban Resource Centre (NGO)	Growing vegetables using contaminated water that has arsenic which is slow poison	This project will improve Malir river water quality by stopping mixing of sewerage water in it.
Chinoot Hospital (NGO)	Through consuming these vegetables, the people become the patients of diabetes, blood pressure in young age, losing eye sight and less concentration.	This project will stop sewerage water being used for agriculture. Other GoS projects will treat Industrial effluents. In other words the GoS planned activities of this project and others will improve the overall health
	Communities should recognize benefits of water assets and how they fit with community goals (resilience, water quality, habitat, recreation and livelihood.), help address low water and other vulnerabilities.	This project will improve the water quality by reducing or stopping intermingling of sewerage water with water in use including groundwater.

Stakeholder	Summary of Key Issues Raised	Responses
Agha Khan Institution (NGO)	Communities should identify existing natural assets that are providing protection from pollution.	This could be done in the planned Public hearing or via SEP Plan as discussed in detail in **Table 8-6.**
	Provide placed-based training to build understanding of situational vulnerability needs assessments.	The suggestion of training of situational vulnerability need assessment may be taken up by EPC contractor as part of training program or CSR.
Focal person of MNA Agha Rafiullah	There is no problem in the introduction of water ATMs if they provide proper services and facilities on regular basis.	Water ATMs are not part of this project which is related to transfer of sewerage water to TP Plant.
SOS Village	Women make essential contributions to the economies and their roles vary considerably between and within regions and are changing rapidly.	Awareness campaign may take up this issue and acceptance of women in agriculture with equal opportunity for women and girls in line with UN Sustainable Development Goal 5.
All Communities	Most of the females face issues related to activity segregation in daily life. A deficiency of suitable capacity, skill and experience, with limited opportunities and awareness remain the main challenges for women's participation in development and household income.	This project should take due care to train and involve women in construction phase. Skill raising may be taken up as part of CSR by EPC contractor.
	Strengthen the capacity of women through this project and motivate men and women to work towards gender equality.	This project will take due to care to promote gender equality and involve women in construction phase equally. Skill raising may be taken up as part of CSR by EPC contractor
	Increased burden of household activities, lack of clean drinking water, appropriate sanitation facilities, low and poor quality health services and imbalanced intake of food affects women's health and makes them prone to diseases. Many a times, they do not receive the required medical treatment due to financial constraints or further suffer in the hands of quacks. This has also increased the prevalence of hepatitis in many areas.	The project will improve the water quality, and as such, it will also improve health. The gender issues will be addressed by awareness campaign and preaching gender equality. Initiating skill enhancement training programs and equal opportunity hiring on project. The EPC contractor may take up some of these issues as part of their CSR especially gender equality. Furthermore they may provide medical support to area people especially women by allowing their project site doctor on duty to one day free medical service to area residents.
	Women face difficulties in accessing microcredits, information and training that have exacerbated the risk of not achieving the full potential.	Noted to be communicated to the relevant departments

Stakeholder	Summary of Key Issues Raised	Responses
	Lack of access to educational and vocational training facilities and weak vocational training infrastructure limits women's ability to improve their productivity and income.	Noted to be communicated to the relevant departments
	Lack of drinking water in most of the settlements	The proposed project has been initiated by KWSC to deliver sanitation services while ensuring its sustainability. It is also working on other projects which are geared towards providing safe water
Roshanabad	Due to more involvement of women in their household activities and care of children they have less time to spare for any job/labour against men.	Training and awareness campaign with families of women explaining benefit of work sharing to increase the overall finances of the family. This may be taken up by EPC contractor as part of CSR and those women who are employed in the project may be provided with child care facilities.
Hammal Goth	Needs to introduce technical education (Embroidery) as a subject in the schools.	The EPC contractor as part of his CSR may take up vocational training that includes teaching women and girls embroidery.
	Increasing access for women to professional skills and on-the-job training (based on practical and strategic needs) and capacity development programs	The EPC contractor make take up capacity need assessment for women and based on the assessment results a program may be designed to implement skill development and training program for women and girls.
Mansehra Colony-2	Ensure that new policies and development projects take into account gender sensitivity and promote the active participation of women at all levels.	Noted
Reta Plot	Problems of proper disposal of solid waste and sewage issues.	This project is specifically geared towards alleviating issues related to sewerage of the project area.
	Needs of a vocational training centre for women in the area.	Creating a vocational training centre is beyond the purview of this project. However the request has been noted to be communicated to relevant authorities.
Haji Ahmed Baloch	Drinking water in the area is contaminated and people have to use this contaminated water	This project will improve the groundwater quality. GoS is also working on other projects which are geared toward supply of safe water
	Lack of health facilities, especially for women in the project area.	The EPC contractor may provide medical support to area people especially women by allowing their project site doctor on duty to attend to community patients once a week or more often.

8.5.5 Addressing Stakeholder Concerns

377. Most of the concerns raised by stakeholders have already been incorporated into the ESIA report (Chapter 05, Chapter 07). In addition, a Grievances Redressal Mechanism will be developed at the implementation level, which will receive and resolve complaints of the communities and other stakeholders of the project area.

8.5.6 Stakeholders Engagement and Consultations Planned for the Project's Life-cycle

a) SEPA / KWSSIP Public Hearing and Other Meetings

378. Major large scale consultations to be performed in relation to the project includes the following:

- SEPA Public Hearing on the disclosure of ESIA Report
- Experts Committee Meeting as a follow-up of Public Hearing

379. A public hearing on the ESIA will be organized by SEPA as part of its permitting functions. The public hearing will be open to community members and general public and advertised in local and national newspapers. Some invitations to community leaders will also be issued. When the document is issued to SEPA, they will disclose it to statutory stakeholders and to its own libraries in the Project district and SEPA's head office. Followed by the Public Hearing, in reviewing the ESIA, SEPA shall consult aa Committee of Experts, to be constituted for the purpose by the Director General - SEPA, and may also solicit views of concerned Advisory Committee, if any, constituted by the Agency.

b) Planned Stakeholder Engagements

380. In order to comply with ESS 10 of World Bank, the Project will require public consultation and disclosure activities and mechanisms to continue beyond the ESIA process throughout the lifecycle of the Project. Stakeholder engagement activities planned to be carried out during the project's life-cycle in line with the SEP requirements (Annexure – II of SEP (Planned Stakeholders Engagement Activities - Stage 2 - Construction and Mobilization Activities and Stage 3 - Operation and Maintenance) includes the following **(Table 8-6)**.

Table 8-6: Planned Stakeholder Engagement Activities for the Project

Target stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
Stage 2: Construction and Mobilization Stage				
Project Affected People ◆ People potentially affected by project activities ◆ People residing in project area Vulnerable and disadvantaged households	◆ Grievance Mechanism / Health and Safety impacts / ESIA, ESMP, ◆ Community H&S, Community Concerns, Employment Opportunities / Project status	◆ -Public meetings, open houses, trainings/workshops ◆ Separate meetings as needed for women and vulnerable / disadvantaged ◆ Individual outreach to PAPs as needed ◆ Disclosure of written information: brochures, posters, flyers, website Information boards in Project area ◆ Notice board(s) at construction sites ◆ Grievance mechanism ◆ KWSSIP monthly newsletter	◆ Quarterly meetings during construction / Communication through mass and social media as needed ◆ Notice boards updated weekly ◆ Routine interactions ◆ Brochures in local offices	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Other Interested Parties (External) ◆ Governmental committees for land use andcompensation	◆ Project scope, rationale and E&S ◆ Principles / Grievance mechanism ◆ Project status ◆ World Bank compensation requirements	◆ Face-to-facemeetings ◆ Joint public/community meetings with PAPs	As needed (monthly during construction season)	(PIU KWSSIP / CSC) Social Development and Environment Specialists

Target stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
◆ Project area residents and representatives in communities				
Other Interested Parties (External) ◆ Press and mediaNGOs ◆ Businesses and businessorganizations ◆ Workers' organizations ◆ Academic institutions ◆ General public, ◆ Jobseekers	◆ Project information - scope ◆ and rationale and E&S principles ◆ Project status Health and safety impacts ◆ Employment opportunities ◆ Environmental concerns ◆ Grievance mechanism process	◆ Public meetings, open houses, trainings/workshops ◆ Disclosure of written information: brochures, posters, flyers, website, Information boards in Project area ◆ Notice board(s) at construction sites ◆ Grievance mechanism	Same as for PAPs	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Other Interested Parties (Internal) ◆ Other KWSSB staff Supervision Consultants, Contractor, sub-contractors,service providers, suppliersand their workers	◆ Project information:scope ◆ and rationale and E&S principles ◆ Training on ESMP ◆ requirements and othersub-management plans ◆ Worker grievance ◆ mechanism	◆ Face-to-face meetings ◆ Trainings/workshops ◆ Invitations to public/community meetings	Daily, as needed	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Stage 3: Operation and Maintenance				
Project Affected People: ◆ People residing in project area	◆ Satisfaction with engagement activities and GRM	◆ Outreach to individual PAPs ◆ KWSSIP website	◆ Outreach as needed Meetings in affected Projectarea	KWSC TP-IV Management

Target stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
◆ ◆ Vulnerable / disadvantaged households	◆ Grievance mechanism process ◆ Damage claim process	◆ Grievance mechanism KWSSIP newsletter	◆ Communities (as needed/requested) Monthly (newsletter)	
Other Interested Parties (External) ◆ Press and media ◆ NGOs ◆ Businesses and businessorganizations ◆ Workers' organizations ◆ Academic institutions ◆ Local Government ◆ Departments in Project area ◆ General public	◆ Grievance mechanism process ◆ Issues of concern ◆ Status and compliance report	◆ Grievance mechanism ◆ KWSSIP website ◆ Face-to-face meetings ◆ Submission of reports as required	As needed	KWSC TP-IV Management

381. Stakeholder engagement activities will be documented and reported as part of reporting requirements as mentioned under **Section 8.5.6**. To the extent possible, profiles of the stakeholders being consulted will be established and as appropriate, disaggregated gender and other socially relevant data will be presented. Any special measures to include disadvantaged groups, for instance physically challenged persons from affected communities will also be documented.

8.5.7 Stakeholder Consultation Workshop

382. PIU - KWSSIP organized a Stakeholder Consultation Workshop on 28th July 2022 at Regent Plaza in relation to information disclosure and stakeholders engagement on SOP-2 Projects. The main objective of the workshop was to get their feedback at broader level. The stakeholders being invited include relevant Government Departments, NGOs, Academia, World Bank, Sindh Environmental Protection Agency (SEPA), Pakistan Air Force (PAF), K-Electric, Transport and Mass Transit Department, World Wildlife Fund (WWF), Pakistan Telecommunication Company Limited (PTCL), National Refinery Limited (NRL), Karachi Development Authority (KDA), Planning & Development Board (P&DB) and Local Community representatives. The stakeholders actively participated and provided precious comments, suggestions and shared their views based on their practical experience at different projects. The proceeding of the workshop started with recitation of Holy Quran, followed by welcome address by the Project Director KWSSIP and Project Presentations by the ESA Consultants about the project interventions. The stakeholder consultation list of the participants is given as **Annexure 8-3**. Following are the summarized comments / suggestions by the stakeholders regarding the Malir Basin Interceptor and TP-IV Project:

- The PD KWSSIP informed the participants that introduction of reuse option at TP-IV is also in the pipeline, that will allow 60 MGD of treated wastewater to be utilized by the nearby Korangi and Landhi Industrial Areas, after necessary tertiary treatment. This component shall be implemented through PPP Mode and at the moment it is in proposal phase.
- A participant suggested the following relevant to the Project / Project Area:

- Rain Water Harvesting and Storage project may be introduced at Malir River Basin.
- TP-IV is a nice initiative, however KWSC should consider rehabilitation of existing STPs of Karachi including TP-I, TP-II and TP-III.
- The GRM proposed for the project is a good sign, however it should be made functional in letter and spirit. It has been responded that the Grievance Redress Mechanism (GRM) will be established by forming a dedicated team for receiving and managing grievances. To raise awareness, the project will conduct campaigns to inform the local community, including women, about the GRM's existence and contact information. Accessibility will be ensured through multiple grievance submission channels, such as hotlines, email, and in-person contact points. Timely responses to grievances will be a priority to instil confidence, and comprehensive documentation will maintain accountability. Regular updates will be provided to complainants, and a monitoring and reporting system will be implemented to assess GRM effectiveness. Continuous improvement will be emphasized, learning from grievances to enhance project practices and community relations.

- A participant questioned about the TP-IV Sludge Treatment / Disposal, wet weather flow considerations in design and analytical methods being employed for wastewater testing / analysis done for design. The Technical Consultants responded to the above raised queries, that sludge shall be recycled, wet weather flows have been considered in design and wastewater testing has been performed through SEPA certified laboratory.
- Participants from academia suggested that other than TSS, BOD and COD, pollutant parameters including pesticides etc. should also be considered for treatment through TP-IV. They also suggested that research so far done by various universities on Malir River pollution should also be reviewed and incorporated in project design.
- A stakeholder mentioned that standards should be maintained for quality ESA reports for the project and project must be implemented keeping in view the sustainable development goals. PIU - KWSSIP representative responded that the reports are gone through strict scrutiny before being approved by the WB, and the reports that shall be submitted to SEPA shall be of highest quality.
- It has been mentioned that since the TP-IV site is in close proximity to the PAF Korangi Creek Base, the project's Feasibility and ESIA Studies may be shared with the PAF Base Officials for their review. It has also been recommended that the TP-IV location may be moved into the Malir River Basin. PIU - KWSSIP representative responded that moving TP-IV into the Malir River Basin is impractical.

383. Pictorial views of Stakeholder Consultation Workshop are shown in **Annexure 8-4.**

9 Grievance Redress Mechanism

384. A GRM is established to address any complaints or grievances that may arise during the implementation of the projects. Any concerns or grievances must be addressed immediately with transparency.

9.1 Objectives

385. The following are the objectives of the GRM:

386. Establish an organizational structure to resolve any grievances from individuals and communities fairly and equitably;

387. Provide a platform for the aggrieved individual or community to deliver their grievances;

388. Ensure that affected communities and individuals are treated fairly at all times;

389. Identify flaws in the operational functions of the project and suggest corrective measures; and,

390. Ensure the sustainability of the project.

9.2 Disclosure of GRM

391. The GRM shall be disclosed in PIU-KWSSIP, KWSC head office, and the KWSSIP website. Establishment of GRM and Grievance Redress Committees (GRCs) shall be part of the proposed consultation framework to ensure that the individuals and communities are aware of an existing GRM.

9.3 Structure of GRM

392. A three-tier GRM composed of community GRC, sub-project GRC, and PIU-GRC. The organization of the GRCs is presented in **Figure 9-1**.

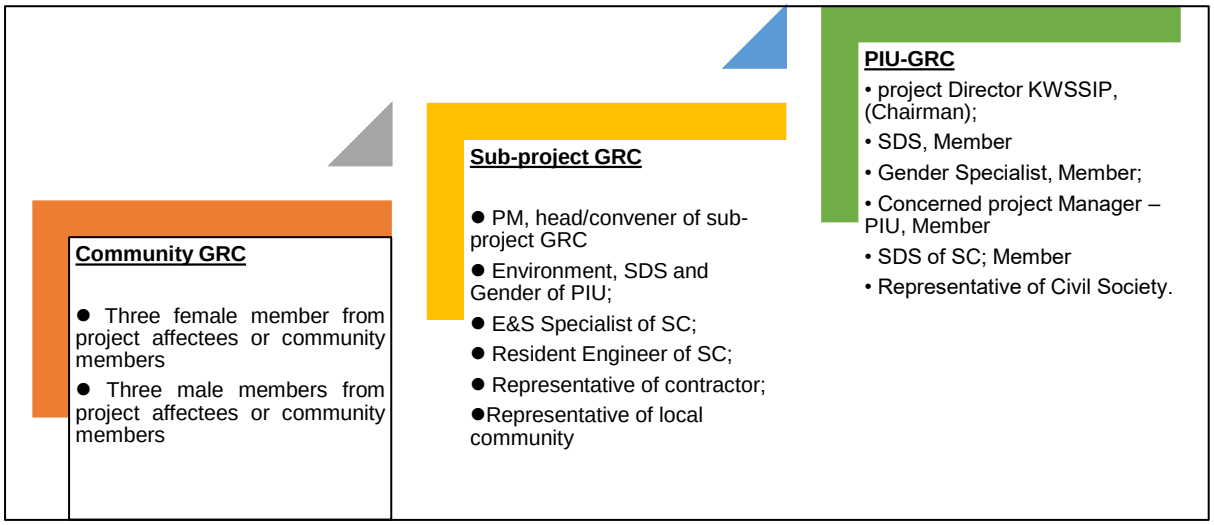


Figure 9-1: Organogram of GRC

9.3.1 Community GRC (Tier 1)

393. The community GRC shall provide a platform for project-affected people or communities to raise their concerns. Resettlement issues at the community level can also be resolved in this tier.

394. It is imperative to establish the community GRC to maintain a good rapport with the community. It will also provide a direct line of communication between the project management and the community members throughout the project implementation.

395. The social development specialist (SDS) of PIU with the assistance of SC will facilitate the establishment of community GRC, which shall be composed of three male and three female members from the project-affected communities.

396. The project E&S and engineering staff will coordinate with the community GRC to review and resolve issues and concerns, preferably within five working days upon receipt of grievances. Complaints that cannot be resolved at the community-GRC shall be forwarded to the next tier.

9.3.2 Sub-project GRC (Tier 2)

397. KWSSIP will constitute a GRC headed by the concerned Project Manager (PM) of each project site, including K-IV Augmentation Works, to resolve grievances that were not resolved by GRC Tier 1. The sub-project GRC will be composed of the following members:

398. Project Manager (PM) as head of sub-project GRC;

399. Environment, SDS and Gender specialists of PIU;

400. E&S specialists of Supervision Consultant (SC)

401. Resident Engineer of supervision consultant;

402. A representative (E&S specialist) of contractor (if required); and

403. A representative of local community.

404. Representatives from other district government departments may be contacted as required by the sub-project GRC. Environmental Specialists of PIU and SC will only join sub-project GRC meetings related to environmental issues.

405. The sub-project GRC shall meet once a month or when then need arises. Grievances involving all E&S issues, including resettlement issues, shall be reviewed. The sub-project GRC shall perform the following:

406. Record, categorize, and prioritize grievances that need to be resolved by the committee and resolve them within ten (10) working days;

407. Require aggrieved persons or parties to present evidence of their claims and;

408. Communicate its decisions and recommendations on all resolved issues to PIU and the aggrieved persons;

409. Forward the unresolved cases and complaints to PIU-GRC within an appropriate timeframe. Recommendations on unresolved cases must also be submitted to PIU-GRC;

410. Develop an information dissemination system and provide updates to the aggrieved persons or parties regarding any developments on their grievance;

411. Maintain a complaint register accessible to the project-affected community members with brief information about complaints and sub-project GRC decisions and status reports; and,

412. Maintain records of all complaints received and corresponding actions taken by the sub-project GRC.

413. Any complaint that cannot be resolved by the sub-project GRC will be forwarded to the next tier – the PIU-GRC.

9.3.3 PIU-GRC (Tier 3)

414. The PIU has already constituted the PIU-GRC, which shall receive complaints that cannot be resolved in Tier 2. The committee is composed of the following:

- Project Director KWSSIP, (Chairman of PIU-GRC);
- SDS, Member
- Gender Specialist, Member;
- Concerned Project Manager – PIU, Member;
- SDS of SC, Member; and
- Representative of Civil Society.

415. Representatives from other district government departments may be invited when required. Environmental Specialists of PIU and SC will only join PIU-GRC meetings related to environmental issues.

416. The PIU-GRC, through the authorized representative, will hear the grievances of the complainant, review any records, explore possible solutions, and request any evidence from the complainant to support their claim. A filed visit may be conducted to validate the evidence and information presented. The PIU-GRC will give its decision within 20 working days upon receipt of the complaint. If the complainant is dissatisfied with the decision, the complaint may refer its grievance to the court of law.

9.3.4 Gender-Based Violence (GBV) Committee

417. Aside from the PIU-GRC, a GBV committee was also established within PIU. The GBV committee is composed of the following members:

- Concerned Project Manager, Head/ Convener of GBV Committee;
- Gender Expert, KWSSIP, Secretary; and
- SDS KWSSIP, Member.

418. GBV Committee will address the issues of GBV/SEA/SH that may have been caused by the project activities during resettlement and project implementation. Service providers and NGOs concerned will also be engaged if necessary.

9.4 Grievance Redress Procedure

419. Complainants may lodge their grievances through several channels, including online, mail, phone, WhatsApp, e-mail, and complaint boxes. Moreover, PIU has established an e-Portal for filing and tracking progress of complaints lodged online.

420. The PIU e-Portal is an application that may be used to lodge complaints. This will be accessible through a link provided on the PIU KWSSIP website. The e-Portal was made for easier and faster complaint lodging. Any project-affected person or community with access to the internet may use the e-Portal. Each complainant will receive a Grievance Number for easier tracking of their complaints. The complainants will be contacted to ensure that their issues are resolved. Additionally, the portal can differentiate types of complaints for targeted decision-making and action by PIU. The -Portal allows monitoring of the entire complaint lodging and resolution process.

10 Institutional Arrangements

421. The institutional requirements for the construction and O&M phases of the proposed project are provided in below sections.

10.1 Institutional Arrangements for Implementation of ESMP during Construction Phase

422. The key players involved during construction phase of the proposed project are the PIU as employer / proponent, SEPA, the Construction Supervision Consultant (CSC), Third Party Environmental Consultant (External Monitor) and the Contractor(s). The roles and responsibilities of these organizations are outlined below.

423. The PIU KWSSIP-2 will make Contractors bound through contract documents to implement the ESIA including ESMP and other terms and conditions of the Environmental Permit of SEPA. The whole ESMP will be included as a clause of the contract documents. Construction camps will be established after necessary approvals and submission of SSESMP, Camp Management Plan and other site-specific plans to be developed in the light of the relevant agencies' requirements, before commencement of new works. The organizational setup for implementation of ESMP during construction phase is provided in **Figure 10-1**.

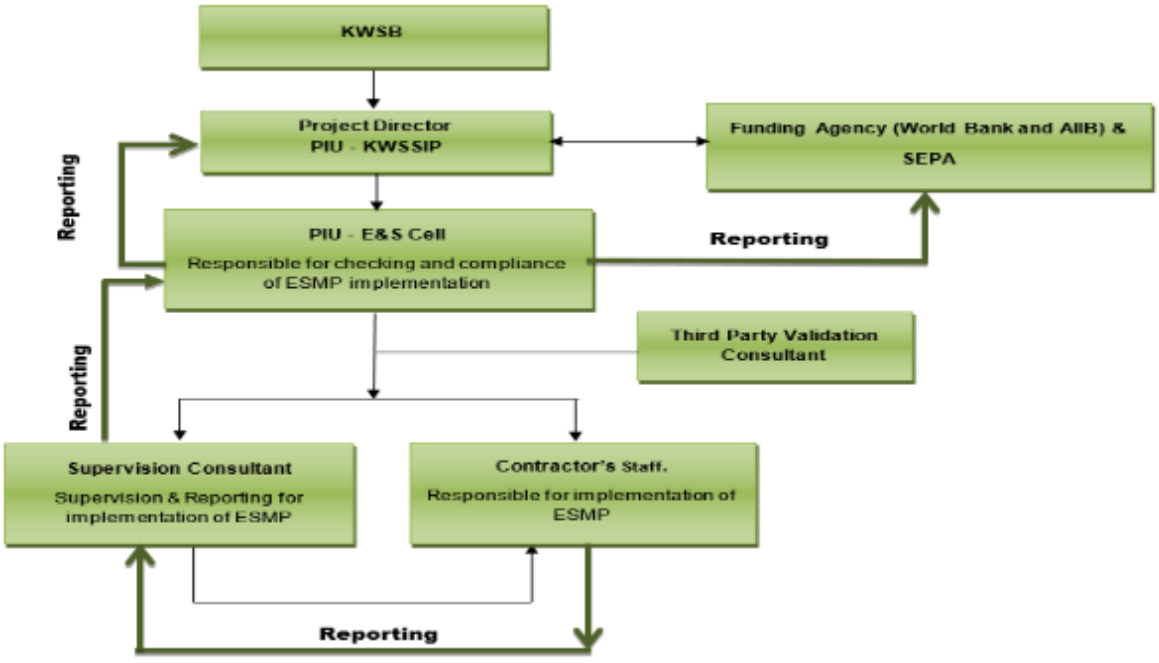


Figure 10-1: Organizational Setup for Implementation of ESMP at Construction Phase

10.1.1 Roles and Responsibilities

a) SEPA

424. SEPA shall be responsible for granting Approval (NOC) for the ESIA Malir Basin Interceptors and Wastewater Treatment Plant Project before initiation of construction activities. SEPA shall also be responsible for providing a separate operational phase approval in the light of Section 14 (2) of SEPA (Environmental Assessment) Regulations, 2021, after the fulfilment of requirements mentioned therein by the KWSSIP.

b) PIU (project Director)

425. The PD of PIU is the executive head of the entire KWSSIP-2 project. He will be responsible for overall implementation of the project including environmental and social management aspects and hiring of contractors and consultants. PD-PIU shall be responsible for approving the overall project's as well as the ESIA / ESMP budget and finances. These finances will be allocated and approved by the Government of Sindh . **Environment and Social Cell (ESC)**

426. An ESC has already been established in PIU, which currently consists of five specialists – two environment specialists, two social safeguard specialists and a gender specialist at project preparation stage. One OHS specialist, one gender officer and four E&S officers will be added in project implementation stage. ESC will be responsible for overall implementation of ESMP and other related tasks. They will be responsible for ensuring the ESMPs are included in the contract documents as well as supervision of ESMPs implementation during construction and operations. ESC will arrange environmental and social monitoring and prepare compliance reports and submit to PD-PIU for further submitting to the WB, AIIB and SEPA, to fulfil their monitoring, reporting and compliance requirements. They will observe and measure environmental and social parameters at the construction sites to evaluate compliance.

427. Furthermore, they shall be responsible for:

i. Ensuring the required environmental and social training is provided to the concerned staff;
ii. Ensuring that all the contractual obligations related to the environmental and social compliance are met;
iii. To carry out regular site visits to the construction sites to review the environmental and social performance of the Contractor(s);
iv. Check regularly of the ESMP implementation status of the project during construction phase is being properly carried out;
v. Review monitoring reports for the progress of environment and social related activities;
vi. Make sure that the Contractor is implementing the additional measures suggested by the SC in environmental and social monitoring reports;
vii. Document and disclose monitoring results and identify necessary corrective and preventive actions in the periodic monitoring reports, and make follow-up on these actions to ensure progress toward the desired outcomes;
viii. Assist in the assessment of the livelihood loss and negotiation with the affected for fixation of compensation to be paid for temporary impacts;

ix. Assist the Contractor for the timely payments of negotiated prices;

x. To assist Contractor for obtaining necessary approvals from the concerned departments;

xi. Oversee the compliance of all the monitoring programs as given in ESMP;

xii. Report immediately within 48 hours to WB when environmental and social incidents and accidents are occurred;

xiii. Maintaining interface with the other lined departments/stakeholders; and

xiv. Reporting to the SEPA on status of ESMP implementation.

c) Third Party Validation

428. The TPV will be carried out through independent E&S Specialists. They will monitor the environmental and social parameters and conduct field surveys at the construction sites to evaluate compliance level. They will be engaged to conduct the external and independent monitoring of the implementation of the ESMP. This external monitoring agency is to carry conduct biannual, annual and final evaluation of the ESMP implementation and recommend changes if and when necessary to the ESC.

429. Roles and responsibilities of third party environmental consultant will be:

i. Carry out independent monitoring at critical locations during construction phase and monitoring the implementation of ESMP at project area;

ii. Monitor GRM and resolution of complaints;

iii. Inform ESC, WB and AIIB of any significant impacts arising during construction;

iv. Observe and amend/prepare (if required) of corrective action plans; and

v. Monitor plan implementation along with project Implementation Consultant.

d) Construction Supervision Consultants (CSC)

430. PIU will engage construction supervision consultants (CSC) for the proposed project The CSC will conduct day to day monitoring of ESMP implementation and prepare monthly monitoring reports for each site and submit to ESC. The ESC will review the report, discuss with the CSC and finalize the findings. In case of noncompliance from the contractors, the CSC will have the authority to halt the construction activities or impose penalties as per the contract conditions. The CSC will submit the final version of monitoring and evaluation reports to PIU as per periodic reporting mechanism (defined later in the document). PIU will submit these reports to WB for their review and further action. Also, these reports will be submitted to SEPA as per the frequency to be mentioned in the construction phase 'Environmental Approval' requirements. Roles and responsibilities of CSC will be to:

i. Review and approve the contractor's management plans;

ii. Oversee and supervise the performance of the Contractor to make sure that the Contractor(s) is complying with ESMP;

iii. Ensuring that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner;

iv. Maintain close coordination with the Contractor and ESC;
v. Preparing training materials and implementing training programs;
vi. Supervise and monitor environmental and social activities being performed at site;
vii. Periodic reporting as mentioned in ESMP; and
viii. Suggest any additional mitigation measures (if required).

431. E&S team of CSC of the proposed project will consist of the following personnel:

i. E&S Team Leader (one specialist – M.Sc. in Environmental Engineering with more than 20 years of professional experience, worked on at least two implementation projects as SC)
ii. Environmental Specialist (one specialist – M.Sc. in Environmental Engineering with 10 years of professional experience, worked on at least one implementation project SC)
iii. OHS Specialist (one specialist – M.Sc. in Environmental Engineering with OHS Certification, 10 years of professional experience, worked on at least one implementation project as OHS - SC)
iv. Environmental Surveyors (two specialists – B.Sc. in Environmental Engineering with and 03 years of professional experience, worked on at least one implementation project SC)
v. Social Safeguard Specialist (one specialist – M.Phil. in Sociology with 10 years of professional experience, worked on at least one implementation project SC)
vi. Gender Specialist (one specialist – M.Phil. in Sociology, Gender Study or equivalent with 10 years of professional experience, worked on at least one implementation project SC)
vii. Ecologist (one specialist) - MSc Ecology or Associated Field – 06 Years' Experience in preparing Tree Inventory with all essential detailing, safe tree cutting and vegetation removal, supervising compensatory plantation programs, implementing control measures to minimize disturbance to fauna)

432. The same firm may qualify as CSC for other sub-projects under KWSSIP-2. In such case, the above mentioned staffing requirements will be applicable separately for each sub-project.

e) Construction Contractor

433. Contractors will be bound to appoint site based Environmental and Social Experts with relevant educational background and experience for each site. The contractors will be responsible for implementation of measures to avoid or minimize adverse environmental and social impacts during construction. Contractors are required to prepare Site specific ESMP (SSESMP) demonstrating the manner in which they will comply with the requirements of ESMP before mobilization and obtain approval from the ESC and CSC. Contractors' Environmental and Social Experts will carry out following activities:

i. Prepare SSESMP and obtain its approval from SC;
ii. Implementation of the mitigation measures as detailed in the ESIA / ESMP, SSESMPs and associated Environmental Health Safety and Social (EHSS) Plans at each construction site and throughout the project area;

iii. Contractors will be bound through contract to take actions against all the special and general provisions of the contract document;

iv. Contractors will make sure the compliance of ESMP recommendations and will also be responsible for effective liaison;

v. Provision of proper PPEs to the workers and train them for their proper use;

vi. Prepare and submit the monthly, quarterly, biannually, annually and final progress reports to CSC;

vii. Report immediately to CSC and ESC when environmental and social incidents and accidents are occurred;

viii. To conduct the environmental and H&S training to the workers / labor; and

ix. Coordinate with CSC and ESC.

434. Appropriate numbers of the following key personnel are required in the contractor's team:

i. Environmental Engineer (1 position) – B.Sc. in Environmental Engineering with 5 years of professional experience in project implementation

ii. HSE Officer (2 positions) – B.Sc. in Environmental Engineering with OHS Certification and 5 years of professional experience in project implementation

iii. Gender / GRM Officer (1 position) – M.Sc. in Sociology with 05 years of professional experience in project implementation

iv. Flag man (8 positions) – Valid work experience at project implementation site.

10.2 Institutional Arrangement for Implementation of ESMP during O&M Phase

435. The proposed project will be administrated by the KWSC during the O&M phase. In the organizational hierarchy of KWSC, Deputy Managing Director Technical Services (DMDTS) will be overall responsible for the O&M of water supply and sewerage infrastructure. Chief Engineer of each district will be responsible for the utility services in his respective district. Project operations will be under direct jurisdiction of Engineers and Plant Managers respectively. Monitoring and compliance of operational phase ESMP will be the responsibility of Engineers and Plant Managers for Interceptor and TP-IV. These personnel will report to the DMDTS for the compliance and monitoring of ESMP. The staff will be responsible for the following:

i. Coordinating to monitor environmental and social compliance during operation;

ii. Monitoring and managing compensatory tree plantations at places to be identified by the PIU at execution stage;

iii. Reporting on the O&M progress of environmental and social compliance to the SEPA;

iv. Assessing as well as mitigating potential environmental and social impacts of the proposed project operation as identified in Section **Error! Reference source not found.**; and

v. Sustaining a working partnership among the SEPA, Forest and Wildlife departments of Sindh, NGOs and other related public private sector organizations.

10.3 Environmental and Social Management

10.3.1 Construction Stage Site Specific Management Plans

436. Contractor will be required to prepare SSESMP along with the ECPs, prior to his mobilization and commencement of construction works, for approval of PIU and CSC. The key sub-plans are described below:

i. Material Transportation Plan will be prepared by the contractor to prevent accidents during transportation. The plan should address specific details on the site conditions, the exact route to be followed and the conditions of the road. The Contractor will propose alternative routes for review and approval by the Engineer. A commitment must be made by the Contractor to repair the road to its original condition, if any local road is damaged due to the heavy loaded traffic of the Project.

ii. Pollution Prevention Plan will be prepared as part of SSESMP and implemented by the contractors on the basis of the ECPs and WBG EHS Guidelines. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

iii. Construction Camp Management Plan will be prepared as part of SSESMP by the contractor based on ECP 14. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal. The Plan will be submitted to the CSC for their review and approval before camp establishment.

iv. Emergency Preparedness Plan will be prepared by the contractor after assessing potential risks and hazards that could be encountered during construction.

v. Communication Plan to deal with the interaction of the community, complaints management, workers recruitment, notice of works and workers conduct with locals.

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Annexure 2-1: Resettlement Plan

Annexure 4-1: Tree Plantation Plan

As estimated during ESIA study of the proposed project, 57 trees growing in the DIA under the AoI shall be cut. 10 plants will require to be planted for each cut tree i.e. total 570 trees will be planted. The replenishment cost of PKR 448,185 for raising one avenue mile (500 plants) of tree and their maintenance for 5 years has been considered as a benchmark, keeping the rate of daily wages as Rs. 1000 per man per day (MD) as detailed in below table. The total replenishment cost of PKR 510,931/- (0.74 avenue miles x PKR 448,185) should be reflected in the bidding as well as contract documents related to project execution. During project implementation, it should be insured that the tree plantation has been carried out and appropriate arrangements have been made for its nourishment at least for five years after execution of the project as per recommendations of Sindh Forest Department. The Contractor shall be required to identify suitable compensatory plantation sites in consultation with the PIU and Sindh Forest Department, and prepare and implement a project specific compensatory planting plan.

The following or other suitable indigenous trees species should be planted as compensatory plantations in the subproject area.

*Melia azadarach L (Neem), Moringa oleifera (Sohanjana), Albizia lebbek (Srikh), Cassia fistula (amaltas), Cordia myxa (Lasura), Phoenix dactylifera, (Date Palm), Terminalia arjuna (Arjan), Ficus bengalensis (Bur), Ficus religiosa (*Peepal*)*

For the assistance of Contractor, indicative cost factors for compensatory tree plantations are provided as follows:

Estimated Cost of Plantation of One Avenue Mile (500 Plants) for First Year

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1.	Clearance of site	One Avenue Mile (500 plants)	1000/MD	10	10,000
2.	Layout	One Avenue Mile	1000/MD	4	40,000
3.	Digging of pits @ 3cft each	500 pits	1000/MD	20 @ 25 pits per person	20,000
4.	Average cost plants	500 plants	Rs.100/-	-	50,000
5.	Carrying of plants from nursery to site including loading/unloading	500 plants	Rs. 10/- per plant	-	5,000
6.	Planting of plants (including 25%) restocking with ball of earth	500+125 =625 plants	Rs. 7 per plant	-	4,375
7.	Replacement of earth with silt 1 cft. (0.0283 m^3) per pit 500 cft. (14.15m^3)	500 pits	1000/MD	20 @ 25 pits per person	20,000
8	Hand watering 30 times during dry months	500x30=15,000 plants	1000/MD	50	50,000

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
9	Reopening of pits 2 times@1Cft. (0.0283m3)	500x2=1000 pits	1000/MD	10 @ 100 pits per person	10,000
10	Weeding 4 times	500x4=2000 plants	1000/MD	5 persons	5,000
11	Miscellaneous/ Unforeseen	Lump Sum			6,000
	Total (1st year)				**Rs. 220,375**

Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Second Year

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1.	Restocking of 25% plants per Avenue Mile	125 plants	Rs.40/- Each	-	5,000
2.	Carrying of plants from Nursery to site including loading/ unloading	125 plants	Rs.15/- Each	-	1,875
3.	Re-digging of pits 25% @ 3cft (0.085m3) each	125 pits	1000/MD	5 @ 25 pits/person	5,000
4.	Planting of plants with ball of earth	125 plants	Rs. 7 per plant	-	875
5.	Hand watering 30 times During dry months	500x30=15,000 plants	1000/MD	50 @ 300 plants per person	50,000
6.	Re-opening of Pits 2 times @ 1 Cft. (0.0283 m3)	500x2=1,000 pits	1000/MD	10 @ 100 pits/person.	10,000
7.	Weeding 2 times	500x2=1,000	1000/MD	10 @ 100 pits/person.	10,000
8.	Miscellaneous/ Unforeseen	Lump Sum			4,000
Sub-Total					**86,750**
Escalation @ 10 %					**8,675**
Total (2nd year)					**Rs. 95,425**

Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Third Year.

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1.	Restocking of 20% plants per Avenue Mile	100 plants	Rs.50/- Each	-	5,000
2.	Carrying of plants from Nursery to site	100 plants	Rs.20/- Each	-	2,000

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
	including loading/ unloading				
3.	Re-Digging of Pits @ 3cft. (0.085m3)	100 pits	1200/MD	4 @ 25 pits/person	48,00
4.	Planting of plants with ball of earth	100 plants	Rs. 10 per plant	-	1,000
5.	Hand watering 20 times During dry months	500x20=10,000 plants	1200/MD	33 @303 plants/person	39,600
6.	Re-opening of Pits 2 times @ 1cft. (0.0283 m3)	500x2=1000 pits	1200/MD	10 @100 plants/person	12,000
7.	Weeding	500 plants	1200/MD	5 @100 plants/person	6000
8.	Miscellaneous/ Unforeseen	Lump Sum			4,000
				Sub-Total	**69,600**
				Escalation @ 10%	**6,960**
				Sub-total for 3rd year	**Rs. 76,560**

Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Fourth Year.

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1.	Restocking of 10% plants per Avenue Mile	50 plants	Rs.50/- Each	-	2,500
2.	Carrying of plants from Nursery to site including loading/ unloading	50 plants	Rs.20/- Each	-	1,000
3.	Re-Digging of Pits @ 3cft. (0.085m3) each	50	1300/MD	2 @ 25 pits per person	2,600
4.	Planting of plants with ball of earth	50 plants	Rs.10 per plant	-	500
5.	Hand watering 10 times During dry months	500x10 =5000 plants	1300/MD	17 @ 300 plants per person	22,100
6.	Weeding	150 plants	1300/MD	1	1300
7.	Miscellaneous/Unforeseen	Lump Sum			3,000
				Sub-Total	**33,000**
				Escalation @ 10%	**33,00**
				Total for 4th year	**Rs. 363,00**

Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Fifth Year.

S. No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1.	Restocking of 5% plants per Avenue Mile	25 plants	Rs.50/- Each	-	1250
2.	Carrying of plants from Nursery to site including loading/ unloading	25 plants	Rs.20/- Each	-	500
3.	Re-Digging of Pits 5% @ 3 cft each	25 pits	1400/MD	0.5	700
4.	Planting of plants with ball of earth	25 plants	Rs.10 per plant	-	500
5.	Hand watering 5 times During dry months	500x5 =2,500 plants	1400/MD	8	11,200
6.	Weeding	150+25= 175 plants	1400/MD	1	1400
7.	Miscellaneous/Unforeseen	Lump Sum			2,000
				Sub-Total	**17,750**
				Escalation @10%	**1,775**
				Total for 5th year	**Rs. 19,525**

Total cost of 1 avenue mile (500 trees) for 5 years (220,375+95,425+76,560+36,300+19,552) = **Rs. 448,185**

Replenishment Cost of Tress

- Total trees to be uprooted = 57
- Planting of trees for each uprooted tree =10
- Avenue miles = 57 x 10 / 500= 1.14

Cost for 1.14 avenue miles= Rs. 448,185 x 1.14 = PKR 510,931**/-**

Annexure 4-2: Social Questionnaire

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Health

Health facilities	Total Numbers in district
District Hospitals	
BHU	
RHC	
MCH	

What major water brown disease are observed in the district?

_____
_____
_____
_____

What measures are taken by the health department/Ministry to overcome these diseases?

_____
_____
_____
_____

What would be the social or environment impacts on peoples by the implementation of this project?

1. _____
2. _____
3. _____

How your institution can help to this project for increasing its efficacy for the public interest

1. _____
2. _____
3. _____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Education

Total no of primary schools in district	Girls	Boys
Estimated enrollment		
School having washroom facilities		
Schools having drinking water facilities		

What kind of problems you are facing with current sewerage system /how it is effecting to the enrollment in schools

_____
_____
_____
_____

Through this project implementation, how it would benefit you/education department

_____
_____
_____
_____

Any campaigns are runned by education department or any other institution on health and hygiene if yes what was the campaigns?

_____
_____
_____
_____

Any suggestions

_____
_____
_____
_____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Fisheries

What are the effects/problems facing the fisherman's due to untreated sewer water wasted in marine

_____
_____
_____
_____

What kind of water born disease are they facing?

_____
_____
_____
_____

What kind of skin disease they are facing due to direct exposure to marine water?

_____
_____
_____
_____

How this project will impact on fisherman's community?

_____
_____
_____
_____

What are your suggestions?

_____
_____
_____
_____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Agriculture

The vegetables cultivated on waste water are good enough for health ❑ Yes ❑ No

If yes then how

_____
_____
_____
_____

If no then wat are the adverse effects of these on health

_____
_____
_____
_____

How departmentally these are these are prohibited

_____
_____
_____
_____

How this project will effect on improving the public health?

_____
_____
_____
_____

Any suggestion or recommendation

_____
_____
_____
_____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Socio-Economic Survey (Key Informant) Questionnaire

Questionnaire No. | | | | |

1. Geographic location

Settlement / Kachi Abadi _____Tehsil/town_____ District _____

North _____ South _____

Respondent Name_____ Fathers Name _____ Age _____

Education (❑ Yes / ❑ No) if yes then what is qualification _____

Family size

Male	Female	System of family		Children
		Joint	Single	

2. Estimated population of area

Total no of HH	No. Mohalla / Streets	Type of Housing Units

3. Source of Drinking water

Water Supply	Groundwater / Hand-Pump	Water Filter Plant	Masjid	Bottle Water

a) Condition of available water sources

Easy Access	Partially Easy Access	Un Fit

b) availability of water supply water for houses

No of hours per day_____ no# houses for available #_____

c) ground water condition for use

Sweet water	Water table

d) Usages of ground water

Cleaning	Bathing	Cooking	Drinking	Other

e) do you use of treatment technique at house

❑ Yes ❑ No if yes what_____

f) how would you rate the quality of drinking water

❑ Good ❑ Acceptable ❑ Poor ❑ don't know

g) is there any water treatment facility available in village

❑ Yes ❑ No nearby is _____ it functional ❑ Yes ❑ No

h) in which months availability of water is most vulnerable _____

i) major water born disease _____

4. Sanitation

Do you have toilet within house premises ❑ Yes ❑ No how many_____

a) Types of toilet available in house

Flush to piped sewer system	Flush to septic tank	Flush to pit	Flush to open sewerage	Compositing toilet	PIT latrine	Bucket	Hanging toilet	Open defecation	others

How your HH disposes off waste water _____

How dispose of the solid waste collection _____

Any treatment measures are taken _____

5. General

Is there any NGO working on water or on sanitation? ❑ Yes ❑ No

If yes specify how / what type of /project doing ? _____

Your suggestions on to improved and effective water and sanitation system

_____

_____

Socio-Economic profile

(Focus Group Discussion)

1. Geographical information

Locality_____ Tehsil/Town_____ District _____

2. Population

Estimated population_____ No. HH_____

Family system

❑ Joint (in percentage) ❑ single_____

Structure of Housing

❑ Kachaa ❑ Pacca ❑ Kacha and Pacca

3. Ethnicity

S. No	Communities	No./Percentage (approx.)
Total		

4. Languages

❑ Sindhi ❑ Urdu ❑ Pashto ❑ Srieky ❑ Others _____

5. Major occupations

S. No	Occupation	Percentage

6. Educational facilities

Description	No. of institution				In case of no. nearest to the locality
	Girls	Boys	Girls	Boys	
Primary school					
Middle school					
High school					
Colledge					
Madersa					
Other (specify)					

7. Health facility

❑ Facility within village _____
❑ Government hospital _____
❑ BHU _____
❑ Mother and child care Health unit _____
❑ Dispensary _____
❑ Hakeem / Practitioners _____

8. Common Diseases in Village

❑ Malaria ❑ Typhoid ❑ Polio ❑ TB ❑ Diarrhea ❑ Haptitas
❑ Skin diseases ❑ Eye Diseases ❑ Any other) _____

9. Civic infrastructure

Type of Amenity	Available in the village	Available in nearby village/locality	Distance from the village
Electricity			
Water supply/Tap water			
Sui-Gas			
Fuel cylinder			
Filling station (patrol/Gas)			
Fuel Agency			
Cable Television			
Access to internet			
Telephone (land line)			
Post office			
Bank			
Mosque			
Graveyard			
Other			

10. Source of drinking water

Tap water/ water supply	Hand-pump	Bottled water	Public Filtration plant	Stream /canal	Others

Water table (ft) _____

Quality of table water for drinking

Excellent	Good	Unfit

11. Sewerage system availability in in locality ❑ Yes ❑ No

If not then where do you disposes your sewerage

Open pit	Septic tank	Open drain	Pipe	Socking pit	Other

Do you have any system for collection of solid waste ❑ Yes ❑ No

a) If yes give details _____

b) If No, then where do you dump your waste _____

Leadership Patterns

12. Who is the most influential person in the village

Designation	Name
MNA/MPA	
UC Member	
Village elder	
Teacher	
Cast/family elder	
Religious leader	
Other	

13. Conflict resolving patterns

How conflicts are resolved

Jirga	Tribal/cast/head	Family head	Court	Any other

14. Women participation

S. No	Activities	Participation Tick (yes/No)	Hours per day	% of Contribution
1.	House Hold			
2.	Child caring			
3.	Farming/crop activities			
4.	Livestock raring			
5.	Sale and purchase of goods			
6.	Produce products			
7.	Do formal jobs			
8.	Others			

a) Women contribute in HH income ❑ Yes ❑ No

If yes, how

_____

_____

b) Are women consulted in decision making matters ❑ Yes ❑ No

If yes, in what matters?

c) Is there any industry in your village or in the vicinity? ❑ Yes ❑ No

If yes which industry?

15. Does any NGO or CBO exist in the area? ❑ Yes ❑ No

If yes: explain their names and activities?

Do there exist any vulnerable households in the area ❑ Yes ❑ No

Widows	Handicapped	Homeless	Others

16. Specify the nearest facility or amenity? (KM)

❑ Police station ❑ Grain Market ❑ Cattel Market ❑ Other

State the pressings needs of the area

Any development in progress at your village regarding community benefit

Community perception about the project

Any specific observations

a) _____

b) _____

Facilitator: _____ **Date:** _____

Facilitator: _____ **Date:** _____

Annexure 5-1: WB Health & Safety Framework – South Asia Region (SAR)

HEALTH AND SAFETY FRAMEWORK

South Asia Region (SAR)

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1 Overview

Health and Safety is defined as the process of anticipation, recognition, evaluation and control of hazards arising in or from the workplace and the community that could impair the health, safety and well-being of workers, considering the possible impact on the surrounding communities and the general environment. The Health and Safety Framework outlines the management of workplace and community hazards and take appropriate preventive measures to make workplace and community safer and healthier.

2 Purpose

This document is a framework for the Borrower to implement a practical approach to manage Occupational Health and Safety (OHS) and Community Health and Safety (CHS) impacts and risks in accordance with national/local regulatory framework, the World Bank Environmental and Social Standards and Environmental Health and Safety (EHS) Guidelines, ISO Standards, Good International Industry Practices (GIIP), etc. This framework document will be in accordance with the following:

- National laws including Acts, Regulations, Codes of Practice, Guidelines, etc. where the project is located.
- ESS2 – Labor and Working Conditions
    - The Borrower will develop and implement written labor management procedures applicable to the Project.
    - Measures relating to occupational health and safety will be applied to the project. The OHS measures will include the requirements of ESS2 and consider the General Environmental Health and Safety Guidelines (EHSGs) and, as appropriate, the industry-specific EHSGs and other GIIP.
    - The OHS measures will be designed and implemented to address, (a) identification of hazards, (b) provision of preventive and protective measures including method statements, safe work procedures, etc., (c) training of project workers, (d) documentation, reporting, and remedies of occupational incidents, (e) emergency prevention and preparedness and response arrangements to emergency situations, and (f) remedies for adverse impacts such as occupational injuries, deaths, disability and disease.
    - All parties who employ or engage project workers will develop and implement procedures to establish and maintain a safe working environment, including that workplaces, machinery, equipment and processes under their control are safe and without risk to health, including by use of appropriate measures relating to chemical, physical and biological substances and agents. Such parties will actively collaborate and consult with project workers in promoting understanding, and methods for, implementation of OHS requirements, as well as in providing information to project workers, training on occupational safety and health, and provision of personal protective equipment without expense to the workers.
    - Workplace processes will be put in place for project workers to report work situations that they believe are not safe or healthy, and to remove themselves from a work environment which they have reasonable justification to believe presents an imminent

and danger to their life or health. Project workers will not be retaliated against or otherwise subject to reprisal or negative action for such reporting or removal.

- Project workers will be provided with facilities appropriate to the circumstances of their work, including access to canteens, hygiene facilities, and appropriate areas for rest.
- A system for regular review of occupational safety and health performance and the working environment will be put in place and include identification of safety and health hazards and risks, implementation of effective methods for responding to identified hazards and risks, setting priorities for mitigation actions, and evaluation of results.
- Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) reporting, prevention and management in the workplace must be addressed in the project health and safety management plan and in the labor management procedures.

- ESS4 – Community Health and Safety (CHS)
  - The Borrower will develop, implement and review/update (as required) a CHS Management Plan or CHS Management measures which will be included in the Environmental and Social Management Plan (ESMP) applicable to the Project.
  - Conduct risk assessment to identify and assess the risks and prevent their adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and nonroutine circumstances.
  - Implement appropriate control measures to avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials.
  - Ensure the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.
  - Ensure appropriate community emergency preparedness and response plan is available and communicate to all stakeholders to address emergency events.
  - Community engagement, communication and reporting processes shall be developed and implemented for community members to report health and safety incidents, incidents (including complaints) must be investigated appropriately, and action plans implemented and communicated to the community.
  - The Borrower will promote quality and safety, and considerations relating to climate change and natural disasters, in the design and construction of infrastructure projects, including dams.
  - SEA/SH reporting, prevention and management for local communities must be addressed in the project health and safety management plan.

- World Bank Group Environmental Health and Safety Guidelines (EHSGs), 2007.
- International Labour Organization (ILO) Code of Practice: Safety and Health in Construction Industry, 1992.
- ILO Codes of Practice: Safety and Health in Building and Civil Engineering Work, 1972.
- International Organization of Standardization (ISO) Standards. Examples include 45001 - Occupational Health and Safety Management Systems, ISO 4007 – Eye and Face Protection, ISO

20345 – Safety Footwear, ISO 3873 – Industrial Safety Helmets, ISO 20345 & ISO 16024 – Fall Protection.

- Good International Industry Practices (e.g., UK HSE Executive, Safe Work Australia, US OSHA, Global Reporting Initiative (GRI)).

3 Scope

The Health and Safety Framework is applicable on all World Bank-financed projects in the South Asia Region (SAR).

4 Implementation of the Health and Safety Framework

The implementation of this framework should adopt a risk-based approach when applying to the World Bank-financed projects. It is critically important that the project conducts impact/risk assessments (environmental, social and health & safety) to identify and assess impacts and risks both in the workplace and in the community.

For OHS impacts and risks, the Borrower shall develop and implement a Health and Safety Management Plan (HSMP) to manage OHS impacts/risks. The detail and comprehensiveness of the Project HSMP should be based on the risk and not on the size of the project or types of contracts (ICB, NCB, etc.). All projects are required to have a HSMP that includes all elements of this framework (e.g. policy, organization, emergency management, etc.). In large (mega) projects where the risk assessment identified multiple significant risks (substantia/high), it is advisable that the Contractor (or Subcontractor) prepare and implement H&S sub plans to manage these risks and will be included in the annex of the Project HSMP. A Project HSMP Plan template is provided in Annex 1.

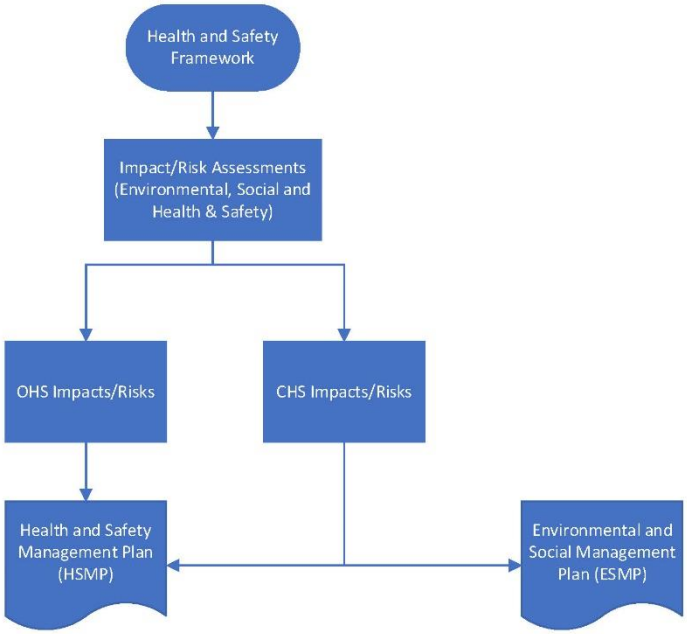
The Borrower is responsible for the project and shall ensure that this Health and Safety Framework is applied. The Borrower can delegate/assign the PIU or Contractor to develop and implement a HSMP to address the Health and Safety Framework requirements and to manage health and safety impacts and risks at the project operational level.

For CHS impacts and risks, the Borrower shall address and manage CHS impacts/risks under the Environmental and Social Management Plan (ESMP) and to some extent in the Health and Safety Management Plan (HSMP).

In some situations, there may be overlapping of the management plans due to project activities impacting both the workers and local communities. For example, road construction projects have significant impacts to workers and local communities and will require robust plans to manage OHS and CHS risks.

The Health and Safety Framework implementation flowchart is provided below (Figure 1).

Figure 1. Health and Safety Framework Implementation Flowchart



Note: CHS impacts and risks may overlap both management plans (HSMP and ESMP) in some projects, e.g. road construction (traffic management plan) will impact both workers and the community.

The Health and Safety Management Plan (HSMP) is the key tool to manage health and safety risks and impacts associated with the Project. Its core purpose is to ensure that all activities are planned, carried out, controlled and directed with consistent, approved, health and safety management practices, procedures or standards.

The HSMP should be applied as a living document and undergo routine review and updates when any of the following happens:

- There is a change in the scope of the project, or
- There is a change in construction methodology/technique based on site condition, or
- Following a major incident/near miss, or
- New or emerging health and safety risks (e.g. disease pandemic), or
- Change in local legal/regulatory requirements, or
- At the end of the Project (to allow for improvements in subsequent projects).

The PIU/Contractor is responsible for the review and update of the HSMP and communicate with relevant stakeholders (e.g. workers, subcontractors, suppliers, local communities, etc.).

In addition, the Contractor/Sub-Contractor can also prepare, submit and implement H&S sub-plans, procedures or SOPs to address specific work activity hazards either as a separate document or as part of the HSMP.

There should be one overall project HSMP that outlines the management of health and safety risks. Do not duplicate efforts by having multiple Health and Safety Plans for contractors, subcontractors, suppliers, etc.

5 Health and Safety Management Strategy - Working Together for Success

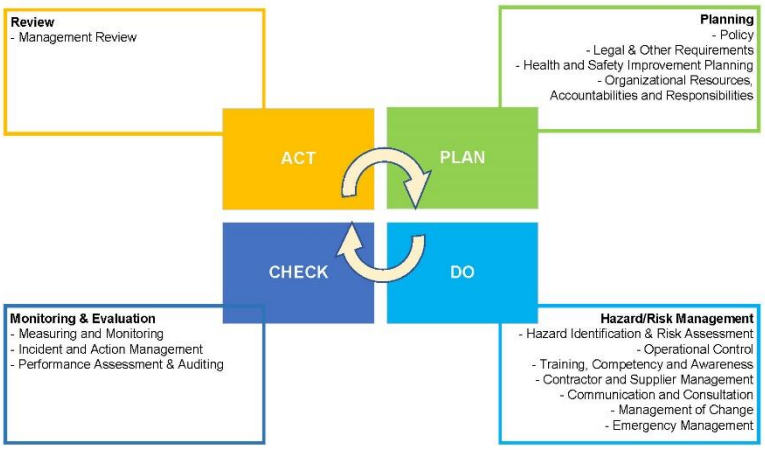
The responsibility for safety cannot be "delegated" to the "OHS Officer or Manager". The OHS staff of the PIU and/or Contractor support line management by assisting in jobsite training, serving as trained and knowledgeable observers, providing administrative assistance, monitoring and evaluating the success of the safety program and acting to continuously improve this plan. While this role is important, commitment and active participation by everyone, every day, on every task, is necessary if the PIU and Contractor are to achieve the level of health and safety excellence, both in the workplace and in the community, that the Borrower expects.

6 Health and Safety Management System

The PIU/Contractor management goal is to aspire Zero Harm to all workers and the community members while carrying operational activities. To achieve this goal, the PIU/Contractor shall prepare a HSMP in accordance with the minimum expectations in line with the policies, standards and best practices noted in this framework (e.g. ESS2 & ESS4, ISO, GIIP, etc.). The HSMP is an overarching health and safety management system for the project. All 15 elements of this framework must be included in the HSMP. In addition, safe work processes and procedures (e.g. Work Statements, SOPs, Work Instructions, etc.) must be developed and implemented for complex and high-risk activities. For example, Operational Control is one of the key elements, and it is expected that in high-risk work activities (e.g. crane lifting, tunnelling, etc.) the Contractor must develop and apply SOPs/Safe Work Procedures to operate safely.

The Health and Safety Management System is designed on the principles of continual improvement and adopts the methodology of Plan, Do, Check and Act (PDCA) (Figure 2). The structure of the management system generally follows the layout of common international standards such as the ISO 45001 and OHSAS 18001 where key elements of the system are aligned to PDCA.

Figure 2. PDCA – Health and Safety Management System



Given all the resources of standards, procedures and guidelines that have been described, the PIU/Contractor shall comply with the following principles:

- Wherever there is a conflict in guidance of the above, the more stringent safety requirement shall be applied. The PIU/Contractor must make sure that all applicable national laws and regulations are always complied.
- In this document 'Shall' and 'Must' signifies a mandatory requirement whereas 'Should' will be used to mention a recommended practice that the PIU/Contractor management will strive to accomplish.

7 Health and Safety Framework Elements

7.1 Element 1 - Health and Safety Policy

The PIU/Contractor must develop a Health and Safety Policy that establishes a clear set of objectives and targets for the effective management of Occupational Health and Safety (OHS) and Community Health and Safety (CHS) performances for the project. It should be consistent with the World Bank's codes of business practice (e.g. Environmental and Social Framework and Standards) and aligned to the local legal framework and requirement.

The Health and Safety Policy must commit to:

a) The prevention of incidents that may lead to injuries, illnesses, pollution, property and environmental damage, security, process losses and product quality impacts.
b) Compliance with legal and other requirements, including international accords and external requirements to which the Borrower is committed.
c) The effective management of OHS and CHS risks and impacts.

d) Establishing measurable objectives and targets for improving OHS CHS performance.
e) Providing the resources needed to meet OHS/CHS performance objectives.
f) Encouraging worker participation and promoting awareness of OHS/CHS risks and opportunities.

The PIU/Contractor shall establish project specific measurable targets to achieve above mentioned objectives. The determination of these targets is based upon the drive for continuous improvement, external peer group benchmarking and stakeholders' input.

7.2 Element 1 - Human Rights Policy

The Borrower's human rights policy should have focus on the responsibility to respect human rights and play a positive role in the communities where they operate. To this end, the Borrower (PIU/Contractor) should commit to respecting human rights as set out in the United Nations Universal Declaration of Human Rights and the International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work, as well as adhere to the United Nations Guiding Principles on Business and Human Rights, the Voluntary Principles on Security and Human Rights and the World Bank Environmental and Social Standards (ESS) 2: Labor and Working Conditions.

The Borrower (PIU/Contractor) must continually assess the human rights context of their activities, including impacts that they may cause and those to which they may contribute or be directly linked. This determines the prevention, mitigation and control measures required, including using leverage from their business relationships.

The Borrower (PIU/Contractor) should recognize, respect and abide by all project workers, community worker, and employment laws and expect their subcontractors and other third-party companies to meet the same standards. No child or forced labor and discriminatory behavior is allowed under the project/program – by the contractors or sub-contractors or primary suppliers.

The Borrower (PIU/Contractor) should value and respect the traditions, diversity and the culture of different communities in the project area where they do business.

The Borrower (PIU/Contractor) should recognize the effect that their activities may have on local communities, and they should strive to engage in a meaningful way with the communities where they do business to help ensure that they positively contribute to the welfare of the local communities.

The Borrower (PIU/Contractor) preferably should endeavor to conduct business with communities who share their values and business principles.

7.3 Element 2 - Legal and Other Requirements

All applicable OHS/CHS legal requirements such as national laws and regulations, World Bank ESS2 & ESS4, etc. must be identified, evaluated for compliance and documented in a project legal register.

The project legal register must:

a) Define accountability for maintaining compliance or conformance to each requirement.
b) Be reviewed regularly for currency, and expiry/renewal dates.
c) Include or provide reference to records that show periodic evaluation of compliance.
d) Include relevant legislative obligations (international, federal, state/provincial, regional or local).

e) Include relevant Borrower policies and standards and external voluntary commitments.
f) Include any other requirements, such as license, codes of practice and product quality obligations.
g) Be accessible to the relevant personnel and stakeholders.

Any new/periodic changes or updates must be communicated to relevant stakeholders.

7.4 Element 3 - Risk Assessment

Risk assessment involves hazard identification and risk management, which are core activities to manage OHS/CHS risks and performance. The objective is to ensure OHS/CHS hazards are timely identified, and their resulting risks to people, property, assets and the environment are evaluated and managed.

A risk assessment is a critical examination of health and safety hazards at a project worksite and to ensure the PIU/Contractor to implement corrective measures to protect workers from health and safety hazards in the workplace.

A community health and safety risk assessment is required to identify, assess and manage for all World Bank financed projects. It is critically important that community health and safety impacts resulted from the project be identified and managed to ensure that the project social license to operate will not be impacted.

The process for analyzing and managing OHS/CHS risk includes:

a) Establishing the context, including acceptability criteria for the risk analysis.
b) Hazards identification to determine risk scenarios and select a suitable level of risk evaluation.
c) Risk estimation outcome and assigning risk ownership.
d) Recording the risk analysis in a risk register.
e) Managing risks according to their classification of either High, Substantial, Moderate, and Low to achieve levels that are deemed to be As Low As Reasonably Practicable (ALARP).
f) Utilizing the hierarchy of control:
    - Elimination of the hazard;
    - Substitution with less hazardous materials, processes, equipment, etc.;
    - Use engineering and process controls;
    - Apply administrative controls or management strategies; and
    - Use of personal protective equipment (PPE).
g) Developing and agreeing on further actions or monitoring of the risks, considering the hierarchy of controls.
h) Verifying the completion of actions.
i) Re-evaluating the risk and classification as appropriate.
j) Reviewing and updating the risk register over time.
k) Documenting, reporting and communicating the risk information.

As noted in the framework implementation section, CHS impacts/risks will be addressed and managed under the ESMP and HSMP.

7.5 Element 4 – Health and Safety Improvement Planning

Establish processes and plans to manage performance and to provide for continual improvement. Objectives and targets must be established for the management of OHS/CHS performance. They must be measurable and contribute to the prevention of incidents or reduce their impact(s).

To enable objectives and targets to be met, improvement plans must be developed, documented and integrated into the overall project planning process.

OHS/CHS improvement plans must:

a) Specify the required resources (both human and financial/budget) needed to meet the objectives.
b) Specify role responsibilities for implementing the improvement plans and their actions.
c) Establish the timeframes for completion of the improvement plans and achieving the objectives.

Project Director, Project Manager, Construction Manager and/or Resident Engineer are fully committed to achieve the above-mentioned targets. Leading and lagging indicators should be established to drive performance to meet these targets.

7.6 Element 5 - Organizational Resources, Accountabilities and Responsibilities

Resources, responsibility and accountability is appropriately allocated for the implementation, maintenance and continual improvement of the Health and Safety Management Plan.

The PIU/Contractor shall establish committees with representatives of workers and management or make other suitable arrangement consistent with national laws and regulations (if available) for the participation of workers in ensuring safe working conditions. A Community Health and Safety Committee comprising of community members may be required under the ESMP/HSMP to address for CHS risks.

All roles with health and safety accountability and responsibilities (including regulatory requirements) must:

- Be documented in role descriptions; and
- Be included in the organization chart specific to the managed site. The organizational charts must be available to all workers and local communities.

Where subcontractors and suppliers are involved, these areas of accountability and responsibility must be clarified with respect to those contractors.

7.7 Element 6 - Training, Competency and Awareness

Processes are established to provide the requisite training, competency and awareness to effectively manage OHS/CHS impacts and risks. There must be a process for the delivery and maintenance of awareness and/or competence based training. Every worker shall receive instruction and training regarding the general safety and health measures common to the project site(s).

All new workers, contractors and/or visitors must undertake relevant safety training. At a minimum, safety induction/orientation training must include reference to the significant OHS/CHS risks identified at the managed site. No person shall be employed in any worksite unless that person has received the necessary

information, instruction, and training to be able to do the work competently and safely. All training must be recorded and documented.

All roles requiring technical certification, registration or licensing are verified and documented. The requisite qualifications/competencies must be maintained for all personnel performing such roles and their associated work activities.

There must be a process to communicate and engage with local community members on CHS impacts and risks. Awareness communications, training and outreach should be conducted throughout the life of the project.

7.8 Element 7 - Contractor and Supplier Management

OHS/CHS risks associated with procured materials, equipment, services and labor are effectively managed.

There must be a process to identify and evaluate risks associated with the planned procurement of materials, equipment, services and labor. This must include an analysis of any downstream implications which may be impacted by the selection. This process must be supported by a written procedure that specifies the criteria for contractor/supplier selection, evaluation and re-evaluation and the rejection of product(s) or material(s).

Individuals engaged on a temporary or casual basis to work within existing managed sites are to be inducted and managed in the same way as permanent staff. There must be a process to ensure all contractor tools and equipment are inspected and evaluated to be in a safe condition and conform to the site's standards and procedures.

7.9 Element 8 - Communication and Consultation

There must be a process to encourage the participation of workers, contractors and community members in activities which promote improvements in health and safety performance. In particular, this must include their appropriate involvement in:

- Hazard identification, risk analysis and determination of controls.
- Incident investigation.
- The development and review of the health and safety policy and objectives.

Workers must be informed about their participation arrangements, including:

- Who is their representative(s) on health and safety matters?
- Time and resources necessary to participate in health and safety activities.
- Access to information that is relevant to current or planned health and safety improvement activities.
- The mechanisms to identify and remove obstacles or barriers to participation.
- Disciplinary actions for safety violations and non-compliances.

There must be a process for communicating about the management of OHS/CHS risks at the various levels of the managed site. This includes, but is not limited to:

- Internal communications to raise awareness about OHS/CHS risks, performance measures and changes or improvements.
- Pre-start meetings or briefings (e.g. toolbox talks) for sharing safety observations/ experiences, lessons learned or raising awareness about OHS/CHS risks.
- Sharing knowledge and lessons learned from around the Project (external to the site, business or site); such as relevant incidents, hazardous conditions or suggested practices.

There must be a grievance process to receive feedback, suggestions and complaints on OHS and CHS matters. This process must include a procedure for documenting, evaluating, implementing (as appropriate) and archiving the improvements.

There must be a process to ensure that, when appropriate, relevant external stakeholders are consulted about pertinent OHS/CHS matters (including statutory and regulatory requirements) as needed.

Communications, engagement and consultation with local communities on CHS matters shall be addressed in the ESMP.

7.10 Element 9 - Operational Control

The Contractor is responsible to manage risks associated with the site's work activities. This shall be achieved by implementing operational controls, as well as other mandated or necessary risk treatment processes to control the risk to As Low As Reasonably Practicable (ALARP).

There must be a process for the development of procedures or work instructions that detail the controls required to treat risks associated with the work activities. These procedures must reference applicable operating criteria, be communicated, available to the appropriate users, and followed.

Plant and equipment must be maintained, inspected and tested to ensure they meet the design descriptions and specifications. All equipment or services provided by third parties, must be inspected, and have the controls verified to ensure the safe operation, and adherence to the health and safety performance objectives.

Where new or non-routine tasks and activities are conducted, the controls identified during the pre-task hazard assessment must be implemented.

Operational controls are health and safety controls designed to eliminate, mitigate or manage the risks/impacts. The Contractor shall develop and implement health and safety controls for risks identified by the project risk register. For example, if a project identified working at height, crane lifting and scaffolding as high-risk activities then the Contractor must develop and implement Working at Height, Lifting, Hoisting & Rigging and Scaffolding procedures incorporating the hierarchy on control concepts (i.e. elimination, engineering, safe work procedures and PPE) to manage these risks. By applying a risk based approach, the Contractor will need to develop and implement operational controls/procedures based only on the risk identified.

Table 1 below summarizes the types of health and safety controls/procedures generally found in civil construction projects. This list is not intended to be all-inclusive as there may be other high-risk activities in projects not listed here.

Table 1 – Health and Safety Controls/Procedures

OHS / Safety Rules (e.g., Golden Rules)	Permit to Work Systems
Excavations and Trenching	Fire Safety
Heavy / Mobile Equipment	Electrical Work / Safety
Barricading and Signs	Hazardous Material Management
Cell/Mobile Phone Use	Equipment Inspection & Maintenance
Safe Driving (Light Vehicles)	Dredging
Material Handling (Loading and Unloading)	Demolition
Traffic Interface Planning / Management	Confined Space
Severe Weather Management	Hot Work (Welding, Grinding, Cutting)
Lifting, Hoisting and Rigging	Hand and Power Tools
Scaffolding	Housekeeping
Work at Height	Lockout/Tagout (Isolation)
Working Near or Over Water	Ladder Safety
Illumination	Hazardous Waste
Ground Support	Fitness for Work (Health/Medical Surveillance)
Water Management	Personal Protective Equipment (PPE)
Tunnelling	Noise Hazard & Protection
Bulk Earthworks and Civil Works	Respiratory Protection
Steel Erection	Working in Heat / Cold
Pressurized Equipment	Manual Handling (Ergonomics) / Vibration
Clearing and Land Disturbance	Fatigue Management
First Aid	Travel and Remote Site Health
Project Worker Welfare Facilities	Animal Bites & Stings
Camp Management	Working Alone
Site Security Management	Radiation (Ionizing and Non-Ionizing)
Blasting and Explosives	Infectious / Communicable Disease (e.g. COVID-19)
Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) Reporting and Management	Other hazards/risks on project site identified through risk assessment

The Contractor shall ensure workers are trained, supervised and applied the required health and safety procedures on managed site.

7.11 Element 10 - Management of Change

There must be a procedure to identify and manage changes to the operational processes and controls that may impact on OHS performance. Changes may be planned or unplanned, sudden or gradual, and temporary or permanent. The procedure must include an analysis of the risks associated with a change and include a contingency to cover emergency situations where the full management of change procedure cannot practically be applied. These situations require the Resident Engineer / Project Manager (or his/her designated deputy) who is accountable for the managed activity to approve the change.

Workers and contractors must be trained to identify what constitutes a change and how to initiate the management of change process.

After completing the change, a formal review must be carried out to evaluate the actual impact against the intended impacts, and to identify the reasons for any deviation.

7.12 Element 11 - Emergency Management

To ensure that the appropriate resources and emergency response plans are prepared, practiced and available. The PIU/Contractor is responsible to develop and implement an Emergency Response Preparedness (ERP) Plan that will provide an effective response for the mitigation, control and recovery from incidents/ accidents including natural disasters which can impact or disrupt the project and/or its managed site(s) and activities.

The PIU/Contractor must clearly define accountability for the ERP and ensure it is adequately resourced. PIU/Contractor must also ensure that individual team members are provided with the relevant training for their required roles. The ERP exercise (drill) must be tested and validated annually. The ERP must be updated to reflect the lessons learned from the exercises and actual incidents.

The process for managing incident communications, notification and reporting must be integrated into the ERP and clearly:

- Identify who is responsible for incident communication, notification and reporting.
- Define how communication protocols are to be conducted with internal and external stakeholders.

The ERP must include local communities during emergencies including natural disasters when the risk and impact assessments identified potential aspects/impacts caused by the project.

7.13 Element 12 - Measuring and Monitoring

The objective is to monitor risks and impacts of the work activities and evaluate the effectiveness of the operational controls. There must be a process for measuring and monitoring the key characteristics of the managed site and its work activities that may have significant OHS/CHS risks. Measuring and/or monitoring can be either qualitative or quantitative but must follow a standardized methodology.

Procedures for measuring and monitoring occupational health exposure and environmental impact must conform to national laws and other international standards that are stated in the contract. Exceedances from specified requirements or limits must be recorded, investigated and reported back to the worker, work area or the community involved. The appropriate actions in response to the exceedance must be recorded, assigned accountability and tracked to completion.

<u>Medical/Health Surveillance</u>

Any medical/health surveillance program must:

- Include project personnel and contractors.
- Be consistent with local regulatory requirements.
- Be designed based on the identification and evaluation of operational health risks.
- Support the project and site's objectives and targets.

7.14 Element 13 - Incident and Action Management

All incidents including near misses must be reported, investigated and corrective actions identified, implemented and communicated. There must be a written procedure for incident management including investigation, reporting and corrective action(s) to prevent recurrence. It must include reference to the appropriate methodologies for:

a) Reporting.
b) Investigating.
c) Analysis of the impact(s) and the potential risk of future incident.
d) Communicating to relevant people/stakeholders.
e) Managing corrective actions to prevent reoccurrence.

The Resident Engineer/Project Director is responsible for all incidents that occurred in the project, and the Site Manager/Supervisor of the involved person(s) must ensure that incident is reported and investigated.

Incident investigations must be completed by competent investigators who have been trained in the appropriate investigation methodology.

All significant incidents must be summarized for lessons learned after the investigation and communicated to all workers and relevant stakeholders.

Community health and safety incidents caused or impacted by the project must be reported, investigated and corrective actions identified, implemented and communicated to the community.

7.15 Element 14 - Performance Assessment and Auditing

A process must be developed for measuring OHS/CHS performance. Metrics must include leading and lagging indicators and be based on qualitative and quantitative data.

Performance must be measured on a regular basis and include an evaluation of:

- the extent to which objectives are being met;
- progress against targets;
- the effectiveness of controls;
- proactive conformance measures; and
- reactive or historical performance measures.

The Contractor should provide a monthly report summarizing the OHS/CHS performance and contain details or summaries of all incidents and progress against corrective actions. The report must be sent to the Project Management Team, the Borrower and other relevant stakeholders.

<u>Audits and Inspections</u>

There must be a process for conducting audits and regular inspections of all work areas including those areas/sensitive areas where there is a potential concern for local communities. The process must include a written procedure, where relevant, to define the scope and depth of audit/inspection and consider:

a) The level of evaluated risk associated with specific activities that the project or site undertakes.

b) The identification of non-conformances with health and safety procedures and the HSMP requirements.
c) The identification of hazards and impacts in the project risk register.
d) Compliance to legal and other requirements as identified and recorded in the legal register.
e) The results of previous audits and inspections.

At the completion of the audit and inspection, a report must be provided to the Resident Engineer/ Project Director, Site Manager and the Supervisor responsible for the work area.

The Project and/or managed site must define an annual schedule of planned audits. The schedule must be developed, based on an evaluation of significant OHS/CHS risks associated with the project or site and the results of previous audits. The audit should be conducted by external third party. Corrective actions to address non-conformance must be assigned and tracked until completion.

7.16 Element 15 - Management Review

The HSMP must be reviewed bi-annually at a minimum. The review must evaluate any need for change and establish actions to improve the HSMP, its processes and resource needs.

Records of completed management review(s) must be retained and include:

a) Decisions and actions relating to possible changes to policy, objectives and targets.
b) Information relating to revised risks and any proposed treatment and controls.
c) Improvement suggestions (including the community) for inclusion into future management plans.
d) Any other alternation, modification and improvement to the HSMP that demonstrates a commitment to continual improvement.

Relevant outputs from the management review(s) must be made available for communication and consultation throughout the project/managed site, the Borrower and relevant stakeholders.

Annex 1 - Health and Safety Management Plan (HSMP) Template

Project title

Effective Date	xxxxxx	**Status**	DRAFT
Version Number	xxx	**Document Number**	xxxxxx

Health and Safety Management Plan

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About the Project Health and Safety Management Plan template

The Project Health and Safety Management Plan (HSMP) is a key document to address the Health and Safety Framework requirements of how OHS and CHS risks will be managed in a project. The HSMP incorporates the 15 elements of the framework to which the Borrower (PIU/Contractor) must address for the project.

Under the Health and Safety Framework, it is mandatory that each project to develop and implement a Project HSMP that identifies the hazard, assess the risk and implement control measures to eliminate or reduce the risk.

The purpose of the Health and Safety Management Plan is to:

- Clearly and succinctly communicate how significant risks in the project will be managed;
- Ensure key requirements including legal / regulatory obligations are considered and met;
- Provide requirements on health and safety standards, procedures and guidelines; and
- Outline how the implementation of the HSMP will be evaluated.

Project personnel and contractors must have access to the HSMP. They should understand it (as it relates to their role) and implement it in their work area, relevant to the hazards encountered by each role.

If a project is subjected to local government regulators management plan template(s), then those templates must be used. Do not duplicate effort.

The Project HSMP should be considered live and dynamic during each stage of the project life cycle. It is recognised that project risks and how they will be managed can change during the life of a project. If the HSMP changes, it must comply with Health and Safety Framework's management of change requirements (Element 10).

This template should be suitable for any project (type and size) with some modifications as required. Additional sub sections may be added as required depending on the size, complexity and risk of the project.

Finally, the Resident Engineer and/or Project Director must determine and justify how this template is to be applied to each project (e.g. a single Plan covering the entire project, or individual Plans or Sub-plans for each work package area, or sub-contractor).

Note: As stated in the Health and Safety Framework, CHS impacts, and risks are addressed in the ESMP. There may be overlapping of CHS and OHS in both the HSMP and ESMP such as road construction where significant risks are found both in the workplace and in the community. In such instances, the Contractor must ensure the HSMP and ESMP requirements are implemented and enforced.

Health and Safety Management Plan

Project title

1 Introduction

1.1 Overview

Describe the purpose of the Project HSMP (e.g. Health and Safety Framework and/or local legal requirements), intended audience (stakeholders), issuance, etc.

1.2 Change Authority

Describe the management of change for any future changes to this HSMP and who can authorize it.

2 Project Description

Provide the project background and scope including the project stage and the activities to be undertaken. Provide brief description of people involved in project (employees, contractors, sub-contractors, suppliers, etc).

3 Objectives

Set out the health and safety objectives and should include Key Performance Indicators (KPIs) to achieve these objectives.

Include any assumptions/ constraints made in the objectives or project scope.

4 Health and Safety Values

4.1 Health and Safety Policy Statement

Insert the Project Health and Safety Policy and/or Contractor Policy (if available) statement.

4.2 Message from Project Leader

Provide an overall vision, values and conduct and behavior expectations from the Resident Engineer or Project Director.

If this template is used by contractors, then the Contractor Director/Manager will address in this space.

5 Health and Safety Organization

Having the appropriate organizational structure and people are essential for the success of a project. Clearly identify and describe the organization structure and people who will be responsible for the management of the project's OHS/CHS risks and compliance to this Plan and other legal requirements. Health and Safety accountability and responsibility must be documented in the role descriptions.

5.1 Team Structure

Short description/ chart of personnel responsible for health and safety management and supervision.

5.2 Roles and Responsibilities

Short description of health and safety roles and responsibilities include the project management team.

Health and Safety Management Plan

6 Legal and Other Requirements

Provide a summary of all the legal obligations with a short description of the main requirement(s) under each obligation (e.g. *Labour Act, Work Bank ESS2 & ESS4, etc.)*.

A Project legal register form is provided in Annex 1.

7 Hazard Identification and Risk Management

7.1 Project OHS / CHS Significant Risk Summary

Describe the process of how the Project Risk Register was achieved including the name of the facilitator and participants (e.g. project team members, health and safety staff and contractor representatives) and when it was undertaken.

Insert a brief bullet point summary to outline the key significant **inherent** risks (i.e. substantial and high). Follow a format like this: *the impact arising from a defined hazard due to a specific activity* e.g. "respiratory disease due to the inhalation of respirable crystalline silica during underground drilling".

Provide details of all significant inherent risks for the project showing current controls in Appendix 1. The significant inherent risk register is a subset of the comprehensive risk register for the project.

Community health and safety (CHS) risks must be identified, assessed and documented in the Project Risk Register. The management of CHS risks will be addressed in the ESMP but can may overlap with the HSMP For example, road construction projects will impact both workers and local communities. In this situation, a traffic management plan may be included in the both the HSMP and ESMP as operational control.

7.2 Health and Safety Operational Control

This section outlines how the key significant risks for the project (as defined in Section 7.1) will be managed. At a minimum, the project current controls must comply with the Health and Safety Framework and other legal requirements.

This is the most important section of the HSMP. It needs to be kept specific to the project and written in a clear and concise manner that enables the information to be used during project familiarisation and induction. As in Section 7.1, there is flexibility to communicate this information in a way that best suits for the project. You may use paragraphs, dot points, tables, etc. You may combine this information with the summary presented in Section 7.2.1.

Provide sufficient information to ensure that current and planned controls are understood by the reader.

7.2.1 Impact / Hazard / Activity 1

Describe how the risk will be managed during the project.

8 Communications

8.1 Onsite Communication and Consultation

8.1.1 Health and Safety Training including Induction

Describe the Health and Safety training process and requirements.

8.1.2 Health and Safety Activities, Meetings and Committees

List all activities, briefings and committee meetings such as toolbox talks, daily pre-start meeting, pre-job briefing, safety committee meeting, safety inspections/ audits, etc.

There is flexibility to communicate this information in a way that best suits your project. You may use

paragraphs, dot points, tables, etc.

8.1.3 Health and Safety Message Board

List strategic locations of Health and Safety message boards so that project workforce will be able to receive relevant information.

8.2 Communication with Contractors and Suppliers

8.2.1 Contractors and Sub-Contractors

List processes and types of information to ensure contractors and subcontractors can safety manage the activities and people in their work areas.

8.2.2 Suppliers

List processes and types of information to ensure the supplier can safely manage the activities and people within their responsibility.

8.3 Community / External Communication

8.3.1 Community Liaison

Describe accountability and process to report any OHS/CHS information to the communities as part of the community engagement requirements.

8.3.2 Regulatory/ Local Government

Describe accountability and process to report any OHS/CHS information to local government agencies/ department as part of the legal reporting requirements.

8.4 Consultation and Complaints

Describe the process to promote the active participation of project workforce in health and safety decisions. Employees and contractors are consulted and given opportunity, encouragement, and training to be proactively involved in health and safety matters affecting the project and their work activities. All workplace consultation should be recorded.

Describe the process to ensure health and safety complaints are received, reviewed and managed in accordance with the health and safety framework requirement.

A similar process shall be developed and implemented for CHS consultation and complaints from community members.

8.5 Non-Compliance/ Conformance and Disciplinary Process

Describe the disciplinary process for non-compliance or non-conformance to health and safety policies and procedures including the requirements of this document.

9 Training and Competency

Describe the project specific health and safety training required by workers and contractors including inductions (where relevant). For project personnel refer to the training needs analysis. For contractors, refer to the contractor prequalification to identify and specific training and induction needs on what the contractor approval is conditional. It is not sufficient to just list the types of training. The HSMP should document which role types should receive each type of training.

Role Type	Project Training
All workers and contractors	Safety Induction

9.1 Awareness and Competency

Describe the health and safety training induction, awareness, and competency on the project. Awareness and competency considerations should include:

- Safety induction and training provided by the project to raise awareness levels;
- Task specific competency assessments conducted by the Contractor;
- Training and induction for the Owner's team specific to the area in which the work is conducted; and
- Competency assessment and required training to render workers/contractors competent to carry out the work activity.

10 Emergency Management

10.1 Emergency Response

Provide a brief summary of site's emergency response preparedness (ERP) plan including reporting procedures, emergency contacts, emergency response team (ERT), evacuation plan/ assembly points and emergency test/ evacuation drills. The intent of this section is to ensure that the site manager/supervisor/worker at the operational level will know what to do in an emergency situation. It is not the intention that the complete site's ERP procedure be included in this section. In large, complex projects the ERP should be a standalone document that is managed by the PIU/Contractor.

There is flexibility to communicate this information in a way that best suits your project. You may use paragraphs, dot points, tables, etc.

Fire, spill response and first aid training and competency can be addressed in the sections below.

The ERP must include local communities during emergencies including natural disasters when the risk and impact assessments identified potential aspects/impacts caused by the project.

10.2 Fire Protection and Prevention

Provide a brief summary of the site's fire protection and prevention procedures including fire response (internal/ external), fire notification and alarms, use and management of firefighting equipment (e.g. fire extinguishers), high risk fire activities such as welding, smoking policy, fuel storage and fire inspections.

10.3 Hazardous Substance Spill Response and Prevention

This Section is not mandatory but if the project or site use or store large quantity of hazardous substances you may include a brief summary of the hazardous substance spill response and prevention management procedures.

10.4 First Aid and Medical Facilities

Provide information on the first aid kits, first aiders, eye wash stations and emergency showers including their locations within the project site.

Described the first aid and/or medical facilities available onsite including the location, medical supplies and equipment and personnel (e.g. first responder, paramedic, nurse) manning the facilities. Also provide information in regard to medical evacuation (i.e. ambulance, medivac, etc), hospitals or health clinics.

Health and Safety Management Plan

11 Site Security Plan

Describe the site's security plan addressing building and infrastructure security, exterior boundaries, access/ egress of project personnel and visitors, movement of equipment and materials, site traffic and vehicle parking, patrol and security inspections, responsibility during emergency situations, etc.

12 Incident Reporting and Investigation

Describe the project incident reporting and investigation process which must be aligned to local legal requirements (if available), SAR OHS Incident Reporting and Investigation Guidelines and any other requirements specified in the contract.

There is flexibility to communicate this information in a way that best suits your project. The sub sections below are outlines to assist – add or delete as required. Use paragraphs, bullet points, flow chart, etc.

Community health and safety incidents caused or impacted by the project must be reported, investigated and corrective actions identified, implemented and communicated to the community.

12.1 Roles and Responsibilities

Provide a short description of the investigation team roles including competency. Also include the roles and responsibilities of the corrective action owners.

12.2 Management of Incidents

Refer to SAR OHS Incident Reporting and Investigation Guidelines and/or Contractor's Incident Management Procedure (if available).

12.2.1 Investigation of Incident and Near Miss

12.2.2 Corrective and Preventive Actions

12.2.3 Reporting and Recording

12.3 Injury Management

Describe the project injury management process to ensure that any workplace injury is treated, managed and complied with the project's fitness for work criteria before the individual can return to normal work duties (i.e. return-to-work program).

13 Project Health and Safety Performance

Develop objectives, targets and key performance indicators (KPIs) such as the number of risk assessment, training and inspection/audit conducted that are proactive and where the outcomes can be directly controlled by the project/ owner's team by implementing OHS and CHS operational controls based on the project risk assessment. Do not develop targets that may inadvertently discourage incident reporting or create a blame culture (e.g. zero incident reports raised, zero audit findings etc).

13.1 Measuring and Monitoring

Describe the health and safety monitoring process where the project impacts the workplace, the environment and the community. Environmental and occupational health monitoring will be conducted to verify the efficacy of operational controls identified in the management of 'High' risks.

13.2 Key Performance Indicators

Develop and describe the key performance indicators (KPIs) for project health and safety objectives and targets. This section can be combined with Section 3 Objectives.

Health and Safety Management Plan

13.3 Audits and Inspections

The HSMP shall be audited internally by the PIU and externally by relevant stakeholders (e.g. Bank). During these audits, the auditor(s) must determine if the risks are being mitigated as described and whether the measures of success (e.g. KPIs) are being achieved.

The following table outlines when the plan will be audited and by whom.

Audit / Inspection	Who will audit the plan?	When is it scheduled for?

The table above contains examples only. Delete examples and adjust as required for each project.

The Contractor shall implement a routine inspection program for specific work area and activity. Where the work activity/ process has been identified as 'Substantial or High' risk, daily or pre-start inspection should be applied.

14 Management of Change (MOC)

Describe the MOC process and requirements for changes to the operational processes and controls that may impact on OHS / CHS performance. Changes may be planned or unplanned, sudden or gradual, and temporary or permanent. MOC must be approved by area or process owner(s) and communicated to area workers, community members (if impact the community) and other relevant stakeholders.

14.1 New Significant Risk/ Hazard Identified

Describe the process when a new or unforeseen risk/ hazard has been identified (e.g. through a near miss, incident, new process or non-routine activity that was not planned) and how the risk will be managed.

15 Management Review

Describe the management review of the HSMP process including participants and how often it is done. The review must evaluate any need for change and establish actions to improve the Plan, its processes and resource needs. The review must be documented and communicated to workers, contractors and relevant stakeholders.

Annex 1

Project Legal Register

Health and Safety Management Plan

PROJECT LEGAL REGISTER

Using the Health, Safety, Environment, Community (HSEC) legal obligations identified for the project, list the obligations relevant to the project and describe how they will be met. You may choose to delete rows containing legislation that does not apply to your project. If so, include the statement below. If not, delete the statement below.

Version xxxx of the Legal Obligations Register was reviewed by (names) and legislation deemed to be not applicable to the project was omitted.

Legislation	How does the legislation apply to Project?	H	S	E	C	Last Amendment	How will these obligations be met in this project?

Annex 2

Project Significant Risk Register

You may present your Significant Risk Register in the table below, or as a separate Excel or Word document (provide a link to the document or a specific reference including document name and location).

Health and Safety Management Plan

SIGNIFICANT RISK REGISTER

						Inherent Risk				Current Risk			
Project Activity	OHS / CHS Issue or Hazard	Hazard	Risk Scenario	Risk Scenario Impact Description	Cause(s)	Risk Scenario Consequence	Risk Scenario Likelihood	Risk Scenario Classification	Controls	Risk Scenario Consequence	Risk Scenario Likelihood	Risk Scenario Classification	Comments and Action Items

Revision History

First Issue	Effective date	Prepared by	Approved by	
1.0				
Revision Number	**Revision date**	**Revised by**	**Approved by**	**Reason for change**

Health and Safety Management Plan

Annexure 5-2: Typical Fire Safety Checklist

TYPICAL FIRE SAFETY CHECKLIST
(SELF-INSPECTION FORM FOR CONSTRUCTION WORK)

Adequate protective equipment and planning for fire emergencies helps keep small fires small, limits losses.

Yes	No	CONDITION
		Housekeeping
☐	☐	Are construction materials stored in an orderly manner?
☐	☐	Is combustible scrap and trash removed from the site regularly?
☐	☐	Are metal containers with covers provided for disposal of oily or paint-soaked rags?
		Smoking
☐	☐	Are NO SMOKING signs posted in hazardous areas?
☐	☐	Are NO SMOKING regulations enforced?
		Electrical
☐	☐	Is temporary wiring installed according to the provisions of the *National Electrical Code*?
☐	☐	Is wiring, including connections to junction boxes, panels, equipment, and the like in good condition?
☐	☐	Are overcurrent protective devices (fuses, circuit breakers) in good operating condition?
☐	☐	Are ground fault circuit interrupters (GFCI) provided where required?
		Welding and Cutting
☐	☐	Are any welding, cutting, or brazing operations in progress?
☐	☐	Are any combustible materials exposed by these operations?
☐	☐	Is a fire watch provided during, and for at least 30 minutes after, these operations?
☐	☐	Is portable fire extinguisher or small hose protection available where these operations are carried on?
		Temporary Heaters
☐	☐	Are temporary heaters in use of "approved" type?
☐	☐	Is sufficient clearance maintained between heaters and combustible materials?
☐	☐	Is a competent (licensed, where required) person responsible for temporary heating operations?
☐	☐	Are fuel storage and refueling arrangements satisfactory?
		Flammable-Combustible Liquids
☐	☐	Are flammable-combustible liquids stored and dispensed in a satisfactory manner?
☐	☐	Is adequate ventilation provided where flammable adhesives, paints, solvents, and other chemicals are in use?
☐	☐	Are roofing operations involving tar kettles supervised by a competent person?
☐	☐	Are tar kettles in use equipped with metal covers?
☐	☐	Are asphalt-saturated roofing mops removed from the building and safely discarded after use?
		Exits
☐	☐	Are fire exits unobstructed, including access ways and discharge areas?
☐	☐	Are all exits clearly marked?
☐	☐	Are exits adequately lighted?
☐	☐	Are stair exit fire doors in good operating condition?
☐	☐	Is adequate egress provided from uppermost work areas?

Yes	No	CONDITION
		Extinguishers and Small Hose
☐	☐	Are sufficient portable extinguishers of the proper type provided throughout?
☐	☐	Are extinguishers and small hoses kept in good operating condition?
☐	☐	Is equipment unobstructed and its location highlighted?
☐	☐	Is equipment protected against freezing?
☐	☐	Are selected personnel trained to operate extinguishers and small hose?
		Sprinkler Systems
☐	☐	Is sprinkler installation progressing with construction?
☐	☐	Are sprinkler controlled valves accessible, labeled and open where necessary?
☐	☐	Are systems adequately protected against freezing?
☐	☐	Are sprinkler alarms in service?
☐	☐	Are sprinkler system pumper connections clearly marked and accessible to the public fire department?
☐	☐	Is the public fire department familiar with the sprinkler installation?
		Hydrants
☐	☐	Are hydrants unobstructed and accessible to the public fire department?
☐	☐	Are hydrants in good operating condition?
		Standpipes
☐	☐	Are standpipe systems installed and in service up to the highest level of construction operations?
☐	☐	Are standpipe system hose connections unobstructed and accessible to the public fire department?
☐	☐	Are standpipe systems adequately protected against freezing?
☐	☐	Are standpipe system pumper connections clearly marked and accessible to the public fire department?
		Fire Alarms
☐	☐	Is a standard procedure established for reporting a fire to the fire department?
☐	☐	Are all workers instructed in this procedure?
☐	☐	Is an audible alarm in operation to alert workers of a fire on the site?
☐	☐	Is there a public fire alarm pull box located nearby?
☐	☐	Has the public fire department visited the site during the past month?
		Watchmen-Guards
☐	☐	Is watch service provided during all nonoperating hours?
☐	☐	Does service cover the entire project site?
☐	☐	Are watchmen-guards instructed in the fire reporting procedure?
		Construction Offices, Trailers, Sheds
☐	☐	Are combustible offices, trailers and sheds located at least 30ft (10m) away from major buildings and materials storage?
☐	☐	Are heating devices in offices, trailers and sheds of an "approved" type?
☐	☐	Are heating devices properly installed and vented?
☐	☐	Are fuel cylinders and fuel lines for heating devices protected against vehicular damage?
		Tarpaulins
☐	☐	Are tarpaulins used for temporary enclosure of building construction?
☐	☐	Are tarpaulins in use of the flame-resistant type?
☐	☐	Are tarpaulins in use tightly secured to prevent contact with ignition sources such as temporary heaters?

Annexure 5-3: Security Management Guidelines for Contractors

1. Security Management Guidelines for Contractors

2. The Contractor during construction phase shall use security arrangements and personnel to safeguard the installations, sites and personnel.

3. To accomplish project security objectives, the security should be provided for the following:

- Construction camps
- Project offices and work sites;
- Visitors and foreign consultants
- Critical assets and infrastructure related to the project; and
- Local labors' residential accommodation and other facilities.

4. Security Guidelines for the Project

- The operations and selection of the Project's security personnel will be guided by the relevant provisions of ESS 2 (Labor conditions) and ESS4 (Community Health, Safety and Security).
- Adoption/compliance with the World Bank Group's Good Practice Notes on Assessing and Managing the Risks and Impacts of the Use of Security Personnel and a project/contract specific Code of Conduct for the security personnel.
- Security will be provided in a manner that does not jeopardize the community's safety and security, or the KWSB's relationship with the community.
- Security arrangements will follow the principle of proportionality, respect for human rights, and good international practice.
- Community engagement will be maintained about the project's impacts on community safety and security, create awareness concerning the Code of Conduct commitment and project grievance mechanism, as outlined in the Stakeholder Engagement Plan (SEP) and SEA/SH mitigation measures given in the ESMP.
- Contractor's Community Liaison Officer will share information with nearby communities if required, about security arrangements, the Contractor's security policies, and the expected conduct of security personnel.
- Arrange dialogue with communities about security issues to identify potential risks and local concerns, and can serve as an early warning system.
- Maintain coordination with the contractors regarding the security issues.

5. Security Guidelines for Contractors

- Contractors will maintain liaison and coordination with any government's security agencies deployed in the area;
- The Contractor will carry out a continuous risk assessment of the security arrangements in place, monitor its security personnel, and identify any necessary corrective or preventive actions for continuing security operations.

- The contractor will prepare and implement clear standard operating procedures (SoP) for the security personnel;
- Security personnel will not use force or extract work from workers;
- The Contractor will ensure that those providing security are not implicated in past abuses;
- The Contractor will provide adequate training in the use of force and appropriate conduct toward workers and communities;
- The Contractor will ensure that security personnel act within the applicable legislation of the province / country;
- The Contractor will not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat;
- The Contractor will provide a grievance mechanism to express concerns about the security arrangements and acts of security personnel;
- If security personnel are permitted to use force, instructions must be clear on when and how force may be used, specifying that security personnel are permitted to use force only as a matter of last resort and only for preventive and defensive purposes in proportion to the nature and extent of the threat, and in a manner that respects human rights;
- Security personnel will be instructed to exercise restraint and caution, clearly prioritizing prevention of injuries or fatalities and peaceful resolution of disputes. The use of physical force will be reported to and investigated by the Contractor;
- Any persons injured as a result of the action of security personnel will be transported to medical facilities;
- The instructions for security personnel will make clear that arbitrary or abusive use of force is prohibited;
- Unlawful acts of any security personnel will be reported to the appropriate authorities.
- The Contractor may seek support from government authorities or other providers of the security services to aid preventative planning, evaluation, monitoring and follow-up to ensure security services providers meet Project expectations. Support may include strategies to identify and manage presence of ex-combatants and ex-military personnel within the community and within the Project security services.
- The Contractor's security services' responsibilities will include preventing hazardous materials or waste from leaving the Project site or the hazardous waste disposal site for the Project.
- The Contractor will need to establish mitigation measures in relations to engaging and partnering with local stakeholders, such as supporting the extension of policing services to prevent the intensification of violent conflicts.

Annexure 7-1: Environmental Code of Practice

The table contains the project activities that will have environmental impacts and their mitigation measures.

ECP 1: Waste Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	The Contractor shall ◆ Develop site specific waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to supervision consultant for approval. ◆ Organize disposal of all wastes generated during construction in the designated disposal sites approved by the Project. ◆ Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. ◆ Segregate and reuse or recycle all the wastes, wherever practical. ◆ Vehicles transporting solid waste shall be covered with tarps or nets to prevent spilling waste along the route. ◆ Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. ◆ Provide refuse containers at each worksite. ◆ Request suppliers to minimize packaging where practicable. ◆ Place a high emphasis on good housekeeping practices. ◆ Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal. ◆ Potable water should be supplied in bulk containers to reduce the quantity of plastic

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		waste (plastic bottles). Plastic bag use should be avoided.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	The Contractor shall ◆ Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labelled for safe transport to an approved chemical waste depot. ◆ Store, transport and handle all chemicals avoiding potential environmental pollution. ◆ Store all hazardous wastes appropriately in bunded areas away from water courses. ◆ Make available Material Safety Data Sheets (MSDSs) for hazardous materials on-site during construction. ◆ Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. ◆ Construct concrete or other impermeable flooring to prevent seepage in case of spills.

ECP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	The Contractor shall ◆ Prepare spill control procedures and submit them for supervision consultant approval. ◆ Train the relevant construction personnel in handling of fuels and spill control procedures. ◆ Store dangerous goods in bunded areas on top of a sealed plastic sheet away from watercourses. ◆ Refueling shall occur only within bunded areas. ◆ Store and use fuels in accordance with MSDSs. Make available MSDS for chemicals and dangerous goods on-site.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site. ◆ Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored; and ensure personnel trained in the correct use. ◆ Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. ◆ Make sure all containers, drums, and tanks that are used for storage are in good condition and are labelled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. ◆ Store and use fuels in accordance with MSDSs. ◆ Store all liquid fuels in fully bunded storage containers, with appropriate volumes, a roof, a collection point and appropriate filling/decanting point. ◆ Store hazardous materials above flood level considered for construction purposes ◆ Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area shall preferably slope or drain to a safe collection area in the event of a spill. ◆ Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. ◆ Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.

ECP3: Water Resources Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	The Contractor shall ◆ Follow the management guidelines proposed in ECPs 1 and 2. ◆ Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems.
Discharge from construction sites	Construction activities, sewage from construction sites and work camps may affect the surface water quality. The construction works will modify groundcover and topography changing the surface water drainage patterns of the area. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, and effect habitat of fish and other aquatic biology.	The Contractor shall ◆ Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials. ◆ Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site. ◆ Divert runoff from undisturbed areas around the construction site. ◆ Stockpile materials away from drainage lines ◆ Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot. ◆ Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall ◆ Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. ◆ Ensure that roads used by construction vehicles are swept regularly to remove dust and sediment. ◆ Water the loose material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and Ecoli.	The Contractor Shall ◆ Provide the drinking water that meets SEQS standards. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time.

ECP4: Drainage Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	The Contractor shall ◆ Prepare drainage management procedures and submit them for supervision consultant approval. ◆ Prepare a program to prevent/avoid standing waters, which supervision consultant will verify in advance and confirm during implementation. ◆ Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line. ◆ Establish local drainage line with appropriate silt collector and silt screen for

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		rainwater or wastewater connecting to the existing established drainage lines already there. ◆ Rehabilitate road drainage structures immediately if damaged by contractors' road transports. ◆ Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to SEQS, before it is being discharged into the recipient water bodies. ◆ Ensure that there will be no water stagnation at the construction sites and camps. ◆ Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion. ◆ Protect natural slopes of drainage channels to ensure adequate storm water drains. ◆ Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem.
Ponding of water	Health hazards due to mosquito breeding	◆ Do not allow ponding of water especially near the waste storage areas and construction camps. ◆ Discard all the storage containers that are capable of storing of water, after use or store them in inverted position.

ECP 5: Soil Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	The Contractor shall ◆ Strictly manage the wastes management plans proposed in ECP1 and storage of materials in ECP2. ◆ Construct appropriate spill contaminant facilities for all fuel storage areas. ◆ Establish and maintain a hazardous material register detailing the location and quantities of hazardous substances including the storage, and their disposals. ◆ Train personnel and implement safe work practices for minimizing the risk of spillage. ◆ Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site. ◆ Remediate the contaminated land using the most appropriate available method.
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	The Contractor shall ◆ Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds.

ECP 6: Erosion and Sediment Control

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils, which affects the growth of vegetation and causes ecological imbalance.	The Contractor shall ◆ Prepare site specific erosion and sediment control measures and submit them for supervision consultant approval. ◆ Reinstate and protect cleared areas as soon as possible.

		◆ Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turf/tree plantations.
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, and (ii) destruction of aquatic environment by erosion and/or deposition of sediment damaging the spawning grounds of fish	The Contractor shall ◆ Locate stockpiles away from drainage lines. ◆ Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds. ◆ Remove debris from drainage paths and sediment control structures. ◆ Cover the loose sediments of construction material and water them if required. ◆ Divert natural runoff around construction areas prior to any site disturbance. ◆ Install protective measures on site prior to construction, for example, sediment traps. ◆ Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion. ◆ Observe the performance of drainage structures and erosion controls during rain and modify as required.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall ◆ Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. ◆ Ensure that roads used by construction vehicles are swept regularly to remove sediment. ◆ Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).

ECP 7: Top soil Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth or agricultural development.	The Contractor shall ◆ Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m. ◆ Remove unwanted materials from top soil like grass, roots of trees and similar others. ◆ The stockpiles will be done in slopes of 2:1 to reduce surface runoff and enhance percolation through the mass of stored soil. ◆ Locate topsoil stockpiles in areas outside drainage lines and protect from erosion. ◆ Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of topsoil. ◆ Spread the topsoil to maintain the physic-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites. ◆ Prior to the re-spreading of topsoil, the ground surface will be ripped to assist the bunding of the soil layers, water penetration and revegetation
Transport	Vehicular movement outside Project area or temporary access roads will affect the soil fertility of the agricultural lands	◆ Limit equipment and vehicular movements to within the approved construction zone. ◆ Plan construction access to make use, if possible, of the final road alignment.

ECP 8: Topography and Landscaping

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as will change the local landscape.	The Contractor shall ◆ Prepare landscaping and plantation plan and submit the plan for supervision consultant approval. ◆ Ensure the topography of the final surface of all raised lands (construction yards, approach roads and rails, access roads, etc.) are conducive to enhance natural draining of rainwater/flood water. ◆ Keep the final or finished surface of all the raised lands free from any kind of depression that causes water logging. ◆ Undertake mitigation measures for erosion control/prevention by grass-turfing and tree plantation, where there is a possibility of rain-cut that will change the shape of topography. ◆ Cover immediately the uncovered open surface that has no use of construction activities with grass-cover and tree plantation to prevent soil erosion and bring improved landscaping. ◆ Reinstate the natural landscape of the ancillary construction sites after completion of works.

ECP 9: Quarry Areas Development and Management Plan

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development and operation of borrow areas	Borrow areas will have impacts on local topography, landscaping and natural drainage.	The Contractor shall ◆ Prepare quarry area management plan and submit the plan for supervision consultant approval. ◆ Use only approved quarry and borrow sites ◆ Identify new borrow and quarry areas in consultation with Project Director or authorized person, if required.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Reuse excavated or disposed material available in the project to the maximum extent possible. ◆ Store top soil for reinstatement and landscaping. ◆ Develop surface water collection and drainage systems, anti-erosion measures (berms, revegetation etc.) and retaining walls and gabions where required. Implement mitigation measures in ECP 3: Water Resources Management, ECP 6: Erosion and Sediment Control ◆ The use of explosive should be used in as much minimum quantity as possible to reduce noise, vibration and dust. ◆ Control dust and air quality deterioration by application of watering and implementing mitigation measures proposed in ECP 10: Air ◆ Quality Management ◆ Noise and vibration control by ECP 11: Noise and Vibration Management.

ECP 10: Air Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	The Contractor shall ◆ Prepare air quality management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. ◆ Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. ◆ Operate the vehicles in a fuel efficient manner. ◆ Cover hauls vehicles carrying dusty materials moving outside the construction site.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Impose speed limits on all vehicle movement at the worksite to reduce dust emissions. ◆ Control the movement of construction traffic. ◆ Water construction materials prior to loading and transport. ◆ Service all vehicles regularly to minimize emissions. ◆ Limit the idling time of vehicles not more than 2 minutes.
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	The Contractor shall ◆ Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof or maintenance register shall be required by the equipment suppliers and contractors/subcontractors. ◆ Focus special attention on containing the emissions from generators. ◆ Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites. ◆ Service all equipment regularly to minimize emissions. ◆ Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard, and also can affect the local crops;	The Contractor shall ◆ Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand shall be covered and confined to avoid their being wind-drifted. ◆ Minimize the extent and period of exposure of the bare surfaces. ◆ Restore disturbed areas as soon as practicable by vegetation/grass-turfing. ◆ Store the cement in silos and minimize the emissions from silos by equipping them with filters. ◆ Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations. ◆ Not water as dust suppression on potentially contaminated areas so that a liquid waste stream will be generated. ◆ Crushing of rocky and aggregate materials shall be wet-crushed, or performed with particle emission control systems. ◆ Not permit the burning of solid waste.

ECP 11: Noise & Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	The Contractor shall ◆ Prepare a noise and vibration management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. ◆ Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures. ◆ Make sure all drivers and operators will comply with the traffic codes concerning maximum speed limit, driving hours, etc. ◆ Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall ◆ Appropriately site all noise generating activities to avoid noise pollution to local residents. ◆ Use the quietest available plant and equipment. ◆ Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. ◆ Install acoustic enclosures around generators to reduce noise levels. ◆ Fit high efficiency mufflers to appropriate construction equipment. ◆ Avoid the unnecessary use of alarms, horns and sirens.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall ◆ Notify adjacent landholders prior any typical noise events outside of daylight hours. ◆ Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions. ◆ Employ best available work practices on-site to minimize occupational noise levels. ◆ Install temporary noise control barriers where appropriate. ◆ Notify affected people if major noisy activities will be undertaken, e.g. blasting. ◆ Plan activities on site and deliveries to and from site to minimize impact. ◆ Monitor and analyze noise and vibration results and adjust construction practices as required. ◆ Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas.

ECP 12: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall ◆ Prepare a plan for protection of flora and submit the plan for supervision consultant approval. ◆ Minimize disturbance to surrounding vegetation. ◆ Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. ◆ Get approval from supervision consultant for clearance of vegetation.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Make selective and careful pruning of trees where possible to reduce need of tree removal. ◆ Control noxious weeds by disposing of at designated dump site or burn on site. ◆ Clear only the vegetation that needs to be cleared in accordance with the engineering plans and designs. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill a, etc. ◆ Not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. ◆ Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from. ◆ Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. ◆ Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. ◆ Ensure excavation works occur progressively and re-vegetation done at the earliest ◆ Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction ◆ Supply appropriate fuel in the work camps to prevent fuel wood collection.

ECP 13: Protection of Fauna

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality	The Contractor shall ◆ Prepare a plan for protection of fauna and submit the plan for supervision consultant approval. ◆ Limit the construction works within the designated sites allocated to the contractors. ◆ check the site for animals trapped in, or in danger from site works and use a qualified person to relocate the animal.
Vegetation clearance	Impact on migratory birds, its habitat and its active nests	The Contractor shall ◆ Not be permitted to destruct active nests or eggs of migratory birds. ◆ Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and locate active nests. ◆ If bird nests are located/ detected within the ledges and roadside embankments then those areas should be avoided. ◆ Petroleum products should not come in contact with the natural and sensitive ecosystems. Contractor must minimize the release of oil, oil wastes or any other substances harmful to migratory birds' habitats, to any waters, wetlands or any areas frequented by migratory birds.
	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	The Contractor shall ◆ Restrict the tree removal to the minimum numbers required. ◆ Relocate hollows, where appropriate. ◆ Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		remain unmoved overnight to allow animals to move of their own volition.
Night time lighting	Lighting from construction sites and construction camps may affect the visibility of night time migratory birds that use the moon and stars for navigation during their migrations.	The Contractor shall ◆ Use lower wattage flat lens fixtures that direct light down and reduce glare, thus reducing light pollution, ◆ Avoid flood lights unless they are absolutely required. ◆ Use motion sensitive lighting to minimize unneeded lighting. ◆ Use, if possible, green lights that are considered as bird's friendly lighting instead of white or red colour lights. ◆ Install light shades or plan the direction of lights to reduce light spilling outside the construction area.
Construction camps	Illegal poaching	The Contractor shall ◆ Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching. ◆ Ensure that staff and Subcontractors are trained and empowered to identify, address and report potential environmental problems.

ECP 14: Protection of Fish

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The main potential impacts to fisheries are hydrocarbon spills and leaks from riverine transport and disposal of wastes into the river	The Contractor shall ◆ Prepare procedures for protection of fish and submit them for supervision consultant approval. ◆ Ensure the construction equipment used in the river are well maintained and do not have oil leakage to contaminate river water. ◆ Contain oil immediately on river in case of accidental spillage from equipment; make an emergency oil spill containment plan (under the Fuels and Hazardous Substances Management Plan) to be supported with enough equipment's, materials and human resources. ◆ Do not dump wastes, be it hazardous or nonhazardous into the nearby water bodies or in the river.
Construction activities on the land	The main potential impacts to aquatic flora and fauna River are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	The Contractor shall follow mitigation measures proposed in ECP 3: Water Resources Management and EC4: Drainage Management.

ECP 15: Road Transport and Road Traffic Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall ◆ Prepare a traffic management plan and submit the plan for supervision consultant approval. ◆ Strictly follow the Project's 'Traffic Management Plan' and work with close coordination with the Traffic Management Unit. ◆ Prepare and submit additional traffic plan, if any of his traffic routes are not covered in the Project's Traffic Management Plan, and requires traffic diversion and management.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Include in the traffic plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, road signs etc. ◆ Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Pakistan Traffic Regulations.
	Accidents and spillage of fuels and chemicals	The Contractor shall ◆ Restrict truck deliveries, where practicable, to day time working hours. ◆ Restrict the transport of oversize loads. ◆ Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. ◆ Enforce on-site speed limit.

ECP 16: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall ◆ Prepare a construction camp management plan and submit the plan for supervision consultant's approval. ◆ Locate the construction camps within the designed sites or at areas which are acceptable from environmental, cultural or social point of view; and approved by the supervision consultant. ◆ Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. ◆ Submit to the supervision consultant for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		locations, and drainage facilities, prior to the development of the construction camps. ◆ Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites ◆ Adequate housing for all workers. ◆ Safe and reliable water supply, which should meet SEQS. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time (World Health Organization -WHO guideline). ◆ Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by location. The minimum number of toilet facilities required is one toilet for every ten persons. ◆ Treatment facilities for sewerage of toilet and domestic wastes. ◆ Storm water drainage facilities. ◆ Paved internal roads. ◆ Provide child crèches for women working construction site. The crèche should have facilities for dormitory, kitchen, indoor and outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers. ◆ Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by the construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall ◆ Ensure proper collection and disposal of solid wastes within the construction camps.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at household level. ◆ Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed. ◆ Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall ◆ Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. ◆ Made available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. ◆ Conduct awareness campaigns to educate workers on preserving the protecting the biodiversity and wildlife of the Project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading Sexually Transmitted Infections (STIs) and Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS). In adequate safety facilities to the construction camps	The Contractor shall ◆ Provide adequate health care facilities within construction sites. ◆ Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. ◆ Provide ambulance facility for the labourers during emergency to be transported to nearest hospitals. ◆ Initial health screening of the labourers coming from outside areas. ◆ Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work. ◆ Provide HIV awareness programming, including STIs and HIV information, education and communication for all workers on regular basis. ◆ Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	may create security problems and fire hazards	stagnant water bodies and puddles do not form. Regular mosquito repellent sprays during rainy season in offices and construction camps and yards. ◆ Not dispose food waste openly as that will attract rats and stray dogs. ◆ Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices. The Contractor shall ◆ Provide appropriate security personnel (police or private security guards) and enclosures to prevent unauthorized entry in to the camp area. ◆ Maintain register to keep a track on a head count of persons present in the camp at any given time. ◆ Encourage use of flameproof material for the construction of labour housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. ◆ Provide appropriate type of firefighting equipment suitable for the construction camps ◆ Display emergency contact numbers clearly and prominently at strategic places in camps. ◆ Communicate the roles and responsibilities of labourers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps	The Contractor shall ◆ Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. ◆ Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed. ◆ Give prior notice to the labourers before demolishing their camps/units.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Maintain the noise levels within the national standards during demolition activities. ◆ Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. ◆ Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site. ◆ Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. ◆ Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ECP 17: Cultural and Religious Issues

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall ◆ Communicate to the public through community consultation regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. ◆ Not block access to cultural and religious sites, wherever possible. ◆ Restrict all construction activities within the foot prints of the construction sites. ◆ Stop construction works that produce noise (particularly during prayer time) should there be any mosque/religious/educational institutions close to the construction sites and users make objections. ◆ Take special care and use appropriate equipment when working next to a cultural/religious institution. ◆ Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given. ◆ Provide separate prayer facilities to the construction workers. ◆ Show appropriate behavior with all construction workers especially women and elderly people. ◆ Allow the workers to participate in praying during construction time. ◆ Resolve cultural issues in consultation with local leaders and supervision consultants. ◆ Establish a mechanism that allows local people to raise grievances arising from the construction process. ◆ Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters.

ECP 18: Worker Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc.), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc.) and (iii) road accidents from construction traffic.	The Contractor shall ◆ Prepare an OHS plan and submit the plan for supervision consultant's approval. ◆ Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labour Office guideline on 'Safety and Health in Construction; WBG's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with Pakistan standards. ◆ Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas. ◆ Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. ◆ Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. ◆ Appoint an EHS manager to look after the health and safety of the workers. ◆ Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Child and pregnant labour accident	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	The Contractor shall ◆ Ensure health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work. ◆ Document and report occupational accidents, diseases, and incidents. ◆ Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards, in a manner consistent with good international industry practice. ◆ Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. ◆ Provide awareness to the construction drivers and operators to strictly follow the driving rules. ◆ Provide adequate lighting in the construction area, inside the tunnels, inside the powerhouse cavern and along the roads.
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECP 16 Construction Camp Management ◆ Adequate ventilation facilities ◆ Safe and reliable water supply. ◆ Hygienic sanitary facilities and sewerage system. ◆ Treatment facilities for sewerage of toilet and domestic wastes ◆ Storm water drainage facilities. ◆ Recreational and social facilities ◆ Safe storage facilities for petroleum and other chemicals in accordance with ECP 2 ◆ Solid waste collection and disposal system in accordance with ECP1. ◆ Arrangement for trainings

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities
Other ECPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community • ECP 2: Fuels and Hazardous Goods Management • ECP 4: Drainage Management • ECP 10: Air Quality Management • ECP 11: Noise and Vibration Management • ECP 13: Road Transport and Road Traffic Management .
Training	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall ◆ Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of STIs HIV/AIDS). ◆ Train all construction workers in general health and safety matters, and on the specific hazards of their work. Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. ◆ Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on on-going and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counselling and testing.

Annexure 7-2: Guidelines for the Preparation of Project and Site-specific Plans for Construction and Operational Stages

Specific plans relevant to the ESMP are as follows:

A. Pre-Construction and Construction Phase Plans

1. Site Specific Environmental Social Management Plan (SSESMP)
2. Labour management plan
3. Project- specific Stakeholder Engagement Plan / Communication Plan
4. Occupational health and safety plan
5. Community health and safety plan
6. Emergency preparedness and response plan
7. Workers camp management plan
8. Site-specific compensatory tree plantation plan
9. Waste management plan
10. Traffic management plan
11. Spill prevention and response plan
12. Pollution prevention plan
13. Material Transportation Plan

B. Operational Phase Plans

1. Sludge Management Plan
2. OHS Plan (Operations)
3. Emergency Response Plan

Guidelines for preparing the above listed plans are provided as follows:

C. Pre-Construction and Construction Phase Plans

1. Contractor's Site Specific Environmental Social Management Plan (SSESMP)

The Contractor will develop a construction phase SSESMP in line with the ESIA and ESMP. The Contractor will also be expected to have its own Environmental and Social Management System aligned to the principles of ISO 14001:2015 and OHSAS 45001 or equivalent. These plans will be formally approved by PIU-KWSSIP and CSC before any work occurs on site. The SSESMP will consist of the following as a minimum and be structured as follows:

a. Section 1: Master SSESMP Document

The master SSESMP document will clearly define the Contractor's ESHS commitments and requirements, including:

- Place a high emphasis on good housekeeping practices.
- ESHS policy, committing to compliance with the ESIA and ESMP.
- Identification of all regulations, standards, and regulatory limits, and specify the means for maintaining compliance.
- Training plan outlining training and capacity building (covering both introductory sessions and technical training).
- Contractor's ESMS and H&S management system
- Organizational capacity and structure, roles and responsibilities, key resources
- Procedures, logistics and communication channels
- Monitoring, inspections, audits and evaluations
- Reporting
- Management of nonconformity procedures (including management and tracking)
- A permit register, with all permits required by the national requirements relating to the project, including timeframes and renewal dates and procedure
- An environmental, social, health and safety (ESHS) risk assessment register, to be maintained and updated monthly and discussed with PIU KWSSIP.
- Description of project areas, including the number, a map, key activities, opening and closing schedule, and access plans.
- A pre-construction plan, which outlines the pre-construction surveys planned to be carried out to record the existing baseline of each site, any changes to the baseline of the ESIA, and any additional measures (following the mitigation hierarchy) to avoid, minimize and mitigate. This will include detailed photographic and video footage for each specific work area

b. Section 2: SSESMP Sub-plans and Procedures

Development and implementation of specific sub-plans, which are detailed as follows shall be referenced under the SSESMP. **Table A7-1** outlines various sub-plans to be developed and implemented by the Contractor under its own SSESMP. All plans need to be developed in line with the applicable standards and GIIP. In addition to GIIP measures, the sub-plans will include the specific mitigation measures identified within the ESIA and ESMP. The key mitigation measures identified in the ESIA and ESMP shall require to be included in the relevant sub-plans. The plans will typically include a similar structure , such as:

- A standard introduction referencing the project, summarizing the project description, linkage of the plan to the SSESMP and other plans, the purpose and scope of the plan
- Requirements and standards
- Roles and responsibilities
- Impact and risk assessment
- Control measures

- Training requirements
- Monitoring and reporting procedures
- Other relevant details
- Document/record control

It is important to note that many plans have overlapping or cross-cutting measures that may need to be considered and included in multiple plans. All plans, when developed, will be reviewed and considered together by the Contractor as part of its overall system, to ensure that key environmental, social, health, safety and security measures are appropriately included, and there is no contradictions between plans.

Table A7-1: Sub-plans to be Prepared by the Contractor and Summary of the Aspects to be Covered

Plan	Objectives and Contents
Social and community	
Labour management plan	◆ To establish and foster sound worker-management relations ◆ Human resources procedures (based on the project HR and labour commitment ◆ Project HR and labour commitment ◆ Workers' code of conduct ◆ Construction labour monitoring procedure ◆ Supply chain analysis and due diligence procedure ◆ Workers' grievance mechanism
Project- specific Stakeholder Engagement Plan / Communication Plan	◆ Ensuring that the mechanism for information disclosure on purpose and nature of the construction activities, early notification of construction start date, scheduling and duration and potential impacts and health and safety measures/ mechanisms is in place ◆ Mechanism for issuance of notification to communities and sensitive receptors for any transport disruptions, construction activities, pedestrian accessibility, etc. is intact ◆ Feedback and grievance redress mechanism is followed ◆ Recruitment and Procurement, Employment of Local Workers details are clear to communities
Health and safety	
Occupational health and safety plan	To implement a safe working environment, procedures and culture during the construction phase. Further policies / procedures to be developed if need identified through site audits.
Community health and safety plan	To avoid, minimize and manage community health and safety risks.
Emergency preparedness and response plan	To cover potential emergencies during construction

Plan	Objectives and Contents
Workers camp management plan	To ensure that all Project accommodation areas are designed, constructed and maintained as healthy, clean and pleasant locations for workers to live in.
Biodiversity	
Site-specific compensatory tree plantation plan	The plan will provide details on the contractor's role and step by step approach for managing and monitoring compensatory tree plantation.
Environmental	
Waste management plan	To identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods
Traffic management plan	To plan, coordinate and management all traffic and access risks in relation to the construction phase of the project.
Spill prevention and response plan	To prevent spills and plan for appropriate responses
Pollution prevention plan	To effectively control air, noise, water and wastewater pollution
Material Transportation Plan	Construction material logistics planning entails managing materials and equipment both to and from construction sites. These two vital processes are inbound logistics and outbound logistics. Both of these equipment and material management activities require a detailed and thorough plan.

1. Contractor's Labour Management Plan

Contents to be covered in this plan by the Contractor include the following:

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
Fair labour management and working conditions	◆ Implement HR policy prepared following KWSSIP-LMP, the project wide labour commitment and related procedures, including a diversity and inclusion policy statement ◆ Include contract clauses for contractors and subcontractors to adhere to the project's reference framework (including the HR policy, GBVH policy, human rights, policy data security policy and use of qualified drivers)	◆ HR and labour commitment ◆ All contractors contractually committed to abide by the HR and labour commitment ◆ All workers trained in the HR and labour commitment

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	◆ Prevent use of child and forced labour through the HR and labour commitment ◆ Use policies, procedures and contracting processes to require that all workers have their own employment contract detailing working terms and conditions ◆ Screen subcontractors and service providers to check they can operate in line with the project's E&S reference framework ◆ Develop and implement a workers' Code of Conduct ◆ Develop and implement a construction labour monitoring procedure ◆ Develop and implement a recruitment and procurement policies and employment decision-making based on non-discrimination and equal opportunity principles ◆ Develop and implement measures to increase women's participation within the workforce during construction and operations, and to protect women working within the project ◆ Use gender neutral terms in official communications (including reporting of person hour time use) ◆ Create an accepting work environment that is supportive of diversity, that encourages respectful communication, and that addresses verbal harassment ◆ Develop and implement a workers' grievance procedure, which includes specific measures for addressing grievances related to gender-based violence and sexual harassment ◆ Establish committees with worker representatives and management to address working condition and labour rights issues	

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	◆ Identify job protection measures and their coverage, in relation to social security provisions, insurances and temporary deployment (as COVID -19 or similar situations may require) ◆ Undertake a supply chain analysis to identify any risks related to use of child or forced labour and unacceptable OHS conditions ◆ Develop a training plan and capacity building program for Contractor's, subcontractors' and service providers' personnel. ◆ Require any project parties using digital time keeping system to have them in place from the beginning of their time on the project	
Labour rights issues – Code of Conduct	◆ Code of conduct, setting out the rules of conduct by which all workers, will be governed and which includes the following: ◆ Discrimination and equal opportunities ◆ Cross cultural awareness (internationally and locally) ◆ Gender based violence and harassment ◆ Rules governing interactions with local communities, engaging in sex industry transactions, ◆ Health care awareness and protection from sexually transmitted disease. ◆ Align the code of conduct with the HIV and AIDS policy and awareness and prevention program. ◆ Provide training on the workers code of conduct to all workers during site induction and require signatures upon receipt.	◆ Completed code of conduct document ◆ All contractors contractually committed to abiding by the code of conduct ◆ All workers trained in the code of conduct
Labour rights issues – Labour monitoring	◆ Implement labour monitoring procedure, including:	◆ Completed labour monitoring activities

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	◆ Daily observations of labour and working conditions ◆ Weekly monitoring of workers of all contractors and third party agencies through random spot checks of workers contracts' provision and signing, payroll, overtime, workers; awareness of labour rights, workers' awareness and use of the labour grievance mechanism; through interviews and review of workers' HR files ◆ Weekly review of Workers Complaints logs Weekly review of training records (regarding induction training on code of conduct) ◆ Monthly reporting on compliance monitoring against the Project's human resource policy/labour standard which will include the following: ◆ Women's protection in workforce ◆ Workers with disabilities/special needs participation ◆ Vulnerable workers' protection	◆ Labour monitoring findings, including number of non-compliances identified. ◆ Number, gender, origin, and skill level of workers ◆ Worker contract provision and signing ◆ Working hours and overtime ◆ Payment of salaries and overtime ◆ Worker awareness of labour rights ◆ Cases of non-discrimination and equal opportunities (target zero) ◆ Child and forced labour (target zero)
Labour rights issues – Worker representation	◆ Establish committees with worker representatives and management to address working condition and labour rights issues	◆ Established worker representation committees with democratically elected worker representatives ◆ Number of committee meetings
Labour rights issues – Employment contracts	◆ Produce template and use clear and signed individual worker contracts based on templates with terms and conditions including decent terms for hours of work, rest, wages, leave, overtime payments, time to visit family and enough time to carry out parenting duties. ◆ Advance warning of end of contracts, certificates provided to workers and	◆ Each worker has a signed contract ◆ Evidence of notification of termination of contracts ◆ Certificates provided to workers

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	retention through to operations for as many as possible	
Labour rights issues – Labour and social rights awareness	◆ Provide induction training for workers covering health and safety, labour rights, the grievance mechanism, GBVH and how to interact respectfully with local communities. ◆ Provide refresher labour awareness training after probation and before the six-month period ◆ Conduct toolbox talks every six months related to GoS labour laws and regulations to be held by all project employers (KWSSIP / KWSB, Contractor, subcontractors and service providers) whose staff are involved in core business processes (production or service processes essential for a specific business activity without which the project could not continue).	◆ Each worker has completed induction training ◆ Training records (such as attendance logs for refresher training and toolbox talks)
Labour rights issues - Labour grievance mechanism	◆ A workers' grievance mechanism involving workers' representatives who meet with project management once a month during construction to resolve labour issues. The workers' grievance mechanism will encompass confidential channels to report acts of GBVH and those administering the grievance mechanism will be trained on how to deal with complaints about GBVH	◆ Workers' grievance log showing grievances ◆ Grievances closed out in time and to workers' satisfaction
Influx management	◆ Produce influx management plan, compiling measures within other plans s (stakeholder engagement plan and, community health and safety plan)	◆ Cross-reference and alignment included in all relevant management plans

2. Project- Specific Stakeholder Engagement Plan / Communication Plan

What is a Project- Specific stakeholder engagement / communication plan?

A project-specific stakeholder engagement plan—also known as a stakeholder management plan—is a subsidiary document that is often created alongside the main project plan for a given body of work. It

is a written document that is formulated before a project begins, and which is kept on file and updated over the course of the project as necessary. Its purpose is to identify a project's key stakeholders, and to outline a methodology and approach for how the project team will interact and communicate with those stakeholders.

What goes into a stakeholder engagement plan?

Stakeholder Identification

This section is used to identify all of the project's stakeholders by name. At a minimum, the section also defines their roles and responsibilities as they relate to the project. In some cases, it can be much more extensive.

Planning to Interact with the Stakeholders

The next section is dedicated to actually determining how the project team will interact and engage with the stakeholders identified in the first portion of the plan. This will often involve a deeper assessment of each stakeholder, which will be used to inform the rest of the plan.

Stakeholder Engagement Activities

The final portion of the plan is essentially an outline of the various activities the project team will undertake to communicate with stakeholders, manage their expectations, and keep them engaged with the project. This includes activities such as pre-planned meetings with stakeholders or key reports. This section of the document will also typically outline the types of communications that will be used throughout the project—FGDs, pamphlets, media, periodic meetings etc.—and which each form of communication is best suited for.

Contractor shall follow the KWSSIP-2 Stakeholder Engagement Plan in principal for preparing the Project-specific SEP / Communication Plan. Indicative overview of contents to be covered is as follows:

- **INTRODUCTION**
- ✓ Background to Stakeholder Engagement
- ✓ Objectives of the Stakeholder Engagement Plan
- ✓ Structure of the Document
- **PROJECT DESCRIPTION**
- ✓ Project Overview
- ✓ Key Project Aspects
- ✓ Social Area of Influence
- **LEGAL FRAMEWORK**
- ✓ Local and WB Requirements for Stakeholder Engagement and Public Consultation
- **KEY PROJECT PRINCIPLES OF STAKEHOLDER ENGAGEMENT AND APPROACH**
- ✓ Stakeholder Identification and Analysis

- ✓ Methodology and Approach for Engaging Stakeholders
- ✓ Vulnerable Groups

- ◆ **STAKEHOLDER ENGAGEMENT**

- ✓ Stakeholder Engagement Activities according to National and International Requirements
- ✓ Stakeholder Engagement Activities within the Scope of ESIA Studies and KWSSIP-2 SEP
- ✓ Summary of the Social Field Studies for the ESIA Report
- ✓ Tools for Communication Routine (E.g. Internet/Website, Public Media, FGDs etc.)
- ✓ Community Relations
- ✓ Notice Boards

- ◆ **STAKEHOLDER ENGAGEGEMENT PROGRAM**

- ✓ Pre-Construction Phase
- ✓ Construction Phase

- ◆ **GRIEVANCE MECHANISM**

- ✓ Public Grievance Mechanism
- ✓ Receipt of Grievances
- ✓ Acknowledgement and Record Keeping
- ✓ Investigation
- ✓ Response to Complainant
- ✓ Discussion of Resolution
- ✓ Worker Grievance Mechanism

- ◆ **EXTERNAL COMMUNICATIONS**

- ✓ Institutional Arrangements, Roles and Responsibilities

3. Occupational and Community Health & Safety Plan

Occupational and Community Health and Safety Plans (OHS / CHS Plans) are key document to address how OHS and CHS risks will be managed in a project. A Health & Safety Framework (Attached as **Annexure 5-1**) has been prepared by the World Bank E&S Safeguards Unit which is applicable on all World Bank-financed projects in the South Asia Region (SAR). The framework provides guidelines not only to the proponent but also to the project Contractors to implement a practical approach to manage Occupational Health and Safety (OHS) and Community Health and Safety (CHS) impacts and risks in accordance with national/local regulatory framework, the World Bank Environmental and Social Standards and Environmental Health and Safety (EHS) Guidelines, ISO Standards, Good International Industry Practices (GIIP), etc. The framework also includes a template for OHS / CHS Plans which should be followed by the Contractor for making these plans.

Some key guidelines to be covered under the plan includes the following:

Specific Mitigation Guidelines for Dealing with OHS Hazards

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
1.	**Trench Excavation**[1] Collapse of Excavation and falling of materials while working in excavations could result in workers injuries or fatalities. Workers could be at risk from: ◆ Excavations collapsing and burying or injuring people working in them; ◆ Material falling from the sides into excavation; ◆ People or plant falling into excavations. ◆ Serious accidents could occur if buried services are damaged during excavation work. ◆ Excavation inside water stream or at dry areas during wet weather can cause many safety hazards including intrusion of water into excavation, slippery conditions for the drivers of equipment, causing the ground to be slippery and muddy thereby creating the possibility of slips and falls, and making the site work less stable.	**Collapse of excavations:** a- **Temporary support** - Before digging any trench pit, or other excavations, Contractor shall decide what temporary support will be required and accordingly plan the precautions to be taken. b- Contractor shall make sure the equipment and precautions needed (trench sheets, props, baulks etc.) are available on site before work starts. c- **Battering the excavation sides** - Battering the excavation sides to a safe angle of repose may also make the excavation safer. d- In granular soils that may come across during trenching, the angle of slope should be less than the natural angle of repose of the material being excavated. In wet ground a considerably flatter slope will be required. **Falling or dislodging material:** a- **Loose materials** - may fall from spoil heaps into the excavation. Edge protection should include toe boards or other means, such as projecting trench sheets or box sides to protect against falling materials. Head protection should be worn. b- Effect of plant and vehicles - Do not park plant and vehicles close to the sides of excavations. The extra loadings can make the sides of excavations more likely to collapse. **Falling into excavations** a- **Prevent people from falling** – Contractor shall protect edges of excavations with substantial barriers where people are susceptible to fall into them. b- To achieve this, use of following options shall be made: ◆ Guard rails and toe boards inserted into the ground immediately next to the supported excavation side; or fabricated guard rail assemblies that connect to the sides of the trench box

[1] https://www.hse.gov.uk/construction/safetytopics/excavations.htm

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
		◆ The support system itself, e.g. using trench box extensions or trench sheets longer than the trench depth. **Inflow of surface or ground water** a- Sewage from Malir River could may intrude into the excavation at certain areas, therefore proper shoring shall be required to avoid danger of collapse of excavation. b- Depending on the permeability of the ground, water may flow into any excavation below the natural groundwater level. c- The supports to the side of the excavation should be designed to control the entry of groundwater and the design should take any additional water loading into account. d- Particular attention should be given to areas close to lakes, rivers and the sea. e- Water entering the excavation needs to be channeled to sumps from where it can be pumped out; however, the effect of pumping from sumps on the stability of the excavation should be considered. **Safety Measures for Excavation in Wet Weather** a- Weather conditions needs to be checked before daily work to be aware of rain and storm possibilities. b- Inspection of trenches to be done every day before construction begins. c- Workers shall not be allowed to go near unprotected trenches. d- Heavy equipment shall be kept away from trench edges. e- Workers shall be trained to have the skills needed to identify wet weather hazards and how to minimize risks. f- Protective equipment shall always be worn and in a correct manner. g- All power tools shall be correctly maintained and used properly. h- Protective systems including benching, sloping, shoring, and shielding shall be utilized. i- Planning and implementation of safety systems and inspections shall be used regularly on the construction sites. **Other aspects of excavation safety**

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
		a- Safe means of getting into and out of an excavation shall be provided. If a risk assessment identifies that ladders are a reasonable means of access and egress from an excavation, ladders with suitable length and of sufficient strength shall be provided for the purpose. b- Use of petrol or diesel engines in excavations shall be avoided without arranging for the fumes to be ducted safely away or through forced ventilation. **Inspection** a- A competent person who fully understands the dangers and necessary precautions shall inspect the excavation at the start of each shift. b- Excavations shall also be inspected after any event that may have affected their strength or stability, or after a fall of rock or earth. c- A record of the inspections shall be maintained and any faults that are found should be corrected immediately. d- A written report shall be made containing the following information: ◆ Location and description of the place of work or work equipment inspected; ◆ Date and time of the inspection; ◆ details of: ◆ Any matter identified that could give rise to a risk to the health or safety of any person; ◆ Any action taken as a result of any matter identified; ◆ Any further action considered necessary; and ◆ Name and position of the person making the report.
2.	**Excavators**[2] Most fatal and serious injuries involving excavators occur when the excavator is: ◆ **Moving** – and strikes a worker / pedestrian, particularly while reversing; ◆ **Slewing** – trapping a person between the excavator and a fixed structure or vehicle; or	**Controlling the risk** It is important to select the right excavator for the job. There are five main precautions needed to control excavator hazards. These are: a- **Exclusion:** People should be kept away from areas of excavator operation by the provision of suitable barriers. Bunting or fencing can be used to create and maintain a pedestrian exclusion area. b- **Clearance:** When slewing in a confined area the selection of plant with minimal tail swing is preferred. Clearance of over 0.5m needs to be maintained between

[2] https://www.hse.gov.uk/construction/safetytopics/excavators.htm

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
	◆ **Working** – when the moving bucket or other attachment strikes a worker or when the bucket inadvertently falls from the excavator. ◆ Most excavator related deaths involve a person working in the vicinity of the excavator rather than the driver.	any part of the machine, particularly the ballast weight, and the nearest obstruction. c- **Visibility:** Excavators with the best view around them directly from the driver position should be selected. Excavators should be equipped with adequate visibility aids to ensure drivers can see areas where people may be at risk from the operation of the machine. d- **Plant and vehicle marshal/banksmen:** A Plant and vehicle marshal/banksmen should be provided in a safe position to direct excavator operation and any pedestrian movements. e- **Bucket attachment:** Quick hitches can be used to secure buckets to the excavator arm. **Training and competence** There are three categories of people who must be trained and made competent regarding the excavator hazards and precautions: a- **Drivers:** should be trained, competent and authorized to operate the specific excavator. Training certificates from recognized schemes help demonstrate competence and certificates should be checked for validity; b- **Plant and vehicle marshal:** should be trained, competent and authorized to direct excavator movements and, where possible, provided with a protected position from which they can work in safety; and c- **Pedestrians:** should be instructed in safe pedestrian routes on site and the procedure for making drivers aware of their presence through sign boards and on-site instructions. **Inspection and maintenance** a- A program of daily visual checks, regular inspections and servicing schedules shall be established in accordance with the manufacturer's instructions and the risks associated with each vehicle. b- Drivers shall be advised to report defects or problems. Reported problems shall be put right quickly and the excavator taken out of service if the item is safety critical.
3.	**Lifting Operations (Cranes)**[3]	**Pre-requisite:**

[3] https://www.hse.gov.uk/construction/safetytopics/lifting-operations.htm

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
	◆ **Collapse of the Crane** – such incidents present significant potential for multiple fatal injuries, both on and off-site; ◆ **Falling of the Load** – these events also present a significant potential for death and major injury.	a- Cranes and lifting accessories such as slings shall be of adequate strength, tested and subject to the required examinations and inspections. b- All crane operators, and people involved in slinging loads and directing lifting operations, shall be trained and competent. **Planning lifting operations** a- All lifting operations shall be planned so they are carried out safely with foreseeable risks taken into account. b- The person appointed to plan the lifting operation shall have adequate practical and theoretical knowledge and experience of the lifts being undertaken. c- The plan will need to address the risks identified by a risk assessment, the resources required, procedures and the responsibilities so that any lifting operation is carried out safely. d- The plan shall ensure that the lifting equipment remains safe for the range of lifting operations for which the equipment might be used. **Supervision of lifting** a- The right level of supervision shall be in place for lifting operations, reflecting the degree of risk and personnel involved in the particular lifting operation. b- The crane supervisor shall direct and supervise the lifting operation to make sure it is carried out in accordance with the method statement. c- The crane supervisor shall be competent and suitably trained and should have sufficient experience to carry out all relevant duties and authority to stop the lifting operation if it is judged dangerous to proceed. **Thorough examination** a- Lifting equipment shall be thoroughly examined at the prescribed intervals. This shall be a detailed and specialized examination by a competent person. b- Records of thorough examinations and tests shall be: made readily available to the relevant authorities; secured; and capable of being reproduced in written form.
4.	**Heat Stress / Heat Stroke**[4]	**Control of Heat Stress**

[4] https://www.cdc.gov/niosh/topics/heatstress/recommendations.html

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
	◆ Workers who are exposed to extreme heat may be at risk of heat stress. ◆ Exposure to extreme heat can result in occupational illnesses and injuries. ◆ Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. ◆ Burns may also occur as a result of accidental contact with hot surfaces.	Work practice recommendations include the following: a- Limit time in the heat and/or increase recovery time spent in a cool area. b- Use tools intended to minimize manual strain. c- Increase the number of workers per task. d- Train supervisors and workers about heat stress. e- Use a buddy system where workers observe each other for signs of heat-related illnesses. f- Require workers to conduct self-monitoring and create a work group (i.e., workers, a paramedic, and a safety manager) to make decisions on self-monitoring options and standard operating procedures. g- Provide adequate amounts of cool, potable water near the work area and encourage workers to drink often. h- Use a heat alert program whenever the weather service forecasts a heat wave. i- Institute a heat acclimatization plan and encourage increased physical fitness. **Training** Contractor shall implement a heat stress training program for all workers and supervisors which will cover the following: a- Training of workers before hot outdoor work begins. b- Recognition of the signs and symptoms of heat-related illnesses and administration of first aid. c- Causes of heat-related illnesses and steps to reduce the risk. These include drinking enough water and monitoring the color and amount of urine output. d- Proper care and use of heat-protective clothing and equipment and the added heat load caused by exertion, clothing, and personal protective equipment. e- Effects of other factors (drugs, obesity, etc.) on tolerance to occupational heat stress. f- The importance of acclimatization. g- The importance of immediately reporting any symptoms or signs of heat-related illness in themselves or in co-workers to the supervisor. h- Procedures for responding to symptoms of possible heat-related illness and for contacting emergency medical services. Supervisors shall also be trained on the following: a- Implementing appropriate acclimatization plan.

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
		b- Procedures to follow when a worker has symptoms of heat-related illness, including emergency response procedures. c- Monitoring weather reports. d- Responding to hot weather advisories. e- Monitoring and encouraging adequate fluid intake and rest breaks. **Hydration** The Contractor shall provide the means for appropriate hydration of workers and ensure that: a- Water should be potable, <15°C (59°F), and made accessible near the work area. b- Estimate how much water will be needed and decide who will get and check on water supplies. c- Provide individual drinking cups for each worker. d- Encourage workers to hydrate themselves. e- Workers should drink an appropriate amount to stay hydrated. f- For moderate activities in the heat that last less than 2 hours, drink 1 cup (8 oz.) of water every 15–20 minutes. g- If sweating lasts for several hours, drink sports drinks containing balanced electrolytes. h- Avoid alcohol and drinks with high caffeine or sugar. i- Generally, fluid intake should not exceed 6 cups per hour.
5.	**Confined Space Working**[5] The most likely hazards related to confined spaces include: ◆ A risk of fire or explosion can arise flammable substances and oxygen enrichment. ◆ Hot conditions can lead to a dangerous rise in core body temperature and this can be made worse by wearing PPE,	**Work in confined spaces** a- No person at work shall enter a confined space to carry out work for any purpose unless it is not reasonably practicable to achieve that purpose without such entry. b- A site specific method statement shall be produced by the Contractor and all workers shall adhere to the method statement instructions before the work is carried out. c- It shall be ensured that there is suitable ventilation within the workplace. d- Damaging any underground utilities shall be avoided. e- It shall be ensured that workers are provided with the following: ◆ Head, hand and foot protection ◆ Eye and hearing protection

[5] https://www.hse.gov.uk/pubns/priced/l101.pdf

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	highly physical or strenuous work. ◆ The presence of toxic gas, fume or vapour can lead to asphyxia or unconsciousness ◆ A lack of oxygen in the atmosphere may also lead to asphyxia or unconsciousness.	◆ Waterproof and thermal clothing ◆ Respirators and breathing apparatus ◆ Appropriate safety harnesses. f- It shall be ensured that Emergency arrangements such as First aid procedures, arrangements for the safety of rescuers and mechanism of liaison with emergency services are in place before any work starts to make sure that the workers can be rescued safely if required. g- Those who are identified as rescuers need to be: ◆ Ready at hand ◆ Properly trained ◆ Fit to carry out their task ◆ Protected against the cause of the emergency ◆ Capable of using any equipment provided for rescue, for example breathing apparatus, lifelines and fire-fighting equipment. h- Training is critical in all work with confined spaces. The Contractor shall ensure that all workers are given suitable and appropriate training to carry out the workplace task. This will include trainings on; emergency procedures and use of breathing apparatus.
6.	**Welding Safety**[6] There are a variety of welding methods available, all of which have inherent safety and health hazards associated with them, such as: a- Metal fumes are formed when a metal is heated above its boiling point and its vapors condense into very fine particles. Health effects can range from short-term illnesses such as metal fume fever with flu-like symptoms to longer-term issues such as	**Safety Measures** The Contractor shall ensure the following: a- Welders, bystanders and work space are properly protected. b- Use of local exhaust ventilation, such as an exhaust trunk, while performing welding activities whenever possible to minimize exposures to welding fume. c- Use of respiratory protection below the recommended air quality levels. d- Protecting worker's exposures to UV and infrared radiation by providing a properly fitted welding helmet, with proper grade of filter plate while ensuring that it must be worn. An auto-darkening welding helmet is highly recommended as these helmets do not need to be raised to check welds and can be kept in the lowered position all the time, reducing fume exposure. These helmets also reduce the urge to use the neck muscle to flip the helmet to the "up" position, which can cause significant neck discomfort and possible injury.

[6] https://www.hse.gov.uk/welding/index.htm

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
	lung damage or neurological disorders. b- Burns may be caused by contact with hot surfaces or hot flying particles. c- Eye injuries can result from exposure to ultraviolet and infrared radiation created from the arc or from particulates or spattering. d- Electric shock may occur due to improper grounding and/or contact with current through damp clothing, wet floors and other humid conditions. Even if the shock itself is not fatal, the jolt may still cause welders to fall from their work positions. In addition, stray welding current may cause extensive damage to equipment, buildings and electrical circuits. e- Fire caused by heat, sparks, slag or flames contacting combustible or flammable materials in the welding area. f- Improper use and storage of oxygen and acetylene may result in fire or explosion g- Strains, neck and lower back injuries resulting from repetitive motions and work orientation.	e- Safety glasses should also be worn under the welding helmet to provide impact protection and to protect eyes from particulates when hoods are lifted. f- Pant cuffs and rolled up sleeves should be avoided. g- Workers shall be trained to protect their body from spatter and arc flash with flame-resistant gloves and apron or jacket, flame-resistant natural fiber clothing (such as wool or cotton) and leather boots etc. h- Any combustible or flammable materials shall be put away from the welding area to prevent fires. i- A clear egress path shall be maintained out of the welding area as well as to the nearest emergency equipment such as fire extinguisher, emergency eyewash and emergency shower. j- Check welding equipment and personal protective equipment (PPE) for defects and damage before beginning work. Ensure PPE is properly stored and maintained when not in use. k- Position welding curtains as needed to protect others in the area from splatter, flash and glare. l- Setting up any signs or safety cones as needed. m- Prevent lacerations by identifying sharp edges and burrs, wearing appropriate gloves, deburring, and proper storage methods. n- Ensure good insulation from work surfaces, the electrode, the electrode holder and grounding surfaces is obtained and maintained. o- Practice good lifting techniques by workers and considering ergonomics when setting up the work and minimizing awkward postures. p- Workers shall be trained on the safe use, transportation and storage of compressed gases prior to use.

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
	h- Lacerations resulting from accidental contact with sharp edges and burrs.	
7.	**Construction Dust**[7] a- Drilling, cutting, sanding and driving over dusty areas can pose risks for the workers involved. b- Dust that can enter the nose and mouth during breathing is referred to as 'total inhalable dust'. Some dust may consist of larger or heavier particles that tend to get trapped in the nose, mouth, throat or upper respiratory tract where they can cause damage. c- Chronic effects of dust in the lungs are usually permanent and may be disabling, so prevention of the onset of disease should be given the highest priority.	**Control Measures** a- Contractor shall ensure that workers are protected from excessive exposure to dust. a- Keep construction areas shall be kept as clean as possible. b- Workers shall be provided with clothing that resists dust and essential PPEs. c- Working shifts shall be rotated to limit inhalation of polluted air by workers specially the potentially dusty work sites. d- Dust shall be suppressed and dampen at project sites by sprinkling water. e- Construction vehicles shall be driven at slow speeds to keep dust emissions limited. f- Contractor shall provide construction workers with information / training about potential dust hazards and instructions on how to avoid them. g- Workers shall be trained to wet the tools before cutting into any materials as it can reduce dust accumulation.
8.	**Construction Noise**[8] a- Exposure to high levels of noise can cause permanent hearing loss. b- Loud noise can create physical and psychological stress, reduce productivity, interfere with communication and concentration, and	**Control Measures** a- As a first step, the Contractor shall choose quieter equipment and machinery to save the cost of introducing noise-reduction measures and providing hearing protection, health surveillance and associated trainings etc. b- Hearing protection shall be issued to employees: ◆ where extra protection is needed above what has been achieved using noise control ◆ as a short-term measure while other methods of controlling noise are being developed.

[7] https://www.hse.gov.uk/construction/healthrisks/hazardous-substances/construction-dust.htm
[8] https://www.hse.gov.uk/noise/hearingprotection.htm

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
	contribute to workplace accidents and injuries by making it difficult to hear warning signals.	c- Contractor shall make sure that the protectors give enough protection - at least to get below 85 dB at the ear. d- Use of protectors to the noisy tasks and jobs in a working day shall be made mandatory. e- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. f- Periodic medical hearing checks shall be performed on workers exposed to high noise levels.
9.	**Fire Safety** a- Fire at a construction site can endanger the lives of workers and others who happen to be on the site. b- A fire during the course of construction also can result in severe structural damage; destruction of machinery, equipment or materials; and untimely delay in project completion.	**Control Measures** a- The Contractor shall develop an effective fire prevention and extinguishing plan before the onset of construction. The plan shall be put into practice as soon as construction operations begin and shall be closely followed throughout the course of construction. b- Contractor shall ensure that fire safety and firefighting trainings are provided to selected workers from each worker groups so that they can handle the localized fires. c- Contractor shall ensure the availability of right fire extinguishers at project construction and campsites to deal with different types of fires in accordance with the following chart: **Fire Extinguisher Chart** Extinguisher (Colour, Type) / Type of Fire: Solids (wood, paper, cloth, etc); Flammable Liquids; Flammable Gasses; Electrical Equipment; Cooking Oils & Fats Water: Yes; No; No; No; No Foam: Yes; Yes; No; No; Yes Dry Powder: Yes; Yes; Yes; Yes; No Carbon Dioxide (CO2): No; Yes; No; Yes; Yes d- The local fire department shall be made aware of construction plans and kept up to date during the course of construction regarding items such as access to the sites during both working and non-working hours; and the location of fuel storage, power and fuel shutoffs, power generators, and fixed-fire extinguishing systems.

S. No.	Work Activities and Associated Hazards	Mitigation Guidelines
		e- The project requires considerable works related to welding at TP-IV. Cutting and welding sparks cause more construction fires than any other ignition source. The personnel responsible for fire safety shall ensure that adequate precautions are taken during welding works and adequate numbers of fire extinguishers are present in proximity to the work areas. f- Suitable fire extinguishers are Carbon Dioxide or Dry Powder because of the risk of electrical fires in the welding area, whereas use of water based extinguisher shall be avoided. g- Fuel gas and oxygen cylinders shall be placed upright and secured at safe locations, protected from high temperatures and adequately separated from each other. h- Typical Fire Safety Checklist is attached as Error! Reference source not found., which shall be followed by the Contractor during construction phase.

4. Emergency Preparedness and Response Plan (EPRP)

The Contractor will be responsible for ensuring adequate emergency preparedness and response planning for the construction phase of the project. Following Table presents the contents to be covered under EPRP.

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
Construction phase emergency preparedness and response plan, including flooding, medical emergencies etc.	◆ Develop and implement a regularly updated EPRP so that project staff, relevant local authorities and emergency services are prepared to respond to accidental and emergency situations in a manner that prevents and mitigates harm to people and the environment. The EPRP will include: ◆ Identification of accidents and emergency situations and the communities and individuals that may potentially be impacted. ◆ Identification of response procedures, provision of equipment and resources, designation of responsibilities, communication systems and channels and periodic response training	◆ Records of training drills ◆ Disclosure of EPRP to affected communities, emergency services and operations workers ◆ Type, duration and adequacy of emergency response in specific situations

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	◆ Routine inspection of work sites ◆ Maintenance of plant, equipment, supplies and materials required for preventative measures and emergency responses ◆ Clearly defined evacuation procedures ◆ Training requirements for staff and managers, including details on who provides training ◆ Identification of relationship to and integration with other plans ◆ Identification of revision timeframe and process ◆ Template for incident reporting forms ◆ Identify a set of procedures to assist in rapid and early identification and responses to potential and occurring emergencies relevant to the construction phase. These are likely to include categories such as: ◆ Flooding ◆ Equipment failure or malfunctioning ◆ Seismic activity ◆ Terrorism ◆ Address specific situations such as emergencies occurring: ◆ In the dark: with extra attention on emergency power sources, backup lighting systems, mobile lighting for response teams ◆ In adverse weather: with extra attention placed on emergency shelter and clothing for responders, and shelter for evacuees ◆ Produce detailed information on internal and external equipment, personnel, facilities, funding, expert knowledge and material that will facilitate appropriate responses to specific types of emergencies ◆ Identify procedures for using, inspecting, testing and maintaining emergency response equipment, which may include equipment under the control of third parties	

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	(such as local fire brigades or emergency medical teams) ◆ Produce inundation maps that will be provided to aid evacuation plans and be distributed to local authorities ◆ Develop a rescue and relief plan to cover actions required in the event of a flood. This will include details on: ◆ Support for evacuees to provide food, fuel and shelter ◆ Securing potable water supplies to affected areas ◆ Identification of buildings for use as relief camps ◆ Identification of health facilities and contact details of key personnel	

5. Workers Camp Management Plan

Contents to be covered in the plan by the Contractor include the following:

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
Construction worker well-being in accommodation facilities Community, health, safety and security and relations/conflict between workers and host communities	◆ Describe the minimum national legislative requirements plus the applicable international requirements relevant to the facility standards and management of labour accommodation – these are aligned with the WBG guidance note on workers accommodation[9]. ◆ Describe standards to be met that will avoid safety hazards and protect workers from disease, illness, exposure to natural hazards, including but not limited to ◆ Types and materials of living facilities ◆ Provision of minimum amounts of space for each worker	◆ Worker accommodation plan compliant with the WBG guidance note on workers' accommodation ◆ Types of accommodation (on site, offsite) ◆ Number of accommodated employees and rooms ◆ Ratio of facilities to workers

[9] Workers' Accommodation: Processes and Standards, September 2009 - https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	◆ Adequate drainage, dormitories, bed and storage ◆ Provision of sanitary, laundry, cooking and medical facilities and potable water ◆ Location of accommodation in relation to the workplace ◆ Any health, fire, safety or other hazards or disturbances and local facilities ◆ Provision of first aid and medical facilities ◆ Heating and ventilation ◆ Workers freedom of movement to and from the employer-provided accommodation will not be unduly restricted ◆ Include an accommodation code of conduct with rights, rules and regulations for workers' accommodation ◆ Identify a grievance and maintenance response mechanism for the accommodation facilities and services	◆ Accommodation inspections ◆ Worker and community grievances ◆ Disease type / incidence, and lost time impacts ◆ Water / food quality inspections test results ◆ Waste segregation and appropriate disposal monitoring results ◆ Hygiene inspection results

6. Site-specific Compensatory Tree Plantation Plan

A Compensatory Tree Plantation Plan has been prepared for the project and attached as **Annexure 4-1**. This shall be followed by the Contractor for the development of Site-specific Compensatory Tree Plantation Plan. Provision of hiring Ecologists has been kept in the ESMP Cost and these Ecologists shall develop this plan in consultation with the PIU, Sindh Forest Department and the departments which will provide land for compensatory plantation.

Compensatory planting shall involve replacement, planting or making available of a number of trees as a replacement for a damaged or uprooted tree. The aim of this plan shall be to address the conditions that shall be observed when carrying out compensatory planting with respect to uprooted or damaged trees in accordance with the PIU and Forest Department Guidelines.

General Principles to be Followed for Compensatory Plantation

a- Wherever removal of existing trees is justified and permitted, the Contractor shall be required to carry out compensatory planting in accordance with the PIU and Forest Department Guidelines.

b- Whilst compensatory planting is a compulsory requirement for all trees, the Contractor shall also compensate uprooting / clearance of shrubs, through planting ornamental shrubs at locations to be identified by the PIU.

c- Compensatory planting may also apply in cases in which severe pruning is carried out and severely mutilates or damages the tree. The criteria for compensatory planting are to be approved by the PIU and Forest Department prior to authorizing interventions on trees.

d- The quality of trees and site targeted for replacement should meet certain specifications to ensure as much as possible equivalence to offset the adverse impact on the environment, landscape, general amenity and ensure conditions for the survival of newly planted species.

e- Ratio of compensatory plantations shall be 10 trees in place of every affected tree.

f- In order to prevent monocultures, where compensation would involve the planting of a considerable number of trees, species composition should not be limited to the species for which compensation is being carried out. A diversity of species shall require to be planted to compensate for the tree, such as reflecting the natural diversity at the site earmarked for planting.

g- Non-indigenous species are to be replaced by indigenous species.

h- Indigenous trees for planting purposes shall be insofar as reasonably possible from local stock.

i- Unless prevented by the conditions on the site chosen for compensatory planting, replacement trees shall be at least of medium-standard trees, that is, the overall height exceeding 1 m and stem diameter exceeding 5 cm, with a well-balanced branching head.

j- Replacement trees shall be planted in accordance with good arboricultural practice, ensuring distance between individual trees and built structures are appropriate for growth of mature trees specimens. In certain contexts, this requirement may need to be reconciled with other specifications (e.g. denser planting, clustering) that may need to be pursued for the purpose of improved blending into surrounding landscape, improved screening of structures or for mimicking the natural distribution of trees within a particular natural habitat.

Contents of the plan includes the following:

Tree Inventory

To develop a realistic and useful compensatory plantation plan, it is necessary to complete an inventory and analysis of the trees found growing in the DIA. Typical inventory data sheet that could be adopted for the purpose is as follows:

Date:____ Map#:____

Tree Inventory Data Sheet

Tree Information			Tree Condition					Planting Location				Conditions				If Pruning Needed What Type?			Comments
Tree #	Code	DBH	G	F	P	D	H	Swlk	<4'	>4'	Lwn	Weak Fork	Over. Wires	Dead Wood	Cav	Clean	Raise	Reduct.	

Legend:
(Tree Condition) G = Good F = Fair D = Dead H = Hazard
(Planting Location) Swlk = Sidewalk <4' = less than 4' >4' = more than 4' Lwn = Lawn
(Conditions) Weak Fork = Weak Branch Fork Connection Over Wires = Overhead Utility Wires Dead Wood = Dead Wood in Crown Cav = Cavity in Trunk
(If Pruning Needed What Type?) Clean = Crown Cleaning Raise = Crown Raising Reduct. = Crown Reduction

- **Selection of Tree Species**

This section will include details on species to be planted. Selection should be made while ensuring possibilities of monocultures and a diverse species should be planted.

- **Details of Compensatory Plantation Sites**

A key section in the plan shall be regarding the details on identification of compensatory planting locations. Planting locations should be identified before tree cutting by the Contractor in consultation with the PIU and the Sindh Forest Department. This section should include geographic and ownership details of compensatory plantation sites.

- **Maintenance Needs**

The plan should provide clear-cut guidelines on maintenance needs of the trees, a strategy for the removal of hazard conditions, and the development of an operational maintenance program. This should contain details on maintenance responsibilities, watering frequencies, fertilization and pruning etc. Disposal of the tree debris, including recycling operations etc. should also be covered.

7. Waste Management Plan

The waste management plan will identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods. Contents to be covered in waste management plan by the Contractor include the following:

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
General waste management plan requirements	◆ Identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods. ◆ Prepare in accordance local waste regulations and the WBG EHS Guidelines for Construction Materials Extraction (2007), the WBG General EHS guidelines ◆ Cover all waste streams from the project (solid, liquid, hazardous, non-hazardous), for all activities, including construction works and worker facilities and accommodation. ◆ Develop a waste management system reflected in the plan that addresses issues linked to waste minimisation, generation, transport, disposal, and monitoring including: ◆ Contractor training requirements with respect to waste handling procedures ◆ Waste generation data collection for each waste stream by volume. This will include the proportion of each waste stream going for reuse, recycling or disposal. Any unusual waste volumes will be investigated ◆ An audit schedule which details the frequency of waste management audits and those responsible for undertaking them ◆ Procedure for reporting any environmental incidents related to waste ◆ The specific regulatory licensing and reporting requirements as they relate to waste. ◆ A map showing each temporary waste storage location for the Project ◆ Strict conditions on handling and storage of fuel, explosives, and chemicals will be imposed on the Contractor and suppliers to prevent accidental pollution and injury. ◆ Procedures for, and identification of, licensed contractors to collect, transport and dispose of waste	Waste record completion Recycling rates Amount of waste generated by stream

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	◆ If any waste facilities are developed detailed management plans would be required following national and international standards.	
Waste segregation	◆ Segregate wastes in designated storage areas, such that hazardous and non-hazardous wastes are not mixed and to allow for recycling and reuse where appropriate ◆ Segregate hazardous waste (such as oils, lubricants, batteries, chemicals and medical waste) from other waste types to avoid cross contamination ◆ Label waste streams for identification and warning purposes	No non- compliances of waste being mixed identified in inspections
Storage requirements	◆ Correctly identify wastes and stored pending collection/transfer for reuse, recovery, recycling or disposal in an environmentally sound manner ◆ Locate waste storage areas on areas of impermeable hard standing to prevent leaching of any contaminants should spillage or leakage occur ◆ Identify a suitable method to cover all skips ◆ Store liquid wastes/oil/chemicals in tanks or drums located in bunded areas which can hold 110% of the capacity of the largest tank or drum or, for multiple drum storage, 25% of the total volume of material stored ◆ Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site ◆ Store hazardous waste in closed containers away from direct sunlight, wind and rain in designated storage areas. Limit access to hazardous waste to those who have received training. ◆ Provide adequate ventilation where volatile wastes are stored, safety datasheets. ◆ Have spill management equipment (spill kits, eyewash stations, PPE) and readily available information on chemical compatibility for	◆ No non- compliances with management measures identified ◆ No spillages resulting from chemical storage in bunded areas.

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	workers including labelling each container, demarcation of the area (e.g. on a facility map/site plan) ◆ Include visual and emissions management measures implemented as appropriate (e.g. screening)	
Handling and transportation	◆ Train staff to carry out handling and storage ◆ Make available and maintain spill response equipment in areas where hazardous wastes may be spilt ◆ Train an appropriate number of site personnel in spill response techniques ◆ Prepare and implement spill prevention and response plan and emergency preparedness and response plan to address any accidental release and leakage ◆ Assign each waste shipment a unique waste consignment number. The Contractor is responsible for ensuring that a register is kept at site recording all waste shipments leaving the site and their disposal destination ◆ Ensure a waste transfer note accompanies all waste consignments from the construction site to the disposal destination ◆ Confirm that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for the waste being handled ◆ Design transportation of waste to minimise and prevent spills releases or exposures to workers, the public or the environment. ◆ Secure and label waste containers designated for off-site shipment with the contents and associated hazards ◆ Confirm that the waste containers are correctly loaded on the transport vehicles before leaving the site, and that they are accompanied by relevant documentation that describes the load and its associated	◆ All staff involved with waste management trained on waste management and materials handling ◆ No spills

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	hazards, consistent with the reference framework.	
Recycling and reuse	◆ Evaluate waste production processes and identify potentially recyclable materials ◆ Investigate external markets for recycling ◆ Establish recycling objectives and formal tracking of waste generation and recycling rates ◆ Provide training and incentives to employees	Recycling targets included in plan and audited against.
Disposal	◆ Use offsite waste treatment or disposal facilities appropriately permitted, or if not available based on the most suitable site in consultation with authorities ◆ Do not release the waste if there is concern about the standard of transport or destination of the waste ◆ Dispose of any medical waste at licensed facilities ◆ Do not permit burning of waste	◆ Permits held for waste treatment and disposal sites ◆ Medical waste licensed facilities records kept
Wastewater management	◆ Establish wastewater management system for worker and facilities wastewater. Treated water discharged in line with WBG and national limits, or tankered off site to appropriate licensed treatment facility or Include appropriate capacity of septic tank ◆ Include the importance of using project toilets and related procedures in site induction procedures.	◆ Wastewater treated in line with relevant standards ◆ No effluent not meeting standards discharged.
Contaminated materials or areas	◆ Develop procedure to identify, manage and remove any identified contaminated land as part of construction areas	◆ Any contaminated soils or ground managed in line with national and international requirements. ◆ Minimisation of pollution to ground and surface water resources

8. Traffic Management Plan

Contents to be covered in traffic management plan by the Contractor include the following:

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Reduced road safety and impacts upon communities	◆ Undertake a road safety awareness programme along the main site access routes in coordination with PIU ◆ Provide information regarding construction activities and activities to stakeholders ◆ Plan and coordinate transport timings to minimise bottlenecks and avoid peak high-risk periods (e.g. school runs).	◆ Implementation of road safety awareness program along main site routes ◆ Provision of construction information to communities / stakeholders regarding construction activities. ◆ Quarterly stakeholder consultation meetings
Reduced road safety	◆ Train drivers fully in road safety and appropriately licensed certified and medically fit to operate the class of vehicle and for the vehicle's operation on and off site. ◆ Implement a no tolerance policy to alcohol and drugs including testing of drivers. ◆ Prohibit hand-held cell phones and radios while driving	◆ Inspect contractor's licences ◆ Inspect transportation contractors for knowledge and compliance with the traffic management plan
	◆ Ensure all vehicles are road worthy, drivers made aware of the potential risks as part of training. ◆ Include fatigue management as part of training ◆ Review likelihood of local workers using motorcycles as means of transportation to and from work or during off hours and decide whether such use is permitted and conditions for doing so, in particular use of helmets and possibly other protective gear.	◆ Vehicle inspections undertaken monthly

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	◆ Undertake routine vehicle inspections and monitoring on an on-going basis ◆ Use hazard identification and risk assessment for vehicles on a regular basis ◆ Prohibit vehicles will be prohibited from being overloaded ◆ Utilize low emissions vehicles for the transportation of materials (wherever practicable) ◆ Install seat belts and require they are worn by all occupants	
	◆ Use licensed contractors for waste and fuel transportation ◆ Undertake due diligence of subcontractors (e.g. those bringing equipment to site), and adequately brief them on the traffic management plan. ◆ Include clauses related to traffic management plan implementation and use of qualified drivers in contracts.	◆ Inspect contractor's licences ◆ Inspect transportation contractors for knowledge and compliance with the traffic management plan
	◆ Require adherence to all national and specific area speed limits ◆ Impose and monitor speed restrictions for project traffic ◆ Organize delivery schedules are reasonable and achievable to prevent speeding by drivers	◆ Monitor vehicle speeding and driver's schedules ◆
	◆ Designate crossing points along the access roads based on consultation with local communities	Designated crossing points implemented.
	◆ Erect road signs to i. clearly indicate the route of construction traffic and speed limits, ii. identify where the road is single carriageway about the dangers of overtaking and iii. be in	◆ Erect traffic and road safety signs along project routes in-line with local laws ◆ Flag staff at intersections. ◆ Illuminated / flashing signs at crossing points

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	accordance with local laws and rules ◆ Appoint and locate flag staff at intersections in the case of intensive traffic ◆ Where the access roads join the main road, erect illuminated and flashing signs to warn road users of the crossing points ◆ Restrict night-time use of road for large vehicles	◆
	◆ Put in place an action plan in case of an accident ◆ Communicate the action plan to all drivers ◆ Report and investigate all accidents and incidents/	◆ Action plan in place and training provided. ◆ Any incidents/accidents responded to rapidly and in line with GIIP including investigations undertaken and measures to prevent reoccurrence identified and implemented within short timeframes
	◆ Implement no-driving policy at night except for exceptional circumstances ◆ Prohibit traffic movements during extreme weather conditions such as heavy rainfall, to avoid potential road accidents associated with driver's visibility and road hazards ◆ Require all loads to be secured ◆ If road crossing is required, schedule movements to ensure that vehicles arrive and leave at the same time (two-way movement) ◆ Fit vehicles with warning alarms for reversing ◆ Maintain site vehicles in accordance with the manufacturer's instruction, with catalytic convertors installed and maintained. Older construction vehicles to be replaced with more fuel-efficient ones.	● No road traffic incidents at night ● No road traffic incidents in extreme weather ● No complaints about vehicle emissions

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	◆ Enforce a 'no-idling' policy ◆ Do not allow parking outside of site areas (e.g. along local roads)	

9. Spill Prevention and Response Plan

Contents to be covered in Spill Prevention and Response Plan by the Contractor include the following:

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Spill prevention and response plan	◆ Develop a spill prevention and response plan to follow GIIP and include: ◆ Procedures for immediate spill response actions specified for all relevant scenarios relating to hazardous materials used in the construction processes. ◆ Complete list of equipment available for use in emergency situations. ◆ Procedures for immediate information to authorities in case of discharges and standards for reporting irregular events. ◆ Programme for training of key staff in emergency responses. The training is to be based on various emergency scenarios.	No pollution events

10. Pollution Prevention Plan

Contents to be covered in Pollution Prevention Plan by the Contractor include the following:

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Dust	Use covers and/or control equipment such as water suppressors	No excessive dust levels reported in visual inspections No dust related grievances
Dust resuspension on unpaved roads	Implement dust suppression techniques on unpaved roads, such as applying water or non-toxic chemicals to minimise dust from vehicle movements Compact and periodically grade and maintain all construction roads	No excessive dust levels reported in visual inspections. No dust related grievances No reports of speeding

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	Enforce a speed limit for heavy goods vehicles (HGVs) on-site at 20km per hour	
Dust from open area sources, including storage piles	Use control measures such as installing enclosures and covers, and increasing moisture content Use vegetation on exposed surfaces of stockpiled materials	All stockpiles are enclosed or covered. No non-compliance recorded in visual inspections
Emissions from burning materials	Prohibit bonfires and burning of waste materials	No burning of waste materials
Emissions from generators	Consider the location and height of exhaust pipes to ensure proper dispersion of pollutants Use generators of a modern design and keep them well maintained	Generators of modern design and in good working order
Dust emissions from cement batching plant	Contain and arrest the dusty processes Suppress dust using water or proprietary suppressants that are fitted with a low-level water supply alarm. Protect external sources, such as stockpiles and external conveyors, from wind whipping by dampening or covering during the delivery, storage, and handling of crushed rock/sand/coarse aggregate	All stockpiles are enclosed or covered. No dust related grievances.
Emissions from construction vehicles	Implement the manufacturer recommended engine maintenance programs regardless of the size or type of vehicle Instruct drivers on the benefits of driving practices that reduce both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits Enforce a ‘no-idling’ policy Replace old construction vehicles with newer more fuel-efficient alternatives where possible Convert high use vehicles to cleaner fuels where possible Install and maintain emission control devices such as catalytic converters	Maintain records of the engine maintenance programmes for all vehicles Records of driver training maintained No idling vehicles noted during site inspections Newer more fuel-efficient vehicles recommended onsite

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Noise and vibration due to construction traffic on existing roads	Manage project vehicles to not wait or queue up with engines running at the entrance to the site access or on the public roads Maintain vehicles Restrict deliveries to be within working hours of the site minimising significant movements during sensitive times Use adjustable or directional audible vehicle-reversing alarms or use alternative warning systems, e.g. white noise alarms (including arrangements to minimise the need to perform reversing manoeuvres) Avoid unnecessary revving of engines, reducing speed of vehicle movement and maintaining the condition of the road surface to avoid body slap from empty lorries, designing and maintaining access routes to minimise vehicle noise. Explain and train drivers to minimise vehicular noise impacts	Construction traffic use identified routes No community grievances raised with respect to construction traffic-related noise
Noise complaints	Investigate noise and vibration complaints raised using the project grievance mechanism	Complaints are satisfactorily resolved in line with timeframes given in the grievance mechanism No further complaints regarding previous resolved issues are received
Noise from construction activities	Restrict access of the general public to the site access road and transmission line construction zone	No incidents of members of the public accessing the restricted zone
Noise from construction works	Use site terrain, material stockpiles and suitable work locations to screen work locations and maximise the distance between work activities and nearest noise sensitive receptors.	Noise levels to not exceed threshold values
Noise from construction activities	Where feasible, prioritise noisy activities to be undertaken in the daytime (i.e. avoid night working)	Night-time noise levels do not exceed threshold values

11. Material Transportation Plan

Aspects to be covered under this plan includes the following:

Inbound transportation logistics: Inbound transportation is highly sensitive to a reciprocal relationship between cost and time. Products and machinery have to be available exactly when needed. Delayed deliveries can stop production while early arrivals can make material and equipment management stressful.

Outbound transportation logistics: No matter how detailed the logistics plan is, there will always be some excess material that needs returning. Rented construction equipment also has to go back to the dealer promptly to avoid unnecessary costs. Part of outbound transportation logistics also includes waste disposal.

Construction material logistics: Different construction materials arrive at different milestones throughout the project, requiring skilled coordination to ensure a smooth workflow. Good material logistics also account for the true costs involved in transporting materials, such as truck rental fees, operating costs and fuel expenses. Included in material logistics is also the cost associated with loading and offloading.

Construction equipment logistics: Having a construction material logistics plan starts with knowing what machinery and attachments are required for specific tasks. Equipment logistic plans also identify timeframes when vital tools have to be sourced, transported, used and returned.

Site management logistics: Construction manager has to prepare sites to accept deliveries as they arrive and have the resources present to efficiently deal with removing items from trucks, securely storing them and having them available precisely when needed. Any break in logistical chain links could result in lost time. Good site management plans account for every logistical step required for smooth trucking to and from construction sites.

Communication logistics: Clear and concise communications are the key to successfully executing construction material and equipment logistic plans. Everyone involved in the supply chain needs to know what their role is and when they're required to fulfill it.

Regulation logistics: Good logistic plans account for regulatory compliance both on and off the road. Safety should be the number one concern for all construction managers who develop logistic plans. Failing to safely transport construction materials can have devastating consequences. However, tragic accidents can be prevented by knowing all transportation regulations and building strict compliance into a logistics plan.

A. Operational Phase Plans

1. Sludge Management Plan
2. OHS Plan (Operations)
3. Emergency Response Plan

1. Sludge Management Plan

Contents to be covered by the KWSB TP-IV Management in the Sludge Management Plan includes the following:

Part – A - OWNER/OPERATOR INFORMATION

a. Facility Information

A. Facility Information
Facility Name:
Facility Owner:
Chief Operator:
Phone Number:
24 hr. Emergency Phone/Pager Number:
Email Address:
Facility Physical Street Address:
City:
Latitude:
Facility Mailing Address:
City:
Authorized Representative/Title:
Mailing Address:
City:
Phone Number:
Email Address:

b. Operations Contractor Details (If plant is operated by external Contractor)

B. Contract Operations (complete this section only if the facility is run by a contracted operator)		
Company Name:		
Primary Contact Name:		
Mailing Address:		
City:		
Phone Number:		
Email Address:		

c. Details of Third Party Sludge Managers (Company / Organization / Department engaged by the TP-IV Management for Sludge Recycling in Horticultural Activities)

C. Third Party Sludge Managers (complete this section only if sludge is transferred to a third party who treats sludge to biosolids for final management)			
Third Party Name:			
Primary Contact Name:			
Mailing Address:			
City:			
Phone Number:			
Email Address:			

Part – B - SLUDGE MANAGEMENT INFORMATION

a. Sludge Quality

1. Describe how much sludge is generated and managed at the WWTF (treatment, dewatering and storage units and attach schematic. Identify the type and capacity of units involved. Include the amount (volume or weight) of sludge managed at the facility and frequency of transportation for recycling.
2. Describe the management strategy for sludge generated and include a contingency plan to use when the primary plan is not available.
3. Identify whether there are any standards that must be met for the selected management option (such as volatile solids reduction, metals, or TCLP). Provide information/data that demonstrates how these qualifications and standards will be met. For example, if the sludge must be digested and dewatered prior to transfer to another facility, provide detailed information regarding the digestion and dewatering capability of units.
4. Describe any pollution prevention plan to maintain and improve sludge quality.

b. Sampling and Monitoring

1. Identify the parameters and frequency for testing to demonstrate compliance of sludge quality with standards being set for recycling in horticultural activities.

c. Spill Response Plan

1. Describe how spills of sludge would be contained and managed.

d. Reporting/Record Keeping

1. Updated log of recycled sludge, reporting of complaints, emissions or spills etc. to be maintained on weekly basis. Also describe how records will be safely kept for a period of at least five years.

2. Emergency Preparedness and Response Plan (Operations)

Following should be included in the operational phase emergency response plan:

a. List of Contacts

At a minimum ERP should include a list of contact people and phone numbers for troubleshooting, servicing and assistance. This includes operators, repair people, government agencies, media representatives and community members.

b. Introduction

The introduction of ERP should explain its purpose, goals, and overall organization, and should describe the roles and responsibilities of community members involved, including the drinking water system operator(s). Stating a mission and goals for emergency response is an important first step because it helps focus on the important aspects of the plan. The mission statement should reflect the duty to provide proper wastewater treatment and disposal and to protect public health, the environment, infrastructure and property. The goals for ERP should include:

- Assess the type and severity of the emergency
- Notify key contacts and authorities
- Take appropriate and timely emergency response actions
- Take action to minimize system damage
- Return the system to normal operation

Defining clear roles and responsibilities for system operators and other personnel during an emergency speeds up response time and helps eliminate confusion. System personnel needs to 5 know who to report the emergency to, who is responsible for overall management of the emergency, who has decision-making authority and what their own responsibilities are. Large systems may have a variety of persons involved on-site, whereas small systems may only have one person, usually the wastewater system operator.

c. System Information

- Describe the sewage collection, treatment and disposal system as well as built-in redundancy features of the system.
- Describe equipment standard operating procedures.
- Describe procedures for connecting to portable pumps, switching to alternate power supplies and/or maintaining generators, including schematics of electrical systems in lift stations and wastewater treatment plants. They should be located beside the equipment they refer to.
- Storage location of tools and maintenance equipment.
- Storage location of O&M Manual.

Provide a map of nearby community that shows the location of the items such as the ones below to help in the fastest possible response:

- wastewater collection sewers;
- critical control points (e.g., lift stations, shut-off valves, manholes, cleanouts, overflow storage or bypassing facilities);
- access routes, roads or trails to these critical control points;

- wastewater treatment plant;
- effluent disposal systems (i.e., ground disposal fields, outfalls, etc.);
- all built-in redundancy features of the facility;
- high-volume sewage discharge businesses if any;
- drinking water distribution lines;
- drinking water sources (wells, surface water intakes) and pump houses; and
- other high-risk downstream receptors such as residents, schools, hospitals, daycare centers, long term care facilities, wells in unconfined aquifer or influenced by surface water, shellfish beds, recreational beaches and fish-bearing waters.

d. Mitigation Measures

System components identified in the previous section can become less susceptible to encounter problematic situations, which in turn may cause harm, if proper mitigation measures are in place. Mitigation measures refer to actions taken to eliminate or reduce the harmful effects of wastewater systems emergencies. By making a thorough evaluation of all the potential “trouble spots” or vulnerable points in own system, you may identify steps can be taken now that will prevent an emergency from happening later. The following items provide a guide to mitigation measures. Describe in ERP all features that apply to wastewater utility.

Mitigation of wastewater collection system failures consists of:

- cleaning sewer lines on a regular basis to remove grease, grit, and other debris that may lead to sewer backups;
- ensuring that groundwater and storm water runoff infiltration and inflow are minimized ─ rain water entering the sewer pipe causes overflows;
- inspecting and maintaining manholes, sewer intakes and sewer lines for structural integrity;
- regular valve testing—check locations of valve boxes to ensure that they have not been paved over;
- installing backup lift station at critical system control point, or installing a portable generator to provide protection against spills;
- providing storage to contain flow during a limited power outage; and
- educating system users about behaviors that can cause sanitary sewer blockage/overflows ─typical solids that build up in the pipe and cause backups are grease, dirt, bones, tampons, paper towels, diapers, broken dishware, and garbage.

Mitigation of wastewater treatment process failures consists of:

- having power back-up sources and ensuring availability of fuel;
- getting trained on how to run utility systems manually when automated systems fail;
- having repair kits, spare parts, portable pump, etc.

Mitigation of impacts from spills consists of:

- determining the best methodology and location to bypass overflows due to equipment malfunction and/or power outages;

- arranging for alternate/emergency outfall; and
- having spill cleanup materials readily available and in a known location.

e. Potential Emergency Situations

When preparing ERP, it is necessary to identify all situations which could have a negative impact on human health/safety or the environment. Some of the causes of spills and other malfunctions that should be identified include:

- Wastewater spill / broken sewer main
- Blocked sewer main
- Malfunctioning of wastewater treatment plant
- Pump/siphon failure
- Electrical control malfunctioning
- Power failure
- Malfunctioning of wastewater disposal facilities (i.e. ground disposal fields, outfalls)
- Flooding of wastewater treatment or disposal facilities
- Earthquakes damaging the system
- Snow/wind storm
- Fire
- Act of vandalism, terrorism or sabotage causing system disruption

The O&M Manual and standard operating procedures for system may list typical system malfunctions and related emergency situations, methods to prevent them, and actions required when they occur. This information comes in handy when developing an ERP. The potential impact caused by the above emergency situations can be ranked into three levels: minor, significant and major emergencies.

f. Communication Plan

Communication plays a key role in how well the plant management is able to respond during an emergency. The system should be such that it must be able to alert all the receptors of the spill from your system as soon as possible, especially if there is a possible risk to their health from contact with sewage.

g. Equipment Operation

Standard operating procedures for switching to alternate power supplies and/or maintaining generators, including schematics of electrical systems in pump houses, may also form part of ERP, and should be located beside the equipment they refer to.

h. ERP Update and Training

Describe the ERP review and update process, evaluate the effectiveness of the ERP and provide information on the wastewater system's ERP training program. Relevant components of the ERP needs to be updated when new wastewater facilities are added or the existing system is altered. Emergency contact list should also be updated once per year or whenever contact information changes, whichever

comes first. The plant operators needs to be familiar with the emergency response plan when starting the job and when the ERP is updated. It is also important to practice the ERP. A wastewater emergency response drill (or mock emergency) is recommended once per year.

3. OHS Plan (Operations)

Template of an operational phase OHS Plan to be followed by the operators of the plant for making operational phase OHS Plan is attached as follows:

TEMPLATE FOR OHS PLAN (TP-IV OPERATIONAL PHASE)

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1 INTRODUCTION

This Health and Safety plan is presented for the use of all employees of this utility to assist in the administration of our safety program and to provide means and methods that will aid in the performance of our various assignments in a safe and efficient manner.

It is the intent of the utility to conduct its operations in a safe and efficient manner with the utmost regard for the health and safety of the employees and the public. Safety is an integral part of everyone's duties and responsibilities.

This Health and Safety Rulebook expresses the basic safety policies of this utility. Each employee and wastewater treatment system is expected to ensure proper application of its contents.

2 RESPONSIBILITY

2.1 Management

The employer shall have the same responsibility for safety as for any other part of the operation.

The employer shall appoint only competent personnel as supervisors, who shall be responsible for the safety of those under his or her supervision.

The employee shall require a supervisor to observe and enforce all safety rules.

The employer shall provide adequate automotive equipment, tools, and protective devices, and insist upon their proper use and maintenance.

The employer, or designated representative, shall fully investigate all serious accidents and take remedial steps to prevent repetition of similar accidents wherever possible.

The employer shall be responsible for safety records and shall be responsible for completing safety inspections and maintaining records to reflect findings and corrective actions taken.

The employer shall require employees to use suitable tools and equipment in order that they may perform their work in a safe manner.

The employer shall require employees to be instructed in safe methods of performing their work.

The employer shall require employees who, in the course of their work, are subject to the hazards of electrical shock, asphyxiation, or drowning, to be instructed in accepted methods of artificial respiration.

2.2 Supervisor

Supervisors shall have the same responsibility for safety as any other part of their wastewater operations.

Supervisors are at all times responsible for the execution of the work in a safe manner and for the job performance of all personnel under their direction.

Supervisors will be held accountable for all accidents and employee actions unless investigation indicates the actions were due to conditions beyond the supervisor’s control.

Supervisors shall instruct all new employees on the reporting of all accidents and the prompt receipt of first aid.

Supervisors shall be responsible for the training and instruction of new employees and of employees transferred to their supervision.

Supervisors shall fully understand and comply with the safety rules of this manual. They shall also ensure that safety rules are understood by the wastewater operators under their supervision.

Supervisors shall insist on employees observing these safety rules and shall use disciplinary measures, if necessary, to obtain compliance.

Supervisors shall be responsible for the proper use of safety devices and equipment by the employees under their supervision.

Supervisors shall be responsible for the regular inspection of all tools and equipment, including employees personal tools used while working under their supervision.

Supervisors shall ensure no duties are assigned to an individual who is unqualified or incapable of completing those duties safely.

Before leaving a job, the supervisor shall see that the site is left in as safe a condition as possible. The supervisor shall arrange adequate warning of any condition that might endanger other employees, the general public, or inspectors.

2.3 Employee

It is the definite responsibility of each employee to so perform assigned duties while at work to assure:

- Safety for self;
- Safety for fellow employees;
- Protection for the public;
- Protection for company property, and for public and private property.

It is the responsibility of each employee to report to the person in charge all unsafe conditions or acts witnessed on the job.

When an employee is requested to perform duties under unsafe conditions, the employee should not perform those duties without first notifying the person in charge of the unsafe conditions.

It is the responsibility of management to verify that each employee is acquainted with the principles of first aid and resuscitation as soon as possible.

It is the responsibility of each employee to attend all safety meetings possible and to take an active part in safety work.

It is the responsibility of each employee to know and understand the safety rules of this manual, which will apply to the work being performed.

3 GENERAL SAFETY RULES

3.1 Location of Safety Manual

This safety manual has been prepared for use by the operating personnel of the company. Each employee shall be given a copy of this manual.

This manual is consistently updated to cover areas relating to the safe operation of wastewater treatment plants. A current copy may be obtained by contacting the company office.

Any comments or suggestions on improving this manual or updating information pertaining to the safe operation of equipment is welcome and may be incorporated into future editions.

3.2 Safety Meetings

Safety meetings shall be held on a quarterly basis on the first day of each quarter. The company shall provide a program suitable for the season and discuss any current regulations or changes that may have occurred since the last meeting.

All personnel shall be required to take an active part in the safety program. Personnel should offer input and dissipate information regarding the safe operation of municipal sewage systems.

3.3 Personal Conduct While On Company Business

The use of intoxicating liquor during working hours, including lunch hour, is strictly prohibited. Any violation shall be considered sufficient cause for disciplinary action.

Any employee reporting for duty under the influence of liquor, illegal drugs, or illegal smoking materials shall be dismissed. Any supervisor or other person in charge who permits such employee to work shall also be subject to disciplinary action.

3.4 Taking Chances

Before commencing any work that may be hazardous, care should be taken to establish a safe procedure. Where more than one employee is engaged in the same job, all employees shall be concerned and understand the procedures to be followed to prevent endangerment to self or other personnel on the job. Under no circumstances shall safety be sacrificed for speed.

Employees shall always place themselves in a safe and secure position. The care exercised by others shall not be relied upon for one’s own protection.

3.5 Guards

No guard shall be removed from any machine or piece of equipment except toperform required maintenance.

3.6 Protecting the Public

When an employee needs additional light while working on the premises of a customer, he shall use a battery powered flashlight, or an approved properly guarded electrical extension light. An open flame light such as a match, torch, or cigarette lighter shall not be used.

When operating temporary pumping equipment in a public location, barricades shall be used to keep all traffic and personnel a safe distance away from the site.

3.7 Housekeeping

- Materials and supplies used at a plant site should be stored in a neat and orderly manner at the site to prevent them from falling off of shelves onto moving equipment.
- Junk parts removed from a piece of equipment should be disposed of in a proper manner.
- Spare parts used in the operation of a wastewater treatment plant should be kept in a neat and orderly manner with the item labeled to indicate on what piece of equipment the spare part is used.

3.8 Reporting Hazardous Conditions

- When an employee observes a hazardous condition that may cause injury or property damage, the employee shall report it promptly to a proper authority and when necessary, guard it.
- An employee who receives a report of a hazardous condition, either from the general public or another employee, shall immediately refer this information to the person or utility responsible for such matters.

3.9 Fire Prevention and Control

- Paper and other combustible materials shall not be allowed to accumulate in blower buildings or other structures in order to prevent them from getting into the machinery or causing a fire.
- Flammable liquids such as gasoline and diesel fuel shall not be stored in blower buildings, chlorine rooms, or other structures where they may cause a fire or leak onto the floor causing hazardous working conditions.
- Strict adherence shall be paid to “No Smoking” and “Stop Your Motor” signs at fuel dispensing stations.
- Oily rags and papers used for cleaning shall not be allowed to accumulate in service trucks and car trunks, as these can spontaneously combust under the proper conditions.

4 SAFE WORKING PRACTICES

4.1 Clothing

- Wearing of loose fitting clothing around machinery with moving parts or belt drives is discouraged, as clothing may become entangled in equipment resulting in serious injury or death.
- Wearing of sandals or open toe shoes in a field environment is discouraged, especially when handling tools or entering areas where weeds and debris can hide glass or sharp objects. In all cases rubber boots or leather shoes shall be worn in areas where contact is possible with biological organisms found in wastewater treatment plants.

4.2 Personal Eye Protection

Eyeglasses, even hardened lenses, are not a substitute for goggles. Full cover goggles or face shields shall be worn when an employee is engaged in or is close to work involving:

- Power grinding, buffing, or wire brushing, even if there is a built in eye shield.
- Using compressed air to remove dust or debris from a piece of equipment.
- Flame welding, cutting, or burning. (Approved colored lenses shall be used.)
- Handling of acids, caustics, dry chlorine, ammonia, or other similar liquids, except when approved complete head covering is worn.

4.3 Lifting

- Consider the size and weight of any object before attempting to lift or move the object. Do not lift any materials that can not be handled comfortably. If necessary, obtain assistance or wait until assistance is available.
- Exercise extreme care in lifting oily or greasy parts. Use proper containers or straps to remove these objects.
- Never carry a load that prevents you from seeing in front of you.
- Never carry an object over a slick or iced surface.
- When carrying objects near aeration or settling tanks extra care should be taken to avoid falling in the tanks or dropping objects into the tanks.

4.4 Handling of Materials and Chemicals

The two most commonly used chemicals in a wastewater treatment plant are chlorine for disinfection of the effluent and herbicides for weed control.

4.5 Dry Chlorine

- Dry chlorine is available in several forms: granular chlorine (HTH or PACE), tablet chlorine (Sanuril), liquid (household bleach), and gas.
- Dry chlorine, no matter what type – tablet or powder -- can be very volatile when mixed with other substances. It should always be kept in a dry container with the cover sealed to prevent moisture from coming into contact with the chlorine.

- Dry chlorine should always be handled with a clean container that is used only for handling chlorine powder.
- Dry chlorine should not be stored in an environment with electrical controls. If left open it can cause corrosion on electrical wiring and controls.

4.6 Chlorine Gas

- Chlorine gas is relatively stable when properly handled; however, cautions should be taken due to the large volume of gas that can be released in a short period of time.
- Keep chlorine cylinders stored in a proper enclosure to prevent unauthorized tampering with cylinders.
- Chain all cylinders to wall to prevent tipping.
- Open cylinder valve only ¼ turn, or as much as needed, to obtain sufficient gas flow to the chlorinator.
- Check for gas leak using ammonia bottle after changing cylinders.
- Always plan your escape from the chlorine room prior to attempting any service on a chlorinator.
- Keep chlorine gas mask available, outside of the chlorine room, in case of emergency.

4.7 Herbicides

- Herbicides are normally used near wastewater treatment plants to control weeds around fences and equipment and to control algae in lagoons.
- Always mix herbicides in a clean disposable container.
- Use of gloves and appropriate eye protection is recommended.
- Apply herbicides in proper dosages using the recommended application procedures - algaecides for lagoons and weed killers for ground application.
- Wash hands and clothing thoroughly after each application.
- Clean and dispose of unused portions and packaging materials properly.
- Empty containers shall be disposed of in a safe manner. They shall never be thrown into lagoons or storage tanks.

4.8 Proper Use and Care of Equipment

- Employees shall use tools suitable for the job in progress and only those in good repair.
- Employees shall avoid awkward positions when using tools to avoid possible injuries should the tools slip.
- When using wrenches always pull the wrench toward you, protecting hands and knuckles in case the wrench slips.
- Keep volt and amp meters in good working condition. You are dependent upon these instruments to tell you if a circuit is hot.

5 PROPER PROCEDURES

5.1 Entering Confined Spaces

- Confined spaces including wet wells, manholes, dry wells, or any space that is below ground level or has inadequate ventilation, has the potential for containing deadly hydrogen sulfide gas.
- Prior to entering any confined space, an instrument check of the space should be completed to determine the presence of gas.
- All confined spaces must have an operating ventilation fan. If a fan is not present and operating, personnel should not enter the confined space without an air pack or proper retrieval equipment.
- Portable ventilation equipment should be readily available for use in case of failure of the normal ventilation equipment.
- Under no circumstances should personnel enter a confined space without proper equipment or rescue personnel standing by.

5.2 Operation of Wastewater Plant

- Extreme caution should always be used near aeration tanks and sludge collection tanks. The aerated water is turbulent. It can be very difficult to remain on the surface until reaching a hand hold.
- Hoses, extension cords, and ropes not in use should not be left where operating personnel might trip over them and possibly fall into a tank.
- Operating personnel should never assume that a piece of equipment is turned off and will remain turned off. Most equipment at a wastewater plant operates on a time clock and may automatically start at any moment, unless locked out of service.

5.3 Maintenance of Treatment Plant

- Steep stairways, uncovered aeration tanks, and narrow walkways are all potential accident areas. Guard rails should be in proper repair and secured to their foundations any time operating personnel are performing their duties at a plant.
- Gratings shall be kept in proper place and in adequate repair. Rusted gratings should be replaced with adequate materials of construction to allow personnel to safely perform their duties.
- Indoor areas, such as blower rooms, pump rooms, and electrical control rooms, shall have adequate lighting for operating personnel to perform duties in a safe manner.

6 ACCIDENT REPORTING

6.1 In Case of Traffic Accident

- Stop at once to determine if anyone was injured, the nature and extent of the injury, and administer first aid and all reasonable assistance.
- Obtain the names and addresses of all witnesses before they leave the scene of the accident.
- Obtain the name and address of each driver involved, and the names and addresses of all passengers riding with such driver.
- Secure all available data on each vehicle involved, including make, model, type, year, state, and license number.
- Secure all available data from the operator, or driver's license of the driver of each vehicle involved.
- Note the time and place of the accident.
- Carefully list damage to each vehicle involved.
- Secure the name and badge number of any police officials who appear.
- If a parked vehicle is involved in an accident and the owner can not be located, a notice should be left on or in the vehicle providing the name and address of the parties involved. Within 24 hours, the police, sheriff, or highway patrol should be notified of the accident.
- Comply with other reports as required by state and local ordinance.
- Avoid discussing the accident and make no admissions of responsibility to anyone except authorized representatives. Necessary data given to a law enforcement officer should be given in private. Never obligate your employer for damages or medical expenses for non-employees.
- Report the accident to the main office location along with the above information.

6.2 In Case of Public Accident or Sewer Backup

- All accidents resulting in injury or death of a member of the public and in which the company may be involved shall be reported to the main office immediately.
- In the event of damage to the property of a member of the public, such damage shall be reported to the main office immediately.
- No employee shall make statements concerning liability or indicating that settlement will be made in any accident resulting in injury or property damage to a member of the public.
- It is important that the names and addresses of all witnesses be obtained in all accidents involving the public.

7 OPERATION AND MAINTENANCE OF COMPANY OWNED VEHICLES

7.1 Maintenance

- It shall be the responsibility of the driver of the company vehicle to maintain the vehicle in proper working order, changing the oil and servicing the vehicle when required to maintain safe operating condition.
- Whenever possible a company credit card shall be used to pay for gasoline and services to the vehicle.

8 FIRST AID

8.1 General Directions for First Aid

Following are nine general directions for first aid in an emergency, outlined by theAmerican Red Cross.

- Keep the victim lying down.
- Examine the victim - look for serious bleeding, lack of breathing, and poisoning.
- Keep the victim warm.
- Send someone to call a physician or ambulance.
- Remain calm. Do not be rushed into moving the victim unless absolutely necessary.
- Never give an unconscious victim anything to eat or drink.
- Keep the crowd away from the victim.
- Ensure the victim is comfortable and cheerful.
- Don't allow the victim see his injury.

8.2 Other General Information

Knowing what not to do in an emergency is just as important as knowing what to do. The original injury may be magnified by the wrong kind of treatment or mishandling.If a victim must be transported, ensure that methods described in a standard first aidtext are used. With neck or back injuries, particularly, serious damage may occur by improperly transporting the victim. If possible, the victim should remain at the site where the injury occurred until a physician arrives, rather than risk an increase to the injury through mishandling.

9 ARTIFICIAL RESPIRATION

9.1 Mouth-to-Mouth Method

The mouth-to-mouth (or mouth-to-nose) technique of artificial respiration is the most practical method for emergency ventilation of anyone – adult or child – who has stopped breathing due to an electric shock, drowning, carbon monoxide poisoning, or any other cause. This method, officially adopted by the American Red Cross, has the advantage of providing pressure to immediately inflate the victim's lungs. It also enables the rescuer to judge more accurately the volume, pressure, and timing of his efforts, than does other methods. When a victim is unconscious and not breathing, the base of the tongue tends to press against and block the upper air passageway. The procedures described below should create an open-air passageway when the rescuer isworking alone.

- If there is foreign matter visible in the mouth, wipe it out quickly with your fingers or cloth wrapped around your fingers.
- Tilt head back so chin is pointed upward. Pull or push jaw into jutting out position. These manoeuvres should relieve obstruction of airway by moving the base of the tongue away from the back of the throat.
- Open your mouth wide and place tightly over victim's mouth. At the same time pinch the victim's nostrils shut, close them with your cheek, or close the victim's mouth and place mouth over victim's nose. (Air may be blown through the victim's teeth even though they may be clenched.)

Remove your mouth, turn your head to the side, listen for return rush of air that indicates air exchange. Repeat blowing effort. For an adult, blow vigorously at the rate of approximately 12 breaths per minute. For a child, take relatively shallow breaths appropriate for the child's size at the rate of approximately 20 breaths per minute

Annexure 8-1: Attendance Sheets of Socio-Economic Baseline Participants

Female Participants

Participants List of Aghaz Town		
S. No.	**Name**	**Settlement**
1.	Gulnar	Agha Town
2.	Hussan Zari	
3.	Shreen Taj	
4.	Haseena	
5.	Sameena	
6.	Gulin Bibi	
7.	Saira	
8.	Kair Ki	
9.	Noor Bano	
10.	Yasmeen	

Participants List of Hamal Village		
S. No.	**Name**	**Settlement**
1.	Ghaala	Hamal Village
2.	Furqat Bibi	
3.	Nabeela Shamshad	
4.	Shahnaz	
5.	Najima	
6.	Rani	
7.	Alishba	
8.	Rabia	
9.	Nighat	
10.	Maryam	
11.	Gulnaz	
12.	Aneela	
13.	Salma	
14.	Shaheen	

S. No.	Participants List of Mansehrah -2	
	Name	**Settlement**
1.	Afshan	Mansehrah-2
2.	Seema	
3.	Nigar Begum	
4.	Nazbeena	
5.	Haseena	
6.	Sabreena	

S. No.	Participants List of Mansehrah -2	
	Name	Settlement
7.	Shah Iram	
8.	Zanib	
9.	Dil Aful	
10.	Asma	
11.	Maryam	
12.	Aysha	

Participants List of Raita Plot		
S. No.	Name	Settlement
1.	Samina	Raita Plot
2.	Qaiser	
3.	Najima	
4.	Nahied	
5.	Shazia	
6.	Farzana	
7.	Fareeda	
8.	Kouser	

Participants List of Roshanabad		
S. No.	Name	Settlement
1.	Samina	Roshanabad
2.	Qairer	
3.	Najma	
4.	Naheed	
5.	Shazia	
6.	Farzana	
7.	Fareeda	
8.	Kouser	
9.	Kalsoom	
10.	Shabana	
11.	Shaheen	
12.	Raheela	
13.	Somia	
14.	Noor	

S. No.	Participants List of Haji Ahmed Baloch	
	Name	Settlement
1.	Saima	Haji Ahmed Baloch
2.	Farwa	
3.	Shagufta	
4.	Munza	
5.	Faiza	
6.	Shabana Munir	
7.	Zanib Shareef	
8.	Ume Hani	

Male Participants

Participants List of Aghaz Town		
S. No.	Name	Settlement
1.	Niaz Khatak	Aghaz Town
2.	Mohammad Youns	
3.	Haneef Khan	
4.	Muhammad Atif	
5.	Sajjad Ahamed	
6.	Ashiq Hussain	
7.	Muhammad Umair	
8.	Muhammad Asif	
9.	Muhammad Arif	
10.	Noor Muhammad Khan	

Participants List of Hamall Village		
S. No.	Name	Settlement
1.	Malik Akhter	Hamal Village
2.	Mohammad Naeem	
3.	Mohammad Yaseen	
4.	Akhtar Zaman	
5.	Mohammad Aleem Jan	
6.	Parveez Hussain	
7.	Abdul Hanan	
8.	Abdul Manan	
9.	Dilber Khan	
10.	Momin Khan	
11.	Rehmat Ali	
12.	Adil Khan	

Participants List of Mansehrah -2		
S. No.	Name	Settlement
1.	Afshan	Mansehrah-1
2.	Seema	
3.	Nigar Begum	
4.	Nazbeena	
5.	Haseena	
6.	Sabreena	
7.	Shah Iram	
8.	Zanib	
9.	Dil Aful	
10.	Asma	
11.	Maryam	
12.	Aysha	

Participants List of Mansehrah-2		
S. No.	Name	Settlement
1.	Abid Hussain	Mansehrah-2
2.	Fakhar Raza	
3.	Anwarul Haq	
4.	Akhter Nawaz	
5.	Noshe Rawan Badshah	
6.	Niamat Khan	
7.	Asif	
8.	Khalid Zaman	
9.	Niaz Ali	
10.	Salih Mohammad	
11.	Nek Mohammad	

Participants List of Raita Plot		
S. No.	Name	Settlement
1	Faizan Farooq	Raita Plot
2	Wazeer Ahmed	
3	Shamroz	
4	Faraz	
5	Muhammad Munib	
6	Nasir	
7	Shakir	
8	Rehman	

Participants List of Roshan Abad		
S. No.	Name	Settlement
1.	Irshad Ahamed	Roshan Abad
2.	Jamel Ahamed	
3.	Muhammad Anees	
4.	Fakher-uddin Alvi	
5.	salman Ahamed	
6.	Azhar Ali	
7.	Nadir	
8.	Sajid Ali	

Participants List of TP-II Mehmoodabad		
S. No.	Name	Settlement
1.	Abdullah Siddiqui	TP-II Mahmoudabad
2.	Syed Nasir Ali Naqvi	
3.	Javed Akhtar	
4.	Imran	
5.	Shabir	
6.	Ishaq	
7.	Jamil Ahmed	
8.	Niaz Hussain	
9.	Mohammad Shoib Rana	
10.	Dain	
11.	Ramish	
12.	Khizer Hyat	

S. No.	Participants List of Haji Ahmed Baloch	
	Name	Settlement
1.	Salih Mohammad	Haji Ahmed Baloch
2.	Basheer Ahmed	
3.	Jamil Ahmed	
4.	Munir Ahmed	
5.	Zafar Hussain	
6.	Mohammad Umar	
7.	Muhammad Shareef	
8.	Murtaza	
9.	Saleem Ahmed	

Participants List of Sharafi Goth		
S. No.	**Name**	**Settlement**
1.	Gul Muhamad Baloch	Sharafi Goth
2.	Shahid	
3.	Nazar Mohammad Baloch	
4.	Nizamuddin Baloch	
5.	Irfan Ali	
6.	Salih Mohammad	
7.	Hasil	
8.	Khan Mophammad	

Participants List of Jalal Murad Goth		
S. No.	**Name**	**Settlement**
1.	Ilahi Dad	Jalal Murad Goth
2.	Baloch Khan	
3.	Jan Muhammad	
4.	Mohammad Rahim	
5.	Fateh Baloch	
6.	Wahid Bukhsh	
7.	Muhammad Alim	
8.	Abid Ali	
9.	Badar Khan	
10.	Nazar	
11.	Sadiq Ali	
12.	Gulab	

Participants List of Shambi Goth		
S. No.	**Name**	**Settlement**
1.	Abdul Naveed	Shambi Goth
2.	Abdul Ghafoor	
3.	Ghulam	
4.	Master Mushtaq	
5.	Abdul Hameed	
6.	Lal Muhammad	
7.	Abdul Salam	
8.	Saleem Ahmed	

Annexure 8-2: Photographs

Public Consultation (Female)





Aghaz Town





Hamal Village





Mansehrah Colony





Raita Plot





RoshanAbad

Public Consultation (Male)





Aghaz Town





Ahmed Baloch





Hamal Village



Jamal Murad Village



TP-II Mahmoudabad





Mansehrah coloney





Raita Plot





Roshanabad





Shambi Village

Malir Institutional



DC Korangi



KMC Malir



Consultation with KWSB Malir



Consultation with Public Health Engineering



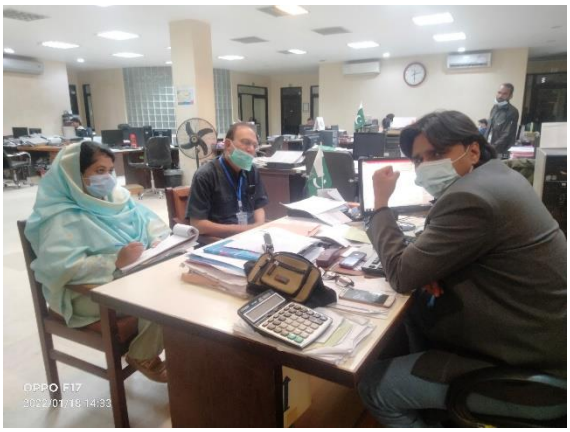
Aggriculture Department



Consultation with ADHO Malir



Consultation with Administrator Malir



Consultation with chiniot Hospital Korangi



Consultation with Aghan Khan Lab



Consultation with CB korangi



Conultation with DMC Malir



Health Department



KMC Consultation



KWSB-TP-II



Urban Resource center NGO



KWSB Malir

Annexure 8-3: Attendance Sheets of Stakeholder Consultation Workshop

KWSSIP

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Stakeholder Consultation Workshop – Environmental & Social Assessment Studies

SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
1.	Muhammad Tariq	ASE	
2.	Bilal Zafar	KWSSIP	
3.	Sibtain Mughal	Joint Director Comm	
4.	Dr. Abdul Ghaffar	Env. Engg. Deptt. NED University	
5.	Mr. Shoaib Qureshi	Addl Director SEPA	
6.	Ali Larosh	Sr. Project officer WWF-Pakistan	Alilarosh
7.	Farooq Bhutto	K Electric	
8.	Yar Muhammad	Transport Deptt.	
9.	Huma Haleposto	Safeguard Specialist	
10.	Zahid Farooq	Joint Director LRC KMC	

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28th July 2022

S. No.	Name	Designation / Department	Signature
11.	UZAIR HAMEED KHAN	MANAGER ROW OPS PTCL	
12.	Mushtaque Ahmed Soomro	Coordinator Protocol NRL.	
13.	CDR Rehan Sadiq	Sr. Mgr Administration	
14.	KHALID M. SIDDIQUI	Member (Service) PED Board GOS	
15.	SYED ALI NAUMAN	CHIEF ENGINEER, K.D.A.	28/07/2022
16.	Kamran Akbar	Sr. Social Div SP	
17.	SARFARAZ	KWSIP	
18.	Mazhar Ali Shaikh	Director Katchi Abadi KWSSIP	
19.	Abdul Rehman	WB	
20.	Engr: M. Usman Memon	S.E I/C (BWSD). PS IC: Steel.	

KWSSIP

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SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
21.	KAMRAN UMAR	EE / KDA	
22.	Khurram Shah	SDS / KWSSIP	
23.	Syed Waqar Hussain	ES / KWSSIP	
24.	ARSLAN ASGHAR	PRINCIPAL ENVIRONMENTALIST - PK	
25.	Aqeel Ahmed Maggi	SA. Asstt. Engineer M.Co	
26.	Muhammad Saqib Siddiq	Sr. Social & Resettlement Spec.	
27.	Muhammad Norman	Junior Engineer WAPDA K-4	
28.	Muhammad Yousaf	Manager (LAND) PSP	
29.	Mashar Abbas	Assistant Manager (PSM)	
30.	Intelehab A Rajput	Chief Engineer (ESM) KWSSIP	

1071PO1 I 01 (Stakeholder Consultation Workshop – Attendance List)

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SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
31.	Tuba Noman	GIS Specialist	
32.	Muhammad Sajjad	Resettlement Expert NESPAK	
33.	M. A. Shishanlal	MMP	
34.	M. Shafiq Ahmed	Nespak Lhr. (PM-C1)	
35.	Fahad Saleem	Nespak (Env. spec.)	
36.	OMAR ARIF	EMC Pakistan	
37.	Talal Ahmed	MMP	
38.	Rameez ul Islam	MMP	
39.	GUL MIR KHAN	Chief Engr (T&C) KCIV Board	
40.	Najeeb-ur-Rehman	Manager PTCL N/Wall	

1071PO1 I 01 (Stakeholder Consultation Workshop – Attendance List)

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28th July 2022

S. No.	Name	Designation / Department	Signature
41.	Dr. Aamir Alamgir	Assistant Professor / Institute of Environmental Studies Uni	
42.	Ghulam Kibria	Energy update	
43.	Wg Cdr DARYA KHAN	OC Admin / PAF SWEEP. Korangi	D. Coor
44.	Muhammad Nawaz	Social safeguard,	
45.	Zulfiqar Laghari	Sr. Social Development Specialists	
46.	Muhammad Zafar Iqbal	Resettlement MMP Specialists	Muhammad 28/7/22
47.	Muhammad Rahim Junejo	M.M.P.	M. Rahim
48.	A. Rehman	Leads.	
49.	Nasreen Baloch	Assistant Director Social welfare.	
50.	Jawed Shami	Team leader Deputies	

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28th July 2022

S. No.	Name	Designation / Department	Signature
51.	Masood ur Rehman	Sr. Environmentalist-I	
52.	Nadeem Akhtar	Pakistan Refinery Sr Manager construct	
53.	Khurram Shehzad.	CE-Civil PIU	
54.	Aamir Waqar	SE (Civil) PIU.	
55.	Syed Babar Ali	Social specialist Click consultant	
56.	Rehan Zahir	Survey Officer	
57.	Syed Waqas	Sub Eng.	
58.	Hareeda Kaleem	Gender Specialist	
59.	Ismail Zaidi	CMES	
60.	Mussawir Qureshi	PIU SWEEP	

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SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
61.	Hania Handani	Design Engineer	
62.	Imad Mohsin	Civil Engineer	
63.	Sonia	SCDA	
64.	Farah Yamin Khan	Consultant WBG	
65.	Muhammad Ijaz	Consultant	
66.	Azizullah Channa	Assistant Professor Env. Eng Mehran UET, J	
67.	Salman Manaj	consultant	
68.	Syed Hasan Ali.	Addl Manager	
69.	Ziad Chandio	Sr. Engr (G-03)	
70.	Jawad Ahmed	C.R.O	

1071PO1 I 01 (Stakeholder Consultation Workshop – Attendance List)

Annexure 8-4: Pictorial views of Stakeholder Consultation Workshop



The Welcome address given by Mr. Syed Salahuddin (Project Director)



Mr. Khurram Shams Khan and Syed Waqar Hussain Shah present the objectives of the workshop to the audience



Participants in Stakeholder Consultation meeting



Question from the stakeholder



Group photo after the successful completion of stakeholder meeting