

ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN PRIORITY WATER NETWORK REHABILITATION AND EXTENSION PROJECT



**FINAL REPORT
OCTOBER 2023**



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

**Environmental & Social Management Plan of
Priority Water Network Rehabilitation and
Extension Project**

October 2023



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

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Sponsored by:

- Asian Infrastructure Investment Bank (AIIB)
/ World Bank (WB)
- Karachi Water & Sewerage Corporation,
Government of Sindh

Environmental & Social Management Plan of Priority Water Network Rehabilitation and Extension Project

October 2023

Issue and Revision Record

Revision	Date	Originator	Checked	Approved	Description
A First Draft	April 2022	Masood ur Rehman Aqeel Ahmed Magsi Umeed Khalid Tanvir Arif Ruqaiya Fatima Tuba Noman Rameez ul Islam	Azmat Beg Dr. Muhammad Ashraf Ihsan ul Haq Farooqi	Pervez Anjum M.A. Shishmahal	First Draft ESMP
B Final Draft	November 2022	Masood ur Rehman Aqeel Ahmed Magsi Umeed Khalid M. Zafar Iqbla Saquib Siddiq Tuba Noman Rameez ul Islam	Azmat Beg Dr. Muhammad Ashraf Ihsan ul Haq Farooqi	M.A. Shishmahal	Final Draft ESMP
C Final Report	January 2022	Masood ur Rehman Aqeel Ahmed Magsi Umeed Khalid M. Zafar Iqbla Saquib Siddiq Tuba Noman Rameez ul Islam	Azmat Beg Dr. Muhammad Ashraf Ihsan ul Haq Farooqi	Pervez Anjum M.A. Shishmahal	Final Report ESMP
D Final Report	September 2023	Masood ur Rehman Tuba Noman Rameez ul Islam	Azmat Beg Dr. Muhammad Ashraf Ihsan ul Haq Farooqi	Pervez Anjum M.A. Shishmahal	Final Report ESMP
E Final Report	October 2023	Joma Ilm	Masood ur Rehman Rameez ul Islam	PIU KWSSIP E&S Team	Final Report ESMP

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List of Acronyms

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
AOI	Area of Influence
ARCGIS	Arc info Geographic Information System
BOD	Biochemical Oxygen Demand
CBOs	Community Based Organizations
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CO	Carbon Monoxide
CO₂	Carbon Dioxide
COC	Commitment of Cooperation
COD	Chemical Oxygen Demand
CoD	Central Ordnance Depot
COVID-19	Coronavirus Disease
CSC	Construction Supervision Consultant
dB	Decibel
DBPs	Forms Disinfection By-products
DC	Deputy Commissioner
DCR	District Census Report
DIA	Direct Impact Area
DMAs	District Metered Areas
DMC	District Municipal Corporation
DPC	Dhabeji Pumping Complex
EBRD	European Bank for Reconstruction and Development
EDO	Executive District Officers
EHS	Environment, Health and Safety
EHS&S	Environmental, Health, Safety and Sustainability
EIA	Environmental Impact Assessment
EIU	Economist Intelligence Unit
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EPC	Environmental Protection Council
EPRP	Emergency Preparedness and Response Plan
ESA	Environmental & Social Assessment
ESF	Environmental and Social Framework
ESIA	Environmental & Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental & Social Management Plan
ESS	Environmental & Social Standards
FGD	Focus Group Discussion
FY	Fiscal Year
GAP	Gender Action Plan
GIIP	Good International Industry Practice

GKBWSS	Greater Karachi Bulk Water Supply System
GOS	Government of Sindh
GRM	Grievance Redress Mechanism
HIV/AIDS	Human Immunodeficiency Virus / Acquired immunodeficiency syndrome
HRRP	Habitat Removal and Restoration Plan
HSE	Health, Safety and Environment
IECs	Important Environmental and Social Components
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IIA	Indirect Impact Area
ILO	International Labour Organization
INGOs	International Non-Governmental Organization
ISO	International Standards Organization
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
JV	Joint Venture
KG	Kinjhar Gujjo
KII	Key Informant Interview
KWSC	Karachi Water & Sewerage Corporation
KWSSIP	Karachi Water & Sewerage Services Improvement Project
MEAS	Multilateral Environmental Agreements
MGD	Million Gallon Per Day
MMP	MM Pakistan (Pvt.) Ltd.
MS	Mild Steel
MSDS	Material Safety Data Sheet
NALA	Municipal Drain
NaOCl	Sodium Hypochlorite
NCR	Non-Compliance Reports
NEK	North East Karachi
NGOs	Non-Governmental Organization
NO₂	Nitrogen dioxide
NRW	Non-Revenue Water
NTU	Nephelometric Turbidity Units
OHS	Occupational Health and Safety
OPM	Old Pipri Main
PAF	Pakistan Air Force
PAPs	Project Affected Persons
PIC	Prior Informed Consent
PIC	Prior Informed Consent
PIU	Project Implementation Unit
PM₁₀	Particulate Matter 10 Micron
PM_{2.5}	Particulate Matter 2.5 Micron
POPs	Persistent Organic Pollutants
PRCC	Prestressed Reinforced Concrete Pipes
PSN	Priority Sewer Network
QMS	Quality Management Systems
RAP	Resettlement Action Plan

RCC	Roller- Compacted Concrete
RoW	Right Of Way
RP	Resettlement Plan
RPF	Resettlement Policy Framework
RSU	Reform Support Unit
SEP	Stakeholder Engagement Plan
SEPA	Sindh Environmental Protection Agency
SEQS	Sindh Environmental Quality Standards, 2016
SKAA	Sindh Katchi Abadi Authority
SMF	Social Management Framework
SO₂	Sulfur dioxide
SOPs	Series of Projects
SPs	Safeguard Policies
SSEMPs	Site Specific Environmental Management Plans
SSWMB	Sindh Solid Waste Management Board
TBD	To be Design
TBT	Toolbox Talks
TC	Tehsil Council
TCU	True Colour Units
TMP	Traffic Management Plan
ToR	Terms of Reference
TP	Treatment Plant
UC	Union Council
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific and Cultural Organization
USEPA	United State Environmental Protection Agency
VECs	Valued Environmental Components
VU	Vulnerable
WB	World Bank
WBG	World Bank Group
WHO	World Health Organization
WMP	Waste Management Plan
XDR	Extensively Drug-Resistant

1 Introduction

The Government of Sindh (GoS) and Karachi Water and Sewerage Corporation (KWSC) plan to implement the Second Karachi Water and Sewerage Services Improvement Project (KWSSIP-2) in Karachi with financial support from the World Bank (WB) and Asian Infrastructure Investment Bank (AIIB). One planned intervention under KWSSIP-2 comprises priority water scheme rehabilitation and extension reduce Non-Revenue Water (NRW) losses and improve water supply as well as quality.

This document presents the Environmental and Social Management Plan (ESMP) of the proposed Priority Sewer Network Rehabilitation and Extension Project to comply with local regulations and WB Environmental and Social Framework (ESF) requirements and to address potential environmental and social (E&S) impacts of the project.

The proposed project will include the replacement of 4.5 km long rising main no. 2 with 72" Mild Steel (MS) pipelines starting from Dhabeji Pumping Complex (DPC) to Fore-bay High Point, rehabilitation of New Pipri Main (NPM) of diameters 54" & 48" PRCC pipe from Pipri Reservoir to Y - junction with external joint sealing, Rehabilitation of Korangi Main 66", 48" & 33" diameter PRCC pipe from Y Point to Shan Chowrangi with external joint repairing, Installation of Radar based Non-contact Open Channel Flow Meters at the upstream of Keenjhar Gujju (KG) Canal, Greater Karachi (GK) Canal, K-II Canal and downstream of KG Canal, and Installation of Intermediate Chlorination Facilities at twenty five (25) Pumping Stations.

1.1 Objective of ESMP

The objectives of the study are to:

- ◆ Facilitate PIU-KWSSIP in ensuring environmental and social sustainability of the project;
- ◆ Establish a baseline of existing social and environmental conditions prior to project initiation;
- ◆ 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.

1.2 Document Structure

Chapter 1: Introduction – This chapter defines the ESMP's objectives and the document's structure.

Chapter 2: Brief Discussion of Legal and Institutional Requirements, Project Description, Description of the Environment, and Potential Environmental and Social (E&S) Impacts and Risks – This chapter presents the legal and institutional requirements related to the environmental protection of the proposed

project. It also provides a brief description of the project, a summary of the baseline conditions of the physical, biological, and socio-economic environment of the project area, and the potential impacts and risks of the project to the environment and society during its implementation.

Chapter 3: Environmental and Social Management Plan – The Environmental and Social Management Plan (ESMP) describes the proposed measures and actions to address the project's potential adverse impacts on the environment, workers, and communities by the WB-prescribed mitigation hierarchy.

Chapter 4: Environmental and Social Monitoring Plan – The Environmental and Social Monitoring Plan (ESMoP) provides the monitoring activities' methodology, frequency, and duration.

Chapter 5: ESMP Implementation (Institutional Arrangements, Trainings, Reporting, and Cost) – This chapter describes the institutional arrangements for the ESMP implementation during the project construction and operation, the training/capacity development programs, reporting requirements, and the indicative costs of the ESMP implementation. It also presents the Grievance Redress Mechanism (GRM) adopted for addressing grievances from the workers, communities, and stakeholders and the planned stakeholders' engagement and consultation throughout the project cycle.

Additional details on the Project Background, Legal and Institutional Requirements, Project Description, Description of the Environment, Assessment of Potential E&S Impacts and Risks, Analysis of Alternative, Grievance Redress Mechanism, and Information Disclosure, Consultation, and Participation prepared as part of the Environmental and Social Impact Assessment (ESIA) are provided as Annexes of this ESMP.

2 Brief Discussion of Legal and Institutional Requirements, Project Description, Description of the Environment, and Potential Environmental and Social Impacts and Risks

2.1 Legal and Institutional Requirements

2.1.1 National and Provincial Legislation

The applicable national and provincial E&S legislation and regulation to the project include the Sindh Environmental Protection Act, 2014; Sindh Environmental Quality Standards, 2016; Sindh Solid Waste Management Board Act, 2014; Karachi Water and Sewerage Corporation Act, 1996; Hazardous Substances Rules, 2014; Sindh Plantation, Maintenance of Trees and Public Parks Ordinance, 2002; Sindh Cultural Heritage (Preservation) Act 1994; Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020; Pakistan Labor laws, Sindh Factories (Second Amendment) Act, 2021; Sindh Occupational Safety and Health Act, 2017; Sindh Bonded Labor System (Abolition) Act, 2015; Sindh Occupational Health and Safety Rules, 2019; Sindh Minimum Wages Act, 2015; Sindh Workers Compensation Act, 2015; Sindh Prohibition of Employment of Children Act, 2017; Protection Against Harassment of Women at the Workplace Act, 2010; and Sindh Local Government (Amendment) Act, 202.

2.1.2 International Treaties and Conventions

Pakistan is a signatory to several international E&S-related treaties, conventions, declarations, and protocols.

2.1.3 World Bank Environmental, Health, and Safety (WB EHS) Guidelines

The applicable WB EHS Guidelines during the construction and operation of the project include the General EHS Guidelines (2007), the EHS Guidelines for Waste Management Facilities (2007), and the EHS Guidelines for Water and Sanitation (2007).

2.1.4 World Bank Environmental and Social Standards (WB ESS)

The applicable WB ESS to the project are ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), ESS2 (Labor and Working Conditions), ESS3 (Resource Efficiency and Pollution Prevention and Management), ESS4 (Community Health and Safety), ESS6 (Biodiversity, Conservation, and Sustainable Management of Living Natural Resources), and ESS10 (Stakeholder Engagement and Information Disclosure).

2.2 Project Description

The Project comprises following four construction packages:

- ◆ **Package 01:** Laying and installation of a new 4.5 km long 72" diameter MS Rising Main No. 02 starting from the Dhabeji Pump Station up to the Forebay High-point, including installation of Air Release Valves.

- ◆ **Package 02:** Rehabilitation of New Pipri Main (NPM) of diameters 54" & 48" PRCC pipe from Pipri Reservoir to Y - junction with external / internal joint sealing, Rehabilitation of Korangi Main 66", 48" & 33" diameter PRCC pipe from Y Point to Shan Chowrangi with external / internal joint repairing and replacement of defective air valves and installation of new air valves with chambers at all lines.
- ◆ **Package 03:** Installation of Radar based non-contact Open Channel Flow Meters at the upstream of KG canal, GK canal, K-II canal and downstream of KG canal (04 Nos. Flow Meters).
- ◆ **Package 04:** Installation of Intermittent Chlorination Systems at 25 Nos. selected distribution pumping stations.

2.3 Description of the Environment

2.3.1 Physical Environment

The hottest months are April to June, whereas December and January are relatively colder. July and August are the wettest months in the project area.

The soils in this region predominantly comprise a mixture of consolidated to unconsolidated gravels interspersed within a matrix of silt, sand, and clay.

The land use in the Package 01 area is cultivation, whereas some farmhouses are near the Dhabeji Pumping Complex and rising mains. Barren with sparse vegetation composed of small trees and shrubs are in the surrounding lands towards the Forebay area. The nearest settlements are KWSC Colony and a few small villages. The land use in the Package 02 area is residential areas and industrial installations. A small patch of agricultural lands and cattle farms are present along the NPM alignment at military-owned land in Landhi Town. The land use in the Package 03 area is mainly composed of cultivated lands. Lastly, residential settlements surround the land use in the Package 04 area.

About ten sensitive receptors are identified near the New Pipri Mains (NPM) / Korangi Main (KM) and pump houses.

The laboratory analysis results of the air, noise, and water quality monitoring conducted from February to March 2022 were compared with the SEQS and WHO/WBG Standards. The PM_{2.5} air quality concentrations at all stations, PM₁₀ at seven locations, and NO and CO at Sakhi Hasan Pump house sampling point located near KWSC Water hydrant and NO at KWSC Colony – Dhabeji sampling point exceeded the standards. The noise level at 10 locations exceeded the limits. All water samples showed the presence of bacterial contamination.

2.3.2 Biological Environment

Field assessments were conducted in December 2021 at Flow Meters Installation Sites, February 2022 at Old Pipri, New Pipri, Korangi, and Dhabeji Rising Mains, and March 2022 at 25 Pump houses.

Per the IUCN Red List of Threatened Species, no endangered, threatened, or vulnerable plant species exist within the project sites. Approximately 510 trees growing in the Direct Impact Area (DIA) will have to be cut for the execution of construction activities.

During the field visits, seven mammalian and 6 reptile species were recorded in the project area. All recorded mammalian and reptile species are common in nature. A total of 21 bird species have been recorded in the project area. None is on the IUCN Red List. However, one species is listed on CMS Appendix II, and three are listed on CITES appendices. No critical habitat is present in the project area.

2.3.3 Socio-Economic Environment

There are around 40 small and large communities in the Area of Influence (AoI) of the project. The socioeconomic baseline of the project area has been established by utilizing both primary and secondary data sources.

2.4 Potential E&S Impacts and Risks

The potential environmental and social (E&S) impacts of the project on the physical, biological, and socio-economic environment with significant risk levels during the construction phase include inadequate implementation of the ESMP, Occupational Health & Safety (OHS) and Emergency Preparedness & Response, solid waste management - generation of excavated material, kitchen waste, and hazardous waste; and Community Health and Safety (CHS) impacts. No significant impacts were identified during the pre-construction and operation phases.

3 Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) describes the proposed measures and actions to address the project's potential adverse impacts and risks on the environment, workers, and communities during pre-construction, construction, and operation. **Table 3-1** presents the ESMP for the project with the details of the mitigation/enhancement measure(s) for every significant impact/risk identified by the WB-prescribed mitigation hierarchy and grouped according to the relevant WB ESS, the relevant guidelines/plans, and the entities responsible for implementing the measure(s).

3.1 Various Mitigation and Control Measures

The ESMP includes different types of mitigation and control measures and guidelines for managing environmental, health, safety, and social impacts and risks in the form of general and non-site-specific measures or Environmental and Social Codes of Practices (ECPs) to address general construction and operation matters; specific mitigation measures; and guidelines for making construction and operational phase site-specific plans.

3.2 Environmental and Social Code of Practices for Construction

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 as follows: 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; and ECP 16: Workers Health and Safety

3.3 Site Specific Environmental and Social Management Plan (SSESMP)

The Contractor will prepare a Site Specific Environmental and Social Management Plan (SSESMP) demonstrating how they will comply with the requirements of the site-specific management plans, ECPs, and the mitigation measures proposed in this ESMP. The SSESMP will be submitted before any construction activities start and approved by the Engineer. The SSESMP will form part of the contract documents and be used as a monitoring tool for compliance. Violating the compliance requirements will be treated as non-compliance, leading to corrections, or imposing a penalty on the Contractor.

3.4 Occupational and Community Health & Safety Plans

The Contractor will also prepare an Occupational Health and Safety (OHS) Plan for managing the identified OHS hazards and control measures. The OHS Plan will comply with WB ESS2 (Labor and Working Conditions), WB EHS Guidelines, WB Health, and Safety Framework South Asia Region (SAR), Sindh Occupational Safety and Health Act (2017), Sindh Labour Acts, International Labour Organization (ILO) Code of Practices, and Good International Industry Practices (GIIP).

A review and update of the OHS Plan will be done whenever: (i) there is a significant change in the scope of the project; (ii) there is a change in construction methodology/technique based on site conditions; and (iii) following significant OHS hazard or a major accident.

3.4.1 Job Hazard Analysis

The Contractor will conduct a Job Hazard Analysis (JHA) for each construction component, focusing on job tasks 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 should be taken to utilize the hierarchy of control: elimination, substitution, engineering controls, administrative controls, and personal protective equipment, to minimize them to an acceptable risk level. Many workers are injured and killed at the worksite every day.

The JHA should be one of the major components of the larger commitment of the Contractor's health and safety management system. The JHA should be conducted on many jobs on the worksite. Priority should be given to the following types of jobs: (i) jobs with the highest injury or illness rates; (ii) jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents; (iii) jobs in which one simple human error could lead to a severe accident or injury; (iv) jobs that are new or complex to the construction or have undergone changes in construction processes and procedures; and (v) jobs complex enough to require written instructions.

3.4.2 EHS in Method Statement

The Contractor will include an EHS Chapter in each Method Statement. This EHS section will be based on the JHA and other provisions of the OHS Plan and environmental issues of the site and specific to construction methods to be followed by the Contractor. This section will be reviewed by the EHS Specialists of the Engineer/Construction Supervision Consultant (CSC) and confer approval along with other technical parameters to be reviewed by the engineering team of the CSC. The EHS Specialists will also review each revision of the method statement, and their concurrence will be required to approve the method statements.

3.5 Inclusion of ESHS Conditions in the Bidding Documents

To make Contractors fully aware and responsible for ensuring Environmental, Social, Health, and Safety (ESHS) compliance, the following conditions and all other relevant conditions in line with the "WB – Procurement of Works & User's Guide – Updated January 2017", will be made part of the bidding documents:

- ◆ The Contractor will obtain ESHS Performance Security for Compliance with the Contractor's ESHS obligations.
- ◆ The Contractor will be required to declare any civil work contracts that have been suspended or terminated and performance security called by an employer for reasons related to the non-compliance of any environmental, 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 will submit comprehensive and concise Environmental, Social, Health, and Safety Management Strategies and Implementation Plans (ESHS-MSIP), which include but are not limited to a 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 will recruit qualified and experienced ESHS Staff with relevant educational backgrounds and experience for each site to manage E&S aspects of the project.
- ◆ The Contractor will be bound to disclose the "Recruitment Policy" and follow it. The Contractor will hire at least 60% of the people who live near the project area.
- ◆ The Contractor will be encouraged to contribute to the well-being of the environment and society exceptionally and find ways to take up the relevant stakeholders' suggestions as a part of their commitment and develop solutions or alternatives.
- ◆ The ESMP will be made part of the bidding documents.
- ◆ Incorporate SEA/SH/GBV provisions in the bidding document.
- ◆ The Contractor will be required to ensure compliance with the 'Code of Conduct' signed by each of its employees/workers. The issues to be addressed in the Code of Conduct will include the following:
 - ◆ Compliance with applicable laws, rules, and regulations of the jurisdiction;
 - ◆ Compliance with applicable health and safety requirements (including wearing prescribed personal protective equipment, preventing avoidable accidents, and a duty to report conditions or practices that pose a safety hazard or threaten the environment);
 - ◆ Use of illegal substances;
 - ◆ Non-discrimination (for example, based on family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction);
 - ◆ Interactions with community members (for example, to convey an attitude of respect and non-discrimination);
 - ◆ Sexual harassment (for example, to prohibit the use of language or behavior, particularly 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 favors or other forms of humiliating, degrading, or exploitative behavior);
 - ◆ Protection of children (including prohibitions against abuse, heresy, or otherwise unacceptable behavior 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 preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection);
 - ◆ Respecting reasonable work instructions (including regarding E&S norms);
 - ◆ Protection and proper use of the property (for example, to prohibit theft, carelessness, or waste);

- ◆ Duty to report violations of this Code;
- ◆ Non-retaliation against workers who report violations of the Code if that report is made in good faith;
- ◆ Contract payments will be linked to environmental, health, and safety performance, measured by completing the prescribed E&S mitigation measures in the 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 engineer (CSC) or pay the implementing agency (IA) for 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. The penalty for non-compliance with the SSESMP and OHS Plan requirements 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.

3.6 Criteria for the Selection of Sub-Contractors

The Contractor will ensure that the following criteria are followed for the selection of any sub-contractor to ensure their ability to implement ESHS requirements:

- ◆ All ESF / ESS Requirements applicable to the main Contractor shall also apply to the hired Sub-contractors.
- ◆ Sub-contractor should have proven experience in providing services for at least five 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 the year of manufacturing, support agencies, other facilities, and resources.
 - ◆ Details of completion of similar types of projects within the last five years indicating their brief scope of work, the value of work, contractual duration, actual completion of the project, client's name, contact details of that client, safety appreciation or compliance certification or inspection of plant and machinery, 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 projects of similar magnitude carried out.
 - ◆ Details of experience of working on similar kind of project.
 - ◆ Details of EHS policy, safety manual, safety plan, and implementation procedures in line with internationally accepted practices, along with the statistics for the last four years.
 - ◆ Details of quality assurance and quality control practices currently in place for the execution of similar work.
 - ◆ Details of Contractor's financial performance documents (audited balance sheets with profit and loss statements) and audit reports for the last five preceding years.

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- ◆ 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 managing and monitoring sub-contractor performance.
 - ◆ 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.

Table 3-1: Environmental and Social Mitigation Plan

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
Pre-Construction Phase			
ESS1: Assessment and Management of Environmental and Social Risks and Impacts			
Permits, NOCs, Clearances	<ul style="list-style-type: none"> Secure all essential consents, permits, and clearances before starting civil works. 	<ul style="list-style-type: none"> Completion of ESMP Approval Process in line with Review of SEPA IEE/EIA Regulations 2021 Writing formal letters from PD-KWSSIP to the identified departments for taking necessary permits, consents, and approvals. 	<ul style="list-style-type: none"> PIU
Lack of appropriate E&S personnel with CSC and Contractors	<ul style="list-style-type: none"> Recruit qualified CSC and Contractors able to implement the Project's Environmental, Social, Health, and Safety requirements. Include personnel's education, qualification, and experience requirements in the bidding documents. Hire Contractors with good environmental, health, and safety management. Include the Contractor's qualifications as pre-qualification criteria in the short-listing process. Reflect ESMP conditions in the Contractor's bidding documents and the supervision consultant's ToR. Allocate necessary funds for ESMP implementation and monitoring. 	<ul style="list-style-type: none"> Bidding and Contract Documents ESMP, SSESMP, OHS/CHS and Other Plans 	<ul style="list-style-type: none"> CSC's Selection: PIU Contractor's Selection: PIU & CSC Contractor's EHSS Staff Recruitment: Contractor Preparation of Plans: Contractor Supervision: CSC Monitoring: PIU
Inappropriate Planning for Construction Traffic Routes	<ul style="list-style-type: none"> Devise a Traffic Management Plan (TMP) by PIU/CSC/Contractors, in collaboration with the Sindh Traffic Police, to minimize the expected disruption at the identified access roads. Ensure PIU approves the TMP before construction activities. No work will be done without approved TMP. Ensure TMP will: 	<ul style="list-style-type: none"> Preparation and Implementation of TMP, ECP 13 	<ul style="list-style-type: none"> Preparation of TMP: PIU/CSC/Contractor/ Sindh Traffic Police Implementation: Contractor Supervision: CSC Monitoring: PIU

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Provide a safe environment for all road users; ◆ Protect the general public from traffic hazards that may arise as a result of the construction vehicles movement; ◆ Minimize disruption, congestion, and delays to all road users; ◆ Ensure access to adjacent private/commercial premises is maintained at all times. ◆ Ensure, whenever possible, that a sufficient number of traffic lanes to accommodate vehicle traffic volumes are provided. ◆ Ensure that delays and traffic congestion are minimal and within acceptable levels. ◆ Ensure that appropriate/sufficient warning and information signs are installed, and adequate guidance is provided to delineate the travel paths through the event site. ◆ Ensure that the roads are free of hazards and that all road users are adequately protected from the activities of road users. ◆ Implement ECP 13: Road Transport and Road Traffic Management 		
ESS4: Community Health and Safety			
Improper Location of Worker Camps Leading to Environmental and Social Issues	<ul style="list-style-type: none"> ◆ Develop worker camps at the identified campsite locations and provide ancillary facilities, such as electricity, washrooms for labor with suitable effluent and sewage disposal facilities, and water for their everyday use for drinking and bathing, etc. 	<ul style="list-style-type: none"> ◆ Worker's CMP and Implementation of LMP 	<ul style="list-style-type: none"> ◆ Preparation and Implementation of LMP: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Ensure that camps are away from local communities with strict protocols for interaction with local communities to avoid impacts from labor influx and minimal disturbance to the nearby communities. ◆ Prepare a Worker's Camp Management Plan (CMP) and a Labor Management Plan (LMP) to ensure effective implementation. ◆ Other measures include: <ul style="list-style-type: none"> ◆ Develop a Code of Conduct (COC) for all site personnel. All site personnel shall sign this COC and abide by it. ◆ Ensure project staff receive training on preventing SE/SH/GBV. ◆ Provide on-site anti-harassment training to create awareness of the harmful effects of GBV, as well as consequences if GBV occurs according to the anti-harassment policies. ◆ Avoid entering settlements. ◆ Incorporate SEA/SH/GBV provision in the bidding document. ◆ Engage skilled trainers to raise awareness among project workers of the risks, expected behaviors, and consequences of violations, communicated through training and publicized codes of conduct. ◆ Raise awareness of the risks among community members and local health authorities and inform them about available grievance mechanisms. ◆ Provide extensive training for awareness-raising strategy to describe SEA/SH risks and the worker's responsibilities under the COC. 		

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Avoid the routes/places the women use as far as possible. If unavoidable, identify alternate routes for the communities. ◆ Conduct induction training or workshops to introduce the basics of health and hygiene and the necessary preventive measures against diseases. ◆ Ensure necessary medical screening of all workers & staff and submission of proof of vaccination (COVID-19) before employment. ◆ Provide training on the worker's GRM to know their rights and responsibilities. ◆ Ensure the availability of complaint boxes at all work sites, allowing workers to report any issues and wrongdoings. 		
Lack of Community Awareness	<ul style="list-style-type: none"> ◆ Conduct FGDs and distribute pamphlets before the project implementation begins to increase local awareness. Maintain regular interaction by PIU/CSC/Contractor's Social Safeguard Team throughout construction. Share key information about the <ul style="list-style-type: none"> ○ Project overview and objectives ○ Preliminary and final design of project components ○ Environmental and social impacts, along with mitigation measures ○ Grievance redress mechanism and contact details 	<ul style="list-style-type: none"> ◆ Community Interactions through FGDs, Pamphlets etc. 	<ul style="list-style-type: none"> ◆ Implementation: PIU, CSC, Contractor
Construction Phase			
ESS1: Assessment and Management of Environmental and Social Risks and Impacts			
Inadequate Implementation of ESMP, OHS, CHS and Other Specific Plans.	<ul style="list-style-type: none"> ◆ Enlist Environment, Social, Health, and Safety Staff by the CSC and Contractor. 	<ul style="list-style-type: none"> ◆ ESMP, OHS, CHS and Other Specific Plans. 	<ul style="list-style-type: none"> ◆ Contractor's selection: PIU and CSC

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Outline Environmental, Social, Occupational, and Community Health and Safety procedures within method statements. ◆ Formulate and implement a Site-Specific Environmental and Social Management Plan (SSESMP), OHS Plan, CHS Plan, and other necessary plans as per ESMP guidelines. ◆ Evaluate the Contractor's capability concerning safeguard management by the PIU - KWSSIP. ◆ Hire Contractors with good environmental, health, and safety management. 		<ul style="list-style-type: none"> ◆ Preparation / Implementation of plans: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
<p>Temporary Closure of Water Supply</p>	<ul style="list-style-type: none"> ◆ Create a repair schedule that allows periodic and short-term water supply closures in specific mains. ◆ Ensure that only one water main will shut off at a time. ◆ PIU, CSC, and the Contractor's Social Safeguard Staff will engage with the public to inform nearby communities about temporary water supply closures during construction, providing tentative closure timings for residents to make necessary water storage arrangements to fulfill their needs during the closure period. 	<ul style="list-style-type: none"> ◆ Adequate planning of water supply closure 	<ul style="list-style-type: none"> ◆ Water Supply Closure Planning: Contractor, PIU and KWSC ◆ Public Awareness: Contractor, PIU and CSC
ESS2: Labor and Working Conditions			
<p>Occupational Health & Safety / Emergency Preparedness and Response</p>	<ul style="list-style-type: none"> ◆ Create an OHS plan compliant with local regulations and international standards before starting construction. ◆ Cover COVID-19 protocols and an Emergency Preparedness and Response Plan. ◆ Provide first aid units, medical staff, and hospital transport. ◆ Include safety measures such as barricades, green nets, signs, PPE for workers, and a "zero tolerance to loss of life" policy. ◆ Provide health and safety training for all site personnel and compensation following the Sindh Workers Compensation Act, 2015. ◆ Provide measures for trench excavation and pipeline work safety. ◆ Supervise construction activities and provide insurance 	<ul style="list-style-type: none"> ◆ Implementation of OHS Management Plan, Emergency Preparedness and Response Plan 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Provide safety measures, including firefighting equipment and hazardous material storage ◆ Provide PPE and clean drinking water, and reduce work hours during extreme heat ◆ Ensure proper storage and handling of chemicals and hazardous materials ◆ Provide adequate sanitation, washing, cooking, and dormitory facilities 		
Communicable Diseases - COVID- 19 and Camp Management	<ul style="list-style-type: none"> ◆ Follow COVID-19 protocols issued by the Ministry of Health Services, GoP, April 2020. ◆ Raise worker awareness on sanitation and hygiene practices. ◆ Maintain good housekeeping at camps and sites. ◆ Provide clean water and proper personal hygiene facilities. ◆ Ensure timely treatment for affected workers to control disease spread. ◆ Implement Camp Management Plan and Labor Management Procedures. ◆ Use non-wood fuel for cooking. ◆ Appoint cleaning staff for Campsites' cleanliness. ◆ Implement ECP 14: Construction Camp Management. 	<ul style="list-style-type: none"> ◆ Implementation of COVID19 Guidelines - Health & Safety of Building and Construction Workers, Workers Code of Conduct (CoC), CMP, LMP. ECP 14 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Working Conditions	<ul style="list-style-type: none"> ◆ Adhere to labor standards, including Provincial Labor Laws and ILO Standards for work hours, workers' payments & compensations. Ensure their compliance with CSC/PIU. ◆ To understand their rights and responsibilities, provide workers with training on the existing Grievance Redress Mechanism (GRM). Ensure the availability of a complaint box for reporting wrongdoings. ◆ Enforce strict compliance with Labor Management Procedures (LMP) 	<ul style="list-style-type: none"> ◆ Implementation of Provincial Labor Laws and ILO Standards for work hours, workers payments & compensations 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Employment of Child Labor	<ul style="list-style-type: none"> ◆ Implementation of Sindh Prohibition of Employment of Children Act, 2017 and ESS-2. 	<ul style="list-style-type: none"> ◆ Implementation of Sindh Prohibition of Employment of Children Act, 2017 and ESS-2 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Strict prohibition on the employment of children under the age of 18 in construction work. ◆ Contractors must ensure that all individuals at the construction site are adults with valid government-issued identity cards. 		<ul style="list-style-type: none"> ◆ Monitoring: PIU and TPV
ESS3: Resource Efficiency and Pollution Prevention and Management			
Dust Emissions	<ul style="list-style-type: none"> ◆ Moisten surfaces regularly to suppress dust. ◆ Use barriers to contain dust at sites. ◆ Adhere to reduced speeds to control dust from vehicles. ◆ Keep sites and roads clean to prevent dust build-up. ◆ Redirect traffic away where appropriate. ◆ Cover materials to prevent wind dispersal. ◆ Plan activities to minimize dusty work during peak hours. ◆ Inform locals about construction activities and dust mitigation. ◆ Monitor dust levels around sensitive receptors. ◆ Train workers on dust control practices. ◆ Address complaints promptly through the Grievance Redress Mechanism. ◆ Implement ECP 1: Waste Management, ECP 2: Fuels and Hazardous Goods Management, ECP 7: Topsoil Management, ECP 9: Air Quality Management, and ECP 13: Road Transport and Road Traffic Management 	<ul style="list-style-type: none"> ◆ ESMP, ECP 1, ECP 2, ECP7, ECP 9, ECP 13 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
High Noise Levels from Construction Activities	<ul style="list-style-type: none"> ◆ Install temporary noise barriers around the construction site to reduce noise transmission to nearby schools and hospitals. ◆ Plan construction activities during off-peak hours when schools and hospitals are less busy to minimize the impact of noise on their daily operations. ◆ Use modern and quieter construction equipment and machinery to reduce noise emissions during construction. ◆ Implement noise control measures on machinery and equipment using mufflers and sound-insulating materials. 	<ul style="list-style-type: none"> ◆ ESMP, Noise Management Plan, ECP 10 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Maintain construction machinery to ensure they are operating efficiently and producing less noise. ◆ Implement efficient traffic management around the construction site to reduce vehicle noise and congestion. ◆ Train construction workers to operate equipment and machinery to minimize noise and be mindful of noise levels near sensitive locations. ◆ Communicate with the local community, including schools and hospitals, about the construction schedule, potential noise impacts, and the steps taken to mitigate noise. ◆ Conduct noise monitoring around sensitive areas to ensure compliance with acceptable noise limits. ◆ Encourage construction workers to adopt quieter work practices, such as avoiding unnecessary shouting and loud conversations. ◆ Register any noise-related public complaints registered through the Project's Grievance Redress Mechanism. ◆ Implement ECP 10: Noise and Vibration Management 		
<p>Waste Management - Generation of Excavated Material, Kitchen Waste, Hazardous Waste</p>	<ul style="list-style-type: none"> ◆ Estimated quantities of major waste streams during construction: <ul style="list-style-type: none"> ◆ 5740 cubic meters of excavated material ◆ 43,164 kg of domestic waste from construction camps ◆ Mitigation measures include: <ul style="list-style-type: none"> ◆ Implement a waste management system to minimize, reduce, and reuse waste. ◆ Design and locate waste material storage areas ◆ Develop a Waste Management Plan (WMP) before construction starts. ◆ Sort hazardous and non-hazardous materials before disposal. ◆ Provide waste bins at project sites. ◆ Ensure an onsite hazardous waste storage facility with secondary containment. 	<ul style="list-style-type: none"> ◆ Implementation of WMP, ECP 1, ECP 2, ECP 7 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Introduce measures for safe materials storage, handling, and use. ◆ Use concrete or brick masonry bunds for secondary containment at fuel storage areas. ◆ Check fuel tanks daily for leaks and immediate repairs. ◆ Include designated wash-down and refueling points in the camp layout plan. ◆ Engage licensed and SEPA-approved waste contractors for disposal. ◆ Utilize all excavated material through backfilling. ◆ Store and dispose of hazardous waste generated from maintenance workshops through approved contractors. ◆ Temporarily store clinical waste onsite and hand it over to approved waste contractors. ◆ Dispose of domestic waste from camps in the nearest SSWMB waste collection bins. ◆ Implement ECPs, including ECP 1: Waste Management, ECP 2: Fuels and Hazardous Goods Management, and ECP 7: Topsoil Management 		
<p>Untreated Disposal of Effluent from Worker Camps</p>	<ul style="list-style-type: none"> ◆ Establish a closed sewage treatment system, including soak pits/septic tanks, to prevent untreated effluent release from the camp. ◆ Construct soak pits in absorbent soil, maintaining a minimum distance of 300 m from nearby water wells and bores. ◆ Ensure constant coverage of soak pits and prevent rainwater entry ◆ Use vacuum trucks to empty septic tanks if sludge reaches capacity. Seek approval from KWSC before transferring effluent to an approved municipal drain. ◆ Implement ECP 1: Waste Management, ECP 3: Water Resources Management, and ECP 14: Construction Camp Management 	<ul style="list-style-type: none"> ◆ Implementation of WMP, ECP 1, ECP 3, ECP 14 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
Soil Contamination	<ul style="list-style-type: none"> ◆ Establish a systematic process for handling and disposing of sludge from sewer lines through SEPA-certified waste handlers, preventing spills and leakages during transit. ◆ Install arrangements to prevent spills from reaching the soil, using secondary containment for storage areas. ◆ Provide personnel with spill prevention and response training, emphasizing safe handling of sludge and hazardous materials. ◆ Use measures to prevent soil erosion and the spread of contaminants. ◆ Implement ECP 2: Fuels and Hazardous Goods Management and ECP 5: Soil Quality Management 	<ul style="list-style-type: none"> ◆ Implementation of Spill Prevention Plan, ECP 2, ECP 5 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Construction of Intermittent Chlorination Facilities	<ul style="list-style-type: none"> ◆ Provide barricades at worksites and enforce the Code of Conduct (COC) to prevent contact with local communities. ◆ Ensure power generators are well-tuned and equipped with soundproof canopies. ◆ Transport construction materials with minimal disruption, preferably during evening or night hours, to reduce traffic congestion. 	<ul style="list-style-type: none"> ◆ Implementation of ECP, OHS, CHS and Other Specific Plans, Workers COC. 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Impacts Associated with Pipe Jacking	<ul style="list-style-type: none"> ◆ Remove excavation material from the site as work progresses. ◆ Implement ECP 1: Waste Management, ECP 2: Fuels and Hazardous Goods Management, ECP 7: Topsoil Management 	<ul style="list-style-type: none"> ◆ Implementation of WMP, ECP 1, ECP 2, ECP 7 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Improper Site Restoration	<ul style="list-style-type: none"> ◆ Ensure backfilling of trenches. ◆ Restore ground surface contour. ◆ Replace topsoil if removed. ◆ Plant native vegetation. ◆ Implement erosion control measures. ◆ Repair disturbed pavements or surfaces. ◆ JAll Camp and Other Sites: ◆ Dismantle and remove worksite facilities, including offices, accommodations, warehouses, and machinery yards. 	<ul style="list-style-type: none"> ◆ Implementation of WMP, Tree Plantation Plan, ECP 1, ECP 2, ECP 5, ECP 6, ECP 7, ECP 8, ECP 11 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV ◆ Identification of Compensatory Plantation Sites: PIU

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Remove drinking water facilities, sewage networks, and electric facilities. ◆ Clear all solid construction waste and other camp-related waste. ◆ Remove fencing, anchoring, and leftover concrete. ◆ Clean the ground by removing the affected topsoil and adding topsoil where necessary. ◆ Identify spaces for compensatory tree plantation and restore trees and vegetation per the Tree Plantation Plan. ◆ Implement ECP 5: Soil Quality Management, ECP 6: Erosion and Sediment Control, ECP 7: Topsoil Management, ECP 8: Topography and Landscaping, ECP 11: Protection of Flora 		
ESS4: Community Health and Safety			
Community Health and Safety	<ul style="list-style-type: none"> ◆ Create a Community Health and Safety (CHS) Plan based on construction methods and hazards. ◆ Barricade construction areas like trenches, excavations, and holes and mark them with warning tapes. ◆ Minimize off-site material stacking and provide areas distant from public access with clear warning signs. ◆ Removal of excavated material from the site ◆ Reinstate excavations and trenches after completion and won't be left open for extended periods. ◆ Prevent unauthorized entry and restrict unnecessary movement across the site. ◆ Provide safety drainage, non-slip mats, and traffic control for workers and public safety measures during wet spells. ◆ Provide signposts in the entrances and access routes ◆ Provide adequate lighting in excavated areas and trenches to ensure night safety. ◆ Vehicles and equipment are to be operated by drivers and equipment operators with valid licenses and proven competency. 	<ul style="list-style-type: none"> ◆ Implementation of CHS Plan 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<ul style="list-style-type: none"> ◆ Minimize dust and noise nuisance through noise suppression, low-dust techniques, water sprinkling, and strategic work times. ◆ Provide safe pedestrian walkways at sensitive locations, maintained to standards suitable for all users. ◆ Barricade walkways with guardrails and clear signs ensure safe entry and exit, even for vulnerable individuals. ◆ Provide signboards at appropriate spots to warn the public about construction activities and associated risks. ◆ Inform locals about construction-related risks through community liaison and awareness efforts. 		
<p>Labor Influx / SEA – SH – GBV Incidents</p>	<ul style="list-style-type: none"> ◆ Prioritize hiring locals for various job categories: skilled, semi-skilled, and unskilled. ◆ Establish construction camps at designated CSC/PIU-approved locations. ◆ Include COC obligations and relevant legislation, with penalties for violations. ◆ Train project staff on preventing SEA/SH/GBV. ◆ Inform community members and health authorities about risks and grievance mechanisms. ◆ Do not allow drugs and alcohol at the construction site. ◆ Prohibit carrying weapons into the workplace. ◆ Follow Security Management Guidelines ◆ Secure construction sites with fencing, checkpoints, gates, and guards will secure construction sites. ◆ Maintain strong relations with local communities. 	<ul style="list-style-type: none"> ◆ Workers COC, CHS Plan, ECP 16 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
<p>Restricted Access</p>	<ul style="list-style-type: none"> ◆ Establish safe pedestrian walkways at sensitive receptor locations, such as Jamia Masjid Aqsa - Mehran Highway – NPM. Maintain walkways to a high standard to ensure they are safe for all individuals, including women, children, the elderly, patients, and those with disabilities. ◆ Enhance the safety and visibility of walkways. Provide barricades and guardrails and mark them with signs and reflective tapes. 	<ul style="list-style-type: none"> ◆ Implementation of CHS Plan 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
<p>Construction Traffic Management and Safety</p>	<ul style="list-style-type: none"> ◆ Develop a Traffic Management Plan (TMP), subject to PIU/CSC approval, before initiating any construction work. ◆ Deploy barricades, signs, markings, flags, lights, and trained flagmen at crucial locations. ◆ Equip flagmen with red and green flags and lights and provide traffic management training. ◆ Provide compensation as per the Fatal Accidents Act 1855 for accidents involving the community. ◆ Implement ECP 13: Road Transport and Road Traffic Management 	<ul style="list-style-type: none"> ◆ Implementation of TMP, ECP 13 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU
ESS6: Biodiversity, Conservation, and Sustainable Management of Living Natural Resources			
<p>Vegetation Loss and Disturbance to Fauna</p>	<ul style="list-style-type: none"> ◆ Prepare a Compensatory Tree Plantation Plan in collaboration with relevant authorities. ◆ Conduct an inventory of trees to be cut based on the finalized work plan. ◆ Identify suitable spaces for tree plantation before tree clearance. ◆ Maintain trees planted under compensatory plantation for at least five years during the contract and defect liability periods. ◆ Adhere to Compensatory plantation (10 trees planted for each one removed). Select native/local species for plantation. ◆ Prevent damage to trees saved from cutting during construction. ◆ Provide measures to prevent injury or harm to wildlife during vegetation clearing and excavation. ◆ Avoid high-noise construction work at night to prevent local bird and fauna disturbance. ◆ Provide training to workers on protecting flora and fauna and relevant government regulations. ◆ Implement ECP 5: Soil Quality Management, ECP 6: Erosion and Sediment Control, ECP 7: Topsoil 	<ul style="list-style-type: none"> ◆ Implementation of TMP, ECP 5, ECP 6, ECP 7, ECP 8, ECP 11, ECP 12 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV ◆ Identification of Compensatory Plantation Sites: PIU

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	Management, ECP 8: Topography and Landscaping, ECP 11: Protection of Flora, ECP 12: Protection of Fauna		
ESS8: Cultural Heritage			
Cultural Heritage Sites	<ul style="list-style-type: none"> ◆ Train workers on chance find procedures and responses. ◆ Coordinate with PIU and Directorate General of Antiquities and Archaeology for suspected chance finds. ◆ Implement ECP 15: Cultural and Religious Issues. 	<ul style="list-style-type: none"> ◆ Chance Find Procedure, ECP 15 	<ul style="list-style-type: none"> ◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
ESS10: Stakeholder Engagement and Information Disclosure			
Stakeholders Concerns and Engagement	<ul style="list-style-type: none"> ◆ Facilitate public consultations and stakeholder participation as per KWSSIP-2 Stakeholder Engagement Plan (SEP), addressing concerns promptly. ◆ Implement comprehensive, inclusive stakeholder engagement and offer access to remedies. 	<ul style="list-style-type: none"> ◆ Implementation of KWSSIP-2 SEP 	<ul style="list-style-type: none"> ◆ Implementation: PIU, CSC and Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Operation Phase			
ESS2: Labor and Working Conditions			
Handling of Sodium Hypochlorite / OHS Management at Pump Houses	<ul style="list-style-type: none"> ◆ Prepare OHS Management Procedures and implement them throughout the operational phase. ◆ Designate safe storage of all hazardous / non-hazardous chemicals and be equipped with proper ventilation arrangements. ◆ Label containers and post the Safety Data Sheet (SDS) at prominent locations. ◆ Post the emergency contact numbers for calling police, ambulance, and fire services at prominent locations. ◆ Provide hazard information and training on the safe handling of sodium hypochlorite to workers at the pump houses. ◆ Store sodium hypochlorite in a cool, dry, and dark place. ◆ Conduct periodic medical check-ups for workers engaged in sodium hypochlorite dosing and handling. ◆ Provide appropriate PPE such as rubber gloves, protective clothing, safety footwear, headgear, goggles, face shields, 	<ul style="list-style-type: none"> ◆ OHS Management Procedures, SDS 	<ul style="list-style-type: none"> ◆ Preparation of OHS Management Procedures: KWSC Management ◆ Implementation: Pump house In-Charges

Impacts and Risks	Details of Mitigation / Enhancement Measures	Relevant Guidelines / Plans	Responsibility
	<p>and respirators to workers engaged in sodium hypochlorite dosing and handling.</p> <ul style="list-style-type: none"> ◆ Equip all selected pump houses for intermittent chlorinators with CO2, dry chemical, water, and foam-type fire extinguishers, and train all staff on dealing with accidental fires. ◆ In the event of sodium hypochlorite spills or leaks: ◆ Remove all potential ignition sources from the area and ensure proper ventilation. ◆ Neutralize spilled or leaked chemicals with sodium bisulfite, cover them with soda ash, and place them into covered containers for disposal. ◆ Consider the contained sodium hypochlorite as hazardous waste and hand it over to a SEPA-certified hazardous waste management contractor. ◆ Implement regular training and orientation on safety practices to impart knowledge of a safe and efficient working environment. ◆ Maintain proper housekeeping at all pump houses. ◆ Ensure the safe handling and storage of sodium hypochlorite and minimize potential hazards associated with its use in water treatment. 		

4 Monitoring Parameters and Monitoring Plan

Table 4-1 presents the project's Environmental and Social Monitoring Plan (ESMoP) for the pre-construction, construction, and operation phases. The monitoring will comprise surveillance to check whether the Contractor implements the ESMP requirements and meets the contract's provisions during the project's construction and operation phases, including the responsible agencies for implementation and supervision. Monitoring the frequency and locations of some parameters may require adjustments by the CSC and PIU during project execution.

Table 4-1: Environmental and Social Monitoring Plan

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
Pre-Construction Phase				
ESS3: Resource Efficiency and Pollution Prevention and Management				
Ambient Air Quality	<ul style="list-style-type: none"> ◆ Carbon Monoxide (CO) - 4 mg/m³ for 8 hrs ◆ Sulphur Dioxide (SO₂) - 40 µg/m³ ◆ Nitrogen Oxide (NO) - 40 µg/m³ ◆ Particulate Matter (PM₁₀) - 45 µg/m³ ◆ Particulate Matter (PM_{2.5}) - 15 µg/m³ 	06 Locations - Sensitive Receptors that remains under continuous public use including: NPM / KM <ul style="list-style-type: none"> ◆ Quaid e Azam Park – Gulshan e Hadeed ◆ Razia Medical Centre ◆ Govt. Degree and Science College – Landhi ◆ Khadija Girls College - Korangi ◆ Al – Mustafa Academy and Orphanage ◆ Aziz Hospital - Landhi Road 	Once	Contractor, CSC
Noise Level	<ul style="list-style-type: none"> ◆ 24hr – Noise Levels ◆ Day Time: 55 dB(A) ◆ Night Time: 45 dB(A) 	06 Locations - Sensitive Receptors that remains under continuous public use (as above).	Once	Contractor, CSC
Construction Phase				
ESS2: Labor and Working Conditions				
Occupational Health and Safety	<ul style="list-style-type: none"> ◆ 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 	All Project Sites	Regularly	Contractor, CSC
COVID19	<ul style="list-style-type: none"> ◆ Number of cases in workforce ◆ Number of COVID-19 tests ◆ Number of workers vaccinated. ◆ Audit of provisions and equipment 	All Project Sites	To be determined by PIU, CSC at the time of execution	

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
Worker Grievances	<ul style="list-style-type: none"> ◆ Number and types of worker grievances ◆ Resolution timeframes ◆ Number and duration of worker protests 	All Project Sites	Monthly	Contractor, CSC
ESS3: Resource Efficiency and Pollution Prevention and Management				
Ambient Air Quality Monitoring	<ul style="list-style-type: none"> ◆ Carbon Monoxide (CO) - 4 mg/m³ for 8 hrs ◆ Sulphur Dioxide (SO₂) - 40 µg/m³ ◆ Nitrogen Oxide (NO) - 40 µg/m³ ◆ Particulate Matter (PM₁₀) - 45 µg/m³ ◆ Particulate Matter (PM_{2.5}) - 15 µg/m³ 	06 Locations - Sensitive Receptors that remains under continuous public use including: NPM / KM <ul style="list-style-type: none"> ◆ Quaid e Azam Park – Gulshan e Hadeed ◆ Razia Medical Centre ◆ Govt. Degree and Science College – Landhi ◆ Khadija Girls College - Korangi ◆ AI – Mustafa Academy and Orphanage ◆ Aziz Hospital - Landhi Road 	Monthly	
Noise Level	<ul style="list-style-type: none"> ◆ 24hr – Noise Levels ◆ Day Time: 55 dB(A) ◆ Night Time: 45 dB(A) 	06 Locations - Sensitive Receptors that remains under continuous public use (as above) and 04 locations at work sites (to be decided by CSC/PIU)	Monthly	Contractor, CSC
Water Quality	<ul style="list-style-type: none"> ◆ Sindh Environmental Quality Standards (SEQS) Drinking Water Quality Parameters 	04 Locations: Worker Camps, Office Sites and Kitchen / Mess Areas	Monthly	Contractor, CSC
Waste Management	<ul style="list-style-type: none"> ◆ Inspection of solid waste generation, collection, storage, recycling, and disposal ◆ Recording volumes of excavation and spoil generated, reused, sold, stockpiled by location. ◆ Recording waste volumes by type (kitchen and domestic, medical, batteries, electrical equipment, tires, rags, paper, 	All Project Sites, camps, focusing on areas where waste is stored / located	Fortnightly	Contractor, CSC

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
	scrap metal wastes etc.) generated at various construction sites. <ul style="list-style-type: none"> ◆ Recording the final disposal of each waste stream ◆ Calculating rate of waste reuse / recycling ◆ Recording storage, transport, and disposal costs 			
Soil Contamination	<ul style="list-style-type: none"> ◆ Visual Inspection ◆ Recording Incidents of oil, fuel and chemical spills 	All work areas, machinery parking areas, generator installation sites and workshops	Weekly	Contractor, CSC
Effluent Disposal	<ul style="list-style-type: none"> ◆ Visual Inspection for checking any bypasses or leakages in effluent disposal arrangements at camp and office sites 	All workers camp / office sites	Weekly	Contractor, CSC
ESS4: Community Health and Safety				
Community Health and Safety / Construction Traffic Management and Safety / Access to Receptors	<ul style="list-style-type: none"> ◆ Status of Barricading at Trenches and Excavations ◆ Status of provision of Pedestrian access ◆ Status of piling-up of excavated material and pipes along trenches ◆ Status of provision of access at sensitive receptor locations ◆ Status of posting safety signage ◆ Status of traffic diversions ◆ Road safety incidents records ◆ Lighting arrangements ◆ Provision of safety equipment and materials at sites 	All listed parameters to be monitored throughout the Project area except Provision of Access, which shall be monitored at: <ul style="list-style-type: none"> ◆ Al Rahman Masjid – N5 – OPM ◆ FAST University – N5 – OPM ◆ Khyber Hospital – Yunus Textile Road – OPM ◆ Shumaila Public Secondary School - Yunus Textile Road – OPM ◆ Jamia Masjid Aqsa – Mehran Highway – NPM 	Bi-weekly	Contractor, CSC

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
SEA/SH incidents	<ul style="list-style-type: none"> ◆ Status of workers interaction with public, nearby communities. ◆ Investigation of any SEA/SH incidents reported / communicated by workers or registered by communities in GRM 	All Campsites and Project Sites	Weekly	Contractor, CSC
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources				
Tree Cutting	<ul style="list-style-type: none"> ◆ 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	Fortnightly	Contractor, CSC
ESS10: Stakeholder Engagement and Information Disclosure				
Stakeholder Engagement	<ul style="list-style-type: none"> ◆ Number and types of engagements ◆ Topics raised during engagement ◆ Number and types of community grievances ◆ Closure duration of grievances ◆ Claimant satisfaction of process and results grievance mechanism 	Stakeholders Identified in Project's SEP	Monthly	
Public Grievances	<ul style="list-style-type: none"> ◆ Numbers of grievances ◆ Types of grievances ◆ Number of grievances related to dust, noise, traffic, restricted access, any abuses related to project workers. ◆ Appropriate close-out measures and actions to prevent recurrence 	Affected Communities	Monthly	Contractor, CSC

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
	<ul style="list-style-type: none"> Grievances closed out within timeframes 			
Operation Phase				
ESS2: Labor and Working Conditions				
OHS Management at Pump Houses	<ul style="list-style-type: none"> Implementation Status of OHS Management Procedures Availability of Specified Fire Extinguishers Provision and Utilization of PPEs by Workers Ensure Chlorine dosage is in line with specifications Sodium hypochlorite handling and storage Posting of Safety Data Sheet (SDS) for sodium hypochlorite. 	25 Pump Houses including LSR, Kidney Hills, Temple & Curry, Saleh Muhammad, Korangi 5 ½, Sakhi Hassan, Coast Guard, NIPA, Nagan Chowrangi, Jamia Milia, Shah Faisal Colony # 4, Shah Faisal Colony # 3, Sindhi Hotel, Clifton No. 5, M.E.S, Baldia 3 No., Disco More, Lee Market, Chandni Chowk, Jigar Muradabadi, Mahmoodabad, PIC Pump House (PRC Tower), Ajmair Nagri, Zia Colony and Bath Island.	Daily	Pump-house In-charge

5 ESMP Implementation (Institutional Arrangements, Trainings, Reporting, and Cost), GRM and Stakeholders Engagement and Consultations

5.1 Institutional Arrangements for ESMP Implementation during Construction Phase

The key players involved in the implementation of the ESMP during the project’s construction phase are the Sindh Environmental Protection Agency (SEPA), Project Implementation Unit (PIU), Third Party Validation (TPV) Consultation, Construction Supervision Consultant (CSC), and Contractor(s). **Figure 5-1** presents the organizational setup for the ESMP implementation during the project's construction phase.

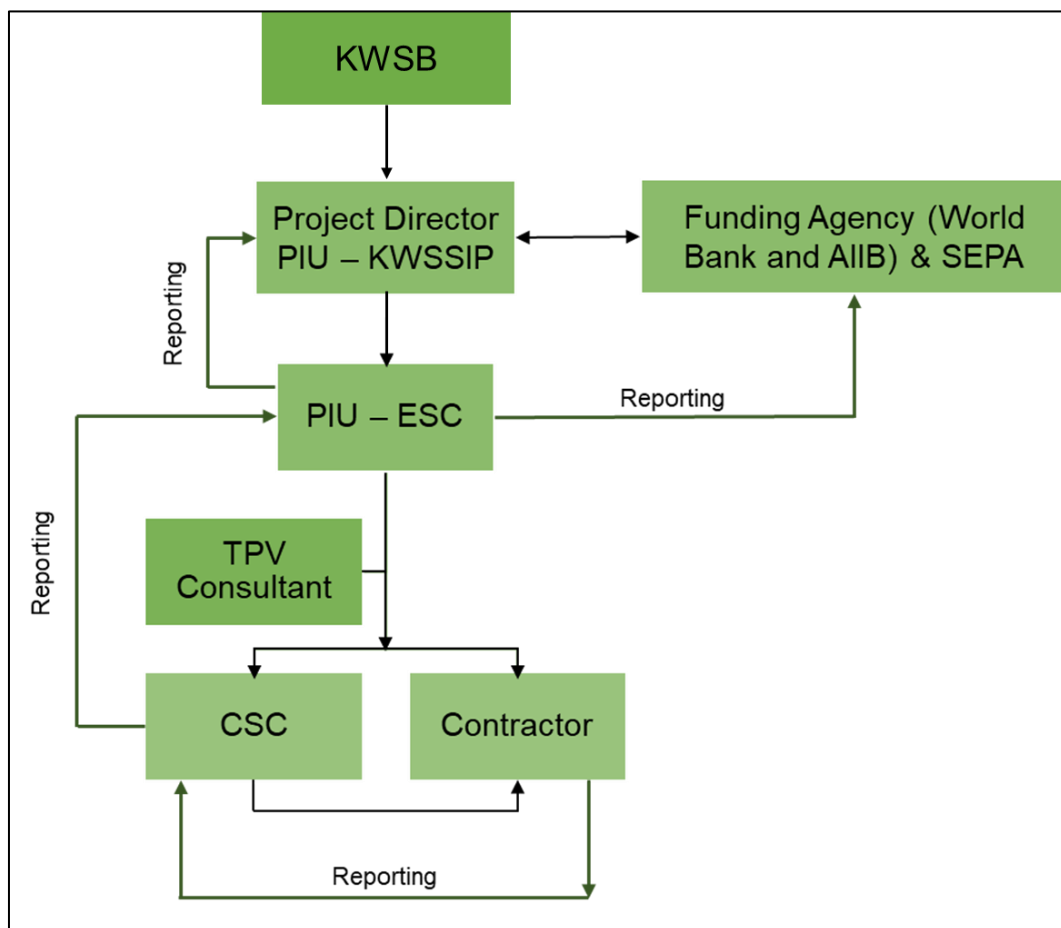


Figure 5-1: Organizational Setup for Implementation of ESMP at Construction Phase

The PIU KWSSIP-2 will bind Contractors through contract documents to implement the ESMP and other terms and conditions of the Environmental Permit of SEPA. The whole ESMP will be included in 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 relevant to agency requirements before the commencement of new works.

5.1.1 Roles and Responsibilities

a) SEPA

As per the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency (SEPA) approves the environmental and social impact assessment (ESIA) reports. SEPA will be responsible for granting a No Objection Certificate (NOC) for the ESMP before initiation of construction activities.

b) PIU (project Director)

The Project Implementation Unit (PIU)'s Project Director (PD) is the executive head of the entire KWSSIP-2 Project. The PD PIU is responsible for policy, administrative, and financial decisions and actions for effective and timely project implementation per the approved framework and schedule. The PD PIU will be responsible for overall project implementation, including environmental and social management and hiring contractors and consultants. PD PIU will approve the overall project and the ESMP budget and finances. The Government of Sindh will allocate these finances with assistance from the WB / AIIB.

c) Environment and Social Cell (ESC)

The Environment and Social Cell (ESC) is already established in the PIU, which currently consists of four specialists – two environment specialists, one social safeguard specialists and one gender specialist. However, one OHS specialist, one social development specialist, one junior gender specialist and four E&S officers will be added in project implementation stage.

The ESC will be responsible for implementing the ESMP and other related tasks and ensuring that the ESMPs are included in the contract documents. The ESC under PIU will take care of the E&S aspects of the project activities. ESC will arrange environmental and social monitoring, prepare compliance reports, and submit them to PD PIU for further submission to the WB, AIIB, and SEPA to fulfill their monitoring, reporting, and compliance requirements for E&S aspects of the project. The ESC will ensure compliance with ESMP during the construction phase. Compliance will require measurements of E&S parameters and observations at the construction sites to evaluate compliance. The specific roles and responsibilities of the ESC are as follows:

- ◆ Ensure that the required E&S training is provided to the concerned staff;
- ◆ Make sure that all the contractual obligations related to E&S compliance are met;
- ◆ Carry out regular site visits to the construction sites to review the E&S performance of the Contractor(s);
- ◆ Check regularly the ESMP implementation status of the project during the construction phase is being properly carried out;
- ◆ Review monitoring reports for the progress of E&S-related activities;
- ◆ Make sure that the Contractor is implementing the additional measures suggested by the SC in environmental and social monitoring reports;

- ◆ 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;
- ◆ Assist in the assessment of the livelihood loss and negotiation with the affected persons for fixation of compensation to be paid for temporary impacts;
- ◆ Assist the Contractor for the timely payments of negotiated prices;
- ◆ Assist the Contractor in obtaining necessary approvals from the concerned departments;
- ◆ Oversee the compliance of all the monitoring programs as given in ESMP;
- ◆ Report immediately to WB when E&S-related incidents and accidents occur;
- ◆ Maintain interface with the other lined departments/stakeholders and
- ◆ Report to the SEPA on the status of ESMP implementation.

d) Third Party Validation

The PIU will hire the services of an independent E&S consultancy firm for the Third-Party Validation (TPV). The TPV consultants will monitor the E&S parameters and conduct field surveys at the construction sites to evaluate compliance levels. They will be engaged to conduct the external and independent monitoring of the implementation of the ESMP. This external monitoring agency is to conduct biannual, annual, and final evaluations of the ESMP implementation and recommend changes if and when necessary to the ESC. The specific roles and responsibilities of a TPV consultant will be to:

- ◆ Carry out independent monitoring at critical locations during the construction phase and monitoring the implementation of ESMP at the project area;
- ◆ Monitor GRM and resolution of complaints;
- ◆ Inform ESC, WB, and AIIB of any significant impacts arising during construction;
- ◆ Observe and amend/prepare (if required) corrective action plans; and
- ◆ Monitor plan implementation along with project Implementation Consultant.

e) Construction Supervision Consultants (CSC)

The PIU will engage Construction Supervision Consultants (CSC) for the project. The CSC will conduct day-to-day monitoring of ESMP implementation, prepare monthly monitoring reports for each site, and submit them to ESC. The ESC will review the report, discuss it 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 monitoring and evaluation reports to PIU as per the 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 per the frequency mentioned in the construction phase 'Environmental Approval' requirements. The specific roles and responsibilities of the CSC will be as follows:

- ◆ Review and approve the Contractor's management plans;

- ◆ Oversee and supervise the performance of the Contractor to make sure that the Contractor(s) is complying with ESMP;
- ◆ Ensure that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner;
- ◆ Maintain close coordination with the Contractor and ESC;
- ◆ Prepare training materials and implementing training programs;
- ◆ Ensure the implementation of the mitigation measures suggested in ESMP;
- ◆ Supervise and monitor E&S activities being performed at the site;
- ◆ Organize periodic E&S training programs and workshops for the consultant's and Contractor's staff;
- ◆ Periodic reporting as mentioned in ESMP; and
- ◆ Suggest any additional mitigation measures (if required).

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

- ◆ E&S Team Leader – M.Sc. in Environmental Engineering with more than 20 years of professional experience, worked on at least two implementation projects as CSC.
- ◆ EHS Specialist– M.Sc. in Environmental Engineering with OHS Certification and 10 years of professional experience, worked on at least one implementation project CSC.
- ◆ Ecologist– M.Sc. in Ecology / Botany or similar with 08 years of professional experience related to safe tree cutting and vegetation removal, supervising compensatory plantation programs, implementing control measures to minimize disturbance to fauna, worked on at least one implementation project as CSC.
- ◆ Social and Gender Specialist– Degree. in Sociology with 10 years of professional experience, worked on at least one implementation project CSC.

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

f) Construction Contractor

Contractors will be bound to appoint site-based E&S Experts with relevant educational backgrounds and experience for each site. The contractors will be responsible for implementing measures to avoid or minimize adverse E&S impacts during construction. Contractors are required to prepare Site-Specific ESMP (SSESMP) demonstrating how 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 the following activities:

- ◆ Prepare SSESMP and obtain its approval from CSC;
- ◆ Implement mitigation measures as detailed in the ESMP, SSESMPs, and associated ESHS Plans at each construction site and throughout the project area;
- ◆ Take actions against all the special and general provisions of the contract document;

- ◆ Ensure compliance with ESMP recommendations and be responsible for effective liaison;
- ◆ Provide proper PPEs to the workers and train them for their proper use;
- ◆ Prepare and submit the monthly, quarterly, biannually, annual, and final progress reports to CSC;
- ◆ Report immediately to CSC and ESC when E&S incidents and accidents occur;
- ◆ Conduct the EHS training for the workers and
- ◆ Coordinate with CSC and ESC.

The Contractor will be required to have suitably qualified and experienced persons to function as environmental, social, and OHS Specialists, who will be working in close liaison with the ESC and CSC. Appropriate numbers of the following key personnel are required in the Contractor's team:

- ◆ Environmental Engineer (1 position) – B.Sc. in Environmental Engineering with 5 years of professional experience in project implementation.
- ◆ HSE Officer (1 position) – B.Sc. in Environmental Engineering with OHS Certification and 5 years of professional experience in project implementation.
- ◆ Gender / GRM Officer (1 position) – M.Sc. in Sociology with 05 years of professional experience in project implementation.
- ◆ Flag man (2 positions) – Valid work experience at project implementation site.

5.2 Institutional Arrangement for ESMP Implementation during O&M Phase

The KWSC will administrate the proposed project during the O&M phase. In the organizational hierarchy of KWSC, the Deputy Managing Director of Technical Services (DMDTS) will be responsible for the O&M of water supply and sewerage infrastructure. Each district's Chief Engineer will be solely responsible for the utility services in his respective district. The project operation will be under the direct jurisdiction of Engineers and Supervisors, respectively. Currently, KWSC has no full-time environmental and social management staff. An E&S cell is proposed to be established at KWSC to look after the operational phases of KWSSIP sub-projects. It is proposed that at least one environmental specialist, one social specialist, and one OHS specialist be hired full-time to effectively implement operational phase ESMP requirements at KWSSIP sub-projects. The monitoring and compliance of operational phase ESMP requirements will be under the responsibilities of Engineers / Supervisors for respective towns where priority sewer schemes are situated. These personnel will report to the DMDTS to comply with and monitor operational phase ESMP requirements. The staff will be responsible for the following:

- ◆ Coordinate to monitor environmental and social compliance during operation;
- ◆ Monitor and manage compensatory tree plantations at places to be identified by the PIU at the execution stage;
- ◆ Report on the O&M progress of environmental and social compliance to the SEPA (if required);
- ◆ Assess as well as mitigate potential operational phase environmental and social impacts and;
- ◆ Sustain a working partnership among the SEPA, Local Government Department, KMC, DMCs, public utilities, traffic police, NGOs, and other related public and private sector organizations.

5.3 ESMP Trainings

Training programs will be implemented during the project life cycle to ensure all staff receive the required training in both general and job-specific issues. Training will be provided to all recruits, and continual refresher courses will be organized for the existing staff. Implementing the E&S training would ensure that the requirements of the ESMP are transparent to all project personnel and followed accordingly throughout the project lifespan. Moreover, the training programs also ensure that all site personnel are well aware of their work responsibilities, the E&S requirements of the project, and how they will be implemented and monitored on-site. They will also be introduced to the potential impacts and risks of the project, including the mitigation and control measures adopted to address those impacts and risks and where to implement the appropriate measures.

Additionally, the training would make the staff aware of the roles of PIU, the CSC, the TPV, and the Contractors regarding E&S issues. Each organization will be responsible for providing training to their staff before the start of the project and during the project execution. Training will cover all staff levels, including management, supervisory personnel, and skilled and unskilled workforces.

Training program will consist of the following:

5.3.1 ESMP Implementation Training during Pre-construction Phase

CSC will organize training for PIU, CSC, and Contractor Management & Workers, and it will provide awareness on waste management, driving safety, standard operating procedures (SOPs) for construction works; community and occupational health and safety, core labor standards, code of conduct, avoidance of interaction with communities, outcomes of GBV/SEA/SH conducts, transmissible diseases, applicable E&S laws, sensitivity of the project area and key findings of the ESMP etc.

5.3.2 ESMP Implementation Training during Construction Phase

The training during the construction phase includes the following:

- ◆ Workers will be provided with weekly ESHS awareness sessions, daily toolbox talks, and induction training during worker appointments, covering topics including OHS/CHS protocols, avoidance/protocols of community interaction, etc.
- ◆ Drivers and operators would be regularly trained before and during field operations regarding road safety, defensive driving, waste disposal, cultural values, and social sensitivity.
- ◆ All site personnel would be educated about the proper use of personal protective equipment, camp operations and management, waste disposal, resource conservation, and housekeeping through regular weekly training.
- ◆ Workers will be provided with training on ESHS management related to site restoration works at the end of the construction phase.

5.3.3 Capacity Development Trainings

In addition to regular ESMP and H&S training, the Contractor will be required to organize capacity development training once before construction and monthly throughout the construction period for the key ESHS management staff, site supervisors, and project management personnel belonging to the

Contractor, PIU, and CSC for sensitizing them on effective ESHS management, relevant WB ESS and GoS requirements on ESHS management. An adequate budget for capacity development training in the ESMP cost has been maintained. A tentative training plan is presented in **Table 5-1**.

Table 5-1: Training Plan during the Construction Phase

No.	Training Activity	Participants	Trainer	Mode of Training	Content	Schedule
1.	Site Orientation and Induction	Contractor and Construction Supervision Consultant (CSC)	PIU KWSSIP-2	Presentation / Lecture	Awareness about site, working protocols	Once for everyone
2.	ESMP and Environment Code of Practices (ECPs)	Contractor	CSC and PIU KWSSIP-2	Presentation	Awareness and applicability of ESMP and ECPs	Monthly
3.	Emergency Response and Use of Fire Extinguishers	Contractor	CSC and PIU KWSSIP-2	Presentation	Potential natural and other hazard/emergencies and dealing with emergency and fire to minimize damage	Quarterly
4.	Resettlement Related Issues and Grievance Redress	Contractor	CSC and PIU KWSSIP-2	Presentation	Awareness on WB ESS5 (Involuntary Resettlement)	Quarterly
5.	Labor Management Procedures	Contractor	CSC and PIU KWSSIP-2	Presentation	Awareness on WB ESS2 (Labor and Working Conditions)	Quarterly
6.	Gender Aspects including GBV	Contractor	CSC and PIU KWSSIP-2	Presentation	Awareness on GBV, gender equality, gender related issues and their redress; awareness regarding Gender Action Plan (GAP)	Quarterly
7.	Stakeholder Engagement	Contractor	CSC and PIU KWSSIP-2	Presentation	Interaction with the Project Affected Peoples (PAPs) and Other Interested Parties, Awareness on WB ESS10 (Stakeholder Engagement)	Quarterly
8.	Awareness workshop regarding COVID-19 and other vector borne diseases	Contractor	CSC and PIU KWSSIP-2	Presentation	Risk, prevention, and available treatment	Semiannual
9.	First Aid and Cardiopulmonary resuscitation (CPR)	Contractor	CSC and PIU KWSSIP-2	Presentation	Onsite first aid procedures	Quarterly
10.	Compliance of SEPA NOC (Environmental Approval) and WB ESS	Contractor	CSC and PIU KWSSIP-2	Presentation	Awareness on SEPA NOC, rules, guidelines, regulation, and standards for	Semiannual

No.	Training Activity	Participants	Trainer	Mode of Training	Content	Schedule
					satisfactory compliance	
11.	Community Involvement for Ecological Sustainability	Community and Contractor	KMC, Park and Horticulture Department, Forest Department, Agriculture Department, CSC and PIU KWSSIP-2	Seminar and Workshop	Awareness on Plantation of beneficiary trees, protection of flora and fauna, ecological sustainability	Annual

5.4 Reporting and Documentation

The Contractor will prepare monthly reports detailing the progress on implementing the Project's Environmental, Social, Health and Safety (ESHS) Safeguards Requirements included in the ESMP. The PIU-ESC will also produce quarterly reports with CSC and Contractors' assistance.

Contractor's Monthly ESHS Reports. The monthly reports will provide the implementation status of the mitigation measures in the ESMP. It includes updates on the outcome of the field inspections carried out by the Contractor ESHS Teams and the status/results of ESHS monitoring as required under monitoring plans. The report will also provide details on all sorts of training conducted by the Contractor during the reporting month, details of complaints registered at the Project's GRM, and actions taken by the Contractor to resolve complaints.

CSC's Monthly ESHS Reports. Based on the Contractor's monthly reports, the CSC will validate the information provided in the Contractor's report, indicate the gaps in their field observations, and evaluate the Contractor's performance in implementing the project's ESHS safeguards. CSC Monthly Reports will also provide details on Corrective Action Plans (CAPs), agreed timelines for resolution of active ESHS issues, the status of penalties imposed by the CSC on Contractors for continual noncompliance, and the way forward suggested by the CSC. The report will also provide expert analysis on the adequacy of training organized by the Contractor, advice for the Contractor regarding realignment of the training program, independent analysis of GRM activities, and details/outcomes of stakeholder engagement activities carried out during the reporting month.

PIU's Quarterly Progress Reports on ESHS Management. The PIU will prepare the reports with assistance from CSC and Contractors. The report will provide a 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 noncompliance, recommended mitigation and corrective measures, GRM data, stakeholders engagement activities, ESHS training conducted, and environmental and OHS regulatory violations observed. If required, the monitoring reports will also be submitted to the SEPA under ESMP Approval Conditions.

PIU Reporting to WB. PIU will prepare and submit quarterly monitoring reports to the World Bank throughout project implementation on the 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 will also submit to the World Bank the Contractor's and CSC's monthly reports on ESHS performance following the metrics specified in the respective bidding documents and contracts.

Moreover, PIU will promptly notify the Bank no later than 48 hours after learning of any incident or accident related to the project that has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers, including, among other things, cases of sexual exploitation and abuse (SEA), sexual harassment (SH), and accidents that result in death, serious or multiple injuries or other examples of incidents and accidents, as appropriate for the type of operation. The incident report should provide sufficient detail regarding the scope, severity, and possible causes of the incident or accident, indicating immediate measures taken or planned to address it, and any information provided by any contractor and supervising firm, as appropriate.

Project's EHS Completion Report. At the end of construction, the PIU - ESC will submit a Project Completion Report, which will summarize the overall E&S impacts/risks that 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 learned.

5.5 Indicative ESMP Implementation Costs

Estimated cost estimates for the Contractor's staffing, implementation of mitigation measures, preventive actions, and monitoring are presented in **Table 5-2**. The total cost of ESMP implementation is estimated at **PKR 9.72 Million**.

Table 5-2: Estimated 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	2	One time	50,000	100,000
2	Vehicles, Generators and other emitting sources of fumes	1	2	One time	50,000	100,000
3	Noise Quality (24 hours specified in SEQs) – Pre-Construction Phase	1	2	One time	10,000	10,000
4	Waste Water samples collection and Laboratory analysis (SEQs parameters) - Construction Phase	1	1	One time	50,000	50,000
TOTAL-A						260,000
B- CONSTRUCTION PHASE (IMPLEMENTATION PHASE)						
5	Environmental Engineer	1		7	200,000	1,400,000
6	HSE Officer	1		7	150,000	1,050,000
7	Gender/GRM Officer	1		7	150,000	1,050,000
8	Flag man	2		7	60,000	840,000
9	Air Monitoring (Ambient Air)-24 Hrs as per SEPA standards	2	3	Quarterly	50,000	300,000

S. No.	Description	No	Samples	Frequency/ Months	Rate/unit	Amount (PKR)
10	Vehicles, Generators and other emitting sources of fumes	2	3	Quarterly	50,000	300,000
11	Noise Quality (24 hours specified in SEQS) – Purchase of Decibel meter	1		Once	10,000	10,000
12	Waste Water samples collection and Laboratory analysis (SEQS parameters) - Construction Phase	2	3	Quarterly	50,000	300,000
13	Fixed cost at project sites (PPEs, In-house, fire safety equipment, septic tanks, installation of noise / safety barriers)	7		Monthly	300,000	2,100,000
14	Provision of First Aid Facility including medicine	7		Monthly	100,000	700,000
15	Capacity Development Trainings: ESHS Management, Occupational & Community Health and Safety, Disease Prevention, Maintaining Community Values – Pre - Construction Phases	7		Monthly	50,000	350,000
16	Fire Safety Equipment, Installation of Noise / Safety Barriers, Signage, Site Waste Management (Bins / Skips) etc.	1		Once	200,000	200,000
Total-B						8,600,000
Total Amount (A-B)						8,860,000
Escalation and Contingencies on B					10%	860,000
Grand Total						9,720,000

5.6 Grievance Redress Mechanism

Grievance Redress Mechanism (GRM) intends to resolve a complaint as quickly and at as low a level as possible to avoid a minor issue becoming a significant grievance. Irrespective of the process stage, a complainant can pursue the grievance through the court following the law.

The Grievance Redress Committee (GRC) will work at the site, sub-project, and PIU levels. The E&S and engineering staff of PIU, in coordination with site staff, will inform the project affected and community members about the GRCs and their mechanism through consultations and by posting at prominent places. The complaints received through any media will be screened by type and category. These complaints will be registered in the Community Complaints Register (CCR), where the name and address of the complainant, date, description of the complaint, and action taken will be recorded. The following procedure will be used to redress the grievances:

- ◆ First, complaint resolution will be attempted to be addressed at community-GRC through the involvement of the field E&S/engineering staff. The community GRC will decide within five working days of receipt of the complaint. If unsettled, a grievance can be lodged to the sub-project GRC by the complainant or by the GRC;

- ◆ Sub-project GRC will acknowledge the receipt within two working days of the complaint lodging. Initial review and consultation with the sub-project GRC will be conducted within five working days of receipt of the complaint. If required, sub-project GRC will advise the E&S/engineering specialists to conduct field visits in consultation with the aggrieved persons/parties and the local community and submit a fact-finding report. Preferably, the fact-finding will be completed within eight working days of receiving complaints. Sub-project GRC will decide within ten working days of receipt of the complaint. If unresolved, a grievance will be lodged to the (PIU-GRC) by the complainant or by the GRC, and
- ◆ The PIU-GRC will decide within 20 working days of receipt of the complaint. If the complainant is still unsatisfied, they can pursue further by submitting the case to the appropriate court of law.

All E&S issues will be dealt with according to the above GRM procedures. The GRCs will hear and clarify with the complainant (if required) about the E&S issue and will conclude and communicate their recommendations for further implementation. The complainant will be kept informed during the process, and the GRC decision will be communicated accordingly. In case of any delay, the complainant will be informed of the progress and process of their grievance. The GRC proceedings will be documented step by step, and all records will be maintained and summarized in the project progress and internal monitoring reports.

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

The project will require public consultation and disclosure activities and mechanisms to continue beyond the ESIA process throughout the project's lifecycle to comply with WB ESS 10. The planned stakeholders' engagement activities in **Table 5-3** are aligned with the SEP requirements.

Stakeholder engagement activities will be documented and reported as part of reporting requirements. The profiles of the stakeholders being consulted will be established, and 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.

Table 5-3: Planned Stakeholder Engagement Activities for the Project

Target stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
Construction Phase				
Project Affected People <ul style="list-style-type: none"> ◆ People potentially affected by project activities ◆ People residing in project area vulnerable and disadvantaged households 	<ul style="list-style-type: none"> ◆ Grievance Mechanism / Health and Safety impacts / ESMP ◆ Community H&S, Community Concerns, Employment Opportunities / Project status 	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ 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) <ul style="list-style-type: none"> ◆ Governmental committees for land use and compensation ◆ Project area residents and representatives in communities 	<ul style="list-style-type: none"> ◆ Project scope, rationale, and E&S ◆ Principles / Grievance mechanism ◆ Project status ◆ World Bank compensation requirements 	<ul style="list-style-type: none"> ◆ Face-to-face meetings ◆ Joint public/community meetings with PAPs 	<ul style="list-style-type: none"> ◆ As needed (monthly during construction period) 	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Other Interested Parties (External) <ul style="list-style-type: none"> ◆ Press and media NGOs ◆ Businesses and business organizations ◆ Workers' organizations ◆ Academic institutions ◆ General public, ◆ Jobseekers 	<ul style="list-style-type: none"> ◆ Project information - scope and rationale and E&S principles ◆ Project status Health and safety impacts ◆ Employment opportunities ◆ Environmental concerns ◆ Grievance mechanism process 	<ul style="list-style-type: none"> ◆ 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 	Same as for PAPs	(PIU KWSSIP / CSC) Social Development and Environment Specialists

Target stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
		◆ Grievance mechanism		
Other Interested Parties (Internal) <ul style="list-style-type: none"> ◆ Other KWSSB staff Supervision Consultants, Contractor, sub-contractors, service providers, suppliers and their workers 	<ul style="list-style-type: none"> ◆ Project information: scope and rationale and E&S principles ◆ Training on ESMP requirements and other sub-management plans ◆ Worker grievance mechanism 	<ul style="list-style-type: none"> ◆ Face-to-face meetings ◆ Trainings/workshops ◆ Invitations to public/community meetings 	Daily, as needed	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Operation and Maintenance				
Project Affected People: <ul style="list-style-type: none"> ◆ People residing in project area ◆ Vulnerable / disadvantaged households 	<ul style="list-style-type: none"> ◆ Satisfaction with engagement activities and GRM <ul style="list-style-type: none"> ◆ Grievance mechanism process ◆ Damage claim process 	<ul style="list-style-type: none"> ◆ Outreach to individual PAPs ◆ KWSSIP website ◆ Grievance mechanism KWSSIP newsletter 	<ul style="list-style-type: none"> ◆ Outreach as needed Meetings in affected Project area ◆ Communities (as needed/requested) Monthly (newsletter) 	KWSC FPs Management
Other Interested Parties (External) <ul style="list-style-type: none"> ◆ Press and media ◆ NGOs ◆ Businesses and business organizations ◆ Workers' organizations ◆ Academic institutions ◆ Local Government ◆ Departments in Project area ◆ General public 	<ul style="list-style-type: none"> ◆ Grievance mechanism process ◆ Issues of concern ◆ Status and compliance report 	<ul style="list-style-type: none"> ◆ Grievance mechanism ◆ KWSSIP website ◆ Face-to-face meetings ◆ Submission of reports as required 	As needed	KWSC FPs Management

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Annexure 1: Project Background

Water is supplied to Karachi from Keenjhar Lake, located around 150 km away from the city. A considerable amount of the water supplied from the source is wasted because of theft and leakages in the bulk transmission network. This is not only causing loss of this precious and scarce commodity but also causing financial loss to KWSC due to frequent bursting and heavy leakages from the outlived PRCC pipe joints in the water trunk mains. The major objectives of the proposed Priority Water Network Rehabilitation and Extension Project are to reduce Non-Revenue Water (NRW) losses and water theft by replacing / repairing the outlived section of Old Pipri Main (OPM), New Pipri Main (NPM) and Korangi Mains, sealing the leaking joints, installing flow meters for quantifying the water being supplied and improving water quality by installing intermittent chlorination facilities at 25 selected pumping stations of the city. The integration of the project will strengthen the KWSC's water transmission infrastructure and increase KWSC's operational performance.

Karachi Water and Sewerage Services Improvement Project (KWSSIP)

In order to address the water supply and sewerage issues in Karachi, KWSSIP has been initiated as a phased program and agreed on a financing approach through SOPs with four overlapping phases. Following SOPs have been conceived under KWSSIP:

- ◆ SOP-1 (KWSSIP-1): Focuses on reforms, maintenance and rehabilitation
- ◆ SOP-2 (KWSSIP-2): To scale-up work done under the SOP-1
- ◆ SOP-3: Will focus on increasing water production and to ensure the additional wastewater created can be treated
- ◆ SOP-4: Will focus on improving services in informal settlements based on experience gained under the previous projects

Second Series of Project (SOP-2) or KWSSIP-2

The SOP-2 (or KWSSIP-2) involves scaling-up infrastructure rehabilitation and expansion, complemented by capacity building to raise operational performance and improvements to the enabling environment. KWSSIP-2 has the following components:

- ◆ Component 1 is related to the capacity building and reform measures to improve the utility performance, including more reliable and energy efficient services.
- ◆ Component 2 undertakes selected infrastructure, aimed at improving the water and sewerage services in Karachi, while also increasing the city's resilience to water shortages, floods, and saltwater intrusion.
- ◆ Component 3 deals with project management and associated studies.

Selection, design, and implementation of infrastructure subprojects identified under Component-2 is based on a set of screening criteria as part of a "Project Risk Reducing Procedure" (PRRP) and ensure compliance with the WB's ESF 2018 requirements. Following are the sub-projects included under Component 2 of KWSSIP-2:

- ◆ K-IV Augmentation (Installation of water main pipes to supply the treated water from K-IV Reservoirs to the existing water supply network);
- ◆ Malir Basin Wastewater Interceptors and Treatment Plant (TP-IV)
- ◆ Improving Water Supply and Sewerage in Ten (10) Low-Income Communities (Katchi Abadis);
- ◆ Priority Sewer Network Rehabilitation and Extension – Eight (08) Scheme;
- ◆ Priority Water Network Rehabilitation and Replacement of one 72” Diameter Raising Main (Rising Main No. 02) at Dhabeji Pumping Station, Sealing of PRCC Pipe Joints at New Pipri and Korangi Mains, Installation of Open Channel Flow Meters and Intermittent Chlorination Facilities at 25 Pump Houses;
- ◆ Reducing Energy Consumption at Dhabeji, NEK and Hub Pumping Stations; and
- ◆ Rehabilitation of Existing and Construction of New Filtration Plants to assure treatment of all water currently received.

Project Design and Environment & Social Assessment Study

Joint Venture comprising ILF Consulting Engineers - Austria and Techno Consult International (Pvt.) Limited have been engaged by the Project Implementation Unit (PIU) – KWSSIP for carrying out the feasibility study and detailed design of the project, whereas the consultancy services for carrying out its Environmental and Social Assessment (ESA) Studies have been assigned to MM Pakistan Pvt. Limited (MMP). Based on the updated detailed design information, below provides an overview of the project interventions.

- ◆ Replacement of 4.5 km long rising mains no. 02 with 72” MS pipelines starting from Dhabeji Pumping Complex (DPC) to Fore-bay High point.
- ◆ Rehabilitation of New Pipri Main (NPM) of diameters 54” & 48” PRCC pipe from Pipri Reservoir to Y - junction with external joint sealing
- ◆ Rehabilitation of Korangi Main 66”, 48” & 33” diameter PRCC pipe from Y Point to Shan Chowrangi with external joint repairing
- ◆ Installation of Radar based Non-contact Open Channel Flow Meters at the upstream of Keenjhar Gujju (KG) Canal, Greater Karachi (GK) Canal, K-II Canal and downstream of KG Canal
- ◆ Installation of Intermediate Chlorination Facilities at twenty-five (25) Pumping Stations

Project works will be performed through four construction packages, which includes the following:

- ◆ Package 01: Laying and installation of a new 4.5 km long 72” diameter MS Rising Main No. 02 starting from the Dhabeji Pump Station up to the Forebay High point, including installation of Air Release Valves.
- ◆ Package 02: Rehabilitation of New Pipri Main (NPM) of diameters 54” & 48” PRCC pipe from Pipri Reservoir to Y - junction with external / internal joint sealing, Rehabilitation of Korangi Main 66”, 48” & 33” diameter PRCC pipe from Y Point to Shan Chowrangi with external / internal joint repairing and replacement of defective air valves and installation of new air valves with chambers at all lines.

- ◆ Package 03: Installation of Radar based non-contact Open Channel Flow Meters at the upstream of KG canal, GK canal, K-II canal and downstream of KG canal (04 Nos. Flow Meters).
- ◆ Package 04: Installation of Intermittent Chlorination Systems at 25 Nos. selected distribution pumping stations.

Requirement to Conduct ESMP / EMP Study

Considering the scope of the project's construction activities and prevailing conditions of project area, the proposed project has been classified as Environmentally and Socially 'Moderate' based on the WB Environmental and Social Framework (ESF), 2018, for which preparation of an Environmental and Social Management Plan (ESMP) deemed appropriate. The project may cause site specific and low intensity impacts, whereas the implementation of mitigation measures will further reduce the magnitude of these impacts. To fulfil the WB ESF, 2018, an ESMP has been prepared.

The Sindh Environmental Protection Act - 2014 is the core environmental law for the proposed project, and Sindh Environmental Protection Agency (SEPA) is the concerned authority with respect to environmental approvals. Under Section 17 of the Act, it is mandatory for the proponents of the projects to execute appropriate studies such as preparing Environmental Checklist, Environmental Assessment, Environmental Management Plan (EMP), Initial Environmental Examination (IEE) and/ or Environmental Impact Assessment (EIA), where warranted, and get the approval from SEPA prior to commencement of any project works. The proposed Priority Water Network Rehabilitation and Extension Project falls under **Schedule I**, and an Environmental Management Plan (EMP) will be submitted to SEPA. Review process at SEPA takes approximately thirty (30) days for granting approval.

This ESMP will also be submitted as an EMP to SEPA by KWSSIP for SEPA approval.

Other Environmental and Social Studies

Besides this ESMP, the following documents prepared for the whole KWSSIP-2 project¹, also apply to the proposed project:

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

ESMP Study Area - Area of Influence (Aoi)

The area of influence (Aoi) covers the areas likely to be directly or indirectly impacted by the Project, i.e., Direct Impact Area (DIA) and Indirect Impact Area (IIA). DIA includes the core project construction sites where direct impacts of construction activities are envisaged such as cutting of trees. IIA includes areas / communities adjacent to the core project construction sites that may experience impacts (e.g.,

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, Reducing Energy Consumption, and Rehabilitation of Existing and Construction of New Filtration Plants.

nuisance associated with traffic congestion, community safety, dust or noise, odor etc.) during construction or operation phases of the Project.

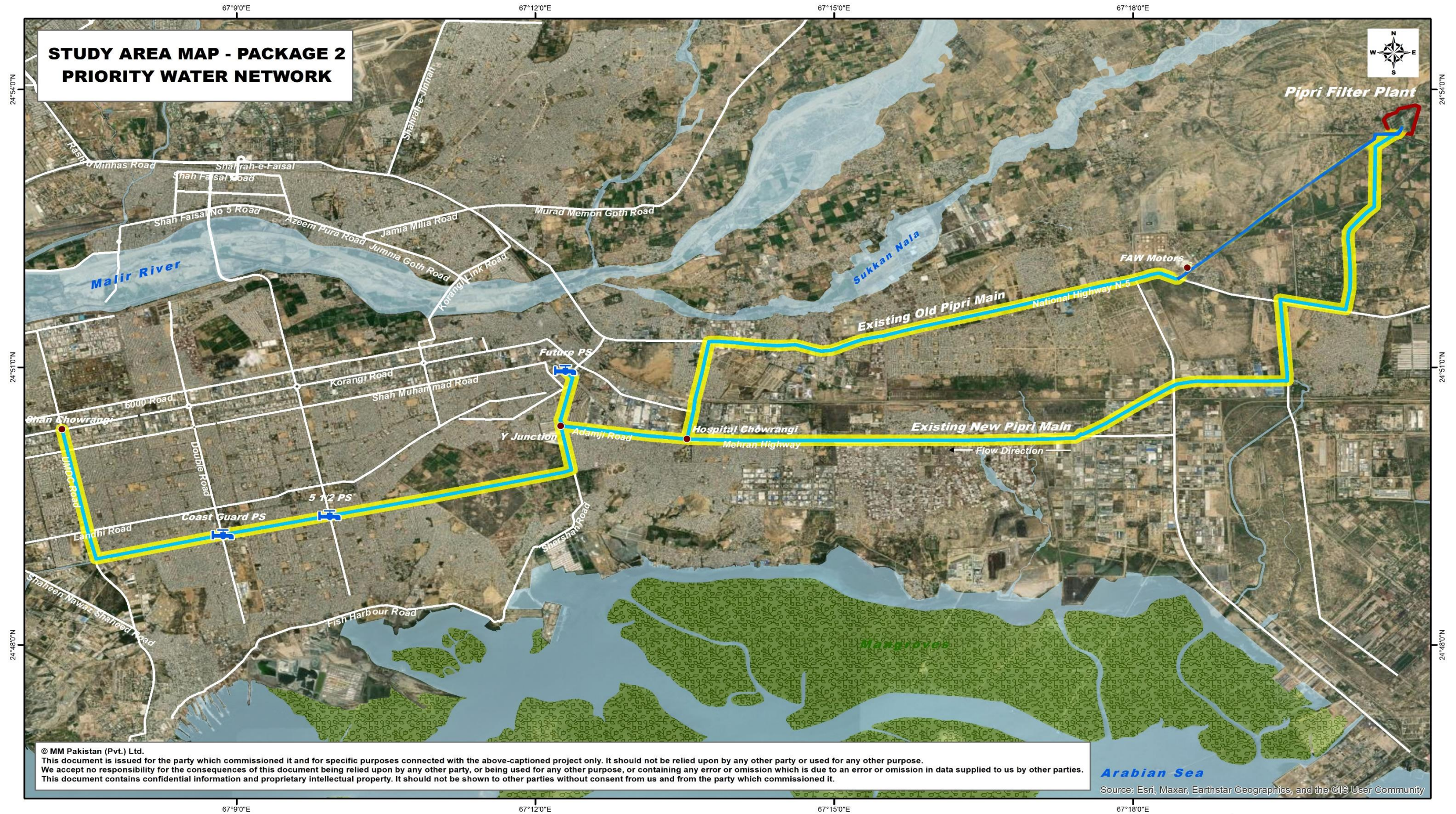
Table A1-1 defines the Areas of Influence (AoI) covering both Direct Impact Area (DIA) and Indirect Impact Area (IIA) which have been considered for the assessment of impacts. The extent of the IIA has been determined by the reach of impacts such as noise and air pollution etc. **Figure A1-1** to **Figure A1-4** describe the AoI in the form of maps.

Table A1-1: Project Area of Influence

No.	Project Components / Sites	Direct Impact Area (DIA)	Indirect Impact Area (IIA)
1	Rising Mains No. 02 spanning over 4.5 km from Dhabeji Pumping Complex (DPC) to Fore-bay High point.	Main construction / trenching area, space for the movement of machinery / dumper trucks and spaces for temporarily stocking the excavated material along excavated trenches.	200 m (100 m from the center line on both sides)
2	Construction Site Location	Main site area	100 m radius
3	Repair of New Pipri and Korangi Bulk Water Mains	Main construction / trenching / repairing areas, spaces for the movement of machinery / dumper trucks, space for temporarily stocking pipes and excavated material nearby excavated areas.	200 m (100 m from the center line on both sides)
4	25 Nos. selected pump houses for installation of chlorination facilities	Main site area within existing pump house boundaries	50 m radius



Figure A1-1: Project Area of Influence for Package 01



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Client: Karachi Water & Sewerage Services Improvement Project	Consultant: MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2	Legend <ul style="list-style-type: none"> Pumping Stations Existing PRCC Mains Package 2 - Existing PRCC Mains Area of Influence - 200m Filter Plant Boundary 		Drawn: T. Noman
		Coordinate System: UTM 42N			Checked: M.A Shishmahal Approved: P. Anjum Date: 9/15/2023 Scale: 1: 65,000 Sheet Size: A 4

Figure A1-2: Project Area of Influence for Package – 02

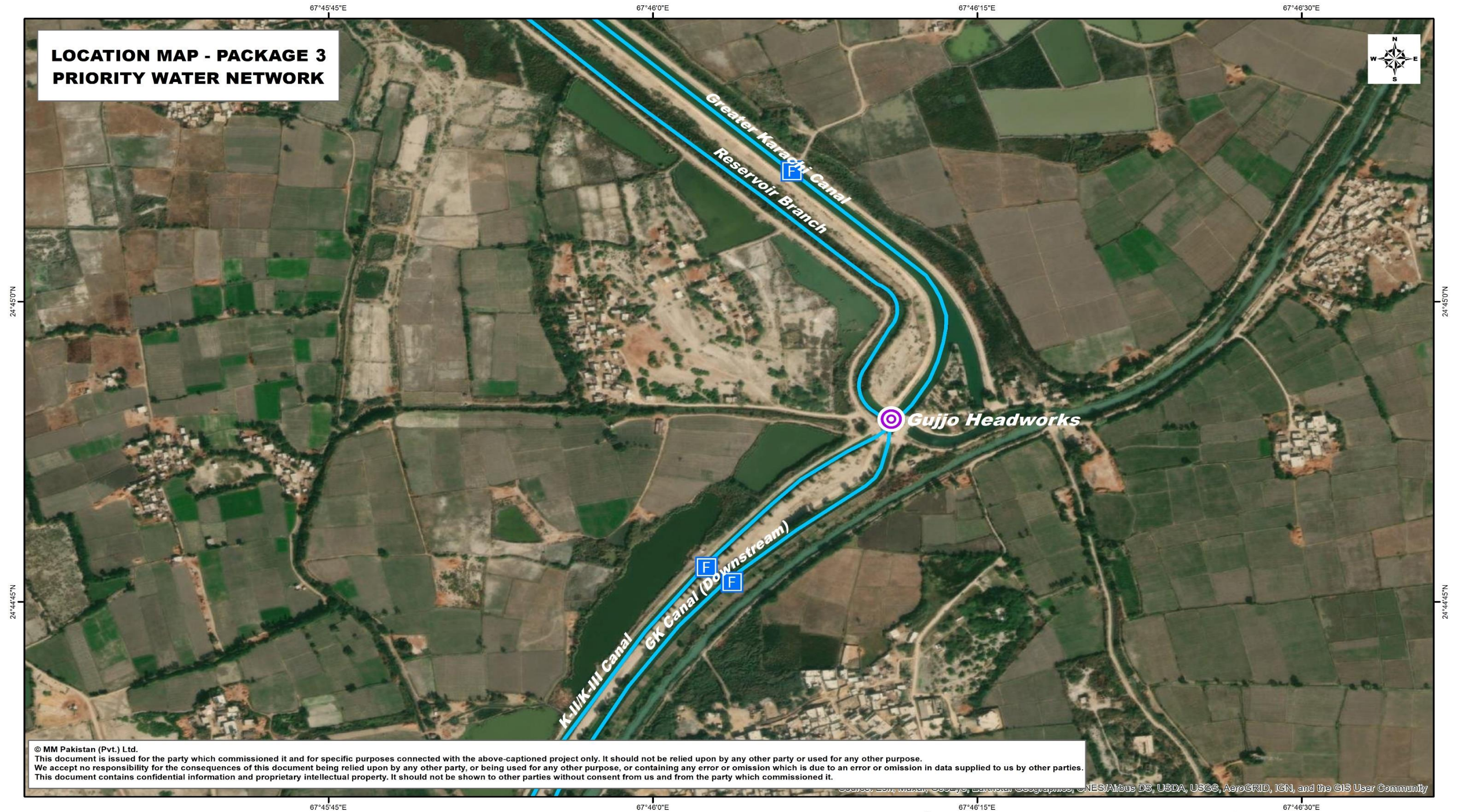
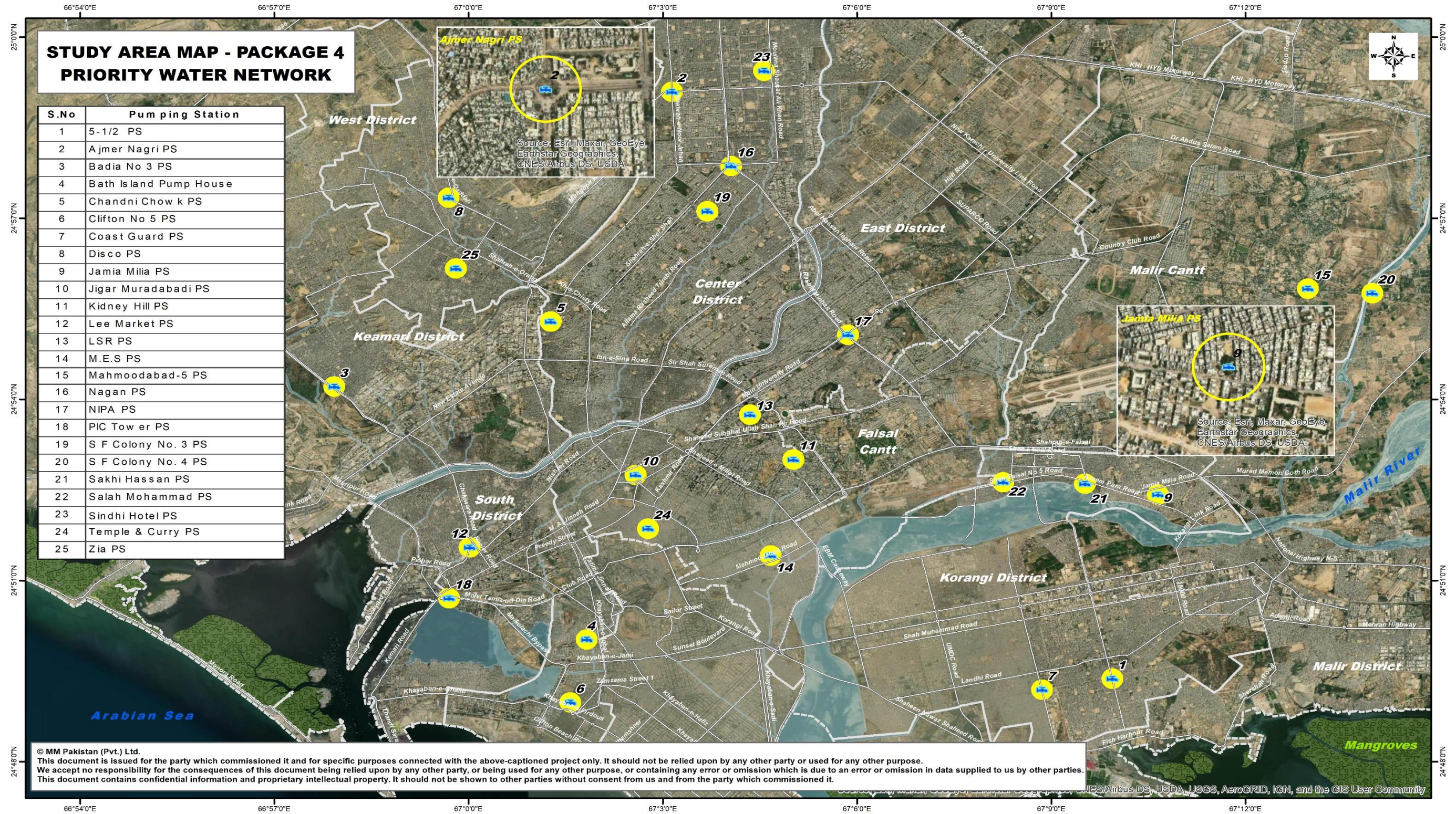


Figure A1-3: Project Location Map – Installation of Open Channel Flow Meters



**STUDY AREA MAP - PACKAGE 4
PRIORITY WATER NETWORK**

S.No	Pumping Station
1	5-1/2 PS
2	Ajmer Nagri PS
3	Badia No 3 PS
4	Bath Island Pump House
5	Chandni Chow k PS
6	Clifton No 5 PS
7	Coast Guard PS
8	Disco PS
9	Jamia Milla PS
10	Jigar Muradabadi PS
11	Kidney Hill PS
12	Lee Market PS
13	LSR PS
14	M.E.S PS
15	Mahmoodabad-5 PS
16	Nagan PS
17	NIPA PS
18	PIC Tow er PS
19	S F Colony No. 3 PS
20	S F Colony No. 4 PS
21	Sakhi Hassan PS
22	Salah Mohammad PS
23	Sindhi Hotel PS
24	Temple & Curry PS
25	Zia PS

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Client: Karachi Water & Sewerage Services Improvement Project	Consultant: MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2	Legend Package 5 WPS - Chlorination Area of Influence - 100 m District Boundary		Drawn: T. Noman
		Coordinate System: UTM 42N			Checked: M.A Shishmahal Approved: P. Anjum Date: 8/29/2022 Scale: 1: 100,000 Sheet Size: A 4

Figure A1-4: Project Area of Influence for Package – 04

ESMP Study Methodology

The ESMP study has been carried out in compliance with the mitigation hierarchy as per the World Bank's ESF. Impacts and risks associated with the project's pre-construction, construction and operational phases have been assessed following the World Bank ESS guidelines. Accordingly, mitigation and control strategies have been devised to address the potentially significant environmental and social risks associated with the project. The following methodology was employed for the preparation of the ESMP:

Review of Project's Design Documents and Desk Research for Secondary Data Analysis

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

Reconnaissance Surveys, Delineation of the Area of Influence (Aol) and Environmental & Social Screening

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. Aol has been decided by the consultants' 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, the type of assessment to be carried out and the appropriate ESA instrument required for the project.

Review of Legislation and Guidelines

National 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.

Primary Data Collection (Baseline Surveys)

Comprehensive field data gathering exercises were carried out for environmental and social baseline data collection in the Aol. In this regard, the Environmental, Ecology and Social Teams have performed detailed field surveys between December 2021 and April 2022.

The environment survey focused on site-specific baseline information of the project area related to water quality, air quality, noise, traffic situation, land-use, sensitive receptors that could get affected by dust or noise and presence of any historical / cultural / archaeological sites etc.

The ecology team has recorded the vegetation growing in the Aol and prepared an Inventory of the trees that are growing in the Direct Impact Area and shall require to be cut during construction activities.

The photographs of un-identified plants were captured and identified later using “PLANTNET²” software. The 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 in the AoI.

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 the specific aspects of socio-economic profile of the project area related to households, education, health situation, diseases, income, gender related problems, businesses, presence of social organizations and political patterns etc.

Stakeholder Consultations

Stakeholder consultations were carried out with all key stakeholders, particularly local communities residing in the project’s AoI, local businesses and government / local government bodies in line with the WB ESS 10. A series of scoping sessions were undertaken with the local communities / residents, representatives from educational institutes and health care facilities, NGO/CBO, government departments, District Municipal Corporation (DMC) officials etc. The stakeholder consultation process involved verbal disclosure regarding the project development with stakeholders to brief them about project and to seek their response/recommendation. A stakeholder engagement workshop has also been organized to disseminate the project information and get feedback from the key institutional stakeholders.

Impacts Identification and Assessment

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

Recommendations for Mitigation Measures

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

Preparation of Environmental and Social Impact Assessment (ESIA)

An Environmental and Social Impact Assessment (ESIA) has been prepared for effective implementation of the recommended mitigation measures. The ESIA 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 ESIA has identified roles and responsibilities of all concerned parties during the implementation of the project.

Methodology for the ESIA comprises a series of integrated tasks including fieldwork (e.g., surveys, consultations etc.) and desk reviews as deemed necessary to meet the needs of the ESIA.

² 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.

Annexure 2: Legal and Institutional Framework

General

This Chapter summarizes the national, provincial, the World Bank and international environmental and social legislations, regulations, standards, and treaties relevant to this ESA Study. The footprint of the Project is in the administrative boundaries of Sindh, therefore the rules, regulations, and standards applicable in Sindh are applicable to this project. World Bank's ESF and the ESS relevant to this project are duly described in this section. World Bank's EHS Guidelines will also be followed to make the project implementation in compliance with these guidelines.

Applicable National and Provincial Policies

Pakistan has in place a comprehensive constitutional, policy framework for the protection of the environment and people. This section is structured around the constitutional foundation and legislative hierarchy. An overview of relevant national policies is presented here. The full list of relevant policies is provided in **Table A2-1**.

Table A2-1: Applicable National and Provincial Policies and Guidelines

National Policies (Year of implementation)	Relevance / Applicability
National Conservation Strategy (NCS), 1992	The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core area relevant in the context of the proposed project development is the conservation of water.
National Climate Change Policy, 2012	The policy commits for responding appropriately for mitigation and adaptation to climate change through tools of environmental assessment, environmental management and environmental enhancement. The present ESMP has been prepared in consistence with this policy.
National Water Policy, 2002	Objectives of this policy include, efficient management and conservation of existing water resources, optimal development of potential water resources and improved flood control and protective measures. The policy requires municipal entities to treat effluents and hazardous discharge before disposal into water bodies. This project has considered the goals of this policy.
Sindh Drinking Water Policy, 2017	The policy is aimed to provide safely managed drinking water whose supply is adequate, well maintained and sustainable. The proposed project will also be a contribution towards fulfilment of this policy.
1st Sindh Labour Policy, 2018	This policy aims at decent working conditions following the international labour standards and asks for improvement in health and safety of workers and timely payment of wages. This policy requires the stakeholders in developing strategies, plans and programs for the protection and promotion of the rights and benefits of working community without jeopardizing the genuine concerns of the employers, through any project /activity in the Sindh province and as such applicable.
Guidelines for Public Consultation, 1997	Public involvement can lead to a better and more acceptable decision for project implementation; hence, the project has considered these guidelines for completing this ESMP Study.

Relevant Applicable Sections of Provincial Environmental Laws / Acts

Table A2-2 enlists the key sections of the Sindh Environment Protection Act that have a direct bearing on the project area.

Table A2-2: Key Sections of Sindh Environment Protection Act for Project

Environmental Legislation	SEPA 2014	Relevance with Project
<p>Prohibition of Certain Discharges or Emissions: No person shall discharge or emit, or allow the discharge or emission of, any effluent or waste or air pollutant or noise in an amount, concentration or level, which is in excess to that specified in Sindh Environmental Quality Standards.</p>	Section 11 of Act	<p>Applicable</p> <p>The project is required to show the compliance of provincial standards related with pollutants emission.</p>
<p>Handling of Hazardous Substances: No person shall import, generate, collect, consign, transport, treat, dispose of, store, handle or otherwise use or deal with any hazardous substance except (a) under a license issued by the EPA or (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement, or other Instrument to which Government is a party.”</p>	Section 13 of Act	<p>Applicable</p> <p>The project is required to show the compliance of provincial and international standards related with Handling of Hazardous Substances.</p>
<p>Regulation of motor vehicles: No person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of subsection (g) of sub-section (1) of section 6.</p>	Section 15 of Act	<p>Applicable</p> <p>The project is required to show the compliance of provincial standards related with Handling of Motor Vehicles.</p>
<p>EC, EA, EMP, IEE and EIA: No proponent of a project shall commence construction or operation unless he has filed with the EPA an EC, EA, EMP, IEE or an EIA, and has obtained from the Agency approval in respect thereof.</p>	Section 17 of Act	<p>Applicable</p> <p>The project is required to obtain environmental approval before commencement of work from Sindh EPA under this section of the Act.</p>
<p>Environmental Monitoring: For purposes of sub-section (1), the Agency may require the person in charge of a project to furnish such information as it may specify pertaining to the environmental impact of the project, including quantitative and qualitative analysis of - (a) discharge of effluents, wastes, emissions of air pollutants, noise and any other matter or action that may be found offensive under section 14 from the project on daily, weekly, monthly or annual basis; (b) ambient quality of the air, water, noise and soil before, during and after construction and during operation of the project. (3) On review of the</p>	Section 19 of Act	<p>Applicable</p> <p>The project proponent (KWSSIP / KWSC) shall submit various environmental monitoring reports to as per SEPA directives.</p>

Environmental Legislation	SEPA 2014	Relevance with Project
data collected by it and information provided, the Agency may issue such directions to the person in charge as it may consider necessary to ensure compliance with the conditions of the approval.		
<p>Penalties: Whoever contravenes or fails to comply with the provisions of sections 11, 17, 18 and 21 or any order issued there under shall be punishable with a fine which may extend to five million rupees, to the damage caused to environment and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues: Penalties. Provided that if the contravention of the provisions of section 11 also constitutes a contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2).</p>	Section 22 of Act	<p>Applicable</p> <p>The project proponent (KWSSIP / KWSC) shall ensure compliance of all regulatory requirements in relation to the project.</p>

Review of the National and Provincial Environmental Requirements

The applicable Environmental and Social (E&S) legislations and regulations are briefly described in **Table A2-3**.

Table A2-3 Applicable National and Provincial Acts

National/Provincial Acts (Year of implementation)	Relevance / Applicability
Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021	The proposed project falls under Schedule I , requiring submission of an Environmental Management Plan (EMP) to SEPA.
Sindh Environmental Quality Standards 2016	<p>Standards set out in SEQS and relevant to the Project include:</p> <ul style="list-style-type: none"> ◆ 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). <p>These standards will be applicable for the construction phase of the project.</p>
Sindh Solid Waste Management Board (SSWMB) Act, 2014	The SSWMB Act, 2014, ensures effective waste management practices, aligning with the project's commitment to environmental sustainability by minimizing waste generation during construction and rehabilitation activities. The act's guidelines help maintain a clean and safe working environment, supporting the project's goal of infrastructure enhancement.
The Karachi Water and Sewerage Corporation Act, 1996 (Amendment 2015)	The Amendment to the Karachi Water and Sewerage Corporation Act, 1996, strengthens the legal framework for water supply and sanitation services in the city. The amended act fosters cooperation between project stakeholders, aiding the project's

National/Provincial Acts (Year of implementation)	Relevance / Applicability
	efforts to improve water distribution infrastructure and ensure equitable access to clean water for Karachi's residents.
Hazardous Substances Rules, 2014	The Hazardous Substances Rules, 2014, align with the project's commitment to worker and public safety. By adhering to these rules, the project ensures proper handling, storage, and disposal of hazardous materials, safeguarding both the environment and the health of workers and nearby communities during the rehabilitation of water supply lines and other components under the project.
Sindh Plantation, Maintenance of Trees and Public Parks Ordinance, 2002	The Sindh Plantation, Maintenance of Trees and Public Parks Ordinance, 2002 prohibits the cutting of trees in the project area and prior permission from the Local Government Department (LGD - GoS) shall be needed as per the ordinance for any tree cutting activity during the project construction. Since, the project involves cutting of trees coming under the DIA, prior permission and consent of the LGD – GoS shall be sought. Contractors and sub-contractors will have to comply with this Act.
Antiquity Act (1975) and the Sindh Cultural Heritage (Preservation) Act, 1994	The Antiquities Act of 1975 and the Sindh Cultural Heritage (Preservation) Act, 1994 ensures the protection of cultural resources / assets in Sindh. The act is 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 may relevant.
Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020	This Act requires measures for direct protection to the wildlife resources in Sindh province and indirect protection to other natural resources and allows the project to work on the principles of no harm. This act is relevant to the project as the faunal species detailed under Section 0 could be encountered during construction activities, hence implementation of this law shall be mandatory during the construction phase of the project.
Pakistan Labor laws	Labor rights in Pakistan specified under Article 11 and 17 of the constitution of Pakistan, shall be applicable to the proposed project. More specific laws are described separately. The laws are relevant to 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 Labor works in the province of Sindh and 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 Labor System (Abolition) Act, 2015	The Bonded Labor System (Abolition) Act defines the `Bonded Labor System' as a system of forced, or partly forced, Labor under which a debtor enters, or is presumed to have entered into an agreement with the creditor. Adherence to the act is 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 industrial and commercial undertakings and establishments in Sindh province. Adherence to the act is mandatory.
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. Adherence to the act is 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	An Act to prohibit the employment of children and to regulate employment of adolescents in certain occupations and processes to be taken place in provincial boundaries. 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.
The Sindh Local Government (Amendment) Act, 2021	<p>The LGA empowers the provincial governments to enforce laws for:</p> <ul style="list-style-type: none"> ◆ 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. <p>Under the act, the local councils are authorized to restrict activities causing pollution. The Project will be required to follow the provisions of the LGA with regards to pollution of air, water and land.</p>

Applicability of Stringent Environmental Quality Standards

According to the WB ESF, when host country requirements differ from the levels and measures presented in the EHSGs, the Bank will require the proponent to achieve or implement whichever is more stringent. In this regard, the comparison and applicability of relevant local and international environmental quality standards is discussed as follows:

Comparison and Applicability of SEQs vs WHO / WBG Standards on Drinking Water Quality

A comparison of local and international water quality standards is provided as **Table A2-4**. The more stringent of the two should be followed during the construction stage (drinking water quality for labor and workers) and during the operational stage while assessing the quality of treated water from the pump houses equipped with intermittent chlorination system under the project. 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 A2-4: Comparison of Local and International Drinking Water Quality Standards

Parameter	Unit	SEPA	WHO / WBG
Bacterial			
E-Coli	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Total Coliform	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Physical			
Color	TCU	≤ 15 TCU	≤ 15 TCU
Taste	No objectionable / Acceptable	None	None
Odor	No objectionable / Acceptable	None	None
Turbidity	NTU	< 5 NTU	< 5 NTU
Total Hardness	mg/l	< 500 mg/l	-
TDS	mg/l	< 1000	< 1000
pH		6.5-8.5	-
Chemical			
Aluminum	mg/l	≤0.2	0.2
Antimony	mg/l	≤0.005	0.02
Arsenic	mg/l	≤0.05	0.01
Barium	mg/l	0.7	0.7
Boron	mg/l	0.3	0.3
Cadmium	mg/l	0.01	0.003
Chloride	mg/l	<250	250
Chromium	mg/l	≤0.05	0.05
Copper	mg/l	2	2
Cyanide	mg/l	≤0.05	0.07
Fluoride	mg/l	<1.5	1.5
Lead	mg/l	≤0.05	0.01
Manganese	mg/l	≤0.5	0.5
Mercury	mg/l	≤0.001	0.001
Nickel	mg/l	≤0.02	0.02
Nitrate	mg/l	≤0.50	50
Nitrite	mg/l	≤3	3
Selenium	mg/l	0.01	0.01
Residual Chlorine	mg/l	0.2-0.5 at consumer end	-
Zinc	mg/l	5.0	3

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

Comparison of local and international air quality standards is provided as **Table A2-5**. The more stringent of the two will be followed during the project construction and implementation. The stringent of the two are highlighted with green, which are applicable at the project.

Table A2-5: 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	120 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

Comparison and Applicability of SEQs vs WHO / WBG Standards on Noise

Comparison of local and international noise standards are provided as **Table A2-6**. The more stringent of the two will 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 A2-6: 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

International Treaties and Conventions

Pakistan is a signatory to a number of international environment and social related treaties, conventions, declarations and protocols. The relevant international treaties and conventions to the project to which Pakistan is a party are as follows:

ILO's Fundamental Conventions – Ratified by Pakistan

The following ILO's fundamental convention 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)

World Bank Environmental, Health and Safety Guidelines

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) and the EHS Guidelines for Water and Sanitation (2007).

World Bank Environmental and Social Framework

The World Bank ESF sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of ESS that are designed to for environmental and social sustainability. There are 10 Environmental and Social Standards and their applicability on project is given in **Table A2-7**.

Table A2-7: 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	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ 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 ESMP 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. ◆ 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	Labor and Working Conditions	<ul style="list-style-type: none"> ◆ 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 labor and child labor. ◆ Support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law. ◆ Provide project workers with accessible means to raise workplace concerns. 	<ul style="list-style-type: none"> ◆ The project will employ direct workers (project managers and supervisors, employees of KWSSIP / KWSC); indirect workers (employees of Contractors and Construction Supervision Consultant) (CSC). Contractors might further engage subcontractors. In all cases, labor laws and guidelines shall be implemented to safeguard the labor rights. ◆ Influx of migrant labor from other districts for construction works is a norm, however, it will be minimized by employing local workers. ◆ Implementation of Grievance Redress Mechanism (GRM), Workers Code of Conduct (CoC), OHS Plan and, guidelines on non-discrimination, equal opportunity, protecting workers and communities from Sexual Exploitation and Abuse / Sexual Harassments (SEA/SH), prohibition of child / forced labor etc. shall be ensured.

	Environmental and Social Standards	Description	Relevance with Project and Actions (to be) Taken
ESS 3	Resource Efficiency and Pollution Prevention and Management	<ul style="list-style-type: none"> ◆ 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. 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. 	<ul style="list-style-type: none"> ◆ With respect to Resource Efficiency, the project preparation and the ESMP process have identified feasible measures for efficient (a) energy use; (b) water usage and management to minimize water usage during construction, conservation measures to offset total construction water demand and maintain balance for demand of water resources; and (c) raw materials use by exploring use of local materials, recycled construction materials. ◆ With respect to Pollution Management, as part of the ESMP, prevention and management measures have been devised to offset risks and impacts of pollution from potential sources such as dust and emissions from operation of construction equipment, material haulage vehicles; effluents and wastewater from labor camps, construction camp; spillage or leakage during handling of hazardous materials like petroleum fuel, battery wastes etc.; and disposal of wastes generated during project implementation period.
ESS 4	Community Health and Safety (CHS)	<ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> ◆ CHS will be ensured through suitable measures as incorporated in the ESMP and they will also be made an integral part of the Contractor's Site Specific Environmental Social Management Plan (SSESMP). Contractor's SSESMP will also include OHS / CHS Plans, and other plans. ◆ If the Contractor needs to use security arrangements and personnel to safeguard the project sites, it shall abide by the principal of proportionality and GIIP and the relevant laws related to hiring, rules of conduct, training and equipping such workers. ◆ Security Management Guidelines for Contractors

	Environmental and Social Standards	Description	Relevance with Project and Actions (to be) Taken
ESS 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	<ul style="list-style-type: none"> ◆ ESS 6 requires protection and conservation of biodiversity and habitats, application of the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity. It requires promoting the sustainable management of living natural resources. 	<ul style="list-style-type: none"> ◆ For project's construction phase, site clearance activities will involve clearance of vegetation and cutting of trees. To compensate the loss, compensatory tree plantation will be performed with the ratio of 10:1 (10 trees in compensation to each affected tree). Compensation for clearing shrubs shall also be made by the Contractor by compensatory plantation of ornamental shrubs. ◆ While clearing vegetation and excavation it shall be ensured that no wildlife get injured or killed. ◆ Construction work that may generate high noise levels will not be carried out during night time so that there would be no disturbance to local birds and fauna; ◆ Workers shall be provided with adequate knowledge regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching.
ESS 10	Stakeholder Engagement and Information Disclosure	<ul style="list-style-type: none"> ◆ Requires establishment of a systematic approach to stakeholder engagement that helps the project proponent identify stakeholders and maintain a constructive relationship with them. ◆ Requires assessment of 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. 	<ul style="list-style-type: none"> ◆ The ESMP will be disclosed both at the KWSSIP and Bank's websites. ◆ Engagement with communities shall continue throughout the construction phase in order to keep them aware about the project progress and to encourage them in registering any complaints through the Project's GRM. ◆ Contractor shall prepare a project specific Stakeholder Engagement and Communication Plan (SECP) for implementation during the construction phase of the project. This plan shall be made part of the SSESMP. Guidelines for preparing project specific plans.

Project Categorization

Sindh EPA

The project falls in the category of projects requiring submission of an Environmental Management Plan (EMP) to SEPA, as listed under Schedule I of the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021.

Environmental and Social Framework of World Bank

The World Bank Environmental and Social Framework uses categories of High Risk, Substantial Risk, Moderate Risk or Low Risk. Based on these risk categories, the following tools alone, in combination or their specific elements are required to be prepared by the borrower to fulfil WB ESF requirements:

- ◆ Environmental and Social Impact Assessment (ESIA);
- ◆ Environmental Audit;
- ◆ Hazard or Risk Assessment;
- ◆ Social and Conflict Analysis;
- ◆ Environmental and Social Management Plan (ESMP);
- ◆ Environmental and Social Management Framework (ESMF);
- ◆ Regional or Sectoral EIA;
- ◆ Strategic Environmental and Social Assessment (SESA).

Considering the scope of project's construction activities and prevailing conditions of project area, the proposed project has been classified as Environmentally and Socially 'Moderate' based on the WB ESF, 2018, therefore, the combined E&S risk rating is "Moderate Risk" for which an ESMP is required.

Major E&S impacts associated with different phases of the project are as follows:

Pre-Construction Phase

- i. Lack of appropriate E&S personnel with CSC, and Contractors
- ii. Traffic related impacts due to inadequate planning

Construction Phase

- i. Inadequate Implementation of ESMP, OHS, CHS and Other Specific Plans.
- ii. Nuisance to public due to the generation of noise and dust
- iii. Generation of excavated material
- iv. Solid waste and wastewater generation from campsite
- v. Soil contamination due to construction activities
- vi. Occupational and community health and safety risks associated with construction works
- vii. Construction traffic management and safety
- viii. Vegetation loss

ix. Labour influx / SEA – SH – GBV Incidents

Operational Phase

i. OHS Issues and handling of sodium hypochlorite

All the identified E&S impacts have been assessed as reversible in nature and manageable through the implementation of mitigation measures discussed in the subsequent sections of the report. With the implementation of the mitigations, the residual impacts of the project shall be short-term and site-specific without likelihood of going beyond the actual footprint of the project.

Annexure 3: Project Description

Project Background

Major volume of bulk water is supplied to Karachi through a complex transmission system comprising of canals, conduits, syphons and large diameter pipes ranging from 48" to 84" and a gigantic pumping complex at Dhabeji; comprising of 06 pumping stations, lifting around 500 MGD water to a high point (Fore-bay) for its onward transmission to the city through gravitational flow. Most of the bulk water lines are made up of PRCC pipes having rubber ring gaskets at the joints. These lines were laid decades back and their rubber rings have lost flexibility because of ageing. Resultantly a large quantity of water is wasted through these leaking joints that also become a source of water contamination as well as contributing to high non-revenue water (NRW) losses. Moreover, in the absence of the flow measurement devices at bulk transmission systems, it is not possible to measure the actual bulk transmission losses. With the passage of time, this water loss is further intensifying due to ageing lines and unauthorised use of water especially from the bulk transmission system passing through remote areas and un-authorised settlements located along and even on top of the transmission network. While it is essential to enhance the water supply to the city in order to meet the ever-increasing water demand, reduction of water loss through leakages and control on NRW is equally important, not only for saving this precious commodity but also to improve the revenue and financial health of KWSC.

Due to non-availability of adequate financial resources, KWSC has not been able to spend much on the maintenance of this huge water supply infrastructure which results in frequent breakdowns, reduced performance, and efficiency of delivering quality water services.

Keeping in view the above, rehabilitation of priority water networks and improvement of associated infrastructure has been made part of the SOP – 02 investments under KWSSIP, with an aim of improving the performance and reliability of the bulk transmission network by rehabilitation or replacement of the leaking water trunk mains, measurement of bulk water supply by installation of flow meters on open channels, replacement of old / worn out regulating valves with remote control actuated valves and improving the water quality through intermittent chlorine injection at 25 pumping stations.

The information provided in this chapter is based upon the feasibility reports and other related information provided by the Technical Consultants.

Project Components

The Project comprises following four construction packages:

1. **Package 01:** Laying and installation of a new 4.5 km long 72" diameter MS Rising Main No. 02 starting from the Dhabeji Pump Station up to the Forebay High-point, including installation of Air Release Valves.
2. **Package 02:** Rehabilitation of New Pipri Main (NPM) of diameters 54" & 48" PRCC pipe from Pipri Reservoir to Y - junction with external / internal joint sealing, Rehabilitation of Korangi Main 66", 48" & 33" diameter PRCC pipe from Y Point to Shan Chowrangi with external / internal joint repairing and replacement of defective air valves and installation of new air valves with chambers at all lines.

3. **Package 03:** Installation of Radar based non-contact Open Channel Flow Meters at the upstream of KG canal, GK canal, K-II canal and downstream of KG canal (04 Nos. Flow Meters).
4. **Package 04:** Installation of Intermittent Chlorination Systems at 25 Nos. selected distribution pumping stations.

Package 01 - Laying and installation of a new 4.5 km long 72" diameter MS Rising Main No. 02 and Installation of Air Release Valves

The Project comprises of laying and installation of a new 72" diameter MS Rising Main starting from the Dhabeji Pump Station up to the Forebay High point, including installation of Air Release Valves. From Dhabeji Pumping Station, around 500 MGD water is pumped to Fore-bay High Point which is located approximately 4.5 km North, North-East through six pumping stations and 10 rising mains. Eight of the rising mains are of MS pipe whereas two are of PRCC pipe. The PRCC rising mains are decades old and have numerous leaking joints with history of frequent bursting. One of these PRCC rising mains is rising main # 02 which is in very poor condition and usually bursts once or twice a month. The bursting of rising mains does not only cause disruption of water supply to the city but also causes huge financial loss on account of emergency repair of the burst lines again and again. Under the proposed project, replacement of rising main # 02 is proposed with MS pipe of the same size i.e., 72 inches along with replacement / installation of air valves and their chambers. The replacement of air valves is proposed to avoid the water loss from the leaking air valves and for the safety of the rising main.

a) Location and Right of Way (RoW)

Dhabeji pumping complex is in Union Council Dhabeji – Tehsil Mirpur Sakro, District Thatta, whereas the Forebay (High point) is in the jurisdictions of Union Council Ghagar - Bin Qasim Town, District Malir. KWSC owns a 1000 ft wide – Right of Way (RoW) from DPC to Forebay, in which sufficient space is available for replacing the old and laying of two new proposed MS lines.

b) Crossing the National Highway (N-5) and the Main Railway Track (ML-1)

Laying of the new rising main no. 02 will involve crossing of National Highway and main railway line (ML-1) track. According to the Technical Consultants, disturbance to N5 and ML-1 will be avoided by utilizing existing pipeline sleeves as casing to cross the two. Provision for pipe jacking (trenchless micro-tunnelling) has also been kept for the safe side. In any of the two cases, the N-5 and ML-1 will not be disturbed.

c) Construction Camp Locations

Suitable spaces are available for the establishment of campsites between National Highway and National Railway Track within the 1000 ft wide RoW. Location map of the project as well as proposed location for campsite and locations where jacking will be employed i.e., N5 / Railway line crossings are shown in **Figure A3-1**.



Figure A3-1: Project Location Map - Dhabeji Rising Main No. 02 Rehabilitation and Proposed Campsite Location

d) Utilities - Water / Power Requirement for Construction Phase

The work will involve little use of water as most of the work shall be related to MS pipe laying. Water for drinking purpose and concrete work of chambers will be arranged by the Contractor through bowsers. Estimated water consumption will be 1000 gallons per day. Electricity shall be required mainly for welding works. For generating electricity, the Contractor shall use diesel-fired generators. For construction camp too, electricity will be managed by using small generators.

e) Construction Equipment Requirement

1. Excavators -2 Nos.
2. Crane - 2 Nos.
3. Generator for Camp and Site for Welding purpose- 2+1 Nos.
4. Welding plants - 2 Nos.
5. Submersible Pumps with Generators - 5 Nos.
6. Dumpers - 2 Nos.
7. Loaders - 2 Nos.
8. Internal CC lining equipment - 1 No.

f) Source and Quantities of Construction Material

MS Pipes will be procured from the two pipe factories located near Nooriabad and Kotri. Bedding material and aggregates required for concreting of chambers will be brought from the quarries along M-9 Motorway.

g) Estimated Quantities of Excavated Material / Surplus Material

It is estimated that approximately 38,484 cubic feet of excavated material will be generated from the construction activities which will be utilized in backfilling works.

h) Implementation Timeline

Construction period shall be 180 days.

i) Manpower Requirement for Construction Phase

1. Project Manager / Engineer In-charge
2. Site Engineers - 2 Nos.
3. Supervisors - 3 Nos.
4. Submersible Pumps Operators & Generator Operators - 5 Nos.
5. Excavator Operators - 2 Nos.
6. Excavator Operators - Helpers - 2 Nos.
7. Crane Operators - 2 Nos.
8. Crane Operators Helpers - 2 Nos.
9. Generator Operators for the Welding Plants - 2 Nos.
10. Dumper & Loader Operators - 4 Nos.
11. Dumper & Loader Helpers - 4 Nos.

- 12. Mechanics - 2 Nos.
 - 13. Helpers with Mechanic - 2 Nos.
 - 14. Site Labour - 20 Nos.
- Total = 53

Package 02: External / Internal Sealing of Joints of NPM from Pipri Reservoir to Y – Junction, Korangi Main from Y - Junction to Shan Chowrangi and Replacement / Installation of Defective Air Valves

NPM originates from the Pipri Filtration Plant reservoir and terminates into 66-inch diameter Korangi Main at the intersection of Mehran Highway and Lalabad Road known as Y-Point. After passing through Gulshan-e-Hadeed, it crosses the National highway near Steel Mills roundabout, takes a right turn on Mehran Highway and then goes straight up to the Y-Point Landhi. The total length of this line is around 19.4 km out of which the initial section of around 17.2 km is 54-inch diameter and the remaining 2.2 km section is 48 inches. It feeds a large area comprising of Bin Qasim Industrial Estate Area (Economic Processing Zone), Cattle Colony, Landhi Industrial area, and residential colonies along Mehran Highway before its termination point at Y-Point where it drops into 66-inch dia Korangi main.

The 66-inch diameter Korangi Main (KM) starts from the Future pump house, reduces to 48 inch after Korangi 5^{1/2} and reduces gradually to a 33 inch further downstream, with termination point at Shan Chowrangi.

All the lines are composed of 16-ft long PRCC pipes having rubber ring gaskets at the joints. These joints have numerous minor and major leakages which are causing not only the wastage of a huge quantity of water but also damage to the pipe reinforcement reducing its useful life.

After conditional assessment of these lines, the Technical Consultant – Group 05 has proposed majorly external sealing of leaking joints, however internal sealing option is also proposed for locations where the lines are encroached to avoid resettlement or livelihood disturbance issues.

According to the Technical Consultants, for external sealing of around 100 nos. joints, 15 feet deep and 10 feet wide excavation will be done, whereas for internal sealing of joints, an entrance for labour shall be made after every 1000 feet at lines greater than 48-inch diameter and at every 500 feet for less than 48 inch diameter lines at suitable locations. For external sealing works, closure of water supply will not be required, however for internal joint repair works, temporary / periodic closure shall be needed. Moreover, repair of defective air valves on all the lines shall also be performed to avoid the water loss from the leaking air valves and for the safety of these mains.

a) Location and Right of Way (RoW)

The project area for this component falls under the jurisdiction of Bin Qasim Town, District Malir and Landhi / Korangi Towns, District Korangi. According to the Technical Consultants, NPM and KM lines are primarily laid under the maiden and service roads and no RoW is fixed for this line. Overall, 15 feet deep & 10 feet wide excavation shall be made to expose the joints for external repair or for making workers entrance into the line for internal repair, and this space, along with space required for machinery movement is generally available throughout the corridor.

Location map for this project component as well as proposed campsite location for this package is shown in **Figure A3-2**.

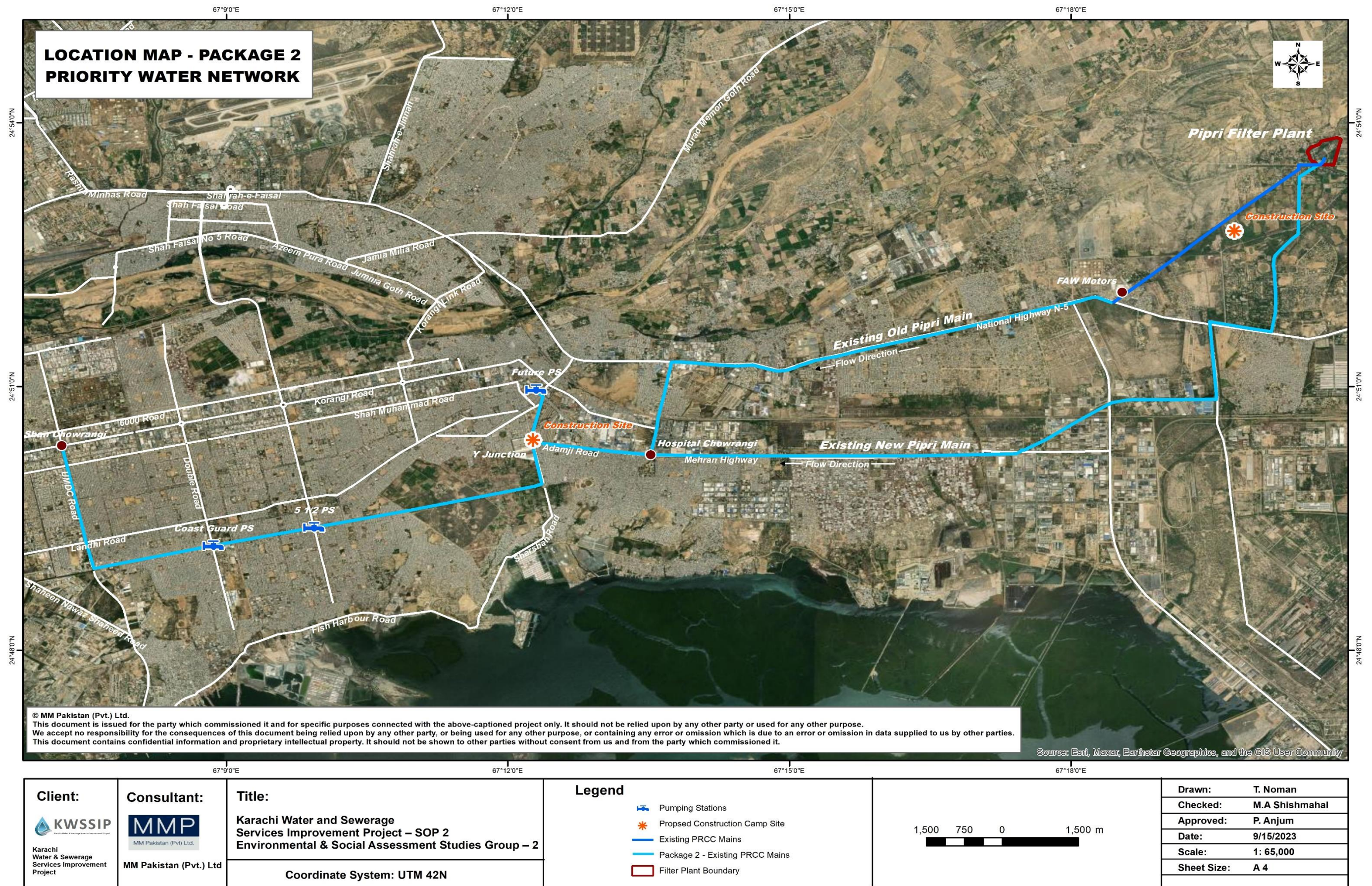


Figure A3-2: Project Location Map – Rehabilitation of NPM and KM

b) Utilities - Water / Power Requirement for Construction Phase

This joint repair work does not require much use of water except for drinking purposes which will be managed by the Contractor through bowsers. Power would be required for air compressors which will be managed through generators.

c) Construction Equipment Requirement

1. Excavators - 20 Nos. (10 for each line i.e., NPM, KM)
2. Generator for Campsite - 1 Nos.
3. Submersible Pumps with Generators - 40 Nos. (20 for each line i.e., NPM, KM)
4. Dumpers - 6 Nos. (3 for each line i.e., NPM, KM)
5. Loaders - 6 Nos. (3 for each line i.e., NPM, KM)

d) Source and Quantities of Construction Material

Imported materials will be used for sealing joints that include Hydraulic Cement & Thermoplastic Joint Tape. The required material will be arranged by the contractor having expertise in this field.

e) Estimated Quantities of Excavated Material / Surplus Material

It is estimated that approximately 164,230 ft³ of excavated material will be generated from the construction activities of this component and will be backfilled after completion of repair works.

f) Implementation Timeline

Construction period will be of 180 days.

g) Manpower Requirement for Construction Phase

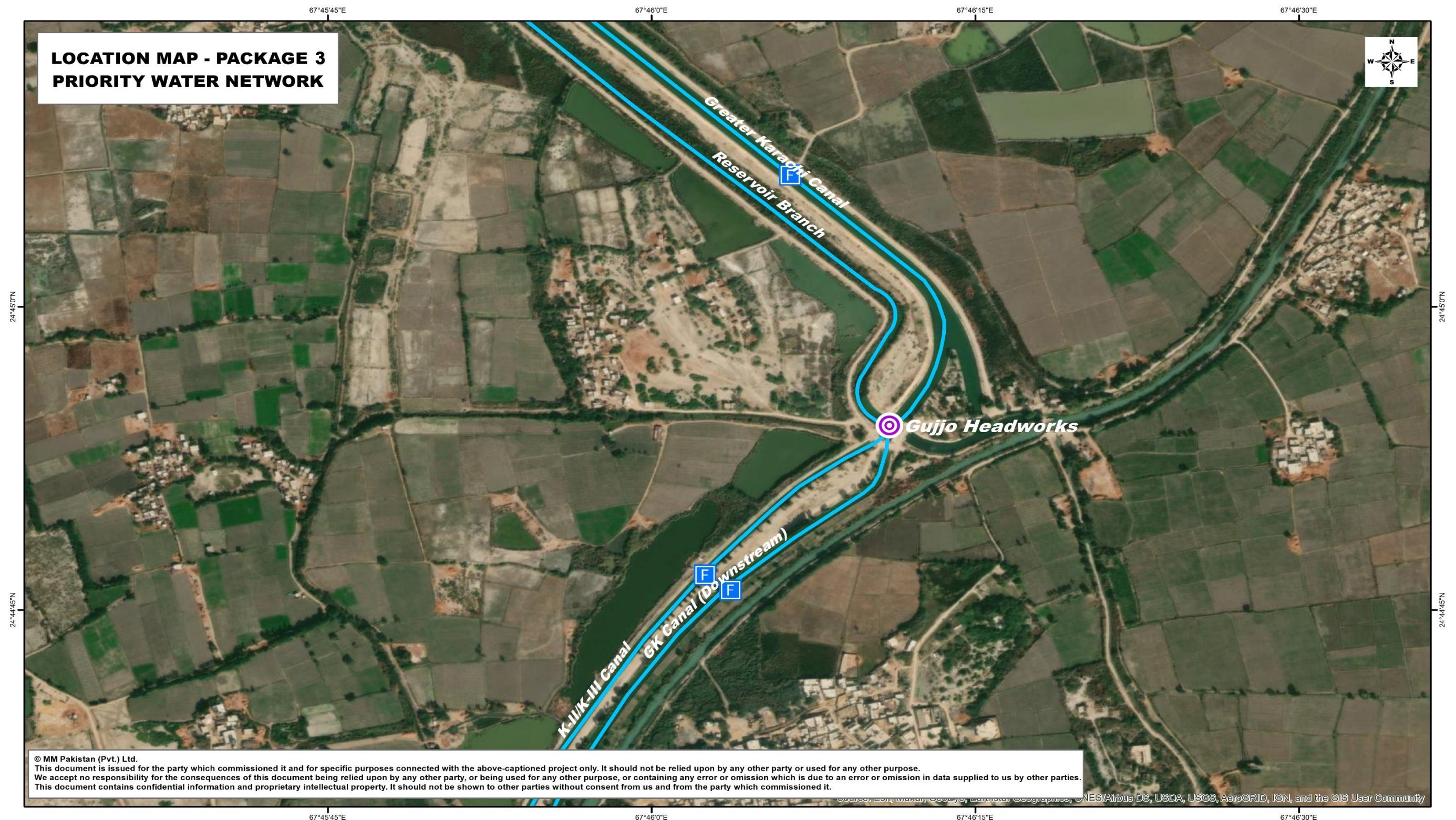
1. Project Manager / Engineer In-charge
2. Site Engineers - 3 Nos.
3. Supervisors - 15 Nos.
4. Technicians – 30 Nos.
5. Submersible Pumps Operators & Generator Operators - 30 Nos.
6. Excavator Operators - 30 Nos.
7. Excavator Operators - Helpers - 30 Nos.
8. Dumper & Loader Operators - 18 Nos.
9. Dumper & Loader Helpers - 18 Nos.
10. Mechanics - 9 Nos.
11. Helpers with Mechanic - 9 Nos.
12. Site Labour - 60 Nos.

Total = 253.

Package 03: Installation of Open Channel Flow Meters at Upstream KG Canal, GK Canal, K-II Canal and Downstream KG canal

A total of four open channel flow meters will be installed under the project. Two of them will be installed at the upstream and downstream of 1200 cusec capacity KG canal originating from Kinjhar Lake and one each at the upstream of K-II and GK canal originating from KG canal 29.3 km downstream the Chilya headwork. Radar based non-contact flow meters have been selected keeping in view ease of installation, maintenance, and data transfer / collection. Installation of these flow meters will enable KWSC to have a better control on recording bulk water supply drawn from the source and reaching at the DPC and to devise a strategy to minimize the transmission losses / theft of water from the canals.

Location map for this project component is shown as **Figure A3-3**.



Client: Karachi Water & Sewerage Services Improvement Project	Consultant: MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2	Legend <ul style="list-style-type: none"> Headworks Proposed Flow Meters Existing Bulk Water Mains 		Drawn: T. Noman
		Coordinate System: UTM 42N			Checked: M.A Shishmahal Approved: P. Anjum Date: 9/26/2022 Scale: 1: 5,000 Sheet Size: A 4

Figure A3-3: Project Location Map – Installation of Open Channel Flow Meters

a) Utilities - Water / Power Requirement for Construction

Water would only be required for concreting of footings, and it will be arranged through bowsers. For welding works, the contractors will use stand-by generators. Solar panels will be installed for meeting the operational phase power requirements of flow meters.

b) Estimated Quantities of Excavated Material / Surplus Material

It is estimated that approximately 400 ft³ of excavated material will be generated from the construction activities of this component and all the material will be utilized for backfilling.

c) Implementation Timeline

Construction period will be of 30 days.

d) Manpower Requirement for Construction Phase

1. Supervisors - 1 No.
2. Site Labour / Installers - 12 Nos.

Total = 13.

Package 04: Installation of Intermittent Chlorination Systems at 25 Nos. Selected Distribution Pumping Stations

Due to the gap between the designed filtration capacity of KWSC's existing Filtration Plants and the actual quantity of water being routed through them, the excess water is being by-passed to the filtered water reservoirs untreated. Post chlorination for by-passed untreated water is being done at the filtered water reservoirs, however it is not effective as most of the gas is evaporated. At the filtration plants too, the existing chlorination mechanisms are also not up to the mark and the chlorinators often remain out of order. On the supply end, the decades old distribution system is facing degradation of pipelines and leakages of joints. The negative pressure developed during the closure or low water pressure causes infiltration of dirty water from the leaking joints and the chlorine dose provided at the filtration plants is consumed in between the filtration plants and the pump houses. According to the KWSC's list of Residual Chlorine Values at 51 pump stations of Karachi, residual chlorine levels of 0.5 to 1 ppm has only been recorded at the outlets of 03 out of 51 pump stations.

In view of the above circumstances, the major aim of this project component is to equip 25 of 51 most critical pumping stations where no residual chlorine is found, with intermittent chlorination facilities so that residual chlorine levels of at least 2.0 ppm are maintained in the pumped water. The minimum recommended World Health Organization (WHO) value for free chlorine residual in treated drinking water is 0.2 ppm whereas the Centres for Disease Control and Prevention (CDC) - USA recommends that the residual chlorine levels should not exceed 2.0 ppm due to taste concerns.

a) Selection of 25 Nos. Distribution Pumping Stations

The Group 05 Technical Consultants in consultation with the concerned KWSC Officials including Chief Engineer (E&M), Chief Engineer (Water Distribution) and Chief Chemist (KWSC), made the selection

of 25 most critical pump houses for chlorination out of given list of 51 pump houses. The selection has been done keeping in view the parameters including:

- ◆ Residual chlorine levels at the pumping stations
- ◆ If free chlorine is available at the pumping stations, then its status at the tail-end consumers
- ◆ Service area of the pumping station
- ◆ Population served
- ◆ Quantity of water pumped daily / monthly
- ◆ Availability of space for installation of the chlorination system

The list of selected pump houses was submitted to KWSSIP for approval and the approval has been accorded. The Technical Consultants also collected freshwater samples from all 25 selected distribution pump houses and got them tested from PCRWR. The test results show the same results as given in the list provided by the Client in the ToRs, except some small variations at few pump houses.

The approved list of 25 pump houses with recorded Residual Chlorine levels is given as **Table A3-1**.

Table A3-1: Approved list of 25 pump houses with recorded residual chlorine levels

No.	Description	Location	Residual Chlorine Level (ppm)	
			As per Annexure – C of ToRs	As per PCRWR test report
1	LSR pump house	Gulshan e Iqbal	Nil	Nil
2	Kidney Hills Pump House	Dhoraji Area	Nil	Nil
3	Temple & Curry Reservoir and Pump house	Jamshed Town	Traces	Nil
4	Saleh Muhammad Pump House	Malir	Nil	Nil
5	Korangi 5 ½ Pump House	Korangi # 5 ½	Nil	Nil
6	Sakhi Hassan Pump House	North Nazimabad	Nil	0.5
7	Coast Guard Pump House	Coast Guard Chowrangi	Nil	Nil
8	NIPA Pump house	NIPA Chowrangi Gulshan e Iqbal	0.5	0.05
9	Nagan Chowrangi Pumping Station	North Karachi & North Nazimabad	Nil	Nil
10	Jamia Milya Pump House	Shah Faisal Colony	Nil	Nil
11	Shah Faisal Colony # 4 Pump House.	Shah Faisal Colony	Nil	Nil
12	Shah Faisal Colony # 3 Pump House.	Shah Faisal Colony	Nil	Nil
13	Sindhi Hotel Pump house	North Karachi Town	Traces	Nil
14	Clifton No. 5 Pump house	Clifton/ Saddar Town	Nil	Nil
15	M.E.S. Pump house	Malir Cantonment	Nil	Nil
16	Baldia 3 No. Pump House	Mohajir Camp, Baldia Town	Nil	Nil

No.	Description	Location	Residual Chlorine Level (ppm)	
			As per Annexure – C of ToRs	As per PCRWR test report
17	Disco More Pump House	Orangi Town	Nil	Nil
18	Lee Market	Saddar Khjoor Bazar	Nil	Nil
19	Chandni Chowk Pump House	Nazimabad.	Nil	Nil
20	Jigar Muradabadi Pump House	Jigar Muradabadi Road	Nil	1.5
21	Mahmoodabad Pump House	Mahmoudabad No. 5,	Nil	Nil
22	PIC Pump House (PRC Tower)	ver Kemari Town	Nil	0.1
23	Ajmair Nagri Pump House	North Karachi	Traces	Nil
24	Zia Pump house	4/10-A Orangi Town	Nil	Nil
25	Bath Island Pump House	Clifton	Nil	Nil

Figure A3-4 shows the locations of selected pump houses for installation of intermittent chlorination.

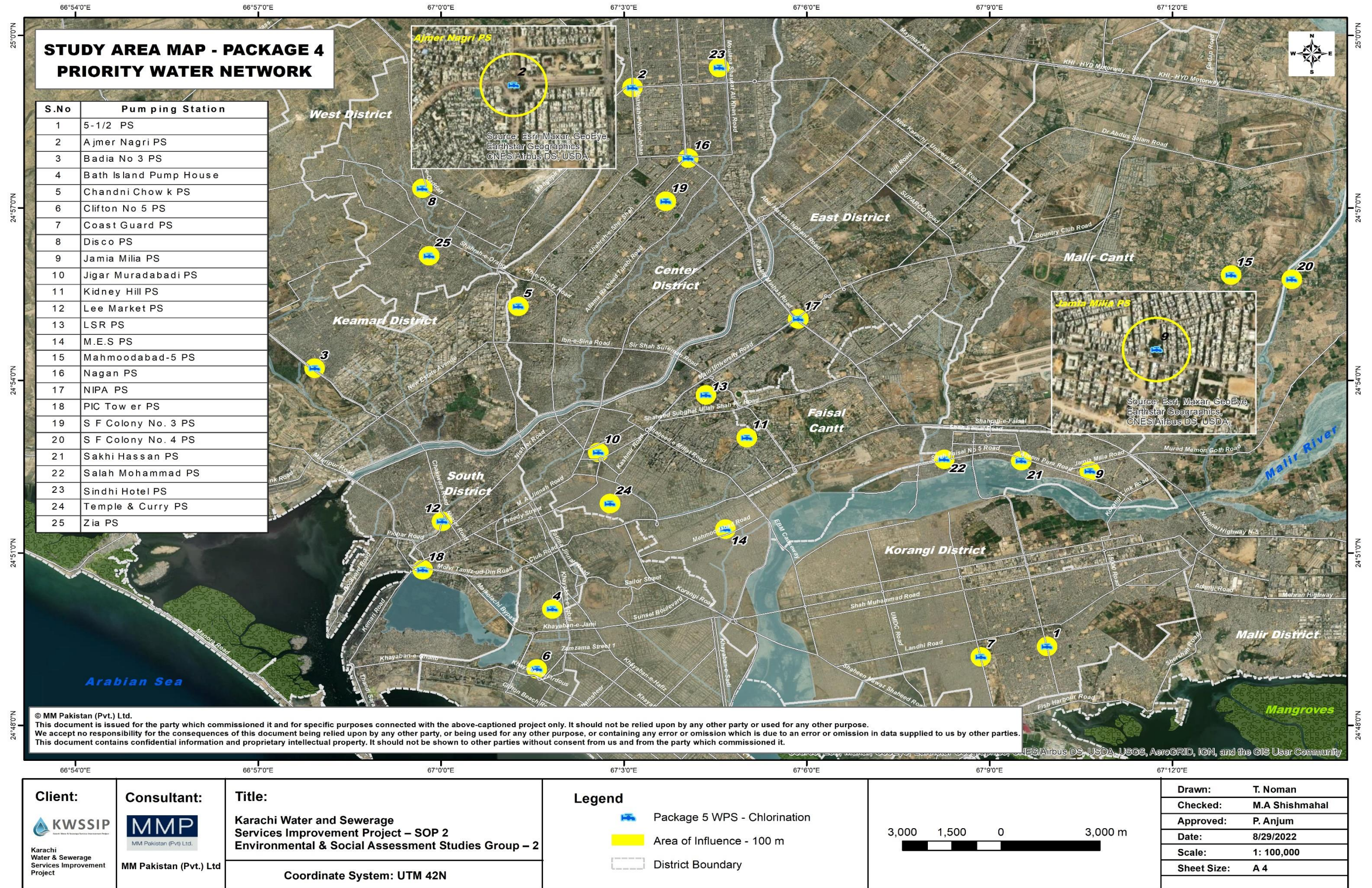


Figure A3-4: Project Location Map – Selected Pump houses for Installation of Intermittent Chlorination Facilities

b) Intermittent Chlorination System

Intermittent chlorination at the selected pump houses will be performed through Sodium Hypochlorite injection that requires installation of a diaphragm pump and a chlorine analyser at the outlet of the manifold header.

Disinfection with sodium hypochlorite has similar disinfectant efficiency and residual performance as of Gas Chlorination System, however with the benefit of having no hazards associated with the handling and storing of chlorine gas, which gas chlorination has. Installation and O&M cost of hypochlorite dosing systems is also less than that of gas chlorination systems.

The Hypo-chlorination system will comprise of a storage tank, a small positive displacement diaphragm pumps, chlorine analyser and associated electronic control system such as PLCs. Sodium hypochlorite solution stored in fibre glass tank or plastic tanks shall be added to filtered water through dosing pumps. Dilute solution of sodium hypochlorite of 5 to 12.5% concentration shall be supplied by the manufacturers like Engro Chemicals in plastic cans, as small quantities shall be required during operations.

Hypo-chlorination has many advantages over gas chlorination, like low capital / operating expenditures, lower safety measures required, ease of storage and handling, low exposures / risks and much lower corrosive effect.

A schematic diagram of proposed hypo-chlorination system is provided as **Figure A3-5**.

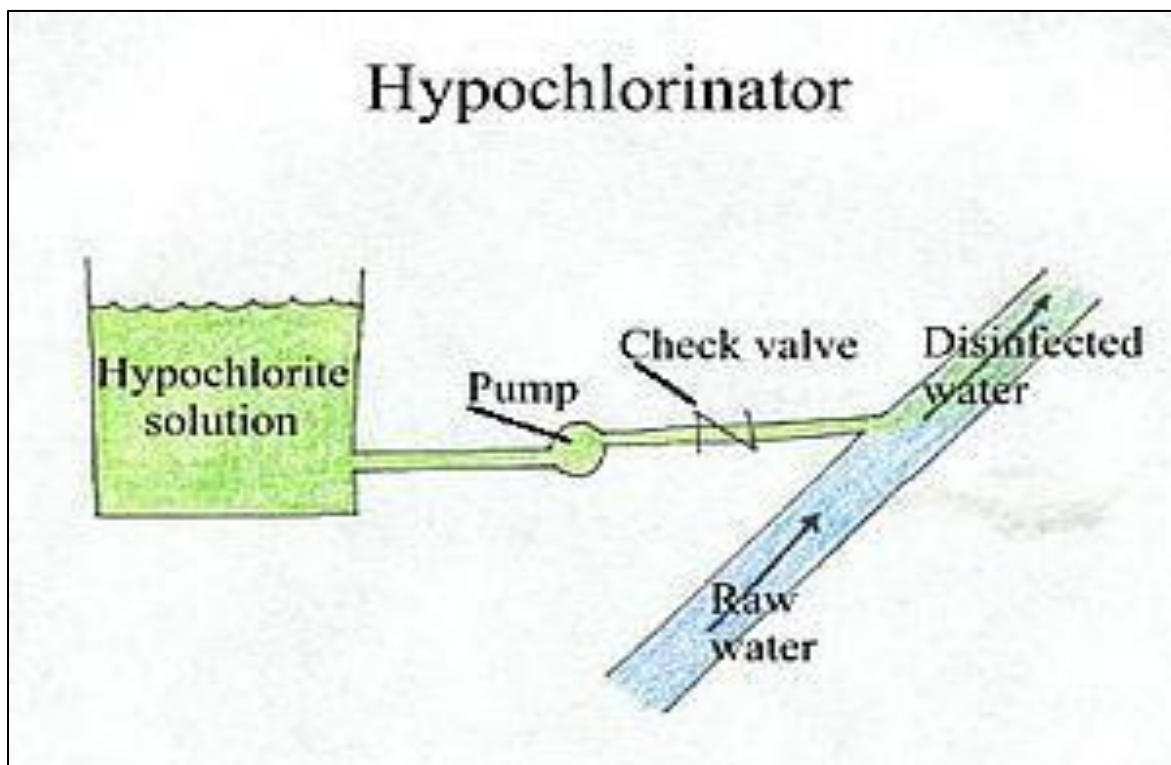


Figure A3-5: Schematic of Proposed Hypo-chlorination System for Installation at Selected Intermittent Chlorination Facilities

Figure A3-6 shown typical hypo-chlorination systems, similar to those shall be installed at the selected pump houses.



Figure A3-6: Typical Hypo-chlorinators to be Installed at Selected Pump Houses

c) Construction Camp Locations

Temporary camps will be established at all the selected 25 pump houses. Adequate spaces are available within or in the vicinity of pumphouses for temporary camps.

d) Utilities - Water / Power Requirement for Construction Phase

This work involves little use of water as most of the work is related to installation. For construction of chlorination room and for drinking purpose water will be obtained from the pump houses directly. Electricity will be required mainly for welding work for which the Contractor will use generators. For site camps too, electricity will be managed through small generators.

e) Construction Equipment Requirement

1. Generator for Welding purpose - 1 No.
2. Small Generator for Campsite – 1 No.

f) Source and Quantities of Construction Material

Chlorination equipment will be imported by the local representatives of the manufacturers. Aggregates required for concreting and chlorination rooms construction shall be sourced from local suppliers.

g) Estimated Quantities of Excavated Material / Surplus Material

It is estimated that approximately 2000 ft³ of excavated material shall be generated from the construction activities of this component and all the material will be utilized for backfilling.

h) Implementation Timeline

Construction period will be of 180 days.

i) Manpower Requirement for Construction Phase

1. Project Manager / Engineer In-charge

2. Installing Technicians - 25 Nos.
3. Helpers - 25 Nos.
4. Generator Operators for Campsites- 25 Nos.
5. Generator Operators for Welding Plant- 25 Nos.
6. Site Labour - 100 Nos.

Total = 226.

Environmental, Social, Health and Safety Safeguard Staff

The following key personnel will be hired in the contractor's team for the implementation of the project's Environmental, Social and Health & Safety requirements:

- ◆ Environmental Engineer (1 position)
- ◆ HSE Officer (1 position)
- ◆ Gender / GRM Officer (1 position)
- ◆ Flag man (2 positions)

Overall Resources and Waste Estimation

The key resources that will be consumed by the workforce are water and electricity. Total no. of workforce to employed during the project's construction phase shall be approximately 545 workers. The key waste streams are solid waste from the camp and wastewater. Excavated material will be the major waste material that will be generated from the construction sites. Excavated material will be utilized in backfilling works, whereas domestic waste will be disposed to the nearby SSWMB waste collection bins. **Table A3-2** provide an estimate of the number of resources that are likely to be consumed and waste which is likely to be produced.

Table A3-2: Estimate of Resources Consumption and Waste Production in Construction Phase

Resource	Unit	Average per capita daily use ³	Project daily use	Construction period
Water (Labor Usage)	liters	50	27,250	4,905,000
Water (Construction)	liters	-	3785	681,300
Electricity	kWh	5	2,725	490,500
Domestic Solid Waste	kg	0.44 ⁴	239.8	43,164
Wastewater	liters	45	24,525	4,414,500
Excavated Material	m ³	-	-	5740

³ "Water consumption in construction sites (Tropical Cities) – Research Paper – (<https://www.researchgate.net/publication/297774249>)" and "Previous Project Experiences"

⁴ Waste Generation Rate = 0.44kg/capita/day (Ref: Pakistan - Waste Management Report, 2020)

Annexure 4: Description of the Environment

The location of project components lies in the jurisdictions of seven districts of Karachi and District Thatta.

Physical Environment

Climate

According to the Koppen Climate Classification, the project area lies in the Subtropical - Arid Climate Zone, with mild winters and hot summers. Due to the proximity to the coastline, the climate of the project area is influenced by sea breezes, which results in less warm evenings throughout the year. Humidity, however, generally remains high. As shown in the wind rose diagram **Figure A4-1** below, winds for more than half the year, including the monsoons blow from south-west to west. The wind direction changes in winter to east and north-east. The hottest months are April to June whereas December and January are relatively colder months of the year. During July and August, it remains cloudy with generally light to heavy rainfalls influenced by monsoon weather system.

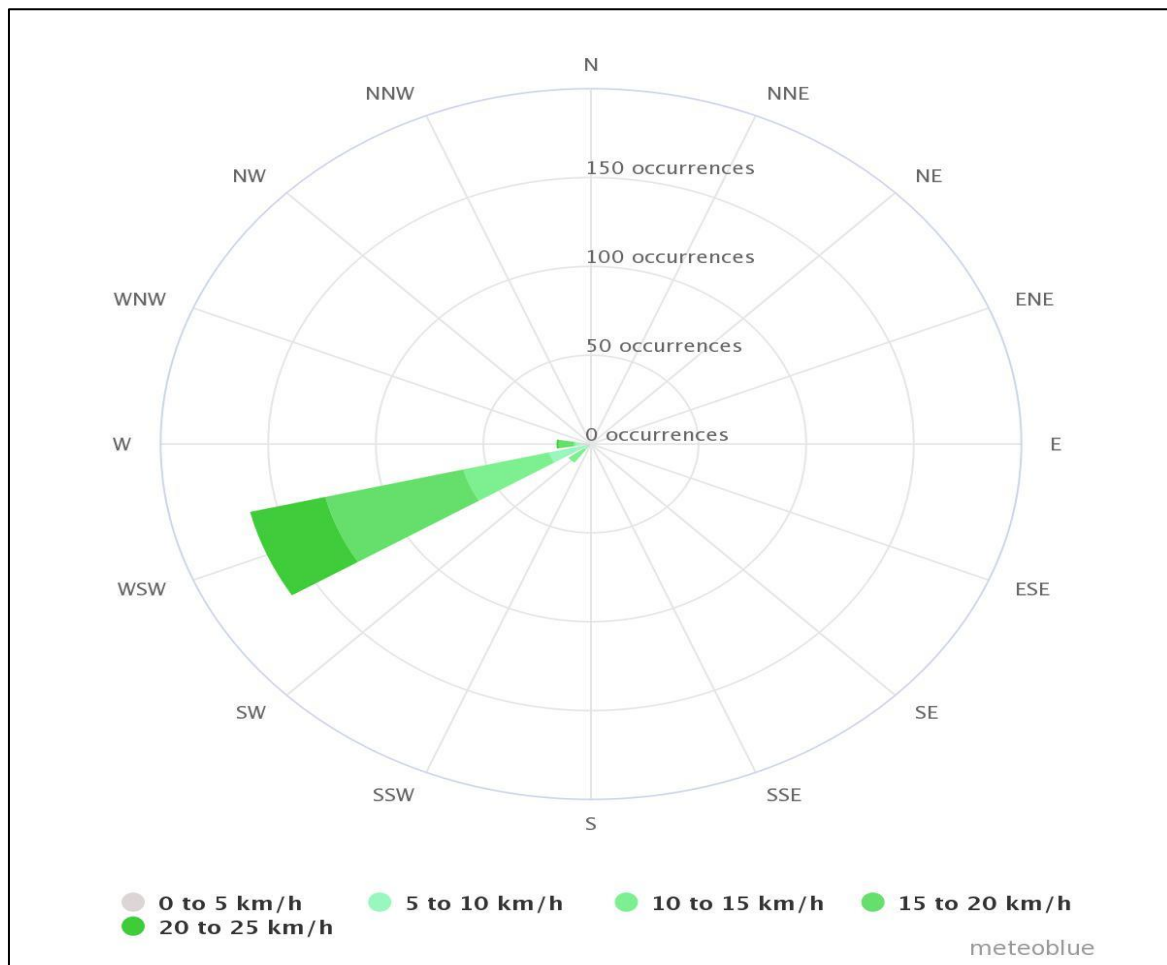


Figure A4-1: Wind Direction in the Project Area

High Temperatures and Heat Waves

Based on the maximum and minimum monthly average temperatures recorded between January 2012 to June 2022 at the weather station closest to the project area.

The average maximum and minimum temperatures of the project area based upon the historic data are given in **Table A4-1**.

Table A4-1: 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)

Last few years have witnessed a sharp rise in the heat waves occurrences in Karachi and its outskirts during May to September. During a heat wave, unusual period of hot, humid or dry conditions may prevail from three to five consecutive days during summer season. Most deadly heatwave in Karachi occurred between June 17-24, 2015, which took more than 1200 human lives. Pakistan Meteorological Department (PMD) issues an early warning in case a heat wave is expected to occur in the city.

Since heatwave may directly impact the health and performance of site workers and makes the workers susceptible to heat stroke, necessary mitigation measures shall be implemented during project implementation.

Rainfall

The rainfall / temperature data for the last five years (**Table A4-2**) reveals notable annual variations in temperature and precipitation. Over the five-year period from 2018 to 2022, Karachi experienced an average annual temperature ranging from approximately 26.9°C to 27.6°C. The maximum annual temperature ranged from 31.9°C to 32.9°C, while the minimum annual temperature varied from 22.3°C to 23.4°C. Of particular significance is the variability in annual precipitation, with 2018 experiencing a relatively low level of 3.56 mm, followed by substantial increases in subsequent years. Precipitation figures surged to 463.81 mm in 2019, 427.77 mm in 2020, 473.45 mm in 2021, and a notably higher 769.65 mm in 2022. Additionally, the number of days with rain ranged from 33 to 56 over these years. These variations underline the importance of considering local weather patterns and their potential implications for various projects and activities in the region. As the project involves extensive

excavation, the implementation of control measures at excavation sites to mitigate damage to the trenches and ensure the safety of both the community and workers, particularly during rainy periods will be a priority. Additionally, it will be ensured that project activities are carefully planned to allow for the completion of excavation, trenching, pipeline laying, or repair works either before the onset of the rainy season or after it has concluded.

Table A4-2: Last Five Years Rainfall / Temperatures

Year	Average Annual Temperature (°C)	Annual Average Maximum Temperature (°C)	Annual Average Minimum Temperature (°C)	Annual Precipitation (mm)	Number of Days with Rain
2018	27.2	32.8	22.3	3.56	04
2019	26.9	31.9	22.6	463.81	56
2020	27.4	32.3	23.2	427.77	42
2021	27.6	32.8	23.4	473.45	33
2022	27.4	32.9	23.0	769.65	49

Soil

Based on the ongoing geotechnical investigations carried out by the Technical Consultants within the project area, the soils in this region predominantly comprise a mixture of consolidated to unconsolidated gravels interspersed within a matrix of silt, sand, and clay. The consistency and depth of these soil types vary in accordance with the local topographical features. Analysis of drilling logs and classification test results indicates relatively consistent subsurface geology both laterally and vertically. Moreover, certain boreholes have revealed the presence of a water table and seepage.

Multiple test results affirm that the existing subsurface materials are suitable for use in filling activities and for the construction of embankments. Gravels are primarily found within the subsurface soil composition. Furthermore, particle size distribution analyses suggest that the site is primarily underlain by sandy and clayey soils.

Land use

Package 01 - Laying and installation of a new 4.5 km long 72” dia MS Rising Main No. 02 and Installation of Air Release Valves

The project area is located in Dhabeji. The predominant land use in the vicinity is cultivation, whereas some farmhouses are also operating in proximity to Dhabeji Pumping Complex and rising mains. Towards Forebay area, most of the surrounding lands are barren with sparse vegetation composed of small trees and shrubs. Nearest settlements to the project area include KWSC Colony and few small villages. Physical conditions of the project alignment are shown in **Figure A4-2**.



Figure A4-2: Physical Conditions of the Project Alignment

Package 02: External / Internal Sealing of Joints of; NPM from Pipri Reservoir to Y – Junction, Korangi Main from Y - Junction to Shan Chowrangi and Replacement / Installation of Defective Air Valves

Package 02 project area traverses through large patches of Malir and Korangi Districts with residential areas and industrial installations as major land uses. A small patch of agricultural lands and cattle farms is also present along the NPM alignment at military owned land in Landhi Town.

Physical conditions of the project alignment are shown in **Figure A4-3**.





Figure A4-3: Physical Conditions of the Project Alignment (Package 02)

Package 03: Installation of Open Channel Flow Meters at Upstream KG Canal, GK Canal, K-II Canal and Downstream KG canal

The areas in proximity to the Package 03 project area (locations where flow meters shall be installed at KG canal, GK canal, and K-II canal) is mainly composed of cultivated lands.

Package 04: Installation of Intermittent Chlorination Systems at 25 Nos. Selected Distribution Pumping Stations

Package 04 project area includes 25 KWSC pump houses located all around the city. All selected pump houses are surrounded mainly by residential settlements.

Potential Sensitive Receptors in the Project Area

Table A4-3 lists the sensitive receptors whereas their photographs and maps showing their locations and proximity of the project intervention areas are provided in **Figure A4-4**.

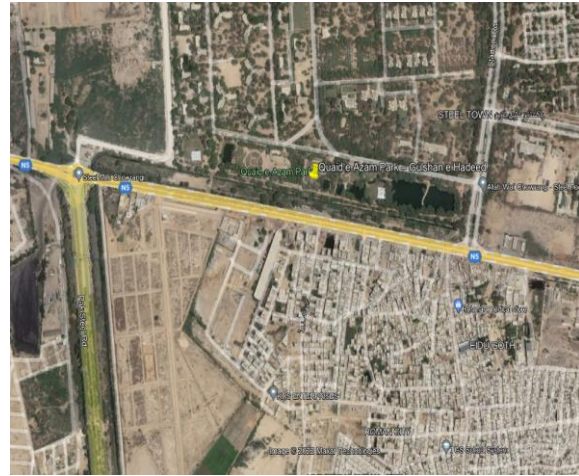
Table A4-3: List of Sensitive Receptors

No.	Sensitive Receptor Name	Distance from Center Line (Meter)	Northing	Easting	Impacts
New Pipri Mains (NPM) / Korangi Main (KM)					
1	Quaid e Azam Park – Gulshan e Hadeed	20	24°51'41.83"N	67°19'53.20"E	Excavation, Dust and Noise
2	Razia Medical Centre	45	24°50'10.63"N	67°15'47.64"E	Excavation, Dust and Noise
3	Jamia Masjid Aqsa	37	24°50'18.76"N	67°12'36.15"E	Restricted Access
4	Govt. Degree and Science College – Landhi	52	24°49'31.86"N	67°10'29.47"E	Excavation, Dust and Noise
5	Khadija Girls College – Korangi	38	24°48'59.64"N	67° 7'50.36"E	Excavation, Dust and Noise
6	Al – Mustafa Academy and Orphanage	44	24°49'0.07"N	67° 7'49.24"E	Excavation, Dust and Noise
7	Jamia Masjid Ibrahim – Korangi	18	24°48'58.84"N	67° 7'46.40"E	Excavation, Dust and Noise
8	Aziz Hospital Landhi Road	21	24°49'14.66"N	67° 7'31.55"E	Excavation, Dust and Noise
Pump houses for Intermittent Chlorination					
9	LSR Pump house Jamia Masjid Farooqi	-	24°53'44.95"N	67° 4'18.10"E	Noise
10	Zia Pump house TB Hospital	-	24°56'12.16"N	66°59'50.60"E	Noise

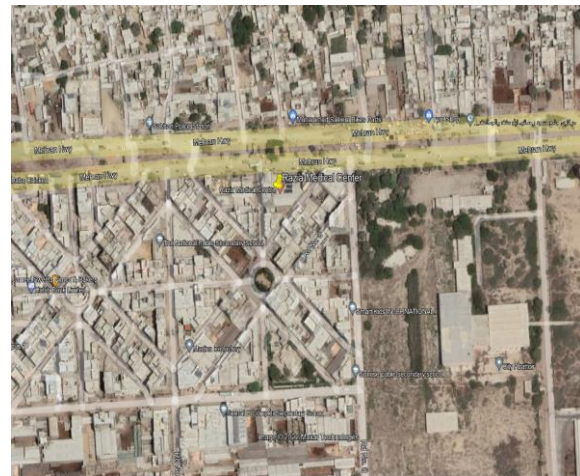
Figure A4-4: Sensitive Receptors

New Pipri Mains (NPM) / Korangi Main (KM)

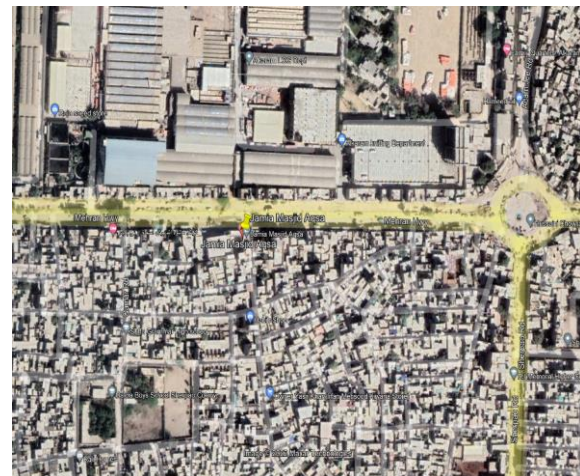
i. Quaid e Azam Park – Gulshan e Hadeed



ii. Razia Medical Centre



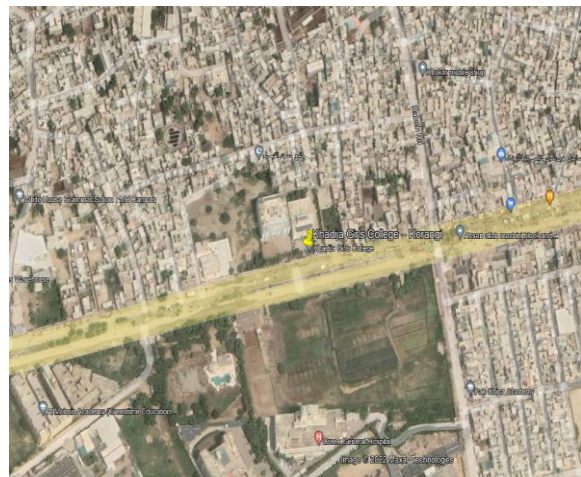
iii. Jamia Masjid Aqsa



iv. Govt. Degree and Science College – Landhi



v. Khadija Girls College – Korangi



vi. AI – Mustafa Academy and Orphanage



vii. Jamia Masjid Ibrahim – Korangi



viii. Aziz Hospital Landhi Road

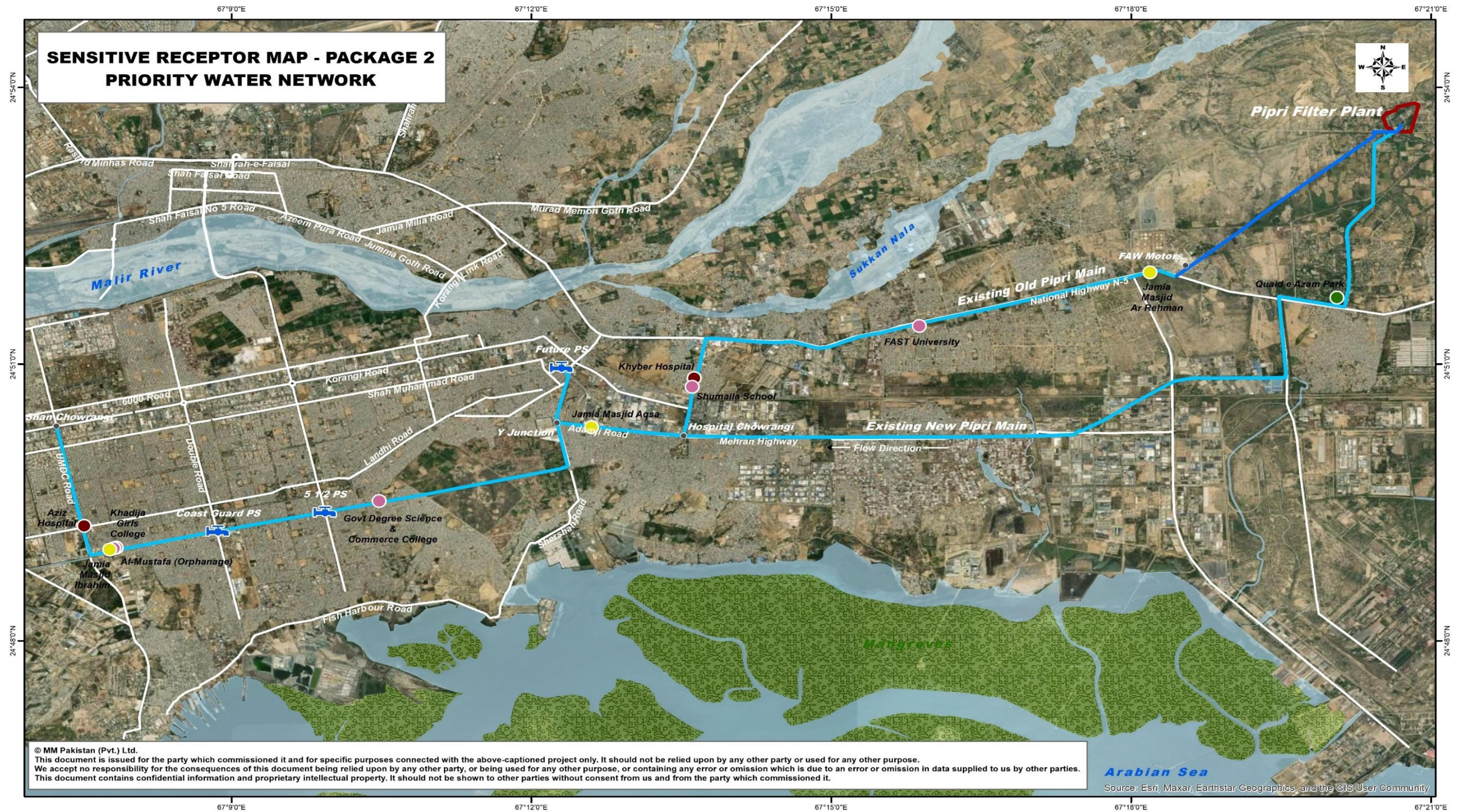


Pump houses for Intermittent Chlorination

LSR Pump house

Jamia Masjid Farooqi



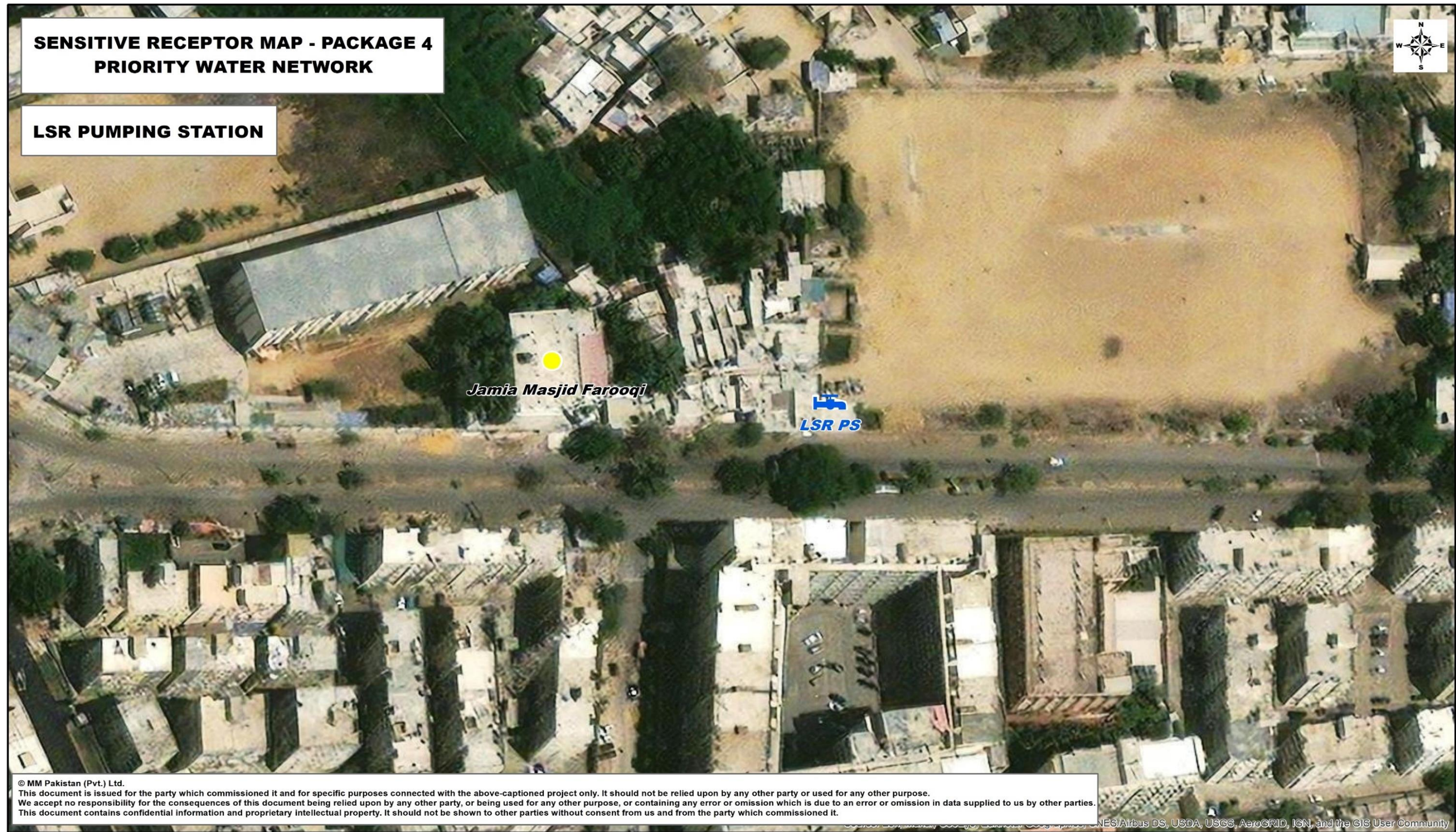


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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Client: Karachi Water & Sewerage Services Improvement Project	Consultant: MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2	Legend <ul style="list-style-type: none"> Pumping Stations Existing PRCC Mains Package 2 - Existing PRCC Mains Filter Plant Boundary Health Care Religious Institutions Educational Institutions Recreational Activities/Parks 		Drawn: T. Noman
		Coordinate System: UTM 42N			Checked: M.A Shishmahal Approved: P. Anjum Date: 9/15/2023 Scale: 1: 65,000 Sheet Size: A 4

Figure A4-5: Sensitive Receptor Map – Old Pipri, New Pipri and Pump houses for Intermittent Chlorination



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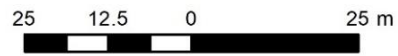
Client:  Karachi Water & Sewerage Services Improvement Project	Consultant:  MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 Coordinate System: UTM 42N	Legend  Pumping Stations  Religious Institutions		<table border="1"> <tr><td>Drawn:</td><td>T. Noman</td></tr> <tr><td>Checked:</td><td>M.A Shishmahal</td></tr> <tr><td>Approved:</td><td>P. Anjum</td></tr> <tr><td>Date:</td><td>9/6/2022</td></tr> <tr><td>Scale:</td><td>1: 1,000</td></tr> <tr><td>Sheet Size:</td><td>A 4</td></tr> </table>	Drawn:	T. Noman	Checked:	M.A Shishmahal	Approved:	P. Anjum	Date:	9/6/2022	Scale:	1: 1,000	Sheet Size:	A 4
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Approved:	P. Anjum																
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Figure A4-6: Sensitive Receptor Map – LSR Pumping Station



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Figure A4-7: Sensitive Receptor Map – Zia Pumping Station

Air, Noise, Water Quality Monitoring

Air, Noise and Water Quality monitoring was carried out in the project area at twelve locations from 22 February to 15 March 2022. Monitoring points were selected with the objective that they are located in proximity to the project intervention areas as well as to the nearby residential settlements.

Air Quality Monitoring Zones / Coverage Area

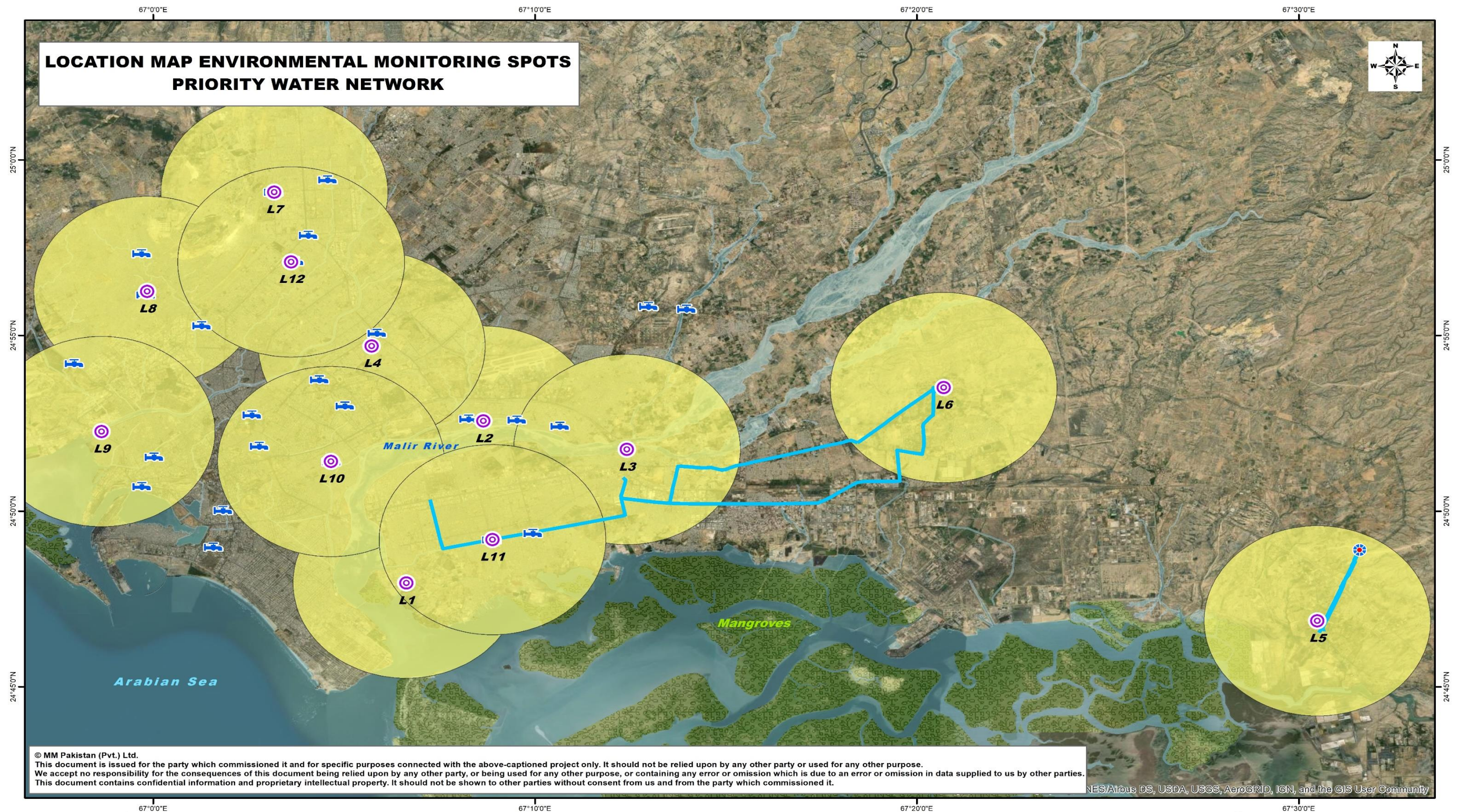
Based upon the review of published literature⁵ and past experience of the monitoring laboratory, 5 km zone has been considered as the coverage area for each sampling point in terms of ambient air quality.

Details of monitoring locations are provided in **Table A4-4** and **Figure A4-8**.

Table A4-4: Details of Air, Noise and Water Quality Monitoring Locations

	Names	Latitude	Longitude
L1	Near New Pipri Mains	24.7992° N	67.1105° E
L2	Near Shah Faisal Colony No. 3 PS, Shah Faisal Colony No. 4 PS, Jamia Milia PS	24.8761° N	67.1441° E
L3	Near Old Pipri Mains	24.8626° N	67.2068° E
L4	Near NIPA Pumping Station, LSR PS	24.9117° N	67.0954° E
L5	Near KWSC Colony, Dhabeji	24.7813° N	67.5081° E
L6	New / Old Pipri Mains – KWSC Colony	24.8920° N	67.3450° E
L7	Ajmer Nagri Pumping Station	24.9847° N	67.0529° E
L8	Near Zia Pumping Station	24.9376° N	66.9974° E
L9	Near Gulbai Pumping Station	24.8711° N	66.9775° E
L10	Near Mahmoudabad Pump Station	24.8569° N	67.0776° E
L11	Near New Pipri / Korangi Mains, Coast Guard PS, Korangi 5 ½ PS	24.8198° N	67.1481° E
L12	Near Sakhi Hassan PS	24.951681° N	67.060278° E

⁵ <https://www.sciencedirect.com/book/9780124017337/fundamentals-of-air-pollution>



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Client: Karachi Water & Sewerage Services Improvement Project	Consultant: MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2	Legend <ul style="list-style-type: none"> Environmental Monitoring Spots Pumping Stations - Chlorination Priority Water Mains Environmental Monitoring Zone 		Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 9/9/2022 Scale: 1: 170,000 Sheet Size: A 4
		Coordinate System: UTM 42N			

Figure A4-8: Environmental Monitoring Locations

Air Quality

Sampling was performed for a 24-hour period at each site following the SEQS for ambient air. **Table A4-5** shows the observed average concentrations for ambient air quality parameters, such as, particulate matter (PM10 and PM2.5), carbon monoxide (CO), oxides of nitrogen as NO, total suspended particles (TSP), sulfur dioxide (SO₂) and compares these with the SEQS and WHO / WB Standards.

Table A4-5: Ambient Air Quality Level

No.	Measuring Parameter	Unit	SEQs / WBG Limit 2	L01	L02	L03	L04	L05	L06	L07	L08	L09	L10	L11	L12
1	Oxides of Nitrogen as NO	(µg/ m ³)	40	Nil	37.5	20.8	24.15	45.83	40	25	12.5	21	33	39	187.5
2	Sulfur Dioxide (SO ₂)	(µg/ m ³)	40	Nil	8.3	4.2	NIL	Nil	Nil	Nil	Nil	33	4	4	0
3	Carbon Monoxide (CO)	(mg/m ³)	4 (for 8 hrs)	Nil	0.75	2	1.8	Nil	Nil	Nil	4	ND	ND	1.8	10.41
4	Total Suspended Particulate (TSP)	(µg/m ³)	500 µg/m ³	225	264	270	235	189.00	169.00	135	134.83	134	145	136.9	343.70
5	Particulate Matter (PM _{2.5})	(µg/m ³)	15	17.21	25.50	40.42	54.29	31.75	18.95	39.95	53.54	53.58	56.25	54.84	155.16
6	Particulate Matter (PM ₁₀)	(µg/m ³)	45	18.83	29.38	54.79	46.60	27.45	17.40	35.40	46.58	46.62	49	47.67	137.58
7	Ozone (O ₃)	(µg/m ³)	130	18	20.75	17	11	14	20	16	14	14	16	17	21
8	Lead (Pb)	(µg/m ³)	1.5	0.43	0.29	0.8	ND	ND	0.01	ND	ND	0.01	ND	0.02	ND

It shows that, PM2.5 values are exceeding the standards at all 12 locations, and PM10 at 07 out of 12 locations. NO and CO are also found exceeding at Sakhi Hasan Pump house sampling point located near KWSC Water hydrant and NO at KWSC Colony – Dhabeji sampling point. The sampling locations, especially Sakhi Hassan pump house area (Water Pump Roundabout) experience heavy traffic movement throughout the day, the major reason for excessive air pollutant levels is likely to be vehicular emissions. At Dhabeji sampling point, excavation work was in progress for underground pipeline repair during sampling time. The emissions from the excavator may possibly be the source for higher NO emissions. Overall, the level of vehicle fitness in Karachi is poor and incomplete combustion of fuel is a major source of PM2.5 emissions. Another factor is the poor road conditions, which also results in excessive PM2.5 and PM10 ambient levels. As the air pollutant levels are already high, the project will implement strict air pollution control measures to ensure that it does not aggravate the prevailing baseline conditions.

Noise

Baseline noise monitoring for the project was undertaken at 12 monitoring locations for a 24-hour period at each site. Only at 02 out of 12 locations the observed results have been found meeting the standards for day and nighttime noise standards. At other 10 locations, the observed values were overall found to be higher than the limits mainly due to excessive movement of private and commercial vehicles both in day and night time. As the most of the observed noise levels are already towards the higher side, the project will implement strict noise control measures to ensure that it does not aggravate the prevailing baseline conditions.

Table A4-6 shows the observed day and night time results.

Table A4-6: Noise Monitoring

No	Monitoring Location	Time	Category	Measured Values	SEQS	WHO / WBG
1	L1 – Near New Pipri Mains	Day	Commercial	53.35	65	70
		Night		47.43	55	70
2	L2 – Shah Faisal	Day	Residential	51.95	55	55
		Night		48.72	45	45
3	L3 – Near Old Pipri Mains	Day	Residential	62.17	55	55
		Night		56.21	45	45
4	L4 – Near NIPA and LSR PS	Day	Commercial	62.24	65	70
		Night		59.83	55	70
5	L5 – KWSC Colony - Dhabeji	Day	Residential	47.25	55	55
		Night		37.56	45	45
6	L6 - New / Old Pipri Mains – KWSC Colony	Day	Residential	55.9	55	55
		Night		48.5	45	45
7	L7 - Ajmer Nagri Pumping Station	Day	Residential	59.57	55	55
		Night		47.43	45	45
8	L8 - Near Zia Pumping Station	Day	Residential	58.76	55	55

No	Monitoring Location	Time	Category	Measured Values	SEQS	WHO / WBG
		Night		53.15	45	45
9	L9 - Near Gulbai Pumping Station	Day	Commercial	68.3	65	70
		Night		59.39	55	70
10	L10 - Near Mahmoudabad Pump Station	Day	Residential	61.09	55	55
		Night		57.37	45	45
11	L11 - Near New Pipri / Korangi Mains, Coast Guard PS, Korangi 5 ½ PS	Day	Commercial	68.65	65	70
		Night		53.23	55	70
12	L12 - Near Sakhi Hassan PS	Day	Residential	71.2	55	55
		Night		60.27	45	45

Water Quality

Water quality sampling and analysis was performed at all the 12 monitoring locations. The water samples have been collected from taps whereas the main sources of water supply were mainly the ground water bores. The testing was performed as per APHA methods. The results showed presence of bacterial contamination in all water samples, whereas all other parameters were found within the SEQS / WHO limits. Generally, the ground water quality all over Karachi is very poor due to the intrusion of sewerage into ground water aquifers as the sewerage system of the city is overall in very poor state. Overflowing of sewerage gutters are common in almost every nook and corner of the city, especially in the lower to lower-middle and middleclass settlements. Damaged sewerage and water supply system and intrusion of sewerage into water distribution lines is also a common problem. It has also been recorded that private water filtration plants are common in the sampled areas and the residents purchase filtered water from them for drinking purposes. Water analysis results are shown in **Table A4-7**.

Table A4-7: Water Quality Results

No	Measuring Parameters	Unit	Testing Method	SEQs Limits	WHO / WBG	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12
1	Color	TCU	Pt-Co	< 15 TCU	< 15 TCU	6	2	<1	1	<1	2	2	2	2	2	2	1
2	Taste	Taste	Sensory Evolution	Objection / Non-Objection	Objection / Non-Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection
3	Odor	Odor	Sensory Evolution	Objection / Non-Objection	Objection / Non-Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection	Non Objection
3	Turbidity	NTU	APHA-2130	< 5 NTU	< 5 NTU	1	ND	<1	1	ND	1.06	1.15	1.15	1.1	1.25	0.9	1
5	Total Hardness as CaCO3	mg/l	APHA-2340	< 500	-	135	165	150	135	135	155.73	115	105	11	125	110	180
6	Total Dissolved Solids (TDS)	mg/l	APHA-2450C	< 1000	< 1000	321	226	351	321	368	319	326	320	32	336	374	518
7	pH @ 25°C	pH	ASTM-1293	6.5 - 8.5	-	7.78	7.17	7.53	7.78	7.42	7.56	7.02	7.02	7	7.02	7.1	7.35
8	Aluminum (AL)	mg/l	ASTM D-857	<0.2	0.2	0.1	0.085	0.04	0.1	0.04	0.11	0.163	0.163	0.164	0.163	0.095	0.03
9	Antimony (Sb)	mg/l	APHA 3111 Sb	<0.005	0.02	Nil	Nil	ND	ND	Nil	ND	ND	ND	ND	ND	0.0011	ND
10	Arsenic (Ar)	mg/l	Merck Kit Method	< 0.05	0.01	Nil	Nil	0.022	ND	Nil	ND	ND	ND	ND	ND	ND	0.02
11	Barium (Ba)	mg/l	APHA-D3651	0.7	0.7	Nil	Nil	0.019	ND	0.019	0.17	ND	ND	ND	ND	0.12	0.024
12	Boron (B)	mg/l	APHA 4500-B	0.3	0.3	Nil	Nil	0.09	ND	0.01	0.096	ND	ND	ND	ND	0.098	0.15
13	Cadmium (Cd)	mg/l	ASTM D-3557	0.01	0.003	Nil	Nil	0.01	ND	Nil	ND	ND	ND	ND	ND	ND	0.01
14	Chloride (Cl ⁻)	mg/l	APHA 4500-Cl ⁻	< 250	250	76.43	175.6	69.4	76.43	51.61	69	62.35	62.3	62.36	62.35	67	108
15	Chromium (Cr)	mg/l	APHA 3500-CrB	< 0.05	0.05	Nil	Nil	0.021	ND	Nil	ND	ND	ND	ND	ND	ND	0.032
16	Copper (Cu)	mg/l	Test Kit Method	2	2	Nil	Nil	0.61	ND	0.61	0.812	0.11	0.1	0.11	0.11	ND	0.74
17	Cyanide (Cn)	mg/l	APHA 4500 CN	<0.05	0.07	Nil	Nil	0.013	ND	0.01	ND	ND	ND	ND	ND	ND	ND
18	Fluoride (F)	mg/l	APHA 4500 F ⁻	< 1.5	1.5	0.951	0.951	0.61	0.951	0.61	0.25	0.178	0.178	0.178	0.178	0.75	0.8
19	Lead (Pb)	mg/l	APHA 3500 Pb B	< 0.05	0.01	Nil	Nil	ND	ND	Nil	ND	ND	ND	ND	ND	ND	0.01
20	Manganese (Mn)	mg/l	APHA 3500 MnB	< 0.5	0.5	Nil	Nil	0.29	ND	0.3	ND	ND	ND	ND	ND	ND	0.34
21	Mercury (Hg)	mg/l	Test Kit Method	< 0.001	0.001	Nil	Nil	ND	ND	Nil	ND	ND	ND	ND	ND	ND	ND
22	Nickel (Ni)	mg/l	APHA 3500 Ni	< 0.02	0.02	Nil	Nil	0.009	ND	0.009	0.01	ND	ND	ND	ND	ND	0.01
23	Nitrate (NO3)	mg/l	Test Kit Method	< 0.50	50	Nil	Nil	ND	ND	Nil	0.435	ND	0.2	ND	0.4	0.25	ND
24	Nitrite (NO2)	mg/l	Test Kit Method	< 3	3	Nil	Nil	ND	ND	Nil	ND	ND	ND	ND	ND	0.63	ND
25	Selenium (Se)	mg/l	APHA 3500 Se	0.01	0.01	Nil	Nil	ND	ND	Nil	ND	ND	ND	ND	ND	ND	ND
26	Residual Chlorine	mg/l	Test Kit Method	0.2 - 1.5	-	0.32	0.32	0.29	0.32	0.29	0.152	0.26	0.26	0.26	0.26	0.265	0.25
27	Zinc (ZN)	mg/l	APHA 3500 Zn	5	3	1	1	2	1	2	1.05	1.068	1.068	1.068	1.068	0.065	2
28	Faecal Coliforms	Count / ml	APHA 922 B	0 Per 100 ml	0 Per 100 ml	Nil	Nil	2	36	0	42	28	13	28	18	35	2
29	E Coli	Count / ml	Total Viable Count	0 Per 100 ml	0 Per 100 ml	18	18	1	16	8	18	15	5	15	10	24	2
30	Total Bacterial Count	Count / ml	APHA 922 B	0 Per 100 ml	0 Per 100 ml	Nil	Nil	3	52	ND	67	43	24	43	32	55	4
31	Pesticides	mg / l	Kit Method	0.001	-	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Ecological Environment

The status of the flora and fauna of the study area was determined through detailed field assessments carried out at the following dates:

1. 22 to 23 December 2021 – Flow Meters Installation Sites
2. 06 to 09 February 2022 – Old Pipri, New Pipri and Korangi Mains
3. 23 February 2022 – Dhabeji Rising Mains
4. 01 to 05 March 2022 – 25 Pump houses

Flora

Data on flora was gathered mainly through field surveys. Out of the total vegetation, around 1795 are trees. Out of these, approximately 510 trees growing in the Direct Impact Area (DIA) will have to be cut for the execution of construction activities. All these tree species are common and none of them are of critical nature.

As environmental compensation, the contractor shall be required to plant 10 trees for every cut / uprooted tree. Suitable spaces for compensatory tree plantation will be identified by the PIU KWSSIP before execution of construction activities in consultation with Local Government Department, Forest Department, Parks and Horticulture Department - KMC and District Municipal Corporations (DMCs). A Tree Plantation Plan provides details on different aspects of compensatory plantation to be followed by the Contractor.

Tree Plantation Plan

As estimated during environmental study of the proposed project, 510 trees growing in the DIA under the Aol shall be cut. 10 plants will require to be planted for each cut tree i.e., total 10,000 trees will be planted. The replenishment cost of **Rs. 2.78 Million** for raising 10,350 trees and their maintenance for 5 years, keeping the rate of daily wages as Rs. 700 per man per day (MD) as detailed in **Table A4-8** to **Table A4-12**. The total replenishment cost of **Rs. 2.78 million (10.2 avenue miles x Rs. 272,609)** should be reflected in the bidding as well as contract documents related to subproject 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, CSC's Ecologist and Sindh Forest Department, and prepare and implement a project specific compensatory planting plan.

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)

Table A4-8: Estimated Cost of Plantation of One Avenue Mile (500 Plants) for First Year.

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1	Clearance of site	One Avenue Mile (500 plants)	700/MD	10	7,000
2	Layout	One Avenue Mile	700/MD	4	2,800
3	Digging of pits @ 3cft each	500 pits	700/MD	20 @ 25 pits per person	14,000
4	Average cost plants	500 plants	Rs.50/-	-	25,000
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. 5 per plant	-	3,125
7	Replacement of earth with silt 1 cft. (0.0283 m ³) per pit 500 cft. (14.15m ³)	500 pits	700/MD	20 @ 25 pits per person	14,000
8	Hand watering 30 times during dry months	500x30=15,000 plants	700/MD	50	35,000
9	Reopening of pits 2 times @ 1Cft	500x2=1000 pits	700/MD	10 @ 100 pits per person	7,000
10	Weeding 4 times	500x4=2000 plants	700/MD	5	3,500
11	Miscellaneous/ Unforeseen	Lump Sum			4,000
Total (1st year)					Rs. 120,425

Table A4-9: Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Second Year

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1	Restocking of 25% plants per Avenue Mile	125 plants	Rs.30/- Each	-	3,750
2	Carrying of plants from Nursery to site including loading/ unloading	125 plants	Rs.10/- Each	-	1,250
3	Re-digging of pits 25% @ 3cft each	125 pits	700/MD	5 @ 25 pits/person	3,500
4	Planting of plants with ball of earth	125 plants	Rs. 5 per plant	-	625
5	Hand watering 30 times During dry months	500x30=15,000 plants	700/MD	50 @ 300 plants per person	35,000
6	Re-opening of Pits 2 times @ 1 Cft.	500x2=1,000 pits	700/MD	10 @ 100 pits/person.	7,000
7	Weeding 2 times	500x2=1,000	700/MD	10 @ 100 pits/person.	7,000
8	Miscellaneous/ Unforeseen	Lump Sum			3,000
Sub-Total			61,125		
Escalation @ 10 %			6,112		
Total (2nd year)			Rs. 67,237		

Table A4-10: Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Third Year.

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1	Restocking of 20% plants per Avenue Mile	100 plants	Rs.30/- Each	-	3,000
2	Carrying of plants from Nursery to site including loading/ unloading	100 plants	Rs.10/- Each	-	1,000
3	Re-Digging of Pits @ 3cft.	100 pits	700/MD	4 @ 25 pits/person	2,800
4	Planting of plants with ball of earth	100 plants	Rs. 5 per plant	-	500
5	Hand watering 20 times During dry months	500x20=10,000 plants	700/MD	33 @303 plants/person	32,100
6	Re-opening of Pits 2 times @ 1cft.	500x2=1000 pits	700/MD	10 @100 plants/person	7,000
7	Weeding	500 plants	700/MD	5 @100 plants/person	3,500
8	Miscellaneous/ Unforeseen	Lump Sum			3,000
Sub-Total		50,200			
Escalation @ 10%		5,020			
Sub-total for 3rd year		Rs. 55,220			

Table A4-11: Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Fourth Year.

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1	Restocking of 10% plants per Avenue Mile	50 plants	Rs.30/- Each	-	1,500
2	Carrying of plants from Nursery to site including loading/ unloading	50 plants	Rs.10/- Each	-	500
3	Re-Digging of Pits @ 3cft each	50	700/MD	2 @ 25 pits per person	1,400
4	Planting of plants with ball of earth	50 plants	Rs.5 per plant	-	250
5	Hand watering 10 times During dry months	500x10 = 5000 plants	700/MD	17 @ 300 plants per person	11,900
6	Weeding	150 plants	700/MD	1	700
7	Miscellaneous/Unforeseen	Lump Sum			2,000
Sub-Total		18,250			
Escalation @ 10%		1,825			
Total for 4th year		Rs. 20,075			

Table A4-12: Estimated Cost of Maintaining Plantation of One Avenue Mile (500 Plants) for Fifth Year.

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
1	Restocking of 5% plants per Avenue Mile	25 plants	Rs.30/- Each	-	750
2	Carrying of plants from Nursery to site including loading/ unloading	25 plants	Rs.10/- Each	-	250
3	Re-Digging of Pits 5% @ 3 cft each	25 pits	700/MD	0.5	350
4	Planting of plants with ball of earth	25 plants	Rs.5 per plant	-	125
5	Hand watering 5 times During dry months	500x5 =2,500 plants	700/MD	8	5,600
6	Weeding	150+25= 175 plants	700/MD	1	700
7	Miscellaneous/Unforeseen	Lump Sum			1,000
Sub-Total					8,775
Escalation @10%					877
Total for 5th year					Rs. 9,652

Total cost of 1 avenue mile (500 trees) for 5 years (120,425+67,237+55,220+20,075+9,652) = **Rs. 272,609**

Replenishment Cost of Tress=

- ◆ Total trees to be uprooted = 510
- ◆ Planting of trees for each uprooted tree =10
- ◆ Avenue miles = 510 x 10 / 500= 10.2

Cost for 20 avenue miles= Rs. 272,609 x 10.2 = **2,780,611 (Rs. 2.78 Million)**

The ecology team has prepared an inventory of the trees that are growing in the DIA shall require to be cut for construction activities. This inventory is attached as **Table A4-13**.

Table A4-13: Inventory of Trees to be Cut for Construction

No.	Name Of Species	Common Names	IUCN Status	Dhabeji Rising Main Line	NPM / KM
TREES					
1.	<i>Acacia nilotica</i>	Babur	LC	1	2
2.	<i>Albizia lebbeck</i>	Siris	LC	1	30
3.	<i>Azadirachta indica</i>	Neem	LC	9	1
4.	<i>Bombax ceiba</i>	Simbal, Simal.	LC	-	6
5.	<i>Callistemon citrinus</i>	Bottle brush tree	-	-	5
6.	<i>Casuarina equisetifolia</i>	She oak tree	-	-	140
7.	<i>Conocarpus leucifolius</i>	Cono	NT	10	0
8.	<i>Cocos nucifera</i>	Coconut palm	NE	-	0
9.	<i>Dalbergia sissu</i>	Sheesham	LC	-	16
10.	<i>Delonix regia</i>	Gul e mohar tree	LC	-	140
11.	<i>Eucalyptus citriodora</i>	Safeda	LC	6	8

No.	Name Of Species	Common Names	IUCN Status	Dhabeji Rising Main Line	NPM / KM
12.	<i>Ficus elastica</i>	Rubber tree	NE	-	5
13.	<i>Ficus Benghalenses</i>	Bargad	NE	-	10
14.	<i>Ficus microcarpa</i>	Ficus	LC	-	1
15.	<i>Ficus palmata</i>	Phagwara, Anjir, Patguleri	NE	6	15
16.	<i>Ficus religiosa</i>	peepal	NE	4	7
17.	<i>Ficus virens</i>	Jangli Pipit, Man, Palakh	LC	-	11
18.	<i>Guaiaum officinale</i>	Lignum	EN	-	25
19.	<i>Leucaena leucocephala</i>	White lead tree	NE	2	1
20.	<i>Mangifera indica</i>	Mango/ Aam	DD	-	0
21.	<i>Manilkara zapota</i>	Cheeko	LC	-	5
22.	<i>Melia azedarach</i>	Baqain	NE	-	7
23.	<i>Moringa oleifera</i>	Moringa/sowanjhna	LC	-	3
24.	<i>Parkinsonia aculeata</i>	Mexican Palo-Verde	LC	-	7
25.	<i>Phoenix dactylifera</i>	Date palm	NE	2	4
26.	<i>Pithecellobium dulce</i>	Jungle jalebi/ Madras Thorn	LC	1	3
27.	<i>plumeria obtusa</i>	Champa	LC	-	1
28.	<i>Plumeria rubra</i>	White champa	LC	-	4
29.	<i>Polyathia longifolia</i>	False Ashoka	NE	-	0
30.	<i>Prosopis glandulosa</i>	Vilayati keekar	LC	4	3
31.	<i>Ricinus communis</i>	Arand, Castor-Oil Plant.	NE	-	0
32.	<i>Salvadora oleidis</i>	Khabbar	LC	-	0
33.	<i>Syzygium cumini</i>	Jamun/ Java plum,	LC	-	0
34.	<i>Tamarindus indica</i>	Immli	LC	-	2
35.	<i>Terminalia catappa</i>	Badam	LC	-	2
36.	<i>Ziziphus jujuba</i>	Sufi beer	LC	-	1
Total (510)				45	465

The natural vegetation within Aol is provided in **Table A4-14**.

Table A4-14: Vegetation within the Aol

No.	Name of Species	Common Names	IUCN Status
Trees			
1	<i>Acacia nilotica</i>	Babur	LC
2	<i>Albizia lebbeck</i>	Siris	LC
3	<i>Azadarichta indica</i>	Neem	LC
4	<i>Bombax ceiba</i>	Simbal, Simal.	LC
5	<i>Callistemon citrinus</i>	Bottle brush tree	-
6	<i>Casuarina equisetifolia</i>	She oak tree	-
7	<i>Conocarpus lencifolius</i>	Cono	NT
8	<i>Cocos nucifera</i>	Coconut palm	NE
9	<i>Delonix regia</i>	Gul e mohar tree	LC
10	<i>Eucalyptus citriodora</i>	Safeda	LC
11	<i>Ficus elastica</i>	Rubber tree	NE
12	<i>Ficus Benghalenses</i>	Bargad	NE
13	<i>Ficus microcarpa</i>	Ficus	LC
14	<i>Ficus palmata</i>	Phagwara, Anjir, Patguleri	NE
15	<i>Ficus religiosa</i>	peepal	NE
16	<i>Ficus virens</i>	Jangli Pipit, Man, Palakh	LC
17	<i>Guaiaum officinale</i>	Lignum	EN
18	<i>Leucaena leucocephala</i>	White lead tree	NE

No.	Name of Species	Common Names	IUCN Status
19	<i>Mangifera indica</i>	Mango/ Aam	DD
20	<i>Melia azedarach</i>	Baqain	NE
21	<i>Moringa oleifera</i>	Moringa/sowanjhna	LC
22	<i>Parkinsonia aculeata</i>	Mexican Palo-Verde	LC
23	<i>Phoenix dactylifera</i>	Date palm	NE
24	<i>Pithecellobium dulce</i>	Jungle jalebi/ Madras Thorn	LC
25	<i>plumeria obtusa</i>	Champa	LC
26	<i>Plumeria rubra</i>	White champa	LC
27	<i>Polyathia longifolia</i>	False Ashoka	NE
28	<i>Ricinus communis</i>	Arand, Castor-Oil Plant.	NE
29	<i>Terminalia catappa</i>	Badam	LC
30	<i>Ziziphus jujuba</i>	Sufi beer	LC
Herbs			
1	<i>Agave americana</i>	century plant	LC
2	<i>Aloe vera</i>	Aloevera	NE
3	<i>Alternanthera sessilis</i>	sessile joyweed	NE
4	<i>Anagallis arvensis</i>	Scarlet pimpernel	NE
5	<i>Asphodelus tenuifolius</i>	Onion weed	NE
6	<i>Amaranthus viridis</i>	Chull	NE
7	<i>Blepharis indica</i>	Asad	NE
8	<i>Boerhavia procumbens</i>	Sentori	NE
9	<i>Corchorus olitorius</i>	Jute mallow	NE
10	<i>Cleome brachycarpa</i>	Ponwar	NE
11	<i>Eclipta alba</i>	Bhringraj	LC
12	<i>Euphorbia hirta</i>	Asthma Weed	NE
13	<i>Heliotropium crispum</i>	---	NE
14	<i>Ipomoea cairica</i>	Messina creeper/ Mile a minute vine	LC
15	<i>Canna indica</i>	Hakik	NE
16	<i>Convolvulus glomeratus</i>	Clustered Bindweed	NE
17	<i>Chenopodium sp.</i>	wild spinach and fat-hen,	NE
18	<i>Cleome brachycarpa</i>	Ponwar	NE
19	<i>Cressa cretica</i>	Rudranti	LC
20	<i>Datura alba</i>	Tooh	NE
21	<i>Fagonia indica</i>	Dhamasa, Dhamana	NE
22	<i>Melilotis indica</i>	-	NE
23	<i>Pavonia arabica</i>	Arabian Swamp Mallow	NE
24	<i>Peristrophe paniculata</i>	Atrilal, Ubut kundri	NE
25	<i>Portulaca oleracea</i>	Kulfe Ka Sag, Salunak, Lunak, Khurfa.	LC
26	<i>Phyla nodiflora</i>	Makna, Wakan, Jal-nim	LC
27	<i>Physalis divaricata</i>	Pygmy Groundcherry	NE
28	<i>Rhynchosia minima</i>	burn-mouth-vine	LC
29	<i>Sida ovata</i>	Oval-Leaf Fan	NE
30	<i>Senna holosericia</i>	Jangli Sana.	NE
31	<i>Solanum albicaule</i>	bittersweet nightshade	NE
32	<i>Solanum nigrum</i>	Mako, Kach-Mach	NE
33	<i>Solanum surratense</i>	kundiari, 'Momoli, Mokri	NE
34	<i>Sonchus asper</i>	Sow thistles	NE
35	<i>Tetraena simplex</i>	Alethi, Putlani	NE
36	<i>Tagetes erecta</i>	marigold	NE
37	<i>Tephrosia purpurea</i>	Wild Indigo	LC
38	<i>Tribulus terrestris</i>	puncture vine	LC
39	<i>Tridax procumbens</i>	coatbuttons or tridax daisy	NE
40	<i>Trichodesma indicum</i>	Indian Borage	NE
41	<i>Vernonia cinerea</i>	Little Ironweed	NE
Shrubs			

No.	Name of Species	Common Names	IUCN Status
1	<i>Abutilon fruticosum</i>	Texas Indian mallow	NE
2	<i>Abutilon indicum</i>	India Abutilon	NE
3	<i>Achyranthes aspera</i>	Ubat kandi	NE
4	<i>Aerva javanica var javanica</i>	Booh	NE
5	<i>Bougainvillea spectabilis</i>	Great bougainvillea	NE
6	<i>Capparis decidua</i>	Karil, Karir	LC
7	<i>Calotropis Procera</i>	Aak	NE
8	<i>Catharanthus roseus</i>	Sada bahar	NE
9	<i>Dracaena reflexa</i>	Song of india	LC
10	<i>Euphorbia milii var. milii</i>	Crown-of-thorns'	LC
11	<i>Ficus carica</i>	Injeer/ fig	LC
12	<i>Heliotropium rariflorum</i>	-	NE
13	<i>Hibiscus rosa-sinensis</i>	China rose	NE
14	<i>Ixora coccinea</i>	Flame of the woods.	NE
15	<i>Jatropha gossypifolia</i>	bellyache bush	LC
16	<i>Nerium oleander</i>	Oleander/ Ganira, Kunair	LC
17	<i>Peristrophe paniculata</i>	Atrilal, Ubut kundri	NE
18	<i>Pluchea lanceolata</i>	arme, Reshami, Phar Buti	NE
19	<i>Prosopis juliflora</i>	Vilayati keekar	NE
20	<i>Rosa indica</i>	Rose	NE
21	<i>Salsola imbricata</i>	Lana, Gora Lana, Hashok	NE
22	<i>Salvadora persica</i>	khabar	LC
23	<i>Sueda fruticosa</i>	Laani/ Laana	NE
24	<i>Tamarix aphylla</i>	lai	NE
25	<i>Tephrosia sp.</i>	-	NE
26	<i>Withania somnifera</i>	Aksan	NE
27	<i>Ziziphus nummularia</i>	Jungle berr/ berri	NE
Grasses			
1	<i>Cenchrus ciliaris</i>	Buffalo Grass	LC
2	<i>Chloris barbata</i>	Ganni, Jargi.	NE
3	<i>Desmostachya bipinnata</i>	Drabh	LC
4	<i>Dactyloctenium aegyptium</i>	Egyptian crowfoot grass	NE
5	<i>Dactyloctenium scindicum</i>	Sind Crowfoot Grass	NE
6	<i>Phragmites australis</i>	Kaano	LC
7	<i>Sorghum halepense</i>	Johanson grass	NE
8	<i>Saccharum griffithii</i>	-	NE
9	<i>Typha sp</i>	Booh/ bulrush	LC
NOTE: NE=NOT EVALUATED, LC= LEAST CONCERN, DD= DATA DEFICIENT, NT= NEAR THREATENED, EN= ENDANGERED, CR= CRITICALLY ENDANGERED			

Fauna

The 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 in the Direct Impact Area (DIA). For birds, the surveys were conducted using call recognition, line transect as well as point count method for recording bird's species. Birds were identified in the field and confirmed through consulting the handbook for bird identification (Grimmett *et al.*, 2008). The conservation status of faunal species was assessed as per IUCN Red List of Endangered species.

a) Terrestrial Mammals

The presence of mammals was recorded through direct sightings, their burrows, tracks and footprints, and local information about their presence. A total of 7 mammals' species has been recorded during the field visits in the AoI. All recorded mammalian species are common in nature. These may be encountered during clearance of vegetation and earth excavation and may get disturbed due to construction activities. No significant impacts are expected on recorded faunal species as these can naturally disperse easily from one habitat to the other during construction activities.

A complete list of the mammalian species observed in the project area is given in **Table A4-15**.

Table A4-15: 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	House Mouse	<i>Mus musculus</i>	x			LC
2	Five striped-palm Squirrel	<i>Funambulus pennantii</i>	x			LC
3	House Shrew	<i>Suncus murinus</i>	x			LC
4	Indian Gerbil	<i>Tatera indica</i>	x			LC
5	Little Indian field Mouse	<i>Mus booduga</i>	x			LC
6	Indian Grey Mongoose	<i>Herpestes edwardsi</i>	x			LC
7	House Rat	<i>Rattus rattus</i>	x			LC

b) Reptiles

A total of 6 reptile species have been recorded in the project area. All the species are common in nature. The project activities may disturb them for some time; however, these species can adapt to changes in their habitat.

A complete list of reptiles reported in the project area is provided as **Table A4-16**.

Table A4-16: List of Reptiles Reported in the Project Area

No.	Common Name	Scientific Name	Listing		
			WP Act	IUCN Red list	CITES Appendix
1	Indian Cobra	<i>Naja naja naja</i>			II
2	Indian Fringe-toed Sand lizard	<i>Acanthodactylus cantoris cantoris</i>			
3	Saw scaled Viper	<i>Echis carinatus pyramidum</i>			
4	Garden Lizard	<i>Calotes versicolor</i>			
5	Spotted Indian House Gecko	<i>Hemidactylus brookii brookii</i>			

c) Avifauna / Birds

A total of 21 bird species have been recorded in the project area. Out of the total 21 recorded species, none is on IUCN Red List. However, one species is listed on CMS appendix II and three are listed on CITES appendices i.e., Black Kite, Blue Rock Pigeon, and Rose-ringed Parakeet. List of birds observed / reported in the Aol during field surveys is provided in **Table A4-17**. It is to be noted that all the bird species have been recorded in the broader area of the project, and not specifically on or along the project Aol. Due to the distance of their habitat from the project area, no bird species are expected to be disturbed by the project's construction activities.

Table A4-17: Birds Recorded / Reported in the Project Area

No	Common Name	Scientific Name	Priority Water Network	Status			Listing		
				Migratory	Resident	W P Act	IUCN Red List	CMS Appendix	CITES
1	Bank Myna	<i>Acridotheres ginginianus</i>	x		x				
2	Black Drongo / King Crow	<i>Dicrurus macrocercus</i>	x		x				
3	Black Kite	<i>Milvus migrans</i>	x		x	P			II
4	Blue Rock Pigeon	<i>Columba livia</i>	x		x				III
5	Collared Dove	<i>Streptopelia decaocto</i>	x		x				
6	Crested Lark	<i>Galerida cristata</i>	x		x				
7	Grey Partridge	<i>Francolinus pondicerianus</i>	x		x				
8	House Crow	<i>Corvus splendens</i>	x		x				
9	House Sparrow	<i>Passer domesticus</i>	x		x				
10	House Swift	<i>Apus affinis</i>	x		x				
11	Indian Myna/Common Myna	<i>Acridotheres tristis</i>	x		x				
12	Indian Tree-Pie	<i>Dendrocitta vagabunda</i>	x		x				
13	Jungle Babbler	<i>Turdoides striatus</i>	x		x				
14	Koel	<i>Eudynamys scolopacea</i>	x		x				
15	Little Green Bee-eater	<i>Merops orientalis</i>	x		x				
16	Pied Bushchat	<i>Saxicola caprata</i>	x		x				
17	Purple Sunbird	<i>Nectarinia asiatica</i>	x		x				
18	Red-vented Bulbul	<i>Pycnonotus cafer</i>	x		x				
19	Red-wattled Lapwing	<i>Hoplopterus indicus</i>	x		x				
20	Rose-ringed Parakeet	<i>Psittacula krameri</i>	x		x				III
21	White-cheeked Bulbul	<i>Pycnonotus leucogenys</i>	x		x				

Critical Habitats

No critical habitats have been found within the Aol of the proposed project interventions.

Social and Socioeconomic Aspects

This section presents the socioeconomic baseline based on data collected through rounds of public consultation and a household socioeconomic survey conducted for the ESMP. There are around 40 small and large communities that are located in the Aol of the project. These include KWSC Colony –

Dhabeji, Yaqoobabad (Dhabeji), KWSC Colony - Pipri Filtration Plant, Tayyab Jokhyo Goth, Razaq Abad (Haji Natho Goth), Hassan Panhwahar Goth, Zafar Town, Landhi Cattle Colony, Jumo Goth, Labour Square, Future Colony, Cost Guard Chowrangi, Nasir Colony, Mehran Town, Bhittai Colony, Korangi 5 ½, Shah Faisal Colony 4 No., Shah Faisal Colony 3 No., Jamia Milia Colony (Gulshan- e Qadri), Clifton, Bath Island, PIC Tower – Keamari and areas around Temple Curry PS, Lea Market PS, Jigar Muradabadi PS, Saleh Muhammad PS, Gulbai PS, Baldia PS, Chandni Chowk PS, Kidney Hill PS, Kidney Hill PS, Mahmoudabad 5 PS, LSR PS Staff Colony, NIPA PS, Surjani PS, Sakhi Hassan PS, Ajmer Nagari PS, Nagan PS, Zia Colony PS and Disco PS.

The socio-economic baseline of the project area has been established by utilizing both primary and secondary data sources. In addition, baseline was strengthened by sample-based socio-economic survey conducted within the project area, with the sample size of 306 households as given in **Table A4-18**. During the survey, primary data has been collected from 40 communities through formal and informal consultations.

Table A4-18: Sample Distribution

No	Community	District	Sample Size
1	Dhabeji KWSC Colony	Thatta	6
2	Yaqoobabad	Thatta	6
3	KWSC Colony, Pipri Filtration Plant	Malir	7
4	Tatal Jokheyo Goth	Malir	8
5	Near Razaq Abad (Haji Natho) Goth	Malir	8
6	Hassan Panhwahar Goth	Malir	8
7	Zafar Town	Korangi	10
8	Cattal Colony PS Locality	Malir	6
9	Jumo Goth	Malir	10
10	Labour Square	Malir	8
11	Future PS Locality	Korangi	8
12	Coast Guard Chowrangi Locality	Korangi	8
13	Nasir Colony	Korangi	12
14	Mehran Town	Korangi	7
15	Bhittai Colony	Korangi	10
16	Korangi 5 ½ PS Locality	Korangi	5
17	Shah Faisal Colony No. 4 PS Locality	Korangi	8
18	Shah Faisal Colony No. 3 PS Locality	Korangi	7
19	Shah Faisal Colony - Jamia Milia Colony PS (Gulshan- e Qadri) Locality	Korangi	6
20	Clifton PS Locality	South	5
21	Bath Island Pump House (PS Street) Locality	South	4
22	PIC Tower Locality	Kemari	9
23	Temple Curry PS Locality	South	10
24	Lea Market PS Locality	South	6
25	Jigar Murad PS Locality	East	8
26	Saleh Muhammad PS Locality	Malir	5
27	Gul Bai PS Locality	Kiamari	6
28	Baldia PS Locality	Kiamari	6

No	Community	District	Sample Size
29	Chandni Chowk PS Locality	Central	10
30	Kidney Hill PS (Dhoraji)	East	6
31	Kidney Hill PS (Shaerpao Basti)	East	8
32	Mahmoudabad 5 PS Locality	East	7
33	LSR PS Staff Colony	East	6
34	NIPA PS Locality	East	6
35	Surjani PS Locality	West	8
36	Sakhi Hassan PS Locality	Central	5
37	Ajmer Nagari PS Locality	Central	11
38	Nagan PS Locality	Central	12
39	Zia PS Locality	West	10
40	Disco PS Locality	West	10
Total			306

Socioeconomic data was collected through questionnaire in **Figure A4-9**. The maps of public consultation locations are shown in **Figure A4-10** to **Figure A4-12**.

Figure A4-9: 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 what 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 Sriekey 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: _____

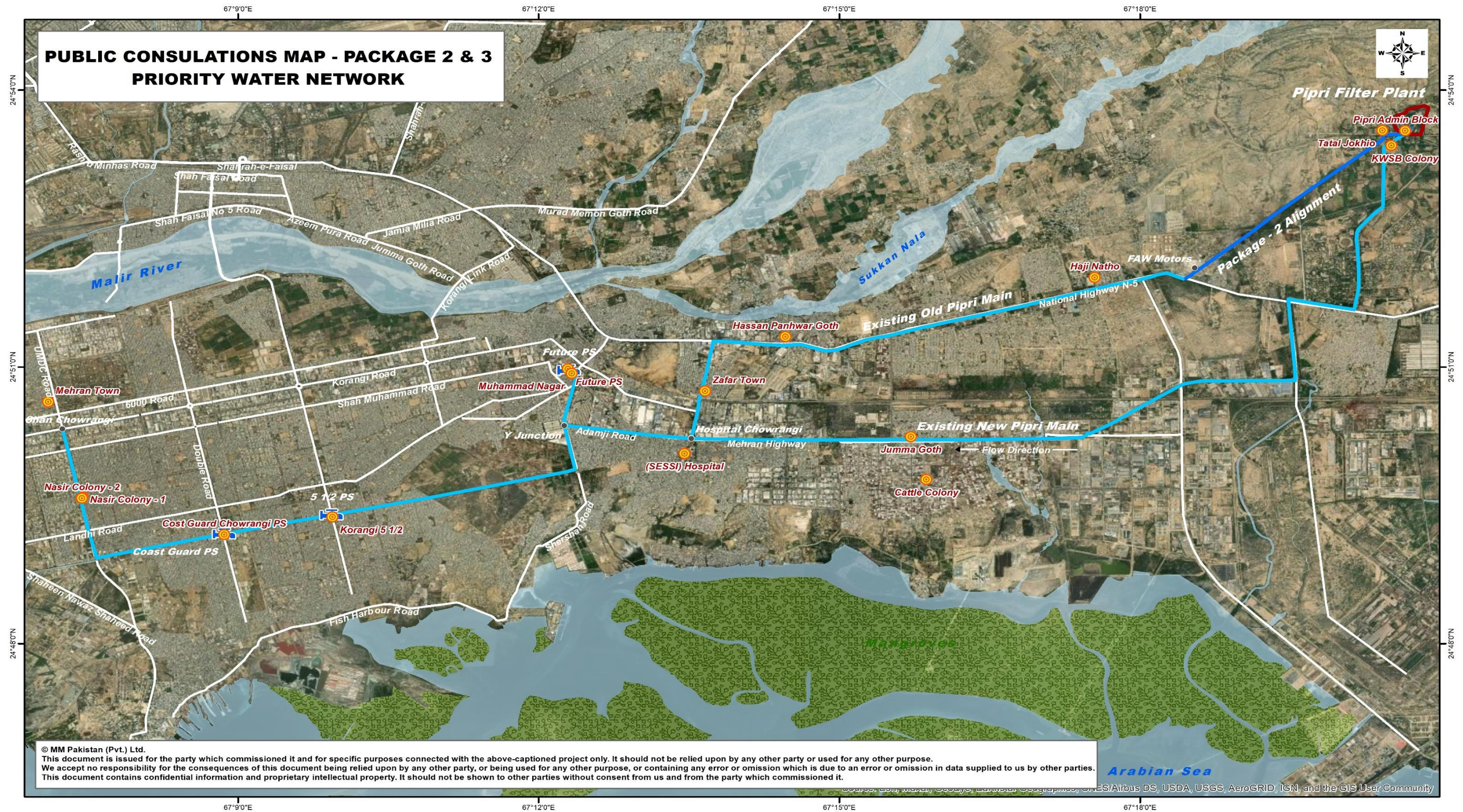
Date: _____

Facilitator: _____

Date: _____



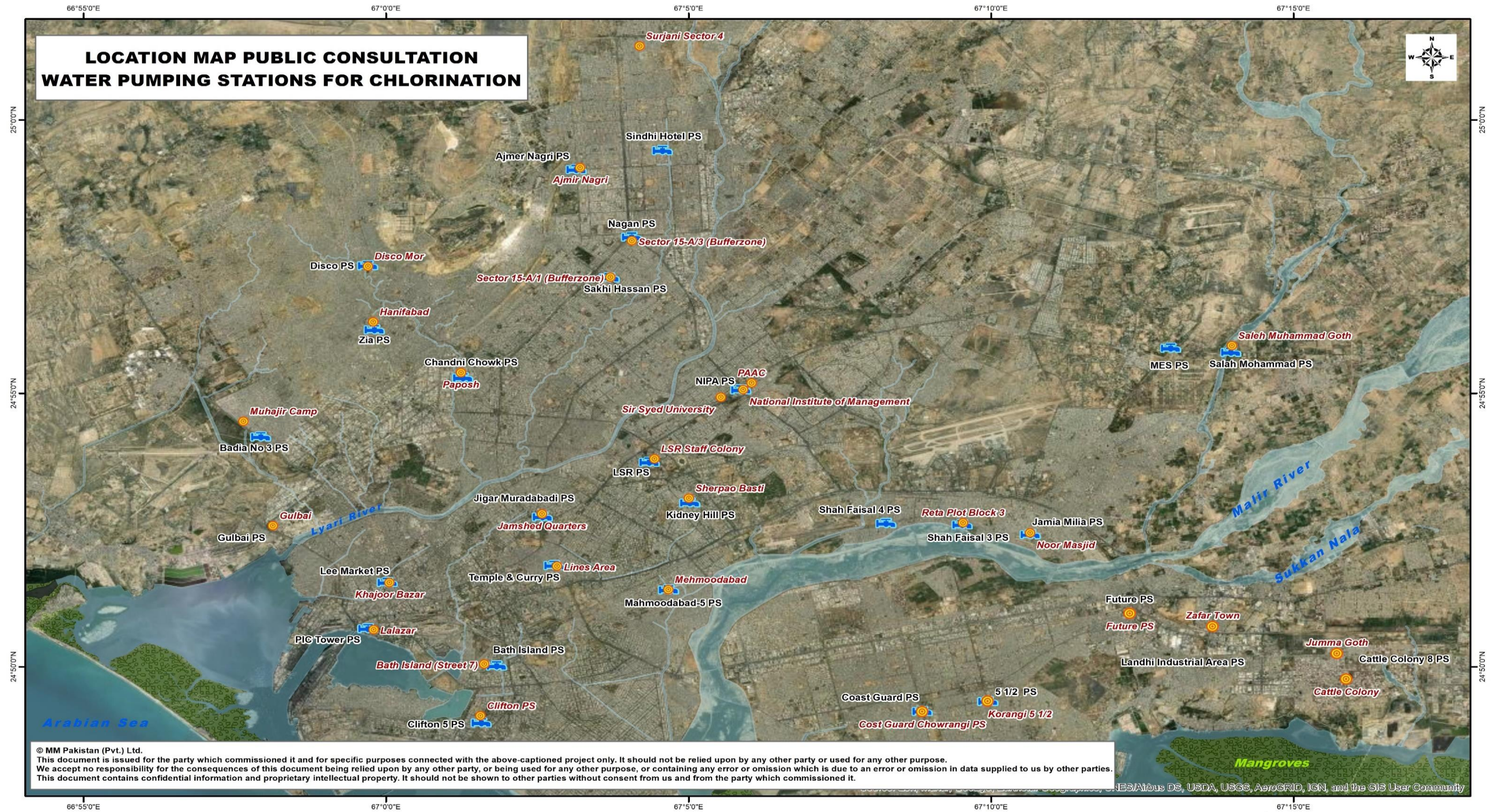
FigureA4-10: Location Map of Public Consultation – Package 01



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Client: Karachi Water & Sewerage Services Improvement Project	Consultant: 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 <ul style="list-style-type: none"> ● Public Consultations ■ Pumping Stations — Package 2 - Existing PRCC Mains — Package 3 - Existing PRCC Mains Filter Plant Boundary 	1,500 750 0 1,500 m 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Drawn:</td><td>T. Noman</td></tr> <tr><td>Checked:</td><td>M.A Shishmahal</td></tr> <tr><td>Approved:</td><td>P. Anjum</td></tr> <tr><td>Date:</td><td>9/15/2022</td></tr> <tr><td>Scale:</td><td>1: 65,000</td></tr> <tr><td>Sheet Size:</td><td>A 4</td></tr> </table>	Drawn:	T. Noman	Checked:	M.A Shishmahal	Approved:	P. Anjum	Date:	9/15/2022	Scale:	1: 65,000	Sheet Size:	A 4
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Figure A4-11: Location Map of Public Consultation – Package 02







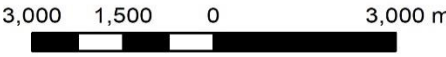
Client:  Karachi Water & Sewerage Services Improvement Project	Consultant:  MM Pakistan (Pvt.) Ltd	Title: Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2	Legend <ul style="list-style-type: none">  Public Consultation Communities  Water Pumping Stations 		Drawn: T. Noman
		Coordinate System: UTM 42N			Checked: M.A Shishmahal Approved: P. Anjum Date: 9/26/2022 Scale: 1: 110,000 Sheet Size: A 4

Figure A4-12: Location Map of Public Consultation – Selected Water Pumping Stations for Chlorination

Administrative Setup

The project area of the proposed project falls in Thatta district and all seven districts of Karachi, i.e., Malir, Korangi, Kemari, Central, South, East and West Karachi.

Population

At the surveyed settlements, most of the population lives in close and joint families, mainly because of low income as well as poverty in some settlements, close family relations etc. The detail pertaining to total household and population of these settlements is provided in **Table A4-19**.

Table A4-19: Population and Households in the Aol

No	Community	District	Population	Household	Sample Size
1	Dhabeji KWSC Colony	Thatta	1500	250	6
2	Yaqoobabad	Thatta	960	160	6
3	KWSC Colony, Pipri Filtration Plant	Malir	1400	200	7
4	Tatal Jokheyo Goth	Malir	4800	600	8
5	Near Razaq Abad (Haji Natho) Goth	Malir	1600	200	8
6	Hassan Panhwahar Goth	Malir	5600	700	8
7	Zafar Town	Korangi	12600	1260	10
8	Cattal Colony PS Locality	Malir	2190	365	6
9	Jumo Goth	Malir	5000	500	10
10	Labour Square	Malir	4800	600	8
11	Future PS Locality	Korangi	8000	1000	8
12	Coast Guard Chowrangi Locality	Korangi	10400	1300	8
13	Nasir Colony	Korangi	36000	3000	12
14	Mehran Town	Korangi	150000	21000	7
15	Bhittai Colony	Korangi	5960	600	10
16	Korangi 5 ½ PS Locality	Korangi	3500	700	5
17	Shah Faisal Colony No. 4 PS Locality	Korangi	40000	5000	8
18	Shah Faisal Colony No. 3 PS Locality	Korangi	490	70	7
19	Shah Faisal Colony - Jamia Milia Colony PS (Gulshan- e Qadri) Locality	Korangi	2400	400	6
20	Clifton PS Locality	South	1000	200	5
21	Bath Island Pump House (PS Street) Locality	South	30	8	4
22	PIC Tower Locality	Kemari	60000	7000	9
23	Temple Curry PS Locality	South	500	50	10
24	Lea Market PS Locality	South	15000	2500	6
25	Jigar Murad PS Locality	East	5000	600	8
26	Saleh Muhammad PS Locality	Malir	325	65	5
27	Gul Bai PS Locality	Kiamari	3000	500	6
28	Baldia PS Locality	Kiamari	40000	7000	6
29	Chandni Chowk PS Locality	Central	30000	3000	10
30	Kidney Hill PS (Dhoraji)	East	18000	3000	6
31	Kidney Hill PS (Shaerpao Basti)	East	650	80	8
32	Mahmoudabad 5 PS Locality	East	150000	21000	7
33	LSR PS Staff Colony	East	700	116	6

No	Community	District	Population	Household	Sample Size
34	NIPA PS Locality	East	4000	700	6
35	Surjani PS Locality	West	30000	4000	8
36	Sakhi Hassan PS Locality	Central	20000	4000	5
37	Ajmer Nagari PS Locality	Central	200000	18000	11
38	Nagan PS Locality	Central	5000	404	12
39	Zia PS Locality	West	2000	200	10
40	Disco PS Locality	West	3650	365	10
Total					306

Poverty

Along the Aol except few lower middle to middle-class communities, most of the settlements are poverty stricken. Most of the residents are working class, working as labor, daily wages worker, running small shops and rickshaw drivers. All the members of families are struggling for survival. Many of them don't have the same degree of access to the basic necessities of life, such as healthcare facilities, drinking water, and roads, as people living in the urban areas do. Lack of proper and affordable healthcare facilities in these settlements makes the women of these communities vulnerable. Mostly the population in the Aol is Sindhi, Malwari, Pathan, Muhajir and Baloch which belongs to the lower class, therefore due to limited earning sources the female only remains busy at household works and do not have easy mobility as well as the easy access to basic facilities like education, employment opportunities, and health facilities. The children and old age people are also vulnerable because the senior citizens do not have easy access to the basic facilities like health and nutrition.

They also do not have the opportunity for easy mobility, because the young members remain busy with earnings and do not having enough income to address the household expenses, therefore they could not move easily from one place to another

Ethnic Structure

The most common ethnic groups found in Project Area are presented in **Table A4-20**. The field data shows that the respondents belonging from different ethnic groups include 26% Pathan, Jokhyo 11.5%, Bihari 23.9%, Baloch 12.1%, and Memon 10.2%, while 16.4% belongs to some other castes such as Paliyo, Soomro, Magsi, Jatt, Gujjar etc.

Table A4-20: Ethnic Structure

No	Ethnic Group	%
1.	Jokhyo	11.5
2.	Pathan	26
3.	Bihari	23.9
4.	Baloch	12.1
5.	Memon	10.2
6.	Other	16.4
Total		100

Language

In the Project's Aol, Urdu, Sindhi and Pushto were found to be the dominant languages. Some respondents speak other languages as well. Statistics are shown in **Table A4-21**.

Table A4-21: Language

No	Ethnic Group	Numbers	%
1.	Urdu	140	37.5
2.	Sindhi	131	35.1
3.	Pashto	78	20.9
4.	Other	24	6.4
Total		373	100

Economic Condition

i. Local Economy

Though the Project Area is highly dense, it has many small unpaved roads, and is highly accessible both for residents as well as visitors. The area is well connected with the surrounding areas and other Karachi towns through public bus system as well as taxis, rickshaws, and motorcycle rickshaws.

Most of the people in the area are private and government job holders, workers in industries etc. Large number of people living in settlements near to the industrial area are earning their livelihood by working in the nearby industrial units. Many male residents of Haji Natho, Hassan Panhwahar, Zafar Town, Cattle Colony PS, Jumo Goth, Labour Square, Cost Guard Chowrangi, Nasir Colony, Mehran Town, Bhattai Colony and Tatal Jokhyo areas are mostly engaged in professions such as drivers, gardeners, sweepers, security guards, while female residents as house maids. Other sources of income in these communities include small businesses and daily wages labour works.

ii. Industry

Landhi, Korangi and Bin Qasim Industrial areas are the nearest industrial areas located in proximity to the project area.

iii. Occupational Structure

The occupational structure of the respondents was studied during the field survey. The statistics regarding occupational status of the respondents is presented in **Table A4-22**.

Table A4-22: Occupational Status

No	Occupational Status	%
1.	Small Business / Shopkeeper	25.7
2.	Labour	28.2
3.	Driver	3.8
4.	Private Job	39.7
7.	Any other	2.7
Total		100

iv. Monthly Income of the Respondents

Most of the families are comprised of big family size, whereas 41% of the respondents informed that their income was below 17,500, this is indicative of those respondents' income and not that of the family. The adults of these families are associated with the different professions as detailed above to earn their livelihood. The people in Yaqoobabad – Dhabeji and other nearby villages are mostly employed in the surrounding industries of Dhabeji. The major source of income is labor work in industry while few people depend on agriculture.

Income distribution details of respondents are given in **Table A4-23**.

Table A4-23: Monthly Income of the Respondents

No	Average Monthly Income (Rs.)	%
1.	Up to 17,500	41
2.	17,501 - 30,000	30
3.	30,001 – 50,000	20.1
4.	50,001 – 75,000	6.2
5.	75,000 – 100,000	2.1
6.	Above 100,000	0.5
Total		100

v. Expenditure of the Respondents

Household expenditure depends on the earning. The average monthly expenditures of respondents is shown in **Table A4-24**

Table A4-24: Expenditure of the Respondents

No	Expenditure	%
1.	Up to 17,500	35.9
2.	17,501 - 30,000	35.1
3.	30,001 – 50,000	18.8
4.	50,001 – 75,000	6.9
5.	75,000 – 100,000	2.4
6.	Above 100,000	0.8
Total		100

Social Infrastructure and Services

i. Access to Social Amenities in the Project Area

The result of the survey indicated that 97.3% of the households had electricity, water supply was available for the 96.5% of the households and proper sewerage system to 95.4% of the households while the health care facilities in shape of dispensaries/hospitals were available to 77% of the surveyed population. Rest of the 33% were of the view that they do not have any health facility near their residences and they have to travel some distance to avail health facilities. Providing basic level of education is the responsibility of the government, and facility of school and graveyard was available in the area to almost 99% of the respondents. The information in respect to access to social amenities is given in **A4-25**.

Table A4-25: Social Infrastructure

No	Facility	%
1.	Electricity	97.3
2.	Water Supply	96.5
3.	Sewerage	95.4
4.	Dispensary/ hospital	77
5.	School	99.4
6.	Metaled Roads	96.2
7.	Graveyard	99.4

ii. Quality of Health Facilities

During the socio-economic survey it has been witnessed that the survey areas are facing challenges with respect to the availability and access to health facilities with poor quality of available facilities as well.

iii. Quality of Education Facilities

It has been observed in Yaqoobabad – Dhabeji that there are no education facilities located in proximity to the AoI. The children go to schools located in main Dhabeji town. For the settlements located in Karachi, the consulted settlements have both public and private educational institutions from primary to university level in proximity. Quality of education has reported to be reasonable at Dhabeji and Pipri KWSC Staff Colony Schools.

iv. Transport

The community travels to their destinations in local buses, auto rickshaws, cars, motorbikes, and pickups. Individuals in the area often use their own source of transport (mainly motorbikes and cars).

Table A4-26 describes mode of transport being used by the respondents during social impact assessment survey. About 62.2% of respondents were using public transport and 37.8% reported their own private transport. While, the respondents using personal transport, use to go for public transport when they must travel a far distance area in Karachi city.

Table A4-26: Mode of Transport

No	Mode of Transport	%
1.	Public	62.2
2.	Personal	37.8
Total		100

v. Ownership Status of the Houses

Respondents were asked about their housing ownership status to know their level of living standard as reflected in **Table A4-27**. Majority of respondents 57.1% were living in their own houses whereas, 42.9% were living in rented houses.

Table A4-27: Ownership Status of the Houses

No	Type of Ownership of House	%
1.	Owner	57.1
2.	Renter	42.9
Total		100

A mix housing pattern has been observed in the Project Aol where 78.6% of the respondents live in pacca⁶ houses that are constructed with superior materials and workmanship while 21.4% respondents have semi pacca houses that are made of bricks masonry with mud mortar. **Table A4-28** shows construction pattern of houses in the Aol.

Table A4-28: Housing Construction Pattern

No	Type of House	%
1.	Pacca	78.6
2.	Semi Pacca	21.4
Total		100

vi. Source of Drinking Water

Scarcity/ unavailability of clean and safe water is one of the major problems being faced by the residents of Project area especially in Hassan Panhwahar Cattle Colony PS, Jumo Goath, Cost Guard Chowrangi, Nasir Colony, Mehran Town, Bhattie Colony, Lea Market PS, Saleh Muhammad, Baldia PS, Surjani PS and Ajmer Nagari PS settlements, where there is poor water supply facility is available to the local residents. Although quality of water is not good but local people are forced to consume this water as the water tanker is quite expensive. People are forced to purchase water from tankers or by the water purification centres on high rates. The water supply is insufficient and polluted in many of the areas and water is not fit for drinking purpose. In many of the areas, water normally comes for a few hours in a day and is not available in sufficient quantity. The findings of the study indicate that most of the residents of the area rely upon the government water supply. Details are given **Table A4-29**.

Table A4-29: Source of Drinking Water

No	Water Supply Source	%
1.	Water supply	96.5
2.	Tanker	3.5
Total		100

vii. Sanitation

Proper sanitation system is available only in urban areas and KWSC Colonies. The consulted settlements mostly have drainage system and covered sewage lines, however due the lack of regular cleaning, sewerage systems usually remain choked, which cause inconvenience for the residential. In rural type settlements, people have established their own pipe / open sewerage systems which is being

⁶ Structure made of concrete blocks, reinforced and cement

disposed into nearby sewer mains. Most of the households have flush type latrines connected to these sewerage systems.

Law and Order Situation

The law and order situation in the project area has been improving in the recent years as crime rates have been decreasing all over the city. It has been informed by the respondents that in these days, only few cases of mobile snatching and other petty street crimes were reported.

Mechanism of Conflict Resolution

According to normal social practices in the society, people have various disputes / conflicts on different issues like other parts of the country. The people in the project area have two options available for conflict resolution. First is the Police and government judiciary system and second is Mutual understanding (Council of elders) system. The people of project area are believed to be peaceful but sometimes a dispute between two individuals, from two casts, may generate problems. Usually the individuals go to government Judiciary system if they are not satisfied with their problems. Ordinarily, whenever there is a dispute between two persons /parties, the notables of one side go for reconciliation to the other party and sit together to resolve the issue. Sometimes the dispute is resolved through imposition of penalties in the form of cash, land and kind. In case of serious matters local political influential intervene to settle the dispute. Police and court of law is the last option.

Awareness Regarding the Proposed Project

Many respondents (65.1%) had prior knowledge of the Project. Only 34.9% were unaware about the Project as shown below in **Table A4-30**. All respondents were briefed about the features of the proposed Project.

Table A4-30: Awareness about the Project

No	Awareness of the Project	%
1.	Yes	65.1
2.	No	34.9
Total		100

Acceptability of the Proposed Project

During the survey, majority of respondents favoured the proposed project keeping in view its importance and need. The reason for accepting the proposed Project is the anticipated drastic improvement in the water supply system of the city.

Sites of religious significance

No site of religious significance was found in the project's Aol.

Gender Aspects

Gender issues are gaining importance in development projects because female members of the community are generally neglected while designing, assessing, and implementing such projects. In

general, the project area reflects a male dominated society. Women face difficulties in getting education and are not consulted for most of the decision-making processes. Females are generally more vulnerable than male members of the society. This project is also no exception to it.

Women Participation

Women have a vital role in maintaining domestic functions. During the field survey, the role of the respondents about their participation in different activities of daily life was inquired. The information on gender was also collected through individual interviews and group discussions with female respondents by the gender enumerators.

The survey revealed that the 68.5% of women participates only in household and child caring activities, 21% have found to be engaged in employment while 10.5% women runs small home-based business such as tailoring, beauty parlours and small tuition centres etc. **Table A4-31** indicates the women participation level.

Table A4-32: Women Participation in the Various Activities

Activity	Percentage (%)
Household / Child caring	68.5
Employment	21
Business / Home based Business	10.5
Total	100

Level of Education

Overall, the level of education among women has found to be reasonable and 18.7% women were found to be un-educated. Further detail of female population of the project area is described in **Table A4-33**.

Table A4-33: Level of Formal Education of Respondents

Education Level	Percentage (%)
Primary	24.6
Middle	21.6
Matric	16.4
Higher secondary school certificate	9.9
Bachelor of Arts (BA)	5.8
Masters of Arts (MA)	2.9
Un-educated	18.7
Total	100

Age Composition

Table A4-34 shows the overall percentage distribution of the respondent's age. The majority of the respondent's (23.9 %) had reached mature age is 26-30. Remaining females of 12.3%, 21.6%, 16.9%,

16.4% and 8.8% females' lie in the age group of 16-20, 21-25, 31-35, 36-40 and 41 and above age groups respectively.

Table A4-34: Age Composition of Female Respondents

Categories (Age)	Percentage (%)
16-20	12.3
21-25	21.6
26-30	23.9
31-35	16.9
36-40	16.4
41 and Above	8.8
Total	100.0

Decision Making Process

Most of the consulted women respondents were of the view that final decision-making power overall rests with the male heads of the families.

Information on Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) and Gender Based Violence (GBV);

The World Bank (Bank) has been taking concerted measures to strengthen its approach to the prevention and mitigation of SEA/SH risks in Bank-financed projects. In this scenario, the female respondents identify some facts during the survey on GBV, SEA/SH Prevention and Response which are as under:

- ◆ One of the Participant of Nasir Colony expressed that the common perception of domestic violence is by the husband on his wife, but the women (mothers-in-laws) are also the enforcer of violence domestically and the war on domestic violence is actually not only between male and female but also between the females due to inferiority inside the family.
- ◆ A 60 years old participant revealed that she was living in a joint family and her marriage was arranged and she experienced extreme violence from her in-laws and husband both.
- ◆ As overall in the consulted settlements, population and ethnicity is mixed in some areas especially where the Pashtun and Baloch communities are settled. They have almost same customs, values and restrictions for the women.
- ◆ Most of the participants of different settlements informed that dowry related customs are common among the settlements. In most cases, meeting groom's dowry demand is very difficult for the bride's family due to poverty.
- ◆ One of the participants of Zafar town told us that Laws of Pakistan are according to the principles of Islam, but culture is not predominately Islamic and is influenced by other cultures, e.g., Hinduism and strict tribal customs such as honour killings, exchange marriages etc.
- ◆ In all the consulted villages women participate in household decisions, but not in major decisions of property buying and selling. The rarely have the property ownership rights.

Gender issues in the Project Area

Collectively, major demands of the consulted female members of the communities are as follows;

- ◆ Women demanded the improvement in available health facilities in the local hospitals.
- ◆ Women demanded for the upgradation of educational facilities in local schools.
- ◆ Drinking water is not safe and is insufficient. Women demanded for the improvement in quality and quantity of the drinking water.
- ◆ The educated women are jobless, hence jobs should be provided to these women during project execution if possible;
- ◆ Numerous women are doing the embroidery work for domestic use; their skill should be enhanced through providing training and setting up of the skill development centres in the project area.

Annexure 5: Assessment of Potential Environment and Social Impacts and Risks

This chapter identifies and assesses the potential impacts of Priority Water Networks Rehabilitation and Extension Project on physical, biological and socio-economic environment that could arise during pre-construction (design), construction and operational phases of the project. The impact analysis has been performed keeping in view the information and data available regarding project interventions, primary field studies and secondary data review. Mitigation measures have been proposed taking guidance from the local laws and guidelines, WB ESS, WB EHS Guidelines, OSHA Standards, Health & Safety Executive (UK) and where applicable the GIIP. Identified impacts have been arranged in line with ESS 1-10 and mitigation hierarchy as per ESS1 has been followed for devising the mitigation measures.

Methodology for Screening of Impacts

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. It is often described like this:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

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

Consequence Scale

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding communities e.g., extreme loss of soil and water resources and quality from storm water runoff, extreme pollution of soil and water resources including major contamination from hazardous materials, widespread effects on ecosystems with deaths of fauna/flora, widespread community impacts resulting in illness, injury or inconvenience, loss or destruction of archaeological or historical sites. 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 e.g., major loss of soil and water resources and quality from storm water runoff, major pollution of soil and water resources including contamination from hazardous materials, significant effects on ecosystems with isolated deaths of non-vulnerable flora and fauna, significant annoyance or nuisance to communities, major damage to or movement required to archaeological or historical sites. Occurrence may result in work being halted and a fine.	3

Consequence	Definition	Score
Moderate	The action will cause limited adverse impacts on the environment or surrounding communities e.g., Localized short term noticeable changes in storm water quality, short term minor changes on ecosystems, some annoyance or nuisance to communities, isolated or partial damage to archaeological or historical sites, work is unlikely to be halted, fines unlikely.	2
Minor	No minimal adverse environmental or social impacts e.g., no measurable or noticeable changes in storm water quality. Water quality remains within tolerable limits, little noticeable effect on ecosystems, no or isolated community complaints, no or unlikely damage to archaeological or historical sites no likelihood of being fined.	1

Adapted from: Environmental Management for Construction Handbook-Safeguards Unit Central & West Asia Department-ADB

Risk Score Table

Likelihood	Consequence			
	Catastrophic	Major	Moderate	Minor
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		

Pre-Construction Phase

Screening of potential impacts during the pre-construction phase is provided in **Table A5-1**.

Table A5-1: Screening of Possible Impacts during Pre- Construction Phase

No.	Potential Issue	Relevant ESS	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Significant, Medium, Low)
1	Permits, NOCs, Clearances	ESS1: Assessment and Management of E&S Risks and Impacts	Likely	Moderate	Medium	Low
2	Lack of appropriate E&S personnel with CSC, and Contractors		Likely	Moderate	Medium	Low
3	Inappropriate Planning for Traffic Management		Likely	Major	Medium	Low
4	Improper location of worker camps leading to environmental and social issues	ESS4: Community Health and Safety	Likely	Major	Medium	Low
5	Community Awareness Program		Overall Positive			
6	ESMP Implementation Training		Overall Positive			

- Critical Risk Level
- Significant Risk Level
- Medium Risk Level
- Low Risk Level

Permits, NOCs, Clearances Impacts

a) Impacts

Without necessary permissions from relevant Government Agencies, the project cannot be implemented. Failure to obtain necessary consents, permits, and other appropriate regulatory clearances may result work stoppage.

b) Mitigation Measures

Necessary consents, permits, and clearances will be obtained before the start of civil works. from the Sindh Environmental Protection Agency (SEPA). This ESMP is part of the process for acquiring necessary environmental approval from SEPA.

Lack of appropriate E&S personnel with CSC and Contractors

a) Impacts

Lack of E&S personnel's environmental safeguard capacity or selection of environment non-responsive contractors may result in failure of ESMP implementation and may be a source of number of non-compliances. Inadequate resources will lead to major impacts and risk in the physical, biological, and social environment and eventual harms to environment and non-compliances with ESMP requirements.

b) Mitigation Measures

Appropriate E&S personnel are crucial for the effective implementation, supervision, and monitoring of various plans outlined in this document, including the ESMP, SSESMP, OHS Plan, CHS Plan, and others. Mitigation measures include:

- ◆ PIU will recruit qualified CSC and Contractors capable of meeting the Project's E&S and safety standards.
- ◆ Education, qualification, and experience requirements for personnel will be specified in bidding documents and reviewed by the supervision consultant for approval.
- ◆ PIU will avoid hiring Contractors with inadequate environmental, health, and safety management records.
- ◆ Contractor qualifications outlined in the ESMP will be part of pre-qualification criteria during short-listing.
- ◆ Conditions of the ESMP will be accurately reflected in contractor bidding documents and supervision consultant's TOR.
- ◆ PIU - KWSSIP will ensure ESMP inclusion in bidding documents.
- ◆ PIU - KWSSIP will ensure the selection of project contractors based on merit, with allocated funds for ESMP implementation and monitoring

Inappropriate Planning for Traffic Management

a) Impacts

Open cut trenches will inevitably restrict traffic flows and movement of construction traffic at some of the already busy sections of project area roads and can have substantial impacts on the community, public safety, traffic congestion and air quality in case of inappropriate planning for traffic management and diversions. Potential traffic blockage spots in the Project Area are in proximity to the Landhi Industrial Area provided in **Table A5-2**.

Table A5-2: Potential traffic blockage spots in the Project Area

No.	Project Package / Section	Location Map
1.	Approximately 2KM Section of Old Pipri Mains (OPM) – Starting from Manzil Pump to Hospital Chowrangi.	
2.	Approximately 2KM Section of Old Pipri Mains (OPM) / New Pipri Mains (NPM) – Starting from Hospital Chowrangi to Y-Junction.	

b) Mitigation Measures

- ◆ 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.
- ◆ Works will not commence until the PIU obtains necessary permissions from relevant authorities such as Korangi and Malir DMCs.

- ◆ PIU shall accord approval of TMP before initiation of construction activities and no temporary or permanent works shall be initiated before the plan is approved by the PIU.
- ◆ The TMP shall ensure the following:
 - ◆ Providing a safe environment for all road users;
 - ◆ Providing protection to the general public from traffic hazards that may arise as a result of the construction vehicles movement;
 - ◆ Minimizing disruption, congestion and delays to all road users;
 - ◆ Ensuring access to adjacent private/commercial premises maintained at all times.
 - ◆ Ensure whenever possible, that a sufficient number of traffic lanes to accommodate vehicle traffic volumes are provided.
 - ◆ Ensure that delays and traffic congestion are kept to a minimum and within acceptable levels.
 - ◆ Ensure that appropriate/sufficient warning and information signs are installed and that adequate guidance is provided to delineate the travel paths through the event site.
 - ◆ Ensure that the roads are free of hazards and that all road users are adequately protected from activities of road users

Improper Location of Worker Camps Leading to Environmental and Social Issues

a) Impacts

The duration of the construction activity for the project is expected to be 06 months and approximately 545 skilled / unskilled workers will be engaged. For smooth execution of construction activity and residence of the workforce, two construction camps will be established. Almost 100 – 150 workers are expected to reside in each camp. Influx of these workers could affect project areas negatively in terms of utilization of public infrastructure, utilities, housing, and social dynamics if labor camps are not sited properly. Their interaction with the local community might lead to privacy issues for the nearby community and unwarranted exposure to Gender Based Violence, sexual exploitation, and abuse (SEA), violence against children and sexual harassment. Besides, improper disposal of sewage and solid waste from these camps may cause vector borne diseases, unhygienic conditions and aesthetic issues.

b) Mitigation Measures

- ◆ Campsite locations are proposed in this ESMP after consulting with the Technical Consultants and keeping in view suitable distance from the nearby settlements. Worker camps shall be developed at the identified campsite locations and ancillary facilities shall be provided such as electricity, washrooms for labor with suitable effluent and sewage disposal facilities as well as water for their everyday use for drinking and bathing etc.
- ◆ The Contractor in collaboration with the PIU / CSC will ensure that camps are suitably separated from local communities with strict protocols for interaction with local communities in order to avoid impacts from labor influx and having minimal disturbance to the nearby communities.
- ◆ The contractor will be contractually bound to disclose the “Recruitment Policy” and hiring at least 60% people who live within close proximity to the Project Area.

- ◆ Contractors will follow whereas PIU shall ensure the adherence to the labor standards including Provincial Labor Laws and ILO Standards for work hours, worker's payments & compensations.
- ◆ In line with the KWSSIP Labor Management Procedures, the contractor shall prepare site-specific Workers Camp Management Plan (CMP) and Labor Management Plan (LMP) and ensure its effective implementation.
- ◆ Other necessary measures include:
- ◆ Contractor will develop a Code of Conduct (COC) for all site personnel. All site personnel shall sign this COC and abide by it.
- ◆ Contractor will ensure that its staff and workers receive proper training on the prevention of Sexual Exploitation, GBV / SH. The training will be resourced by the contractor, provided on-site, and include awareness and information on effects and consequences of GBV, SEA, VAC and SH.
- ◆ Construction crew will avoid entering settlements.
- ◆ Provision related to SEA/SH/GBV will be incorporated in the bidding document,
- ◆ The Contractor shall raise awareness of the risks among community members and inform them about available grievance mechanisms.
- ◆ The routes / places used by the women will be avoided as far as possible. If unavoidable, alternate routes will be identified for the communities.
- ◆ Contractor shall conduct induction training or workshops to introduce the basics of health and hygiene and the necessary preventive measures against diseases.
- ◆ Necessary medical screening of all workers & staff and submission of proof of vaccination (COVID-19) prior to any employment shall be ensured.
- ◆ Workers shall be provided with training on the Worker's GRM so that they know their rights and responsibilities.
- ◆ Availability of complaint box shall be ensured at all work sites allowing workers to report any issues and wrongdoings.

Community Awareness Program

Before the start of project implementation, awareness shall be provided to the local population through 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.

ESMP Implementation Training

Often lack of proper training to implement the ESMP stipulated in the bid document leads to mismanaged environmental and social safeguards. Therefore, ESMP training for the Contractors and its workers will be organized before construction goes on-board. Training will be arranged before construction starts with all involved parties: Contractor, Workers and Management Staff from PIU and CSC. The training will cover topics including spoils management, waste management, driving safety, standard operating procedures (SOPs) for construction works; community and occupational health and safety, core labor standards, code of conduct, avoidance of interaction with communities, outcomes of GBVH / SEA / SH conducts, applicable environmental and social laws, etc. Training shall be organized by the CSC.

Construction Phase

Screening of potential impacts during the construction phase of the project are provided in **Table A5-3**.

Table A5-3: Screening of Possible Impacts during Construction Phase

No.	Potential Issue	Relevant ESS	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Significant, Medium, Low)
1	Inadequate Implementation of ESMP, OHS, CHS and Other Specific Plans.	ESS1: Assessment and Management of E&S Risks and Impacts	Likely	Major	Significant	Low
2	Temporary Closure of Water Supply		Likely	Major	Medium	Low
3	Occupational Health & Safety and Emergency Preparedness & Response	ESS2: Labor and Working Condition	Likely	Major	Significant	Low
4	Communicable Diseases - COVID- 19 and Camp Management		Likely	Major	Medium	Low
5	Working Conditions		Likely	Major	Medium	Low
6	Employment of Child Labor		Likely	Major	Moderate	Low
7	Employment Generation		Overall Positive			
8	Dust Emissions	ESS3: Resource Efficiency and Pollution Prevention	Likely	Moderate	Medium	Low
9	High Noise Levels from Construction Activities		Likely	Moderate	Medium	Low
10	Solid Waste Management - Generation of Excavated Material, Kitchen Waste, Hazardous Waste		Likely	Major	Significant	Low
11	Untreated Disposal of Effluent from Worker Camps		Likely	Moderate	Medium	Low
12	Soil Contamination		Likely	Moderate	Medium	Low
13	Construction of Intermittent Chlorination Facilities		Unlikely	Moderate	Low	Low
14	Impacts Associated with Pipe Jacking		Unlikely	Moderate	Low	Low
15	Improper Site Restoration		Likely	Major	Medium	Low
16	Community Health & Safety		Likely	Major	Significant	Low
17	Labor Influx / SEA – SH – GBV Incidents		ESS4: Community Health and Safety	Likely	Moderate	Medium
18	Restricted Access	Likely		Moderate	Medium	Low

No.	Potential Issue	Relevant ESS	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Significant, Medium, Low)
19	Construction Traffic Management and Safety		Likely	Moderate	Medium	Low
20	Vegetation Loss and Disturbance to Fauna	ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Likely	Moderate	Medium	Low
21	Cultural Heritage Sites	ESS8: Cultural Heritage	Unlikely	Moderate	Low	No residual Impact
22	Stakeholders Concerns and Engagement	ESS 10: Stakeholder Engagement and Information Disclosure	Likely	Moderate	Low	No residual Impact

- Critical Risk Level
- Significant Risk Level
- Medium Risk Level
- Low Risk Level

Inadequate implementation of ESMP, OHS, CHS and Other Specific Plans

a) Impacts

Inadequate implementation of ESMP and associated plans will result in major concerns in the form of community grievances, environmental / social impacts and risking the health and safety of the workforce.

b) Mitigation Measures

- ◆ The Contractor will hire qualified Environment, Health, Safety, and Social Staff to oversee project E&S aspects.
- ◆ The Contractor will establish Environmental, Social, Occupational, and Community Health and Safety procedures in method statements for all activities, with approval needed from PIU and CSC. They'll also create and implement specific management plans based on the ESMP guideline.
- ◆ Qualified EHS and Social Management Staff will be recruited by the Contractor to ensure ESMP compliance.
- ◆ PIU - KWSSIP will assess the Contractor's capacity for safeguard management, and contracts will be awarded accordingly. Contractors lacking the required capacity for E&S safeguards management will not be pre-qualified or selected.

Temporary Closure of Water Supply

a) Impacts

Internal joint repair works at OPM, NPM and KM may require temporary closure of water supply during work hours, which could cause nuisance to public due to short-term periodic cut-off of water supplies during construction period.

b) Mitigation Measures

- ◆ The Contractor, in collaboration with KWSC, will create a repair works schedule allowing periodic and short-term closures of specific water mains.
- ◆ PIU will ensure that only one water main is shut down at a time.
- ◆ PIU, CSC, and Contractor's Social Safeguard and Community Liaison Staff will engage with the public to ensure nearby communities are informed about temporary water supply closures during construction. They will also provide tentative closure timings to help residents make necessary water storage arrangements.

Occupational Health & Safety and Emergency Preparedness & Response

a) Impacts

- ◆ Occupational Health and Safety risks in the project will mainly be associated with the construction phase. Workers could face physical hazards like accidents involving heavy equipment, falling objects, trips and falls near excavations, heat stress, fires, dust, noise, confined spaces, and welding-related risks (electrical, heat, fire, asphyxiation, respiratory, and gas use/storage).

- ◆ Specific hazards for different construction packages include:
- ◆ **Package 01 (Dhabeji Rising Main No. 02):** Heavy equipment, crane use, falling objects, and welding during MS Pipeline installation.
- ◆ Package 02 (OPM / NPM External / Internal Joint Repair): Hazards related to working in confined spaces.
- ◆ Package 03 (Flow Meters) and Package 04 (Intermittent Chlorination): Fewer OHS hazards due to lighter work activities.
- ◆ Poorly regulated working hours can increase accident risks due to worker fatigue.

b) Mitigation Measures

- ◆ Before commencing construction activities, the Contractors will prepare an Occupational Health and Safety (OHS) Management Plan in accordance with the national/local regulatory framework, including the 'Sindh Occupational Safety and Health Act, 2017', and adhere to the World Bank Environmental and Social Standards, specifically 'ESS-2: Labor and Working Conditions', the WB Health and Safety Framework, and World Bank EHS Guidelines on Construction and Decommissioning Activities.
- ◆ Contractor will follow internationally recognized Good International Industry Practices (GIIP), International Standards Organization (ISO) Standards and Occupational Safety and Health Administration (OSHA) Standards. These practices encompass elements like OHS Policy Statements, organizational structures, Standard Operating Procedures (SOPs) for all activities, Hazard Identification and Risk Management, conducting Job Hazard Analysis, creating Method Statements containing OHS considerations, OHS training requirements, and protocols for recording and reporting incidents, wherever applicable.
- ◆ The Contractor will adhere to the guidelines and the World Bank Group (WBG) Environmental, Health, and Safety (EHS) guidelines when preparing and implementing the OHS Management Plan on-site.
- ◆ COVID-19 protocols issued by the Ministry of National Health Services will be implemented.
- ◆ An Emergency Preparedness and Response Plan (EPRP) will be part of the OHS Plan.
- ◆ PIU will coordinate with emergency services if additional resources are needed.
- ◆ First aid units, equipment, and paramedical staff will be available at workplaces and camps.
- ◆ Site safety measures include barricading, signboards, traffic diversions, and personal protective equipment for workers.
- ◆ A "zero tolerance to loss of life" policy will be implemented.
- ◆ Health and Safety training will be provided, and compensation will follow Sindh Workers Compensation Act, 2015.
- ◆ Trench excavation safety measures include temporary support, edge protection, and avoiding work during monsoons.
- ◆ Amenities like shaded rest areas, clean drinking water, medical facilities, and appropriate work spacing will be provided.

- ◆ Special precautions for internal pipeline work, including training and safety equipment, will be enforced.
- ◆ Job hazard analysis (JHA) will be conducted for each construction component.
- ◆ A project-wide H&S risk assessment will be done before work begins.
- ◆ OHS officers will supervise construction activities.
- ◆ OHS training and basic medical services will be provided.
- ◆ Mandatory accident insurance for labor and employees will be secured.
- ◆ Layout plans for camp sites will display safety measures and contingency plans.
- ◆ Work safety practices and good workmanship will be upheld.
- ◆ Proper storage areas and precautions for hazardous materials will be implemented.
- ◆ Adequate sanitation, washing, cooking, and dormitory facilities will be provided at camp sites.

Communicable Diseases - COVID- 19 and Camp Management

a) Impacts

- ◆ Communicable diseases such as COVID-19 may be introduced due to the immigration of workers associated with the project.
- ◆ Inappropriate camp management may lead to discomfort among workers as well as causing disease vectors and nuisance for the community / passers-by.

b) Mitigation Measures

The Contractor shall ensure the following measures:

- ◆ Implementation of health and safety protocols on COVID19 i.e. Health & Safety of Building and Construction Workers⁷ - Issued by Ministry of National Health Services, Regulations and Coordination, GoP - April, 2020.
- ◆ Awareness among workers will be created on proper sanitation and hygiene practices to endorse proper health;
- ◆ Good housekeeping practices will be maintained at camp and project sites;
- ◆ Adequate personal hygiene facilities will be provided in good condition with adequate supply of clean water;
- ◆ Arrangements will be made to treat the affected workers on time to control the movement of vectors diseases;
- ◆ Implementation of Camp Management Plan and Labor Management Plan (LMP).
- ◆ Use of non-wood fuel for cooking;

⁷

https://storage.covid.gov.pk/new_guidelines/01June2020_20200411_Guidelines_for_the_health_&_safety_of_building_&_construction_workers_1101.pdf

- ◆ Contractor shall implement ECP 14: Construction Camp Management which ensure that the Contractors are following the labor standards, training for the workers on the existing GRM so that they know their rights and responsibilities, and availability of complaint box allowing for workers to report any wrongdoings.
- ◆ Dedicated cleaning staff shall be appointed for maintaining cleanliness at campsites.

Working Conditions

Around 649 construction workers will be on project sites and a certain percentage of them will be sourced from the local communities.

a) Impacts

Poor enforcement of labor laws in Pakistan may lead to labor right abuses.

b) Mitigation Measures

- ◆ Contractors will follow the labor standards including Provincial Labor Laws and ILO Standards for work hours, workers payments & compensations.
- ◆ Workers shall be provided with training on the existing GRM so that they know their rights and responsibilities, and availability of complaint box allowing for workers to report any wrongdoings.
- ◆ Effective compliance of LMP shall be ensured.

Employment of Child Labor

a) Impacts

Major impacts of child labor include psychological, physical damage to the child being employed, deprivation of educations and chances of sexual exploitation. The child labor is common in the low-income groups. The parents of underage children belonging from low-income groups prefer to get their children hired as labor. However, the local legislation prohibits the employment of children and restrict the employment of adolescents in certain occupations and processes such as construction industry.

b) Mitigation Measures

- ◆ The Contractor shall have its employment policy in accordance with relevant acts, guidelines and labor policies i.e. The Sindh Prohibition of Employment of Children Act, 2017 and ESS-2;
- ◆ No child having age below 18 shall be allowed to be employed in any construction work by the – construction contractors, sub-contractors and any service providers.
- ◆ Contractor will ensure that all persons at site are adults and have their government issued identity card with them.

Employment Generation

Primarily a positive impact, 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 649 employment opportunities shall be created during the construction period.

Dust Emissions

a) Impacts

- ◆ Local air quality will be affected by dust and vehicular emissions due to the movement of construction vehicles.
- ◆ The impacts of dust emissions shall majorly be limited to the work areas.
- ◆ Dust could cause nuisance to nearby sensitive receptors during construction activities. There are 10 Nos. Sensitive Receptors in proximity to the project sites that could get affected by dust emissions if adequate mitigation measures are not applied.

b) Mitigation Measures

- ◆ Specific mitigation measures for protecting the sensitive receptors from construction related dust impacts includes:
- ◆ Installation of signboards at prominent locations near the sensitive receptor locations to provide awareness to the project workers and drivers about the proximity of sensitive receptors.
- ◆ Immediate removal of excavated material from sites nearby sensitive receptors.
- ◆ Water sprinkling at work areas to restrict dust emissions.
- ◆ Limiting speeds of construction vehicles in the project area and specifically near the sensitive receptors
- ◆ Regular trainings of the drivers to ensure implementation of speed limits.
- ◆ Project's Grievance Redress Mechanism shall deal with any public complaints related to excessive dust and shall resolve the complaint on immediate basis.
- ◆ Avoiding burning of any waste at campsites.
- ◆ All heavy equipment and machinery will be in best working conditions, in full compliance with the national and local regulations.
- ◆ Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.
- ◆ Fuel-efficient and well-maintained dumper trucks shall be employed to minimize exhaust emissions.
- ◆ Vehicles transporting soil, sand and other construction materials will be covered with tarpaulin.
- ◆ Transport through densely populated area shall be avoided.

High Noise Levels from Construction Activities

a) Impacts

- ◆ Construction activities will involve use of construction equipment and machinery i.e. excavators, cranes, power generators, loaders and dumper trucks etc. which shall generate high noise levels at the project sites and in the project area can have effects on the people nearby the project sites.

- ◆ The movement of heavy vehicles, loading, transportation and unloading of construction materials shall produce high levels of noise during the construction stage. However, these increased noise levels will prevail only for a short duration during the construction phase.
- ◆ Construction noise could cause nuisance to nearby sensitive receptors during construction activities. There are 10 Nos. Sensitive Receptors in proximity to various project sites that could get affected by construction noise if adequate mitigation measures are not applied.

b) Mitigation Measures

Specific mitigation measures for protecting the sensitive receptors from construction related noise impacts includes:

- ◆ Installation of signboards at prominent locations near the sensitive receptor locations to provide awareness to the project workers and drivers about the proximity of sensitive receptors to the project sites and to encourage them taking necessary measures for reducing noise.
- ◆ Installation of noise barriers to minimise construction noise as early as possible in consultation with the sensitive receptors management.
- ◆ Use of electric powered equipment rather than diesel powered where possible.
- ◆ Blowing of horns by construction machinery and vehicles shall be strictly prohibited at project locations in proximity to the sensitive receptors.
- ◆ The operation of heavy equipment shall be restricted to daylight hours as far as possible and noisy works shall be avoided / minimized during the night time.
- ◆ Construction equipment in use near the sensitive receptors, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise.
- ◆ Project's Grievance Redress Mechanism shall deal with any public complaints related to noise and shall resolve the complaint on immediate basis.
- ◆ Mitigation measures applicable to the whole project area would include reduction of noise at source by proper design, maintenance and repair of construction machinery and equipment.
- ◆ Noise from vehicles and power generators will be minimized by use of proper silencers and mufflers.
- ◆ Excessive noise emitting equipment will not be allowed to operate and will be replaced.
- ◆ Blowing of horns by construction machinery and vehicles shall be strictly prohibited unless inevitable.
- ◆ Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise.
- ◆ Well-maintained haulage trucks will be used with speed controls.
- ◆ All the equipment and machinery used during construction phase shall be well maintained and in compliance with SEQS.

Solid Waste Management - Generation of Excavated Material, Kitchen Waste, Hazardous Waste

a) Impacts

- ◆ 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.
- ◆ Estimated quantities of major waste stream to be generated during the construction phase includes the following;
- ◆ 5740 cubic meter of Excavated Material
- ◆ 43,164 kg of Domestic Waste from Construction Camps

b) Mitigation Measures

- ◆ Waste storage areas will be carefully designed and sited to segregate the wastes and store safely.
- ◆ A waste management plan will be developed by the Contractor prior to the start of construction. The plan will cater sorting and storage of hazardous and non-hazardous materials prior to disposal, placing of waste bins at the project sites for waste disposal and an onsite hazardous waste storage facility i.e., designated area with secondary containment.
- ◆ Fuel storage areas and generators will have secondary containment in the form of concrete or brick masonry bunds. The volume of the containment area shall be equal to 120% of the total volume of fuel stored. Fuel tanks should have calibration certificate and daily dip logs and should be maintained. Fuel tanks should be checked daily for leaks and all such leaks should be plugged immediately.
- ◆ Fuel and hazardous material storage points must be included in camp layout plan to be submitted for approval. Hazardous material storage areas shall include a concrete floor to prevent soil contamination in case of leaks or spills.
- ◆ Spill and fire control equipment should be available along with mops near fuel tank storage area. Arrangement for proper disposal of cleaning material and spilled material (if any) will have to be assured.
- ◆ Designated vehicles/plant wash down and refuelling points must be included in camp layout plan to be submitted for approval.
- ◆ Licensed and SEPA approved waste contractors will be engaged to dispose-off all hazardous and non-hazardous waste materials that cannot be recycled or reused.
- ◆ Hazardous waste will be initially stored on site at designated storage areas and then handed over to SEPA certified contractor for final disposal.
- ◆ 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 through SEPA certified waste management contractors which shall be contracted for this job by the construction contractor with PIU approval.

- ◆ Hazardous waste generated from maintenance workshops shall be stored at designated storage areas and afterwards be handed over to approved and licensed waste handling contractors for disposal.
- ◆ Medical waste will be temporarily stored onsite separately and will be handed over to approved waste contractor for final disposal.
- ◆ Domestic waste from camps, will be disposed in the nearest SSWMB waste collections bins.

Untreated Disposal of Effluent from Worker Camps

a) Impacts

The project's construction camps will be a source for the generation of domestic effluent from the toilets, washrooms and the kitchen area. The effluent could harm the environment if it is not treated properly prior to disposal.

b) Mitigation Measures

- ◆ The Contractor shall ensure that no untreated effluent is released to the environment.
- ◆ A closed sewage treatment scheme including soak pits and septic tanks will be constructed to treat the effluent from the construction/labor camps.
- ◆ Soak pits will be built in absorbent soil and shall be located 300 m away from any nearby water well, boring or hand pump.
- ◆ Soak pits in non-absorbent soil will not be constructed.
- ◆ It shall be ensured that the soak pits remain covered all the time and measures are taken to prevent entry of rainwater into them.
- ◆ In case the septic tank gets filled with sludge, it shall be emptied through vacuum truck and after getting approval from KWSC, the removed effluent shall be transferred to the approved municipal drain.
- ◆ Typical layout of the proposed effluent treatment system for campsites is provided as **Figure A5-1**

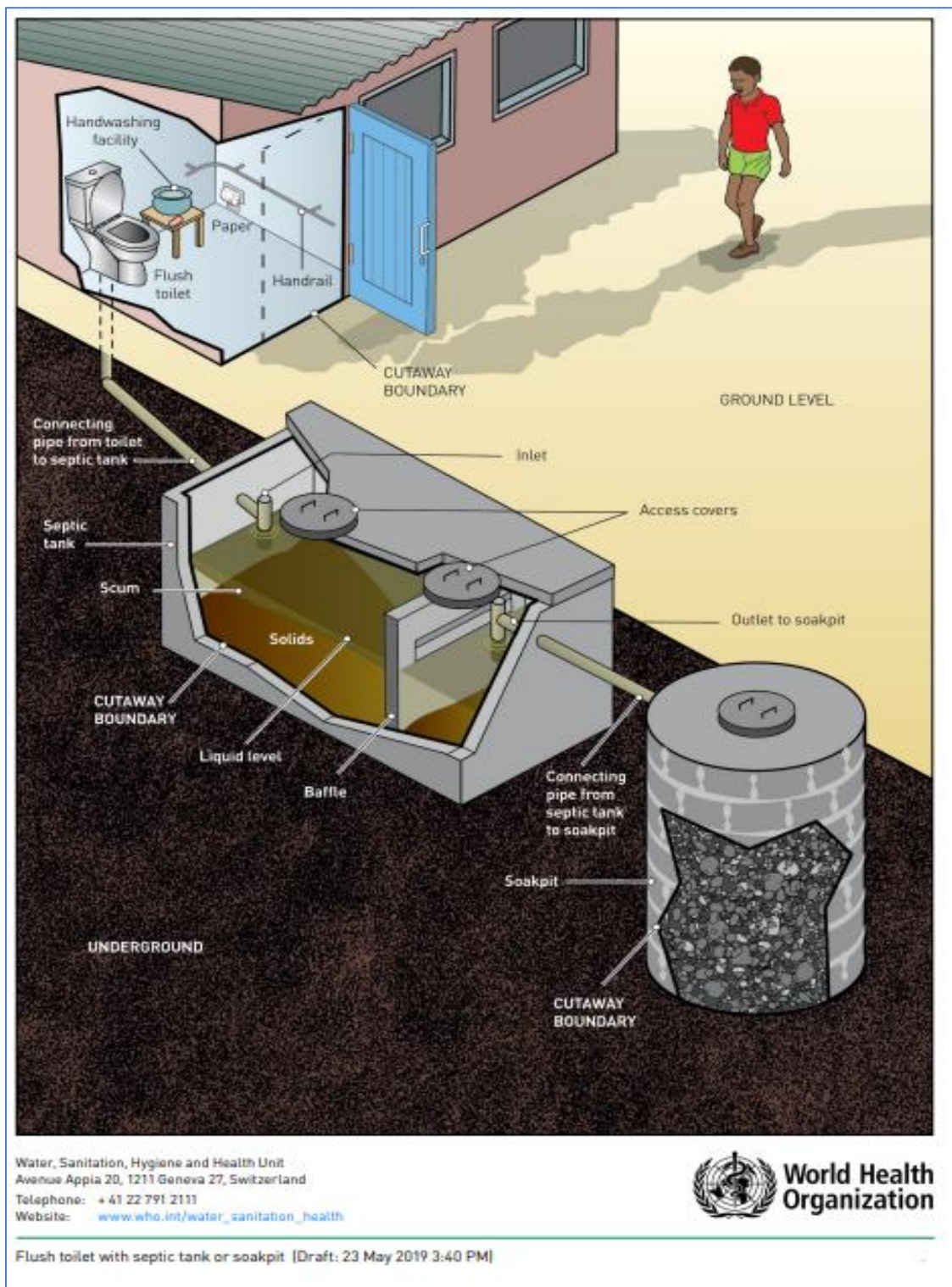


Figure A5-1: Typical Layout of Effluent Treatment System for Campsites

Soil Contamination

a) Impacts

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, vehicles and power generators. Depending on the quantity of spill, the soil can get contaminated.

b) Mitigation Measures

- ◆ The Contractor shall ensure that all the construction vehicles, equipment and power generators are properly maintained and there are no leakages from their engines and mechanical / moving parts.
- ◆ It shall be ensured that trays are provided and used during refueling, maintenance of construction vehicles / equipment and under the parked vehicles and equipment if there are any leakages.
- ◆ In case on-site maintenance is unavoidable, tarpaulin or other impermeable material will be laid on the ground to contain any dripping oils and preventing contamination of soil.
- ◆ Regular inspections will be carried out to detect leakages in construction vehicles and equipment and all vehicles will be washed in external commercial facilities.
- ◆ Fuels, lubricants and chemicals shall be stored in covered bounded areas, underlain with impervious lining. Static Power Generators will also be placed at impervious floors bunded with parapet walls.
- ◆ Appropriate arrangements and presence of shovels, plastic bags and absorbent materials will be ensured near fuel, oil storage and vehicles / equipment parking areas.

Construction of Intermittent Chlorination Facilities

a) Impacts

- ◆ The impacts related to the construction of intermittent chlorination facilities are characterized as of low significance as most of the work is of installation nature and shall be limited to pump house boundaries.
- ◆ Impacts may include temporary and limited disturbance to nearby communities due to the transportation of construction material and chlorination equipment to selected pump houses and noise from power generators.
- ◆ Approximately 10 Nos. construction staff will be working during daytime only at each of the pump houses for making foundations and other installation works.

b) Mitigation Measures

- ◆ Worksites shall be properly barricaded; workers shall strictly follow the Code of Conduct and avoid any contacts with local communities.
- ◆ Power Generators shall be properly tuned and equipped with soundproof canopy.
- ◆ Transportation of construction material shall be performed with minimum nuisance, preferably in the evening or night when there is less traffic on roads to avoid congestion.

Impacts Associated with Pipe Jacking

a) Impacts

- ◆ Pipe jacking may be employed at 02 locations of Dhabeji Rising Mains section where it crosses the Railway Line ML-1 and National Highway N5 near Dhabeji Town.
- ◆ Pipe jacking is a trenchless method of installing pipes that require application of a force which pushes the pipe through the ground while controlled excavation takes place at the face.
- ◆ Impacts associated with pipe jacking includes generation of small quantities of excavated material and generation of noise due to related mechanical works.

b) Mitigation Measures

- ◆ Excavation material will be backfilled right after the completion of works. No accumulation of excavated material within the construction area will be allowed.
- ◆ Workers will be provided with essential Hearing Protection to protect them from noise impacts.

Improper Site Restoration

a) Impacts

In case the temporary sites such as trenches or campsites etc. are not restored in appropriate manner, the area shall not regain its value and function. Inappropriate restoration of sites could lead to nuisance to the public and users due to damaged site conditions, debris, dismantled material, spoils, excess construction materials, oil spills etc.

b) Mitigation Measures

The Contractor will have a full and rigorous program for closing up and removing temporary facilities as well as for cleaning up and/or restoring the sites occupied on temporary basis. The facilities to be used in the construction stage that will be either removed or dismantled are the camps and workshops. Following are the main activities envisaged for removing all part of the facilities and restoring the intervened areas:

- ◆ Proper backfilling of trenches, Compaction in layers to prevent settling, Restoration of the ground surface contour, Replacement of topsoil if removed, Planting native vegetation, Implementing erosion control measures and Repairing disturbed pavements or surfaces. Dismantling and full removal of worksite facilities and camps, including contractor offices, staff and workers' accommodation, machinery yard, warehouses, store rooms, maintenance shops, drinking water utilities, vehicle parking areas, temporary materials stockpiling enclosures etc.
- ◆ Removal of drinking water facilities, including pipes and storage tanks, as well as sanitary facilities, i.e. sewage network and toilets.
- ◆ Removal of electric facilities, including electrical posts and wiring; this job will be done by specialized personnel.
- ◆ Removal of all solid construction waste piled up in temporary enclosures, as well as other wastes that may be present in the camp.

- ◆ Removal of fencing, anchoring and other minor facilities, concrete left over from mixing etc. after all the movable elements have been removed.
- ◆ Ground cleaning will be done by removing all the affected topsoil and handing it over to authorized waste handlers.
- ◆ topsoil will be added where necessary.
- ◆ Suitable spaces / areas for compensatory tree plantation shall be identified by the PIU and KWSC in consultation with Local Government Department, Forest Department, Municipal Corporations and Cantonment Boards etc. and restoration of the trees / vegetation shall be performed in line with Tree Plantation Plan.

Community Health & Safety

a) Impacts

General public shall be susceptible to following health and safety risks construction activities, especially at OPM, NPM and KM Sections of the project:

- ◆ Emissions of dust due to construction vehicles movement in case surplus excavated material is not removed in a timely manner.
- ◆ Construction machinery noise.
- ◆ Restricted access to sensitive receptor locations.
- ◆ Chances of fall into unprotected excavations.
- ◆ Inadequate protection of excavated areas, trenches, uneven surfaces, poor reinstatement, spillage of oils, gravel etc. are some of the causes for slip and falls.
- ◆ Poor storage of materials, equipment and other obstructions in public areas, including inadequate control of waste materials, are also common causes for slips, trips and falls.

b) Mitigation Measures

- ◆ Contractor shall prepare Community Health and Safety Plan based on construction methods, site specific hazards and framework.
- ◆ Construction areas including trenches, excavations, holes and obstructions shall be properly barricaded and marked with warning tapes.
- ◆ Off-site stacking of material shall be avoided to the maximum possible extent. In case it is unavoidable, stacking areas shall be positioned away from public access with adequate posting of warning signs.
- ◆ 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.
- ◆ Excavated material shall not be piled next to the trenches and excavations for long periods shall be removed from site on a frequent basis.
- ◆ Excavations and trenches shall not be left open for long and be reinstated as soon as the works in that particular section is completed.

- ◆ Site supervisors shall be trained to keep a watch on people especially kids trying to enter the construction area and restrict them crossing the site unnecessarily.
- ◆ The entrance, access routes to the construction areas and any obstructions shall be clearly signposted.
- ◆ Adequate lighting shall be installed at excavated areas and trenches to keep them well-lit and prominent during night for the sake of workers as well as public safety.
- ◆ Contractor shall ensure that all the vehicle drivers and equipment operators have valid licenses and proven competency to safely operate vehicles and equipment in populated areas.
- ◆ All heavy vehicles and moving equipment shall be provided with trained banksmen / marshal to supervise safe movement in public areas.
- ◆ Vehicular speeds shall be kept at minimum during movement in populated areas.
- ◆ All equipment shall be immobilized out of hours with keys removed and parked at designated areas.
- ◆ Following measures shall be adopted for minimizing the nuisance caused by dust and noise to the public:
 - ◆ Use of noise suppression on equipment;
 - ◆ Use of stacks of materials or any existing features as temporary noise barriers;
 - ◆ Use of low-dust producing equipment;
 - ◆ Use of water sprinkling for dust suppression;
 - ◆ Work at times when the public are less likely to be in the area;
 - ◆ Provision of solid barriers adjacent to public areas and sensitive receptors.
- ◆ Contractor shall provide safe pedestrian walkways at the identified sensitive receptor locations to allow safe entry and exit to the visitors.
- ◆ The walkways provided shall be maintained to a standard suitable for use by women, children, elderly, patients and disables.
- ◆ The walkways shall be properly barricaded, where necessary provided with guardrails and made prominent by installing signs and reflective tapes.
- ◆ Sign boards will be placed at appropriate locations to warn the public about construction activities and the associated risks
- ◆ Community liaison will be maintained. Community awareness will be raised about the construction related risks.

Labor Influx / SEA – SH – GBV Incidents

a) Impacts

- ◆ Influx of workers at project sites may pose a threat of communicable diseases, most common are HIV/AIDS (Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (AIDS)), COVID- 19, tuberculosis, pulmonary infections, typhoid, cholera and dysentery, malaria, rabies and other skin disease, hepatitis A, B and C, in case of not complying with adequate control measures.

- ◆ The influx of labor, seeking construction jobs can be associated with a series of social challenges such as crime, illegal drug abuse etc.
- ◆ Many of the skilled labor employed from outside the project area may cause some antipathy among the local people and outsiders.

b) Mitigation Measures

- ◆ To avoid conflicts with local people on employment matters, the contractor shall employ more locals in skilled, semi-skilled, and unskilled work;
- ◆ The contractor will proactively manage the potential impacts from labor influx and potential cultural conflicts between local communities and workers, which include following:
 - ◆ Construction camps will be built at the designated areas;
 - ◆ The Contractor's training program will cover topics related to respectful attitude while interacting with the local communities;
 - ◆ Inclusion of COC obligations and the applicable legislation in the contracts of all employees and workers with the provision of sanctions and penalties in case of violations;
 - ◆ ESS-4 guidelines on Influx of labor shall be adhered to.
- ◆ Contractor shall develop a Code of Conduct (CoC) for all site personnel. All site personnel shall sign this CoC and abide by it.
- ◆ Contractor shall ensure that project staff will receive training on the prevention of Sexual Exploitation, Gender Based Violence and Abuse (SEA) / Sexual Harassment (SH).
- ◆ Construction crew will avoid entering settlements.
- ◆ The Contractor shall raise awareness of the risks among community members and local health authorities and inform them about available grievance mechanisms.
- ◆ The routes/places used by the women will be avoided as far as possible. If unavoidable, alternate routes will be identified for the communities.
- ◆ Any employees will be terminated, who continues misconduct or lack of care, carry out duties amateurishly or inattentively, fail to conform to provisions of the contract, or persist in any conduct which is harmful to community, safety, health, or the protection of the environment;
- ◆ The use of drugs and alcohol will not be allowed at the work/construction site;
- ◆ Carrying weapons into the workplace premises will be prohibited;
- ◆ Site security arrangements shall be ensured in line with Security Management Guidelines for Contractors (under ESS-4 guidance).
- ◆ 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;
- ◆ The Contractor will ensure that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft;

Restricted Access

a) Impacts

The construction activities may block access to Jamia Masjid Aqsa – Mehran Highway – NPM.

b) Mitigation Measures

- ◆ Contractor shall provide safe pedestrian walkways at the mentioned sensitive receptor locations to allow safe entry and exit to the visitors.
- ◆ The walkways provided shall be maintained to a standard suitable for use by women, children, elderly, patients and disables.
- ◆ The walkways shall be properly barricaded, where necessary provided with guardrails and made prominent by installing signs and reflective tapes.

Construction Traffic Management and Safety

a) Impacts

The excavation of trenches and pipe installation along the already busy sections of project area roads will inevitably restrict traffic flows. Movement of construction traffic can have substantial impacts on the community, public safety, traffic congestion and air quality. The potential traffic blockage spots in the Project Area are located in proximity to the Landhi Industrial Area.

b) Mitigation Measures

The Contractor shall implement the following measures for effectively managing the construction traffic and public safety:

- ◆ Traffic Management Plan (TMP) shall be prepared before taking up any construction work and shall be implemented after getting approved from the PIU / CSC.
- ◆ Contractor shall inform the relevant traffic police sections before starting road cutting/excavation. Community liaison officer shall be responsible for communication with traffic police.
- ◆ Barricades, signs, markings, flags, lights and flagmen shall be deployed at key spots.
- ◆ The flagmen shall be trained for traffic management and equipped with red and green flags and lanterns/lights.
- ◆ Construction would seriously hamper the traffic movement, therefore trenching shall be done at night at the identified busy road sections.
- ◆ Construction equipment and materials shall be removed from the busy roads at the end of night shift.
- ◆ Where ramps, temporary carriageways and walkways are required, they shall be provided and maintained to a standard suitable in all respects for the traffic or pedestrians.
- ◆ The walkways shall be kept in such a way that they shall remain usable by women, children, patients and disables.

- ◆ 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.

Vegetation Loss and Disturbance to Fauna

a) Impacts

- ◆ Out of the total 1795 trees growing in the Aol of the project, approximately 510 trees growing in the Direct Impact Area (DIA), shall require to be cut for the execution of Package 01 and 02 (DRM, NPM, KM Repairs / Rehabilitation) construction activities. Package 03 and 04 (Flow Meters and Intermittent Chlorination Facilities Installation) shall not require any tree cutting.
- ◆ Faunal species may be encountered during clearance of vegetation and earth excavation, and may get disturbed due to construction activities, however, no significant impacts are expected on recorded faunal species as these can be naturally dispersed easily from one habitat to the other during construction activities.
- ◆ The presence of Indian Cobras has been reported in Package 01 (DRM No. 02) Area of Influence (Aol), and accidental contact with them may pose a risk to workers.

b) Mitigation Measures

- ◆ A project specific Compensatory Tree Plantation Plan shall be prepared by the Contractor based upon the Tree Plantation Plan and with guidance and collaboration of PIU, CSC's Ecologist, Sindh Forest Department and entities which will provide land for compensatory plantation.
- ◆ According to the Tree Plantation Plan;
- ◆ The Contractor will finalize the inventory of the trees to be cut before initiation of construction activities based on finalized work plan and requirements.
- ◆ 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.
- ◆ 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, whereas after that, the trees shall be handed over to the relevant departments which have the ownership of the land for compensatory plantation sites.
- ◆ Compensatory plantation of the trees shall be undertaken by the Contractor at the replacement ratio of ten trees for every tree that is cut (i.e. 10:1 ratio) and it will be ensured that native / local species are selected for plantation.
- ◆ Plantation will be performed at the initiation of the project so that necessary care to the planted saplings is ensured.
- ◆ For trees not proposed to be cut, all precautions shall be taken to protect them from any damage from construction activities.

- ◆ The contractor shall also be required to compensate the cutting of shrubs in the project's DIA through plantation of ornamental shrubs at the areas to be specified by the PIU at the time of project execution.
- ◆ While clearing vegetation and excavation it shall be ensured that no wildlife get injured or killed.
- ◆ Construction work that may generate high noise levels shall be avoided during night time as far as possible to prevent local birds and fauna from disturbance;
- ◆ Workers shall be provided with adequate knowledge regarding protection of flora and fauna, and relevant regulations.
- ◆ Workers will be provided with training on identifying Indian Cobras and taking appropriate actions in case of an encounter. They will be guided on how to administer basic first aid for snakebites and provided with awareness about the risks associated with snake presence and the importance of immediate reporting.
- ◆ Workers to be provided with snake-resistant boots and gloves as part of their standard protective gear when working in areas with reported cobra sightings.
- ◆ Contractor will ensure that anti-venom is readily available on-site or in nearby medical facilities. Clear instructions will be included in the emergency response plan for administering anti-venom in case of snakebites and establishing communication procedures for rapid medical assistance.
- ◆ Hunting in or around the project site will be strictly prohibited.

Cultural Heritage Sites

a) Impacts

- ◆ 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'.
- ◆ Socio-Cultural establishments such as mosques, medical and educational facilities are located in proximity to the project alignment.
- ◆ During construction activities, these establishments may be impacted by noise and dust pollution. Accessibility to these establishments may also be hampered during construction phase.

b) Mitigation Measures

Contractor shall train the workers on chance find procedures and in the event of a chance finds, the following measures shall be strictly adopted by the Contractor:

- ◆ 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.

Stakeholders Concerns and Engagement

a) Impacts

The identified stakeholders may have different types of stakes associated with various aspects of the project depending on their professions, affiliations, and involvements.

b) Mitigation Measures

- ◆ Stakeholder Engagement Plan for the KWSSIP-2 shall be followed.
- ◆ PIU, CSC, and Contractor to ensure public consultations and participation of stakeholders throughout the project lifecycle. This would ensure that concerns about the impacts of the project are addressed at the right time.
- ◆ Stakeholder engagement to be carried out in a meaningful and inclusive way, providing access to remedy.

Operational Phase Impacts

Screening of potential impacts during the operational phase of the project are provided in **Table A5-4**.

Table A5-4: Screening of Possible Impacts during Operational Phase

No.	Potential Issue	Relevant ESS	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Significant, Medium, Low)	
1	Handling of Sodium Hypochlorite / OHS Management at Pump Houses	ESS2: Labor and Working Conditions	Unlikely	Moderate	Low	Low	
2	Improved Drinking Water Availability	ESS4: Community Health and Safety	Positive				

- Critical Risk Level
- Significant Risk Level
- Medium Risk Level
- Low Risk Level

Handling of Sodium Hypochlorite / OHS Management at Pump Houses

c) Impacts

The proposed intermittent chlorination facilities at the 25 selected pump houses involves the use of Sodium Hypochlorite for disinfection. If handled improperly, the vapours of sodium hypochlorite may irritate the respiratory system and causes burns to the skin and eyes on contact. Though Sodium Hypochlorite is not combustible but is a strong oxidizer which enhances the combustion of other substances.

d) Mitigation measures

PIU – KWSSIP shall prepare OHS Management Procedures based upon the following mitigation measures and Pump house In-Charges to implement throughout the operational phase:

- ◆ Chemical storage area shall be designated at the pump houses for safe storage of Sodium Hypochlorite and it shall be equipped with proper ventilation arrangements.
- ◆ Containers shall be labelled and Safety Data Sheet (SDS) shall be posted at prominent locations.
- ◆ Emergency contact numbers for calling Police, Ambulance and Fire Services shall be posted at prominent locations of the pump houses.
- ◆ Workers at the pump houses shall be provided with hazard information and trainings on safe handling of Sodium Hypochlorite.
- ◆ Sodium hypochlorite shall be stored at cool, dry, and dark place.
- ◆ Medical check-ups for workers engaged with sodium hypochlorite dosing and handling shall be performed periodically.
- ◆ Essential PPEs of appropriate specifications such as Rubber Gloves, Protective Clothing, Safety Footwear, Headgear, Goggles, Face Shields and Respirators shall be provided to the workers engaged with sodium hypochlorite dosing and handling.
- ◆ All selected pump houses for intermittent chlorinators shall be provided with CO₂, Dry Chemical, Water and Foam Type Fire Extinguishers and all the staff shall be trained for dealing with accidental fires.
- ◆ In case of Sodium Hypochlorite spills or leaks, following measures shall be taken:
- ◆ All potential ignition sources shall be removed from the area and proper ventilation arrangements shall be ensured.
- ◆ Spilled or leaked chemical shall be neutralized with Sodium Bisulphite, covered with Soda Ash and shall be placed into covered containers for disposal.
- ◆ The contained Sodium Hypochlorite shall be considered as a hazardous waste, and it shall be handed over to SEPA certified hazardous waste management contractor.
- ◆ Regular trainings and orientation on safety practices shall be implemented to impart knowledge of safe and efficient working environment.
- ◆ Proper housekeeping shall be maintained at all pump houses.

Improved Drinking Water Availability

- ◆ The supply of disinfected water from the pumping stations equipped with chlorination facilities will be an indispensable facility for the residents of Karachi.
- ◆ The proposed intervention will ensure that the water is free from bacterial contaminants and will facilitate the domestic as well as commercial consumer's drinking water requirements.
- ◆ The clean potable water will reduce water borne diseases, improve public health and ultimately reduce the pressure on health care system.

WB Health & Safety Framework – South Asia Region (SAR)



HEALTH AND SAFETY FRAMEWORK

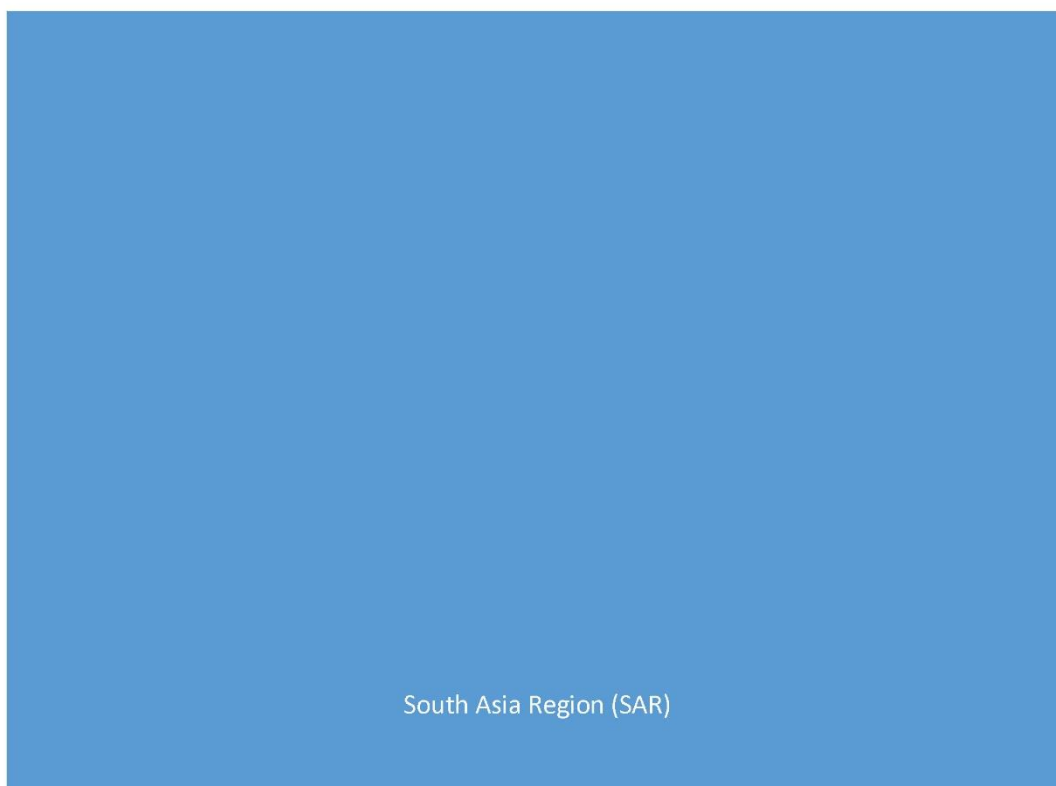




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1 Overview

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
 - o The Borrower will develop and implement written labor management procedures applicable to the Project.
 - o 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.
 - o 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.
 - o 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.
 - o 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.
 - o 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.
 - o 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.
 - o 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)
 - o 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.
 - o 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.
 - o Implement appropriate control measures to avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials.
 - o Ensure the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.
 - o Ensure appropriate community emergency preparedness and response plan is available and communicate to all stakeholders to address emergency events.
 - o 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.
 - o 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.
 - o 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.

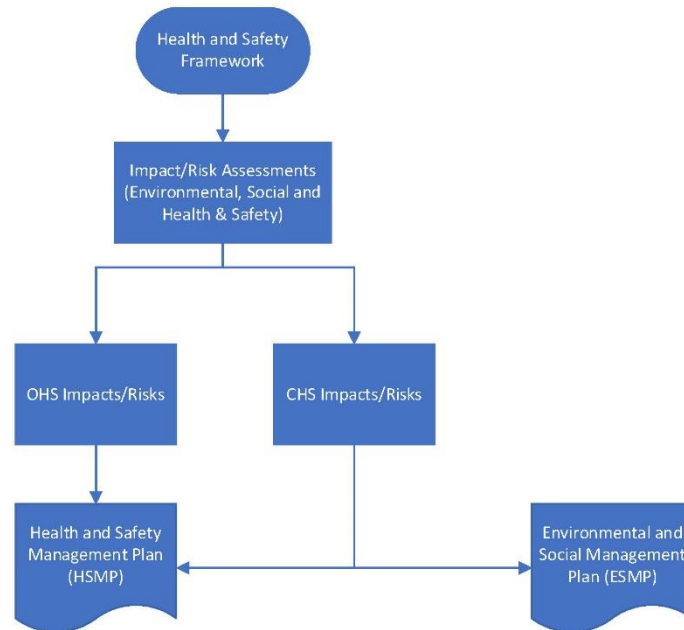
The Borrower is responsible for the project and shall ensure that this Health and Safety Framework is applied. The Borrower can delegate/assign the PIU or Contractor to develop and implement a HSMP to address the Health and Safety Framework requirements and to manage health and safety impacts and risks 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

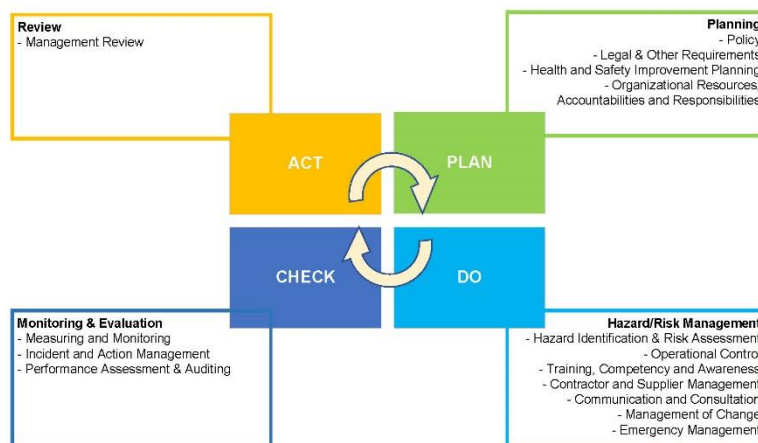
The responsibility for safety cannot be “delegated” to the “OHS Officer or Manager”. The OHS staff of the PIU and/or Contractor support line management by assisting in jobsite training, serving as trained and knowledgeable observers, providing administrative assistance, monitoring and evaluating the 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.

Medical/Health Surveillance

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:

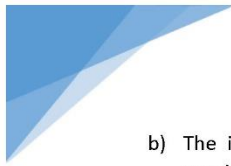
- the extent to which objectives are being met;
- progress against targets;
- the effectiveness of controls;
- proactive conformance measures; and
- reactive or historical performance measures.

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.

Audits and Inspections

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.

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.

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 safely 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.

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.

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

Revision History

First Issue	Effective date	Prepared by	Approved by	
1.0				
Revision Number	Revision date	Revised by	Approved by	Reason for change

Security Management Guidelines for Contractors

The Contractor during construction phase shall use security arrangements and personnel to safeguard the installations, sites, and personnel.

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.

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 KWSC'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.

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.

Environmental Code of Practice

- ◆ 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: Worker Health and Safety

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.	<ul style="list-style-type: none"> ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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 waste (plastic bottles). Plastic bag use should be avoided.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	<ul style="list-style-type: none"> ◆ 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 banded 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 the 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.	<ul style="list-style-type: none"> ◆ 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 banded areas on top of a sealed plastic sheet away from watercourses. ◆ Refueling shall occur only within banded areas. ◆ Store and use fuels in accordance with MSDSs. Make available MSDS for chemicals and dangerous goods on-site. ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	of runoff, increase in sediment and contaminant loading, increased flooding, and effect habitat of fish and other aquatic biology.	<ul style="list-style-type: none"> ◆ 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.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	<ul style="list-style-type: none"> ◆ 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 the presence of suspended solids and Ecoli.	<ul style="list-style-type: none"> ◆ The Contractor Shall ◆ Provide 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 work, 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.	<ul style="list-style-type: none"> ◆ The Contractor shall ◆ Prepare drainage management procedures and submit them for supervision consultant approval. ◆ Prepare a program to prevent/avoid standing water, 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 rainwater or wastewater connecting to the existing established drainage lines already there. ◆ Rehabilitate road drainage structures immediately if damaged by contractors' road transports.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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 topsoils, which affects the growth of vegetation and causes ecological imbalance.	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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.	<ul style="list-style-type: none"> ◆ 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: Topsoil 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.	<ul style="list-style-type: none"> ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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 physico-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	<ul style="list-style-type: none"> ◆ 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.	<ul style="list-style-type: none"> ◆ 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: 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	<ul style="list-style-type: none"> ◆ The Contractor shall

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	emissions and combustion of fuels.	<ul style="list-style-type: none"> ◆ 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. ◆ 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.	<ul style="list-style-type: none"> ◆ 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.
Construction activities	Dust generation from construction sites, material stockpiles and access roads are a nuisance in the environment and can be a health hazard, and also can affect the local crops;	<ul style="list-style-type: none"> ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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 10: 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	<ul style="list-style-type: none"> ◆ 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 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.	<ul style="list-style-type: none"> ◆ 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.
Construction activity	Noise and vibration may have an impact on people, property,	<ul style="list-style-type: none"> ◆ The Contractor shall

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	fauna, livestock and the natural environment.	<ul style="list-style-type: none"> ◆ 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 11: 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.	<ul style="list-style-type: none"> ◆ 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. ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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 12: 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 wildlife habitat and habitat quality	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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 remain

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		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.	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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 13: 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.	<ul style="list-style-type: none"> ◆ 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. ◆ 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	<ul style="list-style-type: none"> ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		◆ Enforce on-site speed limit.

ECP 14: 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.	<ul style="list-style-type: none"> ◆ 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 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.	<ul style="list-style-type: none"> ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ The Contractor shall ◆ Ensure proper collection and disposal of solid wastes within the construction camps. ◆ 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	<ul style="list-style-type: none"> ◆ 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 may create security problems and fire hazards	<ul style="list-style-type: none"> ◆ 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ 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 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	<ul style="list-style-type: none"> ◆ 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. ◆ 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 (contractor and land-owner) has been made so.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> ◆ Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ECP 15: 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.	<ul style="list-style-type: none"> ◆ 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 16: Worker Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	<p>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.</p>	<ul style="list-style-type: none"> ◆ 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.
Child and pregnant labour accident	<p>Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims</p>	<ul style="list-style-type: none"> ◆ 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	<p>Lack of proper infrastructure facilities, such as housing,</p>	<p>The Contractor shall provide the following facilities in the campsites to improve health and hygienic</p>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	<p>water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards</p>	<p>conditions as mentioned in ECP 16 Construction Camp Management</p> <ul style="list-style-type: none"> ◆ 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 ◆ Paved internal roads. ◆ Security fence at least 2 m height. ◆ Sick bay and first aid facilities
Other ECPs	<p>Potential risks on health and hygiene of construction workers and general public</p>	<p>The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community</p> <ul style="list-style-type: none"> ◆ 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	<p>Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.</p>	<ul style="list-style-type: none"> ◆ 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.

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- 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 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 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 ESMP, 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 ESMP. The key mitigation measures identified in the 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ To avoid, minimize and manage community health and safety risks.
Emergency preparedness and response plan	<ul style="list-style-type: none"> ◆ To cover potential emergencies during construction
Workers camp management plan	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ To identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods
Traffic management plan	<ul style="list-style-type: none"> ◆ To plan, coordinate and management all traffic and access risks in relation to the construction phase of the project.
Spill prevention and response plan	<ul style="list-style-type: none"> ◆ To prevent spills and plan for appropriate responses
Pollution prevention plan	<ul style="list-style-type: none"> ◆ To effectively control air, noise, water and wastewater pollution
Material Transportation Plan	<ul style="list-style-type: none"> ◆ 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
<p>Fair labour management and working conditions</p>	<ul style="list-style-type: none"> ◆ 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) ◆ 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 ◆ 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. 	<ul style="list-style-type: none"> ◆ 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
	<ul style="list-style-type: none"> ◆ Require any project parties using digital time keeping system to have them in place from the beginning of their time on the project 	
<p>Labour rights issues – Code of Conduct</p>	<ul style="list-style-type: none"> ◆ Code of conduct, setting out the rules of conduct by which all workers, will be governed and which includes the following: <ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> ◆ Completed code of conduct document ◆ All contractors contractually committed to abiding by the code of conduct ◆ All workers trained in the code of conduct
<p>Labour rights issues – Labour monitoring</p>	<ul style="list-style-type: none"> ◆ Implement labour monitoring procedure, including: <ul style="list-style-type: none"> ◆ 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: <ul style="list-style-type: none"> ◆ Women’s protection in workforce ◆ Workers with disabilities/special needs participation ◆ Vulnerable workers’ protection 	<ul style="list-style-type: none"> ◆ Completed labour monitoring activities ◆ 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) ◆
<p>Labour rights issues – Worker representation</p>	<ul style="list-style-type: none"> ◆ Establish committees with worker representatives and management to address working condition and labour rights issues 	<ul style="list-style-type: none"> ◆ Established worker representation committees with democratically elected worker representatives ◆ Number of committee meetings
<p>Labour rights issues – Employment contracts</p>	<ul style="list-style-type: none"> ◆ 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, 	<ul style="list-style-type: none"> ◆ Each worker has a signed contract ◆ Evidence of notification of termination of contracts

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	<ul style="list-style-type: none"> 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 retention through to operations for as many as possible 	<ul style="list-style-type: none"> ◆ Certificates provided to workers
Labour rights issues – Labour and social rights awareness	<ul style="list-style-type: none"> ◆ 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 / KWSC, 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). 	<ul style="list-style-type: none"> ◆ Each worker has completed induction training ◆ Training records (such as attendance logs for refresher training and toolbox talks)
Labour rights issues - Labour grievance mechanism	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ Workers' grievance log showing grievances ◆ Grievances closed out in time and to workers' satisfaction
Influx management	<ul style="list-style-type: none"> ◆ Produce influx management plan, compiling measures within other plans (stakeholder engagement plan and, community health and safety plan) 	<ul style="list-style-type: none"> ◆ 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 proposed project ESMP and KWSSIP-2 SEP
- ✓ Summary of the Social Field Studies for the proposed project ESMP
- ✓ Tools for Communication Routine (E.g. Internet/Website, Public Media, FGDs etc.)
- ✓ Community Relations

- ✓ Notice Boards

STAKEHOLDER ENGAGEMENT 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 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 include the following:

Specific Mitigation Guidelines for Dealing with OHS Hazards

No.	Work Activities and Associated Hazards	Mitigation Guidelines
1.	<p>Trench Excavation⁸ Collapse of Excavation and falling of materials while working in excavations could result in workers injuries or fatalities. Workers could be at risk from:</p> <ul style="list-style-type: none"> ◆ 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 	<p>Collapse of excavations:</p> <ul style="list-style-type: none"> 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. <p>Falling or dislodging material:</p>

⁸ <https://www.hse.gov.uk/construction/safetytopics/excavations.htm>

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	<p>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.</p>	<p>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.</p> <p>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.</p> <p>Falling into excavations</p> <p>a- Prevent people from falling – Contractor shall protect edges of excavations with substantial barriers where people are susceptible to fall into them.</p> <p>b- To achieve this, use of following options shall be made:</p> <ul style="list-style-type: none"> o 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 o The support system itself, e.g. using trench box extensions or trench sheets longer than the trench depth. <p>Inflow of surface or ground water</p> <p>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.</p> <p>b- Depending on the permeability of the ground, water may flow into any excavation below the natural groundwater level.</p> <p>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.</p> <p>d- Particular attention should be given to areas close to lakes, rivers and the sea.</p> <p>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.</p> <p>Safety Measures for Excavation in Wet Weather</p> <p>a- Weather conditions needs to be checked before daily work to be aware of rain and storm possibilities.</p> <p>b- Inspection of trenches to be done every day before construction begins.</p> <p>c- Workers shall not be allowed to go near unprotected trenches.</p> <p>d- Heavy equipment shall be kept away from trench edges.</p> <p>e- Workers shall be trained to have the skills needed to identify wet weather hazards and how to minimize risks.</p> <p>f- Protective equipment shall always be worn and in a correct manner.</p> <p>g- All power tools shall be correctly maintained and used properly.</p>

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		<p>h- Protective systems including benching, sloping, shoring, and shielding shall be utilized.</p> <p>i- Planning and implementation of safety systems and inspections shall be used regularly on the construction sites.</p> <p>Other aspects of excavation safety</p> <p>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.</p> <p>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.</p> <p>Inspection</p> <p>a- A competent person who fully understands the dangers and necessary precautions shall inspect the excavation at the start of each shift.</p> <p>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.</p> <p>c- A record of the inspections shall be maintained and any faults that are found should be corrected immediately.</p> <p>d- A written report shall be made containing the following information:</p> <ul style="list-style-type: none"> ◆ 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.	<p>Excavators⁹ Most fatal and serious injuries involving excavators occur when the excavator is:</p> <ul style="list-style-type: none"> ◆ Moving – and strikes a worker / pedestrian, particularly while reversing; ◆ Slewing – trapping a person between the excavator and a fixed structure or vehicle; or ◆ Working – when the moving bucket or other attachment strikes a worker or when the bucket inadvertently falls from the excavator. 	<p>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:</p> <p>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.</p> <p>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 any part of the machine, particularly the ballast weight, and the nearest obstruction.</p> <p>c- Visibility: Excavators with the best view around them directly from the driver position should be selected.</p>

⁹ <https://www.hse.gov.uk/construction/safetytopics/excavators.htm>

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	<ul style="list-style-type: none"> ◆ Most excavator related deaths involve a person working in the vicinity of the excavator rather than the driver. 	<p>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.</p> <ul style="list-style-type: none"> 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. <p>Training and competence There are three categories of people who must be trained and made competent regarding the excavator hazards and precautions:</p> <ul style="list-style-type: none"> 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. <p>Inspection and maintenance</p> <ul style="list-style-type: none"> 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.	<p>Lifting Operations (Cranes)¹⁰</p> <ul style="list-style-type: none"> ◆ 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. 	<p>Pre-requisite:</p> <ul style="list-style-type: none"> 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. <p>Planning lifting operations</p> <ul style="list-style-type: none"> 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

¹⁰ <https://www.hse.gov.uk/construction/safetytopics/lifting-operations.htm>

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		<p>and the responsibilities so that any lifting operation is carried out safely.</p> <p>d- The plan shall ensure that the lifting equipment remains safe for the range of lifting operations for which the equipment might be used.</p> <p>Supervision of lifting</p> <p>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.</p> <p>b- The crane supervisor shall direct and supervise the lifting operation to make sure it is carried out in accordance with the method statement.</p> <p>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.</p> <p>Thorough examination</p> <p>a- Lifting equipment shall be thoroughly examined at the prescribed intervals. This shall be a detailed and specialized examination by a competent person.</p> <p>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.</p>
4.	<p>Heat Stress / Heat Stroke¹¹</p> <ul style="list-style-type: none"> ◆ 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. 	<p>Control of Heat Stress</p> <p>Work practice recommendations include the following:</p> <ul style="list-style-type: none"> 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. <p>Training</p> <p>Contractor shall implement a heat stress training program for all workers and supervisors which will cover the following:</p> <ul style="list-style-type: none"> 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.

¹¹ <https://www.cdc.gov/niosh/topics/heatstress/recommendations.html>

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		<ul style="list-style-type: none"> 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. <p>Supervisors shall also be trained on the following:</p> <ul style="list-style-type: none"> a- Implementing appropriate acclimatization plan. 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. <p>Hydration The Contractor shall provide the means for appropriate hydration of workers and ensure that:</p> <ul style="list-style-type: none"> 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.	<p>Confined Space Working¹² The most likely hazards related to confined spaces include:</p> <ul style="list-style-type: none"> ◆ 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, 	<p>Work in confined spaces</p> <ul style="list-style-type: none"> 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.

¹² <https://www.hse.gov.uk/pubns/priced/l101.pdf>













No.	Work Activities and Associated Hazards	Mitigation Guidelines
	<p>highly physical or strenuous work.</p> <ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> ○ Head, hand and foot protection ○ Eye and hearing protection ○ 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: <ul style="list-style-type: none"> ○ 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.	<p>Welding Safety¹³</p> <p>There are a variety of welding methods available, all of which have inherent safety and health hazards associated with them, such as:</p> <ul style="list-style-type: none"> 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 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. 	<p>Safety Measures</p> <p>The Contractor shall ensure the following:</p> <ul style="list-style-type: none"> 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. 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.

¹³ <https://www.hse.gov.uk/welding/index.htm>

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	<p>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.</p> <p>e- Fire caused by heat, sparks, slag or flames contacting combustible or flammable materials in the welding area.</p> <p>f- Improper use and storage of oxygen and acetylene may result in fire or explosion</p> <p>g- Strains, neck and lower back injuries resulting from repetitive motions and work orientation.</p> <p>h- Lacerations resulting from accidental contact with sharp edges and burrs.</p>	<p>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.</p> <p>h- Any combustible or flammable materials shall be put away from the welding area to prevent fires.</p> <p>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.</p> <p>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.</p> <p>k- Position welding curtains as needed to protect others in the area from splatter, flash and glare.</p> <p>l- Setting up any signs or safety cones as needed.</p> <p>m- Prevent lacerations by identifying sharp edges and burrs, wearing appropriate gloves, deburring, and proper storage methods.</p> <p>n- Ensure good insulation from work surfaces, the electrode, the electrode holder and grounding surfaces is obtained and maintained.</p> <p>o- Practice good lifting techniques by workers and considering ergonomics when setting up the work and minimizing awkward postures.</p> <p>p- Workers shall be trained on the safe use, transportation and storage of compressed gases prior to use.</p>
7.	<p>Construction Dust¹⁴</p> <p>a- Drilling, cutting, sanding and driving over dusty areas can pose risks for the workers involved.</p> <p>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.</p> <p>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.</p>	<p>Control Measures</p> <p>a- Contractor shall ensure that workers are protected from excessive exposure to dust.</p> <p>a- Keep construction areas shall be kept as clean as possible.</p> <p>b- Workers shall be provided with clothing that resists dust and essential PPEs.</p> <p>c- Working shifts shall be rotated to limit inhalation of polluted air by workers specially the potentially dusty work sites.</p> <p>d- Dust shall be suppressed and dampen at project sites by sprinkling water.</p> <p>e- Construction vehicles shall be driven at slow speeds to keep dust emissions limited.</p> <p>f- Contractor shall provide construction workers with information / training about potential dust hazards and instructions on how to avoid them.</p> <p>g- Workers shall be trained to wet the tools before cutting into any materials as it can reduce dust accumulation.</p>
8.	<p>Construction Noise¹⁵</p> <p>a- Exposure to high levels of noise can cause permanent hearing loss.</p>	<p>Control Measures</p> <p>a- As a first step, the Contractor shall choose quieter equipment and machinery to save the cost of introducing noise-reduction measures and providing</p>

¹⁴ <https://www.hse.gov.uk/construction/healthrisks/hazardous-substances/construction-dust.htm>

¹⁵ <https://www.hse.gov.uk/noise/hearingprotection.htm>

No.	Work Activities and Associated Hazards	Mitigation Guidelines																																										
	<p>b- Loud noise can create physical and psychological stress, reduce productivity, interfere with communication and concentration, and contribute to workplace accidents and injuries by making it difficult to hear warning signals.</p>	<p>hearing protection, health surveillance and associated trainings etc.</p> <p>b- Hearing protection shall be issued to employees:</p> <ul style="list-style-type: none"> o where extra protection is needed above what has been achieved using noise control o as a short-term measure while other methods of controlling noise are being developed. <p>c- Contractor shall make sure that the protectors give enough protection - at least to get below 85 dB at the ear.</p> <p>d- Use of protectors to the noisy tasks and jobs in a working day shall be made mandatory.</p> <p>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.</p> <p>f- Periodic medical hearing checks shall be performed on workers exposed to high noise levels.</p>																																										
<p>9.</p>	<p>Fire Safety</p> <p>a- Fire at a construction site can endanger the lives of workers and others who happen to be on the site.</p> <p>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.</p>	<p>Control Measures</p> <p>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.</p> <p>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.</p> <p>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:</p> <div style="text-align: center;"> <p>Fire Extinguisher Chart</p> <table border="1"> <thead> <tr> <th colspan="2">Extinguisher</th> <th colspan="5">Type of Fire</th> </tr> <tr> <th>Colour</th> <th>Type</th> <th>Solids (wood, paper, cloth, etc)</th> <th>Flammable Liquids</th> <th>Flammable Gasses</th> <th>Electrical Equipment</th> <th>Cooking Oils & Fats</th> </tr> </thead> <tbody> <tr> <td></td> <td>Water</td> <td>✓ Yes</td> <td>✗ No</td> <td>✗ No</td> <td>✗ No</td> <td>✗ No</td> </tr> <tr> <td></td> <td>Foam</td> <td>✓ Yes</td> <td>✓ Yes</td> <td>✗ No</td> <td>✗ No</td> <td>✓ Yes</td> </tr> <tr> <td></td> <td>Dry Powder</td> <td>✓ Yes</td> <td>✓ Yes</td> <td>✓ Yes</td> <td>✓ Yes</td> <td>✗ No</td> </tr> <tr> <td></td> <td>Carbon Dioxide (CO2)</td> <td>✗ No</td> <td>✓ Yes</td> <td>✗ No</td> <td>✓ Yes</td> <td>✓ Yes</td> </tr> </tbody> </table> </div> <p>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.</p>	Extinguisher		Type of Fire					Colour	Type	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
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	Dry Powder	✓ Yes	✓ Yes	✓ Yes	✓ Yes	✗ No																																						
	Carbon Dioxide (CO2)	✗ No	✓ Yes	✗ No	✓ Yes	✓ Yes																																						

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		<p>e- The project requires considerable works related to welding. 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.</p> <p>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.</p> <p>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.</p> <p>h- Typical Fire Safety Checklist is attached as Annexure 5, which shall be followed by the Contractor during construction phase.</p>

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. Table presents the contents to be covered under EPRP.

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
<p>Construction phase emergency preparedness and response plan, including flooding, medical emergencies etc.</p>	<ul style="list-style-type: none"> ◆ 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 ◆ 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 	<ul style="list-style-type: none"> ◆ 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
	<ul style="list-style-type: none"> ◆ 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: <ul style="list-style-type: none"> ◆ Flooding ◆ Equipment failure or malfunctioning ◆ Seismic activity ◆ Terrorism ◆ Address specific situations such as emergencies occurring: <ul style="list-style-type: none"> ◆ 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 (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: <ul style="list-style-type: none"> ◆ 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
<p>Construction worker well-being in accommodation facilities Community, health, safety and security and relations/conflict</p>	<ul style="list-style-type: none"> ◆ Describe the minimum national legislative requirements plus the applicable international requirements relevant to the facility standards and management of labour accommodation – these are aligned 	<ul style="list-style-type: none"> ◆ Worker accommodation plan compliant with the WBG guidance note on workers' accommodation

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
between workers and host communities	<p>with the WBG guidance note on workers accommodation¹⁶.</p> <ul style="list-style-type: none"> ◆ 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 ◆ 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 	<ul style="list-style-type: none"> ◆ Types of accommodation (on site, offsite) ◆ Number of accommodated employees and rooms ◆ Ratio of facilities to workers ◆ 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. This shall be followed by the Contractor for the development of Site-specific Compensatory Tree Plantation Plan. The Contractor shall develop this plan in consultation with the PIU and CSC's Ecologist as well as 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.

¹⁶ 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

- 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:

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
General waste management plan requirements	<ul style="list-style-type: none"> ◆ 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: <ul style="list-style-type: none"> ◆ 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 ◆ If any waste facilities are developed detailed management plans would be required following national and international standards. 	Waste record completion Recycling rates Amount of waste generated by stream
Waste segregation	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Correctly identify wastes and stored pending collection/transfer for reuse, recovery, 	<ul style="list-style-type: none"> ◆ No non- compliances with management measures identified

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	<p>recycling or disposal in an environmentally sound manner</p> <ul style="list-style-type: none"> ◆ 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 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) 	<ul style="list-style-type: none"> ◆ No spillages resulting from chemical storage in bunded areas.
Handling and transportation	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ 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
	<ul style="list-style-type: none"> ◆ 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 hazards, consistent with the reference framework. 	
Recycling and reuse	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ Recycling targets included in plan and audited against.
Disposal	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ Permits held for waste treatment and disposal sites ◆ Medical waste licensed facilities records kept ◆
Wastewater management	<ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> ◆ Wastewater treated in line with relevant standards ◆ No effluent not meeting standards discharged.
Contaminated materials or areas	<ul style="list-style-type: none"> ◆ Develop procedure to identify, manage and remove any identified contaminated land as part of construction areas 	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Undertake a road safety awareness programme along the main site 	<ul style="list-style-type: none"> ◆ Implementation of road safety awareness program along main site routes

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
impacts upon communities	<ul style="list-style-type: none"> 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). 	<ul style="list-style-type: none"> ◆ Provision of construction information to communities / stakeholders regarding construction activities. ◆ Quarterly stakeholder consultation meetings
Reduced road safety	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ Inspect contractor's licences ◆ Inspect transportation contractors for knowledge and compliance with the traffic management plan
	<ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> ◆ Vehicle inspections undertaken monthly
	<ul style="list-style-type: none"> ◆ 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 	
	<ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> ◆ Inspect contractor's licences ◆ Inspect transportation contractors for knowledge and compliance with the traffic management plan
	<ul style="list-style-type: none"> ◆ Require adherence to all national and specific area speed limits 	<ul style="list-style-type: none"> ◆ Monitor vehicle speeding and driver's schedules

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	<ul style="list-style-type: none"> ◆ Impose and monitor speed restrictions for project traffic ◆ Organize delivery schedules are reasonable and achievable to prevent speeding by drivers 	
	<ul style="list-style-type: none"> ◆ Designate crossing points along the access roads based on consultation with local communities 	<ul style="list-style-type: none"> ◆ Designated crossing points implemented. ◆
	<ul style="list-style-type: none"> ◆ 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 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 	<ul style="list-style-type: none"> ◆ Erect traffic and road safety signs along project routes in-line with local laws ◆ Flag staff at intersections. ◆ Illuminated / flashing signs at crossing points
	<ul style="list-style-type: none"> ◆ 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/ 	<ul style="list-style-type: none"> ◆ 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
	<ul style="list-style-type: none"> ◆ 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. ◆ Enforce a 'no-idling' policy ◆ Do not allow parking outside of site areas (e.g. along local roads) 	<ul style="list-style-type: none"> ◆ No road traffic incidents at night ◆ No road traffic incidents in extreme weather ◆ No complaints about vehicle emissions

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	<ul style="list-style-type: none"> ◆ 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. 	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Use covers and/or control equipment such as water suppressors 	<ul style="list-style-type: none"> ◆ No excessive dust levels reported in visual inspections ◆ No dust related grievances
Dust resuspension on unpaved roads	<ul style="list-style-type: none"> ◆ 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 ◆ Enforce a speed limit for heavy goods vehicles (HGVs) on-site at 20km per hour 	<ul style="list-style-type: none"> ◆ No excessive dust levels reported in visual inspections. ◆ No dust related grievances ◆ No reports of speeding
Dust from open area sources, including storage piles	<ul style="list-style-type: none"> ◆ Use control measures such as installing enclosures and covers, and increasing moisture content ◆ Use vegetation on exposed surfaces of stockpiled materials 	<ul style="list-style-type: none"> ◆ All stockpiles are enclosed or covered. ◆ No non-compliance recorded in visual inspections
Emissions from burning materials	<ul style="list-style-type: none"> ◆ Prohibit bonfires and burning of waste materials 	<ul style="list-style-type: none"> ◆ No burning of waste materials
Emissions from generators	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ Generators of modern design and in good working order

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Dust emissions from cement batching plant	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ All stockpiles are enclosed or covered. ◆ No dust related grievances. ◆
Emissions from construction vehicles	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ 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
Noise and vibration due to construction traffic on existing roads	<ul style="list-style-type: none"> ◆ 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 	<ul style="list-style-type: none"> ◆ Construction traffic use identified routes ◆ No community grievances raised with respect to construction traffic-related noise
Noise complaints	<ul style="list-style-type: none"> ◆ Investigate noise and vibration complaints raised using the project grievance mechanism 	<ul style="list-style-type: none"> ◆ Complaints are satisfactorily resolved in line with timeframes given in the grievance mechanism ◆ No further complaints regarding previous

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
		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.

Annexure 6: Analysis of Alternatives

Overview

Project alternatives analysis has been performed with an aim to foresee environmental, economic and social impact of different alternatives like no project option, location alternatives, technology and cost alternatives of technologies.

The main project interventions include the rehabilitation of existing “Bulk Mains” therefore scope of alternative studies is very limited. This chapter discusses the no project alternative as well as provides an overview of the various technologies that have been considered by the Technical Consultants for intermediate chlorination at selected pumping stations for the water treatment and recommend the most suitable set of options.

This process of analysis of the different alternatives ensures that a well-informed decision is taken for the selection of the most optimal option amongst the possible options that are brought into consideration.

No Project Alternatives

If ‘no project’ option is triggered, it will result in loss of all positive impacts that project will pose on Karachi city, such as metering of flows, restriction of non-revenue losses, leakage free bulk water supply, improved water pumping infrastructure and improved treated potable water availability to citizens of Karachi. Project will also help in reducing water borne disease, ultimately reducing the pressure on health care system of the city.

Furthermore, project implementation will also create job opportunities during construction and operational phases, thereby improving the socioeconomic condition of the local people and help in improving their quality of life. Thus, the ‘no project’ option is not a viable option.

Alternatives Types

The availability of alternatives ensures to a degree that a comparative analysis will lead to a well-informed decision regarding the selection of the most optimal option among all that are brought into consideration. The analysis for the proposed rehabilitation and extension of priority water networks lays a primary emphasis on factors influencing economic viability, environmental sustainability and social acceptability that may arise from the execution of the project, during both construction and operational phases. Two key components of this particular analysis are:

- ◆ Site / Location alternatives
- ◆ Environmentally Friendly Technology Selection

Site / Location Alternatives

No site / location alternatives have been proposed by the Technical Consultants as the project mainly involves rehabilitation of existing bulk water supply components with major focus on bulk water supply lines aligned within the RoW of existing lines.

Comparison of Technological Alternatives in terms of Environmental Benefits

Intermittent Chlorination at Distribution Pump Houses

Three options have been assessed for the selection of feasible intermittent chlorination option for 25 selected pump houses:

a) Gas Chlorination System

Chlorine is produced at the manufacturing plants in gaseous form and then it is transformed into liquid form under pressure. It is stored in cylinders and supplied to water treatment facilities for use as a powerful disinfectant. Because of being highly toxic it requires to observe high safety procedures and utmost care in its handling. It has severe effects on the health of workers involved in its handling, if required precautions are not taken. The pressurised containers are to be handled with extreme care as they may explode and cause fatal accidents. Use of gas chlorination is declining because of many reasons like, risks involved in its handling, damage to the installations due to excessive corrosiveness causing high maintenance cost and health risk to the staff handling the system without wearing masks. In view of the above-mentioned facts the option of using gas chlorination system at distribution pumping stations located in densely populated areas has been ruled out. **Figure A6-1** shows the process flow of a gas chlorination system.

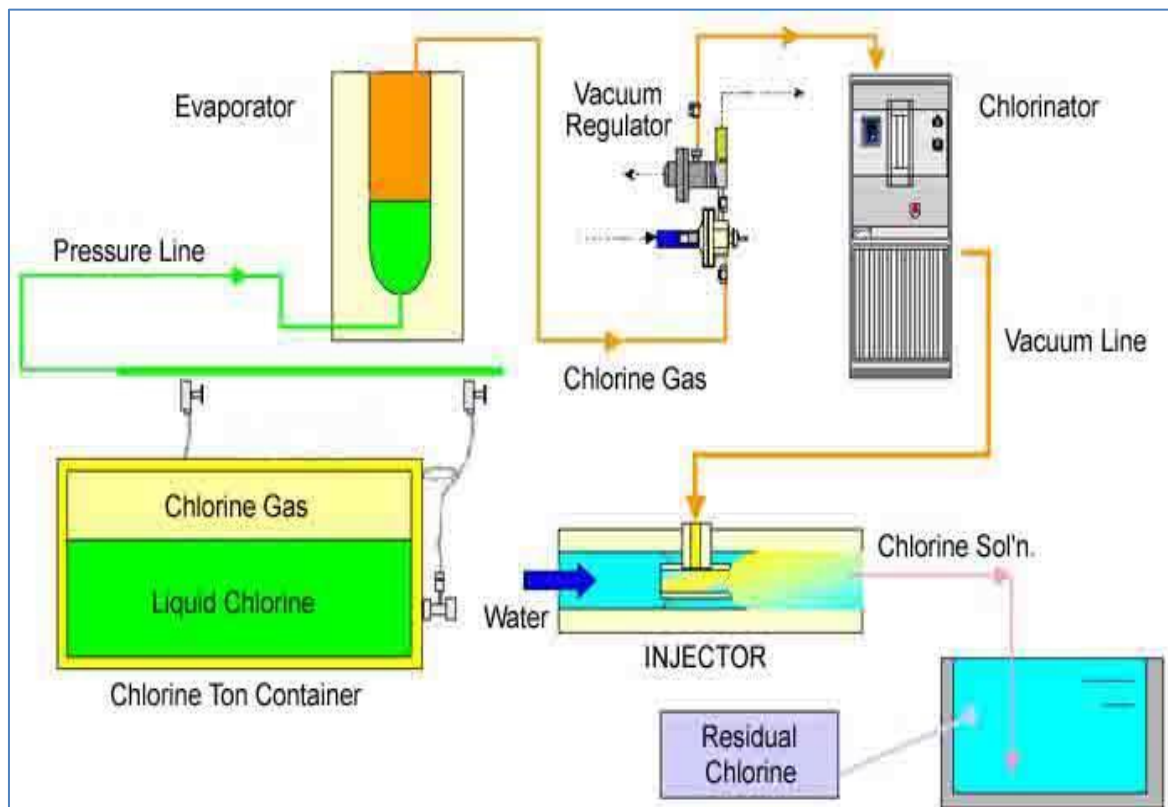


Figure A6-1: Gas Chlorination System

b) Chlorine Dioxide Dozing

Another mean of ensuring the sterility of drinking water is to use chlorine dioxide as a disinfectant. Chlorine dioxide is effective against all types of germs and has a long dwell time in the piping system, which means it disinfects even without re-dosing. Chlorine Dioxide is generated at site using diluted solutions of sodium chlorite (NaClO_2 7.5 %) and hydrochloric acid (HCl 9 %). The chlorine dioxide solution produced is stored in an integrated or external batch tank and is added to the potable water line as required using the integrated dosing pump or an external dosing pump. One of the major disadvantages of the Chlorine Dioxide System is that, it is very unstable and when it comes in contact with sunlight, it decomposes. Selection of this type of chlorination has been ruled out due to the instability of Chlorine Dioxide, hazards of handling the HCl as well as higher cost of the system as compared to others. **Figure A6-2** shows the process flow of a chlorine dioxide system.

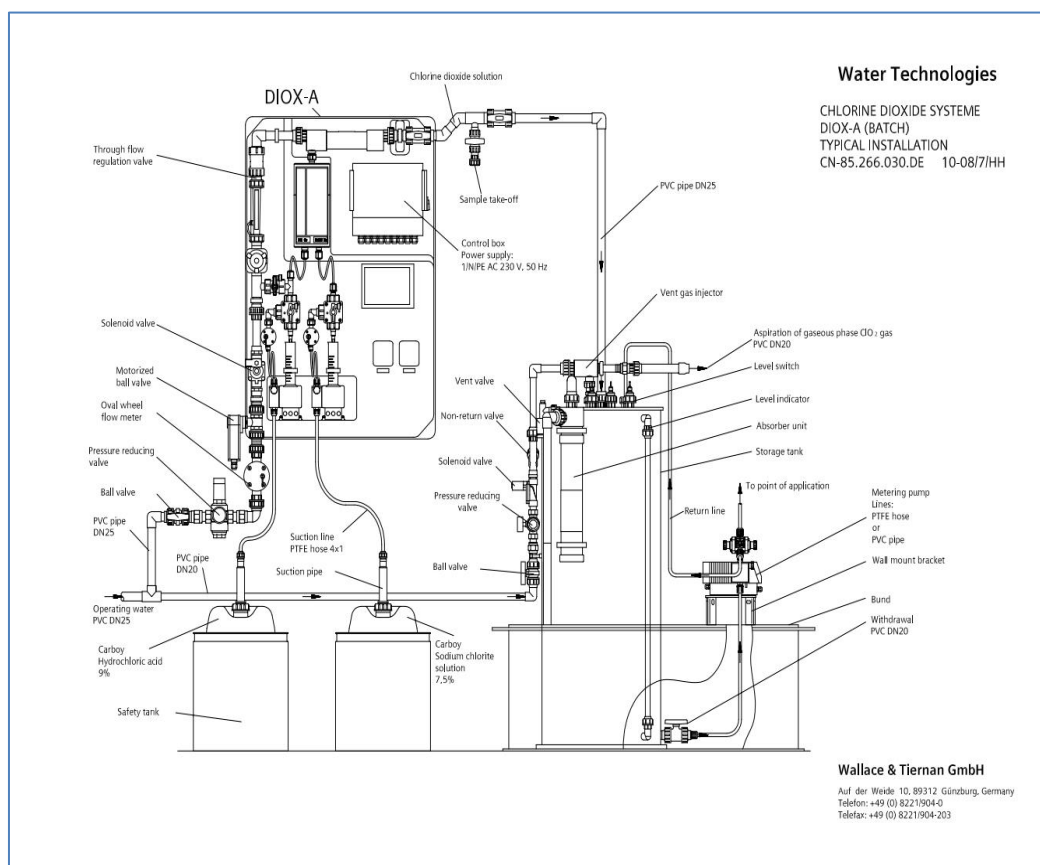


Figure A6-2: Chlorine Dioxide System

c) Hypo-chlorination System

Disinfection with sodium hypochlorite has similar disinfectant efficiency and residual performance as chlorine gas, but reduces the hazards associated with the handling and storing of chlorine gas especially if generated on-site. Installation and O&M cost of hypochlorite dosing systems is less than that of gas chlorination and chlorine dioxide systems.

As compared to both gas chlorination and chlorine dioxide systems, the Hypo-chlorination system is simpler. The dosing system comprises of a storage tank and a small positive displacement diaphragm

pump. Sodium hypochlorite solution stored in fibre glass tank or plastic tanks is added to filtered water through dosing pumps.

Dilute solution of sodium hypochlorite of 5 to 12.5% concentration is supplied by the manufacturers like Engro Chemicals either in plastic cans (in small quantities) or delivered at the water treatment installations through tankers (In large quantities). Hypo-chlorination has many advantages over gas chlorination and chlorine dioxide systems, like low CAPEX and OPEX, lower safety measure required, ease of storage and handling, low exposure risks and much lower corrosive effect. **Figure A6-3** shows the process flow of a hypo-chlorination system.

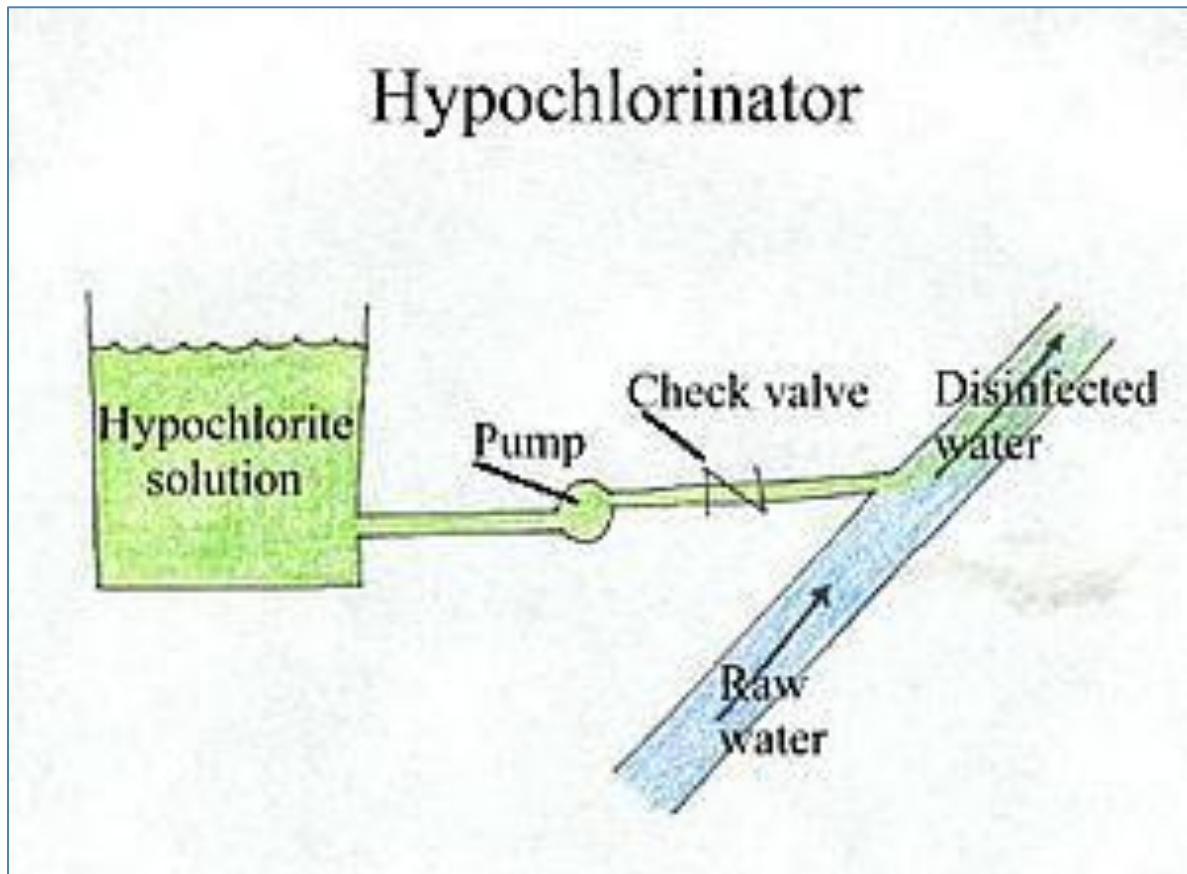


Figure A6-3: Hypo-Chlorinator

Selected Option for Chlorination

Keeping in view the pros and cons as well as the cost factors, the Technical Consultants have opted for the installation of chlorination system based on Sodium Hypochlorite injection at the selected Pumping Stations that requires installation of a sodium hypo-chlorite tank, diaphragm pump with injection arrangements and a chlorine analyser at the outlet of the manifold header. The Sodium Hypochlorite shall be sourced from suppliers like Engro Chemicals in cans, which could easily be transported to pump houses through Suzuki pickups, without causing any traffic or safety related nuisance to the public and nearby communities.

Selection of Open Channel Flow Meters

Open channel flow meters are proposed for the three canals and intake channels at Dhabeji Pumping Complex.

a) Traditional Methods of Flow Metering

There are several types of open channel flow meters, the traditional methods using primary devices such as flumes or weirs. These consist of a primary device, transducer, and flow transmitter. The wetted primary device restricts the liquid flow stream. Under flowing conditions, this restriction causes a rise in liquid level at a location either upstream or within the flowmeter. When the flow increases, the level rises higher. A transducer is mounted on or near the primary device to sense the level. The electronic flow transmitter uses the signal from the transducer to measure the level and determine liquid flow. Since these methods use a primary device, sedimentation, dirt, and other debris often times accumulate on the bottom of these devices, making level measurement highly inaccurate and thereby jeopardizing overall flow measurement accuracy. Moreover, the original shape of these primary devices is subject to wear and tear over time which further introduces inaccuracies in the overall flow measurement system. For these reasons, these devices are becoming obsolete.

b) Ultrasonic Flow Meters

Ultrasonic open channel flow meters emit and receive a signal directed at the surface of the liquid being measured. The sensor then calculates the level and/or velocity by processing the time between the original and returning signal. When this information is combined with the known physical characteristics of the channel (incorporating a primary device or otherwise) it is possible to calculate flow rate using the appropriate formula, usually done within specialized instrumentation manufactured for this task.

c) Radar Flow Meters

Radar sensors are conversion devices that transform microwave echo signals into electrical signals. They use wireless sensing technology to detect motion by figuring out the object's position, shape, motion characteristics, and motion trajectory. Radar sensors aren't affected by light and darkness and with the ability to detect obstructions like glass, it can "see" through walls. When compared to ultrasound, radar can sense longer distances and is safe for people and animals. One of the biggest advantages radar sensors have over other sensors is its detection of motion and velocity. The proper functioning of a RADAR does not require any medium.

d) Final Section

Keeping in view the pros and cons, the Technical Consultants have selected Radar based open channel flow meters at the following locations:

1. At the start of KG canal downstream Chilya headwork.
2. Near the end of KG canal upstream Gujjo headwork.
3. At the start of K-II/K-III canal downstream Gujjo headwork.
4. At the start of GK canal downstream Gujjo headwork.

Annexure 7: Grievance Redressal Mechanism

Principles

A GRM is established to address any complaints or grievances arising during the implementation period of the projects. People of the project area may perceive risks to themselves or their property or their legal rights or have concerns about the possible adverse environmental and social impact that a project may have. Any concerns or grievances will be addressed quickly and transparently, and without retribution to the project affectees or community members or complainant.

The primary principle of GRM is that all complaints or grievances are resolved as quickly as possible in a fair and transparent manner.

Objectives

The objectives of the GRM are to:

- ◆ develop an organizational framework to address and resolve the grievances of individual(s) or community(s), fairly and equitably;
- ◆ provide enhanced level of satisfaction to the aggrieved;
- ◆ provide easy accessibility to the aggrieved/affected individual or community for immediate grievance redress;
- ◆ ensure that the targeted communities and individuals are treated fairly at all times;
- ◆ identify systemic flaws in the operational functions of the project and suggest corrective measures; and
- ◆ ensure sustainability of the project.

Type of Complaints

The major complaints that may arise during the execution of the proposed project at site include but not limited to:

- ◆ E&S issues (dust, noise, air pollution, social and cultural issues);
- ◆ Damage and blockage of public utilities;
- ◆ Traffic inconvenience;
- ◆ Gender based violence (GBV) and harassment;
- ◆ Resettlement issues including loss of livelihood; and
- ◆ Issues related to compensation of resettlement impacts.
- ◆ Disclosure of GRM

The GRM shall be disclosed at PIU-KWSSIP, KWSC head office, and concerned project engineers, KWSSIP website as well as at sub-project sites.

Structure of Grievance Redress Mechanism

The project will establish a three-tier GRM comprising Community GRC, sub-project GRC; and PIU-GRC.

Community GRC (Tier-1)

The community-GRC will provide a platform for project affectees or community members to raise and discuss their concerns, resolve the E&S including resettlement issues at the community level and coordinate with project management to communicate these issues and concerns. Community-GRC will be established to maintain a close rapport and coordination with affected persons and community members throughout the project implementation. The social development specialist (SDS) of PIU with the assistance of SC will facilitate the establishment of community-GRC that is representative of the ethno-cultural and gender diversity within the community. The community-GRC will comprise the following six members with one as the committee convener:

- ◆ Three female members (from the project affectees or community members); and
- ◆ Three male members (from project affectees or community members).

The project E&S and engineering staff will coordinate with community-GRC to review and resolve the issue or concern related to resettlement planning or implementation as well as environmental and social concerns preferably within five (05) working days from receipt of the grievance. Any complaints that cannot be resolved at community-GRC will be forwarded to the next tier.

Sub-Project GRC (Tier-2)

KWSSIP will constitute a GRC headed by concerned Project Manager (PM) at each project site (including Priority Water Network Rehabilitation and Extension Project) to resolve all grievances and complaints of the project affectees or community members received either directly or through the Tier-1. Sub-project GRC will comprise of the following members:

- ◆ Project Manager (PM), as head/convener of sub-project GRC;
- ◆ Environment, SDS and Gender specialists of PIU;
- ◆ E&S specialists of Supervision Consultant (SC)
- ◆ Resident Engineer of supervision consultant;
- ◆ A representative (E&S specialist) of contractor (if required); and
- ◆ A representative of local community.

Note: Representative from any other district government department may be called as and when required by the sub-project GRC. Environmental Specialists of PIU and SC will join sub-project GRC meeting related to environmental issues only.

Sub-project GRC will meet once a month and when the need arises. The sub-project GRC will review grievances involving all E&S issues including resettlement issues that may arise due to project implementation. Sub-project GRC will perform the following functions:

- ◆ Record, categorize and prioritize the grievances that need to be resolved by the committee and resolve them within ten (10) working days;
- ◆ Invite and hear aggrieved persons/parties to produce evidence of their claims and record their view point;
- ◆ Communicate its decisions and recommendations on all resolved issues to PIU and the aggrieved persons for smooth implementation;
- ◆ Forward the unresolved cases/ complaints to PIU-GRC within an appropriate time frame with reasons recorded and its recommendations;
- ◆ Develop an information dissemination system and acknowledge the aggrieved persons/parties about the development regarding their grievance;
- ◆ Maintain a complaint register accessible to the project affectees or community members with brief information about complaints and sub-project GRC decision with status report; and,
- ◆ Maintain complete record of all complaints received by the sub-project GRC with actions taken.

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

PIU-GRC (Tier-3)

At the third tier, the PIU has already constituted a GRC (PIU-GRC). The PIU GRC will receive complaints either directly or through the Tier-2 GRC. The committee has the following compositions:

- ◆ 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.

Note: Representative from any other district government department may be called as and when required by the PIU-GRC. Environmental Specialists of PIU and SC will join PIU-GRC meeting related to environmental issues only.

The PIU-GRC through authorized representative, will acknowledge the complainant about his/her complaint, scrutinize the record, investigate the remedies available and request the complainant to produce any record in favor of his/her claim. After thorough review and scrutiny of the available record on the complaint, field visit will be conducted to collect additional information, if required. Once the investigations are completed, the PIU-GRC will give decision within twenty (20) working days of receipt of the complaint. If the complainant is still dissatisfied with the decision, he/she can go to the court of law, if he/she wishes so.

Organization of the GRC is shown in **Figure A7-1**.

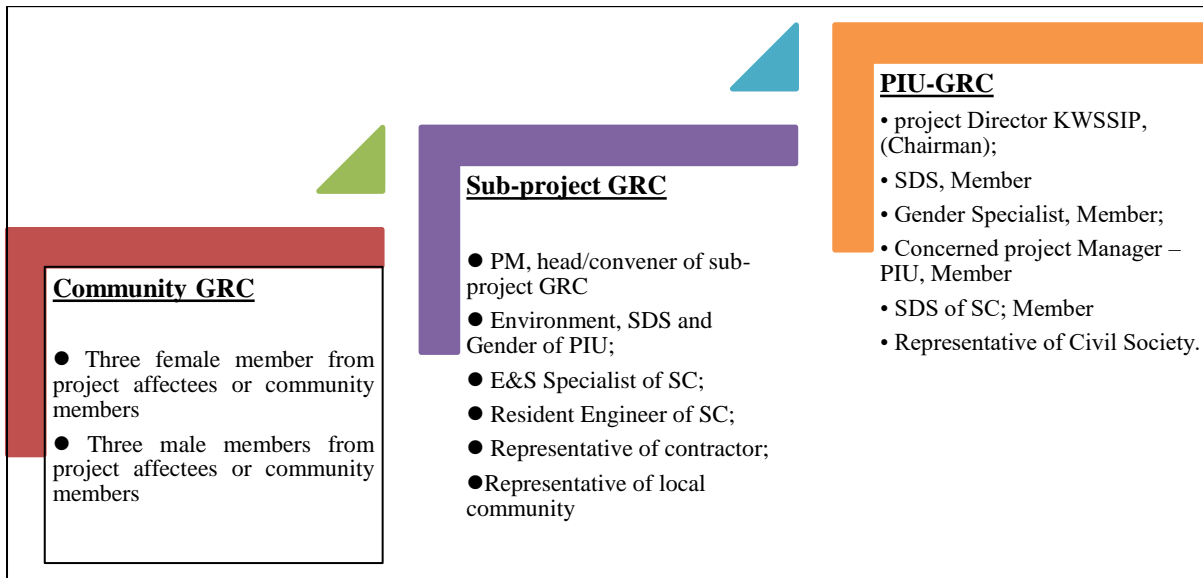


Figure A7-1: Organogram of GRC

Gender representation will be ensured by inducting a female member in all GRCs. The mechanism will ensure the access of project affectees or community members to a GRM that openly and transparently deals with the grievances and makes decision in consultation with all concerned that are consistent with the WB ESF requirements.

Gender Based Violence (GBV) Committee

Besides PIU-GRC, a GBV committee has also been established and notified within PIU consisting of the following members:

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

GBV Committee will address the gender related issues caused by the project activities during RP and project implementation.

Grievance Redress Procedure/ Mechanism

The intention of GRM is to resolve a complaint as quickly and at as low a level as possible to avoid a minor issue becoming a significant grievance. Irrespective of the stage of the process, a complainant has the option to pursue the grievance through the court as is his/her legal right in accordance with law.

The GRCs will work at site, sub-project and PIU levels. The E&S and engineering staff of PIU, in coordination with site staff will inform the project affected and community members about the GRCs and its mechanism through consultations and by posting at prominent places. The complaints received through any media will be screened by type and category. These complaints will be registered in Community Complaints Register (CCR), where the name and address of complainant, date, description

of complaint and action taken will be recorded. The following procedure will be used to redress the grievances:

- ◆ First, complaint resolution will be attempted to be addressed at community-GRC through the involvement of the field E&S/engineering staff. The community-GRC shall give decision within five working days of receipt of the complaint. If unsettled, grievance can be lodged to the sub-project GRC by the complainant or by the GRC;
- ◆ Sub-project GRC will acknowledge the receipt within two working days of lodging of complaint. Initial review and consultation with the sub-project GRC will be conducted within five working days of receipt of complaint. If required, sub-project GRC will advise the E&S/engineering specialists to conduct field visits in consultation with the aggrieved persons/parties and local community and submit a fact-finding report. Preferably, the fact finding will be completed within eight working days from receipt of complaints. sub-project GRC shall give decision within 10 working days of receipt of the complaint. If unresolved, a grievance will be lodged to the (PIU-GRC) by the complainant or by the GRC; and
- ◆ The PIU-GRC shall give decision within 20 working days of receipt of the complaint. If the complainant is still not satisfied, he/she can pursue further by submitting the case to the appropriate court of law.

All E&S issues will be dealt according to the above GRM procedures. The GRCs will hear and clarify with the complainant (if required so) about the E&S issue and shall conclude and communicate their recommendations for further implementation in due course of time. Complainant will be kept informed during the process and the GRC decision will be communicated to him/her accordingly. In case of any delay, the complainant will be informed on the progress and process about his/her grievance. The GRC proceedings will be documented step by step and all records will be maintained and summarized in the project progress and internal monitoring reports.

Lodging of Complaint

The complainant(s) can lodge their grievances through a number of ways/channels including online mail, phone, WhatsApp, e-mail and complaint box. Moreover, PIU has established an e-Portal for filing and tracking progress of the application online; the details are provided below.

- ◆ It is an electronic complaint lodging system (application) that will be accessible through a link on the PIU KWSSIP website;
- ◆ The focus of the e-portal is the quick complaint lodging for all types of primary stakeholders;
- ◆ Any project affectee or community member with internet access can lodge a complaint with option for anonymous complaints. Uploading of photos for better understanding of the problem will also be an option;
- ◆ Each complainant will get a unique Grievance Number to track their complaints through the e-portal;
- ◆ Each complaint will go through a quick resolution mechanism being managed by a dedicated team at the PIU. Each complainant will be contacted to ensure that his/her issue is resolved;

-
- ◆ The portal will differentiate between types of complaints for targeted decision-making and action on behalf of PIU; and
 - ◆ The portal will allow a quick and easy method for monitoring of the entire complaint lodging and resolution mechanism.

Annexure 8: Information on Disclosure, Consultation and Participation

Introduction

Public consultation and information disclosure is an essential component of the EA process, recognized by development agencies and national governments alike. Similarly, in view of incorporating the views, concerns and suggestions of project stakeholders and providing them sufficient opportunity to become part and parcel of the development process, the importance of stakeholder engagement throughout the project life-cycle and provides the scope and salient features of WB's requirements for stakeholder interactions through implementation of ESS-10: Stakeholder Engagement and Information Disclosure. A SEP has been prepared for entire KWSSIP-2 to comply with the ESS-10 requirement.

The WB's ESS are a cornerstone of its support to sustainable development and poverty reduction. The objective of these standards, policies and procedures is to prevent and mitigate undue harm to people and their environment in the development process. Local communities, their representatives, government and national and international NGOs and the civil society at large may all be able to contribute to, and benefit from, the dialogue directed at identifying and resolving key project-related issues.

Stakeholder consultation presents an opportunity for mutual information-sharing and dialogue between the project proponent and stakeholders. An effective public consultation provides concrete suggestions that can help improve project design, resolve conflicts at an early stage, identify management solutions to mitigate potentially adverse consequences and enhance perceived positive impacts.

Consultation Objectives

Effective stakeholder engagement enhances project beneficiaries' role from "participants" to "enabling agents" that proactively provide insights to project planning and implementation. The stakeholder consultation process for this project has been designed to enhance the role of stakeholders and thereby contribute towards project success and sustainability. Specific tasks and purposes of consultations with stakeholders have been given in the **Table A8-1**.

Table A8-1: Tasks and Purposes of Consultations

Task	Purpose of Consultation with Stakeholders
Why consultation with the stakeholders?	<ul style="list-style-type: none"> To build trust to ensure sustained support for the proposed project and build resilience for times of crisis. To learn about public concerns that need to be addressed and taken into account in designing of the project concept and preparation mitigation measures and programs. To learn about the strengths, skills and organizations that the stakeholders can bring to support project planning and implementation.
Modes and benefits of consultation	<ul style="list-style-type: none"> Listening and dialogue with stakeholders to keep the project at tuned to public concerns early, to pre-empt breakdowns in public confidence. Engaging the public as advocates for the project construction and to support the implementation of social, resettlement, and environment and health programs.

The specific objectives of the stakeholder engagement exercise carried out for the project:

- ◆ Inform all stakeholders about the project, its context and objectives, salient design features and potential social and environmental consequences;
- ◆ Facilitate and encourage interaction with project's beneficiaries, including project-affected parties and other-interested parties to encourage project acceptance, sustainability and ownership;
- ◆ Adopt an inclusive, participatory and transparent approach towards stakeholder engagement that provides opportunities for engagement with relevant stakeholders of all backgrounds, regardless of gender, race, ethnicity, income-class and ability;
- ◆ Benefit from the local knowledge for enhancing strategic interventions for public space design and infrastructure improvement; and
- ◆ Identify specific community concerns and suggestions about proposed designs and develop solutions to ensure satisfactory results.

Stakeholders Identification and Analysis

The three categories of stakeholders as per the ESS10 are outlined below:

- ◆ **Affected Parties** – persons, groups and other entities within the project area of Influence (AOI)¹⁷ that are directly influenced (actually or potentially) by the project and/or have been identified as most susceptible to change associated with the project, and who need to be closely engaged in identifying impacts and their significance, as well as in decision-making on mitigation and management measures;
- ◆ **Other Interested Parties** – individuals/groups/entities that may not experience direct impacts from the project but who consider or perceive their interests as being affected by the project and/or who could affect the project and the process of its implementation in some way; and
- ◆ **Vulnerable Groups** – persons who may be disproportionately impacted or further disadvantaged by the project(s) as compared with any other groups due to their vulnerable status¹⁸, and that may require special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the project.

Stakeholder identification and consultation were done as per the SEP of KWSSIP-2.

Primary Stakeholders – Project Affected Parties

ESS10 refers to identifying individuals, groups, and other parties that may be directly or indirectly affected by the project, positively or negatively. Affected Parties include local communities, community members and other parties that may be subject to direct impacts from the project. The RP focuses particularly on those directly affected, positively or adversely by the project activities. At this time, the PIU of KWSSIP-2 has identified directly affected parties under this category as:

- ◆ Beneficiaries of the project; and

¹⁷ This refers to the overall project area which may have direct or indirect impacts due to project activities in these locations.

¹⁸ Vulnerable status may stem from an individual's or group's race, national, ethnic or social origin, color, gender, language, religion, political or other opinion, property, age, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.

- ◆ People as well as entities affected by environmental and social impacts such as livelihood loss, social and cultural issues, noise, dust and increased vehicular traffic.

Secondary Stakeholders - Other Interested Parties

There may be broader stakeholders who may be interested in the project because it indirectly affects their work or has some bearing on it. As elucidated in the ESS10, while these groups may not be directly affected by the project, they may have a role in the project preparation or have a broader concern including for, but not limited to, information dissemination, awareness raising, community mobilization, and feedback. Interested parties under this category may be identified as:

- ◆ Revenue Department;
- ◆ KMC and DMCs;
- ◆ Local Councillors;
- ◆ Forest Department of Sindh;
- ◆ Sindh Wildlife Department;
- ◆ Livestock & Fisheries Department;
- ◆ Archeological 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.

Details regarding roles and responsibilities of the concerned departments. Institutions and Primary stakeholders are given in **Table A8-2**.

Table A8-2: Role and Responsibilities of project Stakeholders

Project Stakeholders	Roles and Responsibilities
Sindh Solid Waste Management Board (SSWMB)	<ul style="list-style-type: none"> ◆ The Board shall regulate control or inspect the source points of generation, accumulation, transfer, recycling, trading of the solid waste. ◆ The Board shall have the right over the solid waste related issues, assets, funds, and liabilities of the Councils and shall possess sole rights on all kinds of solid waste within the limits of all Councils. The Board may support, promote, administer, execute, and implement schemes for undertaking any commercial or business enterprise which may benefit the management of waste.
Sindh Environmental Protection Agency	<ul style="list-style-type: none"> ◆ SEPA is the regulatory authorities and mainly responsible for the development and implementation of the environmental policies and strategies in order to integrate the environmental issues and sustainable

Project Stakeholders	Roles and Responsibilities
	<p>development approaches into the legal and regulatory frameworks as per Sindh Environmental Protection Act, 2014.</p> <ul style="list-style-type: none"> ◆ EPAs are responsible for the issuance of NOC of the Proposed project. ◆ EPA Sindh is responsible for the compliance of ESMP and NOC provision during the construction and operation stages of the project.
Forest Department	<ul style="list-style-type: none"> ◆ Protection, improvement, and maintenance of existing trees ◆ Increase forests by planting new trees ◆ Extension and advisory services to the public about tree plantation
Wildlife Department	<ul style="list-style-type: none"> ◆ To save and protect wildlife
Revenue Department	<ul style="list-style-type: none"> ◆ Provide and verify land ownership data which include but not limited to the ownership record, land categorization and price details.
KMC and DMC	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ The political parties working to resolve the problems faced by Karachi take up the issues of water and sanitation at different forums. ◆ The city mayor, to be elected by the citizenry through the local bodies elections, will likely be from a political party. The working of KWSC and KWSSIP falls under the mandate of the mayor.
Local Councillors	<ul style="list-style-type: none"> ◆ Elected and represent union committee constituents. Key link between constituents and city legislature and executive.
Civil Society Groups (CSG) and (CBOs)	<ul style="list-style-type: none"> ◆ Largely policy and advocacy with limited interaction with government except in areas where strong CBO culture exists. ◆ CSOs in Karachi involved in development activism and service delivery. ◆ 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 positive win-win solutions for environmental and social sustainability of the project
Cantonment Boards	<ul style="list-style-type: none"> ◆ Six cantonment boards in Karachi with Clifton being the largest and Karachi Cantonment Board the smallest. Manage public services, environmental development, and land use in their jurisdictions. Self-sufficient and managed directly by Core Commander and Ministry of Defence.
Academia and Subject Specialists	<ul style="list-style-type: none"> ◆ Identification of project-related environmental and social issues and concerns ◆ Identification of positive solutions for environmental and social sustainability of the project that are technically sound and cost-effective
Labor and Human Resource	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Social protection including institutional care, skill development and rehabilitation ◆ Provide welfare services
Women Development Department	<ul style="list-style-type: none"> ◆ Cover all the needful grounds regarding women without the discrimination of class, creed, religion, economic position. ◆ Address concerns of women related to the project ◆ Create employment opportunities ◆ Training and capacity building of women
Communities and project Affected Persons	<ul style="list-style-type: none"> ◆ Participation in social impact assessment surveys, Consultation, and Focus Group Discussions

Project Stakeholders	Roles and Responsibilities
	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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 and concerns ◆ 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	<ul style="list-style-type: none"> ◆ 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

Disadvantaged / Vulnerable Individuals or Groups

It is particularly important to understand whether project impacts may disproportionately fall on disadvantaged or vulnerable individuals or groups, who often do not have a voice to express their concerns or understand the impact of a project. It would also be critical to ensure that awareness raising and stakeholder engagement with disadvantaged or vulnerable individuals or groups be adapted to take into account particular sensitivities, concerns and cultural sensitivities of such individuals or groups and to ensure a full understanding of project activities and benefits. The vulnerability may stem from person's origin, gender, age, health condition, literacy levels, economic deficiency and financial insecurity, disadvantaged status in the community (e.g., religious and ethnic minorities or fringe groups), dependence on other individuals or natural resources, especially those living in remote, and insecure or inaccessible areas. Engagement with the vulnerable groups and individuals often requires the application of specific measures and assistance aimed at the facilitation of their participation in the project-related decision making so that their awareness of and input to the overall process are commensurate to those of the other stakeholders. In this project, the vulnerable or disadvantaged groups may include, but are not limited to the following:

- ◆ Women working in the water and sanitation sector in the city;
- ◆ Elderly employees and citizens;
- ◆ Disabled employees and citizens;
- ◆ Minorities (ethnic, religious, women);
- ◆ Low-income households;
- ◆ Women/child headed households; and
- ◆ Transgender persons.

Vulnerable groups within the communities affected by the project will be further confirmed and consulted through dedicated means, as appropriate.

Consultation Participation Process

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. 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

Consultations with Secondary Stakeholders - Other Interested Parties

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.

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.

Consultations with Primary Stakeholders - Project Affected Parties

ESS10 refers to Identifying individuals, groups, and other parties that may be directly or indirectly affected by the project, positively or negatively. Affected Parties include local communities, community members and other parties that were subject to direct impacts from the project.

The public consultations arranged through Participatory Appraisal (PA) method. Participation mechanism and consultative process included: Information sharing, disseminate, impacts of the projects on social life and infrastructures of the people in the project area, 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.

For the public consultation following steps were adopted:

1. Consultations with Beneficiaries

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.

2. Consultations with Project Affected Parties

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.

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.

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.

3. Methods of Public Consultation

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

4. Categories of Stakeholders Contacted

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.

Community Consultation

Consultations mainly in form of “Focus Group Discussions” (FGD) with Primary Stakeholders in randomly selected communities of the AoI were carried out, majorly 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 have been discussed and disclosed in an open and transparent manner with the communities in order to solicit their comments and suggestions in the studies.

On the whole there were 306 (194 males & 112 females) participants and participation of women was also ensured. Consultations were carried out between the period of January 2022 to April 2022. **Table A8-3** provides an overview of consulted communities. The complete settlement wise list of participants are provided in **Table A8-4** and social baseline photographs provided in **Figure A8-1**.

Table A8-3: Consulted Communities

No	Community	District	Population	Household	Sample Size	Male Participants	Female Participants
1	Dhabeji KWSC Colony	Thatta	1500	250	6	4	2
2	Yaqoobabad	Thatta	960	160	6	6	0
3	KWSC Colony, Pipri Filtration Plant	Malir	1400	200	7	4	3
4	Tatal Jokheyo Goth	Malir	4800	600	8	6	2
5	Near Razaq Abad (Haji Natho) Goth	Malir	1600	200	8	5	3
6	Hassan Panhwahar Goth	Malir	5600	700	8	6	2
7	Zafar Town	Korangi	12600	1260	10	5	5
8	Cattal Colony PS Locality	Malir	2190	365	6	4	2
9	Jumo Goth	Malir	5000	500	10	7	3
10	Labour Square	Malir	4800	600	8	5	3
11	Future PS Locality	Korangi	8000	1000	8	8	0
12	Coast Guard Chowrangi Locality	Korangi	10400	1300	8	4	4
13	Nasir Colony	Korangi	36000	3000	12	7	5
14	Mehran Town	Korangi	150000	21000	7	5	2
15	Bhittai Colony	Korangi	5960	600	10	7	3
16	Korangi 5 ½ PS Locality	Korangi	3500	700	5	3	2
17	Shah Faisal Colony No. 4 PS Locality	Korangi	40000	5000	8	5	3
18	Shah Faisal Colony No. 3 PS Locality	Korangi	490	70	7	4	3
19	Shah Faisal Colony - Jamia Milia Colony PS (Gulshan- e Qadri) Locality	Korangi	2400	400	6	4	2
20	Clifton PS Locality	South	1000	200	5	3	2

No	Community	District	Population	Household	Sample Size	Male Participants	Female Participants
21	Bath Island Pump House (PS Street) Locality	South	30	8	4	3	1
22	PIC Tower Locality	Kemari	60000	7000	9	5	4
23	Temple Curry PS Locality	South	500	50	10	7	3
24	Lea Market PS Locality	South	15000	2500	6	4	2
25	Jigar Murad PS Locality	East	5000	600	8	4	4
26	Saleh Muhammad PS Locality	Malir	325	65	5	3	2
27	Gul Bai PS Locality	Kiamari	3000	500	6	4	2
28	Baldia PS Locality	Kiamari	40000	7000	6	5	1
29	Chandni Chowk PS Locality	Centeral	30000	3000	10	5	5
30	Kidney Hill PS (Dhoraji)	East	18000	3000	6	3	3
31	Kidney Hill PS (Shaerpao Basti)	East	650	80	8	5	3
32	Mahmoudabad 5 PS Locality	East	150000	21000	7	5	2
33	LSR PS Staff Colony	East	700	116	6	3	3
34	NIPA PS Locality	East	4000	700	6	4	2
35	Surjani PS Locality	West	30000	4000	8	5	3
36	Sakhi Hassan PS Locality	Central	20000	4000	5	2	3
37	Ajmer Nagari PS Locality	Central	200000	18000	11	7	4
38	Nagan PS Locality	Central	5000	404	12	8	4
39	Zia PS Locality	West	2000	200	10	5	5
40	Disco PS Locality	West	3650	365	10	5	5
Total					306	194	112

Table A8-4: Attendance Sheets of Socio-Economic Baseline Participants

No	Community	Male Participants	Female Participants
1.	Dhabeji KWSC Colony	4	2
2.	Yaqoobabad	6	0
3.	KWSC Colony, Pipri Filtration Plant	4	3
4.	Tatal Jokheyo Goth	6	2
5.	Near Razaq Abad (Haji Natho) Goth	5	3
6.	Hassan Panhwahar Goth	6	2
7.	Zafar Town	5	5
8.	Cattal Colony PS Locality	4	2
9.	Jumo Goth	7	3
10.	Labour Square	5	3

No	Community	Male Participants	Female Participants
11.	Future PS Locality	8	0
12.	Coast Guard Chowrangi Locality	4	4
13.	Nasir Colony	7	5
14.	Mehran Town	5	2
15.	Bhittai Colony	7	3
16.	Korangi 5 ½ PS Locality	3	2
17.	Shah Faisal Colony No. 4 PS Locality	5	3
18.	Shah Faisal Colony No. 3 PS Locality	4	3
19.	Shah Faisal Colony - Jamia Milia Colony PS (Gulshan- e Qadri) Locality	4	2
20.	Clifton PS Locality	3	2
21.	Bath Island Pump House (PS Street) Locality	3	1
22.	PIC Tower Locality	5	4
23.	Temple Curry PS Locality	7	3
24.	Lea Market PS Locality	4	2
25.	Jigar Murad PS Locality	4	4
26.	Saleh Muhammad PS Locality	3	2
27.	Gul Bai PS Locality	4	2
28.	Baldia PS Locality	5	1
29.	Chandni Chowk PS Locality	5	5
30.	Kidney Hill PS (Dhoraji)	3	3
31.	Kidney Hill PS (Shaerpao Basti)	5	3
32.	Mahmoudabad 5 PS Locality	5	2
33.	LSR PS Staff Colony	3	3
34.	NIPA PS Locality	4	2
35.	Surjani PS Locality	5	3
36.	Sakhi Hassan PS Locality	2	3
37.	Ajmer Nagari PS Locality	7	4
38.	Nagan PS Locality	8	4
39.	Zia PS Locality	5	5
40.	Disco PS Locality	5	5

Figure A8-1: Social Baseline Photographs

Public Consultation (Female)



Baldia PS



Cattle Colony



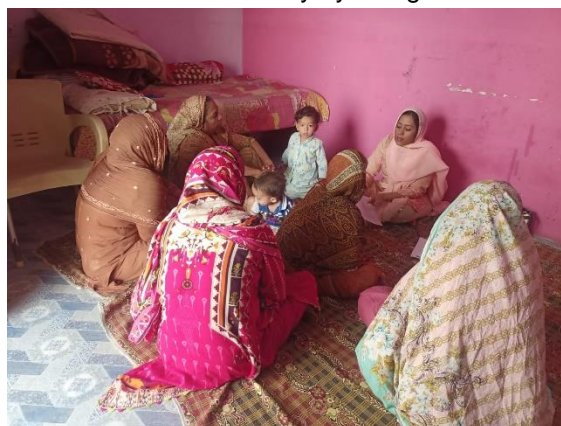
KWSC Colony Pipri F



Jumma Himayaty Village



Nasir Colony



Near Disco PS



Saleh Mohammad PS



Surjani PS



Yaqoobabadad

Public Consultation (Male)



Baldia PS



Bath Island



Bhatie Colony



Cattel Colony



Clifton PS



Cost gvaed Chowrangi



Dohoroje Kidney Hill PS



Disco Ps



Zia PS



Future PS



Gulbai PS



Gulshane Qaderi Jamia Milia PS



Hassan Panhwar



Jamia Milia PS



Jigar Muradabad PS



Jumma Himayat Village



Korangi 5 12/1



Korangi 5 1/2



Labour Square

Lee Market PS



LSR Staff colony PS



Mehmoodabad PS



Mehmoodabad



Mehran Town



Nagan PS



Nasir Colony



Near Chandni Chowk PS



Near Disco PS



Near Pani ki Tanki



PIC Tower PS



Razaqabad Nathokhan



Sakhi Hassan PS



Salieh Mohammad PS



Shah faisal Town PS 4



Surjani PS



Temple Curry PS



Yaqoobabad

Zafar Town

Institutional Consultations



Consultation at Dhabeji



Women development Department (a)

Feedback and Concerns from the Communities

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 **Table A8-5**. The stakeholders requested the concerned authorities to ensure the project was beneficial for the concerned communities. Most of the concerns raised by stakeholders have been incorporated into the ESMP study report. 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.

Table A8-5: Summary of Consultation Meetings Outcomes

Stakeholder	Summary of Key Issues Raised	Responses
Dhabeji KWSC Colony	Workers camps and their possible conflicts with local communities	Worker's camp site location has been selected far away from the communities. As per the ESMP directives, the Contractor shall be bound to develop campsite at the identified location only and equip it with proper facilities in order to restrict access of workers to the outside shops etc. so that their interaction with nearby communities shall be avoided.
	Nuisance related to construction traffic, dust and noise.	Suitable mitigation measures have been made part of the ESMP that shall be followed by the Contractor to protect communities from the impacts of construction traffic, dust and noise. These include, preparation and implementation of Traffic Management Plan, water sprinkling, avoidance of noisy work at night, ensuring low speed driving, immediate collection of excavated material, installation of safety barriers etc.
Yaqoobabad	Male family members should be employed in the project related jobs so that they could get the jobs in their hometown. Hiring process should be transparent and hiring of local workers should be ensured.	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area
KWSC Colony, Pipri Filtration Plant	Hiring of Locals	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area
	Safety while crossing the road	To avoid any safety related incidences and ensuring well-being of the local residents, the construction areas will be barricaded in line with the ESMP guidelines to restrict any

Stakeholder	Summary of Key Issues Raised	Responses
		pedestrian entrance. Implementation of other CHS measures incorporated in the ESMP shall also ensure community safety.
Tatal Jokheyo	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 who live within close proximity to the Project Area
Near Razaq Abad (Haji Natho)	There is a need to help communities understand, participate in all activities related to this project and also there is a need to work to increase civic engagement in addressing their concerns and facilitate collaboration among local and regional entities to address their problems.	This has been addressed in SEP and problems may be addressed via the robust Grievance Redress Mechanism
	What shall be the impacts of Excavation associated with project works	Construction activity at Bulk Water Mains will be conducted within the already defined corridor and may result in temporary soil dumps and congestion in the Aol. Adequate measures have been included in the ESMP that will be implemented by the Contractor for protecting public from nuisance.
Hassan Panhwahar	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 who live within close proximity to the Project Area
	Chances of dust emissions due to construction activities.	Construction activity at Bulk Water Mains will be conducted within the already defined corridor however it may result in generation of dust in the Aol. Adequate measures have been included in the ESMP that will be implemented by the Contractor for protecting public from dust nuisance.
Zafar Town	Is there a grievance redress mechanism system in place and will it be effective?	There is a grievance redress mechanism in place which with cooperation from the KWSSIP is expected to handle any issues fairly.
	What is the solution of waste generation during construction?	A waste management plan will be developed prior to the start of construction. This plan will cater to sorting of hazardous and non-hazardous materials prior to disposal, placing of waste bins at the project sites for waste disposal and an onsite hazardous waste storage facility i.e., designated area with secondary containment.
Cattle Colony PS	What is the procedure to address grievances?	Most of the concerns raised by stakeholders have been incorporated into the project's environmental and social assessment and EMP. In addition, a Grievance Redress Mechanism / Complaint

Stakeholder	Summary of Key Issues Raised	Responses
		Handling Mechanism will be developed at the implementation level by forming Grievance Redress Committee which will receive and resolve complaints of the project affected persons and other stakeholders of the project area.
Jumo Goath	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 who live within close proximity to the Project Area
Labour Square	Crossing the road could be a problem during the construction	Adequate and safe pedestrian access shall be provided for communities in line with ESMP guidelines
Future PS	Safety while crossing the road especially students/pupils, old and women.	The traffic management and CHS plans will be prepared and implemented in line with the ESMP guidelines for ensuring public safety.
	Labor influx is a major problem for us	The Contractor will develop and enforce a strict code of conduct for workers to regulate their behaviour in the local communities. Campsites will be far away from communities to restrict chances of interaction. Implementation of ESMP shall ensure protection of communities from any labor influx issues.
Nasir Colony	We are worried about the conflicts with construction labour	To avoid conflicts among local people on employment matter, the Contractor will be bound to employ the locals in cooperation with local administration for unskilled and semi-skilled duties.
	What are the mitigation measures for child labor?	Ensure that contractor shall have its employment policy in accordance with relevant act and labor policies in Pakistan. Contractor shall ensure the presence of all persons at site are adults and have their proper identity card with them.
Mehran Town	Will the service delivery improved?	This project will enable the KWSC to expand its areas of coverage, reduce NRW and improve its customer experience. This will contribute to improvement in the level of satisfaction of citizens to the service delivery.
	What are the specific objectives of the ESMP?	Facilitate the implementation of the mitigation measures identified in the ESMP Maximise potential Project benefits (enhancements) and manage adverse risks and impacts Define responsibilities for the Project Proponent, consultant, contractors, and other members of the Project team for ES management of the Project Define a monitoring mechanism and identify monitoring parameters in order to:

Stakeholder	Summary of Key Issues Raised	Responses
		Ensure the complete implementation of all mitigation measures
Bhittai Colony	People of Karachi are annoyed for receiving water via tankers instead of piped water and the common perception is that Karachiites are denied supply of piped water, as their basic human right, and this water is stolen and sold to them on exorbitant prices.	GoS and WB are working on other projects which will address the issue regarding water supply.
	The stakeholders requested the concerned authorities to ensure the project was completed on a fast-track basis and hoped it would not suffer any delays.	A fully capable Project Implementation Unit (PIU) has been setup within KWSC consisting primarily of existing KWSC staff; to mitigate weaknesses in certain specialized areas, as well as selected individual consultants to further strengthen the PIU in project preparation and implementation. The PIU is headed by the Project Director supported by a team of technical directors/managers and further supported by individual technical and safeguards consultants.
Korangi 5 ½ PS	Job preference should be given to local people during construction.	The contractor will be contractually bound to disclose the “Recruitment Policy” and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area
	The need for efficient and detailed planning and development of a detailed traffic management plan prior to the commencement of the project construction was emphasized repeatedly since it was mentioned that the project route passes through certain highly congested areas.	PIU - KWSSIP shall review the contractor capacity during bidding with respect to safeguard management and contracts shall be awarded accordingly.
Shah Faisal Colony 4 (PS)	Privacy and security of local people should not be disturbed due to construction work.	The Contractor will develop and enforce a strict code of conduct for workers to regulate their behaviour in the local communities. Campsites will be far away from communities to restrict chances of interaction. Implementation of ESMP shall ensure privacy of communities.
Shah Faisal Colony 3 (Near PS)	Construction related issues like excavated material, soil erosion, hazards for local communities and labour force should be appropriately addressed during the construction activities.	During the construction, occurrence of accidents/incidents during the construction activities, particularly from excavation activities could happen in case of inadequate safety arrangements. The traffic management and CHS plans will be prepared and implemented in line with the ESMP guidelines for ensuring public safety.
	Job preference should be given to local people during construction.	The contractor will be contractually bound to disclose the “Recruitment Policy” and

Stakeholder	Summary of Key Issues Raised	Responses
		follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area.
Shah Faisal Colony Jamia Milia Colony PS (Gulshan- e Qadri)	Contractors' familiar with community norms should be hired	PIU - KWSSIP shall review the contractor capacity during bidding with respect to his ability of following community norms and management of other safeguard aspects. Contracts shall be awarded accordingly to qualified contractors.
	Is there any traffic management plan to be established during construction work of the interventions to avoid access problem?	The traffic management and CHS plans will be prepared and implemented in line with the ESMP guidelines for ensuring public safety.
Clifton PS	The project proponents should develop organizational structure to handle the environmental and social issues during the project implementation.	A fully capable Project Implementation Unit (PIU) has been setup within KWSC consisting primarily of existing KWSC staff; to mitigate weaknesses in certain specialized areas, as well as selected individual consultants to further strengthen the PIU in project preparation and implementation. The PIU is headed by the Project Director supported by a team of technical directors/managers and further supported by individual technical and safeguards consultants.
	Will water availability be ensured after the implementation of the project?	Rehabilitation and construction of water supply network will directly increase the supply of clean, safe water to all parts of the city. This will increase the living standard of the local community and will help to reduce the troubles regarding the clean water thereby improving the overall system situation in the city.
Bath Island Pump House (PS Street)	Safety while crossing the road especially students/pupils, old and women.	CSC/PIU KWSSIP shall ensure the contractor staff working in the components of the project are well trained and educated in the Health, Safety and Environment (HSE) hazards associated with their duties, and that of the public, in the project area. Contractor will prepare construction management plan which will include the hazard prevention and safety plan, which will address health and safety of the people in the project area. Best industry practices related to Occupational Health and Safety standard (OHS) shall be adopted during the execution of the project.
PIC Tower Kiamari	Job preference should be given to local people during construction.	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area.

Stakeholder	Summary of Key Issues Raised	Responses
Temple Curry (Near PS)	What is the procedure to address grievances?	Most of the concerns raised by stakeholders have been incorporated into the project's environmental and social assessment and EMP. In addition, a Grievance Redress Mechanism / Complaint Handling Mechanism will be developed at the implementation level by forming Grievance Redress Committee which will receive and resolve complaints of the project affected persons and other stakeholders of the project area.
Lea Market PS	Job preference should be given to local people during construction.	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area.
Jigar Muradabadi PS	The community perception of the project is good and most of the people wish to see immediate implementation of the project.	The proposed project will be started soon.
Salih Muhammad	Privacy and security of local people should not be disturbed due to construction work.	The Contractor will develop and enforce a strict code of conduct for workers to regulate their behaviour in the local communities. Campsites will be far away from communities to restrict chances of interaction. Implementation of ESMP shall ensure privacy of communities.
Gul Baie PS	Contractors' familiar with community norms should be hired	PIU - KWSSIP shall review the contractor capacity during bidding with respect to his ability of following community norms and management of other safeguard aspects. Contracts shall be awarded accordingly to qualified contractors.
	Queries about whether there are going to be improvements made to existing local roads.	There is no provision of road improvement in this project
Baldia PS	What is this project?	The proposed Priority Water Network Rehabilitation and Extension Project will be undertaken under SOP-II of KWSSIP. The project will reinforce the Non-Revenue Water (NRW) and revenue management reforms and priority areas of the network will be rehabilitated focusing on reducing major leaks in the bulk water mains, installing district and customer meters, rehabilitating regulating valves and rehabilitation of pump houses and development of chlorination facilities. Leakage reduction will reduce the energy bill of water supplied to consumers. Modern meters with data loggers for large bulk customers will be installed and equipped with KWSC meter reading devices. Reducing NRW losses and introducing consumption metering will improve the

Stakeholder	Summary of Key Issues Raised	Responses
		supply of water and promote its conservation, thereby making Karachi's residents more satisfied with the quality water services.
	The community perception of the project is good and most of the people wish to see immediate implementation of the project.	The proposed project will be started soon.
Chandni Chowk PS	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.
	The need for efficient and detailed planning and development of a detailed traffic management plan prior to the commencement of the project construction was emphasized repeatedly since it was mentioned that the project route passes through certain highly congested areas.	The traffic management plan will be prepared and implemented in line with the ESMP guidelines.
Kidney Hill PS (Dhoraje and Shaerpao Colony 1)	EHS awareness should be provided to the local public being directly affected by the construction activities.	The Contractor shall implement a Stakeholder Engagement Plan and shall actively remain in touch with communities throughout the construction stage to timely address their concerns.
Mahmoudabad 5 PS	Hiring process shall be open and transparent and hiring committee should include participants from nearby communities.	The contractor will be contractually bound to disclose the "Recruitment Policy" that specifically includes a requirement to prioritise local employment for unskilled and semi-skilled positions that become available.
	What is the mechanism of grievances?	Timely and effective redress of stakeholder grievances contribute to bringing sustainability in the development's projects in an area. In this context, the Grievance Resolution Mechanism (GRM) will help advocate the process of forming and strengthening relationships between KWSC management and the stakeholder community groups and bridge any gaps to create a common understanding. The GRM and other developments will help achieve the objectives of sustainability and cooperation by dealing with the environmental and social issues of the Project.
LSR PS Staff Colony	Measures about the workers and community conflicts.	The Contractor will develop and enforce a strict code of conduct for workers to regulate their behaviour in the local communities. Implementation of ESMP shall ensure that there will be no conflicts between the communities and workers.

Stakeholder	Summary of Key Issues Raised	Responses
NIPA PS	Is there any traffic management plan to be established during construction work of the interventions to avoid access problem?	Yes, the traffic management plan will be prepared and implemented during the construction work.
Sakhi Hassan PS	Job preference should be given to local people during construction.	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area.
	Construction Disturbances to Allied Communities	Construction activities may result in generation of construction related impacts and nuisance to communities however adequate measures have been included in the ESMP that will be implemented by the Contractor for protecting public and environment from construction related impacts and nuisance.
Ajmir Nagari PS	Job preference should be given to local people during construction.	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow it. They will be asked to hire at least 60% people who live within close proximity to the Project Area.
	Contractors' familiar with community norms should be hired	PIU - KWSSIP shall review the contractor capacity during bidding with respect to his ability of following community norms and management of other safeguard aspects. Contracts shall be awarded accordingly to qualified contractors.
Nagan PS	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
Zia PS	Contractors' familiar with community norms should be hired	PIU - KWSSIP shall review the contractor capacity during bidding with respect to his ability of following community norms and management of other safeguard aspects. Contracts shall be awarded accordingly to qualified contractors.
Disco PS	What about the community health and safety?	During the rehabilitation works of Bulk Mains, occurrence of accidents/incidents during the construction activities, particularly from excavation activities could happen in case of inadequate safety arrangements. Safety of public residing close to excavation work will particularly be at stake. In line with the ESMP guidelines, the contractor shall prepare and implement CHS plan to ensure public safety.
	Is there any traffic management plan to be established during construction work of the interventions to avoid access problem?	Yes, the traffic management plan will be prepared and implemented by the Contractor during the construction stage.

Women Consultation within Project Area

Besides male members, consultations with female members of the communities were also carried out in project area during the study. A participatory and consultative approach was employed for information gathering and data collection. 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.

Their feedback expressed in their own words, along with how their concerns will be addressed through the Environmental and Social Management Plan (ESMP) is detailed below:

- ◆ Safety and Privacy Concerns: "We are worry about our safety and privacy with strangers around. We need assurances that security measures will be in place."
- ◆ Response: In line with the ESMP requirements, the Contractor will be bound to ensure that workers are following Code of Conduct as well as taking other measures to address community safety concerns, such as perimeter fencing, security personnel, and community awareness programs.
- ◆ Harassment: "We fear harassment. Measures should be taken to prevent and address any harassment issues."
- ◆ Response: The ESMP (Sections 5.1.4, 5.2.17) outlines the project's commitment to zero tolerance for harassment and include mechanisms for reporting and addressing any incidents, with a focus on women's safety.
- ◆ Education: "Our children need education. Can the project help with schools or adult education programs?"
- ◆ Response: PIU KWSSIP will consider this community request and 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.
- ◆ Transportation: "We need safe transportation options for essential services."
- ◆ Response: PIU KWSSIP will consider this community request and concerned local authorities will be requested to improve transportation infrastructure or establish a community transportation service.
- ◆ Empowerment: "We want opportunities to be economically and socially empowered."
- ◆ Response: PIU KWSSIP will consider the community request and including such component in the Contract document, to allow the Contractor to introduce skill development, vocational training, or income-generation programs tailored for women to enhance their economic and social status.

Consultations with Institutional Stakeholders

The consultant environmental and social team visited various organizations and offices located in the project area for information disclosure and to get feedback. Institutional stakeholder consultations were more formal as they involved government personnel and non-governmental organization, who were consulted. They were briefed on the ESA 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 ESMP 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

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.

The complete list of offices visited and officials consulted as **Table A8-6**, whereas **Table A8-7** provides digest of major comment and suggestions received from institutional stakeholders:

Table A8-6: Consultation with Institutional Stakeholders

No.	Department/ Organization	Name	Designation
1	Education Department, Thatta	Muhammad Rahim Somro	D.E.O
2	Sahil Welfare Association (NGO), Thatta	Ali Muhammad Jatt	Press Secretary
3	Wildlife Department	Adil Khan	P.S
4	Public Health Engineering Department	Muhammad Bakhash	Research Officer
5	KWSC Dhabeji Pumping Complex	Aijaz Bulidi	Residential Engineer
6	KWSC Pipri Filtration Plant, Malir	Allah Dino Palejo	Resident Engineer
7	Agriculture Department, Malir	Abdul Ghani Arbani	Deputy Director
8	District Municipal Corporation (DMC), Malir	Riaz Ahmed Khatri	Administrator
9	Taxation, Encroachment Department, Malir	Shamsher Khan	Sub Inspector
10	TMO, Malir	Sohail Ahamed	Executive Engineer
11	Health Department, Malir	Dr. Mohammad Khan	A.D.H.O
12	DMC, East	Javed Soomro	Assistant District Commissioner
		Rehmatullah Sheikh	Administrator
13	Health Department, East	Dr. Jamil Sheikh	D.H.O
		Dr. Jameel Mughal	A.D.H.O

No.	Department/ Organization	Name	Designation
14	Education Department, Karachi Division	Abida Lodhi	Director
15	Sir Syed Ahmed Khan University	Muhammad Ameen	Supervisor
16	National Institute of Management	Syed Rafiq Hussain Shah	Director
17	Sindh Infection Disease and Research Center	Dr. Adul Razzaq	A.M.S
18	Education Department, Thatha	Muhammad Rahim Somro	D.E.O
		Jahangir Memon	A.D.E.O
19	Civil Aviation Authority, Thatha	Ijaz Ahmed	Incharge
20	PAF, Thatha	Major Jamshed	Squadron Leader
		Muhammad Riaz	A.W
21	Sahil Welfare Association (NGO), Thatha	Ali Muhammad Jatt	Press Secretary
22	Wildlife Department	Adil Khan	P.S
23	Public Health Engineering Department	Muhammad Bakhsh	Research Officer
24	Urban Resource Center (NGO)	Mohammad Younus	Director
25	Chinoot Hospital (NGO)	Rizwan Ahmed	Administrator
26	Agha Khan Institution (NGO)	Faheem Ahmed	Supervisor
27	SOS Village (NGO)	Ghazala Farooqi	Assistant Director
28	KWSC, Karachi	Shahzad Mashkoo	Assistant Executive Engineer
		Muhammad Amir	A.A
29	KWSC Hub Filtration Plants	Sadaqat Ali	A.E.E
		Farhan Ansari	Sub-Engineer
		Muhammad Asif	Sub-Engineer
30	Taxation and Narcotic Control Department	Imran Bhatti	Additional Secretary Excise and PD to CLICK ET and NC project
		Muhammad Hussain	Additional Private Secretary
31	Women Development Department	Hiba Khan	Project Coordinator
		Dr. Abdul Hafeez Sheikh	General Coordinator Project
32	Fisheries Department Government of Sindh	Dr. Muhammad Asim Kareem	Deputy Director Fisheries Department
33	Auditor Journal	Ms. Tanzeela Akbar	Audit Officer
34	KWSC Dhabeji Pumping Complex	Aijaz Bulidi	Residential Engineer
35	Centre for Development Innovation	Akbar Ali Dars	Executive Director
36	KWSC PS Shah Faisal	Ejaz Ahmed	AEE
		Ali Ahmed	AEE

No.	Department/ Organization	Name	Designation
37	MCH Labour Square Government Facility run by HANDS	Ms. Nayab	Staff Nurse
		Dr. Sumera	Doctor
38	Sindh Employees Social Security Hospital	Dr. Farooq Ahamed	RMO

Table A8-7: Feedback and Concerns

Stakeholder	Summary of Key Issues Raised	Responses
Education Department, Thatta	Since KWSC shall be building the KWSIIP sub-projects including Dhabeji component through WB funding, it is needed that already deprived education sector of District Thatta should also get some benefits of this funding. KWSC may think about building some schools in the area under the CSR activities for local children.	It has been considered a reasonable suggestion and PIU – KWSSIP / KWSC shall take up the matter with higher officials.
KWSC Dhabeji Pumping Complex	The project will have far reaching impacts on the financial health of the KWSC as it will eliminate the nuisance of frequent bursting of rising mains which consumes huge amounts of money for repairs.	It has been agreed that definitely the project interventions shall considerably improve the KWSC's water supply infrastructure in which the Dhabeji Pumping Complex and Rising Mains are considered as the backbone.
KWSC Pipri Filtration Plant, Malir	The officials of the KWSC said that implementation of ESMP in letter and spirit shall be needed to confine impacts of the proposed construction activities to limited periphery.	The ESMP has been prepared following the WB and GoS guidelines and includes all necessary mitigation measures for controlling and mitigating the anticipated environmental and social impacts of the proposed project. This ESMP shall be implemented in letter and spirit by the Contractor for protecting environment and communities.
Agriculture Department, Malir	The decreasing water quantity continues to be one of the most important threats to land eco-systems around the study area. Water is vital for all anthropogenic activities. The quality of water is getting vastly deteriorated due to industrial waste and carelessness to the environment	GoS is working on providing more water and reducing pollution as part of other schemes.
District Municipal Corporation (DMC), Malir	Decision-makers should have knowledge of negative impacts and actions to reduce them.	The ESMP has listed the negative impacts, and their mitigation and public hearing will also provide further opportunities to interested and affected parties to comment further.
Taxation, Encroachment Department, Malir	Ensuring safe water supply for communities across the Karachi is a growing challenge due to aging infrastructure, impaired source water, strained community.	GoS with WB is working on providing more water to the city to fulfil the future needs
TMO, Malir	It was said in the consultation that the water shortage should be addressed	The proposed Priority Water Network Rehabilitation and Extension Project will

Stakeholder	Summary of Key Issues Raised	Responses
	<p>immediately to counter water supplied by tankers.</p> <p>Stated there is difficulty in finding trained safety staff</p>	<p>restrict NRW losses and well as water theft issues.</p> <p>CSC/PIU KWSSIP shall ensure the contractor staff working in the components of the project are well trained and educated in the Health, Safety and Environment (HSE) hazards associated with their duties, and that of the public, in the project area.</p> <p>Contractor will prepare construction management plan which will include the hazard prevention and safety plan, which will address health and safety of the people in the project area. Best industry practices related to Occupational Health and Safety standard (OHS) shall be adopted during the execution of the project.</p>
Health Department, Malir	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 installing intermittent chlorination facilities at 25 selected pump houses. GoS is also working on other projects which are geared towards addressing the issues mentioned herein. The items mentioned may be used as a part of awareness campaign and SEP.
DMC East	The proposed project is the great initiative by the government.	Rehabilitation and construction of water supply network will directly increase the supply of clean, safe water to all parts of the city. This will increase the living standard of the local community and will help to reduce the troubles regarding the clean water thereby improving the overall situation in the city.
Education Department, Karachi Division	Strengthen the capacity of women through this project and motivate men and women to work towards gender equality.	This project will take due care to promote gender equality and involve women in construction phase equally. Skill raising may be taken up as part of CSR by contractor
Sir Syed Ahmed Khan University	Good construction techniques and competent staff are pre-requisites for such projects	A fully capable Project Implementation Unit (PIU) has been setup within KWSC consisting primarily of existing KWSC staff; to mitigate weaknesses in certain specialized areas, as well as selected individual consultants to further strengthen the PIU in project preparation and implementation.
Sindh Infection Disease and Research Centre	Microbiological contamination is a major issue in Karachi's groundwater that is resulting in regular cases of diarrhoea and dysenteries caused by bacteria, viruses or protozoa, enteric fevers and worm infestation etc.	It has been agreed as water quality sampling been carried out by the Consultants through SEPA certified Environmental Monitoring Laboratory at eleven locations in proximity to the proposed project sites showed that the

Stakeholder	Summary of Key Issues Raised	Responses
		samples are contaminated with bacterial pollutants that include E. coli, Fecal and Total Coliforms.
	Hopefully the project shall improve water quality	Project will improve the water quality by installing intermittent chlorination facilities at 25 selected pump houses. GoS is also working on other projects which are geared towards addressing the issues mentioned herein.
Sahil Welfare Association (NGO), Thatta	Women make essential contributions to the economies and their roles vary considerably between and within regions and are changing rapidly, where economic and social forces are transforming many sectors.	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 and it may be made part of CSR by contractor.
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 ESMP 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
Public Health Engineering Department	The proposed project is essential for the improvement of public health and socio-economic development, particularly in Karachi with a high incidence of water-related diseases, which affect particularly children.	Definitely, the project will improve overall public health profile of the city.
Urban Resource Centre (NGO)	Training programs should be included in the ESMP for staff and community.	Provisions for trainings and regular interactions with communities have already been kept in the ESMP.
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
SOS Village (NGO)	Strengthen the capacity of women through this project and motivate men and women to work towards gender equality.	This project will take due care to promote gender equality and involve women in construction phase equally. Skill raising may be taken up as part of CSR by the Contractor
Women Development Department	Strengthen the capacity of women through this project and motivate men and women to work towards gender equality.	This project will take due care to promote gender equality and involve women in construction phase equally. Skill raising may be taken up as part of CSR by 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	The project will improve the water quality as mixing of sewerage water with other sources will be eliminated or reduced. As such it will also improve the health. The gender issues discussed may be addressed by awareness

Stakeholder	Summary of Key Issues Raised	Responses
	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.	campaign and preaching gender equality. Initiating skill enhancement training programs and equal opportunity hiring on project. The contractor may take up some of these issues as part of their CSR especially related to UN SDG 5, related to gender equality, women, and girl empowerment. 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.	The gender issues raised may be addressed by contractor by Initiating skill enhancement training programs, including awareness raising that may enhance the knowledge of women and enable them to get access to micro financing. As part of CSR program due attention may be paid towards UN SDG 5, related to gender equality.
	Strengthen the capacity of women through this project and motivate men and women to work towards gender equality.	This project will take due care to promote gender equality and involve women in construction phase equally. Skill raising may be taken up as part of CSR by contractor

Addressing Stakeholder Concerns

Most of the concerns raised by stakeholders have already been incorporated into the ESMP. 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.

Stakeholder Consultation Workshop

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 **Figure A8-2** Following are the summarized comments / suggestions by the stakeholders regarding the proposed project:

- ◆ The effects of the projects will be greatly positive as it will contribute towards meeting the city water demands as well as paving the way for generation of revenue, reducing water losses and enabling KWSC to supply treated drinking water to the residents of Karachi.
- ◆ Under the project, the priority areas of the network will be rehabilitated, focusing on reducing major leaks, ensuring water metering, improving water treatment profile and developing additional intermittent chlorination facilities.
- ◆ Reducing NRW losses and introducing consumption metering will increase the supply of water and promote the conservation of water, thereby making Karachi's residents more protected to water shortages.
- ◆ The project is expected to result in improved access to uncontaminated water for at least 2,000,000 consumers through the installation of additional chlorination facilities within the existing network.
- ◆ Lower technical losses that increase supply to customers will make Karachi's citizens more resilient to extreme, climate-related water events. Reduction in physical losses will also improve energy efficiency and reduce greenhouse gas emissions as detailed in the project's Greenhouse Gas (GHG) analysis.
- ◆ The project will improve water supply to low income areas as well.
- ◆ The project will have two primary beneficiaries: Firstly, many inhabitants of Karachi will benefit from uncontaminated water and associated gains in health and economic prosperity. At least 2,000,000 people are expected to benefit from better access to improved water services. Secondly, KWSC will benefit from enhanced distribution capacity and service quality, as well as capacity building measures to translate these infrastructure improvements into higher revenues through improved billing and collections and greater accountability to customers.











Photographs of Stakeholder Consultation Workshop are shown in **Figure A8-3**.

Figure A8-2 Attendance Sheets of Stakeholder Consultation Workshop



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 C&M	
4.	Dr. Abdul Qhatta	Env. Engg. Dept - NED University	
5.	Mr. Shoaib Qureshi	Act Director SEPA	
6.	Ali Larosh	Sr. Project officer WWF - Pakistan	
7.	Farooq/Bhutto	K Electric	
8.	Yasir Muhammad Tazfar	Dept -	
9.	Hussain Haleem	Safeguard Specialist	
10.	Zahid Farooq	Joint Director WRC	

1071PO1 | 01 (Stakeholder Consultation Workshop – Attendance List)





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
11.	UZAIR HAMEED KHAN	MANAGER Row OPS PTCL	
12.	Mushtaq Ahmad Sudhro	Coordinator Protocol NRL.	
13.	CDR Rehman Saif	Sr. Mgr Administration	
14.	KHAUD M. SIDDIQUI	Member (Service) PED Board GOS	
15.	SYED ALI NAUMAN	CHIEF ENGINEER, K.D.A.	 28/07/2022
16.	Kamran Akh	Sr. Social Div SP	
17.	SARFARAZ	KWSSIP	
18.	Mazhar Ali Shaikh	Director Katchi Abadi KWSSIP	
19.	Imdad Rehman	WB	
20.	Engr: M. Usman Memon	S.E/C (BWSA). PK: Steel.	



**Stakeholder Consultation Workshop – Environmental & Social Assessment Studies
SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)**






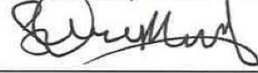




28th July 2022

S. No.	Name	Designation / Department	Signature
21.	KAMRAN UMAR	EE / KDA	
22.	Khuram Shauq	SDS / KWSSIP	
23.	Syed Waqar Hussain	ESI / KWSSIP	
24.	ARSLAN ASYHAR	PRINCIPAL ENVIRONMENTALIST - PK	
25.	Adeel Ahmed Maggi	SA. Int. Engineer m.c	
26.	Muhammad Sajid Siddiq	Sr. Social & Resettlement spec.	
27.	Muhammad Noorman	Junior Engineer WAPDA K-4	
28.	Muhammad Syed Mansur (LAND) PSM		
29.	Maghar Abbas	ASSISTANT MANAGER (PSM)	
30.	Intelehas A Rajput	Chief Engineer (ESM) KWSSIP	



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
31.	Tuba Noman	GIS Specialist	
32.	Muhammad Sijjad	Resident Engineer NESPAK	
33.	M.A. Shishamul	MMP	
34.	M. Shauq Ahmed	Nespak Lhr. (PM-CA)	
35.	Fahad Saleem	Nespak (Env. spec.)	
36.	QULAR ARIF	EMC Pakistan	
37.	Talal Ahmed	MMP	
38.	Rameez ul Islam	MMP	
39.	GUL MIR UMMA N	Chief Eng (T&C) CIV NESPAK	
40.	Hajeeb-ur-Rehman	Manager PCL N/W NESPAK	



Stakeholder Consultation Workshop – Environmental & Social Assessment Studies
SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022






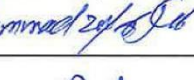




S. No.	Name	Designation / Department	Signature
41.	Dr. Amir Alamgir	Assistant Professor / Institute of Environmental Studies UoM	
42.	Ghulam Kibri	Energy update	
43.	wg Cdr DARYA KHAN	OC Admin / PAF S.W.E.E.P. Karachi	
44.	Muhammad Nawaz	Social Safeguards Specialist	
45.	Zulfiqar Laghari	Sr. Social Development Specialist	
46.	Muhammad Zafar Jaffer	Resettlement Specialist	
47.	Muhammad Rahim Jaffer	M.M.P.	
48.	A. Rehman	kwss	
49.	Nasreen Baloch	Assistant Director Social welfare	
50.	Jawed Shami	Team leader, S.W.E.E.P.	

Figure A8-3 Photographs 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