KWSSIP
Karachi Water & Sewerage Services Improvement Project

Final Report

Environmental & Social Management Plan

Rehabilitation of Existing and Construction of New Filtration Plants Project






October 2023

MMP
MM Pakistan (Pvt) Ltd.

Second Karachi Water & Sewerage Services

Improvement Project [KWSSIP-2]

Environmental & Social Management Plan of Rehabilitation of Existing and Construction of New Filtration Plants Project

October 2023

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List of Acronyms

AIIB	Asian Infrastructure Investment Bank
AOI	Area of Influence
BOD	Biochemical Oxygen Demand
BOQ	Bill of Quantities
CBOs	Community Based Organizations
CHS	Community Health and Safety
CLO	Community Liaison Office
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSC	Construction Supervision Consultant
DBPs	Disinfection by-products
E&M	Electrical and Mechanical
EARs	Environmental Assessment Regulations
ECP	Environmental Code of Practices
EHS	Environment, Health and Safety
EHSGs	Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ESA	Environmental & Social Assessment
ESCP	Environment and Social Commitment Plan
ESF	Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental & Social Impact Assessment
ESMMP	Environmental & Social Management and Monitoring Plan
ESMP	Environmental & Social Management Plan
ESS	Environmental & Social Standards
ESSU	Environmental and Social Safeguard Unit
FGD	Focus Group Discussion
FP	Filtration Plant
GBV	Gender Based Violence
GIIP	Good International Industry Practice
GIS	Geographic Information System
GoS	Government of Sindh
GRM	Grievance Redress Mechanism
H&S	Health and Safety
HIV/AIDS	Human Immunodeficiency Virus / Acquired immunodeficiency syndrome

IEE	Initial Environmental Examination
IFC	International Finance Corporation
ILO	International Labor Organization
INGOs	International Non-Governmental Organization
IOSH	Institution of Occupational Safety and Health
IPC	Instruction of Payment Certificate
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
JHA	Job Hazard Analysis
KWSC	Karachi Water & Sewerage Corporation
KWSSIP	Karachi Water & Sewerage Services Improvement Project
LMP	Labor Management Plan
MGD	Million Gallon Per Day
MMP	MM Pakistan (Pvt.) Ltd.
MSIP	Management Strategies and Implementation Plans
NC	Non-compliance Report
NEBOSH	National Examination Board in Occupational Safety and Health
NGOs	Non-Governmental Organization
NO_2	Nitrogen dioxide
OHS	Occupational Health and Safety
OSHA	Occupational Safety& Health Administration
PAF	Pakistan Air Force
PAPC	Project Affected Persons Committees
PAPs	Project Affected Persons
PCC	Pre-Cast Concrete
PCRWR	Pakistan Council of Research in Water Resources
PD	Project Director
PIU	Project Implementation Unit
PM_{10}	Particulate Matter 10 Micron
$PM_{2.5}$	Particulate Matter 2.5 Micron
PMDC	Pakistan Medical and Dental Council
PPE	Personal Protective Equipment
PQA	Port Qasim Authority
PSM	Pakistan Steel Mills
RCC	Roller Compacted Concrete
RFI	Request for Inspection
SCADA	Supervisory Control and Data Acquisition
SEA	Sexual Exploitation and Abuse
SEPA	Sindh Environmental Protection Agency

SEQS	Sindh Environmental Quality Standards, 2016
SMF	Social Management Framework
SO_2	Sulfur dioxide
SOPs	Series of Projects
SOSH	Sindh Occupational Safety and Health
SSESMP	Site-specific Environmental and Social Management Plan
TMP	Traffic Management Plan
ToR	Terms of Reference
USEPA	United State Environmental Protection Agency
VU	Vulnerable
WB	World Bank
WBG	World Bank Group
WMP	Waste Management Plan

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 rehabilitating existing and constructing new filtration plants to treat raw water before supplying it to end users.

This document presents the Environmental and Social Management Plan (ESMP) of the proposed Rehabilitation of Existing and Construction of New Filtration Plants 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 rehabilitation of Pipri (JBIC) - 50 MGD and NEK (New) K-II - 100 MGD, major re-building of Gharo - 30 MGD, Pipri Old - 90 MGD, COD - 180 MGD and new construction of NEK K-III - 100 MGD and Dumlottee – 15 MGD. All construction activities will be carried out within the existing boundaries of the filtration plants, and no land acquisition will be required for the project.

1.1 Objective of ESMP

The ESMP has been developed 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, and mitigation and control strategies have been devised accordingly to address the potential E&S risks associated with the project.

Other associated objectives of the ESMP are to:

- Facilitate PIU of KWSSIP in ensuring E&S sustainability of the project;
- Establish a baseline of existing E&S conditions before project initiation by collecting secondary and primary data/information on the physical, biological, and socio-economic environment of the project area;
- Identify potentially significant E&S 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 an ESMP for all project stages as a tool for implementing the suggested measures and monitoring and evaluation mechanisms 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 Alternatives, 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 Factories (Second Amendment) Act, 2021; Sindh Occupational Safety and Health Act, 2017; 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; Sindh Local Government (Amendment) Act, 2021; Hazardous Substances Rules, 2014; and Building Code of Pakistan, 2007.

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), ESS8 (Cultural Heritage), and ESS10 (Stakeholder Engagement and Information Disclosure).

2.2 Project Description

The rehabilitation, rebuilding, and construction will take place within the boundaries of the existing filtration plant sites. The filtration plants under the project will mainly be upgraded/equipped with the following interventions:

- Enhancement of water treatment process through implementing direct filtration replacement/installation of new electro-mechanical systems
- Installation of SCADA systems
- Upgradation of electrical system for plants, admin buildings, and laboratories

- Installation of safety equipment, wash stations, and safety kits for personnel
- Installation of Sodium hypochlorite-based chlorination/disinfection system
- Allocation of space for emergency treatment of staff

Table 2-1 summarizes the proposed enhancements of filtration plants.

Table 2-1: Summary of Proposed Enhancement of Filtration Plants

No	Filtration Plant	Proposed Capacity (MGD)	Nature of Construction Works
1	PIPRI (JBIC)	50	◆ Civil structure rehabilitation ◆ Actuators, motors, switches, level probes and level switches replacement ◆ Electro-mechanical system up gradation using SCADA system. ◆ Electrification up gradation. ◆ Plant will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted.
2	NEK (KII)	100	◆ Revision of water treatment process as per new treatment techniques & technologies. ◆ Complete replacement of electro-mechanical system. ◆ Installation of SCADA system. ◆ Upgrade of electrical system for plant, admin building and laboratory. ◆ Plant will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted ◆ Allocation of space for emergency treatment of staff.
3	COD-I & II	90 + 90 = 180	◆ Revision of water treatment process as per new treatment techniques & technologies. ◆ Complete replacement of electro-mechanical system. ◆ Installation of SCADA system. ◆ Upgrade of electrical system for plant, admin building and laboratory. ◆ Plants will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted ◆ Allocation of space for emergency treatment of staff.
4	PIPRI (Old 1,2 + Dumlottee)	105	◆ Civil structure rehabilitation / construction ◆ Actuators, motors, switches, level probes and level switches replacement / installation ◆ Electro-mechanical system upgrade / installation using SCADA system. ◆ Electrification up gradation / installation. ◆ Plants will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted
5	Gharo	30	◆ Civil structure rehabilitation

No	Filtration Plant	Proposed Capacity (MGD)	Nature of Construction Works
			◆ Actuators, motors, switches, level probes and level switches replacement ◆ Electro-mechanical system up gradation using SCADA system. ◆ Electrification up gradation. ◆ Plant will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted
6	NEK (K-III)	100	◆ Civil structure construction ◆ Actuators, motors, switches, level probes and level switches installation ◆ Electro-mechanical system up installation using SCADA system. ◆ Electrical equipment / systems installation. ◆ Plants will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be installed
Source: Feasibility & Preliminary design report of technical consultant - G-03 Consultant-MMP			

2.3 Description of the Environment

2.3.1 Physical Environment

The project sites are in the jurisdictions of District East (COD FP), District Malir (Pipri Old, Dumlottee, Pipri JBIC, NEK (New) - K II FPs), Malir Cantonment (NEK – III FP) and District Thatta (Gharo FP).

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.

A series of tests and boreholes at the locations of different FPs are conducted to determine the geotechnical information, including the groundwater table.

Karachi is situated in a region where moderate earthquakes of magnitude 5.0 to 6.0 may occur, equivalent to an intensity between VII and VIII on the Modified Mercalli Scale (M).

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 PM2.5 air quality concentrations at all stations and PM10 at one location exceeded the standards. The noise level at three locations exceeded the limits. All water samples showed the presence of bacterial contamination.

The land use at Pipri FP, NEK K-II, and NEK-KIII sites is mostly barren land with residential areas. Trees, shrubs, and herbs surround Gharo FP with few settlements. Residential and commercial settlements surround COD FP.

2.3.2 Biological Environment

Field assessments were conducted in December 2021 at COD FP, February 2022 at NEK K-II and K-III FPs, and March 2022 at Pipri and Gharo FPs.

Per the IUCN Red List of Threatened Species, no endangered, threatened, or vulnerable plant species exist within the project sites. Approximately 263 trees will have to be cut for the execution of construction activities.

During the field visits, eight mammalian and five 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 ten small and large communities near the project area. These include KWSC Colonies at Pipri, NEK Old, Gharo, and NEK KII FPs, as well as other settlements, including Tatal Jokheyo Village, Haji Dadu Jokheyo Village, Muhammad Ismail Jokheyo Village, Madina Colony and Shanti Nagar. 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 and Safety (OHS) Plan, Community Health and Safety (CHS) Plan, and other specific plans; OHS and Emergency Preparedness and Response impacts; solid waste management - generation of excavated material, kitchen waste, and hazardous waste; and 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 Management; ECP 4: Drainage Management; ECP 5: Air Quality Management; ECP 6: Noise and Vibration Management; ECP 7: Protection of Flora; ECP 8: Protection of Fauna; ECP 9: Road Transport and Road Traffic Management; ECP 10: Construction Camp Management; and ECP 11: Worker 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. The sub-plans include the

- The Contractor will prepare a Material Transportation Plan to prevent accidents during transportation. The plan should address specific details on the site conditions, the exact route to be followed, and the conditions of the access roads. The Contractor must commit to repairing the road to its original condition if any local road is damaged due to the heavy loaded traffic of the project.
- A Pollution Prevention Plan will be prepared as part of SSESMP and implemented by the contractors based on the ECPs and WBG EHS Guidelines that will be part of the bidding documents. The plan will be submitted to the CSC for approval before contractor mobilization.

- The Contractor will prepare the Construction Camp Management Plan as part of SSESMP based on ECP 14. The plan will include the camp layout details of various facilities, including supplies, storage, and disposal. The plan will be submitted to the CSC for review and approval before camp establishment.
- The Contractor will prepare an Emergency Preparedness Plan after assessing potential risks and hazards that could be encountered during construction.
- Communication Plan to deal with the community's interaction, complaints management, workers recruitment, a notice of works, and workers' conduct with locals.

3.4 Occupational Health and Safety Plan

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.
- 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 Management 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			
Lack of appropriate E&S personnel with CSC and Contractors	◆ 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. ◆ Contractors with poor environmental, health, and safety management will not be hired. ◆ Contractor's qualifications will be included 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.	◆ Bidding and Contract Documents ◆ ESMP, SSESMP, OHS / CHS and Other Plans	◆ 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	◆ PIU / CSC / Contractors in collaboration with the Sindh Traffic Police will devise a Traffic Management Plan (TMP) to minimize the expected disruption at the identified access roads. ◆ PIU will approve the TMP before construction activities and no temporary or permanent works will be done without approved TMP. ◆ The TMP shall ensure the following: ◆ Provide a safe environment for all road users;	◆ Preparation and Implementation of Traffic Management Plan (TMP), ECP 09	◆ 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
	◆ Provide protection to 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 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 ◆ Implement ECP 9: Road Transport and Road Traffic Management		
ESS4: Community Health and Safety			
Improper Location of Worker Camps Leading to Environmental and Social Issues	◆ Worker camps will be developed at the identified campsite locations, and ancillary facilities will be provided, such as electricity, washrooms for labor with suitable effluent and sewage disposal facilities, and water for their everyday use for drinking and bathing, etc. ◆ Ensure that camps are away from local communities with strict protocols for interaction with local communities to avoid	Establishment of Campsites at proposed locations and implementation of Labor Management Plan (LMP)	◆ Preparation and Implementation of LMP: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	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 necessary measures shall include: ◆ 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 Sexual Exploitation, GBV / SH. ◆ 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. ◆ SEA/SH/GBV provision will be incorporated 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. ◆ Extensive training for awareness-raising strategy, which describes how workers and local communities will be sensitized to SEA and SH risks and the worker's responsibilities under the COC		

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	◆ The routes/places the women use will be avoided as far as possible. If unavoidable, alternate routes will be identified 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 any employment shall be ◆ Provide training on the Worker's GRM to know their rights and responsibilities. ◆ Availability of complaint boxes shall be ensured at all work sites, allowing workers to report any issues and wrongdoings.		
Construction Phase			
ESS1: Assessment and Management of Environmental and Social Risks and Impacts			
Inadequate Implementation of ESMP, OHS, CHS and Other Specific Plans.	◆ Recruit qualified and experienced Environment, Health, Safety, and Social Staff. ◆ Define Environmental, Social, Occupational, and Community Health and Safety procedures for all works in method statements. ◆ Prepare and implement Site-Specific Environmental Social Management Plan (SSESMP), OHS Plan, CHS Plan, and other required plans based on the ESMP guideline. ◆ PIU to review the Contractor's capacity to safeguard management. ◆ Contractors not possessing the required capacity for E&S safeguards management will not be pre-qualified.	ESMP, OHS, CHS and Other Specific Plans.	◆ Contractor's selection: PIU and CSC ◆ Preparation / Implementation of plans: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
ESS2: Labor and Working Conditions			

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
Occupational Health & Safety/ Emergency Preparedness and Response	◆ Prepare the Occupational Health and Safety (OHS) Plan before the commencement of construction activities. ◆ Established occupational health and safety protocols on COVID-19, i.e., Health & Safety of Building and Construction Workers - Issued by Ministry of National Health Services, Regulations, and Coordination, GoP - April 2020 shall be followed. ◆ Prepare an Emergency Preparedness and Response Plan (EPRP) as part of the OHS Plan to contain larger emergencies. ◆ PIU shall work with the national/provincial emergency response services to ensure any external emergency response arrangements (Fire, Ambulance, Epidemic Control, etc.) if the resources available with the Contractor are insufficient to contain any such emergencies. ◆ A readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided at every workplace. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. ◆ Proper equipment and paramedical staff will be provided. ◆ Maintain site safety and install hard barricading, flexible green net, signboards, and temporary safety and traffic diversions throughout the construction period and provide personal protective equipment (PPE) to all the workers working at the construction sites. ◆ Zero tolerance to loss of life policy will be developed and implemented.	Implementation of OHS Plan, EPRP, ECP 11	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV ◆ Coordination with National / Provincial Emergency Response Services: PIU

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	◆ Ensure organization of Health and Safety training for all site personnel throughout construction. In case any workers get affected by an accident in the form of injury or fatality, they or their legal heirs shall be compensated by following the Sindh Workers Compensation Act, 2015. ◆ If an accident in the form of injury or fatality affects any workers, they or their legal heirs will be compensated by following the Sindh Workers Compensation Act, 2015. ◆ Implement ECP 11: Workers Health and Safety Guidelines.		
Communicable Diseases - COVID-19 and Camp Management	◆ Implement health and safety protocols on COVID-19 (i.e., Health and Safety of Building and Construction Workers - Issued by Ministry of National Health Services, Regulations and Coordination, GoP - April 2020). ◆ Provide awareness to workers on proper sanitation and hygiene practices. ◆ Maintain good housekeeping practices at camp and project sites. ◆ Provide adequate personal hygiene facilities in good condition with an adequate supply of clean water. ◆ Arrange treatment of the affected workers on time to control the movement of vector diseases. ◆ Implement Camp Management Plan and Labor Management Procedures (LMP). ◆ Implement ECP 10: Construction Camp Management. ◆ Appoint cleaning staff to maintain cleanliness at campsites.	Implementation of COVID-19 Guidelines - Health and Safety of Building and Construction Workers, Workers Code of Conduct (CoC), CMP, LMP, ECP 10	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Working Conditions	◆ Adhere to labor standards, including the Provincial Labor Laws and International Labor Organization (ILO) Standards. It	Implementation of Provincial Labor Laws and ILO Standards for work	◆ Implementation: Contractor ◆ Supervision: CSC

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	includes compliance with regulations related to work hours, workers' payments, and compensations. ◆ Provide training to workers on the Grievance Redress Mechanism (GRM) ◆ Provide complaint boxes to allow workers to report misconduct, violations, or grievances. ◆ Ensure strict compliance with the Labor Management Procedures (LMP) to manage and address labor-related issues effectively.	hours, workers payments & compensations	◆ Monitoring: PIU and TPV
Employment of Child Labor	◆ Implement Sindh Prohibition of Employment of Children Act, 2017 and WB ESS2; ◆ Avoid hiring workers below 18 years of age at any construction site. ◆ Ensure that all persons at the site are adults and have government-issued identity cards.	Implementation of Sindh Prohibition of Employment of Children Act, 2017 and WB ESS2	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
ESS3: Resource Efficiency and Pollution Prevention and Management			
Dust Emissions	◆ Remove excavated material to avoid accumulation on roadsides. ◆ Water sprinkling to restrict dust due to the movement of construction vehicles. ◆ Limit speeds of construction vehicles in the project area. ◆ Regular training of the drivers to ensure implementation of speed limits. ◆ Implement Project's Grievance Redress Mechanism to resolve public complaints related to dust generation as a result of construction traffic movement.	ESMP, ECP 1, ECP 2, ECP 5, ECP 9	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	◆ Ensure that heavy equipment and machinery will be maintained and complied with the national and local regulations. ◆ Ensure that stockpiled soil and sand will be slightly wetted before loading, particularly in windy conditions. ◆ Employ fuel-efficient and well-maintained dumper trucks to minimize exhaust emissions. ◆ Vehicles transporting soil, sand and other construction materials will be covered with tarpaulin. ◆ Speed limitation of vehicles. Avoid transport through densely populated area. ◆ Keep low speed at the project sites and access roads. ◆ Minimized dust generation through good construction practices (such as keeping stockpiles down wind and away from communities), covering loose material with tarpaulin and water sprinkling over the access road. ◆ Implement ECP 1: Waste Management, ECP 2: Fuels and Hazardous Goods Management, ECP 5: Air Quality Management and ECP 9: Road Transport and Road Traffic Management		
High Noise Levels from Construction Activities	◆ Install signboards to educate the project workers and drivers about speed control and minimize the use of horns. ◆ Restrict heavy equipment operation to daylight hours, and noisy work will be avoided/minimized during the nighttime. ◆ Construction equipment that generates excessive noise will be enclosed or fitted with an effective silencing apparatus to minimize noise. ◆ Implement the Project's Grievance Redress Mechanism to resolve public complaints related to noise.	ESMP, ECP 6	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	◆ Minimize noise from vehicles and power generators by use of silencers and mufflers. ◆ Prohibit the blowing of horns by construction machinery and vehicles ◆ Enclose construction equipment that generates excessive noise, with effective silencing apparatus to minimize noise. ◆ Well-maintained haulage trucks will be used with speed controls. ◆ Maintain all the equipment and machinery used during the construction phase. Ensure compliance with SEQS. ◆ Implement ECP 6: Noise and Vibration Management		
Generation of Excavated Material, Kitchen Waste, Hazardous Waste	◆ Develop a Waste Management Plan (WMP) before construction. ◆ Ensure waste sorting and safe storage for hazardous and non-hazardous materials before disposal. ◆ Provide onsite hazardous waste storage facility with secondary containment. ◆ Appoint licensed and SEPA-approved Contractors to dispose of waste materials. ◆ Fuel storage areas, hazardous material storage areas, and generators will have secondary containment in concrete or brick masonry bunds. The containment area's volume will equal 120% of the total volume of fuel stored. ◆ Ensure timely disposal of domestic waste from the camps to the nearest SSWMB disposal bins. ◆ Implement ECP 1: Waste Management and ECP 2: Fuels and Hazardous Goods Management	Implementation of WMP, ECP 1, ECP 2	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
Untreated Disposal of Effluent from Worker Camps	◆ Ensure no untreated effluent is released. ◆ Construct a closed sewage treatment scheme, including soak pits and septic tanks, to treat the effluent from the construction/labor camp. ◆ Build soak pits in absorbent soil and locate them at least 300 meters from nearby water wells, bores, or hand pumps. ◆ Keep the soak pits covered at all times and take measures to prevent the entry of rainwater into them. ◆ When the septic tank is filled with sludge, empty it using a vacuum truck. Obtain approval from KWSC and transfer the removed effluent to the approved municipal drain. ◆ Implement ECP 1: Waste Management, ECP 3: Water Resources Management, and ECP 10: Construction Camp Management	Implementation of WMP, ECP 1, ECP 3, ECP 10	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
Soil Contamination	◆ 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. ◆ Ensure 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. ◆ If on-site maintenance is unavoidable, tarpaulin or other impermeable material will be laid on the ground to contain dripping oils and prevent soil contamination. ◆ Regular inspections will be conducted to detect leakages in construction vehicles and equipment, and all cars will be washed in external commercial facilities. ◆ Fuels, lubricants, and chemicals shall be stored in covered bounded areas under waterproof lining. Static Power	Implementation of Spill Prevention Plan, ECP 2	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	Generators shall also be placed on impervious floors bunded with parapet walls. ◆ Appropriate arrangements and the presence of shovels, plastic bags, and absorbent materials shall be ensured near fuel, oil storage, and vehicles/equipment parking areas. ◆ Implement ECP 2: Fuels and Hazardous Goods Management		
Improper Site Restoration	◆ Dismantle and fully remove worksite facilities and camps, including worker rest areas, storerooms, drinking water utilities, and temporary materials stockpiling enclosures. ◆ Remove drinking water facilities, including pipes and storage tanks, as well as sanitary facilities, such as the sewage network and toilets. ◆ Remove electric facilities, including electrical posts and wiring. This task should be carried out by specialized personnel. ◆ Once all movable elements have been removed, ® Remove fencing, anchoring, and other minor facilities, along with any leftover concrete from mixing. ◆ Clean the ground by removing all affected topsoil and handing it over to authorized waste handlers. ◆ Add topsoil where necessary to restore the site. ◆ Implement ECP 2: Fuels and Hazardous Goods Management.	Implementation of Spill Prevention Plan, ECP 2	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV ◆ Identification of Compensatory Plantation Sites: PIU
ESS4: Community Health and Safety			
Community Health and Safety	◆ Prepare a Community Health and Safety (CHS) Plan based on construction methods and specific hazards. ◆ Plan, provide, and maintain suitable perimeters and barriers to separate the public and others from the work. ◆ Ensure the setting up of its machinery on the roads for construction works so that it will not hinder public traffic to the	Implementation of CHS Plan	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	maximum possible extent and will not compromise public safety. ◆ Ensure that all vehicle drivers and equipment operators have valid licenses and proven competency to operate vehicles and equipment in populated areas safely. ◆ All heavy vehicles and moving equipment will be provided with trained bankmen / marshallers to supervise safe movement in public areas. ◆ Vehicular speeds will be kept at a minimum during movement in populated areas. ◆ All equipment will be immobilized out of hours with keys removed and parked at designated areas. ◆ The following measures shall be adopted to minimize 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 at access roads and project sites for dust suppression; ◆ Transport material to and from the construction sites when the public is less likely to be at the access roads.		
Labor Influx / In-migration / SEA – SH – GBV Incidents	◆ Employ more locals in skilled, semi-skilled, and unskilled work to reduce pressure on resources and avoid conflicts on employment matters. ◆ Take proactive measures to manage potential impacts from labor influx and cultural conflicts, including establishing	Workers COC, CHS Plan	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	construction camps at designated areas and training workers on respectful interaction with local communities. ◆ Develop a Code of Conduct (COC) for all site personnel and ensure that all personnel sign and abide by it. ◆ Provide training to project staff on preventing Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH) and conduct on-site anti-harassment training to raise awareness. ◆ Instruct construction crews to avoid entering settlements and engage skilled trainers to raise awareness among workers about the risks and consequences of violations. ◆ Raise awareness of risks among community members and local health authorities and inform them about available grievance mechanisms. ◆ Provide training to workers and local communities to sensitize them to SEA and SH risks and their responsibilities under the COC. ◆ Avoid routes/places women use as much as possible and identify alternate routes if necessary. ◆ Enforce the COC to protect local communities, including addressing gender-based violence, social issues, and environmental concerns such as tree cutting and hunting. Violations will result in strict punishment, including termination of employment. ◆ Terminate employees who continue misconduct or lack of care, perform duties unprofessionally or negligently, fail to conform to contract provisions, or engage in conduct harmful to the community, safety, health, or the environment.		

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	◆ Prohibit the use of drugs and alcohol and the carrying of weapons into the workplace premises. ◆ Ensure site security arrangements align with Security Management Guidelines for Contractors under WB ESS4 guidance. ◆ Provide appropriate fencing, security checkpoints, gates, and security guards at construction sites to monitor the entry and exit of workers, staff, and visitors. ◆ Maintain good relations with local communities and their leaders to reduce the risk of vandalism and theft.		
ESS6: Biodiversity, Conservation, and Sustainable Management of Living Natural Resources			
Vegetation Loss and Disturbance to Fauna	◆ Prepare a project-specific Compensatory Tree Plantation Plan based on the Tree Management Plan. ◆ Inventory the trees that must be cut before construction based on the finalized work plan and requirements. ◆ Identify suitable space for tree plantation in consultation with the Local Government Department, Forest Department, Municipal Corporations, Cantonment Boards, etc., before clearance of trees. ◆ Ensure appropriate arrangements are in place for maintaining the trees planted under compensatory plantation for at least five years. Maintain the trees during the contract period and defect liability period. In contrast, the trees will be handed over to the relevant departments that own the land for compensatory plantation sites. ◆ Replacement of ten trees for every tree that is cut ◆ For trees not proposed to be cut, all precautions shall be taken to protect them from any damage from construction activities.	Implementation of Compensatory Tree Plantation Plan, ECP 7, ECP 8	◆ 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
	◆ While clearing vegetation and excavation, it shall be ensured that no wildlife gets 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 the protection of flora and fauna and relevant government regulations.		
ESS8: Cultural Heritage			
Impact to Cultural Heritage Sites	◆ Train the workers on chance find procedures and in case of a chance finds. ◆ 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 findings are suspected, and ◆ Request an authorized person from the Archaeology Department to observe when excavation resumes, identify the potential chance to find, and comply with further instructions.	Chance Find Procedure	◆ Implementation: Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV
ESS10: Stakeholder Engagement and Information Disclosure			
Stakeholders Concerns and Engagement	◆ Ensure public consultations and participation of stakeholders throughout the project lifecycle. ◆ Ensure that concerns about the project's impacts are addressed promptly. ◆ Stakeholder engagement is to be carried out meaningfully and inclusively, providing access to remedy.	Preparation and Implementation of Project Specific Stakeholder Engagement Plan (SEP)	◆ Preparation of Plan: CSC and Contractor ◆ Implementation: PIU, CSC and Contractor ◆ Supervision: CSC ◆ Monitoring: PIU and TPV

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
Operation Phase			
ESS2: Labor and Working Conditions			
Handling of Sodium Hypochlorite / Sulphuric Acid / Other Hazardous Chemicals	◆ 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 safely handling sodium hypochlorite, sulphuric acid, and alum. ◆ Wear all appropriate PPEs while dealing with sodium hypochlorite, sulfuric acid, alum, or other chemicals, and avoid more prolonged exposure to any of these chemicals. ◆ Restrict the generation of vapors or mists and workers' exposure to the misting vapors. ◆ Unlined mild steel cylindrical tanks for acid storage ◆ Provide automatic controls for the dosing pumps. Provide a globe control valve with an electromagnetic flowmeter with an indication to adjust the diluent water flow. Provide each pump with a removable perspex safety guard, eyewash, and safety shower. Install warning signs and safety railings and ensure the issuance of PPE to workers. Reduce humidity in the acid storage area using hollow blocks and grated doors. Bounded wall with compacted hardcore filler for the acid storage tanks	OHS Plan	◆ Preparation of OHS Plan: KWSC FPs Management ◆ Implementation: KWSC FPs Management

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
	◆ Ensure that the sulphuric acid storage is in an area that is cool, dry, out of direct sunlight, and away from heat and ignition sources, separate from incompatible materials. Avoid indoor bulk storage of sulphuric acid. ◆ Perform regular inspections to check any physical changes or signs of crystallization, damage, or leaks. ◆ Perform periodic medical check-ups for workers with dosing and handling hazardous/non-hazardous chemicals. ◆ Provide appropriate PPEs such as rubber gloves, protective clothing, safety footwear, headgear, goggles, face shields, and respirators to the workers engaged with chemical dosing and handling. ◆ Provide CO2, dry chemical, water, and foam-type fire extinguishers; ◆ Provide training for all staff to deal with accidental fires. ◆ In case of sodium hypochlorite spills or leaks: ◆ Remove all potential ignition sources from the area and ensure proper ventilation arrangements. ◆ Neutralize spilled or leaked chemicals with sodium bi-sulfite, covered with soda ash, and placed into covered containers for disposal. ◆ Consider the contained sodium hypochlorite as hazardous waste and hand it over to a 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		

Impacts and Risks	Details of mitigation / enhancement measures	Relevant Guidelines / Plans	Responsibility
Generation of Sludge / Domestic Waste and Disposal	◆ No sludge is used in agricultural activities as the sludge may contain some chemical content. Utilize sludge only in horticultural activities. Potential users of this treated sludge shall be both from the private and government sectors. ◆ Prepare and implement a sludge management plan for effective removal, storage, transportation, and recycling of sludge. ◆ Include recycling of sludge in the contract. ◆ Finalize the modalities and procedures for designing and operating a sludge recycling facility. Carry out sludge quality testing before its utilization as fertilizer and test it periodically during the operational phase of the project to ensure that the sludge generated at FPs is fit for recycling. ◆ Remove the dried sludge from sludge drying beds (SDBs) periodically and temporarily store it in hook-lift skips equipped with lids. Transport filled skips through trucks for recycling purposes. ◆ Perform the operations of sludge transfer to the recycling facility at night after 9:00 p.m. to avoid traffic congestion and minimize interactions with the public. ◆ Use registered vehicles to transport dried sludge, and drivers with proper licenses shall drive those.	Standard Operating Procedures (SOPs) for Sludge Disposal / Sludge Management Plan	◆ Implementation: KWSC FPs Management

4 Monitoring Parameters and Monitoring Plan

Environmental and Social monitoring provides timely and useful information to the project management and implementation agencies. Conceptually, “monitoring” means to check and balance, regularly, the status of the project activities and realization of various developmental targets during construction and O&M. It helps in the timely identification/analysis and removal of the bottlenecks and expedites actions. Certain environmental parameters (physical, ecological, and social) are selected, and quantitative analysis is carried out. The analysis results are compared with the guidelines, standards, and pre-project conditions to investigate whether the ESMP and its implementation are effective for the mitigation of impacts or not. The objectives of the environmental and social monitoring plan during the construction and O&M phases:

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

PIU of KWSSIP will be responsible for all the monitoring activities (compliance monitoring and effect monitoring). All the findings and results in a monitoring report will be finally shared with respective SEPA and WB as per the reporting mechanism.

4.1 Compliance Monitoring

The compliance monitoring of the proposed project activities ensures that the identified environmental and social control measures are strictly adhered to during the project execution. The E&S Staff of SC will conduct the compliance monitoring. Various aspects of the ESMP compliance monitoring

- Systematically observe the activities undertaken by the contractor or any other persons associated with the proposed project;
- Verify that the activities are undertaken in compliance with the ESMP;
- Document and communicate the observations to the ESC of PIU so that any corrective measures, if required, can be taken promptly;
- Maintain a record of all incidents of environmental and social significance and related actions and corrective measures;

- Maintain contact with the communities, solicit their views and concerns, and discuss them during the monthly meetings; and
- Prepare periodic reports on the environmental and social performance of the proposed project.

4.2 Effect Monitoring Strategy

The ESMP anticipates the impacts of the proposed project based on information available at the time of the assessment and the natural processes that link various environmental and social parameters. Based on assessment, mitigation measures are introduced such that the predicted residual effects do not exceed acceptable levels. Consequently, it is possible that even if the mitigation measures are implemented fully, the project's negative impacts could exceed predicted levels or acceptable limits. Effects monitoring will be undertaken during the project activities to address the above concerns and properly manage environmental and social risks and uncertainties. Broadly, effects monitoring has the following objectives:

- To verify that the impacts of the proposed project are within acceptable limits, thus establishing credibility (public assurance);
- To immediately warn the PIU of unanticipated adverse impact or sudden changes in impact trends so that corrective actions can be undertaken, which may include modifications in the proposed activities or the inclusion of modified or additional mitigation measures;
- To provide information to plan and control the timing, location, and level of certain project activities so that the effects are minimized; and
- To facilitate research and development by documenting the proposed project's effects that can be used to validate impact-prediction techniques and provide a basis for more accurate predictions of future projects.

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	◆ Nitrogen Oxide (NO) - 40 µg/ m^3 ◆ Sulphur Dioxide (SO_2) - 40 µg/ m^3 ◆ Carbon Monoxide (CO) - 4 mg/m^3 for 8 hrs ◆ Suspended Particulate Matter (SPM) - 500 µg/m^3 ◆ Particulate Matter (PM2.5) - 15 µg/m^3 ◆ Particulate Matter (PM10) - 45 µg/m^3 ◆ Ozone (O_3) - 130 µg/m^3 ◆ Lead (Pb) - 1.5 µg/m^3	Baseline Monitoring Locations	Once	Contractor, CSC
Noise Level	◆ 24hr – Noise Levels ◆ Day Time: 55 dB(A) ◆ Night Time: 45 dB(A)	Baseline Monitoring Locations	Once	Contractor, CSC
Construction Phase				
ESS2: Labor and Working Conditions				
Occupational Health and Safety	◆ 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

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
COVID-19	◆ Number of cases in the 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	Contractor, CSC
Worker Grievances	◆ 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	◆ Nitrogen Oxide (NO) - 40 µg/ m^3 ◆ Sulphur Dioxide (SO2) - 40 µg/ m^3 ◆ Carbon Monoxide (CO) - 4 mg/m^3 for 8 hrs ◆ Suspended Particulate Matter (SPM) - 500 µg/m^3 ◆ Particulate Matter ($PM_{2.5}$) - 15 µg/m^3 ◆ Particulate Matter (PM_{10}) - 45 µg/m^3 ◆ Ozone (O_3) - 130 µg/m^3 ◆ Lead (Pb) - 1.5 µg/m^3	5 Locations: Project Sites for FPs	Monthly	Contractor, CSC
Noise Level	24hr – Noise Levels ◆ Day Time: 55 dB(A) ◆ Night Time: 45 dB(A)	5 Locations: Project Sites for FPs	Monthly	Contractor, CSC
Water Quality	◆ Sindh Environmental Quality Standards (SEQS) Drinking Water Quality Parameters	5 Locations: Workers Camps at Project Sites for FPs	Monthly	Contractor, CSC

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
Waste Management	◆ Inspection of solid waste generation, collection, storage, recycling, and disposal ◆ Recording volumes of excavation and spoil generated, reused, sold, and stockpiled by location ◆ Recording waste volumes by type (kitchen and domestic, medical, batteries, electrical equipment, tires, rags, paper, scrap metal wastes, etc.) generated at various construction sites ◆ Recording the final disposal of each waste stream ◆ Calculating the rate of waste reuse/recycling ◆ Recording storage, transport, and disposal costs	All Project Sites, Worker Camps, focusing on areas where waste is stored / located	Fortnightly	Contractor, CSC
Soil Contamination	◆ Visual Inspection ◆ Recording of oil, fuel, and chemical spill incidents	All work areas, machinery parking areas, generator installation sites and workshops	Weekly	Contractor, CSC
Effluent Disposal	◆ Visual inspection for checking any bypasses or leakages in effluent disposal arrangements at camp and office sites	All Worker Camps/ Office Sites	Weekly	Contractor, CSC
ESS4: Community Health and Safety				

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
Community Health and Safety/Construction Traffic Management	◆ Status of posting safety awareness signage ◆ Status of traffic safety at access roads ◆ Road safety incidents records ◆ Number of related grievances	All Project Area Access Roads	Weekly	Contractor, CSC
SEA/SH incidents	◆ Status of workers interaction with public, nearby communities. ◆ Investigation of any SEA/SH incidents reported / communicated by workers or registered by communities in GRM ◆ Number of related grievances	All Project Sites and Worker Camps	Weekly	Contractor, CSC
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources				
Tree Cutting	◆ Existing vs Planned Tree Cutting ◆ NOC from Engineer / PIU for tree cutting ◆ No. of trees planted under Compensatory Plantation Scheme ◆ Growth / Maintenance / Care of trees planted ◆ Survival rate of compensatory trees	All Project Sites and Compensatory Plantation Sites	Fortnightly	Contractor, CSC, PIU with guidance from Sindh Forest Department
ESS10: Stakeholder Engagement and Information Disclosure				
Stakeholder Engagement	◆ Number and types of engagements ◆ Topics raised during engagement ◆ Number and types of community grievances ◆ Closure duration of grievances	Stakeholders Identified in Project's SEP	Monthly	Contractor, CSC, PIU

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
	◆ Claimant satisfaction of process and results grievance mechanism			
Public Grievances	◆ Numbers of grievances ◆ Types of grievances ◆ Number of grievances related to dust, noise, traffic, restricted access, any abuses related to project workers. ◆ Appropriate redress measures and actions to prevent recurrence ◆ Grievances closed out within timeframes	Affected Communities	Monthly	Contractor, CSC, PIU
Operation Phase				
ESS2: Labor and Working Conditions				
Occupational Health and Safety (OHS) Plan at FPs	◆ Implementation status of the OHS Plan ◆ Availability of fire extinguishers ◆ Provision and utilization of PPEs by workers ◆ Posting of Safety Data Sheet (SDS) for sodium hypochlorite, sulphuric acid, alum, etc. ◆ Chemical handling and storage	All FP Sites	Daily	KWSC FPs Management
ESS3: Resource Efficiency and Pollution Prevention				
Sludge Management	◆ Ensure sludge generated during operation of FPs is safely transferred for recycling.	All FP Sites	Daily	KWSC FPs Management

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
	◆ Laboratory analysis of sludge to check its quality ◆ Inspection of sludge drying beds / sludge skips ◆ Ensure no excess sludge piled up in SDBs and plant's premises ◆ Record volumes of sludge generated and sent for recycling ◆ Maintaining sludge inventory			
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources				
Compensatory Tree Plantation	◆ Tree Survival Rate ◆ Growth and Height ◆ Maintenance and Care	Compensatory Plantation Sites	Monthly	KWSC FPs Management

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.

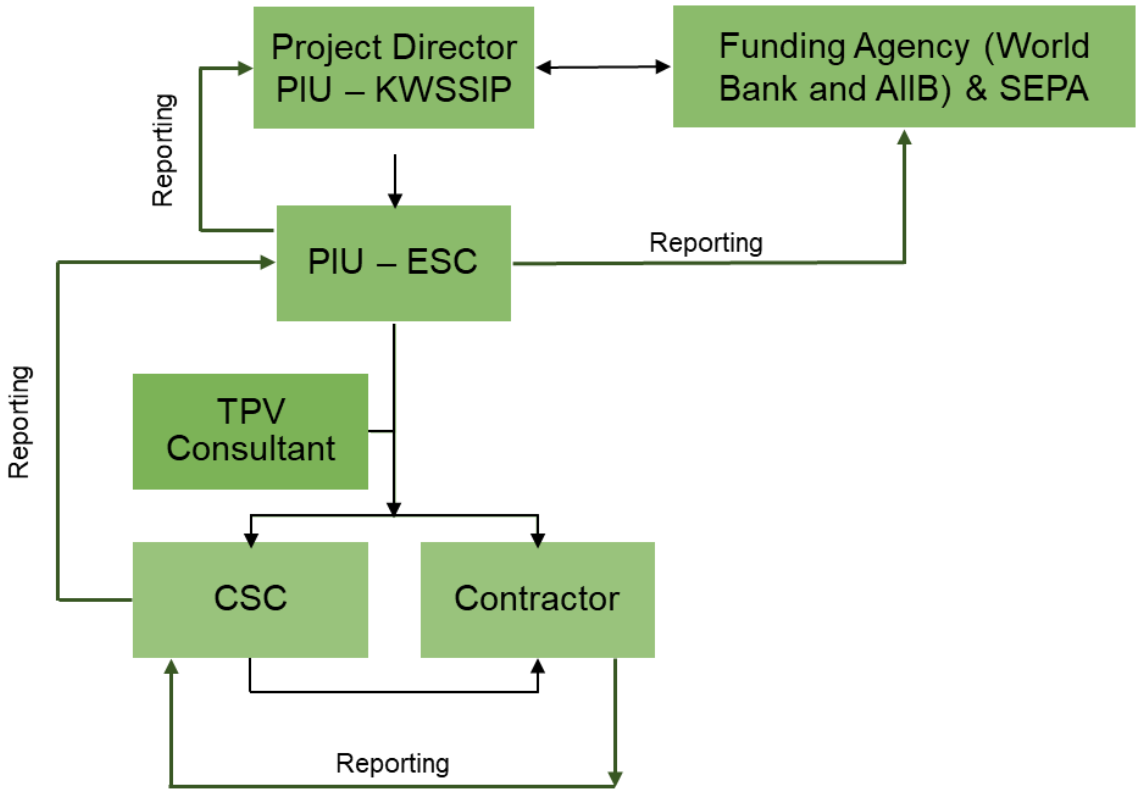


Figure 5-1: Organizational Setup for Implementation of ESMP during Construction Phase

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) Sindh Environmental Protection Agency (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) Project Implementation Unit (PIU)

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 specialist, and one gender specialist at the project preparation stage. However, one OHS specialist, one social development specialist, one junior gender specialist, and four E&S officers will be added to the 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 (TPV) Consultant

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:

- EHS Team Leader (one specialist – M.Sc. in Environmental Engineering with more than 20 years of professional experience in Environment, Health, Safety, and Social Management, worked on at least two implementation projects as CSC)
- Environmental Specialist (one specialist – M.Sc. in Environmental Engineering with ten years of professional experience, worked on at least one implementation project as CSC)
- OHS Specialist (one specialist – M.Sc. in Environmental Engineering with OHS Certification, ten years of professional experience, worked on at least one implementation project as OHS - CSC)
- Ecologist (one specialist – 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, working on at least one implementation project as CSC)
- EHS Officers (five officers – B.Sc. in Environmental Engineering with IOSH / NEBOSH and 03 years of professional experience, worked on at least one implementation project as CSC)
- Social Safeguard Specialist (one specialist – M.Phil. in Sociology with ten years of professional experience, worked on at least one implementation project as CSC)
- Gender Specialist (one specialist – M.Phil. in Sociology, Gender Study or equivalent with ten years of professional experience, worked on at least one implementation project as 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) 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.
- Social Safeguard Specialist (1 position) – M.Sc. in Sociology with 5 years of professional experience in project implementation.
- HSE Officer (2 positions) – 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 (3 positions) – Valid work experience at project implementation site.

5.2 Institutional Arrangement for ESMP Implementation during O&M Phase

The Karachi Water & Sewerage Board (KWSC) will administrate the proposed project during the operation and maintenance (O&M) phase. In the organizational hierarchy of KWSC, the Deputy Managing Director of Technical Services (DMDTS) will be responsible for the overall O&M of the water supply. 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 Plant Managers deployed by KWSC at Filtration Plants. The monitoring and compliance of operational phase ESMP will be under the responsibilities of Plant Managers. These personnel will report to the DMDTS for the compliance and monitoring of ESMP. The staff will be responsible for the following:

- Coordinating to monitor E&S compliance during operation;
- Monitoring and managing compensatory tree plantations at places to be identified by the PIU at the execution stage;

- Reporting on the O&M progress of E&S compliance to the SEPA (if required); and;
- Assessing as well as mitigating potential E&S impacts of the proposed project operation;
- Sustaining a working partnership among Sindh's SEPA, Forest, and Wildlife departments, NGOs, and other public-private sector organizations.

5.3 ESMP Training

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.

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	Contractor	CSC and PIU KWSSIP-2	Presentation	Risk, prevention, and available treatment	Semiannual

No.	Training Activity	Participants	Trainer	Mode of Training	Content	Schedule
	other vector borne diseases					
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 satisfactory compliance	Semiannual
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

A comprehensive training manual will be developed and implemented by the Contractor with prior consent of CSC environmental staff.

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 62.588 Million**.

Table 5-2: Indicative ESMP Implementation Cost

S. No	Description	No	Samples	Frequency/ Months	Rate/unit	Amount
A- Pre-Construction Phase						
1	Air Monitoring (Ambient Air)-24 Hrs as per SEPA standards	1	3	One time	50,000	150,000
2	Vehicles, Generators and	1	3	One time	50,000	150,000

S. No	Description	No	Samples	Frequency/ Months	Rate/unit	Amount
	other emitting sources of fumes					
3	Noise Quality (24 hours specified in SEQS) – Pre-Construction Phase	1	3	One time	10,000	10,000
4	Waste Water samples collection and Laboratory analysis (SEQS parameters) - Construction Phase	1	3	One time	50,000	150,000
					TOTAL-A	**460,000**
B- Construction Phase (Implementation Phase)						
5	Environmental Engineer	1		24	200,000	4,800,000
6	Social Safeguard Specialist	1		24	200,000	4,800,000
7	HSE Officer	2		24	150,000	7,200,000
8	Gender/GRM Officer	1		24	150,000	3,600,000
9	Flag man	3		24	60,000	4,320,000
10	Air Monitoring (Ambient Air)-24 Hrs as per SEPA standards	6	3	Quarterly	50,000	900,000
11	Vehicles, Generators and other emitting sources of fumes	6	3	Quarterly	50,000	900,000
12	Noise Quality (24 hours specified in SEQS) – Purchase of Decibel meter	1		Once	10,000	10,000
13	Waste Water samples collection and Laboratory analysis (SEQS parameters) - Construction Phase	6	3	Quarterly	50,000	900,000
14	Fixed cost at project sites (PPEs, In-house, fire safety equipment, septic tanks, installation of noise / safety barriers)	24		Monthly	700,000	16,800,000

S. No	Description	No	Samples	Frequency/ Months	Rate/unit	Amount
	Provision of First Aid Facility including medicine	24		Monthly	200,000	4,800,000
15	Capacity Development Trainings: ESHS Management, Occupational & Community Health and Safety, Disease Prevention, Maintaining Community Values – Pre - Construction Phases	24		Monthly	50,000	1,200,000
16	Tree Plantation (providing and Installation)	2500			2,500	6,250,000
					Total – B	**56,480,000**
					Total Amount (A – B)	**56,940,000**
					Escalation and Contigencies on – B **10%**	**5,648,000**
					Grand Total	**62,588,000**

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 ◆ People potentially affected by project activities ◆ People residing in project area Vulnerable and disadvantaged households	◆ Grievance Mechanism/H&S Impacts, ESMP, ◆ CHS, Community Concerns, Employment Opportunities/Project Status	◆ Public meetings, open houses, trainings/workshops ◆ Separate meetings as needed for women and vulnerable/disadvantaged ◆ Individual outreach to PAPs as needed ◆ Distribution of written information: brochures, posters, flyers, website information boards in Project area ◆ Notice board(s) at construction sites ◆ Grievance mechanism ◆ KWSSIP monthly newsletter	◆ Quarterly meetings during construction/communication through mass and social media as needed ◆ Notice boards updated weekly ◆ Routine interactions ◆ Brochures in local offices	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Other Interested Parties (External) ◆ Governmental committees for land use and compensation ◆ Project area residents and representatives in communities	◆ Project scope, rationale and E&S ◆ Principles/grievance mechanism ◆ Project status ◆ WB compensation requirements	◆ Face-to-face meetings ◆ Joint public/community meetings with PAPs	◆ As needed (monthly during construction phase)	(PIU KWSSIP / CSC) Social Development and Environment Specialists

Target Stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
Other Interested Parties (External) ◆ Press and media NGOs ◆ Businesses and business organizations ◆ Workers' organizations ◆ Academic institutions ◆ General public, ◆ Jobseekers	◆ Project information – scope and rationale and E&S principles ◆ Project status H&S impacts ◆ Employment opportunities ◆ Environmental concerns ◆ Grievance mechanism process	◆ Public meetings, open houses, trainings/workshops ◆ Distribution of written information: brochures, posters, flyers, website, Information boards in Project area ◆ Notice board(s) at construction sites ◆ Grievance mechanism	Same as for PAPs	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Other Interested Parties (Internal) ◆ Other KWSSB staff, CSC, Contractor, sub-contractors, service providers, suppliers and their workers	◆ Project information: scope and rationale and E&S principles ◆ Training on ESMP requirements and other sub-management plans ◆ Worker grievance mechanism	◆ Face-to-face meetings ◆ Trainings/workshops ◆ Invitations to public/community meetings	Daily, as needed	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Operation and Maintenance				
PAPs ◆ People residing in project area ◆ Vulnerable/disadvantaged households	◆ Satisfaction with engagement activities and GRM ◆ Grievance mechanism process ◆ Damage claim process	◆ Outreach to individual PAPs ◆ KWSSIP website ◆ Grievance mechanism ◆ KWSSIP monthly newsletter	◆ Outreach as needed meetings in affected Project area ◆ Communities (as needed/requested) monthly newsletter	KWSC Management
Other Interested Parties (External)	◆ Grievance mechanism process	◆ Grievance mechanism ◆ KWSSIP website	◆ As needed	KWSC Management

Target Stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
◆ Press and media ◆ NGOs ◆ Businesses and business organizations ◆ Workers' organizations ◆ Academic institutions ◆ Local Government ◆ Departments in Project area ◆ General public	◆ Issues of concern ◆ Status and compliance report	◆ Face-to-face meetings ◆ Submission of reports as required		

List of Annexes

Annexure 1: Project Background

At present, a total of approximately 650 MGD water is being supplied to the city. Out of the total supplied water, approximately 210 MGD bypasses the filtration system and supplied raw as the existing KWSC's Filtration Plants (FPs) are under capacity and most of them have already surpassed their design life. These are ten existing filtration plants located at six distinct locations in and around Karachi. These include:

- COD Filtration Plant - 02 units of 70 + 45 MGD established in 1962 &1971 and located in Gulshan e Iqbal Town, District Karachi East.
- Pipri Old Filtration Plant - 02 units of 25 + 25 MGD established in 1971 & 1978 and located in Pipri FP Complex, Bin Qasim Town, District Malir
- Pipri JBIC Filtration Plant – 50 MGD unit established in 2006 and located in Pipri FP Complex, Bin Qasim Town, District Malir.
- NEK Old Filtration Plant - 25 MGD unit established in 1978 and located in Gadap Town, District Malir.
- NEK (New) K-II Filtration Plant - 100 MGD unit established in 2006 and located in the jurisdiction of Malir Cantonment.
- Gharo Filtration Plant - 02 units of 10 + 17 MGD established in 1943 &1954 and located in District Thatta.
- Hub Filtration Plant - 80 MGD unit established in 2006 and located in Gadap Town, District Malir.

Of these plants, Pipri (JBIC) - 50 MGD and NEK (New) K-II - 100 MGD will be rehabilitated; Gharo - 30 MGD, Pipri Old - 90 MGD, COD - 180 MGD will receive major re-building, whereas two new plants i.e. NEK K-III - 100 MGD and Dumlottee – 15 MGD will be newly constructed under the proposed project. Hub Filtration Plant is in relatively better state and operating conditions, therefore it has not been considered for the proposed rehabilitation works. The proposed works will upgrade the KWSC's filtration profile in a way that all the raw water being received by the system will effectively be treated before being supplied to the end users.

Proposed Rehabilitation, Re-building and Construction of new plants will be undertaken within the boundaries of five existing filtration plant sites, that includes.

- Pipri JBIC (Rehabilitation), Pipri Old (Re-construction) and Dumlottee (New Construction) FPs inside the boundaries of Pipri FP Complex located in Bin Qasim Town, District Malir.
- NEK – KIII (New Construction) inside the boundaries of NEK Old FP located in Gadap Town, District Malir.
- NEK (New) – KII (Rehabilitation) inside its existing boundaries and located in the jurisdiction of Malir Cantonment.
- Gharo (Re-construction) inside its existing boundaries and located in District Thatta.
- COD (Re-construction) inside its existing boundaries and located in Gulshan e Iqbal Town, District Karachi East.

All the construction activities either related to rehabilitation, re-construction or new construction will be performed within the existing FPs boundaries and the project will not require any acquisition of land.

This ESMP covering the environmental and social aspects of the proposed works has been prepared by MMP, on behalf of the PIU- KWSSIP. Design review and detailed design for rehabilitation of existing and construction of new FPs has also been carried out by the technical design team of MMP.

Rehabilitation of Existing and Construction of New Filtration Plants Project

The project involves following major works;

- Rehabilitation of Pipri (JBIC) - 50 MGD and NEK (New) K-II - 100 MGD;
- Re-building of Gharo - 30 MGD, Pipri Old 90 MGD (Including Pipri Old 01 and 02), COD 180 MGD; and
- New construction of NEK (K-III) - 100 MGD and Dumlotee – 15 MGD.

As mentioned above, the proposed rehabilitation and re-building works will take place within the existing boundaries of Pipri (JBIC), NEK (New) K-II, Gharo, Pipri Old and COD FPs, whereas new FPs shall also be built within the existing boundaries i.e. NEK (K-III) inside NEK (Old) FP and Dumlotee in Pipri Old FP boundaries.

Nature of Rehabilitation Works at Pipri (JBIC) and NEK (New) K-II FPs

Civil rehabilitation works for Pipri (JBIC) and NEK (K-II) FPs will involve Building's Roof Treatment, Floor finishing, Painting of Buildings, Replacing of Doors, Windows & Ventilators, Concreting of Structural Components and Allied Works such as boundary wall repairs, construction of guard posts at each corner of boundary wall, rain water drainage works, rehabilitation of roads inside plant boundaries, installation of curb stones and plantation.

Most of the Electro-Mechanical equipment will be removed and replaced with new, modernized and more efficient equipment. Mechanical works will include replacement of Air Scouring Blowers, Plant's and Piping network and installation of Bypass Arrangements. Electrical works will include replacement of 11 kV Switchboards, Distribution Transformer (1000kVA), Repair / Replacement of Electrical Systems for Filtration Block, Chemical Building, Wash water Recovery System, Outdoor Lighting Arrangements, Residential colony and Earthing System; and installation of 220 V DC Power Supply Systems and SCADA works.

Nature of Re-building Works at Gharo, Pipri (Old) and COD FPs

Civil re-construction works at Gharo, Pipri (Old), and COD FPs will include construction of new Distribution Chambers, Rapid sand gravity filters and Treated water tanks. Mechanical works will involve installation of new Backwash Pumping System, Air Scouring Blowers, Bypass Arrangements, Pumps, Valves and Piping Networks. Electrical works will include replacement of Switchboards, Distribution Transformer (1000kVA), installation of of Electrical Systems for Filtration Block, Chemical Building, Wash water Recovery System, Outdoor Lighting Arrangements, Residential colony and Earthing System; and installation of 220 V DC Power Supply Systems and SCADA works.

Nature of Works for New NEK (K-III) and Dumlottee FPs

Civil works at NEK (K-III) and Dumlottee FPs will include construction of new Distribution Chambers, Rapid sand gravity filters and Treated water tanks. Mechanical works will involve installation of Backwash Pumping System, Air Scouring Blowers, Bypass Arrangements, Pumps, Valves and Piping Networks. Electrical works will include installation of Switchboards, Distribution Transformer (1000kVA), installation of of complete Electrical Systems such as; for Filtration Block, Chemical Building, Wash water Recovery System, Outdoor Lighting Arrangements, Earthing Systems; and installation of 220 V DC Power Supply Systems and SCADA works.

Requirement to Conduct IEE / ESIA Study

The proposed project is located in Sindh, therefore, the Sindh Environmental Protection Act – 2014 is the core environmental law for the proposed project. Under Section 17 of the Act, it is mandatory for the proponents of the projects to execute the Initial Environmental Examination (IEE) and/ or Environmental and Social Impact Assessment (ESIA), where warranted, and get the approval from SEPA prior to commencement of any project works. Hence, for the proposed project, SEPA is the concerned authority with respect to environmental approvals.

The Review of IEE/EIA Regulations, 2021 of SEPA provides the necessary details on the preparation, submission, and review of the Environmental Checklist (EC), IEE and the EIA reports. The categorization of the proposed Rehabilitation of Existing and Construction of New Filtration Plants Project falls under the following category defined by the SEPA:

Schedule II – Projects Requiring an IEE

Category H – Water Supply and Filtration Plants

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. 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 local WB ESF, 2018, an ESMP study (equivalent to an IEE for fulfilling SEPA requirements) has been conducted for the proposed project.

This ESMP will also be submitted as an IEE to SEPA by KWSSIP to initiate the process of SEPA approval. Since SEPA requirements are less stricter than WB, a separate document with lesser headings shall be submitted to SEPA. SEPA review process takes approximately forty five (45) days for granting approval of the IEE.

ESIA 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.

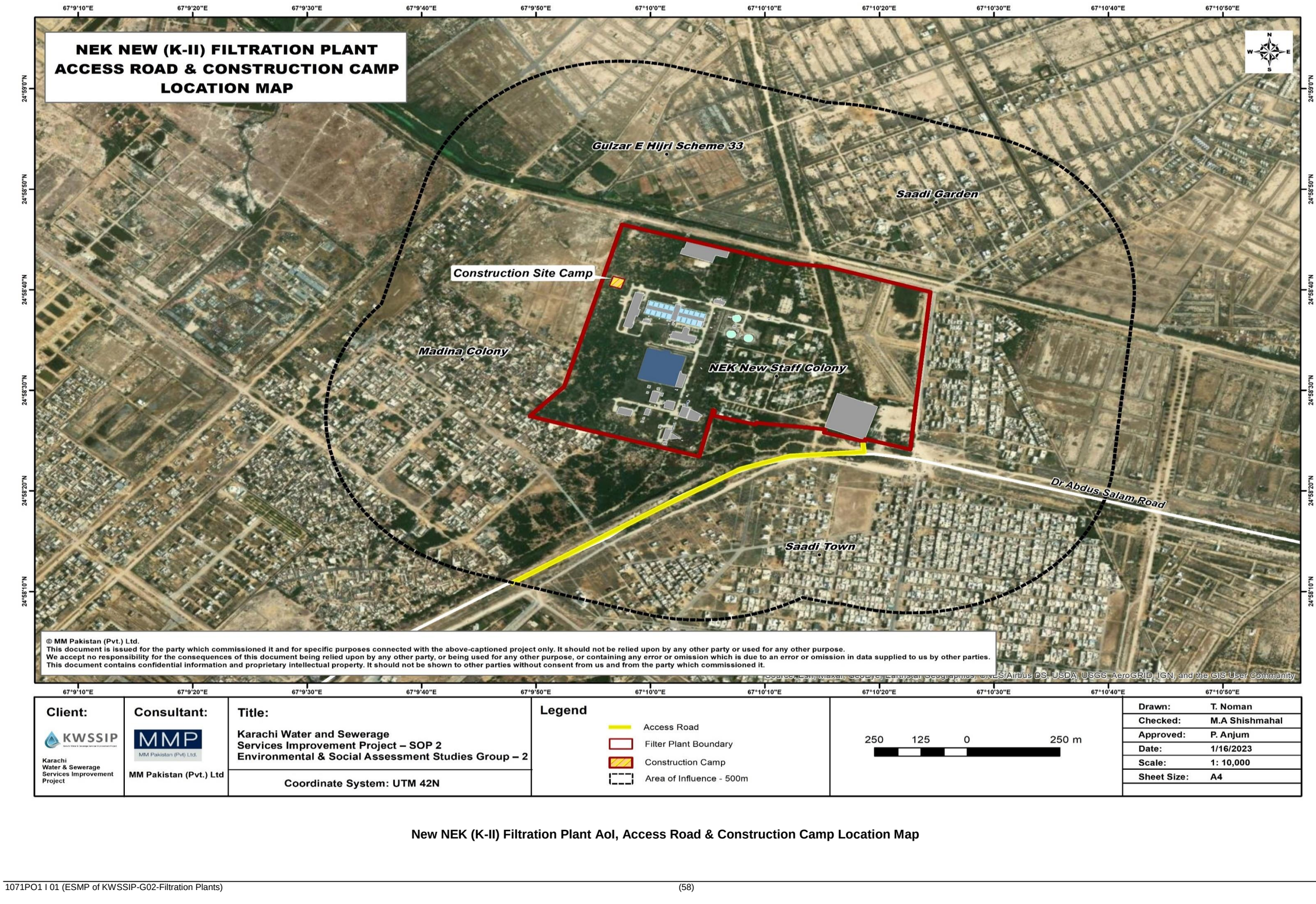
nuisance associated with traffic congestion, community safety, dust or noise, odor etc.) during construction or operation phases of the project.

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** describes the AoI in the form of a map as well as proposed locations for construction camps and existing access roads to be utilized for the project.

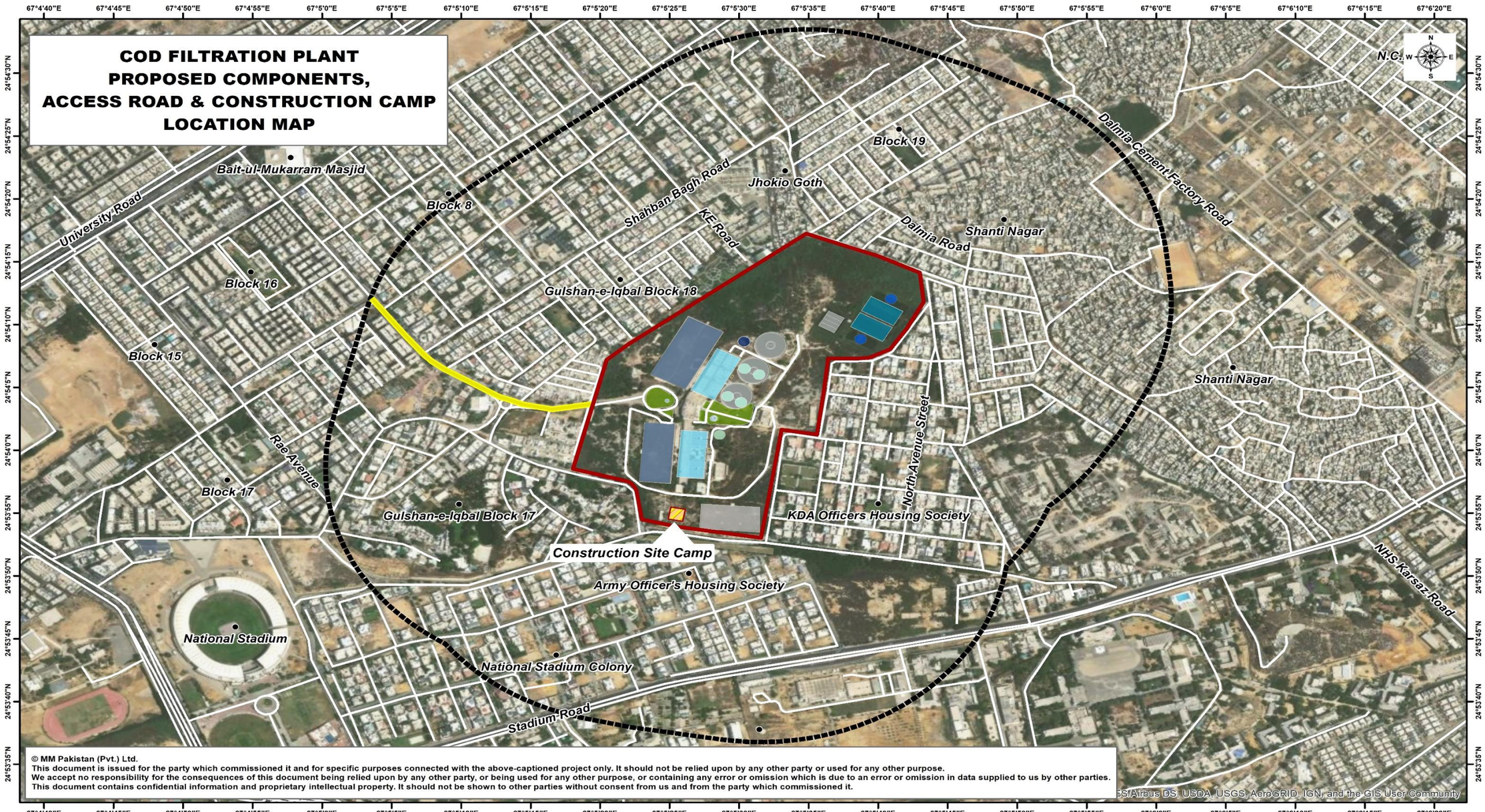
Table A1-1: Project Area of Influence (AoI)

Project Components / Sites	Direct Impact Area (DIA)	Indirect Impact Area (IIA)
Rehabilitation, Re-construction / Construction of Filtration Plants	Construction Areas inside the boundaries of each FP site	500 m radius outside the FPs boundaries

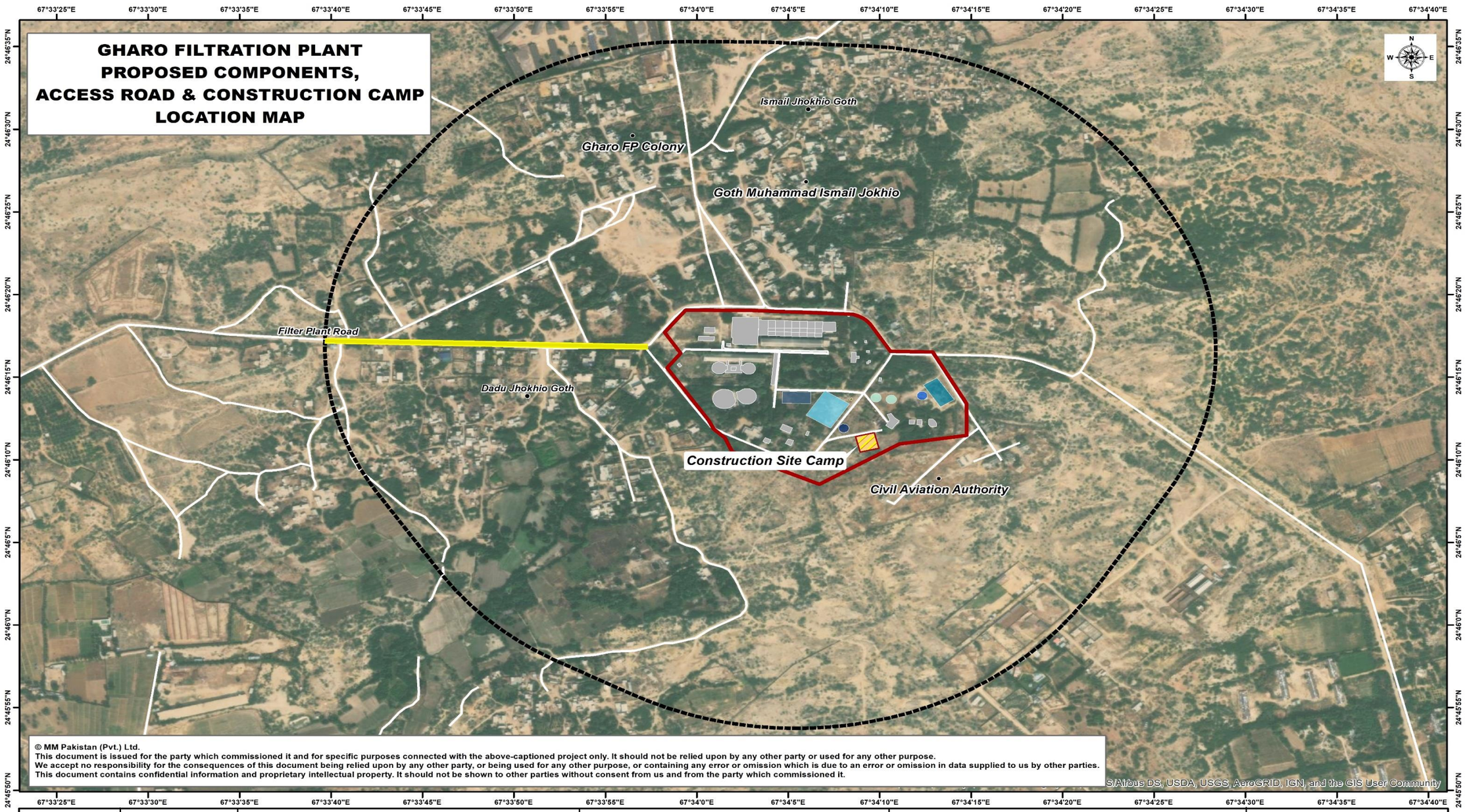
Figure A1-1: Project Area of Influence (AoI) Maps



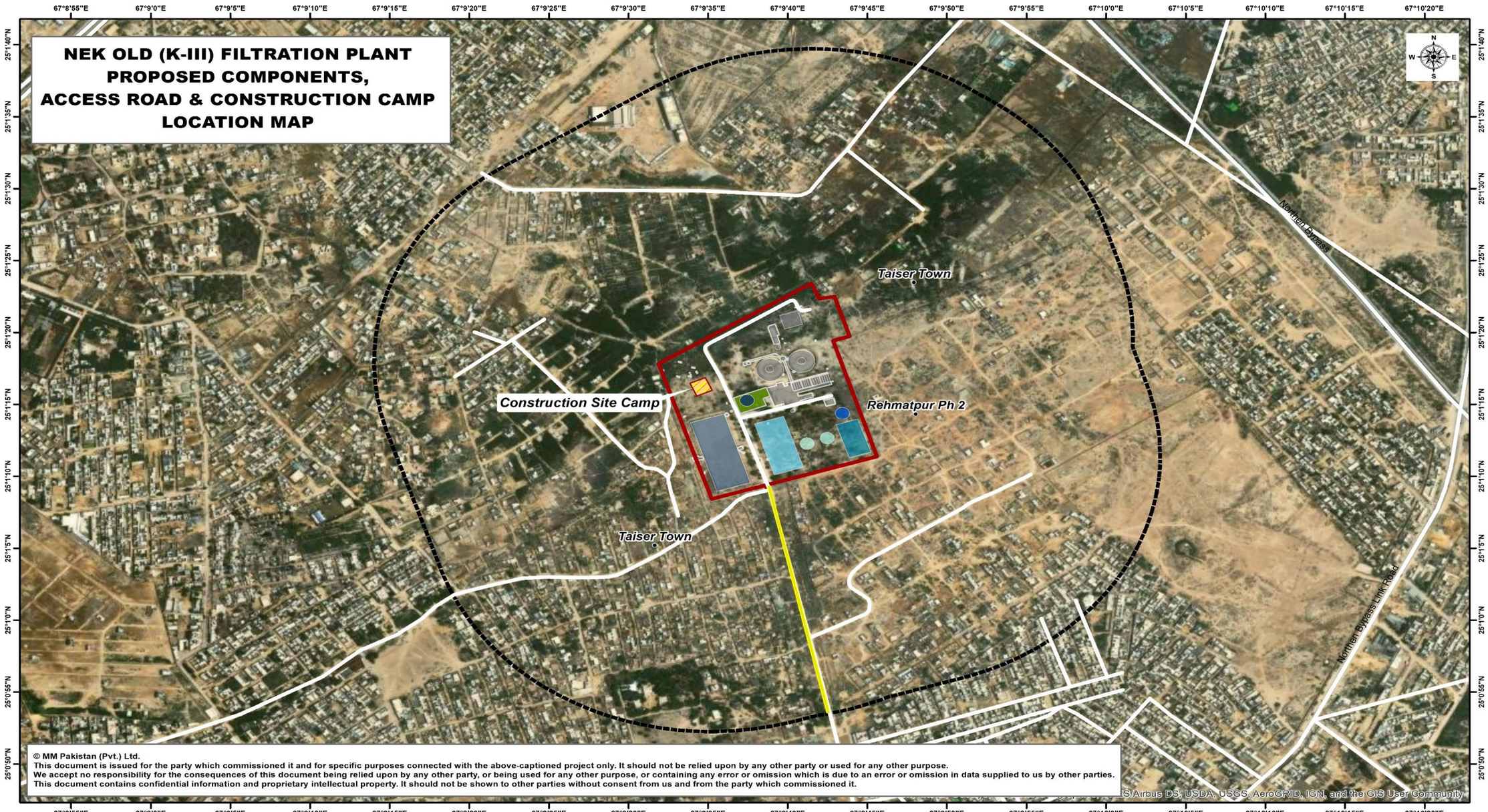
New NEK (K-II) Filtration Plant AoI, Access Road & Construction Camp Location Map



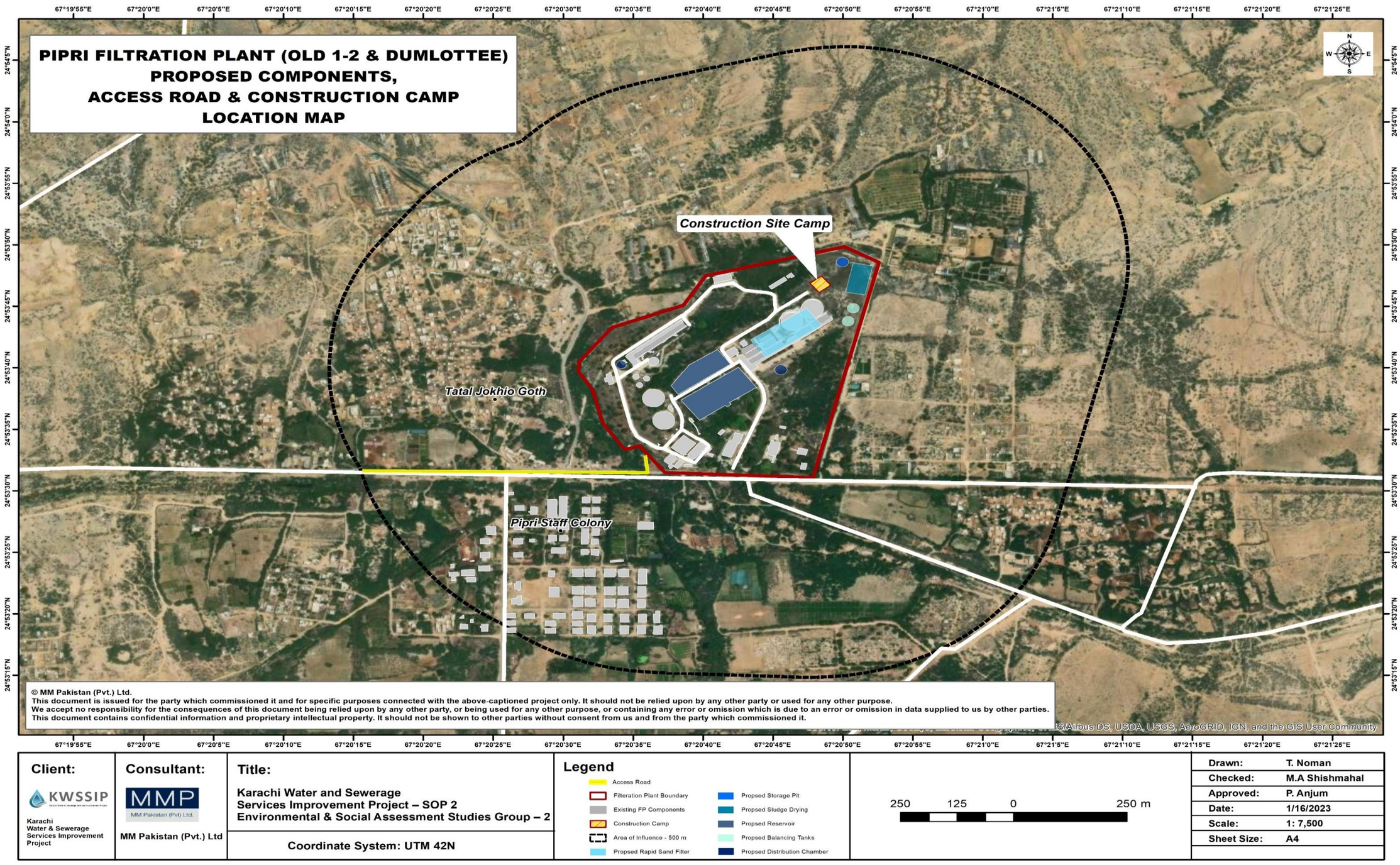
COD Filtration Plant AoI, Access Road & Construction Camp Location Map



Gharo Filtration Plant AoI, Access Road & Construction Camp Location Map



NEK old (K-III) Gharo Filtration Plant AoI, Access Road & Construction Camp Location Map



Pipri Filtration Plant Complex (JBIC, Old 1-2 & Dumlottee) AoI, Access Road & Construction Camp Location Map

ESA Study Methodology

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

This involved collecting information from the PIU KWSSIP and Technical Consultants (Design Consultants) regarding the proposed project activities. The design documents and feasibility reports have thoroughly been reviewed to understand the extent of construction works and their potential outcomes on the existing environment and social conditions. Moreover, literature review has been conducted to have a grasp on the available environmental and social baseline information of the project area. In addition to that 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, literature on critical habitats / vegetation, data on any sites / structures / natural features having archaeological / historical / architectural / religious or cultural significance; and Socio-economic environment including socio-economic and livelihood conditions in the project area.

Reconnaissance Surveys, Delineation of the Area of Influence (AoI) 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 interventions. AoI has been decided by the consultant's 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 to be prepared 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 AoI. In this regard, the Environmental, Ecology and Social Teams have performed detailed field surveys between December 2021 and April 2022.

The environment team focused on the collection of 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 focused on the collection of baseline information on floral and faunal species. Detailed inventory has been prepared by the ecology team for the trees that are growing within the main construction areas and shall require to be cut. Other vegetation growing in the AoI that shall not be affected by the construction activities has also been recorded. The photographs of un-identified plants

were photographed and identified later using "PLANTNET[1]" software. The data on the fauna was gathered through random sampling and observations at the project sites, 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 with 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 getting feedbacks from the key institutional stakeholders.

Impacts Identification and Assessment

Potential impacts arising from each phase of the proposed project have been identified and assessed on the basis of field data, secondary data, expert opinions and examining previous similar projects in Pakistan. These include effects on 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 (ESSIA) 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.

1 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

Overview

This Chapter summarizes the national, provincial, the World Bank and international environmental and social legislations, regulations, standards, and treaties relevant to this ESIA Study. The footprint of the Project is located 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 (EHSGs) shall 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 to 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 Labor Policy, 2018	This policy aims at decent working conditions following the international labor 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

National Policies (Year of implementation)	Relevance / Applicability
	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
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.	Section 11 of Act	Applicable The project is required to show the compliance of provincial standards related with pollutants emission.
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."	Section 13 of Act	Applicable The project is required to show the compliance of provincial and international standards related with Handling of Hazardous Substances.
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.	Section 15 of Act	Applicable The project is required to show the compliance of provincial standards related with Handling of Motor Vehicles.
IEE and EIA: No proponent of a project shall commence construction or operation unless he has filed with the EPA an IEE or an EIA and has obtained from the Agency approval in respect thereof.	Section 17 of Act	Applicable The project is required to obtain environmental approval before commencement of work from Sindh EPA under these sections of the acts.

Environmental Legislation	SEPA 2014	Relevance with Project
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 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.	Section 19 of Act	Applicable The project proponent (KWSSIP / KWSC) shall submit various environmental monitoring reports to as per SEPA directives.
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).	Section 22 of Act	Applicable The project proponent (KWSSIP / KWSC) shall ensure compliance of all regulatory requirements in relation to the project.

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 Quality Standards, 2016	◆ Environment quality standard (EQS) set out in the SEQS and relevant to the Project include: ◆ Municipal and liquid industrial effluents (32 parameters) ◆ Industrial gaseous emissions (16 parameters) ◆ Motor vehicle exhaust and noise (used and new vehicles) ◆ Ambient air quality (9 parameters)

National/Provincial Acts (Year of implementation)	Relevance/Applicability
	◆ Drinking water quality (32 parameters) ◆ Noise (four zones during day and night). ◆ These standards are applicable for both construction and operational phases of the project.
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 working in the province of Sindh and shall be applicable to the proposed works.
The Sindh Occupational Safety and Health Act, 2017	This is a consolidated law for the OHS of the persons at workplace and to protect them against risks arising out of the occupational hazards; to promote safe and healthy working environment catering to the physiological and psychological needs of the employees at workplace and is relevant to the project
The Sindh Occupational Health and Safety Rules, 2019	This law binds the employers to provide clean and safe working environment to workers without harming their health. It also set out the requirement to safely dispose of waste and effluents generated from facility and set guide precautions to take in case of fire. Hence applicable
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. It is applicable.
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 and as such 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.

National/Provincial Acts (Year of implementation)	Relevance/Applicability
The Sindh Local Government (Amendment) Act, 2021	The LGA empowers the provincial governments to enforce laws for: ◆ Land use ◆ Conservation of natural vegetation ◆ Air, water, and land pollution ◆ Disposal of solid waste and wastewater effluents ◆ Public health and safety, including some provisions for environmental protection. Under the act, the local councils are authorized to restrict activities causing pollution. The Project will be required to follow the provisions of the Sindh Local Government Act to ensure; prevention of air, water and land pollution, safe disposal of waste and implementation of safe work practices.
Hazardous Substance Rule, 2014	The rule describes the procedure of handling, transportation and disposal of hazardous substances and hazardous waste. General safety precautions for handling hazardous substances as well as safety precautions for workers, and notification requirements in the event of an accident are also described in these rules. The proposed project might generate hazardous waste in the form of sludge from the filtration plant, fuel or chemical spills. These Rules are applicable to the proposed project due to involvement of such hazardous material as well as waste handling and disposal during different construction activities at the construction stage. Accordingly, the guideline for a Waste Management Plan has been developed aligned with these rules
Building Code of Pakistan, 2007	The Project area lies in Zone 2B as per Building Code of Pakistan, 2007. The provision of Building Code of Pakistan shall apply for engineering design of building like structure and related components. The construction in violation of the Building Code shall be deemed as violation of professional engineering work. Moreover, a certificate for the proposed action will be obtained from Provincial Building Control Authority.

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

Comparison of local and international water quality standards is provided as **Table A2-4**. The more stringent of the two shall be followed during the construction stage (drinking water quality for labor and workers). 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 inany 100 ml sample	Must not be detectable inany 100 ml sample
Total Coliform	numbers/ml	Must not be detectable inany 100 ml sample	Must not be detectable inany 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

International Treaties and Conventions

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

International Labor Organization (ILO's) Fundamental Conventions – Ratified by Pakistan

The ILO's fundamental convention applicable.

- Forced Labor 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 Labor 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 Labor 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), the EHS Guidelines for Waste Management Facilities (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 ten Environmental and Social Standards (ESS) that are designed to for environmental and social sustainability. The WB ESS applicable to the project is provided in **Table A2-5.**

Table A2-5: World Bank Environmental and Social Standards Applicable to the Project

Policy	Environmental and Social Standards	Description	Relevance with Project and Actions (to be) Taken
ESS 1	Assessment and Management of Environmental and Social Risks and Impacts	Identify, assess, evaluate, and manage environment and social risks and impacts in a manner consistent with the ESF. Adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities	◆ 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 this ESMP based on surveys and consultations with primary stakeholders including communities and implementing agency ◆ This ESMP will be disclosed both in the KWSSIP and WBs websites. ◆ PIU - KWSSIP has prepared an Environment and Social Commitment Plan (ESCP). ◆ Monitoring and reporting on E&S performance will be carried out during implementation.
ESS 2	Labor and Working Conditions	Promote safety and health at work. Promote the fair treatment, non-discrimination, and equal opportunity of project workers. Protect project workers, with particular emphasis on vulnerable workers. Prevent the use of all forms of forced 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.	◆ A Labor Management Procedure (LMP) for the SOP - II projects (Rehabilitation of existing and construction of new FP is also a part of SOP - II) has been prepared to regulate working condition and management of workers relation including worker specific Grievance Redress Mechanism (GRM), terms and conditions of employment, non-discrimination and equal opportunity, Sexual Exploitation and Abuse/Sexual Harassments (SEA/SH), protection of workforce, the prohibition of child /forced labor (including in source country and supply chain) and provision of OHS management.

Policy	Environmental and Social Standards	Description	Relevance with Project and Actions (to be) Taken
ESS 3	Resource Efficiency and Pollution Prevention and Management	Promote the sustainable use of resources, including energy, water, and raw materials. Avoid or minimize adverse impacts on human health and the environment caused by pollution from project activities. Avoid or minimize project-related emissions of short and long-lived climate pollutants. Avoid or minimize generation of hazardous and non-hazardous waste. Minimize and manage the risks and impacts associated with pesticide use. Requires technically and financially feasible measures to improve efficient consumption of energy, water, and raw materials, and introduces specific requirements for water efficiency where a project has high water demand.	◆ With respect to Resource Efficiency, the project preparation and the 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, use of innovative design so as to minimize project's footprints on finite water bodies. ◆ With respect to Pollution Management, as part of the ESMP process, prevention and management measures have been thoroughly devised to offset risks and impacts of pollution from potential sources such as dust and emission 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 spoil material and solid waste.
ESS 4	Community Health and Safety (CHS)	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	◆ As project is contained within boundaries, low risk of communities being affected during construction activity is anticipated. ◆ This ESMP includes measures to address the CHS risks. In addition, as part of this ESMP during construction phase, contractor will be obliged to form Contractor's Construction Environmental and Social Action Plan (CESAP) to offset any impact on community health and safety.

Policy	Environmental and Social Standards	Description	Relevance with Project and Actions (to be) Taken
		and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	
ESS 10	Stakeholder Engagement and Information Disclosure	Establish a systematic approach to stakeholder engagement that helps Borrowers identify stakeholders and maintain a constructive relationship with them. Assess stakeholder interest and support for the project and enable stakeholders' views to be taken into account in project design. Promote and provide means for effective and inclusive engagement with project affected parties throughout the project life-cycle. Ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner.	◆ Low Social risks are anticipated from the project because most activities are within clearly demarcated boundary walls. A Stakeholder Engagement Plan (SEP) has been prepared for the KWSSIP-2 in compliance with ESS10. The project will ensure stakeholder consultation are carried out as per this SEP and will be followed during implementation of project. A project GRM has also been established in compliance with ESS10.

Project Categorization

Sindh EPA

The project falls in the category of projects requiring an Initial Environmental Examination (IEE), as listed in Schedule-II of the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021. Schedule-II (H) – Water Supply and FP.

Environmental and Social Framework of World Bank

The World Bank ESF classify the projects into one for four classifications, i.e. High Risk, Substantial Risk, Moderate Risk or Low Risk. The environmental and social assessment needs to be undertaken for the project to assess the potential risks and impacts throughout the project lifecycle. The environmental and social assessment can be or combination of environmental and social impact assessment (ESIA), environmental and social management plan (ESMP), environmental and social management framework (ESMF), regional/sectoral EIA, or strategic environmental and social assessment (SESA).

KWSSIP-2 has been classified as High risk (Environment: Substantial, Social: High) by the World Bank. However, this specific Project involves environmentally: Moderate and socially: Low risks and impacts, therefore the combined environmental and social (E&S) risk of the project has been assessed as “Moderate” and an ESMP has been prepared. The project is anticipated to have positive environmental impacts as it will allow provision of clean drinking water to its end users.

The more likely environmental risks are (i) generation of excavated material, (ii) air and noise pollution, (iii) waste generation from labor camp, site clearance etc. (iii) consumption of water and raw materials during civil works, and (v) occupational health and safety risks associated with construction works and operation.

Annexure 3: Project Description

Project Background

The present KWSC's water treatment capacity is insufficient, and a large volume of raw water is being supplied without treatment as the existing Filtration Plants (FPs) are under capacity and most of them have already surpassed their design life. The filtered water at all the Filtration Plants (FP) is also not safe for drinking as water samples have been found contaminated with different physical / chemical / biological contaminants. The proposed project is geared towards the improvement and enhancement of KWSC's current water treatment profile in order to provide clean drinking water to the end users. As per the design, the quality of treated water from the rehabilitated and new FPs under the project will meet the WBG / WHO drinking water quality standards and will be safe for drinking.

Existing Conditions and Proposed Rehabilitation / Construction of Filtration Plants

As shown in **Figure A3-1**, there are ten existing KWSC's filtration plants located at six distinct locations in and around Karachi. Out of these plants, Hub Filtration Plant is in relatively better state and operating conditions, therefore it has not been considered for the proposed rehabilitation works. Rehabilitation, re-building and construction of new plants will take place within the boundaries of five existing filtration plant sites.

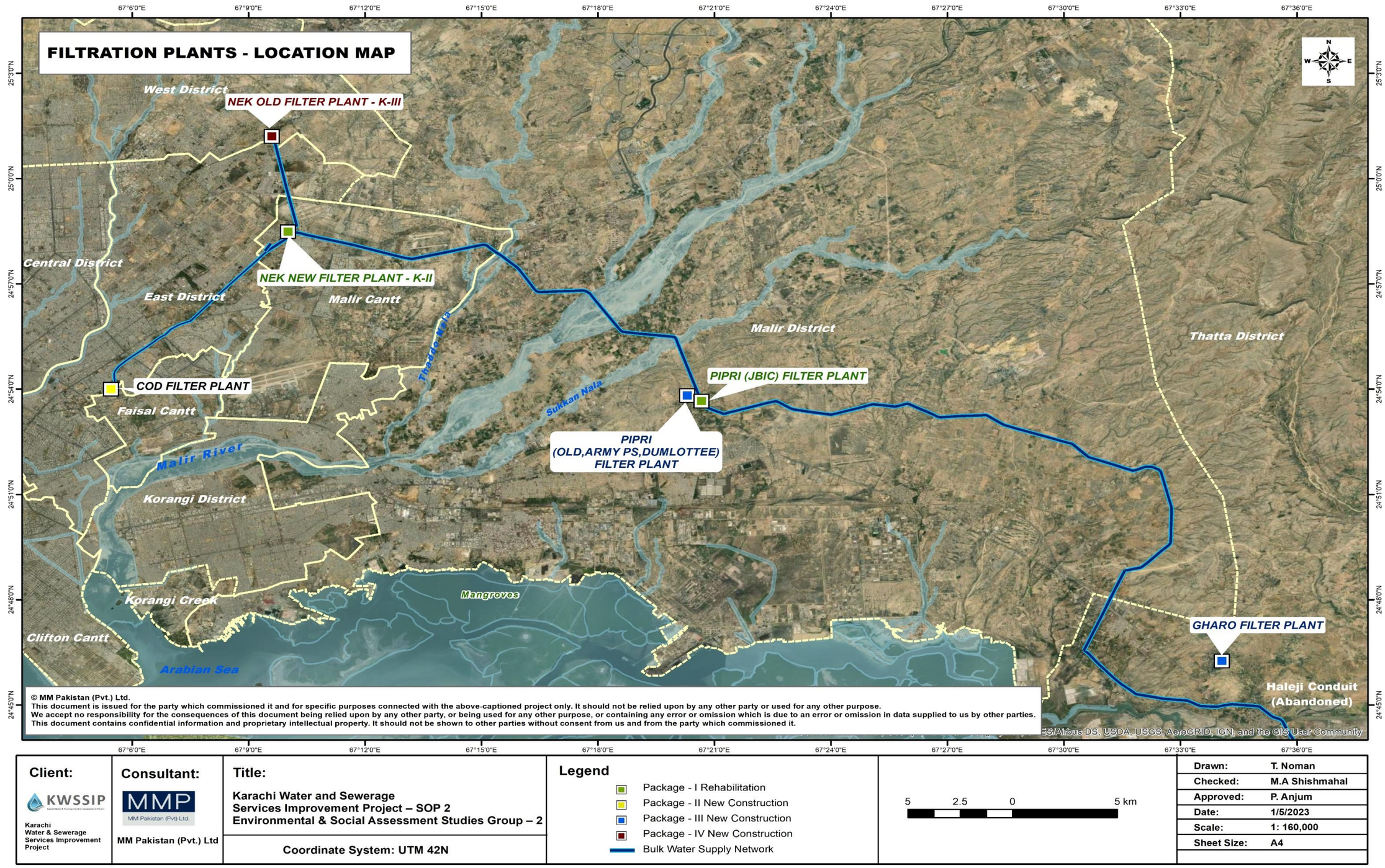


Figure A3-1: Locations of KWSC's Filtration Plants In and Around the City

Construction Packages

The project will be executed through the following two main construction packages:

- Contract Package-I: Rehabilitation of Pipri (JBIC) - 50 MGD and NEK (K-II) - 100 MGD FPs on BOQ basis;
- Contract Package-II: Re-building of Gharo - 30 MGD, Pipri Old 105 MGD (Including Pipri Old 01 & 02 and Dumlotee), COD 180 MGD and New construction of NEK (K-III) - 100 MGD on EPC Mode.

Current Status of FPs and Proposed Enhancements

In the light of project's design studies, **Table A3-1** provides an overview of current operational status of the existing filtration plants, environmental issues they are facing and proposed enhancements / construction measures.

Table A3-1: Summary of Current Status of FPs and Proposed Enhancements

No	Filtration Plant	Proposed Capacity (MGD)	Current Status	Nature of Construction Works
1	PIPRI (JBIC)	50	◆ This plant is in operational state and is treating 50 MGD of raw water. ◆ Treated water quality was found meeting the SEQS / WHO standards.	◆ Civil structure rehabilitation ◆ Actuators, motors, switches, level probes and level switches replacement ◆ Electro-mechanical system up gradation using SCADA system. ◆ Electrification up gradation. ◆ Plant will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted.
2	NEK (KII)	100	◆ This treatment plant is non-operational mainly due to shortage of funds. Only 10 MGD untreated water is pumped directly to few areas from old pumping station. ◆ Reservoir of this treatment plant receives water from K-III Pumping station and after chlorination distributed by 66"	◆ Revision of water treatment process as per new treatment techniques & technologies. ◆ Complete replacement of electro-mechanical system. ◆ Installation of SCADA system.

No	Filtration Plant	Proposed Capacity (MGD)	Current Status	Nature of Construction Works
			dia line to Manghopir and 36" dia line to Scheme 33. ◆ Water sample at the plant outlet was however found meeting the SEQS / WHO Standards.	◆ Upgrade of electrical system for plant, admin building and laboratory. ◆ Plant will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted ◆ Allocation of space for emergency treatment of staff.
3	COD-I & II	90 + 90 = 180	◆ Status of plant is non-operational mainly due to shortage of funds. ◆ Only Chlorination of Raw water is in progress. ◆ Rest of the system is out of order and need replacement. ◆ Water samples at the plant outlet have found to be high in turbidity and with traces of Total Coliforms.	◆ Revision of water treatment process as per new treatment techniques & technologies. ◆ Complete replacement of electro-mechanical system. ◆ Installation of SCADA system. ◆ Upgrade of electrical system for plant, admin building and laboratory. ◆ Plants will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted ◆ Allocation of space for emergency treatment of staff.
4	PIPRI (Old 1,2 + Dumlottee)	105	◆ The existing FP i.e., PIPRI (old) 25+25 MGD are non-operational, mainly due to shortage of funds. ◆ Additionally, 40 MGD water coming from Army PS is being supplied from PIPRI without any treatment. ◆ 15 MGD water from Dumlottee will also be	◆ Civil structure rehabilitation / construction ◆ Actuators, motors, switches, level probes and level switches replacement / installation ◆ Electro-mechanical system upgrade /

No	Filtration Plant	Proposed Capacity (MGD)	Current Status	Nature of Construction Works
			diverted to PIRPI FP site for treatment. Hence, the construction of 105 MGD FP has been proposed at PIPRI (old). ◆ Water samples at the plant outlet have found to be high in turbidity and with presence of E. coli, Total and Fecal Coliforms.	installation using SCADA system. ◆ Electrification up gradation / installation. ◆ Plants will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted
5	Gharo	30	◆ Plant is non-operational due to shortage of funds. Only Chlorination of Raw water is in progress whereas rest the system is out of order and need replacement. ◆ Water samples at the plant outlet have found to be high in turbidity and with presence of E. coli, Total and Fecal Coliforms.	◆ Civil structure rehabilitation ◆ Actuators, motors, switches, level probes and level switches replacement ◆ Electro-mechanical system up gradation using SCADA system. ◆ Electrification up gradation. ◆ Plant will be equipped with safety equipment and safety kits for personnel ◆ Sodium hypochlorite based chlorination technique to be adopted
6	NEK (K-III)	100	◆ The existing FP i.e., NEK (old) is non-operational. Therefore, , the construction of 100 MGD FP has been proposed at NEK (old), named as NEK (K-III).	◆ Civil structure construction ◆ Actuators, motors, switches, level probes and level switches installation ◆ Electro-mechanical system up installation using SCADA system. ◆ Electrical equipment / systems installation. ◆ Plants will be equipped with safety equipment and safety kits for personnel

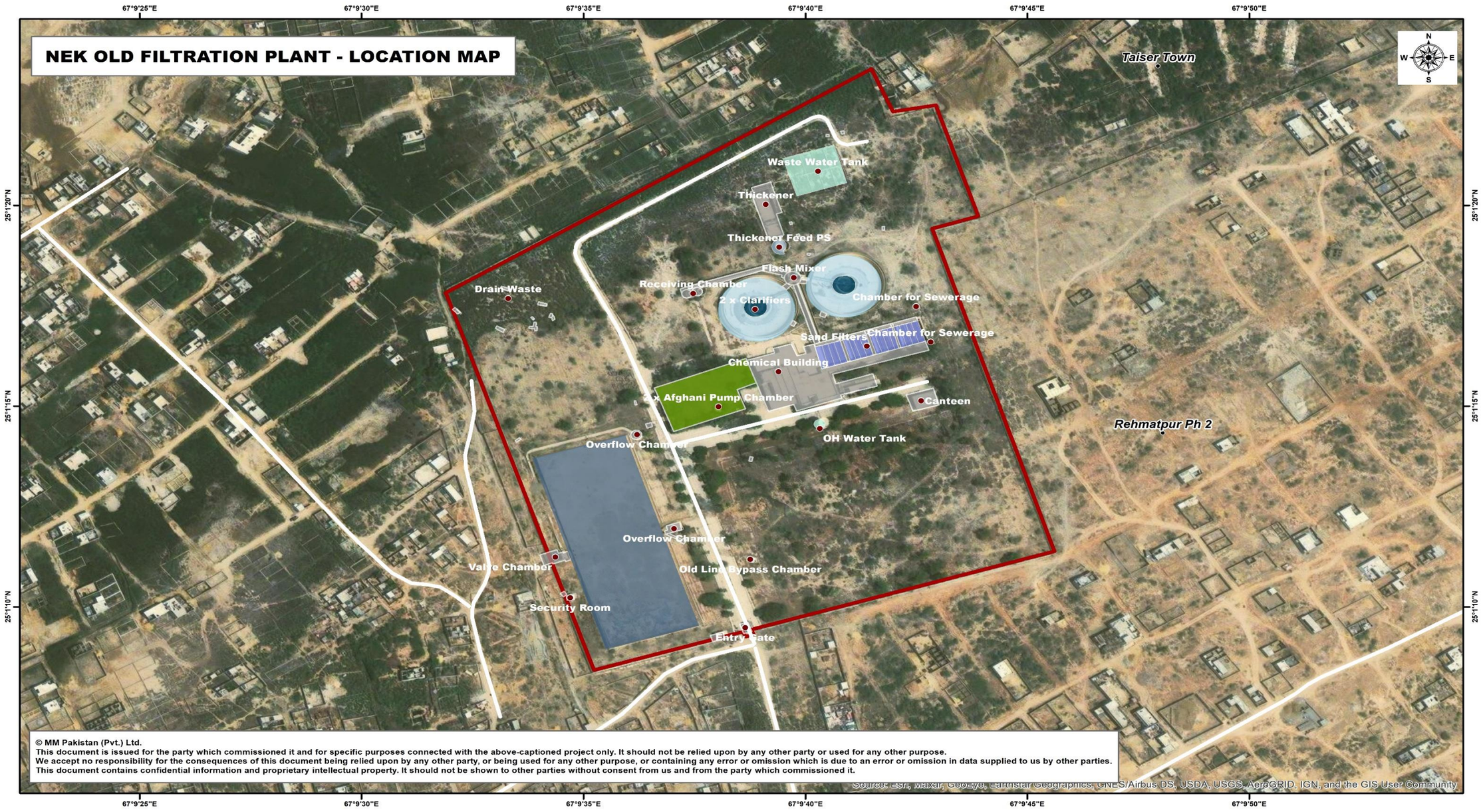
No	Filtration Plant	Proposed Capacity (MGD)	Current Status	Nature of Construction Works
				◆ Sodium hypochlorite based chlorination technique to be installed
Source: Feasibility & Preliminary design report of technical consultant - G-03 Consultant-MMP				

Figure A3-2 shows the individual locations of the existing and new FP sites along with the major treatment process components and details about associated components such as access roads, construction camp locations etc.

Figure A3-2: Access Roads, Construction Camp Location Map

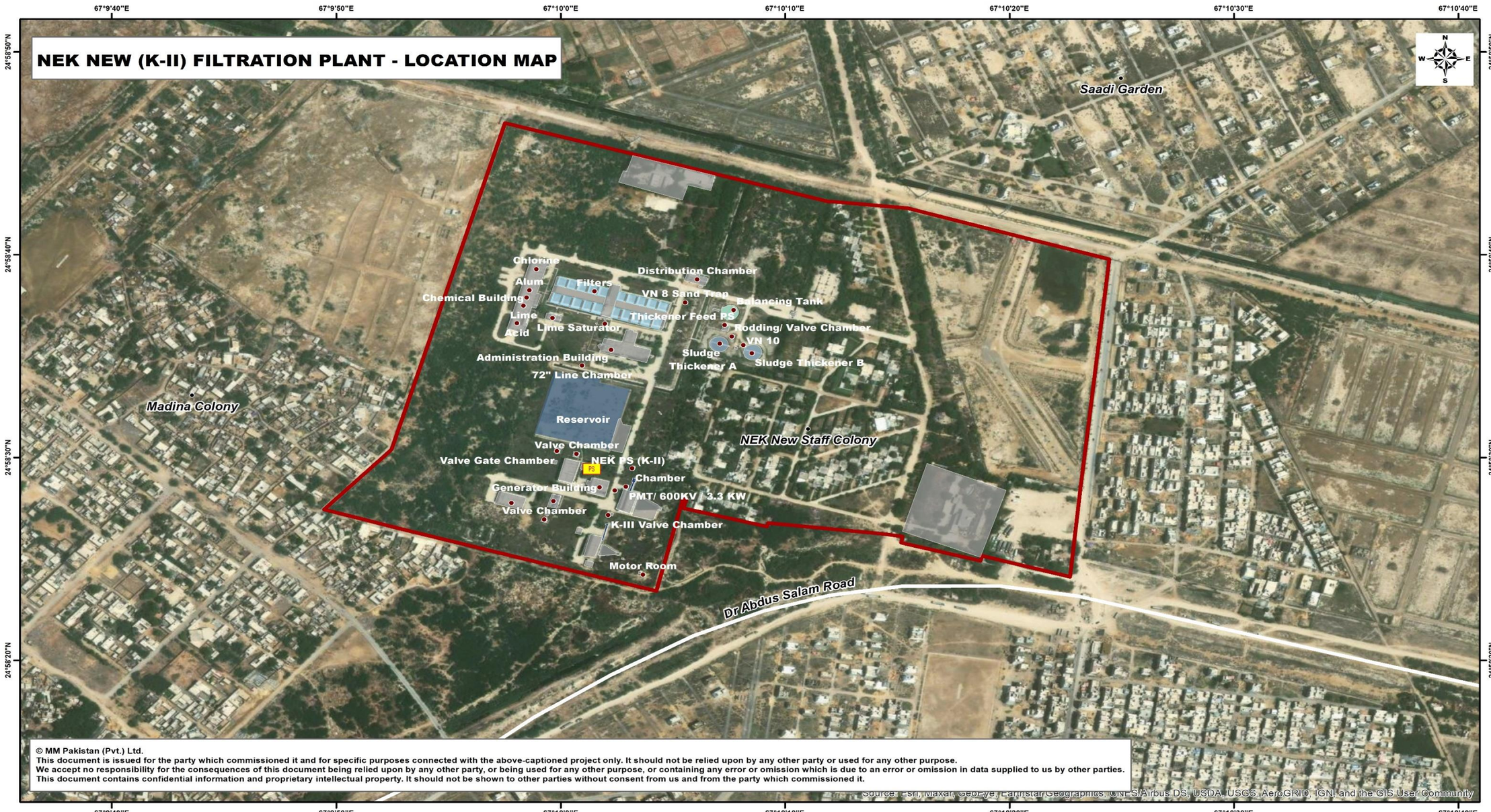
Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 **Coordinate System: UTM 42N**	**Legend:** Structural Details; Filteration Plant Boundary; Parks; Flocculator; Clarifiers; Reservoir; Tanks; Thickner Ponds	150 75 0 150 m	Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 1/5/2023 Scale: 1: 4,000 Sheet Size: A4

COD 180 MGD FP Site



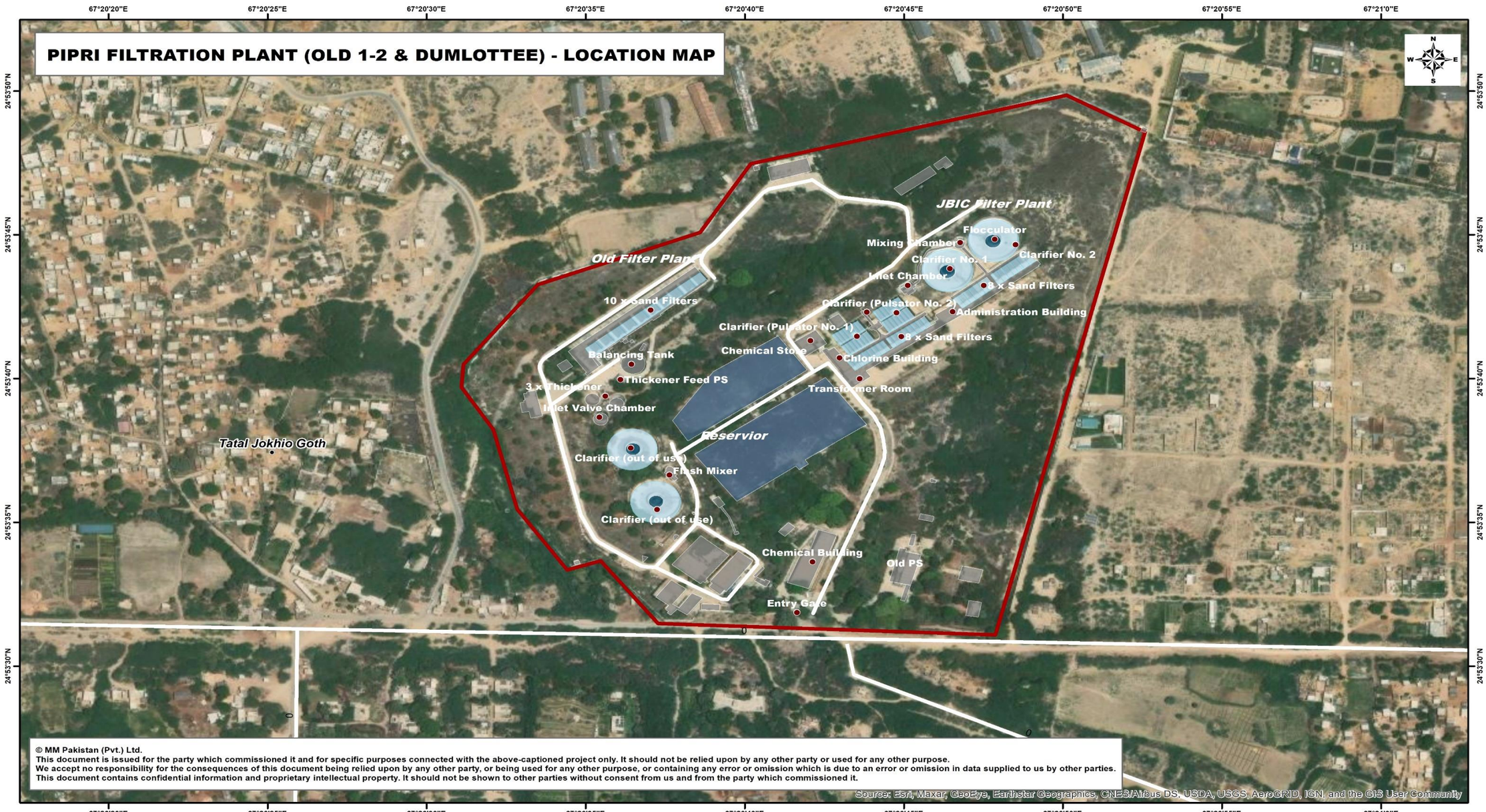
Client:	Consultant:	Title:	Legend					Drawn:	T. Noman
KWSSIP Karachi Water & Sewerage Services Improvement Project	MMP MM Pakistan (Pvt.) Ltd MM Pakistan (Pvt) Ltd	Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 Coordinate System: UTM 42N	Structural Details Filteration Plant Boundary Parks Flocculator Sand Filters	Clarifiers Reservoir Tanks Thickner Ponds	80 40 0 80 m			Checked:	M.A Shishmahal
								Approved:	P. Anjum
								Date:	1/16/2023
								Scale:	1: 2,500
								Sheet Size:	A4

NEK K-III FP Site (NEK old)



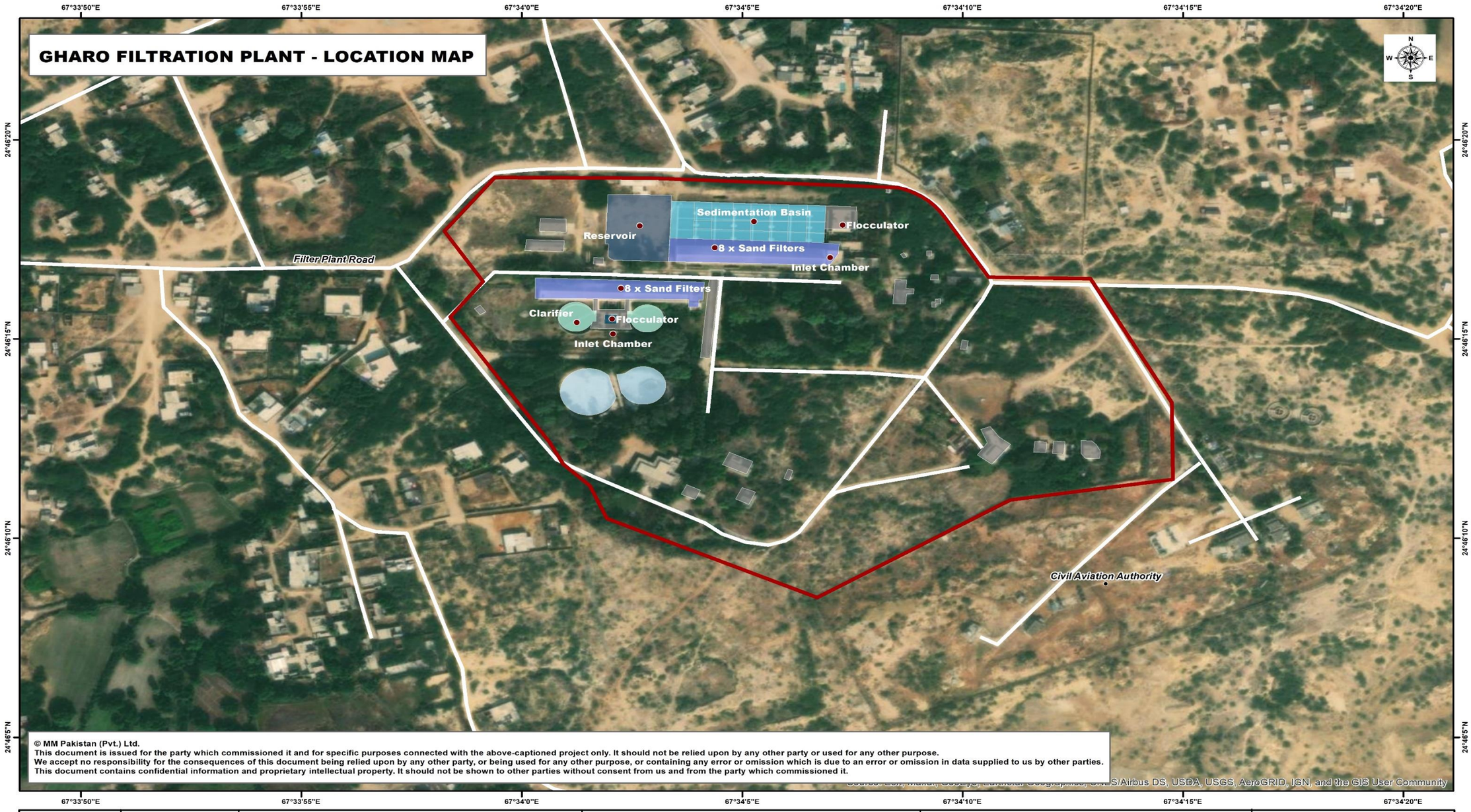
Client:	Consultant:	Title:	Legend			
KWSSIP Karachi Water & Sewerage Services Improvement Project	MMP MM Pakistan (Pvt.) Ltd MM Pakistan (Pvt.) Ltd	Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 Coordinate System: UTM 42N	Structural Details NEK Pumping Station (K-II) Filteration Plant Boundary Flocculator	Clarifiers Reservoir Tanks Slugde Thickner	150 75 0 150 m	Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 1/16/2023 Scale: 1: 5,000 Sheet Size: A3

NEK K-III FP Site (Nek New)



Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP (MM Pakistan (Pvt.) Ltd.) — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 **Coordinate System: UTM 42N**	**Legend:** Structural Details; Filteration Plant Boundary; Reservoir; Clarifiers/Filters; Flocculator	100 50 0 100 m	Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 1/16/2023 Scale: 3,500 Sheet Size: A4

Pipri JBIC, OLD + Dumlottee FP Site



Client: KWSSIP — Karachi Water & Sewerage Services Improvement Project	**Consultant:** MMP (Pvt.) Ltd — MM Pakistan (Pvt.) Ltd	**Title:** Karachi Water and Sewerage Services Improvement Project – SOP 2 Environmental & Social Assessment Studies Group – 2 **Coordinate System: UTM 42N**	**Legend:** Structural Details; Filteration Plant Boundary; Sand Filters; Flocculator; Clarifiers; Reservoir; Ponds; Sedimentation Basin	80 40 0 80 m	Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 1/5/2023 Scale: 1: 2,500 Sheet Size: A4

Gharo FP Site

Process Flow at Proposed FPs

The basic details of process flow at the FPs are shown in **Figure A3-3**. The proposed filtration system is based upon a direct filtration method with inline coagulation. The major processes involved in treatment are inflow of raw water to measuring chamber, pH adjustment through Alum and Sulfuric Acid (H_2SO_4), Backwash pumping, Air Scouring during backwash, post filter chlorination through Sodium hypochlorite dosing, filtered water holding, outflow of treated water to measuring chamber and then to the distribution network. The whole system shall be controlled through SCADA. A brief description of the process components including Sludge Handling and Management is provided in the following sections.

pH Adjustment

Alum dosing system will be equipped with two pumps (1 duty, 1 standby), valves, interconnecting piping, instruments, and other relevant equipment to fulfil the Alum dosing requirements at the rate of 1580 litres / hr. Since alum shall be used as a coagulant, high pH in the raw water will be adjusted for effective coagulation, using Sulfuric Acid (H_2SO_4) dosing system. Special material will be provided for piping because of the corrosive nature of the fluid. For acid storage, unlined Mild Steel cylindrical tanks shall be utilized. Automatic controls shall be provided for the dosing pumps. A globe control valve with an electromagnetic flowmeter with indication will be used for adjustment of diluent water flow. Each pump shall be fitted with a removable Perspex safety guard, Eyewash and safety shower. Warning signs and safety railings shall be installed and PPE's issuance and utilization by workers shall be ensured. Acid storage tanks will be in the bounded wall with compacted limestone hardcore filler.

Distribution Chamber

The distribution chamber is proposed to achieve proper chemical mixing. The chamber will ensure supply of raw water to the Coagulation chamber with uniform quality and quantity. This chamber will also have a bypass arrangement, allowing the water to bypass the whole filtration scheme if the inlet water quality is meeting the drinking water quality standard. The distribution chamber will be circular in shape. Maximum diameter and height of chamber will be 12000mm and 9000mm respectively.

Rapid Sand Filters

High-rate granular media filtration system with single media is proposed. Multiple filter beds, each with a filtration capacity of 05 MGD will be provided in rapid sand filtration unit. The raw water will be carried to these beds through an incoming pipe of DN1500 opening in a common channel. The raw water will enter the filtration units through a penstock slide gate and leaves the filtration bed after gravity filtration.

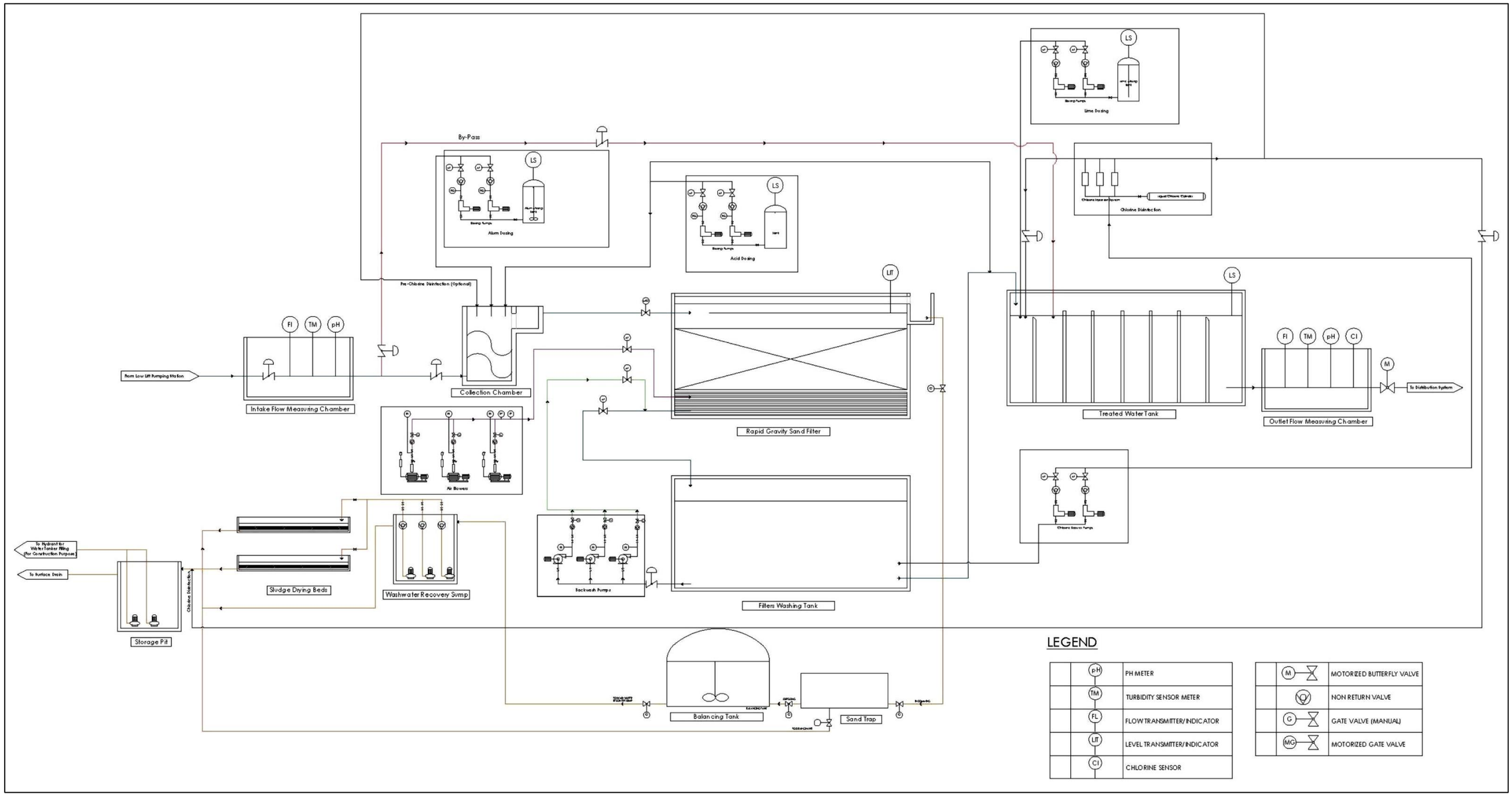


Figure A3-3: Typical Process Flow Diagram

Backwash Pumping Station

After a few cycles of raw water filtration, the filtration beds will require back washing to remove all dirt and suspended impurities. For this purpose, three centrifugal pumps (2 duty 1 standby) will be provided, which will be connected in parallel to a DN 800 filtered water main pipe on suction side and DN1000 main header pipe on discharge side to enforce the clean water into the bottom of every filtration bed for backwashing. The backwash water will be equally distributed under the bed through an array of nozzles to de-settle the dirt and impurities and get clean water after 10 to 15 minutes.

Disinfection / Chlorination

Chlorination shall be performed by injecting Sodium Hypochlorite through a diaphragm pump and a chlorine analyser at the outlet of the manifold header. It has similar efficiency and performance as Gas Chlorination System, but without having any Cl_2 handling or storage hazards. Installation and O&M cost of hypochlorite dozing systems is also less than that of gas chlorination systems. The Hypo-chlorination system shall 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 or plastic tanks shall be added to filtered water through dozing pumps. Dilute solution of sodium hypochlorite of 5 to 12.5% concentration in small quantities shall be required during operations.

Water Storage Tank

The treated water will be stored in a tank for onward pumping to the distribution network.

Sludge Handling and Management

A collective sludge tank known as a sump pit is proposed at the FPs for the collection of sludge. The sump pit will collect the backwash water from the filter beds containing solid content ranging around 0.01-0.05 % which will be transferred to the sludge drying beds through pumping. It is estimated that during the operational phase, 1200 to 2200 ton/year of sludge will be generated from each FP. The technical consultant has recommended recycling sludge through its utilization in horticultural activities. Use in agricultural activities is not recommended usless it is tested and proven to contain no chemical content. Currently, no sludge is generated at the existing Filtration Plants as they are only disinfecting the incoming water through chlorination. The remaining processes of filtration are largely non-functional.

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

Recycling of sludge shall be a condition of Contract and the sludge treatment methods will be finalized during detailed design stage to be carried out by the Contractor. The Contractor shall finalize the modalities and procedures for design and operation of sludge recycling facility. The sludge quality testing shall be carried out before its utilization as fertilizer, and it shall also be tested periodically during the operational phase of the project by KWSC to ensure that the sludge generated at FPs is fit for recycling.

Stand-by Power Generator

At the plant sites, stand-by power generators will be provided to run the plant at fifty percent capacity to avoid complete shutdown in case of power failure. Another alternative will be the provision of power supply from two dedicated feeders to ensure round the clock operations of filtration plants.

SCADA Plant Control System

Supervisory Control and Data Acquisition (SCADA) is a category of software application program for process control through real-time data gathering from remote locations to control equipment and conditions. SCADA allows unified control of a FP from a centralized location. It allows faster troubleshooting, reduced operating cost, and data logging to identify optimization opportunities. SCADA system installed at FP will ensure control of treated water pumping, filtrations, disinfection, and chemical treatment. SCADA monitoring and control system in this project will include the following equipment and software:

- Control and Monitoring System / Fault Monitoring System (CMS): Control and Monitoring of all major electrical equipment/components.
- Photovoltaic Monitoring System: Collection of all major monitoring parameters from individual PV power plants
- Plant Security System, Fire, and Gas Alarm System: Local and Remote Monitoring for Security Systems, Fire, Gas Alarm, and Detection System in line with an Alarm Management System, detailed interface to individual plants to be defined at a later stage and as per requirement.
- Performance of the FP.
- Water levels of Tanks and Chambers
- Performance of Online Residual Chlorine Analyzer and Online Conductivity Analyzer (TDS)
- Tabular Form will display in Tabular form.
- Alarms will be logged, acknowledged, and cleared out of the system

Construction Activities / Works

The construction activity will span over approximately three years. During construction phase, an estimated 700 persons consisting of both semi-skilled and skilled human resource will be required.

Development of Construction and Labor Camps

One of the first activities to be completed by the Contractor shall be the establishment of the construction and labor camps. The Contractor will also establish construction yards and sites including material storage areas, offices, workshops etc. These sites will be developed within the boundaries of FPs. Each campsite shall be built on approximately 1000 m^2.

Dismantling, Excavation and Civil Works

Major works at the existing FP sites will include:

- Dismantling of existing mechanical and electrical components including machinery, piping, scrapers, pumping arrangements, electrical panels, transformers, cables, cable trays, lighting and other components etc. Dismantled material will be the property of KWSC and will be scrapped as per the applicable official procedures.
- Excavation works (for new plants), construction of foundations and civil structures for Distribution Chamber, Rapid Sand Filter, Water Reservoir, Balancing Tank and Sand Traps, Sludge Thickener, Sludge Drying Beds, Bypass System, Administration Building, Chemical Building, Generator Room, Internal Roads, Landscaping & Transformer Foundations etc.
- Excavated material will be utilized mainly for backfilling at the FP sites.

Mechanical Works

Installation of mechanical equipment such as Pump with accessories such as valves, joints, flanges, air release valves, Backwash Pumping system, Air Scouring Blowers, Filter Gallery Sump pumps, Filtered water sample pump, Filter inlet sample pump, Alum Dosing Pumps, Chlorine dosing system, Distribution Chamber inlet and out let slide gates, Rapid Gravity Sand Filters, By-pass line, All Piping with complete accessories, Miscellaneous items including scrapers, exhaust fans, ducts, steel gratings, hatch covers, chequered plates, hand rails and safety fences etc.

Electrical Works

Installation of electrical equipment such as Transformers (1600kVA, 630kVA), Medium Voltage Switchgear (11kV) with complete accessories, bus bars, incoming vacuum circuit breakers, outgoing circuit breakers, Disconnecting switches, earthing switches, Protection numerical relays, wiring, etc., Medium Voltage Switchgear (3.3kV) with complete accessories, Lighting fixtures, Distribution Boards, conduits, wires, clamps, lighting poles, junction boxes etc., Complete Earthing Set (Earthing copper plates, conductor, Earthing Rods, Lightning rods, clamps etc.) boring, conduits, moulder, exothermic joints etc., Cables (MV, LV, XLPE, Armour),11kV, 3.3kV, 600/1000V Along with Protective earthing cores, Cable trays (Hot dip galvanized), cable ladders, Diesel Generator Sets (1500kVA), Bulk Storage Fuel tanks 3000 ltrs, generator sump pumps, Auto Refueling system, Fuel Transfer Pumps, Piping, Synch and Load sharing Panels etc.

Construction Machinery Requirement

The approximate number of construction machinery requirement for the project is presented in **Table A3-2**.

Table A3-2: Estimated Equipment and Machinery

No.	Machinery / Equipment	No. of Machines
1	Excavators	22
3	Loaders	14
4	Power Generators	14
5	Rollers	15
6	Tractor Trolley	30
7	Compactor / Roller	14

No.	Machinery / Equipment	No. of Machines
8	Crane	7
9	Concrete Pump	2
10	Vibro Hammer	20
11	Watering Tanks (moveable)	10
12	Haulage Trucks	15
13	Cars / Pickups	25

Access Roads for Filtration Plants

Access roads leading to the project's filtration plant sites are already existing and construction / allocation of new access roads will not be required. These access roads include the following:

Access Road for NEK-KIII

Access road from northern by pass link road leading to NEK K-III shall be utilized for the movement of construction machinery, material haulage and other construction vehicles to reach the site.

Access Road for NEK K-II

NEK K-II FP is accessible from university road, leading to Abdus Salam Road.

Access Road for Gharo FP

Road leading to Gharo FP from National Highway-05 shall be utilized for the movement of construction machinery, material haulage and other construction vehicles to reach the site.

Access Road for PIPRI (Old and JBIC) FPs

Eastern bypass road on National Highway-05 lead towards the PIRPI FP. This access road is mostly barren land and has no major settlements.

Access Road for COD FP

COD FP is accessible from road next to Bait ul Mukaram Masjid on University Road. This road shall be utilized for the movement of construction machinery, material haulage and other construction vehicles to reach the site.

Construction Material Requirement

During the construction phase, construction materials in considerable volumes will be required. Typical materials required for construction of FP are available locally and the same will be utilized. The common sources of the material required for civil works are described in the **Table A3-3**.

Table A3-3: Sources of Raw Material for Rehabilitation and Construction of New FP during Project Construction

No.	Raw Material	Source
1	Earth Material	Available locally in abundance in Malir / Korangi Area.
2	Aggregate	Available at many sources within the vicinity of the Malir / Korangi Area
3	Sand	Sand is available in the vicinity. Excavated soil from the rebuild FPs shall be reused for backfilling and other purposes, whereas surplus material may be sold to third party vendors with PIU approval.
4	Water	Water for construction works and workers is already available in abundance at all the FP sites and the Contractor will get water connections with KWSC approval in line with the contractual provisions.
5	Cement	Ordinary Portland Cement is suitable, which is available at various cement plants located near Karachi.
6	Reinforcement Steel	Steel re-rolling mills in Karachi meeting the standards from the billet produced either by Pakistan steel or others. These will serve the purpose of steel availability.
7	Electricity	Electricity supplies shall be made available at the sites through portable generators.
Source: MMP Project Experience		

Manpower Requirements during Construction Phase

Estimated manpower requirement during project's construction phase is estimated to be about 700 workers (100 persons for each FP site).

Manpower Requirements during Operational Phase

Estimated manpower requirement during operational phase at each site is provided in **Table A3-4**.

Table A3-4: Estimated Manpower requirement during Operational Phase

No.	Filtration Plant Name	Operational Phase Manpower
1	PIPPRI (JBIC) - 50 MGD	96
2	NEK (K-II) - 100 MGD	188
3	Gharo - 30 MGD	50
4	PIPRI (OLD 1&2) + Dumlotee - 105 mgd	238
5	COD – 180 MGD	188
6	NEK (K-III) - 100 MGD	188
Total		**948**

Resources and Waste Estimation

Table A3-5 and **Table A3-6** provide an estimate of the number of resources which are likely to be consumed and waste which is likely to be produced from each site.

Table A3-5: Estimate of Resources Consumption and Waste Production in Construction Phase

Resource	Unit	Per Capita	Project Daily	Construction Period
Water (For Construction)	m^3	-	66,150	48,289,500.
Water (For Workers)	m^3	0.08[2]	56	40,880
Electricity	kWh	5	3500	2,555,000
Domestic Solid waste	kg	1	700	511,000
Waste water	m^3	0.045	31.5	22,995

In addition to above, dismantled material and excavated material is also expected to be generated from construction activities. Dismantled material will be the property of KWSC and will be scrapped as per the applicable official procedures. Excavated material will be utilized mainly for backfilling at the FP sites. Quantity of excavated material expected to be generated is 100,000 m^3, whereas dismantled material is expected to be approximately 3000 tons.

Table A3-6: Estimate of Resources Consumption and Waste Production in Operational Phase

Resource	Unit	Per Capita	Project Daily	Project Annual
Water	m^3	0.05	47.4	17,301
Electricity	kWh	5	4,740	1,730,100
Solid waste	kg	1	948	346,020
Filtration Plant Sludge	ton	-	3.28 to 6	1200 to 2200
Waste water	m^3	0.045	42.66	15,570

Construction & Implementation Schedule

The implementation schedule is divided into three major tasks. Once the Contract is awarded, design of the project will begin. Technical Experts hired by the Contractor(s) will be responsible for the execution of work at site as per engineering design, construction drawings and technical specifications and proper quality control under the supervision of CSC.

During the design stage, the procurement of different components (Local and Imported) will be made by the Contractor(s). This needs to be done as soon as possible to complete the Project within the defined time span. Once the procurement is completed, the construction of FP, will start. Total duration of Design, Procurement and Construction will 24 months depending upon the capacity of FP (50 MGD to 100 MGD).

After substantial completion of FP, the testing and commissioning of works will be done.

[2] Water consumption in construction sites (Tropical Cities) – Research Paper - (https://www.researchgate.net/publication/297774249)

Annexure 4: Description of the Environment

The project sites are located in the jurisdictions of District East (COD FP), District Malir (Pipri Old, Dumlottee, Pipri JBIC, NEK (New) - K II FPs), Malir Cantonment (NEK – III FP) and District Thatta (Gharo FP).

Physical Environment of the Project Area

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 its proximity to the coastline, the climate of the project area is dominated by sea breezes producing pleasant weather throughout the year, with a generally high relative humidity. As shown in the wind rose diagram in **Figure A4-1**, winds for more than half the year, including the monsoons blow from south-west to west. The wind direction in winter changes to east and north-east. The hottest months are April to June whereas December and January are the colder months of the year. During the rainy season in July and August, it remains cloudy almost every day with generally light to heavy rainfalls influenced by monsoon weather system.

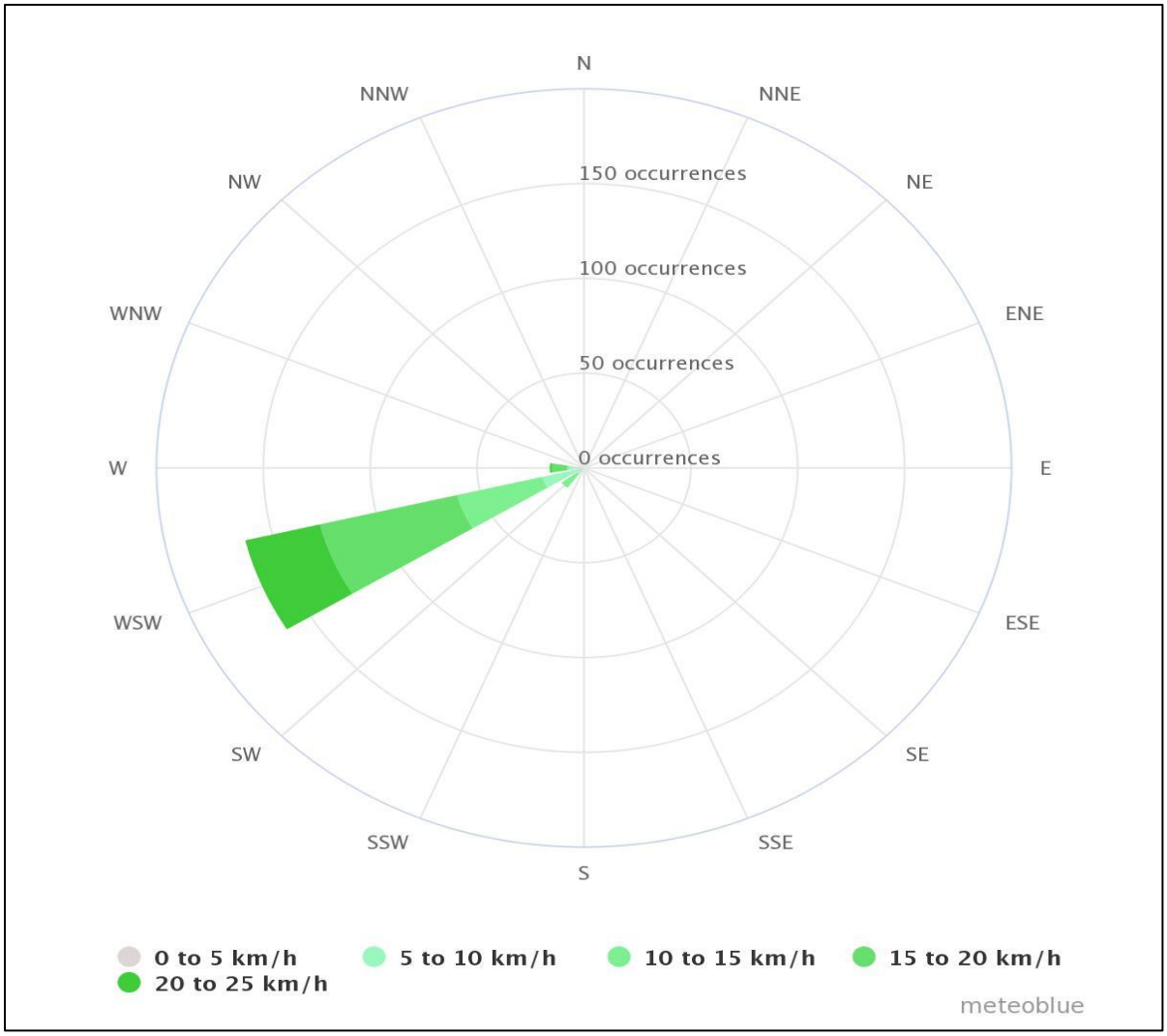


Figure A4-1: Wind Direction in the Project Area

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, it is noted that January and December are the colder months, and the daily day temperature varies between 28 to 31 °C, whereas for night time, between 07 to 08°C. The warmest months in the project area include April to June, with average day temperatures ranging from 40 to 41°C during daytime and between 21 to 26 °C during night time.

The 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, unusually hot, humid, or dry conditions may prevail from three to five consecutive days during summer season. Pakistan Meteorological Department (PMD) issues an early warning in case a heat wave is expected to occur in the city.

Since heatwaves have the potential to directly impact the health and performance of the site workers and make the workers susceptible to heat strokes, necessary mitigation measures shall be implemented during project implementation to protect the workers.

Geology and Soil

To acquire information about geotechnical parameters, KWSSIP carried out a series of test and boreholes at the locations of different FPs.

- **Gharo FP**: The deposition of the area mainly consists of ‘fine to coarse grained, sandy clay’, ‘fine to coarse grained, very dense, silty sand’, and ‘very weak to weak, partially weathered limestone’. Perched water was encountered at a depth 0.46 meters below the existing ground level in one of the boreholes drilled at site.
- **Pipri FP**: The deposition of the area mainly consists of ‘very dense, gravel’, ‘fine to coarse grained, medium dense to very dense, silty sand’, ‘fine grained, stiff to hard, silt’ and ‘partially weathered, limestone’. Ground water was encountered at a depth range of 2.6 – 3.6 meters below the existing ground level in two of the boreholes drilled at site.
- **NEK K-III and NEK Old FP**: The deposition of the area mainly consists of ‘medium dense to very dense, fine to coarse grained sand’, ‘very dense, fine to coarse grained, sandy gravel’ and ‘distinctly weathered, conglomerate’. Groundwater table was encountered at the depth range of 1.52 – 3.1 meters in the boreholes drilled at the project site.
- **COD FP**: Deposits of Limestone were found in all boreholes drilled on site, deposits of Shale were also found, however the quality is termed as very poor to poor. In addition to this groundwater was encountered at varying depths across the site but at an average of 4.3m.

Seismicity

Karachi is situated in a region where moderate earthquakes may occur of magnitude 5.0 to 6.0 equivalents to intensity between VII and VIII on Modified Mercalli Scale (M). As per Building Code of Pakistan 2007, project lies in Zone 2B. Zone 2B has Peak Ground Acceleration (PGA) is 6g to 0.24g for a return period of 475 years and is considered to be at ‘Moderate’ risk of a major earthquake event.

The project structures will be designed in line with the requirements of Zone 2B.

Environmental Monitoring

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

- One monitoring point for Pipri (JBIC, Old 1, Old 2 and Dumlotee) FPs located inside same boundaries near KWSC Colony - 24.8920°N / 67.3450°E
- One monitoring point (NEK-KII KWSC Colony) for NEK – KII and KIII FPs, both located within 5km radius - 24.9753°N / 67.1711°E
- One monitoring point for Gharo FP near KWSC Colony - 24.7710°N / 67.5689°E
- One monitoring point for COD near KWSC Colony - 24.9117°N / 67.0954°E

Air Quality Monitoring Zones / Coverage Area

Based upon the review of published literature[3] and 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. **Figure A4-2** shows location of sites.

[3] https://www.sciencedirect.com/book/9780124017337/fundamentals-of-air-pollution

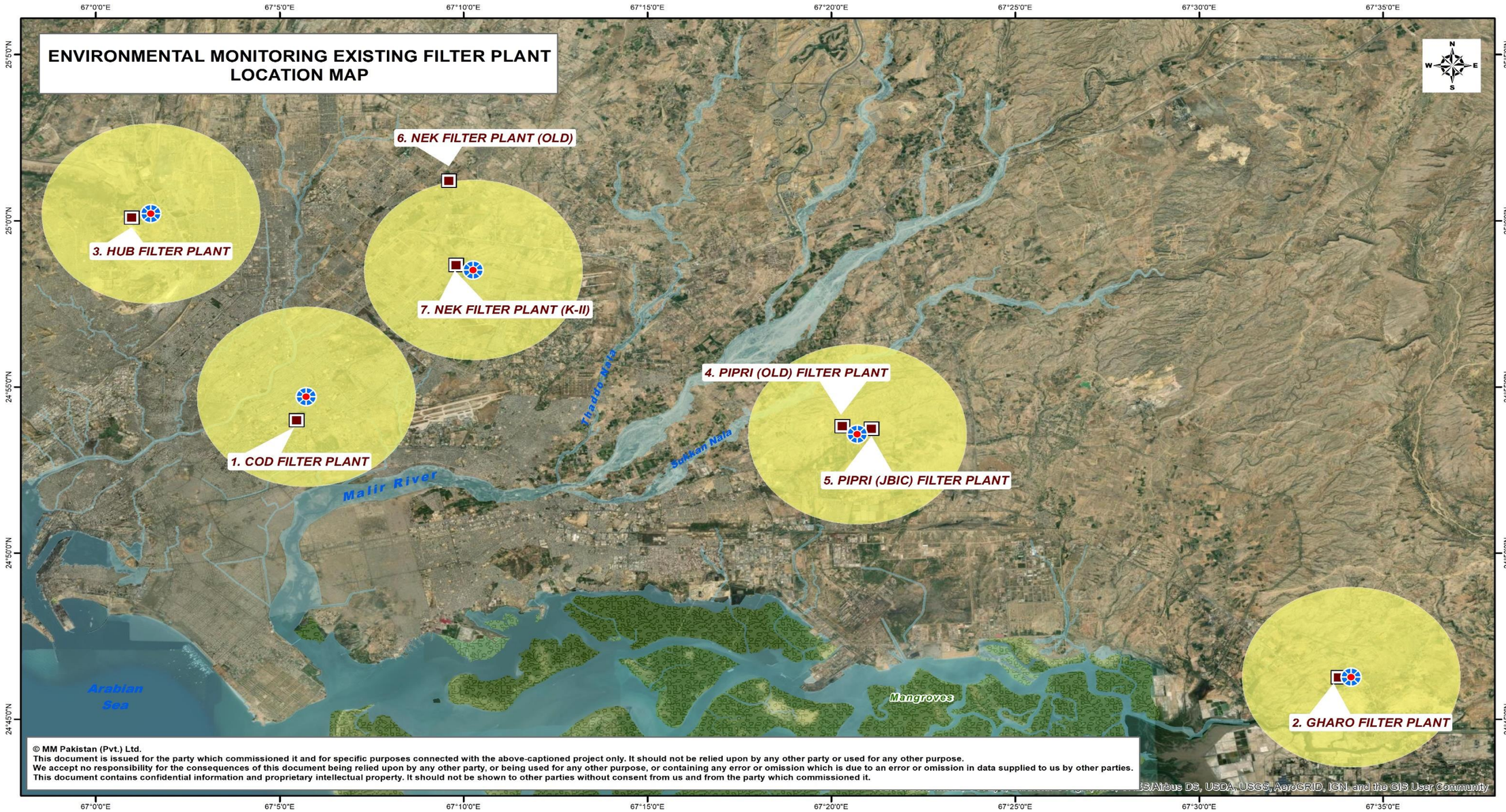


Figure A4-2: Environmental Monitoring Locations

Water Quality

Water quality sampling and analysis was performed at all the four monitoring locations. Water samples have been collected from taps whereas the main sources of water supply were the KWSC's colonies overhead water tanks. The testing was performed as per APHA methods. Results of the monitoring are given in **Table A4-1**. The results showed presence of bacterial contamination in all water samples, whereas all other parameters were found within the SEQS / WHO limits. The overhead tanks have not been cleaned and disinfected since long, which could be the major cause for the presence of bacterial contaminations in the sampled water. Generally, the water quality all over Karachi and especially the ground water is very poor due to the intrusion of sewerage into ground water aquifers. 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.

Table A4-1: Water Quality Result

No	Parameters	SEQs Values	WHO / WBG	NEK K-II, K-III	COD	Gharo	PIPRI (JBIC, Old, Dumlotee)
1	Color	< 15 TCU	< 15 TCU	1	2	2	1
2	Taste	Objection/Non-Objection	Objection / Non-Objection	Non Objection	Non Objection	Non Objection	Non Objection
3	Odour	Objection/Non-Objection	Objection / Non-Objection	Non Objection	Non Objection	Non Objection	Non Objection
4	Turbidity	< 5 NTU	< 5 NTU	1	<1	0.96	1.08
5	Total Hardness as CaCO3	< 500	-	135	150	105	165.58
6	Total Dissolved Solids (TDS)	< 1000	< 1000	321	348	356	319
7	pH @ 25^{o}C	6.5 - 8.5	-	7.78	7.57	7.16	7.56
8	Aluminum (AL)	<0.2	0.2	0.1	0.1	0.096	0.12
9	Antimony (Sb)	<0.005	0.02	ND	0.0032	0.0012	ND
10	Arsenic (Ar)	< 0.05	0.01	ND	0.03	ND	ND
11	Barium (Ba)	0.7	0.7	ND	0.47	0.13	0.189
12	Boron (B)	0.3	0.3	ND	0.18	0.098	0.096
13	Cadmium (Cd)	0.01	0.003	ND	ND	ND	ND
14	Chloride (Cl^{-})	< 250	250	76.43	94.297	65.28	68.96
15	Chromium (Cr)	< 0.05	0.05	ND	0.024	ND	ND
16	Copper (Cu)	2	2	ND	0.6	ND	0.896
17	Cyanide (Cn)	<0.05	0.07	ND	0.018	ND	ND
18	Fluoride (F)	< 1.5	1.5	0.951	1.32	0.758	0.25
19	Lead (Pb)	< 0.05	0.01	ND	0.01	ND	ND
20	Manganese (Mn)	< 0.5	0.5	ND	0.34	ND	ND
21	Mercury (Hg)	< 0.001	0.001	ND	ND	ND	ND
22	Nickel (Ni)	< 0.02	0.02	ND	0.01	ND	ND
23	Nitrate (N03)	< 0.50	50	ND	40	0.25	0.435
24	Nitrite (NO2)	< 3	3	ND	ND	0.63	ND
25	Selenium (Se)	0.01	0.01	ND	ND	ND	ND

No	Parameters	SEQs Values	WHO / WBG	NEK K-II, K-III	COD	Gharo	PIPRI (JBIC, Old, Dumlotee)
26	Residual Chlorine	0.2 - 1.5	-	0.32	0.032	0.272	0.152
27	Zinc (ZN)	5	3	1	2.2	0.065	1.05
28	Pesticides	0.001	-	ND	ND	ND	ND
29	Fecal Coliforms	0 Per 100 ml	0 Per 100 ml	36	47	39	48
30	E Coli	0 Per 100 ml	0 Per 100 ml	16	28	20	17
31	Total Coliform	Per 100 ml	0 Per 100 ml	52	75	59	65

Air Quality

Sampling was performed for a 24-hour period at each site following the SEQS for ambient air. **Table A4-2** shows the observed average concentrations for ambient air quality parameters and compares these with the SEQS and WHO / WB Standards.

Table A4-2: Ambient Air Quality Level

No.	Measuring Parameter	Unit	SEQs / WBG Limit	NEK K-II, K-III	COD	Gharo	PIPRI (JBIC, Old, Dumlotee)
1	Oxides of Nitrogen as NO	(µg/ m^3)	40	29	24.15	27	40
2	Sulfur Dioxide (SO2)	(µg/ m^3)	40	Nil	NIL	Nil	Nil
3	Carbon Monoxide (CO)	(mg/m^3)	4 (for 8 hrs)	Nil	1.8	Nil	Nil
4	Total Suspended Particulate (TSP)	(µg/m^3)	500	210.00	235	245	169.00
5	Particulate Matter (PM2.5)	(µg/m^3)	15	24.00	54.29	16.13	18.95
6	Particulate Matter (PM10)	(µg/m^3)	45	27.00	46.60	13.88	17.40
7	Ozone (O3)	(µg/m^3)	130	12	11	16	20
8	Lead (Pb)	(µg/m^3)	1.5	ND	ND	ND	0.01

It shows that PM2.5 values at all four locations and PM10 at one location are exceeding the standards, while other parameters were found within the limits. Since the sampling locations experience relatively traffic movement in their vicinities throughout the day, the major reason for excessive air pollutant levels is vehicular emissions. The level of vehicle fitness and the road conditions in Karachi are generally poor leading to excessive PM2.5 and PM10 emissions. As the air pollutant levels are already towards the higher side, 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 four monitoring locations for a 24-hour period at each site. At one location, the observed results have been found meeting the standards for day and night time noise standards. At other three locations, the observed values were found to be higher than the limits mainly due to regular traffic movement in the vicinity both in day and night time. As the observed noise levels in **Table A4-3** 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 A4-3: Noise Monitoring Results

No	Monitoring Location	Time	Category	Measured Values	SEQS	WBG
1	NEK K-II, K-III Filter Plant	Day	Res	54.18	55	55
		Night		48.07	45	45
2	COD Filter Plant	Day	Commercial	62.24	65	70
		Night		59.83	55	70
3	Gharo Filter Plant	Day	Res	55.29	55	55
		Night		46.21	45	45
4	Pipri FPs	Day	Res	55.9	55	55
		Night		48.5	45	45

Land Use

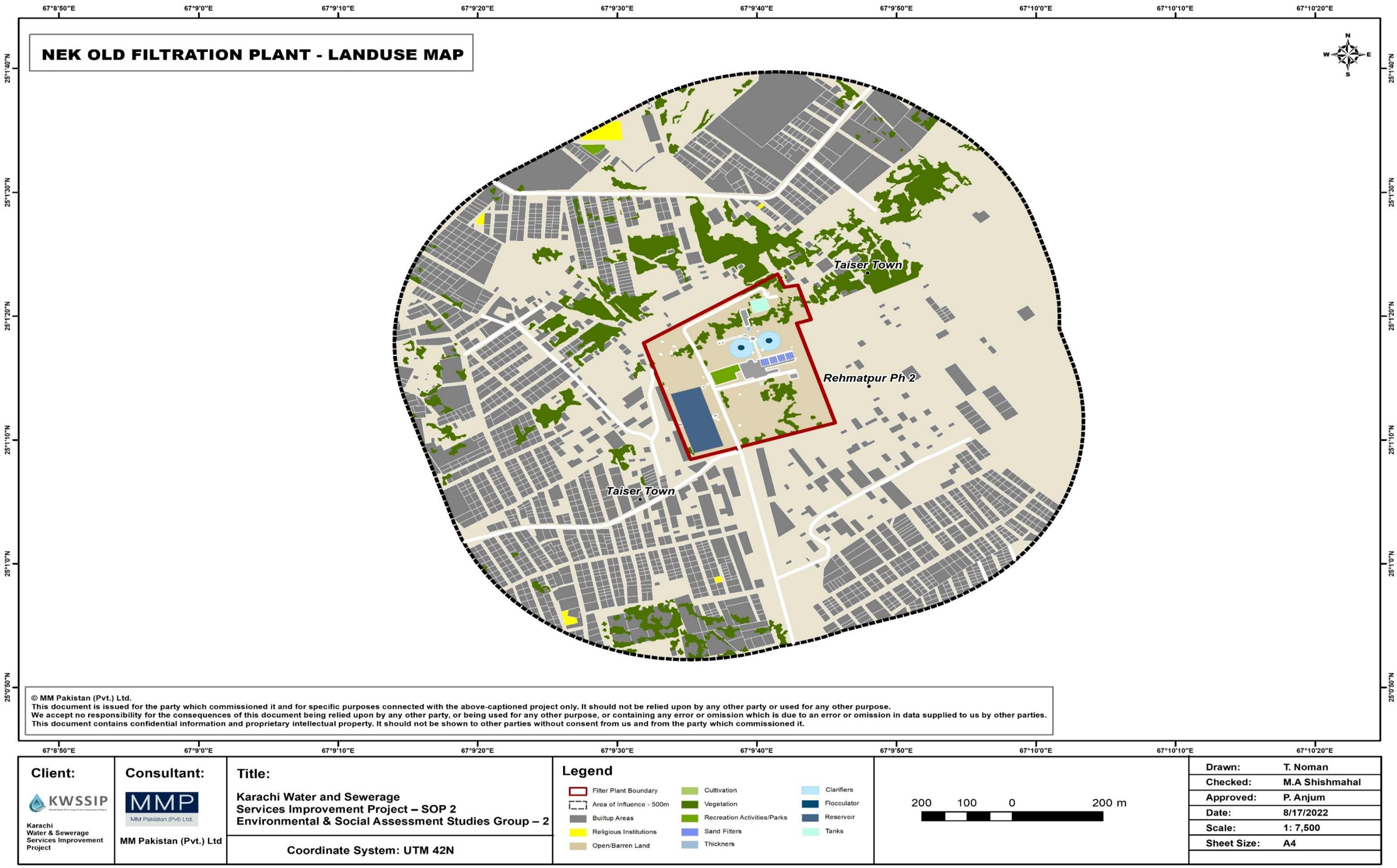
The land use around the FPs differs from each other. Pipri FP is surrounded by areas of mostly barren land with residential blocks of FP staff colony and a nearby village. At the NEK K-III site, a residential area known as Taiser town is located nearby whereas the site is mostly surrounded by barren land in abundance. The other predominant feature is the presence of shrub trees and bushes.

Gharo FP is surrounded by areas that have good green cover with trees, shrubs, and herbs. The dominant trees are *Azadirachta indica* (Neem), *Ficus benghalensis* (Bargad) and *Phoenix dactylifera* (Khajoor). A few settlements such as the FP staff colony and villages also exist outside the FP boundary. COD FP is mostly surrounded by residential and commercial settlements.

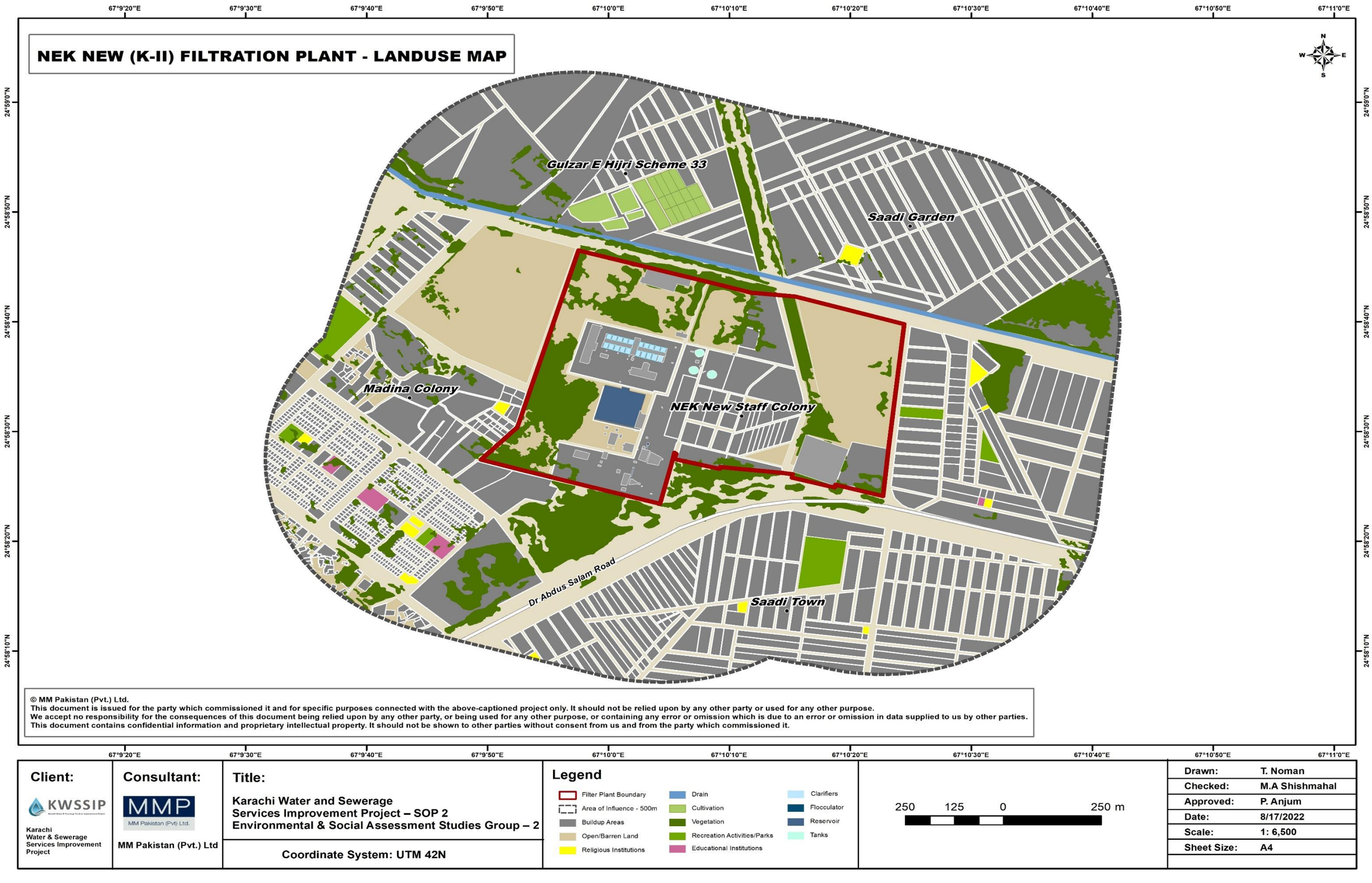
NEK K-II is surrounded by barren land and residential built up. Dr. Abdus Salam Road that leads to FP gate has Saadi town on its right and Madina Colony on its left. The premises have some vegetation cover which is evident from its land use map.

Land use maps for the project sites with 500-meter buffer radius are provided in **Figure A4-3.**

Figure A4-3: Land Use Maps for the Project sites with 500-meter Buffer Radius

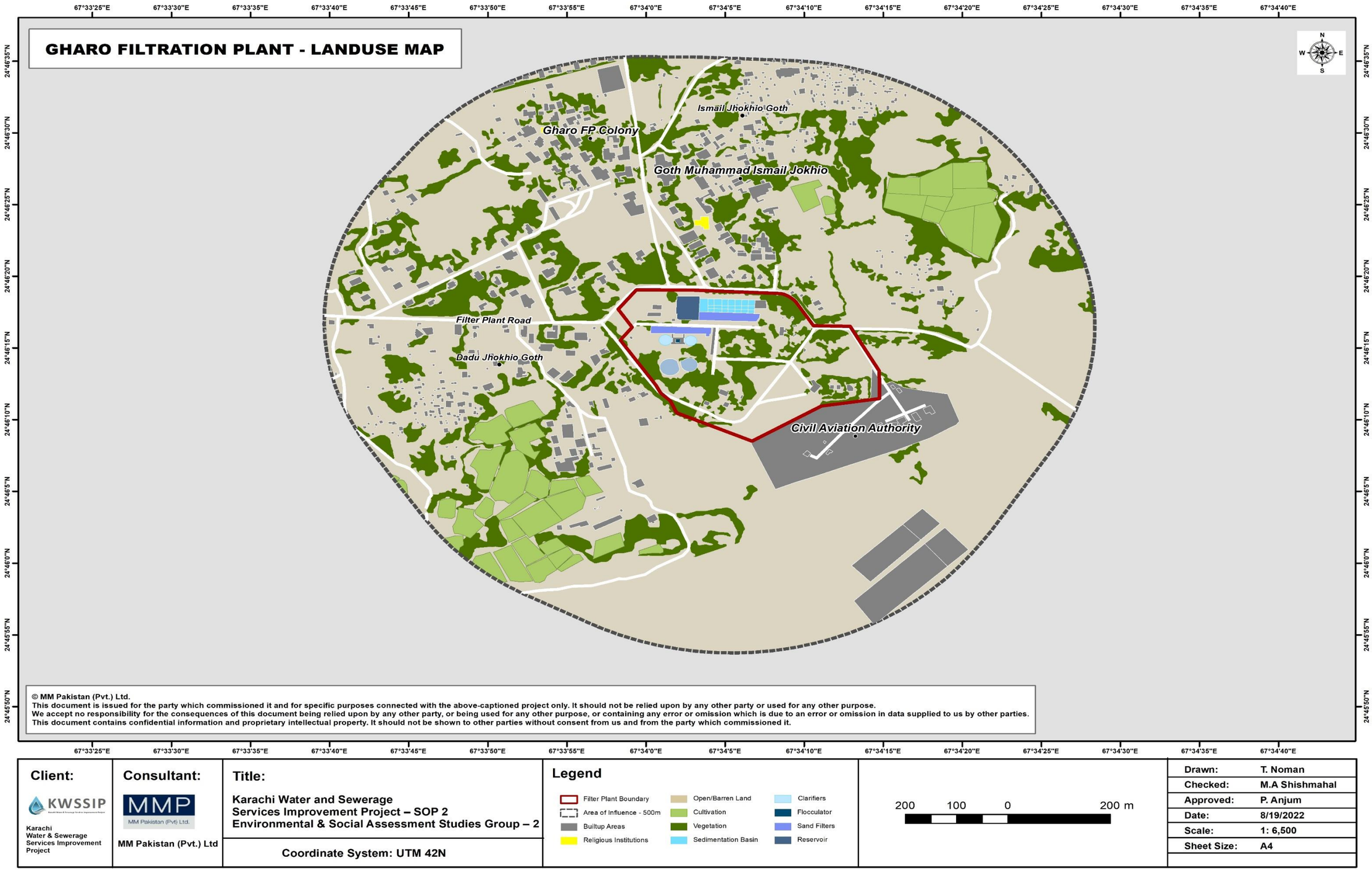


NEK (Old) Filtration Plant Land use Maps with Marked Buffer Radius

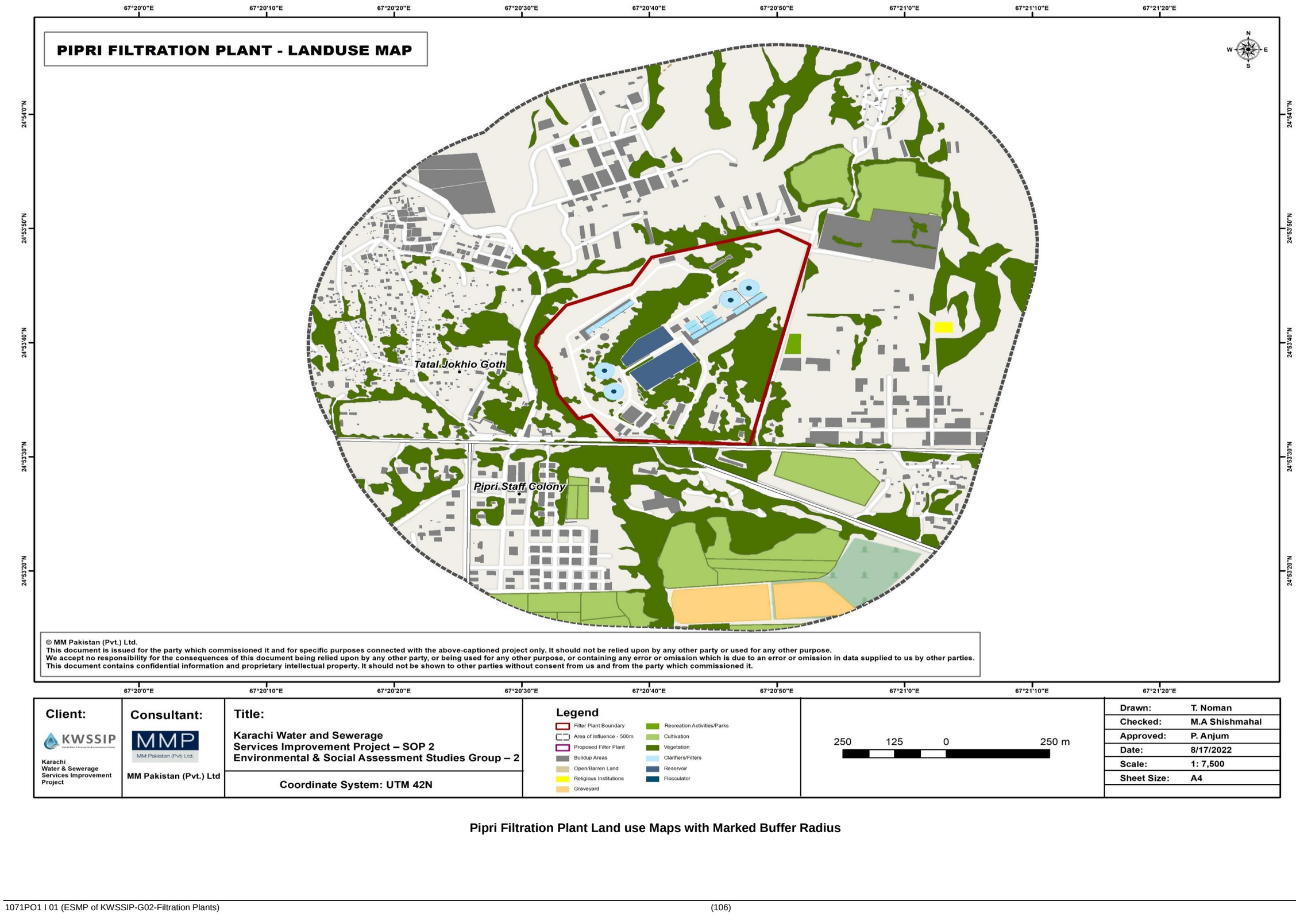


NEK (New) Filtration Plant Land use Maps with Marked Buffer Radius

COD Filtration Plant Land use Maps with Marked Buffer Radius



Gharo Filtration Plant Land use Maps with Marked Buffer Radius



Pipri Filtration Plant Land use Maps with Marked Buffer Radius

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:

- 22 to 23 December 2021 – COD FP,
- 06 to 09 February 2022 – NEK K-II and K-III FPs
- 01 to 05 March 2022 – Pipri and Gharo FPs

Flora

Data on flora was gathered through field surveys of the AoI and an inventory has been prepared for the trees that are growing within the main construction areas and shall require to be cut. The photographs of un-identified plants were photographed and identified later on using "PLANTNET" software. The natural vegetation within the filtration plant boundaries.

a) Pipri FP Complex

Trees: *Acacia nilotica (*Babool*), Albizia lebbeck (Siris), Araucaria columnaris (*Cook's Pine*), Azadirachta indica (*Neem*), Carica papaya (*Papaya*), Cassia fistula* (Amaltas), *Conocarpus lancifolious (*Conocarpous*), Cordia myxa (*Lasora*), Erythrina glabrescens (*Coral tree*), Eucalyptus sp. (*Safeeda*), Ficus elastica (*Rubber tree*), Ficus palmata (*Phagwara*), Guaiacum officinale (*Tree of life*), Mangifera indica (*Mango*), Moringa olifera (*Suhanjna*), Phoenix dactylifera (*Khajoor*), Pithecellobium dulce (*Jungle Jaleebi*), Plumeria obtusa (*Champa*), Plumeria rubra, (*Frangipani*), Syzygium cumini (*Jamun/ Java plum*), Ziziphus jujube (*Ber*).*

Shrubs: *Abutilon indicum* (Kanghi Booti), *Acalypha wilkesiana (*Fire Fiji Plant*), Aerva javanica* (Booh), *Barleria acanthoides (*Asad), *Bougainvillea spectabilis* (Great bougainvillea), Calotr*opis procera* (Ak), *Capparis decidua* (Karil, Karir), *Catharanthus roseus* (Sada bahar), *Ficus microcarpa (*Ficus), *Ixora coccinea* (Flame of the woods), *Jatropha integerrima* (Peregrina, Spicy Jatropha), *Murraya koenigii* (Karri patta plant), *Nerium oleander* (Oleander/ Ganira, Kunair), *Ocimum basilicum* (Niazbo), *Peristrophe paniculata* (Atrilal, Ubut kundri), *Prosopis glandulosa* (Jangli Kiker), *Pseuderanthemum reticulatum* (Gold-Veined Eranthemum), *Rosa indica* (rose), *Salsola imbricate* (Lana, Gora Lana, Hashok), *Salvadora persica* (khabar), *Suaeda fruiticosa* (Laani/ Laana), *Withania somnifera (Aksin), Ziziphus nummularia* (Jungle berr/ berry).

Herbs: *Anagallis arvensis (*Scarlet pimpernel*), Boerhavia procumbens (*Sentori), *Ipomoea cairica* (Messina creeper/ Mile a minute vine), *Canna indica* (Hakik), *Convolvulus glomeratus (*Clustered Bindweed), *Fagonia indica* (Dhamasa, Dhamana), *Ipomoea cairica* (Messina creeper/ Mile a minute vine), *Musa paradisiaca (*Banana/ keela), *Melilotis indica, Pavonia Arabica (*Arabian Swamp Mallow), *Senna holosericia*, (Jangli Sana), *Solanum albicaule (*Bittersweet nightshade), *Sonchus asper* (Sow thistles), *Tagetes erecta* (Marigold), *Trichodesma indicum* (Indian Borage),*Tridax procumbens (*Coatbuttons or tridax daisy), *Vernonia cinerea* (Little Ironweed).

Grasses/Sedges: *Cenchrus ciliaris (F*oxtail buffalo grass), *Chloris barbata* (Ganni, Jargi, Windmill Grass)*, Dactyloctenium aegyptium* (Egyptian crowfoot grass*), Phragmites australis* (Kaano).

b) COD FP

The following plant species were recorded during field visit:

Trees: *Araucaria columnaris* **(**Cook pine), *Azadirachta indica (*Neem*), Conocarpus lancifolious (*Conocarpous*), Delonix regia (*Gul e mohar tree*), Eucalyptus sp. (*Safeeda*), Ficus palmata (*Phagwara*), Ficus religiosa (*People*), Leucaena leucocephala, (*White lead tree*), Mangifera indica (*Mango*), Melia azedarach* (Baqain, *Phoenix dactylifera (*Khajoor*), Pithecellobium dulce (*Jungle Jaleebi*), Psidium guajava (*Amrood*), Polyathia longifolia, Syzygium cumini (*Jamun/ Java plum*), Ziziphus jujube (*Sufi beer).

Shrubs: *Achyranthes aspera* (Ubat kandi), *Aerva javanica* (Booh), *Bougainvillea spectabilis* (Great bougainvillea), *Calotropis procera* (Ak), *Ficus benjamina* (Kabar), *Ficus elastica* (Rubber tree), *Heliotropium rariflorum, Nerium oleander*, *Peristrophe paniculata* (Atrilal, Ubut kundri), *Prosopis glandulosa* (Jangli Kiker), *Salvadora persica* (khabar), *Ziziphus nummularia* (Jungle berr/ berry).

Herbs: *Anagallis arvensis* (Scarlet pimpernel), *Amaranthus virdis* (Chull), *Convolvulus glomeratus* (Clustered Bindweed), Euphorbia *hirta* (Asthma Weed), *Fagonia indica* (Dhamasa, Dhamana), *Senna holosericia* (Jangli Sana), *Sonchus asper* (Sow thistle), *Tephrosia purpurea* (Wild Indigo).

Grasses/Sedges: *Chloris barbata* (Windmill Grass), *Dactyloctenium aegyptium (*Egyptian crowfoot grass*).*

c) Gharo FP

The following plant species were recorded during field visit:

Trees: *Albizia lebbeck (*Siris*), Azadirachta indica(*Neem*), Bombax ceiba* (Simbal Simal*). Conocarpus lancifolious (*Conocarpous*), Eucalyptus sp. (*Safeeda*), Ficus benghalensis* (Bargad), *Ficus religiosa* (People), *Leucaena leucocephala* (White lead tree), *Mangifera indica (*Mango*), Manilkara zapota (*Cheeko*), Phoenix dactylifera (*Khajoor*), Pithecellobium dulce (*Jungle Jaleebi*), Plumeria obtusa (*Champa*), Plumeria rubra, (*Frangipani*), Prosopis glandulosa (*Vilayati keekar*), Syzygium cumini (*Jamun/ Java plum*), Tamarindus indica (Imli), Casuarina equisetifolia (*She oak*).*

Shrubs: *Abutilon indicum* (Kanghi Booti), *Acalypha wilkesiana (*Fire Fiji Plant*), Adenium obesum (*Desert rose*), Bougainvillea spectabilis* (Great bougainvillea), Calotr*opis procera* (Ak), *Capparis decidua* (Karil, Karir), *Catharanthus roseus* (Sada bahar), *Datura alba* (Tooh), *Ficus benjamina* (Kabar), *Ficus carica* (Injeer/ fig). *Ficus microcarpa (*Ficus), *Jatropha integerrima* (Peregrina, Spicy Jatropha), *Salsola imbricate* (Lana, Gora Lana, Hashok), *Salvadora persica* (khabar), *Suaeda fruiticosa* (Laani/ Laana), *Tamarix dioica (*Lai), *Withania somnifera (*Aksin*), Ziziphus nummularia* (Jungle berr/ berry)

Herbs: *Anagallis arvensis (*Scarlet pimpernel*), Amaranthus virdis (Chull), Boerhavia procumbens (*Sentori), *Cleome brachycarpa* (Ponwar), *Convolvulus glomeratus (*Clustered Bindweed), *Euphorbia hirta* (Asthma Weed), *Fagonia indica* (Dhamasa, Dhamana), *Portulaca oleracea (*Kulfe Ka Sag),

*Rhynchosia minima (B*urn-mouth-vine), *Senna holosericia*, (Jangli Sana), *Solanum albicaule (*Bittersweet nightshade), *Solanum nigrum* (Mako) *Sonchus asper* (Sow thistles), T*ridax procumbens (*Coatbuttons or tridax daisy), *Vernonia cinerea* (Little Ironweed),

Grasses/Sedges: *Cenchrus ciliaris (F*oxtail buffalo grass), *Chloris barbata* (Ganni, Jargi, Windmill Grass)*, Dactyloctenium aegyptium (*Egyptian crowfoot grass*), Phragmites australabalis* (Kaano).

d) NEK Old FP

The following plant species were recorded during field visit:

Trees: *Acacia nilotica (*Babool*), Albizia lebbeck (**Siris**), Araucaria columnaris (*Cook's Pine*)*, *Azadirachta indica (*Neem*), Conocarpus lancifolious (*Conocarpous*), Eucalyptus sp. (*Safeeda*), Ficus benghalensis (*Bargad*), Guaiacum officinale (*Tree of life*), Leucaena leucocephala (*White lead tree*), Mangifera indica (*Mango*), Manilkara zapota (*Cheeko*) Phoenix dactylifera (Khajoor), Pithecellobium dulce (*Jungle Jaleebi*), Plumeria obtusa (Champa), Syzygium cumini (*Jamun/ Java plum*).*

Shrubs: *Abutilon indicum* (Kanghi Booti), *Achyranthes aspera* (Ubat), *Aerva javanica* (Booh), *Bougainvillea spectabilis* (Great bougainvillea), Calotr*opis procera* (Ak), *Capparis decidua* (Karil, Karir), *Catharanthus roseus* (Sada bahar), *Datura alba* (Tooh), *Jatropha integerrima* (Peregrina, Spicy Jatropha), *Nerium oleander* (Oleander/ Ganira, Kunair), *Prosopis glandulosa* (Jangli Kiker), S*alsola imbricate* (Lana, Gora Lana, Hashok), *Suaeda fruiticosa* (Laani/ Laana), *Withania somnifera (*Aksin).

Herbs: *Amaranthus virdis (*Chull*), Convolvulus glomeratus (*Clustered Bindweed), *Euphorbia hirta* (Asthma Weed), *Fagonia indica* (Dhamasa, Dhamana), *Rhynchosia minima* (Burn-mouth-vine), *Senna holosericia*, (Jangli Sana), *Solanum albicaule (*Bittersweet nightshade), *Solanum nigrum* (Mako), *Sonchus asper* (Sow thistles).

Grasses/Sedges: *Cenchrus ciliaris (F*oxtail buffalo grass), *Chloris barbata* (Ganni, Jargi, Windmill Grass)*, Dactyloctenium aegyptium* (Egyptian crowfoot grass*)*

e) NEK KII FP

The following plant species were recorded during field visit:

Trees: *Azadirachta indica (*Neem*), Cocos nucifera (*Narial*), Delonix regia (*Gul e mohar tree*), Ficus elastica (*Rubber tree*), Leucaena leucocephala (*White lead tree*), Mangifera* indica (Mango), Moringa olifera (Suhanjna), Phoenix dactylifera (Khajoor), Pithecellobium dulce (Jungle *Jaleebi), Plumeria obtusa (*Champa*), Plumeria rubra, (*Frangipani)*, Ricinus communis (*Arand Castor-Oil Plant*), Syzygium cumini (*Jamun/ Java plum*), Tamarindus indica* (Imli), *Polyathia longifolia, Ziziphus jujube (*Ber*).*

Shrubs: *Abutilon fruticosum* (Texas Indian mallow), *Abutilon indicum* (Kanghi Booti), *Achyranthes aspera* (Ubat kandi), *Aerva javanica* (Booh), *Bougainvillea spectabilis* (Great bougainvillea), Calotr*opis procera* (Ak), *Capparis decidua* (Karil, Karir), *Caesalpinia bonduc* (Katkaranj, Khayah – I - iblis), *Catharanthus roseus* (Sada bahar), *Datura alba* (Tooh), *Ficus benjamina* (Kabar), *Ficus carica* (Injeer/fig), *Ficus elastic* (Rubber tree), *Ficus microcarpa (*Ficus), *Heliotropium rariflorum, Ixora coccinea* (Flame of the woods), *Jatropha integerrima* (Peregrina, Spicy Jatropha), *Murraya koenigii*

(Karri patta plant), *Nerium oleander* (Oleander/ Ganira, Kunair), *Peristrophe paniculata* (Atrilal, Ubut kundri), *Prosopis glandulosa* (Jangli Kiker), *Rosa indica* (rose), *Salsola imbricate* (Lana, Gora Lana, Hashok), *Salvadora persica* (khabar), *Suaeda fruiticosa* (Laani/ Laana), *Withania somnifera (Aksin), Ziziphus nummularia* (Jungle berr/ berry),

Herbs: *Anagallis arvensis (*Scarlet pimpernel*), Amaranthus virdis, (*Chull*), Boerhavia procumbens (*Sentori), *Cassia senna* (Senna-i-Makki), *Convolvulus glomeratus (*Clustered Bindweed), *Euphorbia hirta*, (Asthma Weed), *Fagonia indica* (Dhamasa, Dhamana), *Musa paradisiaca (*Banana*/* keela), *Portulaca oleracea* (Kulfe Ka Sag), *Rhynchosia minima* (burn-mouth-vine, Salunak, Lunak, Khurfa), *Senna holosericia*, (Jangli Sana), *Solanum albicaule (*Bittersweet nightshade), *Sonchus asper* (Sow thistles), *Solanum nigrum* (Mako, Kach-Mach), *Tephrosia purpurea, Tridax procumbens (*Coatbuttons or tridax daisy), *Vernonia cinerea* (Little Ironweed).

Grasses/Sedges: *Cenchrus ciliaris (*Foxtail buffalo grass), *Chloris barbata* (Ganni, Jargi, Windmill Grass)*, Dactyloctenium aegyptium* (Egyptian crowfoot grass*), Phragmites australis* (Kaano).

As per the survey, no endangered, threatened, or vulnerable plant species as per IUCN Red List of Threatened Species exists within the project sites. Generally, the FP sites have the following vegetation in abundance:

Acacia nilotica (Babur)*, Araucaria columnaris* (Cook pine), *Azadirachta indica (*Neem*), Conocarpus lancifolous* (Conocarpus)*, Delonix regia (*Gul e mohar tree*), Eucalyptus sp. (*Safeeda*), Ficus palmata (*Phagwara*), Ficus religiosa (*Peeple*), Leucaena leucocephala, (*White lead tree*), Mangifera indica (*Mango*), Melia azedarach* (Baqain, *Phoenix dactylifera (*Khajoor*), Pithecellobium dulce (*Jungle Jaleebi*), Psidium guajava (*Amrood*), Polyathia longifolia, Syzygium cumini (*Jamun/ Java plum*), Prosopis glandulosa* (Vilayati keekar*) and Ziziphus jujube (*Sufi beer).

a) Trees to be Cut

Around 1,857 trees of various species are growing in the AoI of project interventions. Out of these, approximately 263 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. Details of the trees that will require to be cut are provided under **Table A4-4**. The contractor will try to minimize the number of trees that have to be felled. No tree cutting will be allowed without prior written approval from CSC and prior information to the PIU. 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 Management Plan providing details on different aspects of compensatory plantation and to be followed by the contractor. The plan also includes an indicative cost calculated for compensatory tree plantation plan for the project which has been estimated as PKR. 1.44 million and it is also included in the Project's ESMP implementation Cost.

Table A4-4: Trees in DIA to be Cut for Construction Activities at Various FP Sites

No.	Name Of Species	Common Names	IUCN Status	No. of Trees
1	*Acacia nilotica*	Babur	LC	35
2	*Azadarichta indica*	Neem	LC	19
3	*Conocarpus lencifolius*	Cono	NT	41

No.	Name Of Species	Common Names	IUCN Status	No. of Trees
4	*Eucalyptus*	Safaida	NE	74
5	*Ficus religiosa*	Peeple	NE	21
6	*Phoenix dactylifera*	Date palm	NE	26
7	*Pithecellobium dulce*	Jungle jalebi/ Madras Thorn	LC	23
8	*Prosopis glandulosa*	Vilayati keekar	LC	24
Total				**263**

Tree Management Plan

The vegetation restoration plan has been proposed as detailed below for the management of biological resources in the Project Area:

As estimated during environmental study of the proposed project, 1857 trees of different species are growing within the FPs boundaries. It is estimated that 263 trees would be cut/uprooted during project execution. These trees may be cut only if it is assured that 10 plants will be planted for each cut tree i.e. total 2630 trees will be planted. The replenishment cost of Rs. 272,609 for raising one avenue mile (500 plants) of tree and their maintenance for 5 years, keeping the rate of daily wages as Rs. 700 per man per day (MD). The total replenishment cost of Rs. 1.44 million (5.26 avenue miles x Rs. 272,609) should be reflected in the bidding as well as contract documents related to project execution. During project implementation, it should be insured that the tree plantation has been carried out and appropriate arrangements have been made for its nourishment at least for five years after execution of the project as per recommendations of Forest/Wildlife Departments.

Contractor Responsibility

An inventory of trees cut by the contractor during execution of the works shall be maintained during construction. The contractor shall minimise the number of trees to be cut, making careful and selective pruning where possible to reduce the need for removal. Additionally, Contractor shall take every effort to avoid cutting of native trees such as neem, babbur and instead Eucalyptus or Conocorpus could be considered for cutting.

If it is necessary to cut a tree, then following measure shall be taken by Contractor:

The contractor shall clearly mark each tree that is required to be removed with a cross on all four sides using a highly visible paint. The marking shall be located at approximately 4.5 feet from the base of the tree.

The contractor shall prepare an inventory of all trees to be cut. The inventory shall include the following details for each tree:

- Reference number
- Location
- Species
- Girth
- Approximate height
- Photograph of tree

The contractor shall submit the inventory to the CSC, and no tree cutting shall be permitted until written approval is received from the CSC.

The CSC shall only approve tree cutting where a complete tree inventory has been submitted to the CSC detailing all trees included in the request. A joint visit between the CSC and the Contractor (or their representatives) shall be carried out to verify the inventory prior to approval.

Once the Contractor receives approval from the CSC he can proceed to cut the sanctioned trees and shall store them in a designated, secure storage area.

The Contractor shall maintain the tree inventory to include the number of cut sections of each tree and storage details of each section removed from site. The tree inventory shall be kept up-to-date and available on site.

The following or other suitable indigenous trees species would 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). In addition orchids may also be developed where feasible using drip irrigation techniques.

Plantation site shall be selected by Contractor in consultation with CSC, as there are ample space available within FP boundary, Contractor can plant trees with in FP after approval from KWSC.

Furthermore, Contractor shall also devise tree management plan which shall be reviewed and approved by CSC and PIU prior to cutting of any tree.

The total replenishment costs are provided from **Table A4-5** to **Table A4-9**.

Table A4-5: 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

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
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 A4-6: 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 A4-7: 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

No.	Description	Quantity	Rate (Rs.)	Man Days	Amount (Rs.)
8	Miscellaneous/ Unforeseen	Lump Sum			3,000
Sub-Total					**50,200**
Escalation @ 10%					**5,020**
Sub-total for 3rd year					**Rs. 55,220**

Table A4-8: 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 A4-9: 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=263
- Planting of trees for each uprooted tree =10
- Avenue miles = 263x10/500= 5.26

Cost for 5.26 avenue miles= Rs. 272,609x5.26= **1,433,923 (Rs. 1.44 Million).**

The plant species growing within filtration plants boundaries and their conservation status are provided in **Table A4-10**.

Tree Inventory and Conservation Status

Table A4-10: Plant species growing within Filtration Plants Boundaries and their Conservation Status:

No.	Name of Species	Common Names	IUCN Status	Pipri T1	COD T3 70MGD	COD T4 45 MGD	Gharo T5	NEK old T6	NEK-K.3 T7	NEK-K.2 T8
Trees										
1.	*Acacia nilotica*	Babur	LC	3				2		
2.	*Albizia lebbeck*	Siris	LC	17			9	3		
3.	*Araucaria columnaris*	Cook pine	LC	4	24			13		
4.	*Azadarichta indica*	Neem	LC	150	94	237	11	28	80	70
5.	*Bombax ceiba*	Simbal, Simal.	LC				1			
6.	*Carica papaya*	Papaya	DD	4						
7.	*Cassia fistula*	Amaltas	LC	2						
8.	*Casuarina equisetifolia*	She oak	LC				6		8	
9.	*Cocos nucifera*	Coconut palm	NE						15	21
10.	*Conocarpus lencifolius*	Cono	NT	44	6	34	62	24	10	
11.	*Cordia myxa*	lasura	NT	3		2				
12.	*Delonix regia*	Gul e mohar tree	LC		37					12
13.	*Erythrina glabrescens*	Coral tree	NE	1						
14.	*Eucalyptus citriodora*	Safeda	LC	12	4	3	6	19	35	
15.	*Ficus benghalenses*	Bargad	NE			2	7	2		
16.	*Ficus elastica*	Rubber tree	NE	2						3
17.	*Ficus palmata*	Phagwara, Anjir, Patguleri	NE	1	3					
18.	*Ficus religiosa*	peeple	NE		9		14			
19.	*Ficus virens*	Jangli Pipit, Man, Palakh	LC			112				
20.	*Guaiaum officinale*	Lignum	EN	4		4		17	16	
21.	*Leucaena leucocephala*	White lead tree	NE		37	94	3	2		10
22.	*Mangifera indica*	Mango/ Aam	DD	3	3	4	5	13	11	10
23.	*Manilkara zapota*	Cheeko	LC			9	1	9	7	
24.	*Melia azedarach*	Baqain	NE		12	8				
25.	*Moringa oleifera*	Moringa/sowanjhna	LC	5		3				5
26.	*Morus nigra*	Black Mulberry/ Shah Tut.	NE							
27.	*Parkinsonia aculeata*	Mexican Palo-Verde	LC			27				
28.	*Peltophorum pterocarpum*	Yellow Flame/Yellow Flamboyant	NE	1						
29.	*Phoenix dactylifera*	Date palm	NE	2	62	5	8	6	13	20
30.	*Pithecellobium dulce*	Jungle jalebi/ Madras Thorn	LC	4	2	10	2	3		5
31.	*plumeria obtusa*	Champa	LC	4			3	1		4
32.	*Plumeria rubra*	White champa	LC	2		1				3
33.	*Prosopis glandulosa*	Vilayati keekar	LC			1	2			
34.	*Psidium guajava*	Amrood	LC		1					
35.	*Ricinus communis*	Arand, Castor-Oil Plant.	NE							4
36.	*Syzygium cumini*	Jamun/ Java plum,	LC	3			3	7	6	12
37.	*Tamarindus indica*	Imli	LC			1	2			2
38.	*Terminalia catappa*	Badam	LC						3	
39.	*Polyathia longifolia*		NE		10					42
40.	*Ziziphus jujuba*	Sufi beer	LC	5	2					
	Total			**273**	**306**	**557**	**145**	**149**	**204**	**223**
Shrubs										
41.	*Abutilon fruticosum*	Texas Indian mallow	NE						X	X
42.	*Abutilon indicum*	India Abutilon	NE	X			X	X	X	X
43.	*Acalypha wilkesiana*	Fire Fiji Plant	NE	X					X	
44.	*Achyranthes aspera*	Ubat kandi	NE		X	X	X	X	X	X
45.	*Adenium obesum*	Desert rose	LC				X			
46.	*Aerva javanica*	Booh	NE	X	X	X		X	X	X
47.	*Barleria acanthoides*	Asad	NE	X						
48.	*Bougainvillea spectabilis*	Great bougainvillea	NE	X	X	X	X	X	X	X
49.	*Caesalpinia bonduc*	Katkaranj, Khayah-i-iblis.	LC						X	X
50.	*Calotropis Procera*	Aak	NE	X	X	X	X	X	X	X
51.	*Capparis decidua*	Karil, Karir	LC	X		X	X	X		X
52.	*Catharanthus roseus*	Sada bahar	NE	X			X	X	X	X
53.	*Datura alba*	Tooh	NE				X	X	X	X
54.	*Dracaena marginata*	Madagascar dragon tree	NE	X						
55.	*Echinops echinatus*	Indian globe thistle	NE							
56.	*Euphorbia milii var. milii*	Crown-of-thorns'.	LC						X	
57.	*Ficus benjamina*	Kabar	LC		X	X	X		X	X
58.	*Ficus carica*	Injeer/ fig	LC				X		X	X
59.	*Ficus elastica*	Rubber tree	NE	X	X	X	X			X
60.	*Ficus microcarpa*	Ficus	LC				X			X
61.	*Heliotropium rariflorum*	----	NE		X	X	X		X	X
62.	*Ixora coccinea*	Flame of the woods.	NE	X						X
63.	*Jatropha integerrima*	Peregrina, Spicy Jatropha	NE	X			X	X		X

No.	Name of Species	Common Names	IUCN Status	Pipri T1	COD T3 70MGD	COD T4 45 MGD	Gharo T5	NEK old T6	NEK-K.3 T7	NEK-K.2 T8
64.	*Murraya koenigii*	Karri patta plant	LC	X					X	X
65.	*Nerium oleander*	Oleander/ Ganira, Kunair	LC	X	X	X	X	X	X	X
66.	*Ocimum basilicum*	Niazbo	NE	X					X	
67.	*Peristrophe paniculata*	Atrilal, Ubut kundri	NE	X	X	X			X	X
68.	*Prosopis glandulosa*	Vilayati keekar	NE	X	X	X		X	X	X
69.	*Pseuderanthemum reticulatum*	Gold-Veined Eranthemum	NE	X						
70.	*Rosa indica*	rose	NE	X						X
71.	*Salsola imbricata*	Lana, Gora Lana, Hashok	NE	X			X	X	X	X
72.	*Salvadora persica*	khabar	LC	X	X	X	X		X	X
73.	*Sueda fruticosa*	Laani/ Laana	NE	X				X		X
74.	*Tamarix dioica*	Lai	NE				X		X	
75.	*Thelucactus sp.*	Cactus	NE							
76.	*Withania somnifera*	Aksan	NE	X			X	X	X	X
77.	*Ziziphus nummularia*	Jungle berr/ berri	NE	X	X	X	X		X	X
Herbs										
78.	*Agave americana*	century plant	LC							
79.	*Aloe vera*	Aloevera	NE							
80.	*Anagallis arvensis*	Scarlet pimpernel	NE	X	X	X	X		X	X
81.	*Asphodelus tenuifolius*	Onion weed	NE							
82.	*Amaranthus virdis*	Chull	NE		X	X	X	X	X	X
83.	*Boerhavia procumbens*	Sentori	NE	X			X			X
84.	*Canna indica*	Hakik	NE	X						
85.	*Cassia senna*	Senna-i-Makki	NE						X	X
86.	*Cleome brachycarpa*	Ponwar	NE				X		X	
87.	*Convolvulus glomeratus*	Clustered Bindweed	NE	X	X	X	X	X	X	X
88.	*Euphorbia hirta*	Asthma Weed	NE		X	X	X	X	X	X
89.	*Fagonia indica*	Dhamasa, Dhamana	NE	X	X	X	X	X		
90.	*Iphiona grantioides*	Cutch Inula	NE							
91.	*Ipomoea cairica*	Messina creeper/ Mile a minute vine	LC	X						
92.	*Melilotis indica*	---	NE	X						
93.	*Musa paradisiaca*	Banana/ keela	NE	X					X	X
94.	*Pavonia arabica*	Arabian Swamp Mallow	NE	X						
95.	*Portulaca oleracea*	Kulfe Ka Sag, Salunak, Lunak, Khurfa.	LC				X			X
96.	*Rhynchosia minima*	burn-mouth-vine	LC				X	X		X
97.	*Senna holosericia*	Jangli Sana.	NE	X	X	X	X	X	X	X
98.	*Solanum albicaule*	bittersweet nightshade	NE	X		X	X	X	X	X
99.	*Solanum nigrum*	Mako, Kach-Mach	NE			X	X	X	X	X
100.	*Sonchus asper*	Sow thistles	NE	X	X	X	X	X	X	X
101.	*Tagetes erecta*	marigold	NE	X						
102.	*Tephrosia purpurea*		LC		X	X	X		X	X
103.	*Tetraena simplex*	Alethi, Putlani	NE							
104.	*Trichodesma indicum*	*Indian Borage*	NE	X						
105.	*Tridax procumbens*	coatbuttons or tridax daisy	NE	X			X		X	X
106.	*Vernonia cinerea*	Little Ironweed	NE	X			X		X	X
Grasses										
107.	*Cenchrus ciliaris*	Buffalo Grass	LC	X			X		X	X
108.	*Chloris barbata*	Ganni, Jargi.	NE	X	X	X	X		X	X
109.	*Dactyloctenium aegyptium*	Egyptian crowfoot grass	NE	X	X	X	X		X	X
110.	*Phragmites australis*	Kaano	LC	X			X		X	X

Fauna

The data on the fauna was gathered through random sampling and observations at the FP sites, 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.

Terrestrial Mammals

The presence of mammals was recorded through direct sightings, their burrows, tracks and footprints through the surveys carried out at FP sites which are overall protected through boundary walls and fences. Additionally, local information about their presence has also been relied on for record. A total of eight species of mammals have 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 be naturally dispersed easily from one habitat to the other during construction activities.

List of the mammalian species observed in the AoI is given in **Table A4-11**.

Table A4-11: Mammalian Species Observed/Reported in the AoI

No	Common Name	Scientific Name	Gharo	Pipri	COD	NEK Old	NEK New	Common	Less Common	Rare	IUCN Listing
1	House Mouse	*Mus musculus*	x	x	x	x	x	x			LC
2	Five stripped-palm Squirrel	*Funambulus pennantii*	x	x	x	x	x	x			LC
3	Long-eared desert Hedgehog	*Hemiechinus collaris*	x	x	x			x			LC
4	Small Indian Mongoose	*Herpestes javanicus*	x	x				x			LC
5	Indian Gerbil	*Tatera indica*	x	x				x			LC
6	Little Indian field Mouse	*Mus booduga*	x					x			LC
7	Indian Grey Mongoose	*Herpestes edwardsi*	x	x	x			x			LC
8	House Rat	*Rattus rattus*	x	x	x	x	x	x			LC

Reptiles

A total of five 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 are capable of adapting to changes in their habitat.

A complete list of reptiles reported in the project area is provided as **Table A4-12**.

Table A4-12: List of Reptiles Reported in the Project Area

No.	Common Name	Scientific Name	Listing			Occurrence	Gharo	Pipri	COD	NEK Old	NEK New
			WP Act	IUCN Red list	CITES Appendix						
1	Indian Cobra	*Naja naja naja*			II	Less Common		x	x		
2	Indian Fringe-toed Sand lizard	*Acanthodactylus cantoris cantoris*				Common	x				
3	Saw scaled Viper	*Echis carinatus pyramidum*				Less Common	x	x			
4	Garden Lizard	*Calotes versicolor*				Common	x	x	x		
5	Spotted Indian House Gecko	*Hemidactylus brookii brookii*				Common	x	x	x	x	x

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 AoI during field surveys is provided in **Table A4-13**. 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 AoI. 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 A4-13: Birds Recorded / Reported in the Project Area

No	Common Name	Scientific Name	Status			Listing		
			Migratory	Resident	W P Act	IUCN Red List	CMS Appendix	CITES
1	Bank Myna	*Acridotheres ginginianus*		**x**				
2	Black Drongo / King Crow	*Dicrurus macrocercus*		**x**				
3	Black Kite	*Milvus migrans*		**x**	**P**			**II**
4	Blue Rock Pigeon	*Columba livia*		**x**				**III**
5	Collared Dove	*Streptopelia decaocto*		**x**				
6	Crested Lark	*Galerida cristata*		**x**				
7	Grey Partridge	*Francolinus pondicerianus*		**x**				

No	Common Name	Scientific Name	Status			Listing		
			Migratory	Resident	W P Act	IUCN Red List	CMS Appendix	CITES
8	House Crow	*Corvus splendens*		x				
9	House Sparrow	*Passer domesticus*		x				
10	House Swift	*Apus affinis*		x				
11	Indian Myna/Common Myna	*Acridotheres tristis*		x				
12	Indian Tree-Pie	*Dendrocitta vagabunda*		x				
13	Jungle Babbler	*Turdoides striatus*		x				
14	Koel	*Eudynamys scolopacea*		x				
15	Little Green Bee-eater	*Merops orientalis*		x				
16	Pied Bushchat	*Saxicola caprata*		x				
17	Purple Sunbird	*Nectarinia asiatica*		x				
18	Red-vented Bulbul	*Pycnonotus cafer*		x				
19	Red-wattled Lapwing	*Hoplopterus indicus*		x				
20	Rose-ringed Parakeet	*Psittacula krameri*		x				III
21	White-cheeked Bulbul	*Pycnonotus leucogenys*		x				

Critical Habitat

No critical habitat is present within the FP boundaries and in the AoI as the project sites are in urban setting and have been largely developed because of the existing FPs operations.

Social and Socioeconomic Baseline

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 ten (10) small and large communities that are located in the AoI of the project. These include KWSC Colonies at Pipri, NEK Old, Gharo and NEK KII FPs as well as other settlements including Tatal Jokheyo Village, Haji Dadu Jokheyo Village, Muhammad Ismail Jokheyo Village, Madina Colony and Shanti Nagar.

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 79 households as given in **Table A4-14**. During the survey, primary data has been collected from 10 communities through formal and informal consultations.

Table A4-14: Survey Locations in AoI

No.	FP	Colony/Settlement	District	Population	Household	Sample Size	Number of Participants	
							Male	Female
1	Pipri	Tatal Jokheyo	Malir	4800	600	8	8	0
2		KWSC Colony		1400	200	7	4	3
3	NEK Old	KWSC Colony	Malir Cantonment	560	70	8	5	3

No.	FP	Colony/Settlement	District	Population	Household	Sample Size	Number of Participants	
							Male	Female
4	Gharo	Haji Dadu Jokheyo	Thatha	256	32	8	5	3
5		KWSC Colony		994	142	7	4	3
6		Muhammad Ismail Jokheyo		720	60	12	8	4
7	NEK	Madina Colony	East	1080	180	6	3	3
8	New	KWSC Colony		2660	380	7	4	3
9	COD	KWSC Colony		3200	400	8	5	3
10		Shanti Nagar		672	84	8	5	3

Socioeconomic data was collected through questionnaire in **Figure A4-4** and also with the help of secondary sources.

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Health

Health facilities	Total Numbers in district
District Hospitals	
BHU	
RHC	
MCH	

What major water brown disease are observed in the district?

_____
_____
_____
_____

What measures are taken by the health department/Ministry to overcome these diseases?

_____
_____
_____
_____

What would be the social or environment impacts on peoples by the implementation of this project?

1. _____
2. _____
3. _____

How your institution can help to this project for increasing its efficacy for the public interest

1. _____
2. _____
3. _____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Education

Total no of primary schools in district	Girls	Boys
Estimated enrollment		
School having washroom facilities		
Schools having drinking water facilities		

What kind of problems you are facing with current sewerage system /how it is effecting to the enrollment in schools

_____
_____
_____
_____

Through this project implementation, how it would benefit you/education department

_____
_____
_____
_____

Any campaigns are runned by education department or any other institution on health and hygiene if yes what was the campaigns?

_____
_____
_____
_____

Any suggestions

_____
_____
_____
_____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Fisheries

What are the effects/problems facing the fisherman's due to untreated sewer water wasted in marine

_____
_____
_____
_____

What kind of water born disease are they facing?

_____
_____
_____
_____

What kind of skin disease they are facing due to direct exposure to marine water?

_____
_____
_____
_____

How this project will impact on fisherman's community?

_____
_____
_____
_____

What are your suggestions?

_____
_____
_____
_____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

Questionnaire for Institutional Consultation

Name of department _____ **District** _____

Name of consulted representative _____**Designation** _____

Agriculture

The vegetables cultivated on waste water are good enough for health ❑ Yes ❑ No

If yes then how

_____
_____
_____
_____

If no then wat are the adverse effects of these on health

_____
_____
_____
_____

How departmentally these are these are prohibited

_____
_____
_____
_____

How this project will effect on improving the public health?

_____
_____
_____
_____

Any suggestion or recommendation

_____
_____
_____
_____

Name of interviewer _____ **Date** _____ **Designation** _____

Name of interviewer _____ **Date** _____ **Designation** _____

KWSSIP
Karachi Water & Sewerage Services Improvement Project

MMP
MM Pakistan (Pvt) Ltd.

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

_____

_____

KWSSIP
Karachi Water & Sewerage Services Improvement Project

MMP
MM Pakistan (Pvt) Ltd.

Socio-Economic profile

(Focus Group Discussion)

1. Geographical information

Locality_____ Tehsil/Town_____ District _____

2. Population

Estimated population_____ No. HH_____

Family system

❑ Joint (in percentage) ❑ single_____

Structure of Housing

❑ Kachaa ❑ Pacca ❑ Kacha and Pacca

3. Ethnicity

S. No	Communities	No./Percentage (approx.)
Total		

4. Languages

❑ Sindhi ❑ Urdu ❑ Pashto ❑ Srieky ❑ Others _____

5. Major occupations

S. No	Occupation	Percentage

6. Educational facilities

Description	No. of institution				In case of no. nearest to the locality
	Girls	Boys	Girls	Boys	
Primary school					
Middle school					
High school					
Colledge					
Madersa					
Other (specify)					

7. Health facility

❑ Facility within village _____

❑ Government hospital _____

❑ BHU _____

❑ Mother and child care Health unit _____

❑ Dispensary _____

❑ Hakeem / Practitioners _____

8. Common Diseases in Village

❑ Malaria ❑ Typhoid ❑ Polio ❑ TB ❑ Diarrhea ❑ Haptitas

❑ Skin diseases ❑ Eye Diseases ❑ Any other) _____

9. Civic infrastructure

Type of Amenity	Available in the village	Available in nearby village/locality	Distance from the village
Electricity			
Water supply/Tap water			
Sui-Gas			
Fuel cylinder			
Filling station (patrol/Gas)			
Fuel Agency			
Cable Television			
Access to internet			
Telephone (land line)			
Post office			
Bank			
Mosque			
Graveyard			
Other			

10. Source of drinking water

Tap water/ water supply	Hand-pump	Bottled water	Public Filtration plant	Stream /canal	Others

Water table (ft) _____

Quality of table water for drinking

Excellent	Good	Unfit

11. Sewerage system availability in in locality ❑ Yes ❑ No

If not then where do you disposes your sewerage

Open pit	Septic tank	Open drain	Pipe	Socking pit	Other

Do you have any system for collection of solid waste ❑ Yes ❑ No

a) If yes give details _____

b) If No, then where do you dump your waste _____

Leadership Patterns

12. Who is the most influential person in the village

Designation	Name
MNA/MPA	
UC Member	
Village elder	
Teacher	
Cast/family elder	
Religious leader	
Other	

13. Conflict resolving patterns

How conflicts are resolved

Jirga	Tribal/cast/head	Family head	Court	Any other

14. Women participation

S. No	Activities	Participation Tick (yes/No)	Hours per day	% of Contribution
1.	House Hold			
2.	Child caring			
3.	Farming/crop activities			
4.	Livestock raring			
5.	Sale and purchase of goods			
6.	Produce products			
7.	Do formal jobs			
8.	Others			

a) Women contribute in HH income ❑ Yes ❑ No

If yes, how

_____

_____

b) Are women consulted in decision making matters ❑ Yes ❑ No

If yes, in what matters?

c) Is there any industry in your village or in the vicinity? ❑ Yes ❑ No

If yes which industry?

15. Does any NGO or CBO exist in the area? ❑ Yes ❑ No

If yes: explain their names and activities?

Do there exist any vulnerable households in the area ❑ Yes ❑ No

Widows	Handicapped	Homeless	Others

16. Specify the nearest facility or amenity? (KM)

❑ Police station ❑ Grain Market ❑ Cattel Market ❑ Other

State the pressings needs of the area

Any development in progress at your village regarding community benefit

Community perception about the project

Any specific observations

a) _____

b) _____

Facilitator: _____ **Date:** _____

Facilitator: _____ **Date:** _____

Figure A4-4: Questionnaire

Administrative Setup

The project area falls into four administrative areas, which include District Malir and District East Karachi, District Thatta and Malir Cantonement.

Population

In the surveyed communities, it is observed that a significant majority of families choose to live in close-knit and joint family setups. This choice is driven by various factors, including economic constraints, strong familial bonds, and adherence to traditional cultural values.

Vulnerable Groups and Poverty

Except few lower middles to middle-class communities residing in KWSC Colonies, 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 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 AoI is Sindhi, Pathan, Muhajir and Baloch which belongs to the lower-to-lower middle class having limited earning sources. Females are mostly remains busy with 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.

Ethnic Structure

The ethnic system exerts a profound influence on the economic and social endeavours of individuals, particularly within the project area. It significantly shapes the opportunities and challenges faced by people, impacting their livelihoods and social interactions. There are various castes and sub castes in the area. The most common ethnic groups found in consulted settlements are presented in **Table A4-15**.

Table A4-15: Ethnic Structure

No	Ethnic Group	%
1	Pathan	30.7
2	Jokhio	27.5
3	Baloch	24.8
4	Sheikh	5.9
5	Memon	1.3
6	Other	9.8
Total		**100**

Language

In the Project's AoI, Urdu, Sindhi and Pushto were found to be the dominant languages. Some respondents speak other languages as well. Statistics are shown in **Table A4-16**.

Table A4-16: Language

No	Ethnic Group	%
1	Sindhi	46.4
2	Urdu	28.8
3	Pashto	16.3
4	Other	8.5
Total		**100**

Religion

The majority religion is Islam, of 96% of the population near the FPs.

Economic Condition

Local Economy

Though the consulted settlements are highly dense and have many small-unpaved roads, yet they are accessible for both 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. They can be categorized as low-income earners. Many people are earning their livelihood by working with the departments and companies working in the industrial units based in Bin Qasim Town. While many residents of Tatal Jokheyo, Muslim Goth and Ismail Jokheyo and Shanti Nagar also work in various professions as drivers, gardeners, sweepers, security guards, and house maids. The consulted village type settlements around the FPs have seen a large increase in labor class. Most of the community members of the consulted settlements are working in informal sectors.

Apart of industrial units in the vicinity of some settlements, important features of the economy of the region include agricultural activity and labor.

Industry

Malir and Thatta Districts are also known as the hub of the industrial sector as many large industries are established here. Yet, the living standards of its inhabitants are some of the lowest in the city. The type of industries that are commonly found near the consulted settlements are textiles, food, pharmaceuticals, iron, and ceramics. The famous ones are: (i) Thatta Cement Company (ii) Abdullah Shah Ghazi Mills; (iii) Dewan Sugar Mill; (iv) Al-Abbas Industries; (v) Dewan Industries; (vi) Graib Sons and other industries.

Bin Port Qasim is also situated near the project area that is mainly used for bulk cargo and particularly serving for shipment of steel mills and other industrial products.

Agriculture

Agricultural activities have been continuously degraded, due to rapid urbanization in the area and lack of water in the Malir River. Agriculture is restricted to only some areas. Most of the farmers belong to

the Tatal Jokheyo, Muslim Goth and Ismail Jokheyo. During Kharif season wheat is grown, whereas principal crop during rabbi are vegetables and fodder.

Thatta district is suitable for sugarcane and rice crops. In addition to the said crops; sunflower, rape plant and mustard are also grown as dobari. Mash and masoor pulses are also suitably grown in the area.

Occupational Structure

Occupational structure of the respondents was studied during the field survey. The statistics regarding occupational status of the respondents is presented in **Table A4-17**. The results showed that majority of the surveyed communities belongs to working class.

Table A4-17: Occupational Status

No	Occupational Status	%
1	Labor	33.3
2	Business/ Shopkeeper	20.9
3	Government Job	16.3
4	Farmer	14.4
5	Private Job	7.8
6	Driver	2
7	Any other	5.2
Total		**100**

Monthly Income of the Respondents

The surveyed communities consist predominantly of families with larger household sizes, typically ranging from 8 to 12 members. These extended family structures reflect the cultural and social dynamics within the community, where multiple generations often reside together and share a common living space. The young adults of these families are associated with the different professions to earn their livelihood. Many of them are associated with labor as well as working in hotels and different shops. Income distribution details of respondents are given in **Table A4-18**. The results shown that majority of the respondents belong to lower-to-lower middle-income class with monthly earnings up to PKR 30,000.

Table A4-18: Monthly Income of the Respondents

No	Average Monthly Income (Rs.)	%
1	Up to 17,500	30.1
2	17,501 - 30,000	51.6
3	30,001 – 50,000	15.7
4	50,001 – 75,000	2
5	75,000 – 100,000	0.7
6	Above 100,000	0
Total		**100**

Expenditure of the Respondents

Household expenditure depends on the earning. The average monthly expenditures of respondents is shown in **Table A4-19**.

Table A4-19: Expenditure of the Respondents

No	Expenditure	%
1	Up to 17,500	29.4
2	17,501 - 30,000	56.2
3	30,001 – 50,000	11.8
4	50,001 – 75,000	2
5	75,000 – 100,000	0.7
6	Above 100,000	0
Total		**100**

Social Infrastructure and Services

Access to Social Amenities in the Project Area

The results of the survey revealed that majority of the respondent households are connected with electricity water supply and all other necessities. Details are provided in **Table A4-20**.

Table A4-20: Social Infrastructure

No	Facility	%
1	Electricity	98
2	Water Supply	89.5
3	Sewerage	65.4
4	Dispensary/ hospital	91.5
5	School	94.8
6	Metalled Road	65.4
7	Graveyard	98

Quality of Health Facilities

During the socio-economic survey it has been recorded that the surveyed areas are facing challenges due to poor quality of health facilities.

Quality of Education Facilities

Quality of education has reported to be reasonable in schools located in KWSC Colonies.

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).

Ownership Status of the Houses

Respondents were asked about their housing ownership status in order to know their level of living standard as reflected in **Table A4-21**.

Table A4-21: Ownership Status of the Houses

No	Type of Ownership of House	%
1	Owner	58.8
2	Renter	41.2
Total		**100**

Table A4-22 shows construction pattern of houses in Project Area.

Table A4-22: Housing Construction Pattern

No	Type of House	%
1	Pacca	70
2	Semi Pacca	28.8
3	Katcha	1.3
Total		**100**

Source of Drinking Water

Unavailability of clean water is one of the problems being faced by the residents of concerned settlements around the FPs especially in Tatal Jokheyo, Muslim Goth and Haji Dadu Jokheyo where quality of water was reported to be poor.

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 and outskirts. Now there are only a few cases of mobile snatching and other petty street crimes. Currently the law-and-order condition is much better, and no abnormal situation has been reported by the respondents except occasional cases of mobile snatching.

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 Mutual understanding (Council of elders) system and second is the Police and government judiciary 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.

Acceptability of the Proposed Project

As shown in the **Table A4-23**, majority of the respondents shown acceptance of the proposed project keeping in view the benefits it will offer to the residents of the city.

Table A4-23: Acceptability of the Proposed Project

No	Acceptability of the Proposed Project	%
1	Yes	98
2	No	2
Total		**100**

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 enumerators.

Table A4-24 indicates the women participation level.

Table A4-24: Women Participation in the Various Activities

Activity	Percentage (%)
Household	84.5
Employment	6.5
Livestock	4.1
Farming	4.9
Total	100

Level of Education

Table A4-25 illustrate that level of formal education of female respondents. It has been recorded that the consulted female respondents were only educated with basic education and the level of being highly educated was found to be minimal.

Table A4-25: Level of Formal Education of Respondents

Education Level	Percentage (%)
Primary	42.3
Middle	19.5
Matric	9.8
Higher secondary school certificate	1.6
Bachelor of Arts (BA)	1.6
Masters of Arts (MA)	0.8
Un-educated	24.4
Total	**100**

Decision Making Process

Of the total women involved in the focus groups, most of these respondents were involved in decision-making process regarding important issues of sale and purchase of property, for schooling and marriages of their children. However, a vast majority of women were of the view that beside all the discussions regarding decision-making, final decision power lies with the male head of the family. A small number of respondents had the right to ownership of the property. These findings are indicative of the conditions for other women in the project area.

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

Karachi generally has a high incidence of gender-based violence not only due to poverty, lack of education, and lack of awareness but also because of severe shortcomings in the drive to improve women's lives. Measures taken by civil society and non-governmental organizations are often frowned upon as representing liberal and/or anti-Islamic values. Thus, the society-level support needed for the success of remedial programs is often quite weak.

In this scenario, the female respondents identified some facts during the survey on GBV, SEA/SH Prevention and Response which are as under:

- As overall in the consulted settlements population and ethnicity is mixed in some areas the Pashtun and Baloch communities are settled. They have the same customs, values and restrictions for the women.
- One of the participants of village Shanti Nagar expressed that Violence against women in our settlements is prevalent because of misguided and misinterpreted local teaching regarding culture and religion. Religious and cultural values are often used as a means of controlling women in the family. Such control by men over women has brought up many issues related with GBV such as domestic violence, sexual violence, and traditional harmful practices which include dowry, genital mutilation.
- One of the participants of the Madina Colony told us that GBV is widespread. It affects both men and women but is most often perpetrated by men against women and girls, with more than one in three women having experienced some form of physical or sexual violence during their lifetime.
- In all the consulted villages women participate in household decisions, but not in major decisions of property buying and selling as well as having the property ownership rights.
- In most of the project area, the harassment cases in street and domestic violence was reported to be infrequent, however in rare cases it does happen. The people in the area indicated high respect for women. Evan then some of the participants expressed following problems during fight against sexual harassment and gender-based violence:
  - unexpected costs through litigation
  - loss of confidence among the colleagues
  - damaged relationships with employer
  - increased absenteeism and presentism among workers
  - difficulty securing workers for shifts
  - reduced health and safety
  - difficulty recruiting new staff and upskilling and promoting existing staff

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 Environmental & Social Impacts and Mitigation Measures

Potential impacts arising from design, construction and operation phase of Rehabilitation of Existing and Construction of New Filtration Plants Project have been identified and assessed on the basis of field data, secondary data, experts' opinion and examining previous similar projects in Pakistan. These impacts include effects on physical, biological and socio-economic environments.

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:

Risk = Likelihood × 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
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

Consequence	Definition	Score
Minor	No or 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- Asian Development Bank - 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	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic,Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Lack of appropriate E&S personnel with CSC, and Contractors	Likely	Moderate	Medium	Short Term
2	Inappropriate Planning for Construction Traffic Routes	Likely	Major	Medium	Short Term
3	Improper location of worker camps leading to environmental and social issues	Likely	Major	Medium	Short Term
4	Land acquisition and resettlement impacts	Unlikely	Moderate	Low	Long Term

Critical Risk Level

Significant Risk Level

Medium Risk Level

Low Risk Level

Lack of Appropriate Environment and Social Personnel with PIU, CSC and Contractors

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.

Mitigation Measures

Appropriate E&S personnel are essential to implement, supervise, and monitor the ESMP, Site Specific Environmental Social Management Plan (SSESMP), Occupational Health and Safety (OHS) Plan, Community Health and Safety (CHS) Plan and other plans specified in this document. Mitigation measures include:

- PIU shall recruit qualified CSC and Contractors who are able to implement the Project's Environmental, Social, Health and Safety requirements as per the desired standards.
- Education, qualification and experience requirements of personnel (Section 7.8.2) shall be included in the bidding documents and considered by the supervision consultant when they give approval to the Contractor.
- PIU shall ensure that Contractors with poor environmental, health, and safety management shall not be hired.
- PIU shall ensure that Contractor's qualifications as stated in this ESMP to be included as the pre-qualification criteria in the short-listing process.
- PIU shall ensure that the conditions of the ESMP are correctly reflected in the contractor's bidding documents and the supervision consultant's ToR.
- PIU – KWSSIP shall ensure inclusion of ESMP in the bidding documents.
- PIU - KWSSIP shall ensure that the project contractors are selected on merit and necessary funds have been allocated in the Contract documents for ESMP implementation and monitoring.
- Guidelines for the preparation of above-mentioned plans are discussed.

Inappropriate Planning for Construction Traffic Routes

Impacts

The construction traffic will need to utilize the access roads. This may cause nuisance to the general traffic and could result in traffic congestions.

Mitigation Measures

- PIU / CSC / Contractors in collaboration with the Sindh Traffic Police will devise a Traffic Management Plan (TMP) to minimize the expected disruption at the identified access roads.

- 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

Impacts

- Disturbance to privacy of nearby communities.
- Community exposure to Labor Influx; Gender Based Violence, Sexual Exploitation and Abuse (SEA) / Sexual Harassment (SH)
- Improper Sewage and Waste Disposal
- The duration of the construction activity for the project is expected to be 24 months and approximately 700 skilled / unskilled workers will be engaged. Influx of these workers could affect project areas negatively in terms of excessive utilization of public infrastructure, utilities, housing and social dynamics if labor camps are not sited properly.
- There are chances that the migrant workers may travel to nearby communities for visiting shops etc., hence creating chances of interactions with the local communities.
- The influx of workers may result in women harassment events, sexual exploitation and or bring communicable diseases to the project area.

Mitigation Measures

- Campsite locations proposed in this ESMP (See Section 3.5.1) are located within the boundaries of filtration plants selected for rehabilitation / construction under the project. 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. KWSC staff colonies as well as all other settlements are located outside the FPs boundaries.

- The Contractor in collaboration with the PIU / CSC will make use of proper planning while establishing the labor camps to ensure that camps are away 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.
- Contractor shall prepare a Workers Camp Management Plan (CMP) and a Labor Management Plan (LMP) and ensure its effective implementation.
- Other necessary measures shall include:
- 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, GBV / SH.
- Contractor shall provide on-site anti-harassment trainings to create awareness of the harmful effects of GBV, as well as consequences if GBV occurs according to the anti-harassment policies.
- Construction crew will avoid entering settlements.
- Provision related to SEA/SH/GBV will be incorporated in the bidding document,
- Engagement of skilled trainers shall be done to raise awareness among project workers of the risks, expected behaviours, and consequences of violations, communicated through training, and publicized codes of conduct.
- The Contractor shall raise awareness of the risks among community members and local health authorities and inform them about available grievance mechanisms.
- Extensive training for awareness raising strategy which describes how workers and local communities will be sensitized to SEA and SH risks, and the worker's responsibilities under the COC.
- 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 trainings 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.

Land Acquisition and Resettlement

Keeping in view the existing project design, no resettlement, land acquisition or livelihood disturbance is envisaged due to project activities.

Construction Phase

Screening of potential impacts during the construction phase of the project are provided in **Table A5-2**.

Table A5-2: Screening of Possible Impacts during Construction Phase

No.	Potential Issue	Likelihood(Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic,Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Inadequate Implementation of ESMP, OHS, CHS and Other Specific Plans.	Likely	Major	Significant	Short Term
2	Temporary Disruption in Supply of Water	Unlikely	Moderate	Low	Short term
3	Occupational Health & Safety	Likely	Major	Significant	Short term
4	Communicable Diseases - COVID- 19 and Camp Management	Likely	Major	Medium	Short term
5	Employment of Child Labor	Likely	Major	Medium	Long Term
6	Employment Generation	Overall Positive			
7	Dust Emissions	Likely	Moderate	Medium	Short term
8	High Noise Levels from Construction Activities	Likely	Moderate	Medium	Short term
9	Solid Waste Management - Generation of Excavated Material, Kitchen Waste, Hazardous Waste	Likely	Major	Significant	Short term
10	Untreated Disposal of Effluent from Worker Camps	Likely	Moderate	Medium	Short term
11	Soil Contamination	Likely	Moderate	Medium	Short term
12	Improper Site Restoration	Likely	Major	Medium	Short term
13	Community Health & Safety	Likely	Major	Significant	Short term
14	Labor Influx / SEA – SH – GBV Incidents	Likely	Moderate	Medium	Short term
15	Vegetation Loss and Disturbance to Fauna	Likely	Moderate	Medium	Short term
16	Cultural Heritage Sites	Unlikely	Moderate	Low	No residual Impact
17	Stakeholders Concerns and Engagement	Unlikely	Moderate	Low	No residual Impact

Critical Risk Level

Significant Risk Level

Medium Risk Level

Low Risk Level

Inadequate implementation of ESMP, OHSMP, CHSMP and Other Plans

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.

Mitigation Measures

- The Contractor will recruit qualified and experienced Environment, Health, Safety and Social Staff in line with the requirements mentioned in Section 7.8.2, to manage E&S aspects of the project.
- The Contractor shall be required to define Environmental, Social, Occupational & Community Health and Safety procedures for all works in method statements, including excavation, backfilling, camp operations, management of noise, dust, and use of Personal Protective Equipment (PPEs) etc., and shall prepare and implement Site Specific Environmental Social Management Plan (SSESMP), OHS Plan, CHS Plan and other required plans based on the ESMP guideline. These procedures and plans shall be approved by the PIU and CSC before the Contractor commences any physical works on ground.
- Recruitment of qualified and experienced EHS and Social Management Staff so that compliance of the ESMP could be ensured. Section 7.8.2 enlists the required experience and qualifications of the CSC / Contractor's Environment, Health, Safety and Social (EHSS) Staff, which shall be hired at the project during construction phase.
- PIU - KWSSIP shall review the Contractor's capacity with respect to safeguard management and contracts shall be awarded accordingly. It shall be ensured that the Contractors that do not possess the required capacity for E&S safeguards management must not be pre-qualified and selected.

Temporary Disruption in Supply of Water

Impacts

During rehabilitation and re-construction of filtration plants, the consumers may face temporary disruption in supply of water.

Mitigation Measures

According to the Technical Consultants, disruption of water supply during construction phase is not anticipated as all the existing FPs are equipped with by-pass lines. Therefore, termination of water supply for construction works will not be needed.

Occupational Health & Safety and Emergency Preparedness & Response

Impacts

- Occupational Health and Safety risks related to the project, shall mainly be associated with the project's construction phase as the workers will be exposed to a number of physical hazards such as accidents related to the use of heavy equipment and cranes, falling of objects, trip and fall

accidents near excavations, heat stress / heat stroke occurrences during extreme hot weather, fires at construction sites, increased levels of dust and noise at sites, confined spaces inside pipes and hazards related to welding works such as; Electrical hazards, Heat related risks, Fire related risks, Asphyxiation risks, Fumes / respiratory risks and Gas use and storage risks etc.

- In case, if the working hours are not regulated properly, the risk of accidents could increase due to the higher probability of fatigue.
- Communicable diseases such as COVID-19 may be introduced due to the migration of workers associated with the project.

Mitigation Measures

- Before initiating construction activities, the Contractors shall prepare Occupational Health and Safety (OHS) Management Plan in accordance with national / local regulatory frameworks. The OHS plan would include OHS Policy Statement, OHS Organization, SOPs for all works, Hazard Identification and Risk Management, requirement of conducting Job Hazard Analysis and preparing Method Statements containing OHS aspects, OHS training requirements, incident recording and reporting protocols, and the OHS plan needs to be approved by the supervision consultant before start of construction.
- The Health & Safety Framework by the World Bank will be followed by the PIU-KWSSIP and the Contractors, and reflected in OHS plan.
- Specific mitigation guidelines for dealing with various hazards associated with the proposed construction activities as well as guidelines for the preparation of OHS Plan.
- Established occupational health and safety protocols on COVID19 i.e., Health & Safety of Building and Construction Workers - Issued by Ministry of National Health Services, Regulations and Coordination, GoP - April 2020 shall be followed.
- Contractor shall prepare an Emergency Preparedness and Response Plan (EPRP) as part of the OHS Plan to contain larger emergencies.
- PIU shall work with the national / provincial emergency response services to ensure any external emergency response arrangements (Fire, Ambulance, Epidemic Control etc.), if the resources available with the Contractor are not sufficient to contain any such emergencies.
- At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital.
- At every workplace and construction camp, proper equipment and paramedical staff will be provided.
- The Contractor shall maintain site safety and install hard barricading, flexible green net, signboards, and temporary safety and traffic diversions throughout the construction period and provide personal protective equipment (PPE) to all the workers working at the construction sites.
- Zero tolerance to loss of life policy shall be developed and implemented by the Contractor.

- Contractor shall ensure organization of Health and Safety trainings for all site personnel throughout the construction period. In case any workers get affected by accident in the form of injury or fatality, they or their legal heirs shall be compensated by following Sindh Workers Compensation Act, 2015.
- In case accident in the form of injury or fatality affects any workers, they or their legal heirs will be compensated by following Sindh Workers Compensation Act, 2015.

Communicable Diseases - COVID- 19 and Camp Management

Impacts

Communicable diseases such as COVID-19 may be introduced due to the immigration of workers associated with the project.

Mitigation Measures

The Contractor shall ensure the following measures:

- Health screening of workers at the time of their induction as well as on periodic basis will be carried out.
- Implementation of health and safety protocols on COVID19 i.e. Health & Safety of Building and Construction Workers - 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;
- 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;
- Contractor shall implement ECP 10: Construction Camp Management;
- Cleaning staff shall be appointed for maintaining cleanliness at Campsites.

Employment of Child Labor

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.

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;

- 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 700 employment opportunities shall be created during the construction period.

Dust Emissions

Impacts

- Local air quality shall 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.

Mitigation Measures

- Immediate removal of excavated material so that their emission, runoff and accumulation on roadsides could be avoided.
- Water sprinkling to restrict emissions of dust that could arise due to the movement of construction vehicles.
- Limiting speeds of construction vehicles in the project area.
- Regular trainings of the drivers to ensure implementation of speed limits.
- Project's Grievance Redress Mechanism shall deal with any public complaints related to dust generation as a result of construction traffic movement and shall resolve the complaint on immediate basis.
- All heavy equipment and machinery shall be in best working conditions and 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 shall be covered with tarpaulin.
- Limitations to speeds of such vehicles as felt necessary. Transport through densely populated area shall be avoided.
- Project traffic to keep speeds low at the project sites and access roads.
- Dust emissions due to road travel shall be minimized through good construction practices (such as keeping stock piles down wind and away from communities), covering loose material with tarpaulin and sprinkling water over the access road.

- Dust control measures would consist of proper construction materials planning, dust management planning, and water spraying where needed.

High Noise Levels from Construction Activities

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 higher noise levels at the project sites and can have effects on the people nearby the project sites. These increased noise levels will however prevail only for a short duration during the construction phase.

Mitigation Measures

- Installation of signboards at prominent locations to provide awareness to the project workers and drivers about speed control and minimized use of horns.
- 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 in order to avoid probable dispersion of noise to the nearby communities.
- Construction equipment 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.
- 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, Domestic Waste, Hazardous Waste

Impacts

During construction phase the major waste streams will include dismantled and excavated material from the project sites and domestic waste from construction camps, hazardous waste including used oil filters, used oils from workshop and small quantities of clinical waste resulting from first aid treatments.

Mitigation Measures

- 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.
- 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.
- Fuel storage areas, hazardous material 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.
- Domestic waste from the camp will be disposed to the nearest SSWMB waste disposal bins.

Untreated Disposal of Effluent from Worker Camps

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.

Mitigation Measures

- The Contractor will 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.

Soil Contamination

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.

Mitigation Measures

- The Contractor will 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 shall 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 shall also be placed at impervious floors bunded with parapet walls.
- Appropriate arrangements and presence of shovels, plastic bags and absorbent materials shall be ensured near fuel, oil storage and vehicles / equipment parking areas.

Improper Site Restoration

Impacts

In case the temporary sites such as campsites 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 users due to damaged site conditions, debris, dismantled material, spoils, excess construction materials, oil spills etc.

Mitigation Measures

Following are the main activities envisaged for removing all part of the facilities and restoring the intervened areas:

- Dismantling and full removal of worksite facilities and camps, including worker rest areas, store rooms, drinking water utilities, 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.
- 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.
- Addition of topsoil where necessary.

Community Health & Safety

Impacts

General public could become susceptible to the following health and safety risks during construction activities pf the project:

- Traffic congestion due to construction works and diversions;
- Dust and noise;
- Interaction with machinery and equipment;

Mitigation Measures

- Contractor shall prepare Community Health and Safety Plan based on construction methods and specific hazards in line with the framework.
- Contractor shall plan, provide, and maintain suitable perimeters and barriers at locations where it is necessary to separate the public and others from the work.
- Contractor shall ensure setting up of its machinery on the roads for construction works in such way that it will not hinder the public traffic to the maximum possible extent and will not compromise the 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 / marshaller 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 at access roads and project sites for dust suppression;
  - Transport material to and from the construction sites when the public are less likely to be at the access roads.

Labor Influx / SEA – SH – GBV Incidents

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.
- The skilled labor employed from outside the project area may cause some antipathy among the local people and outsiders.

Mitigation Measures

- To avoid conflicts with local people on employment matters, the contractor shall preferably employ more local people **for skilled**, semi-skilled, and unskilled work. This will reduce pressure on resources such as residential and health facilities;
- 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;
- 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).
- Contractor shall provide on-site anti-harassment trainings to create awareness of the harmful effects of GBV, as well as consequences if GBV occurs according to the anti-harassment policies.
- Workers will avoid entering nearby residential settlements.
- Engagement of skilled trainers shall be done to raise awareness among project workers of the risks, expected behaviors, and consequences of violations, communicated through training, and publicized codes of conduct.
- The Contractor shall raise awareness of the risks among community members and local health authorities and inform them about available grievance mechanisms.
- Extensive training for awareness raising strategy which describes how workers and local communities will be sensitized to SEA and SH risks, and the worker's responsibilities under the CoC.
- The routes/places used by the women will be avoided as far as possible. If unavoidable, alternate routes will be identified for the communities.
- Code of conduct (CoC) for workers and employees will be enforced for the protection of local communities, gender-based violence, other social issues, flora and fauna and a ban on tree cutting and hunting etc. Any violation of the COC will lead to strict punishment including termination of employment;

- 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 will be ensured in line with Security Management Guidelines for Contractors are attached as Error! Reference source not found..
- 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;

Vegetation Loss and Disturbance to Fauna

Impacts

About 263 trees growing in the Direct Impact Area (DIA) under the AoI as d, shall be cut for the execution of construction activities. Details of the trees to be cut are provided in **Table A5-3**. 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.

Table A5-3: Trees in DIA to be Cut for Construction Activities

No.	Name of Species	Common Names	IUCN Status	No. of Trees
1	*Acacia nilotica*	Babur	LC	35
2	*Azadarichta indica*	Neem	LC	19
3	*Conocarpus lencifolius*	Cono	NT	41
4	*Eucalyptus*	Safaida	NE	74
5	*Ficus religiosa*	Peeple	NE	21
6	*Phoenix dactylifera*	Date palm	NE	26
7	*Pithecellobium dulce*	Jungle jalebi/ Madras Thorn	LC	23
8	*Prosopis glandulosa*	Vilayati keekar	LC	24
Total				**263**

Mitigation Measures

- A project specific Compensatory Tree Plantation Plan shall be prepared by the Contractor based upon the Tree Plantation Plan.
- According to the Tree Plantation Plan;
  - The Contractor shall make inventory of the trees that shall require 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 and KWSC in consultation with Local Government Department, Forest Department, District Administration etc. before clearance of trees.

- Seed supply, nursery, watering and any other necessary arrangements should be 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);
- 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 government regulations.

Cultural Heritage Sites

Impacts

There are no reported cultural heritage, archeological sites or buildings located within the filtration plant sites which are listed in 'Cultural, Tourism, Antiquities and Archives Department – Government of Sindh (GoS) – List of Heritage Buildings' or 'UNESCO World Heritage list'.

Mitigation Measures

Contractor shall however 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

Impacts

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

Mitigation Measures

- 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	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic,Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Long Term, Short Term)
1	Handling of Sodium Hypochlorite / Sulphuric Acid / Other Hazardous Chemicals and Overall OHS Management	Likely	Major	Medium	Long Term
2	Generation of Sludge / Domestic Waste and Disposal	Likely	Major	Medium	Short Term
3	Improved Drinking Water Availability	Positive			

Critical Risk Level

Significant Risk Level

Medium Risk Level

Low Risk Level

Handling of Sodium Hypochlorite / Sulphuric Acid / Other Hazardous Chemicals and Overall OHS Management

Impacts

The filtration process at the FPs will involve use of Sodium Hypochlorite for disinfection and Alum & Sulphuric Acid for pH stabilization. Hazards associated with these chemicals include the following:

- 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.
- Sulfuric Acid (H_2SO_4) is a corrosive substance, destructive to the skin, eyes, teeth, and lungs. Its severe exposure can result in death. It is a strong oxidant that reacts violently with flammable, and combustible materials.
- Severe exposure to Alum could lead to skin and eye irritation.

Mitigation measures

PIU – KWSSIP shall prepare OHS Management Procedures based upon the following mitigation measures and Filtration Plant In-Charges will implement them throughout the operational phase:

- Chemical storage area shall be designated for safe storage of all hazardous / non-hazardous chemicals, and it shall be equipped with proper ventilation arrangements.
- Containers shall be labelled, and Material Safety Data Sheet (MSDS) shall be posted at prominent locations.
- Emergency contact numbers for calling Police, Ambulance and Fire Services shall be posted at prominent locations of the FPs.
- Workers shall be provided with hazard information and trainings on safe handling of Sodium Hypochlorite, Sulphuric Acid and Alum.
- Workers shall wear all essential PPE's while dealing with Sodium Hypochlorite, Sulfuric Acid, Alum or other chemicals and will avoid longer exposure to any of these chemicals.
- Handling of Sulphuric Acid will strictly require restricting generation of vapors or mists as well as workers exposure to the misting vapors.
- For acid storage, unlined Mild Steel cylindrical tanks shall be utilized. Automatic controls shall be provided for the dosing pumps. A globe control valve with an electromagnetic flowmeter with indication is proposed for the adjustment of diluent water flow. Each pump shall be fitted with a removable Perspex safety guard, Eyewash and safety shower. Warning signs and safety railings shall be installed and PPE's issuance and utilization by workers shall be ensured. To reduce humidity in the acid storage area, Hollow blocks and grated doors are proposed. The Acid storage tanks are proposed in the bounded wall with compacted limestone hardcore filler.
- Sulphuric Acid storage shall be made in an area that is: cool, dry, out of direct sunlight and away from heat and ignition sources, separate from incompatible materials. Bulk storage of Sulphuric Acid indoors shall be avoided.

- Regularly inspection shall be performed to check any physical changes or signs of crystallization, damage, or leaks.
- Medical check-ups for workers engaged with all hazardous / non-hazardous chemicals 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 chemical dosing and handling.
- The Filtration Plants as a whole and their chemical storage areas 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.

Generation of Sludge / Domestic Waste and Disposal

Impacts

During operations, the major waste stream will be dried sludge from the filtration plants. It is estimated that 1200 to 2200 ton / year of sludge will be generated from each FP.

Mitigation measures

- Use of sludge in agricultural activities is not recommended as the sludge may contain some chemical content, therefore, its utilization in horticultural activities is considered appropriate. Potential users of this treated sludge shall be both from private and government sectors. Key government sector user shall be the Parks and Horticulture Department of Karachi Municipal Corporation (KMC).
- Sludge Management Plan shall be prepared and implemented by the Filtration Plants Management for effective removal, storage, transportation, and recycling of sludge.
- Recycling of sludge shall be a condition of Contract and the sludge treatment methods will be finalized during detailed design stage to be carried out by the Contractor. The Contractor shall finalize the modalities and procedures for design and operation of sludge recycling facility. The sludge quality testing shall be carried out before its utilization as fertilizer, and it shall also be tested

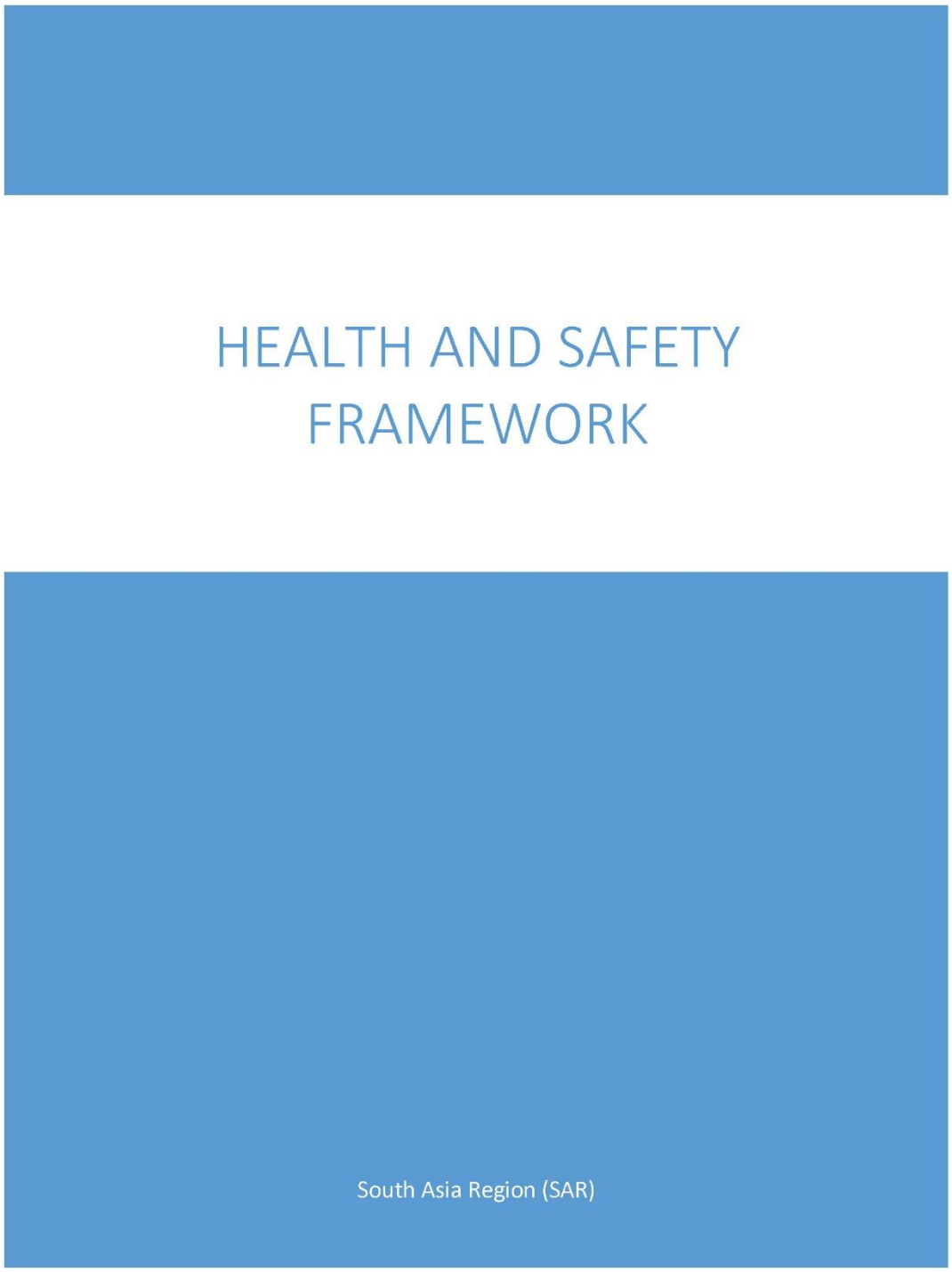
periodically during the operational phase of the project by KWSC to ensure that the sludge generated at FPs is fit for recycling.

- Dried sludge from Sludge Drying Beds (SDBs) shall be periodically removed and temporarily stored in Hook-lift Skips equipped with Lids. Filled skips shall further be transported through trucks for recycling purposes.
- The operations of sludge transfer to the recycling facility shall be performed in the nighttime after 9:00 pm to avoid traffic congestion and minimizing interactions with the public.
- Specifically designed and officially registered vehicles shall be used for the transportation of dried sludge and those shall be driven by drivers with proper license.

Improved Drinking Water Availability

- The supply of treated water from the Filtration Plants will be an indispensable facility for the residents of Karachi.
- The proposed interventions 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)



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1 Overview

Health and Safety is defined as the process of anticipation, recognition, evaluation and control of hazards arising in or from the workplace and the community that could impair the health, safety and well-being of workers, considering the possible impact on the surrounding communities and the general environment. The Health and Safety Framework outlines the management of workplace and community hazards and take appropriate preventive measures to make workplace and community safer and healthier.

2 Purpose

This document is a framework for the Borrower to implement a practical approach to manage Occupational Health and Safety (OHS) and Community Health and Safety (CHS) impacts and risks in accordance with national/local regulatory framework, the World Bank Environmental and Social Standards and Environmental Health and Safety (EHS) Guidelines, ISO Standards, Good International Industry Practices (GIIP), etc. This framework document will be in accordance with the following:

- National laws including Acts, Regulations, Codes of Practice, Guidelines, etc. where the project is located.
- ESS2 – Labor and Working Conditions
    - The Borrower will develop and implement written labor management procedures applicable to the Project.
    - Measures relating to occupational health and safety will be applied to the project. The OHS measures will include the requirements of ESS2 and consider the General Environmental Health and Safety Guidelines (EHSGs) and, as appropriate, the industry-specific EHSGs and other GIIP.
    - The OHS measures will be designed and implemented to address, (a) identification of hazards, (b) provision of preventive and protective measures including method statements, safe work procedures, etc., (c) training of project workers, (d) documentation, reporting, and remedies of occupational incidents, (e) emergency prevention and preparedness and response arrangements to emergency situations, and (f) remedies for adverse impacts such as occupational injuries, deaths, disability and disease.
    - All parties who employ or engage project workers will develop and implement procedures to establish and maintain a safe working environment, including that workplaces, machinery, equipment and processes under their control are safe and without risk to health, including by use of appropriate measures relating to chemical, physical and biological substances and agents. Such parties will actively collaborate and consult with project workers in promoting understanding, and methods for, implementation of OHS requirements, as well as in providing information to project workers, training on occupational safety and health, and provision of personal protective equipment without expense to the workers.
    - Workplace processes will be put in place for project workers to report work situations that they believe are not safe or healthy, and to remove themselves from a work environment which they have reasonable justification to believe presents an imminent

and danger to their life or health. Project workers will not be retaliated against or otherwise subject to reprisal or negative action for such reporting or removal.

- Project workers will be provided with facilities appropriate to the circumstances of their work, including access to canteens, hygiene facilities, and appropriate areas for rest.
- A system for regular review of occupational safety and health performance and the working environment will be put in place and include identification of safety and health hazards and risks, implementation of effective methods for responding to identified hazards and risks, setting priorities for mitigation actions, and evaluation of results.
- Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) reporting, prevention and management in the workplace must be addressed in the project health and safety management plan and in the labor management procedures.

- ESS4 – Community Health and Safety (CHS)
  - The Borrower will develop, implement and review/update (as required) a CHS Management Plan or CHS Management measures which will be included in the Environmental and Social Management Plan (ESMP) applicable to the Project.
  - Conduct risk assessment to identify and assess the risks and prevent their adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and nonroutine circumstances.
  - Implement appropriate control measures to avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials.
  - Ensure the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.
  - Ensure appropriate community emergency preparedness and response plan is available and communicate to all stakeholders to address emergency events.
  - Community engagement, communication and reporting processes shall be developed and implemented for community members to report health and safety incidents, incidents (including complaints) must be investigated appropriately, and action plans implemented and communicated to the community.
  - The Borrower will promote quality and safety, and considerations relating to climate change and natural disasters, in the design and construction of infrastructure projects, including dams.
  - SEA/SH reporting, prevention and management for local communities must be addressed in the project health and safety management plan.

- World Bank Group Environmental Health and Safety Guidelines (EHSGs), 2007.
- International Labour Organization (ILO) Code of Practice: Safety and Health in Construction Industry, 1992.
- ILO Codes of Practice: Safety and Health in Building and Civil Engineering Work, 1972.
- International Organization of Standardization (ISO) Standards. Examples include 45001 - Occupational Health and Safety Management Systems, ISO 4007 – Eye and Face Protection, ISO

20345 – Safety Footwear, ISO 3873 – Industrial Safety Helmets, ISO 20345 & ISO 16024 – Fall Protection.

- Good International Industry Practices (e.g., UK HSE Executive, Safe Work Australia, US OSHA, Global Reporting Initiative (GRI)).

3 Scope

The Health and Safety Framework is applicable on all World Bank-financed projects in the South Asia Region (SAR).

4 Implementation of the Health and Safety Framework

The implementation of this framework should adopt a risk-based approach when applying to the World Bank-financed projects. It is critically important that the project conducts impact/risk assessments (environmental, social and health & safety) to identify and assess impacts and risks both in the workplace and in the community.

For OHS impacts and risks, the Borrower shall develop and implement a Health and Safety Management Plan (HSMP) to manage OHS impacts/risks. The detail and comprehensiveness of the Project HSMP should be based on the risk and not on the size of the project or types of contracts (ICB, NCB, etc.). All projects are required to have a HSMP that includes all elements of this framework (e.g. policy, organization, emergency management, etc.). In large (mega) projects where the risk assessment identified multiple significant risks (substantia/high), it is advisable that the Contractor (or Subcontractor) prepare and implement H&S sub plans to manage these risks and will be included in the annex of the Project HSMP. A Project HSMP Plan template is provided in Annex 1.

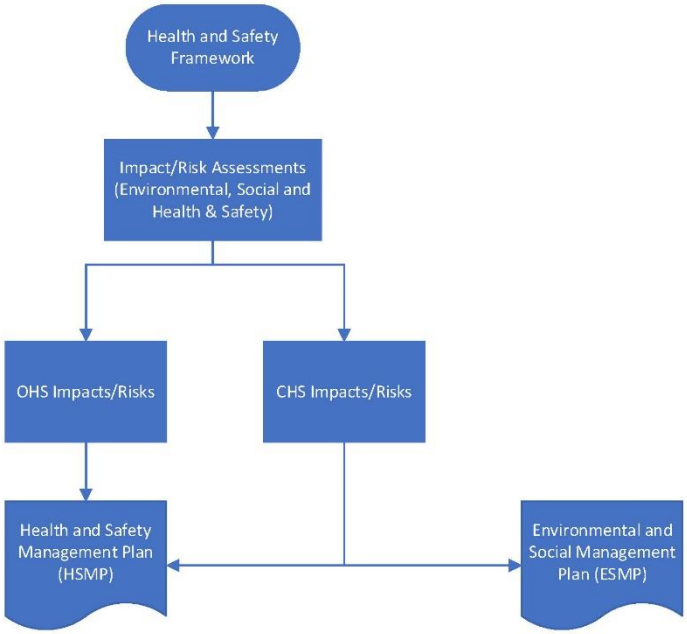
The Borrower is responsible for the project and shall ensure that this Health and Safety Framework is applied. The Borrower can delegate/assign the PIU or Contractor to develop and implement a HSMP to address the Health and Safety Framework requirements and to manage health and safety impacts and risks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

For CHS impacts and risks, the Borrower shall address and manage CHS impacts/risks under the Environmental and Social Management Plan (ESMP) and to some extent in the Health and Safety Management Plan (HSMP).

In some situations, there may be overlapping of the management plans due to project activities impacting both the workers and local communities. For example, road construction projects have significant impacts to workers and local communities and will require robust plans to manage OHS and CHS risks.

The Health and Safety Framework implementation flowchart is provided below (Figure 1).

Figure 1. Health and Safety Framework Implementation Flowchart



Note: CHS impacts and risks may overlap both management plans (HSMP and ESMP) in some projects, e.g. road construction (traffic management plan) will impact both workers and the community.

The Health and Safety Management Plan (HSMP) is the key tool to manage health and safety risks and impacts associated with the Project. Its core purpose is to ensure that all activities are planned, carried out, controlled and directed with consistent, approved, health and safety management practices, procedures or standards.

The HSMP should be applied as a living document and undergo routine review and updates when any of the following happens:

- There is a change in the scope of the project, or
- There is a change in construction methodology/technique based on site condition, or
- Following a major incident/near miss, or
- New or emerging health and safety risks (e.g. disease pandemic), or
- Change in local legal/regulatory requirements, or
- At the end of the Project (to allow for improvements in subsequent projects).

The PIU/Contractor is responsible for the review and update of the HSMP and communicate with relevant stakeholders (e.g. workers, subcontractors, suppliers, local communities, etc.).

In addition, the Contractor/Sub-Contractor can also prepare, submit and implement H&S sub-plans, procedures or SOPs to address specific work activity hazards either as a separate document or as part of the HSMP.

There should be one overall project HSMP that outlines the management of health and safety risks. Do not duplicate efforts by having multiple Health and Safety Plans for contractors, subcontractors, suppliers, etc.

5 Health and Safety Management Strategy - Working Together for Success

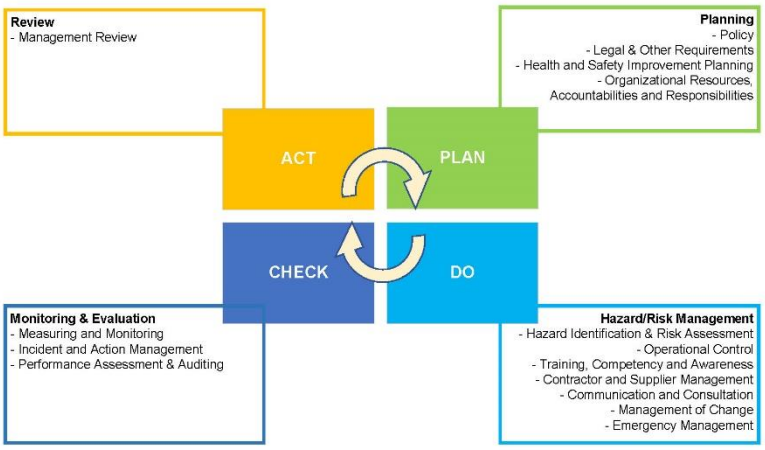
The responsibility for safety cannot be "delegated" to the "OHS Officer or Manager". The OHS staff of the PIU and/or Contractor support line management by assisting in jobsite training, serving as trained and knowledgeable observers, providing administrative assistance, monitoring and evaluating the success of the safety program and acting to continuously improve this plan. While this role is important, commitment and active participation by everyone, every day, on every task, is necessary if the PIU and Contractor are to achieve the level of health and safety excellence, both in the workplace and in the community, that the Borrower expects.

6 Health and Safety Management System

The PIU/Contractor management goal is to aspire Zero Harm to all workers and the community members while carrying operational activities. To achieve this goal, the PIU/Contractor shall prepare a HSMP in accordance with the minimum expectations in line with the policies, standards and best practices noted in this framework (e.g. ESS2 & ESS4, ISO, GIIP, etc.). The HSMP is an overarching health and safety management system for the project. All 15 elements of this framework must be included in the HSMP. In addition, safe work processes and procedures (e.g. Work Statements, SOPs, Work Instructions, etc.) must be developed and implemented for complex and high-risk activities. For example, Operational Control is one of the key elements, and it is expected that in high-risk work activities (e.g. crane lifting, tunnelling, etc.) the Contractor must develop and apply SOPs/Safe Work Procedures to operate safely.

The Health and Safety Management System is designed on the principles of continual improvement and adopts the methodology of Plan, Do, Check and Act (PDCA) (Figure 2). The structure of the management system generally follows the layout of common international standards such as the ISO 45001 and OHSAS 18001 where key elements of the system are aligned to PDCA.

Figure 2. PDCA – Health and Safety Management System



Given all the resources of standards, procedures and guidelines that have been described, the PIU/Contractor shall comply with the following principles:

- Wherever there is a conflict in guidance of the above, the more stringent safety requirement shall be applied. The PIU/Contractor must make sure that all applicable national laws and regulations are always complied.
- In this document 'Shall' and 'Must' signifies a mandatory requirement whereas 'Should' will be used to mention a recommended practice that the PIU/Contractor management will strive to accomplish.

7 Health and Safety Framework Elements

7.1 Element 1 - Health and Safety Policy

The PIU/Contractor must develop a Health and Safety Policy that establishes a clear set of objectives and targets for the effective management of Occupational Health and Safety (OHS) and Community Health and Safety (CHS) performances for the project. It should be consistent with the World Bank's codes of business practice (e.g. Environmental and Social Framework and Standards) and aligned to the local legal framework and requirement.

The Health and Safety Policy must commit to:

a) The prevention of incidents that may lead to injuries, illnesses, pollution, property and environmental damage, security, process losses and product quality impacts.
b) Compliance with legal and other requirements, including international accords and external requirements to which the Borrower is committed.
c) The effective management of OHS and CHS risks and impacts.

d) Establishing measurable objectives and targets for improving OHS CHS performance.
e) Providing the resources needed to meet OHS/CHS performance objectives.
f) Encouraging worker participation and promoting awareness of OHS/CHS risks and opportunities.

The PIU/Contractor shall establish project specific measurable targets to achieve above mentioned objectives. The determination of these targets is based upon the drive for continuous improvement, external peer group benchmarking and stakeholders' input.

7.2 Element 1 - Human Rights Policy

The Borrower's human rights policy should have focus on the responsibility to respect human rights and play a positive role in the communities where they operate. To this end, the Borrower (PIU/Contractor) should commit to respecting human rights as set out in the United Nations Universal Declaration of Human Rights and the International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work, as well as adhere to the United Nations Guiding Principles on Business and Human Rights, the Voluntary Principles on Security and Human Rights and the World Bank Environmental and Social Standards (ESS) 2: Labor and Working Conditions.

The Borrower (PIU/Contractor) must continually assess the human rights context of their activities, including impacts that they may cause and those to which they may contribute or be directly linked. This determines the prevention, mitigation and control measures required, including using leverage from their business relationships.

The Borrower (PIU/Contractor) should recognize, respect and abide by all project workers, community worker, and employment laws and expect their subcontractors and other third-party companies to meet the same standards. No child or forced labor and discriminatory behavior is allowed under the project/program – by the contractors or sub-contractors or primary suppliers.

The Borrower (PIU/Contractor) should value and respect the traditions, diversity and the culture of different communities in the project area where they do business.

The Borrower (PIU/Contractor) should recognize the effect that their activities may have on local communities, and they should strive to engage in a meaningful way with the communities where they do business to help ensure that they positively contribute to the welfare of the local communities.

The Borrower (PIU/Contractor) preferably should endeavor to conduct business with communities who share their values and business principles.

7.3 Element 2 - Legal and Other Requirements

All applicable OHS/CHS legal requirements such as national laws and regulations, World Bank ESS2 & ESS4, etc. must be identified, evaluated for compliance and documented in a project legal register.

The project legal register must:

a) Define accountability for maintaining compliance or conformance to each requirement.
b) Be reviewed regularly for currency, and expiry/renewal dates.
c) Include or provide reference to records that show periodic evaluation of compliance.
d) Include relevant legislative obligations (international, federal, state/provincial, regional or local).

e) Include relevant Borrower policies and standards and external voluntary commitments.
f) Include any other requirements, such as license, codes of practice and product quality obligations.
g) Be accessible to the relevant personnel and stakeholders.

Any new/periodic changes or updates must be communicated to relevant stakeholders.

7.4 Element 3 - Risk Assessment

Risk assessment involves hazard identification and risk management, which are core activities to manage OHS/CHS risks and performance. The objective is to ensure OHS/CHS hazards are timely identified, and their resulting risks to people, property, assets and the environment are evaluated and managed.

A risk assessment is a critical examination of health and safety hazards at a project worksite and to ensure the PIU/Contractor to implement corrective measures to protect workers from health and safety hazards in the workplace.

A community health and safety risk assessment is required to identify, assess and manage for all World Bank financed projects. It is critically important that community health and safety impacts resulted from the project be identified and managed to ensure that the project social license to operate will not be impacted.

The process for analyzing and managing OHS/CHS risk includes:

a) Establishing the context, including acceptability criteria for the risk analysis.
b) Hazards identification to determine risk scenarios and select a suitable level of risk evaluation.
c) Risk estimation outcome and assigning risk ownership.
d) Recording the risk analysis in a risk register.
e) Managing risks according to their classification of either High, Substantial, Moderate, and Low to achieve levels that are deemed to be As Low As Reasonably Practicable (ALARP).
f) Utilizing the hierarchy of control:
    - Elimination of the hazard;
    - Substitution with less hazardous materials, processes, equipment, etc.;
    - Use engineering and process controls;
    - Apply administrative controls or management strategies; and
    - Use of personal protective equipment (PPE).
g) Developing and agreeing on further actions or monitoring of the risks, considering the hierarchy of controls.
h) Verifying the completion of actions.
i) Re-evaluating the risk and classification as appropriate.
j) Reviewing and updating the risk register over time.
k) Documenting, reporting and communicating the risk information.

As noted in the framework implementation section, CHS impacts/risks will be addressed and managed under the ESMP and HSMP.

7.5 Element 4 – Health and Safety Improvement Planning

Establish processes and plans to manage performance and to provide for continual improvement. Objectives and targets must be established for the management of OHS/CHS performance. They must be measurable and contribute to the prevention of incidents or reduce their impact(s).

To enable objectives and targets to be met, improvement plans must be developed, documented and integrated into the overall project planning process.

OHS/CHS improvement plans must:

a) Specify the required resources (both human and financial/budget) needed to meet the objectives.
b) Specify role responsibilities for implementing the improvement plans and their actions.
c) Establish the timeframes for completion of the improvement plans and achieving the objectives.

Project Director, Project Manager, Construction Manager and/or Resident Engineer are fully committed to achieve the above-mentioned targets. Leading and lagging indicators should be established to drive performance to meet these targets.

7.6 Element 5 - Organizational Resources, Accountabilities and Responsibilities

Resources, responsibility and accountability is appropriately allocated for the implementation, maintenance and continual improvement of the Health and Safety Management Plan.

The PIU/Contractor shall establish committees with representatives of workers and management or make other suitable arrangement consistent with national laws and regulations (if available) for the participation of workers in ensuring safe working conditions. A Community Health and Safety Committee comprising of community members may be required under the ESMP/HSMP to address for CHS risks.

All roles with health and safety accountability and responsibilities (including regulatory requirements) must:

- Be documented in role descriptions; and
- Be included in the organization chart specific to the managed site. The organizational charts must be available to all workers and local communities.

Where subcontractors and suppliers are involved, these areas of accountability and responsibility must be clarified with respect to those contractors.

7.7 Element 6 - Training, Competency and Awareness

Processes are established to provide the requisite training, competency and awareness to effectively manage OHS/CHS impacts and risks. There must be a process for the delivery and maintenance of awareness and/or competence based training. Every worker shall receive instruction and training regarding the general safety and health measures common to the project site(s).

All new workers, contractors and/or visitors must undertake relevant safety training. At a minimum, safety induction/orientation training must include reference to the significant OHS/CHS risks identified at the managed site. No person shall be employed in any worksite unless that person has received the necessary

information, instruction, and training to be able to do the work competently and safely. All training must be recorded and documented.

All roles requiring technical certification, registration or licensing are verified and documented. The requisite qualifications/competencies must be maintained for all personnel performing such roles and their associated work activities.

There must be a process to communicate and engage with local community members on CHS impacts and risks. Awareness communications, training and outreach should be conducted throughout the life of the project.

7.8 Element 7 - Contractor and Supplier Management

OHS/CHS risks associated with procured materials, equipment, services and labor are effectively managed.

There must be a process to identify and evaluate risks associated with the planned procurement of materials, equipment, services and labor. This must include an analysis of any downstream implications which may be impacted by the selection. This process must be supported by a written procedure that specifies the criteria for contractor/supplier selection, evaluation and re-evaluation and the rejection of product(s) or material(s).

Individuals engaged on a temporary or casual basis to work within existing managed sites are to be inducted and managed in the same way as permanent staff. There must be a process to ensure all contractor tools and equipment are inspected and evaluated to be in a safe condition and conform to the site's standards and procedures.

7.9 Element 8 - Communication and Consultation

There must be a process to encourage the participation of workers, contractors and community members in activities which promote improvements in health and safety performance. In particular, this must include their appropriate involvement in:

- Hazard identification, risk analysis and determination of controls.
- Incident investigation.
- The development and review of the health and safety policy and objectives.

Workers must be informed about their participation arrangements, including:

- Who is their representative(s) on health and safety matters?
- Time and resources necessary to participate in health and safety activities.
- Access to information that is relevant to current or planned health and safety improvement activities.
- The mechanisms to identify and remove obstacles or barriers to participation.
- Disciplinary actions for safety violations and non-compliances.

There must be a process for communicating about the management of OHS/CHS risks at the various levels of the managed site. This includes, but is not limited to:

- Internal communications to raise awareness about OHS/CHS risks, performance measures and changes or improvements.
- Pre-start meetings or briefings (e.g. toolbox talks) for sharing safety observations/ experiences, lessons learned or raising awareness about OHS/CHS risks.
- Sharing knowledge and lessons learned from around the Project (external to the site, business or site); such as relevant incidents, hazardous conditions or suggested practices.

There must be a grievance process to receive feedback, suggestions and complaints on OHS and CHS matters. This process must include a procedure for documenting, evaluating, implementing (as appropriate) and archiving the improvements.

There must be a process to ensure that, when appropriate, relevant external stakeholders are consulted about pertinent OHS/CHS matters (including statutory and regulatory requirements) as needed.

Communications, engagement and consultation with local communities on CHS matters shall be addressed in the ESMP.

7.10 Element 9 - Operational Control

The Contractor is responsible to manage risks associated with the site's work activities. This shall be achieved by implementing operational controls, as well as other mandated or necessary risk treatment processes to control the risk to As Low As Reasonably Practicable (ALARP).

There must be a process for the development of procedures or work instructions that detail the controls required to treat risks associated with the work activities. These procedures must reference applicable operating criteria, be communicated, available to the appropriate users, and followed.

Plant and equipment must be maintained, inspected and tested to ensure they meet the design descriptions and specifications. All equipment or services provided by third parties, must be inspected, and have the controls verified to ensure the safe operation, and adherence to the health and safety performance objectives.

Where new or non-routine tasks and activities are conducted, the controls identified during the pre-task hazard assessment must be implemented.

Operational controls are health and safety controls designed to eliminate, mitigate or manage the risks/impacts. The Contractor shall develop and implement health and safety controls for risks identified by the project risk register. For example, if a project identified working at height, crane lifting and scaffolding as high-risk activities then the Contractor must develop and implement Working at Height, Lifting, Hoisting & Rigging and Scaffolding procedures incorporating the hierarchy on control concepts (i.e. elimination, engineering, safe work procedures and PPE) to manage these risks. By applying a risk based approach, the Contractor will need to develop and implement operational controls/procedures based only on the risk identified.

Table 1 below summarizes the types of health and safety controls/procedures generally found in civil construction projects. This list is not intended to be all-inclusive as there may be other high-risk activities in projects not listed here.

Table 1 – Health and Safety Controls/Procedures

OHS / Safety Rules (e.g., Golden Rules)	Permit to Work Systems
Excavations and Trenching	Fire Safety
Heavy / Mobile Equipment	Electrical Work / Safety
Barricading and Signs	Hazardous Material Management
Cell/Mobile Phone Use	Equipment Inspection & Maintenance
Safe Driving (Light Vehicles)	Dredging
Material Handling (Loading and Unloading)	Demolition
Traffic Interface Planning / Management	Confined Space
Severe Weather Management	Hot Work (Welding, Grinding, Cutting)
Lifting, Hoisting and Rigging	Hand and Power Tools
Scaffolding	Housekeeping
Work at Height	Lockout/Tagout (Isolation)
Working Near or Over Water	Ladder Safety
Illumination	Hazardous Waste
Ground Support	Fitness for Work (Health/Medical Surveillance)
Water Management	Personal Protective Equipment (PPE)
Tunnelling	Noise Hazard & Protection
Bulk Earthworks and Civil Works	Respiratory Protection
Steel Erection	Working in Heat / Cold
Pressurized Equipment	Manual Handling (Ergonomics) / Vibration
Clearing and Land Disturbance	Fatigue Management
First Aid	Travel and Remote Site Health
Project Worker Welfare Facilities	Animal Bites & Stings
Camp Management	Working Alone
Site Security Management	Radiation (Ionizing and Non-Ionizing)
Blasting and Explosives	Infectious / Communicable Disease (e.g. COVID-19)
Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) Reporting and Management	Other hazards/risks on project site identified through risk assessment

The Contractor shall ensure workers are trained, supervised and applied the required health and safety procedures on managed site.

7.11 Element 10 - Management of Change

There must be a procedure to identify and manage changes to the operational processes and controls that may impact on OHS performance. Changes may be planned or unplanned, sudden or gradual, and temporary or permanent. The procedure must include an analysis of the risks associated with a change and include a contingency to cover emergency situations where the full management of change procedure cannot practically be applied. These situations require the Resident Engineer / Project Manager (or his/her designated deputy) who is accountable for the managed activity to approve the change.

Workers and contractors must be trained to identify what constitutes a change and how to initiate the management of change process.

After completing the change, a formal review must be carried out to evaluate the actual impact against the intended impacts, and to identify the reasons for any deviation.

7.12 Element 11 - Emergency Management

To ensure that the appropriate resources and emergency response plans are prepared, practiced and available. The PIU/Contractor is responsible to develop and implement an Emergency Response Preparedness (ERP) Plan that will provide an effective response for the mitigation, control and recovery from incidents/ accidents including natural disasters which can impact or disrupt the project and/or its managed site(s) and activities.

The PIU/Contractor must clearly define accountability for the ERP and ensure it is adequately resourced. PIU/Contractor must also ensure that individual team members are provided with the relevant training for their required roles. The ERP exercise (drill) must be tested and validated annually. The ERP must be updated to reflect the lessons learned from the exercises and actual incidents.

The process for managing incident communications, notification and reporting must be integrated into the ERP and clearly:

- Identify who is responsible for incident communication, notification and reporting.
- Define how communication protocols are to be conducted with internal and external stakeholders.

The ERP must include local communities during emergencies including natural disasters when the risk and impact assessments identified potential aspects/impacts caused by the project.

7.13 Element 12 - Measuring and Monitoring

The objective is to monitor risks and impacts of the work activities and evaluate the effectiveness of the operational controls. There must be a process for measuring and monitoring the key characteristics of the managed site and its work activities that may have significant OHS/CHS risks. Measuring and/or monitoring can be either qualitative or quantitative but must follow a standardized methodology.

Procedures for measuring and monitoring occupational health exposure and environmental impact must conform to national laws and other international standards that are stated in the contract. Exceedances from specified requirements or limits must be recorded, investigated and reported back to the worker, work area or the community involved. The appropriate actions in response to the exceedance must be recorded, assigned accountability and tracked to completion.

<u>Medical/Health Surveillance</u>

Any medical/health surveillance program must:

- Include project personnel and contractors.
- Be consistent with local regulatory requirements.
- Be designed based on the identification and evaluation of operational health risks.
- Support the project and site's objectives and targets.

7.14 Element 13 - Incident and Action Management

All incidents including near misses must be reported, investigated and corrective actions identified, implemented and communicated. There must be a written procedure for incident management including investigation, reporting and corrective action(s) to prevent recurrence. It must include reference to the appropriate methodologies for:

a) Reporting.
b) Investigating.
c) Analysis of the impact(s) and the potential risk of future incident.
d) Communicating to relevant people/stakeholders.
e) Managing corrective actions to prevent reoccurrence.

The Resident Engineer/Project Director is responsible for all incidents that occurred in the project, and the Site Manager/Supervisor of the involved person(s) must ensure that incident is reported and investigated.

Incident investigations must be completed by competent investigators who have been trained in the appropriate investigation methodology.

All significant incidents must be summarized for lessons learned after the investigation and communicated to all workers and relevant stakeholders.

Community health and safety incidents caused or impacted by the project must be reported, investigated and corrective actions identified, implemented and communicated to the community.

7.15 Element 14 - Performance Assessment and Auditing

A process must be developed for measuring OHS/CHS performance. Metrics must include leading and lagging indicators and be based on qualitative and quantitative data.

Performance must be measured on a regular basis and include an evaluation of:

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

The Contractor should provide a monthly report summarizing the OHS/CHS performance and contain details or summaries of all incidents and progress against corrective actions. The report must be sent to the Project Management Team, the Borrower and other relevant stakeholders.

<u>Audits and Inspections</u>

There must be a process for conducting audits and regular inspections of all work areas including those areas/sensitive areas where there is a potential concern for local communities. The process must include a written procedure, where relevant, to define the scope and depth of audit/inspection and consider:

a) The level of evaluated risk associated with specific activities that the project or site undertakes.

b) The identification of non-conformances with health and safety procedures and the HSMP requirements.
c) The identification of hazards and impacts in the project risk register.
d) Compliance to legal and other requirements as identified and recorded in the legal register.
e) The results of previous audits and inspections.

At the completion of the audit and inspection, a report must be provided to the Resident Engineer/ Project Director, Site Manager and the Supervisor responsible for the work area.

The Project and/or managed site must define an annual schedule of planned audits. The schedule must be developed, based on an evaluation of significant OHS/CHS risks associated with the project or site and the results of previous audits. The audit should be conducted by external third party. Corrective actions to address non-conformance must be assigned and tracked until completion.

7.16 Element 15 - Management Review

The HSMP must be reviewed bi-annually at a minimum. The review must evaluate any need for change and establish actions to improve the HSMP, its processes and resource needs.

Records of completed management review(s) must be retained and include:

a) Decisions and actions relating to possible changes to policy, objectives and targets.
b) Information relating to revised risks and any proposed treatment and controls.
c) Improvement suggestions (including the community) for inclusion into future management plans.
d) Any other alternation, modification and improvement to the HSMP that demonstrates a commitment to continual improvement.

Relevant outputs from the management review(s) must be made available for communication and consultation throughout the project/managed site, the Borrower and relevant stakeholders.

Annex 1 - Health and Safety Management Plan (HSMP) Template

Project title

Effective Date	xxxxxx	**Status**	DRAFT
Version Number	xxx	**Document Number**	xxxxxx

Health and Safety Management Plan

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Health and Safety Management Plan

About the Project Health and Safety Management Plan template

The Project Health and Safety Management Plan (HSMP) is a key document to address the Health and Safety Framework requirements of how OHS and CHS risks will be managed in a project. The HSMP incorporates the 15 elements of the framework to which the Borrower (PIU/Contractor) must address for the project.

Under the Health and Safety Framework, it is mandatory that each project to develop and implement a Project HSMP that identifies the hazard, assess the risk and implement control measures to eliminate or reduce the risk.

The purpose of the Health and Safety Management Plan is to:

- Clearly and succinctly communicate how significant risks in the project will be managed;
- Ensure key requirements including legal / regulatory obligations are considered and met;
- Provide requirements on health and safety standards, procedures and guidelines; and
- Outline how the implementation of the HSMP will be evaluated.

Project personnel and contractors must have access to the HSMP. They should understand it (as it relates to their role) and implement it in their work area, relevant to the hazards encountered by each role.

If a project is subjected to local government regulators management plan template(s), then those templates must be used. Do not duplicate effort.

The Project HSMP should be considered live and dynamic during each stage of the project life cycle. It is recognised that project risks and how they will be managed can change during the life of a project. If the HSMP changes, it must comply with Health and Safety Framework's management of change requirements (Element 10).

This template should be suitable for any project (type and size) with some modifications as required. Additional sub sections may be added as required depending on the size, complexity and risk of the project.

Finally, the Resident Engineer and/or Project Director must determine and justify how this template is to be applied to each project (e.g. a single Plan covering the entire project, or individual Plans or Sub-plans for each work package area, or sub-contractor).

Note: As stated in the Health and Safety Framework, CHS impacts, and risks are addressed in the ESMP. There may be overlapping of CHS and OHS in both the HSMP and ESMP such as road construction where significant risks are found both in the workplace and in the community. In such instances, the Contractor must ensure the HSMP and ESMP requirements are implemented and enforced.

Health and Safety Management Plan

Project title

1 Introduction

1.1 Overview

Describe the purpose of the Project HSMP (e.g. Health and Safety Framework and/or local legal requirements), intended audience (stakeholders), issuance, etc.

1.2 Change Authority

Describe the management of change for any future changes to this HSMP and who can authorize it.

2 Project Description

Provide the project background and scope including the project stage and the activities to be undertaken. Provide brief description of people involved in project (employees, contractors, sub-contractors, suppliers, etc).

3 Objectives

Set out the health and safety objectives and should include Key Performance Indicators (KPIs) to achieve these objectives.

Include any assumptions/ constraints made in the objectives or project scope.

4 Health and Safety Values

4.1 Health and Safety Policy Statement

Insert the Project Health and Safety Policy and/or Contractor Policy (if available) statement.

4.2 Message from Project Leader

Provide an overall vision, values and conduct and behavior expectations from the Resident Engineer or Project Director.

If this template is used by contractors, then the Contractor Director/Manager will address in this space.

5 Health and Safety Organization

Having the appropriate organizational structure and people are essential for the success of a project. Clearly identify and describe the organization structure and people who will be responsible for the management of the project's OHS/CHS risks and compliance to this Plan and other legal requirements. Health and Safety accountability and responsibility must be documented in the role descriptions.

5.1 Team Structure

Short description/ chart of personnel responsible for health and safety management and supervision.

5.2 Roles and Responsibilities

Short description of health and safety roles and responsibilities include the project management team.

Health and Safety Management Plan

6 Legal and Other Requirements

Provide a summary of all the legal obligations with a short description of the main requirement(s) under each obligation (e.g. *Labour Act, Work Bank ESS2 & ESS4, etc.)*.

A Project legal register form is provided in Annex 1.

7 Hazard Identification and Risk Management

7.1 Project OHS / CHS Significant Risk Summary

Describe the process of how the Project Risk Register was achieved including the name of the facilitator and participants (e.g. project team members, health and safety staff and contractor representatives) and when it was undertaken.

Insert a brief bullet point summary to outline the key significant **inherent** risks (i.e. substantial and high). Follow a format like this: *the impact arising from a defined hazard due to a specific activity* e.g. "respiratory disease due to the inhalation of respirable crystalline silica during underground drilling".

Provide details of all significant inherent risks for the project showing current controls in Appendix 1. The significant inherent risk register is a subset of the comprehensive risk register for the project.

Community health and safety (CHS) risks must be identified, assessed and documented in the Project Risk Register. The management of CHS risks will be addressed in the ESMP but can may overlap with the HSMP For example, road construction projects will impact both workers and local communities. In this situation, a traffic management plan may be included in the both the HSMP and ESMP as operational control.

7.2 Health and Safety Operational Control

This section outlines how the key significant risks for the project (as defined in Section 7.1) will be managed. At a minimum, the project current controls must comply with the Health and Safety Framework and other legal requirements.

This is the most important section of the HSMP. It needs to be kept specific to the project and written in a clear and concise manner that enables the information to be used during project familiarisation and induction. As in Section 7.1, there is flexibility to communicate this information in a way that best suits for the project. You may use paragraphs, dot points, tables, etc. You may combine this information with the summary presented in Section 7.2.1.

Provide sufficient information to ensure that current and planned controls are understood by the reader.

7.2.1 Impact / Hazard / Activity 1

Describe how the risk will be managed during the project.

8 Communications

8.1 Onsite Communication and Consultation

8.1.1 Health and Safety Training including Induction

Describe the Health and Safety training process and requirements.

8.1.2 Health and Safety Activities, Meetings and Committees

List all activities, briefings and committee meetings such as toolbox talks, daily pre-start meeting, pre-job briefing, safety committee meeting, safety inspections/ audits, etc.

There is flexibility to communicate this information in a way that best suits your project. You may use

paragraphs, dot points, tables, etc.

8.1.3 Health and Safety Message Board

List strategic locations of Health and Safety message boards so that project workforce will be able to receive relevant information.

8.2 Communication with Contractors and Suppliers

8.2.1 Contractors and Sub-Contractors

List processes and types of information to ensure contractors and subcontractors can safety manage the activities and people in their work areas.

8.2.2 Suppliers

List processes and types of information to ensure the supplier can safely manage the activities and people within their responsibility.

8.3 Community / External Communication

8.3.1 Community Liaison

Describe accountability and process to report any OHS/CHS information to the communities as part of the community engagement requirements.

8.3.2 Regulatory/ Local Government

Describe accountability and process to report any OHS/CHS information to local government agencies/ department as part of the legal reporting requirements.

8.4 Consultation and Complaints

Describe the process to promote the active participation of project workforce in health and safety decisions. Employees and contractors are consulted and given opportunity, encouragement, and training to be proactively involved in health and safety matters affecting the project and their work activities. All workplace consultation should be recorded.

Describe the process to ensure health and safety complaints are received, reviewed and managed in accordance with the health and safety framework requirement.

A similar process shall be developed and implemented for CHS consultation and complaints from community members.

8.5 Non-Compliance/ Conformance and Disciplinary Process

Describe the disciplinary process for non-compliance or non-conformance to health and safety policies and procedures including the requirements of this document.

9 Training and Competency

Describe the project specific health and safety training required by workers and contractors including inductions (where relevant). For project personnel refer to the training needs analysis. For contractors, refer to the contractor prequalification to identify and specific training and induction needs on what the contractor approval is conditional. It is not sufficient to just list the types of training. The HSMP should document which role types should receive each type of training.

Role Type	Project Training
All workers and contractors	Safety Induction

9.1 Awareness and Competency

Describe the health and safety training induction, awareness, and competency on the project. Awareness and competency considerations should include:

- Safety induction and training provided by the project to raise awareness levels;
- Task specific competency assessments conducted by the Contractor;
- Training and induction for the Owner's team specific to the area in which the work is conducted; and
- Competency assessment and required training to render workers/contractors competent to carry out the work activity.

10 Emergency Management

10.1 Emergency Response

Provide a brief summary of site's emergency response preparedness (ERP) plan including reporting procedures, emergency contacts, emergency response team (ERT), evacuation plan/ assembly points and emergency test/ evacuation drills. The intent of this section is to ensure that the site manager/supervisor/worker at the operational level will know what to do in an emergency situation. It is not the intention that the complete site's ERP procedure be included in this section. In large, complex projects the ERP should be a standalone document that is managed by the PIU/Contractor.

There is flexibility to communicate this information in a way that best suits your project. You may use paragraphs, dot points, tables, etc.

Fire, spill response and first aid training and competency can be addressed in the sections below.

The ERP must include local communities during emergencies including natural disasters when the risk and impact assessments identified potential aspects/impacts caused by the project.

10.2 Fire Protection and Prevention

Provide a brief summary of the site's fire protection and prevention procedures including fire response (internal/ external), fire notification and alarms, use and management of firefighting equipment (e.g. fire extinguishers), high risk fire activities such as welding, smoking policy, fuel storage and fire inspections.

10.3 Hazardous Substance Spill Response and Prevention

This Section is not mandatory but if the project or site use or store large quantity of hazardous substances you may include a brief summary of the hazardous substance spill response and prevention management procedures.

10.4 First Aid and Medical Facilities

Provide information on the first aid kits, first aiders, eye wash stations and emergency showers including their locations within the project site.

Described the first aid and/or medical facilities available onsite including the location, medical supplies and equipment and personnel (e.g. first responder, paramedic, nurse) manning the facilities. Also provide information in regard to medical evacuation (i.e. ambulance, medivac, etc), hospitals or health clinics.

Health and Safety Management Plan

11 Site Security Plan

Describe the site's security plan addressing building and infrastructure security, exterior boundaries, access/ egress of project personnel and visitors, movement of equipment and materials, site traffic and vehicle parking, patrol and security inspections, responsibility during emergency situations, etc.

12 Incident Reporting and Investigation

Describe the project incident reporting and investigation process which must be aligned to local legal requirements (if available), SAR OHS Incident Reporting and Investigation Guidelines and any other requirements specified in the contract.

There is flexibility to communicate this information in a way that best suits your project. The sub sections below are outlines to assist – add or delete as required. Use paragraphs, bullet points, flow chart, etc.

Community health and safety incidents caused or impacted by the project must be reported, investigated and corrective actions identified, implemented and communicated to the community.

12.1 Roles and Responsibilities

Provide a short description of the investigation team roles including competency. Also include the roles and responsibilities of the corrective action owners.

12.2 Management of Incidents

Refer to SAR OHS Incident Reporting and Investigation Guidelines and/or Contractor's Incident Management Procedure (if available).

12.2.1 Investigation of Incident and Near Miss

12.2.2 Corrective and Preventive Actions

12.2.3 Reporting and Recording

12.3 Injury Management

Describe the project injury management process to ensure that any workplace injury is treated, managed and complied with the project's fitness for work criteria before the individual can return to normal work duties (i.e. return-to-work program).

13 Project Health and Safety Performance

Develop objectives, targets and key performance indicators (KPIs) such as the number of risk assessment, training and inspection/audit conducted that are proactive and where the outcomes can be directly controlled by the project/ owner's team by implementing OHS and CHS operational controls based on the project risk assessment. Do not develop targets that may inadvertently discourage incident reporting or create a blame culture (e.g. zero incident reports raised, zero audit findings etc).

13.1 Measuring and Monitoring

Describe the health and safety monitoring process where the project impacts the workplace, the environment and the community. Environmental and occupational health monitoring will be conducted to verify the efficacy of operational controls identified in the management of 'High' risks.

13.2 Key Performance Indicators

Develop and describe the key performance indicators (KPIs) for project health and safety objectives and targets. This section can be combined with Section 3 Objectives.

Health and Safety Management Plan

13.3 Audits and Inspections

The HSMP shall be audited internally by the PIU and externally by relevant stakeholders (e.g. Bank). During these audits, the auditor(s) must determine if the risks are being mitigated as described and whether the measures of success (e.g. KPIs) are being achieved.

The following table outlines when the plan will be audited and by whom.

Audit / Inspection	Who will audit the plan?	When is it scheduled for?

The table above contains examples only. Delete examples and adjust as required for each project.

The Contractor shall implement a routine inspection program for specific work area and activity. Where the work activity/ process has been identified as 'Substantial or High' risk, daily or pre-start inspection should be applied.

14 Management of Change (MOC)

Describe the MOC process and requirements for changes to the operational processes and controls that may impact on OHS / CHS performance. Changes may be planned or unplanned, sudden or gradual, and temporary or permanent. MOC must be approved by area or process owner(s) and communicated to area workers, community members (if impact the community) and other relevant stakeholders.

14.1 New Significant Risk/ Hazard Identified

Describe the process when a new or unforeseen risk/ hazard has been identified (e.g. through a near miss, incident, new process or non-routine activity that was not planned) and how the risk will be managed.

15 Management Review

Describe the management review of the HSMP process including participants and how often it is done. The review must evaluate any need for change and establish actions to improve the Plan, its processes and resource needs. The review must be documented and communicated to workers, contractors and relevant stakeholders.

Annex 1

Project Legal Register

Health and Safety Management Plan

PROJECT LEGAL REGISTER

Using the Health, Safety, Environment, Community (HSEC) legal obligations identified for the project, list the obligations relevant to the project and describe how they will be met. You may choose to delete rows containing legislation that does not apply to your project. If so, include the statement below. If not, delete the statement below.

Version xxxx of the Legal Obligations Register was reviewed by (names) and legislation deemed to be not applicable to the project was omitted.

Legislation	How does the legislation apply to Project?	H	S	E	C	Last Amendment	How will these obligations be met in this project?

Annex 2

Project Significant Risk Register

You may present your Significant Risk Register in the table below, or as a separate Excel or Word document (provide a link to the document or a specific reference including document name and location).

Health and Safety Management Plan

SIGNIFICANT RISK REGISTER

						Inherent Risk				Current Risk			
Project Activity	OHS / CHS Issue or Hazard	Hazard	Risk Scenario	Risk Scenario Impact Description	Cause(s)	Risk Scenario Consequence	Risk Scenario Likelihood	Risk Scenario Classification	Controls	Risk Scenario Consequence	Risk Scenario Likelihood	Risk Scenario Classification	Comments and Action Items

Revision History

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

Health and Safety Management Plan

Typical Fire Safety Checklist

TYPICAL FIRE SAFETY CHECKLIST
(SELF-INSPECTION FORM FOR CONSTRUCTION WORK)

Adequate protective equipment and planning for fire emergencies helps keep small fires small, limits losses.

Yes	No	CONDITION
		Housekeeping
☐	☐	Are construction materials stored in an orderly manner?
☐	☐	Is combustible scrap and trash removed from the site regularly?
☐	☐	Are metal containers with covers provided for disposal of oily or paint-soaked rags?
		Smoking
☐	☐	Are NO SMOKING signs posted in hazardous areas?
☐	☐	Are NO SMOKING regulations enforced?
		Electrical
☐	☐	Is temporary wiring installed according to the provisions of the *National Electrical Code*?
☐	☐	Is wiring, including connections to junction boxes, panels, equipment, and the like in good condition?
☐	☐	Are overcurrent protective devices (fuses, circuit breakers) in good operating condition?
☐	☐	Are ground fault circuit interrupters (GFCI) provided where required?
		Welding and Cutting
☐	☐	Are any welding, cutting, or brazing operations in progress?
☐	☐	Are any combustible materials exposed by these operations?
☐	☐	Is a fire watch provided during, and for at least 30 minutes after, these operations?
☐	☐	Is portable fire extinguisher or small hose protection available where these operations are carried on?
		Temporary Heaters
☐	☐	Are temporary heaters in use of "approved" type?
☐	☐	Is sufficient clearance maintained between heaters and combustible materials?
☐	☐	Is a competent (licensed, where required) person responsible for temporary heating operations?
☐	☐	Are fuel storage and refueling arrangements satisfactory?
		Flammable-Combustible Liquids
☐	☐	Are flammable-combustible liquids stored and dispensed in a satisfactory manner?
☐	☐	Is adequate ventilation provided where flammable adhesives, paints, solvents, and other chemicals are in use?
☐	☐	Are roofing operations involving tar kettles supervised by a competent person?
☐	☐	Are tar kettles in use equipped with metal covers?
☐	☐	Are asphalt-saturated roofing mops removed from the building and safely discarded after use?
		Exits
☐	☐	Are fire exits unobstructed, including access ways and discharge areas?
☐	☐	Are all exits clearly marked?
☐	☐	Are exits adequately lighted?
☐	☐	Are stair exit fire doors in good operating condition?
☐	☐	Is adequate egress provided from uppermost work areas?

Yes	No	CONDITION
		Extinguishers and Small Hose
☐	☐	Are sufficient portable extinguishers of the proper type provided throughout?
☐	☐	Are extinguishers and small hoses kept in good operating condition?
☐	☐	Is equipment unobstructed and its location highlighted?
☐	☐	Is equipment protected against freezing?
☐	☐	Are selected personnel trained to operate extinguishers and small hose?
		Sprinkler Systems
☐	☐	Is sprinkler installation progressing with construction?
☐	☐	Are sprinkler controlled valves accessible, labeled and open where necessary?
☐	☐	Are systems adequately protected against freezing?
☐	☐	Are sprinkler alarms in service?
☐	☐	Are sprinkler system pumper connections clearly marked and accessible to the public fire department?
☐	☐	Is the public fire department familiar with the sprinkler installation?
		Hydrants
☐	☐	Are hydrants unobstructed and accessible to the public fire department?
☐	☐	Are hydrants in good operating condition?
		Standpipes
☐	☐	Are standpipe systems installed and in service up to the highest level of construction operations?
☐	☐	Are standpipe system hose connections unobstructed and accessible to the public fire department?
☐	☐	Are standpipe systems adequately protected against freezing?
☐	☐	Are standpipe system pumper connections clearly marked and accessible to the public fire department?
		Fire Alarms
☐	☐	Is a standard procedure established for reporting a fire to the fire department?
☐	☐	Are all workers instructed in this procedure?
☐	☐	Is an audible alarm in operation to alert workers of a fire on the site?
☐	☐	Is there a public fire alarm pull box located nearby?
☐	☐	Has the public fire department visited the site during the past month?
		Watchmen-Guards
☐	☐	Is watch service provided during all nonoperating hours?
☐	☐	Does service cover the entire project site?
☐	☐	Are watchmen-guards instructed in the fire reporting procedure?
		Construction Offices, Trailers, Sheds
☐	☐	Are combustible offices, trailers and sheds located at least 30ft (10m) away from major buildings and materials storage?
☐	☐	Are heating devices in offices, trailers and sheds of an "approved" type?
☐	☐	Are heating devices properly installed and vented?
☐	☐	Are fuel cylinders and fuel lines for heating devices protected against vehicular damage?
		Tarpaulins
☐	☐	Are tarpaulins used for temporary enclosure of building construction?
☐	☐	Are tarpaulins in use of the flame-resistant type?
☐	☐	Are tarpaulins in use tightly secured to prevent contact with ignition sources such as temporary heaters?

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

Applicable 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: Air Quality Management
- ECP 6: Noise and Vibration Management
- ECP 7: Protection of Flora
- ECP 8: Protection of Fauna
- ECP 9: Road Transport and Road Traffic Management
- ECP 10: Construction Camp Management
- ECP 11: 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.	• The Contractor shall • Develop site specific waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to supervision consultant for approval. • Organize disposal of all wastes generated during construction in the designated disposal sites approved by the Project. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate and reuse or recycle all the wastes, wherever practical. • Vehicles transporting solid waste shall be covered with tarps or nets to prevent spilling waste along the route. • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. • Provide refuse containers at each worksite. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		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	The Contractor shall • Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labelled for safe transport to an approved chemical waste depot. • Store, transport and handle all chemicals avoiding potential environmental pollution. • Store all hazardous wastes appropriately in bunded areas away from water courses. • Make available Material Safety Data Sheets (MSDSs) for hazardous materials on-site during construction. • Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. • Construct concrete or other impermeable flooring to prevent seepage in case of spills.

ECP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	The Contractor shall • Prepare spill control procedures and submit them for supervision consultant approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in bunded areas on top of a sealed plastic sheet away from watercourses. • Refueling shall occur only within bunded areas. • Store and use fuels in accordance with MSDSs. Make available MSDS for chemicals and dangerous goods on-site. • Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site. • Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored; and ensure personnel trained in the correct use. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		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.

ECP 3: Water Resources Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	The Contractor shall • Follow the management guidelines proposed in ECPs 1 and 2. • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems.
Discharge from construction sites	Construction activities, sewage from construction sites and work camps may affect the surface water quality. The construction works will modify	The Contractor shall • Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	groundcover and topography changing the surface water drainage patterns of the area. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, and effect habitat of fish and other aquatic biology.	around storage areas for construction materials. • Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site. • Divert runoff from undisturbed areas around the construction site. • Stockpile materials away from drainage lines • Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot. • Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall • Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. • Ensure that roads used by construction vehicles are swept regularly to remove dust and sediment. • Water the loose material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and Ecoli.	The Contractor Shall • Provide the drinking water that meets SEQS standards. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time.

ECP 4: Drainage Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	The Contractor shall • Prepare drainage management procedures and submit them for supervision consultant approval. • Prepare a program to prevent/avoid standing waters, which supervision consultant will verify in advance and confirm during implementation. • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line. Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there. • Rehabilitate road drainage structures immediately if damaged by contractors' road transports. • Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to SEQS, before it is being discharged into the recipient water bodies. • Ensure that there will be no water stagnation at the construction sites and camps. • Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion. • Protect natural slopes of drainage channels to ensure adequate storm water drains. • Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem.
Ponding of water	Health hazards due to mosquito breeding	• Do not allow ponding of water especially near the waste storage areas and construction camps. • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position.

ECP 5: Air Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	The Contractor shall • Prepare air quality management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. • Operate the vehicles in a fuel efficient manner. • Cover hauls vehicles carrying dusty materials moving outside the construction site. • Impose speed limits on all vehicle movement at the worksite to reduce dust emissions. • Control the movement of construction traffic. • Water construction materials prior to loading and transport. • Service all vehicles regularly to minimize emissions. • Limit the idling time of vehicles not more than 2 minutes.
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	The Contractor shall • Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof or maintenance register shall be required by the equipment suppliers and contractors/subcontractors. • Focus special attention on containing the emissions from generators. • Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites. • Service all equipment regularly to minimize emissions. • Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations.
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard, and also can affect the local crops;	The Contractor shall • Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand shall be covered and confined to avoid their being wind-drifted. • Minimize the extent and period of exposure of the bare surfaces. • Restore disturbed areas as soon as practicable by vegetation/grass-turfing. • Store the cement in silos and minimize the emissions from silos by equipping them with filters.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• 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 6: Noise & Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	The Contractor shall • Prepare a noise and vibration management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures. • Make sure all drivers and operators will comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall • Appropriately site all noise generating activities to avoid noise pollution to local residents. • Use the quietest available plant and equipment. • Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. • Install acoustic enclosures around generators to reduce noise levels. • Fit high efficiency mufflers to appropriate construction equipment. • Avoid the unnecessary use of alarms, horns and sirens.
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall • Notify adjacent landholders prior any typical noise events outside of daylight hours. • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• 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 7: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall • Prepare a plan for protection of flora and submit the plan for supervision consultant approval. • Minimize disturbance to surrounding vegetation. • Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. • Get approval from supervision consultant for clearance of vegetation. • 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

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		approximately the same area of the roadside it came from. • Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. • Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. • Ensure excavation works occur progressively and re-vegetation done at the earliest • Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction • Supply appropriate fuel in the work camps to prevent fuel wood collection.

ECP 8: Protection of Fauna

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality	The Contractor shall • Prepare a plan for protection of fauna and submit the plan for supervision consultant approval. • Limit the construction works within the designated sites allocated to the contractors. • check the site for animals trapped in, or in danger from site works and use a qualified person to relocate the animal.
Vegetation clearance	Impact on migratory birds, its habitat and its active nests	The Contractor shall • Not be permitted to destruct active nests or eggs of migratory birds. • Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and locate active nests. • If bird nests are located/ detected within the ledges and roadside embankments then those areas should be avoided. • Petroleum products should not come in contact with the natural and sensitive ecosystems. Contractor must minimize the release of oil, oil wastes or any other substances harmful to migratory birds' habitats, to any waters, wetlands or any areas frequented by migratory birds.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	The Contractor shall • Restrict the tree removal to the minimum numbers required. • Relocate hollows, where appropriate. • Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition.
Night time lighting	Lighting from construction sites and construction camps may affect the visibility of night time migratory birds that use the moon and stars for navigation during their migrations.	The Contractor shall • Use lower wattage flat lens fixtures that direct light down and reduce glare, thus reducing light pollution, • Avoid flood lights unless they are absolutely required. • Use motion sensitive lighting to minimize unneeded lighting. • Use, if possible, green lights that are considered as bird's friendly lighting instead of white or red colour lights. • Install light shades or plan the direction of lights to reduce light spilling outside the construction area.
Construction camps	Illegal poaching	The Contractor shall • Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching. • Ensure that staff and Subcontractors are trained and empowered to identify, address and report potential environmental problems.

ECP 9: Road Transport and Road Traffic Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall • Prepare a traffic management plan and submit the plan for supervision consultant approval. • Strictly follow the Project's 'Traffic Management Plan' and work with close coordination with the Traffic Management Unit. • Prepare and submit additional traffic plan, if any of his traffic routes are not covered in the Project's Traffic Management Plan, and requires traffic diversion and management. • Include in the traffic plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, road signs etc. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Pakistan Traffic Regulations.
	Accidents and spillage of fuels and chemicals	The Contractor shall • Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit.

ECP 10: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall • Prepare a construction camp management plan and submit the plan for supervision consultant's approval. • Locate the construction camps within the designed sites or at areas which are acceptable from environmental, cultural or social point of view; and approved by the supervision consultant. • Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the supervision consultant for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites • Adequate housing for all workers. • Safe and reliable water supply, which should meet SEQS. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time (World Health Organization -WHO guideline). • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes. • Storm water drainage facilities. • Paved internal roads. • Provide child crèches for women working construction site. The crèche should have facilities for dormitory, kitchen, indoor and outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers. • Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by the construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall • Ensure proper collection and disposal of solid wastes within the construction camps. • 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. • Made available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protecting the biodiversity and wildlife of the Project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading Sexually Transmitted Infections (STIs) and Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS). In adequate safety facilities to the construction camps may create security problems and fire hazards	• The Contractor shall • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the labourers during emergency to be transported to nearest hospitals. • Initial health screening of the labourers coming from outside areas. • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work. • Provide HIV awareness programming, including STIs and HIV information, education and communication for all workers on regular basis. • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Maintain register to keep a track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labour housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. • Provide appropriate type of firefighting equipment suitable for the construction camps • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of labourers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps	The Contractor shall • Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. • Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed. • Give prior notice to the labourers before demolishing their camps/units. • Maintain the noise levels within the national standards during demolition activities. • Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. • Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site. • Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. • Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ECP 11: Worker Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc.), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc.) and (iii) road accidents from construction traffic.	The Contractor shall • Prepare an OHS plan and submit the plan for supervision consultant's approval. • Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labour Office guideline on 'Safety and Health in Construction; WBG's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with Pakistan standards. • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas. • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. • Appoint an EHS manager to look after the health and safety of the workers. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.
Child and pregnant labour accident	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	The Contractor shall • Ensure health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work. • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards, in a

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers and operators to strictly follow the driving rules. • Provide adequate lighting in the construction area, inside the tunnels, inside the powerhouse cavern and along the roads.
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECP 16 Construction Camp Management • Adequate ventilation facilities • Safe and reliable water supply. • Hygienic sanitary facilities and sewerage system. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ECP 2 • Solid waste collection and disposal system in accordance with ECP1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities
Other ECPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community • ECP 2: Fuels and Hazardous Goods Management • ECP 4: Drainage Management • ECP 10: Air Quality Management • ECP 11: Noise and Vibration Management • ECP 13: Road Transport and Road Traffic Management .
Training	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of STIs HIV/AIDS). • Train all construction workers in general health and safety matters, and on the specific hazards of their work. Training

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		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 Site-specific Plans and Procedures

Specific plans relevant to the ESMP are as follows:

A. Pre-Construction and Construction Phase Plans

1. Site Specific Environmental Social Management Plan (SSESMP)
2. Labour management plan
3. Project- specific Stakeholder Engagement Plan / Communication Plan
4. Occupational health and safety plan
5. Community health and safety plan
6. Emergency preparedness and response plan
7. Workers camp management plan
8. Site-specific compensatory tree plantation plan
9. Waste management plan
10. Traffic management plan
11. Spill prevention and response plan
12. Pollution prevention plan
13. Material Transportation Plan

B. Operational Phase Plans

1. Sludge Management Plan
2. OHS Plan (Operations)
3. Emergency Response Plan

Guidelines for preparing the above listed plans are provided as follows:

C. Pre-Construction and Construction Phase Plans

1. Contractor's Site Specific Environmental Social Management Plan (SSESMP)

The Contractor will develop a construction phase SSESMP in line with the 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 ESIA, and any additional measures (following the mitigation hierarchy) to avoid, minimize and mitigate. This will include detailed photographic and video footage for each specific work area

b. Section 2: SSESMP Sub-plans and Procedures

Development and implementation of specific sub-plans, which are detailed as follows shall be referenced under the SSESMP. **Table A5-2** 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 A5-2: Sub-plans to be Prepared by the Contractor and Summary of the Aspects to be Covered

Plan	Objectives and Contents
Social and community	
Labour management plan	◆ To establish and foster sound worker-management relations ◆ Human resources procedures (based on the project HR and labour commitment ◆ Project HR and labour commitment ◆ Workers' code of conduct ◆ Construction labour monitoring procedure ◆ Supply chain analysis and due diligence procedure ◆ Workers' grievance mechanism
Project- specific Stakeholder Engagement Plan / Communication Plan	◆ Ensuring that the mechanism for information disclosure on purpose and nature of the construction activities, early notification of construction start date, scheduling and duration and potential impacts and health and safety measures/ mechanisms is in place ◆ Mechanism for issuance of notification to communities and sensitive receptors for any transport disruptions, construction activities, pedestrian accessibility, etc. is intact ◆ Feedback and grievance redress mechanism is followed ◆ Recruitment and Procurement, Employment of Local Workers details are clear to communities
Health and safety	
Occupational health and safety plan	To implement a safe working environment, procedures and culture during the construction phase. Further policies / procedures to be developed if need identified through site audits.
Community health and safety plan	To avoid, minimize and manage community health and safety risks.
Emergency preparedness and response plan	To cover potential emergencies during construction
Workers camp management plan	To ensure that all Project accommodation areas are designed, constructed and maintained as healthy, clean and pleasant locations for workers to live in.
Biodiversity	
Site-specific compensatory tree plantation plan	The plan will provide details on the contractor's role and step by step approach for managing and monitoring compensatory tree plantation.
Environmental	
Waste management plan	To identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods
Traffic management plan	To plan, coordinate and management all traffic and access risks in relation to the construction phase of the project.

Plan	Objectives and Contents
Spill prevention and response plan	To prevent spills and plan for appropriate responses
Pollution prevention plan	To effectively control air, noise, water and wastewater pollution
Material Transportation Plan	Construction material logistics planning entails managing materials and equipment both to and from construction sites. These two vital processes are inbound logistics and outbound logistics. Both of these equipment and material management activities require a detailed and thorough plan.

1. Contractor's Labour Management Plan

Contents to be covered in this plan by the Contractor include the following:

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
Fair labour management and working conditions	◆ Implement HR policy prepared following KWSSIP-LMP, the project wide labour commitment and related procedures, including a diversity and inclusion policy statement ◆ Include contract clauses for contractors and subcontractors to adhere to the project's reference framework (including the HR policy, GBVH policy, human rights, policy data security policy and use of qualified drivers) ◆ 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	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
	◆ 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. ◆ Require any project parties using digital time keeping system to have them in place from the beginning of their time on the project	
Labour rights issues – Code of Conduct	◆ Code of conduct, setting out the rules of conduct by which all workers, will be governed and which includes the following: ◆ Discrimination and equal opportunities ◆ Cross cultural awareness (internationally and locally) ◆ Gender based violence and harassment ◆ Rules governing interactions with local communities, engaging in sex industry transactions, ◆ Health care awareness and protection from sexually transmitted disease. ◆ Align the code of conduct with the HIV and AIDS policy and awareness and prevention program. ◆ Provide training on the workers code of conduct to all workers during site induction and require signatures upon receipt.	◆ Completed code of conduct document ◆ All contractors contractually committed to abiding by the code of conduct ◆ All workers trained in the code of conduct
Labour rights issues – Labour monitoring	◆ Implement labour monitoring procedure, including: ◆ Daily observations of labour and working conditions ◆ Weekly monitoring of workers of all contractors and third party agencies through random spot checks of workers contracts' provision and signing, payroll, overtime, workers; awareness of labour rights, workers' awareness and use of the labour grievance mechanism; through interviews and review of workers' HR files ◆ Weekly review of Workers Complaints logs Weekly review of training records (regarding induction training on code of conduct) ◆ Monthly reporting on compliance monitoring against the Project's human resource policy/labour standard which will include the following: ◆ Women's protection in workforce ◆ Workers with disabilities/special needs participation ◆ Vulnerable workers' protection	◆ 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)

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
		◆ Child and forced labour (target zero)
Labour rights issues – Worker representation	◆ Establish committees with worker representatives and management to address working condition and labour rights issues	◆ Established worker representation committees with democratically elected worker representatives ◆ Number of committee meetings
Labour rights issues – Employment contracts	◆ Produce template and use clear and signed individual worker contracts based on templates with terms and conditions including decent terms for hours of work, rest, wages, leave, overtime payments, time to visit family and enough time to carry out parenting duties. ◆ Advance warning of end of contracts, certificates provided to workers and retention through to operations for as many as possible	◆ Each worker has a signed contract ◆ Evidence of notification of termination of contracts ◆ Certificates provided to workers
Labour rights issues – Labour and social rights awareness	◆ Provide induction training for workers covering health and safety, labour rights, the grievance mechanism, GBVH and how to interact respectfully with local communities. ◆ Provide refresher labour awareness training after probation and before the six-month period ◆ Conduct toolbox talks every six months related to GoS labour laws and regulations to be held by all project employers (KWSSIP / 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).	◆ Each worker has completed induction training ◆ Training records (such as attendance logs for refresher training and toolbox talks)
Labour rights issues - Labour grievance mechanism	◆ A workers' grievance mechanism involving workers' representatives who meet with project management once a month during construction to resolve labour issues. The workers' grievance mechanism will encompass confidential channels to report acts of GBVH and those administering the grievance mechanism will be trained on how to deal with complaints about GBVH	◆ Workers' grievance log showing grievances ◆ Grievances closed out in time and to workers' satisfaction
Influx management	◆ Produce influx management plan, compiling measures within other plans s (stakeholder engagement plan and, community health and safety plan)	◆ Cross-reference and alignment included in all relevant management plans

2. Project- Specific Stakeholder Engagement Plan / Communication Plan

What is a Project- Specific stakeholder engagement / communication plan?

A project-specific stakeholder engagement plan—also known as a stakeholder management plan—is a subsidiary document that is often created alongside the main project plan for a given body of work. It is a written document that is formulated before a project begins, and which is kept on file and updated

over the course of the project as necessary. Its purpose is to identify a project's key stakeholders, and to outline a methodology and approach for how the project team will interact and communicate with those stakeholders.

What goes into a stakeholder engagement plan?

Stakeholder Identification

This section is used to identify all of the project's stakeholders by name. At a minimum, the section also defines their roles and responsibilities as they relate to the project. In some cases, it can be much more extensive.

Planning to Interact with the Stakeholders

The next section is dedicated to actually determining how the project team will interact and engage with the stakeholders identified in the first portion of the plan. This will often involve a deeper assessment of each stakeholder, which will be used to inform the rest of the plan.

Stakeholder Engagement Activities

The final portion of the plan is essentially an outline of the various activities the project team will undertake to communicate with stakeholders, manage their expectations, and keep them engaged with the project. This includes activities such as pre-planned meetings with stakeholders or key reports. This section of the document will also typically outline the types of communications that will be used throughout the project—FGDs, pamphlets, media, periodic meetings etc.—and which each form of communication is best suited for.

Contractor shall follow the KWSSIP-2 Stakeholder Engagement Plan in principal for preparing the Project-specific SEP / Communication Plan. Indicative overview of contents to be covered is as follows:

- INTRODUCTION
- ✓ **Background to Stakeholder Engagement**
- ✓ **Objectives of the Stakeholder Engagement Plan**
- ✓ **Structure of the Document**
- PROJECT DESCRIPTION
- ✓ **Project Overview**
- ✓ **Key Project Aspects**
- ✓ **Social Area of Influence**
- LEGAL FRAMEWORK
- ✓ **Local and WB Requirements for Stakeholder Engagement and Public Consultation**
- KEY PROJECT PRINCIPLES OF STAKEHOLDER ENGAGEMENT AND APPROACH
- ✓ **Stakeholder Identification and Analysis**
- ✓ **Methodology and Approach for Engaging Stakeholders**

- ✓ **Vulnerable Groups**
- ◆ STAKEHOLDER ENGAGEMENT
- ✓ **Stakeholder Engagement Activities according to National and International Requirements**
- ✓ **Stakeholder Engagement Activities within the Scope of ESIA Studies and KWSSIP-2 SEP**
- ✓ **Summary of the Social Field Studies for the ESIA Report**
- ✓ **Tools for Communication Routine (E.g. Internet/Website, Public Media, FGDs etc.)**
- ✓ **Community Relations**
- ✓ **Notice Boards**
- ◆ STAKEHOLDER ENGAGEGEMENT PROGRAM
- ✓ **Pre-Construction Phase**
- ✓ **Construction Phase**
- ◆ GRIEVANCE MECHANISM
- ✓ **Public Grievance Mechanism**
- ✓ **Receipt of Grievances**
- ✓ **Acknowledgement and Record Keeping**
- ✓ **Investigation**
- ✓ **Response to Complainant**
- ✓ **Discussion of Resolution**
- ✓ **Worker Grievance Mechanism**
- ◆ EXTERNAL COMMUNICATIONS
- ✓ **Institutional Arrangements, Roles and Responsibilities**

3. Occupational and Community Health & Safety Plan

Occupational and Community Health and Safety Plans (OHS / CHS Plans) are key document to address how OHS and CHS risks will be managed in a project. A Health & Safety Framework has been prepared by the World Bank E&S Safeguards Unit which is applicable on all World Bank-financed projects in the South Asia Region (SAR). The framework provides guidelines not only to the proponent but also to the project Contractors to implement a practical approach to manage Occupational Health and Safety (OHS) and Community Health and Safety (CHS) impacts and risks in accordance with national/local regulatory framework, the World Bank Environmental and Social Standards and Environmental Health and Safety (EHS) Guidelines, ISO Standards, Good International Industry Practices (GIIP), etc. The framework also includes a template for OHS / CHS Plans which should be followed by the Contractor for making these plans.

Some key guidelines to be covered under the plan includes the following:

Specific Mitigation Guidelines for Dealing with OHS Hazards

No.	Work Activities and Associated Hazards	Mitigation Guidelines
1.	**Excavation**[4] Collapse of Excavation and falling of materials while working in excavations could result in workers injuries or fatalities. Workers could be at risk from: Excavations collapsing and burying or injuring people working in them; Material falling from the sides into excavation; People or plant falling into excavations. Serious accidents could occur if buried services are damaged during excavation work. Excavation inside water stream or at dry areas during wet weather can cause many safety hazards including intrusion of water into excavation, slippery conditions for the drivers of equipment, causing the ground to be slippery and muddy thereby creating the possibility of slips and falls, and making the site work less stable.	**Collapse of excavations:** a- **Temporary support** - Before digging any trench pit, or other excavations, Contractor shall decide what temporary support will be required and accordingly plan the precautions to be taken. b- Contractor shall make sure the equipment and precautions needed (trench sheets, props, baulks etc.) are available on site before work starts. c- **Battering the excavation sides** - Battering the excavation sides to a safe angle of repose may also make the excavation safer. d- In granular soils that may come across during trenching, the angle of slope should be less than the natural angle of repose of the material being excavated. In wet ground a considerably flatter slope will be required. **Falling or dislodging material:** a- **Loose materials** - may fall from spoil heaps into the excavation. Edge protection should include toe boards or other means, such as projecting trench sheets or box sides to protect against falling materials. Head protection should be worn. b- Effect of plant and vehicles - Do not park plant and vehicles close to the sides of excavations. The extra loadings can make the sides of excavations more likely to collapse. **Falling into excavations** a- **Prevent people from falling** – Contractor shall protect edges of excavations with substantial barriers where people are susceptible to fall into them. b- To achieve this, use of following options shall be made: 1. 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 2. The support system itself, e.g. using trench box extensions or trench sheets longer than the trench depth. Inflow of surface or ground water a- Sewage from Malir River could may intrude into the excavation at certain areas, therefore proper shoring shall be required to avoid danger of collapse of excavation. b- Depending on the permeability of the ground, water may flow into any excavation below the natural groundwater level. c- The supports to the side of the excavation should be designed to control the entry of groundwater and the

[4] https://www.hse.gov.uk/construction/safetytopics/excavations.htm

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		design should take any additional water loading into account. d- Particular attention should be given to areas close to lakes, rivers and the sea. e- Water entering the excavation needs to be channeled to sumps from where it can be pumped out; however, the effect of pumping from sumps on the stability of the excavation should be considered. **Safety Measures for Excavation in Wet Weather** a- Weather conditions needs to be checked before daily work to be aware of rain and storm possibilities. b- Inspection of trenches to be done every day before construction begins. c- Workers shall not be allowed to go near unprotected trenches. d- Heavy equipment shall be kept away from trench edges. e- Workers shall be trained to have the skills needed to identify wet weather hazards and how to minimize risks. f- Protective equipment shall always be worn and in a correct manner. g- All power tools shall be correctly maintained and used properly. h- Protective systems including benching, sloping, shoring, and shielding shall be utilized. i- Planning and implementation of safety systems and inspections shall be used regularly on the construction sites. **Other aspects of excavation safety** a- Safe means of getting into and out of an excavation shall be provided. If a risk assessment identifies that ladders are a reasonable means of access and egress from an excavation, ladders with suitable length and of sufficient strength shall be provided for the purpose. b- Use of petrol or diesel engines in excavations shall be avoided without arranging for the fumes to be ducted safely away or through forced ventilation. **Inspection** a- A competent person who fully understands the dangers and necessary precautions shall inspect the excavation at the start of each shift. b- Excavations shall also be inspected after any event that may have affected their strength or stability, or after a fall of rock or earth. c- A record of the inspections shall be maintained and any faults that are found should be corrected immediately. d- A written report shall be made containing the following information:

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		1. Location and description of the place of work or work equipment inspected; 2. Date and time of the inspection; 3. details of: 4. Any matter identified that could give rise to a risk to the health or safety of any person; 5. Any action taken as a result of any matter identified; 6. Any further action considered necessary; and 7. Name and position of the person making the report.
2.	**Excavators**[5] Most fatal and serious injuries involving excavators occur when the excavator is: **Moving** – and strikes a worker / pedestrian, particularly while reversing; **Slewing** – trapping a person between the excavator and a fixed structure or vehicle; or **Working** – when the moving bucket or other attachment strikes a worker or when the bucket inadvertently falls from the excavator. Most excavator related deaths involve a person working in the vicinity of the excavator rather than the driver.	**Controlling the risk** It is important to select the right excavator for the job. There are five main precautions needed to control excavator hazards. These are: a- **Exclusion:** People should be kept away from areas of excavator operation by the provision of suitable barriers. Bunting or fencing can be used to create and maintain a pedestrian exclusion area. b- **Clearance:** When slewing in a confined area the selection of plant with minimal tail swing is preferred. Clearance of over 0.5m needs to be maintained between any part of the machine, particularly the ballast weight, and the nearest obstruction. c- **Visibility:** Excavators with the best view around them directly from the driver position should be selected. Excavators should be equipped with adequate visibility aids to ensure drivers can see areas where people may be at risk from the operation of the machine. d- **Plant and vehicle marshal/banksmen:** A Plant and vehicle marshal/banksmen should be provided in a safe position to direct excavator operation and any pedestrian movements. e- **Bucket attachment:** Quick hitches can be used to secure buckets to the excavator arm. **Training and competence** There are three categories of people who must be trained and made competent regarding the excavator hazards and precautions: a- **Drivers:** should be trained, competent and authorized to operate the specific excavator. Training certificates from recognized schemes help demonstrate competence and certificates should be checked for validity; b- **Plant and vehicle marshal:** should be trained, competent and authorized to direct excavator movements and, where possible, provided with a protected position from which they can work in safety; and

[5] https://www.hse.gov.uk/construction/safetytopics/excavators.htm

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		c- **Pedestrians:** should be instructed in safe pedestrian routes on site and the procedure for making drivers aware of their presence through sign boards and on-site instructions. **Inspection and maintenance** a- A program of daily visual checks, regular inspections and servicing schedules shall be established in accordance with the manufacturer's instructions and the risks associated with each vehicle. b- Drivers shall be advised to report defects or problems. Reported problems shall be put right quickly and the excavator taken out of service if the item is safety critical.
3.	**Lifting Operations (Cranes)**[6] **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.	**Pre-requisite:** a- Cranes and lifting accessories such as slings shall be of adequate strength, tested and subject to the required examinations and inspections. b- All crane operators, and people involved in slinging loads and directing lifting operations, shall be trained and competent. **Planning lifting operations** a- All lifting operations shall be planned so they are carried out safely with foreseeable risks taken into account. b- The person appointed to plan the lifting operation shall have adequate practical and theoretical knowledge and experience of the lifts being undertaken. c- The plan will need to address the risks identified by a risk assessment, the resources required, procedures and the responsibilities so that any lifting operation is carried out safely. d- The plan shall ensure that the lifting equipment remains safe for the range of lifting operations for which the equipment might be used. **Supervision of lifting** a- The right level of supervision shall be in place for lifting operations, reflecting the degree of risk and personnel involved in the particular lifting operation. b- The crane supervisor shall direct and supervise the lifting operation to make sure it is carried out in accordance with the method statement. c- The crane supervisor shall be competent and suitably trained and should have sufficient experience to carry out all relevant duties and authority to stop the lifting operation if it is judged dangerous to proceed. **Thorough examination** a- Lifting equipment shall be thoroughly examined at the prescribed intervals. This shall be a detailed and specialized examination by a competent person. b- Records of thorough examinations and tests shall be: made readily available to the relevant authorities; secured; and capable of being reproduced in written form.
4.	**Heat Stress / Heat Stroke**[7]	**Control of Heat Stress**

[6] https://www.hse.gov.uk/construction/safetytopics/lifting-operations.htm
[7] https://www.cdc.gov/niosh/topics/heatstress/recommendations.html

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	Workers who are exposed to extreme heat may be at risk of heat stress. Exposure to extreme heat can result in occupational illnesses and injuries. Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. **Burns may also occur as a result of accidental contact with hot surfaces**.	Work practice recommendations include the following: a- Limit time in the heat and/or increase recovery time spent in a cool area. b- Use tools intended to minimize manual strain. c- Increase the number of workers per task. d- Train supervisors and workers about heat stress. e- Use a buddy system where workers observe each other for signs of heat-related illnesses. f- Require workers to conduct self-monitoring and create a work group (i.e., workers, a paramedic, and a safety manager) to make decisions on self-monitoring options and standard operating procedures. g- Provide adequate amounts of cool, potable water near the work area and encourage workers to drink often. h- Use a heat alert program whenever the weather service forecasts a heat wave. i- Institute a heat acclimatization plan and encourage increased physical fitness. **Training** Contractor shall implement a heat stress training program for all workers and supervisors which will cover the following: a- Training of workers before hot outdoor work begins. b- Recognition of the signs and symptoms of heat-related illnesses and administration of first aid. c- Causes of heat-related illnesses and steps to reduce the risk. These include drinking enough water and monitoring the color and amount of urine output. d- Proper care and use of heat-protective clothing and equipment and the added heat load caused by exertion, clothing, and personal protective equipment. e- Effects of other factors (drugs, obesity, etc.) on tolerance to occupational heat stress. f- The importance of acclimatization. g- The importance of immediately reporting any symptoms or signs of heat-related illness in themselves or in co-workers to the supervisor. h- Procedures for responding to symptoms of possible heat-related illness and for contacting emergency medical services. Supervisors shall also be trained on the following: a- Implementing appropriate acclimatization plan. b- Procedures to follow when a worker has symptoms of heat-related illness, including emergency response procedures. c- Monitoring weather reports. d- Responding to hot weather advisories. e- Monitoring and encouraging adequate fluid intake and rest breaks. **Hydration** The Contractor shall provide the means for appropriate hydration of workers and ensure that: a- Water should be potable, <15°C (59°F), and made accessible near the work area. b- Estimate how much water will be needed and decide who will get and check on water supplies. c- Provide individual drinking cups for each worker. d- Encourage workers to hydrate themselves.

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		e- Workers should drink an appropriate amount to stay hydrated. f- For moderate activities in the heat that last less than 2 hours, drink 1 cup (8 oz.) of water every 15–20 minutes. g- If sweating lasts for several hours, drink sports drinks containing balanced electrolytes. h- Avoid alcohol and drinks with high caffeine or sugar. i- Generally, fluid intake should not exceed 6 cups per hour.
5.	**Confined Space Working**[8] The most likely hazards related to confined spaces include: A risk of fire or explosion can arise flammable substances and oxygen enrichment. Hot conditions can lead to a dangerous rise in core body temperature and this can be made worse by wearing PPE, highly physical or strenuous work. The presence of toxic gas, fume or vapour can lead to asphyxia or unconsciousness A lack of oxygen in the atmosphere may also lead to asphyxia or unconsciousness.	**Work in confined spaces** a- No person at work shall enter a confined space to carry out work for any purpose unless it is not reasonably practicable to achieve that purpose without such entry. b- A site specific method statement shall be produced by the Contractor and all workers shall adhere to the method statement instructions before the work is carried out. c- It shall be ensured that there is suitable ventilation within the workplace. d- Damaging any underground utilities shall be avoided. e- It shall be ensured that workers are provided with the following: 1. Head, hand and foot protection 2. Eye and hearing protection 3. Waterproof and thermal clothing 4. Respirators and breathing apparatus 5. 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: 1. Ready at hand 2. Properly trained 3. Fit to carry out their task 4. Protected against the cause of the emergency 5. 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

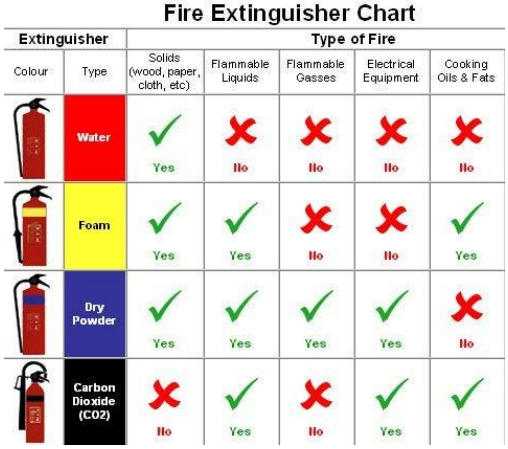
[8] https://www.hse.gov.uk/pubns/priced/l101.pdf

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		workplace task. This will include trainings on; emergency procedures and use of breathing apparatus.
6.	**Welding Safety**[9] There are a variety of welding methods available, all of which have inherent safety and health hazards associated with them, such as: a- Metal fumes are formed when a metal is heated above its boiling point and its vapors condense into very fine particles. Health effects can range from short-term illnesses such as metal fume fever with flu-like symptoms to longer-term issues such as lung damage or neurological disorders. b- Burns may be caused by contact with hot surfaces or hot flying particles. c- Eye injuries can result from exposure to ultraviolet and infrared radiation created from the arc or from particulates or spattering. d- Electric shock may occur due to improper grounding and/or contact with current through damp clothing, wet floors and other humid conditions. Even if the shock itself is not fatal, the jolt may still cause welders to fall from their work positions. In addition, stray welding current may cause extensive damage to equipment, buildings and electrical circuits. e- Fire caused by heat, sparks, slag or flames contacting combustible or flammable materials in the welding area. f- Improper use and storage of oxygen and acetylene may result in fire or explosion g- Strains, neck and lower back injuries resulting from repetitive motions and work orientation. h- Lacerations resulting from accidental contact with sharp edges and burrs.	**Safety Measures** The Contractor shall ensure the following: a- Welders, bystanders and work space are properly protected. b- Use of local exhaust ventilation, such as an exhaust trunk, while performing welding activities whenever possible to minimize exposures to welding fume. c- Use of respiratory protection below the recommended air quality levels. d- Protecting worker's exposures to UV and infrared radiation by providing a properly fitted welding helmet, with proper grade of filter plate while ensuring that it must be worn. An auto-darkening welding helmet is highly recommended as these helmets do not need to be raised to check welds and can be kept in the lowered position all the time, reducing fume exposure. These helmets also reduce the urge to use the neck muscle to flip the helmet to the "up" position, which can cause significant neck discomfort and possible injury. e- Safety glasses should also be worn under the welding helmet to provide impact protection and to protect eyes from particulates when hoods are lifted. f- Pant cuffs and rolled up sleeves should be avoided. g- Workers shall be trained to protect their body from spatter and arc flash with flame-resistant gloves and apron or jacket, flame-resistant natural fiber clothing (such as wool or cotton) and leather boots etc. h- Any combustible or flammable materials shall be put away from the welding area to prevent fires. i- A clear egress path shall be maintained out of the welding area as well as to the nearest emergency equipment such as fire extinguisher, emergency eyewash and emergency shower. j- Check welding equipment and personal protective equipment (PPE) for defects and damage before beginning work. Ensure PPE is properly stored and maintained when not in use. k- Position welding curtains as needed to protect others in the area from splatter, flash and glare. l- Setting up any signs or safety cones as needed. m- Prevent lacerations by identifying sharp edges and burrs, wearing appropriate gloves, deburring, and proper storage methods. n- Ensure good insulation from work surfaces, the electrode, the electrode holder and grounding surfaces is obtained and maintained. o- Practice good lifting techniques by workers and considering ergonomics when setting up the work and minimizing awkward postures. p- Workers shall be trained on the safe use, transportation and storage of compressed gases prior to use.

[9] https://www.hse.gov.uk/welding/index.htm

No.	Work Activities and Associated Hazards	Mitigation Guidelines
7.	**Construction Dust**[10] a- Drilling, cutting, sanding and driving over dusty areas can pose risks for the workers involved. b- Dust that can enter the nose and mouth during breathing is referred to as 'total inhalable dust'. Some dust may consist of larger or heavier particles that tend to get trapped in the nose, mouth, throat or upper respiratory tract where they can cause damage. c- Chronic effects of dust in the lungs are usually permanent and may be disabling, so prevention of the onset of disease should be given the highest priority.	**Control Measures** a- Contractor shall ensure that workers are protected from excessive exposure to dust. a- Keep construction areas shall be kept as clean as possible. b- Workers shall be provided with clothing that resists dust and essential PPEs. c- Working shifts shall be rotated to limit inhalation of polluted air by workers specially the potentially dusty work sites. d- Dust shall be suppressed and dampen at project sites by sprinkling water. e- Construction vehicles shall be driven at slow speeds to keep dust emissions limited. f- Contractor shall provide construction workers with information / training about potential dust hazards and instructions on how to avoid them. g- Workers shall be trained to wet the tools before cutting into any materials as it can reduce dust accumulation.
8.	**Construction Noise**[11] a- Exposure to high levels of noise can cause permanent hearing loss. b- Loud noise can create physical and psychological stress, reduce productivity, interfere with communication and concentration, and contribute to workplace accidents and injuries by making it difficult to hear warning signals.	**Control Measures** a- As a first step, the Contractor shall choose quieter equipment and machinery to save the cost of introducing noise-reduction measures and providing hearing protection, health surveillance and associated trainings etc. b- Hearing protection shall be issued to employees: 1. where extra protection is needed above what has been achieved using noise control 2. as a short-term measure while other methods of controlling noise are being developed. c- Contractor shall make sure that the protectors give enough protection - at least to get below 85 dB at the ear. d- Use of protectors to the noisy tasks and jobs in a working day shall be made mandatory. e- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. f- Periodic medical hearing checks shall be performed on workers exposed to high noise levels.
9.	**Fire Safety** a- Fire at a construction site can endanger the lives of workers and others who happen to be on the site. b- A fire during the course of construction also can result in severe structural damage; destruction of machinery, equipment or materials; and	**Control Measures** a- The Contractor shall develop an effective fire prevention and extinguishing plan before the onset of construction. The plan shall be put into practice as soon as construction operations begin and shall be closely followed throughout the course of construction. b- Contractor shall ensure that fire safety and firefighting trainings are provided to selected workers from each

[10] https://www.hse.gov.uk/construction/healthrisks/hazardous-substances/construction-dust.htm
[11] https://www.hse.gov.uk/noise/hearingprotection.htm

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	untimely delay in project completion.	worker groups so that they can handle the localized fires. c- Contractor shall ensure the availability of right fire extinguishers at project construction and campsites to deal with different types of fires in accordance with the following chart: **Fire Extinguisher Chart**  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. 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. f- Suitable fire extinguishers are Carbon Dioxide or Dry Powder because of the risk of electrical fires in the welding area, whereas use of water based extinguisher shall be avoided. g- Fuel gas and oxygen cylinders shall be placed upright and secured at safe locations, protected from high temperatures and adequately separated from each other. h- Typical Fire Safety Checklist is attached as Error! Reference source not found., which shall be followed by the Contractor during construction phase.

4. Emergency Preparedness and Response Plan (EPRP)

The Contractor will be responsible for ensuring adequate emergency preparedness and response planning for the construction phase of the project. Following Table presents the contents to be covered under EPRP.

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
Construction phase emergency	Develop and implement a regularly updated EPRP so that project staff, relevant local authorities and	◆ Records of training drills

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
preparedness and response plan, including flooding, medical emergencies etc.	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: 3. Identification of accidents and emergency situations and the communities and individuals that may potentially be impacted. 4. Identification of response procedures, provision of equipment and resources, designation of responsibilities, communication systems and channels and periodic response training 5. Routine inspection of work sites 6. Maintenance of plant, equipment, supplies and materials required for preventative measures and emergency responses 7. Clearly defined evacuation procedures 8. Training requirements for staff and managers, including details on who provides training 9. Identification of relationship to and integration with other plans 10. Identification of revision timeframe and process 11. Template for incident reporting forms Identify a set of procedures to assist in rapid and early identification and responses to potential and occurring emergencies relevant to the construction phase. These are likely to include categories such as: 1. Flooding 2. Equipment failure or malfunctioning 3. Seismic activity 4. Terrorism Address specific situations such as emergencies occurring: 1. In the dark: with extra attention on emergency power sources, backup lighting systems, mobile lighting for response teams 2. 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	◆ 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
	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: 1. Support for evacuees to provide food, fuel and shelter 2. Securing potable water supplies to affected areas 3. Identification of buildings for use as relief camps 4. Identification of health facilities and contact details of key personnel	

5. Workers Camp Management Plan

Contents to be covered in the plan by the Contractor include the following:

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
Construction worker well-being in accommodation facilities Community, health, safety and security and relations/conflict between workers and host communities	Describe the minimum national legislative requirements plus the applicable international requirements relevant to the facility standards and management of labour accommodation – these are aligned with the WBG guidance note on workers accommodation[12]. 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	Worker accommodation plan compliant with the WBG guidance note on workers' accommodation Types of accommodation (on site, offsite) Number of accommodated employees and rooms Ratio of facilities to workers Accommodation inspections ◆ Worker and community grievances

[12] Workers' Accommodation: Processes and Standards, September 2009 - https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

Impact to be addressed	Management/Mitigation/ Enhancement to be included in plan	KPI
	1. Types and materials of living facilities 2. Provision of minimum amounts of space for each worker 3. Adequate drainage, dormitories, bed and storage 4. Provision of sanitary, laundry, cooking and medical facilities and potable water 5. Location of accommodation in relation to the workplace 6. Any health, fire, safety or other hazards or disturbances and local facilities 7. Provision of first aid and medical facilities 8. Heating and ventilation 9. 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	◆ 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. CSC's Ecologists shall supervise the Contractor for developing this plan in consultation with the PIU, Sindh Forest Department and the departments which will provide land for compensatory plantation.

Compensatory planting shall involve replacement, planting or making available of a number of trees as a replacement for a damaged or uprooted tree. The aim of this plan shall be to address the conditions that shall be observed when carrying out compensatory planting with respect to uprooted or damaged trees in accordance with the PIU and Forest Department Guidelines.

General Principles to be Followed for Compensatory Plantation

a- Wherever removal of existing trees is justified and permitted, the Contractor shall be required to carry out compensatory planting in accordance with the PIU and Forest Department Guidelines.

b- Whilst compensatory planting is a compulsory requirement for all trees, the Contractor shall also compensate uprooting / clearance of shrubs, through planting ornamental shrubs at locations to be identified by the PIU.

c- Compensatory planting may also apply in cases in which severe pruning is carried out and severely mutilates or damages the tree. The criteria for compensatory planting are to be approved by the PIU and Forest Department prior to authorizing interventions on trees.

d- The quality of trees and site targeted for replacement should meet certain specifications to ensure as much as possible equivalence to offset the adverse impact on the environment, landscape, general amenity and ensure conditions for the survival of newly planted species.

e- Ratio of compensatory plantations shall be 10 trees in place of every affected tree.

f- In order to prevent monocultures, where compensation would involve the planting of a considerable number of trees, species composition should not be limited to the species for which compensation is being carried out. A diversity of species shall require to be planted to compensate for the tree, such as reflecting the natural diversity at the site earmarked for planting.

g- Non-indigenous species are to be replaced by indigenous species.

h- Indigenous trees for planting purposes shall be insofar as reasonably possible from local stock.

i- Unless prevented by the conditions on the site chosen for compensatory planting, replacement trees shall be at least of medium-standard trees, that is, the overall height exceeding 1 m and stem diameter exceeding 5 cm, with a well-balanced branching head.

j- Replacement trees shall be planted in accordance with good arboricultural practice, ensuring distance between individual trees and built structures are appropriate for growth of mature trees specimens. In certain contexts, this requirement may need to be reconciled with other specifications (e.g. denser planting, clustering) that may need to be pursued for the purpose of improved blending into surrounding landscape, improved screening of structures or for mimicking the natural distribution of trees within a particular natural habitat.

Contents of the plan includes the following:

Tree Inventory

To develop a realistic and useful compensatory plantation plan, it is necessary to complete an inventory and analysis of the trees found growing in the DIA. Typical inventory data sheet that could be adopted for the purpose is as follows:

Date:_____ Map#:_____

Tree Inventory Data Sheet

Tree Information			Tree Condition					Planting Location				Conditions				If Pruning Needed What Type?			Comments
Tree #	Code	DBH	G	F	P	D	H	Swlk	<4'	>4'	Lwn	Weak Fork	Over. Wires	Dead Wood	Cav	Clean	Raise	Reduct.	

Legend:
(Tree Condition) G = Good F = Fair D = Dead H = Hazard
(Planting Location) Swlk = Sidewalk <4' = less than 4' >4' = more than 4' Lwn = Lawn
(Conditions) Weak Fork = Weak Branch Fork Connection Over Wires = Overhead Utility Wires Dead Wood = Dead Wood in Crown Cav = Cavity in Trunk
(If Pruning Needed What Type?) Clean = Crown Cleaning Raise = Crown Raising Reduct. = Crown Reduction

- **Selection of Tree Species**

This section will include details on species to be planted. Selection should be made while ensuring possibilities of monocultures and a diverse species should be planted.

- **Details of Compensatory Plantation Sites**

A key section in the plan shall be regarding the details on identification of compensatory planting locations. Planting locations should be identified before tree cutting by the Contractor in consultation with the PIU and the Sindh Forest Department. This section should include geographic and ownership details of compensatory plantation sites**.**

- **Maintenance Needs**

The plan should provide clear-cut guidelines on maintenance needs of the trees, a strategy for the removal of hazard conditions, and the development of an operational maintenance program. This should contain details on maintenance responsibilities, watering frequencies, fertilization and pruning etc. Disposal of the tree debris, including recycling operations etc. should also be covered.

7. Waste Management Plan

The waste management plan will identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods. Contents to be covered in waste management plan by the Contractor include the following:

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
General waste management plan requirements	◆ Identify predicted waste streams, appropriate handling, reuse and recycle opportunities and, as a last resort, disposal methods. ◆ Prepare in accordance local waste regulations and the WBG EHS Guidelines for Construction Materials Extraction (2007), the WBG General EHS guidelines ◆ Cover all waste streams from the project (solid, liquid, hazardous, non-hazardous), for all activities, including construction works and worker facilities and accommodation. ◆ Develop a waste management system reflected in the plan that addresses issues linked to waste minimisation, generation, transport, disposal, and monitoring including: 1. Contractor training requirements with respect to waste handling procedures 2. 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 3. An audit schedule which details the frequency of waste management audits and those responsible for undertaking them 4. Procedure for reporting any environmental incidents related to waste 5. The specific regulatory licensing and reporting requirements as they relate to waste. 6. A map showing each temporary waste storage location for the Project 7. 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. 8. Procedures for, and identification of, licensed contractors to collect, transport and dispose of waste 9. 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	◆ Segregate wastes in designated storage areas, such that hazardous and non-	◆ No non- compliances of waste being mixed

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	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	identified in inspections
Storage requirements	◆ Correctly identify wastes and stored pending collection/transfer for reuse, recovery, recycling or disposal in an environmentally sound manner ◆ Locate waste storage areas on areas of impermeable hard standing to prevent leaching of any contaminants should spillage or leakage occur ◆ Identify a suitable method to cover all skips ◆ Store liquid wastes/oil/chemicals in tanks or drums located in bunded areas which can hold 110% of the capacity of the largest tank or drum or, for multiple drum storage, 25% of the total volume of material stored ◆ Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site ◆ Store hazardous waste in closed containers away from direct sunlight, wind and rain in designated storage areas. Limit access to hazardous waste to those who have received training. ◆ Provide adequate ventilation where volatile wastes are stored, safety datasheets. ◆ Have spill management equipment (spill kits, eyewash stations, PPE) and readily available information on chemical compatibility for 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)	◆ No non- compliances with management measures identified ◆ No spillages resulting from chemical storage in bunded areas.
Handling and transportation	◆ Train staff to carry out handling and storage ◆ Make available and maintain spill response equipment in areas where hazardous wastes may be spilt ◆ Train an appropriate number of site personnel in spill response techniques ◆ Prepare and implement spill prevention and response plan and emergency preparedness and response plan to address any accidental release and leakage ◆ Assign each waste shipment a unique waste consignment number. The Contractor is responsible for ensuring that a register is kept	◆ 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
	at site recording all waste shipments leaving the site and their disposal destination ◆ Ensure a waste transfer note accompanies all waste consignments from the construction site to the disposal destination ◆ Confirm that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for the waste being handled ◆ Design transportation of waste to minimise and prevent spills releases or exposures to workers, the public or the environment. ◆ Secure and label waste containers designated for off-site shipment with the contents and associated hazards ◆ Confirm that the waste containers are correctly loaded on the transport vehicles before leaving the site, and that they are accompanied by relevant documentation that describes the load and its associated hazards, consistent with the reference framework.	
Recycling and reuse	◆ Evaluate waste production processes and identify potentially recyclable materials ◆ Investigate external markets for recycling ◆ Establish recycling objectives and formal tracking of waste generation and recycling rates ◆ Provide training and incentives to employees	◆ Recycling targets included in plan and audited against.
Disposal	◆ Use offsite waste treatment or disposal facilities appropriately permitted, or if not available based on the most suitable site in consultation with authorities ◆ Do not release the waste if there is concern about the standard of transport or destination of the waste ◆ Dispose of any medical waste at licensed facilities ◆ Do not permit burning of waste	◆ Permits held for waste treatment and disposal sites ◆ Medical waste licensed facilities records kept ◆
Wastewater management	◆ Establish wastewater management system for worker and facilities wastewater. Treated water discharged in line with WBG and national limits, or tankered off site to appropriate licensed treatment facility or Include appropriate capacity of septic tank ◆ Include the importance of using project toilets and related procedures in site induction procedures.	◆ Wastewater treated in line with relevant standards ◆ No effluent not meeting standards discharged.
Contaminated materials or areas	◆ Develop procedure to identify, manage and remove any identified contaminated land as part of construction areas	◆ Any contaminated soils or ground managed in line with national and

Topic to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
		international requirements. ◆ Minimisation of pollution to ground and surface water resources

8. Traffic Management Plan

Contents to be covered in traffic management plan by the Contractor include the following:

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Reduced road safety and impacts upon communities	◆ Undertake a road safety awareness programme along the main site access routes in coordination with PIU ◆ Provide information regarding construction activities and activities to stakeholders ◆ Plan and coordinate transport timings to minimise bottlenecks and avoid peak high-risk periods (e.g. school runs).	◆ Implementation of road safety awareness program along main site routes ◆ Provision of construction information to communities / stakeholders regarding construction activities. ◆ Quarterly stakeholder consultation meetings
Reduced road safety	◆ Train drivers fully in road safety and appropriately licensed certified and medically fit to operate the class of vehicle and for the vehicle's operation on and off site. ◆ Implement a no tolerance policy to alcohol and drugs including testing of drivers. ◆ Prohibit hand-held cell phones and radios while driving	◆ Inspect contractor's licences ◆ Inspect transportation contractors for knowledge and compliance with the traffic management plan
	◆ Ensure all vehicles are road worthy, drivers made aware of the potential risks as part of training. ◆ Include fatigue management as part of training ◆ Review likelihood of local workers using motorcycles as means of transportation to and from work or during off hours and decide whether such use is permitted and conditions for doing so, in particular use of helmets and possibly other protective gear.	◆ Vehicle inspections undertaken monthly
	◆ Undertake routine vehicle inspections and monitoring on an on-going basis ◆ Use hazard identification and risk assessment for vehicles on a regular basis	

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	◆ Prohibit vehicles will be prohibited from being overloaded ◆ Utilize low emissions vehicles for the transportation of materials (wherever practicable) ◆ Install seat belts and require they are worn by all occupants	
	◆ Use licensed contractors for waste and fuel transportation ◆ Undertake due diligence of subcontractors (e.g. those bringing equipment to site), and adequately brief them on the traffic management plan. ◆ Include clauses related to traffic management plan implementation and use of qualified drivers in contracts.	◆ Inspect contractor's licences ◆ Inspect transportation contractors for knowledge and compliance with the traffic management plan
	◆ Require adherence to all national and specific area speed limits ◆ Impose and monitor speed restrictions for project traffic ◆ Organize delivery schedules are reasonable and achievable to prevent speeding by drivers	◆ Monitor vehicle speeding and driver's schedules ◆
	◆ Designate crossing points along the access roads based on consultation with local communities	◆ Designated crossing points implemented. ◆
	◆ Erect road signs to i. clearly indicate the route of construction traffic and speed limits, ii. identify where the road is single carriageway about the dangers of overtaking and iii. be in 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	◆ Erect traffic and road safety signs along project routes in-line with local laws ◆ Flag staff at intersections. ◆ Illuminated / flashing signs at crossing points ◆
	◆ Put in place an action plan in case of an accident ◆ Communicate the action plan to all drivers ◆ Report and investigate all accidents and incidents/	◆ Action plan in place and training provided. ◆ Any incidents/accidents responded to rapidly and in line with GIIP including investigations undertaken and measures to prevent reoccurrence identified and implemented within short timeframes

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	◆ 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)	◆ 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	◆ Develop a spill prevention and response plan to follow GIIP and include: ◆ Procedures for immediate spill response actions specified for all relevant scenarios relating to hazardous materials used in the construction processes. ◆ Complete list of equipment available for use in emergency situations. ◆ Procedures for immediate information to authorities in case of discharges and standards for reporting irregular events. ◆ Programme for training of key staff in emergency responses. The training is to be based on various emergency scenarios.	◆ No pollution events

10. Pollution Prevention Plan

Contents to be covered in Pollution Prevention Plan by the Contractor include the following:

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Dust	◆ Use covers and/or control equipment such as water suppressors	◆ No excessive dust levels reported in visual inspections ◆ No dust related grievances

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
Dust resuspension on unpaved roads	◆ Implement dust suppression techniques on unpaved roads, such as applying water or non-toxic chemicals to minimise dust from vehicle movements ◆ Compact and periodically grade and maintain all construction roads ◆ Enforce a speed limit for heavy goods vehicles (HGVs) on-site at 20km per hour	◆ No excessive dust levels reported in visual inspections. ◆ No dust related grievances ◆ No reports of speeding
Dust from open area sources, including storage piles	◆ Use control measures such as installing enclosures and covers, and increasing moisture content ◆ Use vegetation on exposed surfaces of stockpiled materials	◆ All stockpiles are enclosed or covered. ◆ No non-compliance recorded in visual inspections
Emissions from burning materials	◆ Prohibit bonfires and burning of waste materials	◆ No burning of waste materials
Emissions from generators	◆ Consider the location and height of exhaust pipes to ensure proper dispersion of pollutants ◆ Use generators of a modern design and keep them well maintained	◆ Generators of modern design and in good working order
Dust emissions from cement batching plant	◆ Contain and arrest the dusty processes ◆ Suppress dust using water or proprietary suppressants that are fitted with a low-level water supply alarm. ◆ Protect external sources, such as stockpiles and external conveyors, from wind whipping by dampening or covering during the delivery, storage, and handling of crushed rock/sand/coarse aggregate	◆ All stockpiles are enclosed or covered. ◆ No dust related grievances. ◆
Emissions from construction vehicles	◆ Implement the manufacturer recommended engine maintenance programs regardless of the size or type of vehicle ◆ Instruct drivers on the benefits of driving practices that reduce both	◆ Maintain records of the engine maintenance programmes for all vehicles ◆ Records of driver training maintained ◆ No idling vehicles noted during site inspections ◆ Newer more fuel-efficient vehicles recommended onsite

Impact to be addressed	Management / mitigation/ enhancement to be included in plan	KPI
	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	
Noise and vibration due to construction traffic on existing roads	Manage project vehicles to not wait or queue up with engines running at the entrance to the site access or on the public roads Maintain vehicles Restrict deliveries to be within working hours of the site minimising significant movements during sensitive times Use adjustable or directional audible vehicle-reversing alarms or use alternative warning systems, e.g. white noise alarms (including arrangements to minimise the need to perform reversing manoeuvres) Avoid unnecessary revving of engines, reducing speed of vehicle movement and maintaining the condition of the road surface to avoid body slap from empty lorries, designing and maintaining access routes to minimise vehicle noise. ◆ Explain and train drivers to minimise vehicular noise impacts	Construction traffic use identified routes ◆ No community grievances raised with respect to construction traffic-related noise
Noise complaints	◆ Investigate noise and vibration complaints raised using the project grievance mechanism	Complaints are satisfactorily resolved in line with timeframes given in the grievance mechanism ◆ No further complaints regarding previous resolved issues are received
Noise from construction activities	◆ Restrict access of the general public to the site access road and	◆ No incidents of members of the public accessing the restricted zone

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

B. Operational Phase Plans

1. Sludge Management Plan
2. OHS Plan (Operations)
3. Emergency Response Plan

1. Sludge Management Plan

Contents to be covered by the KWSC Filtration Plants Management in the Sludge Management Plan includes the following:

Part – A - OWNER/OPERATOR INFORMATION

a. Facility Information

A. Facility Information
Facility Name:
Facility Owner:
Chief Operator:
Phone Number:
24 hr. Emergency Phone/Pager Number:
Email Address:
Facility Physical Street Address:
City:
Latitude:
Facility Mailing Address:
City:
Authorized Representative/Title:
Mailing Address:
City:
Phone Number:
Email Address:

b. Operations Contractor Details (If plant is operated by external Contractor)

B. Contract Operations (complete this section only if the facility is run by a contracted operator)			
Company Name:			
Primary Contact Name:			
Mailing Address:			
City:			
Phone Number:			
Email Address:			

c. Details of Third Party Sludge Managers (Company / Organization / Department engaged by the KWSC FPs Management for Sludge Recycling in Horticultural Activities)

C. Third Party Sludge Managers (complete this section only if sludge is transferred to a third party who treats sludge to biosolids for final management)			
Third Party Name:			
Primary Contact Name:			
Mailing Address:			
City:			
Phone Number:			
Email Address:			

Part – B - SLUDGE MANAGEMENT INFORMATION

a. Sludge Quality

1. Describe how much sludge is generated and managed at the FP (treatment, dewatering and storage units and attach schematic. Identify the type and capacity of units involved. Include the amount (volume or weight) of sludge managed at the facility and frequency of transportation for recycling.
2. Describe the management strategy for sludge generated and include a contingency plan to use when the primary plan is not available.
3. Identify whether there are any standards that must be met for the selected management option. Provide information/data that demonstrates how these qualifications and standards will be met. For example, if the sludge must be digested and dewatered prior to transfer to another facility, provide detailed information regarding the digestion and dewatering capability of units.
4. Describe any pollution prevention plan to maintain and improve sludge quality.

b. Sampling and Monitoring

1. Identify the parameters and frequency for testing to demonstrate compliance of sludge quality with standards being set for recycling in horticultural activities.

c. Spill Response Plan

1. Describe how spills of sludge would be contained and managed.

d. Reporting/Record Keeping

1. Updated log of recycled sludge, reporting of complaints, emissions or spills etc. to be maintained on weekly basis. Also describe how records will be safely kept for a period of at least five years.

2. Emergency Preparedness and Response Plan (Operations)

Following should be included in the operational phase emergency response plan:

a. List of Contacts

At a minimum ERP should include a list of contact people and phone numbers for troubleshooting, servicing and assistance. This includes operators, repair people, government agencies, media representatives and community members.

b. Introduction

The introduction of ERP should explain its purpose, goals, and overall organization. Stating a mission and goals for emergency response is an important first step because it helps focus on the important aspects of the plan. The goals for ERP should include:

- Assess the type and severity of the emergency
- Notify key contacts and authorities
- Take appropriate and timely emergency response actions
- Take action to minimize system damage
- Return the system to normal operation

Defining clear roles and responsibilities for system operators and other personnel during an emergency speeds up response time and helps eliminate confusion. System personnel needs to know who to report the emergency to, who is responsible for overall management of the emergency, who has decision-making authority and what their own responsibilities are. Large systems may have a variety of persons involved on-site, whereas small systems may only have one person, usually the operator.

c. System Information

- Describe the plant process as well as built-in redundancy features of the system.
- Describe equipment standard operating procedures.
- Describe procedures for connecting to portable pumps, switching to alternate power supplies and/or maintaining generators, including schematics of electrical systems. They should be located beside the equipment they refer to.
- Storage location of tools and maintenance equipment.
- Storage location of O&M Manual.

d. Mitigation Measures

System components identified in the previous section can become less susceptible to encounter problematic situations, which in turn may cause harm, if proper mitigation measures are in place. Mitigation measures refer to actions taken to eliminate or reduce the harmful effects of site emergencies. By making a thorough evaluation of all the potential “trouble spots” or vulnerable points in own system, identify steps can be taken now that will prevent an emergency from happening later. The following items provide a guide to mitigation measures. Describe in ERP all features that apply to the facility.

- Electrical control malfunctioning
- Power failure
- Malfunctioning of sludge management facilities
- Flooding
- Earthquakes damaging the system
- Wind storm
- Fire
- Act of vandalism, terrorism or sabotage causing system disruption

The O&M Manual and standard operating procedures for system may list typical system malfunctions and related emergency situations, methods to prevent them, and actions required when they occur. This information comes in handy when developing an ERP. The potential impact caused by the above emergency situations can be ranked into three levels: minor, significant and major emergencies.

e. Communication Plan

Communication plays a key role in how well the plant management is able to respond during an emergency. The system should be such that it must be able to alert all the receptors of the spill from your system as soon as possible, especially if there is a possible risk to their health from contact with sewage.

f. Equipment Operation

Standard operating procedures for switching to alternate power supplies and/or maintaining generators, including schematics of electrical systems in pump houses, may also form part of ERP, and should be located beside the equipment they refer to.

g. ERP Update and Training

Describe the ERP review and update process, evaluate the effectiveness of the ERP and provide information on the filtration plant’s ERP training program. Relevant components of the ERP needs to be updated if the existing system is altered. Emergency contact list should also be updated once per year or whenever contact information changes, whichever comes first. The plant operators needs to be familiar with the emergency response plan when starting the job and when the ERP is updated. It is also important to practice the ERP. An emergency response drill (or mock emergency) is recommended once per year.

Annexure 6: Analysis of Alternatives

Overview

Project alternatives are studied as a part of this ESMP. Alternatives analysis has been conducted in detail to foresee environmental, economic and social impact of each alternative. This chapter also provides an overview of the various commercially available technologies for the water treatment in an environmentally sound manner and are successfully running in developed countries in particular and recommend the most suitable set of options.

Project alternatives have been studied keeping in view a number of parameters including no project option, location alternatives, technology and cost alternatives of filtration techniques. The rehabilitation of existing and construction of new FP will be based on detailed feasibility assessments focused on assessing the city requirements with regards to population and demand for next many years and then determining the most suitable and effective technology and location for development of the required infrastructure.

No Project Options

At present, Karachi is being supplied with a total of 650 MGD of water out of which approximately 210 MGD bypasses the filtration system and is being supplied raw as the existing Filtration Plants (FPs) are under capacity and most of them have already surpassed their design life.

The existing KWSC's Filteration Plants were constructed from 1943-2006 and except Hub FP the other are not operating at their designed rated capacity, mainly due to poor maintenance surpassing their design life and shortage of funds with KWSC. Rehabilitation and re-construction of the existing FPs will make the existing water treatment facilities upgraded and modified to filter water to achieve the specified standards. Similarly, construction of new treatment plants will treat the raw water which at present is being supplied untreated and will help to achieve the specified quality standards of potable water.

If 'no project' option is triggered, it will result in loss of all positive impacts that project will bring to the Karachi city, such as improved treated potable water availability to citizens of Karachi for next many years. The project will also reduce abstraction of ground water from tube wells and water bores resulting in sustainable water use. Project will reduce water borne disease and ultimately reduced 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 helping in improving their quality of life. Thus, the 'no project' option is not a viable option.

Site / Location Alternatives

No site / location alternatives have been proposed by the Design Consultants as the project mainly involves rehabilitation of existing FPs and construction of new FPs within the boundaries of existing FP sites.

Comparison of Technological Alternatives

Treatment Process Alternatives

Apart from Conventional filtration technology, other treatment technologies available are ultrafiltration, reverse osmosis and Nano filtration. Construction and operational cost associated with conventional filtration technology are low as compared to other membrane filtration technology. Service life for conventional filtration technology is also higher as compared to membrane filtration technology. Power usage in membrane technology is also two times higher than conventional treatment process. The key disadvantage of conventional technology is the larger area requirement. However, for the current project, this disadvantage is overcome due to the ready availability of KWSC land free from all encumbrances.

The comparative assessment of treatment technologies against different parameters are provided in **Table A6-1**.

Based on the above defined parameters, design consultant has selected conventional filtration method as most viable option.

Table A6-1: Comparative Assessment of Treatment Technologies

No	Parameters	Conventional Filtration Technology	Membrane Filtration Technology		
			Ultrafiltration	Reverse osmosis	Nano Filtration
1	Operating Pressure (psi)	No pressure needed	30 - 100	100 - 800	90 -150
2	Removal Efficiency	Only remove sand and microorganisms	Removes bacteria, protozoa, and some viruses	Removes turbidity, including microbes and virtually all dissolved substances.	Removes virus, organic elements, and valence ions
3	Membrane Filter Size (micron pore size)	As per standards	0.01	0.001	0.0001
4	Area	Large space	Require small space		
5	Construction Cost	Economical	Higher than Conventional Treatment		
6	Operating Cost	Low	High	High	High
7	Service Life (Years)	20 - 30	2 - 5		
8	Chemical usage	✓	×	×	×
9	Power Usage	Low	Typically, two times higher than conventional treatment		

Disinfection Alternatives

Following three options have been assessed for the selection of feasible chlorination option for filtration plants:

<u>Gas Chlorination System</u>

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.

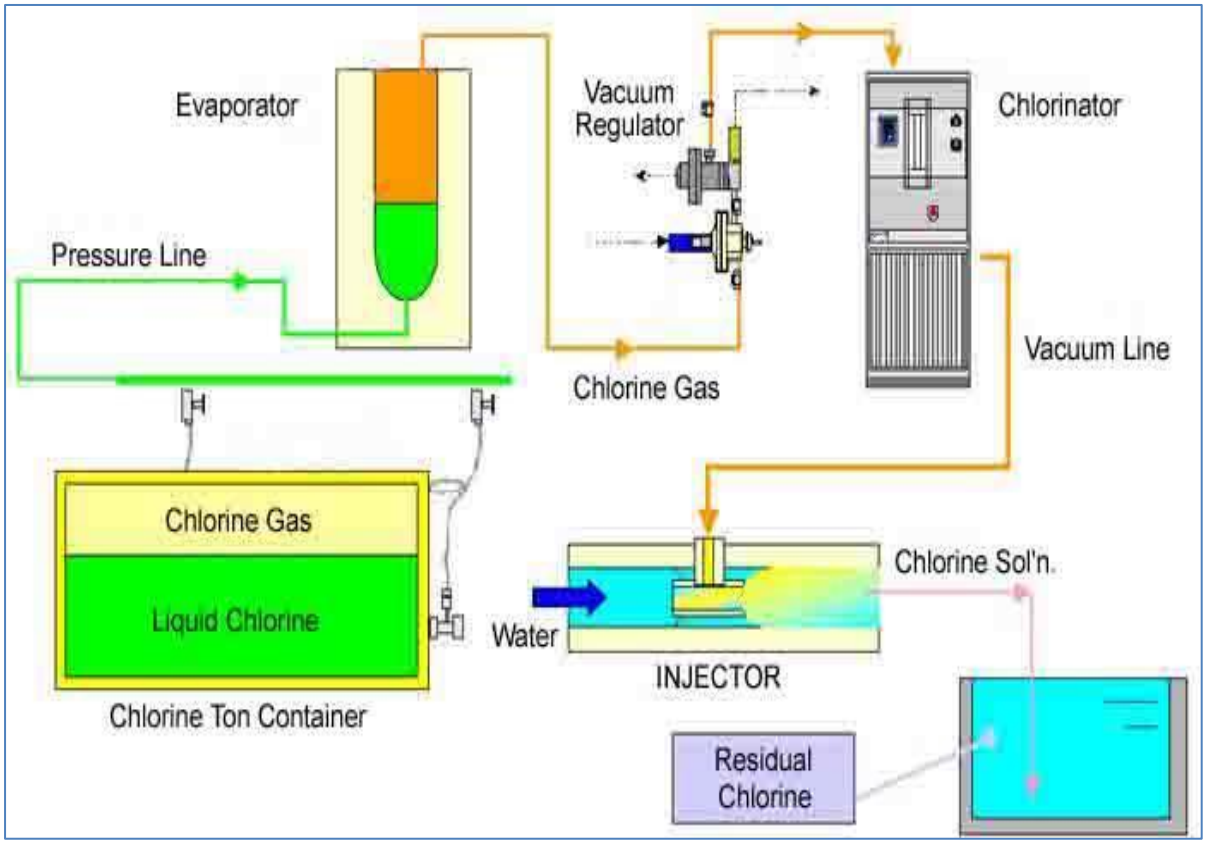


Figure A6-1: Gas Chlorination System

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 (NaClO2 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.

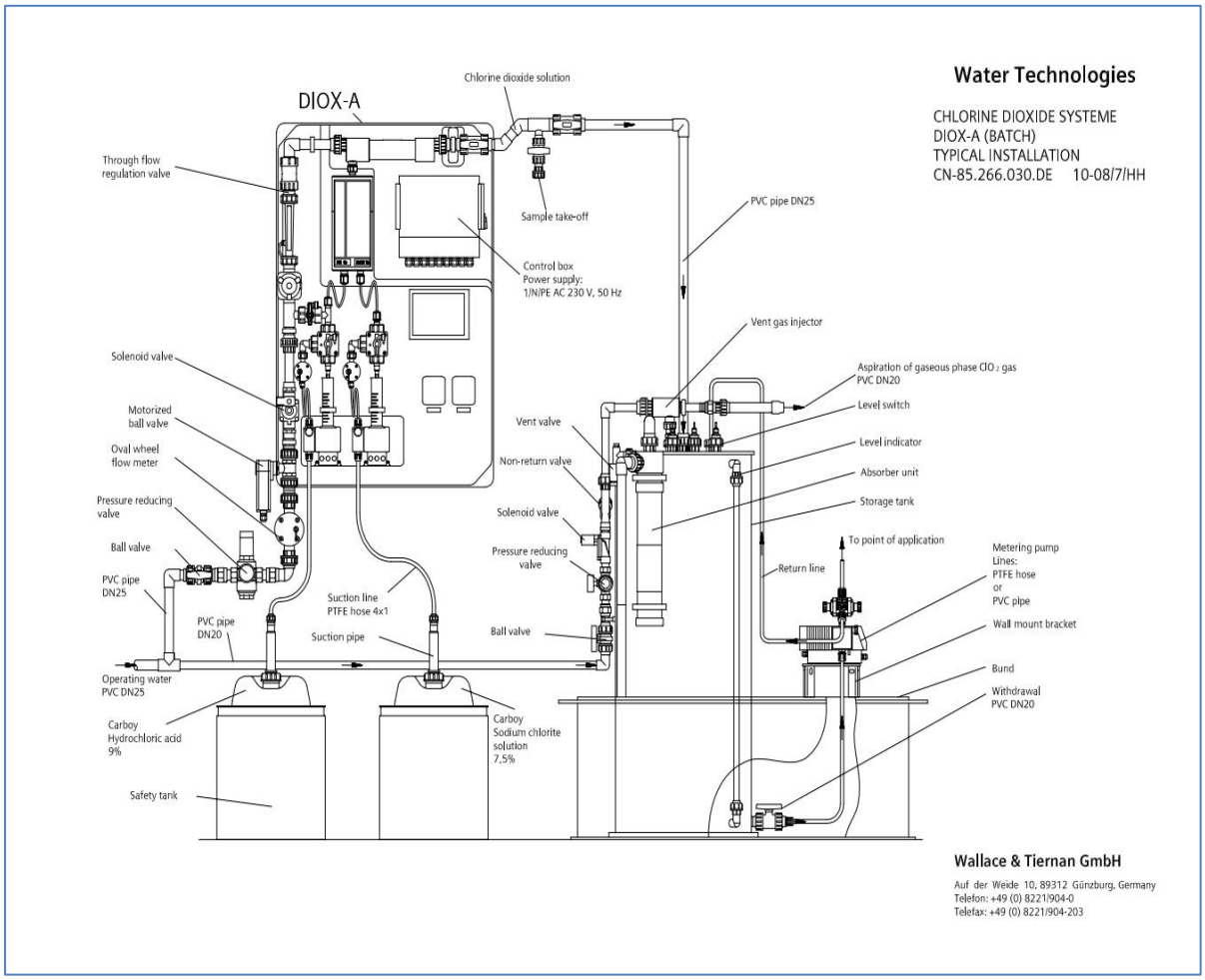


Figure A6-2: Chlorine Dioxide System

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 dozing 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 dozing 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 capital / operational costs, 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.

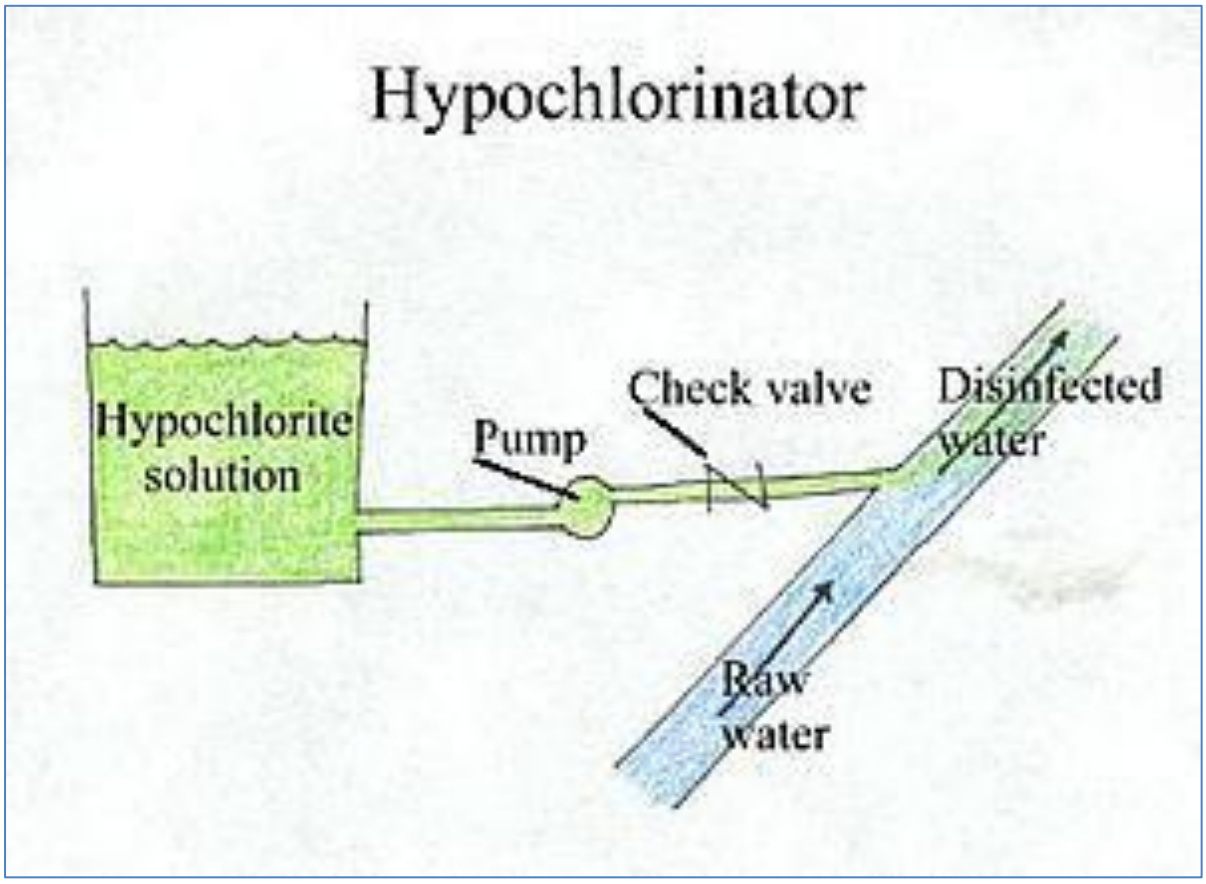


Figure A6-3: Hypo-Chlorinator

Selected Option for Disinfection

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 Filtration Plants 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.

Annexure 7: Grievance Redress Mechanism

This Section outlines the policy and procedure for documenting, addressing, responding and employing methods to resolve project grievances and complaints that may be raised by the project affectees or community members arising from environmental and social performance, the engagement process, resettlement and/or unanticipated environmental or social impacts resulting from project activities that are performed and/or undertaken by PIU. The Section describes the scope and procedural steps and specifies roles and responsibilities of the parties involved in addressing the grievances.

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 affected 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 typical 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 will be disclosed at PIU-KWSSIP, KWSC head office, and concerned project engineers, KWSSIP website as well as at project sites.

Structure of Grievance Redress Mechanism

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

Community GRC (Tier-1)

The community-GRC will provide a platform for project affected 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 affected or community members); and
- Three male members (from project affected 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.

Project GRC (Tier-2)

KWSSIP will constitute a GRC headed by concerned Project Manager (PM) at each project site to resolve all grievances and complaints of the project affected or community members received either directly or through the Tier-1. The 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.

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.

The 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 affected 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 composition:

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

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**.

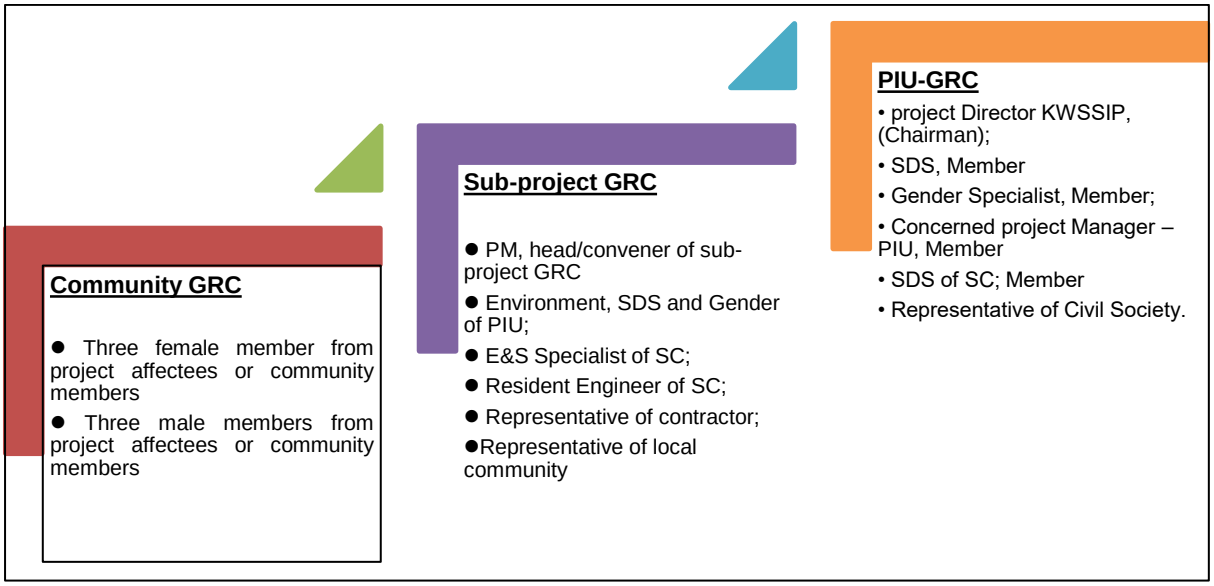


Figure A7-1: Organogram of GRC

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.

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

Grievance Redress Procedure/ Mechanism

The aim 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 affectees 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 Discloser and Stakeholders Consultations

Introduction

Public consultation and information disclosure is an essential component of the EA process, recognized by development agencies and national governments alike. It is an inclusive process conducted throughout the project life cycle and most effective when initiated at an early stage of the project development process. For effective stakeholders' engagement at KWSSIP-2, Stakeholder Engagement Plan (SEP) has been prepared in line with the ESS-10: Stakeholder Engagement and Information Disclosure. This SEP has been followed at the project for the identification of relevant stakeholders, public consultation and information disclosure.

Stakeholders Identification and Analysis

In line with the SEP, the three categories of stakeholders for the Rehabilitation of Existing and Construction of New Filtration Plants Project are outlined below:

- **Primary Stakeholders - Affected Parties** – persons, groups and other entities within the project area of Influence (AoI)13 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;
- **Primary Stakeholders - 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 status14, and that may require special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the project; and,
- **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;

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

Primary Stakeholders – Project Affected Parties and Vulnerable Groups

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

The vulnerable or disadvantaged groups relevant to the project include; women, elderly citizens; , disabled citizens; minorities (ethnic, religious, women); low-income households; women/child headed households; and transgender persons.

13 This refers to the overall project area which may have direct or indirect impacts due to project activities in these locations.
14 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.

Secondary Stakeholders - Other Interested Parties

Interested parties under this category includes the following:

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

Details regarding roles and responsibilities of the concerned secondary stakeholders are given in the **Table A8-1**.

Table A8-1: Role and Responsibilities of Project's Secondary Stakeholders

Project Stakeholders	Roles and Responsibilities
Sindh Solid Waste Management Board (SSWMB)	◆ 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	◆ 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 development approaches into the legal and regulatory frameworks as per Sindh Environmental Protection Act, 2014. ◆ 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	◆ Protection, improvement and maintenance of existing trees ◆ Increase forests by planting new trees ◆ Extension and advisory services to the general public about tree plantation

Project Stakeholders	Roles and Responsibilities
Wildlife Department	◆ To save and protect wildlife
Revenue Department	◆ Provide and verify land ownership data which include but not limited to the ownership record, land categorization and price details.
KMC and DMC	◆ Planning development and maintenance of Karachi roads, bridges, street lights, storm water drains, land control/ removal of encroachment, solid waste management, municipal watch and ward, firefighting, traffic engineering, charged parking, etc.
Political Parties	◆ 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	◆ Elected and represent union committee constituents. Key link between constituents and city legislature and executive.
Civil Society Groups (CSG) and (CBOs)	◆ 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	◆ 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	◆ 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	◆ Enforcement of labor laws ◆ Promotion of healthy labor management and conditions ◆ Monitoring of labor working conditions ◆ Implementation of labor standards ◆ Address grievances of labor force ◆ Maintain the minimum wages rates and impose restriction of child labor
Social Welfare Department	◆ Social protection including institutional care, skill development and rehabilitation ◆ Provide welfare services
Women Development Department	◆ 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	◆ Participation in social impact assessment surveys, Consultation, and Focus Group Discussions ◆ Identification of project impacts, specific community concerns/suggestions from community leaders, male and female community members ◆ Identification of mitigation measures and solutions for enabling win-win solutions ◆ Supervision and disbursement of resettlement cost to APs.
Vulnerable / Disadvantaged Groups	◆ Identification of project impacts on vulnerable / disadvantaged groups ◆ Identification of mitigation measures and solutions to ensure vulnerable / disadvantaged groups are not adversely affected

Project Stakeholders	Roles and Responsibilities
Beneficiaries of the project	◆ Identification of issues. suggestion and coordination for improvement of the project design ◆ Support for implementation and aftercare of the project ◆ Identification of project-related environmental and social issues 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	◆ 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 include:

- 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, throughout the stakeholder's engagement process 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

in line with the SEP. For ascertaining the perceptions of different stakeholders about the project consultations/ meetings were carried out at following two levels:

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

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

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

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

For the public consultations, following steps were adopted:

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.

Consultations with Project Affected Parties

Apart from the Affected Parties such as local communities in the AoI, 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.

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.

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

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 ten selected main 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 has been discussed and disclosed in an open and transparent manner with the communities in order to solicit their comments and suggestions in the studies.

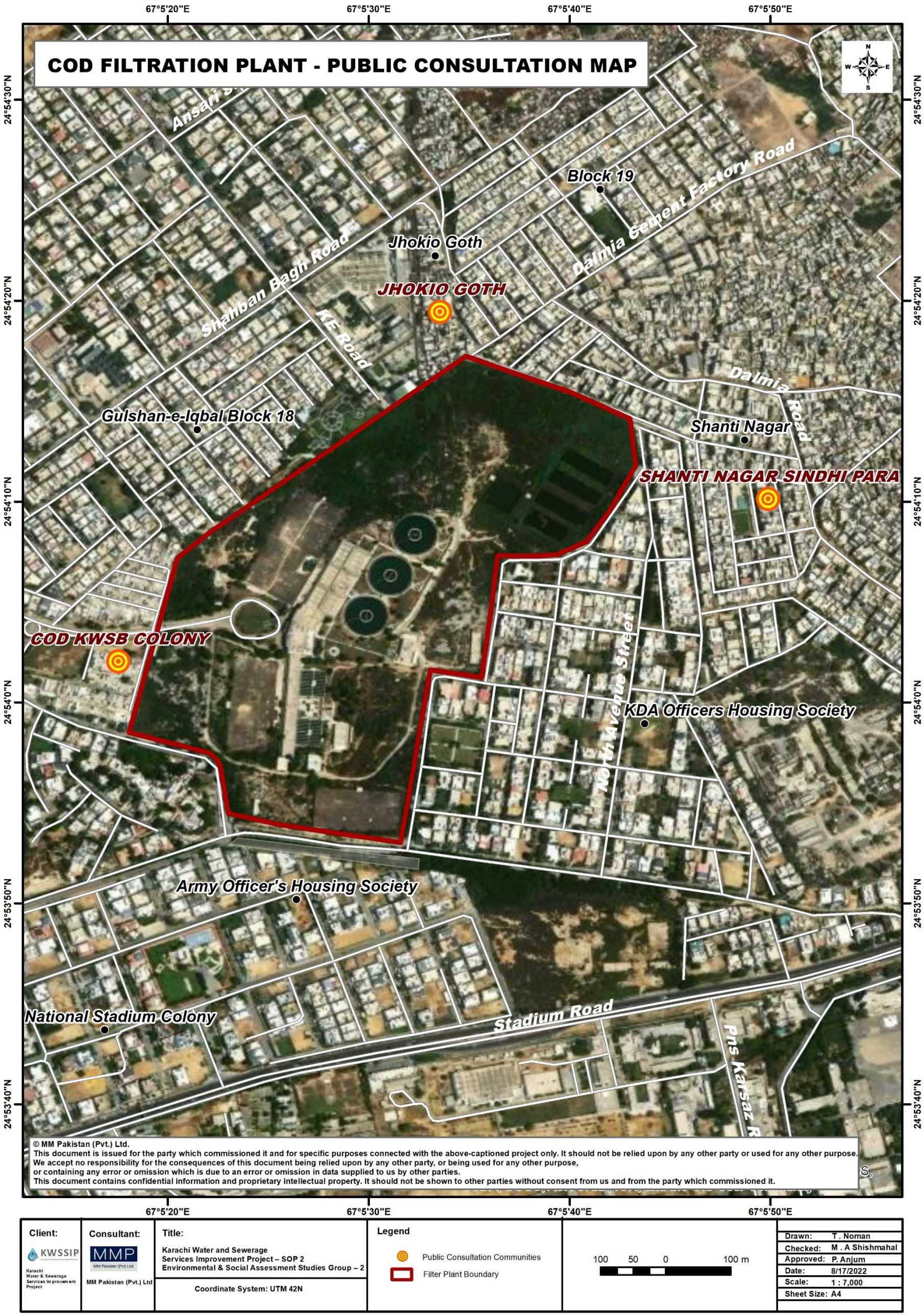
On the whole there were 79 participants including women respondents. In one settlement (Tatal Jokheyo Village), women consultations were not allowed.

Table A8-2 enumerates the consulted communities. **Figure A8-1** shows the consultation maps.

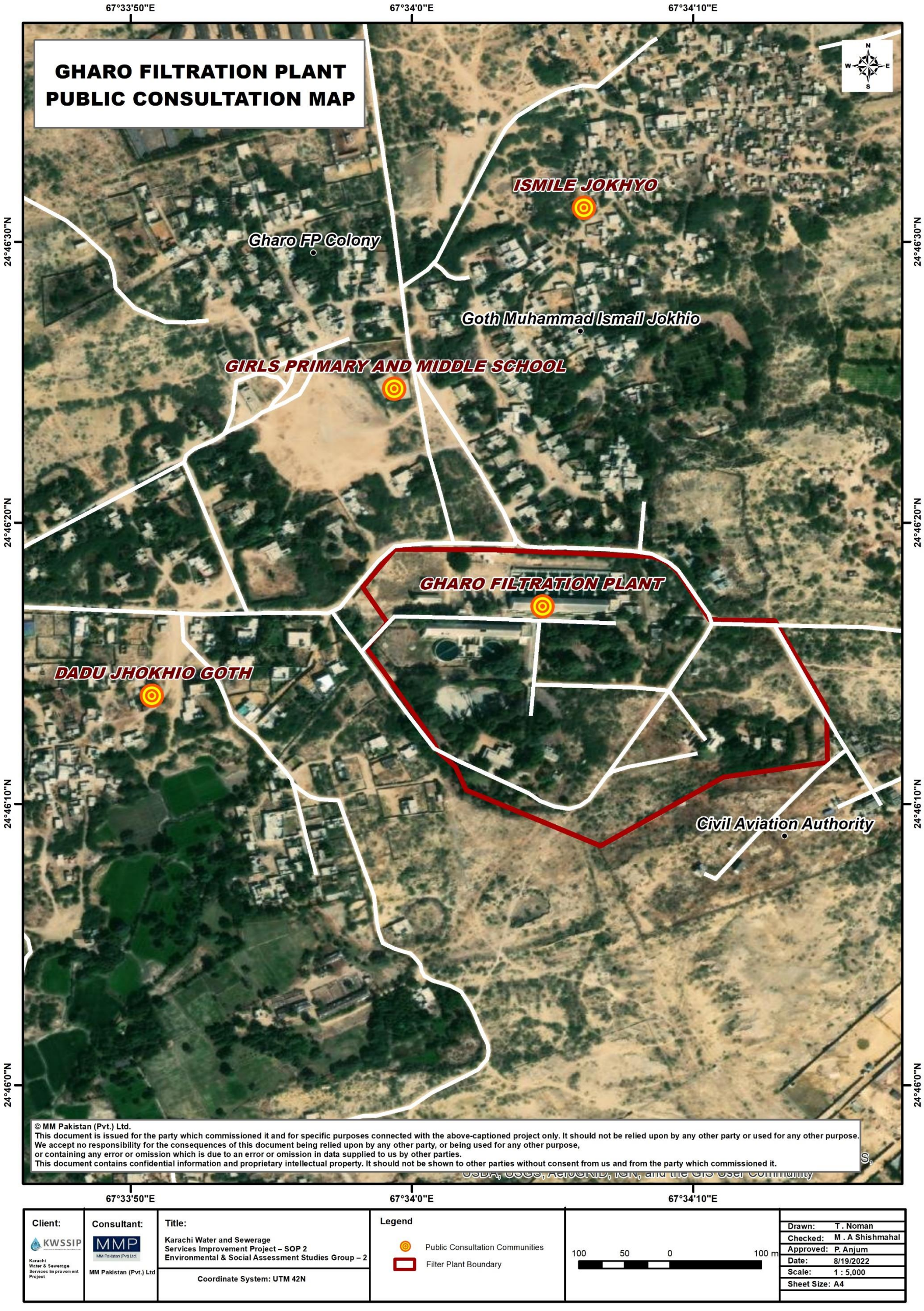
Table A8-2: Consulted Communities

No.	FP	Colony / Settlement	District	Population	Household	Sample Size	Number of Participants	
							Male	Female
1	Pipri	Tatal Jokheyo	Malir	4800	600	8	8	0
2		KWSC Colony		1400	200	7	4	3
3	NEK Old	KWSC Colony	Malir Cantonment	560	70	8	5	3
4	Gharo	Haji Dadu Jokheyo	Thatha	256	32	8	5	3
5		KWSC Colony		994	142	7	4	3
6		Muhammad Ismail Jokheyo		720	60	12	8	4
7	NEK New	Madina Colony	East	1080	180	6	3	3
8		KWSC Colony		2660	380	7	4	3
9	COD	KWSC Colony		3200	400	8	5	3
10		Shanti Nagar		672	84	8	5	3
Total						**79**	**51**	**28**

Figure A8-1: Consultation Maps



Socio-economic Survey Locations - COD Filtration Plant



Socio-economic Survey Locations – Gharo Filtration Plant

Socio-economic Survey Locations – NEK New Filtration Plant

Socio-economic Survey Locations – NEK Old Filtration Plant

Socio-economic Survey Locations - Pipri Filtration Plant

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 was found to be very good. The digest of major issues raised by communities during meetings are given in **Table A8-3**. The stakeholders requested the concerned authorities to ensure the project may be made more beneficial for the local communities.

Table A8-3: Summary of Consultation Meetings Outcomes

Stakeholder	Summary of Key Issues Raised	Responses
KWSC Colony - Pipri	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 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.
Tatal Jokheyo Village	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
	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 built within filtration plant boundaries to restrict chances of interaction. Implementation of ESMP shall ensure privacy of communities.
KWSC Colony – NEK Old	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
	The community desire to receive regular updates on the project development from the relevant government departments.	The consultation process will be on-going process and World Bank's disclosure policy will be adopted. The EPC contractor will maintain an awareness campaign as part of SEP
Haji Dadu Jokheyo	Local people should be preferred when hiring	The contractor will be contractually bound to disclose the "Recruitment Policy" and follow

Stakeholder	Summary of Key Issues Raised	Responses
		it. They will be asked to hire at least 60% people who live within proximity to the Project Area
KWSC Colony – NEK KII (New)	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.
	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.
Muhammad Ismail Jokheyo Village	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
	The community have requested for the construction of a Basic Health Unit (BHU) in the locality under the project through CSR	There is no provision for a community development program in this project however this may be taken up by Contractor as part of their CSR on PIU directives.
	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.
KWSC Colony – COD FP	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.
	Will the service delivery improved?	This project will enable the KWSC to provide clean and potable drinking water to the consumers. 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

Stakeholder	Summary of Key Issues Raised	Responses
		Define a monitoring mechanism and identify monitoring parameters in order to: Ensure the complete implementation of all mitigation measures
Madina Colony	People complained about quality of water received via piped water supply. Almost all Karachi population is forced to buy either bottled mineral water or treated water from reverse osmosis (RO) plants, which are operating in every neighbourhood of Karachi	GoS and WB are working on this as well as on other projects which will address the issue regarding water supply.
Shanti Nagar	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
	The community showed concerns regarding the influx and possible conflicts with construction labor as unemployment is common in the locality	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. Moreover, in line with the ESMP guidelines, the workers will be bound to obey the CoC, and the Contractor will be contractually bound to ensure that workers are following the CoC.
	Local people are annoyed for receiving water via tankers instead of piped water.	GoS and WB are working on this and 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.

The attendance of socio-economic baseline is provided in **Table A8-4**. **Figure A8-2** shows the photograph of socio-economic baseline.

Table A8-4: Attendance of Socio-Economic Baseline / Consultation Participants

Female Participants

Participants List of NEK Old KWSC Colony		
S. No.	**Name**	**Settlement**
1.	Saima Rehhan	NEK Old KWSC Colony
2.	Zubaida tarique	
3.	Rafia	
4.	Kiran	
5.	Afsheen	

Participants List of NEK Old KWSC Colony		
S. No.	Name	Settlement
6.	Saima Israr	
7.	Rubina Saeed	
8.	Sanjeeda Salman	

Participants List of Al-Muslim Village		
S. No.	Name	Settlement
1.	Fozia	Al-Muslim Village
2.	Noor Mahal	
3.	Zenab	
4.	Zakia	
5.	Ruksana	
6.	Zil Hajja	
7.	Shorca	
8.	Mehnaz	
9.	Shameem BIBI	
10.	Talmina	
11.	Bilquees	

Participants List of COD KWSC Staff colony		
S. No.	Name	Settlement
1.	Saima Juaid	COD KWSC Staff colony
2.	Kausar Jawaid	
3.	Lubna	

Participants List of Shanti Nagar Sindhi Para (COD)		
S. No.	Name	Settlement
1.	Ms. Asia	Shanti Nagar Sindhi Para (COD)
2.	Sadia Lodhi	
3.	Misbah Malik	
4.	Shazia	
5.	Mrs. Saira Rehman	
6.	Shumaila	
7.	Rical	
8.	Zumera	
9.	Zeenat	
10.	Siddra	

Participants List of Pipri KWSC Colony		
S. No.	Name	Settlement
1.	Razia qaisar	Pipri KWSC Colony
2.	nosheen	
3.	khair un nissa	
4.	Sumbal Ejaz	
5.	Tehseen	
6.	Zaib Un Nissa	
7.	Imam Zadi	

Participants List of Pipri KWSC Colony		
S. No.	Name	Settlement
8.	Zakia	
9.	shahida majid	
10.	Noreena	

Participants List of Dadu Jokhyo (Gharo)		
S. No.	Name	Settlement
1.	Sakeena	Dadu Jokhyo (Gharo)
2.	Yasmeen	
3.	Zulaikha	
4.	Rasheeda	
5.	Latifa	
6.	Shahida	
7.	Latti	
8.	Rashdi	
9.	Sukkhan	
10.	Hajiani	
11.	Bachal	
12.	Sunari	
13.	Bakhtawar	
14.	Safoora	
15.	Salma	

Participants List of Haji ISmile Jokhyo (Gharo)		
S. No.	Name	Settlement
1.	Noor Bano	Haji ISmile Jokhyo (Gharo)
2.	Tabasum	
3.	Bano	
4.	Rani Razzaqu	
5.	Rehmat G.Mustafa	
6.	Maryam Haroon	
7.	Uzma	
8.	Sahiba	
9.	Shabana	
10.	Shazia	
11.	Razia Ahmed	
12.	Zeenat Aachar	

Participants List of KWSC staff colony Gharo		
S. No.	Name	Settlement
1.	Azeema Palijo	KWSC staff colony Gharo
2.	Rakhsshinda	

Participants List of KWSC staff colony Gharo		
S. No.	Name	Settlement
3.	Sujja	
4.	Fatima	
5.	Ammna	
6.	Kanwal	
7.	Shazia	
8.	Shahida	
9.	Kanwal	
10.	Shakeela	
11.	Nasreen	
12.	Noor Bibi	
13.	Bheemi	
14.	Sidra Bi	
15.	Mehandi	

Participants List of Madina Colony		
S. No.	Name	Settlement
1.	Fatima	Madina Colony
2.	Husan Bano	
3.	Shazia	
4.	Shareefa	
5.	Malaika	
6.	Marvata	
7.	Gul E Lalai	
8.	Parisshta	
9.	Amna	
10.	Farkhinda	

Participants List of NEK New KWSC Staff Colony		
S. No.	Name	Settlement
1.	Qaisar Jahan	NEK New KWSC Staff Colony
2.	Shahina Beghum	
3.	Asma Himayo	
4.	Shazia Zia Ur Rehman	
5.	Ruby Ikram	
6.	Saima Naz	
7.	Mehnaz Asif	
8.	Aisha Sultan	
9.	Mehreen Adil	
10.	Raima Khan	
11.	Areesha	
12.	Shagifta	

Participants List of NEK New KWSC Staff Colony		
S. No.	Name	Settlement
13.	Ruqaiya	

Male Participants

Participants List of NEK Old KWSC Colony		
S. No.	Name	Settlement
1.	Abdul Haleem	NEK Old KWSC Colony
2.	Zakir Hassan	
3.	Qasim Eafi	
4.	Manzoor Ahmed	
5.	Qurban	
6.	Yamin	
7.	Rehan	
8.	Israr	
9.	Imran	
10.	Adeel Khan	
11.	M Aqeel	
12.	Shakeel AHmed	
13.	Samiullah	
14.	Israr Ahmed	
15.	M Imran	

Participants List of Al-Muslim Village		
S. No.	Name	Settlement
1.	Sultan	Al-Muslim Village
2.	Abdul Wakeel	
3.	Mohammad Shahzeb	
4.	Fauji Bahawal	
5.	Shair Afzal	
6.	Bacha Khan	
7.	S.Alishah Ji	
8.	Akber Ali	
9.	Hazrat Ali	
10.	Miam Ali	
11.	Lal Mohammad	
12.	Mukhtiar Hussain	

Participants List of COD Gulshane Iqbal UC Office		
S. No.	Name	Settlement
1.	Sajid HUssain	COD Gulshane Iqbal UC Office
2.	Mudasir Sadiq	
3.	S.Asim Ali	

Participants List of COD Gulshane Iqbal UC Office		
S. No.	Name	Settlement
4.	Shamim Shahzad	
5.	M. HARIS	
6.	M Shakir	
7.	Ghulam Abbas	

Participants List of COD KWSC Colony		
S. No.	Name	Settlement
1.	M Anus	COD KWSC Staff colony
2.	M Usman	
3.	M Junaid	
4.	Faisal	
5.	Abdullah	
6.	Hassam	
7.	Hamza	
8.	Jawad	

Participants List of Gulshne Iqbal Near K-electric (COD)		
S. No.	Name	Settlement
1.	Amayat Khan	Gulshne Iqbal Near K-electric (COD)
2.	Abdul Hameed	
3.	Arsalan	
4.	Toseef Ahmed	
5.	Abdul Rasheed	
6.	M. Waseem	
7.	A. Saboor	
8.	Tasawwar Abbas	

Participants List of Shanti Nagar Sindhi Para (COD)		
S. No.	Name	Settlement
1.	Basheer Sheikh	Shanti Nagar Sindhi Para (COD)
2.	Dr.Peyar Ali	

Participants List of Tatal Jokhyo Village (Pipri)		
S. No.	Name	Settlement
1.	Naveed Ahmed	Tatal Jokhyo Village (Pipri)
2.	Shabir Ahmed	
3.	Siraj Hussain	
4.	Mohammad Hayat	
5.	Naseem Ud din	
6.	Gul Ahmed	
7.	Abdul Shakoor	

Participants List of Tatal Jokhyo Village (Pipri)		
S. No.	Name	Settlement
8.	Ahmed Ali	
9.	Sagheer Ahmed	
10.	Saddam Hussain	
11.	Iqbal	
12.	Malook	
13.	Peer Bakhsh	
14.	Salami	

Participants List of Pipri KWSC Colony		
S. No.	Name	Settlement
1.	Amer jalil	Pipri KWSC Colony
2.	Qadir	
3.	MukhtiarAhmed	
4.	Sheedo	
5.	Noor Ahmed	
6.	Saien DAd	
7.	Iqbal	
8.	Haleem	
9.	Roshan Ali	
10.	Mushtaq Ahmed	
11.	Syed zeeshan ali	
12.	Muhammad arif H	
13.	Muhammad Saleem	
14.	Muhammad Arif	
15.	Yasir Mahmood	
16.	Amer jalil	
17.	Qadir	

Participants List of Dadu Jokyo (Gharo)		
S. No.	Name	Settlement
1.	Sultan Jokhayo	Dadu Jokyo (Gharo)
2.	M Moosa Jokhayo	
3.	jaweed	
4.	shachan	
5.	mustifa	
6.	waheed Bux	
7.	ab.Majeed	
8.	ab.raheeman	
9.	wasahyo	
10.	ashan	

Participants List of Dadu Jokyo (Gharo)		
S. No.	Name	Settlement
11.	rahim	
12.	usman	
13.	farooz jokhayo	

Participants List of KWSC Staff Colony Gharo		
S. No.	Name	Settlement
1.	Sultan Ahmed Baber	KWSC Staff Colony Gharo
2.	Chand Imrab But	
3.	Mohammad Ramzan	
4.	Adul Rehman	
5.	Mohammad Ali sheikh	
6.	Fawwad akhtar	
7.	Charan Das	
8.	Mohammad Alli	
9.	Jafar Ali	
10.	Mehmood khan	
11.	Khumar Payal	
12.	Reeta	
13.	Durga	
14.	Sultan Ahmed Baber	

Participants List of Madina Colony		
S. No.	Name	Settlement
1.	adam khan	Madina Colony
2.	sher khan	
3.	baloch khan	
4.	zar alam	
5.	hayat khan	
6.	nazar khan	
7.	ayoub khan	
8.	saifullah	
9.	M.Saleem	
10.	M.imran	
11.	abdul rehman	
12.	ameer khan	

Participants List of Near K-Electric Office (COD)		
S. No.	Name	Settlement
1.	Abdul Hameed	Near K-Electric Office (COD)
2.	Arsalan	
3.	Tauseef Ahmed	
4.	Abdul Rasheed	
5.	M. Waseem	

Participants List of Near K-Electric Office (COD)		
S. No.	**Name**	**Settlement**
6.	M. Madani	
7.	A. Saboor	
8.	Tasawar Abbas	

Figure A8-2: Social Baseline Photographs

Public Consultation (Female)

Nwsb Gharo

Ismile Jokhyo

Ismile Jokhyo 1

KWSC Colony Gharo

KWSC Colony F

KWSC Colony Gharo

KWSC Colony

KWSC Colony Nek-Old

KWSC Colony New 1

KWSC Colony Pipri F

KWSC Colony Pipri

Nek New KWSC Colony

Shanti Nagar Sindhi Para

Shanti Nagar Sindhi Para 1

Public Consultation (Male)

Dadu Jokhyo Cod2

KWSC Colony Gharo

KWSC Colony Cod

KWSC Colony Cod 1

KWSC Colony Hub P

KWSC Colony

KWSC Colony Nek New

KWSC Colony Nek New 1

KWSC C KWSC colony Nek-New KWSC

KWSC FP Nek Old

KWSC Gharo

KWSC Staff Colony Gharo

KWSC Staff Nek-Old

Madina Colony 1

Madina Colony

Madina Colony 2

Pipri FP

Pipri KWSC Staff And Colony

Tatal Jokhyo Village

Tatal Jokhyo

Tatal Jokhyo 1

FP Institutional Consultations

Administrator East Karachi

Consultation With Local Body East

Consultative Meeting With Gharo At Point (1)

Consultative Meeting With Gharo At Point (2)

Dho And Ahdho East Karachi

Directorate Education Primary Karachi

Do Education Thatta

KWSC Nek New

NGO Representative Thatta

Women Consultation within Project Area

Besides male members, consultations with female members of the communities were also carried out in project area during the ESMP study. Conducting women consultations in the project was a challenging task. Overall there were 79 participants out of which 28 were women respondents. In one settlement i.e., Tatal Jokheyo Village, women consultations were not allowed.

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. 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.

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 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. 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 A8-5**, whereas **Table A8-6** provides digest of major comment and suggestions received from institutional stakeholders:

Table A8-5: Consultation with Institutional Stakeholders

No.	Department / Organization	Name	Designation
1	SEPA	Imran Sabir	Deputy Director
2	KWSC Pipri FP, Malir	Allah Dino Palejo	Resident Engineer
3	DMC, Malir	Riaz Ahmed Khatri	Administrator
4	TMO, Malir	Sohail Ahamed	Executive Engineer
5	Health Department, Malir	Dr. Mohammad Khan	A.D.H.O
6	DMC, East	Javed Soomro	Assistant Commissioner
		Rehmatullah Sheikh	Administrator
7	Health Department, East	Dr. Jamil Sheikh	D.H.O
		Dr. Jameel Mughal	A.D.H.O
8	Sindh Infection Disease and Research Centre	Dr. Adul Razzaq	A.M.S
9	Sahil Welfare Association (NGO), Thatha	Ali Muhammad Jatt	Press Secretary
10	Wildlife Department	Adil Khan	P.S
11	Public Health Engineering Department	Muhammad Bakhash	Research Officer
12	Urban Resource Centre (NGO)	Mohammad Younus	Director
13	KWSC, Karachi	Shahzad Mashkoor	Assistant Executive Engineer
		Muhammad Amir	A.A

Table A8-6: Feedback and Concerns from Key Institutional Stakeholders

Stakeholder	Summary of Key Issues Raised / Comments	Responses
SEPA	The ESA study should thoroughly cover all the environmental and social aspects and the report should provide clear-cut guidelines on the mitigation of identified impacts associated with the project.	The ESMP will thoroughly cover all the environmental and social aspects and the report will be finalized / submitted to SEPA after careful review of the E&S experts associated with the project from PIU / WB and the ESA Consultants.
KWSC Officials	The project will have far reaching positive impacts on the technical and	Definitely the project interventions shall considerably improve the KWSC's water

Stakeholder	Summary of Key Issues Raised / Comments	Responses
	financial health of the KWSC as the project will enable the utility to improve its service delivery.	treatment and supply infrastructure in which all the selected FPs plays a vital role.
District Municipal Corporation (DMC) / TMO - 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 and safe water to the city to fulfil the future needs in sustainable manner.
Health Department, Malir	Keeping in view the proposed interventions, it is anticipated that the project will bring drastic improvement in quality of water being supplied through these FPs.	Definitely, the project will improve quality of water pumping out from the selected KWSC FPs.
DMC East	The proposed project is the great initiative by the GoS and it is needed that further water sector improvement projects may also be inducted.	Rehabilitation and construction of FPs will result in the supply of clean, safe water to the 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. GoS with WB is working on providing more and safe water to the city to fulfil the future needs in sustainable manner.
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. Hopefully the project shall improve overall water quality and reduce reliance of residents on ground and tanker water.	Definitely, the project will improve quality of water as well as the quality of life of Karachiites. This will in turn reduce the water borne disease profile of the city and will result in less patients sufferings with diarrhoea and worm infestations etc.
Sahil Welfare Association (NGO), Thatta	Local men should be preferred for hiring as majority of the people living in the villages under the project's AoI belong to under-privileged poor class.	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.
Urban Resource Centre (NGO)	For local women in villages under the AoI, the Contractor may consider constructing embroidery training centres.	There is no provision for a community development program in this project, however this may be taken up by Contractor on PIU directives as part of their CSR.
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.

Addressing Stakeholder Concerns

Most of the concerns raised by stakeholders have already been incorporated into the project's ESIA. In addition, a Grievances Redress 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 A8-3**. The participants unanimously supported the project. Following are the summarized comments / suggestions by the stakeholders regarding the project:

- Chief Engineer - K-IV Project mentioned that there is an issue of deposition of silt at the existing FPs. The technical consultants responded that the proposed design for the FPs selected for rehabilitation, re-construction and new construction includes provision of Rapid Sand Filtration system which provide rapid and efficient removal of relatively medium to large suspended particles, hence resulting in minimal deposition of sediments. These little deposits could also be cleared through backwashing.
- The effects of the projects will be greatly positive as it will enable KWSC to supply treated drinking water to the residents of Karachi.
- Under the project, the Filtration Plants will be rehabilitated / constructed, focusing on improving water treatment profile and will hence improve the overall quality of life.
- The project is expected to result in improved access to uncontaminated water for thousands of consumers through the employment of state of the art filtration regimes at the FPs.
- 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. 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.

Pictorial views of Stakeholder Consultation Workshop are shown in **Figure A8-4.**

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Figure A8-3: Attendance Sheets of Stakeholder Consultation Workshop

KWSSIP

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Stakeholder Consultation Workshop – Environmental & Social Assessment Studies

SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
1.	Muhammad Tariq	ASE	
2.	Bilal Zafar	KWSSIP	
3.	Sibtain Mughal	Joint Director Comm	
4.	Dr. Abdul Ghaffar	Env. Engg. Deptt. NED University	
5.	Mr. Shoaib Qureshi	Addl Director SEPA	
6.	Ali Larosh	Sr. Project officer WWF-Pakistan	Alilarosh
7.	Farooq Bhutto	K Electric	
8.	Yar Muhammad	Transport Deptt-	
9.	Huma Haleposto	Safeguard Specialist	
10.	Zahid Farooq	Joint Director LRC KMC	

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

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SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
11.	UZAIR HAMEED KHAN	MANAGER ROW OPS PTCL	
12.	Murtaza Ahmed Soomro	Coordinator Protocol NRL.	
13.	CDR Rehan Sattar	Sr. Mgr Administration	
14.	KHALID M. SIDDIQUI	Member (Service) P&D Board GOS	
15.	SYED ALI NAUMAN	CHIEF ENGINEER, K.D.A.	28/07/2022
16.	Kamran Akbar	Sr. Social Div SP	
17.	SARFARAZ	KWSIP	
18.	Mazhar Ali Shaikh	Director Katchi Abadi KWSSIP	
19.	Abdul Rehman	WB	
20.	Engr: M. Usman Memon	S.E T/C (BWSD). PS K: Steel.	

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

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28th July 2022

S. No.	Name	Designation / Department	Signature
21.	KAMRAN UMAR	EE / KDA	
22.	Khurram Shah	SDS / KWSSIP	
23.	Syed Waqar Hussain	ES / KWSSIP	
24.	ARSLAN ASGHAR	PRINCIPAL ENVIRONMENTALIST - PK	
25.	Aqeel Ahmed Maggi	SA. Asstt. Engineer M.Co	
26.	Muhammad Saqib Siddiq	Sr. Social & Resettlement Spec.	
27.	Muhammad Norman	Junior Engineer WAPDA K-4	
28.	Muhammad Yousaf	Manager (LAND) PSM	
29.	Mazhar Abbas	Assistant Manager (PSM)	
30.	Intelehab A Rajput	Chief Engineer (ESM) KWSSIP	

KWSSIP Karachi Water & Sewerage Services Improvement Project

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28th July 2022

S. No.	Name	Designation / Department	Signature
31.	Tuba Noman	GIS Specialist	[signature]
32.	Muhammad Sajjad	Resettlement Expert NESPAK	[signature]
33.	M. A. Shishaudi	MMP	[signature]
34.	M. Shaiq Ahmed	Nespak Lhr. (PM-CA)	[signature]
35.	Fahad Saleem	Nespak (Env. spec.)	[signature]
36.	OMAR ARIF	EMC Pakistan	[signature]
37.	Talal Ahmed	MMP	[signature]
38.	Rameez ul Aslam	MMP	[signature]
39.	GUL MIR KHAN	Chief Engr (T&C) KWSC	[signature]
40.	Hajeeb-u-Rehman	Manager PTCL N/WD	[signature]

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

MMP NESPAK EMC

KWSSIP

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Stakeholder Consultation Workshop – Environmental & Social Assessment Studies

SOP 02 Projects for Karachi Water & Sewerage Services Improvement Project (KWSSIP)

28th July 2022

S. No.	Name	Designation / Department	Signature
41.	Dr. Aamir Alamgir	Assistant Professor / Institute of Environmental Studies Uni	
42.	Ghulam Kibria	Energy update	
43.	Wg Cdr DARYA KHAN	OC Admin / PAF SWEEP. Korangi	D. Coor
44.	Muhammad Nawaz	Social safeguard, Specialists	
45.	Zulfiqar Lashari	Sr. Social Development Specialists	
46.	Muhammad Zafar Iqbal	Resettlement MMP Specialists	Muhammad 28/7/22
47.	Muhammad Rahim Junejo	M.M.P.	M. Rahim
48.	A. Rehman	Lewis.	
49.	Nasreen Baloch	Assistant Director Social welfare.	
50.	Jawed Shami	Team leader Deputies	

MMP NESPAK EMC

KWSSIP

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28th July 2022

S. No.	Name	Designation / Department	Signature
51.	Masood ur Rehman	Sr. Environmentalist-I	
52.	Nadeem Akhtar	Pakistan Refinery Sr Manager construct	
53.	Khurram Shehzad.	CE-Civil PIU	
54.	Aamir Waqar	SE (Civil) PIU.	
55.	Syed Babar Ali	Social specialist Click consultant	
56.	Rehan Zahir	Survey Officer	
57.	Syed Waqas	Sub Eng.	
58.	Hareeda Kaleem	Gender Specialist	
59.	Ismail Zaidi	CMES	
60.	Mussawir Qureshi	PIU SWEEP	

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28th July 2022

S. No.	Name	Designation / Department	Signature
61.	Hania Handani	Design Engineer	
62.	Imad Mohsin	Civil Engineer	
63.	Sonia	SCDA	
64.	Farah Yamin Khan	Consultant WBG	
65.	Muhammad Ijaz	Consultant	
66.	Azizullah Channa	Assistant Professor Env. Eng. Mehran UET, J	
67.	Salman Manaj	consultant	
68.	Syed Hasan Ali.	Addl Manager	
69.	Ziad Chandio	Sr. Engr (G-03)	
70.	Jawad Ahmed	C.R.O	

Figure A8-4: Pictorial views of Stakeholder Consultation Workshop

The Welcome address given by Mr. Syed Salahuddin (Project Director)

Mr. Khurram Shams Khan and Syed Waqar Hussain Shah present the objectives of the workshop to the audience

Participants in Stakeholder Consultation meeting

Question from the stakeholder

Group photo after the successful completion of stakeholder meeting