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KWSSIP
Karachi Water & Sewerage Services Improvement Project

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

REDUCING ENERGY CONSUMPTION AT DHABEJI AND NEK PUMPING STATIONS






Karachi Water & Sewerage Services

Improvement Project [KWSSIP]

Environmental and Social Management Plan Reducing Energy Consumption at Dhabeji and NEK Pumping Stations

October 2023

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

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

Environmental and Social Management Plan Reducing Energy Consumption at Dhabeji and NEK Pumping Stations

October 2023

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List of Acronyms

AIIB	Asian Infrastructure Investment Bank
CBOs	Community Based Organizations
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COC	Code of Conduct
COVID-19	Coronavirus Disease
CSC	Construction Supervision Consultant
DMC	District Municipal Corporation
DPC	Dhabeji Pumping Complex
EHS	Environment, Health and Safety
ESA	Environmental & Social Assessment
ESF	Environmental and Social Framework
ESIA	Environmental & Social Impact Assessment
ESMP	Environmental & Social Management Plan
FGD	Focus Group Discussion
GRM	Grievance Redress Mechanism
HSE	Health, Safety and Environment
ILO	International Labour Organization
IUCN	International Union for Conservation of Nature
JV	Joint Ventura
KWSC	Karachi Water & Sewerage Corporation
KWSSIP	Karachi Water & Sewerage Services Improvement Project
M&E	Monitoring and Evaluation
MGD	Million Gallon Per Day
MMP	MM Pakistan (Pvt.) Ltd.
MSDP	Municipal Services Delivery Program
NEK	North East Karachi
NO	Nitrogen Oxide
OHS	Occupational Health and Safety
PIU	Project Implementation Unit
PM_{10}	Particulate Matter 10 Micron
$PM_{2.5}$	Particulate Matter 2.5 Micron
SEPA	Sindh Environmental Protection Agency
SEQS	Sindh Environmental Quality Standards, 2016
SKAA	Sindh Katchi Abadi Authority
SO_2	Sulfur dioxide

SOPs	Series of Projects
SSWMB	Sindh Solid Waste Management Board
WB	World Bank
WBG	World Bank Group
WHO	World Health Organization
WMP	Waste Management Plan

1 Introduction

1. The Government of Sindh (GoS), through the Karachi Water and Sewerage Board (KSWB) and with financial support from the World Bank (WB) and Asian Infrastructure Investment Bank (AIIB), will be implementing the Second Karachi Water and Sewerage Improvement Project (KWSSIP-2) to improve the access to safe water supply and sewerage services in Karachi, Pakistan. This is the second project series (SOP-2) of the KWSSIP which will deepen the reforms commenced under SOP-1.
2. The SOP-2 has three project components: Component 1 will finance reform and capacity building measures, Component 2 will undertake selected infrastructure investments, thereby ameliorating water and sewer services in Karachi and increasing the city's resilience to water shortages, floods, and saltwater intrusion and lastly, Component 3 will fund project management and associated studies.
3. Under Component 2 of SOP-2 is the subcomponent Reducing Energy Consumption The project will implement the recommendations of the Energy Audit carried out under SOP-1 to improve KWSB's energy efficiency.

1.1 Objective of ESMP

4. This document presents the Environmental and Social Management Plan (ESMP) of Reducing Energy Consumption at Dhabeji and NEK Pumping Stations project to address potential environmental and social (E&S) impacts of the project and ensure the compliance of the project with local regulations and WB Environmental and Social Framework (ESF) requirements.
5. The potential E&S impacts and risks associated with the project's pre-construction, construction, and operational phases were identified and assessed. Considering the mitigation hierarchy of WB ESF, mitigating measures were provided to avoid, minimize and if possible, eliminate the potential risks associated with the identified E&S impacts. The methodology employed to develop this ESMP is discussed in Annexure 2.
6. The objectives of the ESMP are to:
   - Facilitate PIU-KWSSIP in ensuring environmental and social sustainability of the project;
   - Establish a baseline of existing social and environmental conditions prior to project initiation;
   - Identify potentially significant environmental and social impacts (both positive and negative) during all stages of the project;
   - Avoid, minimize, and suggest mitigation and compensation measures for significant adverse impacts;
   - Conduct, record and report public consultation and participation with major stakeholders; and
   - Provide ESMP for all stages of the project as a tool for the implementation of the suggested measures, along with monitoring and evaluation mechanism with adequate resources including capacity building of implementing agencies.

7. All design information presented in this report were those available at the time of preparation. Changes in design elements or processes may be required during the detailed design, construction and operational phases of the project which will result in a deviation from what is presented in this report and may require updating of the ESMP. KSWC shall lead the updating of the ESMP, as necessary.

2 Project Description

8. The energy conservation measures recommended by the Energy Audit Study of DPC include the following:
    - Repair or replacement of mechanical parts such as pressure gauges, discharge header pipes, flow meters, air valves, surge relief valves, surge vessels, manifolds, bypass/overflow arrangements, and intake screens;
    - Repair or replacement of pumps and motors;
    - Installation of thermodynamic pump performance monitoring systems;
    - Electrical-related measures such as installation of LED lighting, installation of energy analyzers at incoming and outgoing MV-panels, proper earthing for transformers, surge protection devices, installation of rubber floor mats around electrical panels, tagging/labeling of equipment, etc.
9. An Energy Audit Study was not yet done in the NEK Pumping Station. However, it is anticipated that the proposed energy conservation measures in the Energy Audit Study of DPC are also applicable to NEK Pumping Station.
10. Improving energy efficiency is a key aspect of KWSSIP-2 as energy is KWSC's central expense, constituting around 45% of the utility's operational costs, thus contributing to its financial losses, unsteady services, and weakening institutional autonomy due to dependency on the provincial government for energy subsidies.
11. Details of the proposed energy efficiency measures are in Annexure 1.

3 Policy, Legal, and Administrative Framework

3.1 National and Provincial Legislation

12. The applicable national and provincial E&S legislation and regulation to the project include the following. The relevance and applicability of these national and provincial policies to the project are further discussed in Annexure 3.

    - 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
    - Building Code of Pakistan, 2007

13. The proposed project is located in Sindh, therefore, the Sindh Environmental Protection Act – 2014 is the core environmental law for the proposed project. According to the SEPA's Review of IEE/EIA Regulations, 2021, the project falls under Schedule – I, hence requiring submission of an Environmental Checklist (EC) to SEPA. The project may cause site specific and low intensity impacts, whereas the implementation of mitigation measures will further reduce the magnitude of these impacts. This ESMP will be followed for the preparation of the EC for submission to SEPA by PIU KWSSIP-2.

14. Aside from this ESMP, the following documents were also prepared for the whole KWSSIP-2 project[1], that will also be applied to the proposed project:

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

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

3.2 International Treaties and Conventions

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

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

16. The applicable WB EHS Guidelines during the construction and operation of the project include the General EHS Guidelines (2007).

3.4 World Bank Environmental and Social Standards (WB ESS)

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

4 Description of the Environment

18. Geographically, the Dhabeji Pumping Complex (DPC) is in District Thatta, while the NEK Pump House is in the Malir Cantonment Area.

19. Table 4-1 presents the summary of the environmental and socio-economic baseline within the defined project area of influence (AoI). The delineation of the AoI is discussed in Annexure 2.1.

20. Annexure 4 presents a detailed discussion of the existing environmental and social conditions in the project areas based on the results of the primary data collection and reviewed available secondary data.

Table 4-1: Summary of Environmental and Socio-Economic Baseline of the Project Areas

Module	Summary of Baseline
Physical Environment	
Land Use	• The project will be done within the existing pump houses; the project activities will not pose any impact on the surroundings of the pump houses. Therefore, a detailed account of the land use is not required.
Climate	• The project area lies in the Subtropical - Arid Climate Zone, with mild winters and hot summers. • Humidity generally remains high. • The hottest months are April to June, while December and January are relatively colder months. • July and August are the wettest months in the project area. • Heat waves have occurred from May to September.
Environmental Quality	
Ambient Air	• Ambient air quality monitoring (24-hour) was done in assigned two locations within the existing pump houses. • Concentrations of nitrogen oxide at Dhabeji Pumping Station exceeded the SEQs limit. • PM2.5 concentrations at both sites exceeded the WHO/IFC limit.
Noise Level	• Noise level was monitored during daytime and nighttime. • The recorded noise levels at the respective pump stations were within applicable daytime SEQs standards. • The nighttime noise levels at NEK pump station exceeded SEQs standards.
Drinking Water	• Drinking water samples were collected at both pump stations. • The samples are from tap with overhead tanks. • Concentrations of total coliform was detected at Dhabeji Pumping Stations • Concentrations of fecal coliform, e. coli, and total coliform were detected at NEK Pumping Stations • Other parameters tested were within the WHO standards for drinking water and SEQs (see Annexure 4).

Module	Summary of Baseline
Biological Environment	
Flora Biodiversity	• No ecologically sensitive species have been found in the project area. • Project activities are within built-up areas of the pump houses and will not require vegetation clearing.
Fauna Biodiversity	• Fauna was encountered at the boundaries of the respective pump houses. • None of the observed faunal species shall be disturbed due to the project's Project activities
Socio-economic Profile	• The socioeconomic baseline of the project area has been established by utilizing both primary and secondary data sources (see Annexure 4.4). • The settlements located within the vicinity of the pump houses are the two KWSC Staff Colonies at Dhabeji and NEK. • There are no sensitive receptors within the AoI.

5 Environmental and Social Management Plan

21. The Environmental and Social Management Plan (ESMP) was prepared to ensure environmental and social compliance with appropriate regulations and guidelines. The 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.

22. **Table 5-1** presents the ESMP for the project. Details of the mitigation/enhancement measures for every significant impact/risk were identified in accordance with the WB-prescribed mitigation hierarchy. This ESMP will be part of the bidding documents, and its implementation will be legally binding on the contractor.

23. The proposed project activities are mainly related to the repair/replacement of electrical and mechanical equipment of the pump houses, which are already confined within the boundary walls. Therefore, they are not expected to cause significant adverse environmental impacts. There are no protected areas or threatened or endangered endemic species in the project area. Schools, mosques, and basic medical facilities are in the vicinity; however, they are outside the pump house boundaries and will not face direct impacts due to project activities.

24. The assessment of potential environmental and social impacts and risks is presented in Annexure 5.

Table 5-1: Environmental and Social Mitigation Plan

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
Pre-Construction Phase				
ESMP Implementation	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 harm to environment and non-compliances with ESMP requirements	◆ 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.		
Labor Risks	Contractors will hire skilled and unskilled workers. It is expected that around 65 workers will be hired during construction phase. Labor risks may include child and forced labor, discrimination.	A Labor Management Procedure (LMP) was prepared for KWSSIP-2 to manage the identified labor risks such as child and forced labor, SEA/SH, labor disputes and others and also the community health and safety risks. The LMP details the approach that will be implemented to meet the national requirements and the objectives of the WB ESS 2: Labour and Working Conditions and WB ESS 4: Community Health and Safety. The key highlights of the LMP on how to address the issues of child and forced labour, labour influx, GBV, SEA/SH, occupational health and safety, and trafficking will be included in the bid documents.		
Construction Phase				
Occupational health and safety	Workers are exposed to occupational health and safety risks of demolition and construction activities such as the following: ◆ Over-exertion and ergonomic injuries and illnesses due to repetitive	The contractors will be required to prepare and implement an OHS program for the construction activities which shall include safety protocols and SOPs for various construction activities, OHS personnel, training, OHS risk assessment and preparation of risk matrix, JHAs, inclusion of OHS aspects in method statements, safety audits, reporting, others. The following are to be considered in the OSH program.	Contractor	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	motion, over-exertion and manual handling. ◆ Poor housekeeping such as excessive waste debris, loose construction materials and liquid spill may cause slips and falls of the workers. ◆ Presence off vehicles or equipment during mobilization and use of materials and equipment may cause accidents ◆ Exposure to faulty electrical devices may result to serious injuries. ◆ Eye injury, burn and electrocution from hot work ◆ During summer season, workers will have to work in extreme hot weather conditions which can bring heat stress ◆ Potential health and safety risks may also arise from dust, pollutants, noise and vibration generated from construction activities.	◆ Conduct a project H&S risk assessment for all the activities of the entire project prior to the commencement of the works focusing the OHS and CHS; ◆ Designate an OHS officer(s) as per the working staff at site with specified responsibilities to supervise all the construction activities at the proposed project site; ◆ Provide OHS training and basic medical training to specified work staff, and basic medical service and supplies to workers; ◆ Layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; ◆ Work safety measures and good workmanship practices ◆ Provision of PPEs to all the workers, visitor and staff in the vicinity of project area; ◆ Provision of sufficient and clean drinking water and sanitation facilities to workers; ◆ Reduce the work hours of workers during extreme hot working environment and heat waves; ◆ Labelling of energized electrical devices and lines with warning signs; ◆ Locking out (de-charging and leaving open with a controlled locking device) and tagging-out (warning sign placed on the lock) devices during service or maintenance; ◆ Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools;		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Double insulating or grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits; ◆ Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas; ◆ Appropriate labeling of service rooms housing high voltage equipment (‘electrical hazard’) and where entry is controlled or prohibited; ◆ Establishing “No Approach” zones around or under high voltage power lines; ◆ Rubber tired construction or other vehicles that come into direct contact with, or arcing between, high voltage wires may need to be taken out of service for periods of 48 hours and have the tires replaced to prevent catastrophic tire and wheel assembly failure, potentially causing serious injury or death; ◆ Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work; Preparation of emergency response and recovery plan; ◆ The working hour and age of labor and staff will be in compliance with the Sindh Factories Act 2021. Overtime working shift will be allowed to the workers as per prevailing clauses of Sindh Factories Act 2021; ◆ Feasible working conditions such as healthy environment, workplace safety, provision of recreational activities and adequate medical/first aid facility at site; ◆ Ensure that the site will be restricted for the entry of irrelevant people particularly children, disabled and elderly peoples;		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Adequate lightning devices, barriers, yellow tape and safety signage will be posted. ◆ At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. ◆ At every workplace and construction camp, proper equipment and paramedical staff will be provided. ◆ 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. Refer to Annexure 9 for the specific mitigation guidelines for dealing with OHS hazards.		
Labor Conditions	Workers are exposed to labor risks such as the following: • GBV might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. • SEA/SH against women might occur from mixing of men and women at the construction site. • Labor exploitation such as unpaid and/or incorrect	◆ A Labor Management Procedure (LMP) was prepared for KWSSIP-2 to manage the identified labor risks such as child and forced labor, SEA/SH, labor disputes and others and also the community health and safety risks. ◆ The key highlights of the LMP on how to address the issues of child and forced labour, labour influx, GBV, SEA/SH, occupational health and safety, and trafficking will be included in the bid documents. ○ Gender Action Plan prepared for KWSSIP will be implemented. ○ A separate SEA/SH Action Plan will be prepared and implemented. ○ Training will be given to construction workers, alongside the implementation of strict measures	Contractor	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	payment of wages by employer, poor working conditions	and punishments in case of any sexual assaults, or GBV. • Provisions of gender disaggregate bathing, changing, and sanitation facilities • 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 SEA/SH/GBV. • Provide on-site anti-harassment training to create awareness of the harmful effects of GBV, as well as consequences if GBV occurs according to the anti-harassment policies. • Avoid entering settlements. • 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/SH/GBV risks and the worker's responsibilities under the COC • Provide training to workers on the Grievance Redress Mechanism (GRM) • Provide complaint boxes to allow workers to report misconduct, violations, or grievances. • The Contractor will provide security onsite. Refer to Annexure 7 for the Security Management Guidelines for Contractors.		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Workers are exposed to health risks of labor relating to HIV/AIDS and other sexually transmitted diseases and COVID-19	◆ To prevent the spread of communicable diseases due to the temporary influx of workers during construction, the following are to be implemented: o Provide surveillance and active screening and treatment of workers o Undertake health awareness and education initiatives among workers o Train health workers in disease treatment o Immunization program and providing health service ◆ 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).	Contractor	Supervision: CSC Monitoring: PIU
	Exposure to vector-borne diseases at construction camp dues to unsanitary conditions	◆ Provision of hygienic and sanitary contractors' camp with access to safe drinking water and sanitation facilities ◆ Proper and regular cleaning, housekeeping and management of the constructors' camp and maintain the camp sites in sanitary conditions ◆ Appoint cleaning staff to maintain cleanliness at campsites. ◆ Implement solid waste management plan ◆ Elimination of unusable impoundment of water ◆ Implementation of integrated vector control programs ◆ 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 ECOP 7: Camp Management.	Contractor	Supervision: CSC Monitoring: PIU
Resource efficiency	Resources that will be used include construction materials, water and fuel. Construction material to be used for construction activities include reinforced and structural steel.	◆ The efficient and well-maintained equipment and machinery will be used; ◆ Implement energy and water conservation measures ◆ Train workers on energy and water conservation measures ◆ Plan for reuse of construction waste materials can be formulated; ◆ Use of solar panels at camp sites to conserve energy.	Contractor	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Almost all the materials to be used in the construction are non-renewable and therefore their sustainable use is necessary for future use.			
Soil	Soil can be contaminated due to • Improper management of construction wastes and demolition wastes • Oil spill/leaks from heavy equipment and vehicles • Disposal of untreated wastewater	◆ 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. ◆ All maintenance activities of heavy equipment and vehicles will be done in a designated area with cement flooring. 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 prevent contamination of soil. ◆ Washing yards will be paved to avoid seepage of runoff from the yard; ◆ 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 and lubricants shall be stored in covered bounded areas, underlain with impervious lining. Static Power ◆ Appropriate arrangements and presence of shovels, plastic bags and absorbent materials shall be ensured near fuel, oil storage and vehicles / equipment parking areas. ◆ Implement ECOP 1: Waste Management, ECOP 2: Fuels and Hazardous Goods Management and ECOP 3: Water Resources Management.	Contractor	Supervision: CSC Monitoring: PIU
Water quality	Discharge of untreated wastewater from constructors' camp and construction site may contaminate the receiving water body	◆ Wastewater from washing of vehicles or equipment will not be directly discharged in any water source or the storm drainage ◆ Use of existing sanitary toilet facilities in the pump houses ◆ A closed sewage treatment scheme including soak pits and septic tanks will be constructed to treat the effluent from the	Contractor	Supervision: CSC

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		construction/labor camps. 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. ◆ Liquid waste from the concrete batching plant will be collected from source by a designated tanker, and taken off-site for proper disposal ◆ Implement ECOP 1: Waste Management, ECOP 2: Fuels and Hazardous Goods Management and ECOP 3: Water Resources Management.		Monitoring: PIU
	Oil/chemical spills/leakage from decommissioned equipment, heavy equipment, and vehicles may contaminate the groundwater table within the project sites	◆ Oils, fuel and chemicals must be stored at bunded storage areas; ◆ Fuel storage areas, hazardous material storage areas, and generators will have secondary containment in the form of concrete or brick masonry bunds. ◆ All maintenance activities of heavy equipment and vehicles will be done in a designated area with cement flooring ◆ Implement ECOP 1: Waste Management, ECOP 2: Fuels and Hazardous Goods Management and ECOP 3: Water Resources Management.	Contractor	Supervision: CSC Monitoring: PIU
Noise and Vibration	Operation of heavy equipment and vehicles will generate noise. Exposure to too much noise is a hearing hazard to workers.	◆ Stakeholders within AoI will be notified before commencement of excavation operations; ◆ Regular maintenance of the machinery, equipment, and vehicles shall be carried out to minimize the noise levels. All machinery, equipment, and vehicles shall have a definite maintenance schedule and be maintained by the Contractor. ◆ Horns will not be used unless it is necessary to warn other road users or animals of the vehicle's approach; Install signboards to educate the project workers and drivers about speed control and minimize the use of horns. ◆ Avoid construction activities during the nighttime near residential areas;	Contractor	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Contractors will comply with submitted work schedule, keeping noisy operations away from sensitive receptors; implement regular maintenance and repairs; and employ strict implementation of operation procedures; ◆ As much as possible, locate the concrete mixing and materials shipment yards at least two kilometers away from sensitive receptors ◆ The plants and equipment used for construction will strictly conform to noise standards specified in the stringent environmental quality standards; ◆ Implement ECOP 5: Noise and Vibration Management		
	Vibration generated by construction and demolition activity may cause structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile	To minimize vibrations, machines should be mounted on shock-absorbing mountings, such as cork or reinforced concrete foundation or a floating isolated foundation set on piles, depending on the machinery. Implement ECOP 5: Noise and Vibration Management	Contractor	Supervision: CSC Monitoring: PIU
Construction and demolition waste	Improper management of construction and demolition wastes (hazardous and non-hazardous) may cause soil pollution and water bodies and nuisance and hazards towards environment and local population. Storing kitchen and food wastes from construction camps can serve as breeding grounds for the disease spreading vectors and rodents.	As part of the CESMP, general (non-hazardous) waste management plans should be implemented at the construction site and camps and should contain the following provisions. ◆ Implementation of waste segregation (biodegradable and non-biodegradable) policy for all construction and operations personnel; ◆ Provision of solid waste handling and storage facilities, such as color-coded trash cans in common areas and strategic locations; ◆ Designate a temporary storage area for the domestic and construction wastes; ◆ The recyclable wastes, such as paper, plastics, and metals, shall be sorted accordingly and maximum efforts will be made to recover and recycle excess concrete, spilled concrete dust, sand and aggregate; ◆ The residual and other general solid wastes shall be disposed in their appropriate bins and in	Contractor	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		accordance with the local solid waste collection schedule ◆ Wastes generated from the camp site will be disposed of at SSWMB and KMC approved sites; ◆ Burning of waste will be prohibited; ◆ Construction workers and supervision staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste; ◆ The contractor will develop specific environmental management plans for asphalt plants and concrete batching plants. These plans will incorporate the general measures as applicable to the entire project, but will also have focused mitigations for solid waste from these plants; ◆ Domestic waste from the camp will be disposed to the nearest SSWMB waste disposal bins A hazardous waste management plan should also be formulated and implemented: ◆ Proper containers must be used for each type of hazardous waste that will be generated. The container must also be closed and sealed and be properly labelled. ◆ Do not store incompatible hazardous wastes near each other. ◆ Hazardous wastes storage and labeling shall comply to the national requirements. ◆ The transport, treatment and disposal of the hazardous wastes shall only be done by licensed service providers. Implement ECOP 1: Waste Management, ECOP 2: Fuels and Hazardous Goods Management and ECOP 3: Water Resources Management.		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Dismantling construction camps will generate waste. Improper management of waste may cause pollution of the environment.	◆ Implement a comprehensive restoration plan for temporary sites, including Campsites. ◆ Conduct regular inspections to identify and address any damages or hazards in the restored areas. ◆ Dispose of debris, dismantled materials, and excess construction materials following waste management regulations. ◆ Clean up and remediate any oil spills or hazardous materials promptly and appropriately. ◆ Ensure excavation trenches and similar areas are backfilled and restored to ensure safety and accessibility. ◆ Replant vegetation and landscaping the area to restore its natural appearance and functionality. ◆ Engage with the local community and stakeholders to address concerns and seek feedback on the restoration process. ◆ Monitor the restored sites over time to assess their effectiveness and make necessary adjustments if required. ◆ Establish clear guidelines and responsibilities for subcontractors regarding site restoration. ◆ Educate all project personnel about the importance of proper site restoration and their roles in achieving it. ◆ Implement ECOP 1: Waste Management		

Community Health and Safety	Delivery of construction materials onsite will generate traffic within the AoI	◆ Traffic controls and diversions marked with signs, lights and other measures (flags) will be provided
		◆ 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 must comprise the following:
		  ◆ Define scope of area that will be affected by construction activities;
		  ◆ Provide sequence of construction operations;
			Contractor	Supervision: CSC
				Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Describe when each phase will commence and finish; ◆ Provide duration of work; and ◆ Note proposed hours of work activity on the site. ◆ The TMP shall ensure the following: ◆ Provide a safe environment for all road users; ◆ 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 ◆ All deliveries, either inbound or outbound of the construction site, may be done during off-peak hours and at designated delivery hubs located near the construction site to prevent blockage of traffic flow along public roads; ◆ Construction vehicles, machinery and equipment will be parked at designated areas to avoid un-necessary congestions along the roads; ◆ Implement ECOP 6: Road Transport and Road Traffic Management		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Vehicular movement at construction sites and access service roads may result in roadside accidents and road damages.	◆ The construction activities will be planned and managed in close consultation with the stakeholders to minimize the vulnerability of above impacts on these sensitive receptors; ◆ The speed of the vehicles will be controlled (at 30 to 40 km/hr) to reduce the probability of severe accidents, debris flows and dust emission ◆ Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work and restore the disturbed area to its original conditions; ◆ At work site, public information and caution boards will be provided including contact for public complaints. ◆ 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.	Contractor	Supervision: CSC Monitoring: PIU
	Infectious or communicable diseases related to the construction activities such as HIV/AIDS, STDs, and COVID-19 also pose a potential health risk to the nearby communities.	◆ Training, awareness and campaigns will be conducted for workers and surrounding communities on awareness and prevention of COVID-19 and HIV/AIDS. Guidelines to combat with COVID-19 ◆ Provide proper and free HIV/AIDS and STDs health screening and counselling for site workers and community members ◆ Necessary medical screening of all workers and staff and submission of proof of vaccination (COVID-19) prior to any employment shall be ensured.	Contractor	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Unsanitary management of the camp sites and improper management of domestic solid wastes may cause the spread of vector-borne and water-borne diseases among the workers and local communities.	◆ Provision of hygienic and sanitary contractors' camp with access to safe drinking water and sanitation facilities ◆ Proper and regular cleaning, housekeeping and management of the constructors' camp and maintain the camp sites in sanitary conditions ◆ Appoint cleaning staff to maintain cleanliness at campsites. ◆ Implement solid waste management plan ◆ Elimination of unusable impoundment of water ◆ Implementation of integrated vector control programs ◆ 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 ECOP 7: Construction Camp Management.	Contractor	Supervision: CSC Monitoring: PIU
	During the construction phase of the project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, religious, cultural or ethnic differences in values may also cause social conflict.	◆ Communities will be informed and consulted before commencing works. ◆ 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 ◆ An effective GRM has been established for the project to resolve all issues related to the community. A separate Grievance Redress Committee for GBV cases has also been established. ◆ Create awareness among workers on proper sanitation and hygiene practices to endorse proper health and maintain good housekeeping practices at all project sites ◆ Prohibiting drugs, alcohol, weapons, and ammunition on the worksite among personnel	Contractor	Supervision: CSC Monitoring: PIU
	The influx of workers may increase the crime rate within the locality including GBV and SEA/SH.	◆ Construction site camps will be located within the existing pump houses (see Annexure 1) ◆ Provisions relevant to management of GBV and SEA/SH during construction will be included in the bidding documents.	Contractor	Supervision: CSC

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
	Physical assault, emotional abuse, sexual violence, early/forced marriage, economic abuse, denial of services and opportunity, and people trafficking are all manifestations of gender-based violence. Arrivals of male-dominated contractors and subcontractors with disposable cash who are not from the area increase the risk of GBV. These dangers are higher if workers have close interaction with the local community, such as when using access roads and other public areas.	◆ 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 GBV, SEA/SH. ◆ Contractor shall 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. ◆ During the construction phase, mobility of workers in the nearby areas will be strictly restricted by the contractor to avoid any inconvenience to the local communities especially women's ◆ 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. ◆ Workers shall be provided with training on the Worker's GRM so that they know their rights and responsibilities. ◆ Availability of complaint box shall be ensured at all work sites allowing workers to report any issues and wrongdoings. ◆ Provide appropriate fencing, security checkpoints, gates, and security guards at construction sites to monitor the entry and exit of workers, staff, and visitors.		Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Maintain good relations with local communities and their leaders to reduce the risk of vandalism and theft. ◆ The Contractor will provide security onsite. Refer to Annexure 7 for the Security Management Guidelines for Contractors.		
Cultural Heritage	There are no reported cultural heritage, archaeological sites or buildings located within the pump houses which are listed in 'Cultural, Tourism, Antiquities and Archives Department – Government of Sindh (GoS) – List of Heritage Buildings' or 'UNESCO World Heritage List'. Contractor shall however train the workers on chance find procedures and in the event of chance finds	◆ 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.	Contractor	Supervision: CSC Monitoring: PIU
Operation				
Occupational Health and Safety	Workers are exposed to OHS hazards during repair/maintenance of the pump houses such as electrical shock, injury from being struck by rotating equipment and moving parts. During cleaning and maintenance, workers may be required to enter a confined space in the pump house.	◆ Labelling of energized electrical devices and lines with warning signs and safety signages; ◆ Locking out (de-charging and leaving open with a controlled locking device) and tagging-out (warning sign placed on the lock) devices during service or maintenance; ◆ Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools; ◆ Double insulating or grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits; ◆ Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas;	KWSP	Supervision: CSC Monitoring: PIU

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		◆ Appropriate labeling of service rooms housing high voltage equipment ('electrical hazard') and where entry is controlled or prohibited; ◆ Establishing "No Approach" zones around or under high voltage power lines ◆ Provide safe means of access and egress from the pumping stations ◆ Implement work permit system for hazardous activities such as entering confined spaces. Provide permanent safety measures for venting, monitoring, and rescue operations, to the extent possible. The area adjoining an access to a confined space should provide ample room for emergency and rescue operations ◆ Prior to entry into a permit-required confined space: o Process or feed lines into the space should be disconnected or drained, and blanked and locked-out. o Mechanical equipment in the space should be disconnected, de-energized, locked-out, and braced, as appropriate. o The atmosphere within the confined space should be tested to assure the oxygen content is between 19.5 percent and 23 percent, and that the presence of any flammable gas or vapor does not exceed 25 percent of its respective Lower Explosive Limit (LEL). o If the atmospheric conditions are not met, the confined space should be ventilated until the target safe atmosphere is achieved, or entry is only to be undertaken with appropriate and additional PPE. o Before workers are required to enter a permit-required confined space, adequate and appropriate training in confined space hazard control, atmospheric testing, use of the necessary PPE, as well as the serviceability and integrity of the PPE should be verified. Further, adequate and appropriate rescue and / or recovery plans and equipment should		

Environmental Issues/Parameters	Environmental and Social Impacts	Mitigation Measures	Implementation Agency	Monitoring Agency
		be in place before the worker enters the confined space ◆ Refer to Annexure 9 for the specific mitigation guidelines for dealing with OHS hazards.		

5.1 E&S Management Plans

25. 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 (ECOPs) to address general construction and operation matters; specific mitigation measures; and guidelines for making construction and operational phase site-specific plans.

5.1.1 Environmental and Social Code of Practices for Construction

26. The environmental and social codes of practice (ECOPs) are generic, non-site-specific guidelines for the construction phase. The ECOPs 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 eight ECOPs are as follows (see Annexure 8):

- ECOP 1: Waste Management;
- ECOP 2: Fuels and Hazardous Goods Management;
- ECOP 3: Water Resources Management;
- ECOP 4: Air Quality Management;
- ECOP 5: Noise and Vibration Management;
- ECOP 6: Road Transport and Road Traffic Management;
- ECOP 7: Camp Management; and
- ECOP 8: Worker Health and Safety.

5.1.2 Inclusion of ESHS Conditions in the Bidding Documents

27. 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;

- E&S-related BOQ items should also be included to ensure all the measures proposed in the ESMP are implemented.
- Contract payments will be linked to environmental, health, and safety performance, measured by completing the prescribed E&S mitigation measures in the CESMP 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.

5.1.3 Occupational and Community Health & Safety Plans

28. The Contractor will 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).
29. 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.

6 Environmental and Social Monitoring Plan

30. Table 6-1 presents the project's Environmental and Social Monitoring Plan (ESMoP) for the pre-construction and construction 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 6-1: Environmental and Social Monitoring Plan

Environmental and Social Aspect	Monitoring Parameters	Monitoring Locations	Monitoring Frequency	Responsibility
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	Daily	◆ Contractor, CSC
Communicable Diseases - COVID- 19 and Camp Management	◆ Number of cases in workforce ◆ Number of COVID-19 tests ◆ Number of workers vaccinated ◆ Audit of provisions and equipment	All Project Sites	Daily	◆ Contractor, CSC
Working Conditions	◆ Implementation of Provincial Labor Laws and ILO Standards for work hours, workers payments & compensations	All Project Sites	Weekly	◆ Contractor, CSC
Employment of Child Labor	◆ Implementation of Sindh Prohibition of Employment of Children Act, 2017 and WB ESS 2	All Project Sites	Weekly	◆ Contractor, CSC
ESS3: Resource Efficiency and Pollution Prevention and Management				
Noise level	◆ 24hr – Noise Levels ◆ Day Time: 55 dB(A) ◆ Night Time: 45 dB(A)	All Project Sites	Monthly	◆ Contractor, CSC
	◆ ESMP Implementation of standard noise control measures ◆ Use of PPEs by workers for protection from high noise	All Project Sites	Daily	◆ Contractor, CSC
Waste management	◆ Implementation of Waste Management Plan (WMP) guidelines	All Project Sites, Campsites, focusing on areas where waste is stored / located	Weekly	◆ Contractor, CSC
ESS4: Community Health and Safety				
Labor Influx / SEA – SH – GBV Incidents	◆ Workers Code of Conduct (COC)	All Project Sites, Campsites	Weekly	◆ Contractor, CSC

6.1 Reporting and Documentation

31. 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.

32. **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.

33. **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.

34. **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.

35. **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.

36. 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.

37. **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.

6.2 Indicative ESMP Implementation Costs

38. Estimated cost estimates for the Contractor's staffing, implementation of mitigation measures, preventive actions, and monitoring are presented in Table 6-2. The total cost of ESMP implementation is estimated at **PKR 6.6 Million**.

39. The implementation of the stakeholders' engagement activities will be covered by the Stakeholder Engagement Plan (SEP) prepared for the whole KWSSIP-2 project.

Table 6-2: Estimated ESMP Implementation Cost

S. No	Description	Packages	Samples/No	Frequency/ Months	Rate/Unit	Amount
CONSTRUCTION PHASE (IMPLEMENTATION PHASE)						
1	Environmental Engineer	1		6	200,000	1,200,000
2	HSE Officer	1		6	150,000	900,000
3	Fixed cost at project sites (PPEs, In-house, Shoes, Safety helmets, Gloves, googles, Harness belts, Jackets, septic tanks, installation of safety barriers)	2		6	200,000	2,400,000
4	Provision of First Aid Facility including medicine.	2		6	50,000	600,000
5	Capacity Development Trainings: ESHS Management, Occupational & Community Health and Safety, Disease Prevention, Maintaining Community Values – Pre - Construction Phases	1		6	50,000	300,000
6	Key Mitigation Measures: Sprinkling/Barricading/Solid Waste Management etc.	2		6	50,000	600,000
					TOTAL	**6,000,000**
					TOTAL AMOUNT	**6,000,000**
					ESCALATION AND CONTIGENCIES ON 10%	**600,000**
					GRAND TOTAL	**6,600,000**

7 Institutional Arrangements

7.1 Institutional Arrangements for ESMP Implementation during Construction

40. The key players involved in the implementation of the ESMP are the Sindh Environmental Protection Agency (SEPA), Project Implementation Unit (PIU), Third Party Validation (TPV) Consultation, Construction Supervision Consultant (CSC), and Contractor(s). Figure 7-1 presents the organizational setup for the ESMP implementation.

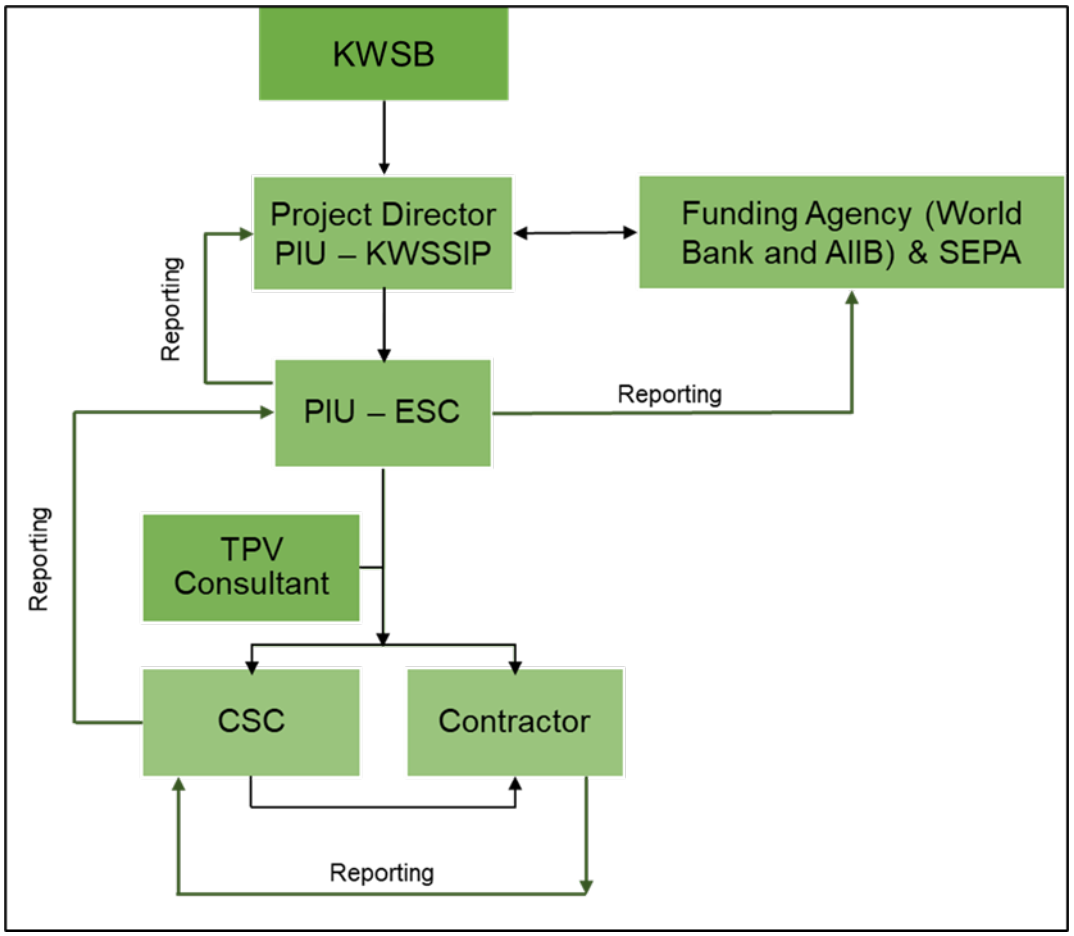


Figure 7-1: Organizational Setup for Implementation of ESMP

41. 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.

Roles and Responsibilities

a) SEPA

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

b) PIU (Project Director)

43. 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)

44. The Environment and Social Cell (ESC) is already established in the PIU. 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. 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 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 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)

45. 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 evaluation 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 of implementation of ESMP;
- Monitor GRM and resolution of complaints;
- Inform ESC, WB, and AIIB of any significant impacts arising;
- Observe and amend/prepare (if required) corrective action plans; and
- Monitor plan implementation along with project Implementation Consultant.

e) Construction Supervision Consultants (CSC)

46. 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).

f) Construction Contractor

47. Contractors will be bound to appoint site-based EHS 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. Contractors' Environmental and HS Experts will carry out the following activities:

- Implement mitigation measures as detailed in the ESMP;
- 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 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.

48. The Contractor will be required to have suitably qualified and experienced persons to function as EHS experts, who will be working in close liaison with the ESC and CSC.

8 ESMP Trainings

49. 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.

50. 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.

51. Training program will consist of 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.
- 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.

9 Grievance Redress Mechanism

52. 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 population or community members or complainant.

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

54. The GRM will be disclosed at PIU-KWSSIP, KWSB head office, and concerned project engineers, KWSSIP website as well as at project sites.

55. 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.

9.1 Type of Complaints

56. 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.

9.2 Structure of Grievance Redress Mechanism

57. The project will establish a three-tier GRM comprising Community GRC, project GRC; and PIU-GRC. These tiers are described below.

9.2.1 Community GRC (Tier-1)

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

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

59. 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.

9.2.2 Project GRC (Tier-2)

60. KWSSIP will constitute a GRC headed by concerned Project Manager (PM) at each project site to resolve all grievances and complaints of the project affectees 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.

61. 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.

62. 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 affectees or community members with brief information about complaints and sub-project GRC decision with status report; and,
- Maintain complete record of all complaints received by the sub-project GRC with actions taken.

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

9.2.3 PIU-GRC (Tier-3)

64. 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.
65. 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.
66. 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.

67. Organization of the GRC is shown in Figure 9.1.

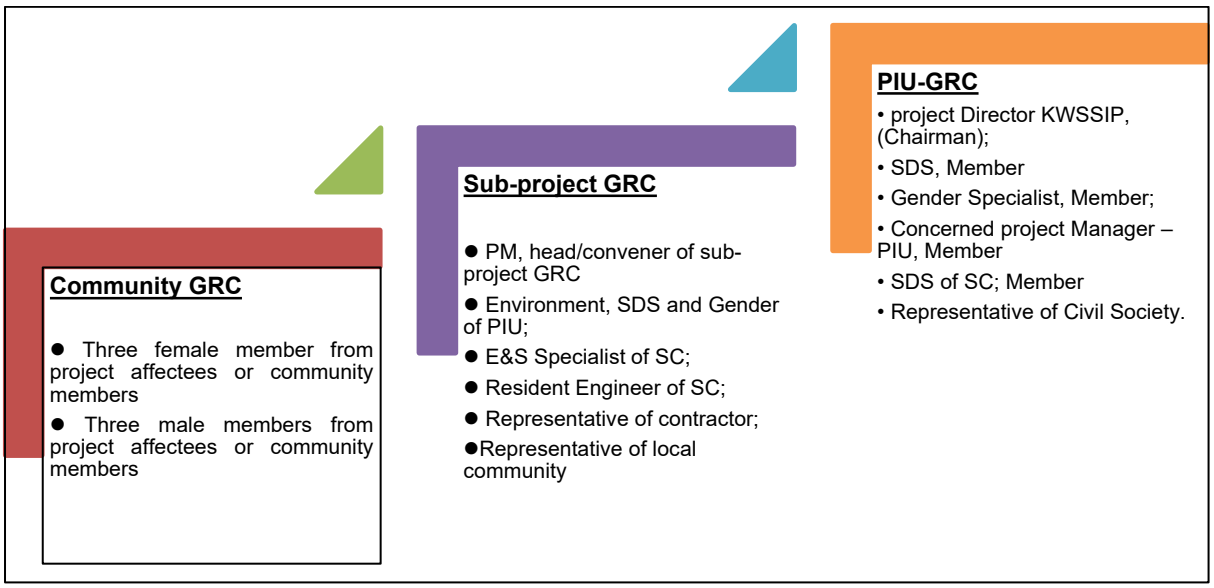


Figure 9.1: Organogram of GRC

68. Gender representation will be ensured by inducting a female member in all GRCs. The mechanism will ensure the access of project affected people 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.

9.2.4 Gender Based Violence (GBV) Committee

69. 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.

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

9.2.5 Grievance Redress Procedure/ Mechanism

71. 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.

72. The GRCs will work at site, sub-project and PIU levels. The E&S and engineering staff of PIU, in coordination with site staff will inform the project affected people 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 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.

73. 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.

74. 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 affected people 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.

10 Stakeholders Engagement Plan

75. 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 10-1 are aligned with the SEP requirements.

76. 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.

77. Series of public consultations and information disclosure activities were already conducted by KWSC and PIU of KWSSIP. Details of these consultation activities are in Annexure 10.

Table 10-1: Planned Stakeholder Engagement Activities for the Project

Target stakeholders	Topic(s) of Engagement	Use of Method (s)	Location / Frequency	Responsibilities
Construction Phase				
Other Interested Parties (External) ◆ Project area residents and representatives in communities	◆ Project scope, rationale, and E&S ◆ Principles / Grievance mechanism ◆ Project status	◆ Face-to-face meetings ◆ Joint public/community meetings with PAPs	◆ As needed (monthly during construction period)	(PIU KWSSIP / CSC) Social Development and Environment Specialists
Other Interested Parties (Internal) ◆ Other KWSSB staff Supervision Consultants, 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

List of Annexures

Annexure 1: Project Description

A comprehensive Energy Efficiency and Technical Audit (EETA) was conducted in the existing Dhabeji Pumping Complex (DPC). The audit provided recommendations for improvements in the physical plant and operations that will lead to improved efficiency and energy savings at the Complex.

The energy conservation measures recommended by the Energy Audit Study include the following:

- Repair or replacement of mechanical parts such as Pressure Gauges, Discharge Header Pipes, Flow Meters, Air valves, Surge Relief Valves, Surge Vessels, Manifolds, Bypass / Overflow Arrangements, Intake Screens;
- Repair or replacement of Pumps and Motors;
- Installation of Thermodynamic Pump Performance Monitoring Systems;
- Electrical related measures such as Installation of LED Lighting, Installation of Energy analysers at incoming and outgoing MV-Panels, Proper Earthing for Transformers, Surge Protection Devices, Installation of Rubber floor mats around electrical panels, tagging / labelling of equipment etc.

Energy Audit is yet to be carried out for NEK Pumping Station, but the proposed energy conservation measures will also be implemented in the NEK Pumping Station.

Project Area

The sites for the project interventions include Dhabeji Pumping Complex and NEK Pumping Station. Locations of these project sites are shown in **Figure A1-1** to **Figure A1-2**.

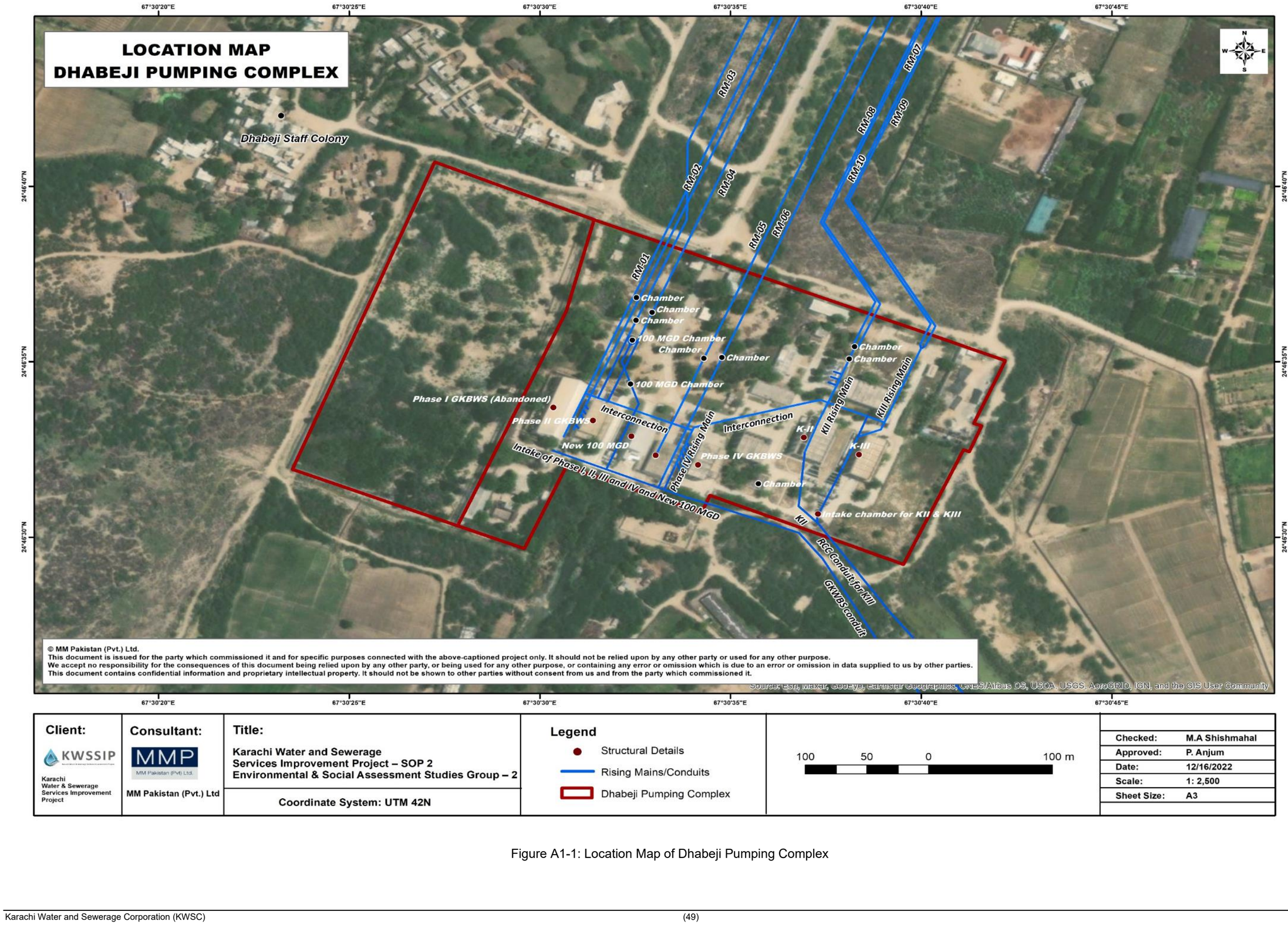


Figure A1-1: Location Map of Dhabeji Pumping Complex

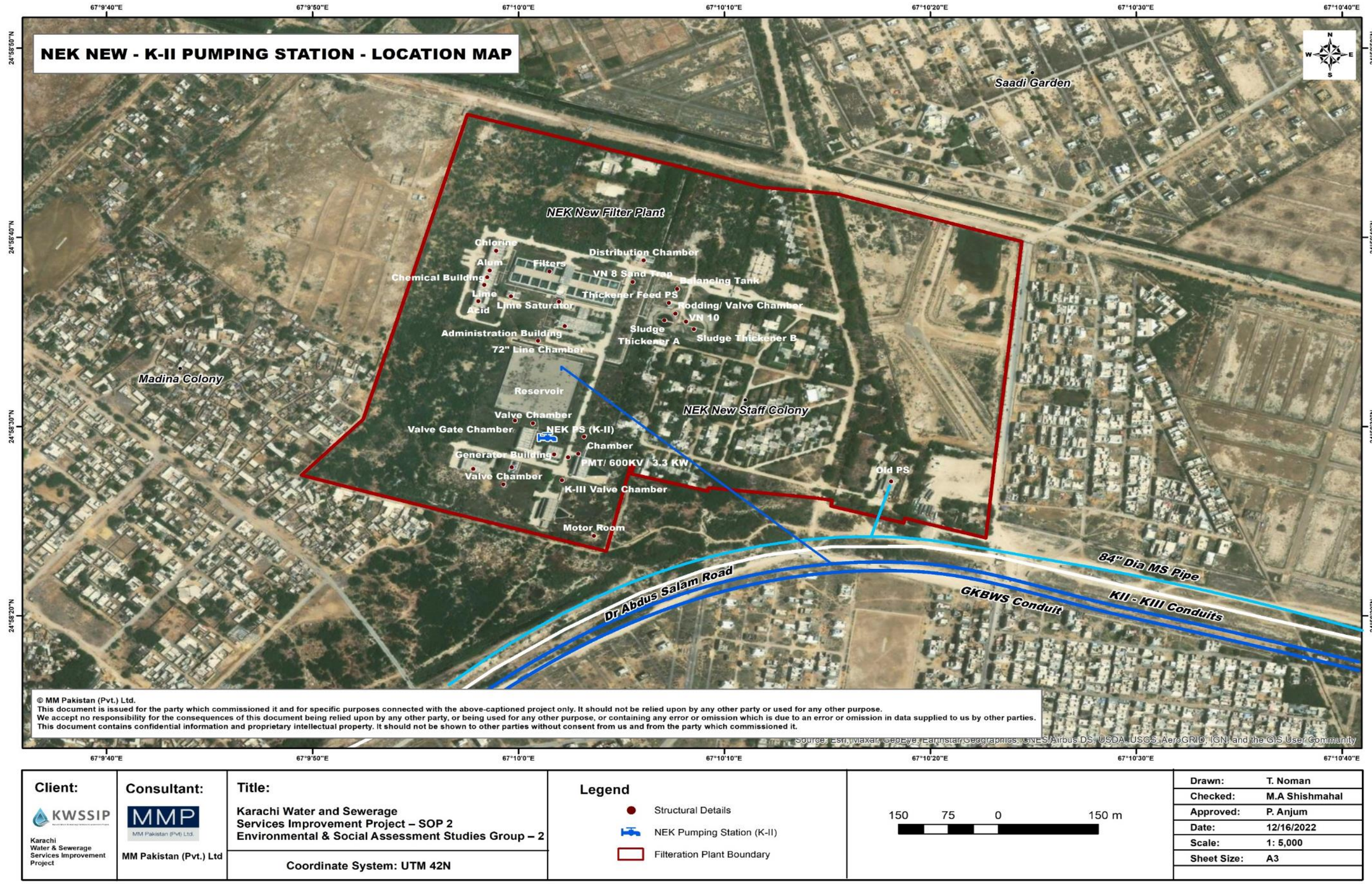


Figure A1-2: Location Map of NEK New – K-II Pumping Station

Proposed Interventions for Reducing Energy Consumption

The Energy Audit Study of DPC has been performed to identify, assess, and recommend opportunities consistent with global best practices for improving energy efficiency and load management KWSC. As an outcome of the study, the low-cost or no cost energy efficiency measures presented in **Table A1-1** have been proposed. Similar measures are expected to be recommended for NEK Pumping Station also, once the energy audit of this facility is performed. It is also to be noted that the footprint of Project activities will be limited and well-confined to the sections within pump house boundaries.

Table A1-1: Energy Efficiency Measures Proposed to Reduce Energy Consumption at Dhabeji Pumping Station (DPC)

No.	Description	Issues	Proposed Interventions
1	Pressure Gauges (Discharge Header Pipes)	◆ Malfunctioning	◆ Portable pressure gauges preferred
2	Repair / Replacement of Flow Meters	◆ Old venturi flow meters are non-operational.	◆ Venturi flow meters to be replaced by electromagnetic flow meters to measure individual pumping station.
3	Air valves (DPC)	◆ Air valves existing on the ten rising mains are badly maintained and not working. The air release valves are also badly corroded.	◆ Replace all air vacuum and air release valves by new ones and along with the isolation gate valves on the 10 rising mains.
4	Surge Relief Valves (SRV)	◆ SRVs not properly working	◆ Replacement of SRVs
5	Surge Vessels	◆ The twin 1500 mm rising mains of the K-II pumping station are undersized comparing with other pumping stations (1800 mm each), for a total flow of 100 MGD from each rising main.	◆ Provide two 1800 mm rising mains for the K-II pumping station instead of the 1500 mm rising mains. These rising mains shall be equipped with appropriate SRVs/ surge vessels.
6	Manifolds of 3rd and 4th Phase PS	◆ Manifolds of 3rd and 4th phase pumping stations are badly damaged due to excessive oxidation (rusting of pipes).	◆ Manifolds to be replaced.
7	Thermodynamic Pump Performance Monitoring System	◆ Thermodynamic pump performance monitoring system technology is now well established and the related pump meters incorporating the required micro-processor are now available in the market.	◆ Provide the thermodynamic monitoring of all the pumps of the six pumping stations of DPC.
8	Water Logging Problem in Dhabeji Pumping Complex	◆ Water logging issue is observed from the standing water in some of the chambers within	◆ The temporary measures for stopping the water logging comprise of: ◆ Checking for the leaks from the pipeline system and concrete structures and

No.	Description	Issues	Proposed Interventions
		the Dhabeji Pumping Complex (DPC) boundaries.	then repairing the leaking joints and concrete cracks/joints. ◆ For permanent solution, a drainage system based on the well (boreholes) pumping system is recommended.
9	Bypass / Overflow Arrangement for the Incoming Flow to DPC	◆ Any Bypass/Overflow arrangement is missing in case any of the six pumping stations stops working due to some reason. The flow from the Gujjo Headworks must be curtailed in this situation	◆ Bypass arrangement for the part inflow to DPC in case of emergency and to avoid the overflowing of the Intake Channels to DPC. The overflow is suggested to be bypassed to an open unlined trapezoidal drain gravitating to seashore on the southern side of DPC.
10	Intake Screens	◆ The screens of 2nd phase, 3rd phase, and 4th phase have been corroded. ◆ Individual penstock of 2nd Phase, 3rd Phase, and 4th Phase of K-I are not given at inlet. Therefore, in case of maintenance, and if shut down is required, water cannot be stopped at inlet of the pumping station. ◆ Coarse Screens and Mechanical Fine Screens of K-II are also corroded.	◆ The screens of 2nd phase, 3rd phase and 4th phase need replacement. ◆ Individual penstock gates are required so that respective pumping station may be isolated in case of major maintenance activities. ◆ Coarse Screens, Mechanical Fine Screens of K-II need repairs, and replacement of parts or whole, if needed. ◆ Removable fine screens may be installed here as these are easier to repair and maintain the existing screens.
11	Electrical related recommendations for low and no cost investments	Common to: ◆ K-I 2nd Phase, K-I 3rd phase, K-I 4th phase, K-II PS and K-III PS	◆ LED Lighting in pumping complex (Basement & Ground Floor) as per required lux level. ◆ Energy analyser in all incoming and outgoing MV-Panels. ◆ Earthing for Transformers, MV-Panels, LV Panels, Motors, and lighting arrestor protection. ◆ Surge Protection Devices in LV Panels. ◆ Replacement/Dehumidification of transformers silica gel. ◆ Installation of Rubber floor mats in pumping complex around MV and LV-Panels. ◆ Proper cable containment for power cables. All joint plate of cable containment to be earthed. ◆ Proper tagging/ labelling for each Transformer, Transformers Incoming and Outgoing Cables, MV-Panels and their cables, Motors and their cables, LV-Panels, and their outgoing breakers as well as their cables. ◆ Proper dressing, cleaning, and harnessing of cables.

No.	Description	Issues	Proposed Interventions
			◆ Proper cleaning of dust and other dirty particles from Transformers Room and MV-Panels.
12		Specific to: ◆ K-I 2nd Phase and K-III PS	◆ Incoming and outgoing connectivity through bus bar of Transformers to be in enclosure to avoid fire and safety hazards.
13		Specific to: ◆ K-I 3rd Phase	◆ Ventilation fans as per required power dissipation load converted in to heat.
14		Specific to: ◆ K-I 4th Phase PS	◆ Ventilation fans as per required power dissipation load converted in to heat. ◆ In 4th Phase LV Supply is running from K1-3rd Phase. It is recommended to use K1-4th Phase 250kVA transformer which is available in the complex.
15		Specific to: ◆ K-II PS	◆ Ventilation fans need to be installed as per required power dissipation load converted into heat. ◆ Incoming and outgoing connectivity through bus bar of Transformers to be in enclosure to avoid fire and safety hazards.

Workforce Requirement

The procurement of contractors will be done in line with the WB guidelines. The hiring of contractor for the execution of low-cost energy reduction works identified in the study shall be completed through normal tendering procedure of KWSC. Approximately 60 workers (civil, electrical, and mechanical technicians / helpers / laborers) and 5 supervisors (managers / supervisors) shall be engaged during the execution at each pump house. Duration of the project to complete the modernization activities will be approximately six months for each site.

No additional manpower will be required during operation phase as operations of the Pump Station sites will be carried out by KWSC as routine works.

Solid Waste Generation

Approximately 28.6 kg / day[2] of solid waste (domestic in nature) shall be generated during the project execution at each Pump House.

Scrap and Waste Lubricant Oil

Scrap resulting from the replacement of current equipment with new energy-efficient (EE) units, such as motors, pumps, old tube lights, and electrical panels etc. shall be generated. This category may also encompass the lubricating oil contained within the existing motors. The disposal plan for these materials involves their sale to authorized scrap dealers, who will manage their appropriate recycling or processing. In the case of waste oil, it will be disposed of in accordance with regulations through waste

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

handlers certified by SEPA to ensure proper and responsible handling. Domestic waste will be disposed of at nearest Sindh Solid Waste Management Board (SSWMB) waste bin.

Water Requirement

Approximately 6,500 liters/day (50 liters per worker per day[3]) of water shall be consumed by the workers at each Pump House.

Construction Camps

The contractor will set up temporary tent facilities for the provision of clean drinking water and rest-areas at each site. Toilets facilities are already available at the pump houses.

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

Annexure 2: ESMP Methodology

A2.1 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). Considering the anticipated project activities, the DIA of the proposed project is limited to within the boundaries of the pumping stations only. 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, etc.) during construction or operation phases of the project.

Table A2-1: Project Area of Influence (AoI)

Project Components / Sites	Direct Impact Area (DIA)	Indirect Impact Area (IIA)
Reducing Energy Consumption at Dhajebi and NEK Pumping Stations	Construction Areas inside the boundaries of each pumping station	500 m radius outside the pumping station boundaries

A2.2 Review of Energy Audit Study

The results and recommendations of the Energy Audit Study conducted in Dhabeji Pumping Complex were reviewed to understand the extent of construction works and their potential outcomes on the existing environment and social conditions.

A2.3 Review of Available Secondary Data

Literature review was 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.

A2.4 Reconnaissance Surveys, Delineation of the Area of Influence (AoI) and Environmental and 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.

A2.5 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.

A2.6 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 February to March 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 "PLANTNET4" 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.

A2.7 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 feedback from the key institutional stakeholders.

A2.8 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.

4 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.

A2.9 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.

Annexure 3: Legal and Institutional Requirements

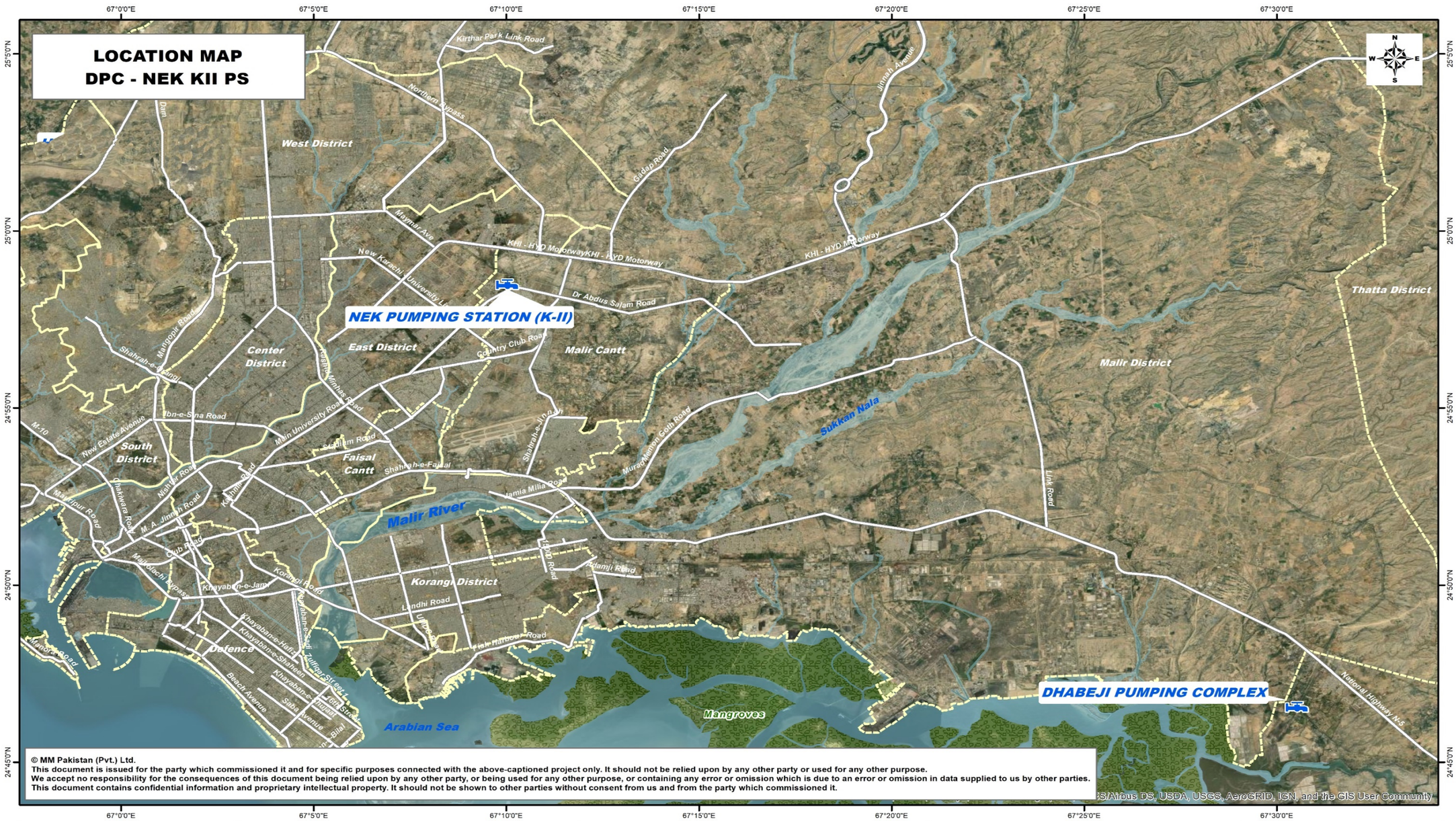
Three sets of laws, policies, and strategies, i.e., national, provincial, and WB Environmental and Social Standards (ESS), are applicable for the project, as given in **Table A3-1.**

Table A3-1: National, Provincial, and WB Environmental and Social Standards (ESS)

Key National Laws, Regulations and Policies	1. National Conservation Strategy (NCS), 1992 2. National Environment Policy, 2005 3. Pakistan Climate Change Act, 2016 4. Pakistan Penal Code 1860 5. Antiquities Act 1975 6. Pakistan Labor laws 7. Fatal Accidents Act 1857 8. Hazardous Substances Rules, 2014 9. Building Code of Pakistan, 2007
Key Provincial Laws, Regulations and Policies	1. Sindh Environmental Protection Act, 2014 2. Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021 3. Sindh Environmental Quality Standards, 2016 4. Sindh Cultural Heritage (Preservation) Act, 1994 5. Sindh Solid Waste Management Board Act, 2014 6. Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020 7. Sindh Factories (Second Amendment) Act, 2021 8. The Sindh Occupational Safety and Health Act, 2017 9. The Sindh Bonded Labour System (Abolition) Act, 2015 10. Sindh Minimum Wages Act, 2015 (Sindh Act No. VIII of 2016) 11. Sindh Workers Compensation Act, 2015 12. The Sindh Prohibition of Employment of Children Act, 2017 13. The Protection Against Harassment of Women at the Workplace Act, 2010 14. The Sindh Local Government (Amendment) Act, 2021
Applicable World Bank ESS / Guidelines	1. ESS 1: Assessment and Management of Environmental and Social Risks and Impacts 2. ESS 2: Labor and Working Conditions 3. ESS 3: Resource Efficiency and Pollution Prevention and Management 4. ESS 4: Community Health and Safety 5. ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources 6. ESS 10: Stakeholder Engagement and Information Disclosure 7. Environmental, Health & Safety Guidelines

Annexure 4: Description of Environment

As shown in **Figure A4-1**, geographically, the Dhabeji Pumping Complex (DPC) is in District Thatta, and the NEK Pump House is in the Malir Cantonment Area.



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:** Pumping Station; Major Road Network; District Boundary 5 2.5 0 5 km	Drawn: T. Noman Checked: M.A Shishmahal Approved: P. Anjum Date: 12/16/2022 Scale: 1: 170,000 Sheet Size: A3

Figure A4-1: Geographically Map of Dhabeji Pumping Complex and NEK Pumping Station

A4.1 Physical Environment

Climate

According to the Koppen Climate Classification, the project area lies in the Subtropical - Arid Climate Zone, with mild winters and hot summers. Due to the proximity to the coastline, the climate of the project area is influenced by sea breezes, which results in less warm evenings throughout the year. Humidity generally remains high. Winds for more than half the year, including the monsoons blow from south-west to west. The hottest months are April to June whereas December and January are relatively colder months. Based on the rainfall data recorded between January 2012 to December 2021, it is evident that July and August are the wettest months in the project area.

The last few years have witnessed a sharp rise in the heat waves occurrences in Karachi and its outskirts during May to September. Since heatwaves have the potential to directly impact the health and performance of the site workers and make them susceptible to heat stroke, necessary mitigation measures shall be implemented during project implementation.

Land use

The project works will be performed within the existing pump houses, situated on the KWSC lands within clearly marked physical boundaries. The project activities will not have any bearings on the lands surrounding the pump houses outside their boundaries, hence there is no need for detailed account of the land use KWSC.

A4.2 Environmental Quality Monitoring

Air, noise and water quality monitoring was carried out in the project area at two locations from 22 February to 15 March 2022. Monitoring points were selected based on the proximity to the core project intervention areas as well as to the nearby residential settlements or sensitive receptors. Details of monitoring locations are provided in **Table A4-1**.

Table A4-1: Details of Air, Noise and Water Quality Monitoring Locations

Names		Latitude	Longitude
Point 1	Near KWSC Colony, Dhabeji	24.78132	67.50812
Point 2	Near Faizan e Raza Masjid – NEK	24.97531	67.17113

Air Quality

Sampling was performed for a 24-hour period at each site following the Sindh Environmental Quality Standards, 2016 (SEQS) for ambient air. **Table A4-2** shows the observed average concentrations for ambient air quality parameters and compares these with the SEQS / WBG standards.

Table A4-2: Ambient Air Quality Level

No.	Measuring Parameter	Unit	SEQs / WBG Limit 2	Monitoring Values	
				Near KWSC Colony, Dhabeji	Near Faizan e Raza Masjid – NEK
1	Nitrogen Oxide (NO)	($\mu g/m^3$)	40	45.83	29
2	Sulfur Dioxide (SO_2)	($\mu g/m^3$)	40	Nil	Nil

No.	Measuring Parameter	Unit	SEQs / WBG Limit 2	Monitoring Values	
				Near KWSC Colony, Dhabeji	Near Faizan e Raza Masjid – NEK
3	Carbon Monoxide (CO)	(mg/m^3)	4 (for 8 hrs)	Nil	Nil
4	Suspended Particulate Matter (SPM)	($\mu g/m^3$)	500 $\mu g/m^3$	189.00	210.00
5	Particulate Matter ($PM_{2.5}$)	($\mu g/m^3$)	15	27.45	27.00
6	Particulate Matter (PM_{10})	($\mu g/m^3$)	45	31.75	24.00
7	Ozone (O_3)	($\mu g/m^3$)	130	14	12
8	Lead (Pb)	($\mu g/m^3$)	1.5	ND	ND

Monitoring results show that $PM_{2.5}$ values exceeded the standards at both monitoring stations whereas, NO at Dhabeji sampling point was also observed to be higher. These exceedances may be attributed to the vehicular emissions and heavy traffic that occurs within the monitoring stations. At Dhabeji sampling point, excavation works for underground pipeline repair were ongoing during sampling. The emissions from the excavator may possibly be the source for higher $PM_{2.5}$ and NO emissions.

The proposed project activities are mainly related to the repair / replacement of electrical and mechanical equipment of the pump houses which are already confined within the boundary walls, therefore they are not expected to worsen the ambient air quality.

Noise

Baseline noise monitoring for the project was undertaken at the two monitoring locations for a 24-hour period at each site. **Table A4-3** shows the observed day and night-time results. Ambient noise levels monitored at Dhabeji sampling points were within the limit while the measured noise level at NEK during nighttime exceeded the standards.

The proposed project activities shall be performed within the specific areas of pump houses; therefore, it is not expected that they further aggravate the prevailing baseline conditions.

Table A4-3: Noise Monitoring Results

Parameters	Units	SEQS	Monitoring Locations	
			Near KWSC Colony, Dhabeji	Near Faizan e Raza Masjid – NEK
Noise	dB(A)	Day Time *55*	47.25	54.18
		Nighttime *45*	37.56	48.07

Water Quality

Water quality sampling and analysis was performed at two monitoring locations. Water samples were collected from the tap at the KWSC colonies in each pumping station. The taps are connected to an overhead tank. The testing was performed as per APHA methods. Monitoring results are given in **Table A4-4**. The results showed presence of bacterial contamination in both water samples, whereas all other parameters were found within the SEQS/WHO limits. The microbial contamination may be due to poor cleaning and maintenance of the overhead tanks, or the water supplied to the overhead tanks were not being disinfected.

Table A4-4: Water Quality Results

No	Measuring Parameters	Unit	Testing Method	SEQs Limits	WHO / WBG	Near KWSC Colony, Dhabeji	Near Faizane Raza Masjid – NEK
1	Color	TCU	Pt-Co	< 15 TCU	< 15 TCU	1	1
2	Taste	Taste	Sensory Evolution	Objection / Non-Objection	Objection / Non-Objection	Non-Objection	Non-Objection
3	Odor	Odor	Sensory Evolution	Objection / Non-Objection	Objection / Non-Objection	Non-Objection	Non-Objection
4	Turbidity	NTU	APHA-2130	< 5 NTU	< 5 NTU	ND	1
5	Total Hardness as CaCO3	mg/l	APHA-2340	< 500	-	135	135
6	Total Dissolved Solids (TDS)	mg/l	APHA-2450C	< 1000	< 1000	368	321
7	pH @ 25°C	pH	ASTM-1293	6.5 - 8.5	-	7.42	7.78
8	Aluminum (AL)	mg/l	ASTM D-857	<0.2	0.2	0.04	0.1
9	Antimony (Sb)	mg/l	APHA 3111 Sb	<0.005	0.02	Nil	ND
10	Arsenic (Ar)	mg/l	Merck Kit Method	< 0.05	0.01	Nil	ND
11	Barium (Ba)	mg/l	APHA-D3651	0.7	0.7	0.019	ND
12	Boron (B)	mg/l	APHA 4500-B	0.3	0.3	0.01	ND
13	Cadmium (Cd)	mg/l	ASTM D-3557	0.01	0.003	Nil	ND
14	Chloride (Cl^-)	mg/l	APHA 4500-Cl^-	< 250	250	51.61	76.43
15	Chromium (Cr)	mg/l	APHA 3500-CrB	< 0.05	0.05	Nil	ND
16	Copper (Cu)	mg/l	Test Kit Method	2	2	0.61	ND
17	Cyanide (Cn)	mg/l	APHA 4500 CN	<0.05	0.07	0.01	ND
18	Fluoride (F)	mg/l	APHA 4500 F^-	< 1.5	1.5	0.61	0.951
19	Lead (Pb)	mg/l	APHA 3500 Pb B	< 0.05	0.01	Nil	ND
20	Manganese (Mn)	mg/l	APHA 3500 MnB	< 0.5	0.5	0.3	ND
21	Mercury (Hg)	mg/l	Test Kit Method	< 0.001	0.001	Nil	ND
22	Nickel (Ni)	mg/l	APHA 3500 Ni	< 0.02	0.02	0.009	ND
23	Nitrate (NO3)	mg/l	Test Kit Method	< 0.50	50	Nil	ND
24	Nitrite (NO2)	mg/l	Test Kit Method	< 3	3	Nil	ND
25	Selenium (Se)	mg/l	APHA 3500 Se	0.01	0.01	Nil	ND
26	Residual Chlorine	mg/l	Test Kit Method	0.2 - 1.5	-	0.29	0.32
27	Zinc (ZN)	mg/l	APHA 3500 Zn	5	3	2	1
28	Pesticides	Count / ml	APHA 922 B	0 Per 100 ml	0 Per 100 ml	ND	ND
29	Fecal Coliforms	Count / ml	Total Viable Count	0 Per 100 ml	0 Per 100 ml	0	36
30	E Coli	Count / ml	APHA 922 B	0 Per 100 ml	0 Per 100 ml	8	16
31	Total Bacterial Count	mg / l	Kit Method	0.001	-	ND	52

A4.3 Ecological Environment

Flora

No ecologically sensitive species have been found in the project area. It is pertinent to mention that the project activities are confined to already built-up sections of the pump houses and shall not require clearance of any vegetation or cutting of trees.

Dhabeji Pumping Complex (DPC). The plant species recorded during field surveys within the boundaries of DPC are:

Trees: *Acacia nilotica* (Babur), *Albizia lebbeck (*Siris), *Azadarichta indica* (Neem), *Bombax ceiba* (Simbal, Simal), *Conocarpus lencifolius* (Cono), *Dalbergia sisso* (Sheesham), *Eucalyptus citriodora* (Safeda), *Ficus benghalensis* (Bargad), *Pithecellobium dulce* (Jungle jalebi/Madras thorn), *Polyathia longifolia* (False Ashoka), *Salvadora oleidis* (Khabbar), *Syzygium cumini* (Jamun/ Java plum), *Tamarindus indica* (Immli).

Shrubs: *Abutilon indicum* (India Abutilon), *Achyranthes aspera* (Ubat kandi), *Aerva javanica var javanica* (Booh), *Barleria acanthoides* (Asad), *Calotropis Procera* (Aak), *Capparis decidua* (Karil, Karir), *Echinops echinatus* (Indian globe thistle), *Heliotropium rariflorum*, *Prosopis juliflora* (Vilayati keekar), *Salvadora persica* (Khabar), *Sueda fruticose* (Laani/ Laana), *Withania somnifera* (Aksan), *Ziziphus nummularia* (Jungle berr/ berry).

Herbs: *Amaranthus virdis* (Chull), *Asphodelus tenuifolius* (Onion weed), *Blepheris sindica* (Asad), *Boerhavia procumbens* (Sentori), *Cleome brachycarpa* (Ponwar), *Eclipta alba* (Bhringraj), *Iphiona grantioides* (Cutch Inula), *Cleome brachycarpa* (Ponwar), *Convolvulus glomeratus* (Clustered Bindweed), *Cressa cretica* (Rudranti), *Datura alba* (Tooh), *Fagonia indica* (Dhamasa, Dhamana), *Melilotis indica* (Senji), *Pavonia arabica* (Arabian Swamp Mallow), *Peristrophe paniculata* (Atrilal, Ubut kundri), *Senna holosericia* (Jangli Sana), *Solanum surratense* (Kundiari, 'Momoli, Mokri), *Sonchus asper* (Sow thistles), *Tephrosia purpurea* (Wild Indigo), *Tetraena simplex* (Alethi, Putlani), *Tribulus terestris* (Puncture vine), *Trichodesma indicum* (Indian Borage),

Grasses: *Cenchrus ciliaris* (Buffalo Grass), *Chloris barbata* (Ganni, Jargi), *Dactyloctenium aegyptium* (Egyptian crowfoot grass), *Dactyloctenium scindicum* (Sind Crowfoot Grass), *Desmostachya bipinnata* (Drabh), *Phragmites australabalis* (Kaano), *Saccharum griffithii*.

NEK Pump House. The plant species recorded during field surveys within the boundaries of NEK Pump House are:

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 australabalis* (Kaano).

Fauna

The data on the fauna was gathered through visual encounters, incidental observations, and indirect methods such as recording pug marks etc. within the pump house boundaries. 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 International Union for Conservation of Nature (IUCN) Red List of Endangered species. None of the observed faunal species shall be disturbed due to the project's Project activities.

List of the mammalian species observed/reported in the project area is given in **Table A4-5**.

Table A4-5: List of Mammalian Species Observed / Reported in the Project Area

No.	Common Name	Scientific Name	Occurrence			Conservation Status
			Common	Less Common	Rare	IUCN Red list
1	House Mouse	*Mus musculus*	**x**			**LC**
2	Five stripped-palm Squirrel	*Funambulus pennantii*	**x**			**LC**
3	House Shrew	*Suncus murinus*	**x**			**LC**
4	Indian Gerbil	*Tatera indica*	**x**			**LC**
5	Little Indian field Mouse	*Mus booduga*	**x**			**LC**
6	Indian Grey Mongoose	*Herpestes edwardsi*	**x**			**LC**
7	House Rat	*Rattus rattus*	**x**			**LC**

List of reptiles reported in the project area is provided in **Table A4-6**.

Table A4-6: List of Reptiles Reported in the Project Area

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

List of birds observed/reported in the project area vicinity is provided in **Table A4-7**.

Table A4-7: Birds Recorded / Reported in the Project Area

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

A4.4 Social Environment

The settlements located in close vicinity of the pump houses are the two KWSC Staff Colonies at Dhabeji and NEK. The socio–economic baseline of the project area has been established by utilizing both primary and secondary data sources. In addition, baseline was strengthened through FGD based socio-economic surveys, where 42 male and female participants have participated. Four FGDs have been organized. Details of the FGDs conducted are in Annexure 10.

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

The risk of each potential impact was assessed using a semi-quantitative analysis. The risk was computed using the formula below.

RISK = MAGNITUDE OF IMPACT X SENSITIVITY TO RECEPTORS

Impact Magnitude

Parameter	Major (4)	Moderate (3)	Minor (2)	Minimal (1)
Duration of potential impact	Long term (beyond the project life)	Medium Term Lifespan of the project (within the project life span)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond next project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Environmental or social parameter needs a year or so with some responses to come back to baseline	Baseline returns naturally or with limited response within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but violates international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Happens under worst case (negative consequences) or best case (positive impact) working conditions (Likely)	Occurs under abnormal, exceptional or emergency conditions (occasional)	Unlikely to happen

Sensitivity of Receptor

Sensitivity Determination	Definition
Very High (4)	Vulnerable receptors with little or no ability to absorb proposed changes or minimal opportunities for mitigation.

Sensitivity Determination	Definition
High (3)	Vulnerable receptors with little or no ability to absorb proposed changes or limited opportunities for mitigation.
Mild (2)	Vulnerable receptors with some ability to absorb proposed changes or moderate opportunities for mitigation
Low (1)	Vulnerable receptors with good ability to absorb proposed changes or/and excellent opportunities for mitigation

Risk Score Table

Magnitude of Impact	Sensitivity of Receptors			
	Very High (4)	High (3)	Mild (2)	Low (1)
Major (4)	16	12	8	4
Moderate (3)	12	9	6	3
Minor (2)	8	6	4	2
Minimal (1)	4	3	2	1
Risk Score and Significance				
>12 High	9-12 Substantial	5-8 Medium	2-4 Low	1 Negligible

Environmental and Social Risks and Impact	Project Phase	Impact Magnitude	Risk Assessment		
			Sensitivity to Receptors	Risk Rating	Description
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts					
Lack of E&S personnel	Construction, Operation	Minor	High	Medium	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 harm to environment and non-compliances with ESMP requirements
ESS 2: Labor and Working Condition					
Occupational Health and Safety	Construction	Minor	High	Medium	Workers are exposed to occupational health and safety risks of demolition and construction activities such as the following: ◆ Over-exertion and ergonomic injuries and illnesses due to repetitive motion, over-exertion and manual handling. ◆ Poor housekeeping such as excessive waste debris, loose construction materials and liquid spill may cause slips and falls of the workers. ◆ Presence off vehicles or equipment during mobilization and use of materials and equipment may cause accidents ◆ Exposure to faulty electrical devices may result to serious injuries. ◆ Eye injury, burn and electrocution from hot work

Environmental and Social Risks and Impact	Project Phase	Impact Magnitude	Risk Assessment		
			Sensitivity to Receptors	Risk Rating	Description
					◆ During summer season, workers will have to work in extreme hot weather conditions which can bring heat stress
	Operation	Minor	High	Medium	Workers are exposed to OHS hazards during repair/maintenance of the pump houses such as electrical shock, injury from being struck by rotating equipment and moving parts. During cleaning and maintenance, workers may be required to enter a confined space in the pump house.
Labor risks	Construction, Operation	Minor	High	Medium	Workers are exposed to labor risks such as the following: • GBV might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. • SEA/SH against women might occur from mixing of men and women at the construction site. • Labor exploitation such as unpaid and/or incorrect payment of wages by employer, poor working conditions
	Construction	Minor	High	Medium	Poor maintenance of the construction camp/staff colony, sanitation facilities and drinking water supplies may cause workers to suffer from vector-borne and water-borne diseases. Workers may also be exposed to various communicable and

Environmental and Social Risks and Impact	Project Phase	Impact Magnitude	Risk Assessment		
			Sensitivity to Receptors	Risk Rating	Description
					infectious diseases within their workplace such as HIV/AIDS and other sexually transmitted diseases and COVID-19.
ESS 3: Resource Efficiency and Pollution Prevention Management					
Resource efficiency	Construction	Minor	Mild	Low	Resources that will be used include construction materials, water and fuel. Construction material to be used for construction activities include reinforced and structural steel. Almost all the materials to be used in the construction are non-renewable and therefore their sustainable use is necessary for future use.
Soil Contamination	Construction	Minor	Mild	Low	Soil can be contaminated due to • Improper management of construction wastes and demolition wastes • Oil spill/leaks from heavy equipment and vehicles • Disposal of untreated wastewater
Pollution of Water Resources	Construction	Minor	Mild	Low	Discharge of untreated wastewater from constructors' camp and construction site may contaminate the receiving water body.
	Construction	Minor	Mild	Low	Oil/chemical spills/leakage from heavy equipment and vehicles may contaminate the groundwater table within the project sites
Noise and Vibration	Construction	Minor	Mild	Low	Operation of heavy equipment and vehicles will generate noise. Exposure to too much noise is a hearing hazard to workers.
	Construction	Minor	Mild	Low	Vibration generated by construction and demolition activity may cause structural damage, such as cracking of floor slabs, foundations,

Environmental and Social Risks and Impact	Project Phase	Impact Magnitude	Risk Assessment		
			Sensitivity to Receptors	Risk Rating	Description
					columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile
Generation of wastes	Construction	Minor	Mild	Low	Improper management of construction and demolition wastes (hazardous and non-hazardous) may cause soil pollution and water bodies and nuisance and hazards towards environment and local population. Storing kitchen and food waste from construction camps can serve as breeding grounds for the disease spreading vectors and rodents. Improper management of wastes from dismantling of camp sites may pollute the environment.
ESS 4: Community Health and Safety					
Traffic	Construction	Minimal	Mild	Low	Delivery of construction materials onsite will generate traffic within the AoI.
Community Health and Safety Risks	Construction	Minor	High	Medium	Community health and safety risks include (i) Exposure to dusts and air emissions from the construction site may cause respiratory distress most especially to the vulnerable groups such as children and the elderly (ii) Pedestrians or vehicles passing by may accidentally fall in the excavated areas especially during at night (iii) Exposure to hazardous materials and wastes. The community may also be exposed to communicable diseases due to the influx of workers

Environmental and Social Risks and Impact			Risk Assessment		
	Project Phase	Impact Magnitude	Sensitivity to Receptors	Risk Rating	Description
	Construction	Minor	High	Medium	Unsanitary management of the camp sites/staff colony and improper management of domestic solid wastes may cause the spread of vector-borne and water-borne diseases among the workers and local communities.
	Construction	Minor	High	Medium	Vehicular movement at construction sites and access service roads may result in roadside accidents and road damages.
Social Conflict, GBV, SEA/SH	Construction	Minor	High	Medium	The influx of workers may increase the crime rate within the locality including GBV and SEA/SH. Physical assault, emotional abuse, sexual violence, early/forced marriage, economic abuse, denial of services and opportunity, and people trafficking are all manifestations of gender-based violence. Arrivals of male-dominated contractors and subcontractors with disposable cash who are not from the area increase the risk of GBV. These dangers are higher if workers have close interaction with the local community, such as when using access roads and other public areas.
	Construction	Minor	High	Medium	During the construction phase of the project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, religious,

Environmental and Social Risks and Impact			Risk Assessment		
	Project Phase	Impact Magnitude	Sensitivity to Receptors	Risk Rating	Description
					cultural or ethnic differences in values may also cause social conflict.
ESS 5: Land Acquisition, Restriction on Land Use and Involuntary Resettlement					
No land acquisition is required for the project.					
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources					
All activities will be done within the pump houses. No vegetation removal will be done.					
ESS 7: Indigenous People					
There are no tribal or indigenous people within the AoI.					
ESS 8: Cultural Heritage					
There are no cultural heritage, archaeological sites located within the pump houses. No excavation activities will be done.					
ESS 10: Stakeholder Engagement and Information Disclosure					
Stakeholder engagement	Construction	Minor	Low	Low	The project-affected population and sensitive receptors are not aware of the proposed project.

Annexure 6: WB Health and Safety Framework – South Asia Region (SAR)

Table of Contents

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.

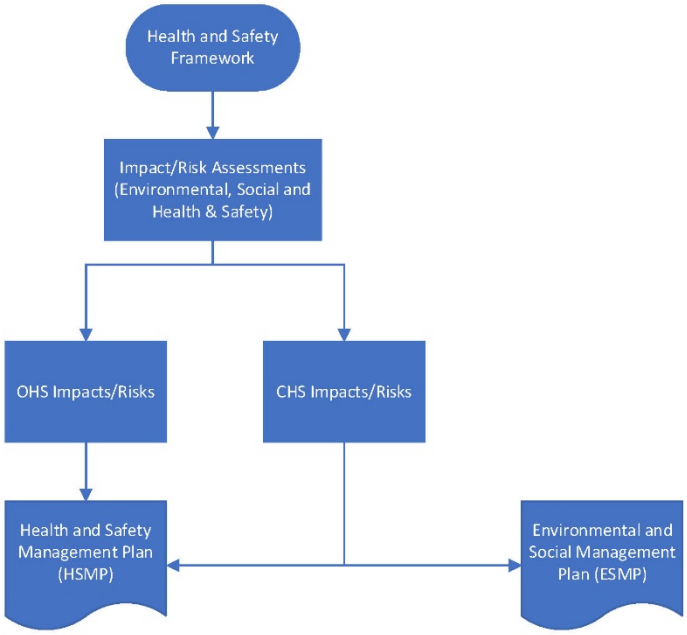
The Borrower is responsible for the project and shall ensure that this Health and Safety Framework is applied. The Borrower can delegate/assign the PIU or Contractor to develop and implement a HSMP to address the Health and Safety Framework requirements and to manage health and safety impacts and risks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

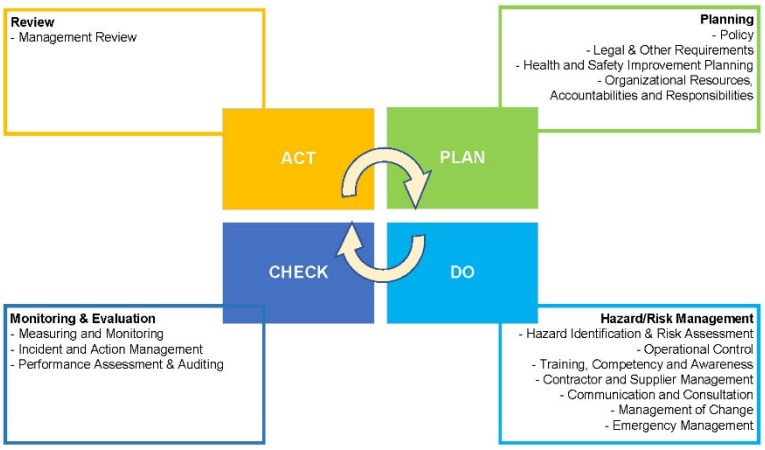
The responsibility for safety cannot be "delegated" to the "OHS Officer or Manager". The OHS staff of the PIU and/or Contractor support line management by assisting in jobsite training, serving as trained and knowledgeable observers, providing administrative assistance, monitoring and evaluating the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

Medical/Health Surveillance

Any medical/health surveillance program must:

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

7.14 Element 13 - Incident and Action Management

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

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

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

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

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

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

7.15 Element 14 - Performance Assessment and Auditing

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

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

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

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

Audits and Inspections

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

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

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

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

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

7.16 Element 15 - Management Review

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

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

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

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

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

Project title

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

Health and Safety Management Plan

Contents page

Health and Safety Management Plan

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.

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.

Health and Safety Management Plan

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?

Annexure 7: Security Management Guidelines during Construction

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 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.

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.

Annexure 8: Environmental and Social Codes of Practices (ECOPs)

The ECOPs are listed, and details are presented subsequently:

- ECOP 1: Waste Management
- ECOP 2: Fuels and Hazardous Goods Management
- ECOP 3: Water Resources Management
- ECOP 4: Air Quality Management
- ECOP 5: Noise and Vibration Management
- ECOP 6: Road Transport and Road Traffic Management
- ECOP 7: Camp Management
- ECOP 8: Worker Health and Safety

ECOP 1: Waste Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of waste and excess materials from the project 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 waste generated during execution 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 project sites in a cleaner, tidy, and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• 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 waste 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 waste appropriately in bunded areas away from water courses. • Make available Material Safety Data Sheets (MSDSs) for hazardous materials on-site during execution. • Collect hydrocarbon waste, 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.

ECOP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in project activities have the potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals, and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	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 is used and stored; and ensure personnel are trained in the correct use. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the site personnel, appropriate materials in use.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• 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 • Put containers and drums in temporary storage 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.

ECOP 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 ECOPs 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 project sites	Project activities, sewage from project sites and work camp may affect the surface water quality.	The Contractor shall • 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Use the existing toilet facilities in the pump houses
Drinking water	Untreated surface water is not suitable for drinking purposes due to the presence of suspended solids and E. coli.	The Contractor Shall • Provide drinking water that meets SEQS standards. Drinking water to be chlorinated at source and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time.

ECOP 4: 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. • Controlling the movement of construction traffic. • 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. • Machinery causing excess pollution (e.g., visible smoke) will be banned from construction sites.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Service all equipment regularly to minimize emissions.

ECOP 5: 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 to keep it in good working order in accordance with manufactures maintenance procedures. • Make sure all drivers and operators comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock, and the natural environment.	The Contractor shall • Appropriately site all noise generating activities to avoid noise pollution to residents. • Use the quietest available plant and equipment. • Maintain all equipment 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 to any typical noise events outside of daylight hours. • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions. • Employ the best available work practices on-site to minimize occupational noise levels.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Install temporary noise control barriers where appropriate. • Notify affected people if major noisy activities are 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 residential areas.

ECOP 6: Road Transport and Road Traffic Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of roads by construction vehicles will affect the movement of normal road traffic 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 an additional traffic plan, if any of his traffic routes are not covered in the Project's Traffic Management Plan and require traffic diversion and management. • Include in the traffic plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, road signs etc. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Pakistan Traffic Regulations.
	Accidents and spillage of fuels and chemicals	The Contractor shall • Restrict truck deliveries, where practicable, to daytime 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.

ECOP 7: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and location of construction camp	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 camp within the designed sites or in areas which are acceptable from environmental, cultural, or social point of view; and approved by the supervision consultant. • Consider the location of construction camp away from communities to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camp 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 camp. • Local authorities responsible for health, religion and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the Campsites. • Adequate housing for all workers. • Safe and reliable water supply, which should meet SEQS. Drinking water to be chlorinated at source and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time (World Health Organization -WHO guideline). • Hygienic sanitary facilities and sewerage system. The toilets and domestic wastewater 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 people.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Treatment facilities for sewerage of toilet and domestic waste. • 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 camp 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 camp. • Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at household level. • Store inorganic waste in a safe place within the household and clear organic waste on daily basis to waste collectors. 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 camp and disposed of in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall • Provide fuel to the construction camp for their domestic purposes, in order to discourage them from using 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	• The Contractor shall • Provide adequate health care facilities within construction sites.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	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 camp may create security problems and fire hazards	• Provide first aid facilities round the clock. Maintain stock of medicines in the facility and appoint full-time designated first aider or nurse. • Provide ambulance facility for the labourers during emergencies 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 camp 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 of food waste openly as that will attract rats and stray dogs. • Carryout short training sessions on best hygiene practices to be mandatorily participated in by all workers. Place display boards at strategic locations within the camp containing messages on best hygienic practices. The Contractor shall • Provide appropriate security personnel (police or private security guards) and enclosures to prevent unauthorized entry into the camp area. • Maintain register to keep track on the 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 windstorms/cyclones. • Provide appropriate type of firefighting equipment suitable for the construction camp. • Display emergency contact numbers clearly and prominently at strategic places in camp. • Communicate the roles and responsibilities of labourers in case of

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		emergency in the monthly meetings with contractors.
Site restoration	Restoration of the construction camp to original condition requires demolition of construction camp	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 camp 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 camp/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 of remaining debris at the designated waste disposal site. • Handover of the construction camp with all built facilities as it is if agreement between both parties (contactor and landowner) has been made so. • Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ECOP 8: 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, wastewater, 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Provide the workers with a safe and healthy work environment, considering inherent risks in its 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 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, religion, and security duly informed before commencement of civil works and establishment of construction camp 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 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 Camp	Lack of proper infrastructure facilities, such as housing, water supply and	The Contractor shall provide the following facilities in the Campsites to improve

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards	health and hygienic conditions as mentioned in ECOP 7: 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 ECOP 2 • Solid waste collection and disposal system in accordance with ECOP1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities
Other ECOPs	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. • ECOP 2: Fuels and Hazardous Goods Management • ECOP 3: Water Resource Management • ECOP 4: Air Quality Management • ECOP 5: Noise and Vibration Management • ECOP 6: Road Transport and Road Traffic Management.
Training	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of STIs HIV/AIDS). • Train all construction workers in general health and safety matters, and on the specific hazards of their work. Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. • Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi-, and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on on-going and regular basis. This should be complemented by easy access to

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		condoms at the workplace as well as to voluntary counselling and testing.

Annexure 9: Occupational Health and Safety Plan

Occupational and Community Health and Safety Plans (OHS / CHS Plans) are key documents to address how OHS and CHS risks will be managed in a project. A Health and 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.

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.

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.

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.	**Heat Stress / Heat Stroke**[5]	**Control of Heat Stress** Work practice recommendations include the following:

5 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 because of accidental contact with hot surfaces.	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.

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		d- Encourage workers to hydrate themselves. e- Workers should drink an appropriate amount to stay hydrated. f- For moderate activities in the heat that last less than 2 hours, drink 1 cup (8 oz.) of water every 15–20 minutes. g- If sweating lasts for several hours, drink sports drinks containing balanced electrolytes. h- Avoid alcohol and drinks with high caffeine or sugar. i- Generally, fluid intake should not exceed 6 cups per hour.
2.	**Confined Space Working**[6] 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, fumes 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: a. Head, hand, and foot protection b. Eye and hearing protection c. Waterproof and thermal clothing d. Respirators and breathing apparatus e. 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: a. Ready at hand b. Properly trained c. Fit to carry out their task d. Protected against the cause of the emergency e. Capable of using any equipment provided for rescue, for example breathing apparatus, lifelines, and fire-fighting equipment. h- Training is critical in all work with confined spaces. The Contractor shall ensure that all workers are given suitable and appropriate training to carry out the workplace task. This will include trainings on; emergency procedures and use of breathing apparatus.
3.	**Welding Safety**[7]	**Safety Measures** The Contractor shall ensure the following:

[6] https://www.hse.gov.uk/pubns/priced/l101.pdf
[7] https://www.hse.gov.uk/welding/index.htm

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	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 condenses 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.	a- Welders, bystanders, and workspace 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 fumes. 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 a 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.
4.	**Construction Noise**[8] a- Exposure to high levels of noise can cause permanent hearing loss.	**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

8 https://www.hse.gov.uk/noise/hearingprotection.htm

No.	Work Activities and Associated Hazards	Mitigation Guidelines
	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.	hearing protection, health surveillance and associated trainings etc. b- Hearing protection shall be issued to employees: a. where extra protection is needed above what has been achieved using noise control b. 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 for 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.
5.	**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 construction also can result in severe structural damage; destruction of machinery, equipment, or materials; and untimely delay in project completion.	**Control Measures** a- The Contractor shall develop an effective fire prevention and extinguishing plan before the onset of construction. The plan shall be put into practice as soon as construction operations begin and shall be closely followed throughout the course of construction. b- Contractors shall ensure that fire safety and firefighting training are provided to selected workers from each worker group so that they can handle the localized fires. c- Contractor shall ensure the availability of right fire extinguishers at project construction and campsites to deal with different types of fires in accordance with the following chart: **Fire Extinguisher Chart** Extinguisher: Colour / Type; Type of Fire: Solids (wood, paper, cloth, etc) / Flammable Liquids / Flammable Gasses / Electrical Equipment / Cooking Oils & Fats Water: Yes / No / No / No / No Foam: Yes / Yes / No / No / Yes Dry Powder: Yes / Yes / Yes / Yes / No Carbon Dioxide (CO2): No / Yes / No / Yes / Yes ◆ d- The local fire department shall be made aware of construction plans and kept up to date during 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 work related to welding. Cutting and welding sparks cause more construction fires

No.	Work Activities and Associated Hazards	Mitigation Guidelines
		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.

Annexure 10: Information Disclosure, Consultation, and Participation

According to ESS10, “stakeholder” refers to the individuals or groups who: (i) are affected or likely to be affected by the project (project-affected parties - PAPs) (ii) may have interest in the project (other interested parties), and (iii) the disadvantaged/vulnerable groups. The stakeholders for the project potentially include public communities in the project vicinity and relevant government departments.

The public consultations have been performed as part of the socioeconomic surveys by the modes including; 1) Focus Group Discussions (FGD) with communities, and 2) Institutional / Department level Stakeholder Consultations. Four FGDs have been organized with communities residing at KWSC colonies at Dhabeji and NEK Pump Stations whereas Institutional consultations were performed with the SEPA and KWSC management at the two pump stations.

Lists of FGDs participants are provided in **Table A10-1**. **Figure A10-1** shows the consultation photographs.

Table A10-1: Lists of FGDs Participants

Dhabeji Participants (Female)

Participants List - KWSC Colony - Dhabeji		
No.	**Name**	**Settlement**
1.	Haleema	KWSC Colony School Dhabeji
2.	Shahida Perveen	
3.	Mahjabeen	
4.	Yasmeen	
5.	Rubina naz	
6.	Shameem	
7.	Naila	
8.	Shameem Akhtar	
9.	Qamar Jahan	
10.	Maryam Fazal	
11.	Euram Amir	
12.	Fahmida Mohsin	
13.	Shahida Parveen	

NEK Participants (Female)

Participants List of NEK New KW&SB Staff Colony		
No.	**Name**	**Settlement**
1.	Qaisar Jahan	NEK New KW&SB 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	

Participants List of NEK New KW&SB Staff Colony		
No.	Name	Settlement
11.	Areesha	
12.	Shagifta	
13.	Ruqaiya	

Dhabeji Male

Participants List – KWSC Colony Dhabeji		
No.	Name	Settlement
1.	Ibrahim	KWSC Colony - Dhabeji
2.	Mehmood Khan	
3.	Rustam Khan	
4.	Shabir Ahmed	
5.	Syed Paryal Ali Shah	
6.	Abdul Sattar	
7.	Mudsir Bhatti	
8.	Raja Obed Rehman	
9.	Ramesh	
10.	Maqsood Bhatti	
11.	Mashooq Ali	

NEK Male

Participants List of NEK Old KW&SB Colony		
No.	Name	Settlement
1.	Abdul Haleem	NEK New KWSC Colony
2.	Zakir Hassan	
3.	Qasim Eafi	
4.	Manzoor Ahmed	
5.	Qurban	

Nek New KW&SB Colony

KW&SB Colony Nek New 1

KW&SB C KW&SB colony Nek-New KW&SB

Consultation Dhabeji Complex

Figure A10-1: Consultation Photographs

Most of the residents of surveyed settlements live in close and joint families. Heads of most households are the employees of KWSC. The major ethnic groups living in colonies include communities with Sindhi, Urdu Speaking, Pathan and Baloch origins. Urdu and Sindhi are the dominant languages being spoken in the surveyed settlements. Adequate educational facilities are present within the KWSC colonies and in their proximity. For health facilities, people must travel to the reputable Government and Private health services providers of the city. All the surveyed settlements are connected to utilities such as electricity, natural gas, water, and sanitation network.

Feedback from the consultations was overall supportive of the project. **Table A10-2** summarizes the general concerns/demands from the community and responses given to them during both rounds. The main suggestions from institutions and responses are summarized in **Table A10-3**.

Table A10-2: Feedback from Communities

Key Concerns	Response
Privacy of people should be respected.	Agreed and noted for COC
More jobs should be given to local people	The works under the project requires specific skills. Contractor will hire local people be having the desired skills.
The project activities should not restrict the mobility of people, particularly women.	Agreed. The Project activities will be restricted to pump house boundaries.

Key Concerns	Response
Labor camps should be away from the settlements.	No labor camps are envisaged. Temporary rest areas will be confined to pump house boundaries.

Table A10-3: Feedback from Institutional Stakeholders

Key Concern	Response/Action
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. Keeping in view the nature of the project and scope of the construction activities, submission of an Environmental Checklist will suffice the SEPA requirements.	The Environmental Checklist 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 and the ESA Consultants.
More sustainable energy initiatives must be taken by KWSC.	Agreed. KWSSIP WB will continue to find new opportunities for energy efficiency.
All KWSC pump stations around the city may be converted on solar power.	Noted to be conveyed to KWSC management.