

# Initial Environmental Examination

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Project Number: 50136-002  
November 2021

## Pakistan: Khyber Pakhtunkhwa Cities Improvement Project

Improvement of Water Supply System (Kohat)

Prepared by Project Management Unit, Planning and Development Department, Government of Khyber Pakhtunkhwa for the Asian Development Bank.

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**CURRENCY EQUIVALENTS**As of 18<sup>th</sup> November, 2021

Currency Unit – Pak Rupees (Pak Rs.)

Pak Rs 1.00 = \$ 0.0057

US\$1.00 = Pak Rs. 175

**CONVERSIONS**

1 meter = 3.28 feet

1 hectare = 2.47 acre

**Acronyms**

<b>ADB</b>	Asian Development Bank
<b>AIP</b>	Access to Information Policy
<b>AMSL</b>	Above Mean Sea Level
<b>BC</b>	Before Construction
<b>BOQ</b>	Bill of Quantities
<b>COVID-19</b>	Corona Virus Infectious Disease-2019
<b>CSC</b>	Construction Supervision Consultant
<b>DC</b>	During Construction
<b>DO</b>	During Operation
<b>EA</b>	Executing Agency
<b>EDCM</b>	Engineering Design Construction Management
<b>EGL</b>	Existing Ground Level
<b>EHS</b>	Environmental, Health, and Safety
<b>EIA</b>	Environment Impact Assessment
<b>EMP</b>	Environmental Management Plan
<b>EPA</b>	Environmental Protection Agency
<b>GER</b>	Gross Enrollment Rate
<b>GoP</b>	Government of Pakistan
<b>GRM</b>	Grievance Redress Mechanism
<b>HDPE</b>	High Density Polyethylene
<b>IA</b>	Implementing Agency
<b>IEE</b>	Initial Environmental Examination
<b>IFC</b>	International Finance Corporation
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>KDA</b>	Kohat Development Authority
<b>KP</b>	Khyber Pakhtunkhwa
<b>KPCIP</b>	Khyber Pakhtunkhwa Cities Improvement Project
<b>KP-EPA</b>	Khyber Pakhtunkhwa Environmental Protection Agency
<b>KPI</b>	Key Performance Indicator
<b>LAA</b>	Land Acquisition Act (of 1984)
<b>LARP</b>	Land Acquisition and Resettlement Plan
<b>Lea</b>	Equivalent sound pressure level
<b>LGERDD</b>	Local Government, Elections and Rural Development Department
<b>LULC</b>	Land use/Land cover
<b>MGD</b>	Million Gallons per Day
<b>MSDS</b>	Material Safety Data Sheet
<b>NCS</b>	National Conservation Strategy
<b>NEP</b>	National Environmental Policy
<b>NEQS</b>	National Environmental Quality Standards
<b>NER</b>	Net Enrollment Rate
<b>OHS</b>	Occupational Health and Safety
<b>O&amp;M</b>	Operation & Maintenance
<b>PAP</b>	Project Affected Persons
<b>PC</b>	Public consultation
<b>PCC</b>	Plain Cement Concrete
<b>PDD</b>	Planning & Development Department
<b>PEP Act</b>	Pakistan Environment Protection Act 1997

<b>PEPC</b>	Pakistan Environmental Protection Council
<b>PGA</b>	Peak Ground Acceleration
<b>PMU</b>	Project Management Unit
<b>PPE</b>	Personal Protective Equipment
<b>RCC</b>	Reinforced Cement Concrete
<b>REA</b>	Rapid Environmental Assessment
<b>RFP</b>	Request for Proposal
<b>RP</b>	Resettlement Plan
<b>SCADA</b>	Supervisory control and data acquisition
<b>SOPs</b>	Standard Operating Procedures
<b>SS</b>	Suspended Solids
<b>SPS</b>	Safeguard Policy Statement
<b>SSEMP</b>	Site Specific Environmental Management Plan
<b>TMA</b>	Tehsil Municipal Administration
<b>TMP</b>	Traffic Management Plan
<b>USEPA</b>	United States Environmental Protection Agency
<b>WHO</b>	World Health Organization
<b>WSSC</b>	Water and Sanitation Services Company
<b>WSSCK</b>	Water and Sanitation Services Company Kohat

## NOTE

In this report, “\$” refers to US dollars

## Definition of Terms

**“Ground Water”**: The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs.

**“Laws”**: means state and local laws and all regulations, rules, orders, decrees, decisions, instructions, requirements, policies and guidance which are issued or made by any Relevant Authority and which are legally binding, as any of them may be amended from time to time.

**“Nodal Demand”** It's a demand for each node in a water distribution network calculated by multiplying as representative length and demand per meter length. Demand per meter length is calculated by  $q = Q/\text{total network length}$ , where Q is total demand of concerned area

**“Peaking Factor”** Peak water use is typically expressed as a ratio, or peaking factor, dividing the peak water use by the average daily water use. Water supply networks design on peaking factor

**“Per Capita Demand”** It is the annual average amount of daily water required by one person and includes the domestic use, industrial and commercial use, public use, wastes, thefts, etc.

**“Personal Protective Equipment”** (also PPE): Clothing and equipment worn by pesticide mixers, loaders, applicators, and re-entry workers, hazmat emergency responders, which is worn to reduce their exposure to potentially hazardous chemicals and other pollutants.

**“Peak Ground Acceleration”** (PGA) is a measure of earthquake acceleration on the ground and an important input parameter for earthquake engineering.

**“PRVs”** A relief valve or pressure relief valve (PRV) is a type of safety valve used to control or limit the pressure in a system

**“Rapid Sand Filtration”** Rapid sand filtration is a purely physical drinking water purification method. Rapid sand filters (RSF) provide rapid and efficient removal of relatively large suspended particles.

**“Risk Assessment”**: Qualitative and quantitative evaluation of the risk posed to human health and/or the environment by the actual or potential presence and/or use of specific pollutants.

**“Sheet Flow”** An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rock surfaces and not concentrated into channels larger than rills

**“Water Supply Main”** Water supply main are larger pipes (12” in diameter and larger) which are designed to move large quantities of water from reservoirs to the smaller distribution mains.

## Content Details

S/No.	Version	Date	Summary of Revisions made
1	1	26-07-21	Final Draft of IEE report
2	2	18-11-21	Updated Draft of IEE report

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## EXECUTIVE SUMMARY

### Project Overview

1. The Khyber Pakhtunkhwa Cities Improvement Projects (KPCIP) will improve the quality of life of the residents of five KP cities, including Abbottabad, Kohat, Mardan, Mingora, and Peshawar, directly benefitting about 6 million of urban population. KPCIP will help selected cities improve their access to quality urban services through three interlinked outputs: (i) Climate resilient and gender friendly urban infrastructure improve, (ii) Institutional capacities of urban service providers and governments strengthened, and (iii) Increased women's participation in urban governance and access to economic opportunities.
2. KPCIP will support the Government of Pakistan's development priorities, established in (i) the National Water Policy (2018), (ii) the Local Government Act (2019), and (iii) Pakistan Vision 2025 . The project is also aligned with ADB's operational priorities of (i) addressing remaining poverty and reducing inequalities; (ii) accelerating progress in gender equality; (iii) tracking climate change, building climate and disaster readiness; (iv) making cities more livable; and (v) strengthening governance and institutional capacity, outlined in ADB's Strategy 2030, and is included in ADB's country operations business plan for Pakistan, 2021–2023.
3. The project readiness financing (approved in March 2019) has financed the preparation and engineering design of the KPCIP. The Department of Local Government, Elections and Rural Development Department (LGE&RDD), the Government of Khyber Pakhtunkhwa, will be the executing agency for the project and the city governments of the five target cities, including the respective Water and Sanitation Services Companies, will be the implementing agencies.
4. This report has been prepared based on detailed engineering designs, due diligence assessments, and studies conducted by the government and project readiness financing consultants. The Government of Pakistan, Asian Development Bank (ADB), and Asia Infrastructure Investment Bank (AIIB) are expected to approve KPCIP in Q3 2021.
5. The Khyber Pakhtunkhwa Cities Improvement Project (KPCIP) is being processed through the Project Readiness Finance (PRF) modality by Asian Development Bank (ADB) under Loan 6016-PAK, being executed by KP LGERDD. The Project is focused on investments of subprojects related to water supply, sanitation and drainage, solid waste management, and urban/green spaces. The Project has the following four major components:
  - Improvement of water supply systems in five (5) cities.
  - Improvement of sewerage and drainage systems in five (5) cities, including provision of sewage treatment plants (STPs)
  - Provision of Integrated Solid Waste management (ISWM) system in five (5) cities
  - Development of Urban/Green Spaces in five cities.
6. The proposed "Improvement in Water Supply System" Kohat city has three main components:
  - Rehabilitation and provision of water reservoirs

- New distribution network and water metering system
  - Energization of existing tube wells through clean energy sources
7. The proposed project “Improvement in Water Supply System” aims to provide new water storage reservoirs to increase storage capacity and overall coverage of the existing water supply system as well as provision of new water distribution networks and water metering system in the Kohat city. Rehabilitation of the existing tube wells is also proposed in the project as well as new tube wells are proposed based on water requirements. In addition, energization of twenty-four (24) existing and proposed tube wells through clean energy sources is included in the scope of the project. .
8. The project is located in the six (6) urban union councils, including Kotal Township (KDA) under the jurisdiction of Water and Sanitation Services Company in Kohat city. The names of the UCs are as follow:
- UC-1 - Urban 1
  - UC-2 - Urban 2
  - UC-3 - Urban 3
  - UC-4 - Urban 4 Including Kohat Township (KDA)
  - UC-5 - Urban 5
  - UC-6 - Urban 6
9. **Figure ES-1** showing the project area UCs while **Figure ES-2** showing the proposed layout plan for water supply scheme in Kohat City.

### Project Need

10. None of the UCs in Kohat has a continuous water supply (CWS) mode of service. Currently, the only water supply source in Kohat city is tube wells-based ground water source with approximately 65 number of existing tube wells. The mode of service in the jurisdiction of WSSC Kohat is intermittent water supply (IWS). Water is pumped into the water distribution networks either directly or from elevated water reservoirs, for a limited number of hours on daily basis. The condition of the existing water distribution network in the city is not satisfactory and has deteriorated over time.
11. There are fourteen (14) no. of existing water reservoirs in Kohat city under the jurisdiction of WSSC Kohat. Out of fourteen (14) existing water storage reservoirs, seven (7) are overhead reservoirs (OHRs) and the remaining seven (7) are surface water reservoirs. Currently, only four (4) OHRs and five (5) surface reservoirs are operational while rest of the water reservoirs are non-functional.
12. Moreover, the existing water distribution network mostly comprises of Asbestos Cement (AC), Galvanized Iron (GI), and PVC pipe material. The existing water distribution network is approximately 177kms in length and more than 20 years old. Due to old age and poor condition of the existing water distribution network, it needs immediate replacement. Further intermittent water supply can cause groundwater infiltration into the pipelines with contamination of the supply or pipes deformation.

### Project Benefits

13. The main benefits of this project include the following
- The proposed project will ensure 24/7 sustainable water supply to all residents in the jurisdiction of WSSC Kohat.



- Reduced groundwater infiltration into the pipelines which limits contamination in water supply mains and also decline chances of pipeline deformation
- Installation of Metering system will reduce chances of exploitation of water and reduce water theft and revenue generation.

### **Environment Category of the Project**

14. According to ADB's Safeguard Policy Statement (SPS) 2009, a Rapid Environmental Assessment (REA) Checklist was prepared for the proposed Improvement in Water Supply Scheme System. Based on the initial findings, it was ascertained that certain adverse environmental impacts are not expected of significance that detailed assessment is required therefore IEE has been conducted for the proposed "Improvement in Water Supply Scheme System Kohat, and thus the subject project is considered environmentally "B" category as per ADB SPS, 2009.
15. Further regulatory requirements of Khyber Pakhtunkhwa Environment Protection Agency (KPEPA) shall be complied by KP LGERDD as per IEE/EIA Regulation 2000 as notified by the Pakistan Environment Protection Agency vide S.R.O. 339 (1)/2001 during the project approval and execution stage.

### **Scope and Objectives of the IEE**

16. The scope of IEE will include environmental impact assessment of project activities including design, construction and operation of water supply system, construction of water storage reservoirs including overhead tanks and surface water reservoirs, water distribution network and installation of water meters. Following are the objectives of the IEE;
  - Assess the existing environmental conditions of project area, including the identification of environmental sensitive receptors and develop a baseline of its prevalent environmental and socioeconomic conditions;
  - Identify and investigate all impacts of the proposed Improvement of Water Supply Scheme pre-construction/design, construction, operation phases, on the physical, biological and socioeconomic environment of the project area;
  - To propose mitigation measures that will help KP LGERDD and WSSCK in conducting the proposed project activities in an environmentally sustainable manner;
  - To uncover the planning and operational phase impacts up to microenvironment levels in which project is proposed to be sited; and
  - To develop an Environmental Management Plan (EMP) that will assist KP LGERDD and WSSCK in the effective implementation of the recommendations of the IEE

### **Study Methodology**

17. This involves collecting information from the ADB, PMU KPCIP and Engineering Design and Construction Management (EDCM) technical team on the proposed project activities and understanding the activities to identify potential impacts of implementing these.
18. Both secondary and primary data on ambient noise levels and air quality, water resources, flora, fauna and information from the detailed design conducted for this and other projects of similar nature was collected, reviewed, and analyzed. Field visits to

the project area were undertaken and key receptors and stakeholders within the project area has been identified and consulted.

19. The significance of impacts from the proposed project were then assessed and for those impacts requiring mitigation, suitable measures in project design, construction and operation phase were proposed to avoid/reduce impacts to within acceptable limits as per local and international applicable regulations. A detailed environmental management and monitoring plan has been developed to ensure compliance to the proposed measures during the project development.

### **Design of Proposed Water Supply System Components**

20. A snapshot of information on the proposed project component with its function and location within the system is provided in table below.

<b>Infrastructure</b>	<b>Function</b>	<b>Description</b>	<b>Location</b>
Tube Wells	To extract ground water	Existing Tubewells are 65 in total out of which 56 are operational, 09 non-operational and 10 new tubewells are proposed	Within Kohat Union Councils
Water Storage Reservoir  Over head reservoir/Surface reservoirs	To store water and provide head to gravity water supply system	Total water storage reservoir are 14, includes 7 OHRs and 7 SRs,  Out of 7 OHRs 4 are operational, 5 new OHRs are proposed  Out of 7 existing SRs 5 are operational, 3 new SRs are proposed	Within Kohat Union Councils
Distribution network	To distribute water from storage reservoirs to end user	Distribution network is proposed in six union councils of Kohat.	Within Kohat City
Bulk Water Meters	To monitor the water use by consumer	Water meters will be installed at each house connection to monitor water use and to bill the service by WSSC Kohat	Within Kohat city
Energization of tube wells through clean energy sources	To Reduce energy cost	14 existing and 10 proposed new tubewells to be energized through clean energy sources	Within Kohat city

### **Baseline Condition of Project location**

#### **Physical Environment**

21. The topography of the district is dominated by mountains and hills. The city is located at an altitude of 489 meters (1,604 ft) above mean sea level (amsl) The topography of the district is dominated by mountains and hills. The Kohat valley is agriculturally rich area. 5. Soil of the project area fall under the ranges in silt loam with pH ranging from 5.6 to 8. Project area is falling in Zone 2B with moderate seismicity risk.
22. Surface water mainly comes from Toi River while groundwater is accessed during dry months. Toi River is fed by rainfall in its catchment area in the hills in north and western side. Various streams exist in the Kohat which originate from surrounding hilly areas and considered as non perennial streams since they are rain fed and do not provide water round the year. All these streams discharge into Toi River. Toi River is flowing from western to southern direction just below UC urban-6 of project area
23. Detailed ambient air quality and noise monitoring was conducted at key location in Kohat city. Results indicate that Kohat city air quality is not healthy as exceedance of PM<sub>10</sub>, at all monitored location above 'most stringent' guidelines while PM<sub>2.5</sub> concentration also exceeding at two of the monitored location above 'most stringent' standards/guidelines. Other pollutants like SO<sub>2</sub>, NO<sub>2</sub>, CO are largely within the applicable 'most stringent' standards/guidelines except for one location (Bannu Road Near Shangrila Hotel) where SO<sub>2</sub> concentration is exceeding stringent criteria. Increased PM<sub>10</sub> , PM<sub>2.5</sub> in air is due to unpaved roads within the vicinity, agricultural fields, traffic congestion, and increased residential fires for cooking purpose due to unavailability of gas supply within nearby villages. The ambient noise levels are found to be generally within the applicable stringent standards/guidelines during the day and however, exceeding at night time. Furthermore, the ground water quality was also monitored and it was found to be within the applicable NEQS limits. Audit of the existing tubewells also indicate that the ground water quality in Kohat is also fair and did not require further treatment before distribution.
24. Kohat has semi-arid to sub humid subtropical climate. Kohat is classified as a subtropical triple season semiarid sub-mountainous area
25. **Biological Environment:** The proposed project area is located in an urban area with mostly built environment. Project area is falling outside environmental sensitive areas (Wildlife Park, Wildlife sanctuary, Game Reserve or Protected/Reserved Forests) and critical habitats. The present flora of the irrigated areas is mostly exotic. The common trees are mesquite, ber, different species of acacia and jand. The most common shrubs are tarmariax, articulata, spands, akk, small red poppy, spera, pueghambrigul, drab grass, spera, eamelthorl and pohli chaulai. No endangered species are present in the project area. Red Fox, Golden Jackal, Indian Crested Porcupine and Wild Boar are some mammals of the area with IUCN least concern status. The commonly found avifauna of the project area are Shikra (Accipiter badius), Crow (Corvus splendens), Common kite (Milvus migrans), Sparrow (Passer domesticus), Pigeons (Columba livia), Dove (Strato pielia SSP.), Parrot (Psittacula krameri), and Partridges. No migratory birds or their routes were found near the project site.
26. **Social Environment:** The project is located in the six (6) urban union councils, under the jurisdiction of Water and Sanitation Services Company in Kohat city. The names of the UCs are UC-1 - Urban 1, UC-2 - Urban 2, UC-3 - Urban 3, UC-4 - Urban 4 Including Kohat Township (KDA), UC-5 - Urban 5, UC-6 - Urban 6.
27. The city's annual growth rate is estimated at 2.58 % per year, and the population of Kohat district is 993,874 according to the 2017 census.

28. The names of the major settlements falling in project area are kotal township phase 1 & phase 2, labour colony, Paracha colony, Mustafa bazar, babri banda etc. Most of the people are doing small business, private/government jobs, while some are farmers in profession in the nearby localities. They are engaged in agriculture either directly or indirectly. The literacy rate for population 10 years and above (2010-2011) was 54 percent (Males: 68%, Females: 38%), which increased to 59% in 2013.
29. The project is assessed as of Involuntary Resettlement (IR)/ Indigenous People (IP) category C as no land acquisition and resettlement (LAR) impacts were identified on land and non-land asset. It is confirmed from the field that none of the IP is present in the area during social due diligence. However, only 4 nos of proposed tube wells to be installed at private land. WSSC is in the process of negotiation with land owners, once conclude social safeguard team will re-access the LAR impacts.

### **Public Consultation Process**

30. As part of environmental and social assessment, detailed consultations were carried with primary and secondary stakeholders and also with institutional stakeholders. Meetings with village notables and focus group discussions (FGDs) with the communities, including women in the project area were carried out. The public consultation process was carried out by the KPCIP-EDCM team in May, 2020 and second round was carried in April, 2021. Mainly key informants were consulted for these meetings which were carried out in an open and frank atmosphere conducive to appreciation of the basic elements of the project and dissemination of information on beneficial and adverse impacts and mitigation for adverse impacts.
31. Total 6 FGDs was conducted in which 53 men participated. Information on positive and negative impacts associated with construction and operational stage and proper mitigation of adverse impacts were shared at these consultations.
32. Findings of consultation shows that existing water supply is not sufficient to cater the needs of Kohat city in terms of water demand. Treated water had biological contamination due to leaks in current network, broken lids of existing water storage reservoirs and mixing of rainwater with water supply network. Project should provide permanent solution of such issues. Road infrastructure should be rehabilitated and maintained immediately to provide uninterrupted access to citizen.
33. Consultation plan for construction and operation phase of improvement in water supply system Kohat will be prepared in order to take response of project stakeholders and general public about the project. Periodic consultations and community feedback surveys will be carried out to develop positive perception about the project. Intended stakeholders for such consultations will be all stakeholders that are consulted at the time of IEE preparation and KPCIP PRF processing. Record of such consultations will be maintained at PMU/WSSCK offices and necessary changes in operational modalities will be introduced in the system in light of the response provided by the consultants.

### **Analysis of Alternatives**

34. If 'no project' option is triggered, it will result in loss of all positive impacts that project will pose on Kohat city; such as improved and sustainable potable water availability to citizens of Kohat for next thirty years, the project will reduce abstraction of ground water from privately owned tube wells or residential water bores. Moreover, continuous supply system and installation water metering system will reduce water

leakages and theft. At the most, clean potable water will reduce water borne disease and ultimately reduced pressure on health care system of Kohat.

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

### Potential Major Impacts

36. The impact screening matrices for the pre-construction/design, construction and operation phases of the proposed improvement of water supply scheme in Kohat are provided as **Tables ES.3, ES.4 and ES.4**.

37. **Pre-construction/design phase:** The key potential impacts that have been assessed and for which necessary mitigation measures have also been proposed, as required, are as follows:

- Improper location of storage tanks and Tube wells
- Improper designing of distribution networks

38. **Construction phase:** The key potential impacts that have been assessed and for which necessary mitigation measures have also been proposed, as required, are as follows:

- Drilling of tube wells and laying of distribution network not in accordance with finalized design
- Impacts associated with construction of water distribution network and supply mains
- Traffic congestion and community health and safety issues
- Occupational health and safety issues
- Communicable diseases including COVID-19

39. **Operation phase:** The key potential impacts that have been assessed and for which necessary mitigation measures have also been proposed, as required are as follows:

- Ground water depletion
- Water system leaks and water discharges
- Occupational Health and Safety including COVID-19

### Key Mitigation Measures

40. Mitigation measures associated with design, construction and operation phases are detailed in the IEE report. Necessary design considerations have been included for installation of tubewells and distribution network. Location of tubewells and storage reservoir has been selected after detail reconnaissance to maintain minimum head in supply network. Tube well shall be designed on the basis of recharging capacity to avoid ground water depletion. Mitigations associated with construction phase are detailed in the IEE report to avoid construction related impacts.

41. Major impacts associated with construction activity are clearance of ROW for water supply line, traffic hindrance and social grievances during laying of pipeline networks within city. Water supply main shall be laid according to available utility corridor. Contractor camp shall be located on a vacant land to avoid unnecessary clearance. Traffic management plan shall be developed to avoid hindrance to locals while laying of distribution networks.
42. The major environmental aspect during operation is pipe flushing or discharge of flushed water, which may be high in suspended solids. The wash water will be discharged into nearest storm water drain. For unprecedented leaks a leak detection and repair program will be implemented. On the other hand improvement of water supply system in Kohat likely to reduce groundwater infiltration into the pipelines which limits contamination in water supply mains and also decline chances of pipeline deformation moreover, installation of metering system will reduce chances of exploitation of water and will reduce water theft.

### **Environmental Management Plan**

43. For the effective implementation and management of mitigation measures, an Environmental Management Plan (EMP) has been prepared and given in section 7 of the IEE report. The EMP provides a delivery mechanism to address potential impacts of project activities, to enhance project benefits and to introduce standards of good practice in all project activities. The EMP has been prepared with the objective of:
  - Defining legislative requirements, guidelines and best industry practices that apply to the project.
  - Defining mitigation measures required for avoiding or minimizing potential impacts assessed by the IEE.
  - Defining roles and responsibilities of the project proponent and the contractor/s; and
  - Defining requirements for environmental monitoring and reporting.
44. The Environmental Management Plan (EMP) for Improvement in Kohat Water Supply System has been prepared keeping in view the anticipated environmental impacts during design, construction and operational stages of the project on the existing environmental conditions including air, soil, water, land, biodiversity and socio economic condition of the project area, and suggests appropriate measures to mitigate the potential adverse impacts and enhance the positive impacts. The compliance monitoring of mitigation measure implementation would be ensured through the implementation of the Environmental Monitoring Plan included in the EMP. The EMP will be included in the contract under specific conditions making it obligatory for the contractor to carry out the works assigned in the EMP.

### **EMP Cost, Monitoring and Reporting**

45. Total estimated indicative cost for EMP implementation is about PKR 4.0 million. Environmental monitoring cost for pre-construction phase (once) and construction and operation phase (annually) will be about PKR 2.0 million.
46. During the construction phase, the overall responsibility for the implementation and monitoring of the EMP rests with the Project Director (PD), Project Management Unit (PMU), KPCIP. The PD at the PMU, using the Construction Supervision Consultant

(CSC), will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field.

47. During the operation phase, the overall responsibility for the implementation and monitoring of the EMP rests with CEO WSSCK. Project will be administered and monitored through City Implementation Unit (CIU) that will be developed within WSSCK which will deliver services based on indicators sets out in Services and Assets Management Agreement (SAMA).
48. EMP implementation would be responsibility of all project stakeholders including PMU, WSSCK, Project Construction contractors, O&M contractor and other suppliers involved in the project. Requirement of environmental staffing will be part of bidding documents and necessary cost will be allocated as BOQ item by the bidder. PMU will maintain environmental safeguard staffing (Environmentalist/Environment Associate) for construction and operation phase of the project to monitor and supervise EMP implementation and performance. Environment expert will also be part of CSC technical team and will produce bi-weekly and monthly environmental compliance reports during construction phase. Environment expert of CSC will be responsible to monitor the implementation of EMP during construction phase by project contractors. Project contractors will also hire sufficient environmental officers to implement the EMP requirements and prepare necessary EMP documentation. Project contractor EMP staff will prepare daily environmental reports and submit to CSC for approval and record. Within city implementation unit (CIU), WSSCK will hire qualified environmental specialist during operation phase of the project who will be responsible for EMP implementation and reporting by WSSCK and its O&M contractors during operation. Monthly environmental compliance report will be prepared by WSSCK and circulated to concerned authorities.

### **Climate Risk and Vulnerability Assessment of the Improvement of Water Supply System in Kohat**

49. Climate change can impact different aspects of the project activities due to projected increased temperatures and intense urban flooding from heavy rainfalls in Kohat. Project design has incorporated necessary climate change mitigations to avoid impacts on water supply system. In Climate Risk and Vulnerability Assessment (CRVA) damages/risk associated during urban flooding are anticipated moreover, ground water depletion is also assessed during drought conditions.

### **Climate Change Adaptation Measures for Water Distribution Networks**

- Concrete ducts has been recommended to provide around distribution mains in areas which are prone to land sliding or areas adjacent to water channels.
- Pressure shall be maintained in water supply system to reduce chances of clogging
- Flushing of water supply mains in case of clogging during flash flooding.
- Tube wells shall be designed on the basis of recharging capacity and able to withstand droughts.

### **Cumulative Impacts**

50. Based on the scoping exercise of the site and based on discussions with the public sector agencies, Sewerage Treatment System at Kohat Development Authority (KDA) situated in Union Council Urban-4 of Kohat a subproject proposed under KPCIP is

planned within the area of influence (AOI) of improvement in water supply system Kohat. However, the overall responsibility for the implementation and monitoring of the project rests with the Project Director (PD), Project Management Unit (PMU), KPCIP. The PD at the PMU, using the Construction Supervision Consultant (CSC), will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field. Therefore, PMU should manage timeline for both of the projects to avoid traffic congestions and contractor conflicts. Moreover, timely repair and maintenance activities shall be carried out to reduce prolonged road closures during laying of sewerage lines or distribution networks.

### **Indirect and Induced Impacts**

51. Potential impacts arising from each phase of the proposed improvement of water supply system has been identified and assessed on the basis of field data, secondary data, expert opinion and examining previous similar projects in Pakistan. These include effects on physical, biological and socio-economic environment. Impacts on the environment from air emissions, traffic and community noise have also been assessed and have found to be acceptable and within the carrying capacities of the environmental media.
52. Thus, negative indirect and induced impacts from the proposed project activities are not expected.

### **Institutional Arrangements**

53. During the construction phase, the overall responsibility for the implementation and monitoring of the EMP rests with the Project Director (PD), Project Management Unit (PMU) KPCIP, KP Local Government Election and Rural Development Department (LGERDD). The PD through assistance from the Supervision Consultant's Environmental staff and the Environment team of PMU, will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field. During operation phase responsibility of EMP implementation lies with WSSCK with limited support from PMU. Monthly environmental monitoring data/reports will be incorporated in the progress reports to be shared with ADB and such monthly reports will be consolidated into bi-annual monitoring reports and submitted to ADB for review and clearance. Upon clearance, all such reports will be uploaded on the PMU and ADB websites.

### **Conclusion & Recommendations**

54. The improvement of water supply system in Kohat is of high significance considering the urgent need for improving sustainable water supply system of Kohat city.
55. An action plan with clear roles and responsibilities of stakeholders is provided in the IEE report. The PMU, Contractors, WSSCK and the Construction Supervision Consultant are the major stakeholders responsible for the action plan. The action plan must be implemented prior to commencement of construction work. In order to execute successful operation of water supply networks, institutional review and capacity building (IRCB) component is included in the project design to enhance services delivery of WSSCK.
56. The majority of the environmental impacts are associated with the design and construction phase of the project as they are envisaged to be long-term. Necessary design considerations have been included for installation of tubewells and distribution network. Location of tubewells and storage reservoir have been selected after detail



reconcile to maintain minimum head in supply network. Tube shall be designed on the basis of recharging capacity to avoid ground water completion. Major impacts associated with construction activity are clearance of ROW for water supply line, traffic hindrance, social grievances and community health and safety issues during laying of water supply system in populated areas. Water supply main shall be laid according to available utility corridor and timely repair and maintenance activities shall be carried out to reduce prolonged road closures.

57. Mitigation measures will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures in the EMP are implemented and to determine whether the environment is protected as intended. This will include observations on and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported.
58. The implementation of mitigation measures during construction period will be the responsibility of the Contractor. Therefore, the required environmental mitigation measures will have to be clearly defined in the bidding and contract documents, and appropriately qualified environmental staff need to be retained by the Consultant to supervise the implementation process. The EMP includes measures to minimize project impacts due to traffic, noise, air pollution and waste generation etc.
59. The EMP contained within this IEE document is considered sufficient for issuance as part of the Contracts to the successful bidder(s) and for subsequent use during the project works. It should be mentioned that prior to the commencement of works, this EMP must be further updated by the Contractor into site specific EMPs (SSEMPs) for review and approval of ADB. In these SSEMPs, aspects such as a detailed traffic management plan, identification of locations for disposal of debris and spoil and any other details which shall become available later must be included for efficient implementation of all proposed mitigation measures and the subsequent monitoring of these measures.
60. Based on the findings of the IEE, the subproject is unlikely to cause any significant, irreversible or unprecedented environmental impacts. The potential impacts are localized, temporary in nature and can be addressed through proven mitigation measures. Hence, the classification of the subproject as Category B per ADB SPS, 2009 is confirmed. No further study or assessment is required at this stage.

### **Recommendations:**

- Obtain statutory clearances prior to award of contract and ensure conditions/requirements are incorporated in the subproject design and documents;
- Upon mobilization of the contractors, PMU KPCIP to provide a safeguards orientation per IEE and project administration manual;
- Contractor to appoint environmental safeguards person responsible for environmental safeguards compliance, occupational health and safety and core labour standards;
- The IEE will be updated and the final IEE report will incorporate results of detailed engineering design and of any additional baseline monitoring as required (e.g., air, noise, surface water quality) and will be submitted to ADB for approval and disclosure at ADB website.

### **Information Disclosure**

61. After completion/revision and approval from the ADB and the KP-EPA, the IEE will be disclosed to all the stakeholders as part of public consultation process. The summary of the IEE report will be made available to the stakeholders at ADB website and official website of PMU KPCIP LGERDD.

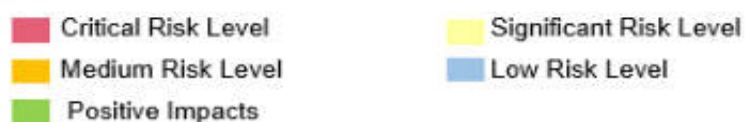
**Table ES-1: Screening of possible Impacts during Design/Pre-Construction phase**

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Improper location of water storage tanks	Likely	Moderate	Medium	Long Term
2	Improper designing of distribution networks including supply mains	Likely	Moderate	Medium	Long Term
3	Lack of integration of IEE/EMP requirements into Construction bid documents	Likely	Moderate	Medium	Short Term
4	Material Haul Routes	Likely	Moderate	Medium	Short Term
5	Contractor's Environmental Safeguards Capacity	Likely	Moderate	Medium	Short Term
6	Improper location of worker camps leading to improper disposal of solid waste and sewage and privacy issues for residents in project area.	Likely	Moderate	Medium	Short Term
7	Cultural Heritage & Religious Sites, Social Infrastructure	Unlikely	Moderate	Low	No residual Impact
8	Land acquisition and resettlement impacts	Likely	Moderate	Medium	Long Term
9	Impacts due to natural hazards	Unlikely	Moderate	Low	No residual Impact
10	Impacts due to existing utilities	Likely	Moderate	Low	No residual Impact



**Table ES-2: Screening of Possible Impacts during Construction Phase**

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Construction of water distribution networks and tube wells and storage tanks	Likely	Moderate	Medium	Short term
2	Impacts on surface water quality	Likely	Moderate	Medium	Short term
3	Degradation of air quality due to construction works	Likely	Moderate	Medium	Short term
4	Potential accidents and injuries to communities in project area during construction works and Road closure/Increased traffic congestion in populated areas	Likely	Moderate	Medium	Short term
5	Injuries to workers from lack of necessary training and/or not using PPEs etc.	Likely	Moderate	Medium	Short term
6	High noise levels from construction activities	Likely	Moderate	Medium	Short term
7	Improper handling and/or disposal of hazardous and non-hazardous waste	Likely	Moderate	Medium	Short term
8	Untreated disposal of effluent from worker camps and batching plant(s)	Likely	Moderate	Medium	Short term
9	Soil Contamination	Likely	Moderate	Medium	Short term
10	Employment Conflicts	Likely	Moderate	Medium	Short term
11	Communicable diseases incl. COVID-19	Likely	Moderate	Medium	Short term
12	Vegetation and Wildlife Loss	Unlikely	Moderate	Low	No residual Impact
13	Historical/Archaeological Sites	Unlikely	Moderate	Low	No residual Impact
14	Site Restorations	Likely	Moderate	Medium	Short term



**Table ES-3: Screening of Possible Impacts during Operation Phase**

S/No.	Potential Issues	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Ground water depletion	Likely	Major	Medium	Long term
2	Water system leaks and water discharges during flushing	Unlikely	Major	Medium	Long term
3	Occupational Health and Safety	Likely	Major	Medium	Long term
4	Improved drinking water availability	Positive impacts expected			Long term positive residual impact
5	Improvements in Public Health	Positive impacts expected			Long term positive residual impact

 Critical Risk Level

 Significant Risk Level

 Medium Risk Level

 Low Risk Level


 Positive Impacts

Figure ES-1: Location Map of Kohat Water Supply System

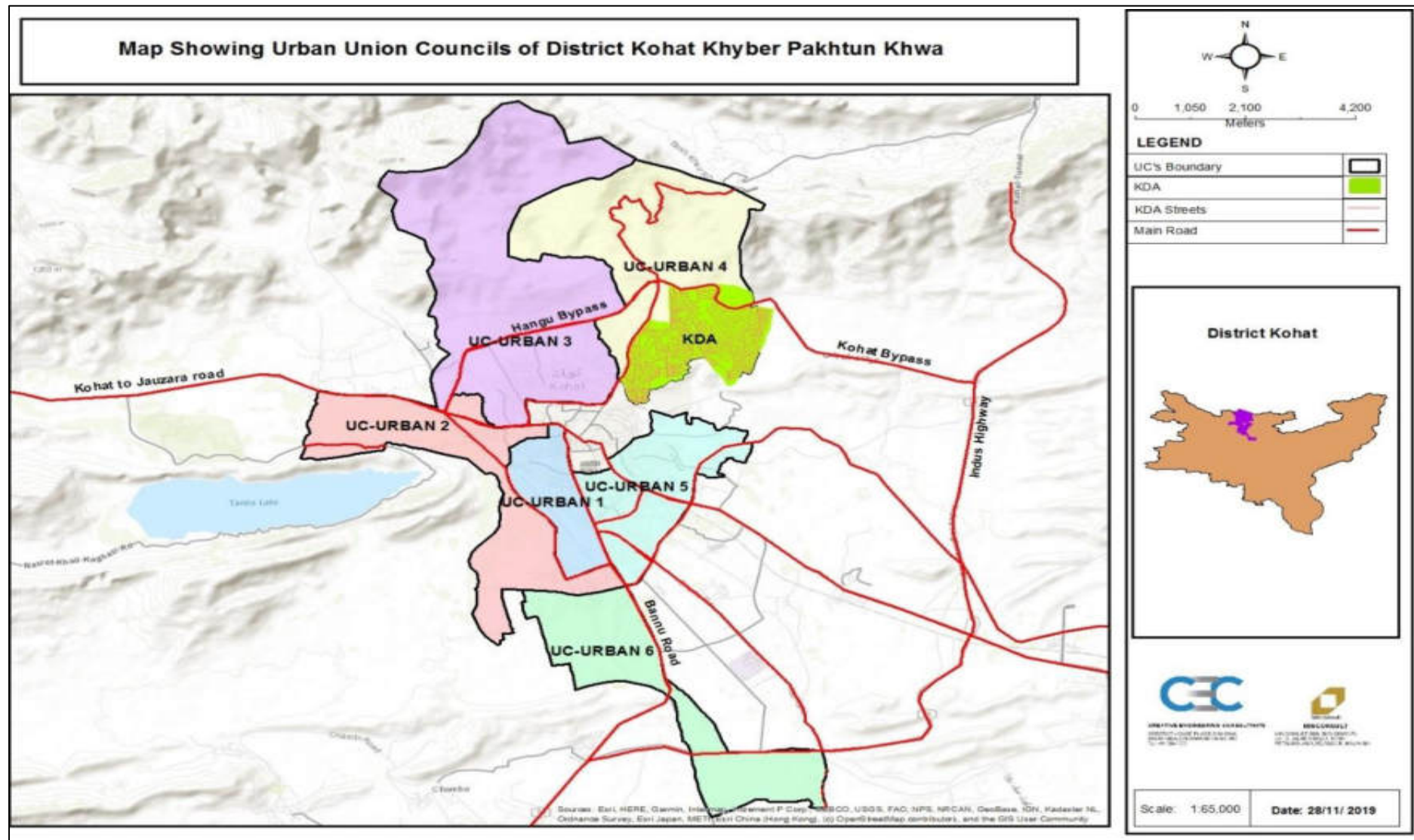
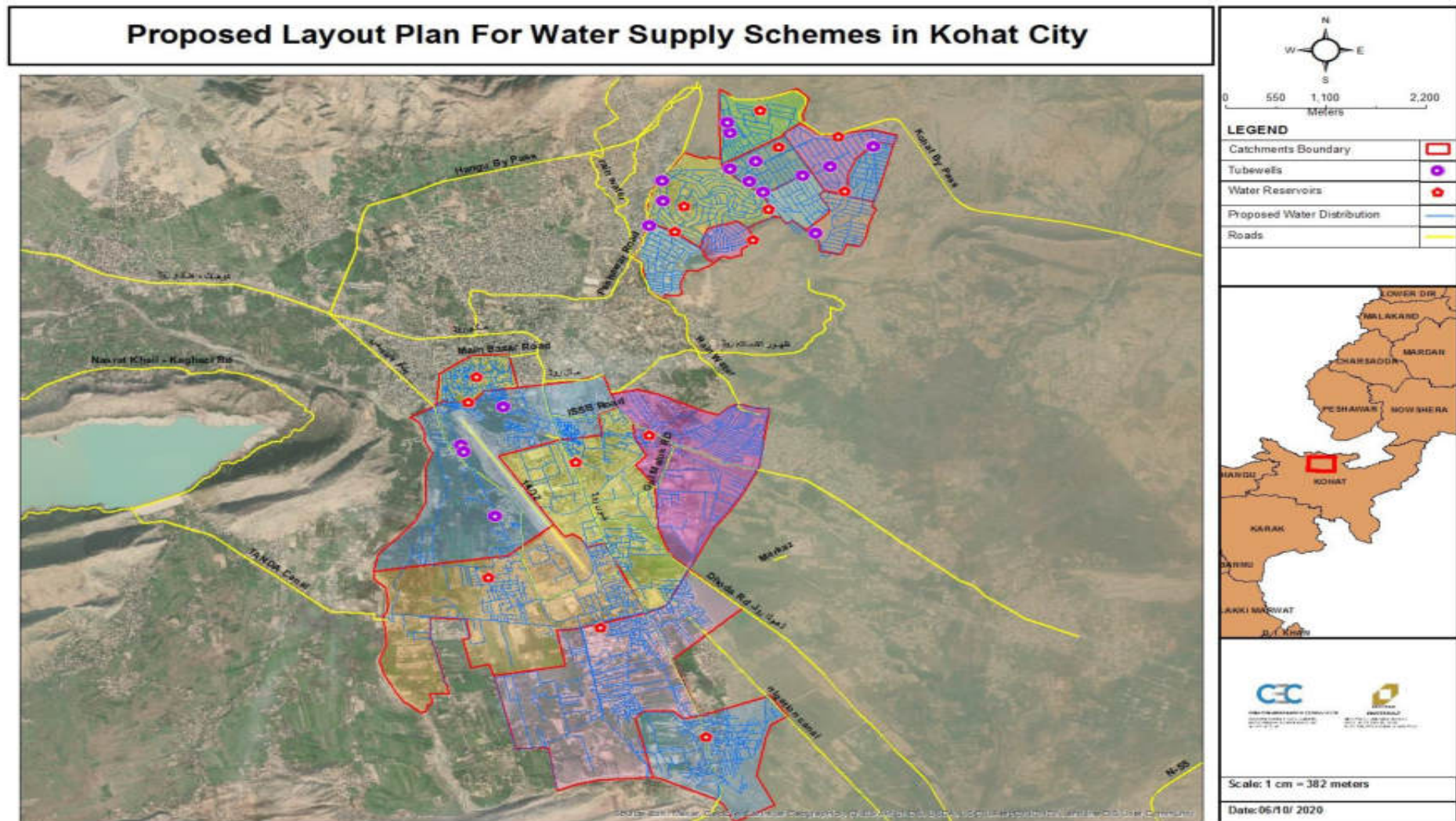




Figure ES-2: Proposed Layout Plan for Water Supply Scheme in Kohat City



# 1 Introduction

## 1.1 Overview

1. The Khyber Pakhtunkhwa Cities Improvement Projects (KPCIP) will improve the quality of life of the residents of five KP cities, including Abbottabad, Kohat, Mardan, Mingora, and Peshawar, directly benefitting about 6 million of urban population. KPCIP will help selected cities improve their access to quality urban services through three interlinked outputs: (i) Climate resilient and gender friendly urban infrastructure improve, (ii) Institutional capacities of urban service providers and governments strengthened, and (iii) Increased women's participation in urban governance and access to economic opportunities.
2. KPCIP will support the Government of Pakistan's development priorities, established in (i) the National Water Policy (2018), (ii) the Local Government Act (2019), and (iii) Pakistan Vision 2025 . The project is also aligned with ADB's operational priorities of (i) addressing remaining poverty and reducing inequalities; (ii) accelerating progress in gender equality; (iii) tracking climate change, building climate and disaster readiness; (iv) making cities more livable; and (v) strengthening governance and institutional capacity, outlined in ADB's Strategy 2030, and is included in ADB's country operations business plan for Pakistan, 2021–2023.
3. The project readiness financing (approved in March 2019) has financed the preparation and engineering design of the KPCIP. The Department of Local Government, Elections and Rural Development Department (LGE&RDD), the Government of Khyber Pakhtunkhwa, will be the executing agency for the project and the city governments of the five target cities, including the respective Water and Sanitation Services Companies, will be the implementing agencies.
4. This report has been prepared based on detailed engineering designs, due diligence assessments, and studies conducted by the government and project readiness financing consultants. The Government of Pakistan, Asian Development Bank (ADB), and Asia Infrastructure Investment Bank (AIIB) are expected to approve KPCIP in Q3 2021.
5. The Khyber Pakhtunkhwa Cities Improvement Project (KPCIP) is be being processed through the Project Readiness Finance (PRF) modality by Asian Development Bank (ADB) under Grant 6016-PAK, being executed by KP LGERDD. The Project is focused on investments of subprojects related to water supply, sanitation and drainage, solid waste management, and urban/green spaces. The Project has the following four major components:
  - Improvement of water supply systems in five (5) cities.
  - Improvement of sewerage and drainage systems in five (5) cities, including provision of sewage treatment plants (STPs)
  - Provision of Integrated Solid Waste management (ISWM) system in five (5) cities
  - Development of Urban/Green Spaces in five cities.
6. The proposed "Improvement in Water Supply System" Kohat city has three main components:
  - Rehabilitation and provision of water reservoirs

- New distribution network and water metering system
  - Energization of existing tube wells through clean energy sources
7. The proposed project “Improvement in Water Supply System” aims to provide new water storage reservoirs to increase storage capacity and overall coverage of the existing water supply system as well as provision of new water distribution networks and water metering system in the Kohat city. Rehabilitation of the existing tube wells is also proposed in the project as well as new tube wells are proposed based on water requirements. In addition, energization of twenty-four (24) existing and proposed tube wells through clean energy sources is included in the scope of the project.
  8. Project involves laying of 190 km of Distribution network in six union councils of Kohat. 10 new tubewells are proposed to be installed while 09 non-operational tubewells shall be rehabilitated. 5 new overhead reservoirs (OHRs) while 3 surface reservoirs (SRs) are proposed to be constructed. 24 tubewells shall be energized through clean energy sources in which 14 are existing and 10 are proposed new tubewells. Water meters will be installed at each house connection to monitor water use and to bill the service by WSSC Kohat.
  9. The project is located in the six (6) urban union councils, including Kotal Township (KDA) under the jurisdiction of Water and Sanitation Services Company in Kohat city. **Figure 1-1** showing the project area UCs. The names of the UCs are as follow:
    - UC-1 - Urban 1
    - UC-2 - Urban 2
    - UC-3 - Urban 3
    - UC-4 - Urban 4 Including Kohat Township (KDA)
    - UC-5 - Urban 5
    - UC-6 - Urban 6
  10. None of the UCs in Kohat has a continuous water supply (CWS) mode of service. Currently, the only water supply source in Kohat city is tube wells-based ground water source with approximately 65 number of existing tube wells. The mode of service in the jurisdiction of WSSC Kohat is intermittent water supply (IWS). Water is pumped into the water distribution networks either directly or from elevated water reservoirs, for a limited number of hours on daily basis. The condition of the existing water distribution network in the city is not satisfactory and has deteriorated over time.
  11. There are fourteen (14) no. of existing water reservoirs in Kohat city under the jurisdiction of WSSC Kohat. Out of fourteen (14) existing water storage reservoirs, seven (7) are overhead reservoirs (OHRs) and the remaining seven (7) are surface water reservoirs. Currently, only four (4) OHRs and five (5) surface reservoirs are operational while rest of the water reservoirs are non-functional.
  12. Moreover, the existing water distribution network mostly comprises of Asbestos Cement (AC), Galvanized Iron (GI), and PVC pipe material. The existing water distribution network is approximately 177kms in length and more than 20 years old. Due to old age and poor condition of the existing water distribution network, it needs immediate replacement. Further intermittent water supply can cause groundwater infiltration into the pipelines with contamination of the supply or pipes deformation.
  13. The main benefits of this project include the following



- The proposed project will ensure 24/7 sustainable water supply to all residents in the jurisdiction of WSSC Kohat.
- Reduced groundwater infiltration into the pipelines which limits contamination in water supply mains and also decline chances of pipeline deformation
- Installation of Metering system will reduce chances of exploitation of water and reduce water theft.

## 1.2 Objective of IEE

- Assess the existing environmental conditions of project area, including the identification of environmental sensitive receptors and develop a baseline of its prevalent environmental and socioeconomic conditions;
- Identify and investigate all impacts of the proposed Improvement of Water Supply Scheme pre-construction/design, construction, operation phases, on the physical, biological and socioeconomic environment of the project area;
- To propose mitigation measures that will help KP LGERDD and WSSCK in conducting the proposed project activities in an environmentally sustainable manner;
- To uncover the planning and operational phase impacts up to microenvironment levels in which project is proposed to be sited; and
- To develop an Environmental Management Plan (EMP) that will assist KP LGERDD and WSSCK in the effective implementation of the recommendations of the IEE.

## 1.3 Environmental Category of Project

14. According to ADB's Safeguard Policy Statement (SPS) 2009, a Rapid Environmental Assessment (REA) Checklist was prepared for the proposed "Improvement of Water Supply System" in Kohat (**Annexure A**). Based on the initial findings, it was ascertained that certain adverse environmental impacts are not expected of significance that detailed assessment is required therefore IEE has been conducted for the proposed "Improvement of Water Supply System", and thus the subject project is considered environmentally "B" category as per ADB SPS, 2009.
15. Further regulatory requirements of Khyber Pakhtunkhwa Environment Protection Agency (KPEPA) shall be complied by KP LGERDD as per IEE/EIA Regulation 2000 as notified by the Pakistan Environment Protection Agency vide<sup>1</sup> S.R.O. 339 (1)/2001 during the project approval and execution stage.

## 1.4 Methodology of IEE Study

16. The various steps undertaken in the preparation of the IEE are summarized below:

### 1.4.1 Understanding of the Proposed Operation

17. This involves collecting information from the ADB, PMU KPCIP and Engineering Design and Construction Management (EDCM) technical team on the proposed project activities and understanding the activities to identify potential impacts of implementing these.

<sup>1</sup> <https://www.informea.org/en/legislation/pakistan-environmental-protection-agency-review-ieee-and-eia-regulations-2000>

### 1.4.2 Review of Legislation and Guidelines

18. National legislation, international agreements, environmental guidelines both of KP Environment Protection Authority (KP-EPA), and ADB, and best industry practices has been reviewed to set environmental standards that KP LGREDD as the executing Agency will adhere during implementation of the project.

### 1.4.3 Secondary Data Collection

- Available published and unpublished information pertaining to the background environment has been obtained and reviewed. All data sources have been carefully reviewed to collect the following information.
- Physical environment – topography, geology, seismology, geomorphology, soils, surface and groundwater resources and climate;
- Physical cultural resources – sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance; and,
- Biological environment – habitat types, flora and fauna (particularly rare or endangered species), critical habitats, vegetation and communities within the area;
- Socio-economic environment – settlements, socio-economic conditions, infrastructure and land use.

### 1.4.4 Field Data Collection (Baseline Survey)

19. Field visits were undertaken consisting of preliminary scoping through survey and assessment activities to establish the potential impacts and categorization of activities and the Rapid Environmental Assessment (REA) was completed. The key receptors and stakeholders within the project area were identified.
20. Baseline surveys required to identify and establish physical and biological conditions in the project area has been carried out by IEE team and results has been incorporated in this report. The socio-economic environment in the project areas has been obtained through the socio-economic profiles and social impact assessment carried out by social safeguard team. Climate risk and vulnerability assessment findings are discussed.
21. Primary data collection in area of influence i.e 6 UCs of Kohat such as ambient noise levels, ambient air quality and ground water quality at the key receptor locations in the project area was conducted.
22. Review of secondary information on the physical, biological and ecological aspects, physical cultural resources and infrastructure utilities in the project area has been conducted.

### 1.4.5 Public Consultation

23. Public consultations (PC) were carried out with all key stakeholders, particularly local communities residing in the project area, local businesses and government and local government bodies in line with ADB's "Safeguard Policy Statement (SPS) – June 2009"/ Environmental Assessment Guidelines. Under ADB requirements, the

environmental assessment process must also include meaningful public consultations during the completion of the study. In this IEE, the Public Consultation process was carried out including verbal disclosure regarding the project development with stakeholders to brief them about project and to seek their response/recommendation.

#### 1.4.6 Impact Identification and Assessment

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

#### 1.4.7 Recommendations for Mitigation Measures

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

#### 1.4.8 Development of Environmental Management Plan (EMP)

26. An Environmental Management Plan (EMP) has been developed for effective implementation of the recommended mitigation measures. The EMP has included controls to minimize the identified impacts and monitoring program to monitor effect of mitigation measures implemented and residual impacts, if any, during implementation. The EMP has identified roles and responsibilities of all concerned parties during the implementation of the project.

### 1.5 Proponent of Project

27. The LGERDD, GoKP is the Executing Agency (EA) for the proposed Improvement in Water Supply System Kohat while the project will be implemented through Water and Sanitation Services Company (WSSC), Kohat with the support of Project Management Unit (PMU). Contact details of the EA are provided as **Table 1.1** below.

**Table 1.1: Executing Agency Contact Details**

Executing Agency Details	Information
Name of EA	Project Management Unit (PMU) KPCIP, Local Government, Elections and Rural Development Department (LGE&RDD), GoKP
Address	Ground Floor, Afzal Apartments, Jamrud Road, Phase-3 Chowk, Hyatabad Peshawar
Telephone	0092-91-5854555
E-mail	<a href="mailto:pdkpcip@gmail.com">pdkpcip@gmail.com</a> , <a href="mailto:info@kpcip.gov.pk">info@kpcip.gov.pk</a>
Web	Kpcip.gov.pk

## 1.6 Structure of the Report

28. The IEE report contains eleven chapters as follows:

- Introduction
- Policy and Legal Framework
- Description of the Project
- Description of Environment
- Analysis of Alternatives
- Assessment of Environmental Impacts and Mitigation Measures
- Institutional Requirements Environmental Management Plan
- Public Consultation
- Grievance Redressal Mechanism
- Findings, Recommendations and Conclusions
- References

## 1.7 IEE Team

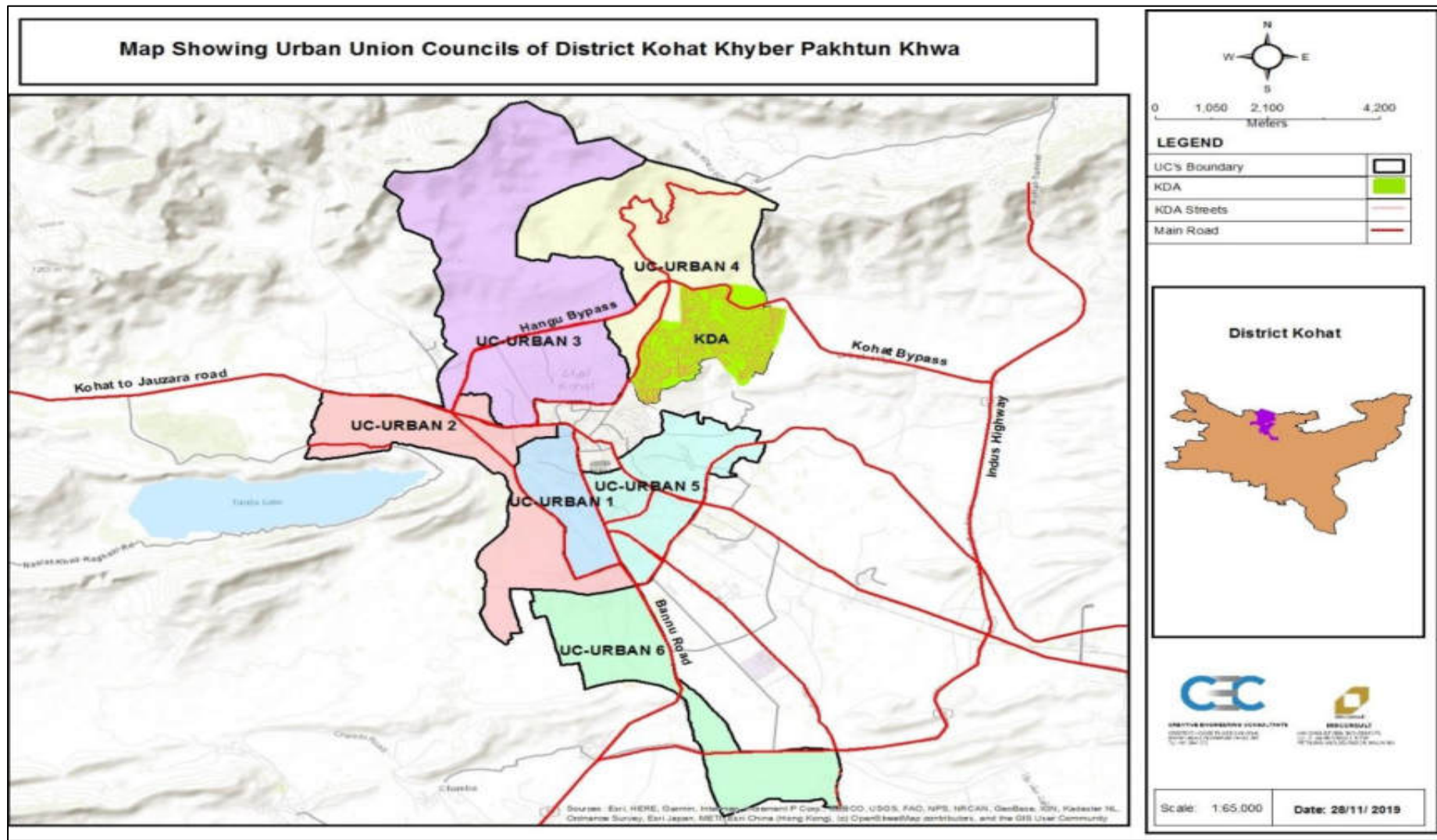
29. IEE team comprising of following members

- Environment Specialists by ADB, PMU KP LGREDD and Engineering Design Construction Management (EDCM)
- Environmental associate
- Water supply system design experts
- Integrated Environmental Laboratory
- Climate change expert
- Social Safeguard Expert
- Social safeguard team of EDCM
- Gender Expert
- ADB and PMU technical team

## 1.8 Further Additions & Updating of IEE Study

30. This version of the report will be further updated once the detailed design is completed and any other details of the proposed project “Improvement in Water Supply System” become available over the coming weeks and months. These revisions shall be incorporated into any subsequent updated versions of this IEE report. Updated IEE will be submitted for ADB review and approval and posted at ADB and PMU / Project website. IEE/EMP will be disclosed locally at PMU KPCIP website at least two weeks prior to the next consultation to allow the public time to read, look for information or consult experts, and form opinions.

7



## **2 Policy and Legal Framework**

### **2.1 General**

31. This section provides an overview of the policy framework and national legislation that applies to the proposed Improvement of Water Supply System in Kohat city, Pakistan. The project will comply with all national legislation relating to the environment in Pakistan and will obtain all the regulatory clearances required from the financing agency, ADB. Project will be consistent with the environmental safeguards requirements as specified in the ADB SPS 2009.

### **2.2 National Policy and Legal Framework**

32. The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the proposed project development are ground water depletion, provision of sustainable potable water to citizens while conserving biodiversity.
33. Prior to the adoption of the 18th Constitutional Amendment, the Pakistan Environmental Protection Act (PEPA) 1997 was the governing law for environmental conservation in the country. Under PEPA 1997, the Pakistan Environmental Protection Council (PEPC) and Pak EPA were primarily responsible for administering PEPA 1997. Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved, and the provinces have been empowered for environmental protection and conservation.

### **2.3 Regulations for Environmental Assessment, Pakistan EPA**

34. Under Section 12 (and subsequent amendment) of the PEPA (1997), a project falling under any category specified in Schedule I of the IEE/EIA Regulations (SRO 339 (10/2000)), requires the proponent of the project to file an IEE with the concerned provincial EPA. Projects falling under any category specified in Schedule II require the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.

### **2.4 Regulatory Clearances, KP EPA**

35. In accordance with provincial regulatory requirements, an EIA satisfying the requirements of the KP Environmental Protection Act (2014) is to be submitted to KP environmental protection agency (KP-EPA) for review and approval, and subsequent issuance of NOC before the commencement of construction.

### **2.5 Guidelines for Environmental Assessment, Pakistan EPA**

36. The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed sub-project are listed below:

- Guidelines for the Preparation and Review of Environmental Reports, Pakistan, EPA1997;
- Guidelines for Public Consultations; Pakistan EPA May 1997;

## 2.6 National Environmental Quality Standards (NEQS) 2000 & 2010

37. The National Environmental Quality Standards (NEQS), 2000 & 2010, specify the following standards:

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

38. NEQS are attached as **Annexure J**.

## 2.7 Other Environment Related Legislations

39. The national laws and regulations are provided in **Table 2.1** below.

**Table 2.1: Environmental Guidelines and Regulations**

Legislation/Guideline	Description
<b>National Environmental Policy (2005) (NEP)</b>	NEP is the primary policy of Government of Pakistan addressing environmental issues. The broad Goal of NEP is, "to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development". The NEP identifies a set of sectoral and cross-sectoral guidelines to achieve its goal of sustainable development. It also suggests various policy instruments to overcome the environmental problems throughout the country.
<b>The Forest Act (1927)</b>	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. No protected forest is situated within the area of influence of project activities i.e. Improvement of Water Supply System.
<b>Khyber Pakhtunkhwa Wildlife and Biodiversity Act, 2015</b>	It empowers the government to declare certain areas reserved for the protection of wildlife and control activities within these areas. It also provides protection to endangered species of wildlife. As no activities are planned in these areas, no provision of this law is applicable to the

Legislation/Guideline	Description
	proposed project.
<b>The KP Antiquities Act (2016)</b>	It ensures the protection, preservation, development and maintenance of antiquities in the province of KP. The Act defines “antiquities” as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoKP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, GoKP, any archaeological discovery made during the course of the project. However, if any archaeological antiquity discovered Archeological Chance Find procedure shall be adopted. Archeological Chance Find procedure has been attached as <b>Annexure F</b> .
<b>Pakistan Penal Code (1860)</b>	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.
<b>NATIONAL ENVIRONMENTAL AND CONSERVATION STRATEGIES</b>	
<b>National Conservation Strategy</b>	Before the approval of NEP, the National Conservation Strategy (NCS) was considered as the Government’s primary policy document on national environmental issues. At the moment, this strategy just exists as a national conservation program. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas.
<b>Biodiversity Action Plan</b>	The plan recognizes IEE/EIA as an effective tool for identifying and assessing the effects of a proposed operation on biodiversity.
<b>INTERNATIONAL CONVENTIONS</b>	
<b>The Convention on Conservation of Migratory Species of Wild Animals (1981.21)</b>	The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species. There are no critical habitat of endangered species of plant life or animal life in proposed project area.
<b>Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)</b>	The convention requires Pakistan to impose strict regulation (including penalization, confiscation of the specimen) regarding trade of all species threatened with extinction or that may become so, in order not to endanger their survival further.



Legislation/Guideline	Description
<b>International Union for Conservation of Nature and Natural Resources Red List (2000)</b>	Lists wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Pakistan.
<b>Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) (1971)</b>	The Ramsar Convention deals with the protection of water bodies of international importance and their associated biodiversity, as well as promoting wise use of allied resources. The Convention was adopted in 1971 at Ramsar, Iran and entered into force in 1975. Pakistan signed the Ramsar Convention in 1971, and ratified it in July 1976. There are 19 Ramsar sites in Pakistan. Tanda Dam a Ramsar site also lies in close vicinity of project area. However, project activities will not deteriorate Ramsar site nor provide hinderance in waterfowl passage.
<b>Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1992)</b>	The Basel Convention deals with the controlled trans-boundary movement of hazardous wastes and their disposal. The Convention was adopted on March 22, 1989, and entered into force on May 5, 1992; Pakistan signed the Convention in May 1992 and ratified it in October 1994.
<b>United Nations Framework Convention on Climate Change (UNFCCC) (1994)</b>	This convention highlights broad guidelines for protecting the climate of the planet. It was adopted in 1992 and came into force in 1994. Pakistan signed the UNFCCC in 1992 and ratified it in June 1994.
<b>Kyoto Protocol to UNFCCC (2005)</b>	The Kyoto Protocol seeks to mitigate climate change and to reverse the pace of climate change through the use of carbon sequestration and carbon credits known as Certified Emission Reduction trading. The Protocol was adopted in 1997 and came into force in 2005; Pakistan signed the Protocol in December 1997 and ratified it in January 2005.

## 2.8 Implications of national policies and regulations on proposed project

40. The Pak-EPA formulated regulations in 2000 for 'Review of IEE and EIA' which categories development projects under three Schedules-Schedules I, II and III. Projects are classified on the basis of expected degree and magnitude of environmental impacts and the level of environmental assessment required is determined from the schedule under which the project is categorized.
41. The projects listed in Schedule-I include those where the range of environmental issues is comparatively narrow and the issues can be understood and managed through less extensive analysis. Schedule-I projects require an IEE to be conducted, rather than a full-fledged EIA, provided that the project is not located in an environmentally sensitive area.

42. The projects listed in Schedule-II are generally major projects and have the potential to affect a large number of people in addition to significant adverse environmental impacts. The impacts of projects included in Schedule-II may be irreversible and could lead to significant changes in land use and the social, physical and biological environments.
43. The proposed project (Improvement in Water Supply System ) has been categorized as Schedule II (G) and requires an EIA.
44. The LGERDD, GoKP, being the Executing Agency for the Project is responsible for management of project impacts, and have to undertake the commitments and mitigation measures proposed in this environmental report and in the subsequent review and approval conditions.
45. According to the regulations, no construction, preliminary or otherwise, relating to the project shall be undertaken until and unless approval of the IEE/EIA report has been issued by the KP EPA.
46. The LGERDD will submit the IEE/EIA Report on a prescribed application along with the processing fee to KP EPA. After submission of the environmental assessment report, a forty-five (45) day period for review will be provided. The assessment will be completed within a period of one hundred and twenty (120) days from receipt of the complete documents, and earlier than this wherever practicable.

## 2.9 ADB's Safeguard Policy Statement (SPS), 2009

47. The ADB's SPS 2009 requires that environmental considerations be incorporated into ADB funded projects to ensure that the project will have minimal environmental impacts and be environmentally sound. Occupational health & safety of the local population should also be addressed as well as the project workers as stated in SPS. A Grievance Redress Mechanism (GRM) to receive application and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance is also established.
48. All loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) checklists, consisting of questions relating to (i) the sensitivity and vulnerability of environmental resources in project area, and (ii) the potential for the project to cause significant adverse environmental impacts. Projects are classified into one of the following environmental categories:
49. **Category A:** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.
50. **Category B:** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required. The project "Improvement of Water Supply System" falls in **Category B**. ADB requirements as stated in ADB SPS (2009) are that the IEE should at least include:
  - A screening process for project should be conducted as early as possible, to determine

the appropriate extent and type of environmental assessment and/or audit required so that appropriate studies are undertaken commensurate with the significance of the Projects' potential environmental and social impacts and risks;

- Studying baseline information, which includes biodiversity, air quality, and noise and water quality. Required baseline surveys for each parameter that is present in the environmental conditions;
- An assessment of all the environment impacts in the project area;
- Mitigation measures, an environmental management plan including the use of appropriate mitigation technologies, an environmental monitoring plan with monitoring indicators, and institutional arrangements and responsibilities (including cost estimates and training);
- Examination of EA's implementation capacity in relation to Environmental safeguards needs and an institution review. A capacity development program to cover all of the marked capacity gaps.

51. ADB SPS 2009 also guide that the borrower/client will assess the significance of project impacts and risks on biodiversity and natural resources as an integral part of the environmental assessment process

52. **Category C:** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

53. **Category FI:** A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary (FI).

## 2.10 ADB's Access to Information Policy (AIP) 2018

54. ADB's new Access to Information Policy (AIP), reflects the ADB's ongoing commitment to transparency, accountability, and participation by stakeholders. The policy contains principles and exceptions to information sharing with external stakeholders, led by a new overarching principle of "clear, timely, and appropriate disclosure."

## 2.11 ADB's Accountability Mechanism Policy 2012

55. The objectives of the Accountability Mechanism are providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or is likely to cause, them direct and material harm. The Accountability Mechanism is a "last resort" mechanism.

## 2.12 Implications of ADB's safeguard policies on proposed project

56. The objectives of ADB's safeguards are to:

- avoid adverse impacts of projects on the environment and affected people, where possible;
- minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems.

57. ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:
- environmental safeguards,
  - involuntary resettlement safeguards, and
  - Indigenous Peoples safeguards.
58. The objective of the environmental safeguards is to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. ADB's policy principles are summarized in **Table 2.2** below.

**Table 2.2: ADB Policy Principles**

No.	Policy principle	Summary
1	Screening and categorization	Screening process initiated early to determine the appropriate extent and type of environmental assessment.
2	Environmental assessment	Conduct an environmental assessment to identify potential impacts and risks in the context of the project's area of influence.
3	Alternatives	Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts, including no project alternative.
4	Impact mitigation	Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts. Prepare an environmental management plan (EMP).
5	Public consultations	Carry out meaningful consultation with affected people and facilitate their informed participation. Involve stakeholders early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation. Establish a grievance redress mechanism.
6	Disclosure of environmental assessment	Disclose a draft environmental assessment in a timely manner, in an accessible place and in a form and language(s) understandable to stakeholders. Disclose the final environmental assessment to stakeholders.
7	Environmental management plan	Implement the EMP and monitor its effectiveness. Document monitoring results and disclose monitoring reports.
8	Biodiversity	Do not implement project activities in areas of critical habitats.

No.	Policy principle	Summary
9	Pollution prevention	Apply pollution prevention and control technologies and practices consistent with international good practices. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges. Avoid the use of hazardous materials subject to international bans or phase outs.
10	Occupational health and safety/Community safety.	Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.
11	Physical cultural resources	Conserve physical cultural resources and avoid destroying or damaging them. Provide for the use of "chance find" procedures.

### 2.13 IFC Environmental, Health, and Safety Guidelines for Water and Sanitation<sup>2</sup>

59. The IFC EHS Guidelines for Water and Sanitation include information relevant to the operation and maintenance of (i) potable water treatment and distribution systems, and (ii) collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities.
60. Environmental issues associated with water and sanitation projects may principally occur during the construction and operational phases, depending on project-specific characteristics and components.
61. Guidelines are related to following impacts associated with Drinking water supply and treatment are as follows:
- Water Withdrawal
  - Water Treatment
    - Solid waste
    - Wastewater
    - Hazardous chemicals
    - Air emissions
    - Ecological impacts

<sup>2</sup> <https://www.ifc.org/wps/wcm/connect/83217cd8-b9a5-4383-97b5-5af26182b3b8/2007+Water+and+Sanitation.pdf?MOD=AJPERES&CVID=m3CdtQr>

- Water Distribution
  - Water system leaks and loss of pressure
  - Water discharges

## 2.14 Comparison of International and Local Environmental Legislations

62. The ADB SPS, 2009 requires application of pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards. The SPS states that when host country regulations differ from these standards, the EA will achieve whichever is more stringent.
63. In order to select the most stringent standards applicable, a mix of local (NEQS) and international (IFC) regulations have been selected. The IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines and Environmental standards are also applicable. It shall be ensured that all necessary noise mitigation measures are implemented to minimize the noise levels in the project area.
64. The **Table 2.3** presents IFC workplace noise standards that are applicable to the construction workers. It should also be noted that IFC EHS guidelines advise that where existing ambient noise levels already exceed thresholds, the project should not result in an increase of more than 3 dB over existing ambient noise levels at the nearest receptor location off-site.
65. A comparison of applicable local and international guidelines for ambient air quality has been provided in **Table 2.4** below. In the case of most pollutants, the Pak NEQS standards for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards. The applicable and most stringent parameters for each respective pollutant are highlighted in green.
66. Similar to the standards for air quality, the comparison of noise standards provided in **Table 2.5** clearly shows that the Pakistan NEQS standards for noise are more stringent in comparison to the IFC standards. The only exception is the daytime noise level standard for Industrial areas where the IFC standard is more stringent (70 dB (A)) in comparison to NEQS (75 dB (A)) and so for this particular parameter, the IFC standard will be used. Apart from this one exception, the NEQS standards have been used for water quality of development project.
67. Comparison of International and Local Water Quality Standards has been provided in **Table 2.6**. Standard for Bacterial contamination are same for both NEQS and IFC/WHO standard while physical parameters are different. NEQS for odor, turbidity, hardness and pH are more stringent while IFC/WHO standards are stringent in metallic contaminations i.e. Arsenic, Barium, Boron, Cadmium and Zinc.
68. As far as regulations regarding other environmental parameters are concerned such as acceptable effluent disposal parameters, the local regulations i.e. NEQS take precedence over any other international regulations such as IFC.

**Table 2.3: IFC Work Environment Noise limits**

Type of Work, workplace	IFC General EHS Guidelines
-------------------------	----------------------------

Heavy Industry (no demand for oral communication)	85 Equivalent level $L_{eq,8h}$
Light industry (decreasing demand for oral communication)	50-65 Equivalent level $L_{eq,8h}$

**Table 2.4: Comparison of International and local Air Quality Standards\***

Pollutants	USEPA		WHO/IFC		Pak. NEQS	
	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
SO <sub>2</sub>	3 hrs.	0.5 ppm	24 hr.	20 up/m <sup>3</sup>	Annual Mean	80 up/m <sup>3</sup>
	1 hr.	75 ppb	10 min	500 up/m <sup>3</sup>	24 hrs.	120 up/m <sup>3</sup>
CO	8 hrs.	9 ppm (11 mg/m <sup>3</sup> )	-	-	8 hrs.	5 mg/m <sup>3</sup>
	1 hr.	35 ppm (43 mg/m <sup>3</sup> )	-	-	1 hr.	10 mg/m <sup>3</sup>
NO <sub>2</sub>	Annual Mean	100 up/m <sup>3</sup> (53 ppb)	1 yr.	40 up/m <sup>3</sup>	Annual Mean	40 up/m <sup>3</sup>
	1 hr.	100 ppb	1 hr.	200 up/m <sup>3</sup>	24 hrs.	80 up/m <sup>3</sup>
O <sub>3</sub>	8 hrs.	0.07ppm (148 up/m <sup>3</sup> )	8 hrs.	100 up/m <sup>3</sup>	1 hr.	130 up/m <sup>3</sup>
TSP	-	-	-	-	Annual Mean	360 up/m <sup>3</sup>
					24 hrs.	500 up/m <sup>3</sup>
PM <sub>10</sub>	24 hrs.	150 up/m <sup>3</sup>	1 yr.	20 up/m <sup>3</sup>	Annual Mean	120 up/m <sup>3</sup>
			24 hr.	50 up/m <sup>3</sup>	24 hrs.	150 up/m <sup>3</sup>
PM <sub>2.5</sub>	Annual Mean	15 up/m <sup>3</sup>	1 yr.	10 up/m <sup>3</sup>	Annual Average	15 up/m <sup>3</sup>
	24 hrs.	35 up/m <sup>3</sup>	24 hr.	25 up/m <sup>3</sup>	24 hrs.	35 up/m <sup>3</sup>
					1 hr.	15 up/m <sup>3</sup>

\*: The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

\* In instances where the air shed is significantly degraded and the pollutant levels are already exceeding the ambient pollutant concentrations provided in the table above, it shall be ensured that the project activities cause as small an increase in pollution levels as feasible, and amounts to a fraction of the applicable short term and annual average air quality guidelines or standards as established in the project specific environmental assessment.

**Table 2.5: Comparison of International and Local Noise Standards**

Category of Area/Zone	Limit in dB(A) Lea			
	NEQS		WHO/IFC	
	Day Time 06:00 – 22:00	Night Time 22:00-06:00	Day Time 07:00 – 22:00	Night Time 22:00-07:00
Residential area (A)	55	45	55	45
Commercial area (B)	65	55	70	70
Industrial area (C)	75	65	70	70
Silence zone (D)	50	45	55	45

\*: The standards highlighted in green for each respective Area/Zone are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

\* In instances where baseline noise levels are already exceeding the standards above, it will need to be ensured that the project activities do not cause an increment of more than 3 dB (A) from the baseline noise levels.

**Table 2.6: Comparison of International and Local Water Quality Standards**

Parameter	Unit	NEQS	WHO/IFC
<b>Bacterial</b>			
E-Coli	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
Total Coliform	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
<b>Physical</b>			
Color	TCU	≤ 15 TCU	-
Taste	No objectionable/Acceptable	-	-
Odor	No objectionable/Acceptable	-	-
Turbidity	NTU	< 5 NTU	
Total Hardness	mg/l	< 500 mg/l	
TDS	mg/l	< 1000	
pH		6.5-8.5	
<b>Chemical</b>			
Aluminum	mg/l	≤0.005 (P)	0.2
Antimony	mg/l	≤0.005 (P)	<0.005 (P)
Arsenic	mg/l	≤0.005 (P)	0.01
Barium	mg/l	0.7	0.3
Boron	mg/l	0.3	0.3
Cadmium	mg/l	0.01	0.0003



<b>Chloride</b>	mg/l	<250	250
<b>Chromium</b>	mg/l	≤0.05	0.05
<b>Copper</b>	mg/l	2	2
<b>Cyanide</b>	mg/l	≤0.05	0.07
<b>Fluoride</b>	mg/l	<1.5	1.5
<b>Lead</b>	mg/l	≤0.05	0.01
<b>Manganese</b>	mg/l	≤0.5	0.5
<b>Mercury</b>	mg/l	≤0.0001	0.0001
<b>Nickel</b>	mg/l	≤0.02	0.02
<b>Nitrate</b>	mg/l	≤50	50
<b>Nitrite</b>	mg/l	≤3	-
<b>Selenium</b>	mg/l	0.01	0.01
<b>Residual Chlorine</b>	mg/l	0.2-0.5 at consumer end	-
<b>Zinc</b>	mg/l	5	3

\*: The standards highlighted in green for each respective Area/Zone are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.

### 3 Project Description

#### 3.1 Project Introduction

69. The proposed “Improvement in Water Supply System” Kohat city has three main components:
- Rehabilitation and provision of water reservoirs
  - New distribution network and water metering system
  - Energization of existing tube wells through clean energy sources
70. The proposed project “Improvement in Water Supply System” aims to provide new water storage reservoirs to increase storage capacity and overall coverage of the existing water supply system as well as provision of new water distribution networks and water metering system in the Kohat city. Rehabilitation of the existing tube wells is also proposed in the project as well as new tube wells are proposed based on water requirements. In addition, energization of twenty-four (24) existing and proposed tube wells through clean energy sources is included in the scope of the project. .
71. The project is located in the six (6) urban union councils, including Kotal Township (KDA) under the jurisdiction of Water and Sanitation Services Company in Kohat city.

##### 3.1.1 Existing Condition of Water Supply System in Kohat

72. The main source of water supply in Kohat is ground water source based on tube wells. There are 65 number of existing tube wells under the jurisdiction of WSSC Kohat. At present, 56 out of 65 tube wells are operational while the remaining 9 tube wells are non-operational. The non-operationality of the tube wells is mainly due to either non availability of pumping machinery, poor or no distribution network, or external electrification. The average discharge from a tube well is approximately 6,250 gallons per hour.
73. There are existing fourteen (14) no. of water storage reservoirs in Kohat under the jurisdiction of WSSC Kohat which includes seven (7) nos. of overhead reservoirs (OHRs) and the remaining seven (7) are surface reservoirs. Currently, only four (4) OHRs and five (5) surface reservoirs are operational while remaining are non-functional.
74. The existing water distribution network mostly comprises of Asbestos Cement (AC), Galvanized Iron (GI), and PVC pipe material. The existing water distribution network is approximately 177kms in length and more than 20 years old. Due to old age and poor condition of the existing water distribution network, it needs immediate replacement. Some of the existing water distribution network was observed to be passing through the sanitation drains which is one of the major sources of contamination in the pipelines. Several leakages were observed in the distribution network which also contributes in the contamination of water supply.
75. The detailed engineering design and construction activities for proposed “Improvement in Water Supply System” is presented in the below sub-sections.

### **3.2 Detailed Engineering Design of Water Supply Network**

76. The various tasks carried out during the detailed engineering design for water supply network including design criteria are presented in the section below.

#### **3.2.1 Applicable standards and specifications**

77. The criteria of WASA Lahore is mainly considered for the design criteria. Similarly, some international best practices were also considered in establishing the design criteria for the entire proposed water supply system.

#### **3.2.2 Design life**

78. Design life considered for different components of the project is given below:
- For proposed OHRs and surface reservoirs, 40 years design life is considered;
  - For water distribution networks, a design life of 25 years is considered;
  - For proposed tube wells, a design life of 15 years is considered.

#### **3.2.3 Per Capita Demand**

79. The average daily demand for this project is taken as 35 US gallons per capita per day. 7 persons per house are assumed for demand calculations. Both average and peak daily demand fluctuations are considered in the design of the proposed system.

#### **3.2.4 Peaking Factors**

80. The following standards are followed for computation of the short-term variations or the peaking factors:
- Maximum day demand has been taken as 1.5 times the average day demand;
  - Peak hour demand has been taken as 2 times the maximum day demand.
81. The hydraulic models for the proposed water distribution network were simulated under the above-mentioned peaking factors.

#### **3.2.5 Terminal Pressures**

82. The following standards related to terminal pressures shall be followed;
- Minimum terminal pressure 10 meters (1 bars) at the user end;
  - Maximum terminal pressure of 65 m (6.5 bars) at the user end.

#### **3.2.6 Velocity Limits**

83. The following standards to be adopted for the velocity of pipes:
- Distribution Network 0.3 to 1.5 m/sec;
  - Transmission and Delivery/ Supply Mains 0.3 to 1.5 m/sec.

#### **3.2.7 House Connections**

84. Following standards for service connection to be adopted for providing house connection:

- Domestic Service House Connection 18.75mm (3/4 inch);
- Commercial Connection 25.4mm (1 inch);
- A dedicated water meter is proposed with each house connection.

### 3.2.8 Pipe Material

85. Two different types of pipe materials are considered for the proposed water supply pipes.

- For distribution network i.e. DN 75 mm to 300 mm (3 to 12 inches), the (HDPE) pipes are proposed. For the proposed pipes above surface, GI pipes are recommended.
- Pipe components installed inside any type of chambers for any pipe diameter shall be constructed by metallic parts to avoid damages

### 3.2.9 Minimum Pipe Size

86. As per design criteria, the minimum acceptable pipe diameter for all newly proposed water distribution lines shall be 75mm (3-inches).

### 3.2.10 Utility Corridor

87. The criteria for the utility corridor for the proposed water distribution pipe, considering that the existing distribution network is located in mostly develop areas, is as follow:

- For a street/road having an existing drain on one side, the proposed water supply pipe shall be laid on the opposite side of the drain;
- For a street/road having an existing drain on both sides, the proposed water supply pipe shall be laid in the middle of the road/street in a way to have minimum damage to the existing carriageway;
- For streets/ road with no drain, the proposed water supply pipe shall be laid at one end of the carriageway to avoid maximum damage to the carriageway.

### 3.2.11 Summary Table for Design Criteria

88. Design criteria established for the proposed water supply distribution system is summarized in Table 3.1.

**Table 3.1: Summary of Design Criteria**

Sr No	Parameter	Criteria
<b>Water Distribution network</b>		
1	Per capita water consumption including unaccounted for water	30 Gallons per capita per day
2	Peak demand for design of distribution network	Peak factor of 1.5 for maximum day demand and peak factor of 2 for maximum hourly demand

Sr No	Parameter	Criteria
3	Permissible velocity in distribution lines	0.3 m/s min to 1.5 m/s max
4	Minimum Pipe Size for Distribution Network	75 mm
5	Pipe size and material for Domestic connection	18.75 mm
6	Pipe size for Commercial Connection	25.4 mm
7	Pipe material	HDPE PE-100, PN-12/PN-16 for underground pipe and GI for at grade
8	Minimum terminal pressure for the farthest point in system	1 bar
9	Desirable maximum pressure	6.5 bars
10	Maximum test pressure	1.5 times the designed pressure
11	Minimum cover to pipe from the finished level / ground level	0.9 m (3ft)
12	Hydraulic modelling software	Bentley's WaterCAD
13	Laying of distribution network	Loop/grid system
14	Isolation valves	Every zone defining junction
15	Pipe crossing existing roads	Concrete encasement
16	Pipe roughness coefficient	130 (Hazen William's Co-efficient)
17	Pipe bedding	Sand bedding for plain/hilly areas

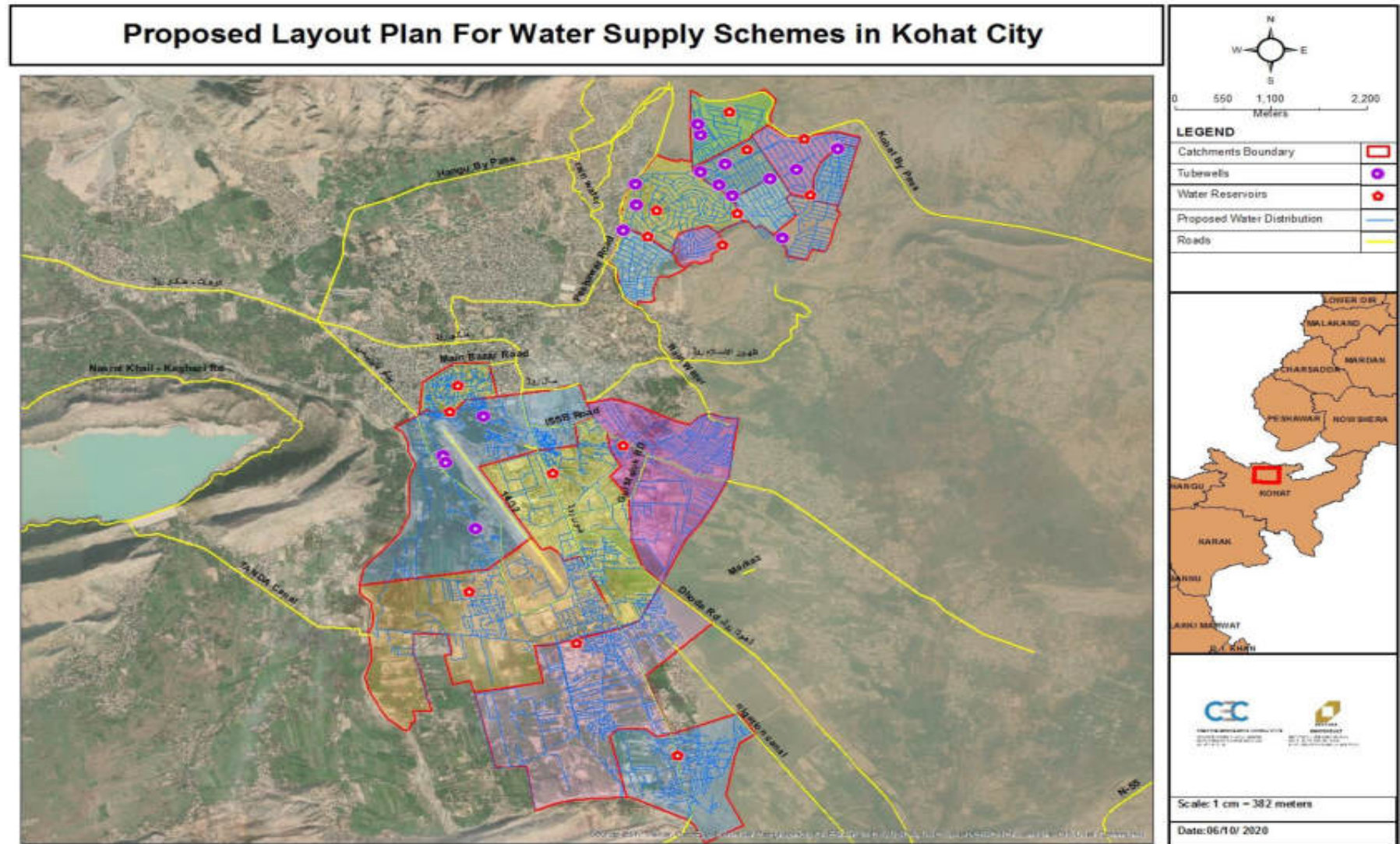
### 3.3 Design of Proposed Water Supply System improvements

89. Improvement of water supply system in Kohat under jurisdiction of WSSC Kohat include the following system components:

- Replacement of water distribution network associated with the existing and proposed water storage reservoirs by delineating new catchment boundaries for improved and increased water service and coverage;
- Installation of water meters in the project area;
- Energization of twenty-four (24) existing and ten (10) newly proposed tube wells through clean energy sources to reduce energy cost of the water supply system;
- Rehabilitation of 24 existing tube wells to reduce maintenance cost of the water supply system;

90. The overall layout of the proposed water distribution network is provided below in Figure 3-1. Further details of the detailed design of the proposed improvements for the water supply system in Kohat are provided in the sub-sections below

Figure 3-1: Proposed layout Plan for Water Supply Scheme in Kohat City



### 3.3.1 Tube wells

91. There are 65 Nos of existing tube wells in Kohat under WSSC Kohat, which are connected to the existing 16 number of water storage reservoirs. Water is pumped via these tube wells to the water storage reservoirs from where it is further supplied to the end users/customers through proposed water distribution network and house connections.
92. Detailed condition assessment of all the existing tube wells was carried out to check the current condition of these tube wells including the condition of the pumping machinery and the pumping room. Based on the condition assessment, certain modifications were recommended by the EDCM team that are summarized below in Table 3.2: Required rehabilitation for the existing tube wells Similarly, some new tube wells are also proposed based on water demand requirements in some of the catchments. The recommended modifications for the tube wells mainly include:
- Replacement of the old pumping machinery at some of the tube wells;
  - Proposed new tube wells where required.

**Table 3.2: Required rehabilitation for the existing tube wells**

S. No.	Name of Tube Well	Union Council	Components Requiring Rehabilitation
1	Eid Gah No. 5	Urban 3	Girder, pump pad, electrical wiring, flow meter, gate valve, room slab, main switch,% MCU pump room floor, New borehole, electrical grounding (earthing)
2	Mehmood Shah	Urban 3	Pump motor, main switch& MCU roof slab, girder, pump room, flow meter, electrical wiring electrical grounding (earthing)
3	Mangal Baba	Urban 3	Delivery pipe, floor level, girder, flow meter, pump room, roof slab, main switch & MCU, electrical wiring, electrical grounding (earthing)
4	Bahawal Nagar	Urban 5	main switch & MCU, electrical wiring, Sluice valves, reflux valve, pump room floor, electrical grounding (earthing), New Bore hole, Pump room reconstruction
5	Dheri Banda	Urban 5	Girder, pump motor, flow meter, main switch & MCU, Major Structural repair, electrical wiring, roof slab, main switch & MCU, electrical grounding (earthing), Pump room major repair
6	Miagaan Colony No. 1	Urban 2	Girder, roof slab, pump motor, pump room, gate valve, flow meter. electrical grounding (earthing), Flooring, Structural repair
7	Khattak Colony	Urban 2	Girder, roof slab, pump motor, electrical wiring, flow meter. Flooring and screed on roof, main switch & MCU, electrical grounding (earthing), Structural repair
8	Hayat Shaheed	Urban 5	Girder, pump motor, flow meter. main switch & MCU, New bore, Structural repair.



S. No.	Name of Tube Well	Union Council	Components Requiring Rehabilitation
9	Comprehensive School	Urban 5	Pump motor, electrical wiring, main switch,. main switch & MCU, electrical grounding (earthing), New Bore, Pump room reconstruction.
10	Slaughter House	Urban 2	girder, roof leakage, delivery pipe, pump motor, electric wiring main switch & MCU, electrical grounding (earthing), pump room
11	Liaqat hospital - Ghost house	Urban 2	Roof slab, girder, electrical wiring, pump motor. with Column pipes, main switch & MCU, Now Bore, electrical grounding (earthing).
12	Meri colony	Urban 5	Pump motor, electrical wiring, main switch & MCU, electrical grounding (earthing), Pump room reconstruction
13	D2 Phase 2	Urban 4	Delivery pipe, floor level, girder. electrical grounding (earthing)
14	Tube well No. 3 E2 Phase 2	Urban 4	Foundation pad, girder, roof slab, electrical grounding, ampere meter, failed bore. tube well Chamber

93. 10 new tube wells are proposed to cater for the future water requirements of the associated catchment.

94. In addition, 4 non-functional tube wells out of the total nine (9) are proposed to be rehabilitated in order to supply water to the proposed water storage reservoirs. The locations for the proposed tube wells were finalized in consultation with WSSCK. The list of the proposed new tube wells and rehabilitated tube wells is provided below in Table 3.3, along with their locations/ coordinates. The list of the source tube wells for both proposed overhead reservoirs (OHRs), as well as the proposed surface reservoirs is also provided in Table 3.4 and 3.5 respectively.

**Table 3.3: List of the proposed & non-functional tube wells**

Sr. No.	Tube well Name	Status	X - Coordinate	Y - Coordinate
1	Tube Well sector-5 Phase-1, opposite of WSSC Kohat Office	Proposed	71.4580994	33.6057014
2	Tube Well No. 6 Phase 1 (Nursery KDA)	Proposed	71.4563980	33.6027985
3	Tub well school No1	Proposed		
4	Sector A-2 Tube well	Proposed	71.4660034	33.6151009
5	Sector F-1 Tube well	Proposed	71.4661026	33.6095009
6	Sector E3/C3 New Tube well	Proposed	71.4759979	33.6015015
7	New Tube well Sector 7 For Sector 8, Phase 1)	Proposed	71.4692001	33.6104012
8	Mohallah Zubair Abad TW	Proposed	71.4451360	33.5523500



Sr. No.	Tube well Name	Status	X - Coordinate	Y - Coordinate
9	New Abadi Dheri Banda TW	Proposed	71.4388260	33.5644370
10	Ayub Abad Chirkar kot TW	Proposed	71.4512020	33.5791640
11	Tube well D2 Phase 2	Non Functional/ Rehabilitated	71.4662600	33.6138390
12	B5 Tube Well Phase 2 KDA	Non Functional/ Rehabilitated	71.4831009	33.6119003
13	Jahandi Station Tube well 1	Non Functional/ Rehabilitated	71.4332962	33.5764999
14	Jahandi Station Tube well 2	Non Functional/ Rehabilitated	71.4336014	33.5756989

**Table 3.4: Details of the proposed OHRs and source tube wells**

S. No.	Name of Proposed OHR	Status	Capacity (US Gallons)	Source Tube-wells
1	Sector B-3, Phase-2, KDA Peoples Works OHR	Proposed	150,000	Peoples Works TW, Sector B2 Tube Well
2	Sector 7, Phase-1 Kotal Township, KDA OHR	Proposed	150,000	Tubewell E2 No. 1 Phase 2, Tubewell No. 8 E2 Phase 2
3	Government School # 1 OHR	Proposed	150,000	New Jarwanda, Jahandi Station 1 & 2, New Abadi Dheri Banda TW
4	Tappi -1 OHR	Proposed	150,000	Tappi Tube well
5	Sector B-5, Phase-2 Kotal Township, KDA OHR	Proposed	150,000	B5 Tubewell

**Table 3.5: Details of the proposed surface reservoirs and source tube wells**

S. No.	Name of Proposed OHR	Status	Capacity (US Gallons)	Source Tube-wells
1	Phase 1- Park Surface Reservoir	Proposed	200,000	T/W Secotr-5 Phase-1 WSSC Kohat Office TW, Tube Well No. 6 Phase 1 (Nursery KDA)
2	Sector B-1 Surface Reservoir, Phase-2 Kotal Township, KDA	Proposed	150,000	Tubewell No. 2- Phase 2, New TW for Sector 8 Phase 1
3	Sector No. 8 Surface Reservoir Phase-1 Kotal Township, KDA	Proposed	150,000	New Tube Well Sector-7 Phase 1 ( New TW for Sector 8 Phase 1)

95. There is an existing water pumping station located in KDA Phase 1 of Kohat city. The pumping station was constructed back in 1980s and is currently in worst condition. The water pumping station serves as a booster pump to serve the areas in higher elevations. Under this project, it is proposed to reconstruct this water pumping station. WSSC Kohat has identified a new location just adjacent to the existing one. The proposed pumping station consists of 50,000 gallons sump tanks along with two pumps

of 80 & 100 horsepower motors. Two additional pumps of same capacity were also provided for backup purposes.

96. In order to reduce the energy and operational cost of the proposed water supply system, energization of 34 tube wells through clean energy sources is also included in the project. List of short-listed tube wells to be energized through clean energy sources is given as Table 3.6 below.

**Table 3.6: List of tube wells shortlisted for energization through clean energy sources**

S.No.	Name of the Tube wells
1	Sector-5, 2-star pump Phase-1, Kotal Township, KDA
2	Chikarkot Railway road No.1 Tube Well
3	Chikarkot Railway road No. 2 Tube Well
4	Eid Gah TW No.5 OTS Road
5	Dheri Banda Tube well Garhi Sarfaraz
6	Eid Gah TW No.1 OTS Road
7	Sector 10 Tube well No.2 phase-1, Kotal Township, KDA
8	Sector 10 Tube well No.1 Phase-1, Kotal Township, KDA
9	D2 Tube well Phase-2 KDA, Kotal Township, KDA
10	Sector 10 Tube well No. 3 Phase 1, Kotal Township, KDA
11	Sector 10 Tube well No 4 Phase 1, Kotal Township, KDA
12	Park Phase 2, Kotal Township, KDA
13	Tube well No. 5 Phase-1, Kotal Township, KDA
14	Pump House, near Grid station phase-2, Kotal Township, KDA
15	New Bus Stand TW
16	Pump House, Sector 10, phase-1, Kotal Township, KDA
17	Sector B-5 Tube well Phase-2, Kotal Township, KDA
18	People works Tube well Phase-2, Kotal Township, KDA
19	Sector B-2 Tube well 1 Phase-2, Kotal Township, KDA
20	Sector C-2 Tube well Phase-2, Kotal Township, KDA
21	Sector E-2 Tube well No.1 Phase-2, Kotal Township, KDA
22	Sector E-2 Tube well No.2 (Tubewell No.8) Phase-2, Kotal Township,
23	Jahandi Station Tube well 1
24	Jahandi Station Tube well 2
25	T/W sector-5 Phase-1, opposite of WSSC Kohat Office Tube well
26	Tube Well No. 6 Phase 1 Nursery KDA Tube well
27	School No 1
28	Sector A-2 Tube well
29	Sector F-1 Tube well
30	Sector E3/C3 New Tube well
31	Tube well sector-7 (For Sector 8, Phase-1)
32	Mohallah Zubair Abad TW
33	New Abadi Dheri Banda TW
34	Ayub Abad Chirkar kot TW

### 3.3.2 Existing and Proposed Water Storage Reservoirs and Associated Demands

97. There are fourteen (14) no. of existing water storage reservoirs in Kohat City under jurisdiction of WSSC Kohat with 7 surface reservoirs and 7 OHRs. Out of the total 14, nine (9) of the existing water storage reservoirs are functional, while the remaining five (5) are non-functional. All these existing water storage reservoirs were assessed in term of structural stability and demand capacity. Location details along with storage capacities of all the existing reservoir are given in Table 3.7.

**Table 3.7: Location details of the existing storage reservoirs**

S. No.	Name of Existing Structure (OHR & Surface Reservoir)	Capacity (US Gallons)	Status	X - Coordinate	Y - Coordinate
1	Chikerkot Railway Road OHR	100,000	Functional	71.4468079	33.5741844
2	Sanghair City Surface Reservoirs 1	100,000	Functional	71.4353561	33.5847549
3	Sanghair City Surface Reservoirs 2	200,000	Functional	71.4353522	33.5847428
4	Sanghair City OHR	100,000	Functional	71.4353154	33.5847744
5	New Bus Stand OHR	30,000	Functional	71.4492569	33.5540733
6	Miangan Colony OHR	50,000	Functional	71.4360657	33.5604248
7	Phase 1- Park Surface Reservoirs 1	200,000	Functional	71.4605637	33.6050186
8	Phase 1- Park Surface Reservoir 2	200,000	Functional	71.4605114	33.6050554
9	Sector 4, Phase-1 KDA Surface Reservoir	200,000	Functional	71.4594269	33.6020126
10	Sector 8, Phase-1 KDA Surface Reservoir	100,000	Non-Functional	71.4685745	33.600769
11	Phase 2 Park OHR	100,000	Non-Functional	71.4719925	33.6120224
12	Phase 2-Pump House OHR	50,000	Non-Functional	71.4699249	33.6164703
13	Phase 2-Pump House Surface Reservoir	200,000	Non-Functional	71.4699555	33.6164200
14	Bhawalnagar OHR	50,000	Non-Functional	71.45558	33.57733

98. In addition to above mentioned existing reservoirs, total nine (9) new water storage reservoirs are proposed in different parts of Kohat, in consultation with WSSC Kohat, as per demand requirements of the city. Among the new proposed water storage reservoirs, five (5) are OHRs and remaining three (3) are surface water reservoirs. Details of the proposed OHRs and surface water reservoirs are given below in Table 3.8 and Table 3.9 respectively.

**Table 3.8: Details of the proposed overhead reservoirs**

S. No.	Name of Proposed OHRs	Status	Proposed Capacity (US Gallons)	X - Coordinate	Y - Coordinate
1	Sector B-5, Phase-2 Kotal Township, KDA OHR	Proposed	150,000	71.4830933	33.6120186
2	Sector B-3, Phase-2, KDA Peoples Works OHR	Proposed	150,000	71.4796219	33.6064835
3	Sector 7, Phase-1 Kotal Township, KDA OHR	Proposed	150,000	71.4705658	33.6045341
4	Government School # 1 OHR	Proposed	150,000	71.4343567	33.5817528

S. No.	Name of Proposed OHRs	Status	Proposed Capacity (US Gallons)	X - Coordinate	Y - Coordinate
5	Tappi -1 OHR	Proposed	150,000	71.4612732	33.540535

**Table 3.9: Details of the proposed surface reservoirs**

S. No.	Name of Proposed Surface Reservoirs	Status	Proposed Capacity (US Gallons)	X - Coordinate	Y - Coordinate
1	Phase 1- Park Surface Reservoir	Proposed	200,000	71.4605637	33.6050186
2	Sector B-1 Surface Reservoir, Phase-2 Kotal Township, KDA	Proposed	150,000	71.4790497	33.6131592
3	Sector No. 8 Surface Reservoir Phase-1 Kotal Township, KDA	Proposed	150,000	71.4605637	33.6050186

99. The water demand for each proposed and existing water storage reservoir was calculated based on planning data compiled for the project area to estimate number of households located within the catchment boundary of each reservoir/tank. Seven (7) person per households were assumed to calculate the maximum peak hour demand of the individual water storage reservoir. The average daily demand for Kohat city was calculated assuming 35 gallons per capita per day as the daily consumption rate. Future growth factors were also applied while calculating the water demands as explained in below sub-sections. Details of population forecast, and water demands for each catchment/ water storage reservoir is given in Table 3.10.

**Table 3.10: Current and projected demand for each reservoir based on Planning Data**

Sr. No.	Tank Names	Served Households	Served Population	Avg. daily demand (US GPD)	Max. daily demand (US GPD)	Max. Peak Hour Demand (US GPD)
1	Park Phase 2	1,203	8,418	294,613	441,919	883,838
2	Peoples Works OHR	871	6,097	213,395	320,093	640,185
3	Phase 1 park Reservoir	1,418	9,923	347,288	520,932	1,041,863
4	Phase 2 Pump House OHR	1,238	8,663	303,188	454,782	909,563
5	Sector 4 Reservoir Phase 1	830	5,810	203,350	305,025	610,050
6	Sector 7 OHR	1,038	7,266	254,310	381,466	762,931
7	Sector 8 Surface Reservoir	418	2,926	102,410	153,615	307,230
8	Sector B-1 Surface Tank	816	5,712	199,920	299,880	599,760
9	Sanghair City	3,114	21,798	762,943	1,144,415	2,288,830
10	Sector B-5 OHR	756	5,292	185,220	277,830	555,660
11	Bahawal Nagar	2,883	20,181	706,336	1,059,504	2,119,007

Sr. No.	Tank Names	Served Households	Served Population	Avg. daily demand (US GPD)	Max. daily demand (US GPD)	Max. Peak Hour Demand (US GPD)
12	Govt School OHR	3,626	25,382	888,370	1,332,555	2,665,110
13	Miagaan Colony	3,928	27,496	962,362	1,443,544	2,887,087
14	New Adda	3,958	27,705	969,674	1,454,511	2,909,021
15	Railway Road Chikarkot	3,907	27,349	957,215	1,435,823	2,871,645
16	Tappi OHR	2,704	18,928	662,481	993,721	1,987,442

100. Based on the condition assessment, some of the existing reservoirs are proposed for demolition and reconstruction due to their old age and unsafe structural condition. The list of such water storage reservoirs is shown in Table 3.11. These reservoirs are proposed to have an increased storage capacity when reconstructed to be able to cater for the water demands of the respective catchment.

**Table 3.11: Details of Existing Tanks (To be Demolished & Reconstructed)**

Name of Tank /(OHR & Surface Reservoir)	Status	Existing Capacity (US Gallons)	Proposed Capacity (US Gallons)
New Bus Stand OHR	Functional	30,000	150,000
Bhawalnagar OHR	Functional	50,000	150,000
Miangan Colony Tube well No.1 OHR	Functional	50,000	150,000
Phase 2-Pump House OHR	Non Functional	50,000	150,000
Chikerkot Railway Road	Functional	50,000	150,000
Sanghair City Surface Reservoir 1 (Surface Reservoir will be converted into OHR)	Functional	100,000	150,000
Sanghair City Surface Reservoir 2	Functional	200,000	200,000

### 3.3.3 Catchment Marking for Water Reservoirs

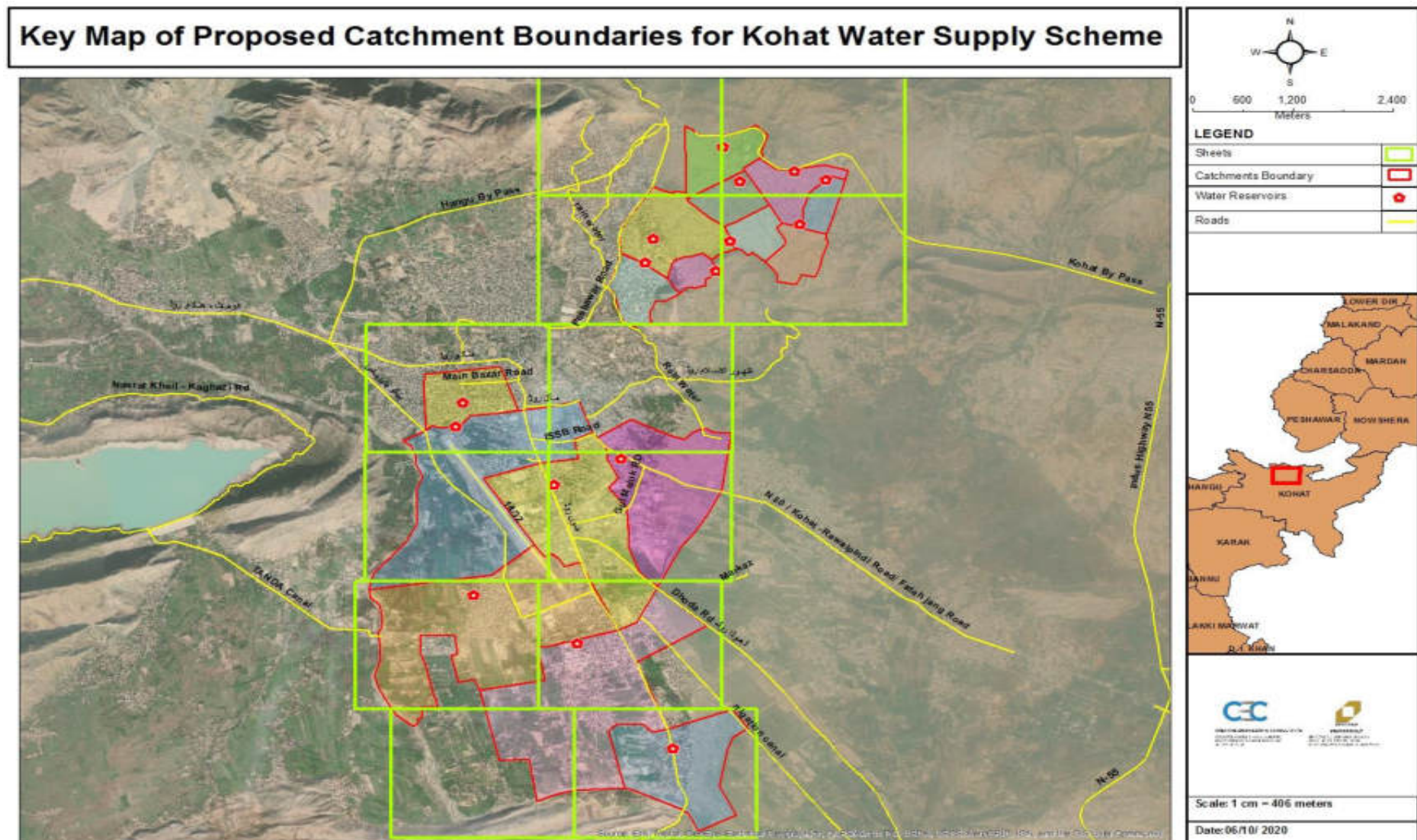
101. After finalizing the locations of the proposed water storage reservoirs, catchment boundaries were marked for each existing and proposed water storage reservoir. The aim of this activity was to delineate the catchment boundaries of each reservoir to eliminate coverage gaps, facilitate zoning and provide better utility service. The EDCM team, in coordination with the WSSC Kohat staff, defined the catchment boundaries with reference to the elevation levels and proximity to available water storage reservoir. Number of houses were calculated that can be served through the current capacity of the water storage reservoir keeping in view the per capita demand criteria. The marked catchments of the reservoir were then cross checked so that these can cater for the calculated number of houses. Catchment boundaries for water storage reservoirs which were proposed to be reconstructed were marked on the basis of their new proposed capacities. The newly proposed catchment boundaries are having the following characteristics:

- Each boundary is associated with a dedicated/separate reservoir having a separate water distribution network catering to the water supply requirements of that specific area only;
- The proposed catchment boundaries will provide almost 100% coverage of entire area under the reservoir;
- There will be no interlinkage between two catchment areas associated with two different Reservoir or with the adjacent area under the direct pumping;
- Catchment boundaries are marked to facilitate a looped system to the extent possible.

**102.** The general layout showing catchment boundaries for each existing and proposed water storage reservoir is shown below in the Figure 3.2.



Figure 3-2: Proposed Catchment Boundaries for Kohat Water Supply Scheme



### 3.3.4 Assigning Water Demands to Nodes

103. The next step was to assign water demands to nodes as per planning data and proposed network layout. Average water demand corresponding to each household was calculated assuming seven (7) persons per households and 35 US GPCD. The demand of an entire street was assigned at the end node of each street/stretch. This was done using excel based demand calculation sheets and the number of households served via each junction node was calculated. Two different kind of approaches were followed for this exercise. For KDA, which is a planned/developed area, the actual number of plots based on its planning data was calculated and were input into the model as a fully built-up scenario. The patterns for future growth are as per the KDA master plan and can be accurately projected with accurate projected water demands.

### 3.3.5 Design of Proposed Water Supply System Components

104. A snapshot of information on the proposed project component with its function and location within the system is provided in **Table 3.12**.

**Table 3.12: Snap short of Information on the proposed project components**

Infrastructure	Function	Description	Location
Tube Wells	To extract ground water	Existing Tubewells are 65 in total out of which 56 are operational, 09 non-operational and 10 new tubewells are proposed	Within Kohat Union Councils
Water Storage Reservoir Over head reservoir/Surface reservoirs	To store water and provide head to gravity water supply system	Total water storage reservoir are 14, includes 7 OHRs and 7 SRs,  Out of 7 OHRs 4 are operational, 5 new OHRs are proposed  Out of 7 existing SRs 5 are operational, 3 new SRs are proposed	Within Kohat Union Councils
Distribution network	To distribute water from storage reservoirs to end user	Distribution network is proposed in six union councils of Kohat.	Within Kohat City
Bulk Water Meters	To monitor the water use by consumer	Water meters will be installed at each house connection to monitor water use and to bill the service by WSSC Kohat	Within Kohat city
Energization of tube wells through clean energy sources	To Reduce energy cost	14 existing and 10 proposed new tubewells	Within Kohat city



### 3.4 Construction Phase Details of Project Activities

#### ***Construction Schedule***

105. The project construction phase is expected to last for a total of 2 years with the activity expected to commence in the first quarter of 2022 and completed by end of 2024.

#### ***Construction phase activities***

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

##### **▪ Development of Construction and Labor Camps**

107. One of the first activities to be completed by the Contractor shall be the establishment of the construction and labor camp. The Contractor will also establish construction yards, offices and workshops.
108. The construction of the proposed water supply system will be divided into construction work packages and these packages will be awarded to the selected project Contractors or single contractor whichever is feasible.
109. The construction activity has to span over approximately twenty-four months. There shall be a number of contracts for a variety of works. The selected Contractors shall have the option to select suitable site(s) located near the project sites to establish his labor camps. If private land is selected, the contractor shall enter into contract with the private owner. During construction phase, an estimated 150-200 persons consisting of both semi-skilled and skilled human resource will be required.
110. Essential for the work bases is easy approach, availability of a suitable place for temporary storage of material and availability of water for construction in the vicinity. Presence of shade from trees close to the work bases can add to the comfort of the labor while taking rest during the hot season.
111. The location of storage materials and camps will be critical. Since the project contractor(s) will be responsible for identifying the suitable locations for storage and labor camps from the private sector, thus there will need to be clear guidelines for this process, which will need to be closely monitored by the implementing agency. As far as possible, the project design team shall be assigned the task to identify the suitable location(s) for storage of materials since inappropriate storage of materials may result disruption of the traffic movement.
112. The proposed site or already constructed buildings within project area can be used as the Contractor's camp and it shall include the following facilities:
- ##### **▪ Labor camp site**
- Accommodation
  - Kitchen
  - Dining area
  - Sanitation facilities
  - Septic tank
  - Liquid and solid waste disposal facilities
  - Generator(s), for operation when the power supply from the grid station was not available

- **Construction camp site**

- Uncovered material storage
- Covered material storage
- Parking for vehicles and plant
- Batching plant (if required)
- Generator(s)
- Site offices

- **Workshop site**

- Workshop
- Storage area
- Generator(s)

- **Site preparation**

113. There may be a need to carry out cutting and filling of the land in order to attain the designed ground elevation. During the process, areas above the design elevation shall be cut and spoils shall be used to fill areas below the designed elevation. The area is to be clean of any obstructions in areas where the general design elevation is already attained. Cut and fill activities will be carried out using mostly heavy mechanical equipment. Manual labor will be negligible.

- **Construction of Supply Network**

114. Major construction works are, laying of supply/delivery mains of varying diameter from 75-300 mm on sand bedding, scarification of existing road pavement structure, disposal of unsuited material for road pavement, excavation for the water supply line in well Graded Gravels with Silty Clay material, backfilling of excavated material, laying of pipes and providing and laying of common fill material.

- **Construction of OHRs and SRs**

115. Major construction activities during construction of OHRs and SRs are leveling, grading and compaction, and multi layered reinforced concrete works for OHRs and SRs and finishing. 5 OHRs of 150,000 US gallons shall be constructed while 3 SRs of (2) 200,000 usg and (1) 150,000 USG shall be constructed. Moreover, 7 tanks including 5 OHRs and 2 SRs shall be demolished and reconstructed.

- **Installation of Tubewells and Energization of Tubewells through clean energy sources**

116. During installation of tubewells major activity would be drilling of tubewells upto required design depth and installation of casing, filter packs and pumps. Truck mounted Rigs shall be used for drilling of tubewells. A room shall also be constructed to secure machinery and tubewell from unprecedented hazards like flooding.
117. To reduce energy requirements 14 existing and 10 new tubewellll be energized through clean energy sources.

### ***Construction Machinery Requirement***

118. For storing materials, stocking equipment and parking machinery and vehicles, the Contractor(s) shall require open and accessible sites close to the labor camps. The Contractor(s), at his own expense, but keeping in view his contractual obligations to honor the applicable national and international guidelines regarding level of pollution, shall make the arrangements.
119. The **Table 3.13** below outlines the approximate number of major machinery and vehicles that are envisaged to be required for the project construction works.

**Table 3.13: Estimated Contractor's Equipment and Machinery**

Sr. No.	Machinery / Equipment	Quantity required*
1	Excavators	4
2	Mixing Plants	1
4	Loaders	1
5	Power Generators	2
6	Tractor Trolley	2
7	Compactor / Roller	1
8	Concrete Pump	1
9	Vibro Hammer	1
10	Watering Tanks (moveable)	1
11	Cars/Pickups	4
12	Truck mounted Rigs for drilling of Tubewell	2

\* Number of machinery is indicative and can be changed subject to working schedule.

### ***Construction Materials Requirement***

120. During the construction phase, construction materials in considerable volumes will be required. Typical material required for laying of supply network and construction of water storage reservoirs is available locally and same will be utilized. The common source of the material require for civil work are described in **Table 3.14** below.

**Table 3.14: Source of Raw Material**

Sr.#	Raw Material	Source
1	Earth Material	Available locally, borrowed from the lands acquired for the project.
2	Aggregate	Available at many sources within the vicinity of the site.
3	Rip-rap material	Available locally from nullah bed deposits and rock excavations.
4	Sand	Sand is available in near vicinity and river bed.

Sr.#	Raw Material	Source
5	Water	Ground water is available at depth of 40 feet and it will be used for construction purpose.
6	Cement	Ordinary Portland Cement is suitable, which is available at various factories in Pakistan mainly from Kohat/Noweshera
7	Reinforcement steel	Steel re-rolling mills in Peshawar meeting the standards from the billet produced either by Pakistan steel or imported. These will serve the purpose of steel availability.
8	Energy	Electricity supplies are available at the site through WAPDA grid.

### 3.5 Operation Phase Details of Water Supply System

#### *Scope of Activities*

121. The activities to be conducted during the operational phase of proposed project are provided below.

- 24/7 Operation and uninterrupted water supply
- Operation and maintenance of tubewells
- Management of water level in water storage reservoirs
- Provision of spare parts and consumables
- Repair/refurbishment arrangements
- Execution of scheduled outages
- Revenue collection for water supply from residents of UCs falling under jurisdiction of WSSC Kohat.

#### *Operation Equipment and Machinery*

122. Equipment used during operation will be pumps and generators.

#### *Manpower Requirement*

123. It is expected that existing organizational capacity of WSSC Kohat may not be able to successfully run the future mode. An institutional review and capacity building firm has been engaged under the project to successfully operationalize the project and improve the capacity of WSSCK.

124. Estimated manpower requirements during construction phase of the project would be about 150 persons while during operation phase would be 30 persons.

### 3.6 Climate Risks of Project

#### 3.6.1 Climate Change Trends and Extremes in Kohat

125. Increases in precipitation, urban flooding and possibly high winds are considered as the key potential climate change impacts for Kohat city which can negatively affect

urban infrastructure and services (transport infrastructure, clogging of drainage system, energy and water supply, health services) as well as private businesses and domestic assets.

126. Kohat has semi-arid to sub humid subtropical climate. Kohat is classified as a subtropical triple season semiarid sub-mountainous area. Careful analysis of climatic conditions of the area will reveal that annual rainfall may continue to increase during the coming years with a rate of 5% per decade subjecting this region to flooding risks. Various studies show that the winter rainfall is continuously decreasing with a significant rate by every passing year. However, the spring rainfall is continuously increasing while the summer (monsoon) rainfall rates show increasing trend while, the fall season indicates a continuous decreasing trend. As a whole, rainfall in winter and fall is on a decreasing trend, whereas spring and summer rains are increasing.
127. From the temperature perspective it was revealed that temperature has escalated up to 0.7 °C in the past century alone, roughly ten times faster than the average rate of ice-age recovery warming. The duration of winters is decreasing slightly, shaping a longer span of heat waves.
128. These climate change patterns and socio-economic changes including rapid urbanization can cause urban flooding events. Intense precipitation as well as infrastructure developments that have reduced urban surface interception, flash floods are increasing, which are likely to continue to become more severe in the future. Urban flooding is largely due to intense precipitation and changes in land use (especially increased concrete surfaces due to residential and commercial area growth) and due to inadequate sewerage and drainage systems while the main nullahs, rivers, streams are flooded due to intense rainfall.
129. Moreover, due to lack of open spaces, water storage ponds and a properly designed urban drainage system, increased surface water due to heavy rainfall has been transported through the existing sewerage systems. This lack of capacity to drain away surface water due to heavy precipitation is most likely the potential cause of increased urban and seasonal flooding in Kohat as well as disrupted waste water and solid waste disposal systems

### **3.6.2 Climate Risk and Vulnerability Assessment of the Water Supply System in Kohat**

130. Climate change can impact different aspects of the project activities due to projected increased temperatures and intense urban flooding from heavy rainfalls in Kohat. Project design has incorporated necessary climate change mitigations to avoid impacts on water supply system. In Climate Risk and Vulnerability Assessment (CRVA) damages/risk associated during urban flooding are highly anticipated moreover, ground water depletion is also assessed during drought conditions.

### **3.6.3 Climate Change Adaptation Measures for Improvement in Water Supply System**

- Concrete ducts has been recommended to provide around distribution mains in areas which are prone to land sliding or areas adjacent to water channels.
- Pressure shall be maintained in water supply system to reduce chances of clogging
- Flushing of water supply mains in case of clogging during flash flooding.
- Tube wells shall be designed on the basis of recharging capacity and able to withstand droughts.

## 4 Description of Environment

131. Kohat is a metropolitan city and is located at the north-west end of Pakistan, about 140 km west of federal capital Islamabad.
132. The proposed project is located in the six (6) urban union councils, including Kotal Township (KDA) under the jurisdiction of Water and Sanitation Services Company in Kohat city. The names of the UCs are UC-1 - Urban 1, UC-2 - Urban 2, UC-3 - Urban 3, UC-4 - Urban 4 Including Kohat Township (KDA), UC-5 - Urban 5 and UC-6 - Urban 6.
133. The description of various features of the project area environment including the physical, ecological, cultural and socio-economic environmental aspects are presented in the following sub-sections.

### 4.1 Physical Resources

#### 4.1.1 Topography

134. District Kohat located in south-central Khyber Pakhtunkhwa province of Pakistan. The town lies just north of the Kohat Toi River and river Indus forms the eastern boundary, which separates it from district Attock of Punjab province.
135. The topography of the district is dominated by mountains and hills. In the northwest of the district the important ranges include lower Miranzai, and Bangash, which run in an eastwest direction. The city is located at an altitude of 489 meters (1,604 ft) above mean sea level (amsl). Kohat Pass lies to the north. It is situated on the left bank of the Toi River at a point where after running nearly due east for 50 miles (80 km), it turns to the south. The total area of the district is 2,545 square kilometers (983 sq. mi). The Kohat valley is agriculturally rich area. Generally the district is elevated and ranges attain only inconsiderable heights above the plain area.

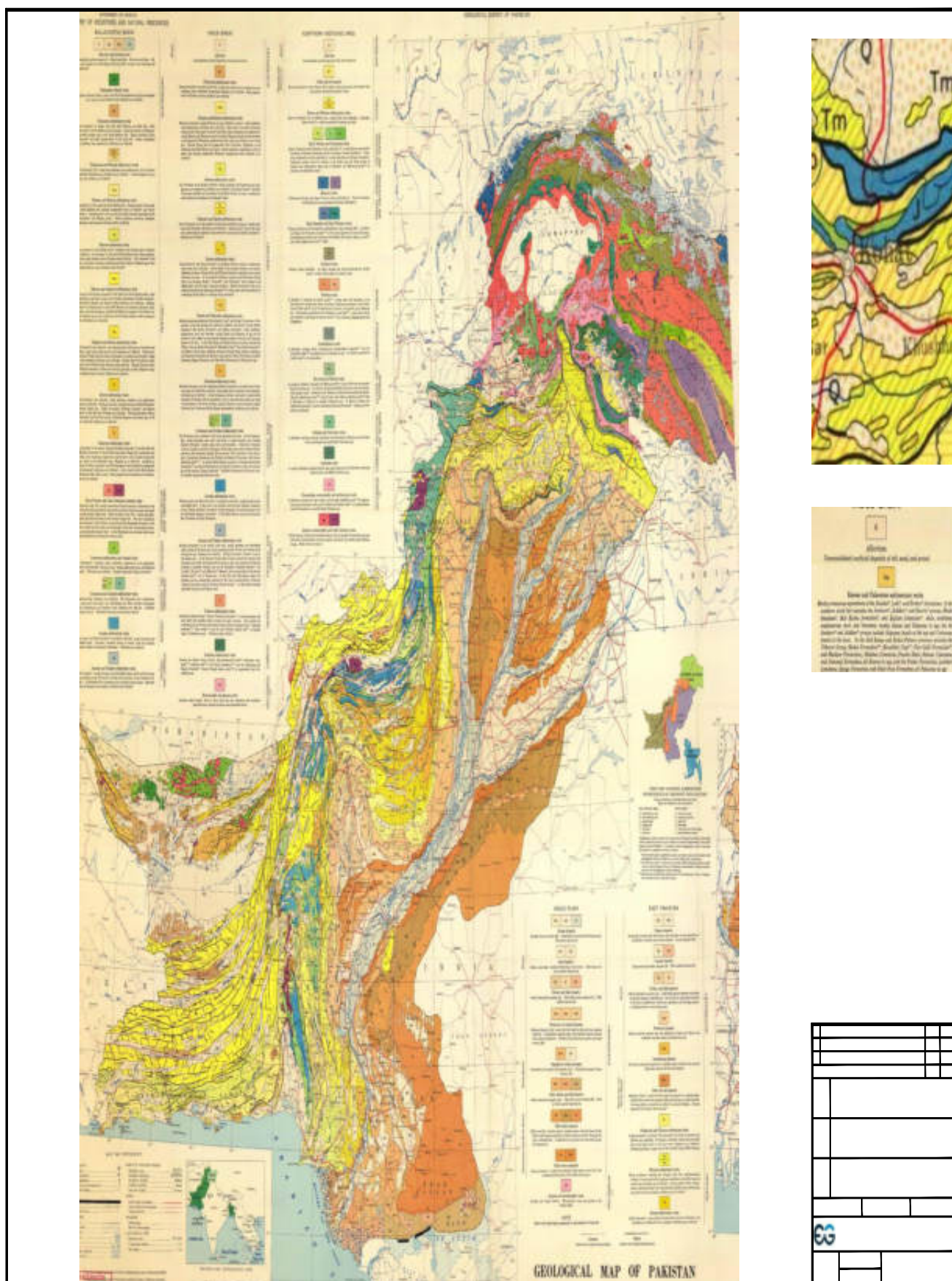
#### 4.1.2 Soils

136. Soil of the project area fall under the ranges in silt loam with pH ranging from 5.6 to 8. The surface soil materials are less deposits, residual mantle on sandstones and shale bedrocks, or narrow strips of silty/loam alleviation along major streams. The cropping pattern and intensity vary spatially as well as temporarily with the moisture availability. The soil characteristics vary within the area depending upon the parent material and the soil age. Inceptisols, Entisols and Ardisols are the dominant soil types.



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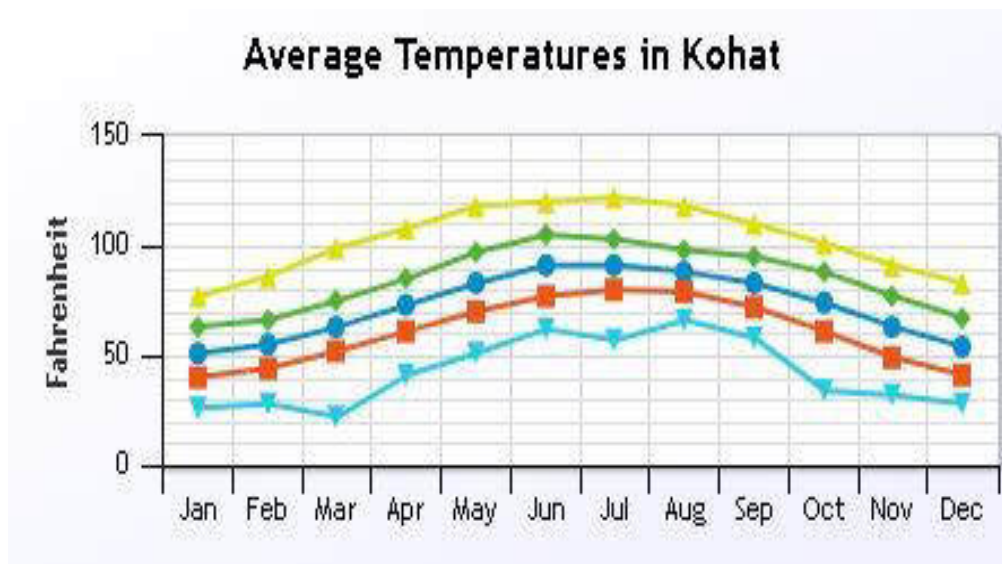
### 4.1.3 Climate

137. Kohat has semi-arid to sub humid subtropical climate. Kohat is classified as a subtropical triple season semiarid sub-mountainous area. Summer season prevails from April to October. Average monthly maximum and minimum temperatures during summer are 40°C and 15°C respectively. Hottest month is June, during which temperature sometime rises as high as 40°C. Winter occurs from November to mid-February. Average maximum and minimum temperatures during winter are 25°C and 40°C respectively. The rainfall is received throughout the year. The monsoon rain is received from May to October. August is the wettest month with an average rainfall of about 141 mm. The winter rains occur from November to April. The highest winter rainfall was received in the month of February.
138. In winter a strong west wind known as 'hangu breeze' often blows down the Miranzai valley towards Kohat & Karak for weeks.

### 4.1.4 Temperature

139. Winter in Kohat starts from mid-November to the end of March. The mean minimum temperature during winter is 4 °C and maximum is 24 °C.
140. Summer months are May to September. The mean maximum temperature in summer is over 38 °C and the mean minimum temperature is 30 °C (77 °F).
141. The temperature profile for Kohat is shown as **Figure 4.2** below.

**Figure 4-2: Year round Temperature Profile of Kohat City**

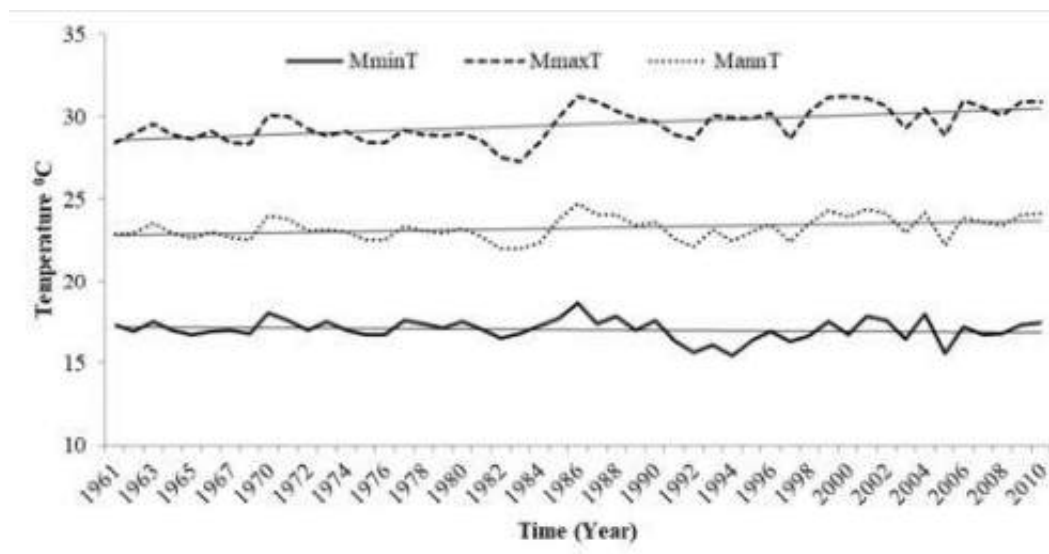


142. From the temperature perspective it was revealed that temperature has escalated up to 0.7 °C in the past century alone, roughly ten times faster than the average rate of ice-age recovery warming. The duration of winters is decreasing slightly, shaping a longer span of heat waves.



143. Analysis of historical data for Kohat<sup>3</sup> for 1950-2016 shows an overall increasing trend where the maximum temperature has increased by 0.57°C while minimum temperature has increased by 0.49°C. The mean annual maximum temperature was 28°C to 31°C while the mean minimum temperature ranged between 15°C to 17.7°C. Temperature trend analysis of Kohat is shown in **Figure 4.3** below.

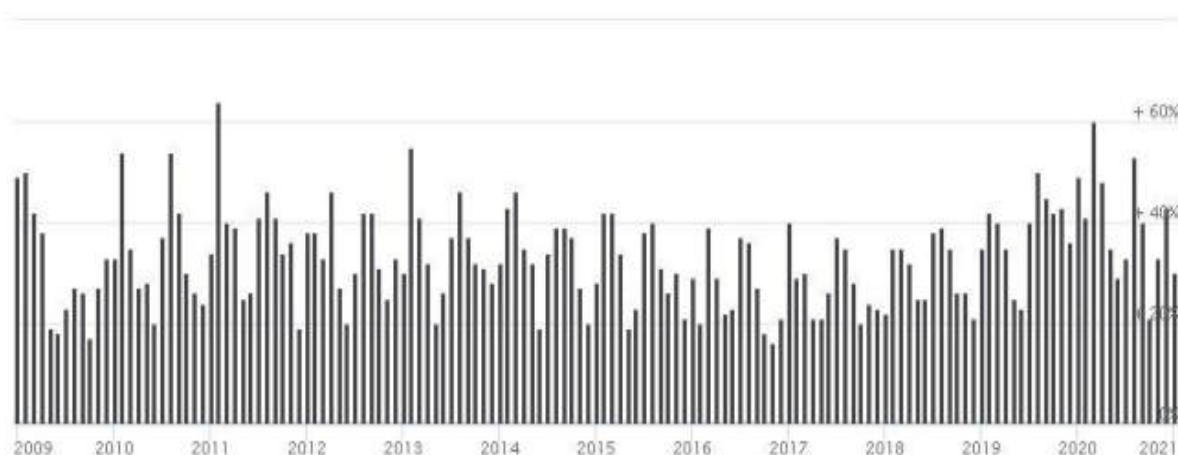
**Figure 4-3: Temperature trend analysis of Kohat (1961-2010)**



### **Relative Humidity**

144. The relative humidity typically ranges from 24% (dry) to 89% (very humid) over the course of the year, rarely dropping below 15% (dry) and reaching as high as 99% (very humid) as can be seen in **Figure 4.4** below.

**Figure 4-4: Humidity Profile of Kohat City**



145. Although heatwaves<sup>4</sup> do not have a statistically significant trend in Kohat, longer periods of rate of increase of maximum and minimum temperature together with heat

<sup>3</sup> The weather data and information in this section is sourced from ADB (2017): UCCRTF TA-8913 PAK: Mainstreaming Climate Risk Management into Urban Infrastructure Investments through Urban Resilience Assessments (URAs), Kohat City, Khyber Pakhtunkhwa, Pakistan.

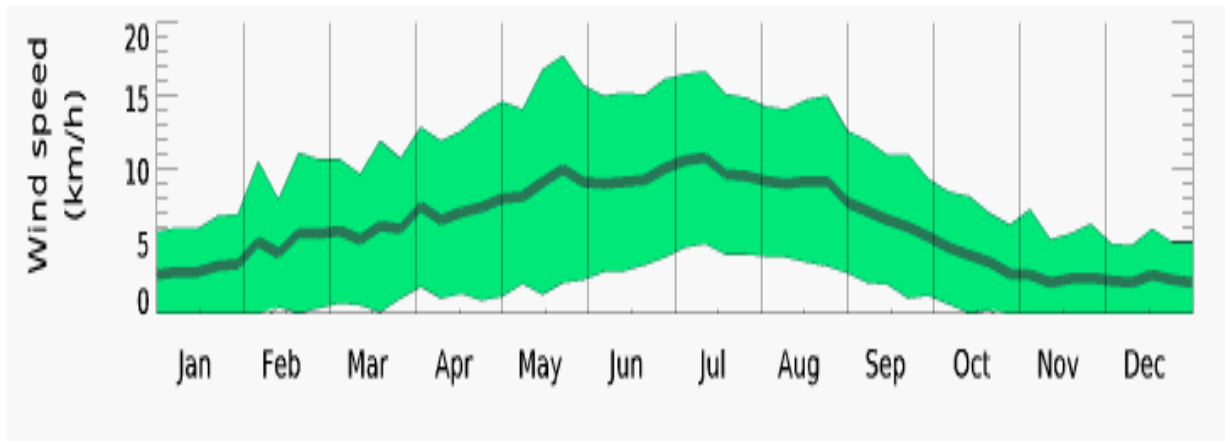
<sup>4</sup> Heatwaves period can be defined as when consecutive 3-days temperature remains >45°C/day.

waves and increased precipitation can cause increases in humidity and water consumption.

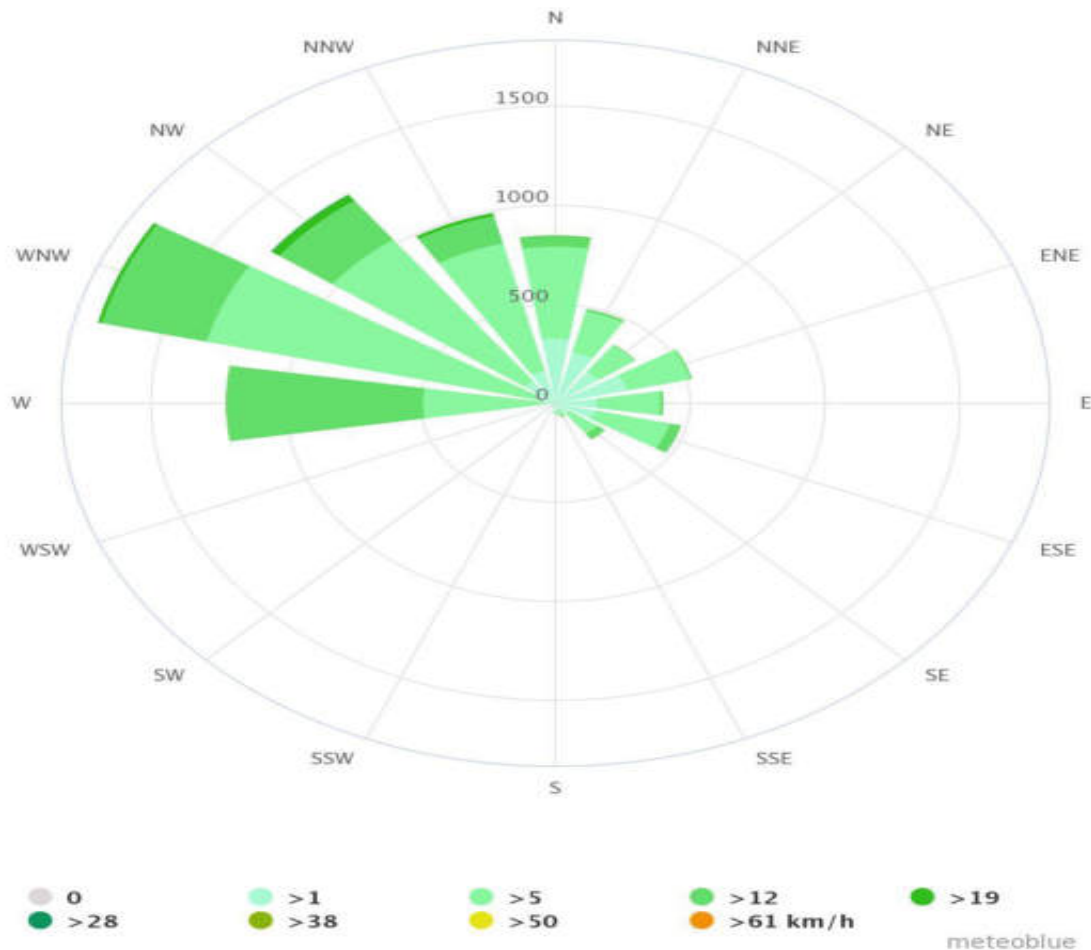
### Wind Speed

146. Over the course of the year, the typical wind speed varies between 0 m/s and 6 m/s (calm to moderate breeze), rarely exceeding 12m/s (strong breeze) as can be seen in **Figure 4.5**.

**Figure 4-5: Wind Speed Profile of Kohat City**



147. The Wind rose profile for Kohat is provided as **Figure 4.6** below. The most prevalent wind direction is WNW to ESE and NW to SE.

**Figure 4-6: Wind rose for Kohat<sup>5</sup>**

### ***Precipitation***

148. The rainfall is received throughout the year. The monsoon rain is received from May to October. August is the wettest month with an average rainfall of about 141 mm. The winter rains occur from November to April. The highest winter rainfall was received in the month of February. The average rainfall for the years 2000-2012 was recorded at about 700 mm.

<sup>5</sup> [https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/Kohat\\_pakistan\\_1168197](https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/Kohat_pakistan_1168197). The meteoblue climate diagrams are based on 30 years of hourly weather model simulations and available for every place on Earth at 30 Km spatial resolution.

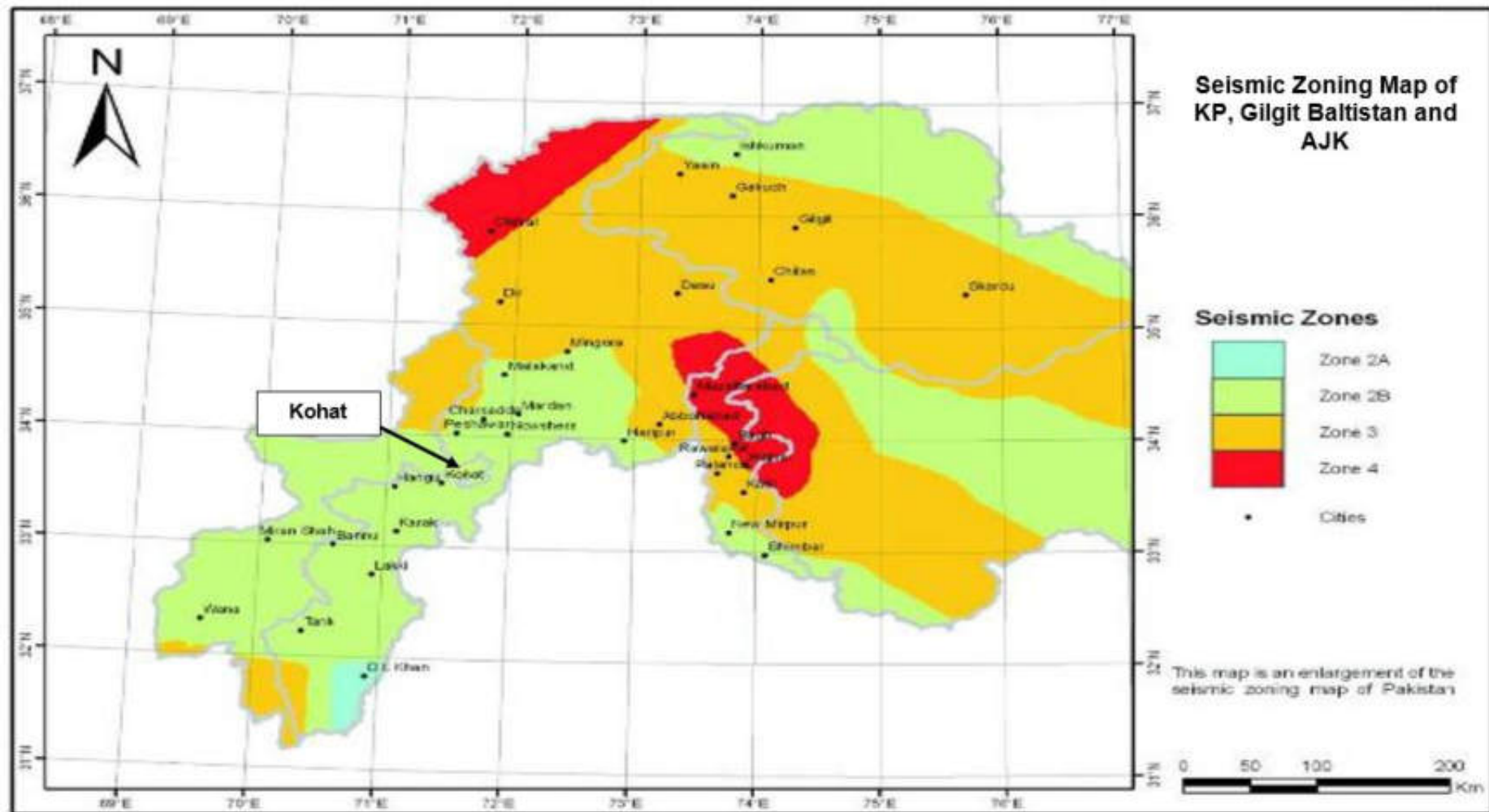
**Figure 4-7: Average Rainfall Profile of Kohat City**

149. Careful analysis of climatic conditions of the area will reveal that annual rainfall may continue to increase during the coming years with a rate of 5% per decade subjecting this region to flooding risks. Various studies show that the winter rainfall is continuously decreasing with a significant rate by every passing year. However, the spring rainfall is continuously increasing while the summer (monsoon) rainfall rates show increasing trend while, the fall season indicates a continuous decreasing trend. As a whole, rainfall in winter and fall is on a decreasing trend, whereas spring and summer rains are increasing.

#### 4.1.5 Seismology

150. The seismic hazard in Kohat is aggravated by increasing vulnerability due to population growth and expansion in infrastructure due to its political and regional importance. It is located in the western Himalayan region characterized by high seismicity rates due to its vicinity to the active plate boundary between the Indian and Eurasian plates. The seismic zone map of Pakistan is shown in **Figure 4.8** below.
151. Kohat is placed in Zone 2B. The Zone 2B has Peak Ground Acceleration (PGA) in the range of 0.16g to 0.24g for a return period of 475 years and is considered to be at 'Moderate' risk of a major earthquake event.
152. It is therefore, recommended that the project structures should be designed to cater for the requirements of Zone 2B of Building Code of Pakistan (2007).

Figure 4-8: Seismic Zones of Pakistan

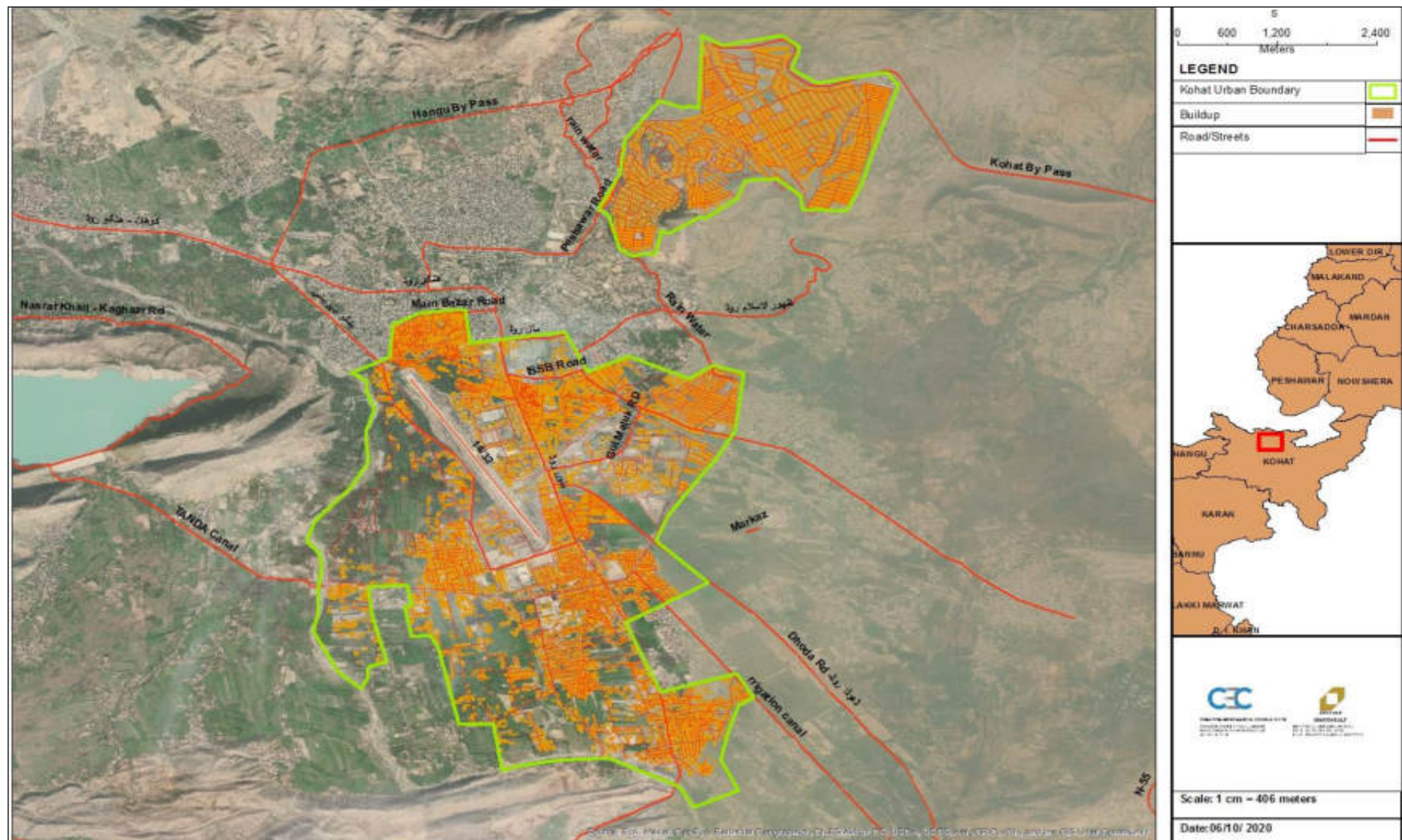


#### 4.1.6 Land Use

153. Land use distribution map of project area has been shown in **Figure 4-9**. The analysis of land use indicates that about 60% of land is build up area with residential/commercial/institutions blocks while 25 % of the is agricultural about 10% are roads and while 5 % of the area is abandoned land.



Figure 4-9: land Use Map of Kohat Water Supply Network



#### 4.1.7 Surface water

154. Water resources of the area is a combination of surface water and ground water. Surface water mainly comes from Toi River while groundwater is accessed during dry months. Toi River is fed by rainfall in its catchment area in the hills in north and western side. Various streams exist in the Kohat which originate from surrounding hilly areas and considered as non perennial streams since they are rain fed and do not provide water round the year. All these streams discharge into Toi River. Toi River is flowing from western to southern direction just below UC urban-6 of project area.

#### 4.1.8 Groundwater

155. Groundwater is the major source of water in the study area, which is extracted with the help of pumps and motors. The groundwater extracted is used to fulfill various domestic and irrigation needs.
156. Ground water is plentifully available which is being harnessed by the local community of respective districts and will continue as the source of water even for the project. Under ground water from a depth of around 25-40 feet as the first aquifer is harnessed by the locals for human consumption and irrigation on a limited scale. However, the depth of tubewells located in Kohat under WSSCK is 250-300 ft with average design life of 15 years.
157. Ground water quality was also assessed during baseline survey. Water samples from Fazaia Inter Collage and Naveed Garden was collected on 12<sup>th</sup> and 13<sup>th</sup> April, 2021. The comparison of the results with stringent guidelines also presented in **Table 4.1** below and it was found that water quality is within the most stringent guidelines. Audit of the existing tubewells (**Annexure N**) also indicate that the ground water quality in Kohat is also fair and did not require further treatment before distribution.

**Table 4.1: Ground water Monitoring Results in Project Area**

Parameter	Unit	NEQS	WHO/IFC	Ground water Sample Fazaia Inter College	Ground water Sample Naveed Garden
<b>Bacterial</b>					
<b>E-Coli</b>	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	0	0
<b>Total Coliform</b>	numbers/ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	0	0
<b>Physical</b>					
<b>Color</b>	TCU	≤ 15 TCU	-	5	3
<b>Taste</b>	No objectionable/Acceptable	-	-	Non objectionable	Non objectionable
<b>Odor</b>	No objectionable/Acceptable	-	-	Non objectionable	Non objectionable
<b>Turbidity</b>	NTU	< 5 NTU		4	4



Parameter	Unit	NEQS	WHO/IFC	Ground water Sample Fazaia Inter College	Ground water Sample Naveed Garden
<b>Total Hardness</b>	mg/l	< 500 mg/l		154	175
<b>TDS</b>	mg/l	< 1000		287	256
<b>pH</b>		6.5-8.5		7.6	7.5
<b>Chemical</b>					
<b>Aluminum</b>	mg/l	≤0.005 (P)	0.2	N.D	N.D
<b>Antimony</b>	mg/l	≤0.005 (P)	<0.005 (P)	N.D	N.D
<b>Arsenic</b>	mg/l	≤0.005 (P)	0.01	N.D	N.D
<b>Barium</b>	mg/l	0.7	0.3	N.D	N.D
<b>Boron</b>	mg/l	0.3	0.3	N.D	N.D
<b>Chloride</b>	mg/l	<250	250	91	98
<b>Chromium</b>	mg/l	≤0.05	0.05	N.D	N.D
<b>Fluoride</b>	mg/l	<1.5	1.5	0.78	0.95
<b>Manganese</b>	mg/l	≤0.5	0.5	N.D	N.D
<b>Mercury</b>	mg/l	≤0.0001	0.0001	N.D	N.D
<b>Nitrate</b>	mg/l	≤50	50	3.1	3.2
<b>Nitrite</b>	mg/l	≤3	-	0.06	0.2
<b>Selenium</b>	mg/l	0.01	0.01	N.D	N.D
<b>Zinc</b>	mg/l	5	3	0.84	0.96

#### 4.1.9 Noise

158. Ambient noise was monitored at four locations as shown in Figure 4-11 during daytime and nighttime between 10<sup>th</sup> – 13<sup>th</sup> April 2021. The comparison of the results also presented in **Table 4.2** below. While the results indicate the ambient noise levels being within the most stringent guidelines during the daytime, however, exceedances were observed at the night time at all location in the project area. The reason of exceedance may be because of transportation as all sampling locations are close to highways.

#### 4.1.10 Air Quality

159. Ambient air sampling was carried out at four locations as shown in Figure 4-11 between 10<sup>th</sup> – 13<sup>th</sup> April 2021. The comparison of the results presented as **Table 4.3** below. Ambient air quality has been carried out near Highways like Kohat Road, Kohat by pass and near airport.
160. Results indicate that Kohat city air quality is not healthy as exceedance of PM<sub>10</sub>, at all monitored location and PM<sub>2.5</sub> at two of the monitored location has been observed above 'most stringent' standards/guidelines while other pollutants are largely within the applicable 'most stringent' standards/guidelines except for one location (Bannu Road Near Shangrila Hotel) where sulphur di oxide concentration is exceeding stringent criteria. Increased PM<sub>10</sub>, PM<sub>2.5</sub> in air is due to unpaved roads within the vicinity, agricultural fields, traffic congestion, and local brick kilns.

**Table 4.2: Ambient Noise Monitoring Results (24 hrs) in Project Area**

Monitoring Location	Parameter	Noise Reading Results	Noise Guideline (Commercial Area)	Compliance Status for Commercial Areas
Day Time Readings (Taken 9:00 AM)			Day time	
Bannu Road Near Shangrila Hotel	dB(A) Leq	62.6	65	
Masjid Nimra Near Kohat Air port		58.15		
Fazaia Inter College (9:30 AM)		59.9		
Naveed Garden (9:15 AM)		58.7		
Night Time Readings (Taken at 9:00 Pm)			Night time	
Bannu Road Near Shangrila Hotel	dB(A) Leq	58.09	55	
Masjid Nimra Near Kohat Air port		57.75		
Fazaia Inter College (9:30 PM)		58.00		
Naveed Garden (9:15 PM)		58.95		

 Exceedance from applicable guidelines

 'Within' applicable guidelines

Note: It is recommended to repeat the ambient noise measurements at selected locations in project area since the readings presented above may not be representative due to the COVID-19 pandemic, there was a nationwide lockdown at the time of this monitoring activity, leading to considerably reduced traffic volumes.

**Table 4.3: Comparison of ambient air quality results versus applicable Air Quality standards**

Monitoring Location	Parameter	NO (ug/m <sup>3</sup> )	NO <sub>2</sub> (ug/m <sup>3</sup> )	CO (ug/m <sup>3</sup> )	SO <sub>2</sub> (ug/m <sup>3</sup> )	PM <sub>2.5</sub> (ug/m <sup>3</sup> )	PM <sub>10</sub> (ug/m <sup>3</sup> )
<b>Applicable Stringent Guideline (ug/m<sup>3</sup>) for 24 hrs</b>	<b>Average</b>	-	80	-	20	25	50
Bannu Road Near Shangrila Hotel	-	14.51	19.77	0.85	22.34	23.75	81.27
Masjid Nimra Near Kohat Air port	-	13.90	17.29	0.81	19.21	25.55	86.71

Fazaia Inter College	-	14.66	16.94	0.72	19.74	24.07	78.62
Naveed Garden	-	14.55	15.48	0.92	17.38	25.85	79.62

■ Exceedance from applicable guidelines

■ 'Within' applicable guidelines

Note: It is recommended to repeat the ambient air quality measurements at selected locations in project area since the readings presented above may not be representative due to the COVID-19 pandemic, there was a nationwide lockdown at the time of this monitoring activity, leading to considerably reduced traffic volumes.

**Figure 4-10: Pictorial Representation of Physical Environment of Kohat**



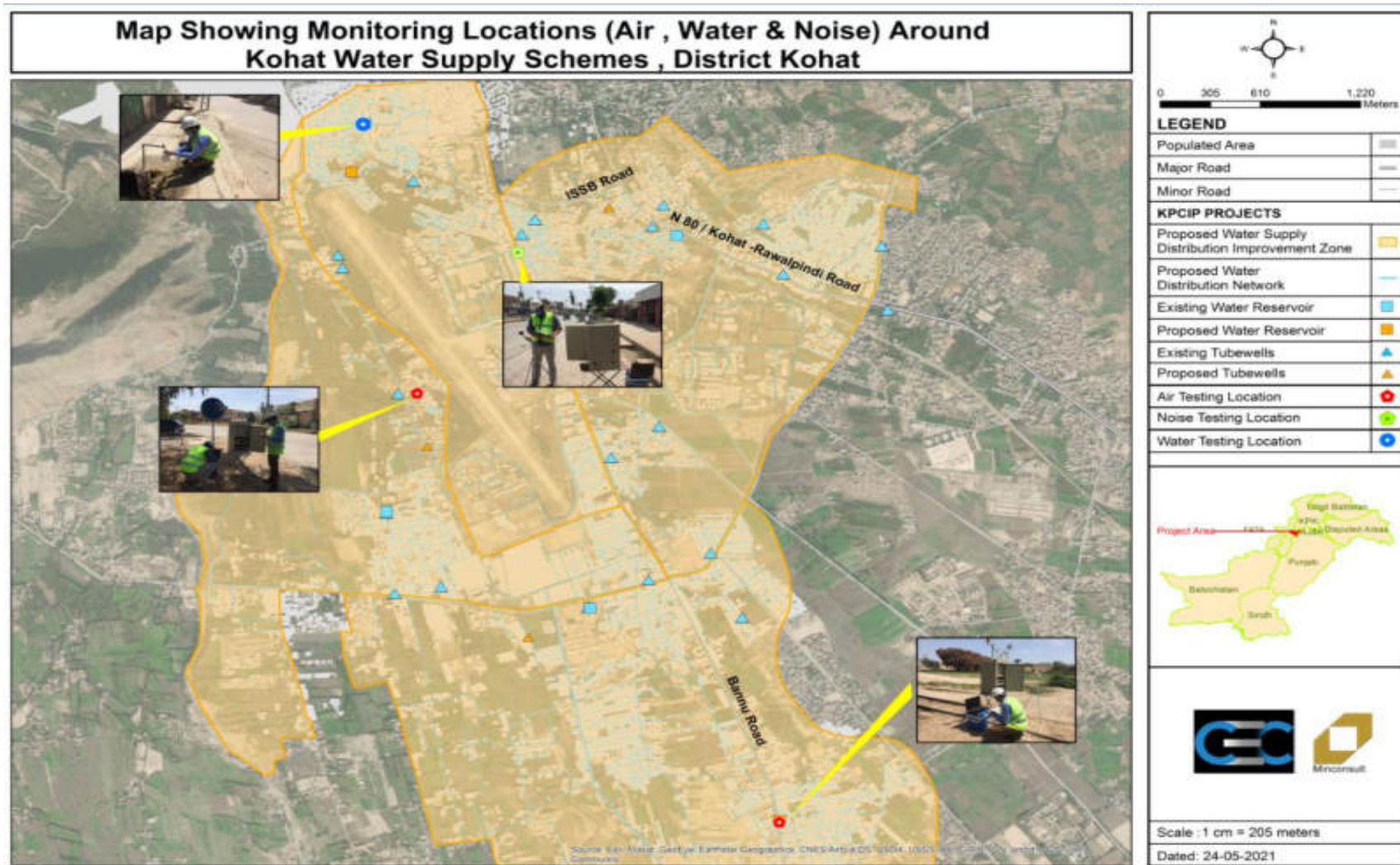
	
Typical mud hills in Kohat	Pictorial view of area near KDA township
	
Typical natural herbaceous plants grown in Kohat	Football Ground

Figure 4-11: Map showing the location of Air, Noise and Drinking water sampling locations





## 4.2 Ecological Environment

161. In order to identify ecological resources, ecological baseline survey was carried out by EDCM team. Detailed surveys were conducted for project scoping during the start of April 2020. Secondary sources were also consulted to supplement the ecological baseline information of the area. The city of Kohat consists of an urban landscape with patches of plants and trees present across the city for the purpose of beautification and landscaping.
162. Nearest protected area is Tanda Lake located at a distance of 2 Km from UC-2 of Kohat. It is located at an elevation of about 528 meters amsl. Tanda Lake is a Ramsar site (Unassigned IUCN management category, designated as Ramsar wetland after ratification of convention by Govt. of Pakistan in 1976) which is located in Tanda Wildlife Park protected under KP wildlife (protection, preservation, conservation and management) Act, 2015. The project activities will not interfere or deteriorate Ramsar site and its habitat as the project activities are localized with short term impacts mainly from construction activity and will be carried away from Tanda lake.
163. Tanda Lake is surrounded by Indus-Ganges monsoon forest. It is freshwater reservoir lies in shallow valley surrounded by hills rising up to 700 meters amsl. Reservoir is mainly fed by Kohat Toi and local run-off.

### 4.2.1 Flora

164. In the Kohat valley, subsistence agriculture is widely practiced with wheat, barley, millet, corn, cotton, pepper and sugarcane being the primary crops. The annual cycle is divided into two planting and harvesting periods, one for wheat and barley in winter and another for corn in summers. Planting and harvesting of sugarcane overlaps both the periods. These crops are supplemented with a variety of vegetables and with clover, which is used in conjunction with millet as a fodder.
165. In many villages in the Kohat valley, there are extensive pear, peach and apricot orchards and grape vineyards.
166. The present flora of the irrigated areas is mostly exotic. The common trees are mesquite, ber, different species of acacia and jand. The most common shrubs are Gymnosporia Royleana, Ziziphus nummularia and Monotheca Buxifolia and common/fodder grasses. Existing dominant flora in the project area is given in **Table 4.3**.
167. Vegetation of the project area is dry deciduous scrub type. The stocking on the whole is poor. There are some species such as trees, grasses and shrubs are found near the project area. Good quality fodder grasses are also found at the moist places, where the incidence of grazing is less.

**Table 4.4: Existing Flora in Project Area**

	Scientific Name	Common Name	IUCN Status
<b>Tree</b>	Acacia Modesta	Phulai	Data Deficient (DD)
	Olea Cuspidata	wild olive	Data Deficient (DD)
	Dodonaea Viscosa	Broad leaf hopbush	Least Concern (LC)

<b>Shrub</b>	Gymnosporia	Royle's Spike Thorn	Data Deficient (DD)
	Royleana		
	Ziziphus nummularia	Jujube	Data Deficient (DD)
	Monothea Buxifolia	-	Data Deficient (DD)
<b>Grass</b>	Aristida Depressa	Aristida	Data Deficient (DD)
	Cymbopogon	East Indian	Data Deficient (DD)
	Jawarnica	lemongrass	
	Eleusine Flagellifera	Goosegrass	Data Deficient (DD)
<b>Fodder Grass</b>	Bothriochloa Pertusa	Indian bluegrass	Data Deficient (DD)
	Digitaria Bicornis	Crabgrass	Data Deficient (DD)

Source: EDCM Ecology Survey, April 2020

#### 4.2.2 Fauna

##### Birds

168. Common bird species found in sub-urbs of Kohat are mentioned in **Table 4.5**. It is pertinent to mention that project area i.e Kohat city which is an urban settlement and therefore, no longer habitat of such bird's species, hence no impact on avifauna is anticipated from the project.

**Table 4.5: List of Birds in Kohat Region**

No.	Common Name	Scientific Name	Status		Occurrence			
			Migratory	Resident	Common	Abundant	Less Common	Rare
1.	Black drongo	<i>Dicrurus macrocercus</i>		x		x		
2.	Black kite	<i>Milvus migrans</i>		x		x		
3.	Black partridge/Francolin	<i>Francolinus francolinus</i>		x	x			
4.	Blue rock pigeon	<i>Columba livia</i>		x	x			
5.	Cattle egret	<i>Bubulcus ibis</i>		x	x			
6.	Common/Indian myna	<i>Acridotheres tristis</i>		x		x		
7.	Collared dove	<i>Streptopelia decaocto</i>		x		x		
8.	Common babbler	<i>Turdoides caudatus</i>		x		x		

No.	Common Name	Scientific Name	Status		Occurrence			
			Migratory	Resident	Common	Abundant	Less Common	Rare
9.	Crested lark	<i>Galerida cristata</i>		x		x		
10.	Greater grey shrike	<i>Lanius excubitor</i>		x	x			
11.	Grey partridge	<i>Fringilla monticola</i>		x	x			
12.	Hoopoe	<i>Upupa epops</i>		x	x			
13.	House sparrow	<i>Passer domesticus</i>		x		x		
14.	House crow	<i>Corvus splendens</i>		x		x		
15.	House swift	<i>Apus affinis</i>		x		x		
16.	Indian cliff swallow	<i>Hirundo fluviicola</i>		x	x			
17.	Indian robin	<i>Saxicoloides fulicata</i>		x	x			
18.	Indian roller	<i>Coracias benghalensis</i>		x	x			
19.	Indian sparrowhawk/Shikra	<i>Accipiter badius cenchroides</i>		x	x			
20.	Indian tree-pie	<i>Dendrocitta vagabunda</i>		x	x			
21.	Koel	<i>Eudynamis scolopacea</i>		x	x			
22.	Little brown dove	<i>Streptopelia senegalensis</i>		x		x		
23.	Little green bee-eater	<i>Merops orientalis</i>		x		x		
24.	Pied bushchat	<i>Saxicola caprata</i>		x		x		
25.	Purple sunbird	<i>Nectarinia asiatica</i>		x	x			
26.	Red-vented bulbul	<i>Pycnonotus cafer</i>		x	x			
27.	Red wattled lapwing	<i>Hoplopterus indicus</i>		x		x		
28.	White breasted kingfisher	<i>Halcyon smyrnensis</i>		x	x			
29.	White eyed buzzard	<i>Butastur teesa</i>		x		x		

No.	Common Name	Scientific Name	Status		Occurrence			
			Migratory	Resident	Common	Abundant	Less Common	Rare
30.	White/Pied wagtail	<i>Motacilla alba</i>	x			x		
31.	White cheeked bulbul	<i>Pycnonotus leucogenys</i>		x		x		

Source: IEE of Drilling of Manzali South-1, 2018

### Mammals

169. The mammal species found in the vicinity of the project area are mentioned below in the **Table 4.6** with their respective IUCN status in the Red List. No endangered species are available in the project area.

**Table 4.6: IUCN Status of Fauna in Project Area**

Scientific Name		Common Name	IUCN Status
<b>Mammals</b>	Vulpes	Red Fox	Least Concern (LC)
	Canis Aureus	Golden Jackal	Least Concern (LC)
	Hystrix Indica	Indian Crested Porcupine	Least Concern (LC)
	Sus Scrofa	Wild Boar	Least Concern (LC)

\*IUCN Red List for species status of Pakistan. EDCM Ecology Survey April 2020

### Reptiles

170. The common reptiles of project area include; Garden lizard, Spotted Indian house gecko and Yellow bellied house gecko. The snakes reported in project area are; Indian cobra, Saw scaled viper and Dhaman/Common rat snake. Dhaman is non-poisonous being farmer friendly species controlling rodent/vermin population.

## 4.3 Socio-economic Environment

171. This section includes a summary of the prevailing socio-economic conditions in the project area and the population that will be potentially affected by the Project. To ascertain the socio-economic condition of the project area, primary and secondary data was collected including social and physical infrastructure in the project area.
172. To assess the socioeconomic conditions of the project area, 5 FGDs were carried out with 50 participants. Households (HH) have been studied during focus group discussions/ public consultations. These people belong to the nearest area of the project, FGDs were held with them to brief them about project and to seek their views. In addition, the secondary data, including Economic Survey of Pakistan (2018-19), Bureau of Statistics (2017-18), District Population Census 2017 of KPK, Crop Reporting Services KP (2017-18) and MICS of KP have been consulted.



173. Detailed surveys were conducted for project scoping during the month March 2021. For the purpose of the environmental and social assessment and sensitive receptor data collection, a two-kilometer-wide, corridor along the proposed project site has been considered as the study area or the project area. Most of the field data collection was carried out within this corridor though where relevant data was also collected from a wider area along the proposed project site. The reason for selecting this corridor is to cover those areas that have a potential to be affected by the project activities.
174. The names of the major settlements falling in project area are kotal township phase 1 & phase 2, labour colony, Paracha colony, Mustafa bazar, babri banda etc. Photographs depicting socio-economic conditions in the project area are provided in **Figure 4-12**.

#### 4.3.1 Administrative Setup

175. The proposed project is located in the six (6) urban union councils, including Kotal Township (KDA) under the jurisdiction of Water and Sanitation Services Company in Kohat city. All these UCs falls in *Tehsil & District* Kohat. The names of the UCs are as follow:
- UC-1 - Urban 1
  - UC-2 - Urban 2
  - UC-3 - Urban 3
  - UC-4 - Urban 4 Including Kohat Township (KDA)
  - UC-5 - Urban 5
  - UC-6 - Urban 6
176. Under the latest revision of Pakistan's administrative structure, promulgated in 2001, District Kohat is headed by Deputy Commissioner who is a chief administrative, revenue officer and representative of government in district. DC is responsible for coordination of work of all the sister offices and public facilities and implementation of government policies in the district.

#### 4.3.2 Demography and Population

177. The total population of district Kohat is 993,874, out of which 723,728 (72.8%) live in the rural areas of the district, while the remaining 270,146 (37.3%) live in urban areas (District Population Census 2017). The average family size in project area is 9.9 from the surveyed population. Most of the families are living in joint family system. Due to joint family system, the family size is large
178. The people of the district are of light brown complexion with black hair and eyes. Some are nearly as fair as Europeans, and brown hair and blue or grey eyes are not uncommon. The upper classes, as usual, are a good deal fairer than the ordinary population. Both Bangashes and Khattaks, who form the main portion of the population, vary a good deal in dress and appearance in different parts of the district. District wise population chart of project areas mentioned below:

Districts	Headquarters	Area (km <sup>2</sup> )	Population (2017)	Density (people/km <sup>2</sup> )
Kohat	<u>Kohat</u>	2,991	993,874	390

\*Source District wise population Census 2017 by Pakistan Bureau of Statistics: Government of Pakistan.

#### 4.3.3 Religion

179. According to the Population Census of 2017, more than 99% of the population of the Kohat district are Muslims, while the remaining 1% of the population consist of minorities such as “Ahmadis”, Christians, Hindus and other scheduled castes. Scheduled castes are the depressed and low rank classes as declared by the Scheduled Castes (Declaration) Ordinance, 1957.
180. More than 90% of population belong to the Muslim “Sunni” school of thought while majority of the remaining population belong to Muslim “Shia” school of thought.

#### 4.3.4 Cultural and Archaeological sites

181. No archaeological and cultural site was observed with ROW for distribution networks. If cultural or archeological site has been witnessed during construction phase archeological chance find procedure will be adopted. Archaeological Chance Find Procedure is attached as **Annexure F**.

#### 4.3.5 Ethnicities in Project Area

182. The primary data collected by the EDCM team during IEE baseline survey and public consultation shows the following ethnic diversity in the project area. None of these castes may be considered as indigenous people (IP) based on ADB SPS definition. The ethnicities present in the project area are provided in **Table 4.7** below.

**Table 4.7: Ethnicities in Project Area**

Settlement	Caste/ Tribe	Decision Making Process in Settlements	Locally Used Language
Lobour Colony	Bangash/ Afridi	Court of Law, Within caste group	Pashto
KDA Phase-II	Afridi/Khatak, Bangash	Court of Law, within caste group	Pashto
Paracha Colony	Afridi/Bangash	Court of Law, within caste group	Pashto

#### 4.3.6 Languages

183. Pushto is the main language of the project area, followed by Hindko. It is easily understood among all the population in the surveyed villages. Apart from these two languages, a small portion can speak Urdu as well.

#### 4.3.7 Dress/Clothing

184. People wear the traditional pakhtoon Shalwar Kameez; a tunic (Kurta), loose trousers and sandals (Kheri). In winters, men wear waist coat in addition to Shalwar Kameez. Women comparatively wear colorful clothing but wear Burqa/Chaddar while travelling outside.

#### 4.3.8 Marriages/Deaths

185. Marriages are arranged according to the traditions of Pakhtun society. The parents of the boys and girls usually arrange the majority of the marriages when they reach the age of 20/25 years. Parents prefer their close relations when choosing bride/groom for their children. Commonly most marriages are held with customs.
186. The death ceremony is performed in sorrowful but respectable manner. The neighbors jointly prepare the grave and men and women assemble in the house of the deceased

for Taziat (mourning). Nemaz-e-Janaza (Funeral prayers) is offered at the time fixed by family of the deceased, and is attended by large number of men of the society. The men / women visit the hujra / house of the deceased for offering Fatiha (prayers) up to three days. The family of the deceased gives food to the poor and relatives as Khairat (charity).

#### **4.3.9 Main Sources of Livelihood/Income**

187. Mostly residents of Kohat are relying on private/government jobs and linked to farming and agriculture directly or indirectly. Other occupations are self-business, working abroad, while remaining doing domestic work.

#### **4.3.10 Education Facilities in project area**

188. Education plays a pivotal role in changing social and economic condition of the individuals. Local community has access to educational facilities. Both primary and secondary schools for boys and girls are available in the project area. The Government Boys and Girls High Schools are in access to most surveyed areas while Private schools were also established by the local educated notables in the area, which were serving to the local communities for education.
189. Notable Higher education institutes exist in the city of Kohat; including Cadet College Kohat and Kohat University of Science and Technology where students come to study from various areas of province.

#### **4.3.11 Social Amenities in project area**

190. During the field survey, the access/availability of the social amenities/ basic infrastructure was asked from the surveyed households as well as physically observed at site. It was noted that facilities such as Electricity, Sui Gas, Water Supply, Telephone, Sewerage Drainage, school are available in the major settlement of Kohat city.
191. For health care, multiple BHUs, District Hospital Kohat, private hospitals and child care centres are also functional to facilitate the health of people in the project area and its near inhabitants.
192. Kohat is connected by rail with Thal and the main (Peshawar–Karachi) rail line via Jand, across the Indus River, and by road with Peshawar, Rawalpindi, and Bannu. A 1.2-mile (1.9-km) tunnel connects Kohat with Peshawar. Including cantonment.

#### **4.3.12 Major Source of Drinking Water**

193. The major sources of drinking water within Kohat city include, water supply networks operated by WSSCK individual and communal hand pumps are not so common.

#### **4.3.13 Types of Dwellings**

194. Housing conditions of the respondents have been analyzed according to the type of houses in which they were residing. The house or building constructed with concrete or burnt bricks fall in pacca category whereas house or building constructed with burnt bricks with mud comes under semi-pacca category while house constructed with mud bricks or temporary wooden logs etc. are categorized as kacha house. Project area most population is living in pacca and semi-pacca houses.

#### 4.3.14 Energy Supplies

195. The residents of project area are reliant on electricity available from the grid. Due to long duration of load-shedding particularly during summer, there is an increasing trend of using diesel generators and installing solar PV systems in both residences and businesses in order to ensure energy reliability.

#### 4.4 Findings of Social Due Diligence

196. The Consolidated Social Due Diligence Report (SDDR) has been prepared as a document of land acquisition and resettlement related impacts of the subprojects selected under the proposed Khyber Pakhtunkhwa Cities Improvement Project (KPCIP) to be financed by the Asian Development Bank (ADB). The SDDR has been prepared by the social safeguard team of the Project Management Unit (PMU) under the Local Government Department (LG) Government of Khyber Pakhtunkhwa (KP) as the executing agency (EA) for the proposed KPCIP project.
197. The ADB's Safeguard Policy Statement (SPS) 2009 (for IR policy) aims to "avoid involuntary resettlement wherever possible or to minimize impacts if avoidance is not possible by exploring project and design alternatives; enhance or at least restore livelihoods of those affected by the Project relative to pre-project levels and to improve the standards of living of those poor and other vulnerable groups. Following this aim of the SPS, the KPCIP project has been carefully conceptualized to either avoid all potential social impacts of proposed subprojects where possible or keep impacts to insignificant thresholds through adopting no or least impacts project designs. Following this concept, the social safeguard team of PMU undertook due diligence of the proposed subprojects to assess the land acquisition and resettlements (LAR) impacts of the subprojects, screen all subprojects, and categorize them under the SPS's projects categorization criterion for involuntary resettlement (IR) and indigenous peoples (IP) impacts, prepare land acquisition and resettlement plans (LARP) as required and compensate all DPs prior to starting of construction work.
198. The subproject involves laying of 190 km of Distribution network in six union councils of Kohat. 10 new tubewells are proposed to be installed while 09 non-operational tubewells shall be rehabilitated. 5 new overhead reservoirs (OHRs) while 3 surface reservoirs (SRs) are proposed to be constructed. 24 tubewells shall be energized through clean energy sources in which 14 are existing and 10 are proposed new tubewells. Water meters will be installed at each house connection to monitor water use and to bill the service by WSSC Kohat.
199. The proposed corridor for the water supply network is based on the best available option as per the topographic survey. The corridor is mostly adopted at one edge of the exiting road carriageway keeping in mind the existing house ramps and utilities at both sides of the road carriageway. Road reinstatement cost is considered in the detailed Bill of Quantities (BOQ) of the project
200. The DDR team carefully reviewed the project documents and consultations with the project staffs and consultants for the presence of any IPs communities. It was found that the entire population is Muslims and they did not consider themselves to be called any other type of population such as indigenous peoples as the ADB's SPS 2009 describes the IPs to be. As the Project is not entailed any significant impact on indigenous peoples owing to the nonexistence of the IP, hence the IP (Indigenous peoples) category "C" will stand here as reflected in. Therefore, an Indigenous Peoples Development Plan (IPDP) is not required for this Project.

201. Details of findings of Due Diligence Work for Kohat water supply scheme has been summarized in **Table 4-8**

**Table 4.8: Due Diligence Work for Kohat Water Supply**

S#	City	Project	IR/IP Category	Remarks
1	Kohat	<p>Water Supply improvements in Kohat City</p> <p>a- Rehabilitation &amp; Provision of water storage reservoirs</p> <p>b- New distribution network &amp; metering system</p> <p>c- Energization of existing tube wells through different clean energy sources</p>	C	<p><b>Screening results:</b></p> <p>a) This subproject involves the distribution network in the length of 190 Km pipeline rehabilitation &amp; provision. LAR impacts are not envisaged as ROW is government owned but encroachment selected areas especially in urban areas and presence of hawkers and vendors cannot be ruled out. Some temporary impacts to hawkers and vendors maybe expected during the excavation and pipeline laying activities that may result in loss of business incomes.</p> <p>b) The energization of 10 nos tube wells through clean energy sources is involved. These tube wells are already existed at KDA's land and has no LAR impacts.</p> <p>c) WSSC intends to construct new 8 nos tube wells, i.e., 4 on KDA's land and remaining on private land (4 Marla<sup>6</sup>). Agreement with land owners not materialized, hence the LAR impacts will be re-assesd once the modalities concluded.</p> <p><b>Initial IR/IP categorization</b></p> <p>Conditional to adoption of design-construction related design measures guarantying no impacts to any structures encroaching in ROW and vendors and their businesses operating in ROW, the subproject may be</p>

<sup>6</sup> 1 Marla is equal to 272.25 sq. feet

				<p>categorized as C for both IR and IP at this stage. Those impacts are not assessed at this stage. However, a detailed due diligence or monitoring is required during the construction stage and in case of any impact, mitigation measures will be followed through the preparation and implementation of Resettlement Plan. The construction work will not be started in the particular section unless the Resettlement Plan is fully implemented and validated by an External Monitoring Consultant engaged with the approval of ADB.</p>
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#### 4.5 Sensitive Receptor Mapping

202. No building/housing structure fall within ROW of distribution networks, Socio economic condition of project area is shown in **Figure 4.12**. Sensitive receptors falling close to project area are provided in **Table 4.9**

**Figure 4-12: Socio-economic conditions of the project area**










Government school situated near KDA, Kohat	WSSC Tube well at UC-4 Kohat
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**Table 4.9: Sensitive Receptors and Prominent Structures near Kohat Water Supply**

Sr No	Pictorial View	Site Coordinates	Description
1		X: 71.46071 Y: 33.60803	Police Station KDA
2		X: 71.46729 Y: 33.60853	Concept Academy Coaching
3		X: 71.45935 Y: 33.60871	Project Director Authority, KDA
4		X: 71.47189 Y: 33.60566	Masjid Abu Huraira
5		X: 71.47002 Y: 33.61027	Govt Girls Degree College, KDA



Sr No	Pictorial View	Site Coordinates	Description
6		X: 71.46979 Y: 33.61194	Masjid Usman Ghani
7		X: 71.47070 Y: 33.61237	PAK CT scan
8		X: 71.47122 Y: 33.61281	Divisional Hospital Kohat
9		X: 71.47151 Y: 33.61264	Hospital Park
10		X: 71.47335 Y: 33.61529	Al-Shifa Trust care

Sr No	Pictorial View	Site Coordinates	Description
11	 A photograph of a mosque with a prominent minaret and a dome, surrounded by greenery and trees. The sky is overcast.	X: 71.46002 Y: 33.60713	Jamiye Masjid KDA
12	 A photograph of a brick wall with a metal fence on top. A sign is visible on the right side of the wall.	X: 71.46022 Y: 33.60728	Khyber Medical University Kohat
13	 A photograph of a small building with a sign on the wall. A tree is in the foreground, and a gate is visible.	X: 71.46042 Y: 33.60751	WSSC KDA store
14	 A photograph of a building with a sign in Urdu. Two men are standing in front of the building, one holding a document.	X: 71.46691 Y: 33.61277	Passport Office
15	 A photograph of a building with a sign that reads 'REGIONAL INFORMATION OFFICE KOHAT'. Three men are standing in front of the building.	X: 71.46669 Y: 33.61261	Regional Information Office

## 5 Analysis of Alternatives

### 5.1 Overview

203. Project alternatives are studied as a part of this IEE process. Alternatives analysis has been conducted in detail to foresee environmental, economic and social impact of each alternative. This chapter also provides an overview of the various commercially available technologies for the water treatment in an environmentally sound manner and are successfully running in developed countries in particular and recommend the most suitable set of options for Kohat city.
204. Project alternatives has been studied keeping in view number of parameters including no project option and selection of water resource i.e ground water or surface water.
205. The proposed improvement of water supply network is based on detailed feasibility assessments focusing on assessing the city requirements with regards to population and demand for next thirty years and then determining the most suitable and effective technology and location for development of the required infrastructure.
206. This process of analysis of the different alternatives for improvement of water distribution network ensures that a well-informed decision is taken regarding the selection of the most optimal option amongst the possible options that are brought into consideration.

### 5.2 No project Option

62. If 'no project' option is triggered, it will result in loss of all positive impacts that project will pose on Kohat city; such as improved and sustainable potable water availability to citizens of Kohat for next thirty years, the project will reduce abstraction of ground water from privately owned tube wells or residential water bores. Moreover, continuous supply system and installation water metering system will reduce water leakages and theft. At the most, clean potable water will reduce water borne disease and ultimately reduced pressure on health care system of Kohat.
63. Furthermore, project implementation will also create job opportunities during construction, thereby improving the socioeconomic condition of the local people and help in improving their quality of life. Thus, the 'no project' option is not a viable option

### 5.3 Alternatives Types

207. The availability of alternatives ensures to a degree that a comparative analysis will lead to a well informed decision regarding the selection of the most optimal option among all that are brought into consideration. The analysis for the Improvement of water supply schemes lays a primary emphasis on factors influencing economic viability, environmental sustainability and social acceptability that may arise from the execution of the project, during both construction and operation.
208. Two key components of this particular analysis are:
- a) Site Selection and
  - b) Water Source Selection

### 5.3.1 Site Alternatives

209. As the project is improvement of existing water supply scheme therefore site is already pre-determined according to availability of utility corridor. Moreover, the proposed new tubewells and water storage tanks shall be installed according to water demand / nodal demand in the area and land availability. The 04 out of 10 shall be constructed on private land and rest 06 shall be installed on WSSC land.

### 5.3.2 Water Source Selection

#### a) Surface water from Tanda Dam

210. To meet water demand for the next 25 years water can be abstracted from Tanda dam but water from Tanda dam requires extensive treatment and filtration which will be costly, requires land for construction of treatment facility and laying of transmission to entire Kohat city. Moreover, Kohat city is located on undulating land therefore head issues can not be ruled out and shall require extensive pumping for supply of water to high altitude areas.

#### b) Installation of Tube wells

211. Currently water supply source in Kohat city is tube wells-based ground water source with approximately 65 number of existing tube wells. To overcome water shortage only 10 new tubewells have been proposed which will be connected to existing network. Design life of Tube wells is 15 years. The recharging capacity of tubewells in Kohat is good as Tanda dam and Kohat Toi river recharge ground water aquifer. Moreover, the ground water quality is good and does not require any further treatment. Therefore installation of Tubewells is more suitable as compared to taking water from surface water source.

#### c) Energy Alternatives

212. In order to reduce the energy and operational cost of the proposed water supply system, energization of 34 tube wells through clean energy sources is also included in the project.

## 5.4 Conclusion & Environment Perspective of Alternatives

213. The project will reduce abstraction of ground water from privately owned tube wells or residential water bores. Moreover, continuous supply system and installation of water metering system will reduce water leakages and theft. The proposed alternative i.e. installation of tubewells will reduce land acquisition, capital investment, and omitting production of hazardous waste during operation of water treatment facility. The energization of tubewells through clean energy sources will reduce energy requirements and promote sustainable development.

## 6 Potential Environmental Impacts and Mitigation Measures

214. Potential impacts arising from design, construction and operation phase of proposed “Improvement of water supply scheme” have been identified and assessed on the basis of field data, secondary data, expert opinion and examining previous similar projects in Pakistan. These include effects on physical, biological and socio-economic environments. Impacts associated with design, construction, operation phases of project components such as installation of tube wells, distribution networks, storage tanks and energization of tubewells through clean energy sources have been detailed in the section.
215. The impact assessment of proposed project has been carried in accordance with the requirements of KP EPA, 2014, Pak EPA-1997 and ADB SPS, 2009. According to ADB’s Safeguard Policy Statement (SPS) 2009, a Rapid Environmental Assessment (REA) Checklist was prepared for the proposed Improvement of water supply scheme in Kohat “ to determine the scope of the IEE’.
216. Impact-screening matrices during development phases i.e. project design, construction and operation are presented below.

### 6.1 Methodology for impact screening

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

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

#### Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventive measures are not applied	3
Unlikely	May occur once or twice during the activity if preventive measures are not applied	2
Rare	Unlikely to occur during the project	1

**Consequence Scale**

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding communities	5
Major	The action will cause major adverse damage on the environment or surrounding communities	3
Moderate	No or minimal adverse environmental or social impacts	2
Minor	No or minimal adverse environmental or social impacts	1

**Risk Score Table**

Likelihood	Consequence				
		Catastrophic	Major	Moderate	Minor
	Certain	25	15	10	5
	Likely	15	9	6	3
	Unlikely	10	6	4	2
	Rare	5	3	2	1

Risk: Significant: 15-25

Medium: 6-10

Low 1-5

219. Any 'Medium' to 'Significant' risk requires an environmental management measure to manage the potential environmental risk. Judgment will be required concerning the application of an environmental management measure to mitigate low risk situations.

**6.2 Design/Pre-Construction Phase*****Impact Screening Matrix***

220. The 'activity wise' screening of potential impacts during the design/pre-construction phase is provided in **Table 6.1** below.

**Table 6.1: 'Activity Wise' screening of possible Impacts during Design/Pre-Construction phase**

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Improper designing of distribution networks including supply mains	Likely	Moderate	Medium	Long Term
2	Improper location of water storage tanks	Likely	Moderate	Medium	Long Term
3	Lack of integration of IEE/EMP requirements into Construction bid documents	Likely	Moderate	Medium	Short Term
4	Material Haul Routes	Likely	Moderate	Medium	Long Term
5	Contractor's Environmental Safeguards Capacity	Likely	Moderate	Medium	Short Term
6	Improper location of worker camps leading to improper disposal of solid waste and sewage and privacy issues for residents in project area.	Likely	Moderate	Medium	Short Term
7	Cultural Heritage & Religious Sites, Social Infrastructure	Unlikely	Moderate	Low	No residual Impact
8	Land acquisition and resettlement impacts	Likely	Moderate	Medium	Long Term
9	Impacts due to natural hazards	Unlikely	Moderate	Low	No residual Impact
10	Impacts due to existing utilities	Likely	Moderate	Low	No residual Impact

 Critical Risk Level

 Significant Risk Level

 Medium Risk Level

 Low Risk Level

### 6.2.1 Improper design of distribution networks including supply main

#### *Impacts*

- 221. The possibility exists that in case the project is not designed in accordance with international standards and guidelines<sup>7</sup> for water and sanitation it could result in multiple potential impacts that could adversely affect the settlements of project area.
- 222. If water supply mains and distribution network is not designed properly it will increase chances of pipe bursting, leakages, reduce water delivery to particular residents resulting in social issues.
- 223. Inadequate/improper water metering system will reduce revenue generation for WSSCK.
- 224. Improper designing and monitoring may also increase water theft which ultimately impact effectiveness of the system.

#### *Mitigation Measures*

- 225. The following design related measures will be implemented to ensure the project activities does not result in unanticipated, long term and potentially irreversible impacts:
  - The design criteria are mainly based on the standards and specifications of WASA Lahore. Where required, international best practices were also considered in establishing the design criteria for the proposed water supply system. Design criteria of proposed water supply system is summarized in Table 3.1.
  - 1.2-meter cover has been proposed from the top of pipe to reduce chances theft and pipe bursting due to traffic loads.
  - Before commissioning water supply network shall be tested on 1.5 times the designed pressure to check leakages.
  - Water metering system shall be proposed to reduce theft and water wastage.

### 6.2.2 Improper location of storage tanks and pumping station

#### *Impacts*

- 226. The proposed water supply scheme is developed on gravity. The tubewell will convey water to water storage reservoirs from where water shall be distributed under gravity. If location/elevation of storage tanks are not located properly while maintaining minimum head the system will require high energy maintaining minimum head till house connections.
- 227. If pumping station is not adequately located it will increase energy requirement or multiple pumping stations could be installed to overcome reduce head in elevated areas. One pumping station will be reconstructing to deliver water to higher elevated areas. The location of pumping station is adjacent to existing pumping location. The

<sup>7</sup> <https://www.ifc.org/wps/wcm/connect/83217cd8-b9a5-4383-97b5-5af26182b3b8/2007+Water+and+Sanitation.pdf?MOD=AJPERES&CVID=m3CdtQr>



proposed pumping station consists of 50,000 gallons sump tanks along with two pumps of 80 & 100 horsepower motors.

### ***Mitigation Measures***

228. The following mitigation measures will be implemented:

- Based on the hydraulic model of the proposed supply mains and distribution networks, raw water from sources shall be conveyed under gravity.
- Water supply network design shall facilitate uninterrupted water supply through gravity system without technical constraints.
- Two additional pumps of same capacity were also provided for backup purposes at new pumping stations for uninterrupted water supply.

### **6.2.3 Lack of integration of IEE/EMP requirements into Construction bid documents**

#### ***Impacts***

229. The bidding documents must reflect the requirement to select a qualified and experienced contractor from the perspective of ensuring implementation of required safeguards during project development.

#### ***Mitigation Measures***

230. The proposed 'Safeguards unit' that will be developed at the PMU will be assigned the task to check that design and bid documents are responsive to key environmental, social and safety considerations, and that the proposed method of work reflects the boundaries defined in the EMP. The bid documents must include the EMP and its implementation cost must be reflected in the BOQ.
231. IEE/EMP implementation and monitoring requirements must be part of bidding documents and necessary contractual binding must be agreed by project contractors before award of contract.
232. Project contractors shall have qualified and experienced environmental staff to plan, arrange, implement, monitor and report IEE/EMP requirements.

### **6.2.4 Material Haul Routes**

#### ***Impacts***

233. Hauling of material can have significant impacts on the community, public safety, traffic congestion, air quality and lifespan of the Kohat city road ways.

#### ***Mitigation Measures***

234. The construction vehicles hauling materials along the Kohat city roads and anywhere where there are sensitive receptors such as hospitals, schools and/or roadside residences will be limited and the PMU in collaboration with the focal agencies will establish a route plan to minimize this disruption which shall be appended to the EMP.

### **6.2.5 Contractor's Environmental Safeguards Capacity**

#### ***Impacts***

- 235. Lack of contractor's environmental safeguard capacity or selection of environment non-responsive contractors may result in failure of EMP implementation and may be a source of number of non-compliances.
- 236. The responsibility of the PMU KPCIP in collaboration with the focal agencies is to review and finalize the bidding documents relating to environmental issues.
- 237. Contractors that do not possess the required capacity for safeguards management must not be pre-qualified and selected.

### ***Mitigation Measures***

- 238. PMU KPCIP shall review the contractor capacity with respect to safeguard management and contracts shall be awarded accordingly.
- 239. The Contractor will be required to define an Occupational and Environmental Health and Safety procedure for all work, including work camp operation, management of cement dust, and use of Personal Safety Equipment. These procedures shall be developed and approved by the PMU in collaboration with the focal agencies before the Contractor commences any physical works on ground.
- 240. PMU KPCIP shall ensure the project contractors are selected on merit and necessary funds has been allocated in the contract documents for EMP implementation and monitoring.

### **6.2.6 Identification of Locations for Labor Camps and ancillary facilities**

#### ***Impacts***

- 241. The duration of the construction activity for the improvement of water supply system in Kohat is expected to be 24 months and a considerable amount of work force will be engaged. As a result, worker camps will need to be developed and ancillary facilities will need to be provided such as electricity, washrooms for labor with suitable effluent and sewage disposal facilities as well as water for their everyday use for drinking and bathing etc.

#### ***Mitigation measures***

- 242. In order to prevent a nuisance, specific locations shall be designated for development of the labor camps. All necessary facilities and amenities shall be provided in these camps such as resting area, drinking water, electricity, supply of water.
- 243. Solid and liquid effluent waste disposal facilities shall also be designed to cater waste of administration/office building etc.
- 244. The use of proper planning while identifying locations for the labor camps will ensure there is minimal disturbance to all key receptors and the traffic is not disrupted by labor camps being set up roadside next to the construction sites.

### **6.2.7 Cultural Heritage & Religious Sites, Social Infrastructure**

#### ***Impacts.***

- 245. No cultural heritage and religious site is located within ROW of distribution networks nor any tubewell or storage reservoir is located in a close vicinity of any social infrastructure of significance. The distribution networks will be laid within TMA RoW

which may create nuisance and disturbance. However, the activity shall be of short term, excavation of trenches, laying of pipeline and covering shall be done within 20-25 days of a certain section.

246. As a result, no major significant impact will be expected from the works on any social infrastructure. However, consideration will be made not to construct at night, from 7 pm onwards till 6 am in the morning, to avoid nuisances.

### ***Mitigation Measures***

247. No mitigation measures are required.

## **6.2.8 Land Acquisition and Resettlement Impacts**

### ***Impacts***

248. The proposed project involves laying of distribution network of 190 Km length. LAR impacts are not envisaged as ROW is government owned. The energization through clean energy sources of 34 nos tube wells is involved. These tube wells are already existed at KDA's land and has no LAR impacts are reported. WSSC intends to construct new 10 nos tube wells, i.e., 4 on KDA's land and remaining on private land (4 Marla<sup>8</sup>). Agreement with land owners not materialized, hence the LAR impacts will be re-accessed once the modalities concluded

### ***Mitigation Measures***

249. The PMU KP LGERDD shall ensure the following:
- Due payment to all land owners must be paid before mobilization of construction contractors.
  - Social safeguard unit shall ensure that project affected people has been paid following appropriate procedures and there are no grievances about land acquisition process.
  - PMU KPCIP will expedite the process of land acquisition for proposed tubewells that will be constructed on private land.
  - PMU KPCIP will ensure that no land acquisition issue left before start of construction works and grievances are adequately addressed.

## **6.2.9 Impacts due to Natural hazards**

### ***Impacts***

250. Site is located outside of seismically active area as it falls in Zone 3. No fault lines or significantly fractured geologic structure is present that may allow unpredictable settlement/land sliding. Urban flooding can damage section of distribution networks in sliding zone areas.

### ***Mitigation Measures***

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<sup>8</sup> 1 Marla is equal to 272.25 sq. feet

- The PMU KPCIP shall ensure the proposed infrastructure shall be designed keeping in view the seismic zone 3 building considerations.
- Surface water diversion shall be included in the design to protect structures from flash flooding.
- Provision in design are included so that water supply network shall not be disrupted/impacted from urban flash flooding, potential seismic intervention and other climate hazards.
- Emergency response plan shall be prepared by construction and operation phase contractors and will be submitted to PMU for approval to manage impacts of natural hazards such as earth quakes and floods.

#### 6.2.10 Impacts due to Existing Utilities

##### *Impacts*

251. The alignment of distribution network is within TMA RoW along existing roads within Kohat city. TMA RoW along the roads are designated place for laying of water supply mains, sewerage conveyance and gas networks therefore limited impact on existing utilities is expected.

##### *Mitigation Measures*

- The PMU KPCIP shall ensure the proposed infrastructure shall be designed keeping in view the minimum disturbance to existing utilities.
- CSC will ensure that project contractors will perform condition assessments prior to excavation works for supply mains and networks and will inform CSC/WSSC Kohat about the presence of any existing utilities within RoW.
- In case if there is need of shifting of any utility, utility custodian department will be taken on board by WSSC Kohat for necessary approvals and informations.
- PMU KPCIP/WSSC Kohat will pay compensation to damage of utilities to utility owners and will ensure that there will be no grievances in this regard.

### 6.3 Construction Phase

#### *Impact Screening Matrix*

252. The screening of potential impacts during the construction phase is provided in **Table 6.2** below.

**Table 6.2: Screening of Possible Impacts during Construction Phase**

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Construction of water distribution networks and tube wells and storage tanks not in accordance of finalized design	Likely	Moderate	Medium	Short term
2	Construction of water distribution networks and storage tanks	Likely	Moderate	Medium	Short term
3	Installation of tube wells and energization through clean energy sources of Tube wells	Likely	Moderate	Medium	Short term
4	Impacts on surface water quality	Likely	Moderate	Medium	Short term
5	Degradation of air quality due to construction works	Likely	Moderate	Medium	Short term
6	Potential accidents and injuries to communities in project area during construction works and Road closure/Increased traffic congestion in populated areas	Likely	Moderate	Medium	Short term
7	Injuries to workers from lack of necessary training and/or not using PPEs etc.	Likely	Moderate	Medium	Short term
8	High noise levels from construction activities	Likely	Moderate	Medium	Short term
9	Improper handling and/or disposal of hazardous and non-hazardous waste	Likely	Moderate	Medium	Short term
10	Untreated disposal of effluent from worker camps and batching plant(s)	Likely	Moderate	Medium	Short term
11	Soil Contamination	Likely	Moderate	Medium	Short term
12	Employment Conflicts	Likely	Moderate	Medium	Short term
13	Communicable diseases incl. COVID-19	Likely	Moderate	Medium	Short term
14	Vegetation and Wildlife Loss	Unlikely	Moderate	Low	No residual Impact

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
15	Historical/Archaeological Sites	Unlikely	Moderate	Low	No residual Impact
16	Site Restorations	Likely	Moderate	Medium	Short term

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

### 6.3.1 Construction of water distribution networks and tube wells and storage tanks not in accordance with finalized design

#### *Impacts*

253. If the proposed water supply networks is not constructed in accordance with the finalized design and its corresponding design parameters, it could lead to a number of unanticipated impacts such as inadequate water supply, degraded water quality and choking of water distribution networks.

#### *Mitigation measures*

254. The following mitigation measures will be implemented:
- Method statements must be prepared by the Contractor and approved by the Construction Supervision Consultant (CSC) prior to commencement of construction works.
  - The CSC must closely monitor the construction works being conducted by the Contractor to ensure the finalized design is implemented in full and water supply system is developed completely in compliance of the approved finalized designs.
  - Any deviation by the Contractor from following the finalized design must be immediately highlighted and corrective measures must be implemented to ensure full compliance with the finalized design.
  - PMU KPCIP shall ensure that construction activities are being carried out in compliance to project design following best international practices. It will closely review and monitor the activities of CSC and contractors involved in construction activities.

### 6.3.2 Construction of water distribution networks

#### *Impacts*

255. Construction activity of water distribution network and supply main will be conducted along the roads. The work will be conducted by a team of 5 workers at each site. Excavation for water supply networks will be carried out in well Graded Gravels with Silty Clay.

256. Trench will be excavated using excavator and where it is not feasible will be done manually. Excavated soil will be placed along the trench. A bed of sand of 150 mm thick will be prepared at the bottom and pipes will be placed and laying of local sand around water supply line shall be done. Excavated soil will be backfilled and compacted. Where the pipes are laid in the roadway, handheld pneumatic drill will be used to break the road surface.
257. The pipeline are to be laid along the roads. The excavated soil, placed along the trench may get disturbed due to wind, rain water and the movement of workers, vehicles and pedestrians, and spill onto road way – disturbing road users, creating dust, road safety issues, etc., and also into nearby open drains.
258. Details of excavated soil from scarification of existing road pavement structures, excavation of earthen/rock material for water supply networks provided below.

**Table 6.3: Details of Excavated Material for Construction of water distribution networks and Transmission Mains**

Description	Quantity (CM)	Mode of Disposal
Scarification Of Existing Road Pavement Structure	30954.92	Disposal of the unsuitable material of Road pavement Structure at designated source
Excavation for water supply line	388775.05	Usable material will be used as backfill Unsuitable material will disposed of at designated place
Back filling with suitable excavated material	169387.53	Excavated material shall be utilized for back filling
Additional Material required for backfilling	86032.09	
laying of local sand around water supply line	80954.09	Will be borrowed from local sources

Source: EDCM Design Report, 2020

259. Construction of the pipelines involves quite simple techniques of civil works, the invasive nature of excavation will result to impacts to the sensitive receptors of sub project locations such as residents, business and community in general.
260. These anticipated impacts are temporary and for short duration. Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be (i) constructed by small teams working at a time; (ii) any excavation done near sensitive area like school, religious places and house will be protected as per standard construction practices.

#### ***Mitigation measures***

261. Mitigation measures adopted for construction of water supply networks and supply main are provided below:
- Prior to starting of work, the contractor shall prepare a method statement for water supply pipeline works. This shall be simple and explain the contractor's work process that is actually conducted on site, with safety and safeguard concerns.

- Method Statement is very important, particularly for water supply pipeline works along the roads.
- Method Statement can be prepared for each stretch (say 1 km) /specific site based on the project area.
- Method Statement shall be in a Table format with appended site layout map and cover the following:
  - Work description
  - No. of workers (skilled & unskilled)
  - Details of Plant, equipment & machinery, vehicles
  - Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing)
  - PPE (helmet, gloves, boots, etc.) details for each type of work
  - Details of materials at each site (type & quantity)
  - Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc.)
  - Construction waste/debris generated (details & quantity)
  - Detail the sequence of work process (step-by-step) including specific details of each work
  - Contractor's supervision & management arrangements for the work
  - Emergency: Designate (i) responsible person on site, and (ii) first aider
  - Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc.
- The following shall be included in the site layout plan:
  - Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone.
  - Location of temporary stockpiles and provision of bunds
  - Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil
  - Wetting of soil to arrest dust generation by sprinkling water
  - Waste/surplus soil utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil



utilization/disposal site in consultation with CSC/PMU.

- PMU KPCIP will ensure the identification of disposal sites for unsuitable excavated material in consultation with WSSC Kohat.
- CSC will inspect and monitor the borrow material areas prior to procurement to ensure that it is being used in sustainable way and no significant disfiguration of landscape is going on at quarry site.
- Stock piling of excavated material at places that are congested will be avoided as these piles can create traffic issues and public nuisance.
- Already available quarry sites for additional backfill material will be utilized. Development of new quarry site will be discouraged.
- Record of borrow materials will be maintained including details of quarry site, agreement and necessary approvals from concerned government authorities.

### **6.3.3 Construction of water storage reservoirs and tube wells and energization through clean energy sources of selected tube wells.**

#### ***Impacts***

262. Environmental impacts from construction of storage tanks, installation of tube well and other infrastructure include construction debris, unattended concrete and cement waste, brick waste, littering and empty cement bags which required to be disposed off as per waste management plan. Flooring works will add to slurry waste resulting from grinding activities. Noise from mixing plants, steel fixing works, wood works is another source of environmental nuisance which need to be managed. Use of generators, tubewell boring rigs, vehicles and machinery may be source of noise and air pollution if not managed.
263. For installation of tubewell equipment boring will be carried out which will result in generation of drilling waste. This waste need to be managed otherwise may be source of nuisance and environmental hazards.

#### ***Mitigation measures***

264. Following are the mitigation measures that will be employed to manage impacts from construction of building and associated infrastructure.
- Stock piles will be appropriately located and out of wind to avoid dust emissions. Dry dusty materials shall be sprinkled with water and properly covered to avoid dust emissions.
  - No cement and concrete waste will be left unattended. Construction debris will not be thrown from height to avoid dust emissions. Return unpaved areas to original or improved contours following construction.
  - Solid waste generated from construction of tubewells and storage reservoirs will be managed through site specific EMMP and no waste will be stored at site to improve housekeeping at site and to avoid environmental nuisance.
  - Set protocols for proper and regular maintenance of construction machinery, vehicles and generators. Generators that will be used will be placed at suitable locations.

- Contractor will not be allowed to store bulk quantities of fuel or hazardous material at site.
- Any fuel or chemicals stored at site (in small quantities) will be stored at designated site and containers/storage vessels be properly marked for their contents. Storage area will be provided with hard impervious surface and secondary containment.
- Equipment and machinery with loose vibratory parts will not be allowed to use. Used equipment and machinery will be in compliance to NEQS.
- Waste bins will be provided at appropriate places to manage waste. Daily housekeeping of the construction area will be carried out.

### 6.3.4 Impacts on surface water quality

#### *Impacts*

265. Unattended stockpiling of excavated materials may interfere with drainage paths if not disposed off properly. The drainage of streams shall not be impeded by the works. The scale of the works does not warrant hydrological monitoring and any surface water quality depletion.
266. Soil erosion triggered by exposed soils on slopes is very unlikely to occur; therefore, no significant impact on surface water quality due to soil erosion is expected.
267. If labor camps are situated close to waterways, sanitary waste may cause surface water pollution. But the scattered nature of construction and short time may not require large scale labor camps. Construction of water distribution network main will be conducted along the roads therefore no impact on surface water quality is envisaged. Construction works during rainy season particular during monsoon should be avoided. Construction work during rainy season can trigger slip, fall hazards, solid waste management problems, poor quality construction works and interruptions in material supply.

#### *Mitigation Measures*

- Construction debris shall not be disposed off in open.
- No stockpiling of materials will be carried out at location closed to streams.
- No labor camp will be constructed at intake location. No solid waste will be disposed off in the streams.
- CSC will maintain good housekeeping during construction works
- No slopes/excavations at the construction location shall be left unattended.

### 6.3.5 Degradation of Ambient Air Quality

#### *Impacts*

268. The proposed project improvement of water supply system will not involve large scale earth works and transporting and dumping large quantities of dry material. However, laying of water supply networks will involve excavation up to 2 meters in depth and 1

meter in width for trenching. This will likely lead to an increase in SPM (Suspended Particulate Matter) in and around the construction zones.

269. Potential sources of particulate matter emission during construction activities include earthworks (dirt or debris pushing and grading), exposed surfaces, exposed storage piles, truck dumping, hauling, vehicle movement on unpaved roads, combustion of liquid fuel in equipment and vehicles, land excavation, and concrete mixing and batching.
270. Vehicles carrying construction material are expected to result in increased SPM levels near the haul roads. This can be of potential importance if the vehicles pass through the areas with a high concentration of sensitive receptors, such as residential areas, in this particular case.
271. At the construction yard, the dust levels are also expected to increase due to unloading of construction materials. It shall be ensured that most of the excavated material will be used within the project, with minimal cut and fill material to come from outside the site.
272. Poor air quality due to the release of contaminants into the workplace can result in possible respiratory irritation, discomfort, or illness to workers. Employers shall take appropriate measures to maintain air quality in the work area.
273. The quantity of dust that will be generated on a particular day will depend on the magnitude and nature of activity and the atmospheric conditions prevailing on the day. Due to the uncertainty in values of these parameters, it is not possible to calculate the quantity from a 'bottom-up' approach, that is, from adding PM<sub>10</sub> emissions from every activity on the construction site separately. Typical and worst-case PM<sub>10</sub> emissions from construction sites have been estimated<sup>9</sup> as 0.27 mega gram per hectare per month of activity (Mg/ha-month) and 1.04 Mg/ha-month, respectively.

### **Mitigation Measures**

274. The following mitigation measures will be adopted for preservation of the environment:
  - All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations.
  - Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.
  - Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.
  - Vehicles transporting soil, sand and other construction materials shall be covered with tarpaulin.
  - Limitations to speeds of such vehicles as felt necessary. Transport through densely populated area shall be avoided.
  - Concrete plants to be controlled in line with statutory requirements and shall not

<sup>9</sup> Gaffney, G. and Shimp, D. 1997. *Improving PM<sub>10</sub> Fugitive Dust Emission Inventories*. Sacramento, CA. California Air Resource Board. <[www.arb.ca.gov/emisinv/pubs/pm10tmp.pdf](http://www.arb.ca.gov/emisinv/pubs/pm10tmp.pdf)>

be close to sensitive receptors.

- Stack height of generators will be at least 3 meters above the ground.
- Project traffic will maintain maximum speed limit of 20 km/hr. on all unsealed roads within project area.
- A minimum distance of 300 meters will be ensured between batching plant(s) and the nearest community.
- The need for large stockpiles shall be minimized by careful planning of the supply of materials from controlled sources. Stockpiles shall not be located within 50 m of schools, hospitals or other public amenities and shall be covered with tarpaulin when not in use and at the end of the working day to enclose dust. If large stockpiles ( $>25\text{m}^3$ ) of crushed materials are necessary, they shall be enclosed with side barriers and also covered when not in use.
- Dust emissions due to road travel shall be minimized through good construction practices (such as keeping stock piles down wind and away from communities) and sprinkling water over the access road.
- Maintaining levels of contaminant dusts, vapors and gases in the work environment at concentrations below those recommended as TWA-TLV's (threshold limit value)—concentrations to which most workers can be exposed repeatedly (8 hours/day, 40 hrs./week, week-after week), without sustaining adverse health effects.
- Developing and implementing work practices to minimize release of contaminants into the work environment including:
  - Direct piping of liquid and gaseous materials
  - Minimized handling of dry powdered materials; Enclosed operations
  - Local exhaust ventilation at emission/release points
  - Vacuum transfer of dry material rather than mechanical or pneumatic conveyance
  - Indoor secure storage, and sealed containers rather than loose storage
- Where ambient air contains several materials that have similar effects on the same body organs (additive effects).

### ***Fugitive Dust Control***

275. The source wise fugitive control measures are provided in **Table 6.4** below. The Dust Management Plan has been attached as **Annexure G**.

**Table 6.4: Control measures for Fugitive Dust emissions**

Source	Control Measures
Earth Moving	For any earth moving that is to take place in the immediate vicinity from the site boundary, watering must be conducted as required to prevent visible dust emissions
Disturbed Surface Areas	Apply dust suppression measures (clear vegetation only from areas where work is to commence, plant or mulch areas that will not receive traffic, construct artificial wind breaks or wind screens) frequently to maintain a stabilized surface.  Areas that cannot be stabilized, such as wind driven dust, must have an application of water at least twice a day
Inactive Disturbed Surface Areas	Apply dust suppressants (clear vegetation only from areas where work is to commence, plant or mulch areas that will not receive traffic, construct artificial wind breaks or wind screens) in sufficient quantity and frequency to maintain a stabilized surface
Unpaved Roads	Periodic sprinkling on all roads used for any vehicular traffic at least twice per day during active operations and restrict vehicle speed to 20 km/h.
Open Storage Piles	Apply water to at least 80 percent of the surface areas of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust or install an enclosure all along the storage piles  Tarpaulin sheet shall be provided on the storage piles to avoid dust emissions.
Track-out Control	Wash down of construction vehicles (particularly tires) prior to departure from site.

***Vehicular & Equipment Emissions***

**276.** It shall be ensured that the following measures are taken to control emissions from vehicles and drilling equipment being used in the construction activity:

- Periodically check and conduct maintenance of the construction machinery and haul vehicles. Generators, compressors and vehicles used during construction works will be maintained in a good condition to ensure that emissions are kept to a minimum level.
- Regularly change the engine oil and use new engines/machinery/equipment having good efficiency and fuel burning characteristics.
- Controlled technology generator and batching plants will be used to avoid excessive emissions.
- Burning of wastes at any site will not be allowed.
- The stack height of generators will be at least 3 meters above the ground.
- Training of the technicians and operators of the construction machinery and drivers of the vehicles.
- All type of machinery and generator must comply with the NEQS. Vehicles, which

are not in compliance with NEQS are not allowed to use.

- Periodic emission monitoring of vehicles, generator and batching plants is proposed.
- Project activities shall be planned to avoid harsh weather conditions.
- Idling time will be 3 to 5 minutes.
- Fuel-efficient and well-maintained vehicles shall be employed to minimize exhaust emissions.

### 6.3.6 Increased Traffic and Community Health and Safety

#### **Impacts**

277. The laying of water supply distribution network will involve the use of considerable machinery within Kohat city along with posing the risk of community members falling into trenches excavated for replacement/laying of pipelines for water supply. In addition, the risk to commuters on the road during the construction works will be significant and thus a number of precautionary measures will be necessary to minimize the risk of possible accidents. Community Health & Safety may be compromised during road travel particularly in night hours if adequate barriers and lighting is not provided at construction sites.
278. Traffic diversion may result in severe congestion, pollution, and a high rate of accidents during peak hours. Lane blocking incidents cause major disruption to traffic flow. Peak hour congestion with low average speeds may be a source of public nuisance. As supply network will be constructed within TMA RoW along road side therefore no major road closure is expected during construction works. Traffic diversion are expected during construction of supply network which will be managed through implementation of traffic management plan.
279. Traffic congestion and mobility issues are not envisaged from construction of storage reservoirs and installation tubewells.
280. Traffic Management Plan has been attached as **Annexure I**.

#### **Mitigation Measures**

281. The following mitigation measures will be implemented:
- A comprehensive traffic management plan (TMP) must be developed and implemented;
  - As part of the TMP, it will be ensured that the movement of heavy vehicles used during laying of pipeline is minimized during the peak traffic hours of the day in order to prevent congestion and accidents as far as possible;
  - Furthermore, the movement of heavy vehicles within Kohat city during laying of pipeline must be restricted to specific routes containing least number of sensitive receptors and low traffic volumes.
  - Traffic diversions shall be avoided as much as possible. If these are unavoidable then it shall be of short duration with limited impact on traffic flow.

- Material stock piling and parking of machinery along the roads shall be avoided. Contrators shall identify suitable places for material stock piling and parking of machinery.
- Work areas outside the project site, especially where machinery is involved, will be barricaded and will be constantly monitored to ensure that local residents, particularly children stay away while excavated areas being prepared for laying of pipelines will be cordoned off. Also, no machinery will be left unattended, particularly in running condition.
- Local communities in the project area will be briefed on traffic safety, especially women who are the main care providers to children.
- Temporary walkways shall be constructed on trenches for providing passage commuters.
- Speed limit of 20 km/hr. will be maintained by all project related vehicles and nighttime driving of project vehicles will be limited where possible.
- Educate drivers on safe driving practices to minimize accidents and to prevent spill of hazardous substances and other construction materials during transport.
- Contractor must take proper safety measures (placing warning tapes around excavations) to avoid people, especially children, accidentally falling into excavations.
- All the working platforms must be cordon off with special care by well-trained skilled workers.
- Contractor will prepare construction management plan which will include the hazard prevention and safety plan, which will address health and safety of the people in the project area.
- PMU KPCIP shall ensure the contractor staff working in the project are well trained and educated in the Health, Safety and Environment (HSE) hazards associated with their duties, and that of the public, in the project area.

### 6.3.7 Occupational Health and Safety (OHS)

#### *Impacts*

**282.** There is invariably an OHS risk when construction works for the improvement of water supply system are conducted, and precautions will be needed to ensure the safety of the workers. Occupational Health and Safety Plan has been attached as **Annexure D**.

**283.** The major OHS hazards expected during the proposed activities are as follows:<sup>10</sup>

#### **Accident Hazards**

- Falls from height, especially when standing/working on ladders;

<sup>10</sup> [https://www.ilo.org/wcmsp5/groups/public/---ed\\_protect/---protrav/---safework/documents/publication/wcms\\_192256.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_192256.pdf)

- Slips, trips and falls, especially while carrying heavy or bulky loads;
- Cuts and injuries caused by sharp instruments and tools;
- Hazard of suffocation from asphyxiant gases released or from oxygen deficiency, during maintenance and cleaning operations;
- Burns caused by hot parts of equipment, steam lines etc., by release of hot water or steam;
- Electric traumas, caused by defective installations and equipment, especially portable;
- Musculoskeletal injury (especially of back), resulting from lifting and moving of heavy loads;

### ***Physical Hazards***

- Exposure to cold and/or heat stress, as a result of rapid movement between cold and hot areas;
- Exposure to UV radiation during welding operations;

### ***Chemical Hazards***

- Exposure to various chemicals, such as: adhesives, caulking compounds, fluxes (solder), hydrochloric acid, zinc chloride, tar and solvents, various greases and inorganic lead;

### ***Biological Hazards***

- Exposure to parasites, such as hookworm, ascaris, and various mites, chiggers and ticks;

### ***Ergonomic, psychosocial and organizational factors***

- Psychological stress due to dissatisfaction at work due to issues with peers, superiors etc.;
- General ill feeling as a result of work in confined spaces and development of 'sick building syndrome';

### ***Mitigation Measures***

#### ***General***

284. The Contractor will be required to prepare and implement an effective OHS Plan that is supported by trained OHS personnel and emergency response facilities. Construction contracts will include standard OHS measures and contractors will be bound to implement these fully.
285. Monitoring will be required to ensure that the health and safety plan based on contract specifications is followed.
  - Cement feed hopper areas will be inspected daily to ensure compliance with the requirement of dust masks.



- Surfaces (including flooring and work surfaces) in camps, kitchens, dining areas and workshops shall be solid and easy to clean. Flooring for work camps must be float finished concrete or better.
- All drivers engaged by Contractors must hold a valid license for the vehicle they are operating.
- Work in confined space shall be executed with available safety standards. Adequate monitoring and equipment shall be available to detect deficient oxygen levels.
- The Contractor shall submit to the Engineer of CSC for approval an emergency evacuation plan and practice the procedure annually.
- The Contractor shall submit to the Engineer of CSC for approval a site layout plan, identifying work areas, accommodation, kitchen, dining area, sanitary facilities, location of generators, plant and vehicle parking, transport routes through the camp, pedestrian routes through the camp, evacuation routes, emergency exits, batching plants, storage areas, waste facilities etc.
- Fire extinguishers shall be provided throughout camps and work sites. Fire extinguishers shall be inspected monthly and maintained as necessary.
- An adequate and reliable supply of safe drinking water shall be made available at readily accessible and suitable places including at all camps.
- The Contractor shall take samples from each supply of drinking water and arrange for analysis of these samples at EPA certified laboratory prior to its use by the Contractor's staff. The results of these tests for each supply must be submitted to the Engineer of CSC and must demonstrate that each water supply meets national and World Health Organisation standards for drinking water.
- The Contractor shall provide and maintain adequate hygienic kitchens which are sheltered and separated from the living quarters. Kitchens shall include raised and washable surfaces suitable for food preparation.
- The Contractor shall provide and maintain adequate hygienic dining areas for staff. Work places and camps shall be provided with both natural & artificial light. Artificial lighting shall be powered by generator in the event of power cuts.
- Public sensitization training shall be provided to workers to avoid social conflicts between residents and the construction contractor, Occurrence of any such impacts can be avoided by community sensitive project planning and implementation and through effective involvement of local administration.
- All OHS protocols shall be implemented in true letter and spirit.
- Contractor must appoint an OHS resource to implement, monitor and report the HSE management plan to concerned authorities.
- Contractor must ensure the provision of first aid facility at construction site and camps through hiring medics and establishing a dispensary at the campsite.
- Reasonable number of first aid kits shall be available on construction sites and within contractor camps.

- Site personnel will be provided appropriate type of personal protective equipment (PPEs). Contractor will ensure consistent use of PPEs.
286. Based on the type of hazard applicable during the proposed works at site, the following mitigation measures as per IFC guidelines for Occupational Health and Safety (OH&S) must be implemented:<sup>11</sup>

### ***Mitigation Measures for Physical Hazards***

#### ***Rotating and Moving Equipment***

287. Injury or death can occur from being trapped, entangled, or struck by machinery parts due to unexpected starting of equipment or unobvious movement during operations. Mitigation measures related to rotating and moving equipment on workers are provided below:
- Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions.
  - Where a machine or equipment has an exposed moving part or exposed pinch point that may endanger the safety of any worker, the machine or equipment shall be equipped with, and protected by, a guard or other device that prevents access to the moving part or pinch point. Guards shall be designed and installed in conformance with appropriate machine safety standards.
  - Turning off, disconnecting, isolating, and de-energizing (Locked Out and Tagged Out) machinery with exposed or guarded moving parts, or in which energy can be stored (e.g. compressed air, electrical components) during servicing or maintenance.
  - Designing and installing equipment, where feasible, to enable routine service, such as lubrication, without removal of the guarding devices or mechanisms.

#### ***Vibration***

288. Exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, shall be controlled through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure. Limits for vibration and action values. Exposure levels shall be checked on the basis of daily exposure time and data provided by equipment manufacturers.
289. Other sources of vibration at construction site are rollers, compactors or any loose part of machinery exposure which may cause serious injury or workplace sickness. No equipment and machinery with loose or vibratory parts will be allowed to work. Such issues will be fixed through maintenance of the machinery on periodic basis. Use of rollers for land grading will be carried out during day times and with intermittent intervals to reduce the impacts of vibration on surrounding environment

#### ***Electrical***

<sup>11</sup> <https://www.ifc.org/wps/wcm/connect/1d19c1ab-3ef8-42d4-bd6b-cb79648af3fe/2%2BOccupational%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES&CVID=ls62x8l>

**290.** Exposed or faulty electrical devices, such as circuit breakers, panels, cables, cords and hand tools, can pose a serious risk to workers. Overhead wires can be struck by metal devices, such as poles or ladders, and by vehicles with metal booms. Vehicles or grounded metal objects brought into close proximity with overhead wires can result in arcing between the wires and the object, without actual contact. Recommended actions include:

- Marking all 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; ·
- Double insulating / 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; ·
- Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work.

### ***Eye Hazards***

**291.** Solid particles from a wide variety of industrial operations, and/or a liquid chemical spray may strike a worker in the eye causing an eye injury or permanent blindness. Recommended measures include:

- Use of machine guards or splash shields and/or face and eye protection devices, such as safety glasses with side shields, goggles, and/or a full-face shield. Specific Safe Operating Procedures (SOPs) may be required for use of sanding and grinding tools and/or when working around liquid chemicals. Frequent checks of these types of equipment prior to use to ensure mechanical integrity is also good practice. Machine and equipment guarding shall conform to standards published by organizations such as CSA, ANSI and ISO.

### ***Welding/Hot Work***

**292.** Welding creates an extremely bright and intense light that may seriously injure a worker's eyesight. In extreme cases, blindness may result. Additionally, welding may produce noxious fumes to which prolonged exposure can cause serious chronic diseases. Recommended measures include: ·

- Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific work station (a solid piece of light metal, canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required. ·

- Special hot work and fire prevention precautions and Standard Operating Procedures (SOPs) shall be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated. Special procedures are required for hot work on tanks or vessels that have contained flammable materials.

### ***Industrial Vehicle Driving and Site Traffic***

293. Poorly trained or inexperienced industrial vehicle drivers have increased risk of accident with other vehicles, pedestrians, and equipment. Industrial vehicles and delivery vehicles, as well as private vehicles on-site, also represent potential collision scenarios. Industrial vehicle driving and site traffic safety practices include:

- Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading, load limits.
- Ensuring drivers undergo medical surveillance.
- Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms.
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures (e.g. prohibiting operation of forklifts with forks in down position), and control of traffic patterns or direction.
- Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to 'one-way' circulation, where appropriate.

### ***Ergonomics, Repetitive Motion, Manual Handling***

294. Injuries due to ergonomic factors, such as repetitive motion, overexertion, and manual handling, take prolonged and repeated exposures to develop, and typically require periods of weeks to months for recovery. These OHS problems shall be minimized or eliminated to maintain a productive workplace. Controls may include:

- Facility and workstation design with 5th to 95th percentile operational and maintenance workers in mind.
- Use of mechanical assists to eliminate or reduce exertions required to lift materials, hold tools and work objects, and requiring multi-person lifts if weights exceed thresholds.
- Selecting and designing tools that reduce force requirements and holding times and improve postures.
- Providing user adjustable workstations.
- Incorporating rest and stretch breaks into work processes and conducting job rotation.
- Implementing quality control and maintenance programs that reduce unnecessary forces and exertions.
- Taking into consideration additional special conditions such as left-handed

persons.

### ***Working at Heights***

**295.** Fall prevention and protection measures shall be implemented whenever a worker is exposed to the hazard of falling more than two meters; into operating machinery; into water or other liquid; into hazardous substances; or through an opening in a work surface. Fall prevention / protection measures may also be warranted on a case-specific basis when there are risks of falling from lesser heights. Fall prevention may include:

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area.
- Proper use of ladders and scaffolds by trained employees. ·
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines. ·
- Appropriate training in use, serviceability, and integrity of the necessary PPE.
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall.

### ***Fire and Explosions***

**296.** Fires and or explosions resulting from ignition of flammable materials or gases can lead to loss of property as well as possible injury or fatalities to project workers. Prevention and control strategies include:

- Fuel storage areas and generators will have secondary containment in the form of concrete or brick masonry bunds. The volume of the containment area shall be equal to 120% of the total volume of fuel stored.
- Storing flammables away from ignition sources and oxidizing materials. Further, flammables storage area shall be:
  - Remote from entry and exit points into camps
  - Away from facility ventilation intakes or vents
  - Have natural or passive floor and ceiling level ventilation and explosion venting
  - Use spark-proof fixtures
  - Be equipped with fire extinguishing devices and self-closing doors, and constructed of materials made to withstand flame impingement for a moderate period of time ·
- Defining and labeling fire hazards areas to warn of special rules (e.g. prohibition in use of smoking materials, cellular phones, or other potential spark generating equipment).

- Providing specific worker training in handling of flammable materials, and in fire prevention or suppression.
- Emergency Response Plan has been attached as **Annexure E**.

### ***Corrosive, oxidizing, and reactive chemicals***

**297.** Corrosive, oxidizing, and reactive chemicals present similar hazards and require similar control measures as flammable materials. However, the added hazard of these chemicals is that inadvertent mixing or intermixing may cause serious adverse reactions. This can lead to the release of flammable or toxic materials and gases, and may lead directly to fires and explosions. These types of substances have the additional hazard of causing significant personal injury upon direct contact, regardless of any intermixing issues. The following controls shall be observed in the work environment when handling such chemicals: ·

- Corrosive, oxidizing and reactive chemicals shall be segregated from flammable materials and from other chemicals of incompatible class (acids vs. bases, oxidizers vs. reducers, water sensitive vs. water based, etc.), stored in ventilated areas and in containers with appropriate secondary containment to minimize intermixing during spills. ·
- Workers who are required to handle corrosive, oxidizing, or reactive chemicals shall be provided with specialized training and provided with, and wear, appropriate PPE (gloves, apron, splash suits, face shield or goggles, etc.).
- Where corrosive, oxidizing, or reactive chemicals are used, handled, or stored, qualified first-aid shall be ensured at all times. Appropriately equipped first-aid stations shall be easily accessible throughout the place of work, and eye-wash stations and/or emergency showers shall be provided close to all workstations where the recommended first-aid response is immediate flushing with water.

### ***Mitigation Measures for Biological Hazards***

**298.** Biological agents represent potential for illness or injury due to single acute exposure or chronic repetitive exposure. Biological hazards can be prevented most effectively by implementing the following measures: ·

- The contractor shall review and assess known and suspected presence of biological agents at the place of work and implement appropriate safety measures, monitoring, training, and training verification programs.
- Project contractor must provide good working and sanitation conditions at camp and work sites. Disease surveillance shall be carried out to identify any exposure to parasites, such as hookworm, ascaris, and various mites, chiggers, ticks and dengue.
- Measures to eliminate and control hazards from known and suspected biological agents at the place of work shall be designed, implemented and maintained in close co-operation with the local health authorities and according to recognized international standards.

### **6.3.8 High Noise Levels**

#### ***Impacts***

299. The proposed improvement of water supply system will result in different construction equipment and machinery i.e. jack hammer, cutter, excavator, tubewells drilling rigs and haul trucks etc. being used which will generate high noise levels at the project site and in the project area.
300. The detailed mapping of sensitive receptors has been conducted and the types of receptors and their respective distances from the work sites are provided earlier. However, any required mitigation measures that shall be proposed will be to control potential impacts on noise to prevent any long-term impacts within the project area.
301. The assessment of the noise impacts on the sensitive receptors that have been identified at various locations in the project area depends upon:
  - Characteristics of noise source (instantaneous, intermittent or continuous in nature)
  - Time of day at which noise occurs, and
  - Location of noise source
302. Each construction activity has its unique noise characteristics due to use of different equipment items. The potential sources of noise during the preparation, construction, and worksite closure phases for the proposed improvement of water supply system works include equipment, machinery, and transportation used for the construction activities. The equipment used for construction will be the major source of noise.
303. Since various modern machines are acoustically designed to generate low noise levels, any high noise levels that might be generated will only be for a short duration during the construction phase.
304. Depending on the construction equipment used and its distance from the receptors, the community and the workers may typically be exposed to intermittent and variable noise levels. During the day, such noise results in general annoyance and can interfere with sleep during the night. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as a doubling or halving of sound level.
305. Due to the various construction activities, there will be temporary noise impacts in the immediate vicinity of the project site. The movement of heavy vehicles, drilling of tubewells, loading, transportation and unloading of construction materials produces significant noise during the construction stage. However, these increased noise levels will prevail only for a short duration during the construction phase.
306. The **Table 6.5** below represents typical noise levels from various construction equipment items. It shall be noted that the values indicated in the table may differ depending on the brand and age of machinery provided/used by construction contractors.

**Table 6.5: Construction Equipment Noise Ranges, dB (A)**

Equipment	Peak Noise Range at 15 m	Typical Peak Sound Level in a Work Cycle at 15 m	Typical 'Quieted Equipment' Sound Level at 15 m	Construction Phase		
				Earthworks	Structures	Installation
Batching plant	82-86	84	81		Y	
Concrete mixers	76-92	85	82		Y	
Cranes	70-94	83	80		Y	Y
Excavators	74-92	85	82	Y		
Front loader	77-94	85	82	Y	Y	Y
Water bowsers	85-93	88	85	Y	Y	Y
Graders	72-92	85	82	Y		
Bulldozers	65-95	85	80	Y		
Pavers	87-89	88	80	Y		
Pumps	68-72	76	75	Y	Y	Y
Diesel generators	72-82	81	77		Y	Y
Drilling machines (Jack Hammer/ portable jack hammer)	82-98	90	87	Y	Y	
Compressors	74-88	81	71		Y	
Dumpers	77-96	88	83	Y	Y	
Dump/flatbed Truck	75-85	80	77	Y	Y	Y

Sources: USEPA, 1971; <http://www.waterrights.ca.gov/EIRD/text/Ch11-Noise.pdf>;  
[http://www.lacsd.org/LWRP%202020%20Facilities%20Plan%20DEIR/4\\_6\\_Noise.pdf](http://www.lacsd.org/LWRP%202020%20Facilities%20Plan%20DEIR/4_6_Noise.pdf);  
<http://newyorkbiz.com/DSEIS/CH18Construction.pdf>

**Notes:**

- Where typical value is not cited in literature, mean of the peak noise range is assumed
- Quieted equipment can be designed with enclosures, mufflers, or other noise-reducing features. Where data is not available, a 3 dB reduction is assumed

**307.** Precise information on the type, quantity and location of equipment to be used during the construction phase is not available at this stage and will be dependent on the



working methods of the selected contractors. However, preliminary calculations have been conducted to provide a general magnitude of the noise levels during various construction phases.

308. Nearest sensitive receptors with respect to noise are the settlements of UC 1,2,3,4,5, and 6 of Kohat during laying of water supply system and associated activities. Maximum noise shall be generated while using mechanical/potable Jack hammer for cutting hard surfaces but this activity is limited as proposed only for cutting hard surfaces.i.e. concrete, however, excavators shall also be utilized for trenching along main roads, while in streets and congested areas, manual excavation has been proposed which do not produce noise. Moreover, rotary rig for drilling of tubewells also generate noise but of low intensity as compared to Jack Hammer.
309. The mitigation measures listed below shall be implemented to minimize noise levels during the construction activity as far as possible.

### ***Mitigation Measures***

310. The following mitigation measures will be implemented:
- Equipment noise will be reduced at source by proper design, maintenance and repair of construction machinery and equipment. Noise from vehicles and power generators will be minimized by use of proper silencers and mufflers.
  - Excessive noise emitting equipment will not be allowed to operate and will be replaced.
  - Blowing of horns will be prohibited on access roads to work sites.
  - Manual excavation has been proposed for congested areas to reduce generation of noise.
  - Limited use of jack hammer in populated areas.
  - As a rule, the operation of heavy equipment shall be conducted in daylight hours.
  - Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise.
  - Well-maintained haulage trucks will be used with speed controls.
  - Use of ear plug and ear muffs must be ensured during construction and drilling of tubewells. No employee shall be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear shall be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
  - Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls shall be investigated and implemented, where feasible.
  - Periodic medical hearing checks shall be performed on workers exposed to high noise levels.
  - Grievance redress mechanism will be established.

- All the equipment and machinery used during construction phase shall be well maintained and in compliance with NEQS.

### 6.3.9 Hazardous and Non-Hazardous Waste Management

#### *Impacts*

311. During construction/civil works potential sources of waste will include spoils generated during excavation of trenches, excavation waste for other civil works including tubewells and water storage reservoirs, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills.
312. Waste disposal of materials containing contents of both hazardous and non-hazardous nature such as scrap wood, bricks, concrete, asphalt, plumbing fixtures, piping, insulation (asbestos and non-asbestos), metal scraps, oil, electrical wiring and components, chemicals, paints, solvents etc. can potentially become a serious environmental issue, particularly with the local contractors. To avoid any potential issue, the PMU in collaboration with focal agencies will need to impose adequate internal controls.
313. Wastes generated during construction of tubewells will include dried bentonite, accidental spills from truck mounted rigs, and domestic waste generated from small camp established by crew members of rigs.

#### *Mitigation measures*

314. A waste management plan will be developed prior to the start of construction. This plan will cater to sorting of hazardous and non-hazardous materials prior to disposal, placing of waste bins at the project sites for waste collection and an onsite hazardous waste storage facility i.e. designated area with secondary containment.
  - Licensed waste contractors will be engaged to dispose off all non-hazardous waste material that cannot be recycled or reused.
  - Excavated material from trenches will be stored at site and it will be used as fill/cover material after laying of pipelines while excess spoil shall be transported to spoil disposal site if required.
  - Spoil/drill cuttings generated during drilling of tubewells shall be transported to spoil disposal site if required.
  - All types of combustible and non-combustible waste including plastic or glass bottles and cans will be temporarily stored on site and later sold/handed over to a waste/recycling contractor who will utilize these wastes for recycling purposes.
  - Waste management training for all site staff to be included in Contractor's training plan.
  - Fuel storage areas and generators will have secondary containment in the form of concrete or brick masonry bunds. The volume of the containment area shall be equal to 120% of the total volume of fuel stored.
  - Fuel and hazardous material storage points must be included in camp layout plan to be submitted for approval. Hazardous material storage areas shall include a concrete floor to prevent soil contamination in case of leaks or spills. Fuel tanks

will be checked daily for leaks and all such leaks will be plugged immediately.

- Designated vehicles/plant wash down and refueling points must be included in camp layout plan to be submitted for approval.
- Hazardous waste will be initially stored on site at designated area and then handed over to EPA certified contractor to final disposal.
- Record of waste generation and transfer shall be maintained by project contractors.
- Spill kits, including sand buckets (or other absorbent material) and shovels must be provided at each designated location.
- At the time of restoration, septic tanks will be dismantled and backfilled with at least 1m of soil cover keeping in view landscape of surrounding natural surface.
- It will be ensured that after restoration activities, the campsite is clean and that no refuse has been left behind.
- Clinical wastes will be temporarily stored onsite separately and will be handed over to approve waste contractor for final disposal.
- Training will be provided to personnel for identification, segregation and management of waste.
- The structure of a Framework waste management plan has been prepared for the project and attached as **Annexure L** and contractors will be required to prepare waste management plan for the site in light of guidelines provided in the waste management plan and submit to PMU for approval

### 6.3.10 Camp Effluent

#### *Impacts*

315. The staff and labor camps for the construction of the proposed improvement of water supply system will be a source of wastewater generated from the toilets, washrooms and the kitchen. The wastewater will not meet the national environmental standards and will therefore need treatment prior to disposal.
316. The project sites where construction is being conducted must not be treated by the project staff and/or labor as a public toilet or for disposal of camp effluent and construction waste.

#### *Mitigation measures*

- It will be ensured that no untreated effluent is released to the environment.
- A closed sewage treatment system including soak pits and septic tank will be constructed to treat the effluent from the construction/labor camps.
- Sewage treatment system will be installed at each respective labor camp based on the number of laborers residing at the respective camp.
- Wastewater from laundry, kitchen washings and showers will be disposed-off into soak pits or septic tank (where soak pit cannot be constructed) and after treatment it will disposed of in TMA provided drains in the project area.

- Soak pits will be built in absorbent soil and shall be located 300 m away from a water well, hand pump or surface water body. Soak pits in non-absorbent soil will not be constructed.
- Ensure that the soak pits remain covered all the time and measures are taken to prevent entry of rainwater into them.
- Sprinkling of grey water or sewage will not be allowed; in case the septic tank gets filled with sludge, septic tank shall be emptied through vacuum truck and material shall be transferred to treatment facility or approved municipal drain.
- Water being released from any batching plant(s) must be treated as per requirements of NEQS prior to release to sewerage system/any other water body.
- Sewage at the end of construction period to be disposed of in nearest municipal drains after getting approval from concerned municipal authorities.

### 6.3.11 Soil Contamination

#### *Impacts*

317. During the project construction, spills of fuel, lubricants and chemicals can take place while transferring from one container to another or during refueling. Also, during maintenance of equipment and vehicles, through leakages from equipment and containers and as a result of traffic accidents.
318. Bentonite mud will be used during drilling of boreholes to avoid the holes from collapsing. The mud and the cuttings will be disposed of into earthen pits backfilled after the mud and cuttings have dried. This mud is prepared by mixing bentonite with water. Bentonite is a natural clay material and non-hazardous in nature. Bentonite mud is also used for tube wells that are drilled for supplying water for drinking or irrigation purposes. The use of the mud and its disposal in earthen pits will therefore have no impacts on groundwater or soil quality. The mud and cuttings after drying may also return to dust.
319. Depending on the nature of the material, location of spill and quantity of spill, the soil can get contaminated.

#### *Mitigation measures*

- It will be ensured that spill prevention trays are provided and used during refueling. Also, on-site maintenance of construction vehicles and equipment will be avoided as far as possible. In case on-site maintenance is unavoidable, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil.
- Regular inspections will be carried out to detect leakages in construction vehicles and equipment and all vehicles will be washed in external commercial facilities.
- Fuels, lubricants and chemicals will be stored in covered bounded areas, underlain with impervious lining. Appropriate arrangements, including shovels, plastic bags and absorbent materials will be available near fuel and oil storage areas.
- Bentonite mud used for the purpose of uphole and deep-hole drilling will be prepared in rig tanks. The used mud will be disposed of in the purpose built pit and left to dry. After the mud has dried the pit will be backfilled;

### 6.3.12 Employment Conflicts

#### *Impacts*

320. The proposed improvement in water supply network is not likely to create any significant permanent job opportunities. Even unskilled and semi-skilled employment opportunities that are likely to be created will be for a short period during construction. As persons with relevant skills may be available locally, people from the project area are likely to fill a significant number of the semi-skilled and skilled jobs.
321. This issue of provision of jobs can become particularly problematic if it is perceived by the local population that a significant number of construction-related jobs opportunities are not given to people from the local community. This can result in friction between local residents and construction workers from outside of the community.

#### *Mitigation measures*

- The Construction Contractor will adopt a transparent hiring policy. Prior to the commencement of the construction activity, the local communities in the project area will be informed of the employment policy in place and number of people that can be employed for this project.
- It will be ensured that maximum number of unskilled and semi-skilled jobs will be provided to the residents of the project area.
- The PMU KPCIP will ensure a balanced process of employment of the communities in the project area with preference given to those most directly affected by the project.

### 6.3.13 Communicable diseases incl. COVID-19

#### *Impacts*

322. Communicable diseases such as COVID-19 and HIV may be introduced due to the immigration of workers associated with the project.
323. Ministry of National Health Services, Regulations and Coordination, GoP has issued guidelines in April, 2020 for Health & Safety of Building and Construction Workers during COVID-19 outbreak. These guidelines are prepared for the workers involved in building and construction work during the current epidemic of COVID-19. These guidelines provide the safety measure to be implemented at the construction site having a dusty environment, continuous flow of different materials and make-shift type of arrangements for storage, food and sanitation calls for implementation of safety precautions at the very basic level of personal hygiene only.

#### *Mitigation measures*

324. A communicable diseases prevention program will be prepared for construction workers or residents near the construction sites.

#### **COVID-19 specific measures WHO**

- All workers must perform complete sanitization at the site as per SOPs/guidelines issued by WHO and the national guidelines issued by the Government of Pakistan

(GOP)<sup>12</sup>.

- All workers must wear a mask and gloves as soon as they arrive at site and must keep wearing it at all times while present at the work site/hospital premises. The use of masks are provided as **Annexure K**.
- As soon as workers arrive at work site, their body temperature must be checked and in case any worker is assessed to be running a fever or suffering from a flu or cough, he must be informed to leave immediately and self-isolate for a two-week period and not report for work until this two-week mandatory period has been completed.
- At the work site(s), social distancing measures must be strictly implemented and gathering of workers at any location at the work site(s) must be strictly forbidden. In case of workers not taking this measure seriously, strict penalties must be imposed to ensure implementation.
- The work tasks must be divided into shifts, as far as possible, to reduce the workforce present at the work site(s) at any one moment and improve the working speed/efficiency.
- All workers will be strictly advised to wash their hands as frequently as practicable and not to touch their face during work.
- A supply of safe drinking water will be made available and maintained at the project site(s).
- COVID awareness sign boards must be installed at the camp clinic and at the work site(s).
- Contact details of all workers will be kept in a register on site in order to efficiently trace and manage any possible workers that might experience symptoms of COVID-19.
- Prohibition of entry for local community/any unauthorized persons at work sites.
- Proper hygiene practices in the toilets and washrooms will be implemented with proper and adequate use of soaps and disinfectant spray.
- Social distancing must be maintained during the pick-up and dropping off of workers from their residences to and from the work site(s).

325. WHO advice on Use of Masks for the COVID-19 Virus has been attached as **Annexure K**.

#### ***COVID-19 specific measures GOP***

##### **Advice for Site Managers:**

- Every construction project shall make proper arrangements for uninterrupted building services including but not restricted to, electricity, fuel, water supply, water disposal and sanitation, communication links, washrooms with hand hygiene and shower facility and with proper and adequate supply of soaps and disinfectants.

<sup>12</sup> <https://covid.gov.pk/guideline>

- Workers shall not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.
- Ensure the availability of the thermal gun at the entry and exit of the construction site and no worker shall be allowed without getting his/her temperature checked.
- Site manager must maintain a register of all contact details with NID number and addresses of all present at the site in case a follow up or tracing and tracking of contacts is required at a later stage.
- Develop the employee roaster to decrease the number of people on the site very day. Split the shifts of the workers in morning and evening with limit of each shift to 8 working hours.
- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must be provided with a face mask. It must be ensured that everyone during his or her presence at the site continues to wear the mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Non-essential work trainings must be postponed avoiding gathering of people.
- Ensure the physical distance by creating more than one route of entry and exit to the site.
- Instruct the workers to inform the construction manager (or authorities) if
  - They develop any symptoms of cough, flu or fever.
  - They have been exposed to someone suspected or confirmed with COVID 19.
  - They have met someone who has a travel history of COVID 19 endemic country. They have travelled in last couple of days or plan to travel soon.
- All incidences of appearance of the symptoms of COVID-19 shall be immediately documented and maintained at the site and information regarding which shall be immediately communicated through e-mail or else, to the designated health facility, and the sick worker shall be transported to the health facility for further advice and action. The site manager must establish a link with a nearby healthcare facility with arrangements for quick transportation of workers in case of an emergency.
- Persuade the workers to inform the authorities for their safety and of other if they observe any signs and symptoms in a colleague.
- Do not allow any worker at the construction site who has the symptoms.
- Display the awareness banners about hand hygiene and physical distancing, where you can, around the work site.
- Everyone on the construction site must observe sneezing and coughing etiquettes. Workers shall be requested and required to wash their hands as frequently as

practicable and shall also be advised not to touch their face with their hands during work.

- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Only sanitizable dining surfaces shall be used, which must be cleaned before each service.
- The lunch breaks and stretch breaks of the workers must be staggered to avoid the clustering of workers. Workers must not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- In the wake of current restrictions on transportations site managers will ensure safe transport arrangements for worker which shall not be crowded and shall have social distancing in place during the entire process from pickups till drops at destination.
- In case of workers sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms, in a well ventilated area.
- A supply of safe drinking water must be made available at the project site and maintained.
- Adequate ventilation shall be provided in dining areas, resting places and sleeping areas.

**Advice for Construction Workers:**

- All possible and prescribed measures shall be taken to ensure your and others health. Enter your contact details in the register maintained at the site, in case a follow up or tracing and tracking of contacts is required at a later stage.
- Follow hygiene practices at washrooms and shower facility with proper and adequate use of soaps and disinfectants.
- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must use face mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Workers shall wash their hands as frequently as practicable and shall not to touch their face with their hands during work.
- Everyone on the construction site must observe sneezing and coughing etiquettes.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.



- Sick workers shall immediately inform the site manager and must get medical advice from nearby health Centre.
- Only sanitizable dining surfaces shall be used.
- Do not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- Do not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.
- Use safe transport arrangements which shall not be crowded and shall have social distancing in place during the entire process from pickups till drops at destination.
- In case sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms in a well ventilated area.

#### **Deliveries or Other Contractors Visiting the Site:**

- Non-essential visits to the construction sites shall be cancelled or postponed.
- Delivery workers or other contractors who need to visit the construction site must go through temperature check before entering and shall be given clear instructions for precautions to be taken while on site.
- Designate the workers, with protective gears or at least gloved and mask, to attend to the deliveries and contractors.
- Make alcohol-based hand sanitizer (at least 70%) available for the workers handling deliveries.
- Instruct the visiting truck drivers to remain in their vehicles and whenever possible make use of contactless methods, such as mobile phones, to communicate with your workers.

### **6.3.14 Vegetation and Wildlife Loss**

#### ***Impacts***

- 326.** The water distribution network will use RoW of TMA and mostly along existing roads and streets therefore, no vegetation and wildlife loss is envisaged. The tube wells and water storage reservoirs are also located within urbanized area therefore, no vegetation and wildlife loss is expected.

#### ***Mitigation measures***

- Off-road travel will be strictly prohibited and observance of this will be monitored during execution of the project. and
- Vehicles speed will be regulated and monitored to avoid excessive dust emissions.
- No hunting or killing of animals will be permitted.
- No cutting down of vegetation or using vegetation or trees as firewood will be permitted.

### 6.3.15 Historical/Archaeological Sites

#### *Impacts*

327. No historical/archaeological sites have been identified in the project area or project site.

#### *Mitigation measures*

328. If evidence of any archaeological remains is found during the construction activities, the excavation work will be stopped immediately, and necessary next steps taken to identify the archaeological discovery based on the 'Chance Find' procedures provided as **Annexure F**.

### 6.3.16 Site restorations

#### *Impacts*

329. After completion of construction activity the project facilities will be restored as close to its original condition as possible. One of the important tool is the photographic record of project facilities e.g., campsite(s) prior to set-up will be taken and will be compared after site restoration.
330. Unattended construction waste and excavated material along the RoW water supply mains will be source of bad aesthetics within city. Before closure of typical construction day area need to be cleared from all type of waste and construction material.

#### *Mitigation measures*

- Demobilization of all equipment and machinery;
- Disposal of any waste material remaining at the time of completion of the operation;
- Backfilling of all excavation followed by compactions;
- Dismantling and removal of fence or barriers surrounding the campsite area; and
- General restoration of the site area including landscaping and restoration of drainage where required.
- PMU KPCIP through CSC will ensure that restoration of construction works at intake structures, water transmission and supply mains will be carried out by contractors.
- PMU KPCIP will ensure periodic monitoring of such restorations.
- Contractors will develop site restoration protocols and will submit to CSC/PMU for review and approval.
- Construction site restoration protocols will be part of bidding documents and constructions contracts.
- Construction contractor will add restorations costs into BOQs.

## 6.4 Operation Phase

331. The potential impacts from operation of water supply system are provided as **Table 6.6** below.

**Table 6.6: Screening of Possible Impacts during Operation Phase**

S/No.	Potential Issues	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Ground water Abstraction	Likely	Major	Medium	Long term
2	Water system leaks and water discharges during flushing	Unlikely	Major	Medium	Long term
3	Occupational Health and Safety	Likely	Major	Medium	Long term
4	Improved drinking water availability	Positive impacts expected			Long term positive residual impact
5	Improvements in Public Health	Positive impacts expected			Long term positive residual impact

- Critical Risk Level
- Significant Risk Level
- Medium Risk Level
- Low Risk Level
- Positive Impacts

### 6.4.1 Ground Water Abstraction

#### Impacts

332. Installation of new tubewells and water abstraction from existing tubewells will result in ground water depletion in Kohat. The installation of new tubewell can also reduce water levels in adjacent tubewells.
333. Ground water is plentifully available which is being harnessed by the local community for domestic and irrigation purpose. The recharging capacity of tubewells in Kohat is good as ground water aquifers are recharged through Tanda dam and Kohat toi river. The depth of tubewells located in Kohat under WSSCK is 250-300 ft with average design life of 15 years.
334. There are 65 number of existing tube wells under the jurisdiction of WSSC Kohat. At present, 56 out of 65 tube wells are operational while the remaining 9 tube wells are non-operational. To meet water demand only 10 new tubewells will be installed.

#### Mitigation Measures

- Over pumping shall be avoided as over pumping can result in a lowering of ground

water levels to the point where it is no longer feasible or possible to continue pumping.

- Periodic monitoring of tubewells recharge rate to ascertain the continuous water availability for the project.
- New tubewells shall be 100 m away from existing tubewells unless it is established by hydrogeological study that the new tubewell will not affect the yield of existing well.

#### **6.4.2 Water system leaks and water discharges during flushing**

##### ***Impacts***

- 335.** Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminated water to leak into the system) and increasing the demands on the source water supply, the quantity of chemicals, and the amount of power used for pumping and treatment. Leaks in the distribution system can result from improper installation or maintenance, inadequate corrosion protection, settlement, stress from traffic and vibrations, frost loads, overloading, and other factors.
- 336.** Water supply lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface water bodies. Recommended measures to prevent, minimize, and control impacts from flushing of mains include:

##### ***Mitigation Measures***

- Ensure construction meets applicable standards and industry practices
- Conduct regular inspection and maintenance;
- Implement a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas);
- Consider replacing mains with a history of leaks or with a greater potential for leaks because of their location, pressure stresses, and other risk factors.
- Discharge the flush water into a municipal sewerage system with adequate capacity;
- Discharge the flush water into a separate storm sewer system
- Minimize erosion during flushing, for example by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities

#### **6.4.3 Occupational Health and Safety**

##### ***Impacts***

- 337.** There are low occupational health and safety risks associated with the operation of the proposed water supply system, keeping in view the limited scope of work to be conducted on a daily basis. During operation of water supply system, handling of valve, flow regulators, switching on/off of pumps/tubewell will be the daily routine activity.

Other than that pipe flushing, maintenance work, and cleaning of tanks will also be done as per maintenance regime and requirement. Draft Occupational Health and Safety Plan has been attached as **Annexure D**.

### ***Mitigation Measures***

**338.** In order to ensure a safe and healthy working environment for the WSSC staff, the following measures have to be strictly enforced, implemented and monitored:

- PMU KPCIP and WSSC Kohat through CSC will ensure the implementation of SOPs issued by GoP and WHO related to COVID-19.
- Designation of an Environment, Health and Safety (EHS) officer dedicated for the project;
- All employees must be able to reach their work stations safely. All path, walkways, staircases, ladders and platforms must be stable and suitable for the tasks to be undertaken;
- Strict use of Personal Protective Equipment (PPE) by all personnel (especially staff working in workshop/ doing maintenance work) must be ensured.
- Mandatory training of all employees, including sub-contractors, on Health and Safety Practices. Tool Box talks are also recommended;
- Accidental fires must be addressed immediately. Firefighting plan shall be developed and extinguishers shall be placed at appropriate locations.
- Emergency plan (including fire management) must be developed and implemented;
- Availability of first-aid kits and vehicles that can be used to bring any injured employee to the nearest doctor in cases of accidents;
- Mandatory reporting of all accidents or incident of near misses of accidents and immediate adoption of corrective measures; and
- Management must provide all the necessary financial and manpower resources for the implementation and enforcement of all health and safety programs and activities of the project;
- Regular training and orientation on safety practices will be implemented to impart knowledge of safe and efficient working environment. Furthermore, regular health checkups of all employees including contract workers will be conducted. Effective and proper housekeeping is recommended. Heat levels must be monitored as well. Spot checks shall be done to ensure that workers' welfare is addressed especially during summer months.

#### **6.4.4 Improved drinking water availability**

##### ***Impacts***

**339.** The continued supply of domestic water by proposed project will be an indispensable facility in Kohat. The proposed improvement in water supply system will facilitate the domestic as well as commercial water requirements of people living in Kohat. With the replacement of outlived/rusted pipeline water shortages and leakage/wastage issues

shall also be resolved. Moreover, the proposed project will provide Improved and sustainable potable water availability to citizens of Kohat for next thirty years. The project will reduce abstraction of ground water from private tube wells and water bores reducing chances of ground water depletion, moreover metering system will reduce exploitation of water resources and energization through clean energy sources will reduce operation cost for WSSCK.

340. Furthermore, project implementation will also create job opportunities during construction, thereby improving the socioeconomic condition of the local people and help in improving their quality of life.

341. ***Mitigation measures***

- No measures required.

#### 6.4.5 Improvements in Public Health

***Impacts***

342. The clean potable water will reduce water borne disease, improve public health and ultimately reduced pressure on health care system

***Mitigation measures***

- No measures required.

#### 6.5 Cumulative Impacts

343. Based on the scoping exercise of the site and based on discussions with the public sector agencies, Sewerage Treatment System at Kohat Development Authority (KDA) situated in Union Council Urban-4 of Kohat a subproject proposed under KPCIP is planned within the area of influence (AOI) of improvement in water supply system Kohat. However, the overall responsibility for the implementation and monitoring of the of both project rests with the Project Director (PD), Project Management Unit (PMU), KPCIP. The PD at the PMU, using the Construction Supervision Consultant (CSC), will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field. Therefore, PMU shall manage timeline for both of the projects to avoid traffic congestions and contractor conflicts. Moreover, timely repair and maintenance activities shall be carried out to reduce prolonged road closures during laying of sewerage lines or distribution networks.

#### 6.6 Indirect and Induced Impacts

64. Potential impacts arising from each phase of the proposed improvement of water supply system has been identified and assessed on the basis of field data, secondary data, expert opinion and examining previous similar projects in Pakistan. These include effects on physical, biological and socio-economic environment. Impacts on the environment from air emissions, traffic and community noise have also been assessed and have found to be acceptable and within the carrying capacities of the environmental media.
65. Thus, negative indirect and induced impacts from the proposed project activities are not expected.

## 7 Environmental Management Plan & Institutional Requirements

### 7.1 Introduction

344. The IEE has identified potential impacts that are likely to arise during proposed improvement of water supply system in detail, both negative and positive impacts at each stage of the project. To minimize the effects of adverse impacts the IEE has recommended mitigation measures in the EMP. The proposed mitigation measures have been based on the understanding of the sensitivity and behavior of environmental receptors in the project area, the legislative controls that apply to the project and a review of good industry practices for projects of similar nature. For residual impacts (impacts remaining after applying the recommended mitigation measures) and for impacts in which there can be a level of uncertainty in prediction at the IEE stage, monitoring measures have been recommended to ascertain these impacts during the course of the project activities.
345. The Environmental Management Plan (EMP) is developed to eliminate and/or mitigate the impacts envisaged at the design, construction and operation stages.
346. The detailed EMP provided in this document as **Table 7.1** ensures that improvement of water supply system Kohat has no detrimental effect on the surrounding environment. The Plan shall act as a guideline for incorporating environmental measures to be carried out by the contractors engaged for the proposed project. It shall also be used for other parties concerned for mitigating possible impacts associated with each project and will form part of the Contract documents to be considered alongside the specifications. This Plan shall act as the Environmental Management and Monitoring Plan during the construction and operation phase of the project and will allow for prompt implementation of effective corrective measures.

### 7.2 Environmental Management Plan (EMP)

347. The EMP attached with this report ensures the following:
- Delivery of the prescribed environmental outcomes during all phases of this sub-project;
  - Formulating a system for compliance with applicable legislative requirements and obligations and commitments for this sub-project.
  - Ensure that project design process incorporates best practice environmental design and sustainability principles to minimize potential impacts of construction and operation on the environment and community.
  - Ensure that the construction and operation work procedures minimize potential impacts on the environment and community.
  - Develop, implement and monitor measures that minimize pollution and optimize resource use.

### 7.3 Objectives of EMP

348. The EMP provides a delivery mechanism to address potential impacts of the project activities, to enhance project benefits and to outline standardized good practice to be adopted for all project works. The EMP has been prepared with the objectives of:
- Defining the roles and responsibilities of the project proponent for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the project;
  - Outlining mitigation measures required for avoiding or minimizing potential negative impacts assessed by environmental study;
  - Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the study;
  - Defining the requirements for communication, documentation, training, monitoring, management and implementation of the mitigation measures.

### 7.4 Environmental Management Monitoring and Reporting

349. During the construction phase, the overall responsibility for the implementation and monitoring of the EMP rests with the Project Director (PD), Project Management Unit (PMU), and KPCIP. The PD at the PMU, using the Construction Supervision Consultant (CSC), will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field.
350. During the operation phase, the overall responsibility for the implementation and monitoring of the EMP rests with CEO WSSCK. Project will be administered and monitored through City Implementation Unit (CIU) that will be developed within WSSCK which will deliver services based on indicators sets out in Services and Assets Management Agreement (SAMA).
351. The specific roles and responsibilities for environmental management and monitoring are provided in **Table 7.1** below. The expected costs for implementing any required mitigation measures are provided in **Table 7.7** below.

#### 7.4.1 Inclusion of EMP in Contract documents

352. In order to make Contractors fully aware and responsible of the implications of the EMP and to ensure compliance, it is recommended that mitigation measures be treated separately in the tender documentation and that payment milestones shall be linked to performance, measured by execution of the prescribed mitigation measures. Such a procedure will help ensure adequate management of project impacts is carried out during the construction and operation phases, where a consistent approach will be expected on behalf of the Contractor and its sub-contractors so that data and information collected from monitoring programs is comparable with baseline monitoring data.
353. The Contractor shall be made accountable through contract documents and/or other agreements for fulfilling the environmental safeguard obligations and delivering on the environmental safeguard components of the Project. Contractors shall be prepared to co-operate with the executing agency and supervising consultants and local population



for the mitigation of adverse impacts. After the EMP's inclusion in the contract documents, the Contractor will be bound to implement the EMP and will engage appropriately trained environmental and social management staff to ensure the implementation and effectiveness of the mitigation measures.

354. The Contractor is required to bid for executing the EMP, including the recommended mitigation measures and monitoring programs, as part of its Bill of Quantities (BOQ).

## **7.5 Institutional Arrangements**

355. The environmental management plan will require involvement of the following organizations for its implementation during construction and operation phases of the project:

### **7.5.1 Role of PMU, KPCIP, LGE RDD**

356. The PMU will:
- Provide support to ADB missions;
  - Coordinate activities with all stakeholders, review consultants, proposals, and provide overall guidance during various stages of project preparation;
  - Manage and ensure safeguard due diligence and disclosure requirements including resettlement and environmental safeguards in accordance with ADB's Safeguard Policy Statement (2009) and KP government requirements;
  - Manage and ensure effective implementation of the gender action plan;
  - Ensure submission of all IEE requirements as per law by responsible entities; and
  - Monitoring of activities of the entire project.

### **7.5.2 Role of the ADB**

357. The ADB will:
- Support the coordination and administration of the project;
  - Provide guidance to PMU KPCIP and WSSCK on implementation issues and project design;
  - Disclose all safeguards documents, and monitor safeguards implementation;
  - Monitor and report project performance;
  - Conduct periodic review of the project;

### **7.5.3 Role of Construction Supervision Consultant (CSC)**

358. The CSC will be responsible for the following items:
- Incorporates into the project design the environmental protection and mitigation measures identified in the EMP for the design stage;
  - Assists PMU to ensure that all environmental requirements and mitigation measures

from the IEE and EMP are incorporated in the bidding and contracts documents.

- Prior to construction, reviews the updated SSEMPs prepared by the contractor.
- Undertakes environmental management capacity building activities for relevant project focal staff including staff from contractors

#### **7.5.4 Role of KP EPA**

**359.** The KP EPA will have the following responsibilities with regards to this project:

- Provides regulatory compliance works for the project.
- Reviews and approves environmental assessment report of water supply system, submitted by PMU.
- Issues environmental clearance certification for the Project based on their mandate and regulations.
- Undertakes monitoring of the project's environmental performance based on their mandate.

#### **7.5.5 Role of Project Contractor**

**360.** The project contractor will be responsible for following items:

- Implementation of, or adherence to, all provisions of the IEE and EMP;
- Preparation of site specific EMPs (SSEMPs) as required. SSEMPs will be prepared by Contractor's Environment Specialist, site in charge, HSE staff and project technical team before their mobilization and it will be submitted to Engineer of construction supervision consultant/PMU for review and approval. Site Specific EMP (SSEMP) Guide & Template for Guidance to Contractor has been attached as **Annexure H**.
- Contractor's environmental performance will rest with the person holding the highest management position within the contractor's organization. Reporting to their management, the contractor's site managers will be responsible for the effective implementation of the EMP.
- The Contractor will be required to have qualified Environmental Specialists in their team to ensure all mitigation measures are implemented during the different development phases of the project.

#### **7.5.6 Role of WSSCK**

**361.** The WSSCK will be responsible for following items:

- Implementation of, or adherence to, all provisions of the IEE and EMP
- Preparation of site specific EMPs for operations phase
- WSSCK will be responsible to ensure that if contractors are engaged during operations of water supply system shall execute activities in compliance to IEE/EMP.

- WSSCK will design and drive behavior change campaigns to increase public participation and cooperation. Public cooperation will be extended through incentives and penalties to the public.
- WSSCK will plan customer feedback surveys in order to ensure sustainable service delivery and to remove gaps in the system.

## 7.6 Monitoring Parameters

362. A monitoring plan for the pre-construction/design and construction phases of the project, indicating environmental parameters, frequency and applicable standards is provided below as **Table 7.2 and Table 7.3** below.
363. During the procurement/pre-construction period, the monitoring activities will focus on (i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time.
364. During the construction period, the monitoring activities will focus on ensuring that any required environmental mitigation measures are implemented to address possible impacts.
365. In general, the construction impacts will be manageable, and no insurmountable impacts are predicted, provided that the EMP is implemented to its full extent as required in the Contract documents. However, experience suggests that some Contractors may not be familiar with this approach or may be reluctant to carry out some measures. For the proposed project, in order that the Contractor is fully aware of the implications of the EMP and to ensure compliance, environmental measures must be costed separately in the tender documentation and listed as BOQ items, and that payment milestones must be linked to environmental performance, Vis a Vis the carrying out of the EMP.
366. The effective implementation of the EMP will be audited as part of the loan conditions by ADB, and as part of regulatory/NOC compliance by KP EPA. In this regard, the PMU/CSC will guide the design engineers and Contractors on the environmental aspects and necessary EMP documentation. Monitoring during operation phase will be carried out by WSSC Kohat.

## 7.7 Environmental Training

### 7.7.1 Capacity Building and Training

367. Capacity building and training programs are necessary for the project staff in order to control the negative impacts resulting from the project construction and during its operation phase. They will also require trainings on monitoring and inspecting of such a project for environmental impacts and for implementation of mitigation measures.
368. The details of this capacity building and training program are presented in the **Table 7.5**

## 7.8 Environmental Staffing and Reporting Requirements

369. EMP implementation will be responsibility of all project stakeholders including PMU, WSSCK, Project Construction contractors, O&M contractor and other suppliers involved in the project. Requirement of environmental staffing will be part of bidding documents and necessary cost will be allocated as BOQ item by the bidder. PMU will maintain environmental safeguard staffing (Environmental/Environment Associate) for construction and operation phase of the project to monitor and supervise EMP implementation and performance. Environment expert will also be part of CSC technical team and will produce bi-weekly and monthly environmental compliance reports during construction phase. Environment expert of CSC will be responsible to monitor the implementation of EMP during construction phase by project contractors. Project contractors will also hire sufficient environmental officers to implement the EMP requirements and prepare necessary EMP documentation. Project contractor EMP staff will prepare daily environmental reports and submit to CSC for approval and record. Within city implementation unit (CIU), WSSCK will hire qualified environmental specialist during operation phase of the project who will be responsible for EMP implementation and reporting by WSSCK and its O&M contractors during operation. Monthly environmental compliance report will be prepared by WSSCK and circulated to concerned authorities.
370. Organogram of PMU KPCIP within LGERDD and City implementation unit (CIU) within WSSCs is provided as **Figure 7-1 and 7-2**.

**Figure 7-1: Proposed Organogram of PMU KPCIP**

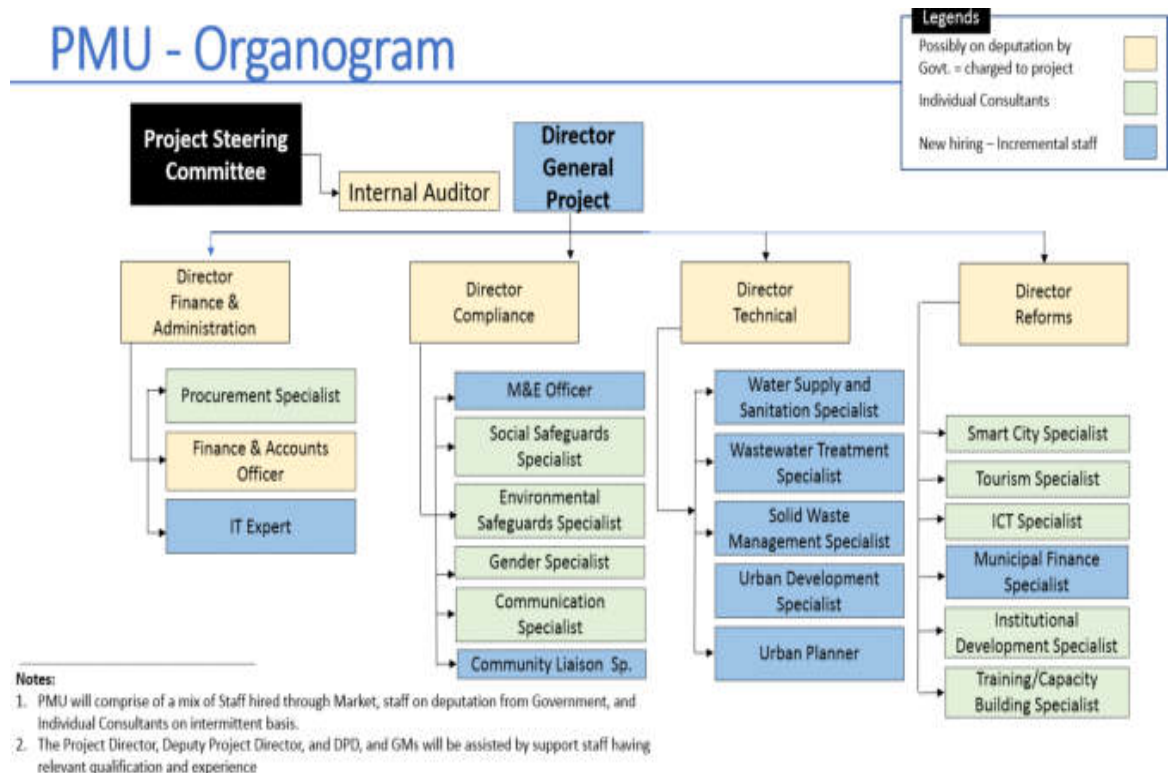
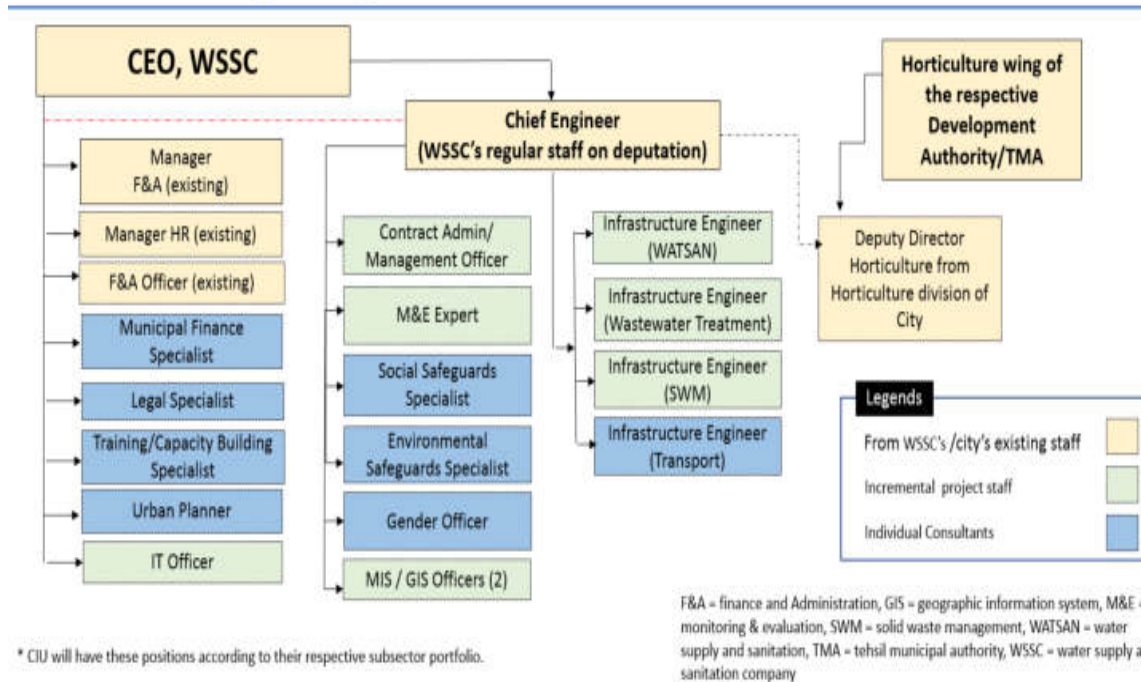


Figure 7-2: Proposed Organogram of CIU WSSC Kohat

## CIU - Organogram



**Table 7.1: Environmental Management Plan**

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
<b>Design/Pre-Construction Phase</b>	1.1	Improper design of distribution networks including supply main	<ul style="list-style-type: none"> <li>The design criteria are mainly based on the standards and specifications of WASA Lahore. Where required, international best practices were also considered in establishing the design criteria for the proposed water supply system. Design criteria of proposed water supply system is summarized in Table 3.1.</li> <li>1.2-meter cover has been proposed from the top of pipe to reduce chances theft and pipe bursting due to traffic loads.</li> <li>Before commissioning water supply network shall be tested on 1.5 times the designed pressure to check leakages.</li> <li>Water metering system shall be proposed to reduce theft and water wastage.</li> </ul>	EDCM	PMU	BC: during detailed designing of the sub-project
	1.2	Improper location of storage tanks and pumping station	<ul style="list-style-type: none"> <li>Based on the hydraulic model of the proposed supply mains and distribution networks, raw water from sources shall be conveyed under gravity.</li> <li>Water supply network design shall facilitate uninterrupted water supply through gravity system without technical constraints.</li> <li>Two additional pumps of same capacity were also provided for backup purposes at new</li> </ul>	EDCM	PMU	BC: during detailed designing of the sub-project

			pumping stations for uninterrupted water supply.			
	1.3	Lack of integration of IEE/EMP requirements into Construction bid documents	<ul style="list-style-type: none"> <li>The proposed 'Safeguards unit' that will be developed at the PMU will be assigned the task to check that design and bid documents are responsive to key environmental, social and safety considerations, and that the proposed method of work reflects the boundaries defined in the EMP. The bid documents must include the EMP and its implementation cost must be reflected in the BOQ.</li> <li>IEE/EMP implementation and monitoring requirements must be part of bidding documents and necessary contractual binding must be agreed by project contractors before award of contract.</li> <li>Project contractors shall have qualified and experienced environmental staff to plan, arrange, implement, monitor and report IEE/EMP requirements</li> </ul>	EDCM	PMU	BC: during detailed designing of the sub-project
	1.4	Material Haul Routes	<ul style="list-style-type: none"> <li>The construction vehicles hauling materials along the Kohat city roads and anywhere where there are sensitive receptors such as hospitals, schools and/or roadside residences will be limited and the PMU in collaboration with the focal agencies will establish a route plan to minimize this disruption which shall be appended to the EMP</li> </ul>	EDCM	PMU	BC: during detailed designing of the sub-project

	1.5	Inadequate Contractor's Environmental Safeguards Capacity	<ul style="list-style-type: none"> <li>PMU KPCIP shall review the contractor capacity with respect to safeguard management and contracts shall be awarded accordingly.</li> <li>The Contractor will be required to define an Occupational and Environmental Health and Safety procedure for all work, including work camp operation, management of cement dust, and use of Personal Safety Equipment. These procedures shall be developed and approved by the PMU in collaboration with the focal agencies before the Contractor commences any physical works on ground.</li> <li>PMU KPCIP shall ensure the project contractors are selected on merit and necessary funds has been allocated in the contract documents for EMP implementation and monitoring</li> </ul>	PMU	-	BC: during detailed designing of the sub-project
	1.6	Identification of Locations for Labor Camps and ancillary facilities	<ul style="list-style-type: none"> <li>In order to prevent a nuisance, specific locations shall be designated for development of the labor camps. All necessary facilities and amenities shall be provided in these camps such as resting area, drinking water, electricity, supply of water.</li> <li>Solid and liquid effluent waste disposal facilities shall also be designed to cater waste of administration/office building etc.</li> <li>The use of proper planning while identifying locations for the labor camps will ensure there is minimal disturbance to all key receptors</li> </ul>	PMU		BC: during detailed designing of the sub-project



			and the traffic is not disrupted by labor camps being set up roadside next to the construction sites			
	1.7	Land Acquisition and Resettlement Impacts	<p>The PMU KP LGERDD shall ensure the following:</p> <ul style="list-style-type: none"> <li>▪ Due payment to all land owners must be paid before mobilization of construction contractors.</li> <li>▪ Social safeguard unit shall ensure that project affected people has been paid following appropriate procedures and there are no grievances about land acquisition process.</li> <li>▪ PMU KPCIP will expedite the process of land i for proposed 16 surface tanks.</li> <li>▪ PMU KPCIP will ensure that no land acquisition issue left before start of construction works and grievances are adequately addressed.</li> </ul>	EDCM	PMU	
	1.8	Impacts due to Natural hazards	<ul style="list-style-type: none"> <li>▪ The PMU KPCIP shall ensure the proposed infrastructure shall be designed keeping in view the seismic zone 3 building considerations.</li> <li>▪ Surface water diversion shall be included in the design to protect structures from flash flooding.</li> <li>▪ Provision in design are included so that water supply network shall not be disrupted/impacted</li> </ul>	EDCM	PMU	BC: during detailed designing of the sub-project

			<p>from urban flash flooding, potential seismic intervention and other climate hazards.</p> <ul style="list-style-type: none"> <li>Emergency response plan shall be prepared by construction and operation phase contractors and will be submitted to PMU for approval to manage impacts of natural hazards such as earth quakes and floods.</li> </ul>			
	1.9	Impacts due to existing utilities	<ul style="list-style-type: none"> <li>The PMU KPCIP shall ensure the proposed infrastructure shall be designed keeping in view the minimum disturbance to existing utilities.</li> <li>CSC will ensure that project contractors will perform condition assessments prior to excavation works for supply mains and networks and will inform CSC/WSSC Kohat about the presence of any existing utilities within RoW.</li> <li>In case if there is need of shifting of any utility, utility custodian department will be taken on board by WSSC Kohat for necessary approvals and informations.</li> <li>PMU KPCIP/WSSC Kohat will pay compensation to damage of utilities to utility owners and will ensure that there will be no grievances in this regard.</li> </ul>			
<b>Construction Phase</b>	2.1	Construction of water distribution networks and tube wells and	<ul style="list-style-type: none"> <li>Method statements must be prepared by the Contractor and approved by the Construction Supervision Consultant (CSC) prior to commencement of construction works.</li> <li>The CSC must closely monitor the</li> </ul>	Contractor	CSC, PMU	DC

		storage tanks not in accordance with finalized design	<p>construction works being conducted by the Contractor to ensure the finalized design is implemented in full and water supply system is developed completely in compliance of the approved finalized designs.</p> <ul style="list-style-type: none"> <li>Any deviation by the Contractor from following the finalized design must be immediately highlighted and corrective measures must be implemented to ensure full compliance with the finalized design.</li> <li>PMU KPCIP shall ensure that construction activities are being carried out in compliance to project design following best international practices. It will closely review and monitor the activities of CSC and contractors involved in construction activities.</li> </ul>			
	2.2	Construction of water supply networks	<ul style="list-style-type: none"> <li>Prior to starting of work, the contractor shall prepare a method statement for water supply pipeline works. This shall be simple and explain the contractor's work process that is actually conducted on site, with safety and safeguard concerns.</li> <li>Method Statement is very important, particularly for water supply pipeline works along the roads.</li> <li>Method Statement can be prepared for each stretch (say 1 km) /specific site based on the project area.</li> <li>Method Statement shall be in a Table format</li> </ul>			

			<p>with appended site layout map and cover the following:</p> <ul style="list-style-type: none"> <li>▪ Work description</li> <li>▪ No. of workers (skilled &amp; unskilled)</li> <li>▪ Details of Plant, equipment &amp; machinery, vehicles</li> <li>▪ Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing)</li> <li>▪ PPE (helmet, gloves, boots, etc.) details for each type of work</li> <li>▪ Details of materials at each site (type &amp; quantity)</li> <li>▪ Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc.)</li> </ul>			
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			<ul style="list-style-type: none"> <li>▪ Construction waste/debris generated (details &amp; quantity)</li> <li>▪ Detail the sequence of work process (step-by-step) including specific details of each work</li> <li>▪ Contractor's supervision &amp; management arrangements for the work</li> <li>▪ Emergency: Designate (i) responsible person on site, and (ii) first aider</li> <li>▪ Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc.</li> <li>▪ The following shall be included in the site layout plan: <ul style="list-style-type: none"> <li>▪ Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone.</li> <li>▪ Location of temporary stockpiles and</li> </ul> </li> </ul>			
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			<p>provision of bunds</p> <ul style="list-style-type: none"> <li>▪ Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil</li> <li>▪ Wetting of soil to arrest dust generation by sprinkling water</li> <li>▪ Waste/surplus soil utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil utilization/disposal site in consultation with CSC/PMU.</li> <li>▪ PMU KPCIP will ensure the identification of disposal sites for unsuitable excavated material in consultation with WSSC Kohat.</li> <li>▪ CSC will inspect and monitor the borrow material areas prior to procurement to ensure that it is being used in sustainable way and no significant disfiguration of landscape is going on at quarry site.</li> <li>▪ Stock piling of excavated material at places that are congested will be avoided as these piles can create traffic issues and public</li> </ul>			
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			<p>nuisance.</p> <ul style="list-style-type: none"> <li>▪ Already available quarry sites for additional backfill material will be utilized. Development of new quarry site will be discouraged.</li> <li>▪ Record of borrow materials will be maintained including details of quarry site, agreement and necessary approvals from concerned government authorities.</li> </ul>			
	2.3	Construction of water storage reservoirs and tube wells and energization through clean energy sources of selected tube wells.	<ul style="list-style-type: none"> <li>▪ Stock piles will be appropriately located and out of wind to avoid dust emissions. Dry dusty materials shall be sprinkled with water and properly covered to avoid dust emissions.</li> <li>▪ No cement and concrete waste will be left unattended. Construction debris will not be thrown from height to avoid dust emissions. Return unpaved areas to original or improved contours following construction.</li> <li>▪ Solid waste generated from construction of tubewells and storage reservoirs will be managed through site specific EMMP and no waste will be stored at site to improve housekeeping at site and to avoid environmental nuisance.</li> <li>▪ Set protocols for proper and regular maintenance of construction machinery, vehicles and generators. Generators that will be used will be placed at suitable locations.</li> <li>▪ Contractor will not be allowed to store bulk</li> </ul>	Contractor	CSC, PMU	DC

			<p>quantities of fuel or hazardous material at site.</p> <ul style="list-style-type: none"> <li>Any fuel or chemicals stored at site (in small quantities) will be stored at designated site and containers/storage vessels be properly marked for their contents. Storage area will be provided with hard impervious surface and secondary containment.</li> <li>Equipment and machinery with loose vibratory parts will not be allowed to use. Used equipment and machinery will be in compliance to NEQS.</li> <li>Waste bins will be provided at appropriate places to manage waste. Daily housekeeping of the construction area will be carried out</li> </ul>			
	2.4	Impacts on surface water quality	<ul style="list-style-type: none"> <li>Construction debris shall not be disposed off in open.</li> <li>No stockpiling of materials will be carried out at location closed to streams.</li> <li>No labor camp will be constructed at intake location. No solid waste will be disposed off in the streams.</li> <li>CSC will maintain good housekeeping during construction works</li> <li>No slopes/excavations at the construction location shall be left unattended.</li> </ul>			



	2.5	Degradation of Ambient Air Quality	<ul style="list-style-type: none"> <li>▪ All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations.</li> <li>▪ Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.</li> <li>▪ Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.</li> <li>▪ Vehicles transporting soil, sand and other construction materials shall be covered with tarpaulin.</li> <li>▪ Limitations to speeds of such vehicles as felt necessary. Transport through densely populated area shall be avoided.</li> <li>▪ Concrete plants to be controlled in line with statutory requirements and shall not be close to sensitive receptors.</li> <li>▪ Stack height of generators will be at least 3 meters above the ground.</li> <li>▪ Project traffic will maintain maximum speed limit of 20 km/hr. on all unsealed roads within project area.</li> <li>▪ A minimum distance of 300 meters will be ensured between batching plant(s) and the nearest community.</li> <li>▪ The need for large stockpiles shall be</li> </ul>			
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			<p>minimized by careful planning of the supply of materials from controlled sources. Stockpiles shall not be located within 50 m of schools, hospitals or other public amenities and shall be covered with tarpaulin when not in use and at the end of the working day to enclose dust. If large stockpiles (&gt;25m<sup>3</sup>) of crushed materials are necessary, they shall be enclosed with side barriers and also covered when not in use.</p> <ul style="list-style-type: none"> <li>▪ Dust emissions due to road travel shall be minimized through good construction practices (such as keeping stock piles down wind and away from communities) and sprinkling water over the access road.</li> <li>▪ Maintaining levels of contaminant dusts, vapors and gases in the work environment at concentrations below those recommended as TWA-TLV's (threshold limit value)—concentrations to which most workers can be exposed repeatedly (8 hours/day, 40 hrs./week, week-after week), without sustaining adverse health effects.</li> <li>▪ Developing and implementing work practices to minimize release of contaminants into the work environment including: <ul style="list-style-type: none"> <li>○ Direct piping of liquid and gaseous materials</li> <li>○ Minimized handling of dry powdered</li> </ul> </li> </ul>			
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			<p>materials; Enclosed operations</p> <ul style="list-style-type: none"> <li>○ Local exhaust ventilation at emission/release points</li> <li>○ Vacuum transfer of dry material rather than mechanical or pneumatic conveyance</li> <li>○ Indoor secure storage, and sealed containers rather than loose storage</li> </ul> <ul style="list-style-type: none"> <li>▪ Where ambient air contains several materials that have similar effects on the same body organs (additive effects).</li> </ul> <p>It shall be ensured that the following measures are taken to control emissions from vehicles being used in the construction activity:</p> <ul style="list-style-type: none"> <li>▪ Periodically check and conduct maintenance of the construction machinery and haul vehicles. Generators, compressors and vehicles used during construction works will be maintained in a good condition to ensure that emissions are kept to a minimum level.</li> <li>▪ Regularly change the engine oil and use new engines/machinery/equipment having good efficiency and fuel burning characteristics.</li> <li>▪ Controlled technology generator and batching plants will be used to avoid</li> </ul>			
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			<p>excessive emissions.</p> <ul style="list-style-type: none"> <li>▪ Burning of wastes at any site will not be allowed.</li> <li>▪ The stack height of generators will be at least 3 meters above the ground.</li> <li>▪ Training of the technicians and operators of the construction machinery and drivers of the vehicles.</li> <li>▪ All type of machinery and generator must comply with the NEQS. Vehicles, which are not in compliance with NEQS are not allowed to use.</li> <li>▪ Periodic emission monitoring of vehicles, generator and batching plants is proposed.</li> <li>▪ Project activities shall be planned to avoid harsh weather conditions</li> </ul>			
	2.6	Increased Traffic and Community Health and Safety	<ul style="list-style-type: none"> <li>▪ A comprehensive traffic management plan (TMP) must be developed and implemented;</li> <li>▪ As part of the TMP, it will be ensured that the movement of heavy vehicles used during laying of pipeline is minimized during the peak traffic hours of the day in order to prevent congestion and accidents as far as possible;</li> <li>▪ Furthermore, the movement of heavy vehicles within Kohat city during laying of</li> </ul>	Contractor	CSC, PMU	DC

			<p>pipeline must be restricted to specific routes containing least number of sensitive receptors and low traffic volumes.</p> <ul style="list-style-type: none"> <li>▪ Traffic diversions shall be avoided as much as possible. If these are unavoidable then it shall be of short duration with limited impact on traffic flow.</li> <li>▪ Material stock piling and parking of machinery along the roads shall be avoided. Contrators shall identify suitable places for material stock piling and parking of machinery.</li> <li>▪ Work areas outside the project site, especially where machinery is involved, will be barricaded and will be constantly monitored to ensure that local residents, particularly children stay away while excavated areas being prepared for laying of pipelines will be cordoned off. Also, no machinery will be left unattended, particularly in running condition.</li> <li>▪ Local communities in the project area will be briefed on traffic safety, especially women who are the main care providers to children.</li> <li>▪ Temporary walkways shall be constructed on trenches for providing passage commuters.</li> <li>▪ Speed limit of 20 km/hr. will be maintained by all project related vehicles and nighttime driving of project vehicles will be limited</li> </ul>			
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			<p>where possible.</p> <ul style="list-style-type: none"> <li>▪ Educate drivers on safe driving practices to minimize accidents and to prevent spill of hazardous substances and other construction materials during transport.</li> <li>▪ Contractor must take proper safety measures (placing warning tapes around excavations) to avoid people, especially children, accidentally falling into excavations.</li> <li>▪ All the working platforms must be cordoned off with special care by well-trained skilled workers.</li> <li>▪ Contractor will prepare construction management plan which will include the hazard prevention and safety plan, which will address health and safety of the people in the project area.</li> <li>▪ PMU KPCIP shall ensure the contractor staff working in the project are well trained and educated in the Health, Safety and Environment (HSE) hazards associated with their duties, and that of the public, in the project area</li> </ul>			
	2.5	Injuries to workers from lack of necessary training and/or	<p><b>General</b></p> <ul style="list-style-type: none"> <li>▪ The Contractor will be required to prepare and implement an effective OHS Plan that is supported by trained first aid personnel and emergency response facilities. Construction contracts will include standard OHS</li> </ul>	Contractor	CSC, PMU	DC

		not using PPEs etc.	<p>measures and contractors will be bound to implement these fully.</p> <ul style="list-style-type: none"> <li>▪ Monitoring will be required to ensure that the OHS plan based on contract specifications is followed.</li> <li>▪ Cement feed hopper areas will be inspected daily to ensure compliance with the requirement of dust masks.</li> <li>▪ Surfaces (including flooring and work surfaces) in camps, kitchens, dining areas and workshops shall be solid and easy to clean. Flooring for work camps must be float finished concrete or better.</li> <li>▪ All drivers engaged by Contractors must hold a valid license for the vehicle they are operating.</li> <li>▪ Work in confined space shall be executed with available safety standards. Adequate monitoring and equipment shall be available to detect deficient oxygen levels.</li> <li>▪ The Contractor shall submit to the Engineer of CSC for approval an emergency evacuation plan and practice the procedure annually.</li> <li>▪ The Contractor shall submit to the Engineer of CSC for approval a site layout plan, identifying work areas, accommodation, kitchen, dining area, sanitary facilities, location of generators, plant and vehicle parking, transport routes through the camp, pedestrian routes through the camp, evacuation routes, emergency exits, batching</li> </ul>			
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			<p>plants, storage areas, waste facilities etc.</p> <ul style="list-style-type: none"> <li>▪ Fire extinguishers shall be provided throughout camps and work sites. Fire extinguishers shall be inspected monthly and maintained as necessary.</li> <li>▪ An adequate and reliable supply of safe drinking water shall be made available at readily accessible and suitable places including at all camps.</li> <li>▪ The Contractor shall take samples from each supply of drinking water and arrange for analysis of these samples at EPA certified laboratory prior to its use by the Contractor's staff. The results of these tests for each supply must be submitted to the Engineer of CSC and must demonstrate that each water supply meets national and World Health Organisation standards for drinking water.</li> <li>▪ The Contractor shall provide and maintain adequate hygienic kitchens which are sheltered and separated from the living quarters. Kitchens shall include raised and washable surfaces suitable for food preparation.</li> <li>▪ The Contractor shall provide and maintain adequate hygienic dining areas for staff. Work places and camps shall be provided with both natural &amp; artificial light. Artificial lighting shall be powered by generator in the event of power cuts.</li> <li>▪ Public sensitization training shall be provided to workers to avoid social conflicts between</li> </ul>			
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			<p>residents and the construction contractor, Occurrence of any such impacts can be avoided by community sensitive project planning and implementation and through effective involvement of local administration.</p> <ul style="list-style-type: none"> <li>▪ All HSE protocols shall be implemented in true letter and spirit.</li> <li>▪ Contractor must appoint an HSE resource to implement, monitor and report the HSE management plan to concerned authorities.</li> <li>▪ Contractor must ensure the provision of first aid facility at construction site and camps through hiring medics and establishing a dispensary at the campsite.</li> <li>▪ Reasonable number of first aid kits shall be available on construction sites and within contractor camps.</li> <li>▪ Based on the type of hazard applicable during the proposed works at site, the following mitigation measures as per IFC guidelines for Occupational Health and Safety (OH&amp;S) must be implemented:<sup>13</sup></li> </ul> <p><b>Mitigation Measures for Physical Hazards</b></p> <ul style="list-style-type: none"> <li>▪ Rotating and Moving Equipment</li> <li>▪ Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal</li> </ul>			
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<sup>13</sup> <https://www.ifc.org/wps/wcm/connect/1d19c1ab-3ef8-42d4-bd6b-cb79648af3fe/2%2BOccupational%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES&CVID=ls62x8l>

			<p>operating conditions.</p> <ul style="list-style-type: none"> <li>▪ Where a machine or equipment has an exposed moving part or exposed pinch point that may endanger the safety of any worker, the machine or equipment shall be equipped with, and protected by, a guard or other device that prevents access to the moving part or pinch point. Guards shall be designed and installed in conformance with appropriate machine safety standards.</li> <li>▪ Turning off, disconnecting, isolating, and de-energizing (Locked Out and Tagged Out) machinery with exposed or guarded moving parts, or in which energy can be stored (e.g. compressed air, electrical components) during servicing or maintenance.</li> <li>▪ Designing and installing equipment, where feasible, to enable routine service, such as lubrication, without removal of the guarding devices or mechanisms.</li> </ul> <p><b>Vibration</b></p> <ul style="list-style-type: none"> <li>▪ Exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, shall be controlled through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure. Limits for vibration and action values. Exposure levels shall be checked on the basis of daily exposure time and data provided by equipment manufacturers.</li> </ul>			
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			<p><b>Electrical</b></p> <ul style="list-style-type: none"> <li>▪ Marking all energized electrical devices and lines with warning signs;</li> <li>▪ 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;</li> <li>▪ 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;</li> <li>▪ Double insulating / grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits;</li> <li>▪ Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas;</li> <li>▪ Conducting detailed examination and marking of all buried electrical wiring prior to any excavation work.</li> <li>▪ Appropriate labeling of service rooms housing high voltage equipment ('electrical hazard') and where entry is controlled or prohibited;</li> </ul> <p><b>Eye Hazards</b></p> <ul style="list-style-type: none"> <li>▪ Use of machine guards or splash shields and/or face and eye protection devices, such</li> </ul>			
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			<p>as safety glasses with side shields, goggles, and/or a full-face shield. Specific Safe Operating Procedures (SOPs) may be required for use of sanding and grinding tools and/or when working around liquid chemicals. Frequent checks of these types of equipment prior to use to ensure mechanical integrity is also good practice. Machine and equipment guarding shall conform to standards published by organizations such as CSA, ANSI and ISO.</p> <p><b>Welding/Hot Work</b></p> <ul style="list-style-type: none"> <li>▪ Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific work station (a solid piece of light metal, canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required.</li> <li>▪ Special hot work and fire prevention precautions and Standard Operating Procedures (SOPs) shall be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated. Special procedures are required for hot work on tanks or vessels that have contained</li> </ul>			
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			<p>flammable materials.</p> <p><b>Industrial Vehicle Driving and Site Traffic</b></p> <ul style="list-style-type: none"> <li>▪ Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading, load limits. ·</li> <li>▪ Ensuring drivers undergo medical surveillance. ·</li> <li>▪ Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms. ·</li> <li>▪ Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures (e.g. prohibiting operation of forklifts with forks in down position), and control of traffic patterns or direction. ·</li> <li>▪ Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to 'one-way' circulation, where appropriate.</li> <li>▪ Ergonomics, Repetitive Motion, Manual Handling</li> <li>▪ Facility and workstation design with 5<sup>th</sup> to 95<sup>th</sup> percentile operational and maintenance workers in mind.</li> <li>▪ Use of mechanical assists to eliminate or reduce exertions required to lift materials, hold tools and work objects, and requiring multi-person lifts if weights exceed</li> </ul>			
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			<p>thresholds.</p> <ul style="list-style-type: none"> <li>▪ Selecting and designing tools that reduce force requirements and holding times and improve postures.</li> <li>▪ Providing user adjustable workstations.</li> <li>▪ Incorporating rest and stretch breaks into work processes and conducting job rotation.</li> <li>▪ Implementing quality control and maintenance programs that reduce unnecessary forces and exertions.</li> <li>▪ Taking into consideration additional special conditions such as left-handed persons.</li> <li>▪ Working at Heights</li> <li>▪ Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area.</li> <li>▪ Proper use of ladders and scaffolds by trained employees.</li> <li>▪ Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines.</li> <li>▪ Appropriate training in use, serviceability, and integrity of the necessary PPE.</li> <li>▪ Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an</li> </ul>			
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			<p>arrested fall.</p> <p><b>Fire and Explosions</b></p> <ul style="list-style-type: none"> <li>▪ Storing flammables away from ignition sources and oxidizing materials. Further, flammables storage area shall be:</li> <li>▪ Remote from entry and exit points into camps</li> <li>▪ Away from facility ventilation intakes or vents</li> <li>▪ Have natural or passive floor and ceiling level ventilation and explosion venting</li> <li>▪ Use spark-proof fixtures</li> <li>▪ Be equipped with fire extinguishing devices and self-closing doors, and constructed of materials made to withstand flame impingement for a moderate period of time.</li> <li>▪ Defining and labeling fire hazards areas to warn of special rules (e.g. prohibition in use of smoking materials, cellular phones, or other potential spark generating equipment).</li> <li>▪ Providing specific worker training in handling of flammable materials, and in fire prevention or suppression.</li> <li>▪ Corrosive, oxidizing, and reactive chemicals</li> <li>▪ Corrosive, oxidizing and reactive chemicals shall be segregated from flammable materials and from other chemicals of incompatible class (acids vs. bases, oxidizers vs. reducers, water sensitive vs. water based, etc.), stored in ventilated areas and in containers with appropriate secondary containment to minimize intermixing during</li> </ul>			
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			<p>spills.</p> <ul style="list-style-type: none"> <li>Workers who are required to handle corrosive, oxidizing, or reactive chemicals shall be provided with specialized training and provided with, and wear, appropriate PPE (gloves, apron, splash suits, face shield or goggles, etc.).</li> <li>Where corrosive, oxidizing, or reactive chemicals are used, handled, or stored, qualified first-aid shall be ensured at all times. Appropriately equipped first-aid stations shall be easily accessible throughout the place of work, and eye-wash stations and/or emergency showers shall be provided close to all workstations where the recommended first-aid response is immediate flushing with water.</li> </ul> <p><b>Mitigations for Biological Hazards</b></p> <ul style="list-style-type: none"> <li>The Contractor shall review and assess known and suspected presence of biological agents at the place of work and implement appropriate safety measures, monitoring, training, and training verification programs.</li> <li>Project contractor must provide good working and sanitation conditions at camp and work sites. Disease surveillance shall be carried out to identify any exposure to parasites, such as hookworm, ascaris, and various mites, chiggers, ticks and dengue.</li> <li>Measures to eliminate and control hazards from known and suspected biological agents at the place of work shall be designed,</li> </ul>			
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			implemented and maintained in close co-operation with the local health authorities and according to recognized international standards.			
	2.6	High noise levels from construction activities	<ul style="list-style-type: none"> <li>▪ Equipment noise will be reduced at source by proper design, maintenance and repair of construction machinery and equipment. Noise from vehicles and power generators will be minimized by use of proper silencers and mufflers.</li> <li>▪ Excessive noise emitting equipment will not be allowed to operate and will be replaced.</li> <li>▪ Blowing of horns will be prohibited on access roads to work sites.</li> <li>▪ Manual excavation has been proposed for congested areas to reduce generation of noise.</li> <li>▪ Limited use of jack hammer in populated areas.</li> <li>▪ As a rule, the operation of heavy equipment shall be conducted in daylight hours.</li> <li>▪ Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise.</li> <li>▪ Well-maintained haulage trucks will be used with speed controls.</li> </ul>	Contractor	CSC, PMU	DC

			<ul style="list-style-type: none"> <li>▪ Use of ear plug and ear muffs must be ensured during construction and drilling of tubewells. No employee shall be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear shall be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).</li> <li>▪ Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls shall be investigated and implemented, where feasible.</li> <li>▪ Periodic medical hearing checks shall be performed on workers exposed to high noise levels.</li> <li>▪ Grievance redress mechanism will be established.</li> <li>▪ All the equipment and machinery used during construction phase shall be well</li> </ul>			
	2.9	Improper handling and/or disposal of hazardous and non-hazardous	<ul style="list-style-type: none"> <li>▪ Licensed waste contractors will be engaged to dispose off all non-hazardous waste material that cannot be recycled or reused.</li> <li>▪ Excavated material from trenches will be stored at site and it will be used as fill/cover material after laying of pipelines while access spoil shall be transported to spoil disposal site</li> </ul>	Contractor	CSC, PMU	DC

		waste	<p>if required.</p> <ul style="list-style-type: none"> <li>▪ Spoil/drill cuttings generated during drilling of tubewells shall be transported to spoil disposal site if required.</li> <li>▪ All types of combustible and non-combustible waste including plastic or glass bottles and cans will be temporarily stored on site and later sold/handed over to a waste/recycling contractor who will utilize these wastes for recycling purposes.</li> <li>▪ Waste management training for all site staff to be included in Contractor's training plan.</li> <li>▪ Fuel storage areas and generators will have secondary containment in the form of concrete or brick masonry bunds. The volume of the containment area shall be equal to 120% of the total volume of fuel stored.</li> <li>▪ Fuel and hazardous material storage points must be included in camp layout plan to be submitted for approval. Hazardous material storage areas shall include a concrete floor to prevent soil contamination in case of leaks or spills. Fuel tanks will be checked daily for leaks and all such leaks will be plugged immediately.</li> <li>▪ Designated vehicles/plant wash down and refueling points must be included in camp layout plan to be submitted for approval.</li> </ul>			
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			<ul style="list-style-type: none"> <li>▪ Hazardous waste will be initially stored on site at designated area and then handed over to EPA certified contractor to final disposal.</li> <li>▪ Record of waste generation and transfer shall be maintained by project contractors.</li> <li>▪ Spill kits, including sand buckets (or other absorbent material) and shovels must be provided at each designated location.</li> <li>▪ At the time of restoration, septic tanks will be dismantled and backfilled with at least 1m of soil cover keeping in view landscape of surrounding natural surface.</li> <li>▪ It will be ensured that after restoration activities, the campsite is clean and that no refuse has been left behind.</li> <li>▪ Clinical wastes will be temporarily stored onsite separately and will be handed over to approve waste contractor for final disposal.</li> <li>▪ Training will be provided to personnel for identification, segregation and management of waste.</li> <li>▪ The structure of a Framework waste management plan has been prepared for the project and attached as <b>Annexure L</b> and contractors will be required to prepare waste management plan for the site in light of guidelines provided in the waste management plan and submit to PMU for</li> </ul>			
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			approval			
	2.10	Untreated disposal of effluent from worker camps and batching plant(s) and construction sites	<ul style="list-style-type: none"> <li>It will be ensured that no untreated effluent is released to the environment.</li> <li>A closed sewage treatment system including soak pits and septic tank will be constructed to treat the effluent from the construction/labor camps.</li> <li>Sewage treatment system will be installed at each respective labor camp based on the number of laborers residing at the respective camp.</li> <li>Wastewater from laundry, kitchen washings and showers will be disposed-off into soak pits or septic tank (where soak pit cannot be constructed) and after treatment it will be disposed of in TMA provided drains in the project area.</li> <li>Soak pits will be built in absorbent soil and shall be located 300 m away from a water well, hand pump or surface water body. Soak pits in non-absorbent soil will not be constructed.</li> <li>Ensure that the soak pits remain covered all the time and measures are taken to prevent entry of rainwater into them.</li> <li>Sprinkling of grey water or sewage will not be allowed; in case the septic tank gets filled with sludge, septic tank shall be emptied through</li> </ul>	Contractor	CSC, PMU	DC

			<p>vacuum truck and material shall be transferred to treatment facility or approved municipal drain.</p> <ul style="list-style-type: none"> <li>▪ Water being released from any batching plant(s) must be treated as per requirements of NEQS prior to release to sewerage system/any other water body.</li> <li>▪ Sewage at the end of construction period to be disposed of in nearest municipal drains after getting approval from concerned municipal authorities</li> </ul>			
	2.11	Soil Contamination	<ul style="list-style-type: none"> <li>▪ It will be ensured that spill prevention trays are provided and used during refueling. Also, on-site maintenance of construction vehicles and equipment will be avoided as far as possible. In case on-site maintenance is unavoidable, tarpaulin or other impermeable material will be spread on the ground to prevent contamination of soil.</li> <li>▪ Regular inspections will be carried out to detect leakages in construction vehicles and equipment and all vehicles will be washed in external commercial facilities.</li> <li>▪ Fuels, lubricants and chemicals will be stored in covered bounded areas, underlain with impervious lining. Appropriate arrangements, including shovels, plastic bags and absorbent materials will be available near fuel and oil storage areas.</li> <li>▪ Bentonite mud used for the purpose of uphole</li> </ul>	Contractor	CSC, PMU	DC

			and deep-hole drilling will be prepared in rig tanks. The used mud will be disposed of in the purpose built pit and left to dry. After the mud has dried the pit will be backfilled;			
	2.12	Employment Conflicts	<ul style="list-style-type: none"> <li>▪ The Construction Contractor will adopt a transparent hiring policy. Prior to the commencement of the construction activity, the local communities in the project area will be informed of the employment policy in place and number of people that can be employed for this project.</li> <li>▪ It will be ensured that maximum number of unskilled and semi-skilled jobs will be provided to the residents of the project area.</li> <li>▪ The PMU will ensure a balanced process of employment of the communities in the project area with preference given to those most directly affected by the project.</li> </ul>	Contractor	CSC, PMU	DC
	2.13	Communicable diseases incl. COVID-19	<ul style="list-style-type: none"> <li>▪ A communicable diseases prevention program will be prepared for construction workers or residents near the construction sites.</li> </ul> <p><b>COVID-19 specific measures</b></p> <ul style="list-style-type: none"> <li>▪ All workers must perform complete sanitization at the site as per SOPs/guidelines issued by WHO.</li> <li>▪ All workers must wear a mask and gloves as soon as they arrive at site and must keep wearing it at all times while present at the work site/hospital premises.</li> <li>▪ As soon as workers arrive at work site, their</li> </ul>	Contractor	CSC, PMU	DC

			<p>body temperature must be checked and in case any worker is assessed to be running a fever or suffering from a flu or cough, he must be informed to leave immediately and self-isolate for a two-week period and not report for work until this two-week mandatory period has been completed.</p> <ul style="list-style-type: none"> <li>▪ At the work site(s), social distancing measures must be strictly implemented and gathering of workers at any location at the work site(s) must be strictly forbidden. In case of workers not taking this measure seriously, strict penalties must be imposed to ensure implementation.</li> <li>▪ The work tasks must be divided into shifts, as far as possible, to reduce the workforce present at the work site(s) at any one moment and improve the working speed/efficiency.</li> <li>▪ All workers will be strictly advised to wash their hands as frequently as practicable and not to touch their face during work.</li> <li>▪ A supply of safe drinking water will be made available and maintained at the project site(s).</li> <li>▪ COVID awareness sign boards must be installed at the clinic premises and at the work site(s).</li> <li>▪ Contact details of all workers will be kept in a register on site in order to efficiently trace and manage any possible workers that might experience symptoms of COVID-19.</li> <li>▪ Prohibition of entry for local community/any</li> </ul>			
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			<p>unauthorized persons at work sites.</p> <ul style="list-style-type: none"> <li>▪ Proper hygiene practices in the toilets and washrooms will be implemented with proper and adequate use of soaps and disinfectant spray.</li> <li>▪ Social distancing must be maintained during the pick-up and dropping off of workers from their residences to and from the work site(s).</li> <li>▪ GoP and GoKPK guidelines issued for Health &amp; Safety of Building and Construction Workers during COVID-19 outbreak shall be implemented.</li> <li>▪ Any future issue or revisions in existing COVID-19 guidelines by GOP and GoKPK shall be adopted and implemented.</li> </ul> <p><b>COVID-19 specific measures GOP</b></p> <p><b>Advice for Site Managers:</b></p> <ul style="list-style-type: none"> <li>▪ Every construction project shall make proper arrangements for uninterrupted building services including but not restricted to, electricity, fuel, water supply, water disposal and sanitation, communication links, washrooms with hand hygiene and shower facility and with proper and adequate supply of soaps and disinfectants.</li> <li>▪ Workers shall not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.</li> <li>▪ Ensure the availability of the thermal gun at</li> </ul>			
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			<p>the entry and exit of the construction site and no worker shall be allowed without getting his/her temperature checked.</p> <ul style="list-style-type: none"> <li>▪ Site manager must maintain a register of all contact details with NID number and addresses of all present at the site in case a follow up or tracing and tracking of contacts is required at a later stage.</li> <li>▪ Develop the employee roaster to decrease the number of people on the site very day. Split the shifts of the workers in morning and evening with limit of each shift to 8 working hours.</li> <li>▪ Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.</li> <li>▪ In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must be provided with a face mask. It must be ensured that everyone during his or her presence at the site continues to wear the mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.</li> <li>▪ Non-essential work trainings must be</li> </ul>			
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			<p>postponed avoiding gathering of people.</p> <ul style="list-style-type: none"> <li>▪ Ensure the physical distance by creating more than one route of entry and exit to the site.</li> <li>▪ Instruct the workers to inform the construction manager (or authorities) if <ul style="list-style-type: none"> <li>- They develop any symptoms of cough, flu or fever.</li> <li>- They have been exposed to someone suspected or confirmed with COVID 19.</li> <li>- They have met someone who has a travel history of COVID 19 endemic country. They have travelled in last couple of days or plan to travel soon.</li> </ul> </li> <li>▪ All incidences of appearance of the symptoms of COVID-19 shall be immediately documented and maintained at the site and information regarding which shall be immediately communicated through e-mail or else, to the designated health facility, and the sick worker shall be transported to the health facility for further advice and action. The site manager must establish a link with a nearby healthcare facility with arrangements for quick transportation of workers in case of an emergency.</li> <li>▪ Persuade the workers to inform the</li> </ul>			
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			<p>authorities for their safety and of other if they observe any signs and symptoms in a colleague.</p> <ul style="list-style-type: none"> <li>▪ Do not allow any worker at the construction site who has the symptoms.</li> <li>▪ Display the awareness banners about hand hygiene and physical distancing, where you can, around the work site.</li> <li>▪ Everyone on the construction site must observe sneezing and coughing etiquettes. Workers shall be requested and required to wash their hands as frequently as practicable and shall also be advised not to touch their face with their hands during work.</li> <li>▪ Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.</li> <li>▪ Only sanitizable dining surfaces shall be used, which must be cleaned before each service.</li> <li>▪ The lunch breaks and stretch breaks of the workers must be staggered to avoid the clustering of workers. Workers must not sit at less than 2 meters distance while having meals and while any other activity requiring</li> </ul>			
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			<p>interpersonal communications.</p> <ul style="list-style-type: none"> <li>▪ In the wake of current restrictions on transportations site managers will ensure safe transport arrangements for worker which shall not be crowded and shall have social distancing in place during the entire process from pickups till drops at destination.</li> <li>▪ In case of workers sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms in a well ventilated area.</li> <li>▪ A supply of safe drinking water must be made available at the project site and maintained.</li> <li>▪ Adequate ventilation shall be provided in dining areas, resting places and sleeping areas.</li> </ul> <p><b>Advice for Construction Workers:</b></p> <ul style="list-style-type: none"> <li>▪ All possible and prescribed measures shall be taken to ensure your and others health. Enter your contact details in the register maintained at the site, in case a follow up or tracing and tracking of contacts is required at a later stage.</li> <li>▪ Follow hygiene practices at washrooms and shower facility with proper and adequate use of soaps and disinfectants.</li> <li>▪ Every worker must change into standard working attire at the time of commencement</li> </ul>			
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			<p>of duty and change back to their regular dress after taking shower when their duty hours end.</p> <ul style="list-style-type: none"> <li>▪ In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must use face mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.</li> <li>▪ Workers shall wash their hands as frequently as practicable and shall not to touch their face with their hands during work.</li> <li>▪ Everyone on the construction site must observe sneezing and coughing etiquettes.</li> <li>▪ Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.</li> <li>▪ Sick worker shall immediately inform the site manager and must get medical advice from nearby health Centre.</li> <li>▪ Only sanitizable dining surfaces shall be used.</li> <li>▪ Do not sit at less than 2 meters distance while</li> </ul>			
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			<p>having meals and while any other activity requiring interpersonal communications.</p> <ul style="list-style-type: none"> <li>▪ Do not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.</li> <li>▪ Use safe transport arrangements which shall not be crowded and shall have social distancing in place during the entire process from pickups till drops at destination.</li> <li>▪ In case sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms in a well ventilated area</li> </ul> <p><b>Deliveries or Other Contractors Visiting the Site:</b></p> <ul style="list-style-type: none"> <li>▪ Non-essential visits to the construction sites shall be cancelled or postponed.</li> <li>▪ Delivery workers or other contractors who need to visit the construction site must go through temperature check before entering and shall be given clear instructions for precautions to be taken while on site.</li> <li>▪ Designate the workers, with protective gears or at least gloved and mask, to attend to the deliveries and contractors.</li> <li>▪ Make alcohol-based hand sanitizer (at least 70%) available for the workers handling deliveries.</li> <li>▪ Instruct the visiting truck drivers to remain in</li> </ul>			
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			their vehicles and whenever possible make use of contactless methods, such as mobile phones, to communicate with your workers.			
	2.14	Vegetation and Wildlife Loss	<ul style="list-style-type: none"> <li>Off-road travel will be strictly prohibited and observance of this will be monitored during execution of the project. And</li> <li>Vehicles speed will be regulated and monitored to avoid excessive dust emissions.</li> <li>No hunting or killing of animals will be permitted.</li> <li>No cutting down of vegetation or using vegetation or trees as firewood will be permitted.</li> </ul>	Contractor	CSC, PMU	DC
	2.15	Historical/Archaeological Sites	<ul style="list-style-type: none"> <li>If evidence of any archaeological remains is found during the construction activities, the excavation work will be stopped immediately, and necessary next steps taken to identify the archaeological discovery based on the 'Chance Find' procedures provided as <b>Annexure F</b>.</li> </ul>	Contractor	CSC, PMU	DC
	2.16	Site restoration	<ul style="list-style-type: none"> <li>Demobilization of all equipment and machinery;</li> <li>Disposal of any waste material remaining at the time of completion of the operation;</li> <li>Backfilling of all excavation followed by compactions;</li> </ul>	Contractor	CSC, PMU	DC



			<ul style="list-style-type: none"> <li>▪ Dismantling and removal of fence or barriers surrounding the campsite area; and</li> <li>▪ General restoration of the site area including landscaping and restoration of drainage where required.</li> <li>▪ PMU KPCIP through CSC will ensure that restoration of construction works at intake structures, water transmission and supply mains will be carried out by contractors.</li> <li>▪ PMU KPCIP will ensure periodic monitoring of such restorations.</li> <li>▪ Contractors will develop site resortation protocols and will submit to CSC/PMU for review and approval.</li> <li>▪ Construction site restoration protocols will be part of bidding documents and constructions contracts.</li> <li>▪ Construction contractor will add restorations costs into BOQs.</li> </ul>			
<b>Operation Phase</b>	3.1	Ground Water Abstraction	<ul style="list-style-type: none"> <li>▪ Over pumping shall be avoided as over pumping can result in a lowering of ground water levels to the point where it is no longer feasible or possible to continue pumping.</li> <li>▪ Periodic monitoring of tubewells recharge</li> </ul>	O&M Contractor/ WSSCK	WSSCK, PMU	DO

			<p>rate to ascertain the continuous water availability for the project.</p> <ul style="list-style-type: none"> <li>New tubewells shall be 100 m away from existing tubewells unless it is established by hydrogeological study that the new tubewell will not affect the yield of existing well.</li> </ul>			
	3.2	Water system leaks and water discharges during flushing	<ul style="list-style-type: none"> <li>Ensure construction meets applicable standards and industry practices</li> <li>Conduct regular inspection and maintenance;</li> <li>Implement a leak detection and repair program (including records of past leaks and unaccounted-for water to identify potential problem areas);</li> <li>Consider replacing mains with a history of leaks of with a greater potential for leaks because of their location, pressure stresses, and other risk factors.</li> <li>Discharge the flush water into a municipal sewerage system with adequate capacity;</li> <li>Discharge the flush water into a separate storm sewer system</li> <li>Minimize erosion during flushing, for example by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities</li> </ul>	O&M Contractor/ WSSCK	WSSCK, PMU	DO
	3.3	Occupational Health and Safety	<ul style="list-style-type: none"> <li>PMU KPCIP and WSSCK Kohat through CSC will ensure the implementation of SOPs issued by GoP and WHO related to COVID-19.</li> </ul>	O&M Contractor/ WSSCK	WSSCK, PMU	DO

			<ul style="list-style-type: none"> <li>▪ Designation of an Environment, Health and Safety (EHS) officer dedicated to the site;</li> <li>▪ All employees must be able to reach their work stations safely. All path, walkways, staircases, ladders and platforms must be stable and suitable for the tasks to be undertaken;</li> <li>▪ Strict use of Personal Protective Equipment (PPE) by all personnel (especially staff working in workshop/ doing maintenance work) must be ensured.</li> <li>▪ Mandatory training of all employees, including sub-contractors, on Health and Safety Practices. Tool Box talks are also recommended;</li> <li>▪ Accidental fires must be addressed immediately. Firefighting plan shall be developed and extinguishers shall be placed at appropriate location.</li> <li>▪ Emergency plan (including fire management) must be developed and implemented;</li> <li>▪ Availability of first-aid kits and vehicles that can be used to bring any injured employee to the nearest doctor in cases of accidents;</li> <li>▪ Mandatory reporting of all accidents or incident of near misses of accidents and immediate adoption of corrective measures; and</li> </ul>			
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			<ul style="list-style-type: none"> <li>Management must provide all the necessary financial and manpower resources for the implementation and enforcement of all health and safety programs and activities of the project;</li> <li>Regular training and orientation on safety practices will be implemented to impart knowledge of safe and efficient working environment. Furthermore, regular health checkups of all employees including contract workers will be conducted. Effective and proper housekeeping is recommended. Heat levels must be monitored as well. Spot checks shall be done to ensure that workers' welfare is addressed especially during summer months.</li> <li>Adequate ventilation shall be provided in dining areas, resting places and sleeping areas.</li> </ul>			
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<b>CSC</b>	Construction Supervision Consultant
<b>BC</b>	Before Construction
<b>DC</b>	During Construction
<b>PMU</b>	Project Management Unit
<b>DO</b>	During Operation

**Table 7.2: 'Pre-Construction' Environmental Monitoring Plan for Baseline Development**

Parameter to be measured	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Surface Water Quality	To establish baseline of surface water quality	NEQS/WHO Standards	Water samples for comparison against NEQS parameters	At three random receptor locations in the project area	Once	CSC
<b>Ambient Air Quality</b>	To establish baseline air quality levels	CO,NO <sub>2</sub> & PM <sub>10</sub> (particulate matter smaller than 10 microns) concentration at receptor level	1-hr and 24-hr concentration levels	At three random receptor locations in the project area , both upwind and downwind	Once	CSC
<b>Ambient Noise</b>	To establish baseline noise levels	Ambient noise level near receptors in project area	A-weighted noise levels – 24 hours, readings taken at 15 s intervals over 15 min. every hour, and then averaged	At three random receptor locations in the project area	Once	CSC
<b>Groundwater Quality in vicinity of project area</b>	To establish groundwater quality in project area	Groundwater quality in project area	Water samples for comparison against NEQS parameters	At three random receptor locations in the project area	Once	CSC

**Table 7.3: Construction Phase Monitoring Requirements**

Project Activity and Potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
<b>Noise</b> Disturbance due to noise from construction activity	To determine the effectiveness of noise abatement measures on sound pressure levels	Ambient noise level at different locations in project area	A-weighted noise levels – 24 hours, readings taken at 15 s intervals over 15 min. every hour at 15 m from receptors, and then averaged	At three random receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC
<b>Air Quality</b> Dust emissions from construction vehicles and equipment	To determine the effectiveness of dust control program on dust at receptor level	CO, NO <sub>2</sub> & PM <sub>10</sub> (particulate matter smaller than 10 microns) concentration at receptor level	1-hr and 24-hr concentration levels	At three random receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC
		Visible dust	Visual observation of size of dust clouds, their dispersion and the direction of dispersion	Construction site	Once daily during peak construction period	Contractor's Environmental officer, CSC
<b>Surface Water Quality</b>	To determine the effectiveness of mitigation measures	As per WHO/NEQS	Water samples for comparison against NEQS parameters	At three random receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC
<b>Safety precautions by Safety workers</b>	To prevent accidents for workers and general public	Number of near miss events and accidents taking place	Visual inspections	Construction site	Once Daily	Contractor's Environmental officer, CSC

<b>Project Activity and Potential Impact</b>	<b>Objective of Monitoring</b>	<b>Parameters to be Monitored</b>	<b>Measurements</b>	<b>Location</b>	<b>Frequency</b>	<b>Responsibility</b>
<b>Soil Contamination</b>	To prevent contamination of soil from oil and toxic chemical spills and leakages	Incidents of oil and toxic chemical spills	Visual inspections	At construction site and at vehicle and machinery refuelling & maintenance areas	Once a month	Contractor's Environmental officer, CSC

**Table 7.4: Capacity Development and Training Programme**

Provided by	Organized by	Contents	Target Audience	Venue	Duration
<b>Pre-construction Phase</b> PMC offering specialized services in environmental management and monitoring	CSC & PMU	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring Plan Group exercise and participatory workshop to measure effectiveness of program	Contractor staff	WSSC Office, Kohat	One day long training seminar including group exercise/workshop
<b>Construction Phase</b> PMC offering specialized services in social management and monitoring	CSC & PMU	Short seminar on Environmental risks associated with construction phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues Group exercise and participatory workshop to measure effectiveness of program	Contractor staff	WSSC Office, Kohat	One day long training seminar including group exercise/workshop
<b>Operation Phase</b> Authorized representative or 3 <sup>rd</sup> party trainer	WSSCK & PMU	Short seminars on Environmental risks associated with operation phase. Development of Environmental Performance Indicators/ Occupational Health and Safety (OHS) issues	O&M contractor	WSSC Office, Kohat	One day long training seminar including group exercise/workshop



		Group exercise and participatory workshop to measure effectiveness of program			
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## 7.9 Environmental Management Costs

372. The **Table 7.5** below provides cost estimates for 'Pre-Construction phase' monitoring while **Tables 7.6** provides cost estimates for 'Construction phase' monitoring of key environmental parameters.
373. The costs associated with implementation of the EMP and the necessary mitigation measures are provided as **Table 7.8** below. The **Table 7.9** below provides the cost for capacity development and training programme for project contractors for the proposed improvement of water supply system.

**Table 7.5: Annual Cost Estimates for 'Pre-Construction Phase' Environmental Monitoring<sup>14</sup>**

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Surface water Quality	NEQS/WHO	6 (once only at 3 locations for 02 streams)	180,000	6 readings @ PKR 30,000 per sample
Air Quality	CO, NO <sub>2</sub> , SO <sub>2</sub> , O <sub>3</sub> , PM <sub>10</sub>	3 (Once only at 3 locations)	90,000	3 readings @ PKR 30,000 per sample
Noise Levels	dB(A)	3 (Once only at 3 locations)	90,000	3 readings @ PKR 30,000 per reading
Ground Water Quality	NEQS	2 (Once only at 2 locations)	60,000	2 readings @ PKR 30,000 per sample
Contingencies			21,000	5% of monitoring cost
<b>Total (PKR)</b>			<b>441,000</b>	

<sup>14</sup> For air quality monitoring: 'Passive samplers' such as test tubes can be used or 'Active samplers' with sorbent tubes can also be used.

For noise monitoring: sampling equipment with duration greater than 1 hour can be used.

**Table 7.6: Annual Cost Estimates for 'Construction Phase' Environmental Monitoring<sup>15</sup>**

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Surface Water Quality	NEQS/WHO	24 (Quarterly at 3 locations for 02 streams)	720,000	24 readings @ PKR 30,000 per sample
Air Quality	CO, NO <sub>2</sub> , PM <sub>10</sub>	12 (Quarterly basis at 3 locations)	360,000	12 readings @ PKR 30,000 per sample
Noise Levels	dB(A)	12 (Quarterly basis at 3 locations)	360,000	12 readings @ PKR 30,000 per reading
Contingencies			72,000	5% of monitoring cost
<b>Total (PKR)</b>			<b>1512,000</b>	

**Table 7.7: Estimated Costs for EMP Implementation**

Item	Sub-Item	Estimated Total Cost (PKR)
Staff, audit and monitoring cost <sup>1</sup>	1 person for 24 months (@ 100,000 per month)	2,400,000
Monitoring Activities	Provided separately in Tables 7.5 and 7.6.	0
Mitigation Measures	As prescribed under EMP and IEE.	40,00,000
(i) Water sprinkling	To suppress dust emissions	800,000
(ii) Solid waste collection & disposal	From construction sites (based on initial estimates)	700,000
(iii) Plantation around project boundary to control odor levels	To plant vegetation all along the boundary of tubewells and storage tanks	15,00,000
Contingencies	5% of EMP implementation cost	195,000
<b>Total Estimated Cost (PKR)</b>		<b>4,095,055</b>

<sup>1</sup>: To cover staff cost and expenses of Environmental Specialist for Contractor

**Table 7.8: Cost of Capacity Development and Training Programme for Project Contractor(s)**

<b>Provided by</b>	<b>Organized by</b>	<b>Contents</b>	<b>No. of training events</b>	<b>Duration</b>	<b>Cost (PKR)</b>
<b>Pre-construction Phase</b> Monitoring Consultants/Organizations offering specialized services in environmental management and monitoring	CSC & PMU	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring Plan Group exercise and participatory workshop to measure effectiveness of program	Two seminars for Contractor management staff and project staff	1 day	100,000/Training
<b>Construction Phase</b> Monitoring Consultants/Organizations offering specialized services in environmental management and monitoring	CSC & PMU	Short seminars on Environmental risks associated with construction phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues Group exercise and participatory workshop to measure effectiveness of program	Two seminars for Contractor management staff and project staff dealing in environment and social issues	1 day	100,000/Training
<b>Operation Phase</b> Authorized Operator or 3 <sup>rd</sup> party trainer	WSSC Kohat	Short seminars on Environmental risks associated with operation phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues	Bi-annual seminars	1-2 Day	600,000/Year

		Group exercise and participatory workshop to measure effectiveness of program			
<b>Total</b>			<b>800,000 (PKR 0.8 million)</b>		

## 8 Public Consultation and Information Disclosure

374. This section describes the process and outcomes of the consultations carried out with various groups of stakeholders as part of the environmental and social assessment. It includes a brief discussion on the concerns expressed by the stakeholders during the consultation meetings and responses provided in order to address the concerns through necessary mitigation measures.
375. The specific objectives of the consultation were: (i) obtaining local and indigenous knowledge about the environment and people living in the project area; (ii) interaction with the project affected population and other stakeholders for the collection of primary and secondary data on environment and people; and (iii) engaging stakeholders for maximization of the project benefits.
376. The public consultation process was carried out by the KPCIP-EDCM team in two rounds first round was carried May, 2020 while second round was carried out in April 2021. Mainly key informants were consulted for these meetings which were carried out in an open and frank atmosphere conducive to appreciation of the basic elements of the project and dissemination of information on beneficial and adverse impacts and mitigation for adverse impacts.
377. Total 5 FGDs was conducted in which 50 men participated. Information on positive and negative impacts associated with constructional and operational stage and proper mitigation of adverse impacts were shared at these consultations. Questionnaires for conducting FGDs and Surveys are attached as **Annexure B**. Details of Public consultations is provided as **Annexure M**.

### 8.1 Identification of Stakeholders

378. Stakeholders are considered to be individuals or organizations which have an interest in the proposed project or knowledge that will provide insight into issues or affect decision making related to the proposed project. On the basis of interest and role criteria there are two types of stakeholders for the proposed project as described below.

#### 8.1.1 Primary Stakeholders

379. The primary stakeholders are primarily the Project Affected Persons (PAPs) and general public including women residing in the project area - for example, people living in the project area particularly those affected by the footprint of proposed improvement of water supply system, Kohat . These are the people who are directly exposed to the project's impacts though in most cases they may not be receiving any direct benefit from the project.

#### 8.1.2 Secondary Stakeholders

380. The secondary stakeholders are typically general public including women residing in the project area - for example, people living in the project area particularly those affected by the footprint of proposed improvement of water supply system, Kohat . These also include institutional stakeholders – for instance, related government department/agencies, local government, and organizations that may not be directly affected by the project; however, they may influence the project and its design. They include project proponent local through WSSC Kohat, other concerned departments that may have a role during various phases of the project, regulatory agencies such as EPA, Kohat Development Authority, non-governmental

organizations (NGOs), the broader interested communities including academia and journalists, and general public.

## 8.2 Consultation Process

381. As part of the present environmental and social assessment, detailed consultations were carried out through village meetings and focus group discussions (FGDs) with the communities. Separate meetings were held with the institutional stakeholders in the form of one-to-one meetings i.e. with EPA, WSSC Kohat, etc. Details of this consultation process are described below;

## 8.3 Consultation with Project Affected Peoples

382. The consultation with project affected peoples was carried out during the various site visits. As water supply network will be constructed within TMA/KDA owned RoW therefore no LAR impact is anticipated hence no significant number of PAPs are identified. All data of group discussion, individual discussion and FGDs was recorded. As mentioned earlier total 5 FGDs were conducted. Details of stakeholder consultations are mentioned in **Table 8.1** and pictures are attached as **Figure 8.1**.

### 8.3.1 Issues, Concerns and Findings of the Focal Group Discussion:

- The people living in the vicinity of the project area had some concerns related to the water supply system of the city. The existing water supply is not sufficient to cater the needs of nearby localities in terms of water demand.
- People told that current water supply networks is broken at multiple point and in contact with sewerage lines.
- Broken lids of water tanks allow dust and dirt to settle down in the existing water storage tanks around city and thus making the drinking water impure.
- There are no special arrangements for cleaning of water supply network, it gets flooded with rainwater. Some water supply lines are passing from waste water drains, with this, the wastewater often mixes into clean water pipeline and this water is again harmful to health. This is an indication of drinking water being contaminated at some point.
- The improvement in roads will help in easy access to different basic life necessities

### 8.3.2 Responses and Proposed Solutions:

- The new water supply network will improve the current situation of water storage tanks and pipeline network. All the damaged or repairable pipeline and water tanks will be replaced/rehabilitated with new structures. To meet demand 10 new tubewells will be installed.
- The drain shall be cleaned and arrangements shall be made separately to avoid mixing of wastewater in the clean water source.
- After installation of new water supply network, sufficient water will be supplied to every house in the parameter and hence water shortage will no longer exist.
- Locals will be preferred for jobs provision as this is both socially and economically favored and feasible.

- Water quality will be monitored and any leakages into the water supply network shall be repaired immediately.
- Countinous supply of water shall be ensured and water meetring will be installed to reduce theft and exploitation of water.



**Table 8.1: Consultation with Project Affected Peoples**

Sr. No.	Date	Location of Consultation	Total No. of Participants	Comments/Concerns	Consultant Response
i	16/04/2021	Kotal Township	15 (10 male and 05 female)	<p>The existing water supply is not sufficient to cater the needs of nearby localities in terms of water demand.</p> <p>Job opportunities shall be provided for the locals</p> <p>Over population has affected every city/village around the Globe, which is why the current supply of clean drinking water is not enough for the existing population of the area.</p> <p>Due to unknown reasons, the water supply from current extractions sometimes detect tapeworm. This is an indication of drinking water being contaminated at some point.</p>	<p>Locals will be preferred for jobs provision as this is both socially and economically favored and feasible.</p> <p>The improvement in water supply scheme and installation of storage tanks and tubewells is proposed for the sole purpose to provide enough water supply to the residents of the city so they can fulfill their water needs just enough.</p> <p>Water quality will be monitored and leakages will be repaired.</p>
ii	16/04/2021	Labour Colony	05 (male)	Road network shall be improved and widened for efficient transportation	Widening and improvement of existing road infrastructure will also be considered a part of this project along the proposed project route.
iii	17/04/2021	Paracha Colony	16 (06 male and 10 female)	Due to unavailability of storage reservoirs water supply was disconnected or reduced when tubewells are on maintenance	After installation of new tubewells and water storage tanks, sufficient water will be supplied to every house during maintenace as well and hence water shortage will no longer exist

iv	17/04/2021	Bannu Road	06 (male)	The project was appreciated as the improvement in water supply network will increase the availability of clean water to the residents.	.
v	17/04/2021	Babri Banda	08 (male)	Job opportunities shall be provided for the locals and they shall be educated how water metering was shall be done and billing mechanism.	Locals will be preferred for jobs provision as this is both socially and economically favored and feasible. Moreover, locals shall be guided regarding water metering and subsequently billing.

**Figure 8-1: Photographs of Focus Group Discussions**

	
<p>Consultation at Bannu road</p>	<p>Consultation at Babri Banda</p>
	
<p>Consultation with notables at KDA Township Jamia Masjid</p>	<p>Consultation at Labor colony</p>
	
<p>Consultation with KDA</p>	<p>Consultation with district administration</p>

#### 8.4 Consultation with Official Stakeholders:

383. As part of environmental assessment, detailed meetings were held with the institutional stakeholders in the form of one-to-one meetings i.e. with WSSC Kohat and KDA details of meeting are shared in **Table 8.2**.

**Table 8.2 Findings of Consultation with Government Stakeholder**

Sr. No.	Date	Location of Consultation	Comments/Concerns	Consultant Response
1	06/05/20	WSSC Kohat Office	Existing system is damaged and could not meet demand of water supply to the citizen of Kohat.  Diseases caused by contaminated water are very common and posing negative impact on health and the environment. Kohat city	The new system will meet requirement for the current as well as future population demand and system will be strengthened.
2	16/04/21	KDA	Existing system need replacement as it is outlived.  KDA extends its full support towards project implementation	New water supply system will replace the outlived pipes and will remove existing constraints.

#### 8.5 Consultation Plan for Construction and Operation Phase

384. Consultation plan for construction and operation phase of water supply system, Kohat will be prepared in order to take response of project stakeholders and general public about the project. Periodic consultations and community feedback surveys will be carried out to develop positive perception about the project. Intended stakeholders for such consultations will be all stakeholders that are consulted at the time of IEE preparation and KPCIP PRF processing. Record of such consultations will be maintained at PMU/WSSCKK offices and necessary changes in operational modalities will be introduced in the system in light of the response provided by the consultants.

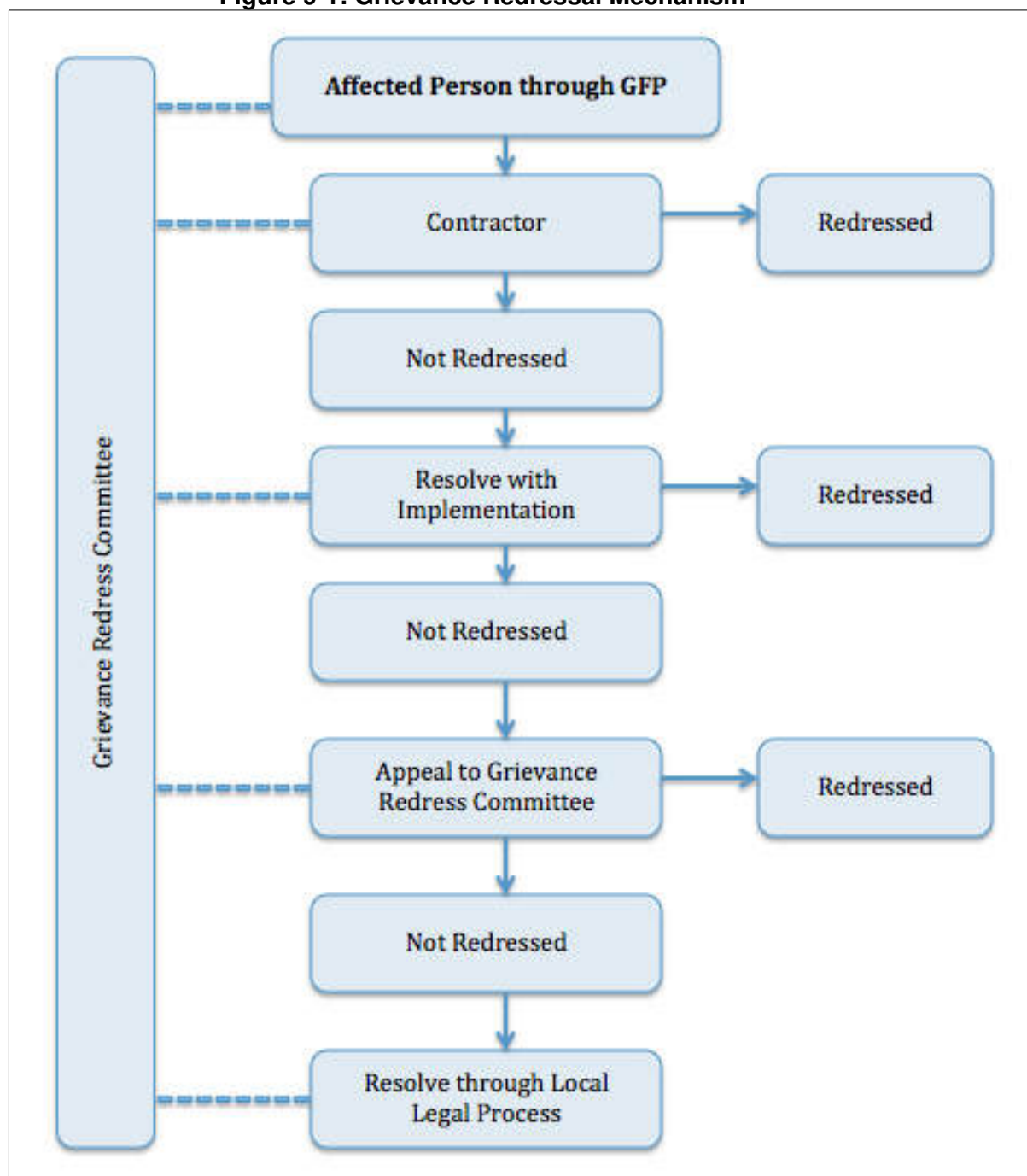
## 9 Grievance Redressal Mechanism

### 9.1 General

385. The ADB Policy (SPS 2009) requires establishment of a local grievance redress mechanism to receive and facilitate resolution of the Displaced/Affected Persons concerns and grievances regarding the project's social and environment performance. The measures have been identified to mitigate any potential environmental and social impacts to be caused due to implementation of proposed improvement of water supply system works.
386. However, in spite of best efforts, there is chance that the individuals / households affected by the project or other stakeholders are dissatisfied with measures adopted to address adverse social impacts of the project. To address, such situation an effective Grievance Redress Mechanism (GRM) will be established to ensure timely and successful implementation of the project. It will also provide a public forum to the aggrieved to raise their objections and the GRM will address such issues adequately. It will receive, evaluate and facilitate the resolution of displaced persons' concerns, complaints and grievances about the social and environmental performance at the level of the project.
387. The GRM will aim to investigate charges of irregularities and complaints receive from any displaced persons and provide a time-bound early, transparent and fair resolution to voice and resolve social and environmental concerns link to the project.
388. The PMU KPCIP shall make the public aware of the GRM through public awareness campaigns. The name of contact person(s) and his/her phone number, PMU contact numbers will serve as a hotline for complaints and shall be publicized through the media and placed on notice boards outside their offices, construction camps of contractors, and at accessible and visible locations in the project area. The project information brochure will include information on the GRM and shall be widely disseminated throughout the project area. Grievances can be filed in writing, via web-based provision or by phone with any member of the PMU.
389. First tier of GRM. The PMU is the first tier of GRM which offers the fastest and most accessible mechanism for resolution of grievances. The PMU staff for environment and social safeguards will be designated as the key officers for grievance redressal. Resolution of complaints will be completed within seven (7) working days. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, traffic police, etc.). Grievances will be documented and personal details (name, address, date of complaint, etc.) will be included, unless anonymity is requested. A tracking number will be assigned for each grievance, including the following elements:
- Initial grievance sheet (including the description of the grievance), with an acknowledgement of receipt handed back to the complainant when the complaint is registered;
  - Grievance monitoring sheet, mentioning actions taken (investigation, corrective measures);
  - Closure sheet, one copy of which will be handed to the complainant after he/she has agreed to the resolution and signed-off.

- The updated register of grievances and complaints will be available to the public at the PMU office, construction sites and other key public offices in the project area. Should the grievance remain unresolved, it will be escalated to the second tier.

- 390. Second Tier of GRM.** The PMU will activate the second tier of GRM by referring the unresolved issue (with written documentation) to the Water Sanitation and Services Company (WSSC), Kohat who will pass unresolved complaints upward to the Grievance Redress Committee (GRC). The GRC will be established by WSSC Kohat before start of site works. The GRC will consist of the following persons: (i) Project Director; (ii) representative of District government; (iii) representative of the affected person(s); (iv) representative of the local Deputy Commissioners office (land); and (v) representative of the KP EPA (for environmental-related grievances). A hearing will be called with the GRC, if necessary, where the affected person can present his/her concerns/issues. The process will facilitate resolution through mediation. The local GRC will meet as necessary when there are grievances to be addressed. The local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within fifteen (15) working days. The contractor will have observer status on the committee. If unsatisfied with the decision, the existence of the GRC will not impede the complainant's access to the Government's judicial or administrative remedies.
- 391.** The functions of the local GRC are as follows: (i) resolve problems and provide support to affected persons arising from various environmental issues and including dust, noise, utilities, power and water supply, waste disposal, traffic interference and public safety as well as social issues and land acquisition (temporary or permanent); asset acquisition; and eligibility for entitlements, compensation and assistance; (ii) reconfirm grievances of displaced persons, categorize and prioritize them and aim to provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.
- 392.** The WSSC Kohat officers will be responsible for processing and placing all papers before the GRC, maintaining a database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out.
- 393. Third tier of GRM.** In the event that a grievance cannot be resolved directly by the PMU (first tier) or GRC (second tier), the affected person can seek alternative redressal through the district or sub-district committees as appropriate. The PMU or GRC will be kept informed by the district, municipal or national authority. The grievance redress mechanism and procedure are depicted in the **Figure 9.1** below. The monitoring reports of the EMP and RP implementation will include the following aspects pertaining to progress on grievances: (i) Number of cases registered with the GRC, level of jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as Name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e., open, closed, pending).
- 394.** In order to provide greater clarity, the pictorial description of the GRM is provided in **Figure 9.1** below.

**Figure 9-1: Grievance Redressal Mechanism**

## 10 Conclusion and Recommendations

395. The improvement of water supply system in Kohat is of high significance considering the urgent need for improving sustainable water supply system of Kohat city.
396. An action plan with clear roles and responsibilities of stakeholders is provided in the IEE report. The PMU, Contractors, WSSCK and the Construction Supervision Consultant are the major stakeholders responsible for the action plan. The action plan must be implemented prior to commencement of construction work. In order to execute successful operation of water supply networks, institutional review and capacity building (IRCB) component is included in the project design to enhance services delivery of WSSCK.
397. The majority of the environmental impacts are associated with the design and construction phase of the project as they are envisaged to be long-term. Necessary design considerations have been included for installation of tubewells and distribution network. Location of tubewells and storage reservoir have been selected after detail reconnaissance to maintain minimum head in supply network. Tube shall be designed on the basis of recharging capacity to avoid ground water depletion. Major impacts associated with construction activity are clearance of ROW for water supply line, traffic hindrance, social grievances and community health and safety issues during laying of water supply system in populated areas. Water supply main shall be laid according to available utility corridor and timely repair and maintenance activities shall be carried out to reduce prolonged road closures.
398. Mitigation measures will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures in the EMP are implemented and to determine whether the environment is protected as intended. This will include observations on and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported.
399. The implementation of mitigation measures during construction period will be the responsibility of the Contractor. Therefore, the required environmental mitigation measures will have to be clearly defined in the bidding and contract documents, and appropriately qualified environmental staff need to be retained by the Consultant to supervise the implementation process. The EMP includes measures to minimize project impacts due to traffic, noise, air pollution and waste generation etc.
400. The EMP contained within this IEE document is considered sufficient for issuance as part of the Contracts to the successful bidder(s) and for subsequent use during the project works. It shall be mentioned that prior to the commencement of works, this EMP must be further updated by the Contractor into site specific EMPs (SSEMPs) for review and approval of ADB. In these SSEMPs, aspects such as a detailed traffic management plan, identification of locations for disposal of debris and spoil and any other details which shall become available later must be included for efficient implementation of all proposed mitigation measures and the subsequent monitoring of these measures.
401. Based on the findings of the IEE, the subproject is unlikely to cause any significant, irreversible or unprecedented environmental impacts. The potential impacts are localized, temporary in nature and can be addressed through proven mitigation measures. Hence, the classification of the subproject as Category B per ADB SPS, 2009 is confirmed. No further study or assessment is required at this stage.

### Recommendations:



- Obtain statutory clearances prior to award of contract and ensure conditions/requirements are incorporated in the subproject design and documents;
- Upon mobilization of the contractors, PMU KPCIP to provide a safeguards orientation per IEE and project administration manual;
- Contractor to appoint environmental safeguards person responsible for environmental safeguards compliance, occupational health and safety and core labour standards;
- The IEE will be updated and the final IEE report will incorporate results of detailed engineering design and of any additional baseline monitoring as required (e.g., air, noise, surface water quality) and will be submitted to ADB for approval and disclosure at ADB website.

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# ANNEXURES

# **Annexure A**

## **REA Checklist**

## Rapid Environmental Assessment (REA) Checklist

**Instructions:**

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Pakistan/Khyber Pakhtunkhwa Cities improvement project (Kohat City)

**Country/Project Title:****Sector Division:**

Improvement of water Supply System in Kohat including:

- i) Rehabilitation and Provision of water reservoirs
- ii) New distribution network and water metering system
- iii) Energization through clean energy sources of Existing Tube wells

Screening Questions	Yes	No	Remarks
<b>A. Project Siting</b> Is the project area...			
▪ Densely populated?	✓		
▪ Heavy with development activities?		✓	
▪ Adjacent to or within any environmentally sensitive areas?		✓	
• Cultural heritage site		✓	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>Protected Area</li> </ul>		✓	
<ul style="list-style-type: none"> <li>Wetland</li> </ul>		✓	
<ul style="list-style-type: none"> <li>Mangrove</li> </ul>		✓	
<ul style="list-style-type: none"> <li>Estuarine</li> </ul>		✓	
<ul style="list-style-type: none"> <li>Buffer zone of protected area</li> </ul>		✓	
<ul style="list-style-type: none"> <li>Special area for protecting biodiversity</li> </ul>		✓	
<ul style="list-style-type: none"> <li>Bay</li> </ul>		✓	
<b>B. Potential Environmental Impacts</b> Will the Project cause...			
<ul style="list-style-type: none"> <li>pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?</li> </ul>		✓	Source of water would be the tube-wells.
<ul style="list-style-type: none"> <li>impairment of historical/cultural monuments/areas and loss/damage to these sites?</li> </ul>		✓	
<ul style="list-style-type: none"> <li>hazard of land subsidence caused by excessive ground water pumping?</li> </ul>		✓	
<ul style="list-style-type: none"> <li>social conflicts arising from displacement of communities?</li> </ul>	✓		Social conflicts may arise during pipe laying activities in congested areas. There is need of sound construction management and continuous community consultation to avoid such impacts.
<ul style="list-style-type: none"> <li>conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?</li> </ul>		✓	
<ul style="list-style-type: none"> <li>unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?</li> </ul>	✓		Water treatment would be required at the source.
<ul style="list-style-type: none"> <li>inadequate protection of intake works or wells, leading to pollution of water supply?</li> </ul>	✓		Fencing and screens would be required in the design for intake structures to prevent polluted water from flowing through the distribution network.

Screening Questions	Yes	No	Remarks
▪ over pumping of ground water, leading to salinization and ground subsidence?		✓	
▪ excessive algal growth in storage reservoir?	✓		Treatment would be required to mitigate the effect
▪ increase in production of sewage beyond capabilities of community facilities?	✓		Increased water supply is expected to increase water usage and therefore the production of sewage water.
▪ inadequate disposal of sludge from water treatment plants?		✓	There would be sludge issues from water treatment plants if not managed.  Regular desludging shall be necessary in operation and maintenance.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		✓	
▪ impairments associated with transmission lines and access roads?	✓		
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	✓		Health hazards should be mitigated by reducing exposure to hazardous chemicals through proper storage and best management practices in line with IFC safety guidelines.
▪ health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?	✓		Best management and safety practices should be adopted to protect workers from any biological or physical hazards.
▪ dislocation or involuntary resettlement of people?		✓	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	
▪ noise and dust from construction activities?	✓		Noise and dust from construction can be minimized and managed with adequate mitigation measures.

Screening Questions	Yes	No	Remarks
▪ increased road traffic due to interference of construction activities?	✓		Traffic increase due to construction activities shall be managed by adhering to scheduled time based on lesser traffic volumes for movement of construction machinery. A proper traffic management plan shall be devised.
▪ continuing soil erosion/silt runoff from construction operations?	✓		Mitigation measures (temporary silt traps) will be adopted to minimize soil erosion/silt runoff.
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	✓		Residual chlorine should be maintained up to the end-user
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		✓	
▪ accidental leakage of chlorine gas?		✓	Emergency Preparedness and response plan shall be in place to manage the situation.
▪ excessive abstraction of water affecting downstream water users?		✓	Controlled supply of water to avoid excessive consumption of water and ensure that other uses of water are not jeopardized.
▪ competing uses of water?		✓	
▪ increased sewage flow due to increased water supply	✓		Water supply is expected to increase water usage and therefore the production of sewage water.
▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		✓	
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	The contractor shall ensure hiring of local labor and sustainable water usage.
▪ social conflicts if workers from other regions or countries are hired?		✓	
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	✓		Strict implementation of safety measures should be suggested in the EMP to reduce these impacts.



Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?</li> </ul>	✓		Safety measures (such as appropriate barriers or buffers) will be installed to keep the community at a safe distance from construction sites, thereby protecting them from accidental and natural hazards.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> <li>Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?</li> </ul>	✓		Yes, it is subject to earthquakes.
<ul style="list-style-type: none"> <li>Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?</li> </ul>	✓		In case of higher precipitation events, handling costs could go up.
<ul style="list-style-type: none"> <li>Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?</li> </ul>	✓		
<ul style="list-style-type: none"> <li>Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?</li> </ul>		✓	

**PMU KPCIP Response:**

Project fall in category: (A) \_\_\_\_\_ (B) \_\_\_\_\_ ✓ \_\_\_\_\_ (C) \_\_\_\_\_ (F) \_\_\_\_\_

# **Annexure B**

## **Questionnaires for Conducting FGDs & Surveys**

## Focus Group Discussion (FGDs)

Project Name: \_\_\_\_\_

Venue: \_\_\_\_\_

Sr no \_\_\_\_\_

Date: \_\_\_\_\_

Sr no	Name	Profession	CNIC	Moza/Village UC, Tehsil & District	Signature/Thumb
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

## SOCIO-ECONOMIC AND DEMOGRAPHIC SURVEY FOR IMPROVED WATER SUPPLY

Date: \_\_\_\_\_

Sr No. \_\_\_\_\_

## 1. Identification

1.1 Name of Respondent \_\_\_\_\_

1.2 Father's Name \_\_\_\_\_

1.3 Respondent CNIC No: \_\_\_\_\_

1.4 Tribe \_\_\_\_\_

1.5 Address: Village: \_\_\_\_\_

Town: \_\_\_\_\_

Tehsil: \_\_\_\_\_

District: \_\_\_\_\_

Province: \_\_\_\_\_

1.6 Demographic Profile of Respondent (Children up to 10 yrs (#): M FM F )

Sr. No.	Relationship with Respondent (See codes)	Sex Male=1 Female=2	Age (Yrs.)	Education (See Codes)	Name of Business/ Occupation (See Codes)		Income From Business/ Occupation (Rs./ Annum)		Diseases During Last Year (See codes)
					Main	Secondary	Main	Secondary	
1	SELF								
2									
3									
4									
5									
6									
7									
8									
9									
10									

\*Other: Rent from property, remittances, net sale of items during a year, net income from agriculture etc.

Demographic Codes:

Relationship: 1=Self, 2=Wife, 3=Son, 4=Daughter, 5=Father, 6=Mother, 7=Brother, 8=Sister, 9=Grand Father, 10=Grand Mother, 11=Bhabhi, 12=Nephew, 13=Father-in-Law, 14=Mother-in-Law, 15=Others

Sex: 1=Male, 2=Female

Education: 1= Primary 2= Middle 3= Matric, 4= Intermediate, 5= BA/BSc, 6= MA/MSc, 7=LLB, 8=Engineer, 9=MBBS, 10=Technical Diploma, 11=Dars-e-Nizami, 12=CanRead Quran, 13=Can Insert Signatures, 14= Illiterate,

Occupations: 1=Agriculturist, 2=Shopkeeper, 3= Trader, 4= Govt. Servant, 5=Private Servant, 6=Timber Labour, 7=General Labour, 8=Livestock, 9=Fishing, 10=Driver, 11=Health Related, 12=Educator/Teacher, 13=House-Maid, 14= House Wife, 15=Gone Abroad, 16=Gone out City within Pakistan

Diseases: 1=Diarrhea, 2=Measles, 3=Hepatitis, 4=Typhoid, 5=HIV/AIDS, 6=Polio, 7=Cholera, 8=Tuberculosis, 9=Heart Disease, 10=No Disease,

1.7 Are you member of any village Community organization \_\_\_\_ 1. Yes ☐ 2. No ☐

1.8 If yes, which of the following organizations?

- i. Religion                      ii. Political                      iii. Law & Order  
 iv. Education (School/Institution)                      v. Community Organization                      vi. Local Body  
 vii. Youth Organization                      viii. Any other

## 2. Land Utilization

Land	Area	Kanal	Mara
Total Area owned			
Total Cultivated Area			
Area Under Rabi (winter) Crops			
Area Under Kharif (summer) Crops			
Uncultivated Area			
Waste land			
Area Under Farm Houses			
Barren Land			

### 2.1 Cropping Pattern, Yield and Cost

Sr. No.	Major Crops	Area Sown		Average Production (Kgs)	Price/40 kgs (Rs.)	Total Cost Incurred (Rs.)
		Acre	Kanal			
1.	Wheat					
2.	Maize					
3.	Cotton					
4.	Rice					
5.	Sugarcane					
6.	Orchards					
7.	Other ( )					
8.	Grand Total:					

2.2 Land Tenure Status: ☐ Owner ☐ Tenant ☐ Share Cropper ☐ Leaser

2.3 Land Rent (Rs. / acre) \_\_\_\_\_

### 3. Possession of Household Goods

Item	No.	Value (Rs.)	Item	No.	Value (Rs.)
Television			Car		
Washing machine			Van/Pickup		
Geyser			Gas Cylinder		
Electric fan			VCR/DVD Player		
Electric iron			Dish Antenna/Cable Connection		

Item	No.	Value (Rs.)	Item	No.	Value (Rs.)
Sewing machine			Telephone/Mobile		
Radio/cassette recorder			Electric Water Pump		
Motor cycle/scooter			Computer		
Other			Other		
Total:			Total:		

#### 4. Average Monthly Expenditure on Food and Non-Food Items

##### 4.1 Monthly Expenditure on Food & Non-Food Items (Rs.)

###### a) Expenditures on Food Items

Sr. No.	Item	Qty. / Month	Expenditure (Rs.)
1.	Wheat / Atta (Flour)		
2.	Maize Flour		
3.	Ghee		
4.	Sugar		
5.	Legumes		
6.	Vegetables		
7.	Tea Leaves		
8.	Milk		
9.	Other Specify		
10.	Total:		

###### b) Exp. On Non-Food Items:

1.	Fire wood		
2.	Gas Cylinder		
3.	Kerosene Oil		
4.	Washing Material		
5.	Other Specify		
6.	Total:		

4.2 Expenditure on clothes and shoes during last year: Rs.

4.3 Occasional expenses during last year (such as meeting social obligation expenditure) Rs.

4.4 Av. Monthly utility bills for: Electricity (Rs.)

Communication (Rs.) Water (Rs.)

4.5 Annual Expenditure on Health Care (Rs.):

#### 5. Social Organizations

5.1 Specify the existing village/sectoral organizations in your area and state their functional status?

Sr. No.	Name of Organization	Category	Registered/ Unregistered	Functions
1		Religious		
2		Educational		
3		Skill Development		
4		Social Welfare		
5		Women Organization		
6		Other		

6. Leadership Pattern

6.1 Which type of people is influential in village matters and how they decide those matters?

Sr. #	Person / Status	Decision Pattern
1	MPA / MNAs	
2	Head of Tribe	
3	Spiritual / Religious Leader	
4	Land Lord / Lumber Dar	
5	School Teacher	
6	Community Leader	
7	Government Official	
8	Retd. Government Official	
9	Any other (specify)	

6.2 Were their decisions considered final and implemented successfully? ☐ 1. Yes

☐ 2. No

i) Level of acceptability (%) \_\_\_\_\_ ii) Successful implementation (%) \_\_\_\_\_

6.3 Are the general relationship among people in the locality essentially based upon?

1. Competition \_\_\_\_\_ 2. Conflict \_\_\_\_\_  
3. Co-operation \_\_\_\_\_ 4. Don't Know \_\_\_\_\_

6.4 Were you involved in any dispute in the past 5 years? ☐ 1. Yes ☐ 2. No

6.5 If yes, what was the nature of dispute and how was it resolved

Nature of Dispute	Method of Resolution
1. _____	_____
2. _____	_____
3. _____	_____

7. Credit

7.1 Have you obtained credit during last year? Yes [ ] No [ ] if yes, source of credit, Formal [ ] Informal [ ]

7.2 Please write the name of relevant source

Formal source (s) \_\_\_\_\_

Informal source (s) \_\_\_\_\_

Percentage of interest \_\_\_\_\_

7.3 Purpose of Loan (Tick)

Purchase House 1) Rs. \_\_\_\_\_  
 Business 1) Rs. \_\_\_\_\_  
 Repair of House 1) Rs. \_\_\_\_\_  
 Medicare of Family Member 1) Rs. \_\_\_\_\_  
 Family/ Social matters 1) Rs. \_\_\_\_\_  
 Farm inputs 1) Rs. \_\_\_\_\_  
 Livestock 1) Rs. \_\_\_\_\_  
 Other (specify) 1) Rs. \_\_\_\_\_

7.4 Mode of repayment (Tick the relevant)

1) One time [ ] 2) Through installments [ ]

i) Quarterly installments [ ] ii) Six monthly [ ]  
 iii) Annual [ ] iv) Other (specify) \_\_\_\_\_

7.5 How much repayment has been made so far? a) 100% [ ] b) 75% [ ] c) 50% [ ]  
 d) 25% [ ] Less than 25 % [ ]

8. Housing Conditions

8.1 Do you have your own house?

1) Yes \_\_\_\_\_ 2) No \_\_\_\_\_

If yes then

8.2 Total Area of the house; square ft. Present Value (Rs) \_\_\_\_\_

Type of Room	No. of Room	Katcha (tick)	Pacca (tick)	Semi Pacca (tick)
Living rooms				
Animal shed				
Other shed				
Bathroom				
Latrine				
- Open				
- Flush				



Officer

8.3 Citrus Assets

Area (H)

Shop (Sq. ft): L W

Khokha:

Electric Pump / Hand Pump (No.):

Hydropower Generator:

Other { } (No.):

8.4 Trees

- Mature Fruit Trees (No.):

- Mature Shade Trees (No.):

## 9. Access to Social Amenities (Tick)

Social Amenities	Available	Satisfactory	Non-Satisfactory	No Access
Electricity				
Sui Gas				
Water Supply				
Telephone				
Sewerage/Drainage				
BHU				
School				
Others				

## 10. Livestock Inventory

Livestock	No.	Present Value (Rs.)
Buffaloes		
Cows		
Horse		
Donkey		
Mule		
Sheep		
Goat		
Poultry		
Other		

## 11. Women's Participation and Decision Making in Different Activities

## 11.1 Women participation in different household activities:

Activities	Participation (%)	Decision Making (%)
Household activities		

Child caring	<input type="text"/>	<input type="text"/>
Farm/Crop activities	<input type="text"/>	<input type="text"/>
Livestock rearing	<input type="text"/>	<input type="text"/>
Sale & Purchase of properties	<input type="text"/>	<input type="text"/>
Social obligations (marriage, birthday & other functions)	<input type="text"/>	<input type="text"/>
Local representation (councilor/ political gathering)	<input type="text"/>	<input type="text"/>
Others	<input type="text"/>	<input type="text"/>

### 11.2 Women issues in the project area

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### 11.3 Women views about the project

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## 12. Perceptions of Respondents for Action Associated with the Project

	Increase	Decrease
Employment opportunities	<input type="text"/>	<input type="text"/>
Marketing facilities opportunities	<input type="text"/>	<input type="text"/>
Living standard	<input type="text"/>	<input type="text"/>
Unemployment	<input type="text"/>	<input type="text"/>
Income generating activities	<input type="text"/>	<input type="text"/>
Mobility (Access to Resources)	<input type="text"/>	<input type="text"/>
Quality of drinking water	<input type="text"/>	<input type="text"/>
Agriculture water	<input type="text"/>	<input type="text"/>
Trend of fish farm	<input type="text"/>	<input type="text"/>
Other specify _____		

### 13. General Remarks of the Respondents

### 14. Resettlement Part

14.1 Do you feel any significant impact?

Yes

No

If yes then

Category	Area Acres	Kanal	Value of Land (Rs.)	Remarks
Cultivated				
Uncultivated				
Grazing				
Barren Land				
Waste Land				
Other				
Total				

14.2 Affected Cropping Area

Yes

No

If yes then

Name of Crop	Acre	Kanal	Value (Rs.)
Rabi			
Kharif			
Total			

14.3 Affected residential structures

Name of Structure	Types of Structures			Area		Value of Structure
	Kacha	Pacca	Semi Pacca	Sq. ft.	Rft.	
Houses						
Boundary Wall						
Other						

14.4 Impact on Farm House

Yes

No

If yes then

Name	Type of Farm House			Area		Value (Rs.)
	Kacha	Pacca	Semi Pacca	Sq.ft	Rft.	
Rooms						
Cattle Shed						
Boundary Wall						
Other						

14.5 Impact of Tube wells

Yes

No

If yes then

Types of Tube wells	No.	Value (Rs.)
Electric		
Diesel		
Turbine		
Other		
Total:		

14.6 Impact on Utility

Yes

No

If yes then

Types	Nos. / Area
Electric poles	
Transformer	
Transmission line	
Telephone	
Other	
Total:	

14.7 Impact on Community Structure

Name	Yes	No	Value (Rs.)
Schools			
Mosque			
Graveyard			
Health Centre			
Shrine			
Others			
Total:			

14.8 How to shift shrines / graveyards?

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14.9 Miscellaneous Impacts of the Project

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14.10 Do you have any alternate residence place?

Yes ☐ No ☐

If yes then (tick relevant)

Own Land / House	Yes/No	Location	Distance from current residence (km)
Tenancy			
Relative			
Other			

14.11 Mode of Payment

Land for land \_\_\_\_\_  
 Cash compensation \_\_\_\_\_  
 Kind \_\_\_\_\_  
 Other \_\_\_\_\_

15. Project

\_\_\_\_\_

16. Views / Comments of Interviewers

\_\_\_\_\_  
 \_\_\_\_\_

Name & Signature of Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_

# **Annexure C**

## **Environmental Baseline Monitoring**



## Air Quality Particulate Matters



## AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Date:	10-04-2021
Monitoring Date:	10-04-2021	Reporting Date:	17-04-2021
Source:	Ambient Air	Monitoring Instrument:	AQMS 65, Serial #1310
GPS Coordinates:	33°32'25.6"N 71°27'40.6"E		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>
	Hours	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )		
1.	09:00 A.M	21.2	81.2	23.75 ( $\mu\text{g}/\text{m}^3$ )	81.27 ( $\mu\text{g}/\text{m}^3$ )
2.	10:00 A.M	23.7	89.8		
3.	11:00 A.M	26.9	85.8		
4.	12:00 P.M	26.4	86.3		
5.	01:00 P.M	25.2	85.3		
6.	02:00 P.M	23.9	88.1		
7.	03:00 P.M	27.5	92.4		
8.	04:00 PM	25.6	86.6		
9.	05:00 PM	26.3	86.8		
10.	06:00 PM	24.1	83.4		
11.	07:00 PM	23.7	86.4		
12.	08:00 PM	26.9	83.5		
13.	09:00 PM	25.7	83.3		
14.	10:00 PM	24.8	85.3		
15.	11:00 PM	24.1	79.7		
16.	12:00 AM	21.8	76.3		
17.	01:00 AM	19.8	78.2		
18.	02:00 AM	20.6	74.6		
19.	03:00 AM	24.8	69.5		
20.	04:00 AM	22.7	68.9		
21.	05:00 AM	24.3	71.3		
22.	06:00 A.M	20.8	75.6		
23.	07:00 A.M	19.6	68.8		
24.	08:00 A.M	19.6	73.7		
NEQSAA				35 ( $\mu\text{g}/\text{m}^3$ )	150 ( $\mu\text{g}/\text{m}^3$ )
WHO				25 ( $\mu\text{g}/\text{m}^3$ )	50 ( $\mu\text{g}/\text{m}^3$ )

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

Note:

- Selected measurement units were  $\mu\text{g}/\text{m}^3$  otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Signature of Analyst

Signature of Chief Chemist



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Environmental Protection Agency (EPA-KPK) Certified





### AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Date:	11-04-2021
Monitoring Date:	11-04-2021	Reporting Date:	18-04-2021
Source:	Ambient Air	Monitoring Instrument:	AQMS 65, Serial #1310
GPS Coordinates:	33°34'04.1"N 71°28'17.8"E		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>
	Hours	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )		
1	10:00 A.M	28.3	105.7	25.55 (µg/m <sup>3</sup> )	86.71 (µg/m <sup>3</sup> )
2	11:00 A.M	27.6	108.3		
3	12:00 P.M	28.4	110.6		
4	01:00 P.M	28.3	106.3		
5	02:00 P.M	25.1	105.7		
6	03:00 P.M	29.6	98.2		
7	04:00 P.M	27.5	95.6		
8	05:00 P.M	23.4	94.3		
9	06:00 P.M	27.6	92.1		
10	07:00 P.M	23.6	89.5		
11	08:00 P.M	25.8	86.2		
12	09:00 P.M	30.1	83.5		
13	10:00 P.M	29.8	83.3		
14	11:00 P.M	24.7	85.3		
15	12:00 A.M	23.1	79.7		
16	01:00 A.M	26.4	76.3		
17	02:00 A.M	23.4	78.2		
18	03:00 A.M	21.6	74.6		
19	04:00 A.M	24.8	69.5		
20	05:00 A.M	22.7	68.9		
21	06:00 A.M	26.2	71.3		
22	07:00 A.M	23.9	75.6		
23	08:00 A.M	21.5	68.8		
24	09:00 A.M	20.8	73.7		
NEQSAA				35 (µg/m <sup>3</sup> )	150 (µg/m <sup>3</sup> )
WHO				25 (µg/m <sup>3</sup> )	50 (µg/m <sup>3</sup> )

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

Note:

- Selected measurement units were µg/m<sup>3</sup> otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring time.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Signature of Analyst:

Signature of Chief Chemist



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### AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Date:	12-04-2021
Source:	Ambient Air	Reporting Date:	19-04-2021
GPS Coordinates:	33°34'35.5"N 71°26'42.5"E	Monitoring Instrument:	AQMS 85, Serial #1310

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>
	Hours	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )		
1	10:15 AM	29.7	89.4	24.07 ( $\mu\text{g}/\text{m}^3$ )	78.62 ( $\mu\text{g}/\text{m}^3$ )
2	11:15 AM	28.4	85.3		
3	12:15 PM	27.3	81.7		
4	01:15 PM	25.3	80.6		
5	02:15 PM	26.7	101.7		
6	03:15 PM	24.1	109.5		
7	04:15 PM	26.3	95.7		
8	05:15 PM	23.7	92.7		
9	06:15 PM	23.6	96.3		
10	07:15 PM	22.1	80.1		
11	08:15 PM	21.3	79.5		
12	09:15 PM	19.7	75.3		
13	10:15 PM	18.3	70.2		
14	11:15 PM	21.8	67.3		
15	12:15 AM	23.4	64.5		
16	01:15 AM	21.7	62		
17	02:15 AM	22.8	60.3		
18	03:15 AM	27.3	78.3		
19	04:15 AM	28.9	76.1		
20	05:15 AM	22.7	59.7		
21	06:15 AM	22.8	63.8		
22	07:15 AM	25.6	71.8		
23	08:15 AM	23.4	75.3		
24	09:15 AM	29.7	89.4		
NEQSAA				35 ( $\mu\text{g}/\text{m}^3$ )	150 ( $\mu\text{g}/\text{m}^3$ )
WHO				25 ( $\mu\text{g}/\text{m}^3$ )	50 ( $\mu\text{g}/\text{m}^3$ )

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Note:

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- The values were representing of monitoring conditions prevailing during the monitoring hours.
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Signature of Analyst:

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Integrated Environment Laboratory



## AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat.
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Instrument:	AQMS 65, Serial #1310
Monitoring Date:	13-04-2021	Reporting Date:	20-04-2021
Source:	Ambient Air		
GPS Coordinates:	33°35'05.0"N 71°26'06.8"E		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>
	Hours	Units ( $\mu\text{g}/\text{m}^3$ )	Units ( $\mu\text{g}/\text{m}^3$ )		
1	10:30 AM	30.1	91.8	25.85 ( $\mu\text{g}/\text{m}^3$ )	79.62 ( $\mu\text{g}/\text{m}^3$ )
2	11:30 AM	29.6	94.1		
3	12:30 PM	28.3	89.3		
4	01:30 PM	28.7	90.6		
5	02:30 PM	28.1	90.4		
6	03:30 PM	26.2	100.9		
7	04:30 PM	29	98.4		
8	05:30 PM	29.7	92.6		
9	06:30 PM	28.6	92.8		
10	07:30 PM	26.4	89.4		
11	08:30 PM	25.2	87.3		
12	09:30 PM	23.6	84.6		
13	10:30 PM	24.1	79.5		
14	11:30 PM	22.5	76.6		
15	12:30 AM	23.4	73.8		
16	01:30 AM	21.7	71.3		
17	02:30 AM	22.1	69.6		
18	03:30 AM	26.6	65.5		
19	04:30 AM	27.1	65.8		
20	05:30 AM	27.6	59.5		
21	06:30 AM	27.7	58.6		
22	07:30 AM	25.5	61.3		
23	08:30 AM	19.3	63.6		
24	09:30 AM	18.5	62.7		
NEQSAA				35 ( $\mu\text{g}/\text{m}^3$ )	150 ( $\mu\text{g}/\text{m}^3$ )
WHO				25 ( $\mu\text{g}/\text{m}^3$ )	50 ( $\mu\text{g}/\text{m}^3$ )

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

## Note:

- Selected measurement units were  $\mu\text{g}/\text{m}^3$  otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
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- The report is not valid for court.

Signature of Analyst:

Signature of Chief Chemist



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## Noise Level Monitoring



## NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Instrument:	Noise Meter-IEC651-Type-2
Monitoring Date:	10-04-2021	Reporting Date:	17-04-2021
Source:	Ambient Noise		
GPS Coordinates	33°32'25.6"N 71°27'40.6"E		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	61.6	63.7	62.6
2.	10:00 A.M		62.4	63.7	63.0
3.	11:00 A.M		59.7	62.3	61.0
4.	12:00 P.M		59.5	62.1	60.8
5.	01:00 P.M		59.8	62.3	60.9
6.	02:00 P.M		59.1	61.7	60.4
7.	03:00 P.M		61.2	63.7	62
8.	04:00 PM		58.7	61.2	59.9
9.	05:00 PM		58.4	61	59.7
10.	06:00 PM		58.2	60.8	59.5
11.	07:00 PM		58	60.6	59.3
12.	08:00 PM		58.8	62.7	60.6
13.	09:00 PM		57.6	60.2	58.9
14.	10:00 PM		57.4	59.8	58.6
15.	11:00 PM		56.7	59.6	59.1
16.	12:00 AM		56.9	59.5	58.2
17.	01:00 AM		56.7	59.3	58.0
18.	02:00 AM		57.3	59.6	58.4
19.	03:00 AM		56.3	58.9	57.8
20.	04:00 AM		56.1	58.6	57.3
21.	05:00 AM		57.3	59.3	58.3
22.	06:00 A.M		55.6	56.7	56.1
23.	07:00 A.M		55.4	58	56.7
24.	08:00 A.M		54.6	56.7	55.8

NEQS limit: 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Signature of Analyst:

Signature of Chief Chemist



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## NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project		
Monitoring Date:	11-04-2021	Reporting Date:	18-04-2021
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651- Type-2
GPS Coordinates	33°34'04.1"N 71°26'17.8"E		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:00 A.M	dB(A)	56.3	59.8	58.05
2.	11:00 A.M		57.3	59.8	58.55
3.	12:00 P.M		58.4	60.7	59.55
4.	01:00 P.M		56.8	59.4	58.1
5.	02:00 P.M		56.6	59.2	57.9
6.	03:00 P.M		56.4	58.4	57.4
7.	04:00 PM		56.2	58.8	57.5
8.	05:00 PM		58.4	61.4	59.9
9.	06:00 PM		59.4	62.7	61.05
10.	07:00 PM		55.5	58.1	56.8
11.	08:00 PM		55.3	57.9	56.6
12.	09:00 PM		55.7	59.8	57.75
13.	10:00 PM		54.9	57.5	56.2
14.	11:00 PM		54.7	57.2	55.95
15.	12:00 AM		56.4	58.9	57.65
16.	01:00 AM		54.2	56.8	55.5
17.	02:00 AM		56.3	57.8	57.05
18.	03:00 AM		53.8	56.4	55.1
19.	04:00 AM		54.7	58.9	55.8
20.	05:00 AM		54.7	57.6	56.15
21.	06:00 A.M		54.6	57.8	56.1
22.	07:00 A.M		53.4	55.8	54.5
23.	08:00 A.M		52.7	55.3	54
24.	09:00 A.M		57.6	58.7	58.15

NEQS limit: 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
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Signature of Analyst

  
Signature of Chief Chemist



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## NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Date:	12-04-2021
Source:	Ambient Noise	Reporting Date:	19-04-2021
GPS Coordinates	33°34'35.5"N 71°26'42.5"E	Monitoring Instrument:	Noise Meter-IEC651-Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:30 A.M	dB(A)	63.4	65.7	64.5
2.	11:30 A.M		58.6	59.7	59.1
3.	12:30 P.M		61.6	64.2	62.9
4.	01:30 P.M		61.4	64	62.7
5.	02:30 P.M		60.41	62.4	61.4
6.	03:30 P.M		61	63.6	62.3
7.	04:30 P.M		60.3	63.4	61.6
8.	05:30 P.M		60.6	63.1	61.8
9.	06:30 P.M		60.3	62.9	61.6
10.	07:30 P.M		58.4	59.7	59.0
11.	08:30 P.M		59.9	62.5	61.2
12.	09:30 P.M		56.4	59.7	58.0
13.	10:30 P.M		59.5	62.1	60.8
14.	11:30 P.M		58.7	61.9	60.3
15.	12:30 A.M		58.7	61.6	60.1
16.	01:30 A.M		58.8	61.4	60.1
17.	02:30 A.M		58.6	61.2	59.9
18.	03:30 A.M		58.4	62.4	60.4
19.	04:30 A.M		57.6	59.8	58.7
20.	05:30 A.M		58	60.5	59.2
21.	06:30 A.M		57.7	60.3	59
22.	07:30 A.M		56.8	61.8	59.3
23.	08:30 A.M		57.3	59.9	58.6
24.	09:30 A.M		58.2	61.6	59.9

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization  
 Leq: Log Equivalent Continuous Sound Level

Note:

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- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
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Signature of Analyst:

Signature of Chief Chemist



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## NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Improvement Project		
Monitoring Date:	13-04-2021	Reporting Date:	20-04-2021
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651-Type-2
GPS Coordinates	33°35'05.0"N 71°26'06.8"E		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:15 AM	dB(A)	63.4	64.8	64.1
2.	11:15 AM		60.8	62.3	61.55
3.	12:15 PM		58.6	61.2	58.9
4.	01:15 PM		58.9	61.7	60.3
5.	02:15 PM		58.2	60.8	59.5
6.	03:15 PM		58	60.6	59.3
7.	04:15 PM		58.6	61.7	60.15
8.	05:15 PM		57.6	60.1	58.85
9.	06:15 PM		57.3	59.9	58.6
10.	07:15 PM		59.7	67.6	58.65
11.	08:15 PM		58.9	59.5	58.2
12.	09:15 PM		58.6	59.3	58.95
13.	10:15 PM		56.5	59.1	57.8
14.	11:15 PM		56.3	58.8	57.55
15.	12:15 AM		56	58.6	57.3
16.	01:15 AM		58.6	59.7	59.15
17.	02:15 AM		55.6	58.2	56.9
18.	03:15 AM		55.4	58	56.7
19.	04:15 AM		59.7	61.7	60.7
20.	05:15 AM		56	57.5	56.25
21.	06:15 AM		54.7	57.3	56
22.	07:15 AM		56.7	59.8	58.25
23.	08:15 AM		54.3	56.9	55.6
24.	09:15 AM		57.6	59.8	58.7

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

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Signature of Analyst

Signature of Chief Chemist



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## Water Quality Analysis



Integrated Environment Laboratory

## WATER ANALYSIS REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project.	Reporting Date:	19-04-2021
Sampling Date:	12-04-2021	Sampling Done by:	Analyst
Source:	Ground Water	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:	33°34'35.5"N 71°28'42.5"E		

Sr. No.	Parameters	Analysis Methods	Units	NDWQS	Results
1.	pH	APHA-4500H+ B	--	8.5-8.5	7.6
2.	Taste & Odor	In-house	--	Non Objectionable	Non Objectionable
3.	Color	APHA-2120 B/C	TCU	<15	5
4.	Turbidity	APHA-2130 B	NTU	<5	4
5.	E-Coli	APHA-9222 D	Number/100 mL	0 Number/100 mL	0
6.	Total Coliform	APHA-9222 B	Number/100 MI	0 Number/100 mL	0
7.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	<1000	287
8.	Total Hardness	APHA-2340 C	mg/L	<500	154
9.	Nitrate	APHA-4500NO3 B	mg/L	≤50	3.1
10.	Nitrite	APHA-4500NO2 B	mg/L	≤3	0.06
11.	Ammonia	APHA-4500-NH3-B	mg/L	-----	N.D
12.	Arsenic	APHA-3500As B	mg/L	≤0.05	N.D
13.	Antimony	APHA-3500Sb B	mg/L	≤0.005	N.D
14.	Barium	APHA-3500Ba-B	mg/L	0.7	N.D
15.	Chloride	APHA-4500Cl- B	mg/L	<250	101
16.	Fluoride	APHA-4500F- C	mg/L	≤1.5	0.82
17.	Aluminum	APHA-3500 Al	mg/L	≤0.2	N.D
18.	Manganese	APHA-3500 MN-B	mg/L	≤0.5	N.D
19.	Mercury	APHA-3500 Hg-B	mg/L	≤0.001	N.D
20.	Iodine	-----	mg/L	-----	0.05
21.	Zinc	APHA- 3500 Zn B	mg/L	5.0	0.98
22.	Boron	APHA 4500 B- C	mg/L	0.3	N.D
23.	Chromium	APHA 3500 Cr B	mg/L	≤0.05	N.D
24.	Selenium	APHA- 3500 Se C	mg/L	0.01	N.D

NDWQS: National Drinking Water Quality Standards

Note:

- Selected measurement units were mg/l otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
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- The report is not valid for court.

Signature of Analyst

Signature of Chief Chemist



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## WATER ANALYSIS REPORT

Reference Number	KPCIP/ENV/43-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project.	Reporting Date:	20-04-2021
Sampling Date:	13-04-2021	Sampling Done by:	Analyst
Source:	Ground Water	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:	33°35'05.0"N 71°26'08.8"E		

Sr. No.	Parameters	Analysis Methods	Units	NDWQS	Results
1.	pH	APHA-4500H+ B	—	6.5-8.5	7.5
2.	Taste & Odor	In-house	—	Non Objectionable	Non Objectionable
3.	Color	APHA-2120 B/C	TCU	<15	3
4.	Turbidity	APHA-2130 B	NTU	<5	4
5.	E-Coli	APHA-9222 D	Number/100 mL	0 Number/100 mL	0
6.	Total Coliform	APHA-9222 B	Number/100 ML	0 Number/100 mL	0
7.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	<1000	256
8.	Total Hardness	APHA-2340 C	mg/L	<500	175
9.	Nitrate	APHA-4500NO3 B	mg/L	≤50	3.2
10.	Nitrite	APHA-4500NO2 B	mg/L	≤3	0.2
11.	Ammonia	APHA-4500-NH3-B	mg/L	—	0.06
12.	Arsenic	APHA-3500As B	mg/L	≤0.05	N.D
13.	Antimony	APHA-3500Sb B	mg/L	<0.005	N.D
14.	Barium	APHA-3500Ba-B	mg/L	0.7	N.D
15.	Chloride	APHA-4500Cl- B	mg/L	<250	98
16.	Fluoride	APHA-4500F- C	mg/L	≤1.5	0.95
17.	Aluminum	APHA-3500 Al	mg/L	≤0.2	N.D
18.	Manganese	APHA-3500 MN-B	mg/L	≤0.5	N.D
19.	Mercury	APHA-3500 Hg-B	mg/L	≤0.001	N.D
20.	Iodine	—	mg/L	—	0.05
21.	Zinc	APHA- 3500 Zn B	mg/L	5.0	0.96
22.	Boron	APHA 4500 B- C	mg/L	0.3	N.D
23.	Chromium	APHA 3500 cr B	mg/L	≤0.05	N.D
24.	Selenium	APHA- 3500 Se C	mg/L	0.01	N.D

NDWQS: National Drinking Water Quality Standards

Note:

- Selected measurement units were mg/l otherwise stated.
- Quality was assured through self calibration of the instrument.
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Signature of Analyst

Signature of Chief Chemist



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## Air Quality



## AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat.
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Instrument:	ACMS 65, Serial # 1310
Monitoring Date:	10-04-2021	Reporting Date:	17-04-2021
Source:	Ambient Air (Gaseous)		
GPS Coordinates:	33°32'25.6"N 71°27'40.6"E		

Sr. No	Time	Parameters			
		CO	NO	NO <sub>2</sub>	SO <sub>2</sub>
		(mg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
1.	09:00 A.M	0.82	16.34	23.65	26.78
2.	10:00 A.M	0.93	15.36	22.97	25.61
3.	11:00 A.M	0.83	16.35	20.74	24.33
4.	12:00 P.M	0.89	15.25	21.28	21.52
5.	01:00 P.M	0.87	15.48	18.64	23.64
6.	02:00 P.M	0.85	16.89	20.08	21.34
7.	03:00 P.M	0.81	15.27	20.28	22.62
8.	04:00 P.M	0.79	14.32	2.32	22.24
9.	05:00 P.M	0.75	16.33	20.29	23.86
10.	06:00 P.M	1.04	14.34	19.88	20.72
11.	07:00 P.M	0.95	13.98	20.62	23.94
12.	08:00 P.M	0.89	14.23	21.89	22.09
13.	09:00 P.M	0.78	13.03	19.21	21.85
14.	10:00 P.M	0.91	13.11	17.98	21.04
15.	11:00 P.M	0.79	13.31	25.78	19.87
16.	12:00 A.M	0.86	13.47	18.61	13.47
17.	01:00 A.M	0.85	15.36	18.8	25.83
18.	02:00 A.M	0.83	14.09	18.67	21.24
19.	03:00 A.M	0.86	14.62	17.65	24.81
20.	04:00 A.M	0.91	12.67	19.64	24.36
21.	05:00 A.M	1.06	13.98	23.64	21.44
22.	06:00 A.M	0.87	12.36	22.65	19.64
23.	07:00 A.M	0.85	14.37	19.87	22.73
24.	08:00 A.M	0.78	13.89	19.37	21.38
Average Concentration		0.85	14.51	19.77	22.34
NEQSAA		05 (24 hr)	40 (24 hr)	80 (24 hr)	120 (24 hr)
WHO		---	---	200 (24 hrs)	20 (24 hrs)

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

## Note:

- Selected measurement units were mg/m<sup>3</sup> and µg/m<sup>3</sup> otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
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Signature of Analyst:

Signature of Chief Chemist



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### AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat.
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Instrument:	AQMS 65, Serial # 1310
Monitoring Date:	11-04-2021	Reporting Date:	18-04-2021
Source:	Ambient Air (Gaseous)		
GPS Coordinates:	33°59'44.93"N 71°33'45.89"E		

Sr. No	Time	Parameters			
		CO	NO	NO <sub>2</sub>	SO <sub>2</sub>
		Units			
	Hours	(mg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
1.	10:00 A.M	1.02	17.32	18.64	19.77
2.	11:00 A.M	1.06	16.46	23.78	18.34
3.	12:00 P.M	0.98	15.61	25.64	16.45
4.	01:00 P.M	0.95	15.23	24.67	15.34
5.	02:00 P.M	1.06	13.67	23.64	17.25
6.	03:00 P.M	0.91	13.15	19.87	14.23
7.	04:00 PM	0.93	14.18	20.37	17.56
8.	05:00 PM	0.89	12.69	19.86	17.28
9.	06:00 PM	0.83	14.2	18.34	16.66
10.	07:00 PM	0.81	13.25	19.83	15.47
11.	08:00 PM	0.83	14.67	18.32	15.99
12.	09:00 PM	0.76	13.14	15.64	17.13
13.	10:00 PM	0.64	12.67	13.64	20.34
14.	11:00 PM	0.69	12.02	13.64	23.56
15.	12:00 AM	0.68	12.22	13.92	15.75
16.	01:00 AM	0.63	13.67	13.61	16.49
17.	02:00 AM	0.78	15.67	13.8	24.86
18.	03:00 AM	0.6	14.37	12.69	21.37
19.	04:00 AM	0.66	13.97	13.61	22.67
20.	05:00 AM	0.66	12.67	14.37	23.67
21.	06:00 A.M	0.73	12.67	14.05	24.37
22.	07:00 A.M	0.71	14.89	15.67	21.86
23.	08:00 A.M	0.79	12.62	12.64	21.63
24.	09:00 A.M	0.83	12.42	14.42	22.73
Average Concentration		0.81	13.90	17.29	19.21
NEQSAA		05	40	80	120
		(24 hr)	(24 hr)	(24 hr)	(24 hr)
WHO		---	---	200	20
				(24 hrs)	(24 hrs)

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

**Note:**

- Selected measurement units were mg/m<sup>3</sup> and µg/m<sup>3</sup> otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Signature of Analyst

Signature of Chief Chemist



### FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

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Environmental Protection Agency (EPA-KPK) Certified





### AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPCIP/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Date:	12-04-2021
Monitoring Date:	12-04-2021	Reporting Date:	19-04-2021
Source:	Ambient Air (Gaseous)	Monitoring Instrument:	AQMS 65, Serial # 1310
GPS Coordinates:	33°34'35.5"N 71°26'42.5"E		

Sr. No	Time	Parameters			
		CO	NO	NO <sub>2</sub>	SO <sub>2</sub>
		Units			
	Hours	(mg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
1.	10:15 AM	0.78	18.67	22.34	24.87
2.	11:15 AM	0.75	18.76	21.67	25.67
3.	12:15 PM	0.69	15.03	19.67	27.36
4.	01:15 PM	0.98	14.98	17.68	20.47
5.	02:15 PM	0.73	15.67	15.67	20.86
6.	03:15 PM	1.09	13.97	16.89	19.87
7.	04:15 PM	0.69	14.67	17.82	18.36
8.	05:15 PM	0.55	16.64	18.2	17.65
9.	06:15 PM	0.63	15.02	16.37	19.89
10.	07:15 PM	0.79	13.67	17.42	19.03
11.	08:15 PM	1.06	13.75	15.89	18.84
12.	09:15 PM	0.59	12.94	15.58	18.79
13.	10:15 PM	0.58	12.76	14.87	19.74
14.	11:15 PM	0.81	12.84	15.36	16.97
15.	12:15 AM	0.79	16.86	18.97	18.8
16.	01:15 AM	0.64	13.2	16.15	19.34
17.	02:15 AM	0.56	13.48	16.34	18.69
18.	03:15 AM	0.58	14.78	15.78	18.64
19.	04:15 AM	0.64	14.35	16.35	19.28
20.	05:15 AM	0.61	15.88	14.67	19.38
21.	06:15 AM	0.67	13.85	16.59	17.84
22.	07:15 AM	0.63	12.89	12.67	19.48
23.	08:15 AM	0.59	13.78	16.33	16.89
24.	09:15 AM	0.78	15.61	17.36	17.65
Average Concentration		0.72	14.66	16.94	19.74
NEQSAA		05 (24 hr)	40 (24 hr)	80 (24 hr)	120 (24 hr)
WHO		---	---	200 (24 hrs)	20 (24 hrs)

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

**Note:**

- Selected measurement units were mg/m<sup>3</sup> and µg/m<sup>3</sup> otherwise stated.
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*Signature of Analyst*

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### AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPC/ENV/53-2021	Site Address:	Replacement of water Supply Scheme in Kohat
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Monitoring Date:	13-04-2021
Monitoring Date:	13-04-2021	Reporting Date:	20-04-2021
Source:	Ambient Air (Gaseous)	Monitoring Instrument:	AQMS 65, Serial # 1310
GPS Coordinates:	33°35'05.0"N 71°26'06.8"E		

Sr. No	Time	Parameters			
		CO	NO	NO <sub>2</sub>	SO <sub>2</sub>
	Hours	(mg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
1.	10:30 AM	0.97	15.67	16.78	25.67
2.	11:30 AM	0.98	17.36	14.55	23.76
3.	12:30 PM	1.03	16.55	15.68	21.79
4.	01:30 PM	1.02	13.98	18.76	19.87
5.	02:30 PM	1.2	14.66	15.84	18.04
6.	03:30 PM	1.6	12.97	16.78	19.34
7.	04:30 PM	1.1	14.89	18.76	16.57
8.	05:30 PM	1.08	13.88	19.87	15.76
9.	06:30 PM	1.03	14.02	15.21	15.67
10.	07:30 PM	0.98	13.07	15.67	14.34
11.	08:30 PM	0.89	13.68	14.05	15.79
12.	09:30 PM	0.72	11.47	15.89	16.93
13.	10:30 PM	0.76	12.58	13.67	14.56
14.	11:30 PM	0.86	14.89	16.88	17.36
15.	12:30 AM	0.79	17.67	13.84	15.55
16.	01:30 AM	0.67	16.77	15.78	16.29
17.	02:30 AM	0.76	15.86	13.72	14.37
18.	03:30 AM	0.64	12.82	14.67	18.57
19.	04:30 AM	0.89	14.67	13.73	16.23
20.	05:30 AM	0.72	15.68	18.47	16.33
21.	06:30 AM	0.73	12.85	15.40	17.35
22.	07:30 AM	0.89	12.58	13.2	16.43
23.	08:30 AM	0.83	14.67	13.71	16.79
24.	09:30 AM	0.99	15.67	12.64	15.78
Average Concentration		0.92	14.55	15.48	17.38
NEQSAA		05 (24 hr)	40 (24 hr)	80 (24 hr)	120 (24 hr)
WHO		---	---	200 (24 hrs)	20 (24 hrs)

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

**Note:**

- Selected measurement units were mg/m<sup>3</sup> and µg/m<sup>3</sup> otherwise stated.
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# **Annexure D**

## **Occupational Health and Safety Plan**

## General

Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank/IFC EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

### a. Screening and regular unannounced checking of workers

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the Contractor and the Worker(s).

### b. Minimizing hazards and risks at the workplace.

To ensure safety at all work sites, the following will be carried out:

i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.

ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.

iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.

iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks they will not be more than 6 feet high.

v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.

vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied

or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;

vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontals.

viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.

ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.

x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.

xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

#### c. Provision of Personal Protective Equipment

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

i. High visibility clothing for all personnel during road works must be mandatory.

ii. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.

iii. Safety belt shall be provided to workers working at heights (more than 20 ft.) such as roofing, painting, and plastering.

iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.

v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.

vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.

vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.

viii. Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

Table E.1 PPE Requirement List



Type of Work	PPE
Elevated work	Safety helmet, safety belt (height greater than 20 ft.), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs, eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

d. Procedures to Deal with Emergencies such as Accidents, Sudden Illness and Death of Workers

First aid kits will be made available at all times throughout the entire construction period by the respective contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

- i. Provision of dispensaries by the individual EPC contractor.
- ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.
- iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.
- iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

e. Record Maintenance and Remedial action

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigate actions to change any unsafe or harmful conditions.

f. Compensation for Injuries and Death

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Each individual contractor will be responsible for ensuring compensation for the respective workers.

g. Awareness Programs

The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.

ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

h. Nomination of a Health and Safety Focal Person

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

i. Function as the focal person/representative for all health and safety matters at the workplace;

ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;

iii. Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions/directives on proper health care and safety from the contractors back to the workers;

iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;

v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

# **Annexure E**

## **Emergency Response Plan**

## **F.1 PURPOSE**

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the project. The aim of the Emergency Response Procedure is to:

- (i) Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.
- (ii) Ensure all personnel are aware of the importance of this procedure to protection of life and property.

## **F.2 EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE**

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

- (i) Construction Accident
- (ii) Road & Traffic Accident
- (iii) Hazardous material spills
- (iv) Structure collapse or failure
- (v) Trauma or serious illness
- (vi) Sabotage
- (vii) Fire
- (viii) Environmental Pollution
- (ix) Loss of person
- (x) Community Accident

## **F.3 RESPONSIBILITIES**

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in **Table G.1** below.

**Table F.1 Emergency Response Team**

Action Group	Responsibility
Emergency Coordinator	<p>Overall control of personnel and resources.</p> <p>The Emergency Coordinator will support and advise the Site Safety Supervision as necessary.</p> <p>Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.</p>
Site Safety Supervision (Emergency Commander)	<p>Overall responsibility for activating emergency plan and for terminating emergency actions.</p> <p>Be alternative of emergency response chairpersons.</p> <p>Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth.</p> <p>Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger.</p> <p>Notify outside authorities if assistance is required.</p> <p>Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation.</p> <p>Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency.</p> <p>Establish and appoint all emergency organization structure and team.</p> <p>Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency.</p> <p>Ensure resources available to purchase needed emergency response equipment and supplies.</p> <p>Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan.</p> <p>Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency.</p>

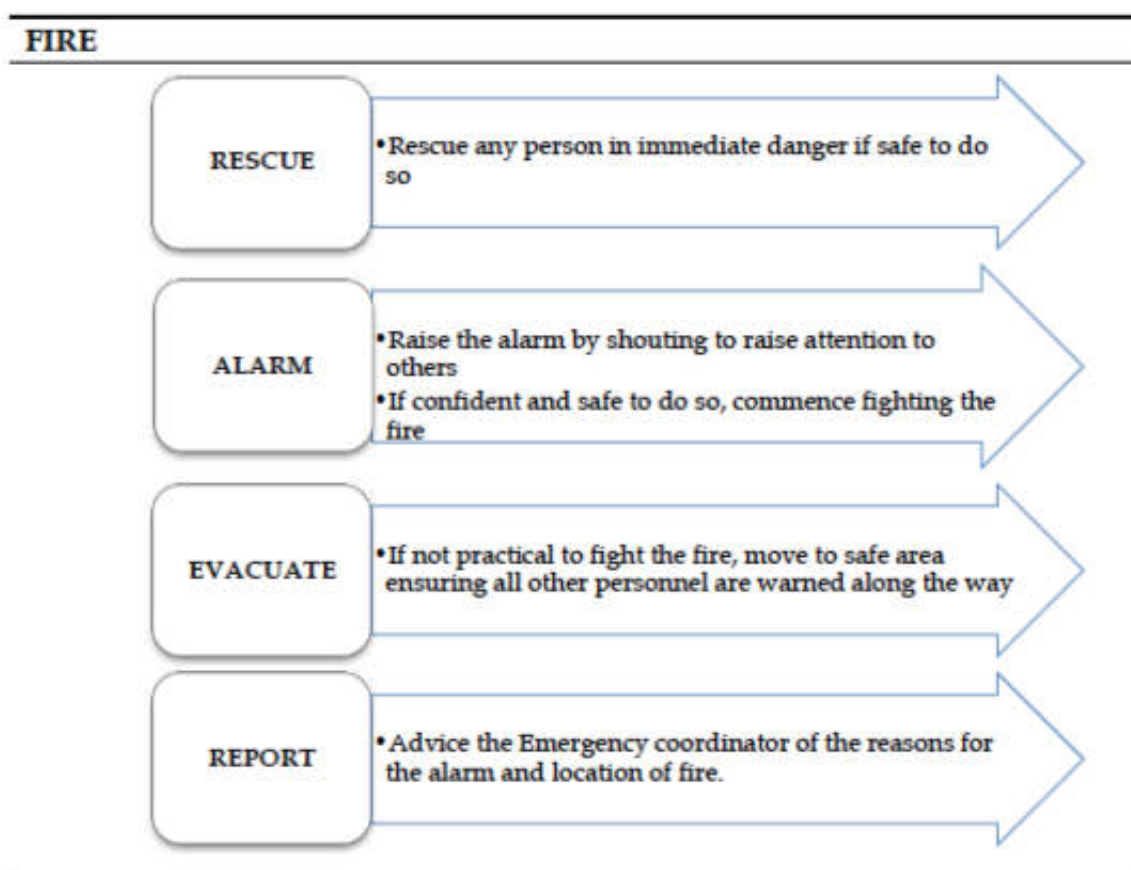
	The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.
Security Team	<p>Ensure that the exit route is regularly tested and maintained in good working order.</p> <p>Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel.</p> <p>Assist with strong/activation of services during an emergency.</p> <p>Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.</p>
Rescue & Medical Team	<p>Protect the injured from further danger and weather.</p> <p>Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital.</p> <p>Remain familiar with the rescue activities and rescue apparatus.</p> <p>Assist outside medical services personnel when they arrive</p>
General Administration Team	Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	<p>Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team.</p> <p>Coordinate emergency plan with the government authorities, local community.</p>
Environment Team	In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	<p>Call up of personnel into the safe location for protective life and property.</p> <p>Take immediate and appropriate action while Emergency Response Team is being mobilized.</p> <p>Keep in touch with the Emergency Commander</p>

	<p>Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary.</p> <p>Provide and maintain emergency equipment of their responsible areas.</p>
Other Staff and Employees	<p>All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team.</p> <p>Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.</p>

#### F.4 PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.

Figure F.1 Emergency Procedure for Fire



take the following action:

If a hazard exists consider your own safety then if possible remove the hazard or the injured person.
Assess the patient by checking for Airway, Breathing, Pulse and obvious
Report directly to First Aid or Security Centers, when raising the alarm you must clearly give the following information; <ul style="list-style-type: none"> <li>- Your name and the detail of accident</li> <li>- The location of the injured person(s)</li> <li>- The number of persons injured</li> <li>- The extent of the injuries, if known</li> <li>- What known hazards are in the area</li> </ul>
Make the injured person as comfortable as possible
Treat the obvious injuries
Reassure the injured person

## F.5 COMMUNICATION WITH AUTHORITIES / PRESS AT SITE

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoided politely, at all



costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office” Do not ever give your opinion or story.

#### First Aid Persons

Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,

Provide treatment to the victim(s) to the best of his/her ability.

Ensure the safety of victims by ceasing any work activity in the area.

Protect the injured from further danger and weather.

Assist medical services personnel when they arrive.

#### General Administration Team

Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

#### Security Team

If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.

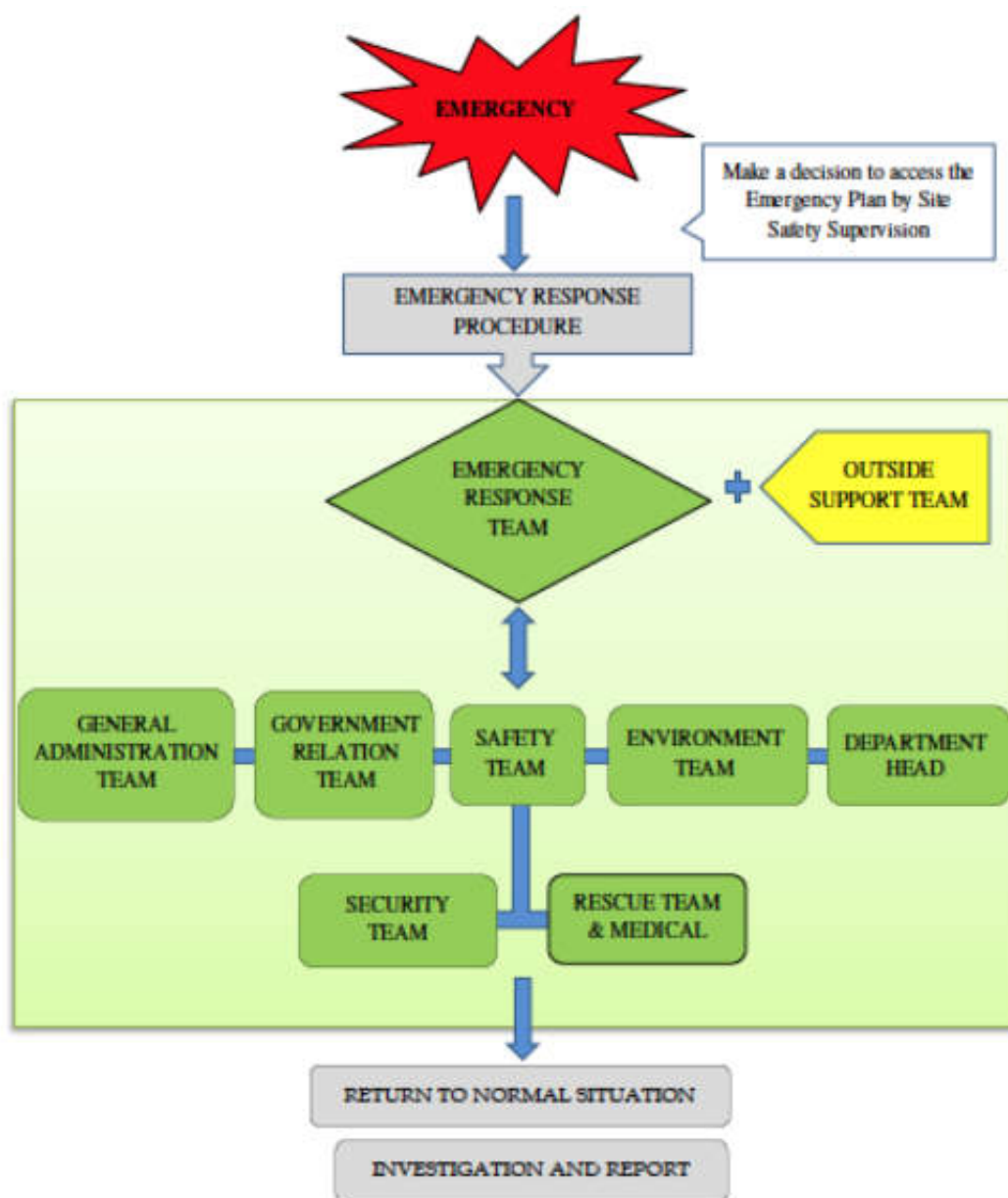
Prevent access to the site of unauthorized personnel (press, etc.).

#### Emergency Coordinator

The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.

The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation

The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.



Note: Name of contact person and call number from Owner/ Contractor to be determined.

## F.5 INCIDENT AND ACCIDENT REPORT

Section A: Identification Data										
Report No:	Date of Reported:				Reporter:			Sign:		
Job Title:					Company Name:					
Section B: Violence Rate										
Accident Violence: <input type="checkbox"/> 01-Death <input type="checkbox"/> 02-Serious Injury <input type="checkbox"/> 03-Lost Time Injury <input type="checkbox"/> 04-First Aid <input type="checkbox"/> 05- Not Injury <input type="checkbox"/> 06-Near Miss Property Damage Cost: <input type="checkbox"/> 1-2,000 USD <input type="checkbox"/> 2,001-10,000 USD <input type="checkbox"/> 10,001-50,000 <input type="checkbox"/> > 50,001										
Section C: Environmental Impact										
Affected area		<input type="checkbox"/> Construction area		<input type="checkbox"/> Public area						
Receptor		<input type="checkbox"/> None		<input type="checkbox"/> Workers		<input type="checkbox"/> Community				
Type of pollution		<input type="checkbox"/> Physical		<input type="checkbox"/> Chemical		<input type="checkbox"/> Biological				
Toxicity		<input type="checkbox"/> Non-toxic		<input type="checkbox"/> Low - toxic		<input type="checkbox"/> High - toxic				
Return to Normal		<input type="checkbox"/> 1 day		<input type="checkbox"/> 1 day to 1 week		<input type="checkbox"/> ≥ 1 week				
Cumulative impact		<input type="checkbox"/> Non-cumulative		<input type="checkbox"/> Cumulative						
Section D: Injured/Illness Employee										
1.Name:		Sex:	Date of Birth:			Age:	Regular Job Title:		Experience:	
		<input type="checkbox"/> Male <input type="checkbox"/> Female	Month	Day	Year				In this job title	In this Project
									Years	Weeks
Site:	Company:		Reference:			Phone No:		Social Security Number		
Part of Body Injured or Affected:					Nature of Injury or Illness:					
<input type="checkbox"/> Head	<input type="checkbox"/> Hands	<input type="checkbox"/> Face	<input type="checkbox"/> Nose	<input type="checkbox"/> Laceration	<input type="checkbox"/> Amputation	<input type="checkbox"/> Puncture	<input type="checkbox"/> Fracture			
<input type="checkbox"/> Eyes	<input type="checkbox"/> Legs	<input type="checkbox"/> Teeth	<input type="checkbox"/> Neck	<input type="checkbox"/> Strain & Sprain	<input type="checkbox"/> Burns	<input type="checkbox"/> Contusion	<input type="checkbox"/> Dry Heat Friction			
<input type="checkbox"/> Trunk	<input type="checkbox"/> Toes	<input type="checkbox"/> Elbow	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Hernia	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Chemical	<input type="checkbox"/> Contamination			
<input type="checkbox"/> Back	<input type="checkbox"/> Ankle	<input type="checkbox"/> Wrist	<input type="checkbox"/> Foot	<input type="checkbox"/> Skin (Occupationnel)	<input type="checkbox"/> Rash	<input type="checkbox"/> Irritation				
<input type="checkbox"/> Arms	<input type="checkbox"/> Thump	<input type="checkbox"/> Fingers	<input type="checkbox"/> Internal							
Remark: .....					Remark: .....					
Section D: Injured/Illness Employee										
2.Name:		Sex:	Date of Birth:			Age:	Regular Job Title:		Experience:	
		<input type="checkbox"/> Male <input type="checkbox"/> Female	Month	Day	Year				In this job title	In this Project
									Years	Weeks
Site:	Company:		Reference:			Phone No:		Social Security Number		
Part of Body Injured or Affected:					Nature of Injury or Illness:					
<input type="checkbox"/> Head	<input type="checkbox"/> Hands	<input type="checkbox"/> Face	<input type="checkbox"/> Nose	<input type="checkbox"/> Laceration	<input type="checkbox"/> Amputation	<input type="checkbox"/> Puncture	<input type="checkbox"/> Fracture			
<input type="checkbox"/> Eyes	<input type="checkbox"/> Legs	<input type="checkbox"/> Teeth	<input type="checkbox"/> Neck	<input type="checkbox"/> Strain & Sprain	<input type="checkbox"/> Burns	<input type="checkbox"/> Contusion	<input type="checkbox"/> Dry Heat Friction			
<input type="checkbox"/> Trunk	<input type="checkbox"/> Toes	<input type="checkbox"/> Elbow	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Hernia	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Contamination	<input type="checkbox"/> Chemical			
<input type="checkbox"/> Back	<input type="checkbox"/> Ankle	<input type="checkbox"/> Wrist	<input type="checkbox"/> Foot	<input type="checkbox"/> Skin (Occupationnel)	<input type="checkbox"/> Rash	<input type="checkbox"/> Irritation				
<input type="checkbox"/> Arms	<input type="checkbox"/> Thump	<input type="checkbox"/> Fingers	<input type="checkbox"/> Internal							
Remark: .....					Remark: .....					
Section E: Accidents/incident Details										
Date Accident/Incident Occurred:			Time Accident/Incident Occurred:				Exact Location of the Accident / Incident:			

Details of the actual Job Being done at the time:		
Details of Accident / Incident / What actually happened?		
<b>Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark O)</b>		
<b>UNSAFE CONDITIONS</b> 1 <input type="checkbox"/> Inadequately Guarded 2 <input type="checkbox"/> Unguarded 3 <input type="checkbox"/> Defective Tools, Equipment, or Substance 4 <input type="checkbox"/> Unsafe Design or Construction 5 <input type="checkbox"/> Hazardous Arrangement 6 <input type="checkbox"/> Unsafe Illumination 7 <input type="checkbox"/> Unsafe Ventilation 8 <input type="checkbox"/> Unsafe Clothing 9 <input type="checkbox"/> Insufficient Instruction 10 <input type="checkbox"/> Lack of system of work Why was the unsafe act committed? _____	<b>UNSAFE ACTS</b> 1 <input type="checkbox"/> Operating Without Authority / Training 2 <input type="checkbox"/> Operating at Unsafe Speed 3 <input type="checkbox"/> Marking SHE Device Inoperative 4 <input type="checkbox"/> Using Unsafe Equipment or Equipment Unsafely 5 <input type="checkbox"/> Unsafe Loading, Placing, Moving 6 <input type="checkbox"/> Taking Unsafe Position 7 <input type="checkbox"/> Working on Moving or Dangerous Equipment 8 <input type="checkbox"/> Distraction, Teasing, Horse Play 9 <input type="checkbox"/> Failure to use Personal Protective Devices 10 <input type="checkbox"/> Lack of effective instruction or supervision Why did the unsafe condition exist? _____	
<b>Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)</b>		
<b>UNSAFE ACT</b> <input type="checkbox"/> Stop the Behaviour <input type="checkbox"/> Study the job <input type="checkbox"/> Instruct (tell-show-try-check) <input type="checkbox"/> Follow Up <input type="checkbox"/> Enforce	<b>UNSAFE CONDITION</b> <input type="checkbox"/> Remove <input type="checkbox"/> Guard <input type="checkbox"/> Warn <input type="checkbox"/> Supervisory Training	<b>If Supervisor can't handle, then recommend to</b> <input type="checkbox"/> Site Engineer, or <input type="checkbox"/> Site Manager, or <input type="checkbox"/> Project Manager, or <input type="checkbox"/> Safety Committee
Detail below any immediate remedial actions that have been taken:		
Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:	Responsible	Completion Date

<b>Section H: Witness Statement</b>			
<b>Witness Name</b>		<b>Interviewer Name</b>	
<b>Section I: Reviewed &amp; Recommend by</b>			
Recommendation:			
<b>Reviewed By:</b>	<b>Position:</b>	<b>Signature:</b>	<b>Date:</b>
<b>Remarks :</b> If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department; : First Aid Cases will not applicable to this form; : The accident report shall submit to Safety Department within 3 days : Attached the photograph or sketch the location of accident / incident;			

# **Annexure F**

## **Archaeological ‘Chance Find’ procedure**

## Background

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling/ It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

### Potential Impacts to Archaeological Sites

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

### Archaeological 'Chance Find' Procedure

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following 'chance-find' principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

- (i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.
- (ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.
- (iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.
- (iv) Work will not re-commence in this location until agreement has been reached between DoA and proponent as to any required mitigation measures, which may include excavation and recovery of the item.
- (v) A precautionary approach will be adopted in the application of these procedures.

### Detailed Procedural Steps

If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.

The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part as for a public purpose.



# **Annexure G**

## **Dust Management Plan**

## General

The purpose of this plan is to describe the measures that the project shall take to ensure that the risk of emissions from dust generated by site operations during construction are minimized and that best practice measures are implemented.

Dust emissions from construction can cause ill health effects to Contractor staff along with nuisance and annoyance to members of the local community. Dust will be controlled through:

- Elimination
- Reduction/Minimization
- Control

This dust management plan shall be implemented based on the measures already provided in the Environmental Management Plan (EMP) relating to controlling dust emissions.

## Methodology

The following methodology will be undertaken for each project section:

### Step 1 – Identify the dust generating activities

Construction activities that are likely to produce dust will be identified. The activities that will be taken into account are:

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Roads, surfaces and public highways

Static and mobile combustion plant emissions

Tarmac laying, bitumen surfacing and coating

Materials Handling, Storage, Spillage and Disposal

Storage of material

Stockpiles

Spillages

Storage of Waste

Site Preparation and Restoration after Completion

Earthworks, excavation and digging

Storage of spoil and topsoil

Demolition

Construction and Fabrication Processes

## Step 2 – Identify Sensitive Receptors

Sensitive receptors have already been identified. The nature and location of the sensitive receptors will be taken into account when implementing control measures. Step 3 – Implement Best Practice Measures to Control

Based on the nature of the activity producing the dust, the likelihood of dust being produced and the possible consequence of dust based on the sensitive receptors, the most effective control measure will be identified and implemented.

## Step 4 – Monitor effectiveness of control

Construction Supervision Staff (CSC) will have the responsibility to ensure that dust control measures are being implemented and are effective.

## Step 5 – Record and report result of monitoring

All inspections, audits and results of monitoring will be recorded and kept as part of the site filing system.

## Method Statements and Risk Assessments

The Contractor's Risk Assessments and Method Statements will be required to be approved by the CSC prior to commencing work and will be required to contain environmental aspects of the task, including dust control measures where required.

Where dust has been identified within the risk assessment as a significant issue, the method statement will be required to cover the following:

Methods and materials that will be used to ensure that dust generation is minimized.

The use of pre-fabricated materials where possible.

Optimum site layout:

Dust generating activities to be conducted away from sensitive receptors

Supply of water for damping down.

Good housekeeping and management

All employees will be briefed on the Risk Assessment and Method Statement before starting work.

## Training

All Contractor staff will be required to attend training seminars as already mentioned in the EMP document. A site-specific induction will also be required before being allowed to work on site. These will include site-specific sensitive receptors and details regarding dust control measures to be taken.

Toolbox talks on air pollution and minimizing dust emissions will be provided on a regular basis to Contractor staff.

## **Identification of Dust Generating Sources and Control Methods**

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant	
Dust Source	Dust Control Methods
Major haul roads and traffic routes	Haul roads will be dampened down via a mobile bowser, as required.
Public Roads	Road sweeper will be used to clean public roads as required.
Site traffic management	Site traffic will be restricted to constructed access roads as far as possible.  Site speed limit will be set at 10 mph as this will minimize the production of dust.
Road Cleaning	A mechanical road sweeper will be readily available and used.
Handling, Storage, Stockpiling and Spillage of Dusty materials	
Material handling operations	The number of times a material will have to be handled will be kept to a minimum to prevent double handling and ensure dusty materials are not handled unnecessarily.
Transport of fine dusty materials and aggregates.	Closed tankers will be used or sheeted vehicles.
Vehicle loading/unloading materials on to vehicles and conveyors.	Dusty materials will be dampened down  Drop heights will be kept to a minimum and enclosed where possible.
Storage of Materials	
Bulk cement, bentonite etc.	Bentonite will be delivered in tankers and stored in dedicated enclosed areas. Bulk cement will be transported through tractor trollies or trailers.
Fine dry materials	These will be protected from the weather and by storing in appropriate containers and indoors, where necessary.
Storage location	Material will be stored in dedicated lay-down areas.
Storage of Stockpiles	
Stockpile location	Stockpiles will be placed so as to minimize double handling and facilitate the site restoration.

Building stockpiles	Stockpiles, tips and mounds will not be stored at an angle greater than an angle of repose of the material.
Small and temporary stockpiles	<p>Where possible, stockpiles will be placed under sheeting.</p> <p>Dusty material will be damped down.</p> <p>Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.</p>
Large and long term stockpiles	<p>Long-term stockpiles will be vegetated and stabilized as soon as possible.</p> <p>Stock piles will be dampened down until stabilized, where necessary.</p> <p>Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.</p>
Waste Material from Construction	
Disposal method	<p>A dedicated lay-down area will be available for waste.</p> <p>Waste will not be allowed to build up and will be disposed off at the designated locations as per EMP.</p>
Site Preparation and Restoration	
Earthworks, excavation and digging	These activity areas will be kept damp where required and if possible, will be avoided during dry and windy periods.
Completed earthworks	Surfaces will be stabilized by re-vegetation as soon as possible, where applicable.
Construction and Fabrication Process	
Crushing of material for reuse, transportation and disposal	<p>Authorization will be obtained from PMU and ADB before using any mobile plant on site for activities such as crushing and screening.</p> <p>Any crushing or screening activities will be located away from sensitive receptors.</p>
Cutting, grinding, drilling, sawing, trimming, planning, sanding	<p>These activities will be avoided wherever possible.</p> <p>Equipment and techniques that minimize dust will be implemented.</p>

	Water will be used to minimize dust.
Cutting roadways, pavements, blocks	Water sprinkling to be used.
Angle grinders and disk cutters	Best practice measures will be used such as dust extraction.

### Monitoring Arrangements

Monitoring will be conducted at sensitive receptor locations in the project area as provided in the EMP. Furthermore, at locations where PM levels are exceeding applicable guidelines, additional stringent measures will be implemented at the respective location(s) in the project area to ensure dust levels are controlled as far as possible.

# **ANNEXURE H**

## **Site Specific EMP (SSEMP) Guide & Template for Guidance to Contractor**

**Guide for Development of SEMP**

Step 1: Define Boundaries

Step 2: Identify Sensitive Receptors

Step 3: Specify construction activities

Step 4: Conduct Risk Assessment

Step 5: Assign Environment Management measures

Step 6: Prepare Site Plans

Step 7: Prepare Environment Work Plans (if required)

Step 8: Monitoring

**Step 1:** The project area needs to be clearly defined.

**Step 2:** The mapping of sensitive receptors has already been conducted and needs to be presented clearly in a map.

**Step 3:** The tentative construction activities to be conducted are as follows:

Site Surveying and Vegetation (Trees and plants) Clearance

Establishment of Work Camp, Batching and Asphalt plant and access roads

Dismantling of Asphalt and existing structures including Utilities

Preparation of ground for Asphaltting

Asphaltting

Landscaping

**Step 4:** The Risk Assessment matrix template is provided in the table below.

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:



**Risk = Likelihood × Consequence****Likelihood Scale**

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventative measures are not applied	3
Unlikely	May occur once or twice during the activity if preventative measures are not applied	2
Rare	Unlikely to occur during the project	1

**Consequence Scale**

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding community e.g. extreme loss of soil and water resources and quality from storm water runoff extreme pollution of soil and water resources including major contamination from hazardous materials widespread effects on ecosystems with deaths of fauna/flora widespread community impacts resulting in illness, injury or inconvenience loss or destruction of archaeological or historical sites Occurrence will almost certainly result in the work being halted and a significant fine.	5
Major	<p>The action will cause major adverse damage on the environment or surrounding communities e.g.</p> <p>major loss of soil and water resources and quality from storm water runoff</p> <p>major pollution of soil and water resources including contamination from hazardous materials</p> <p>significant effects on ecosystems with isolated deaths of non-vulnerable flora and fauna</p> <p>significant annoyance or nuisance to communities</p> <p>major damage to or movement required to archaeological or historical sites</p>	3

	Occurrence may result in work being halted and a fine	
Moderate	<p>No or minimal adverse environmental or social impacts e.g.</p> <p>no measurable or noticeable changes in storm water quality. Water quality remains within tolerable limits</p> <p>little noticeable effect on ecosystems</p> <p>no or isolated community complaints</p> <p>no or unlikely damage to archaeological or historical sites</p> <p>no likelihood of being fined</p>	2
Minor	<p>No or minimal adverse environmental or social impacts e.g.</p> <p>no measurable or noticeable changes in storm water quality. Water quality remains within tolerable limits</p> <p>little noticeable effect on ecosystems</p> <p>no or isolated community complaints</p> <p>no or unlikely damage to archaeological or historical sites</p> <p>no likelihood of being fined</p>	1

### Risk Score Table

Likelihood	Consequence				
		Catastrophic	Major	Moderate	Minor
	Certain	25	15	10	5
	Likely	15	9	6	3
	Unlikely	10	6	4	2
	Rare	5	3	2	1

**Risk: Significant: 15-25**

**Medium: 6-10**

**Low 1-5**

Any Medium to Significant risk requires an environmental management measure to manage the potential environmental risk. Judgement will be required concerning the application of an environmental management measure to mitigate low risk situations.

The higher the risk the more intensive the required mitigation measure will need to be; e.g. where site sedimentation is deemed to be low risk, then silt fences may be needed but as the risk increases, then sediment traps may be required. The selection of the appropriate mitigation measure will require judgment based on the level of risk and the specific site parameters.

**Step 5:** The Environmental Management measures are to be extracted from the EIA study for the project and should be added in the last column of the table below.

No.	Construction Activity	Hazards Consider to	Likelihood That the site or sensitive receptors will be affected?	Consequence of the site or sensitive receptors being affected?	Risk Score (consequence x likelihood)	Environmental Management Measures
i	Site Surveying & vegetation clearance	Damage to vegetation beyond project footprint				These can be taken from the EMP provided in the IEE report  (If Risk Score is 6 or more)
		Erosion of exposed areas and sediment				
		Loss of topsoil				
		Dust generation				
		Noise				
ii	Establishment of Work Camp, Batching plant etc.	Soil deposited onto roads from tires				
		Stockpile erosion				
		Noise & Vibration				
		Traffic congestion				
		Fuel spills				

iii	Dismantling of Asphalt and existing structures including Utilities	Noise and vibration				
		Dust generation				
		Community safety				
		Worker safety				
		Traffic Congestion				
iv	Preparation of Sub-Base	Noise and vibration				
		Dust generation				
		Traffic Congestion				
v	Asphalting	Noise and vibration				
		Dust generation				
		Traffic Congestion				
		Community safety				

		Labor safety (PPEs)				
vi	Landscaping	Dust generation				
		Sediment runoff				
		Failure of vegetation to take root				
vii	<b>Implementation of COVID-19 SOPs</b>	Worker Health Risk				These can be taken from the EMP provided in the IEE report
		Public Health Risk				

**Step 6:** The Site plans are a critical part of the SEMP and will need to be prepared, otherwise the ADB will consider the document as incomplete.

The site plan will need to provide the following:

Indication of North and scale

Existing and planned supporting infrastructure (e.g. access roads, water supplies and electricity supplies)

Location of planned work

Contours

Drainage systems

Locations of sensitive receptors

**Step 7 (if required)**<sup>16</sup>: The completed SEMP provides details of all the environmental management requirements for all stages of the construction process. For individual work teams who are responsible for only a small part of the overall construction works it can be confusing as to what is required for their particular work component. For example, the work team responsible for stripping soil for the construction areas are not going to be interested in the requirements for pouring concrete for footings and foundations. However, it is essential that the soil stripping team knows exactly what to clear and what to leave and where to put stockpiles of soil for later use.

In situations where different work activities are required at different times or at different locations, environmental work plans can be prepared. These are similar to the work method statements that are often produced for major construction projects.

**Step 8:** A detailed monitoring plan will be provided along with frequency and responsibilities to ensure all key environmental parameters are monitored to ensure compliance with both national and ADB requirements.

Template for SEMP

Introduction

Project Overview

Scope of SEMP

Objectives of SEMP

Map of Sensitive Receptors

Construction Activities

Activities

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<sup>16</sup> ADB, Safeguards Unit for Central & West Asia Department, *Environmental Management for Construction Handbook*.

Risk Assessment

Risk Assessment Matrix & Mitigation Measures

Site Plan(s)

Environmental Monitoring Plan

Instrumental Monitoring of Environmental Parameters by Contractor as per EMP

In-house monitoring

Third Party environmental monitoring

Visual monitoring of Environmental Parameters by Contractor as per EMP

Responsibilities

Organizational Responsibilities and Communication

Responsibility of EA

Responsibility of Construction Supervision Consultant (CSC)

Responsibility of Contractor

Responsibility of EPA



# **ANNEXURE I**

## **Traffic Management Plan**

## **K.1 Need for Plan**

The construction/rehabilitation of water supply networks will take over 24 months and in this period, huge vehicular movement carrying large amount of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

## **K.2 The plan**

The Objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

The TMP will advise and inform site Contractors and external suppliers of equipment and materials of access and entry points along with other key information such tipping areas and wash-out areas. It is intended to compliment and work alongside relevant ESMMP. The TMP will be classed as “live” and therefore be subjected to updates as required.

Contractor, at the time of the execution of the project will prepare a comprehensive TMP in coordination with local traffic police department, PMU, emergency services and local administrative department. The PMU and CSC will review and approve contractors TMP. The contractor’s TMP shall include following mitigation measures during its preparation:

Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project construction.

Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.

Spoil dumpsites located close to Project site to minimize journey distance and limit movements to site access roads.

Concrete mixing plant located at Project site limiting traffic movements associated with concrete delivery to site access roads

Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/ from the site

Provision of bus/minibus services for personnel living in nearby settlements

Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.

Schedule deliveries and road movements to avoid peak periods

Road maintenance fund to leave a useful asset for communities after the construction phase.

Driver training for HGV drivers and refresher course every six months for Project drivers

Speed restrictions for project traffic travelling through communities (to be agreed with Traffic Management Authority)

Run a safety campaign to improve the people’s knowledge of the traffic hazard on their roads, public information and other activities to address the issues.

Run a pedestrian awareness programmer

Temporary signage

The traffic management plan is provided below.

### **K.3 Other Recommendations**

It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the project site would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

#### **K.3.1 Public Access Routes**

The use of public road for site access may be restricted in terms of:

Vehicle size, width and type of load

Time limits

Parking

Pedestrian conflicts

Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

#### **K.3.2 Site Workers Traffic**

Site personnel should not be permitted to park vehicles near the site boundary; this will lead to disruption in material deliveries. Designated parking area with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

#### **K.3.3 Site Rules**

Access to and from the site must be only via the specified entrance.

On leaving the site, vehicles must be directed to follow the directions given.

Drivers must adhere to the site speed limits.

All material deliveries to site must keep allocated time limits.

No material or rubbish should be left in the loading-unloading area.

Develop a map for alternate routes showing material delivery services.

Assign designated personnel on site to receive deliveries and to direct the vehicles.

Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.

Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the Improvement of water supply system project.

#### **K.4 Contractor's Obligation**

The traffic management plan of the Contractor should be safe enough and widening of access roads and construction of the detours must be completed before start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes. While widening the access roads, the safe movement of the vehicles, people, animals and wildlife must be ensured. It will be sole responsibility of Contractor. The roads widening should be designed on the basis of the traffic survey, summarized and estimated site traffic. Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to CSC, PMU, emergency services and Traffic Police, and also publish weekly programmer in local newspapers.

# **ANNEXURE J**

## **NEQS Guidelines**

Parameter	Unit	Standards (maximum allowable limit)
Temperature increase	°C	<3
pH value (acidity / basicity)	pH	6-9
5-day biochemical oxygen demand (BOD) AT 20 °C	mg/l	80
Chemical oxygen demand (COD)	mg/l	150
Total dissolved solids	mg/l	200
Total dissolved solids	mg/l	3,500
Grease and oil	mg/l	10
Phenolic compounds (as phenol)	mg/l	0.1
Chloride (as Cl)	mg/l	1.0
Fluoride (as F)	mg/l	10
Sulfate (SO <sub>4</sub> )	mg/l	600
Ammonia (NH <sub>3</sub> )	mg/l	40
Cadmium	mg/l	0.1
Chromium (trivalent and hexavalent)	mg/l	1.0
Copper	mg/l	1.0
Lead	mg/l	0.5
Mercury	mg/l	0.01
Selenium	mg/l	0.5
Nickel	mg/l	1.0
Silver	mg/l	1.0
Total toxic metals	mg/l	2.0
Zinc	mg/l	5
Arsenic	mg/l	1.0
Barium	mg/l	1.5
Iron	mg/l	8.0
Manganese	mg/l	1.5
Boron	mg/l	6.0
Chlorine	mg/l	1.0

**Notes:**

1. The standard assumes that dilution of 1:10 on discharge is available. That is, for each cubic meter of treated effluent, the recipient water body should have 10 m<sup>3</sup> of water for dilution of this effluent.
2. Toxic metals include cadmium, chromium, copper, lead, mercury, selenium, nickel and silver. The effluent should meet the individual standards for these metals as well as the standard for total toxic metal concentration.

Source: Government of Pakistan (2000) (SRO 549(I)/2000).

Pollutants	Time-Weighted Average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st July 2010	Effective from 1st January 2013	
Sulfur Dioxide (SO <sub>2</sub> )	Annual Average *	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	Ultraviolet Fluorescence
	24 hours**	120 µg/m <sup>3</sup>	120 µg/m <sup>3</sup>	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	Gas Phase Chemiluminescence
	24 hours**	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	
Ozone (O <sub>3</sub> )	1 hour	180 µg/m <sup>3</sup>	130 µg/m <sup>3</sup>	Non dispersive UV absorption
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m <sup>3</sup>	360 µg/m <sup>3</sup>	High Volume Sampling, (Average flow rate not less than 1.1 m <sup>3</sup> /minute).
	1 hour	180 µg/m <sup>3</sup>	130 µg/m <sup>3</sup>	
Respirable Particulate Matter. PM <sub>10</sub>	Annual Average*	200 µg/m <sup>3</sup>	120 µg/m <sup>3</sup>	β Ray absorption
	24 hours**	250 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	
Respirable Particulate Matter. PM <sub>2.5</sub>	Annual Average*	25 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>	β Ray absorption
	24 hours**	40 µg/m <sup>3</sup>	35 µg/m <sup>3</sup>	
	1 hour	25 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>	
Lead (Pb)	Annual Average*	1.5 µg/m <sup>3</sup>	1.0 µg/m <sup>3</sup>	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2.0 µg/m <sup>3</sup>	1.5 µg/m <sup>3</sup>	
Carbon Monoxide (CO)	8 hours**	5 µg/m <sup>3</sup>	5 µg/m <sup>3</sup>	Non dispersive Infra-Red (NDIR)
	1 hour	10 µg/m <sup>3</sup>	10 µg/m <sup>3</sup>	

\* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

24 hourly / 8 hourly values should be met 98% of the in a year. 20% of the time, it may exceed but not on two consecutive days.

Source: Government of Pakistan (2010) (SRO 1062 (I)/ 2010).

National Environmental Quality Standards for Noise<sup>1</sup>

S/No.	Category of Area/Zone	Limit in dB(A) Lea	
		Day Time	Night Time
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65
4	Silence zone (D)	50	45

1: Effective from 1<sup>st</sup> July, 2012.

Note: 1. Day time hours: 6 am to 10 pm

2. Night time hours: 10 pm to 6 am

3. Silence zone: Zones that are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

## National Environmental Quality Standards for Motor Vehicle Exhaust and Noise

**(A) For In-use Vehicles**

Sr. No.	Parameter	Standard (Maximum permissible Limit)	Measuring Method	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode	To be compared with Ringlemann Chart at a distance 6 or more.	Immediate effect
2	Carbon Monoxide	6%	Under idling conditions: Non-dispersive infrared detection through gas analyzer.	
3	Noise	85 db (A).	Sound meter at 7.5 meters from the source.	



**(B) For New Vehicles****(i) Emission Standards for Diesel Vehicles****(a) For Passenger Cars and Light Commercial Vehicles (g/Km)**

Type of Vehicle	Category/Class	Tiers	CO	HC+NOX	PM	Measuring Method	Applicability
Passenger Cars	M 1: with reference mass (RW) upto 2500 kg. Cars with RW over 2500 kg to meets NI category standards.	Pak-II IDI	1.00	0.70	0.08	NEDC (ECE 15+ EUDCL)	All imported and local manufactured diesel vehicles with effect from 01-07-2012
		Pak-II DI	1.00	0.90	0.10		
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II IDI	1.00	0.70	0.08		
		Pak-II DI	1.00	0.90	0.10		
	NI-I (1250 kg< RW< 1700 kg)	Pak-II IDI	1.25	1.00	0.12		
		Pak-II DI	1.25	1.30	0.14		
	NI-III (RW> 1700 kg)	Pak-II IDI	1.50	1.20	0.17		
		Pak-II DI	1.50	1.60	0.20		
Parameter	Standard (maximum permissible limit				Measuring Method		
Noise	85 db (A)				Sound meter at 7.5 meters from the source.		

## (ii) Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOX	Measuring Method	Applicability	
Passenger	M 1: with reference mass (RW) upto 2500 kg. Cars with RW over 2500 kg to meets NI category standards.	Pak-II	2.20	0.50	NEDC (ECE 15+ EUDCL)	All imported and new models* locally manufactured petrol vehicles with effect from 1st July, 2009**	
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II	2.20	0.50			
	NI-I (1250 kg> RW< 1700 kg)	Pak-II	4.00	0.65			
	NI-III (RW>1700 kg)	Pak-II	5.00	0.80			
Motor Rickshaws and motor Cycles	2.4 strokes < 150 cc	Pak-II	5.50	1.50	ECER 40		
	2.4 strokes < 150 cc	Pak-II	5.50	1.30			
Parameter	Standard (maximum permissible limit				Measuring Method		
Noise	85 db (A)				Sound meter at 7.5 meters from the source.		

**Explantations:**

DI: Direct Injection

IDI: Indirect Injection

EUDCL: Extra Urban Driving Cycle

NEDC: New Urban Driving Cycle

M: Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat.

N: Motor vehicles with at least four wheels designed and constructed for the carriages of goods.

\* New model means both model and engine type change

\*\* The existing models of petrol driven vehicles locally manufactured will immediately switch over to Pak-II emission standards but not later than 30<sup>th</sup> June, 2012.

Source: Government of Pakistan (2009) (SRO 72 (KE)/ 2009).

## National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan
<b>Bacterial</b>	
All water intended for drinking (E.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water in the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.
<b>Physical</b>	
Color	< 15 TCU
Taste	Non objectionable/ Accept able
Odor	Non objectionable/Accept able
Turbidity	< 5 NTU
Total hardness as CaCO <sub>3</sub>	< 500 mg/l
TDS	< 1000
pH	6.5-8.5
<b>Chemical</b>	
<b>Essential Inorganic</b>	<i>mg/Litre</i>
Aluminum (Al)	≤ 0.005(P)
Antimony	≤ 0.05(P)
Arsenic (As)	≤ 0.05(P)
Barium (Ba)	0.7
Boron (B)	0.3
Cadmium (Cd)	0.01
Chloride (Cl)	<250
Chromium (Cr)	≤ 0.05
Copper (Cu)	2
<b>Toxic Inorganic</b>	<b>Mg/Litre</b>
Cyanide (Cn)	< 0.05
Fluoride (F)*	≤ 1.5
Lead (Pb)	≤ 0.05
Manganese (Mn)	≤ 0.5
Mercury (Hg)	≤ 0.001
Nickel (Ni)	< 0.02
Nitrate (NO <sub>3</sub> )*	≤ 50
Nitrate (NO <sub>2</sub> )*	< 3 (P)
Selenium (Se)	0.01 (P)
Residual chlorine	0.2-0.5 at consumer end; 0.5-1.5 at source
Zinc (Zn)	5.0
<b>Organic</b>	
Pesticides mg/l	PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.**
Phenolic compound (as phenols) mg/l	WHO standards: ≤ 0.002
Polynuclear Aromatic hydrocarbon (as PAH) g/L	WHO standards: ≤ 0.01v (by GC/MS method)
<b>Radioactive</b>	
Alpha Emitters bq/L or pCi	0.1
Beta Emitters	1

\* Indicates priority health related inorganic constituents which need regular monitoring.

\*\* PSQCA: Pakistan Standards Quality Control Authority.

Source: Government of Pakistan (2010) (SRO 1063(I)/2010).

# **ANNEXURE K**

## **WHO/GoP advice on Use of Masks for the COVID-19 Virus**



## Advice on the use of masks in the context of COVID-19: interim guidance

masks away from those in health care who need them most, especially when masks are in short supply.

**Persons with symptoms should:**

- wear a medical mask, self-isolate, and seek medical advice as soon as they start to feel unwell. Symptoms can include fever, fatigue, cough, sore throat, and difficulty breathing. It is important to note that early symptoms for some people infected with COVID-19 may be very mild;
- follow instructions on how to put on, take off, and dispose of medical masks;
- follow all additional preventive measures, in particular, hand hygiene and maintaining physical distance from other persons.

**All persons should:**

- avoid groups of people and enclosed, crowded spaces;
- maintain physical distance of at least 1 m from other persons, in particular from those with respiratory symptoms (e.g., coughing, sneezing);
- perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- cover their nose and mouth with a bent elbow or paper tissue when coughing or sneezing, dispose of the tissue immediately after use, and perform hand hygiene;
- refrain from touching their mouth, nose, and eyes.

In some countries masks are worn in accordance with local customs or in accordance with advice by national authorities in the context of COVID-19. In these situations, best practices should be followed about how to wear, remove, and dispose of them, and for hand hygiene after removal.

**Advice to decision makers on the use of masks for healthy people in community settings**

As described above, the wide use of masks by healthy people in the community setting is not supported by current evidence and carries uncertainties and critical risks. WHO offers the following advice to decision makers so they apply a risk-based approach.

Decision makers should consider the following:

1. **Purpose** of mask use: the rationale and reason for mask use should be clear—whether it is to be used for source control (used by infected persons) or prevention of COVID-19 (used by healthy persons)
2. **Risk of exposure** to the COVID-19 virus in the local context:
  - The population: current epidemiology about how widely the virus is circulating (e.g., clusters of cases versus community transmission), as well as local surveillance and testing capacity (e.g., contact tracing and follow up, ability to carry out testing).
  - The individual: working in close contact with public (e.g., community health worker, cashier)
3. **Vulnerability** of the person/population to develop severe disease or be at higher risk of death, e.g. people with comorbidities, such as cardiovascular disease or diabetes mellitus, and older people

4. **Setting** in which the population lives in terms of population density, the ability to carry out physical distancing (e.g. on a crowded bus), and risk of rapid spread (e.g. closed settings, slums, camps/camp-like settings).
5. **Feasibility**: availability and costs of the mask, and tolerability by individuals
6. **Type** of mask: medical mask versus nonmedical mask (see below)

In addition to these factors, potential advantages of the use of mask by healthy people in the community setting include reducing potential exposure risk from infected person during the “pre-symptomatic” period and stigmatization of individuals wearing mask for source control.

However, the following potential risks should be carefully taken into account in any decision-making process:

- self-contamination that can occur by touching and reusing contaminated mask
- depending on type of mask used, potential breathing difficulties
- false sense of security, leading to potentially less adherence to other preventive measures such as physical distancing and hand hygiene
- diversion of mask supplies and consequent shortage of mask for health care workers
- diversion of resources from effective public health measures, such as hand hygiene

Whatever approach is taken, it is important to develop a strong communication strategy to explain to the population the circumstances, criteria, and reasons for decisions. The population should receive clear instructions on what masks to wear, when and how (see mask management section), and on the importance of continuing to strictly follow all other IPC measures (e.g., hand hygiene, physical distancing, and others).

**Type of Mask****WHO stresses that it is critical that medical masks and respirators be prioritized for health care workers.**

The use of masks made of other materials (e.g., cotton fabric), also known as nonmedical masks, in the community setting has not been well evaluated. There is no current evidence to make a recommendation for or against their use in this setting.

WHO is collaborating with research and development partners to better understand the effectiveness and efficiency of nonmedical masks. WHO is also strongly encouraging countries that issue recommendations for the use of masks in healthy people in the community to conduct research on this critical topic. WHO will update its guidance when new evidence becomes available.



Advice on the use of masks in the context of COVID-19: interim guidance

In the interim, decision makers may be moving ahead with advising the use of nonmedical masks. Where this is the case, the following features related to nonmedical masks should be taken into consideration:

- Numbers of layers of fabric/tissue
- Breathability of material used
- Water repellence/hydrophobic qualities
- Shape of mask
- Fit of mask

## Home care

For COVID-19 patients with mild illness, hospitalization may not be required. All patients cared for outside hospital (i.e. at home or non-traditional settings) should be instructed to follow local/regional public health protocols for home isolation and return to designated COVID-19 hospital if they develop any worsening of illness.<sup>7</sup>

Home care may also be considered when inpatient care is unavailable or unsafe (e.g. capacity is limited, and resources are unable to meet the demand for health care services). Specific IPC guidance for home care should be followed.<sup>3</sup>

### Persons with suspected COVID-19 or mild symptoms should:

- Self-isolate if isolation in a medical facility is not indicated or not possible
- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 m from other people;
- Wear a medical mask as much as possible; the mask should be changed at least once daily. Persons who cannot tolerate a medical mask should rigorously apply respiratory hygiene (i.e. cover mouth and nose with a disposable paper tissue when coughing or sneezing and dispose of it immediately after use or use a bent elbow procedure and then perform hand hygiene.)
- Avoid contaminating surfaces with saliva, phlegm, or respiratory secretions.
- Improve airflow and ventilation in their living space by opening windows and doors as much as possible.

### Caregivers or those sharing living space with persons suspected of COVID-19 or with mild symptoms should:

- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 meter from the affected person when possible;
- Wear a medical mask when in the same room as the affected person;
- Dispose of any material contaminated with respiratory secretions (disposable tissues) immediately after use and then perform hand hygiene.
- Improve airflow and ventilation in the living space by opening windows as much as possible.

## Health care settings

WHO provides guidance for the use of PPE, including masks, by health care workers in the guidance document: Rational use of PPE in the context of COVID-19.<sup>24</sup> Here we provide advice for people visiting a health care setting:

### Symptomatic people visiting a health care setting should:

- Wear a medical mask while waiting in triage or other areas and during transportation within the facility;
- Not wear a medical mask when isolated in a single room, but cover their mouth and nose when coughing or sneezing with disposable paper tissues. Tissues must be disposed of appropriately, and hand hygiene should be performed immediately afterwards.

### Health care workers should:

- Wear a medical mask when entering a room where patients with suspected or confirmed COVID-19 are admitted.
- Use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health-certified N95, European Union standard FFP2, or equivalent, when performing or working in settings where aerosol-generating procedures, such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy are performed.
- Full infection prevention and control guidance for health care workers is provided [here](#).

One study that evaluated the use of cloth masks in a health care facility found that health care workers using cotton cloth masks were at increased risk of infection compared with those who wore medical masks.<sup>25</sup> Therefore, cotton cloth masks are not considered appropriate for health care workers. As for other PPE items, if production of cloth masks for use in health care settings is proposed locally in situations of shortage or stock out, a local authority should assess the proposed PPE according to specific minimum standards and technical specifications.

## Mask management

For any type of mask, appropriate use and disposal are essential to ensure that they are effective and to avoid any increase in transmission.

The following information on the correct use of masks is derived from practices in health care settings

- Place the mask carefully, ensuring it covers the mouth and nose, and tie it securely to minimize any gaps between the face and the mask.
- Avoid touching the mask while wearing it.
- Remove the mask using the appropriate technique: do not touch the front of the mask but untie it from behind.
- After removal or whenever a used mask is inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty.
- Replace masks as soon as they become damp with a new clean, dry mask.
- Do not re-use single-use masks.
- Discard single-use masks after each use and dispose of them immediately upon removal.



WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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## Guidelines

### Health & Safety of Building & Construction Workers during COVID-19 Outbreak

#### Objective

To provide guidelines for the workers involved in building and construction work during the current epidemic of COVID-19.

#### Rationale

Construction processes are dynamic with significantly varying number of workers on a construction project site from day to day. The workers coming from diverse environments and working closely together increases the risk of exposure to COVID 19.

Building construction involves earth work, procurement of materials and supplies and their storage, construction work done by masons, blacksmiths, electricians, carpenters, plumbers, painters, supervisors, managers and security personnel. These guidelines provide the safety measure to be implemented at the construction site having a dusty environment, continuous flow of different materials and make-shift type of arrangements for storage, food and sanitation calls for implementation of safety precautions at the very basic level of personal hygiene only.

#### Advice for Site Managers:

Without prejudice to the following, all possible and prescribed actions shall be taken at the project site, as should facilitate the health of all life present at the site.

- Every construction project shall make proper arrangements for uninterrupted building services including but not restricted to, electricity, fuel, water supply, water disposal and sanitation, communication links, washrooms with hand hygiene and shower facility and with proper and adequate supply of soaps and disinfectants.
- Workers should not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site
- Ensure the availability of the thermal gun at the entry and exit of the construction site and no worker should be allowed without getting his/her temperature checked.
- Site manager must maintain a register of all contact details with NID number and addresses of all present at the site in case a follow up or tracing and tracking of contacts is required at a later stage.
- Develop the employee roster to decrease the number of people on the site very day. Split the shifts of the workers in morning and evening with limit of each shift to 8 working hours.





- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must be provided with a face mask. It must be ensured that everyone during his or her presence at the site continues to wear the mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Non-essential work trainings must be postponed avoiding gathering of people.
- Ensure the physical distance by creating more than one route of entry and exit to the site.
- Instruct the workers to inform the construction manager (or authorities) if
  - They develop any symptoms of cough, flu or fever.
  - They have been exposed to someone suspected or confirmed with COVID 19.
  - They have met someone who has a travel history of COVID 19 endemic country
  - They have travelled in last couple of days or plan to travel soon
- All incidences of appearance of the symptoms of COVID-19 shall be immediately documented and maintained at the site and information regarding which shall be immediately communicated through e-mail or else, to the designated health facility, and the sick worker shall be transported to the health facility for further advice and action. The site manager must establish a link with a nearby healthcare facility with arrangements for quick transportation of workers in case of an emergency.
- Persuade the workers to inform the authorities for their safety and of other if they observe any signs and symptoms in a colleague
- Do not allow any worker at the construction site who has the symptoms
- Display the awareness banners about hand hygiene and physical distancing, where you can, around the work site.
- Everyone on the construction site must observe sneezing and coughing etiquettes.
- Workers shall be requested and required to wash their hands as frequently as practicable and shall also be advised not to touch their face with their hands during work.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Only sanitize-able dinning surfaces shall be used, which must be cleaned before each service. Food must be heated to a temperature to no less than 70° C before consumption and shall preferably be served in disposable utensils. If reusable utensils are used, these must be washed with soap and water immediately after use and stored at a safe place.
- The lunch breaks and stretch breaks of the workers must be staggered to avoid the clustering of workers. Workers must not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- In the wake of current restrictions on transportations site managers will ensure safe transport arrangements for worker which should not be crowded and should have social distancing in place during the entire process from pickups till drops at destination



- In case of workers sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms.
- A supply of safe drinking water must be made available at the project site and maintained.

### **Advice for Construction Workers:**

- All possible and prescribed measures shall be taken to ensure your and others health
- Enter your contact details in the register maintained at the site, in case a follow up or tracing and tracking of contacts is required at a later stage.
- Follow hygiene practices at washrooms and shower facility with proper and adequate use of soaps and disinfectants.
- Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours end.
- In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must use face mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.
- Workers should wash their hands as frequently as practicable and shall not to touch their face with their hands during work.
- Everyone on the construction site must observe sneezing and coughing etiquettes.
- Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermix.
- Sick worker should immediately inform the site manager and must get medical advice from nearby health centre.
- Only sanitize able dinning surfaces shall be used. Food must be heated to a temperature to no less than 70° C before consumption and shall preferably be in disposable utensils. If reusable utensils are used, these must be washed with soap and water immediately after use and stored at a safe place.
- Do not sit at less than 2 meters distance while having meals and while any other activity requiring interpersonal communications.
- Do not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site.
- Use safe transport arrangements which should not be crowded and should have social distancing in place during the entire process from pickups till drops at destination.
- In case sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms.

### **Deliveries or Other Contractors Visiting the Site**

- Non-essential visits to the construction sites should be cancelled or postponed.



Government of Pakistan  
Ministry of National Health Services,  
Regulations & Coordination

- Delivery workers or other contractors who need to visit the construction site must go through temperature check before entering and should be given clear instructions for precautions to be taken while on site.
- Designate the workers, with protective gears or at least gloved and mask, to attend to the deliveries and contractors.
- Make alcohol-based hand sanitizer (at least 70%) available for the workers handling deliveries.
- Instruct the visiting truck drivers to remain in their vehicles and whenever possible make use of contactless methods, such as mobile phones, to communicate with your workers.

*Note: The above recommendations are being regularly reviewed by the Ministry of National Health Services, Regulations & Coordination and will be updated based on the international & national recommendations and best practices.*

*The Ministry acknowledges the contribution of Irfan Mirza, Saida Shehribano Akhtar and HSA/ HPSIU/ NIH team to compile these guidelines.*

**For more information, please contact:**

HSA/ HPSIU/ NIH, PM National Health Complex, Islamabad

<http://covid.gov.pk/>

<http://nhsr.gov.pk/>

<https://www.facebook.com/NHSRCOfficial>

<http://www.hsa.edu.pk/>

<https://twitter.com/nhsrcofficial>

<https://www.nih.org.pk/>

[https://www.youtube.com/channel/UCdYuzeSP4Ug1f\\_ZZKJ](https://www.youtube.com/channel/UCdYuzeSP4Ug1f_ZZKJ)

# **ANNEXURE L**

## **Solid Waste Management Framework**

# Framework for Solid Waste Management

## 1. INTRODUCTION

Framework Solid Waste Management Plan for the improvement of water supply system Kohat is provided. Construction contractors may use this framework as guiding document for preparation of site specific solid waste management plan. The purpose of this Framework Solid Waste Management Plan is to ensure that wastes arising from the proposed construction works of improvement in water supply system are managed, reused, recovered or disposed of by a method that ensures the provisions of the KP EPA Act, 2014 and Pakistan Environmental Protection, 1997 and ADB SPS, 2009. It also ensures that the optimum levels of waste reduction, re-use and recycling are achieved.

Waste management priorities for project are based on following waste management hierarchy.

- Prevent material wastage
- Minimize the quantity of waste
- Reuse of site materials
- Recycling of waste
- Energy recovery
- Disposal

## 2. WASTE MANAGEMENT AT KOHAT WATER SUPPLY NETWORK

### 2.1 National Level

Waste management of the project will be carried as per national rules including:

- Solid Waste Management Policy, 2000
- Requirements of KP EPA, 2014
- Draft Guidelines on Solid Waste Management, 2005.
- Section 11 of PEPA, 1997 prohibits discharge of waste in amount that violates the NEQS.
- Draft Hazardous Substances rule of 1999
- Section 132 of Cantonment Act, 1942
- Provision Contains in the Local Government Ordinance, 2001

### 2.2 Regional Level

- Asian Development Bank (ADB) SPS, 2009
- IFC guidelines for Solid Waste Management
- Best practices of waste management on construction sites

## 3. DESCRIPTION OF THE PROJECT

The proposed project “Improvement in Water Supply System” aims to provide new water storage reservoirs to increase storage capacity and overall coverage of the existing water supply system as well as provision of new water distribution networks and water metering system in the Kohat city. Rehabilitation of the existing tube wells is also proposed in the project as well as new tube wells are proposed based on water requirements. In addition, energization through clean energy sources of twenty-four (24) existing and proposed tube wells is included in the scope of the project.

The project is located in the six (6) urban union councils, including Kotal Township (KDA) under the jurisdiction of Water and Sanitation Services Company in Kohat city. The names of the UCs are as follow:

- UC-1 - Urban 1
- UC-2 - Urban 2
- UC-3 - Urban 3
- UC-4 - Urban 4 Including Kohat Township (KDA)
- UC-5 - Urban 5
- UC-6 - Urban 6

### **3.1 Details of the wastes to be produced**

During construction/civil works potential sources of waste will include spoils generated during excavation, concrete and construction waste, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills. It is the responsibility of all personnel on site including Contractors, Sub-Contractors and their Employees to ensure compliance with this Waste Management Plan.

### **3.2 Main Waste Categories**

Contractors are required to develop inventory of main waste categories that will be generated during construction phase of the project. Anticipated main waste categories include construction debris, concrete waste, scrap wood, bricks, concrete, asphalt, plumbing fixtures, piping, insulation (asbestos and non-asbestos), metal scraps, oil, electrical wiring and components, chemicals, paints, solvents.

### **3.3 Anticipated Hazardous Waste Arising**

Fuels stored on site that will be used during the construction phase are classed as hazardous. There will be fuel stored on site for machinery and construction vehicles. All fuel tanks and draw off points will be bunded. If the fuel is correctly contained and bunded, it is not expected that there will be any fuel wastage at the site. Other sources of hazardous waste include used paints, used oil/lubricants, electrical waste and chemicals. Project contractors are required to develop SOPs for handling, storage and disposal of hazardous waste arising from the project.

## **4. ESTIMATED WASTE GENERATION**

### **4.1 Construction Waste Generation**

Project contractors are required to develop and maintain waste inventory clearly showing the type, amount and location of waste generated from different activities at the site. Waste record keeping is key to successful implementation of waste management plan.

### **4.2 Proposed Waste Management Options**

Waste will be segregated on site. Contractor will ensure that sufficient number of waste drums are placed at site with appropriate color coding. All recyclable waste will be handed over to recycling contractor. The appointed waste contractor will collect and transfer the recyclable wastes as receptacles are filled. The non-recyclable waste will be transferred by an authorized waste collector to an appropriate facility. Project contractors will identify both recycling and non-recycling contractor working in the project area. Contractors through bidding documents will be bound to hire such waste contractors for efficient waste management at project sites. A successful Waste Management Plan is largely dependent on how readily it can be integrated in to normal site operations by the person responsible. It is recognized that the plan should not be obstructive to site operations and the construction program by placing the responsibility of construction waste management with the Manager, all reuse, recycling, wastage and necessary disposal can be monitored as close to the source as possible. An Environmental



Representative from each Works Sub-Contractor will also be nominated responsible for all waste management in their own operations. In this way, it is possible to identify where the greatest material wastage occurs, with a view to implementing better management.

The site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site Waste Management Plan. The Responsible Person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the plan. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in this framework for solid waste management are performed on an on-going basis.

### **4.3 Tracking and documentation procedures for off-site waste**

The site construction Manager will maintain a copy of all waste collection permits. If waste (soil & stone) is being accepted on-site, a waste docket must be issued to the collector. If the waste is being transported to another site, a copy of the waste permit for that site must be provided to the manager. Record of waste collection docket, a receipt from the final destination of the material will be kept as part of the on-site waste management records. All information will be entered in a waste management system to be maintained on-site.

### **4.4 Disposal Waste**

Contractors are required to develop SOP for disposal of recyclable, non-recyclable and hazardous waste generated at site. Surplus excavated soil will be disposed off at designated sites. Food waste will be disposed at food waste pit which will be fenced. Recycling waste will be handed over to recycling waste contractor. Hazardous waste will be disposed through incineration facility available in close proximity of the project area. Workers on the site will be encouraged to recycle as much municipal waste as possible i.e. cardboard, plastic, metals and glass. Prior to removal, the municipal waste will be examined to determine if recyclable materials have been placed in other containers. If this is the case, effort will be made to determine the cause of the waste not being segregated correctly.

## **5. ESTIMATED COST OF WASTE MANAGEMENT**

Contractors are required to estimate and budget cost for waste management through BOQ items. Such waste management cost should include cost of waste drums, cost of waste handling crew, cost of waste transportation, cost of EPA approved waste contractor services and associated incineration costs if any. By reusing materials on site, there will be reduction in transport and disposal costs for a waste contractor taking the material away.

## **6. TRAINING PROVISIONS FOR WASTE MANAGER AND SITE CREW**

A waste manager will be appointed or designated by construction contractors to ensure commitment, operational efficiency and accountability during the project execution.

### **6.1 Site Manager Training and Responsibility**

The waste manager will be given responsibility and authority to select a waste team if required i.e. members of the site crew that will aid him in the organization, operation and recording the waste management system implemented on-site. The waste manager will have overall responsibility to oversee record and provide feedback to the CSC on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors where necessary and to co-ordinate with suppliers, service providers and sub-contractors to prioritize waste prevention and salvage. The waste manager will be trained

in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on-site. He will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and know how to implement this Framework for Solid Waste Management.

## **6.2 Site Crew Waste Management Training**

Training of the site crew is the responsibility of the waste manager and as such, a waste training program should be organized. A basic awareness course will be held for all crew to outline the construction waste management plan and to detail the segregation of waste at source. This may be incorporated with other training needs (e.g. general site induction, safety training etc.). This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A subsection on hazardous wastes will be incorporated and the particular dangers of each hazardous waste will be explained.

## **7. RECORD KEEPING**

Records will be kept for each waste material which leaves the site, either for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site. The waste manager or delegate will record the following:

- Waste taken off-site for reuse
- Waste taken off-site for recovery
- Waste taken off-site for recycling
- Waste taken off-site for disposal
- Waste (soil & stone) accepted on-site for recovery

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

## **8. OUTLINE WASTE AUDIT PROCEDURE**

Contractors are required to develop SOP for waste auditing at the construction sites. Such SOP should reflect frequency and types of waste audits, audit criteria and way forward to close non-compliances.

### **8.1 Responsibility for Waste Audit**

The appointed waste manager will be responsible for conducting a waste audit at the site during project execution.

### **8.2 Review of Records and Identification of Corrective Actions**

A review of all the records for the waste generated and transported off-site, as well as waste accepted, should be undertaken. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed. Upon completion of the construction phase a final report will be prepared summarizing the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

## **9. CONSULTATION WITH RELEVANT BODIES**



### **9.1 Local Authority**

Project contractors are required to maintain close coordination with PMU, WSSC Kohat and KP EPA to ensure that all available waste reduction, re-use and recycling opportunities are identified and utilized.

### **9.2 EPA Approved Waste Contractors**

Companies that specialize waste management will be contacted to determine their suitability for engagement. If used, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and/or license are held. In addition, information regarding individual materials will be obtained including the feasibility of recycling each material, the costs of recycling/reclamation and the means by which the wastes will be collected and transported off-site, and the recycling/reclamation process each material will undergo off-site.

# **ANNEXURE M**

## **Details of Public Consultations**

**STAKEHOLDER CONSULTATION**

Project Name: Khyber Pakhtunkhwa Cities Improvement Project - Kohat Water Supply.

Venue: Kohat

Sr. No. 1

Date: 16/4/21

Sr. No.	Name	Profession	Mobile/CNIC No.	Mouza/Village Tehsil /District	Signature/Thumb
i)	Rehmat Ghani	Local Business	03459628063	میرا 2 کالونی	رسمت غنی
ii)	Muhammad Nazim	-	-	-	نصیر
iii)	Rahim ulah	SSP	0344-987438	میرا 2 کالونی	راہم
iv)	M. Shabir	Pharmacy	03449871150	4	Shabir
v)	Jam Muhammad	-	0340912438	3 کالونی	جام محمد
vi)	Khan Shazad	Tailor	03101571966	میرا 2 کالونی	خان شہزاد
vii)	Zahid Abbasi	Army Retired	0343584713	4	زاید
viii)	Tariq Muhammad	Refrigerator	03449444354	میرا 2 کالونی	TARIQ
ix)	Sana Ullah	Shop Keeper	03014571243	Bani Banda	سنا
x)	M. Farooq Khan	4	-	-	Farooq
xi)	Sajjad Malik	Store Keeper	03322020349	Bani Banda	Sajjad

STAKEHOLDER CONSULTATION

Project Name: KPCIP

Venue: Kohat

Date: 16/4/21

Sr. No. 2

Sr. No.	Name	Profession	Mobile/CNIC No.	Mouza/Village Tehsil /District	Signature/Thumb
vi)	ایمان محمد	مزدور	03385967740	کوہاٹ	ایمان
vii)	نور احمد	معلم	03125910432	کوہاٹ	Adede
viii)	Majeed ur Rehman	Engineer	0331-5149771	4	Majeed
ix)	بابر احمد	-	-	4	بابر
x)	فان محمد	کاشتکار	-	-	فان
xi)	فہیمہ علی	سائنس دان	-	کوہاٹ	فہیمہ
xii)	Amir Khushnood	-	-	4	Amir
xiii)	نور احمد	مستحق اعزاز	0345506096	سول چوک	Amir
xiv)	سمیر احمد	-	03115658336	سول چوک	Amir
xv)	امان محمد	زیریں دار	-	-	امان
xvi)	مظفر زمان	چوکیدار	-	-	-

**STAKEHOLDER CONSULTATION**

Project Name: KPCIP

Venue: Kohat

Sr. No. (3)

Date: 17/6/21

Sr. No.	Name	Profession	Mobile/CNIC No.	Mouza/Village Tehsil /District	Signature/Thumb
21)	Zabak Khan	Student	03425641019	Calang - Kohat	Zabak
22)	حسن	سینئر ڈپٹی	03006433214	کالونی	حسن
23)	شیراد خان	وکیل کوئٹہ	03028441412	سیر کالونی	شیراد
24)	ارشاد حسن	-	-	-	-
25)	خلیل خان	دکان	-	-	-
26)	پرویز حسن	-	-	-	-
27)	مظفر خان	ملازم	-	-	مظفر خان
28)	M. Mahdab	Army Retired	03410064112	کالونی	M. Mahdab
29)	Danish Khan	ملازمین	13503-19581322	کالونی	Danish
30)	جعفر خان	تعلیم	13502-1958222-9	سینئر روڈ	جعفر
31)	علی زمان ولد زید	-	13503-9558139-3	کوئٹہ	علی زمان

**STAKEHOLDER CONSULTATION**

Project Name: KPCIP

Venue: Kohat

Sr. No. (4)

Date: 18/6/21

Sr. No.	Name	Profession	Mobile/CNIC No.	Mouza/Village Tehsil /District	Signature/Thumb
	مسکین خان	-	13503-01307055	کوئٹہ روڈ	مسکین
	وہبی محمد	-	-	کوئٹہ روڈ	
	میرزا خان	میرزا خان	-	سینئر کوئٹہ روڈ	
	میرزا الدین	-	-	-	-
	میرزا فیروز	میرزا خان	-	-	-
	محمد خان	میرزا خان	-	کوئٹہ	
	سید سعید احمد	میرزا خان	-	کوئٹہ - سینئر روڈ	
	احمد خان مروت	میرزا خان	-	سینئر روڈ	
	میرزا الدین احمد	میرزا خان	-	سینئر روڈ	
	میرزا الدین احمد	کوسٹلر	13502-02307143	کوئٹہ	میرزا الدین
	نعمت احمد	کاروبار	-	کوئٹہ	نعمت



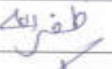
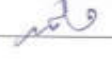

**STAKEHOLDER CONSULTATION**

Project Name: KPCIP- Kohat Water Supply.

Venue:

Sr. No(5)

Date:

Sr. No.	Name	Profession	Mobile/CNIC No.	Mouza/Village Tehsil /District	Signature/Thumb
	Shahzad Khan	Student - MS-80	0301-800240	Kohat	
	Adnan Khan	Private Business	0300-3006353	Kohat	
	عبدالمجید خان	سٹون / این	3832-4656347	کوہاٹ	
	ظفر اللہ خان	-	3832-4656347	کوہاٹ	
	حاکم خان	-	0302-839776	کوہاٹ	
	عنایم اللہ خان	-	0306/1786	کوہاٹ	
	عرفان خان	-	0302-467021	کوہاٹ	
	موسیٰ خان				

# **ANNEXURE N**

## **Env. Audit Report of Existing Facilities**

Table 1: Audit of Existing Tube wells in Kohat

UC Name	Name of Scheme / Address	X - Coordinate	Y - Coordinate	Condition (Functionality)	Water Quality (Fit)	Year of Initial Installation	Depth of Tube well	Depth of Water Table	Motor H	Pump Type	Machinery Condition	Pump Room Condition	Overall Condition	Average Pumping	Discharge of Tube well	Total Production Gallons
1	New Jahandi	71.4	33.5811	Functionality	F	2014	250	100	3	Submersible	Poor	Fair	Fair	6	2000	1200
	Jahandi	71.4	33.5757	Non	N	2018	N	N	NA	N	NIL	Good	Good	0	0	0
	Jahandi	71.4	33.5765	Non	N	2004	N	N	NA	N	NIL	Good	Good	0	0	0
	Allah dad	71.4	33.5785	Functionality	F	1993	250	120	3	Submersible	Good	Good	Good	9	6000	5400
	Gulakhel	71.4	33.5776	Functionality	F	2012	250	120	2	Submersible	Poor	Fair	Fair	9	2000	1800
	Railway	71.4	33.5743	Functionality	F	1970	250	120	2	Submersible	Poor	Poor	Poor	8	6000	4800
	Railway	71.4	33.5743	Functionality	F	2000	250	120	3	Submersible	Poor	Fair	Fair	8	9000	7200
	Railway	71.4	33.5743	Non	N	2012	250	N	NA	N	NA	NA	NA	0	0	0
	Railway	71.4	33.5742	Non	N	1980	250	N	NA	N	NA	NA	NA	0	0	0
2	Bhawal	71.4	33.5779	Functionality	F	1989	250	120	2	Submersible	Poor	Poor	Poor	8	9000	7200
	School	71.4	33.5908	Functionality	F	1993	250	120	2	Submersible	No			9	6000	5400
	Garhi raut	71.4	33.5907	Functionality	F	1991	250	120	2	Submersible	Poor	Poor	Fair	9	6000	5400
	Zaman	71.4	33.5909	Functionality	F	1990	250	9	2	Submersible	Fair	Fair	Fair	9	6000	5400
	garhi	71.4	33.5904	Non	N	2012	N	N	NA	N	NA	NA	NA	0	0	0
	garhi kala	71.4	33.5885	Functionality	F	2004	250	120	2	Submersible	Poor	Fair	Fair	8	6000	4800
	garhi	71.4	33.5879	Functionality	F	2004	250	120	2	Submersible	Poor	Fair	Fair	8	6000	4800
	khattak	71.4	33.5557	Functionality	F	1995	250	120	3	Submersible	Poor	Poor	Poor	8	9000	7200
	Dheri	71.4	33.5677	Functionality	F	1998	250	8	2	Submersible	Poor	Poor	Poor	14	6000	8400
	Miagaan	71.4	33.5552	Functionality	F	1983	250	8	2	Submersible	Poor	Poor	Poor	9	9000	8100
	Miagaan	71.4	33.5602	Functionality	F	2000	250	120	2	Submersible	Poor	Fair	Fair	9	6000	5400
	Liaqat	71.4	33.5895	Functionality	F	2004	250	120	2	Submersible	Fair	Fair	Fair	9	2000	1800
	Miagaan	71.4	33.5556	Functionality	N	2013	250	120	2	Submersible	Good	Fair	Fair	16	6000	9600
	Eid Gah	71.4	33.5974	Functionality	F	1980	250	9	3	Submersible	poor	Poor	Poor	16	1000	1600
	Eid Gah	71.4	33.5971	Functionality	F	1980	250	9	3	Submersible	Good	Fair	Fair	16	1000	1600
	Taj	71.4	33.5997	Functionality	F	1984	250	9	3	Submersible	Poor	Poor	Fair	16	1000	1600



3	Mehmoo	71.4	33.6022	Function	F	1980	250	9	3	Submersi	Poor	Poor	Poor	16	1000	1600
	Mangal	71.4	33.5954	Function	F	1974	250	9	3	Submersi	Poor	Poor	Poor	16	1000	1600
	Sawa	71.4	33.5906	Function	F	1985	250	120	3	Submersi	Fair	Fair	Fair	16	6000	960
	Sawa	71.4	33.5905	Function	F	2015	250	9	3	Submersi	Fair	Poor	Poor	12	6000	720
	Slaughter	71.4	33.5919	Function	F	1977	250	115	3	Turbin	Fair	Poor	Poor	22	6000	1320
	Shirivilla	71.4	33.6022	Function	F	1991	250	8	2	Submersi	Poor	Fair	Fair	4	9000	360
	Saad	71.4	33.5992	Non	F	2005	250	100	2	Submersi	Fair	Fair	Fair	0	0	0
	Shirivilla	71.4	33.6021	Non	F	1977	250	120	NA	N				0	0	0
4	Park	71.4	33.6118	Function	F	2013	300	110	2	Submersi	Good	Good	Good	6	6000	360
	Tube well	71.4	33.6084	Function	F	1990	300	100	2	Turbin	Good	Fair	Fair	6	6000	360
	Tube well	71.4	33.6085	Function	F	1988	300	105	3	Submersi	Fair	Poor	Poor	22	6000	1320
	Tube well	71.4	33.6079	Function	F	2005	300	110	2	Submersi	Fair	Fair	Fair	6	6000	360
	Tube well	71.4	33.6066	Function	F	1992	300	7	3	Turbin	Fair	Fair	Fair	7	6500	455
	B5 Tube	71.4	33.6119	Non	N	1990	300	7	0	N	NA	Fair	Fair	0	0	0
	Tube well	71.4	33.6138	Non	F	1990	300	N	2	N	NA	Fair	Poor	0	0	0
	Tube Well	71.4	33.6065	Function	F	2004	300	110	3	Submersi	Poor	Poor	Poor	16	6000	960
	Tube well	71.4	33.5992	Function	F	1981	300	6	3	Submersi	Poor	Poor	Poor	16	1100	1760
	Tube well	71.4	33.5988	Function	F	1981	210	9	3	Submersi	Poor	Poor	Poor	6	3000	180
	Tube well	71.4	33.6006	Function	F	1999	300	7	3	Submersi	Poor	Poor	Poor	16	9000	1440
	Tube well	71.4	33.6017	Function	F	1981	300	7	3	Submersi	Poor	Poor	Poor	16	6500	1040
	Tube well	71.4	33.6022	Function	F	2005	300	7	3	Submersi	Poor	Poor	Poor	16	8500	1360

	Tube well no 6	71.4579	33.60821	Function	Fi	200	30	8	3	Turbine	Poor	Poo	Poo	1	600	9600
	Crush machine	71.4580	33.60995	Function	Fi	198	25	8	3	Turbine	Poor	Poo	Poo	6	200	1200
	Charbagh TW	71.4498	33.59916	Function	Fi	198	25	100	3	Turbine	Poor	Poo	Poo	4	900	3600
	SDA tube well	71.4575	33.61433	Function	Fi	198	25	100	3	Turbine	Poor	Poo	Poo	7	600	4200
	Malangabad	71.4519	33.60017	Function	Fi	198	25	9	2	Submersibl	Poor	Fair	Fair	6	600	3600
	Abdullah	71.4568	33.58364	Function	Fi	200	25	120	2	Submersibl	Poor	Fair	Fair	8	600	4800
	Bahadur	71.4547	33.57925	Function	Fi	201	25	120	2	Submersibl	Poor	Fair	Fair	8	600	4800

5	Mir Ahmed	71.4624	33.58232	Function	Fi	198	25	9	2	Submersibl	Poor	Fair	Fair	8	600	4800
	Mir Ahmed	71.4652	33.58136	Function	Fi	200	25	110	1	Submersibl	Poor	Fair	Poo	7	200	1400
	Mohammad	71.4625	33.57477	Function	Fi	199	25	8	3	Submersibl	Goo	Fair	Fair	8	900	7200
	Hayat	71.4690	33.57643	Function	Fi	198	25	100	3	Submersibl	Poor	Fair	Fair	1	900	10800
	Rehman Baba	71.4592	33.55331	Function	Fi	201	25	100	2	Submersibl	Poor	Fair	Fair	7	600	4200
	College Town	71.4613	33.57796	Function	Fi	200	25	9	2	Submersibl	Poor	Fair	Fair	8	600	4800
	Mangal Bibi	71.4766	33.57467	Function	Fi	199	25	110	2	Submersibl	Poor	Poo	Poo	8	600	4800
	Meri Banda	71.4509	33.56350	Function	Fi	199	25	120	3	Submersibl	Poor	Poo	Poo	8	900	7200
	Garhi Risaldar	71.4541	33.56540	Function	Fi	201	25	100	2	Submersibl	Poor	Fair	Fair	7	600	4200
	Noor Illahi	71.4572	33.55738	Function	Fi	198	25	120	2	Submersibl	Poor	Fair	Poo	7	600	4200
	Comprehensiv	71.4692	33.57238	Function	Fi	198	25	100	2	Submersibl	Poor	Poo	Poo	1	600	7200
6	New Bus Stand	71.4491	33.55414	Function	Fi	199	25	120	3	Submersibl	Poor	Fair	Fair	8	900	7200

**Table 1: Audit of Existing Condition of Water Distribution Networks and Corrective Actions**

S/No.	Component	Env. Audit Findings	Required Corrective Action
1	Water Storage Reservoirs and Tube wells	<ul style="list-style-type: none"> <li>Total water storage reservoir are 14 includes 7 OHRs and 7 SRs,</li> <li>Out of 7 OHRs 4 are operational,</li> <li>Out of 7 existing SRs 5 are operational</li> <li>Existing Tubewells are 65 in total out of which 56 are operational, 09 non-operational</li> <li>Overhead reservoirs are located in 06 UCs of Kohat</li> <li>Chlorination is being done on monthly basis</li> <li>There are cleaning issues with overhead reservoirs</li> <li>Cleaning of Overhead reservoirs is being done on 06 months basis</li> <li>Cleaning washouts goes into nearby drain through piped network</li> <li>There are 02 persons usually deployed at site</li> <li>Power requirements are being met through WAPDA.</li> <li>There is need to maintain plantation at around storage reservoirs.</li> </ul>	<ul style="list-style-type: none"> <li>5 new OHRs are proposed while 3 will be rehabilitated</li> <li>3 new SRs are proposed while 2 existing will be reconstructed</li> <li>10 new tubewells are proposed while existing 9 non operational will be rehabilitated.</li> <li>14 existing and 10 proposed new tubewells will be energized through clean energy sources</li> <li>SOPs for cleaning of overhead reservoirs shall be robust</li> <li>There is need to increased cleaning frequency of overhead reservoirs</li> <li>No washouts should be drained openly. These should be disposed of through piped network.</li> <li>More plantation should be carried out to improve aesthetics of the area.</li> </ul>
2	<b>Distribution Network</b>	<ul style="list-style-type: none"> <li>Currently distribution network is not in good condition</li> <li>Laying of other utilities i.e. SNGPL, cable, sewerage some time result in damage to distribution networks</li> <li>There are chance of sewerage mixing with distribution network</li> <li>Storm water mixing to distribution network occurs in case of high flow.</li> </ul>	<ul style="list-style-type: none"> <li>Damage to distribution network by other utilities should be avoided.</li> <li>Frequency of purging of distribution network should be defined.</li> <li>Hotspots for storm water mixing within distribution network should be identified and mixing points should be fixed prior to rainy season.</li> <li>Water meters will be installed at each house connection to monitor water use and to bill the service by WSSC Kohat</li> <li></li> </ul>

