ENVIRONMENTAL IMPACT ASSESSMENT

AUGMENTATION OF WATER SUPPLY AND FORMATION OF DMAs IN KHYABAN-E-SIR SYED, DISTRICT RAWALPINDI.

Submitted by

PROGRAM MANAGEMENT UNIT (PMU), PUNJAB INTERMEDIATE CITIES IMPROVEMENT INVESTMENT PROGRAM (PICIIP), LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT DEPARTMENT GOVERNMENT OF PUNJAB | Plot 41, Block B1, Gulberg III, MM Alam Road Lahore, Pakistan; Email: pd@piciip.gop.pk; Tel: 042-99210013-4 / 042-99268484

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Prepared For: AUGMENTATION OF WATER SUPPLY AND FORMATION OF DMAs IN KHYABAN-E SYED, DISTRICT RAWALPINDI.				
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Report Summary: This document presents findings of Environmental Impact Assessment (EIA) regarding Augmentation of **Water Supply System in KSS from Khanpur DAM & Creation of DMAs**, District Rawalpindi.				
0	Report	EDCM	RR	SMM
Revisions	**Description**	**Originator**	**Reviewed**	**Approved**

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GLOSSARY

a. **Act:** means Punjab Environmental Protection Act, 1997 [Amendment 2012].

b. **Dust:** are fine powdery material such as dry earth/ pollen that can be blown in the air.

c. **Discharge:** means spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping

d. **Environment:** means air, water and land; all layers of the atmosphere; all organic and inorganic matter and living organisms; the ecosystem and ecological relationships; buildings, structures, roads, facilities and works; all social and economic conditions affecting community life; and the inter-relationships between any of the factors mentioned.

e. **Environmental Impact Assessment:** means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed.

f. **Effluent:** means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour.

g. **Hazardous Substance:** a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and any substance which may be prescribed as a hazardous substance.

h. **Hazardous Waste:** means waste which is or which contains a hazardous substance or which may be prescribed as hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste.

i. **Industrial Activity:** means any operation or process for manufacturing, making, formulating, synthesizing, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal or for mining, for oil and gas exploration and development, or for pumping

water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose.

j. **Industrial Waste:** means waste resulting from industrial activity.

k. **Incineration:** The thermal destruction of waste for the primary purpose of disposal, with or without recovery of energy.

Note: the term incineration generally means 'the act of burning to ashes'.

l. Initial Environmental Examination: means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an environmental effect for requiring preparation of an environmental impact assessment.

m. Leachate: A liquid that has percolated through and/or been generated by decomposition of waste material. It includes water that come in contact with waste and is potentially contaminated by nutrients, metals, salts and other soluble or suspended components and products of decomposition of waste.

n. Landfill: A waste disposal site used for the controlled deposit of solid waste onto or into land.

o. Mitigation Measure: means measure for control, reduce or elimination of an adverse impact of a development on environment, including a restorative measures.

p. Punjab Environmental Quality Standards: means the permissible standards for emission of air pollutants and noise and for discharge of effluent and waste.

q. Regulations: means the Pakistan Environmental Protection Agency, Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000.

r. Recycling: Set of processes (including biological) for converting recovered materials that would otherwise be disposed of as waste into useful material and/or products

s. Reuse: using a waste product again for the same or different purpose without further manufacture.

t. Suspended Solids: are solid particles suspended in water or air that can be removed by filtration or settlement.

u. **Sustainability:** means such developments that meet the needs of the present generation without compromising the ability of future generations to meet their needs.

v. Waste: means any material, substance, or by-product eliminated or discarded as no longer useful or required after the completion of a process.

LIST OF ABBREVIATIONS

KSS	Khayaban-e-Sir Syed
EA	Environmental Approval/Executive Agency
NOC	No-Objection Certificate
NOx	Oxides of Nitrogen
PC	Public Consultation
PEPA	Punjab Environmental Protection Act, 1997 [Amendment, 2012]
PEPC	Punjab Environmental Protection Council
PM	Particulate Matters
SPM	Suspended Particulate Matters
SOx	Oxides of Sulphur
NO	Nitrogen monooxide
NO_2	Nitrogen dioxide
WHO	World Health Organization
NRW	Non-Revenue Water
ADB	Asian Development Bank
AIP	Access to Information Policy
AMSL	Above Mean Sea Level
AC	Asbestos Cement
BC	Before Construction
BOQ	Bill of Quantities
IBAT	Integrated Biodiversity Assessment Tool
COVID-19	Corona Virus Infection Disease-2019
CSC	Construction Supervision Consultation
DC	During Construction
DMA	District Metered Area
DO	During Operation
EDCM	Engineering Design Construction Management
EGL	Existing Ground Level
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency

GFR	Gross Enrollment Rate
GI	Galvanized Iron
GST	Ground Storage Tanks
GoP	Government of Pakistan
GRM	Grievance Redress Mechanism
GWSS	Gravity Water Supply Scheme
HDPE	High Density Polyethylene
IA	Implementing Agency
IEE	Initial Environmental Examination
IFC	International Finance Corporation
KPI	Key Performance Indicators
LAA	Land Acquisition Act (of 1984)
LARP	Land Acquisition and Resettlement Plan
Lea	Equivalent sound pressure level
MGD	Million Gallons per Day
MSDS	Material safety Data Sheet
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
PEQS	Punjab Environmental Quality Standards
NER	Net Enrolment Rate
NRW	Non-Revenue Water
OHS	Occupational Safety and Health
O&M	Operation and Maintenance
OHR	Overhead Reservoirs
PAP	Project Affected People
PC	Public Consultation
PPC	Plain Cement Concrete
PDD	Planning and Development Department
PEPA	Pakistan Environmental Protection Act 1997
PEPC	Pakistan environmental protection Council
PEQS	Punjab Environmental Quality Standards
PGA	Peak Ground Acceleration
PMU	Program Management Unit
PPE	Personal protective Equipment

RCC	Reinforced Cement Concrete
Punjab-EPA	Punjab Environmental Protection Agency
REA	Rapid Environmental Assessment
RP	Resettlement Plan
RWASA	Rawalpindi Water and Sanitation Agency
SOPs	Standard Operating Procedures
SS	Suspended Solids
TDS	Total Dissolved Solids
SPS	Safeguard Policy Statement
SSEMP	Site Specific Environmental Management Plan
TMA	Tehsil Municipal Administration
TMP	Traffic Management Plan
USEPA	United States Environmental Protection Agency
WTP	Water Treatment Plant
UCs	Union Councils

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. TITLE & LOCATION OF PROJECT:

The city of Rawalpindi mainly depends on the rainfalls for both surface and groundwater resources (as the perched aquifers deplete rapidly due to lesser rainfall). Water supply being the foremost utility for the citizen is currently the most affected municipal service in the city. Citizens are facing a limited supply of water due to depleting water resources and an aging water supply network. Water availability is such a huge issue, and it will further be aggravated in the coming years, that people seldom think much about its deteriorated quality.

Proposed project is about Augmentation of **Water Supply System in KSS from Khanpur DAM & Formation of DMAs,** District Rawalpindi. Khayaban-e-Sir Syed (KSS) is located in the WEST-I Zone of Rawalpindi with a 1.48 sq. km area. KSS comprises of three Union Councils (UCs) in this area named UC-10 (Khayaban-e-Sir Syed (N)), UC-11 (Khayaban-e-Sir Syed (S)), and UC-12 (Dhok Najjo). The study area is bounded by three sides, from the North, the IJP road is passing, while on the East and West side, Nallah Lai and Nikki Nullah split the project boundary from the rest of the area. Due to the unique area boundary, KSS is considered for the formulation of District Metered Area (DMA) as a pilot project which will lay a foundation in the future for the implementation of the same for the rest of the area. The project location plan is shown in **Figure ES- 1**.

Currently, there are two main sources of water for residents of KSS. One is from the Khanpur dam and the other is from the existing water supply tube wells installed by RWASA. The Khanpur Dam supplies water to Rawalpindi and Islamabad for domestic consumption and irrigation water to the agricultural lands and industrial areas surrounding the twin cities.

According to ADB's Safeguard Policy Statement (SPS) 2009, a Rapid Environmental Assessment (REA) Checklist was prepared and has been submitted to ADB for the proposed project of Augmentation of Water Supply in KSS. Based on the initial findings, it was ascertained that certain adverse environmental impacts are not expected of significance that detailed assessment is required for the proposed project "Augmentation of Surface Water Supply for Khayaban-e-Sirsyed from Khanpur Dam and Creation of DMAs", and based on nature of project and anticipated environmental impacts, the project has been categorized under Category B, ADB SPS, 2009 and IEE report for ADB has been prepared and submitted accordingly.

Further as per legal requirement under Section 12 of Punjab Environmental Protection Act, 1997 (Amendment 2012) this project require Environmental Approval from EPA Punjab. As a part of Conductance Main is passing through the federal territory of Islamabad, this project also requires Environmental Approval from Pak EPA under Section 12 of Pakistan Environmental Protection Act, 1997. As a part of Conductance Main is passing through the federal territory of Islamabad, this project also requires Environmental Approval from Pak EPA under Section 12 of Pakistan Environmental Protection Act, 1997. As per clause F, Schedule-II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000 of the acts ibid, the proposed project falls in category of projects requiring Environmental Impact Assessment (EIA) on the basis of project cost. Therefore, Environmental Impact Assessment (EIA) is prepared for submission to EPA Punjab and to obtain NOC from EPA.

Following are the main components of proposed activity.

- Laying of New Conductance Main from Conductance Main of Tomar Reservoir
- Creation of District Metered Area (DMAs)
- Replacement of outlived distribution pipelines
- Installation of Pumps at Water Wrods and Sangjani Water Treatment Plant
- Installation of water meters at household level.

Calculation has been carried out to ascertain the current and future water demand of water from KSS and the sustainable sources of water supply for KSS. Based on these calculation, new Conductance Main of HDPE with 710mm diameter will be laid down to fulfill the water demand of KSS up to next 30 years (year 2050). More harvesting of surface water will reduce the pressure on already depleted groundwater source of KSS. An estimated cost of the proposed project is about PKR 1230 Million.

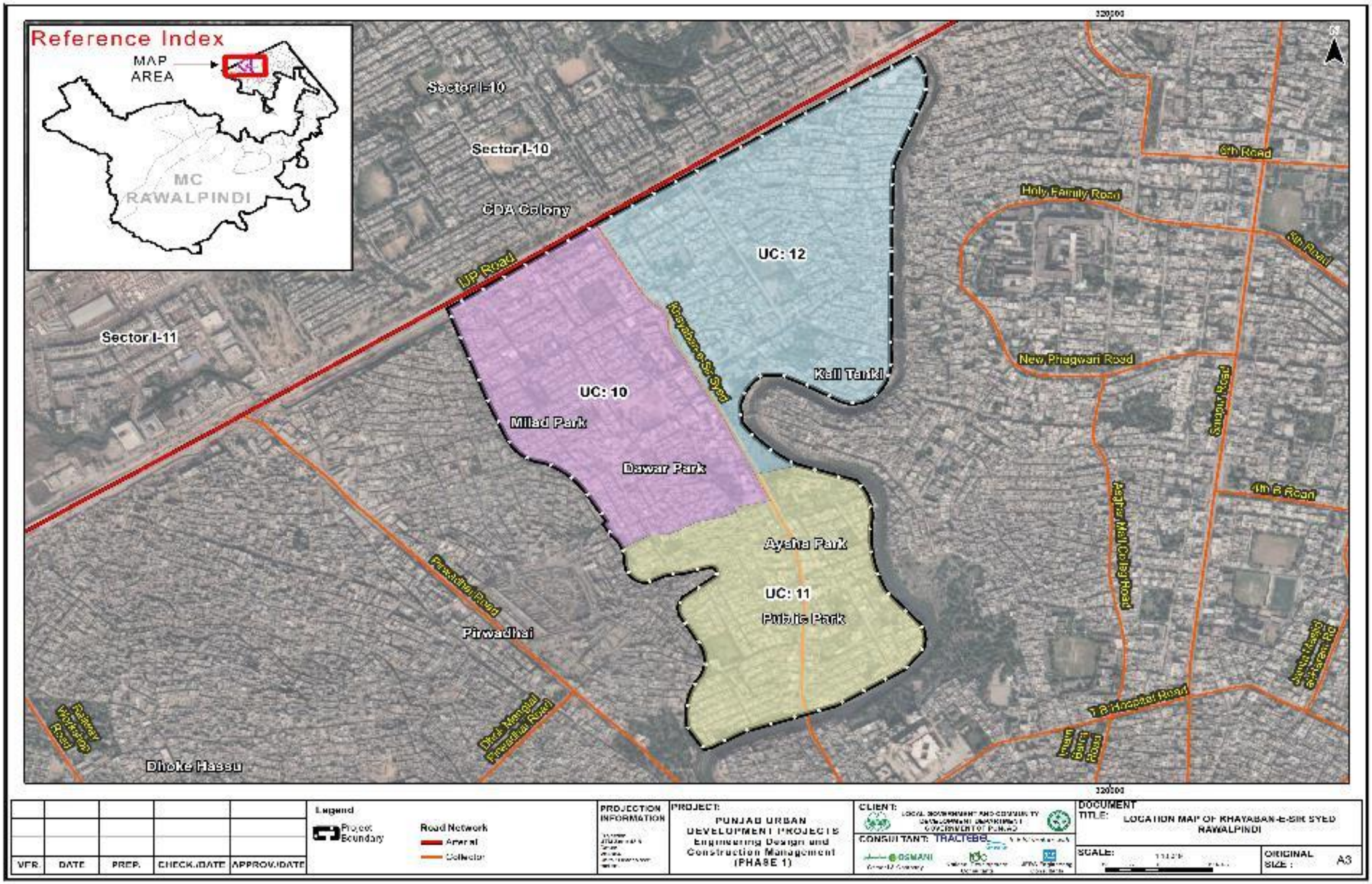


Figure ES- 1: **Location of the Project**

2. PROJECT PROPONENT

Program Management Unit (PMU), Punjab Intermediate Cities Improvement Investment Program (PICIIP), Local Government and Community Development Department Government of Punjab are the Executing Agency (EA) of project. Mr. **Hamza Salik**, **Program Director** will be the contact person for the proposed project **"Augmentation of Water Supply and Formation of DMAs in Khayaban-e-Sir Syed"**. Detail of the proponent is given hereunder.

Name:	**Hamza Salik**
Address:	Plot 41, Block B1, Gulberg III, MM Alam Road, Lahore, Pakistan.
Post:	Program Director PMU, PICIIP Local Government and Community Development Department Government of Punjab Augmentation of Water Supply and Formation of DMAs in Khayaban-e-Sir Syed , Rawalpindi.
Contact Details:	**Cell:** 042-99210013-4 / 042-99268484

3. CONSULTANTS:

In order to satisfy EPA's requirement to carry out Environmental Impact Assessment (EIA), **Engineering Design and Construction Management (EDCM)** is engaged by the Executive Agency of the Project "Program Management Unit (PMU), Punjab Intermediate Cities Improvement Investment Program (PICIIP), Local Government and Community Development Department Government of Punjab" as their Environmental Consultant for this project.

4. PROJECT PARTICULARS:

The project aims at augmentation of **Water Supply System in KSS from Khanpur DAM & Creation of DMAs,** District Rawalpindi**.** The proposed construction and development is planned to be distributed in the WEST-I Zone of Rawalpindi (Khyaban-e-Sir Syed) with a 1.48 sq. km area. Currently, there are two main sources of water for residents of KSS. One is from the Khanpur dam and the other is from the existing water supply tube wells installed by RWASA. The Khanpur Dam supplies water to Rawalpindi and Islamabad for domestic consumption and irrigation water to the agricultural lands and industrial areas surrounding the twin cities.

Following are the main components of proposed activity.

- Laying of New Conductance Main from Conductance Main of Tomar Reservoir
- Creation of District Metered Area (DMAs)
- Replacement of outlived distribution pipelines
- Installation of Pumps at Water Wrods and Sangjani Water Treatment Plant
- Installation of water meters at household level.

Calculation has been carried out to ascertain the current and future water demand of water from KSS and the sustainable sources of water supply for KSS. Based on these calculation, new Conductance Main of HDPE with 710mm diameter will be laid down to fulfill the water demand of KSS up to next 30 years (year 2050). More harvesting of surface water will reduce the pressure on already depleted groundwater source of KSS. An estimated cost of the proposed project is **PKR 1230 Million** that has been calculated and given in Chapter 3 of this EIA Report.

The designing of proposed project component is based on the increasing water demand of KSS with respect to increasing population. The project is designed to cater the water demands of up to 2050.

The discussion and analysis of alternatives considers other practicable strategies that will promote the elimination of negative environmental impacts identified. This section is critical in consideration of the ideal development with minimal environmental disturbance. This process of analysis of the different alternatives for proposed project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Formation of DMAs" 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.

The current project will provide employment opportunities, directly and indirectly to the local people of different categories, both skilled and unskilled, during its construction phase. The main benefits of this project include the following:

- Shifting on surface water use to secure ground water resource. Surface water reservoir has sufficient water to cater this need.

- Installation of DMA to control and regulate the flow of water to selected areas
- Efficient use of already available OHRs and GSTs
- Control on use of water use by installing Water Meters
- Replacement of old distribution lines to control leakages and contamination of drinking water.

The impacts of the project activities on environment during construction and operation phases have been considered in this EIA report.

The mitigation measures have been proposed to minimize / eliminate the adverse/negative impacts of the project on the environment. As per legal requirement under Section 12 of Punjab Environmental Protection Act, 1997 (Amendment 2012) this project require Environmental Approval from EPA Punjab. As a part of Conductance Main is passing through the federal territory of Islamabad, this project also requires Environmental Approval from Pak EPA under Section 12 of Pakistan Environmental Protection Act, 1997. As per clause F, Schedule-II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000 of the acts ibid, the proposed project falls in category of projects requiring Environmental Impact Assessment (EIA) on the basis of project cost.

Regular environmental monitoring, by a third party will also ensure environmentally sound construction of the project. The proponent / contractor will hire trained staff to ensure the enforcement of Environmental Management Plan. No trees will be cut down for this project. The equipment will be kept in proper condition to save the environment from any damage. During construction and operation phase; air and water quality will be monitored.

5. ENVIRONMENTAL ASSESSMENT:

Considering the potential impacts of the Proposed Project, existing baseline environmental conditions of the proposed project's Corridor of Impact (CoI) has to be used as a benchmark for comparison of the physical, ecological and socio-economic conditions before and after construction phases of the Project. This baseline will also provide the datum for assessing the impacts and suggesting the mitigation measures, which will be implemented effectively at various phases of the proposed project activities.

The data has been collected from the primary and secondary sources. For primary data acquisition, the Environment and Social team conducted the field visit during the month of

December, 2022. The secondary data was collected from published sources/reports and relevant departments, which were also verified through visual observations during detailed surveys. Data has been collected for following elements of environment.

- Physical Environment
- Biological Environment
- Socioeconomic environment

The impacts of the project activities on environment during construction & operational phases of proposed project have been considered. The mitigation measures have been proposed to minimize / eliminate the negative impacts of the project on the environment. A complete Environmental Monitoring and Environment Management Plan have been recommended to regulate the requirements of Punjab Environmental Protection Act, 1997 [Amendment, 2012].

The impacts on environment which are likely to be generated during Pre-construction / Planning and Designing Stage are summarized in table below:

ACTIVITY	ENVIRONMENTAL IMPACTS	MITIGATION MEASURES
Installation of construction camps	- Damage to local vegetation/ trees - Mobility of Heavy machinery	- The camps, mobility of machinery should be proper planned and well designed to avoid any loss to local green cover; - It is recommended to establish the construction camps where no or minimum vegetation exists. - The location of construction camp should be selected so, as to have limited environmental impact during construction phase and to reduce the cost and land requirement. - Compensation to the forest department for all type of plants (saplings, sub-mature, mature trees and other green assets) will be paid by the proponent as desired by the Punjab, Forest Department and as per law of land.
Selection of location for the construction of water distribution	- Improper Designing of Distribution Networks and Conductance Main	- Factors such as site capacity, accessibility, acceptability, stability, environmental sensitivity, land use, socio-economic receptors and climate hazards have been

networks and Transmission Mains		studied and site has been selected accordingly. - Water supply network design shall facilitate uninterrupted water supply through gravity system without technical constraints.

The impacts on environment which are likely to be generated during Construction Stage are summarized in table below:

ACTIVITY	ENVIRONMENTAL IMPACTS	MITIGATION MEASURES
Execution on Project designing and planning	- Cutting of trees - Involvement of forest	- Cutting and / or disturbance of trees shall be avoided, as far as possible; - A tree plantation program shall be implemented with the recommendations and technical support of Punjab, Forest Department for the enhancement ecological condition of the area; - There is no protected forest situated in and around the Project area.
Construction of water distribution networks and Transmission Mains	- Improper method of water distribution pipelines;	-The project is designed by certified engineers / architects based on the reliable data. -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. - 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.
Traffic Issues	- Movement of vehicles carrying construction materials and equipment/machinery	- Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime to reduce traffic load and inconvenience to the local population; - Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions on roads;
Solid Waste	- Open dumping of solid waste; - Disposal of Spoil & Demolition Waste	- All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper solid waste management system. The contractor will coordinate with local representatives and administration of the concerned solid waste management

		department for the disposal of solid waste; - The contractor must develop a plan of action with the help of concerned solid waste management department for transporting the waste to the disposal site; - Waste to be reused in the project or by any other interested parties. - All material that is produced shall be transported in tarpaulin covered trucks for disposal at the designated site. At the disposal site, the demolition waste will be disposed off in accordance with the best practices to ensure no residual impact. - Disposal trucks will be properly maintained to minimize oil leakages during the construction.
Wastewater generation	- Discharge of wastewater in open area;	- Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks. - Proper monitoring to check the compliance of PEQS will be carried out; and - Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit. - The contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of wastewater collection, transportation and its disposal.

The impacts on environment which are likely to be generated during execution of operations are summarized in table below:

ACTIVITY	ENVIRONMENTAL IMPACTS	MITIGATION MEASURES
Proper maintenance of pipelines	- Water system leaks and water discharges during flushing	- 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 of 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.

Comprehensive Environmental Monitoring and Environment Management Plans are prepared to satisfy the requirements of Punjab Environment Protection Act, 1997 [Amendment, 2012] and rules and regulations made thereunder. Regular overall environmental monitoring by a third party will also ensure environmentally sound Construction and operation of the project. The proponent / contractor will hire trained staff to ensure the enforcement of Environmental Management Plan. The equipment will be kept in proper condition to save the environment from any damage.

Project impact evaluation matrixes have been developed to evaluate the potential impacts of the proposed Project during planning, construction and operation phases of the project. Qualitative description of each aspect and the affected environment in both RoW and the project's corridor of impact is prepared.

Environmental parameters such as air quality, noise level, and Drinking Water Quality was analyzed to assess the baseline conditions of project area. .The test results show that majority of the parameters of water, air and noise levels are incompliance with applicable National/Punjab Environmental Quality Standards and other international standards like WHO. These tests were performed by experienced staff from an EPA certified environmental laboratory.

Sensitive receptors have been identified which falls under CoI of 100 meters along the alignment of proposed project. These receptors include places of worship, educational institutes, health facilities and area of spiritual value. Mapping of these receptors has been carried out to assess the impacts and proposed mitigation accordingly.

Beneficial as well as the potentially significant adverse environmental and social impacts of the project are evaluated for design/pre-construction, construction and operation phases of the proposed project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation and remedial measures are proposed accordingly.

The EIA has evaluated potential impacts that are likely to arise during proposed project in detail, both negative and positive impacts at each stage of the project. To minimize the effects of adverse impacts, mitigation measures have been recommended in the Environmental Management Plan (EMP).

The proposed project is of high significance considering the urgent need for improving sustainable water supply system of KSS Rawalpindi. The existing water supply is not sufficient to cater the needs of KSS in terms of water demand. An action plan for different stakeholders with roles and responsibilities has been developed to make project sustainable. Base on finding of EIA report, the proposed project 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. No further study or assessment is required at this stage. The requirements of ADB SPS, PMU and Federal & Punjab EPA Punjab shall be communicated to contractor by PMU to control any adverse impact of environment.

CHAPTER-1

INTRODUCTION

1.1 OVERVIEW

The city of Rawalpindi mainly depends on the rainfalls for both surface and groundwater resources (as the perched aquifers deplete rapidly due to lesser rainfall). Water supply being the foremost utility for the citizen is currently the most affected municipal service in the city. Citizens are facing a limited supply of water due to depleting water resources and an aging water supply network. Water availability is such a huge issue, and it will further be aggravated in the coming years, that people seldom think much about its deteriorated quality.

Rawalpindi Water and Sanitation Agency (RWASA), is responsible to provide water supply and sewerage services to 1.6 million people living in 66 Union Councils of the City of Rawalpindi. RWASA has divided this jurisdictional area into six water supply zones namely EAST-1, EAST-2, WEST-1, WEST-2, PP-12, and PP-13. As learned from the RWASA, the Non-Revenue Water (NRW) constitutes almost 30% of the city's water supply, mainly because of the outlived and rusty water supply infrastructure and due to the absence of net water metering.

Khayaban-e-Sir Syed (KSS) is located in the WEST-I Zone of Rawalpindi with a 1.48 sq. km area. There is a total of three Union Councils (UCs) in this area named UC-10 (Khayaban-e-Sir Syed (N)), UC-11 (Khayaban-e-Sir Syed (S)), and UC-12 (Dhok Najjo). The study area is bounded by three sides, from the North, the IJP road is passing, while on the East and West side, Nallah Lai and Nikki Nullah split the project boundary from the rest of the area. Due to the unique area boundary, KSS is considered for the formulation of District Metered Area (DMA) as a pilot project which will lay a foundation in the future for the implementation of the same for the rest of the area. The project location plan is shown in **Figure 1.1**.

Keeping in view the increasing demand of water supply in this region, the proposed project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Creation of DMAs" is selected under the proposed Developing Resilient Environments & Advancing Municipal Services (DREAMS) formerly known as Punjab Intermediate Cities Improvement Investment Program Phase-II (PICIIP-II) to be financed by the Asian Development Bank (ADB).

DREAMS will be built upon the achievements and lessons learned from previous urban sector projects supported by the Asian Development Bank (ADB) and other partners in Pakistan including the Punjab Intermediate Cities Improvement Investment Project (PICIIP-1) with the intention of improving urban services in the two Punjab cities of Sialkot and Sahiwal by: (i) rehabilitating and expanding water supply and sanitation systems;(ii) enhancing urban amenities including bus terminals, parks, greenbelt areas, pathways and other facilities; (iii) building institutional capacity by establishing urban service standards, enhancing customer service functions, and developing new tariff structures.

This project (DREAMS/ PICIIP-2) represents the second phase of the PICIIP-1, which will continue the momentum of the first phase and ensure development continuity by providing similar urban infrastructure investments and capacity support to additional selected seven cities in Punjab Province, namely Sargodha, Rahim Yar Khan, Muzaffargarh, Bahawalpur, DG Khan, Multan and Rawalpindi. This Project Brief covers the Rawalpindi City.

The main purpose of the DREAMS is to improve the quality and access to basic urban services and enhanced utility facilities of the residents in the selected Project cities of Punjab. The consultancy services for DREAMS have been awarded to the Engineering Design and Construction Management (EDCM) Consultant by the PMU to achieve the objectives of the project.

The scope of consultancy works for the EDCM contract of Phase - 1 is to prepare at least until 2050, the urban planning, the spatial planning of SWM, water & sanitation, urban transport sectors, feasibility study and detailed engineering design of identified shortlisted projects of water and sanitation including SWM. In this connection, EDCM prepared the water and sanitation spatial planning reports of all the cities and submitted to the PMU. The Spatial Plan identifies the priority projects in the three phases, i.e., Short-term (2022 – 2030), Medium-term (2031 – 2040) and the Long-term (2041 – 2050). The projects of the immediate nature are proposed in the short-term planning and other projects are proposed in the medium and the long-term planning.

After detailed deliberations the top priority projects to be executed for Rawalpindi City were finalized and named as Dream-1, Projects to be executed up to year 2025. The Dream-1 Projects for Rawalpindi City include the following:

- Water Supply System based on Chahan Dam 12 MGD – RWP
- Augmentation of water supply system and establishment of DMAs in Khayaban-e-Sir Syed, Rawalpindi
- Replacement of 5 MG Existing Conductance Main Rawalpindi
- Hydrological Modelling of groundwater, urban floods (TOR) – RWP
- Feasibility study of the Water supply system based upon Daducha Dam

Detail of sub-projects under Dream-1 project is given below in **Figure 1.2.**

Currently, there are two main sources of water for residents of KSS. One is from the Khanpur dam and the other is from the existing water supply tube wells installed by RWASA. The Khanpur Dam supplies water to Rawalpindi and Islamabad for domestic consumption and irrigation water to the agricultural lands and industrial areas surrounding the twin cities.

Khanpur Dam has a design capacity of 231,851 m^3/d (51 MGD). Due to a lack of water in Khanpur reservoir, the actual supply of water from this dam is only 27,277 m^3/d (6 MGD) to Rawalpindi city. A new 710 mm dia (OD) HDPE Bulk Supply Line will be provided to enhance the water supply for Khayaban-e-Sir Syed (KSS) which further bifurcate into smaller diameters Sub-Mains as per the demand of certain waterworks. This line will be connected with Existing Conductance Main of 1000mm diameter coming from Tomar Reservoir at Service Road North I-10 and the new Bulk Supply Line will be laid in the green strip parallel with Service Road West I-10. This new bulk supply line will be connecting the existing GSTs/OHRs of UC-10/DMA-1 & UC-11/DMA-2 in Khayaban-e-Sir Syed area

RWASA has also installed tube wells of varying capacities in KSS. These tube wells are directly pumping to the distribution network or through the Ground Storage Tanks (GSTs). These tube wells are discharging a total of 7,200 m^3/d water.

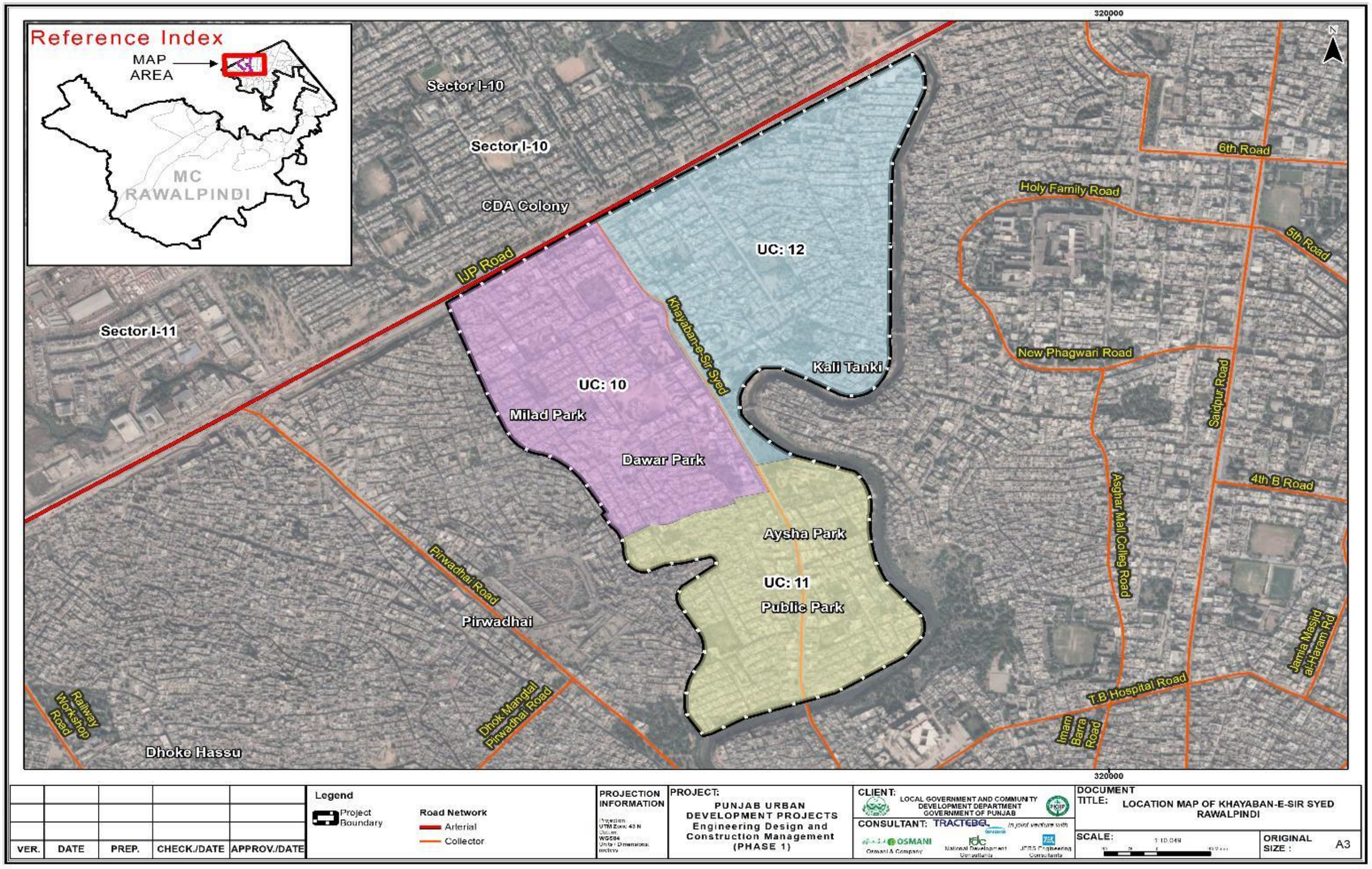


Figure 1. 1: Detail of Projects under Dream-1 Project

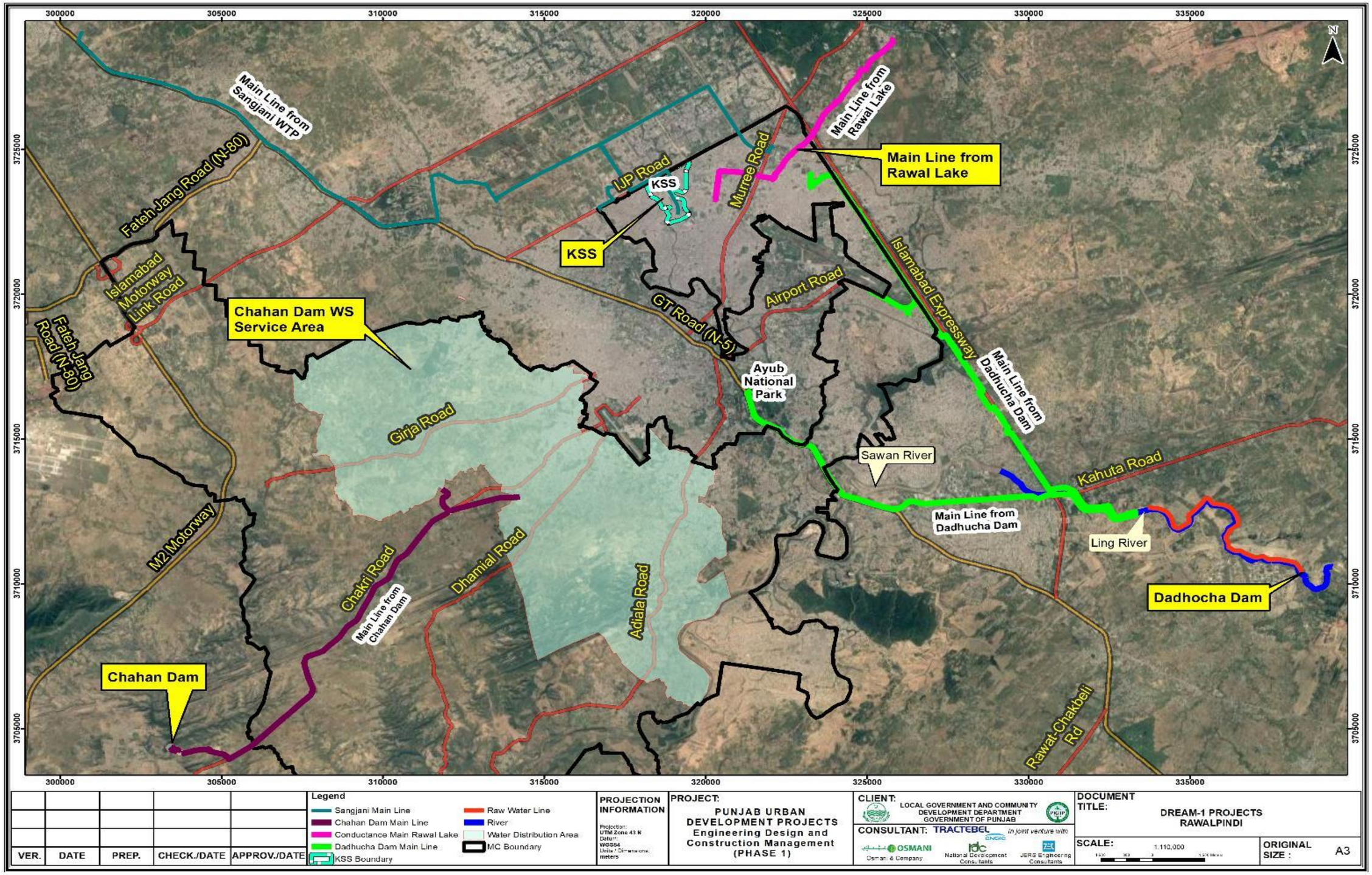


Figure 1. 2: Detail of Projects under Dream-1 Project

1.2 PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore in compliance with the legal requirement of Section, 12 of Punjab Environmental Protection Act, 1997 [Amendment, 2012]; "Preparation and submission of IEE / EIA" for obtaining the Environmental Approval (EA) before starting project activity and **Schedule-II (Clause-I)** of Review of IEE/ EIA Regulations, 2000 stating the proposed project falls in category of projects requiring Environmental Impact Assessment (EIA) on the basis of project cost. The other relevant regulations and guidelines considered while preparing this EIA report include:

- Policy and procedures for filing, review, and approval of environmental assessments.
- Guidelines for the preparation and review of environmental reports.
- Guidelines for public participation.
- Guidelines for sensitive and critical areas.
- Hazardous Substance Rules, 2003.

This report has been prepared based on detailed engineering designs, pre-feasibility of the project and estimates of water availability, supply and future demand in Rawalpindi under Punjab Urban Development Projects, Loan No. 6029, Engineering Design and Construction Management (PHASE 1) project. Different environmental aspects like social, physical biological etc. and other related features of the project both during designing, construction & operational phases are highlighted in this EIA report. Measures necessary to be adopted to mitigate any environmental impacts on any part of the environment around are also described. All the important information is also provided as described under the format used to help decision makers, EPA Punjab in the present case, before issuing the desired Environmental Approval.

1.3 IDENTIFICATION OF THE PROJECT AND THE PROPONENT

a. Contact Person

Program Management Unit (PMU), Punjab Intermediate Cities Improvement Investment Program (PICIIP), Local Government and Community Development Department Government of Punjab are the Executing Agency (EA) of project. Mr. **Hamza Salik**, **Program Director** will be the contact person for the proposed project "**Augmentation of Water Supply and Formation of DMAs in**

Khayaban-e-Sir Syed, Rawalpindi". The detail of the proponent is given hereunder.

Name:	**Mr. Hamza Salik**
Address:	Plot 41, Block B1, Gulberg III, MM Alam Road, Lahore, Pakistan.
Post:	Program Director PMU, PICIIP Local Government and Community Development Department Government of Punjab Augmentation of Water Supply System in KSS
Contact Details:	**Cell:** 042-99210013-4 / 042-99268484 **Email ID:** pd@piciip.gop.pk

b. Consultant

Engineering Design and Construction Management (EDCM)

1.4 NATURE AND SIZE OF THE PROJECT

Proposed project is about Augmentation of **Water Supply System** in KSS. Currently, there are two main sources of water for residents of KSS. One is from the Khanpur dam and the other is from the existing water supply tube wells installed by RWASA. The Khanpur Dam supplies water to Rawalpindi and Islamabad for domestic consumption and irrigation water to the agricultural lands and industrial areas surrounding the twin cities.

Khanpur Dam has a design capacity of 231,851 m³/d (51 MGD). Due to a lack of water in Khanpur reservoir, the actual supply of water from this dam is only 27,277 m³/d (6 MGD) to Rawalpindi city. A new 710 mm dia (OD) HDPE Bulk Supply Line will be provided to enhance the water supply for Khayaban-e-Sir Syed (KSS) which further bifurcate into smaller diameters Sub-Mains as per the demand of certain waterworks. This line will be connected with Existing Conductance Main of 1000mm diameter coming from Tomar Reservoir at Service Road North I-10 and the new Bulk Supply Line will be laid in the green strip parallel with Service Road West I-10. This new bulk supply line will be connecting the existing GSTs/OHRs of UC-10/DMA-1 & UC-11/DMA-2 in Khayaban-e-Sir Syed area

RWASA has also installed tube wells of varying capacities in KSS. These tube wells are directly pumping to the distribution network or through the Ground Storage Tanks (GSTs). These tube wells are discharging a total of 7,200 m^3/d water

A total of 37 tube wells are installed and out of these, only 31 are functional and 06 are not functional. All the tube wells are of submersible type. Due to the limited capacity of the tube wells, each tube well has a very limited-service area spread over 3-to 6 streets mostly. The distribution from the tube wells is mostly done streetwise. On average, each tube well is run for 12 -14 hours per day to meet the water requirements.

Water storage includes the ground storage tanks (GSTs) and the overhead reservoirs (OHRs). In KSS, currently there are 3 GSTs each of 50,000 gallons capacity and 5 OHRs out of which 4 OHRs have a capacity of 50,000 gallons and one has a storage capacity of 25,000 gallons. All 5 OHRs are all in good working condition, but one of the GSTs, which is located in Shah Najaf Park UC-12, is currently not operational due to the unavailability of transformer.

In addition, one GST with a storage capacity of 50,000 gallons is under construction in Jinnah Park, Sector-3. Also, one GST and an OHR, each of 50,000-gallon capacity, are being tendered by Rawalpindi WASA and are to be constructed in Allama Iqbal Park in UC-10 **Table 1.1** gives the detail of storage structures of KSS.

Table 1. 1: Water Storage Capacity of KSS

Sr. No.	UC	Location	Description	Capacity (Cubic Meters)	Capacity (Imperial Gallons)
1	UC-10	Sector-2 Ground	Existing GST	227.3	50,000
2			Existing OHR	227.3	50,000
3		Allama Iqbal Park	GST (Under Construction)	227.3	50,000
4			OHR (Under Construction)	227.3	50,000
5	UC-11	Mohammadi Chowk	Existing GST	227.3	50,000
6			Existing OHR	227.3	50,000
7		Mohra Sharif Park	Existing OHR	227.3	50,000
8		Jinnah Park, Sector 3	GST (Tendered)	227.3	50,000
9	UC-12	Shah Najaf Park	Existing GST	227.3	50,000
10			Existing OHR	227.3	50,000
11		Ladies Park	Existing OHR	113.7	25,000
Total Storage Capacity				2386.7	525,000

Figure 1.3 shows the existing water resources in KSS. Most of the existing water supply networks in Rawalpindi WASA jurisdiction are not the outcome of an integrated design process or a preconceived master plan like all the Cities in Pakistan. They have evolved as a consequence of years of history, giving an anarchic response to continually rising new and additional demands for potable water. As a result, their layouts lack a clear structure from a topological point of view. Low pressure in the distribution system encourages consumers to install booster pumps, increasing their energy consumption and unequal water distribution.

With a total length of 39.19 km, the distribution network in KSS ranges in size from 3 inches (75mm) to 8 inches (200mm). The pipe materials are AC, PVC, HDPE, and G. I. The pipes have been in place for 15 to 33 years.

Due to a lack of Operation and Maintenance funding, WSS systems have been deteriorated. The infrastructure for supplying water is outdated specially AC and G.I. pipes, with leaking pipes and inadequate pressure for consumers.

Corrosion over time has decreased the carrying capacity of MS pipelines. Due to the poor quality of the materials used, shoddy workmanship, corrosion, and aging of the installations, a lot of water is wasted through the distribution system's leaky pipes, joints, valves, and fittings causes the pressure to drop, the supply to decrease, and the quality of the water to worsen. Detail of existing water supply system in KSS is shown in **Figure 1.4.**

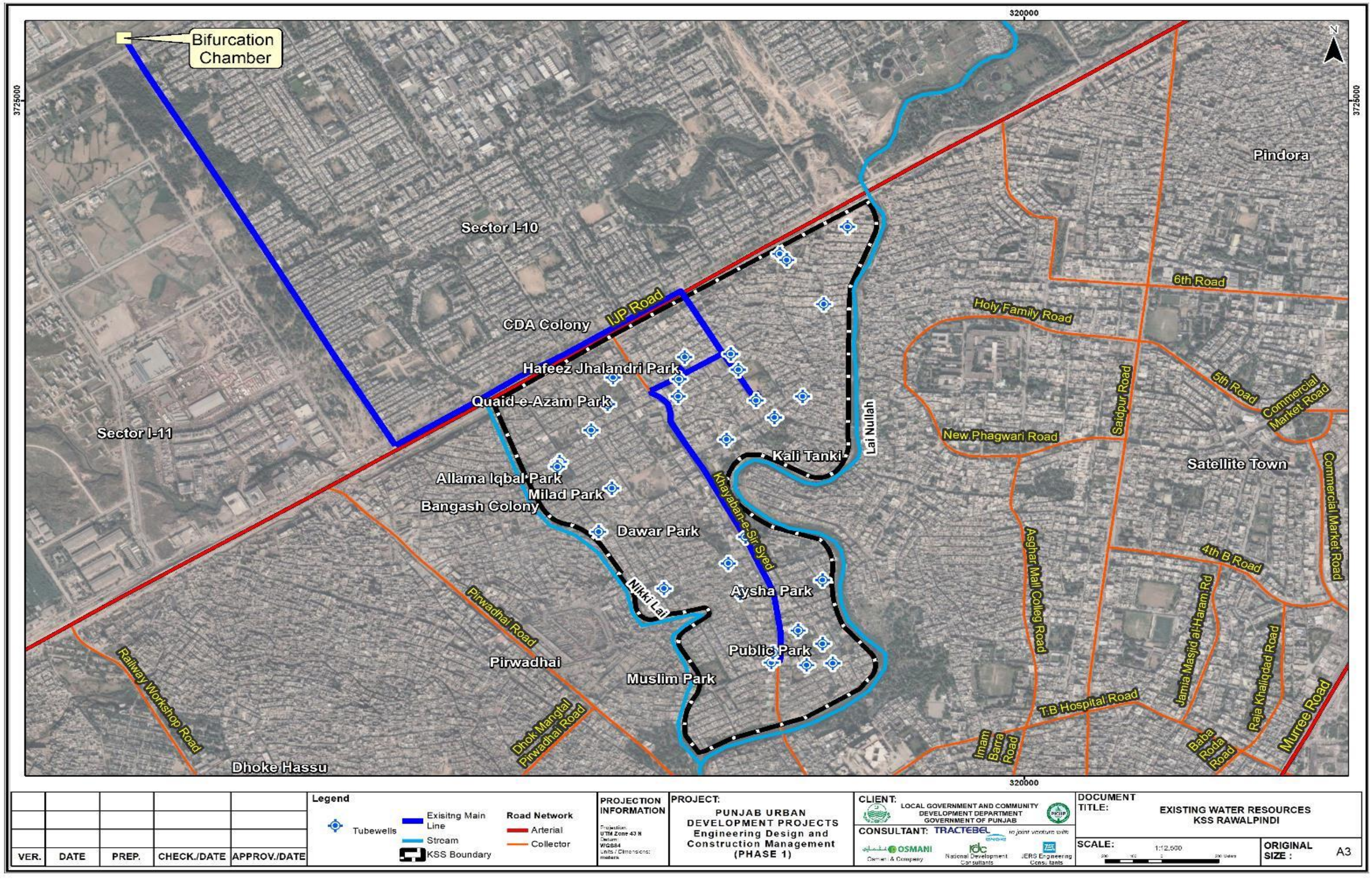


Figure 1. 3: Existing Water Resources of KSS

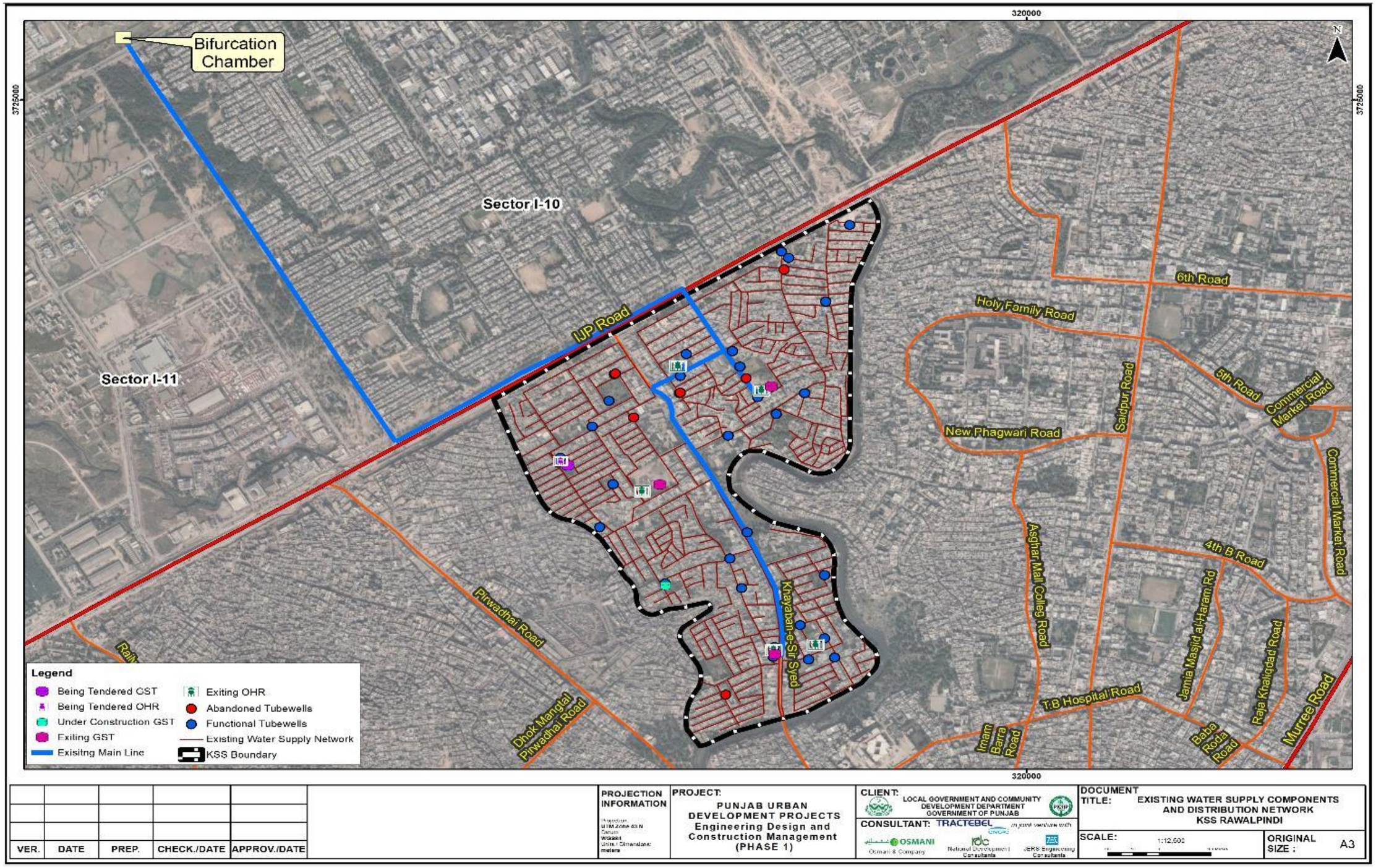


Figure 1. 4: Existing Water Supply System in KSS

The population of KSS from 2017 census was 64,727 persons and estimated current population is 72,303 persons for year 2022. The future population for 2050 is projected as 114,727 persons. Present average water demand at 182 lpcd i.e., 40 gpcd for 2022 is 12,629 m^3/d (2.89 MGD) while future average water demand is calculated as 25,146 m^3/d (4.59 MGD). Details of population and water demand are given in **Table 1.2.**

Table 1. 2: Detail of water demand in KSS

Year	Population	Unit Demand (LPCD)	Av. Water Demand (m^3/day)	Av. Water Demand (MGD)	Max Water Demand (m^3/day)	Max Water Demand (MGD)
2022	72303	182	13159	2.89	19739	4.34
2025	76849		13987	3.07	20980	4.61
2030	84424		15365	3.38	23048	5.07
2040	99575		18123	3.98	27184	5.97
2050	114727		20880	4.59	31320	6.88

It is important to mention here that Ground Water (GW) of Rawalpindi is depleting continuously due to over pumping/extraction of GW. Therefore, boring of new tube wells and repairing of abounded tube wells to meet the existing and increasing future demand of water cannot be considered and augmentation of surface water source to meet current and future demand of water is under consideration to make sustainable use of water resources.

The water deficit is calculated for the year 2022 and project design life i.e., year 2050 keeping in view the water available from the tube wells as well as from the Khanpur dam source. The increase in population is increasing the demand of water and this supply and demand gap is increasing continuously. The water deficit is calculated for the year 2022, 2025, 2030, 2040 and 2050. **Table 1.3** shows the water deficit for KSS.

The intention of RWASA is to reduce the burden on already depleted ground water resource by improving source of surface water supply for KSS.

From the above table, it is clear that the gap between production and supply is ever increasing because limited supply is available from the surface water source (Khanpur Dam), whereas groundwater source (tube wells) is also continuously declining due to over abstraction. To meet this water shortfall, there are two options, one is to install

new tube wells in the project area and the other is to fetch some additional water from the external surface water source.

Table 1. 3: Detail of water deficit for KSS

Year	Av. Water Demand (m^3/day)	Av. Water Demand (MGD)	Production from Tube Wells (m^3/day)	Supply from Khanpur Source (m^3/day)	Water Deficit (m^3/day)	Water Deficit (MGD)
2022	13159	2.89	6546	4546	2067	0.45
2025	13987	3.07			2895	0.63
2030	15365	3.38			4273	0.94
2040	18123	3.98			7031	1.54
2050	20880	4.59			9788	2.15

Since the groundwater is depleting continuously, therefore, boring of new tube wells to meet the additional water requirements cannot be considered. However, augmentation of the surface water source to meet future water requirements can be considered as sustainable option of water supply.

From the above table, it is clear that in the immediate phase, an additional 2067m^3/d (0.45 MGD) would be required that will be further increased to a total of 9788 m^3/d (2.15 MGD) in the year 2050. Therefore, it would be imperative to dedicate the supply of surface water sources to the project area.

Most of the current water supply networks under Rawalpindi WASA jurisdiction are not the result of an integrated design process or a preconceived master plan, like all the Cities in Pakistan. They have developed as a result of years of history, providing anarchic responses to continuously increasing new and additional demands for potable water. As a result, from a topological standpoint, their layouts are unclearly structured.

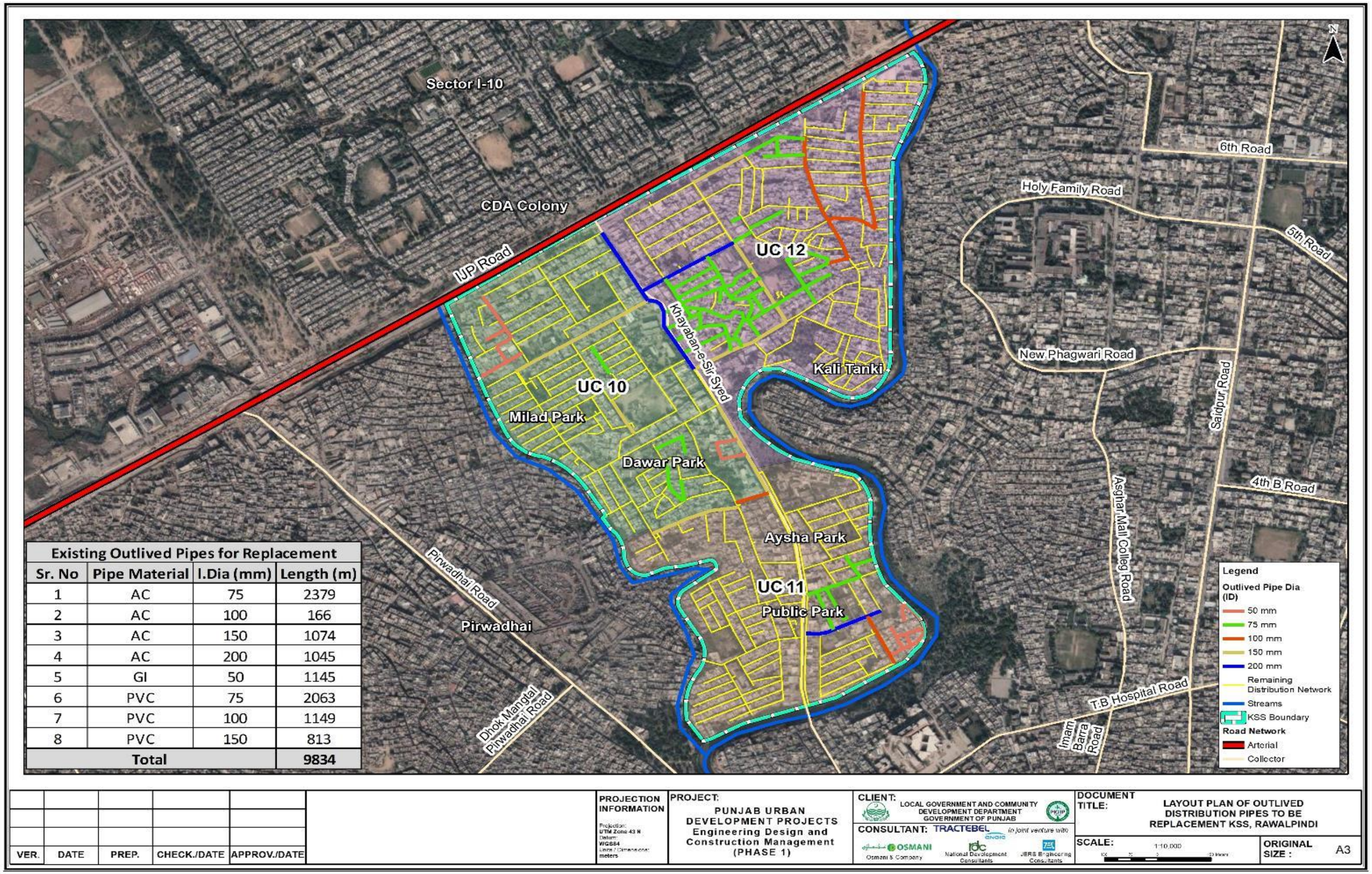
Old leaking pipes causes an insufficient pressure at the consumer's end. Due to a lack of funding for operation and maintenance, WSS systems have deteriorated.

Corrosion over time, especially in unlined MS pipes cause pipes to disintegrate. Due to poor construction, faulty materials, corrosion, and aging installations, a significant amount of water is wasted through the distribution systems' leaky pipes, joints, valves, and fittings causes a decrease in supply, a drop in pressure, and a decline in the quality of the water.

It is suggested that the existing AC/GI water distribution pipelines to be replaced with HDPE pipes with a PN-8 pressure rating. Moreover, some of the pipes which are of

smaller diameters are also need to be replaced with pipes of higher diameters so that desired quantity of water can be supplied with desired pressures. Below in is a layout plan that highlights the pipes that need to be replaced. **Figure 1.5** shows the detail of outlived distribution pipelines to be replaced under proposed project.

The project also involves installation of Water Meters to measure the use of household use of water for billing. This will bring reduction in water use by reducing wastages.



Existing Outlived Pipes for Replacement			
Sr. No	Pipe Material	I.Dia (mm)	Length (m)
1	AC	75	2379
2	AC	100	166
3	AC	150	1074
4	AC	200	1045
5	GI	50	1145
6	PVC	75	2063
7	PVC	100	1149
8	PVC	150	813
Total			9834

VER.	DATE	PREP.	CHECK./DATE	APPROV./DATE

PROJECTION INFORMATION
Projection: UTM Zone 43 N
Datum: WGS84
Units / Dimensions: meters

PROJECT: PUNJAB URBAN DEVELOPMENT PROJECTS Engineering Design and Construction Management (PHASE 1)

CLIENT: LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT DEPARTMENT GOVERNMENT OF PUNJAB

CONSULTANT: TRACTEBEL ENGIE in joint venture with OSMANI Osmani & Company; National Development Consultants; JERS Engineering Consultants

DOCUMENT TITLE: LAYOUT PLAN OF OUTLIVED DISTRIBUTION PIPES TO BE REPLACEMENT KSS, RAWALPINDI

SCALE: 1:10,000

ORIGINAL SIZE : A3

Figure 1. 5: Detail of outlived distribution pipelines to be replaced

Execution of the proposed project would be beneficial for the citizens of Khayaban-e-Sir Syed, Rawalpindi. Following Benefits of the project are anticipated:

- Enhanced water availability and consistency due to dependence on Surface Source.
- Improved water quality due to replacement of old leaking distribution system
- Decreased electricity consumption due to reduction in dependence on Tube Wells
- Improved billing on actual consumption basis due to metering
- Water Conservation due to domestic and commercial metering
- Improved pressure in the system
- Enhanced Management by the responsible agency

1.5 LOCATION OF THE PROJECT

Khayaban-e-Sir Syed (KSS) is located in the WEST-I Zone of Rawalpindi with a 1.48 sq. km area. KSS comprises of three Union Councils (UCs) in this area named UC-10 (Khayaban-e-Sir Syed (N)), UC-11 (Khayaban-e-Sir Syed (S)), and UC-12 (Dhok Najjo). The study area is bounded by three sides, from the North, the IJP road is passing, while on the East and West side, Nallah Lai and Nikki Nullah split the project boundary from the rest of the area. Due to the unique area boundary, KSS is considered for the formulation of District Metered Area (DMA) as a pilot project which will lay a foundation in the future for the implementation of the same for the rest of the area. The project location plan is shown in **Figure 1.6**.

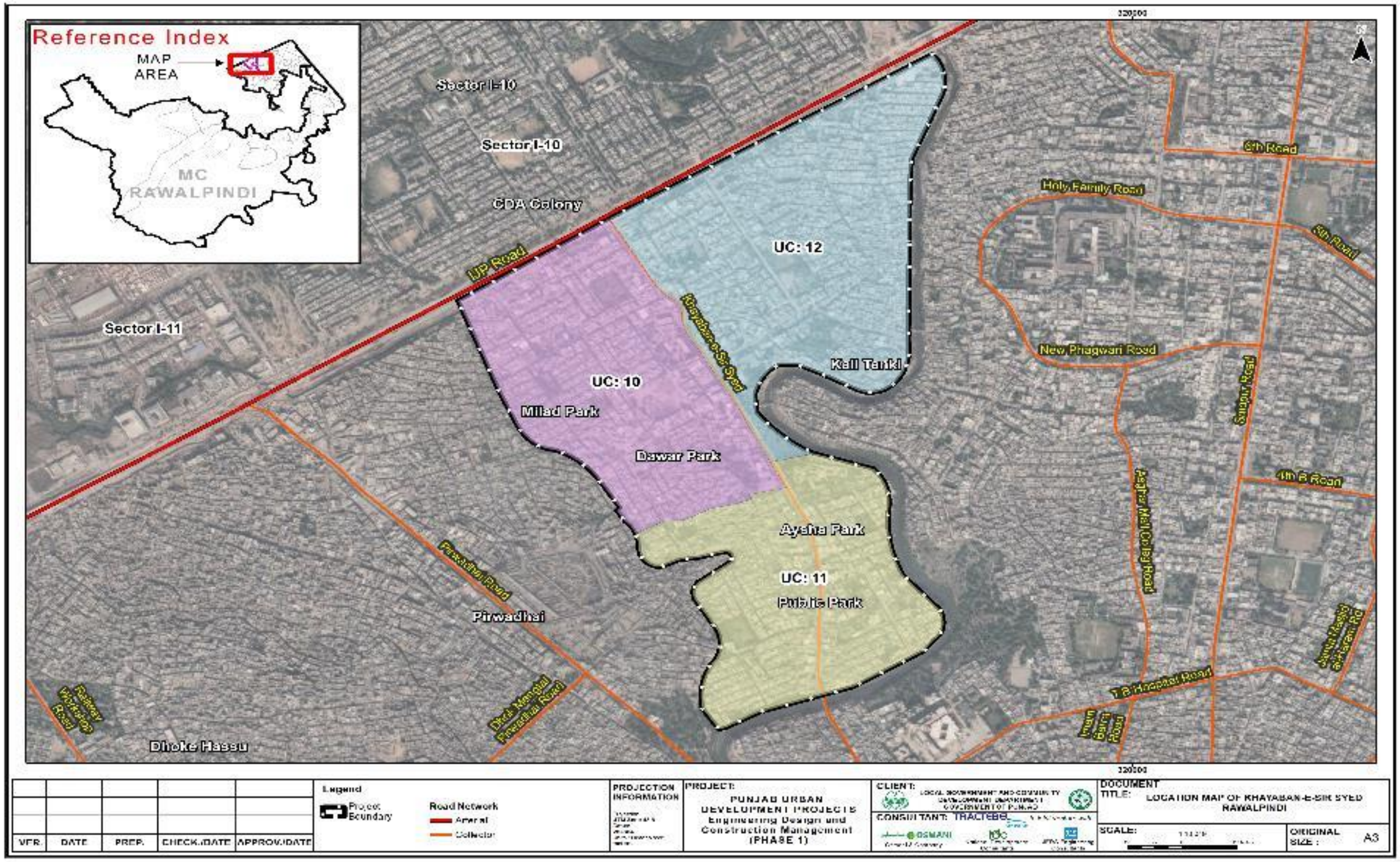


Figure 1. 6: Location of the Project

1.6 SCOPE OF STUDY

The scope of EIA will include environmental assessment of project activities including design, construction and operation of New Conductance Main, installation of DMAs, replacement of distribution lines and installation of household water meters. Following are the objectives of the EIA;

- 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 project of Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Creation of DMAs during pre-construction/design, construction, operation phases, on the physical, biological and socioeconomic environment of the project area;
- To propose mitigation measures that would help execution agency (RWASA) 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 would assist execution agency (RWASA) in the effective implementation of the recommendations of the EIA.

This report has been prepared based on detailed engineering designs, pre-feasibility of the project and estimates of water availability, supply and future demand in Rawalpindi under Punjab Urban Development Projects, Loan No. 6029, Engineering Design and Construction Management (PHASE 1) project.

The key steps followed while conducting EIA are briefly described below.

1.6.1 Understanding of the Proposed Operation

This involves collecting information from the ADB, PMU PICICP, CIU and RWASA, design team of Osmani & Company Limited (OCL) and technical team of Engineering Design and Construction Management (EDCM) on the proposed project activities and understanding the activities to identify potential impacts of implementing these designs.

1.6.2 Review of Legislation and Guidelines

National legislation, international agreements, environmental guidelines both of Punjab Environment Protection Authority (EPA Punjab), and ADB, and best industry practices has been reviewed to set environmental standards that RWASA, being project implementation agency will adhere during implementation of the project.

1.6.3 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;
- Biological environment – habitat types, flora and fauna (particularly rare or endangered species), critical habitats, vegetation and communities within the area;
- 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,
- Socio-economic environment – settlements, socio-economic conditions, infrastructure and land use.

1.6.4 Field Data Collection (Baseline Survey)

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 environmental sensitive receptors and stakeholders within the project area were identified.

Baseline surveys were conducted to by the multidisciplinary team to identify and establish physical and biological conditions and ecosystems in the project area 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.

Primary data collection was carried out for ambient noise levels, ambient air quality and ground water quality at the key receptor locations in the project area and particularly in close proximity to the proposed sites for lying of new Conductance Main, replacement of AC / GI Distribution pipes, installation sites of DMAs.

Review of available secondary information on the physical, biological and ecological aspects, physical cultural resources and infrastructure utilities in the project area has been conducted.

1.6.5 Public Consultation

During the detailed field survey dated December 2022; 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 this EIA, 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.

1.6.6 Impact Identification and Assessment

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.

1.6.7 Recommendations for Mitigation Measures

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

1.6.8 Development of Environmental Management Plan (EMP)

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.

1.7 PERSONS PERFORMING EIA STUDY

EIA study of the project has been conducted by PMU and EDCM team, according to the Review of IEE/EIA Regulations 2000, Pakistan Environmental Protection Agency (Pak EPA), Punjab Environmental Protection Act, 1997 [Amendment, 2012], and other relevant Regulations and completed this EIA Report. List of names with the roles of team members carrying out the EIA study is given in **Table 1.4.**

Table 1. 4: EIA Team

Members	Status in Project
PMU Team	
Mr. Waqas Afzal	Deputy Director (Social & Environmental Safeguards, Review of the report
Syed Osama Faheem Rizvi	Assistant Director M&E, PMU
Ms. Shahnaz Kousar Khan	Assistant Director (Monitoring & Evaluation), PRF
EDCM Team	
Mr. Kevin Holroyd	Team Leader –EDCM
Mr. Farooq Khatak	Deputy Team Leader –EDCM
Asad Yaqoob	GIS Mapping Expert
Mr. Muhammad Mujahid	Project In charge -Environment Component
Dr. Nadeem	Ecological Expert
Ms. Rabia Rafiq	Environmentalist (IEE / EIA specialist)
Mr. Babar Ali	Environmentalist (IEE / EIA specialist)
Mr. Sami Ullah	Social Expert (Env. Team)
Ms. Shagufta Tahir	Female Enumerator
Mis. Komal Aroosh	Jr. Social Expert (Female Enumerator)

1.8 ROLES AND RESPONSIBILITIES

Role and responsibilities have been proposed in the EIA report. Proposed mitigation measures, as defined in the EMP will be primarily implemented by the management of the project with responsibilities assigned to various departments. Project Proponent will strictly adhere to implementation of all mitigation measures contained in this report in order to minimize any negative impact on any component of environment during and after execution of project. Institutional arrangements have been suggested in Chapter-7 of this document, so that proposed mechanism of environmental protection shall work in time.

1.9 ROLE OF ENVIRONMENTAL PROTECTION AGENCY, PUNJAB

The main responsibility of Environmental Protection Agency, Punjab will be to

monitor the mitigation measures, which will be taken up or implemented by **proponent**. EPA is endorsed to inspect compliance of sections 13, 14, 17, & 18 of IEE/ EIA Regulations, 2000, which enunciate the conditions for approval, confirmation of compliance, entry, inspection and monitoring of proposed project. Hence, EPA Punjab is the sole entity which is responsible to issue the necessary approval by exercising powers under section 12 of Punjab Environmental Protection Act 1997 [Amendment, 2012] after proper review of this EIA document.

1.10 ORGANIZATION OF EIA REPORT

The EIA report is divided into following chapter:

Executive Summary

Chapter 1: Introduction - "Introduction" describes introduction, location of project, objective and purpose of the EIA report

Chapter 2: Legal Framework - "Environment Legislative Requirements and Framework" elucidates the current legal framework including national and funding agency's guidelines which is applicable to the proposed project in the context of environment and sustainable development;

Chapter 3: Project Description – "Project Description" furnishes an overall description of the project, including its background, features and key components, timeframe and cost, Alternatives;

Chapter 4: Description of Environment - comprises a detailed narrative of the existing (baseline) conditions of the project area, with respect to its physical, biological and socio-economic environment;

Chapter 5: Stakeholder Consultation - provides summary of consultative sessions with the local community as well as with other stakeholders including local government officials for their opinions and suggestions on the project;

Chapter 6: Impact Identification & Mitigation Measures - elaborates the likely impacts of the project on the physical, biological and socio-economic environment during the construction and operation stages and lays down the proposed measures to mitigate the adverse impacts of the project;

Chapter 7: Environmental Management Plan - provides the mechanism to be adopted for the implementation of measures and monitoring the environment during all stages

Chapter 8: Findings and Recommendations - gives the conclusion of the impact assessment study and recommendations for the construction and operational stages Annexure

CHAPTER-2

POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

2.1 GENERAL

This chapter provides an overview of the policy framework and legislation that applies to control the environmental consequences as a result of implementation and operation of project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Creation of DMAs". The project needs to comply with all the applicable environmental policies, laws, guidelines, acts and legislations of Government of Pakistan and the provincial government as well as International Environmental Guidelines.

Guidelines for Environmental Assessment, Pakistan EPA: 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 project are listed below:

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

2.2 EXISTING REGULATIONS AND LEGAL FRAMEWORK

According to environmental laws of the country development projects have to undergo the process of Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) in order to predict and mitigate the impacts of the development at an early stage. Based on nature, size, cost and associated impacts, the proposed project has been categorized for EIA Study according to the Regulation “4” of Statutory Notification issued on June 13, 2000 (S.R.O.339 (1) /2001). The Proposed Project is "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Creation of DMAs" in District Rawalpindi. As per **Schedule-II (Clause-I)** of the IEE / EIA Regulations 2000 made under section 12 of Punjab Environmental Protection Act, 1997 [Amendment, 2012] under which the Environmental Impact Assessment (EIA) is mandatory for getting Environmental Approval. The Director General, EPA Punjab is the authority to issue the requisite Environmental Approval after proper review of the project.

This EIA Study has been carried out in the light of the policy guidelines of the Government of Pakistan, under the procedures and practices formulated by the Provincial Environmental Protection Agency (EPA-Punjab).

2.3 RELEVANT LEGAL / INSTITUTIONAL FRAMEWORK

The applicable laws for the environmental study of the proposed project are briefly given below. The proponent of the proposed project will abide by the applicable laws and regulations.

2.3.1. NATIONAL CONSERVATION STRATEGY, 1992

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.

2.3.2. PAKISTAN LABOUR POLICY, 2010

The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts:

- Legal Framework;
- Advocacy: rights of workers and employers;
- Skill development and employment; and
- Manpower export.

2.3.3. NATIONAL ENVIRONMENTAL POLICY 2005

In March 2005, Government of Pakistan (GoP) launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources. The main objectives of the policy are here under;

- Conservation, restoration and efficient management of the natural resources.

- Integration of the environmental considerations in policy making and planning process.
- Capacity building of government agencies and other stakeholders at all levels for the better environmental management.
- Meeting international obligations effectively in line with the national aspirations.
- Creation of a demand for environment through mass awareness and community mobilization.

2.3.4. NATIONAL FOREST POLICY 2001

This policy covers the Renewable Natural Resources (RNR) of Pakistan i.e. Forests, Watersheds, Rangelands, Wildlife, Biodiversity and their habitats. The policy seeks to launch a process for eliminating the fundamental causes of the depletion of RNR through the active participation of all the concerned agencies and stakeholders, to realize the sustainable development of the resources. It is an umbrella policy providing guidelines to the Federal Government, Provincial Governments and territories for the management of their RNR. In consonance with it, the Provincial and District Governments may devise their own policies in accordance with their circumstances.

The goal of this policy is to foster the sustainable development of RNR of Pakistan, for the maintenance and rehabilitation of its environment and the enhancement of the sustainable livelihoods of its rural masses especially women, children and other deprived groups. The elements of the policy are as follow:

1. Population planning in critical eco-systems.
2. Providing substitutes to firewood in the wooded mountains.
3. Reducing the impact of socio-economic causes.
4. Reducing poverty, poverty of opportunity, and powerlessness.
5. Reducing political interference in the Forestry and Wildlife Departments.
6. Renovating and invigorating the institutions of RNR.
7. Supporting Local Governments in the sustainable development of their RNR.
8. Policies for fragile natural Eco-systems.
9. Riverain forests.
10. Irrigated Plantations.
11. Preservation of relict and unique forests.
12. Wildlife.

13. Rangelands and desert eco-systems.
14. Planting of trees and fodders on farmlands.

2.3.5. PAKISTAN ENVIRONMENTAL PROTECTION AGENCY, (REVIEW OF IEE AND EIA REGULATIONS, 2000)

The GOP has issued Review of Initial Environmental Examination and Environmental Impact Assessment Regulations 2000, to review the Initial Environmental Examination (IEE) / Environmental Impact Assessment (EIA) Reports. These regulations set out:

- Key policy and procedural requirements for filing an EIA / IEE;
- The purpose of environmental assessment;
- The goals of sustainable development;
- The requirement that environmental assessment be integrated with feasibility studies;
- The jurisdiction of the Federal and Provincial EPA's and Planning &Development (P&D) Departments;
- The responsibilities of proponents;
- Duties of responsible authorities;
- Provides schedules of proposals that the project requires either IEE or an EIA;
- The environmental screening process of the projects under schedule I, II and III; and
- The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.

2.3.6. GUIDELINES FOR THE PREPARATION AND REVIEW OF ENVIRONMENTAL REPORTS, 1997

The GOP has also framed guidelines for the preparation and review of IEE/EIA of projects in various developmental sectors. These guidelines describe the format and content of IEE/EIA reports to be submitted to PEPA for obtaining NOC/approval. The guidelines present:

- The environmental assessment report format;
- Assessing impacts;
- Mitigation and impact management and preparing an environmental management plan;

- Reporting;
- Review and decision making;
- Monitoring and auditing; and
- Project Management.

2.3.7. PUNJAB ENVIRONMENTAL QUALITY STANDARDS (PEQS)

The Punjab Environmental Quality Standards (PEQS), 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.
- Powers conferred under clause (c) of sub-section (1) of section 4 of Punjab

Environmental Protection Act, 1997 [Amendment, 2012] has been approved the Punjab Environmental Quality Standards (PEQS), 2016 for municipal and industrial effluents, noise, drinking water, motor vehicle exhaust, air emissions, industrial gaseous emissions and treatment of liquid & disposal of biomedical waste. PEQS promulgated recently in 2016. Specified standards under PEQS are for:

- Drinking Water;
- Ambient Air;
- Noise;
- Industrial Gaseous Emissions;
- Municipal and Liquid Industrial Effluents;
- Motor vehicle exhaust and noise; and
- Treatment of Liquid and Bio-Medical Waste.

2.3.8. NATIONAL CLIMATE CHANGE POLICY, 2012

The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. In view of

Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. The policy cover measures to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity and other vulnerable ecosystems. Notwithstanding the fact that Pakistan's contribution to global Greenhouse Gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted by giving due importance to mitigation efforts in sectors such as energy, forestry, agriculture and livestock. Furthermore, appropriate measures relating to disaster preparedness, capacity building, institutional strengthening; technology transfer; introduction of the climate change issue in higher education curricula; ensuring environmental compliance through Initial Environmental Examinations (IEE) and Environmental Impact Assessments (EIA) in the development process; addressing the issue of deforestation and illegal trade in timber; promoting Clean Development Mechanisms (CDM); and raising Pakistan's stance regarding climate change at various international forums, have also been incorporated as important components of the policy. The policy thus provides a comprehensive framework for the development of Action Plans for national efforts on adaptation and mitigation.

2.3.9. NATIONAL WATER POLICY 2018

This first ever water policy was unanimously approved in April 2018 by Council of Common Interest (CCI). The Policy aims at efficient management and conservation of existing water resources, optimal development of potential water resources, steps to minimize time and cost overruns in completion of water sector projects, equitable water distribution in various areas and canal commands, measures to reverse rapidly declining groundwater levels in low-recharge areas, increased groundwater exploitation in high-recharge areas, effective drainage interventions to maximize crop production, improved flood control and protective measures, steps to ensure acceptable and safe quality of water, minimization of salt build-up and other environmental hazards in irrigated areas, institutional reforms to make the managing organizations more dynamic and responsive. The policy covered all water related issues, including water uses, allocation of priorities, integrated planning for development, use of water resources, environmental integrity of the basin, impact of climate change, trans boundary water sharing, irrigated and rain fed agriculture,

drinking water and sanitation, hydropower and industry, groundwater, water rights & sustainable water infrastructure, water related hazards, quality management, awareness, conservation, legal and capacity building of infrastructure.

2.3.10. NATIONAL DRINKING WATER POLICY, 2009

The National Drinking Water Policy provides a framework for addressing the key issues and challenges facing Pakistan in the provision of safe drinking water to the people. Drinking water is the constitutional responsibility of the provincial governments and the specific provision function has been devolved to specially created agencies in cities and Town and Tehsil Municipal Administrations under the Local Government Ordinance 2001.

2.3.11. PUNJAB WILDLIFE PROTECTION ACT, 1974

The Punjab Wildlife Act (1974) is developed for the regulation of activities relating to protection, conservation and management of wildlife in Punjab.

2.3.12. PUNJAB FOREST ACT (Amended), 2010

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. There is no protected forest situated in and around the Project area.

2.3.13. PUNJAB ENVIRONMENTAL QUALITY STANDARDS (PEQS), 2016

PEQS promulgated recently in 2016. Specified standards under PEQS are for:

- Drinking Water;
- Ambient Air; •Noise;
- Industrial Gaseous Emissions;
- Municipal and Liquid Industrial Effluents;
- Motor vehicle exhaust and noise; and
- Treatment of Liquid and Bio-Medical Waste.

2.3.14. PAKISTAN PENAL CODE, 1860

The Code deals with the offences where public or private property or human lives are affected due to intentional or accidental misconduct of an individual or organization. The Code also addresses control of noise, noxious emissions and disposal of effluents. Sections 272 and 273 of this Act deal with the adulteration of food or drink. Noise pollution has been covered in Section 268, which defines and recognizes noise as a

public nuisance. “A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger or annoyance to the public or to the people in general who dwell or occupy property in the vicinity, or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right.”

2.3.15. THE PUNJAB OCCUPATIONAL SAFETY AND HEALTH ACT, 2019

This Act entails provision of occupational safety and health of the workers at workplace and to protect them against risks arising out of the occupational hazards; to promote safe and healthy working environment catering to the physiological and psychological needs of the employees at workplace.

2.3.16. PUNJAB PLANTATION AND MAINTENANCE OF TREES ACT, 1974

The Punjab Plantation and Maintenance of Trees Act, (1974) regulates tree plantations and enforces measures for their protection. The requirements of this act are applicable in terms of planting new trees and their maintenance by the occupier of the existing land who would have the physical possession.

2.3.17. HAZARDOUS SUBSTANCE RULES, 2003

The rule describes the procedure of handling, transportation and disposal of hazardous substances and hazardous waste. Inter alia, general safety precautions for handling hazardous substances as well as safety precautions for workers, and notification requirements in the event of an accident are described in these rules. Requirements for project waste management plans are also defined. These include a requirement for updating the plan every three years, the need to provide for management of hazardous waste in a manner that will prevent adverse environmental impacts and to ensure that hazardous and non-hazardous waste are not mixed.

2.3.18 PUNJAB PLANTATION AND MAINTENANCE OF TREES ACT, 1974

The Punjab Plantation and Maintenance of Trees Act, (1974) regulates tree plantations and enforces measures for their protection. The requirements of this act are applicable in terms of planting new trees and their maintenance by the occupier of the existing land who would have the physical possession.

2.3.19. EXPLOSIVES ACT, 1884

It provides regulations for handling, transportation and use of explosives. The proposed project will not involve the blasting activity, therefore, this act will not be applicable.

2.3.20. PAKISTAN ANTIQUITIES ACT 1975 & PUNJAB ANTIQUITIES AMENDMENT ACT 2012

The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The Antiquities Act, 1975 (amended in 1990) states the following:

- "Ancient" is any object that is at least 75 years old;
- All accidental discoveries of artefacts must be reported to the Federal Department of Archaeology;
- The Government is the owner of all buried antiquities discovered on any site, whether protected or otherwise;
- All new construction within a distance of 200 feet from protected antiquities is forbidden;
- No changes or repairs can be made to a protected monument, even if it is owned privately, without approval of the responsible authorities; and
- The cultural heritage laws of Pakistan are uniformly applicable to all categories of sites regardless of their state of preservation and classification as monuments of national or world heritage.

2.3.21. THE PROTECTION AGAINST HARASSMENT OF WOMEN AT THE WORKPLACE ACT, 2010

The Protection Against Harassment of Women at the Workplace Act (2010) refers to sexual harassment at the workplace. This Act will be applicable to the project if women are employed for the construction of the proposed Project.

2.3.22. LABOUR LAWS AS PART OF CONSTITUTION OF PAKISTAN 1973

The Constitution of Pakistan contains a range of provisions with regards to labour rights, in particular:

- Article 11 of the Constitution prohibits all forms of slavery, forced labour and child labour;
- Article 17 provides a fundamental right to exercise the freedom of association and the right to form unions;
- Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone; and
- Article 37(e) makes provision for securing just and human conditions of work, ensuring that children and women are not employed in vocations unsuited to their

age or sex, and for maternity benefits for women in employment.

Labour law is controlled at both provincial and national levels with compulsory employment agreements containing the terms set out by the labour laws. The labour laws are a comprehensive set of laws in Pakistan dealing with the following aspects:

- Contract of Employment;
- Termination of Contract;
- Working Time and Rest Time;
- Working hours;
- Paid Leave;
- Maternity Leave and Maternity Protection;
- Other Leave Entitlements;
- Minimum Age and Protection of Young Workers;
- Equality
- Pay Issues;
- Workers' Representation in the Enterprise;
- Trade Union and Employers Association Regulation; and
- Other Laws.

2.3.23. EMPLOYMENT OF CHILDREN ACT, 1991

Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any construction, or any other hazardous employment.

In accordance with this Article, the Employment of Child Act 1991 prohibits child labour (a child is under 14 years old).The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.

2.3.24. PAKISTAN CLIMATE CHANGE ACT, 2017

This Act aims to meet obligations under international conventions relating to climate change and to provide for adoption of comprehensive adaptation and mitigation policies, plans, programmes, projects and other measures required to address the effects of climate change and for matters connected herewith and ancillary thereto.

This Act will accelerate due to the emissions from the construction machinery.

2.3.25. NATIONAL CLEAN AIR ACT, 2000

The Act aims to control vehicular emissions, pollution from industry, and indoor air pollution in rural and urban areas

This Act will trigger if vehicles and machinery used for construction activities emanate air pollutants above the permissible limit.

2.3.26. PUNJAB MUNICIPAL WATER ACT, 2014

The basic aim of the Act is to recognize, regulate and manage present and future municipal water supply and sanitation services and to establish rights of access to basic water supply and basic sanitation, and to ensure conservation of water resources in the Province. This Act is in draft stage

This Act will elicit if there is misappropriation of water supply during construction activities.

2.3.27. FISHERIES ACT, 1897

This Act aims at the protection of fish in water bodies by rules of State Government. This Act will not be applicable because there is no disturbance to fish due to this project.

2.3.28. CUTTING OF TREES (PROHIBITION) ACT, 1975

The Act was enforced in 1975 to place restrictions on cutting of trees in order to restrain unchecked trend of tree felling without replacement plantations

This act will be applicable to the subject project where the cutting of tree will be involved.

2.3.29. NATIONAL DISASTER MANAGEMENT ACT, 2010

National Disaster Management Act, 2010 was passed by Parliament of Pakistan in 2010. The Act applies to whole Pakistan. The Act was passed in backdrop of 2010 Floods in Pakistan and strengthens Disaster Management system

This act is applicable to the proposed project. The proposed project will require special consideration to disasters and risk management strategies as per the Act.

2.3.30. PUNJAB ENVIRONMENTAL PROTECTION (MOTOR VEHICLES) RULES, 2013

Subject to the provisions of this act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants and noise are being emitted in an amount, concentration or level which is in excess of the Punjab Environmental Quality Standards, or where applicable the standards established under clause (g) of subsection (1) of section 6 of the act. This act will be elicited during construction and operational phase due to use of motor vehicles that produces air pollutants and noise.

CHAPTER-3

PROJECT DESCRIPTION

3.1 TYPE AND CATEGORY OF PROJECT

Proposed project is about Augmentation of **Water Supply System** in KSS. The project activities are located in the Rawalpindi City area, including the suburban and the peri-urban areas of the RDA and the Potohar Town. The study area comprises the RWASA jurisdiction, including 3 Union Councils (UCs). The Master Plan (2016-2040), carried out the demand and the projections for the water supply for the three types of the areas, which are:

- Urban areas
- Peri-urban areas
- Rural areas

A map showing the overall Urban Core area of Rawalpindi is given as **Figure 3.1.**

The KSS is getting water supply from two sources: surface sources and groundwater. The map of existing water resources of KSS are shown in **Figure 3.2**. The City of Rawalpindi mainly depends on the rainfalls for both the surface and the groundwater resources (as the perched aquifers deplete rapidly due to the lesser rainfall). According to the Pakistan Meteorological Department (PMD) data, the mean annual rainfall in Rawalpindi is around 1,267.5 mm (1989-2020). The four monsoon months of June to September account for almost 67% of the yearly average rainfall.

The Water and Sanitation Agency (WASA), Rawalpindi, is responsible for providing water supply and sewerage services to the 2 million people living in the 66 Union Councils/Urban Core of Rawalpindi. The WASA has divided its jurisdictional area into six water supply zones, EAST-1, EAST-2, WEST-1, WEST-2, PP-12 and PP-13.

According to the previous master plan of Rawalpindi (1996) and the information provided by the WASA, the per capita water consumption is estimated to be 182 liters (40 gpcd). The domestic water demand is 491407.462 m^3/d (108.00164 MGD), almost 259127.13m^3/d (57 MGD) less than the current water supply.

The groundwater is depleting due to the extensive abstraction and as a result, the number of the abandoned tube wells is increasing. Almost 15 tube wells out of 485 are either abandoned or non-functional due to a decrease in the water table. Around 136 tube wells installed before the year 2000 are now outlived and need to be rehabilitated or replaced.

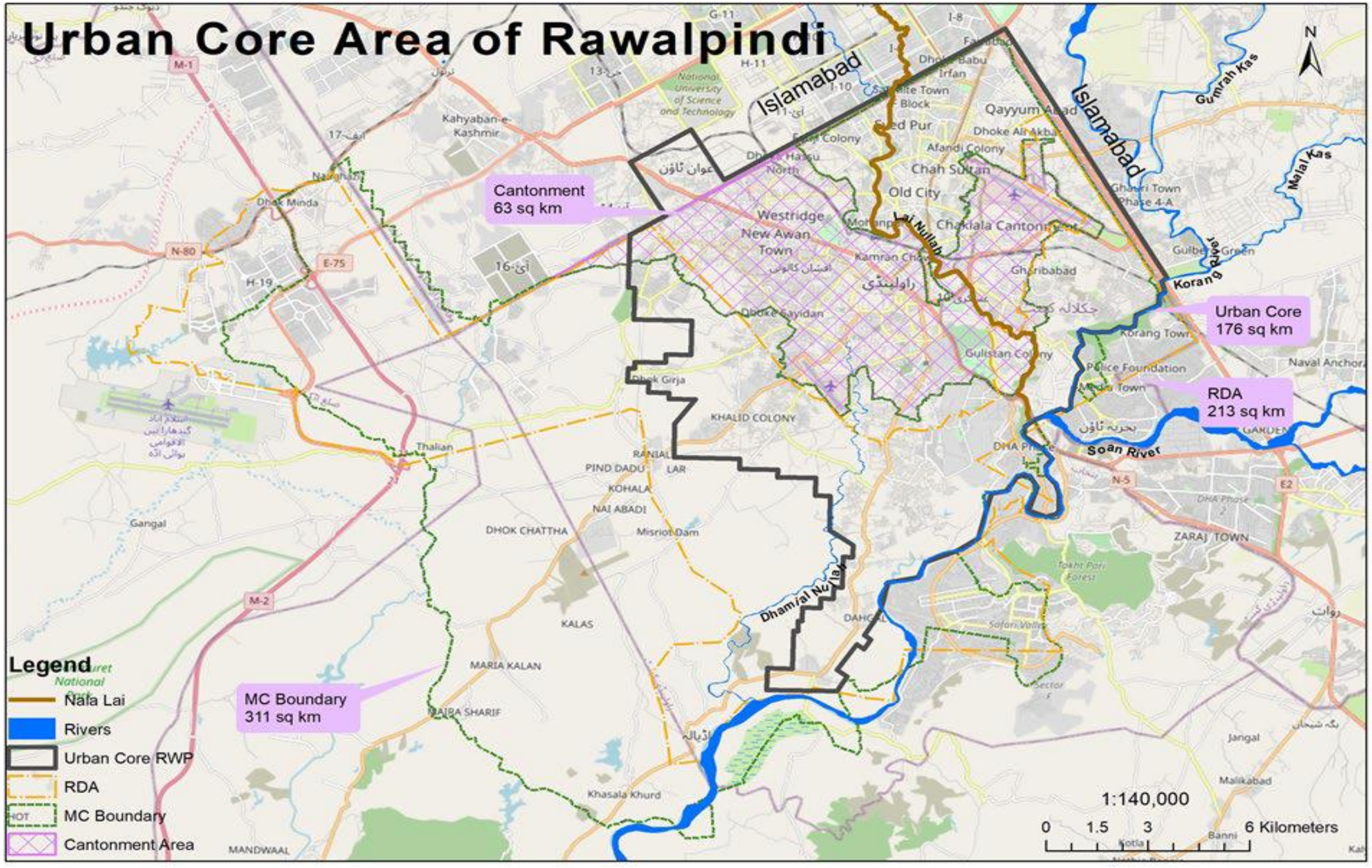


Figure 3. 1: Urban Core Area of Rawalpindi

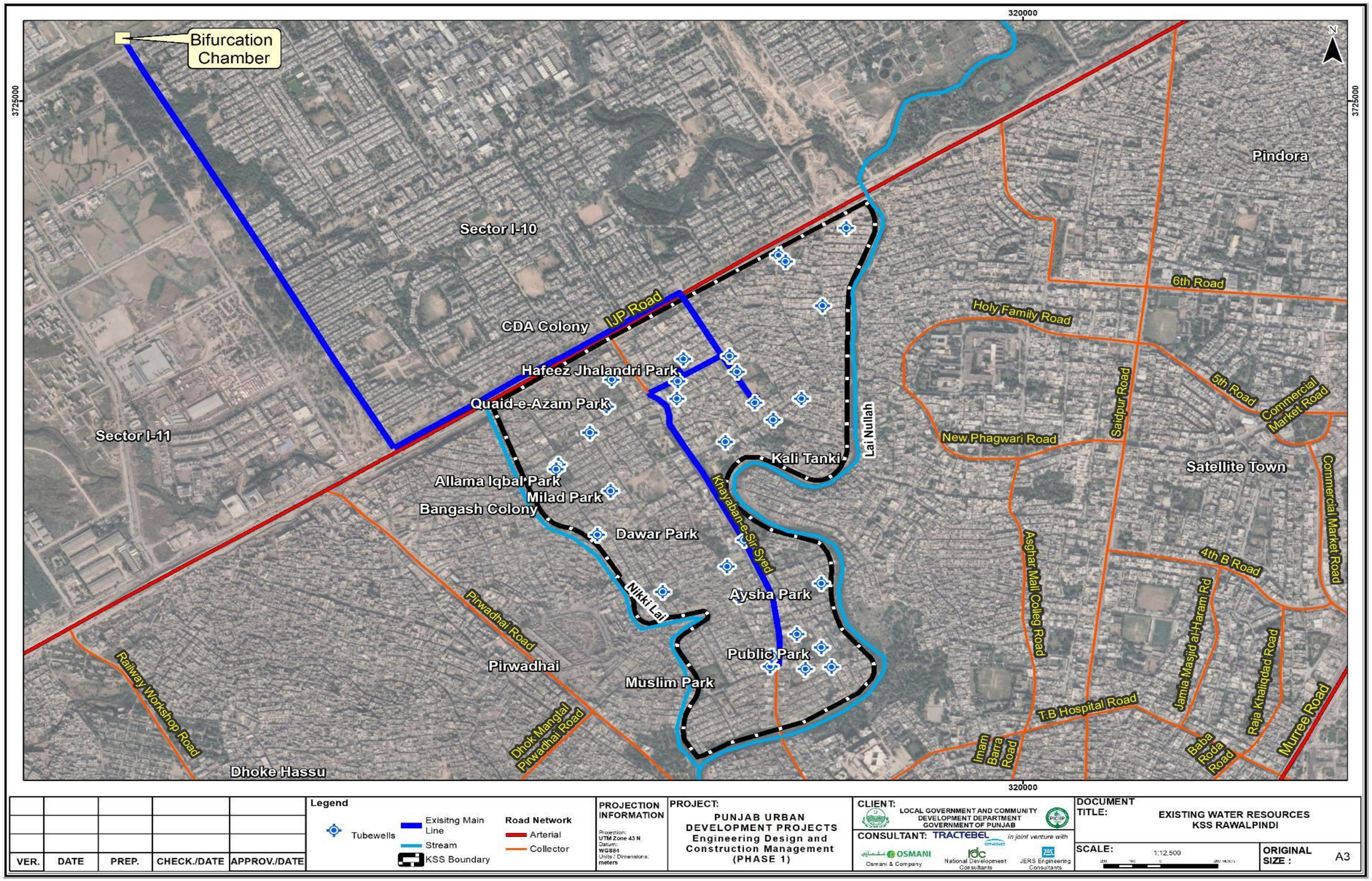


Figure 3. 2: Existing Sources of Water Supply in KSS

As the city is mainly paved, there is more runoff than the percolation of the storm water. Therefore, stopping groundwater abstraction in the urban areas and focusing on the groundwater recharge and the rainfall harvesting strategies are recommended to be adopted.

The WASA's estimate of the current water production from all sources (i.e. groundwater and surface water) is 231,851 m^3/d (51 MGD), which is over-estimated. The total groundwater production from the tube wells is roughly 159,113 m^3/d (35 MGD) with the actual discharge of 127,291 to 136,383m^3/d (28-30 MGD). Therefore, the actual volume of water that is being supplied at source, excluding the Non-Revenue Water (NRW) and other losses range from 204,574 to 213,666 m^3/d (45-47 MGD).

As learnt from the WASA, the NRW constitutes almost 30% of the city's water supply, mainly because of the outlived and the rusty water supply infrastructure. Considering the NRW roughly estimated by the WASA, the total volume of the water available from the ground and the surface water sources at the consumer end ranges from 145,474 - 154,566 m^3/d (32 - 34 MGD). Considering per capita demand of 40 gpcd, the actual water shortage in 2050 is 571,173 m^3/day (126 MGD) for the total area (MC+ Cantonment)

Keeping in view the rapid growth in the city's population and the resulting increased water requirement demands; the immediate identification of the new surface water storage sources, like the Chahan Dam, Daducha Dam, Chirah Dam, Papian Dam, Khanpur Dam and the projects likely to draw water from the Terbela Dam for Rawalpindi.

The RWASA is supplying 231,851 m^3/d (i.e., 51MGD) of water from the surface and the groundwater resources. Almost 85% of its jurisdictional area is being served by a widely distributed water supply system, comprising 24 ground storage tanks (GSTs), 51 over-head reservoirs (OHRs), 485 tube-wells, 198 filtration plants, 21 water bowsers and around 760 km long pipe network. The city has 24 Ground Storage Tanks with a total capacity of 34300.249 m^3 (7.545 million gallons). Individual in addition, there are 51 overhead reservoirs in the city, with a total capacity of 17570.637 m^3 (3.865 million gallons).

Water supply network serves the purpose of supplying water for drinking, washing, sanitation, and firefighting etc. The main purpose of water supply network is to make water accessible to every house, public place, commercial area, amenities etc., and

supply water with adequate pressure and flow. The water supply distribution system is designed to meet the peak demands of an area. A water supply network consists of pressure conduits or pipes of different sizes, valves, service connections, tanks, reservoirs, and pumps, etc. The parameters that are important to consider whilst designing a water supply system are; losses, pipe wall friction, water demand, pipe length, pipe diameter, and gradient. The main source of water for KSS is surface water source from Khanpur dam and tube wells. Every UC has its own water storage reservoirs. Initially water will store in underground tank/ overhead tank and then shall be pumped to the distribution system. The minimum pressure for the water supply distribution network of KSS is 20 psi and the maximum pressure is 70 psi.

Some of the water supply lines are outlived. Due to this, problem like pressure drop, NRW and contaminations are increasing. Majority of the lines which needs replacement are of AC and GI material.

Outlived distribution network of pipe material AC and GI shall be replaced with HDPE pipe. Approximately 4 km length of PVC pipes are also suggested to be replaced with HDPE in order to maintain pressures in the system. The details of distribution network pertaining to replacement and additional pipes for unserved areas are respectively shown in the **Table 3.1** and **Table 3.2.**

Table 3. 1: Distribution Pipes to be Replaced

Sr. No.	Existing Type	Existing Dia (ID) (mm)	Length (m)	New Dia (OD) (mm)	Replacement Material Type	Pressure
1	AC	75	2379	90	HDPE	PN-8
2	AC	100	166	110	HDPE	PN-8
3	AC	150	1074	180	HDPE	PN-8
4	AC	200	1045	225	HDPE	PN-8
5	GI	50	1145	90	HDPE	PN-8
6	PVC	75	2063	90	HDPE	PN-8
7	PVC	100	1149	110	HDPE	PN-8
8	PVC	150	813	180	HDPE	PN-8

Table 3. 2: Distribution Pipes for Unserved Areas

Sr. No.	New Dia (OD) (mm)	Length (m)	Pipe Material	Pressure
1	90	850	HDPE	PN-8

It is suggested that the existing AC/GI water distribution pipelines to be replaced with HDPE pipes with a PN-8 pressure rating. Moreover, some of the pipes which are of smaller diameters are also need to be replaced with pipes of higher diameters so that

desired quantity of water can be supplied with desired pressures. **Figure 3.3** shows the layout plan that highlights the pipes that need to be replaced. In **Figure 3.4**, proposed pipes for replacement is shown.

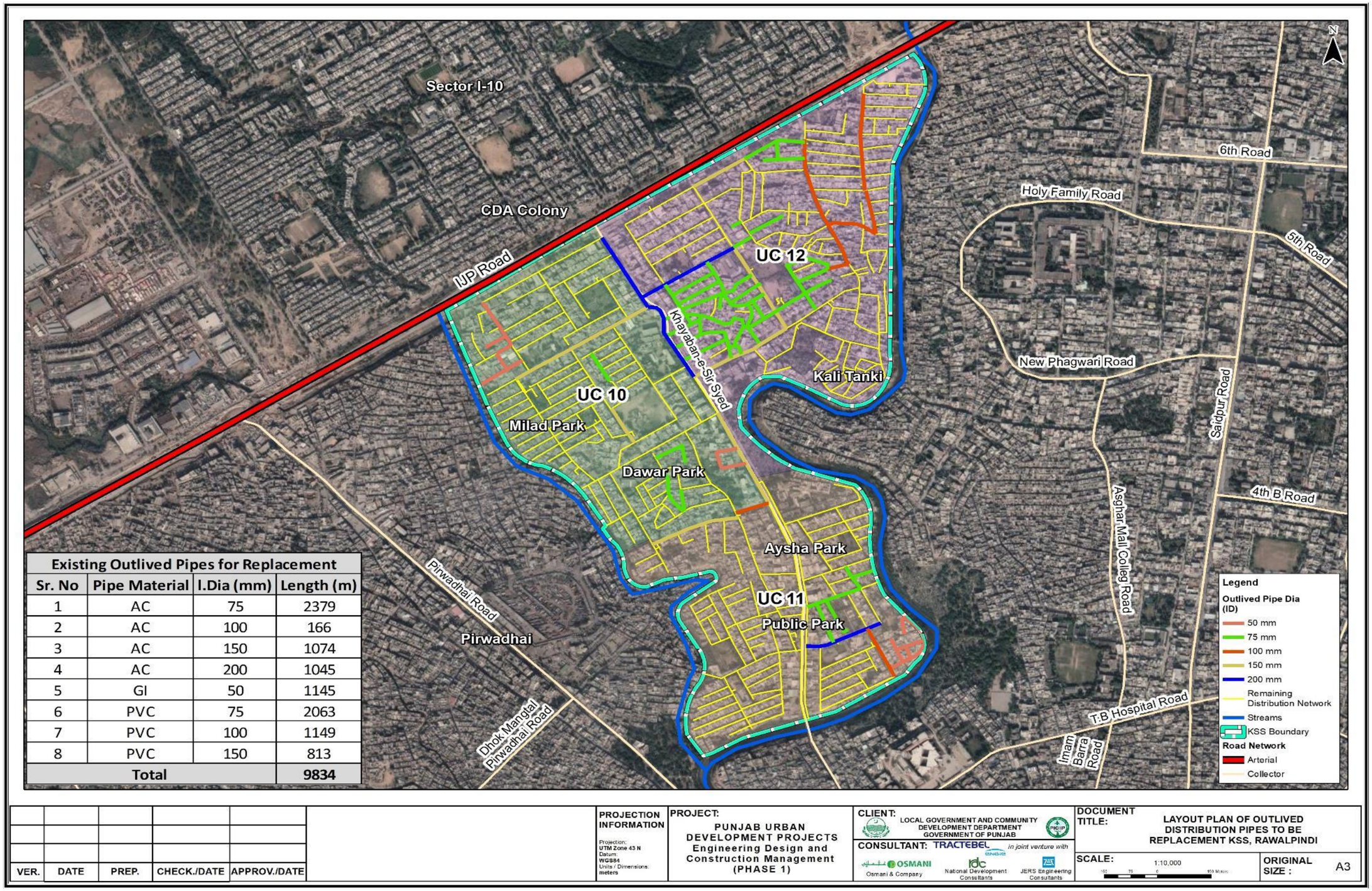
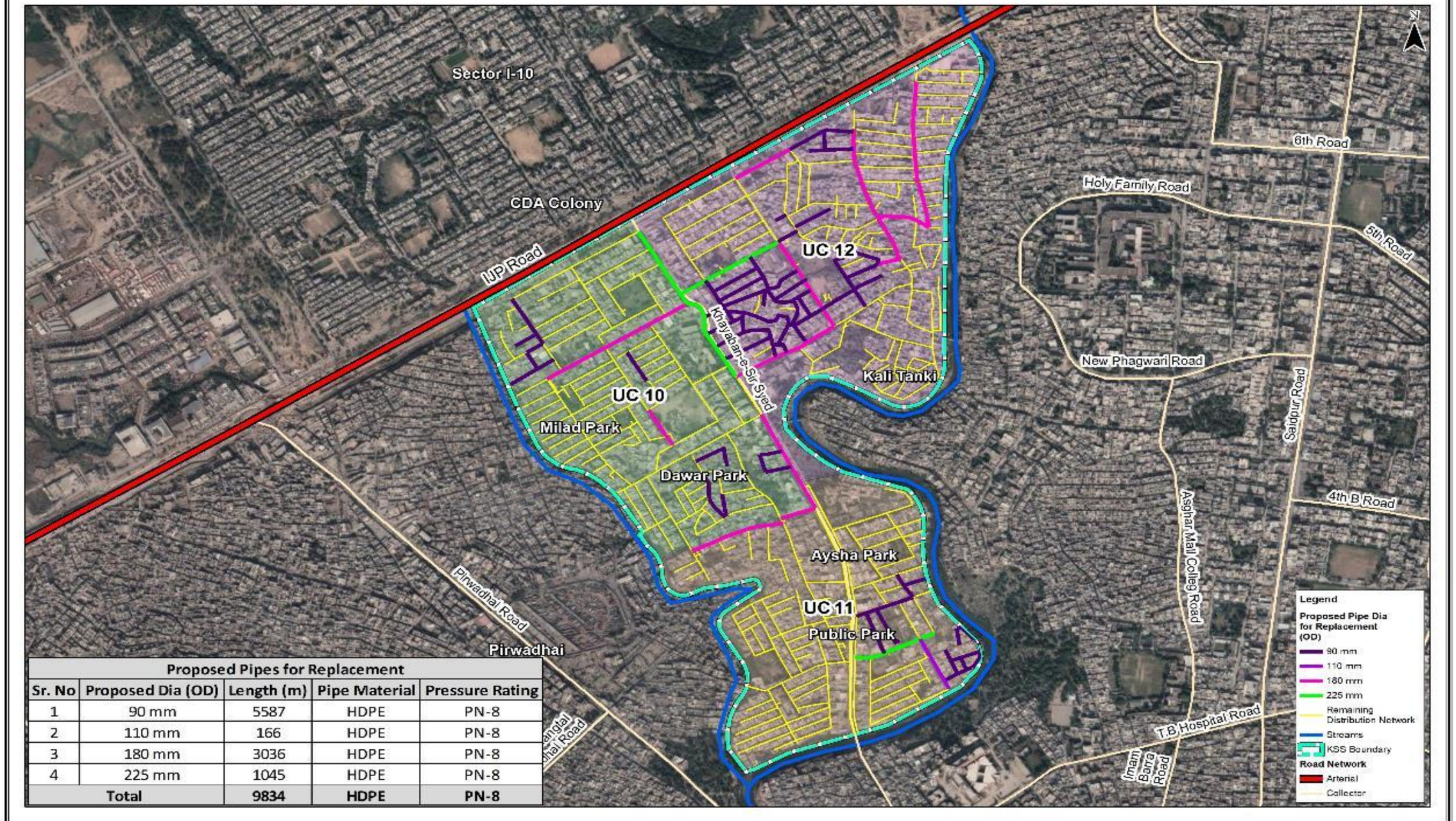


Figure 3. 3: Outlived Distribution Pipes to be Replaced



Proposed Pipes for Replacement				
Sr. No	Proposed Dia (OD)	Length (m)	Pipe Material	Pressure Rating
1	90 mm	5587	HDPE	PN-8
2	110 mm	166	HDPE	PN-8
3	180 mm	3036	HDPE	PN-8
4	225 mm	1045	HDPE	PN-8
Total		9834	HDPE	PN-8

VER.	DATE	PREP.	CHECK./DATE	APPROV./DATE

PROJECTION INFORMATION

PROJECT: PUNJAB URBAN DEVELOPMENT PROJECTS Engineering Design and Construction Management (PHASE 1)

CLIENT: LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT DEPARTMENT GOVERNMENT OF PUNJAB

CONSULTANT: TRACTEBEL in joint venture with OSMANI & Company, National Development Consultants, JERS Engineering Consultants

DOCUMENT TITLE: PROPOSED LAYOUT PLAN OF DISTRIBUTION PIPES FOR REPLACEMENT KSS, RAWALPINDI

SCALE: 1:10,000

ORIGINAL SIZE : A3

Figure 3. 4: Proposed Distribution Pipes for Replacement

In KSS, some of the areas/streets are not getting any supply from existing network. As the total supply includes the share of those unserved areas as well, supply to those areas is considered and new distribution lines are proposed. **Figure 3.5** shows the layout of new distribution lines to be provided in unserved areas of KSS.

Pumps and pumping machinery are used to lift water from a source or to boost water from low point to high areas. Pumps being used are mostly centrifugal and turbine pumps. In tube wells either a vertical turbine pump is used or a submersible pump if the depth of the well is appreciably deep.

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. The **Table 3.3** outlines the approximate number of major machinery and vehicles that are envisaged to be required for the project construction works.

Table 3. 3: Detail of Construction Machinery

	Machinery / Equipment	Quantity required*
	Excavators	2
	Dumpers	2
	Loaders	2
	Power Generators	2
	Tractor Trolley	2
	Compactor / Roller	1
	Crane	1
	Concrete Pump	1
	Vibro Hammer	1
	Watering Tanks (moveable)	1
	Cars/Pickups	4

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

During the construction phase, large quantity of construction materials will be required. Typical material required for lying of New Conductance Main, replacement

of AC/GI Pipelines and for other component of project will be taken from local markets. However, there may be a requirement to import DMAs, domestic meters and pumps. The common source of the material require for civil work are described in **Table 3.4** below.

Table 3. 4: Construction Material and 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	Will be taken from local suppliers
4	Sand	Sand is available in local market.
5	Water	Water will be taken from existing network of water supply.
6	Cement	Ordinary Portland Cement is suitable, which is available at various factories in Pakistan mainly from Kalar Kahar and local market.
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 IESCO.

The proposed project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Formation of District Metered Areas (DMAs)" consist of following sub-components;

- Formation of DMA for KSS
- Water Meting
- Appurtenances
- Design of Bulk Supply Main and Laying of New Conductance Main (Bulk Supply Main)
- Design of Distribution Network and Replacement of Outlived Pipelines
- Installation of Conductance Main / Bulk Water Supply Lines
- Pumping Requirements at Water works and Sangjani Water Treatment Plant (WTP)

The detailed alignment of Existing Conductance Main and New Conductance Main (Bulk Supply Line) along with water works is shown below in **Figure 3.6.**

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. An estimated cost of the proposed project is **PKR 1230 Million.**

As per legal requirement under Section 12 of Punjab Environmental Protection Act, 1997 (Amendment 2012) this project require Environmental Approval from EPA Punjab. As a part of Conductance Main is passing through the federal territory of Islamabad, this project also requires Environmental Approval from Pak EPA under Section 12 of Pakistan Environmental Protection Act, 1997. As per clause F, Schedule-II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000 of the acts ibid, the proposed project falls in category of projects requiring Environmental Impact Assessment (EIA) on the basis of project cost. Therefore, Environmental Impact Assessment (EIA) is prepared for submission to EPA Punjab and to obtain NOC from EPA.

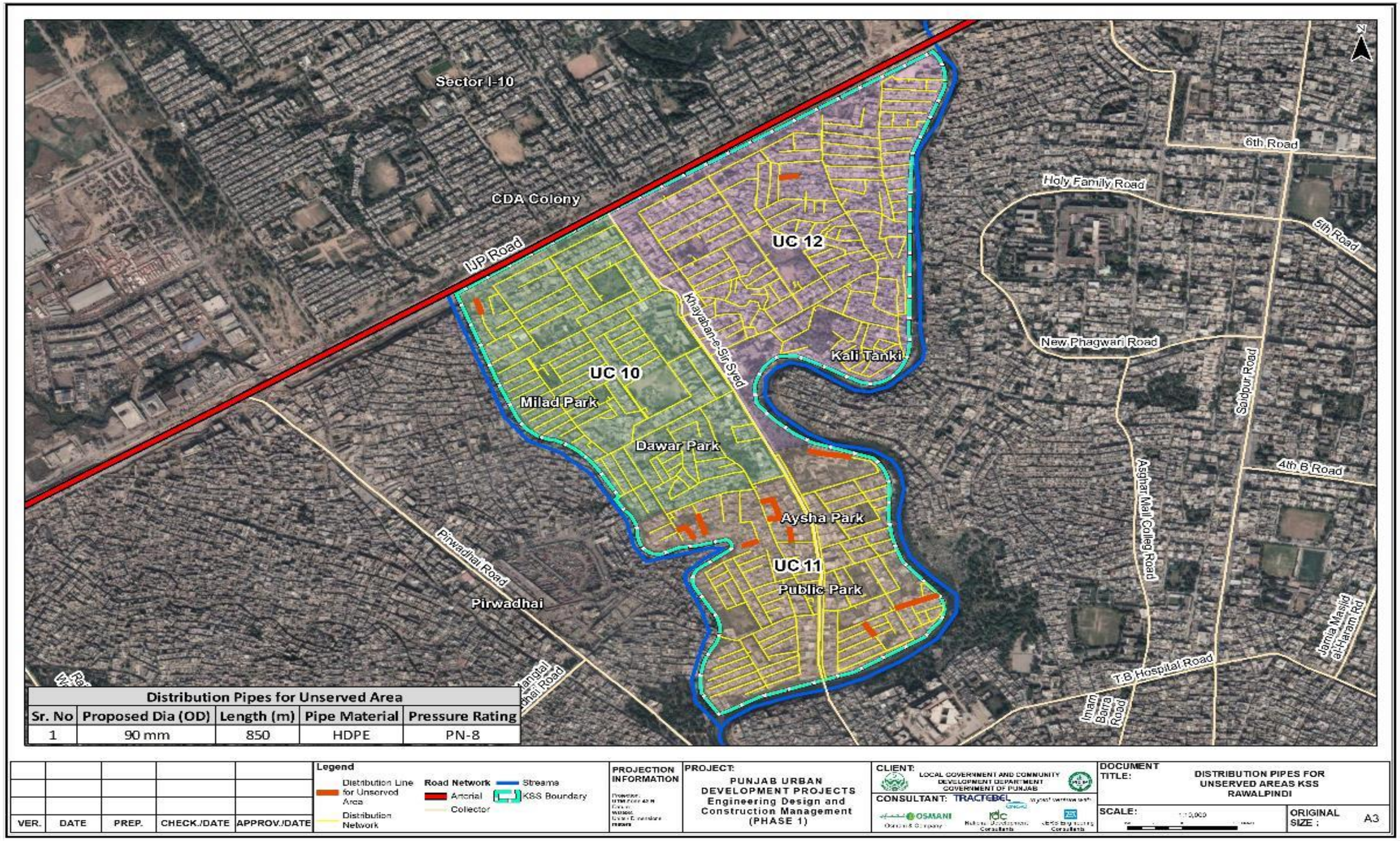
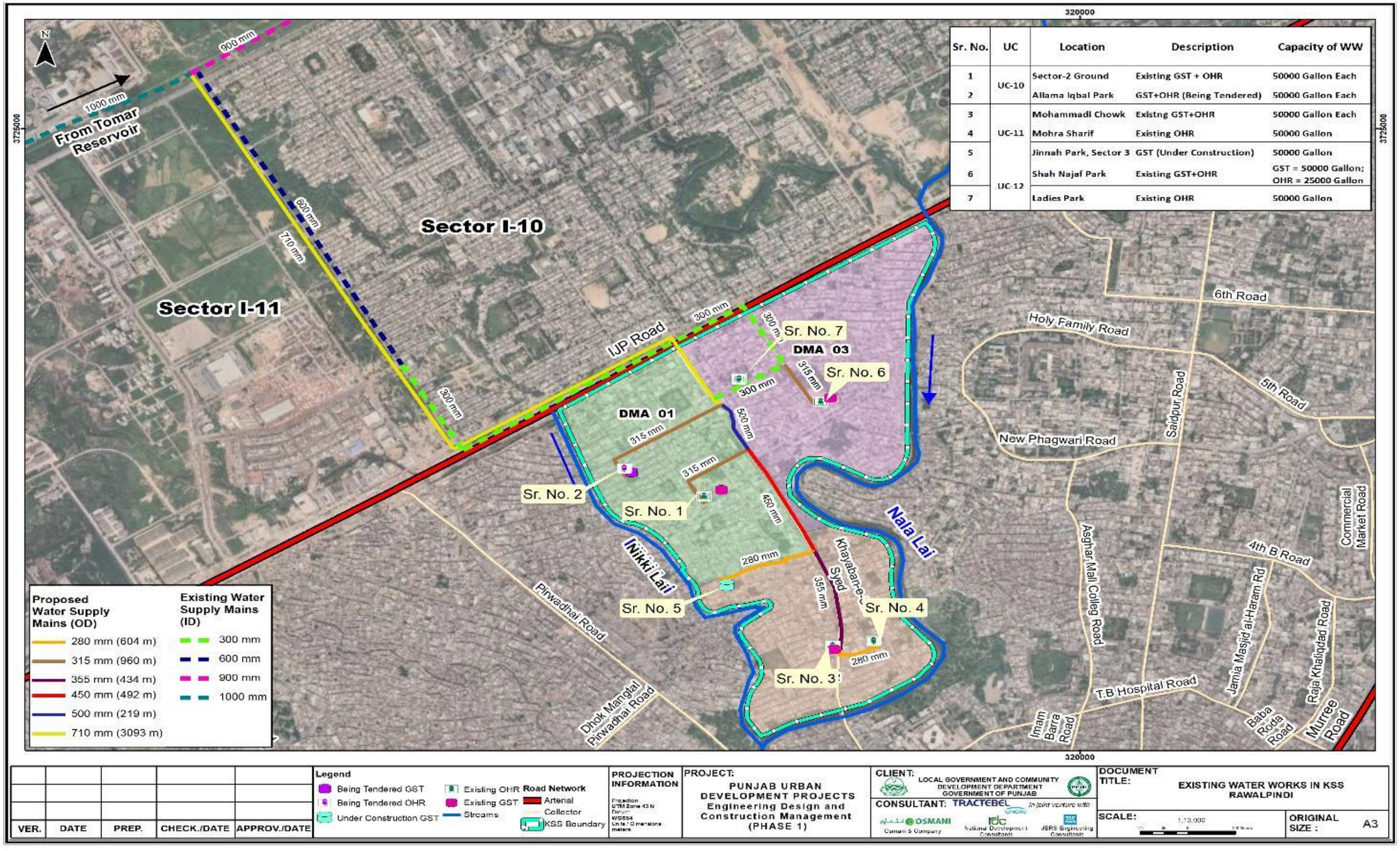


Figure 3. 5: Layout of Distribution Lines for Unserved Areas



Sr. No.	UC	Location	Description	Capacity of WW
1	UC-10	Sector-2 Ground	Existing GST + OHR	50000 Gallon Each
2		Allama Iqbal Park	GST+OHR (Being Tendered)	50000 Gallon Each
3	UC-11	Mohammadi Chowk	Existng GST+OHR	50000 Gallon Each
4		Mohra Sharif	Existing OHR	50000 Gallon
5	UC-12	Jinnah Park, Sector 3	GST (Under Construction)	50000 Gallon
6		Shah Najaf Park	Existing GST+OHR	GST = 50000 Gallon; OHR = 25000 Gallon
7		Ladies Park	Existing OHR	50000 Gallon

Figure 3. 6: Alignment of Existing Conductance Main and Proposed Conductance Main

3.2 OBJECTIVES OF THE PROJECT

The project aims to offer better living standards, achieve design/ construction features of project matching with applicable standards. Execution of the proposed project would be beneficial for the citizens of Khayaban-e-Sir Syed, Rawalpindi. Following Benefits of the project are anticipated:

- Enhanced water availability and consistency due to dependence on Surface Source.
- Improved water quality due to replacement of old leaking distribution system
- Decreased electricity consumption due to reduction in dependence on Tube Wells
- Improved billing on actual consumption basis due to metering
- Water Conservation due to domestic and commercial metering
- Improved pressure in the system
- Enhanced Management by the responsible agency

For more details, please refer to "1-Introduction-Nature and size of the project" above.

3.3 ALTERNATIVES CONSIDERED & THEIR REASON OF REJECTION

Project alternatives are studied as a part of this EIA process. Alternatives analysis has been conducted in detail to foresee environmental, economic and social impact of each alternative. This section also provides an overview of various commercially available technological options and siting of proposed project to make the project environmentally sound Project alternatives has been studied keeping in view number of parameters including no project option, technological / selection of material, construction of new storage facilities. The designing of proposed project component is based on the increasing water demand of KSS with respect to increasing population. The project is designed to cater the water demands of up to 2050. This process of analysis of the different alternatives for Augmentation of Water Supply and Creation of DMAs for KSS 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.

The discussion and analysis of alternatives considers other practicable strategies that will promote the elimination of negative environmental impacts identified. This section is critical in consideration of the ideal development with minimal environmental disturbance. This process of analysis of the different alternatives for proposed project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed

from Khanpur Dam and Formation of DMAs" 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. The report identifies potential environmental impacts of each alternative, develops comparative analysis matrix with respect to components of augmentation of water supply project and environmental impacts to suggest the most feasible alternative that can be taken up for development.

The alternatives for following project components have been discussed:

Alternative I: No Project Option

Alternative II: Capacity Enhancement of Existing Conductance Main

Alternative III: Lying of new Conductance Main

Alternative IV: Construction of New OHRs and GSTs

Alternative I. No Project Option: The "no project option" means no action alternative is required to ensure the consideration of the original environment without any development. This is necessary for the decision-makers in consideration of all possibilities. The development will have a minimal effect on the physical environment. In terms of the social environment, the "no-action" alternative would result in shortage of clean water to residents of KSS, eliminate job opportunities, create insecurities of future water demand, cause provision of contaminated water supply due to leaked distribution lines, uncontrolled and unmanaged water usage, losses of collection revenue to RWASA. The old distributions pipelines were laid down back in early 1990's and some of them are even 33-year-old. These pipelines are leaking at certain points and result in contamination of water supply to residents.

The old lines are rusted and lower the water quality as well. The existing Conductance Main from Tomar reservoir is insufficient to cater the increasing water demand of KSS. If new Conductance Main is excluded from the option, then KSS will face extreme water shortage by 2030. Due to leakage from the replaceable Distribution Pipelines, leakage water cause damage to roads and other permanent structures like houses and shops. The no project conditions will result in further worsening the present environmental conditions and increased disturbance to residents of area. Socio-economic conditions will also be deteriorated due to expenditure on repair work of structures and medical expenses to cure diseases caused by drinking of contaminated water. This moisture on walls and basements will also cause algal and fungal growth which will result in different diseases.

Alternative-II 'Capacity Enhancement of Existing Conductance Main: The strength to this option is that existing Conductance Main will be replaced with line of bigger diameter within existing ROW. No additional land will be required and the same crossing under IJP road will be used. No major disturbance will be caused to any physical, biological and social part of the environment. During the time of replacement of existing Conductance Main, the residents of KSS will not receive water supply until completion of project and this will cause serious social impact on residents. More cost will be involved in removal of existing conductance main and laying of new conductance main.

This option is not recommended because people of KSS will suffer with no water supply for long period of time. This option is not cost effective as well, so this option is rejected.

Alternative-III 'Lying of New Conductance Main': If one additional Conductance Main of 620 mm (ID) or 710 mm (OD) HDPE is laid down parallel to the existing Conductance Main, will enhance the water capacity of KSS without any halt of water supply to people of KSS. It will also ensure the continuous supply to KSS even in case of repair and maintenance of one Conductance Main. ROW is also available to lay new Conductance Main and no land acquisition involved. New line will fulfill the demand of water for next 30 years even in case of failure of Existing Conductance Main due to any reason. It will investment of major cost involves which require large amount of funds. Further, new excavation will cause temporary halt in free movement of people of project area specially along the Corridor of Impact (CoI).

This alternative option is selected because it will continue the supply of water to the residents even during construction of new line for water capacity enhancement of KSS. Further, funds are available under Dream-I project of Local Government and Community Development Department Government of Punjab. Diversion routes will be allocated for movement of traffic under traffic management plan.

Alternative-IV 'Construction of New OHRs and GSTs' : The strength to this option is that increase in water supply needs additional storage to make sure 24/7 water supply to residents of KSS. For this construction, existing Parks of PHA are proposed. The area of KSS is densely populated with no open land available. If private land acquisition will be involved it will involve the involuntary resettlement and dislocation. Therefore, as alternate option parks of PHA are proposed. The parks are used by residents for walk and jogging. These parks are recreational place for

large number of people as large population use them. During public consultation the respondents replied that patients with diseases related to heart and diabetes use these parks for their recommended exercise and walks to maintain their health. Further, there is only one park dedicatedly for women titled as Ladies park which is proposed for construction of OHR and GST. Furthermore, these parks are the only green places of KSS with ornamental plants, grass land and trees.

Based on the social and environmental impacts, the option for construction of New OHR and GSTs in Public Parks of PHA is rejected. It will cause social disturbance to people. Already available water storage facilities will be utilized with additional utilization on household storage tanks.

Reason to choose propose plan "Lying of new Conductance Main": After subsequent consultations with Rawalpindi WASA and stakeholders, it is recommended to go with proposed option Lying of new conductance main i.e., use of both existing and proposed supply main. In this way, existing supply line will continue supplying water during the construction period of new proposed line and supply to the residents of KSS will not be affected. It will also fulfill the water needs of KSS for next 30 years (till 2050).

3.4 PROJECT LOCATION/ SITE LAYOUT

The project activities are located in the Rawalpindi City area, including the suburban and the peri-urban areas of the RDA and the Potohar Town. The study area comprises the RWASA jurisdiction, including 3 Union Councils (UCs). The Master Plan (2016-2040), carried out the demand and the projections for the water supply for the three types of the areas, which are:

- Urban areas
- Peri-urban areas
- Rural areas

The area of actual working space is called as Right of Way (ROW). The required ROW for proposed project is estimated to be 8 feet. **Figure 3.7** shows the location of project marked with COI. **Figure 3.8** shows location map of Rawalpindi-Islamabad showing geographical locations of the area. Khayaban-e-Sir Syed (KSS) is located in the WEST-I Zone of Rawalpindi with a 1.48 sq. km area. There is a total of three Union Councils (UCs) in this area named UC-10 (Khayaban-e-Sir Syed (N)), UC-11 (Khayaban-e-Sir Syed (S)), and UC-12 (Dhok Najjo). The study area is bounded by

three sides, from the North, the IJP road is passing, while on the East and West side, Nallah Lai and Nikki Nullah split the project boundary from the rest of the area. Due to the unique area boundary, KSS is considered for the formulation of District Metered Area (DMA) as a pilot project which will lay a foundation in the future for the implementation of the same for the rest of the area. The project location plan is shown in **Figure 3.9.**

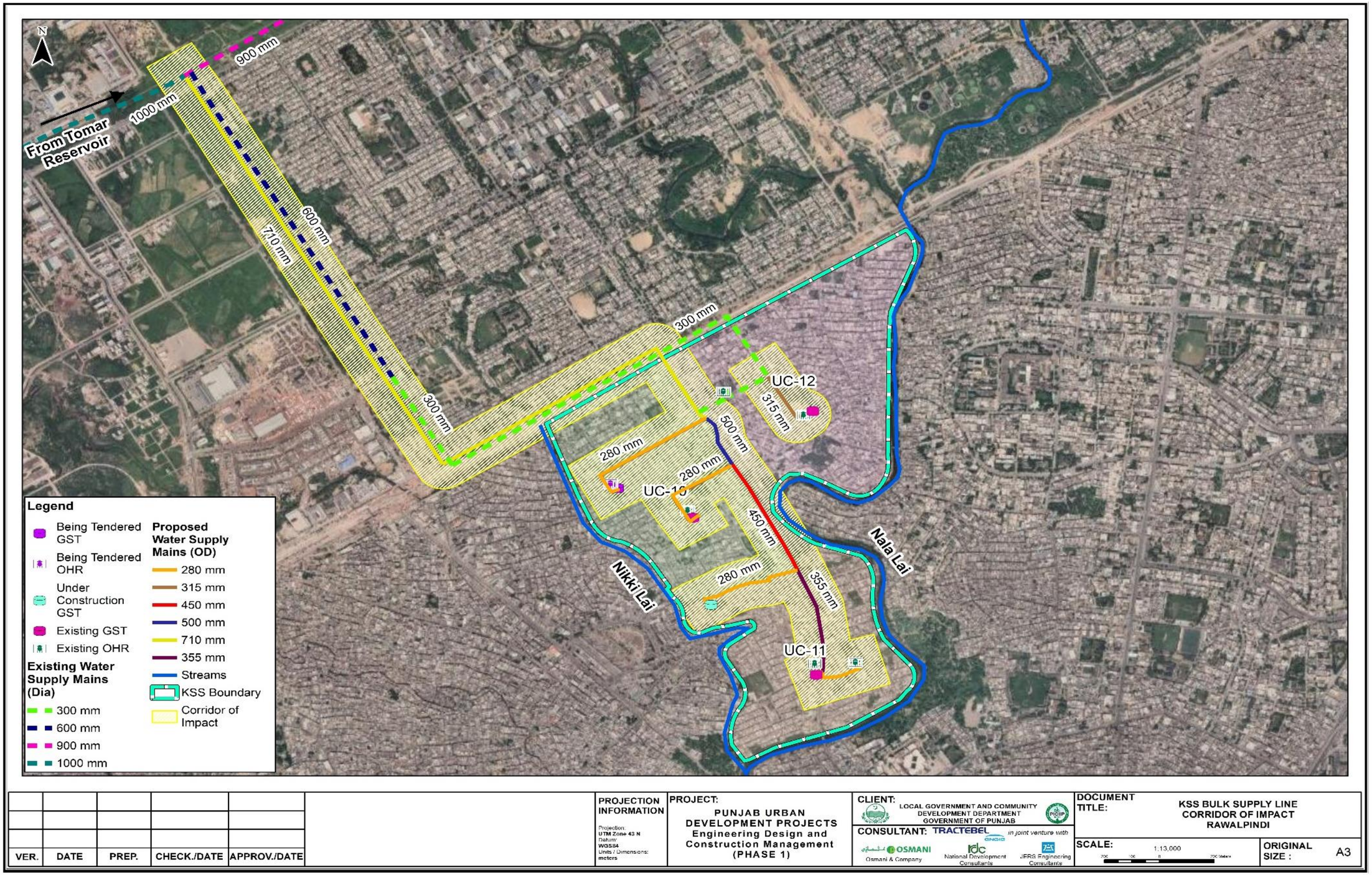


Figure 3. 7: Location of proposed project marked with COI

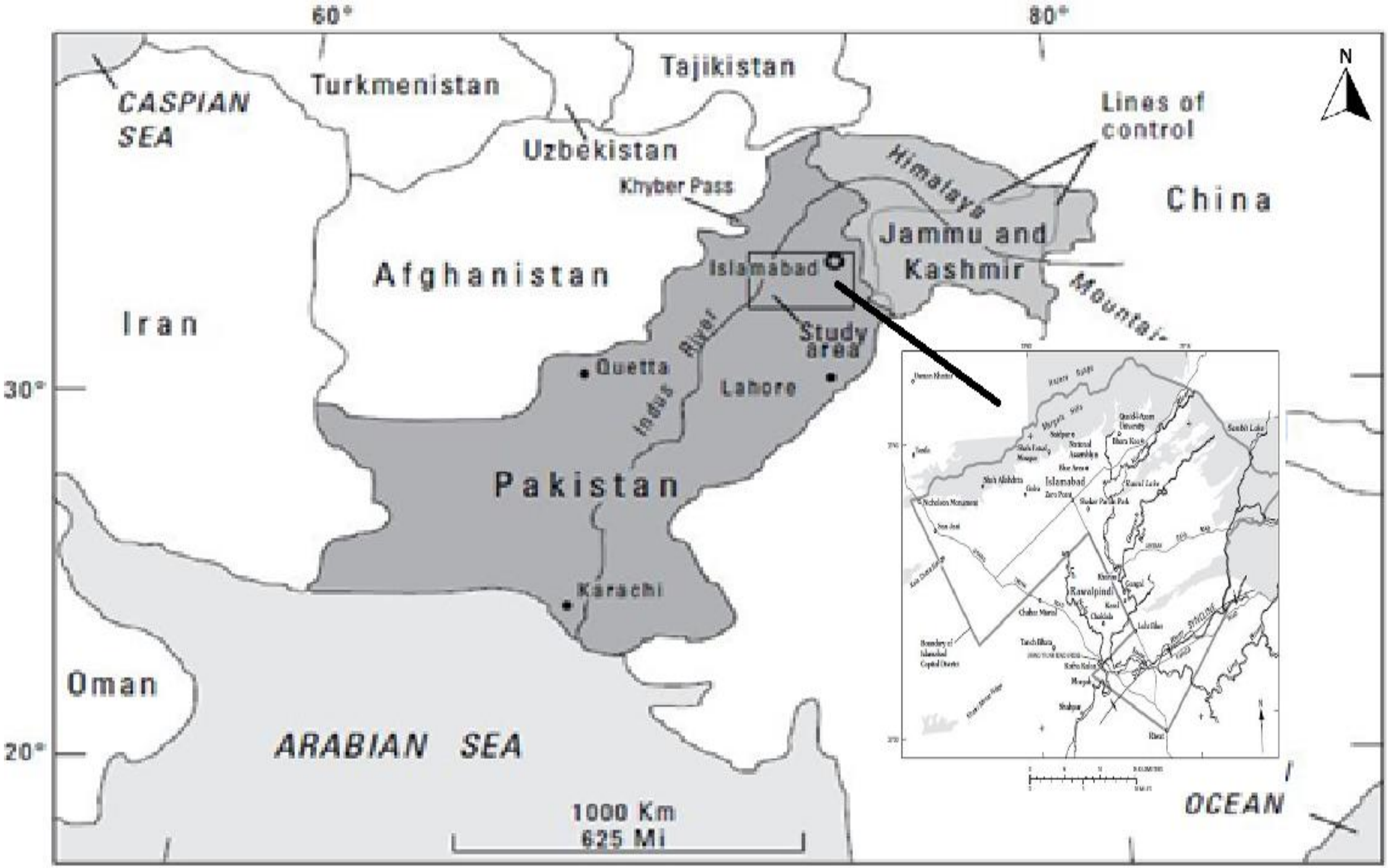


Figure 3. 8: Geographical Map of Rawalpindi-Islamabad

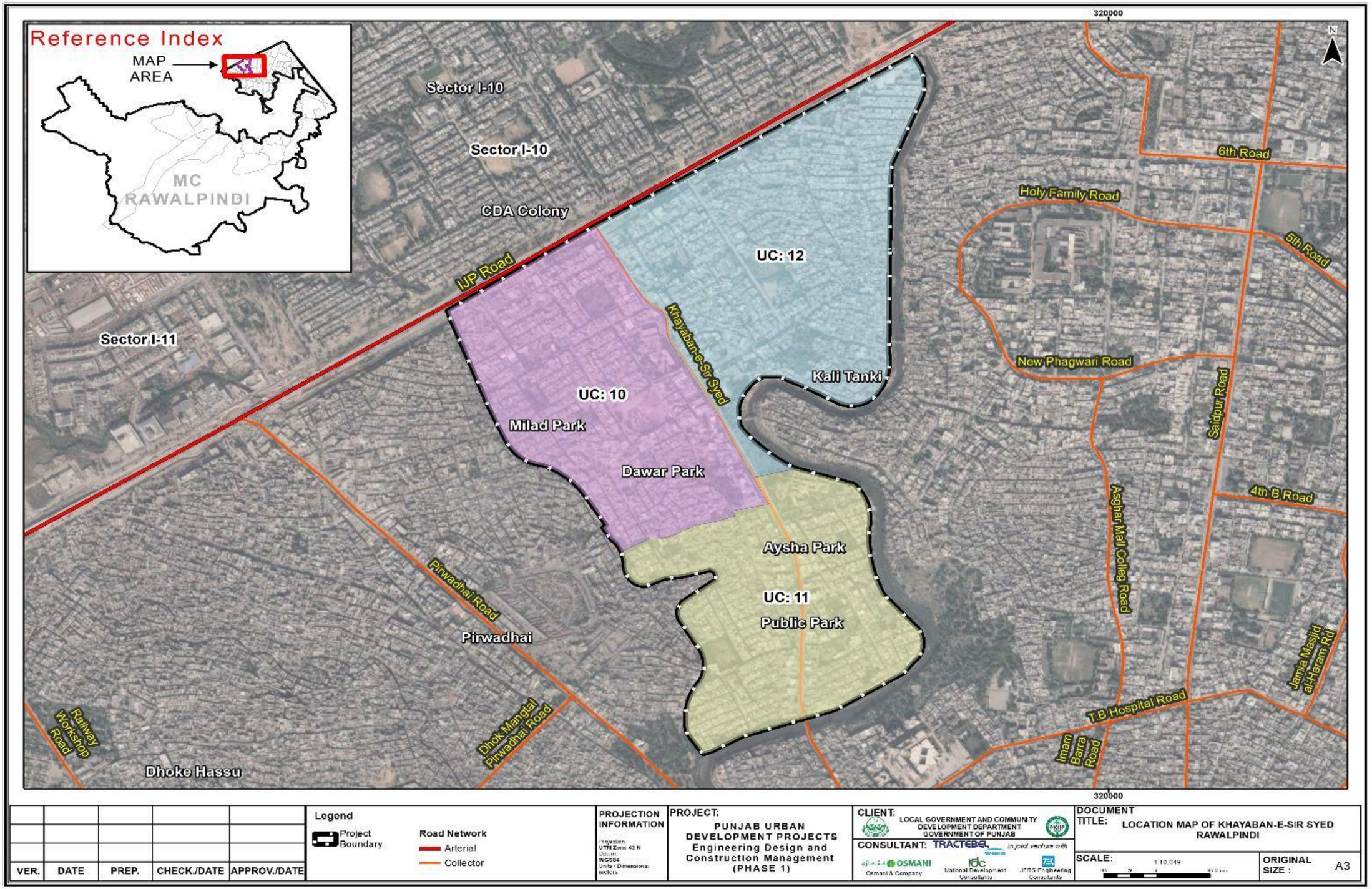


Figure 3. 9: Location of the project

As per spatial plan of urban planning of Rawalpindi, KSS area is very densely populated with very less area remaining for the construction of new houses. Keeping in view the spatial plan findings, population of 2025 was taken to find the number of house connections. Total number of domestic connections was calculated assuming 7 people per house, while commercial connections were assumed as 5% of residential connections. Population and domestic/ commercial connections in each DMA are given in the **Table 3.5**.

Table 3. 5: Detail of DMAs with Domestic/Commercial connections

UC No.	Proposed DMA	Population (2025)	No. of Domestic Connection	No. of Commercial Connection
UC-10	DMA-1	22746	3249	162
UC-11	DMA-2	24201	3457	173
UC-12	DMA-3	29902	4272	214
Total		76849	10978	549

Location map of water meters to be installed in the distribution network of KSS at feeding mains i.e., at main lines which are coming from storages and supplying water to the network is shown in **Figure 3.10.** Flow meters are to be installed at water entry point of all bulk supply mains and sub-main. This will give the total volume of water that is being supplied to the system. **Figure 3.11** shows the location plan of all flow meters that are to be installed at various locations of bulk supply mains.

Fire hydrants are provided in all UCs of KSS. Total six fire hydrant locations were identified and underground pressure type fire hydrants are proposed. **Table 3.6** the detail of Fire Hydrant and the location map is given in **Figure 3.12.**

Table 3. 6: Detail of Fire Hydrants to be installed in KSS

Sr. No.	No. of Fire Hydrants	OD (mm)	Pipe Material
1	6	180	HDPE

Isolation of network is done by using sluice/gate valves at desired location in the network. In KSS, isolation plan for each DMA has been created by installing sluice valves at all boundary nodes (inlets and outlets) of the network. Isolation maps of DMA 1, 2 and 3 are shown in **Figure 3.13**, **Figure 3.14** and **Figure 3.15.** Project layout plan is attached as **Annexure-I**, however the detailed location map is attached as **Annexure-II**.

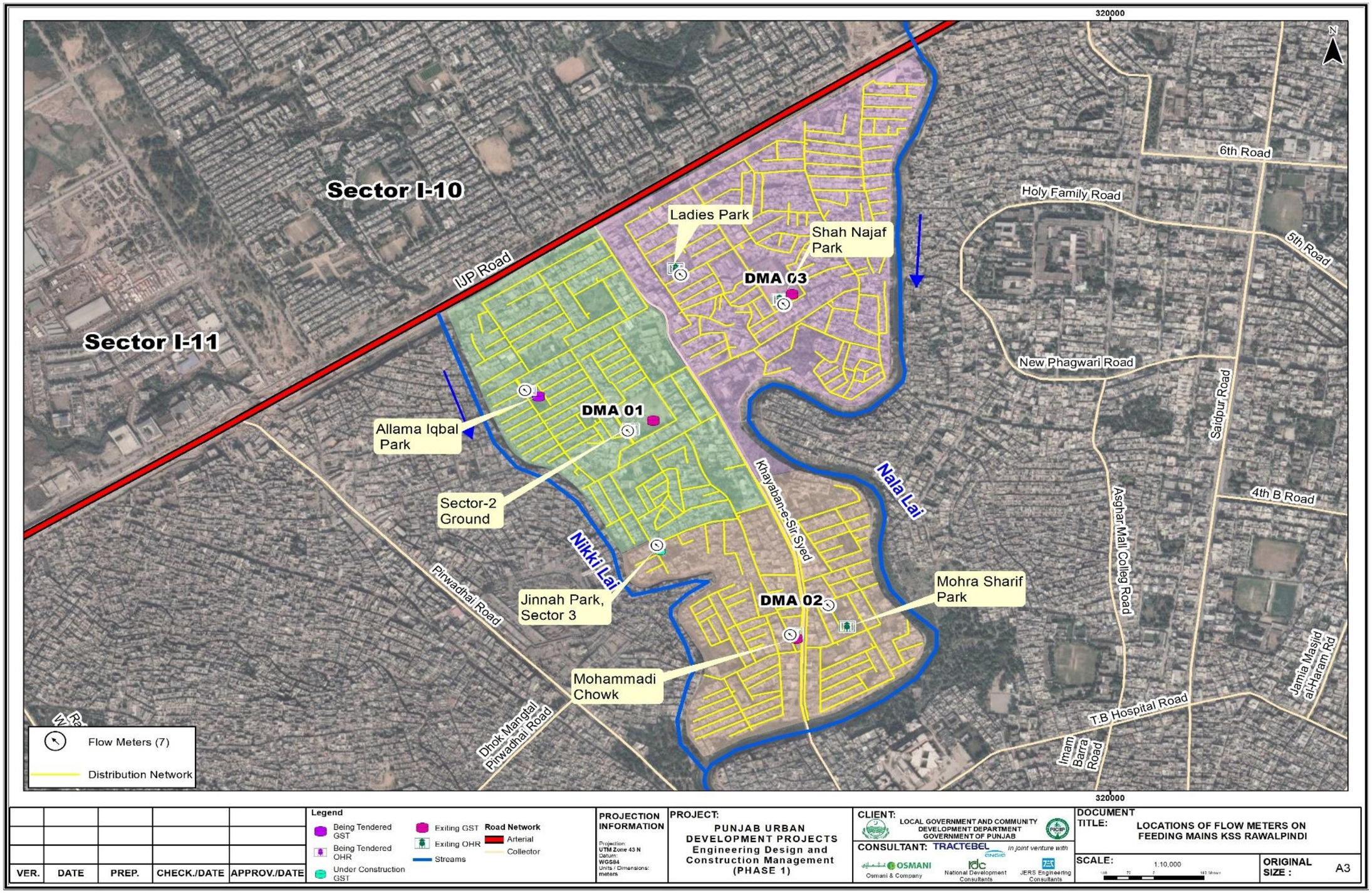


Figure 3. 10: Location of water meters at Feeding Mains

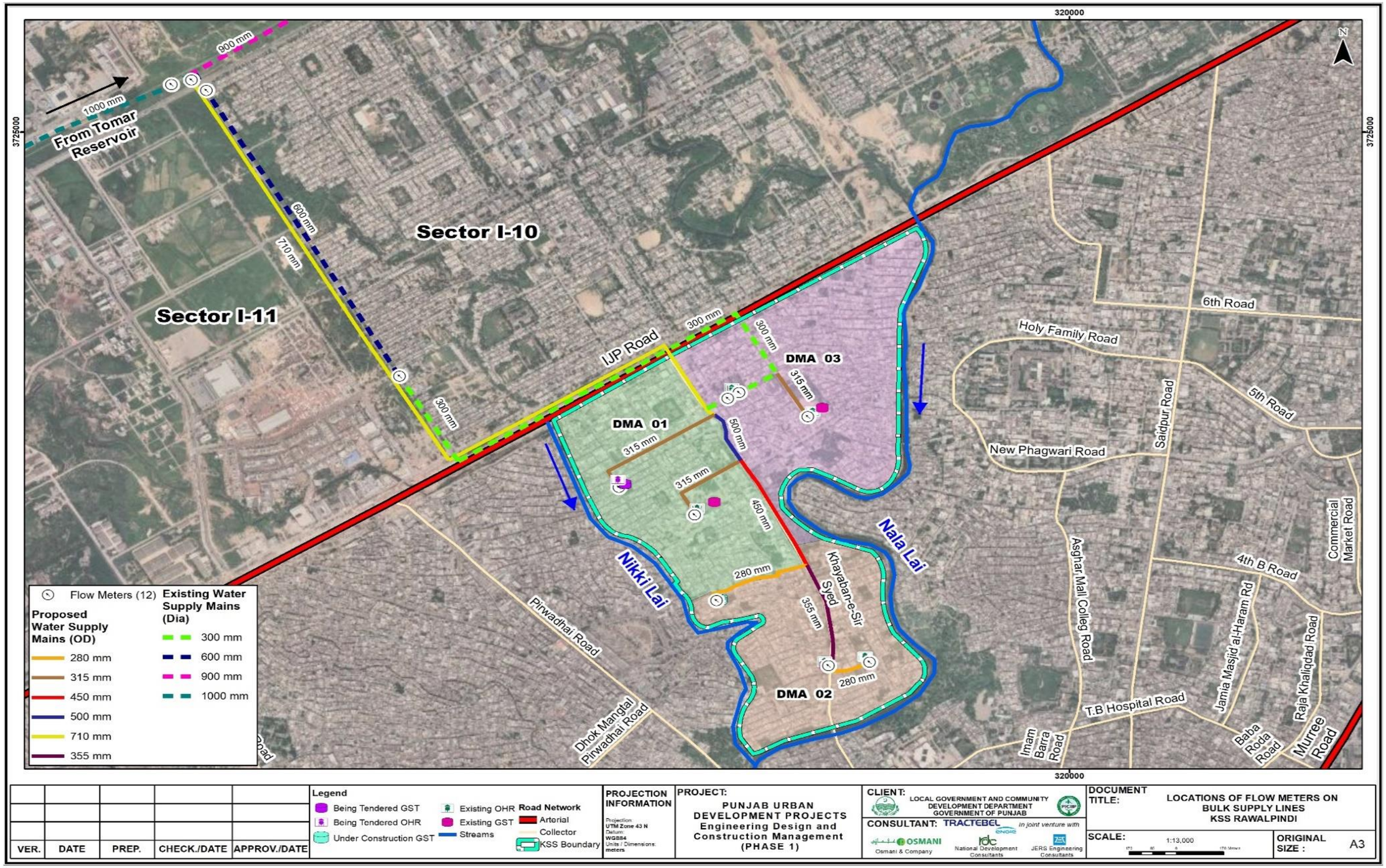


Figure 3. 11: Locations of Flow Meters on Bulk Supply Mains

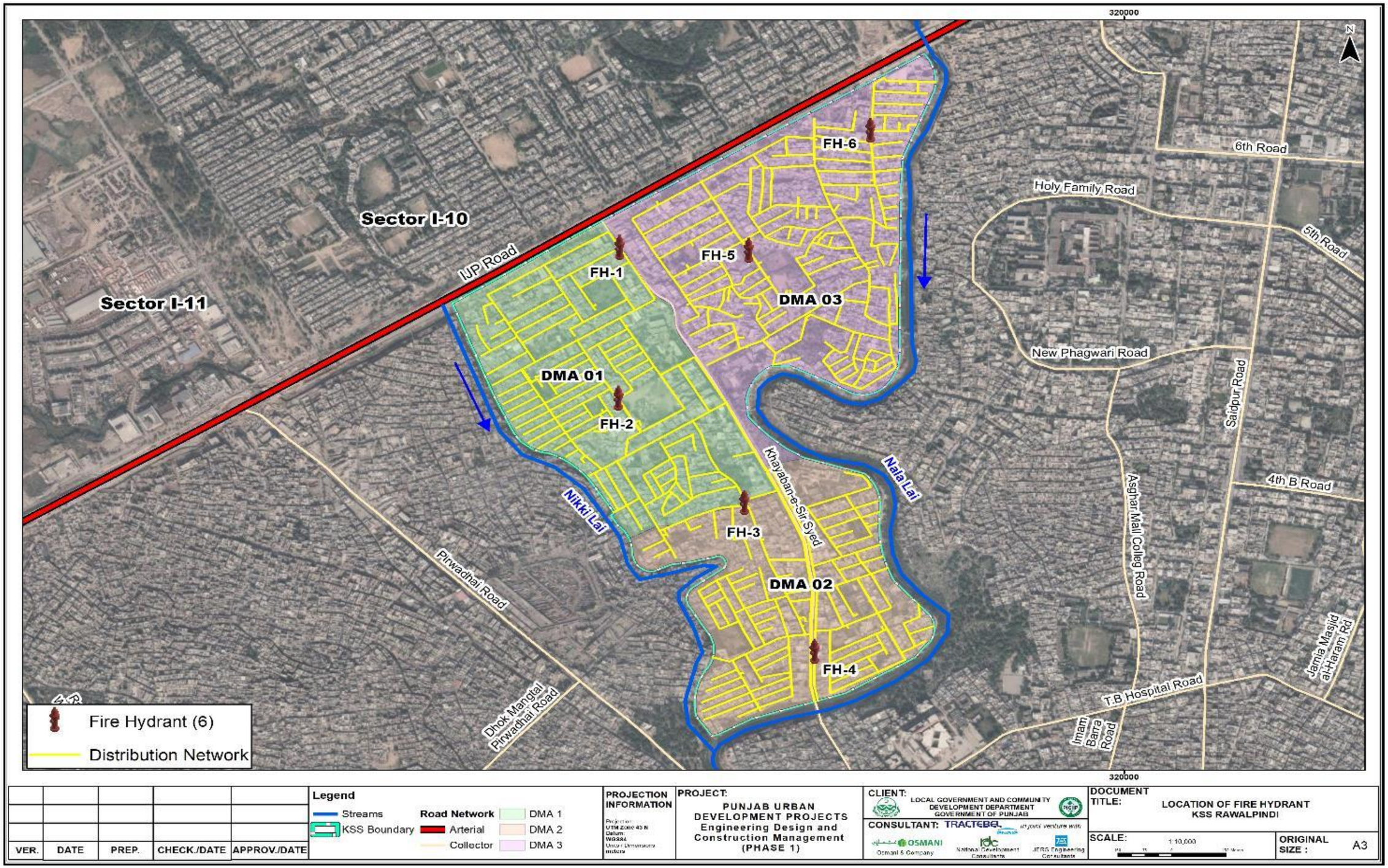


Figure 3. 12: Detail of Fire Hydrants in KSS

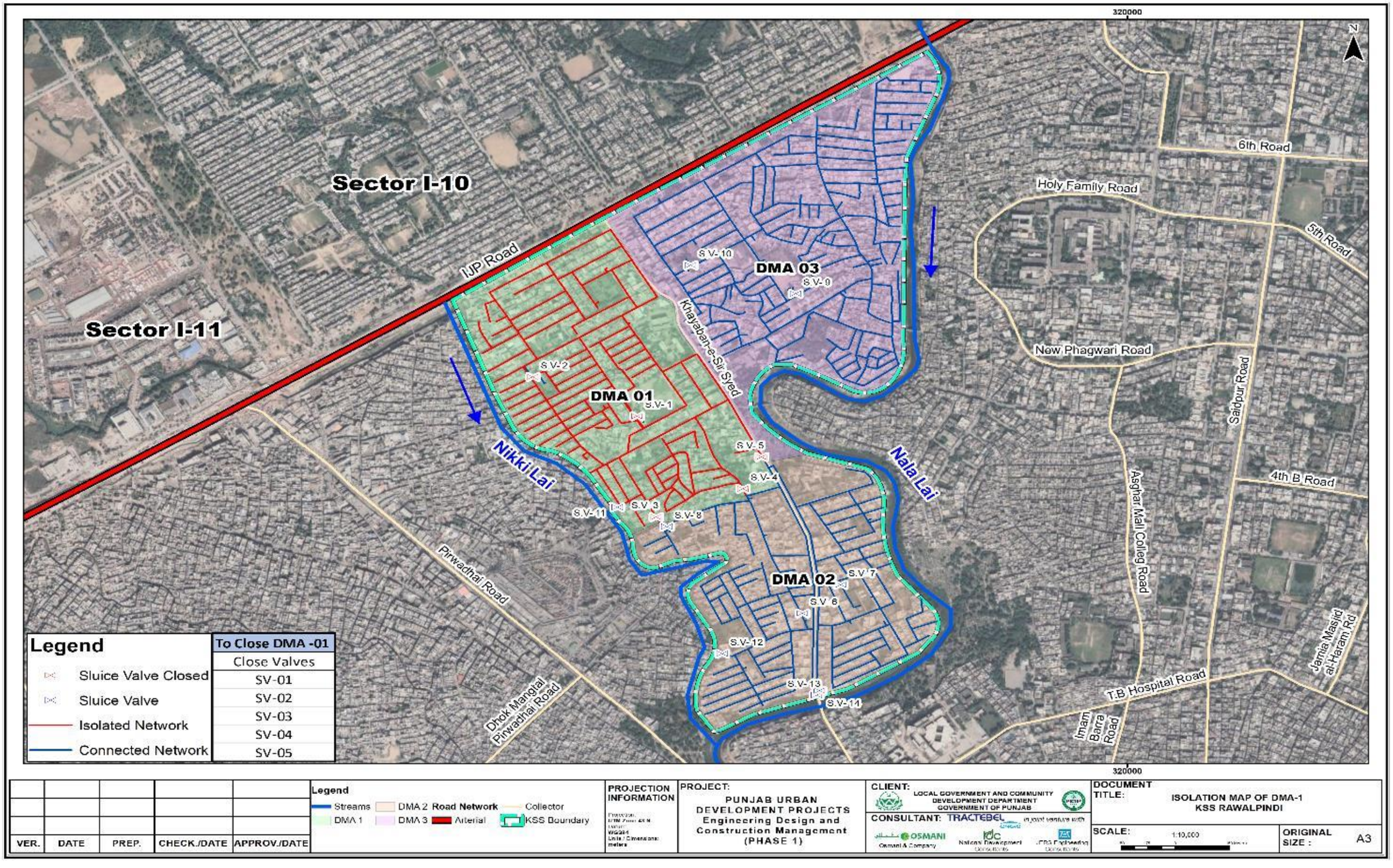


Figure 3. 13: Isolation Map of DMA-1

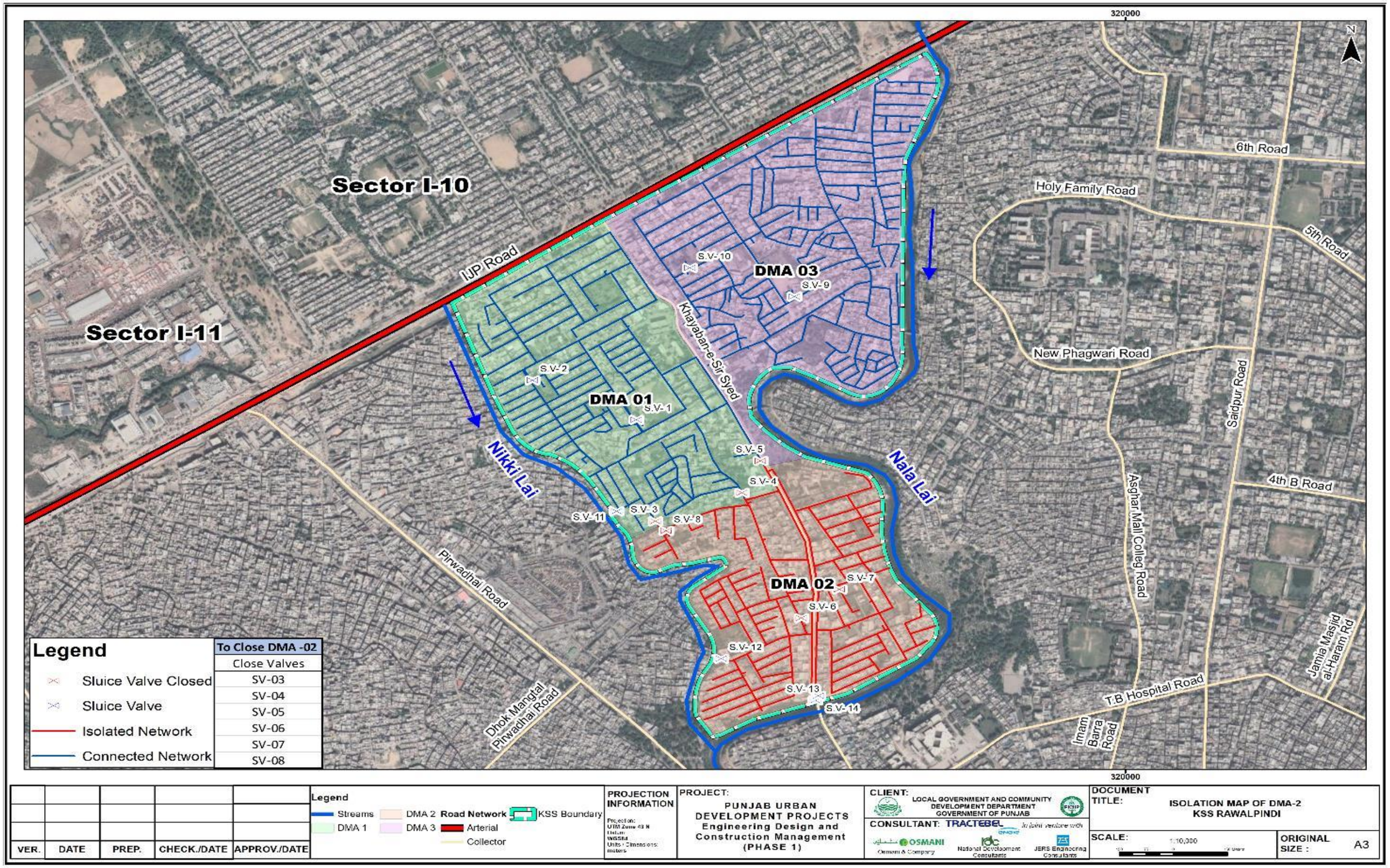


Figure 3. 14: Isolation Map of DMA-2

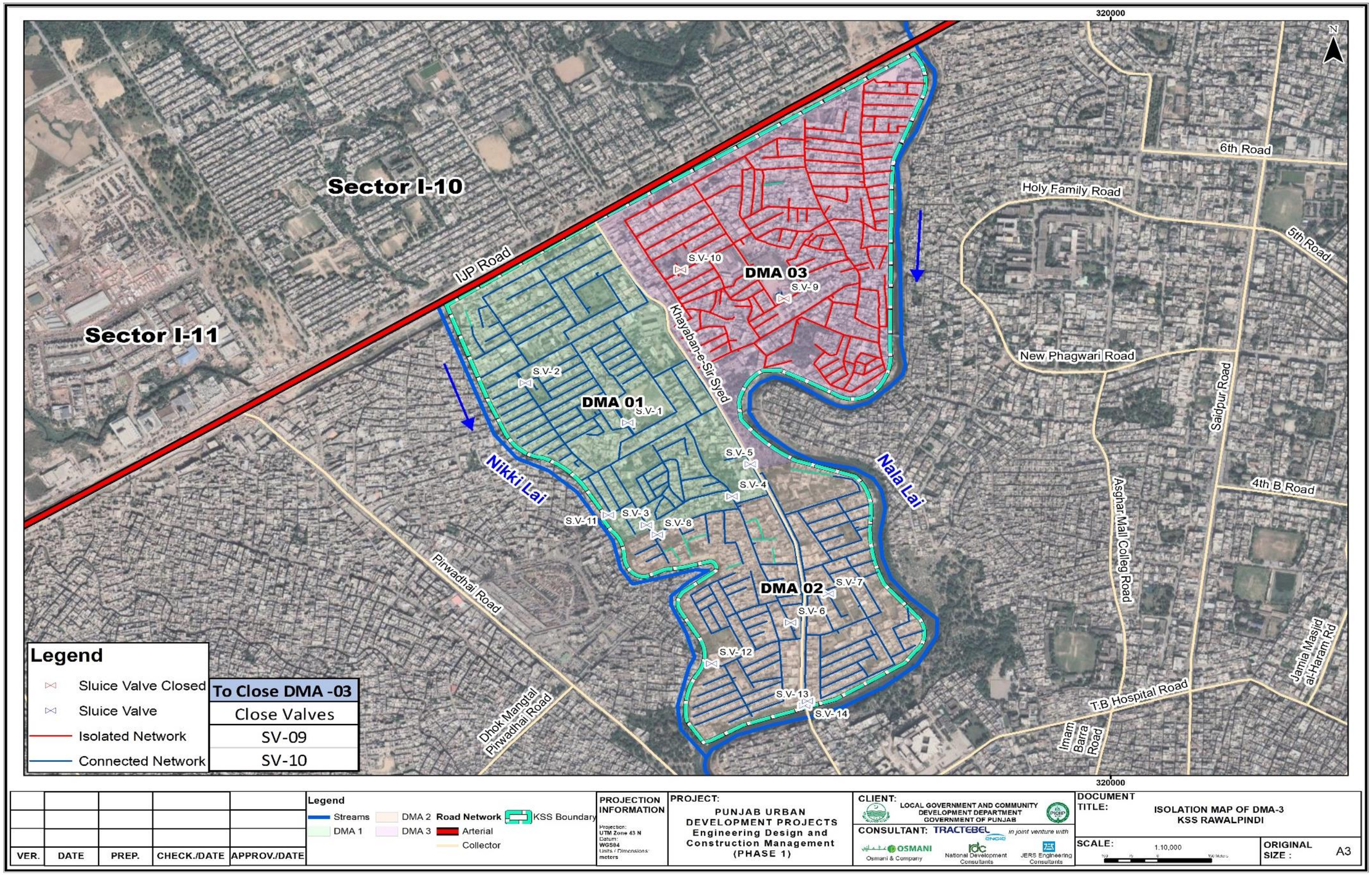
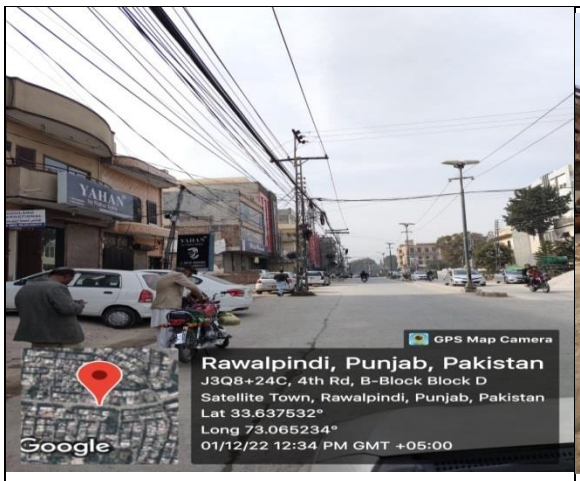
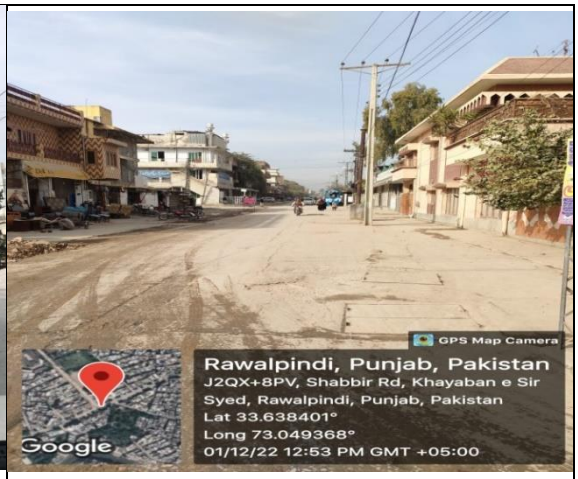


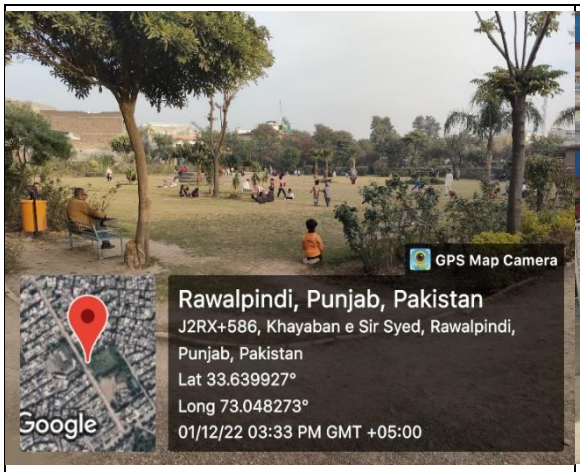
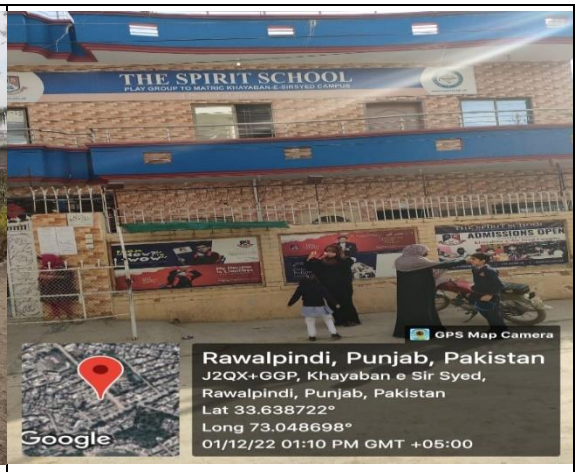
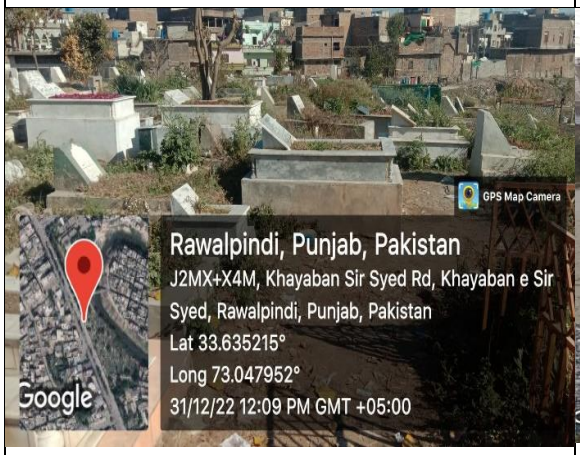
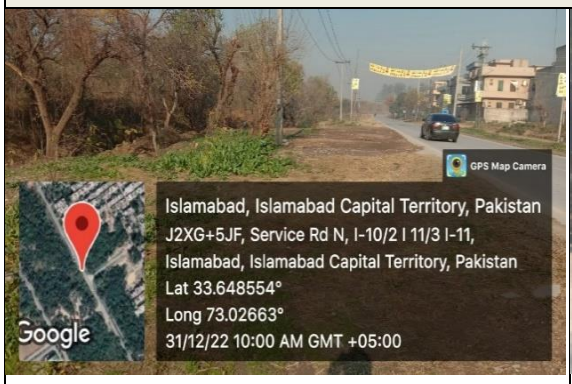
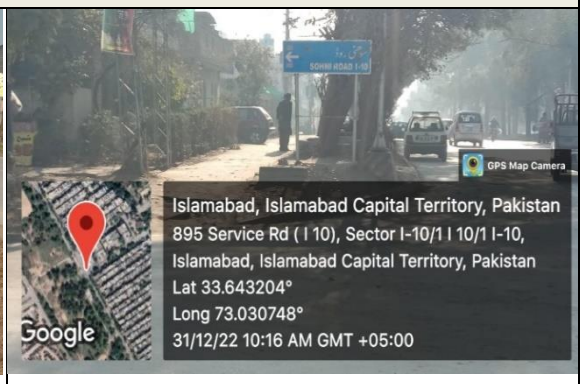
Figure 3. 15: **Isolation Map of DMA-3**

3.5 LAND USE AT THE PROJECT SITE

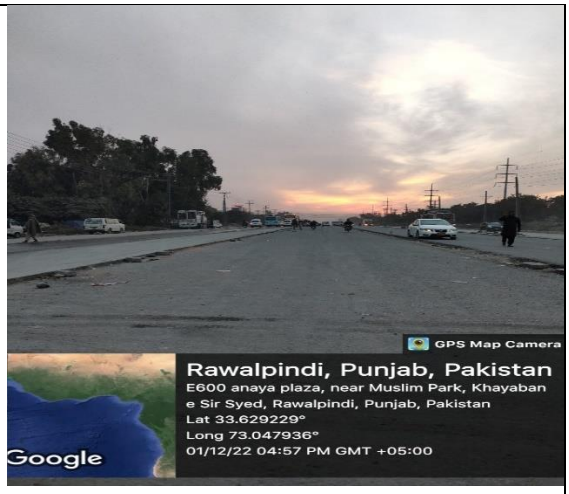
There are different types of land use i.e. open land near Sector I-10, built-up, graveyards, green belt, road/track, stream/ Nullah, residential and commercial structures, and parks etc. majority of the project area is densely populated. **Figure 3.16** shows the land use around the project site. The 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. 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. 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 because the area of I-10 Islamabad and KSS is densely populated.

Figure 3. 16: Land Use around the project site

<table>
<tr>
<td> 
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<td> 
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</tr>
<tr>
<td>Area for lying of new Conductance Main</td>
<td>Shabbir Road, Khyaban-e-Sir Syed</td>
</tr>
</table>

	
School at KSS	Park at KSS
	
Graveyard in KSS	Sector 3, KSS
Area under Islamabad	
	
Service Road Sector I-10	Sector I-10





IJP Road

3.6 ROAD ACCESS

A mild steel (MS) supply main of 300 mm (ID) is currently supplying water to KSS. It takes water from a 600 mm (ID) supply main which is bifurcated from a 1000 mm (ID) main line coming from Tomar reservoir. The Tomar reservoir is fed by a 1400 mm main line from Sangjani treatment plant based on Khanpur dam.

As this supply line is not enough to fulfil even the current water demands, a new supply main of 620 mm (ID) or 710 mm (OD) HDPE with pressure rating of PN-10 has been proposed to meet the maximum water demand of KSS up to the year 2050. This new line shall be laid parallel to the existing main line on the other side of the road (Service Road West I-10) in the green strip in Sector I-10 area. This line will run parallel to IJP Road and will cross the IJP Road to enter into Khyaban-e-Sir Syed (KSS) at CDA Stop. Existing Supply Main is set to supply water to UC-12 of KSS and shall be discontinued at connection with new proposed line at Main KSS Road and new proposed line will be supplying water to the water works of UC-10 and UC-11 through sub-mains. The new line is designed on maximum day demand of whole KSS. This new line can also be used to supply water to UC-12 as well in future if existing line is to be made non-functional due to any reason such as corrosion, aging or diversion. A layout of existing and proposed bulk supply main is shown in **Figure 3.17.**

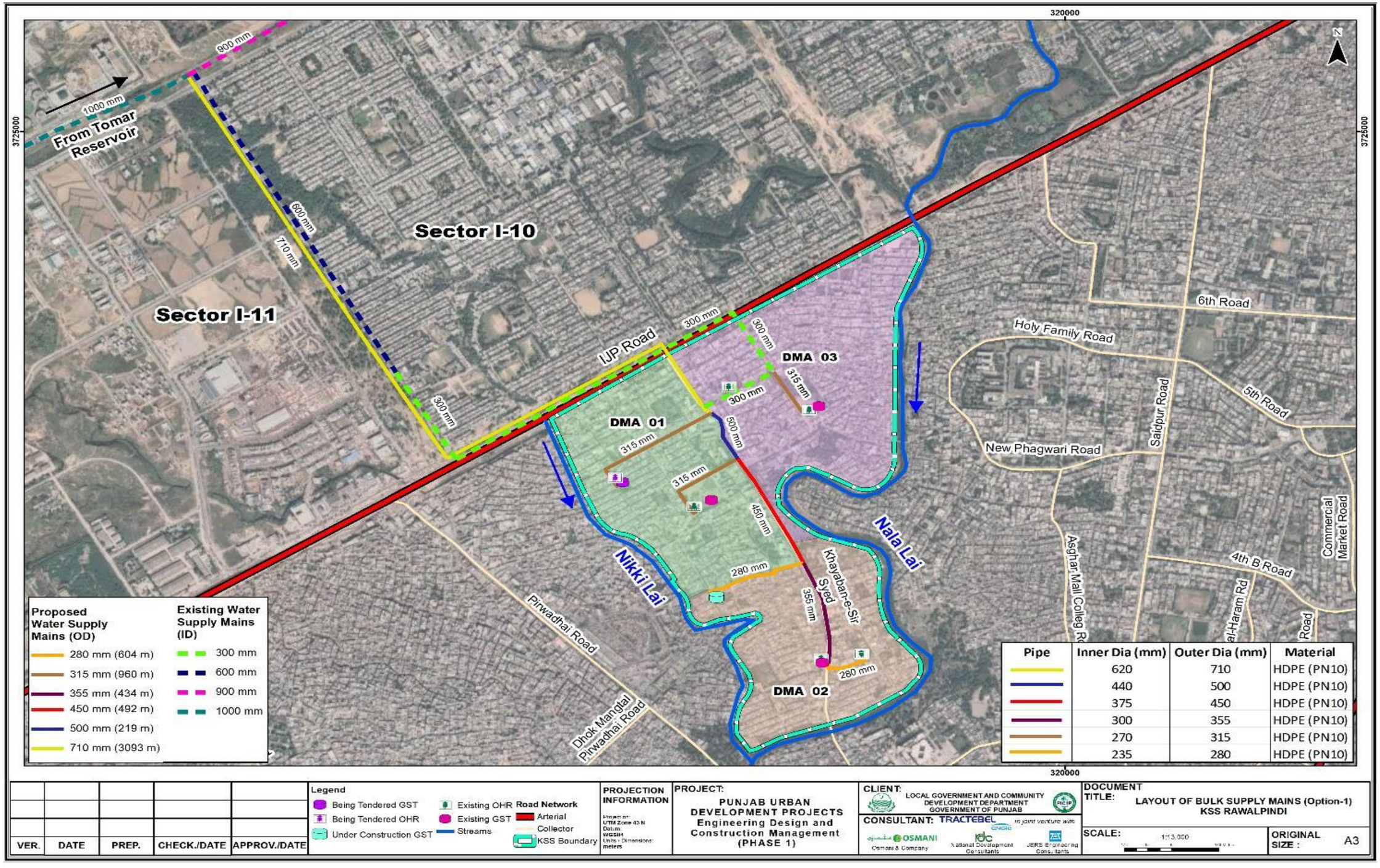


Figure 3. 17: Layout of Existing and Proposed Bulk Supply Line

3.7 VEGETATION FEATURES OF SITE

The area for Conductance Main fall under Sector I-10 is green patch with grass and shrubs. However, the existing RO will be utilized for lying of Conductance Main. Further, **No tree cutting** is involved in this proposed project. There will be disturbance to green patches of public parks during joining of Bulk Water Supply lines with existing OHRs and GSTs which are mostly present in existing parks of PHA. Approval from PHA will be taken before execution of the project. Majority of The other components of project are located within KSS which is densely populated area of Rawalpindi district. No worth mentioned ecological feature has been noticed during site visit and review of literature.

All the available literature was thoroughly reviewed to have a better understanding of the project area and its surroundings including habitat, flora and fauna. The route alignment was thoroughly examined based on the primary and secondary (Flora of Pakistan-MI-Sheikh, Birds of Pakistan-ZB-Mirza-Mammals of Pakistan-TJ Roberts, Manual of silviculture for Pakistan [1965] Champion, Sir H.G.; Pakistan Forest Inst., Peshawar eng; Seth, S.K. Khattak, G.M.) data. The stakeholder Forest, Wildlife, EPA, Fisheries and Agricultural departments were also consulted. This survey broadly covers ecosystem sensitivities (If any), vegetation, other flora and fauna.

3.8 ENERGY/ POWER SOURCE

As mentioned above in this EIA report, the project under reference of this EIA is augmentation of water supply in KSS. Keeping in views the nature of project, estimation of electrical requirement is difficult at this stage especially for construction phase. However, the contractor/s will use their own generators for electricity supply during construction phase. Electricity supplies are also available at the site through Islamabad Electric Supply Company (IESCO).

3.9 WATER REQUIREMENT

During construction phase, an estimated 150-200 persons consisting of both semi-skilled and skilled human resource will be required. The major component which required larger number of workforce is Laying of New Conductance Main and Replacement of AC/GI Pipelines. It is estimated that per worker use of water will be 100 liters per day. An average of 15000 liters/day water will be required during construction phase while during regular operation phase about 2200 liters/day water will be required.

3.10 SOLID WASTE

The major source of solid waste is construction waste during construction phase. Other source of solid waste will be from Worker Camps. The estimated average quantity of Municipal solid waste from worker camps will be 25 to 27 kg per day. Negligible quantity of solid waste will be generated during regular operation of proposed project as it does not involve any processing or manufacturing activities. Based on the number of employees, it is estimated that 5 to 6 kg solid waste will be produced during operation phase.

3.11 PROJECT COST & MAGNITUDE OF OPERTAION

The estimated cost of the proposed project has been calculated based of the scope of work. **Table 3.7** shows breakup of the project cost.

Table 3. 7: Cost of the Project

Sr. No.	Description	Qty.	Unit	Rough Cost Estimate
1	**Proposed Conductance main (OD)**			
i)	710 mm HDPE PN-10	3100	M	167,662,217
ii)	500 mm HDPE PN-10	250	M	7,002,424
iii)	450 mm HDPE PN-10	500	M	11,546,282
iv)	355 mm HDPE PN-10	450	M	6,871,114
v)	315 mm HDPE PN-10	1200	M	14,956,625
vi)	280 mm HDPE PN-10	450	M	4,231,406
vii)	200 mm MS SCH – 40	400	M	6,731,415
2	**Replacement of Water Supply Distribution Pipelines (OD)**			
i)	90mm HDPE PN-8	5600	M	14,107,466
ii)	110mm HDPE PN-8	200	M	587,041
iii)	180mm HDPE PN-8	3100	M	14,807,527
iv)	225mm HDPE PN-8	1100	M	5,253,596
v)	Provision for unforeseen laying (10% of the Item. 2)	1	Job	3,475,263
iv)	House connection	11000	Nos	36,045,900
v)	Commercial Connection	550	Nos	1,802,295
3	**Additional Pipeline for Unserved Area (OD)**			
i)	90mm HDPE PN-8	850	M	1,539,870
4	**Installation of pipe sleeves for Road Crossings**	130	M	1,808,198
5	**Installation of Water Meter**			
i)	Domestic 20mm dia	11000	Nos	249,287,500
ii)	Commercial 25mm dia	550	Nos	12,464,375
6	**Installation of Flow Meter**			
i)	Bulk Flow meter i/c chamber (OD)			
a)	1016 mm dia	1	Nos	1,441,843
b)	710 mm dia	1	Nos	1,441,843
c)	600mm dia	1	Nos	1,441,843

d)	315mm dia	3	Nos	4,325,529
e)	300mm dia	3	Nos	4,325,529
f)	280 mm dia	3	Nos	4,325,529
g)	200 mm dia	7	Nos	10,092,901
ii)	at TWs 110 mm dia	31	Nos	44,697,133
7	**Installation Charges of Bulk/Domestic Meters**	1	Job	53,719,715
8	**SCADA Solution Package for Metering**	1	Job	12,000,000
9	**Installation of isolation (sluice) valves i/c Chambers**			
i)	3" i/d (75 mm)	1	Nos	158,143
ii)	4" i/d (100 mm)	6	Nos	959,253
iii)	8" i/d (200 mm)	14	Nos	2,638,035
iv)	10" i/d (250 mm)	3	Nos	620,590
v)	12" i/d (300 mm)	2	Nos	709,809
vi)	18" i/d (450 mm)	1	Nos	1,086,525
vii)	24" i/d (600mm)	1	Nos	436,276
viii)	28” i/d (700mm)	1	Nos	485,677
ix)	36" i/d (900mm)	1	Nos	584,479
x)	40" i/d (1000mm)	1	Nos	633,880
10	**Installation of Air Release Valves i/c Chambers**	6	Nos	930,456
11	**Fire Hydrant dia 180 mm**	6	Nos	1,181,933
12	**Pipe Jacking for bulk supply line**			
i)	900mm dia MS Sleeve	190	M	61,794,566
13	**Connection with Existing 1000 mm dia Line**	1	Job	25,344
14	**Installation of pumps at Sangjani WTP**	2	Nos	308,729,205
i)	Civil works	1	Job	5,000,000
15	**Installation of pumps at GST/OHR in KSS**			
i)	Centrifugal pumps - 1 cusec	4	Nos	18,855,229
ii)	Turbine pumps - 1 cusec	10	Nos	59,269,955
16	**Thrust Block 2m x 1m x 2m**	200	Nos	9,445,680
Total Cost (PKR) = 1,171,534,414				
5% for Restoration of utilities, Env protection works, Traffic diversions and unforeseen				58,576,721
Grand Total Cost (PKR) = 1,230,111,135 **Total Cost (Million PKR)** =1,230 **Total Cost (Million USD)** = 5.35				

3.12 SCHEDULE OF IMPLEMENTATION

The design of distribution network is performed using Bentley WaterGEMS software. Four phases of design are proposed as given in **Table 3.8**.

Table 3. 8: Design Phase for Distribution System

Sr. No.	Phase	Duration (Year)
1	Phase-1	2022-25
2	Phase-2	2025-30
3	Phase-3	2030-40
4	Phase-4	2040-50

Phase-1 (2022-25): It is the 1st phase of planning, in this phase a new proposed supply main of 710mm (OD) dia HDPE pipe is to be bifurcated from 1000mm supply main coming from Tomar reservoir. The new main line is then linked with all water works of UC-10 and UC-11. The existing supply main of 300mm is to be supplied to the water works of UC-12. In this phase all the AC and GI pipes of distribution network of KSS are to be replaced with HDPE pipes. A length of 554 m of existing PVC pipe of 75mm dia will also be replaced with 100mm dia and 1325 m length with 150mm dia. Moreover, some additional pipes are to laid in unserved areas. All the working Tube Wells (31 No's) shall remain functional in the 1st phase. Total supply to each water works is given in **Table 3.9.**

Table 3. 9: Total Supply to each water works in Phase-1

#	UC	Location	Description	Capacity of WW (Gallons)	Population 2025 (Persons)	Av Demand (MGD)	Supply from TWs MGD	To be Supplied from Khanpur (MGD)
1	UC -10	Sector-2 Ground	GST + OHR	50000 Each	11373	0.45	0.46	0.22
2		Allama Iqbal Park	GST+OHR (Tendered)	50000 Each	11373	0.45		0.22
3	UC -11	Mohammadi Chowk	GST+OHR	50000 Each	8067	0.32	0.33	0.21
4		Mohra Sharif	OHR	50000 Gallon	8067	0.32		0.21
5		Jinnah Park, Sector 3	GST (Under Construction)	50000 Gallon	8067	0.32		0.21
6	UC -12	Shah Najaf Park	GST+OHR	GST: 50000; OHR: 25000	14951	0.60	0.65	0.27
7		Ladies Park	OHR	50000 Gallon	14951	0.60		0.27

Phase 2 (2025-30): In this phase, 11 Tube wells will be discarded and flow compensation shall be made from Khanpur dam source by enhancement of supply. Total demand and supply are tabulated below in **Table 3.10**.

Table 3. 10: Demand and supply for Phase 2

Sr. No.	UC	Location	Description	Capacity of WW (Gallons)	Population 2030 (Persons)	Av Demand (MGD)	Supply from TWs (MGD)	To be Supplied from Khanpur (MGD)
1	UC-10	Sector-2 Ground	GST + OHR	50000 Each	12737	0.51	0.28	0.37
2		Allama Iqbal Park	GST+OHR (Tendered)	50000 Each	12737	0.51		0.37
3	UC-11	Mohammadi Chowk	GST+OHR	50000 Each	9128	0.37	0.23	0.25
4		Mohra Sharif	OHR	50000	9128	0.37		0.25
5		Jinnah Park, Sector 3	GST (Under Construction)	50000 Gallon	9128	0.37		0.25
6	UC-12	Shah Najaf Park	GST+OHR	GST: 50000; OHR: 25000	15784	0.63	0.42	0.42
7		Ladies Park	OHR	50000 Gallon	15784	0.63		0.42

Phase-3 (2030-40): In 3rd phase until 2040, all the remaining Tube wells (20 No's) will be made abandoned and total demand shall be fulfilled from Khanpur dam source. Total demand and supply are tabulated below in **Table 3.11**.

Table 3. 11: Demand and supply for Phase 3

#	UC	Location	Description	Capacity of WW (Gallons)	Population 2040 (Persons)	Av Demand (MGD)	To be Supplied from Khanpur (MGD)
1	UC -10	Sector-2 Ground	GST + OHR	50000 Each	18191	0.73	0.73
2		Allama Iqbal Park	GST+OHR (Tendered)	50000 Each	18191	0.73	0.73
3	UC -11	Mohammadi Chowk	GST+OHR	50000 Each	13370	0.53	0.53
4		Mohra Sharif	OHR	50000	13370	0.53	0.53
5		Jinnah Park, Sector 3	GST (Under Construction)	50000	13370	0.53	0.53
6	UC -12	Shah Najaf Park	GST+OHR	GST: 50000; OHR: 25000	19118	0.76	0.76
7		Ladies Park	OHR	50000 Gallon	19118	0.76	0.76

Phase-4 (2040-50): In the 4th Phase, KSS will be independent of Ground water/ Tube Wells and total demand shall be fulfilled from Khanpur dam source. Total demand and supply are tabulated below in **Table 3.12**.

Table 3. 12: Demand and supply for Phase 4

Sr. No.	UC	Location	Description	Capacity of WW (Gallons)	Population 2040 (Persons)	Av Demand (MGD)	To be supplied from Khanpur (MGD)
1	UC-10	Sector-2 Ground	GST + OHR	50000 Each	15464	0.62	0.62
2		Allama Iqbal Park	GST+OHR (Tendered)	50000 Each	15464	0.62	0.62
3	UC-11	Mohammadi Chowk	GST+OHR	50000 Each	11249	0.45	0.45
4		Mohra Sharif	OHR	50000	11249	0.45	0.45
5		Jinnah Park, Sector 3	GST (Under Construction)	50000	11249	0.45	0.45
6	UC-12	Shah Najaf Park	GST+OHR	50000 Each	17451	0.70	0.70
7		Ladies Park	OHR	50000	17451	0.70	0.70

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

- Mobilization of Contractor
- Development of Construction and Labor Camps
- Excavations for lying of Bulk Water Supply Lines
- Excavation for replacement of AC /GI Pipelines
- Installation of domestic meters
- Excavations for replacement of control Valves and installation of DMAs
- Installation of Pumps and axillary machinery at GSTs and OHRs for water flow
- Installation of Pumps at Sangjani WTP

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 and sites (including storage and batching plant), offices and a workshop.

The project will be divided into construction work packages and these packages will be awarded to the selected project Contractors or single contractor whichever is feasible.

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.

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.

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 because the area of I-10 Islamabad and KSS is densely populated.

3.13 DESCRIPTION OF THE PROJECT

The project has been duly described at: "1-Introduction- Nature and size of the Project-Purpose of the report, identification of the project and the project proponent."

3.14 DESCRIPTION OF THE PROCESS

The project has been duly described at: "1-Introduction- Nature and size of the Project-Purpose of the report, identification of the project and the project proponent."

3.15 DETAILS OF RESTORATION & REHABILITATION PLANS

The proposed project is of high significance considering the urgent need for improving sustainable water supply system of KSS Rawalpindi, as the existing water supply is not sufficient to cater the needs of KSS in terms of water demand.

Major rehabilitation work will include filling back the excavated land, debris disposal according to internationally sustainable practices, scientific disposal of all sorts of solid wastes and grass plantation on pre-planned areas, cleaning of unpaved areas etc.

Debris or any other wastes resulting from demolishing of the buildings will be disposed-off in environmentally sustainable fashion. The materials capable of recycling/ reuse will be either sold in the market or to be reused for other suitable

purposes. While dismantling the structures all Government rules and regulations as applicable to such activities will be strictly adhered to.

During entire construction period, necessary precautions will be taken to ensure that no damage will be done to the basic infrastructures like power transmission lines telephone lines, roads, private or public property and daily human life as well. Any utilities if encountered during the laying of bulk supply line shall be restored. Backfilling of the trenches shall be done as per the designed backfilling detail. Restoration of pavements (rigid/flexible) at all roads/streets shall be done.

Safety measures as desired under the code of demolition will be adopted to avoid any harm to humans, property around or the environment in the project area. Dust to be generated will be minimized by constant sprinkling of water. After completion; all construction matrix, debris and garbage will be removed off immediately from the site within the minimum possible time under safe conditions. Any minor spillover of these materials will be cleared adequately. The land, if and where pitted will be adequately leveled. On the whole, the project site and the area in its near vicinity will be made neat and clean.

3.16 GOVT. APPROVALS AND LEASES REQUIRED BY THE PROJECT

For the proposed Project, the Local Government & Community Development Department, Government of the Punjab is the Executing Agency (EA) while the project will be executed through Program Management Unit (PMU) of Punjab Intermediate Cities Improvement Investment Program (PICIIP). Rawalpindi Water and Sanitation Agency (RWASA) will be the implementation agency of this project. Environmental Protection Department (EPD)/Environmental Protection Agency (EPA), Government of Punjab (GoPb) is the concerned authority. For disclosure of information, PMU has submitted the updated IEE report to ADB. So far the Environmental Approval from the EPA, Punjab, Lahore is another major requirement for which this EIA report has been prepared and submitted.

CHAPTER-4

DESCRIPTION OF ENVIRONMENT

4.1 GENERAL

This section provides the description of the baseline conditions along the proposed Project. Considering the potential impacts of the Proposed Project, existing baseline environmental conditions of the proposed project's Corridor of Impact (CoI) has to be used as a benchmark for comparison of the physical, ecological and socio-economic conditions before and after construction phases of the Project. This baseline will also provide the datum for assessing the impacts and suggesting the mitigation measures, which will be implemented effectively at various phases of the proposed project activities.

The description of the environment is site-specific and includes the information of physical environment including topographic condition, geological setting, water quality (surface water and groundwater), ambient air quality, climate of the area, land use, description of ecological habitats, located in the overall environmental study area and socio-economic conditions of the area.

With due regard to baseline environmental conditions, the impact of project interventions is addressed and mitigation measures are proposed in the foregoing sections. The baseline information also assists in identifying specific issues to be monitored during project implementation as well as during the operational phase.

4.2 PHYSICAL RESOURCES

Following is a brief description of various physical resources of the Project Site.

4.2.1 Topography, Geology & Soil

The terrain in the metropolitan area of Islamabad-Rawalpindi consists of plains and mountains whose total relief exceeds 1,175 m. Three general physiographic zones trend generally east-northeast. The northern part of the metropolitan area lies in the mountainous terrain of the Margala Hills, a part of the lower and outer Himalayas, which also includes the Hazara and Kala Chitta Ranges. The Margala Hills, which reach 1,600-m altitude near Islamabad. South of the Margala Hills is a southward-sloping piedmont bench underlain primarily by folded sandstones and shales of the Rawalpindi Group (Miocene). Although the relief of the piedmont area is generally low and dominated by extensive plains of windblown silt, the piedmont area also includes many ridges and valleys that have been buried by alluvial deposits from the hills. In the southernmost part of the area, the Soan River valley extends generally

along the axis of the Soan syncline at an altitude of about 425 m. The site for New Conductance Main is mostly plain with gentle slope towards KSS from I-10 area which will provide gravity flow to water. The other component of sub-project line replacement of distribution pipelines, creation of DMAs, installation of pumps and auxiliary machinery etc. are also present in flat area of KSS.

The area in and around Rawalpindi and Islamabad has a complex geological history of mountain formation, alluvial-loessic deposition and erosion cycles. In the west of the Potohar Uplands, the main depositions of loess are from the Pleistocene period. Streams and ravines cut the loess plain, affected by gully erosion and steep slopes. This type of land is unsuitable for cultivation. The areas are composed of sandstone and limestone. There is an extensive area with exposed bedrock and fragmentary, thin soil formations. The dominant factor controlling the geology of the Islamabad-Rawalpindi area is the convergence of the Pakistan-India and Eurasian tectonic plates and the collision between the plates that began about 20 million years ago. This process produced complex structure and stratigraphy in the Islamabad-Rawalpindi area. The sedimentary rocks of the Islamabad area record a long period of gentle geologic fluctuations and slow deposition while the Pakistan-India tectonic plate drifted northward across the Indian Ocean, followed by much more vigorous tectonic processes and rapid deposition in the shorter period since the Pakistan-India and Eurasian plates converged. Consequently, the 150-million-year (m.y.) period from deposition of the Samana Suk Formation (Middle Jurassic) to the beginning of deposition of the Murree Formation (lower Miocene) is represented by only about 675 m of primarily marine sedimentary rocks, whereas the last 20 m.y. are represented by more than 7,572 m of continental sedimentary rock The gravel and loess are especially important to the environmental geology because they form most of the building foundations and because gravel is the primary ground-water aquifer. West of Rawalpindi, plains of thick, easily eroded loess is extensively dissected into shallow badland valleys. East of Rawalpindi, the folded ridges of Rawalpindi Group rocks rise above the alluvial cover to form prominent hills. Urban development is concentrated in the piedmont bench area, which is little dissected in its northern part, where Islamabad is located, but is more deeply dissected toward the south near the Soan River, where Rawalpindi is located. Important minerals like limestone, marble, and fireclay are found in the area. Limestone is found abundantly in Margalla Hills and marble in the western section of Margalla range. Limestone is common in the lower

hills in Rawalpindi Tehsil, and deposits can also be found in the Kankar Plains. Clay soils in the District exhibit five strata, from bottom to top: (i) coarse pebbles with sand or clay; (ii) an alluvial stratum deposited by an older river system in the Soan Basin, (iii) alluvial deposits of the present river system (iv) an airborne top layer of silt or clay (loess), and (v) conglomerate and loose gravel deposits.

Soils have different meanings for different people. To a soil scientist it means the upper a few layers created through weather effect in which plants are grown. The solid portion of soil is both organic and inorganic. The organic part consists of both living and decayed plant and animal materials. Texture of the soil plays a very important role in its water holding capacity of the soil. The same is true for various faunal species, which are important for adding the nutrients in the soil by the breakdown of organic matter and making it suitable for the agriculture. The Project Area does not have any valuable minerals. The soil of Rawalpindi is different in character and generally inclined to be dry. However, it is rich in potential plant nutrients. The clay in the region has five distinct strata. Coarse pebbles together with sand and clay make up the lowest layer which is of alluvium nature deposited by older system of Soan Basin over the pebble bed. The alluvium deposits same river system comprises the subsequent layers. The air borne top layer of silt or clay is called loess and the top most one is gravely conglomerate.

***Source:** Iqbal M. Sheikh et al., (Environmental Geology of the Islamabad-Rawalpindi Area, Northern Pakistan) by Geological Survey of Pakistan.*

4.2.2 Hydrology

Ground Water

A supplemental network of municipal and private wells as deep as 200 meters (m) produces ground water primarily from quaternary alluvial gravels. The altitude of the water table decreases from about 600ft at the foot of the Margala Hills to less than 450ft near the Soan River, so that the saturated zone generally lies 2–20 m below the natural ground surface. The strata of the project area are water bearing and alluvial deposits, giving groundwater potential throughout the district. The water table is seasonal at some places and dug wells generally run dry during summer season at some parts of Rawalpindi district. The local population is generally reliant on water supply from RWASA. Some people have installed their own bore holes and use water from them. The chemical quality of ground water in the district varies in different areas and at different depths.

Surface Water

The proposed project area is divided into two main portions, one is area for Laying of New Conductance Main from 620mm to 900mm Distribution Main of Tomar Reservoir, starting from Service Road West of Sector I-10 of Islamabad and passing through IJP Road. The other major components of project fall in Khyaban-e-Sir Syed (KSS) including sub-division of Bulk Water Supply line to connect it with all water works of KSS. The Soan and Kurang Rivers are the main streams draining the area. Their primary tributaries are the Ling River, draining northwestward into the Soan; Gumreh Kas, draining westward into the Kurang from the area between the Kurang and Soan; and Lei Nala, draining southward into the Soan from the mountain front and urban areas. The Kurang and Soan Rivers are dammed at Rawal and Sambli Lakes, respec¬tively, to supply water for the urban area. Nullah Lai has three major tributaries (Saidpur Kas, Tenawali Kas, and Bedarawali Kas) in the administrative jurisdiction of Islamabad. In the jurisdiction of Rawalpindi below Katarian Bridge, other three major tributaries (Nikki Lai, Pir Wadhai Kas, and Dhoke Ratta Nullah) fall into the Nullah Lai. In addition, there are six other drainage channels joining the Nullah after the Dhoke Ratta and finally the Nullah falls down in the Soan River. Nullah Lai basin drains a total area of 235 km^2 south of Margalla Hills, with 70% of the watershed falling within the territory of Islamabad and the remaining 30% within the downstream Rawalpindi municipal and cantonment limits. Stretching from the Margalla hills in the federal capital Islamabad at north-western edge until the Soan River at south-eastern edge in the District Rawalpindi the maximum length of the Lai Nullah does not exceed 45 km. For further details, the hydrological Survey map of Pakistan is given as **Figure 4.1**.

4.2.3 Seismicity

On the basis of SAARC Seismic Microzonation, Pakistan has been divided into four zones. Seismic Zoning Map of Pakistan showing proposed project site area is presented as Figure 5 5, indicating different zones. Being spread over I-10 and IJP road of Islamabad and KSS of Rawalpindi, the project site falls in Seismic Zone 2B according to the Seismic Zoning Map of Pakistan. Zone 2B (moderate limit of high damage) represents peak ground acceleration (PGA) from 0.16 to 0.24g.

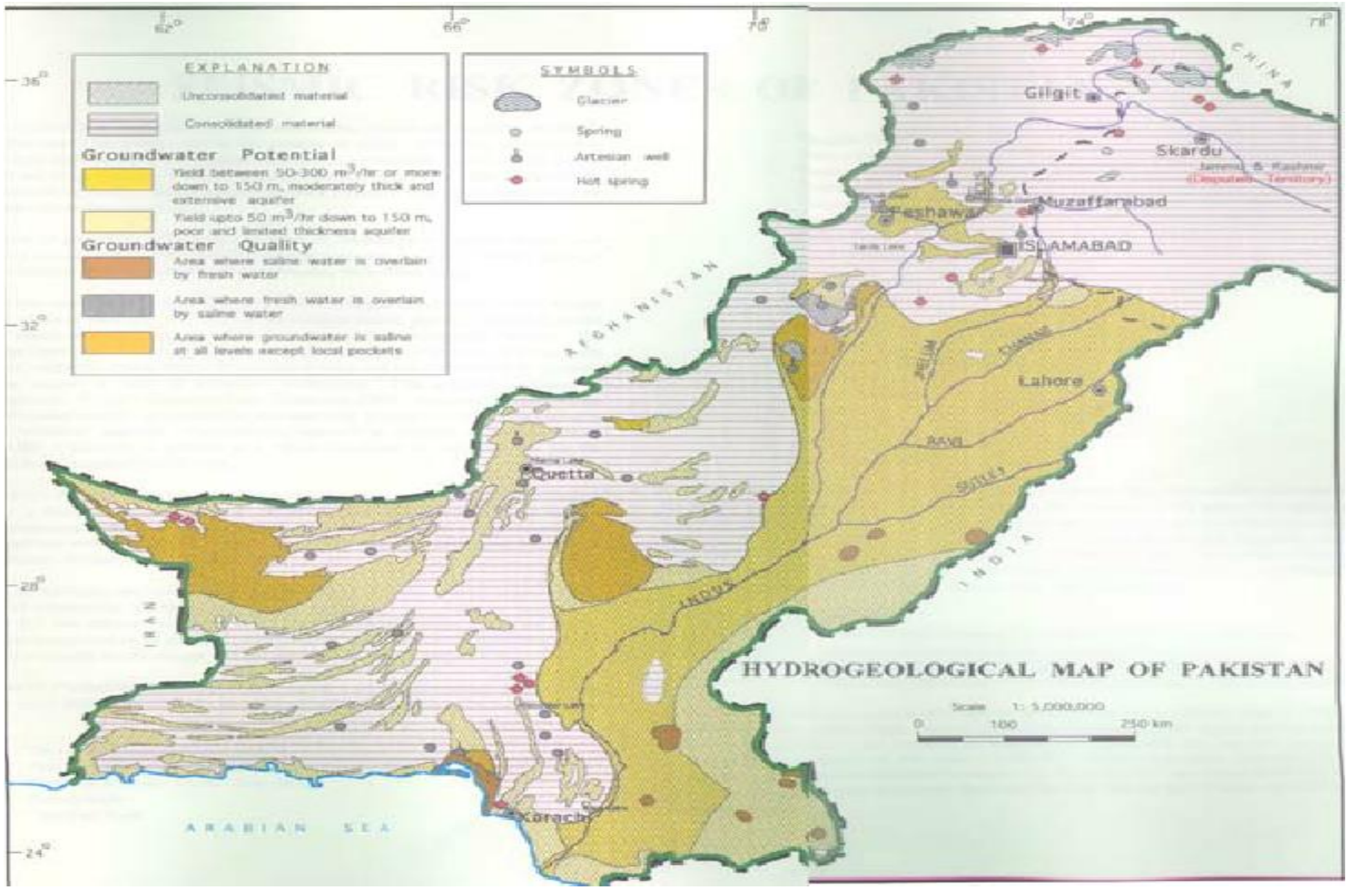


Figure 4. 1: Hydrological Map of Pakistan (covering project area of Rawalpindi and Islamabad

Local Government and Community Development Department Government of Punjab

4.2.4 Climate

The Project area is classified as humid subtropical climate. The humid subtropical climates are characterized by typically mild, dry and short winters. Summers in Project area are long with higher temperatures starting from mid-April and reaching peak temperatures in June/July. The temperatures often exceed 40 °C in summers. The summers are typically followed by monsoons where heavy rains are experienced. The project area receives rains in all the seasons but monsoon rain is pronounced and constitutes a definite rainy season between the month of July and September. Average high temperatures decrease during the monsoon season, but humidity increases. This results in hot and humid conditions, similar to summers in other humid subtropical climates.

The following sections present the climate details of the meteorological gauging station situated near the proposed project. Airport, Islamabad meteorological station was identified near to the proposed project.

The monthly data for Temperature, Rainfall, and Relative Humidity from year (2018-2022) for the above mentioned Weather Stations for the Project Area are presented in subsequent section.

Temperature

The proposed Project Area will be subjected to long periods of high temperature in summers and low temperature in winter. The mean monthly temperature (max & min) of Rawalpindi for the 2018 to 2022 years are 38, 37, 36, 38 & 28C. The mean yearly temperature data is presented in **Table 4.1.**

The temperature rises rapidly until June and the temperature drops with advent of monsoon in July. The temperature rises rapidly until June and the temperature drops with advent of monsoon in July. The months of December and January experience a severe drop in temperature and, the temperature falls below the freezing point in areas above 1800 masl. Summer is marked with monsoon rains, which occur usually in July/August. Yearly average temperature data is presented as **Figure 4.2**.

Table 4. 1: Yearly Mean Temperature (2018-2022)

Sr. No.	Year	Mean Max. Temperature (0^oC)	Mean Min. Temperature (0^oC)	Mean Temperature (0^oC)
1	2022	43	38	28
2	2021	41	31	38
3	2020	41	30	36
4	2019	42	32	37

Sr. No.	Year	Mean Max. Temperature (0ºC)	Mean Min. Temperature (0ºC)	Mean Temperature (0ºC)
5	2018	30	30	38

**Source: Worldweatheronline.com*

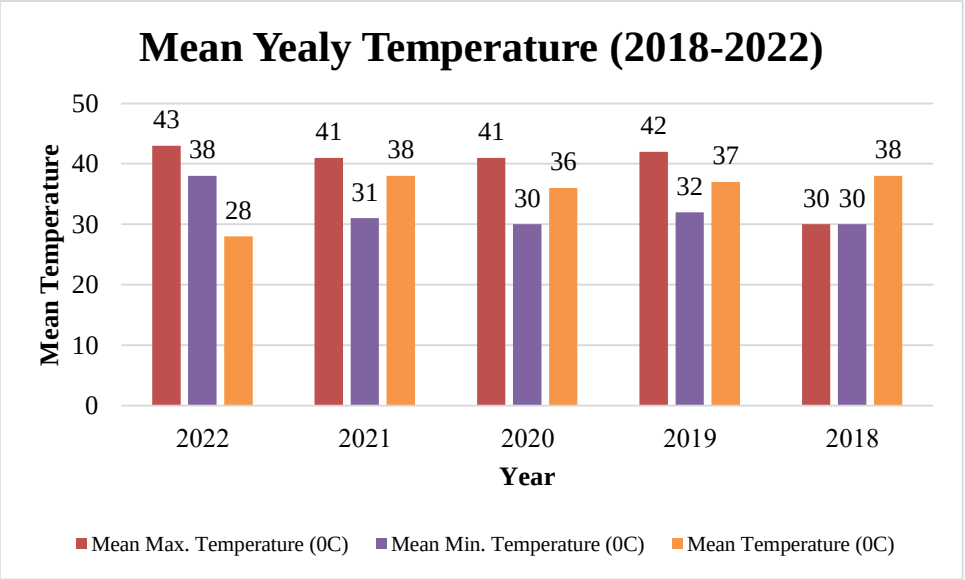


Figure 4. 2: Yearly Mean Temperature (2018-2022)

According to the Metrological Gauging Station installed at Airport, the coldest month is January in which the mean minimum temperature is 3.2°C and the mean maximum temperature is 17.9°C. June is the hottest month with the mean minimum temperature of 23.7°C and the mean maximum temperature as 38.4°C.

Relative Humidity

The relative humidity data at Airport, Islamabad met stations around the proposed Project Area is given in **Table 4.2**. The data reveals that at 00:00 hours, the relative humidity levels are generally higher while lower relative humidity levels are recorded at 12:00 hours. Relative humidity levels are mostly high during the month of August, whereas, these are extremely lower during the highest temperature i.e., May and June.

Table 4. 2: Mean Yearly Relative Humidity (2018-2022)

Sr. No.	Yearly	Humidity
1	2022	41.5
2	2021	38.0
3	2020	41.0
4	2019	43.0
5	2018	34.5

Source: https://worldweatheronline.com/

Graphical representations of month-wise Relative Humidity of Airport meteorological gauging stations are provided below in **Figure 4.3**.

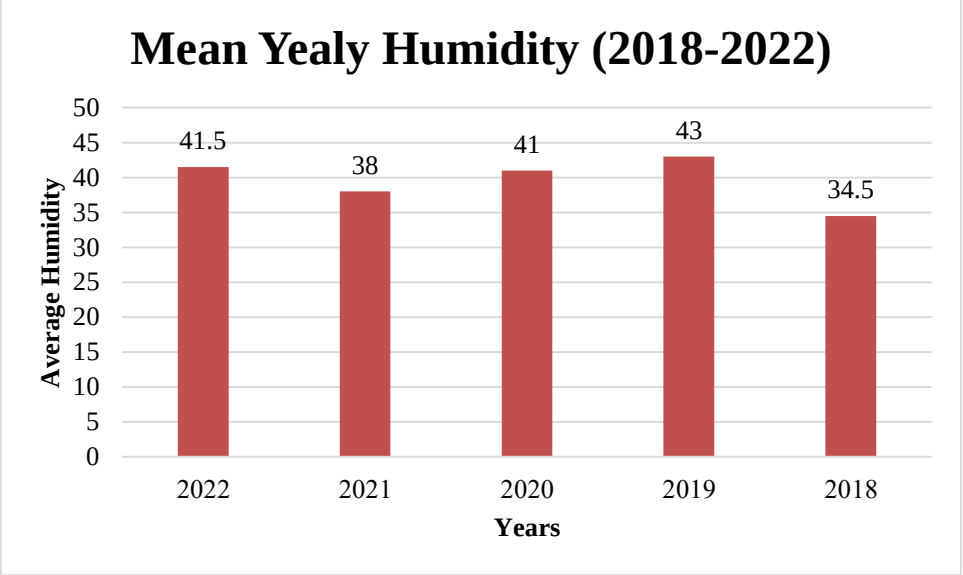


Figure 4. 3: Mean Yearly Humidity (2018-2022)

Rainfall

Mean monthly rainfall data and the number of rainy days recorded at Airport, Islamabad, climatic stations in the vicinity of the Project Area are given in **Table 4.3**. The average annual rainfall of the project area is 1248 mm. The maximum rainfall occurs during the months of July and August, which is about 50% of the annual rainfall. Winter rains generally occur during the months of January to March, whereas, November is normally the months with least precipitation.

Table 4. 3: Mean Monthly Rainfall Recorded at Airport Station

Sr. No.	Months	Mean Monthly Rainfall (mm)
		Airport
1	Jan	56.2
2	Feb	84.1
3	Mar	92.4
4	Apr	63.2
5	May	35.8
6	Jun	75.3
7	Jul	307.8
8	Aug	340.3
9	Sep	110.7
10	Oct	31.7
11	Nov	14.4
12	Dec	36.3
Annual		1248.5

Source: Pakistan Meteorological Department

Graphical representations of month-wise precipitation of Airport meteorological gauging station are provided below in **Figure 4.4**. The maximum rainfall occurs during the monsoon season in the months of July and August.

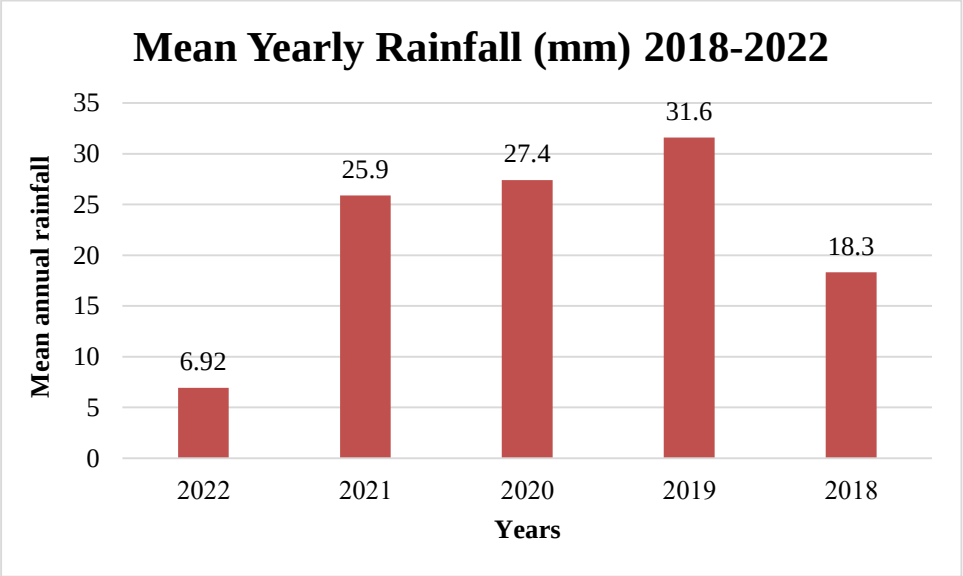
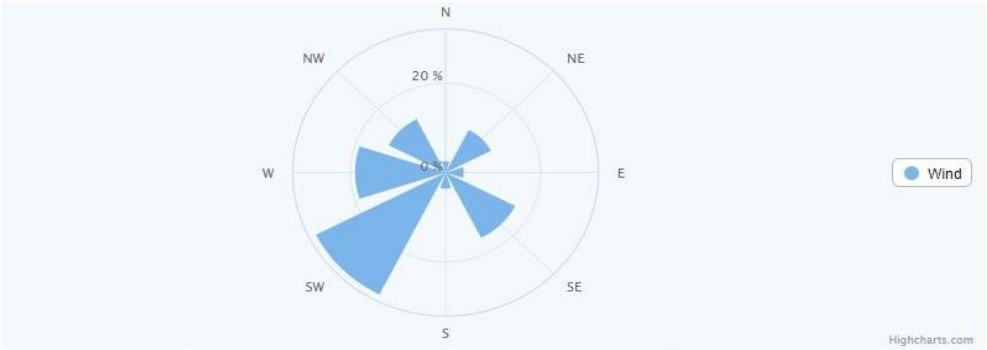


Figure 4. 4: Mean Monthly Rainfall

Wind Direction

The wind rose for Rawalpindi where majority of the project components are present shown in **Figure 4.5.** The figure shows that predominant wind direction if South West and West



Wind direction graph in Rawalpindi using average values according to our data.

N ▼ Northern	NE ▲ Northeastern	E ◄ Eeastern	SE ➤ Southeastern	S ▲ Southern	SW ◄ Southwestern	W ➤ Western	NW ▲ Northwestern
2.5%	10.7%	3.8%	16.4%	3.6%	30.6%	19%	13.4%

Figure 4. 5: Wind Rose of Rawalpindi

4.3 ECOLOGICAL RESOURCES

4.3.1 Biodiversity

Mainly a country's wilderness areas and scenic landscapes with their associated flora and fauna form natural capital of a country. The contribution of the "Natural capital" is recognized at three distinct levels including genera, species, and community-habitat and ecosystem. Pakistan comprises of a total of nine major ecological zones and the term has relevance for each of Pakistan's administrative units—district, province, and particularly country. The greater the number of genera, species and habitats and ecosystems present within these units, the greater is the Biodiversity.

4.3.2 Forestry (Flora)

As climate of study area is subtropical, the vegetation of the area falls under subtropical broad leaved evergreen scrub type as per phyto-geographical classification of the area. The tract, in which the project site exists, was once covered with native vegetation consisting, of trees and thick cover of bushy vegetation, with the onslaught of civilization, this vegetation was cleared for agricultural purposes.

As the project area is part of the Potohar plateau, the vegetation is characteristic of that tract. Kau (Olea cuspidata) is the climax species. However, in the project and the study area, Phulahi (Acacia modesta) and Kikar (Acacia nilotica) dominate. Shisham (Dalbergia sissoo), Mesquit (Prosopis juliflora) and Paper Mulberry (Broussonetia papyrifera) have also grown as secondary species with Phulahi. With the onslaught of civilization and urbanization of the tract, the original vegetation in and around the tract was removed and replaced by ornamental plants and lawns, which is the dominant land use in the tract. The detail of vegetative species of the region are given in **Table 4.4** below:

Table 4. 4: Names of Trees/shrubs & Herbs of the Region

Sr. No.	Common Name	Scientific Name
1	Banyan/Bhor	Ficus benghalensis
2	Phulai	Acacia modesta
3	Wild olive	Olea ferruginea
4	Sanatha	Dodonaea viscosa
5	Dhak	Butea frondosa
6	Anar	Punica granatum
7	Pear	Pyrus pasha
8	Sukh Chain	Pongamia pinnata
9	Amaltas	Cassia fistula

Sr. No.	Common Name	Scientific Name
10	Bottle Brush	Callistemon spp
11	Jasmine	Jasminum humile
12	Holmskioldia	Holmskiodia sanguine
13	Beri	Zizyphus mauritiana
14	Royle's Spike Thorn	Gymnosporia royleana
15	Baikarh	Adhatoda vasica
16	Zebrawood	Pistacia integerrima
17	Poplar	Populus sp.
18	Devil tree	Alstonia scholaris
19	Bougainvillea	Bougainvillea spectabilis
20	Sukh chain	Pongamia pinnata
21	Dharek	Melia azedarach
22	Eucalyptus	Eucalyptus camaldulensis

4.3.3 Wildlife (Fauna)

The project area, on account of nature of vegetation and topography, once rich in vegetation and wildlife has now reduced its potential due to over hunting, loss of proper habitat, conversion of forest land. The wild mammals were not spotted commonly. However, domestic mammals were found to be common around the project area. Fauna of the proposed area consists of mammals, reptiles, amphibians and birds. The details are given as under:

Mammals: The study area was once considered as good habitat to many wild species but due expansion of population and commercialization the habitats of many species are decaled as degraded.

However, there is no wild mammalian specie observed in the Project area except some domesticated animals including cats, dogs, etc. However, the following **Table 4.5** shows the list of mammalian species present in the region, as the project area is to be considered highly degraded in terms of wild fauna. Jackals and foxes are seen occasionally in Islamabad and Sangjani area of proposed project site. Wild boars and Hares are found on all the low hills and in most of the ravines.

Table 4. 5: List of indigenous Mammals

Sr. No.	Mammals	Scientific Name
1	Jackal	Canis aureus
2	Fox	Vulpes vulpes
3	Jungle Cat	Felis chaus
4	Palm Squirrel	Funambulus palmarum
5	Mongoose	Herpestes auropunctatus

Sr. No.	Mammals	Scientific Name
6	Indian mole rat	Rattus rattus
7	Field mouse	Funambulus pennant
8	Porcupine	Hystrix indica
9	Rabbit	Oryctolagus cuniculus
10	Cape hare	Lepus capensis
11	Masked palm civet	Paguma larvata
12	Wild boar	Sus scrofa

Reptiles: Reptiles reported in the project area and its vicinity are given in **Table 4.6**. Other varieties of snakes reported in the project area are Rat Eaters, Sang Choor and a snake locally called as Phissi.

Table 4. 6: List of Reptiles observed in Project Area

Sr. No.	Local/ English Name	Scientific Name
1	Fringed toed Lizard	Acanthodactylus cantoris
2	Spiny tailed Lizard	Uromastyx hardwickii
3	Common Krait	Bungarus caeruleus
4	King Cobra	Ophiophagus Hannah
5	Viper	Vipera xanthina

Amphibians: Amphibians found in the project area are given in **Table 4.7**.

Table 4. 7: List of Amphibians observed in Project Area

Sr. No.	Local/ English Name	Scientific Name
1	Common frog	Rana tigrine
2	Common toad	Bufo bufo
3	Marble frog	Uperodon systoma

Birds: Many bird species have been reported in and around the Study Area. These include passage migrants, vagrant, resident, breeding and irregular visitors. The migratory birds descend from higher altitudes during the winter months. Avifauna of the tract consists of small and medium sized birds of different colors, flying from one tree to the other or from crop to crop. Most common birds are House Sparrow, House Crow and Mynah. Birds like Cuckoo, Bulbul, Hoopoe, Parrots, Blue Birds, and Little Egrets etc were frequently sighted. The common birds observed and reported in the Study Area are given in **Table 4.8** below:

Table 4. 8: Birds Found in Study Area

Sr. No.	Common Name	Scientific Name
1	Rock Pigeo	Columba livia
2	Myna	Acrido therestritis
3	Grey Partridge	Perdix perdix
4	House Sparrow	Passer domesticus
5	Red-billed chough	Pyrrhocorax pyrrhocorax
6	Magpie	Pica pica
7	Alpine Chough	Pyrrhocorax graculus
8	Grey shrikes	Lanius excubitor
9	Spotted doves	Spilopelia chinensis

4.3.4 Fisheries and Aquatic Biology

The Nullah Lai and Niki Lullah are the main water bodies located near project site. Due to discharge of wastewater from residential and commercial areas these water bodies have no aquatic life of worth mentioning.

4.4 SOCIOECONOMIC ENVIRONMENT

To assess the socioeconomic conditions of the project area, consultations are being carried out with participants including male and female. Households (HH) has been studied during field survey based on individual interviews as well as focus group discussions/ public consultations. Consultation participant include project affected people and community residing along the route of Conductance Main and Replacement of AC/GI Pipelines. Further the consultations were carried out at previously selected sites for construction of OHRs and GSTs for storage of additional water. In addition, the secondary data, including Economic Survey of Pakistan (2018-19), Bureau of Statistics (2017-18) and District Population Census report.

Detailed surveys were conducted for project scoping during the month of December 2022. For the purpose of the environmental and social assessment and sensitive receptor data collection, a Corridor of Impact of 100 meters was taken. 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.

The names of the major settlements falling within the close vicinity of project area are Sector 1, 2 and 3 of Khyaban-e-Sir Syed. These sectors are comprised on three union councils, UC 10, UC11, UC-12. The area for proposed Conductance Main start from Service Road West of Sector I-10 of Islamabad and runs through the IJP road before

entering into KSS. Khayaban-e-Sir Syed (KSS) is located in the WEST-I Zone of Rawalpindi with a 1.48 sq. km area.

The proposed project components are located in two territories, Rawalpindi and Islamabad. Start of New Conductance Main is from green area of Sector I-10 of Islamabad and it will run parallel to IJO road and enter into Rawalpindi near CDA Stop. Rest of the project component are located in District Rawalpindi.

Rawalpindi district is governed by the Rawalpindi District Council, while several regions sub-divided into one Municipal Corporation, two Cantonment Boards and Seven Tehsils;

- Rawalpindi Municipal Corporation
- Rawalpindi Cantonment Board
- Chaklala Cantonment Board

Table 4.9 shows the Administrative subdivision of Rawalpindi District.

Table 4. 9: Administrative subdivision of Rawalpindi

Sr. No.	Tehsil	Headquarters	Area (km2)	Population (2017)
1	Taxila	Taxila	NA	677,951
2	Rawalpindi	Rawalpindi	NA	3,258,547
3	Gujar Khan	Gujar Khan	1,466	678,503
4	Kallar Syedan	Kallar Syedan	421	217,273
5	Kahuta	Kahuta	NA	220,576
6	Potohar	Potohar	NA	NA

4.4.1 Population & Communities:

Khayaban-e-Sir Syed (KSS) is located in the WEST-I Zone of Rawalpindi with a 1.48 sq. km area. There is a total of three Union Councils (UCs) in this area named UC-10 (Khayaban-e-Sir Syed (N)), UC-11 (Khayaban-e-Sir Syed (S)), and UC-12 (Dhok Najjo). The current population of KSS is 69,388 persons while the future population for 2050 is projected as 138,165 persons. Sector I-10 of Islamabad is located at the boundary with Rawalpindi, divided by IJP Road. It is a lightly built area

located on the southwestern edge of the city.

According to Census 2017 the male population of Rawalpindi was 2,736,180 and female population was 2,665,089. The ratio of people living in rural and urban area was; 2,396,672 (44.36%) lived in rural areas and 3,005,708 (55.64%) lived in urban areas.

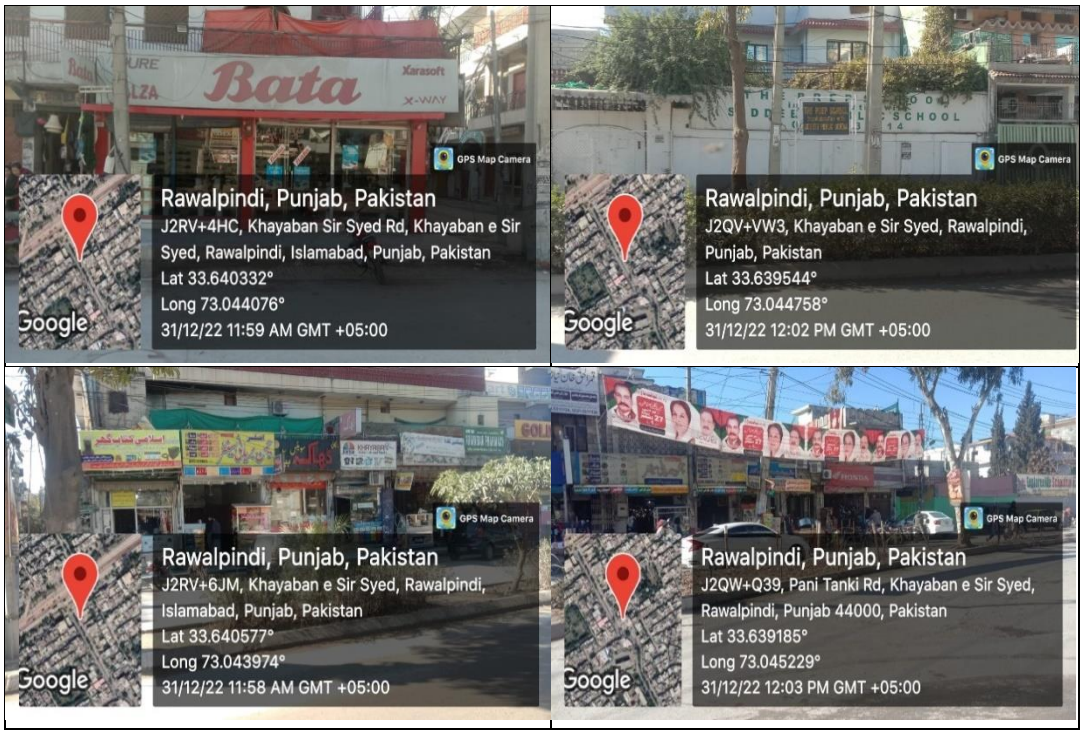
I-10 borders Rawalpindi to the south and neighbor's I-9 and I-11, while sectors H-9, H-10, and H-11 are located adjacent. Like most other I-sectors, I-10 is primarily a part of the industrial zone. It consists of open land with dense vegetation. It is a densely populated area. **Figure 4.6** shows the socio-economic feature of the project area. Demographic features of Rawalpindi are shown in **Figure 4.7**. According to Census report 2017, the demographic features of Rawalpindi including total area, population, population density and annual population change is given in **Table 4.10**.

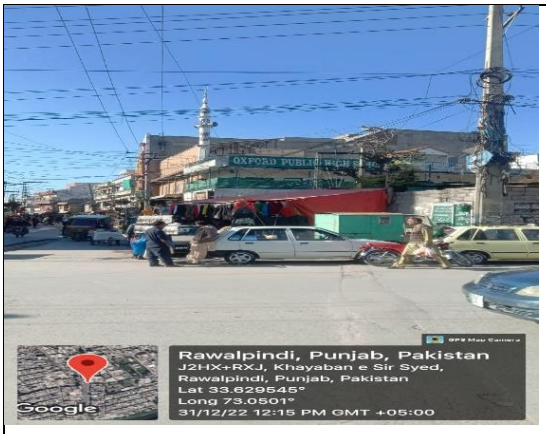
Table 4. 10: Demography of Rawalpindi (2017 Census)

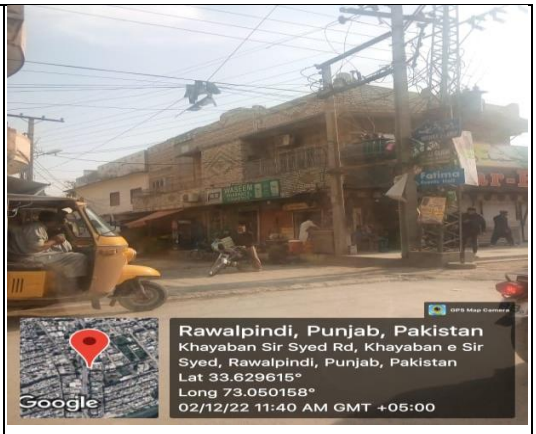
Districts	Area (km^2)	Population (2017)	Density (people/km^2)	Annual Population Change 1998 to 2017
Rawalpindi	5,285	5,402,380	1022	2.5%

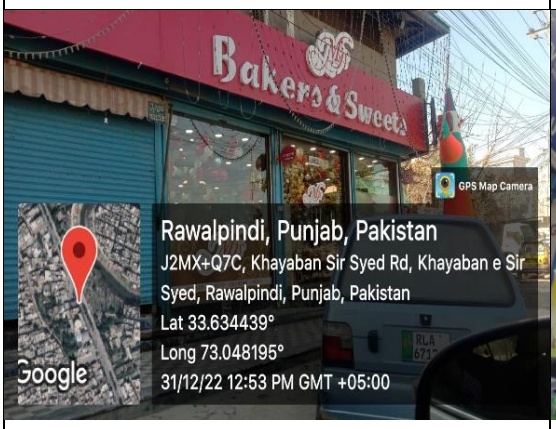
Source: *District wise population Census 2017 by Pakistan Bureau of Statistics: Government of Pakistan*

Figure 4.6: Photographs depicting Socio-economic Conditions of the project area



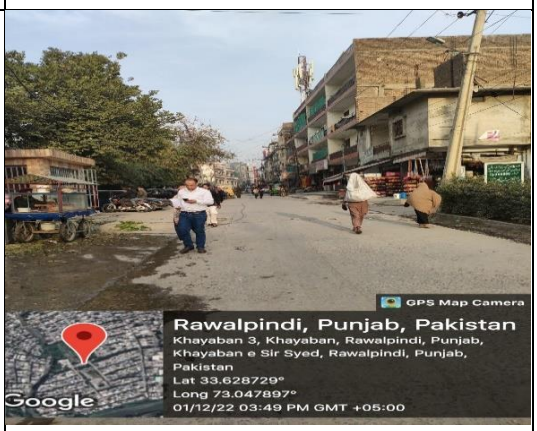

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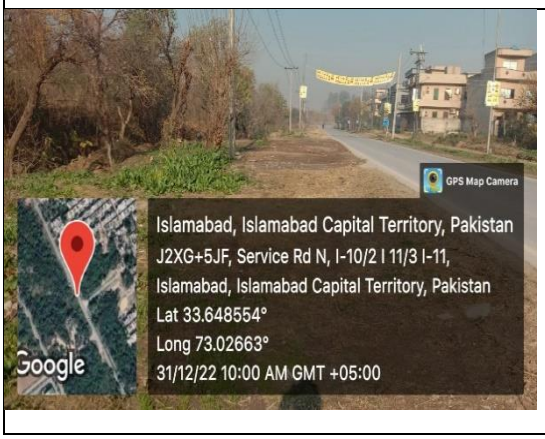

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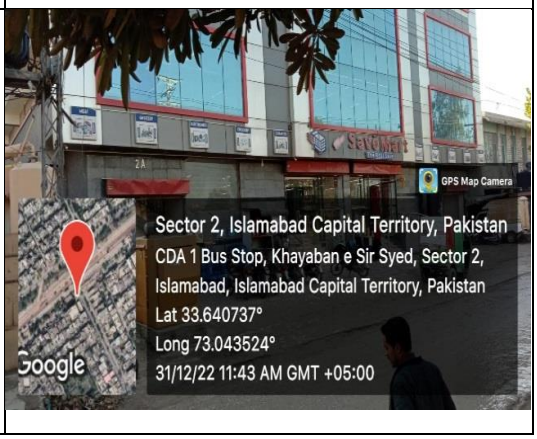

Bakers & Sweets
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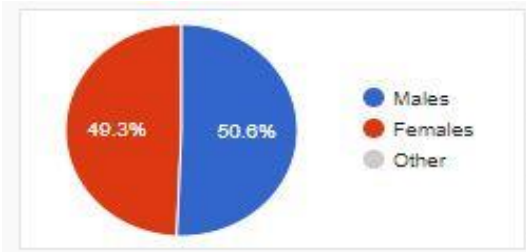

GPS Map Camera
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J2JX+RX4, Khayaban e Sir Syed, Rawalpindi, Punjab, Pakistan
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Long 73.04962°
31/12/22 12:50 PM GMT +05:00
Google


GPS Map Camera
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J2QX+8PV, Shabbir Rd, Khayaban e Sir Syed, Rawalpindi, Punjab, Pakistan
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Google

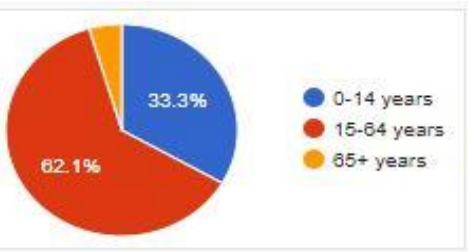

GPS Map Camera
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Lat 33.628729°
Long 73.047897°
01/12/22 03:49 PM GMT +05:00
Google


GPS Map Camera
Islamabad, Islamabad Capital Territory, Pakistan
J2XG+5JF, Service Rd N, I-10/2 I 11/3 I-11, Islamabad, Islamabad Capital Territory, Pakistan
Lat 33.648554°
Long 73.02663°
31/12/22 10:00 AM GMT +05:00
Google

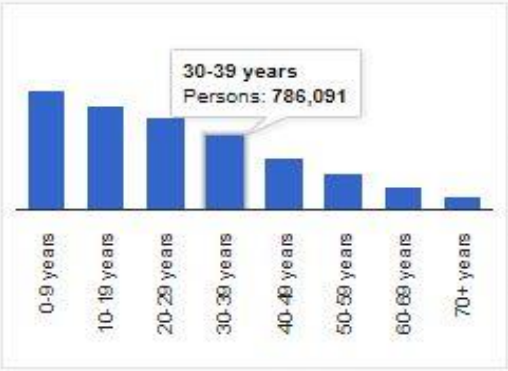

GPS Map Camera
Sector 2, Islamabad Capital Territory, Pakistan
CDA 1 Bus Stop, Khayaban e Sir Syed, Sector 2, Islamabad, Islamabad Capital Territory, Pakistan
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Long 73.043524°
31/12/22 11:43 AM GMT +05:00
Google



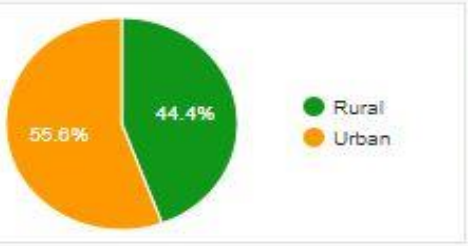
Gender (C 2017)	
Males	2,736,180
Females	2,665,089
Transgender	1,111



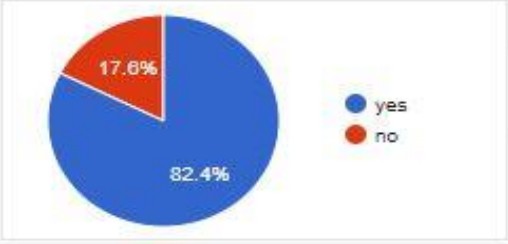
Age Groups (C 2017)	
0-14 years	1,800,127
15-64 years	3,356,182
65+ years	246,071



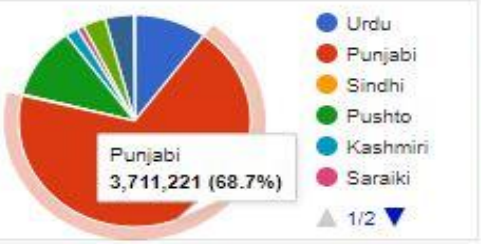
Age Distribution (C 2017)	
0-9 years	1,243,221
10-19 years	1,084,364
20-29 years	969,529
30-39 years	786,091
40-49 years	540,859
50-59 years	389,436
60-69 years	240,132
70+ years	148,748



Urbanization (C 2017)	
Rural	2,396,672
Urban	3,005,708



Literacy (A10+) (C 2017)	
yes	3,429,112
no	730,047



Mother Tongue (C 2017)	
Urdu	548,517
Punjabi	3,711,221
Sindhi	10,280
Pushto	588,570
Balochi	3,304
Kashmiri	97,545
Saraiki	51,512
Hindko	170,677
Brahvi	3,662
Other Language	217,092

Figure 4. 7: Demographic features of Rawalpindi

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. All the respondents in project area are living in category of Pacca Houses.

The economy of majority of the people of study area is based on their private business and government jobs. KSS is among the posh area of Rawalpindi with high rage in per capita income. Some family members are settled outside the country and send remittances to family members in Pakistan. Majority of the people of Rawalpindi and Islamabad are directly or indirectly depends on mining, Government/private jobs in educational/government institutions for their income.

4.4.2 Industries

I-10 borders Rawalpindi to the south and neighbor's I-9 and I-11, while sectors H-9, H-10, and H-11 are located adjacent. Like most other I-sectors, I-10 is primarily a part of the industrial zone. It consists of open land with dense vegetation. It is a densely populated area.

4.4.3 Infrastructure

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 Rawalpindi and Islamabad.

The cities of Islamabad and falls under category of large cities and they are among the hub of educational facilities. Large number of Government and private Schools, Colleges and Universities are present in the study area. The **Figure 4.8** shows the presence of large number of Schools and other educational institutes.

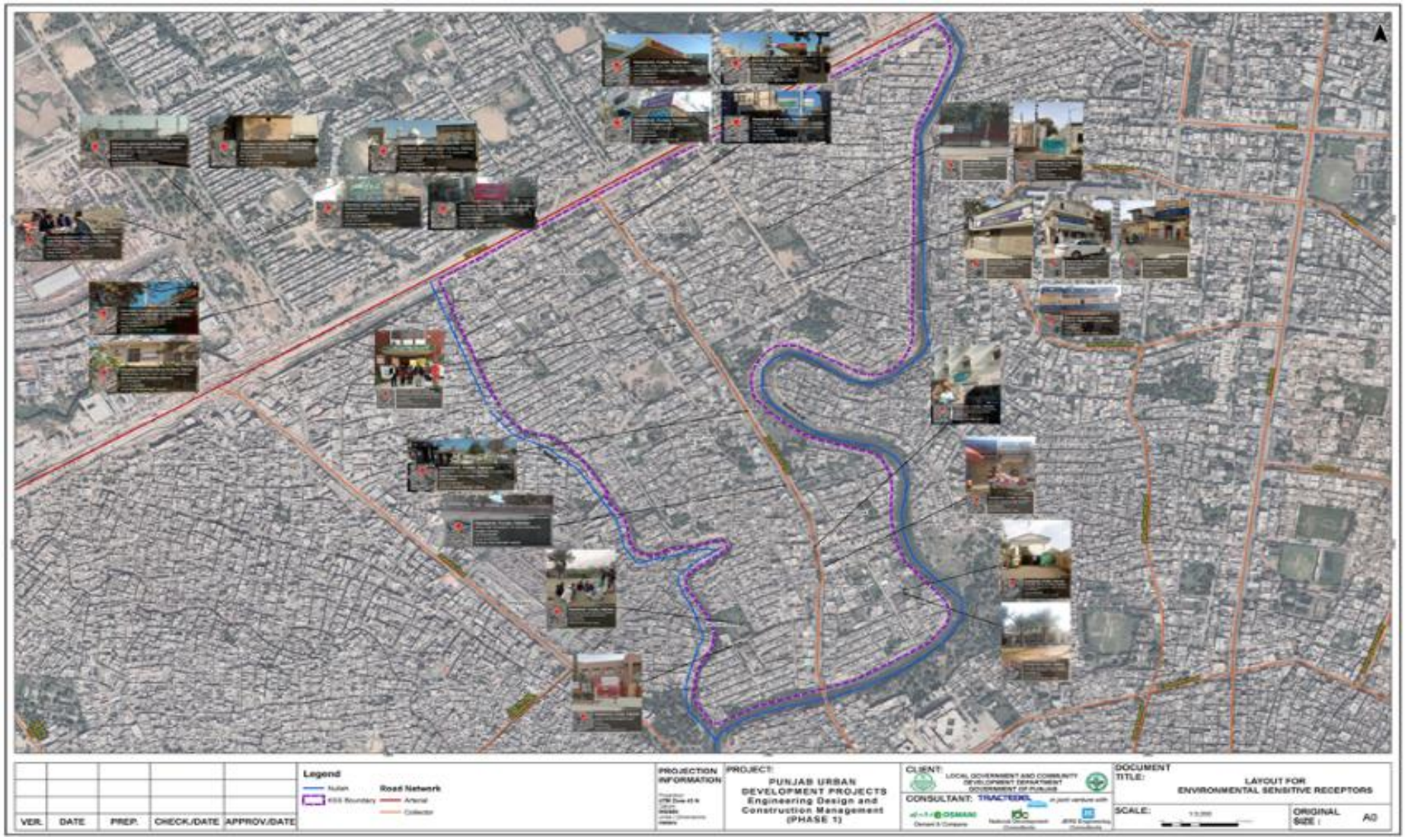


Figure 4. 8: Environmental Sensitive Receptors

4.4.4 Transportation: Roads, Rails, Airports, Navigable Rivers

Airport, Islamabad meteorological station was identified near to the proposed project. A mild steel (MS) supply main of 300 mm (ID) is currently supplying water to KSS. It takes water from a 600 mm (ID) supply main which is bifurcated from a 1000 mm (ID) main line coming from Tomar reservoir. The Tomar reservoir is fed by a 1400 mm main line from Sangjani treatment plant based on Khanpur dam.

As this supply line is not enough to fulfil even the current water demands, a new supply main of 620 mm (ID) or 710 mm (OD) HDPE with pressure rating of PN-10 has been proposed to meet the maximum water demand of KSS up to the year 2050. This new line shall be laid parallel to the existing main line on the other side of the road (Service Road West I-10) in the green strip in Sector I-10 area. This line will run parallel to IJP Road and will cross the IJP Road to enter into Khyaban-e-Sir Syed (KSS) at CDA Stop.

Agriculture & Mineral Development

The Project Area does not have any valuable minerals. The soil of Rawalpindi is different in character and generally inclined to be dry. However, it is rich in potential plant nutrients. Here, the solid portion of soil is both organic and inorganic. The organic part consists of both living and decayed plant and animal materials. Texture of the soil plays a very important role in its water holding capacity of the soil. The same is true for various faunal species, which are important for adding the nutrients in the soil by the breakdown of organic matter and making it suitable for the agriculture.

4.4.5 Health Facilities

Health facilities in the form of Government and Private health care institutes is present in and around the project area. **Figure 4.8** (Sensitive Receptors) shows the presence of health care facilities. Being the major cities, Rawalpindi and Islamabad has primary, secondary and tertiary health care facilities. PIMS, Shifa International, CMH, Rawal Foundation, Ripha International Hospital, Islamabad International Hospital and Research Centre etc.

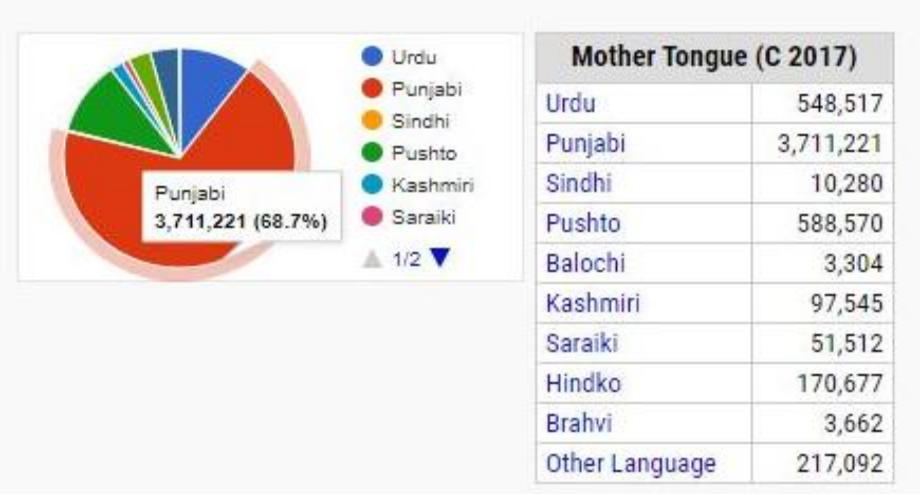
4.4.6 Recreational Resources & Development

Different types of outdoor recreational facilities in twin city include the Allama Iqbal Park, Mohra Sharif Park, Jinnah Park, Shah Najaf Park and Ladies Park. Further, no tree cutting is involved in this proposed project. There will be disturbance to green patches of public parks during joining of Bulk Water Supply lines with existing OHRs

and GSTs which are mostly present in existing parks of PHA. Approval from PHA will be taken before execution of the project.

4.4.7 Cultural & Aesthetic Values

Majority of the population of project area is Muslims. Cultural festivals are mostly linked with traditional religious events. According to the 2017 census Muslims were the overwhelming majority religion with 98.01%, while Christians were 1.90% of the population. The major language of the area is Hindko, Punjab, Urdu and Pashto. People also speak other languages like Kashmiri, Saraiki and Brahvi. The **Figure 4.9** shows detail of mother tongue used by people in study area.



Mother Tongue (C 2017)	
Urdu	548,517
Punjabi	3,711,221
Sindhi	10,280
Pushto	588,570
Balochi	3,304
Kashmiri	97,545
Saraiki	51,512
Hindko	170,677
Brahvi	3,662
Other Language	217,092

Figure 4. 9: Detail of mother tongue of people in the study area

4.4.8 Site Suitability

After subsequent consultations with Rawalpindi WASA and stakeholders, it is recommended to go with proposed option Lying of new conductance main i.e., use of both existing and proposed supply main. In this way, existing supply line will continue supplying water during the construction period of new proposed line and supply to the residents of KSS will not be affected. It will also fulfill the water needs of KSS for next 30 years (till 2050).

During the field survey of the project area, no indigenous people, affected women headed households and environmentally sensitive spot were observed in the project area as well as in the vicinity of the project area. Thus, there would not have any impact on the indigenous people and women headed households' due to the implementation of this project.

Environmentally speaking, the carrying capacity of the environment is not utilized. The project activity, under the proposed strict operational environmental controls, is

not going to leave adverse impacts on all out environment. Further, funds are available under Dream-I project of Local Government and Community Development Department Government of Punjab. Diversion routes will be allocated for movement of traffic under traffic management plan.

4.5 BASELINE ENVIRONMENTAL QUALITY

Environmental monitoring was carried out for water, air and noise levels at two locations within the proposed project site. The locations were selected for environmental monitoring based on the environmental receptors and level of construction activity involved. Environmental monitoring was carried out in December 2022 by EPA Certified Laboratory. Location of the sampling points are marked on the layout map. The map of project site marked with monitoring locations is shown as **Figure 4.10** of this report. The results of Environmental Monitoring are attached as **Annexure-III** of the EIA report. The monitoring is carried out with calibrated equipment. Calibration certificates of the equipment are attached as **Annexure IV.**

4.5.1 Ambient Air Quality

There is no major anthropogenic source found near and around the proposed project site area, other than local traffic and household activities like cooking and cleaning. The monitoring parameters selected for analysis of ambient air are based on the parameters defined in NEQS, PEQS and WHO for air quality. Following parameters were analyzed to check air quality of proposed project area.

- Respirable particulate matter: (PM_{10}): ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Oxides of Nitrogen (NO_X): Mainly Nitrogen dioxide (NO_2) and Nitric oxide (NO)
- Carbon Monoxide (CO)
- Ozone (O_3)
- Suspended Particulate Matter (SPM)

Reason for selection of Monitoring point

The sampling locations were identified to check the ambient air quality near the proposed construction sites of OHRs and GSTs. These sites were selected based on the number of sensitive receptors and level of construction. The construction of GST would have involved emission of fugitive dust and exhaust from working of heavy

machinery. The Ambient air quality analysis was carried out at proposed Underground Tank-2 (A-1) & proposed Underground Tank-4 (A-2). The rationale for selection and detail of sampling locations is given below in **Table 4.11**.

Table 4. 11: Detail of Air Quality Sampling Locations

Sample ID	Coordinates	Location	Rational for selection
A-1	Lat.33.63908 Long. 73.04876	Near proposed Underground Tank-2	The sampling location was identified based on the number of sensitive receptors and level of construction activity.
A-2	Lat. 33.630185 Long. 73.051599	Near proposed Underground Tank-4	The sampling location was identified based on the number of sensitive receptors and level of construction activity.

Sampling location and coordinates are marked on the pictures given in **Figure 4.10.**

Results of Analysis

Ambient Air Quality sampling was carried out at two locations (i) Near proposed Underground Tank-2 (A-1) (ii) Near proposed Underground Tank-2 (A-2) on 1st and 2nd December, 2022. The Summery of air quality analysis is given below in **Table 4.12**. The complete Laboratory reports are attached as **Annexure-III** of the EIA report.

All parameters analyzed are within NEQS/PEQS limits for ambient air. However, values of PM_{10} exceeded the limiting value set by WHO. The major source of particulate matter is traffic and commercial activities in the area.

Table 4. 12: Ambient Air Quality Results

Near Underground Tank-2						
Sr. No	**Parameters**	**PEQS/NEQS**	**WHO**	**Units**	**Results**	**Test Method**
1	PM_{10}	Annual Average 120 24 hours 150	50	µg/m^3	133	Particular Sensor
2	$PM_{2.5}$	Annual Average-15 24 hours -35		µg/m^3	30.2	Particular Sensor
3	CO	8 hours -5 1 hours 10	--	µg/m^3	1.5	Non Dispersive Infrared Absorption (NDIR)
4	NO	Annual Average-40	1 hr. 200	µg/m^3	15.3	Chemiluminescence Detection

		24 hours-40				
5	NO_2	Annual Average-40 24 hours-80		$\mu g/m^3$	28.5	Chemiluminescence Detection
6	SO_2	Annual Average-80 24 hours-120	24hrs 20	$\mu g/m^3$	13	UV Flourescence (UVF)
7	O_3	1 hour -130		$\mu g/m^3$	19	Non Dispersive UV Absorption
8	SPM	Annual Average-360 24 hours-500		$\mu g/m^3$	417	Particular Sensor
Near Underground Tank-4						
Sr. No.	**Parameters**	**PEQS/NEQS**	**WHO**	**Units**	**Results**	**Test Method**
1	PM_{10}	Annual Average-120 24 hours 150	50	$\mu g/m^3$	133	Particular Sensor
2	$PM_{2.5}$	Annual Average-15 24 hours-35		$\mu g/m^3$	34.5	Particular Sensor
3	CO	8 hours-5 1 hours-10	--	$\mu g/m^3$	1.5	Non Dispersive Infrared Absorption (NDIR)
4	NO	Annual Average-40 24 hours-40	1 hr. 200	$\mu g/m^3$	13.7	Chemiluminescence Detection
5	NO_2	Annual Average-40 24 hours-80		$\mu g/m^3$	26.5	Chemiluminescence Detection
6	SO_2	Annual Average-80 24 hours-120	24hrs 20	$\mu g/m^3$	11.5	UV Flourescence (UVF)
7	O_3	1 hour-130 Annual Average-360		$\mu g/m^3$	18.8	Non Dispersive UV Absorption
8	SPM	24 hours-500 Annual Average-120		$\mu g/m^3$	458	Particular Sensor

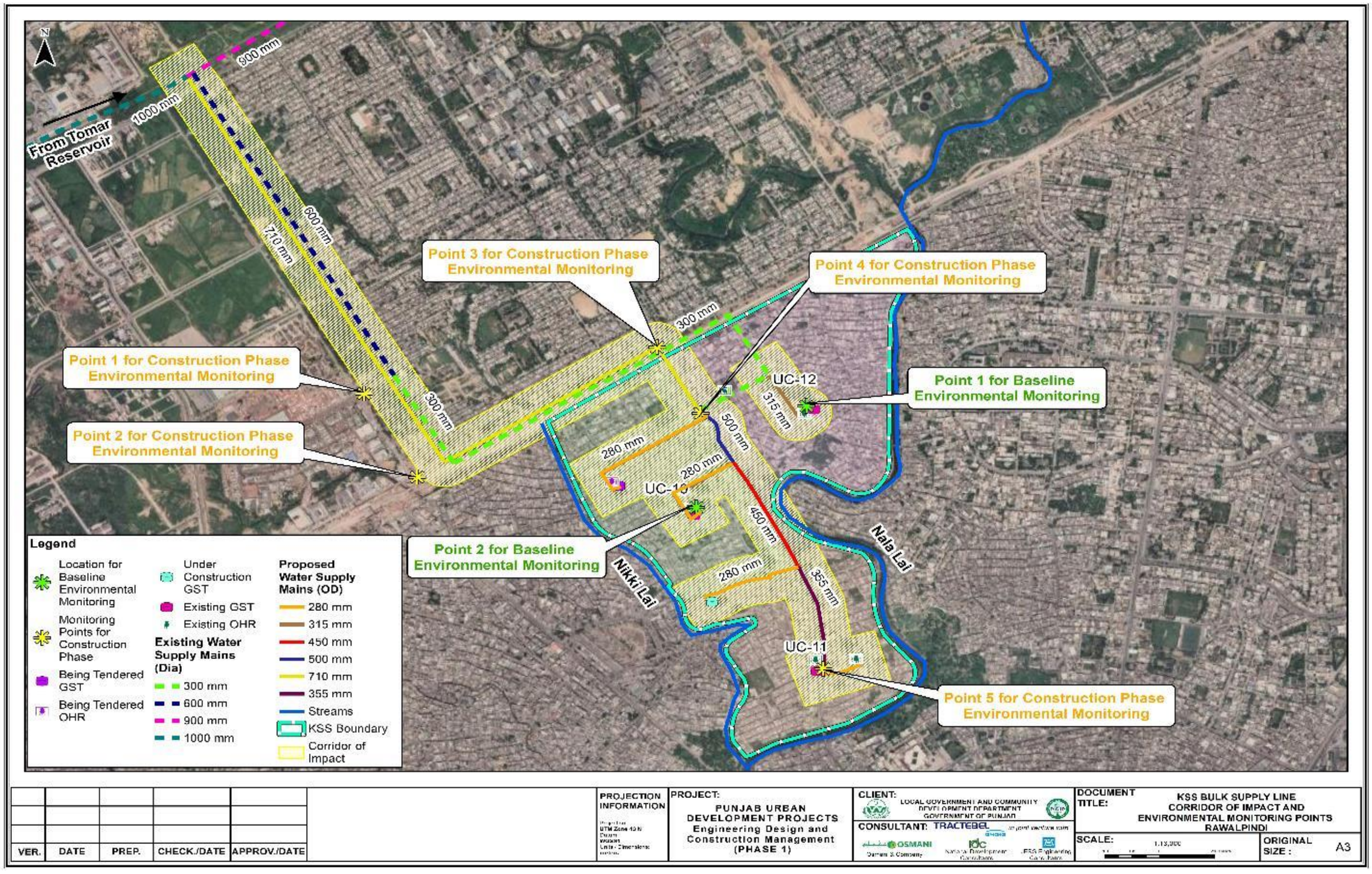


Figure 4. 10: Locations of Environmental Monitoring Points

4.5.2 Ambient Noise Levels

This section defines the baseline ambient noise levels in the CoI in a manner that can be used for the assessment of the noise impact of the proposed project. Noise levels were measured at two selected locations on 1st and 2nd December, 2022. The sampling locations for noise levels was selected based on the presence of environmental receptors and the level of proposed construction activity. The detail monitoring report is attached as **Annexure-III.**

Reason for selection of Monitoring point

The sampling locations were identified to check the noise levels near the treatment plant (source) and the other sample was taken from Underground Tank-2 & Underground Tank-4. KSS is densely populated area with large number of receptors and people to be affected by project activity. Baseline has been established to check the level of impact during construction phase of the proposed project. Sampling location and coordinates are marked on the pictures given in **Figure 4.10.**

The location of noise levels sampling with rational for selection of site is given below in **Table 4.13**.

Table 4. 13: Detail of location for Noise Levels Monitoring

Sample ID	Coordinates	Location	Rational for selection
N-1	Lat 33.63908 Long. 73.04876	Near proposed Underground Tank-2	The sampling location was identified based on the number of sensitive receptors and level of construction activity.
N-2	Lat. 33.630185 Long.73.051599	Near proposed Underground Tank-4	The sampling location was identified based on the number of sensitive receptors and level of construction activity.

Results and Analysis

The results of noise levels monitoring are presented below in **Table 4.14**. All parameters analyzed were within NEQS limits values for ambient noise levels in the day time.

Table 4. 14: Results of Noise level Monitoring

Near Underground Tank-2						
Results (db(A)		**PEQS/NEQS Limits**		**WHO Limits**		**Remarks**
Day	**Night**	**Day Time**	**Night Time**	**Day**	**Night**	
59	51	65	55	70	70	Within limits
Near Underground Tank-4						
Results (db(A)		**PEQS/NEQS Limits**		**WHO limits**		**Remarks**
Day	**Night**	**Day Time**	**Night Time**	**Day**	**Night**	
67	61	65	55	70	70	Exceeding Prescribed limits

The photographic evidence of Baseline Environmental Monitoring of Drinking Water, Ambient Air and Noise level is presented hereby.

4.5.3 Water Quality

Water sampling was carried out at two locations (i) proposed underground tank-2 (W-1) (ii) proposed underground tank-4 (W-2) on 1st and 2nd December 2022. Ground water samples were taken for analysis of physical, chemical and biological parameters defined in NEQS/PEQS and WHO guidelines. It is pertinent to mention here that the sampling locations were selected based on the initial designing of project in which construction of Overhead Reservoirs (OHRs) and Ground Storage Tanks (GSTs) were part of the design. Keeping in view the sensitivity of environmental receptors, these two sampling sites were identified. The samples were taken from tap water of houses near the parks. The analysis results of water samples are given below. The lab reports are attached as **Annexure-III** of the EIA report.

Locations and Reason for selection of Monitoring point:

The location and rationale of the water sampling is given below in **Table 4.15**.

Table 4. 15: Detail of Water Quality Sampling Location

Sample	Coordinated	Location	Sample Taken	Rationale of Selection
W.1	Lat. 33.630233 Long.73.051757	Near proposed underground tank-2	Drinking water (Tap Water)	The sampling locations were identified to check the water quality in KSS to identify the contamination of water due to damaged distribution pipelines.
W.2	Lat. 33.638687 Long.73.04889	Near proposed underground tank-4	Drinking Water (Tap water)	The sampling locations were identified to check the water quality in KSS to identify the contamination of water due to damaged distribution pipelines.

The sampling locations were identified to check the water quality near proposed OHRs and GSTs because these were supposed to be area of heavy construction. Further, the water sampling location were marked to check the level of contamination due to leaked pipelines of KSS. Sampling location and coordinates are marked on the pictures given in **Figure 4.10.**

Results of Analysis

It is evident from the laboratory results that all the analyzed parameters are within compliance of limiting values set by WHO, PEQS, and NEQS for drinking water. The results show that the water is fit for drinking purpose as no biological contamination is found in water sample and the physical and chemical parameters are also fit for drinking purpose. The complete results of the drinking water quality samples are summarized in **Table 4.16**.

Table 4. 16: Analysis Results of Water Samples

Proposed Underground Tank-2						
#	**Parameters**	**PEQS/ NEQS**	**WHO**	**Unit**	**Result**	**Method**
01	pH	6.5-8.5	--	-	6.9	SMWW 4500*B
02	TDS	<1000	1000	mg/l	758	SMWW 2540C
03	Chloride	<250	250	mg/l	54	SMWW 4500Cl-B
04	Fluoride	≤1.5	1.5	mg/l	0.3	U.S. EPA 9214
05	Taste	Nonobjectionable/ Acceptable	--		Acceptable	Organoleptic
06	Odor	Nonobjectionable/ Acceptable	--		Acceptable	Organoleptic
07	Colour	≤15	--	TCU	ND	SMWW 2120C
08	Nitrate	≤50	50	mg/l	25	SMWW 4500NO3-B
09	Nitrite	≤3	--	mg/l	ND	SMWW 4500NO2-B
10	Lead	≤0.05	0.01	mg/l	ND	U.S. EPA-200.7
11	Total Hardness as $CaCO_3$	<500	--	mg/l	468	SMWW 2340C
12	Turbidity	<5	--	NTU	ND	SMWW 2130B
13	Zinc	5	3	mg/l	0.1	U.S. EPA-200.7
14	Aluminum	≤0.2	0.2	mg/l	0.1	U.S. EPA-200.7
15	Cadmium	0.01	0.003	mg/l	ND	U.S. EPA-200.7
16	Selenium	0.01		mg/l	ND	U. S. EPA-200.7

17	Copper	2	2	mg/l	ND	U.S. EPA-200.7
18	Boron	0.3	0.3	mg/l	0.1	U.S. EPA-200.7
19	Barium	0.7	0.7	mg/l	0.2	U.S. EPA-200.7
20	Antimony	≤0.005	≤0.02	mg/l	ND	U.S. EPA-200.7
21	Arsenic	≤0.05	0.01	mg/l	ND	U.S. EPA-200.7
22	Cyanide	≤0.05	0.07	mg/l	ND	SMWW 4500 CN-F
23	Mercury	≤0.001	0.001	mg/l	ND	U.S. EPA-200.7
24	Nickel	≤0.02	0.02	mg/l	ND	U.S. EPA-200.7
25	Residual Chlorine	0.2-0.5	--	mg/l	ND	SMWW 4500-Cl B
26	Total Coliform	-----	0/100ml	------	ND	SMWW 9221 B
27	Fecal Coliform	0/100ml	0/100ml	ml	ND	SMWW 9221 F
28	E. Coli	0/100ml	0/100ml	ml	ND	SMWW 9221 F
29	Manganese	< 0.5		Mg/l	0.1	U. S. EPA-200.7
30	Phenolic Compounds as (Phenols)	NGVS		---	ND	SMWW 5530 C

Proposed Underground Tank-4

Sr. No.	Parameter	PEQS/ NEQS	WHO	Unit	Result	Method
01	pH	6.5-8.5	--	-	6.9	SMWW 4500*B
02	TDS	<1000	1000	Mg/l	614	SMWW 2540C
03	Chloride	<250	250	Mg/l	35	SMWW 4500Cl-B
04	Fluoride	≤1.5	1.5	Mg/l	0.3	U.S. EPA 9214
05	Taste	Nonobjectionable/ Acceptable	--	Unobjec.	Acceptable	Organoleptic
06	Odor	Nonobjectionable/ Acceptable	--	Unobjec.	Acceptable	Organoleptic
07	Color	≤15	--	TCU	ND	SMWW 2120 C
08	Nitrate	≤50	50	Mg/l	15.7	SMWW 4500NO3-B
09	Nitrite	≤3	--	Mg/l	ND	SMWW 4500NO2-B
10	Lead	≤0.05	0.01	Mg/l	ND	U.S. EPA-200.7
11	Total Hardness as $CaCO_3$	<500	--	Mg/l	404	SMWW 2340C
12	Turbidity	<5	--	NTU	0.1	SMWW 2130B

13	Zinc	5	3	Mg/l	0.1	U.S. EPA-200.7
14	Aluminum	≤0.2	0.2	Mg/l	0.1	U.S. EPA-200.7
15	Cadmium	0.01	0.003	Mg/l	ND	U.S. EPA-200.7
16	Selenium	0.01		Mg/l	ND	U. S. EPA-200.7
17	Copper	2	2	Mg/l	ND	U.S. EPA-200.7
18	Boron	0.3	0.3	Mg/l	0.1	U.S. EPA-200.7
19	Barium	0.7	0.7	Mg/l	0.2	U.S. EPA-200.7
20	Antimony	≤0.005	≤0.02	Mg/l	ND	U.S. EPA-200.7
21	Arsenic	≤0.05	0.01	Mg/l	ND	U.S. EPA-200.7
22	Cyanide	≤0.05	0.07	Mg/l	ND	SMWW 4500 CN-F
23	Mercury	≤0.001	0.001	Mg/l	ND	U.S. EPA-200.7
24	Nickel	≤0.02	0.02	Mg/l	ND	U.S. EPA-200.7
25	Residual Chlorine	0.2-0.5	--	Mg/l	ND	SMWW 4500-Cl B
26	Total Coliform	----	0/100ml	Number /100ml	ND	SMWW 9221 B
27	Fecal Coliform	0/100ml	0/100ml	Number /100ml	ND	SMWW 9221 F
28	E. Coli	0/100ml	0/100ml	Number /100ml	ND	SMWW 9221 F
29	Manganese	< 0.5		Mg/l	ND	U. S. EPA-200.7
30	Phenolic Compounds as (Phenols)	NGVS		---	ND	SMWW 5530 C

CHAPTER-5

5.0 PUBLIC CONSULTATION

5.1 GENERAL

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.

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.

The disclosure of the enhancement project in advance and subsequent consultation with stakeholders has advantages in the environmental assessment and mitigation of impacts. Public consultation can also provide a conduit for the improvement of the project implementation to better serve the stakeholders.

Information disclosure through public consultation was carried out. Short brief of project activities was developed and shared with stakeholders.

For disclosure of information, PMU has submitted the IEE report to ADB and it will be uploaded on its website before final approval from ADB.

The implementing agency (RWASA) will prepared brochures related to project containing basic information of the project, construction activities, traffic diversion routes, time of construction etc. for awareness of general public.

The PMU / CIU will provide relevant safeguards information in a timely manner, in an accessible place and in a form and language understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. Disclosure will follow ADB's Public Communication Policy, 2011

The environmental assessment process under the Pakistan Environmental Protection Act only requires the disclosure to the public after the statutory IEE / EIA has been

accepted by the relevant EPA (in this case Federal EPA and Punjab EPA) to be in strict adherence to the rules.

This public consultation process was carried out by the EDCM's Social and Environment teams in December 2022. 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.

The methodology of Focus Group Discussion (FGD) and individual consultation was used for public consultation. Total 10 FGDs were conducted with people of project area. Total 109 men and women participated in these 8 FGDs and individual consultation out of 109 participants 27 (24.8%) are women and 82 (75.2%) are men. Information on positive and negative aspects associated with constructional and operational stage and proper mitigation of adverse impacts were shared at these consultations. Questionnaire used for conducting FGDs and Surveys is attached as **Annexure-XIV**. The attendance sheets of these FGDs are attached as **Annexure-XV**.

5.2 PROPONENTS' ENVIRONMENT MANAGEMENT TEAM

As stated in earlier sections, the following project is in its planning phase. Once the project comes in its construction phase, a team with representatives from key management functions will be developed to assess issues, aspects, opportunities and existing manufacturing process w.r.t environment. Therefore, it is too early to substantiate the stated inscription.

5.3 THE RESPONSIBLE AUTHORITY

Proponent is responsible for the environmental impacts of this project and has taken commitment to implement the mitigation measures proposed in the Environmental Management Plan with subsequent review and approval conditions. Proponent ensured to use all practicable means consistent with other essential considerations to protect and preserve environmental quality.

5.4 OTHER DEPARTMENT & AGENCIES

As part of environmental assessment, detailed meetings were held with the institutional stakeholders in the form of one-to-one meetings i.e. Rawalpindi WASA and CIU Rawalpindi and collective consultative session under the chairmanship of Additional Deputy Commissioner (Finance & Planning) Rawalpindi District. Details of this consultation process are described below;

Officials from office of RDA Rawalpindi, RWASA, Irrigation Department, District officer Rawalpindi, Small Dam project Rawalpindi, MC Rawalpindi, Forest Department, Fisheries Department, Program Director PMU, Deputy Program Director PMU and Team Lead of EDCM participated in this meeting held on 3rd December, 2022 at DC Office Rawalpindi. Details of consultation meetings with official stake holders are mentioned in **Table 5.1**.

Although the project is at its feasibility stage, at some point before or during the construction phase other government departments will be deeply involved regarding their suggestions, requirements of NOCs from their respective departments and any other specific requirement related to proposed project.

Table 5. 1: Finding of Consultation with Government Stakeholders

Sr. No.	Department	Name (FGD)	Comments
Venue: PMU Office Date : 30-11-2022			
1	PMU/CIU	Mr. Ali Qunanin [Infrastructure Engineer]	An infrastructure engineer CIU, Rawalpindi gave a description of the project's objectives. The deputy director development, Rawalpindi also inquired about the project's scope and whether it will have an impact on the supply chains and distribution networking.
2		Mam Sehrish Khurshid [Project Officer]	
Venue: WASA Office Date : 30-11-2022			
1	WASA	Mr. Azizullah Khan [Deputy Director]	According to the WASA deputy director, "A water distribution network already exists; the project will increase the water's storage capacity, allowing for a continuous supply of water."
2		Mr. M.Imran Haider [GM OCL]	
3		Mr. Mujahid [Environmental Consultant]	
Venue: Committee Room of Deputy Commissioner (DC), Rawalpindi Date : 03-12-2022			
1	DC Office	Mr. Umer Razzaq [P & D]	People from different departments suggested that plan for this project should be shared with their stakeholders so that they can provide effective input. They also asked that this project is doable for the government and for
2		Mr. Azizullah Khan [Ex. Deputy Director]	
3		Mr. Amir Mumtaz [XEN Small Dam Islamabad]	
4		Mr. Abid Hussain Abid	

		[Forest Conservator Rawalpindi]	local residents infect they recommended that new societies are emerging future population along with this project should also be served with the clean water supply.
5		Mr. Jawad Arshad [AD (Engineer)]	
6		Mr. M. Haseeb [AD(M & E)]	
7		Mr. Muazzam Mukhatar [Social Safeguard]	
8		Mam Sehrish Khursheed [Project Officer]	
9		Mam Sana Urooj [DDF Rawalpindi]	
10		Mam Rizwana Aziz [ADW Rawalpindi]	
11		Mam Arifa Batool [DDW Rawalpindi]	
12		Mr. M. Farooq [DTL EDCM]	
13		Mr. Aziz Karim [Environmental Specialist]	
14		Mr. Ali Qunain [IE, CIU Rawalpindi]	
15		Mr. Ahmad Afzal [AD (Eng) PRF]	
16		Mr. M. Shahzad [MD reservoir MCR]	
17		Mr. Mujahid [Environmental Consultant]	

Figure 5. 1: Photographs of Consultations with Institutional Stakeholders

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<tr><td>Consultation Meeting with Deputy Director, Rawalpindi WASA</td><td>Consultation Meeting with CIU – Rawalpindi</td></tr>
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<tr><td colspan="2">Consultative Meeting with Government Departments at DC Office Rawalpindi</td></tr>
</table>

5.5 ENVIRONMENTAL PRACTITIONERS & EXPERTS

The Environmental Experts has been informed with briefing on project interventions including its benefits. All of consulted experts asked questions to get information about different components of project. About 6 experts were consulted and their recommendations have been mentioned below.

1. **M. Rafiq** Assistant Director EPA Rawalpindi
2. **Adeel Pervaiz** Sr. Manager Landfill LWMC
3. **Dr. Fariha Arooj.** Assistant Professor UVAS
4. **Dr. Mehwish Mumtaz** Assistant Professor PU
5. **Dr. Abdul Qadir Senior** Associate Professor PU
6. **Dr. Asim Mehmood** Environmental Consultant

Table 5. 2: Environmental Experts and their recommendations

Environmental Experts Date: 03-12-22			
1.	Assistant Director EPA Rawalpindi	M. Rafiq	- No construction, preliminary or otherwise relating to the project shall be started until and unless the Environmental Approval has been issued by EPA.
2.	Sr. Manager Landfill LWMC	Adeel Pervaiz	- The environmental reports must be available for better understanding to comment.
3.	Assis. Prof UVAS	Dr. Fariha Arooj	- All mitigation measures must ensure by proponent while development of this project.
4.	Assistant Professor PU	Dr. Mehwish Mumtaz	- Good Initiative to solve the water-related issues in the area. Follow compliance guidelines to finish the construction on schedule.
5.	Senior Associate Professor PU	Dr. Abdul Qadir	- Solid Waste should be handled properly on daily basis. This waste can be used for land filling.
6.	Environmental Consultant	Dr. Asim Mehmood	- The big problem that we faced during construction are the lack of skilled workers, they do not only delay the work but sometimes also responsible to destroy the work so hire skilful person to complete the work without any obstacle.

5.6 AFFECTED & WIDER COMMUNITY

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.

Primary Stakeholders: 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 project Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Formation of DMAs. 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 like people of Sector I-10 because they will not be getting share of water from this project.

Secondary Stakeholders: The secondary stakeholders are typically general public including women residing around the COI. 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, execution agency, other concerned departments that may have a role during various phases of the project, regulatory agencies such as EPA, other relevant departments such as Forest and Wildlife, non-governmental organizations (NGOs), the broader interested communities including academia and journalists, and general public.

Consultation with Project Affected People: As part of the present environmental and social assessment, detailed consultations were carried out through personal meetings and focus group discussions (FGDs) with the communities, including women in the project area. Separate meetings were held with the institutional stakeholders in the form of combine consultative meetings at DC Rawalpindi Office, one to one meeting with WASA Rawalpindi. All data of group discussion, individual discussion and FGDs was recorded. Total 9 FGDs were conducted for the proposed project of Augmentation of Surface Water Supply at KSS including the consultative session with Government Department. Further, public consultation was carried out with individuals from project area who have direct impacts of the project and falls under project affected people. Total 109 participants including 82 (75.2%) men and 27 (24.8%) women were consulted in these FGDs and individual consultations. Details of stakeholder consultations are given in **Table 5.3** and **Table 5.4**. Pictorial evidence of the consultation is given as **Figure 5.2**.

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 KSS. The existing water supply is not sufficient to cater the needs of KSS in terms of water demand.

- People told that water supply from current water supply system sometimes had foul smell / odor of wastewater and they also have to face stomach problem.
- The internal roads of KSS have low traffic capacity and special care shall be given to traffic management during construction phase of the project.

- The handling of construction shall be given due care and no storage of construction material on road shall be allowed.
- Disposal of solid waste shall be done in scientific manner and no dumping on open spaces and roads shall be allowed
- Preference regarding provision of jobs shall be given to local community
- Special care shall be taken at school time and prayer time.
- Use of low noise producing machinery shall be ensured.
- Residents in the site's vicinity were assured that the Augmentation of water supply in KSS is proposed for the soul purpose to provide enough water supply to the residents of Khyaban-e-Sir Syed so they can fulfil their water needs just enough.

Table 5.3 provide the details about observation/response of individual stakeholder. **Table 5.4** provide detail about the responses of FGDs. It is important to mention here that comments and reservations of respondents have been duel taken care while designing mitigation measures of the project.

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Table 5. 3: Consultation with Project Affected People

Sr.#	Date	Location/ Venue/ Address	Specifics of Participant	Feedback/ Concerns	EDCM and Social Environment Advisors Reply
Public Consultation					
1.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Naeem ur Rehman [Educationist]	I hope the technical staff and project management have sufficiently skills to maintain an orderly workplace both during and after construction.	EDCM and Social Environment Advisors will ensure that skilled labourers are hired in accordance with the correct protocols.
2.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Maqsood Abbasi [Driver]	The drinking water pipelines and sewerage pipeline lines are intertwined; the following project will be helpful to solve this issue.	
3.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Ibrahim Javed [Shopkeeper]	No issue regarding this project. It is requested that the construction be properly monitored to prevent any disruption.	EDCM and Social Environment Advisors will ensure to follow all of the construction protocols/PEQs.
4.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Orangzaib [Govt. Employ]	As stated, this project will result in an increase in water capacity. You are urged to maintain the water quality.	EDCM and Social Environment Advisors will make sure to maintain the water quality being provided.
5.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Bilal Muhammad [Fruit Mundi]	I have no issue as it seems to be a useful project. Try to fix the traffic problems while the project is in its construction phase.	EDCM and Social Environment Advisors will make sure to reduce the traffic related concerns of locals.
6.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Ishfaq Ahmad [Shopkeeper]	It is requested to handle the construction work properly to avoid any inconvenience in our daily routine.	EDCM and Social Environment Advisors will make sure that the construction work is handled expertly.
7.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Tariq Zaman [Businessman]	Satisfied with the project in provision of water, both in terms of quality and quantity.	
8.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mam Palwisha [Housewife]	The project appears to be helpful in resolving the water situation. Problems with the flow of traffic shouldn't arise.	EDCM and Social Environment Advisors will make sure to minimize the traffic related concerns of locals.
9.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Syed Riaz Naqvi [Shopkeeper]	No issue. Handle the construction work properly so that it doesn't interfere with our work.	EDCM and Social Environment Advisors will make sure to handle the construction work properly to avoid disturbing the locals working hours.

10.	01-12-2022	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Mr. Syed Hamid Ali Shah [Retired Police Officer]	Please be considerate and control traffic during the construction work. Keep the road clear and finish the construction as soon as you can.	EDCM and Social Environment Advisors will make sure to eliminate the traffic related concerns of locals.
11.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Aslam Munir [Painter]	Water depletion is one of the biggest issue, we are facing in our area. It seems that the stated project will be helpful to solve this problem.	
12.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Afzal Munir [Unemployed]	We have to face water shortage in summer in our homes. Hopefully this project will be helpful to solve this issue.	
13.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Adnan Mubarak [Shopkeeper]	I have no issue regarding this project. Construction work should not be a hindrance in our daily lives.	EDCM and Social Environment Advisors will make sure to manage the construction work effectively to prevent interfering with the locals working hours.
14.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Naveed Shahzad [Karyana Store]	No objection. It is requested to handle the construction materials properly and work skilfully.	EDCM and Social Environmental Advisor will ensure that all construction regulations are followed.
15.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Habib Gul [Scrap Dealer]	No objection, the following project will be helpful to provide clean water.	
16.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Ahmad Khan [Clerk]	It seems a decent project to improve water quality in the area so I have no issue regarding this project.	
17.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Saad Ghani Shah [Shopkeeper]	No issue, it's a good initiative for local residents by increasing their employment opportunities and improving the quality of water being provided.	
18.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Dil Roz [Mechanic]	No objection and satisfied with this project.	
19.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Taj Pervaiz [Mechanic]	We are experiencing shortage of water in our homes. Hopefully, this initiative will assist in resolving this problem.	

20.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Akbar Ibadat [Labour]	I have no objection regard this project.	
21.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Wajahat Ali [Butcher Shop]	It seems a good initiative to fulfil the amount of water required in the area.	
22.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Raza Taj [Karyana Store]	I have no objections to this initiative as quality of water will increase.	
23.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Zulfiqar Ali [Teacher]	No issue regarding the project as we are facing both, water quantity and quality issue in our area that is leading us to various diseases. The stated project will be helpful to provide and managing the life better with provision of clean water.	
24.	02-12-2022	Khyaban-e-Sir Sayyad, UC 11, Rawalpindi	Mam. Azra Islam [Housewife]	Water amount depleted in summer. Such projects should be implemented, as water is a basic necessity. The project will be helpful to solve water issues in summer.	
25.	02-12-2022	Khyaban-e-Sir Sayyad, UC 11, Rawalpindi	Mam. Mehmoona [Housewife]	This is a good project to solve water crisis issues. I have no objection.	
26.	02-12-2022	Khyaban-e-Sir Sayyad, UC 11, Rawalpindi	Mam Shehnaz [Housewife]	The project will be helpful to conserve water. Water issues in our household will be resolve so I am satisfied.	
27.	02-12-2022	Khyaban-e-Sir Sayyad, UC 11, Rawalpindi	Mr. Saeed Ahmad [Shopkeeper]	The project seems good to save and provide water for coming generation and future so I am satisfied to start this project.	
28.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Sajjad Haider [Principle]	No issue regarding this project. The project seems beneficial to improve both water quality and quantity.	
29.	02-12-2022	Khyaban-e-Sir Sayyad, UC 10, Rawalpindi	Mr. Mugheez Abbasi [Shopkeeper]	I have no issue as stated the said project will be helpful to increase the source of employment.	

30.	02-12-2022	PHA Muslim Park, UC 12, Rawalpindi	Mr. M. Afzal Umar [Security guard]	I have no issue regarding this project. I hope this project may be helpful in providing clean water in our area.	
31.	02-12-2022	PHA Muslim Park, UC 12, Rawalpindi.	Mr. Yasir Khan [Dealer]	Satisfied with the project. Proper monitoring of pipelines and storage tanks should be carried out on a weekly basis, at least.	EDCM and Social Environmental Consultant will ensure routine maintenance of the pipelines and storage tanks on a regular basis.
32.	02-12-2022	PHA Muslim Park, UC 12, Rawalpindi.	Mr. Naseer Salman [Businessman]	Project delays are almost expected in construction so it is requested to work on schedule.	EDCM and Social Environmental Consultant will make sure to regulate the construction activities with appropriate procedures.
33.	02-12-2022	PHA Muslim Park, UC 12, Rawalpindi.	Mr. M. Iqbal [Retired Army Officer]	If there are any employment opportunities with the aforementioned project, locals should be prioritized. Every home ought to have access to clean water.	EDCM and Social Environmental Advisor will make sure to give preference to locals for any employment or job facilities. Access to clean water will be available at an affordable price.
34.	31-12-2022	I-10, Mandi morr, Islamabad	Mr. Maqbool Ahmad [Bykea Service Employe]	It seems a good project; such projects should be implemented.	
35.	31-12-2022	Bangish Colony, Rawalpindi	Mr. Abdul Rehman [Bykea Service Employe]	With the construction of storage tanks and wide pipelines, the stated project appears to be decent. It seems like water issues in the area will be resolved soon.	
36.	31-12-2022	Bangish Colony, Rawalpindi	Mr. Ahmad Sarwar [Bykea Service Employe]	I have no issue regarding this project; just make sure to manage the construction work properly.	EDCM and Social Environmental Advisor will make sure to skilfully manage the construction activities.
37.	31-12-2022	Bangish Colony, Rawalpindi	Mam Jaweria [Housewife]	Timing of transport should be managed during construction in such a manner that it does not affect our earnings.	EDCM and Social Environmental consultant will make sure transit schedules be restricted to prevent interfering with the locals normal schedule.
38.	31-12-2022	Dhok Kasu, Rawalpindi	Mr. Rehan Khan [Labour]	No objection and satisfied with the implementation of this project. Locals should be preferred in provision of job opportunities.	EDCM and Social Environmental Advisor will ensure to prefer locals for jobs facilities available, if any.

39.	31-12-2022	Dhok Kasu, Rawalpindi	Mr. Rahat [Bykea Service Employe]	As the storage tank enables fast access to water when we need it, so I am very satisfied with the implementation of this project.	
40.	31-12-2022	Dhok Kasu, Rawalpindi	Mam Dua [Teacher]	I have no issue. More water will be available for green belts, parks and houses.	
41.	31-12-2022	Sector-3, UC 12, Rawalpindi	Mr. M. Aslam [Fruit Shop]	Project delays are almost expected in construction so it is requested to work on schedule.	EDCM and Social Environmental Advisor will ensure to complete the construction work on schedule.
42.	31-12-2022	Sector-3, UC 12, Rawalpindi	Mr. Rauf Raja [Labour]	I have no issue regarding this project. This project will be helpful to solve the drinking water issues in the area.	
43.	31-12-2022	Sector-3, UC 12, Rawalpindi	Mam Hafsa [Student]	Try to solve construction related issues such as road blockages, dust, and noise of machinery.	EDCM and Social Environmental Advisor will ensure to minimize the traffic related concerns of locals.
44.	31-12-2022	I-10, Service road, Islamabad	Mr. M Awis [Labour]	No issue regarding this project. It is requested that the construction must be properly monitored to prevent any disruption.	EDCM and Social Environmental Advisor will make sure that construction work is handled skilfully.
45.	31-12-2022	I-10, Service road, Islamabad	Mam. Sania [Housewife]	Satisfied with the implementation of this project.	
46.	31-12-2022	I-10, Service road, Islamabad	Mam Tabeer [Housewife]	The big problem that we faced during construction are the lack of skilled workers, they do not only delay the work but sometimes also responsible to destroy the work so hire skilful person to complete the work without any obstacle.	EDCM and Social Environmental Advisor will ensure to hire skilful workers.
47.	31-12-2022	I-10, Mandi morr, Islamabad	Mr. Aziz ur Rehman [Labour]	It seems a good project; such projects should be implemented. Preference should be given to local workforce under this project.	

Table 5. 4: Response of Stakeholder during FGDs

Sr. #	Name (FGD)	Location	Feedback/Concerns	Reply of EDCM' Environmental and Social Experts
FGD of KSS - UC 12				
1	Miss. Muskan [Teacher]	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	Everyone individual in the FGD has no objections to this project because it will assist provide clean water. They did make a number of suggestions. It was asked that the drinking water and sewage pipelines be handled properly. Leakages should be prevented by routine monitoring. Construction work should be conducted carefully to avoid any potentially hazardous scenarios. To avoid any harmful situations, proper material monitoring should be done during the construction process. Construction projects can fail because of a lack of skilled labourers. Hire knowledgeable individuals to address this problem. In order to prevent pollution-related problems, construction activities must be managed appropriately. Overall, they view the stated project as a decent project for the provision of quality water. They anticipate that the construction work will be handled expertly. They also anticipate that the proposed project will be useful in resolving the problem with the drinking water and sewage pipelines.	The Social Environmental Advisor and EDCM will make sure that personnel are employed in accordance with the necessary regulations and legislation. To prevent any accidents, they will make sure to control the construction activities in standard ways. For any employment facilities, EDCM and Social Environmental Advisor will also make sure to give precedence to locals. In order to resolve construction-related issues with dust and noise, EDCM and Social Environmental Advisor will obey the right procedures. They'll also make sure that clean water is provided through the appropriate channels.
2	Miss. Nagina [Teacher]			
3	Miss. Tahreem [Teacher]			
4	Miss. Mahmoona [Teacher]			
5	Miss. Hira Fatima [Teacher]			
6	Mam Saima [Teacher]			
7	Mam Aminah [Teacher]			
8	Miss. Minahil [Teacher]			
	Miss. Sidra [Teacher]			
	Miss. Maham [Teacher]			
	Miss. Rabia [Teacher]			
FGD OF KSS Govt Girls High School				
	Mam Robia Arif [Teacher]		They approved of the project's implementation as long as the correct procedures were followed to	The EDCM and Social Environmental Assistants will ensure that construction-related difficulties, i.e., dust

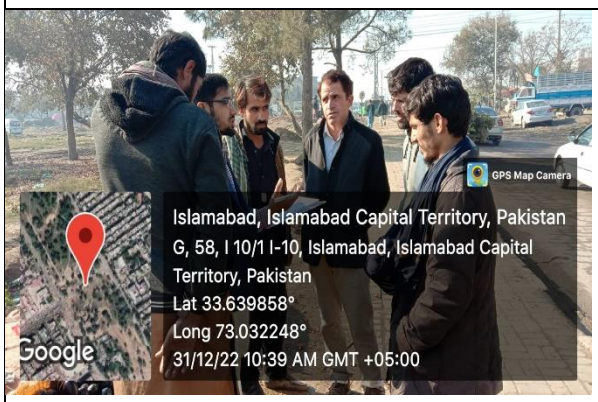
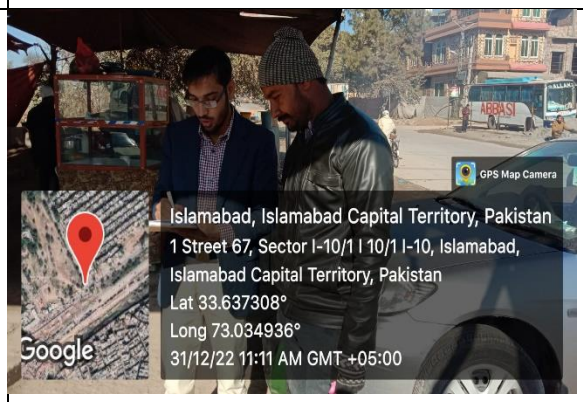
	Mam Jabeen Akhtar [Teacher]	Khyaban-e-Sir Sayyad, UC 11, Rawalpindi	avoid pollution while construction was taking place. They view the expansion of the current project favourably because it will help the community and further tackle its water-related problems. It was suggested that the water tanks and pipelines be adequately inspected.	and noise, are handled. The EDCM and Social Environmental Advisor will ensure that the proper procedures are followed in order to provide clean water.
	Mam Shahida Ameer [Teacher]			
FGD of KSS 1 (UC 12)				
	Mr. Syed Khizar Kazmi [Student]	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	There are no objections from anyone in the FGD to this project because it would help deliver clean water. They did offer a few recommendations. They advised making sure the construction activity was appropriately managed. They were happy with the way this job was carried out because the storage tank makes it easy to access water quickly when needed. The drinking water problems in the area will be helped by this project. They believe that the project will help to improve the standard of living. It was asked that the timing of transportation during construction be managed so as not to interfere with their earning hours. Try to find solutions for construction-related problems like traffic jams, dust, and machine noise. They were pleased that there will be more water available for homes, parks, and green belts. They were in Content with the project's provision of clean water. The main issue we encountered during construction was a lack of skilled workers, who not only caused delays but occasionally even caused damage to the work,	EDCM and Social Environmental Advisors ensure the provision of clean water to everyone. To manage the traffic problems, a proper schedule will be in place. Additionally, proper construction-related procedures will be followed. In order to maintain workplace organization, the EDCM, and Social Environmental Advisor will ensure that qualified staff is hired.
	Mr. Raja M. Awais [Student]			
	Mr. Faheem [Student]			
	Mr. Abdul Latif [Driver]			
	Mr. Asim Shah [Student]			
	Mr. Adnan Shahid [Stationary Shop]			
	Mr. Shoaib Shah [Businessman]			
	Mr. Raza Ali [Student]			
	Mr. M. Zia [Student]			
	Mr. Chaudhary Amar [Student]			

			therefore they suggested to hire skilled people to get the job done without any problems. They anticipate that the construction work will be handled expertly.	
FGD of CDA Stop				
	Mr. Syed Nazim Hussain [Taxi Driver]	Eid Gah, UC 10, Rawalpindi	They seem to be in content with the project as such projects are the need of time. It was advised that the construction activities be properly watched to prevent disturbance, especially during their working hours. They also anticipate that the storage tanks being built, will be useful during the months of drought. During construction, it was advised to handle the materials properly. Follow compliance guidelines to finish the construction on schedule. It was also requested to provide job opportunities to locals. It was also being suggested to keep a close check on the tools being used; if they begin to malfunction suddenly, replace them immediately to stop further damage after construction.	The Social Environmental Advisor and EDCM will make sure to regulate construction operations using the appropriate procedures in order to prevent any mishaps. EDCM and Social Environmental Advisor will make sure to give locals preference whenever an employment opportunity arises. The Social Environmental Advisor and EDCM will ensure that proper protocols are followed during construction activities.
	Mr. M. Shakeel [Tea Stall]	CDA Stop, Rawalpindi		
	Mr. Izhan Ullah [Masoon]			
	Mr. Kalam [Masoon]			
	Mr. Swab [Masoon]			
	Mr. Rahab [Masoon]			
	Mr. Amir [Masoon]			
	Mr. Imran Khan [Masoon]			
FGD of I-10				
	Mr. Junaid Ahmed [Student]	I-10 Street Point, Islamabad	They were happy with this idea since it will help increase the standard of living. The main issue they encountered during construction was a lack of skilled workers, who not only caused delays but occasionally even caused damage to the work, therefore they suggested to hire skilled	EDCM and Social Environmental Advisor will make sure that qualified staff is hired in order to preserve workplace organization. There will be an appropriate schedule in place to handle traffic issues.
	Mr. Abdul Wahid [Masoon]			
	Mr. Waheed Ullah [Labour]			

			people to get the job done without any problems. They don't object because the project seems to be worthwhile. They also suggested to resolve the traffic issues.	
FGD of Sabzi Mandi I-10				
	Mr. M. Anwar [Vegetable Seller]	I-10 Sabzi Mandi, Islamabad	For cleaning and bathing, they are using bore water. They must contend with a water shortage in the summer. They have no objections to the project's development and construction because it will help to tackle this problem. As previously said, this project will improve the amount of water available. It was suggested to preserve the water's quality. It was requested to efficiently oversee construction work. Project mentioned shouldn't have an impact on our daily lives.	EDCM and Social Environmental Advisor will make sure to adhere to the correct processes for resolving construction-related problems and also ensure the provision of high-quality water.
	Mr. Muqallam Shah [Vegetable Seller]			
	Mr. Sher Muhammad [Vegetable Seller]			
	Mr. Jamshaid [Vegetable Seller]			
	Mr. Noor Agha [Vegetable Seller]			
FGD UC-12				
	Mr. Orangzaib [Govt. Employ]	Khyaban-e-Sir Sayyad, UC 12, Rawalpindi	They are satisfied with the project in provision of water, both in terms of quality and quantity. As stated, this project will result to increase in water capacity. They use bore water for bathing and washing. They suffer a water shortage with in summertime. They were happy with the project's development and construction as it will help to fix this problem. It was requested to complete the construction work on schedule.	EDCM and Social Environmental advisors will make sure to complete the construction work on schedule to avoid disturbing the locals.
	Mr. Tariq Zaman [Businessman]			
	Mr. Raza Zahoor [Property Dealer]			
	Mr. Seraj [Driver]			

Figure 5. 2: Photographs of Stakeholder Consultation

	
EDCM E&S Safeguard team in consultation with stakeholders at Government Model School, KSS	EDCM E&S Safeguard team in consultation with stakeholders at Private School, KSS
	
EDCM E&S Safeguard team in consultation with stakeholders at	EDCM E&S Safeguard team in consultation with PEP, KSS
	
EDCM E&S Safeguard team in consultation with stakeholders at KSS	EDCM E&S Safeguard team in consultation with stakeholders at KSS

	
EDCM Social Safeguard team in consultation with stakeholders	EDCM Social Safeguard team in consultation with stakeholders
	
EDCM Social Safeguard team in consultation with stakeholders at	EDCM Social Safeguard team in consultation with stakeholders at private
	
EDCM Social Safeguard team in consultation with at I-10 Islamabad	EDCM Social Safeguard team in consultation with PEP at I-10 Islamabad

CHAPTER-6

SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 GENERAL

This chapter identifies the beneficial as well as the potentially significant adverse environmental and social impacts during design/pre-construction, construction and operation phases of the proposed project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation and remedial measures are proposed in this chapter. A project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed Project. Potential impacts arising from design, construction and operational phases 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 water transmission mains, distribution networks, storage tanks have been detailed in the section. A brief qualitative description of each aspect and the affected environment in both RoW and the project's COI is presented below.

6.2 METHODOLOGY FOR IMPACT IDENTIFICATION

The methodology for assessing the risk level associated with each potential impact is presented below.

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:

Risk = Likelihood × Consequence

Likelihood Scale

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

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

Total 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. Judgment will be required concerning the application of an environmental management measure to mitigate low risk situations.

6.3 IMPACT CHARACTERIZATION

Subsequent to the impact screening, various characteristics of the potential impacts including project siting (dense, heavy with development activities), environmentally sensitive areas (Cultural heritage site, protected area, wet land etc), temporal extent (temporary, permanent), and significance of impacts were determined. There are some potential adverse environmental and social impacts on the local environment. The proposed Project is divided into three (03) stages i.e.

- Pre-construction / Planning and Design Stage,
- Construction Stage and
- Operation and Maintenance (O&M) Stage.

The Pre-Construction Stage includes all stages before the construction Stage (i.e. site investigation work i.e. topographical, seismic studies etc.); Construction Stage includes all stages from mobilization of Contractor to the completion of Project; and

Operation Stage starts after the Construction Stage which includes the inspection and repair works.

Adverse impacts envisaged at these three (03) stages of the proposed water supply project along with their proposed remedial or mitigation measures are given in the following section.

6.4 DESIGN/PRE CONSTRUCTION PHASE

Impact Screening Matrix

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

Sr. 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 transmission mains	3/ Likely	2/ Moderate	6/ Medium	Low / Long Term
2	Lack of integration of EIA/EMP requirements into Construction bid documents	3/ Likely	2/ Moderate	6/ Medium	Low/ Shirt Term
3	Contractor's Environmental Safeguards Capacity	3/ Likely	2/ Moderate	6/ Medium	Low/ Shirt Term
4	Material Hual Routes/ Traffic Issues	3/ Likely	2/ Moderate	6/ Medium	Low/ Shirt Term
5	Identification of Locations for Labor Camps and ancillary facilities	3/ Likely	2/ Moderate	6/ Medium	Medium/ Short Term
6	Cutting of Trees	2/Unlikely	2/ Moderate	4/ Low	Low Residual Impact
7	Land acquisition and resettlement impacts	2/Unlikely	2/ Moderate	4/ Low	Low Residual Impact
8	Seismic Impacts	2/Unlikely	2/ Moderate	4/ Low	Low Residual Impact
9	Impacts due to existing utilities	3/Likely	2/ Moderate	6/ Medium	Low Residual Impact

Critical Risk Level Medium Risk Level

Significant Risk Level Low Risk Level

6.5 ADVERSE IMPACTS DURING PLANNING AND DESIGN PHASE

Potential adverse impacts during the planning and design stage of the Project are given below:

6.5.1 Improper Designing of Distribution Networks and Conductance Main

Impacts

If location of water distribution networks is not carefully selected considering topography, geology and catchment of watershed results in degradation of channel embankments, reduce water flow or increased chances of structure settlement due to weak geological conditions/weak bearing capacity of soil.

The water shall be conveyed to distribution network is also primarily designed on gravity. If not designed properly while maintaining minimum head, the system will require high energy for pumping water to the desired storage tanks.

Mitigation Measures

The following mitigation measures will be implemented:

Factors such as site capacity, accessibility, acceptability, stability, environmental sensitivity, land use, socio-economic receptors and climate hazards have been studied and site has been selected accordingly.

Water supply network design shall facilitate uninterrupted water supply through gravity system without technical constraints.

Residual Impact

Provided the proposed mitigation measures are implemented, no significant adverse residual environmental effects are likely to occur. However, in case improper designing of conductance main, the residual impact will be long term in nature.

6.5.2 Lack of Integration of EIA/EMP Requirements into Construction Bid Documents

Impacts

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

The Environmental staff of 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.

EIA/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.

Project contractors shall have qualified and experienced environmental staff to plan, arrange, implement, monitor and report EIA/EMP requirements.

Residual Impact

Upon integration of EMP requirements into construction contract agreement, and upon implementation of EMP in true letter and spirit, the residual environmental effects are expected to be low in magnitude, intermittent and short term.

6.5.3 Contractor's Environmental Safeguards Capacity

Impacts

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.

The responsibility of the PMU, LG&CD in collaboration with the focal agencies is to review and finalize the bidding documents relating to environmental issues.

Contractors that do not possess the required capacity for safeguards management must not be pre-qualified and selected.

Mitigation Measures

PMU shall review the contractor capacity with respect to safeguard management and contracts shall be awarded accordingly.

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 prior to the commencement any physical works on ground.

PMU shall ensure the project contractors are selected on merit and necessary funds has been allocated in the contract documents for EMP implementation and monitoring.

Residual Impact

Provided the proposed mitigated measures are implemented, no significant adverse residual environmental effects are likely to occur.

6.5.4 Relocation of Utilities

Utility services such as sewerage lines and telephone lines lying along the project alignment may need to be relocated temporarily or permanently to prevent damage to them.

Mitigation Measures

- Detailed filed surveys will be conducted to assess any sub-surface utilities that might be present under the proposed project alignment within the right of way of the project, shall be relocated prior to the commencement of the work.
- Based on the utilities that are identified during the detailed surveys, a relocation plan of those utilities will be developed by the respective line agencies in close coordination.
- In case any utilities can be allowed to remain in place and avoidance of their damage is possible, the contractor will need to be aware of the location of these services so that disruptions are not caused. In such scenario, the responsibility for any repair of damaged services will lie with the contractor.

Residual Impact

Provided the proposed mitigated measures are implemented, the magnitude and extent of the environmental effects will be low. Therefore, no significant adverse residual environmental effects are likely to occur.

6.5.5 Identification of Locations for Labor Camps and ancillary facilities

Impacts

The proposed project is divided into four phases. The first phase will be completed in approximately 2 years (24 months) 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

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.

Solid and liquid effluent waste disposal facilities shall also be designed to cater waste of administration/office building etc.

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.

Residual Impact

No residual effects are expected.

6.5.6 Development of Traffic Management Plan

Impacts

In particular, the lying of water pipelines could result in heavy congestion due to the movement of construction heavy machinery and equipment with significant delays for traffic apart from posing a significant risk for vehicles.

Mitigation Measures

A comprehensive traffic management plan shall be developed by the contractor and approved by the Executing Agency or the Project Management Unit that will contain the traffic diversion onto alternate routes and management of traffic flows to minimize the congestion and the possibility of accidents. This plan shall be dependent to the EMP and will be implemented by the contractor.

Residual Impacts

After implementing the traffic management plan, the residual impacts will be low.

6.5.7 Land Acquisition and Resettlement Impacts

Impacts

The proposed project involves the distribution of the water supply network. This water distribution network or pipes will be laid within the existing network of water pipes, so no land acquisition is involved in this proposed project.

Mitigation Measures

No mitigation measures are required.

Residual Impacts

No residual impacts so it will remain low.

6.5.8 Topography

Potential Impacts

The project area has plain topography but no land acquisition will involve for the proposed project. A minor physical change in the topography of the project area is expected. This adverse impact is low in nature.

Mitigation Measures

Mitigation measures will involve adoption of best engineering design measures keeping in view of the aesthetics of the project area and provision of green areas for the landscape in design. The proposed design has tried to minimize these impacts.

Residual Impact

No residual effects from this component of the project are anticipated as no significant topographical change is anticipated.

6.5.9 Seismicity

Potential Impact

In Building Code of Pakistan (Seismic Provisions, 2007), the whole region of Pakistan is classified into five main Seismic Hazard zones i.e., i) Zone-1, ii) Zone-2A, iii) Zone-2B, iv) Zone-3, v) Zone-4 based on the peak horizontal ground acceleration and its ultimate tendency to damages during seismic events. The proposed Project Area falls in the

seismic zone classified as "Zone-2B" with g-value 0.16 to 0.24, and is considered as Moderate Hazard seismicity zone.

No change (+/-) in the impact of seismology risk of the area is expected during the project construction phase as none of the project activities is expected to be of such a powerful extent to influence the tectonic risk. This adverse impact is medium in nature.

Mitigation Measures

The proposed structure should be designed and constructed keeping in consideration high intensity earthquakes. For seismic hazard analysis, updated structural and seismic evaluations should be conducted by the design engineer/consultant. Moreover, geo-technical investigations must be conducted prior to construction phase.

Residual Impacts

Upon implementation of mitigation measures suggested above, no significant residual impact is anticipated.

6.5.10 Flora

Potential Impacts

During the pre-construction phase, activities such as installation of construction camps, mobility of construction staff may damage the local vegetation/trees. As the heavy machinery and camps will be moved and installed, which require significant space due to which available vegetation is expected to be removed. This impact is site-specific, permanent, irreversible, possible, and medium significant and needs to be encountered prior to the start of construction stage.

Mitigation Measures

- The camps, mobility of machinery should be proper planned and well designed to avoid any loss to local green cover;
- It is recommended to establish the construction camps where no or minimum vegetation exists.
- The location of construction camp should be selected so, as to have limited environmental impact during construction phase and to reduce the cost and land requirement.
- Compensation to the forest department for all type of plants (saplings, sub-mature,

mature trees and other green assets) will be paid by the proponent as desired by the Punjab, Forest Department and as per law of land.

Residual Impacts

Given the type of vegetation involved, and the presence of type of land adjacent to the project site, the residual impacts on vegetation are considered low

6.5.11 Fauna

Potential Impact

As movement and installations of machinery and vehicles will take place so, noise and habitat loss is expected. The routes of the available wildlife and other habitats may be affected due to camps set-up and machinery movements and installations. This impact is site-specific, temporary, irreversible, and possible and low significant.

Mitigation Measures

- The standard measures must be adopted to minimize noise due to machinery movements and installations;
- Wildlife movements and routes must be considered during activities and should be avoided to their maximum level;
- The alternate routes and points are recommended to avoid any damage to locally available fauna;
- The camps shall be properly fenced and gated to check the entry of animals in search of eatable goods; and
- Similarly, wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them.
- Fruit trees along with other broad leaved trees must be considered for plantation to balance the local ecosystem.
- Proper waste management plan may be considered mandatory to safeguard the local environment.

Residual Impacts

Provided the proposed mitigated measures are implemented, no significant adverse residual environmental effects on species/ fauna are anticipated as no significant adverse impacts on fauna are envisaged.

6.6 ADVERSE IMPACTS DURING CONSTRUCTION PHASE

6.6.1 Impact Screening Matrix

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

Sr. 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 Transmission Mains	3/ Likely	2/ Moderate	6/ Medium	Low/ Short term
2	Site Accessibility	3/ Likely	2/ Moderate	6/ Medium	Low/ Short term
3	Degradation of air quality due to construction works	3/ Likely	2/ Moderate	6/ Medium	Low/ Short term
4	Injuries to workers from lack of necessary training and/or not using PPEs etc.	3/ Likely	3/ Moderate	9/ Medium	Low/ Short term
5	High noise/ Vibration levels from Construction activities	5/ Likely	2/ Moderate	10/ Medium	Low/ Short term
6	Wastewater and Solid Waste Generation	3/ Likely	2/ Moderate	6/ Medium	Low/ Short term
7	Disposal of Spoil/ Demolition Waste	3/ Likely	2/ Moderate	6/ Medium	Low/ Short term
8	Social and Cultural Conflicts	3/ Likely	2/ Moderate	6/ Medium	Low/ Short term
9	Communicable diseases incl. COVID-19	2/ Likely	3/ Moderate	6/ Medium	Low/ Short term
10	Vegetation and Wildlife Loss (Flora & Fauna)	2/ Likely	3/ Moderate	6/ Medium	No residual Impact
11	GHG Emission	3/ Likely	2/ Moderate	6/ Medium	No Residual Impact
12	Construction Camps	3/ Likely	2/ Moderate	6/ Medium	No residual Impact
13	Site Restorations	2/ Likely	10/ Moderate	10/ Medium	Low/ Short term

Critical Risk Level

Significant Risk Level

Medium Risk Level

Low Risk Level

6.6.2 Construction of Water Distribution Networks and Conductance Mains

Impacts

Construction activity of water distribution network and transmission main will be conducted along the roads within the existing Right of Way (ROW) of the water lines.

The laying of Conductance Main from Sector I-10 of Islamabad area will take place on the green strip of Service Road of I-10. After crossing the Service Road of I-10 the Conductance Main will join IJP Road and run on the left side along the IJP Road within the territory of Islamabad till the CDA Stop. The Conductance Main will cross IJP at CDA Stop to enter into Khyaban-e-Sir Syed (KSS). This crossing will done through jacking the pipe under IJP road without disturbing the road. Open trench of around 1.5-meter depth will be excavated for laying of Conductance Main (Bulk Supply Line) from I-10 to IJP road and then inside KSS. Replacement of distribution lines the trench of around 2.5 feet will be excavated along the existing ROW. 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, handheld pneumatic drill will be used to break the road surface. The approximate working ROW required for laying of Conductance Main will 8-10 feet while for replacement of Distribution pipeline it will be 2-3 feet.

The pipeline is to be laid along the existing road. 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.

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.

Mitigation measures Mitigation measures adopted for construction of water supply networks and Conductance Main are provided below:

- 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.
- IJP road will not be disturbed and the impact will be mitigated by construction methodology (strategy). The Conductance Main will be jacked under the IJP road and no road cutting will be done.
- 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) (helmet, gloves, boots, etc.) details for each type of work
- 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.)
- 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 LG&CD will ensure the identification of disposal sites for unsuitable excavated material.
- Stock piling of excavated material at places that are congested will be avoided as these piles can create traffic issues and public nuisance.

Residual Impact

After implementation of the proposed mitigation measures, the residual impacts would be low and short term in nature.

6.6.3 Site Accessibility during Construction

Potential Impact

The proposed project can be approached through various roads. The construction material, equipment and machinery will be arrived at proposed workshop area and construction camps sites. From the camp, the material, equipment and machinery will be transferred to work site by multiple routes.

Mitigation Measures

The accessibility of road for local population will be ensured by implementation of Traffic Management Plan. The framework for Traffic Management Plan is given as **Annexure-VI** of this EIA report.

- Selection of access roads/tracks should be based upon certain criteria to ensure high stability, no or minimum tree cutting and crop damage, minimum disturbance to nearby settlements and other social amenities;

- The approach roads should be selected to avoid any soil degradation and erosion impacts;
- Special care should be taken for known sensitive area to ensure that all interested parties are aware of the type and location of working. Measures should be taken where necessary to protect such areas physically; and
- Mitigations for the loss of trees and crops, soil erosion, soil contamination, air and noise pollution, waste generation, and loss of agricultural land provided in below sections will be adopted.

Residual Impacts

Provided the proposed mitigative measures are implemented, the environmental omapcts will have low magnitude and will be reversible. Therefore, no significant adverse residual effects are expected.

6.6.4 Traffic Issues

Potential Impact

The construction phase of the proposed project, the laying of the water supply pipelines, could result in heavy congestion due to the movement of construction heavy machinery and equipment's with significant delays for the traffic apart from posing a significant accident risk for vehicles.

The efficient management of traffic once the construction activity commences will be critical in order to minimize the risk of possible road accidents and construction related hazards.

Mitigation Measures

To minimize traffic problems in the proposed project area, following measures will be considered:

- Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime to reduce traffic load and inconvenience to the local population;
- Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions on roads;
- The speed of the vehicles will be controlled (at 20 to 25 km/hr) to reduce the probability of severe accidents, soil erosion, debris flows due to vibrations and

dust emission;

- Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work;
- Proper sign boards will be provided for smooth flow of traffic;
- Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents; and
- Any closure of the roads (especially main roads) and deviations / diversions proposed should be informed to the riders through standard signs and displays.
- Traffic Management Plan will be implemented to avoid traffic accidents, jams/public inconvenience. Guideline for Traffic Management Plan has been prepared and given as **Annexure-VI**.

Residual Impacts

Upon implementation of the proposed mitigation measures, no significant adverse residual effects are anticipated. Further, traffic management plan has been developed and after implementation of Traffic Management Plan the residual impact will be low.

6.6.5 Resource Conservation

Potential Impact

During the construction, overburden on local resources is possible if construction facilities such as workers camp and construction camp built near rural areas and can create problems for local communities.

Mitigation:

Resource Conservation Plan has been developed for the proposed project and attached as **Annexure-VII**.

Residual Impact

Provided the proposed mitigative measures are implemented as suggested, the environmental impacts will have low magnitude on resource conservation. Therefore, low residual impacts due to the project are anticipated.

6.6.6 Occupational Health and Safety

Potential Impact

Occupational Health and Safety (H&S) related impacts will arise during construction stage activities including clearing of earth, levelling, compaction, foundations, finishing and testing & commissioning. In nutshell, occupational health and safety issues associated with the construction of proposed project will primarily include physical hazards; chemical hazards; and noise.

Noise: Construction and maintenance personnel may be potentially exposed to high levels of noise from heavy equipment operation and from working in proximity to vehicular traffic. As most of these noise sources cannot be prevented, control measures should include the use of personal hearing protection by exposed personnel and implementation of work rotation programs to reduce cumulative exposure.

In addition, disasters such as earthquakes and fires may occur. Lack of Emergency Response Plan (ERP) or an inefficient response plan may lead to an accident or critical injury. Considering these consequences, this impact can be categorized as direct, moderate, site-specific, medium term, temporary, medium probability and irreversible.

Mitigation Measures

Occupational Health and Safety Management plan has been developed to handle any health and safety issue of workers and community. The Occupational Health and Safety plan is attached as **Annexure-VIII**. Mitigation Measures to prevent and control physical hazards include:

Moving Equipment and Traffic Safety

Establishment of work zones to separate workers on foot from traffic and equipment by:

- Routing of traffic to alternative roads when possible;
- Where worker exposure to traffic cannot be completely eliminated, use of protective barriers to shield workers from traffic vehicles, or installation of channeling devices (e.g. traffic cones and barrels) to delineate the work zone;
- Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible;

- Reduction of maximum vehicle speeds in work zones; and
- Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).
- Provide appropriate PPE in conjunction with training, use, and maintenance of the PPE.
- Furthermore, the noise reduction options that should be considered which include:
- Selecting equipment with lower sound power levels;
- Installing suitable mufflers on engine exhausts and compressor components;
- Installing vibration isolation for mechanical equipment;
- Providing noise protection PPEs (ear plugs/ear muffs) to the construction workers;
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding;
- Developing a mechanism to record and respond to complaints; and
- Regular monitoring of noise levels at active sites or near noise producing equipment/machinery and compare it to the available occupational noise standards.

Monitoring of OHS Activities:

During the construction phase of proposed project, occupational health and safety monitoring programs of the contractor (s) should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards at the construction site and camps, and the implementation of prevention and control strategies. The occupational health and safety monitoring program should include:

- Regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used;

- Surveillance of the working environment: The contractors should document compliance using an appropriate combination of portable and stationary sampling and monitoring instruments. Monitoring and analyses should be conducted according to internationally recognized methods and standards. Monitoring methodology, locations, frequencies, and parameters should be established individually for each project following a review of the hazards;
- Continuous and efficient surveillance of worker's health during the entire construction phase by the nominated officials of contractors; and
- Training: Training activities for employees (construction contractor & supervision consultant staff) and visitors should be adequately monitored and documented (curriculum, duration, and participants). Emergency exercises, including fire drills, should be documented adequately. Service providers and contractors should be contractually required to submit to the employer adequate training documentation before start of their assignment.
- Contractor(s) shall prepare a comprehensive OHS Plan including work method statements for all hot works to avoid incidents during construction stage. A guideline OHS Plan is provided in **Annexure-VIII.**

Residual Impacts

Upon implementation of the proposed mitigation measures suggested above, and also upon implementation of the Occupation Health and Safety Plan (Attached as Annexures), low residual impacts are anticipated.

6.6.7 Construction Camps/Camp Sites

Potential Impact

Approximately one (01) construction camp is proposed to be established during construction period for the subject project. Due to the proposed camp site, loss of vegetation and dissatisfaction of rehabilitation measures during and after completion of construction phase may occur. This may include waste, soil pollution, groundwater pollution, dust, etc. However, the impact will be medium adverse in nature. For these impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence and any associated adverse effects. **Table 6.3**

summarizes potential impacts and proposed mitigation measures associated with construction camps.

Table 6. 3: Summary of Workers Camp Impacts & Mitigation Measures

Potential Impact	Proposed Avoidance and Mitigation Measures
Environmental	
• Temporary habitat loss or disturbance • Temporary visual intrusion • Noise emissions at a single location • Waste generation • Discharge of sanitary effluents and rainwater run-off to nearby water bodies	• Reinstate any temporary facilities to pre-existing conditions in ecologically sensitive areas. • Implement landscaping plan for all facilities in areas where high landscape value and visual vulnerability to the proposed activities warrants site-specific landscape restoration measures. • Operate equipment in a manner sympathetic to the ambient noise environment. Do not leave equipment idling unnecessary. • Provide adequate warnings of impeding works to all potential receptors within a 1 km corridor surrounding the ROW via public notices and local news.
Social	
• Worker camp site: consultation surrounding potential construction camp sites revealed concerns regarding the location of proposed sites for Worker Camps.	• State land will be a first preference for worker camp location, followed by land where there is a willing lessee. • Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values. • Training will be provided to all staff on camp management rules and overall discipline and cultural awareness. This will include, in appropriate languages: • A briefing on camp rules • A community relations orientation to increase awareness about the local area, cultural sensitivities and the project Code of Conduct • Awareness-raising on health considerations, including sexually transmitted diseases (STDs).

Potential Impact	Proposed Avoidance and Mitigation Measures
	• The construction contractor is required to develop a Construction Camp Management Plan to address: a. Discipline; b. Community liaison; c. Ethnic tensions and; d. Communicable diseases. • A Code of Conduct and Camp Rules will be required within the Construction Camp Management Plan, which provides policies and a disciplinary framework with respect to worker behavior.
Camp Location	
• The final location will be determined by the construction contractors and agreed with the WASA or its PMU.	• The construction contractor will be required to assess the environmental/social sensitivity of any additional or alternative sites prior to their approval for adoption.

Some additional mitigation measures should include:

- The contractor(s) should provide plan to the Proponent for removal & rehabilitation of site upon completion;
- Photographical and botanical inventory of vegetation before clearing the site; and
- Compensatory plantation to be scheduled when construction works near end.

Residual Impacts

The residual impacts are envisaged to be low after implementation of suggested preventive and mitigatory measures.

6.6.8 Wastewater Generation

Potential Impact

One (01) construction camp is proposed to be established during construction period for the proposed project.

Wastewater will be generated at the construction camp and from construction activities. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as nullahs, drains, water channels etc. apart from soil contamination. Water from dewatering activities (during rainy season)

has the potential to contain suspended solids and oil and grease and if disposed of untreated may affect the soil quality. The **Table 6.4** below shows anticipated composition and estimate of the wastewater to be generated by construction workers during the course of the construction phase of the project assuming that on average the water demand per person is 50 liters per day and that 80% of the water demand will become wastewater.

Table 6. 4: Estimated Wastewater Generated by Workers in Construction Camps

Sr. No.	No. of Workers*	Estimated Total Water Demand** (liters/day)	Estimated Wastewater Generated (liters/day)***
1	150	7,500	6,000

*= "Tentative Work Force Requirements Including Client and Contractor Staff"

** = (150) x (50) = 7,500 liters/day

*** = (7,500) x (80%) =6,000 liters/day

This 6,000 liters/day of wastewater is from the construction camp. This impact can be categorized as medium adverse in nature.

Mitigation Measures

To dispose the liquid waste generated from the construction activities, the following steps will be taken by the contractor:

- Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks.
- Proper monitoring to check the compliance of PEQS will be carried out; and
- Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit.
- The contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of wastewater collection, transportation and its disposal.

Residual Impacts

Provided the proposed mitigative measures are implemented, no significant adverse residual environmental impacts are likely to occur and the residual impact is low.

6.6.9 Disposal of Spoil and Demolition Waste

Potential Impact

During construction of the project, especially during the dismantling of the existing distribution pipeline, spoil/ demolition waste will be generated which need to be addressed. However, this impact is categorized as medium adverse in nature. As the project involve replacement of AC and GI pipelines with HDPE pipeline, the redundant AC pipelines will be removed and must be handled with care to avoid release of asbestos fibers into environment.

Mitigation Measures

- Waste to be reused in the project or by any other interested parties.
- All material that is produced shall be transported in tarpaulin covered trucks for disposal at the designated site. At the disposal site, the demolition waste will be disposed off in accordance with the best practices to ensure no residual impact.
- Disposal trucks will be properly maintained to minimize oil leakages during the construction.
- Demolition waste will not be disposed off at any other area other than the designated area.
- The Asbestos Cement Pipelines falls under Class II non-firable. For handling of this waste the workers must be properly trained with annual refreshers.
- Continuous supervision by Competent supervisor must be carried out
- Engineering Controls including demarcation, wet methods, drop cloths, clean-up and disposal, etc. must be adopted for transportation of redundant AC pipelines.
- Try as much as possible to remove large lengths of pipeline to avoid cutting and damage to pipeline to control release of asbestos fibers.
- Respiratory Protection in the form of full face mask and face shield along with protective clothing including gloves, apron etc. must be provided to workers who will be involved in handling of AC pipelines.
- Disposal of the AC pipelines must be ensured at designated landfill site. The pipelines must be wrapped in double layer of at least 6mil thick plastic sheet.

Residual Impact

After implementation of the proposed mitigation measures, the residual impacts would be low and short term in nature.

6.6.10 Solid Waste Generation

Potential Impact

Considering the labourers (about 150 in numbers) residing in the construction camp and the locally available labour, an average solid waste generation rate of 0.6 kg/capita/day is adopted for the estimation of solid waste generation. Based on this assumption, a total of about 90 kg of solid waste will be generated from construction camp on daily basis. The major components of the labour camp waste will be garbage, putrescible waste, rubbish and small portion of ashes and residues. Other type of wastes may include inorganic construction wastes including hazardous waste.

The estimated quantity of excavation material for ROW clearance cannot be provided at design stage. The contractor will provide the estimated quantity of excavation material during the construction phase. These wastes will be generated due to the construction activities and the materials used for construction. This waste would require proper disposal to minimize land and water contamination. This impact can be categorized as medium adverse in nature.

Mitigation Measures

- All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper solid waste management system. The contractor will coordinate with local representatives and administration of the concerned solid waste management department for the disposal of solid waste;
- The contractor must develop a plan of action with the help of concerned solid waste management department for transporting the waste to the disposal site;
- Toxic waste will be handled, stored, transported and disposed separately;
- The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and
- Solid waste will be segregated at source so that it can be re-used or recycled.
- Waste Management Plan will be developed to implement an efficient and responsive solid waste management system during construction phase. Recyclable wastes e.g. steel bars will be sold to waste vendors;
- Reusable material will be used as a filling material during ground levelling;
- Solid waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management

plan; and

- The site will be restored back to its original conditions after construction completion.

Residual Impact

Upon implementation of the proposed mitigation measures, no significant adverse residual effects are anticipated and the residual impacts will be low.

6.6.11 Green House Gas (GHG) Abatement

Potential Impact

The main sources of greenhouse gases (CO2, CH4, NOx etc.) during the construction activities of the proposed project will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the backup generator for electricity. Emission of greenhouse gases cause global warming and other climatic changes on regional and global scale. This impact is can be categorized as high to low adverse in nature.

Mitigation Measures

- Regular motioning of the vehicles for engine efficiency;
- Avoid idling of construction vehicles;
- Alternative energy resources shall be considered where possible; and
- The Contractor shall ensure the compliance with NEQS/PEQS.

Residual Impacts

After implementation of suggested mitigation measures the residual impact will be low.

6.6.12 Emergency Response Plan

Potential Impact

The construction of the proposed project may encounter emergencies. In addition, disasters such as earthquakes and fires may occur. Lack of Emergency Response Plan (ERP) or an inefficient response plan may lead to an accident or critical injury. This impact is medium adverse in nature.

Mitigation Measures

Emergency Response Plan has been developed to manage all potential and actual emergency situations during construction phase. The same is attached as **Annexure-IX** of the report.

Residual Impact

Successful implementation of mitigation measures suggested here and in Emergency Response Plan (attached as Annexure) will keep the residual impact to low.

6.6.13 Natural and Man-Made Disasters

Potential Impact

Natural disasters (earthquakes) and accidents such as fire, falls, slips and trips may result in injuries, financial losses and may even lead to deaths. The workers shall be trained and facilitated to cope with such disasters. This impact is medium adverse in nature.

Mitigation Measures

Mitigation measures include the following:

- An ERP for earthquakes and manmade disasters should be developed by the contractor, in coordination with SC and the proponent (WASA), should be implemented in close consultation with the RESCUE 1122 Services and other concerned departments;
- Training of the contractor and WASA staff and employees regarding the emergency procedures and plans should be regularly conducted;
- Emergency numbers should be clearly posted at all disposal stations; and
- Minor incidents and near misses should be reported, and preventive measures should be formulated accordingly by the WASA Management.

Residual Impact

The mitigation measures suggested above will keep the risk of natural disasters to low category.

6.6.14 Degradation of Ambient Air Quality

Potential Impacts

Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability.

Potential impacts on the air quality during the construction stage will be due to the fugitive dust and the exhaust gases generated in and around the construction site. Dust is a major component of air pollution, generated mainly from the following construction activities:

- Site clearance and use of heavy vehicles and machinery/equipment etc. at construction site;
- Procurement and transport of construction materials such as sand, cement, etc. to the construction site;
- Other Gaseous emissions during construction result from operating of construction vehicles, plant and equipment;

The sensitive receptors identified within or near the project length are educational institutions and religious and cultural places etc. which may be affected during construction phase, due to emission of air pollutants. The construction activities will also result in increased air pollution in the area. The overall impact on the quality of air during the construction phase will, however, be temporary and limited to the project's implementation phase only. This impact is high adverse in nature.

Mitigation Measures

The major source of air emission is fugitive dust emitted from construction machinery and movement of vehicles. Dust Management plan has been developed and will be implemented by contractor to manage dust emission. Dust management plan is attached as **Annexure-X** of this report. The impacts construction phase of the proposed project could be effectively mitigated by the implementation of simple procedures by the Contractor including but not limited to the following:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;

- Open burning of solid waste from the Contractor's camps and at construction site should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations;
- Construction and spoil materials will be transported trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction works) will comply with the PEQS (as amended) for carbon emissions and noise;
- Contractors shall comply with submitted work schedule, keeping emission operations away from sensitive receptors and residential areas;
- Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions;
- Construction equipment is generally left idling while the operators are on break or waiting for the completion of another task. Emissions from idling equipment tend to be high. Existing idling control technologies, which automatically shut the engine off after a pre-set time can reduce emissions, without intervention of the operators;
- Along the project alignment with water pipelines and trunk sewer being laid, water will be sprinkled at high frequency especially during summer season at all construction sites to suppress dust emissions;
- Construction workers should be provided with masks for protection against the inhalation of dust;
- Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases; and
- Regular monitoring of air quality in accordance with PEQS, 2016.

Residual Impact

It is anticipated that air emissions will not exceed the ambient air quality standards after implementation of the suggested mitigation measures.

6.6.15 Noise/Vibration

Potential Impact

The laying of water pipelines and installation of water pumps will result in different construction equipment and machinery being used which will generate high noise levels at the project sites and in the project areas.

The noise and vibration will be produced due to the operation of construction machinery and equipment. Sources of noise and vibration during construction are heavy machinery such as bulldozers, excavators, concrete mixing plant, pneumatic drills and other equipment's. Noise and vibration are perceived as one of the most undesirable consequences of construction activity. The above machinery is expected to generate noise levels that would be severe in the project area.

The cumulative effects from several machines can be significant and may cause significant nuisances. However, these increased noise levels will prevail only for a short duration during the construction stage. The noise produced by construction equipment is presented in **Table 6.5** below as reference.

Table 6. 5: Noise Produced by Construction Equipment

Sr. No.	Equipment	Noise dB(A) at 15ft from Source
1	Wheeled loading	90
2	Grader	90
3	Bulldozer	86
4	Sprayer	87
5	Power generator	98
6	Impact drill	87
7	Truck	92
8	Concrete mixer	91
9	Concrete pump	85
10	Pneumatic hammer and rock crusher	98
11	Breaker	84
12	Pneumatic spanner	95

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

The likely impacts due to noise are:

- Psychological effects of distraction of attention, irritation and short temperedness in the exposed persons due to persistently higher noise levels; and
- Noisy settings and higher background levels can cause temporary threshold shift and the consequent habit of speaking loud, which may cause damage to vocal cords in the persons exposed.
- The sensitive receptors identified within or near the RoW are educational institutions and religious and cultural places etc. which may affect during construction phase, due to noise and vibration.
- Though the construction method has not been determined yet, however it is believed that the adopted method of construction shall produce less noise and vibration if the suggested mitigation measures are adopted. This impact is high adverse in nature.

Mitigation Measures

There are a variety of ways by which construction equipment and worksite noise can be controlled. The following is a list of ways to control noise level at the worksite of the proposed project:

Quieter Equipment: A cost-effective way to reduce noise at a construction worksite is to buy quiet equipment. In addition, equipment in use should be the most suitable for the job. Avoid using equipment that is over-powered and, conversely, avoid using under powered equipment. Whenever possible the quietest equipment alternative should be used. In general, electronic powered equipment is quieter than diesel powered equipment and hydraulically powered equipment is quieter than pneumatic power.

Modifying Existing Old Equipment: The most common way to reduce the noise levels of common construction equipment is through worksite modifications. Some common worksite modifications consist of retro-fitting existing equipment with damping materials and mufflers.

Barrier Protection: An effective way of reducing noise is to locate noisy equipment behind purpose-built barriers. The barriers can be constructed on the work site from

common construction building material (plywood, block, stacks or spoils) or the barriers can be constructed from commercial panels which are lined with sound absorbing material to achieve the maximum shielding effect possible. To be effective, the length of the barrier should be greater than its height. The noise source should not be visible and barrier should be located as close as possible to either the noise source or the receiver.

Work Activity Scheduling: Work activity scheduling are administrative means to control noise exposure. Planning how noise sources are sited and organized on a work site can reduce noise hazards. Jobs can be rotated so that exposure time is limited. Transferring workers from a high exposure task to a lower exposure task could make the employee's daily noise exposure acceptable.

Maintenance: Increased attention to maintenance of tools and equipment will reduce worksite noise levels. Maintaining plant and equipment in good order not only increases its life, but makes it safer to use and quieter. Loose and worn parts should be fixed as soon as possible. Ideally, the worksite should have a system in place for checking and servicing the various machines and power tools.

- Use of low noise machinery, or machinery with noise shielding and absorption;
- Contractors shall comply with submitted work schedule, keeping noisy operations away from sensitive receptors, residential areas; implement regular maintenance and repairs; and employ strict implementation of operation procedures;
- The Contractor shall comply with PESQ, 2016.

In addition to the above mentioned mitigative measures, Noise and Vibration Management Plan has been developed and appended as **Annexure-XI.**

Residual Impact

Provided the proposed mitigative measures are implemented as suggested, the environmental effects due to noise will have a low magnitude. Therefore, no significant adverse residual impacts on the acoustic environment are likely to occur. Therefore, the residual impacts due to noise and vibration will be low.

6.6.16 Flora

Potential Impact

No vegetation exists within the existing right of the water pipe lines and the proposed project deals only the laying of water pipe lines within the existing right of way along

the existing pipelines. Therefore, no damage to the existing flora is envisaged due to the laying of proposed water supply lines. However, the installation of water pumps may damage the grass near the existing overhead water reservoirs.

This impact is negligible and temporary in nature.

Mitigation Measures

- Cutting and / or disturbance of trees shall be avoided, as far as possible;
- A tree plantation program shall be implemented with the recommendations and technical support of Punjab, Forest Department for the enhancement ecological condition of the area;
- Final and actual plantation and trees plantation cost will be finalized after assessment by Punjab, Forest Department. All the activities will be executed as per agreement/MOU between proponent and Punjab, Forest department while strictly considering law of land.
- Open fires should be banned in the area to avoid hazards of fire in the area;
- Clearing of vegetation cannot be avoided at the areas specified for project structures, but damage to the natural vegetation may be minimized by establishing camp sites, workshops and concrete mixing plants on waste/barren land rather than on forested or green land. However, if such type of land is not available, it shall be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth;
- Construction vehicles, machinery and equipment will remain confined within their designated areas of movement;
- The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes; and
- Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel shall be strictly prohibited.

Residual Impacts

Given the type of vegetation involved, and the presence of type of land adjacent to the Project Site, the residual effects on vegetation are considered not significant.

6.6.17 Fauna

Potential Impact

During construction phase the existing population of birds, mammals and reptiles of the construction areas will be affected due to disturbance arising from construction activities involving excavation, movement of machinery and vehicular traffic, movement of labor, camping, etc. The existing fauna will leave the directly affected areas due to construction activities and human intervention. Some animals particularly reptiles may get killed during the earthworks operations. Moreover, the movements of the mammals and reptiles will be restricted during the construction phase.

Birds as well, will tend to move away from the construction areas and find shelter and food elsewhere due to the activities mentioned above for fear of being hunted / trapped.

Noise generated from machinery particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction areas. Food and refuse at the Contractor's camps may attract animals that might in turn be hunted by the workers. This impact is indirect, site-specific, temporary, reversible, possible and medium significant.

Mitigation Measures

- Care shall be taken during construction activities for avoiding purposely or chance killing of animals;
- If any wild species and habitat is found during construction, it must be dealt carefully and local wildlife department officials should be informed;
- Hunting, poaching and harassing of wild animals shall be strictly prohibited, and Contractor shall be required to instruct and supervise its labor force accordingly and clear orders should be given in this regard;
- The Contractor must be held responsible for instructing his work force accordingly and for enforcing this restriction. In addition, this shall have to be controlled by the Wildlife Department.
- Special measures shall be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding;
- Noise generating activities shall not be carried out during the night by the work force;

- Wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them; and
- Noise produced due to construction activities may be kept to acceptable level.

Residual Impacts

The residual, after implementation of suggested mitigation measures, will be low.

6.6.18 Social and Cultural Conflicts

Potential Impact

During the construction phase of the proposed project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, difference in cultural values may also cause discomfort to local residents. This impact is negative, local, low, short-term and probable.

Mitigation Measures

- Local labor especially from nearby communities should be given preference for the construction works;
- Careful planning and training of work force to minimize disturbance to the local people;
- Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals; and
- Adequate training especially for the transitive workforce of the station (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.

Residual Impacts

Implementation of mitigation measures will reduce the risk of conflicts in society and will results into short term and low residual impacts.

6.6.19 Community Health and Safety

Potential Impact

Community health and safety issues during the construction of proposed project may include dust, noise, and vibration from construction vehicle transit, and

communicable disease associated with the influx of temporary construction labor. Significant community health and safety issues associated with the projects may also include:

- Pedestrian safety;
- Traffic safety; and
- Emergency preparedness.

Further, the laying of water supply pipelines, in particular, will require the digging of trenches for laying these lines will pose a risk of community members falling into these trenches. The construction areas located near the, settlements may cause accident for the people moving near to these areas. Considering these consequences, this impact can be categorized as direct, moderate, site-specific, medium term, temporary, medium probability and irreversible.

Mitigation Measures

The World Bank/IFC EHS Guidelines, 2007, defines community health and safety in terms that guarantee as-built infrastructure conforms to acceptable standards (structural safety, flood and fire risk), water supply sources are of suitable potable quality, emergency response planning is in place for built environments, traffic safety provisions are enforced alongside transport hazard assessment and mitigation, and disease prevention measures are taken. The Contractor will prepare the site specific community health and safety plan in compliance with relevant sections of the IFC General Environmental Health and Safety Guidelines (WB/IFC 2007), Pakistan Labor Laws, Punjab Occupational Safety and Health Act (2019);

- The Contractor will clearly barricade work areas to prevent access by the public, while ensuring passage by providing safe pathways for pedestrians around construction zones;
- The Contractor will exclude parking, waiting vehicles and vendors from areas adjacent to the work by means of clearly marked barricades and posted signage;
- The Contractor will remove excavated earth, spoil, rubble, cut vegetation and refuse whether generated by the project or discarded by third parties from areas within the construction zone, where it has potential to interfere with the public or generate dust;
- The Contractor will provide temporary lighting to facilitate construction during

night time;

- The Contractor will remove hazardous conditions on construction sites that cannot be controlled effectively with site access restrictions and will barricade any excavations and materials placed near the public place (if applicable);
- Hard Barricades will be provided at the excavation deeper than 1.5 meter as per "NZS 3845:1999 Road safety barrier systems";
- The Contractor will promptly reinstate any services and reinstall any physical facilities that are cut, disconnected or damaged during construction, and maintain or provide temporary services that are interrupted by construction. The Supervisory Consultant will inspect and certify the adequacy of all reinstated services and facilities;
- Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas especially near the settlements;
- An Emergency Preparedness and Response Plan (EPRP) in coordination with the local emergency responders to provide timely first aid response in the event of accidents and hazardous materials response in the event of spills;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Timely public notification on planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;
- Any environmental condition that is disagreeable to the public and causes an avoidable nuisance can be addressed with additional provisions over and above those described above, as determined necessary by the supervisory consultant.
- These requirements will be incorporated into the bidding specification and contract documents, and will be binding on the contractor, at risk of penalty for noncompliance, as charges to be recovered from contractor for unsafe act or condition.

Residual Impacts

Upon implementation of the proposed mitigation measures suggested above, and also upon implementation of the proposed Health and Safety Plan, no residual impacts are anticipated.

6.6.20 Communicable Diseases

Potential Impact

The laborers in the Contractor Camp, truck drivers and like personnel who interact with each other have the potential for the spread of HIV/AIDS if the incidence exists. Majority of the people living in the surrounding of the Project, and potential Labor are not aware of the source, mode of communication or consequences of HIV/AIDS. Although their religious and cultural value system, to a large extent excludes the outbreak or rapid communication of HIV/AIDS, yet its occurrence in such a situation cannot be precluded. It is necessary that awareness and preventive campaigns are run from time to time in the Labor camps and the field offices of the Project to prevent the communicable diseases like Cholera, Typhoid and Tuberculosis.

There is a chance of spreading of an epidemic of Coronavirus disease (COVID-19) due to close interaction of the labor force during construction not only among the workers but also in the area. This impact is high adverse in nature. The guidelines of WHO for prevention of COVID-19 are given as **Annexure-XII** of the EIA report.

Mitigation Measures

The Contractor shall:

- Arrange to run an active campaign, in the labour camp, to make people aware of the
  cause, mode of transmission and consequences of HIV/AIDS;
- Latest / Updated SOPs by WHO, national and provincial Government related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored;
- Strengthen the existing local health & medical services for the benefit of labour as well as the surrounding villages;
- Ensure cleanliness and hygienic conditions at the labour camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by the Health Department;
- Locating a labour camp at least away from the villages (local settlement), and
- Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures and related documents.

Residual Impacts

Successful implementation of suggested mitigation measures in above section in implementation of WHO guidelines for prevention of COVID-19 will reduces the chances of spread of communicable diseases among workers and nearby community. Therefore, the impact will be low.

6.6.21 Sensitive Receptors

Potential Impacts

Replacement of ECM from would result in intermittent construction activities near the sensitive receptors. These construction activities could potentially expose sensitive receptors to noise levels in excess of the applicable noise standards or result in a noticeable increase in ambient noise levels, or both.

Mitigation Measures

Impacts of construction equipment, noise, dust and construction related traffic on exposure of sensitive receptors to temporary and short-term construction related activities should be strictly monitored and mitigate immediately.

It's the contractor responsibility to work in sensitive area as per EMP to avoid negative impacts & disturbance to sensitive report.

Residual Impacts

Successful implementation of mitigation measures suggested above and in the EMP will reduces the chances of negative impacts of sensitive receptors. Therefore, the residual impacts will be low.

The sensitive receptors in the COI are highlighted in the map presented in Section IV (**Figure 4.8)**.

6.6.22 Site restorations

Potential Impacts

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.

Unattended construction waste and excavated material along the RoW of transmission and water supply mains will be source of bad aesthitcs 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;
- General restoration of the site area including landscaping and restoration of drainage where required.
- PMU through Contractor will ensure that restoration of construction works at water transmission and supply mains will be carried out by contractors.
- PMU will ensure periodic monitoring of such restorations.
- Contractors will develop site restoration protocols and will submit to 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.

Residual Impacts

The proposed site will be restored near to its original conditions and the residual impacts will be low.

6.7 IMPACTS DURING OPERATIONAL PHASE

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

Table 6. 6: Screening of Potential 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	Water system leaks and water discharges during flushing	2/ Unlikely	3/ Major	6/ Medium	Low/ Short term
2	Improved drinking water availability	Positive impacts expected			Long term positive residual impact
3	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

6.7.1 Water System Leaks and Water Discharges during Flushing

Potential Impacts

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.

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 of 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

Residual Impact

The implementation of suggested mitigation measures will reduce impacts on the environment and the residual impacts will be low.

6.7.2 Improved Drinking Water Availability

Potential Impacts

The continued supply of treated quality water by proposed project will be an indispensable facility in Khyaban-e-Sir Syed (KSS), Rawalpindi. The proposed water supply system will facilitate the domestic as well as commercial water requirements of people living in KSS, Rawalpindi. 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 for next fifty years. The project will reduce abstraction of ground water from tube wells and water bores omitting chances of ground water depletion and reduce operation cost for RWASA.

Furthermore, project implementation will also create job opportunities during operation, 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

Mitigation measures

No mitigation measures required.

6.7.3 Improvements in Public Health

Potential Impacts

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.

6.8 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5RS Principles- Reduce, Reuse, Recycle, Refurbish and Retrofit.

The project will provide sustainable and clean water source in serving areas.

Access to clean water will improve the general health status of the area and reduce exposure to waterborne diseases, ultimately, health budget of the project area will be decreased.

The project will result in conservation of groundwater resource of project area by augmenting more surface water from WTP.

People will save lot of cost which they need to spend on purchase of water containers, especially during summer season.

The project will result in improved access to water for nearby communities and other major settlements.

The sale of food and other services to immigrant workers during the construction phase of the project will lead to some direct incomes as a form of project impact.

The communities may be presented in form of temporary employment, when engaged to assist surveyors. Also, experts involved in feasibility studies and other pre-project

consultations may lead to some level of purchases of items from petty traders and farmers during their presence in the communities. Some form of temporary employment would be generated for community members during the construction phase by the project directly. However, completion of the project will enhance the employment possibilities of inhabitants.

CHAPTER-7

ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

7.1 ENVIRONMENTAL MANAGEMENT

The EIA has identified potential impacts that are likely to arise during proposed project of water supply system for KSS in detail, both negative and positive impacts at each stage of the project. To minimize the adverse impacts, EIA has recommended mitigation measures in the Environmental Management Plan (EMP). The proposed mitigation measures have been based on the understanding of the sensitivity and behavior of environmental receptors in the project area, 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 EIA stage, monitoring measures have been recommended to ascertain these impacts during the course of the project activities.

The Environmental Management Plan (EMP) is developed to eliminate and/or mitigate the impacts envisaged at the design, construction and operation stages.

The detailed EMP provided in this document as **Table 7.1** ensures that proposed project 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.

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.

7.2 INSTITUTIONAL CAPACITY

7.2.1 Environmental Committee and its Responsibilities

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 LG&CD Department. 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.

During the operation phase, the overall responsibility for the implementation and monitoring of the EMP rests with Managing Director (MD) WASA, Rawalpindi. The specific roles and responsibilities for environmental management and monitoring are provided in **Table 7.1** below.

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

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 Federal & Punjab Government requirements;
- Have competent staff to manage contractors and ensure implementation of recommended mitigation measures
- Manage and ensure effective implementation of the gender action plan;
- Ensure submission of all IEE/EIA requirements as per law by responsible entities; and

- Monitoring of activities of the entire project.

The ADB will:

- Support the coordination and administration of the project;
- Provide guidance to PMU, LG&CD and R-WASA 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.

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;
- Hire competent staff to implement the ensure implementation of mitigation measures suggested in the EMP.
- Addition of one international consultant to supervise the implementation process.
- Assists PMU to ensure that all environmental requirements and mitigation measures from the IEE/EIA and EMP are incorporated in the bidding and contracts documents.
- Prior to construction, reviews the updated Site Specific Environmental Management Plans (SSEMPs) prepared by the contractor.
- Undertakes environmental management capacity building activities for relevant project focal staff including staff from contractors

The Federal & Punjab EPAs will have the following responsibilities with regards to this project:

- Provides regulatory compliance works for the project.
- Reviews and approves environmental assessment report of the proposed project 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.

The project contractor will be responsible for following items:

- Implementation of, or adherence to, all provisions of the IEE/EIA 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 template for guidance of contractors is provided as **Annexure-XIII**.
- 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.

The R-WASA will be responsible for following items:

- Implementation of, or adherence to, all provisions of the IEE/EIA and EMP
- Preparation of site specific EMPs for operations phase
- R-WASA will be responsible to ensure that contractors engaged during operation phase of WTP are executing activities in compliance to IEE/EMP.
- R-WASA will be required to have qualified Environmental Specialist designated to ensure all mitigation measures are implemented in true letter and spirit.
- R-WASA 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.
- R-WASA will plan customer feedback surveys in order to ensure sustainable service delivery and to remove gaps in the system.

The third party monitor will be responsible for following items:

- Monitoring and reporting of all provisions of the IEE/EIA and EMP.
- Periodic environmental monitoring during operation phase.
- Reporting of environmental non-compliance to project stakeholders including

ADB, PMU, R-WASA and Supervision Consultant.

- Suggest corrective actions for close out of EMP non compliances.
- Train the contractors and project stakeholders towards EMP implementation.

Table 7. 1: Environmental Management Plan

Project Activities	Section	Impact	Mitigation Measures Recommended	Responsibility		Timing
				Execution	Monitoring	
Design/Pre-Construction Phase	1.1	Improper design of distribution networks and Conductance Mains	Factors such as site capacity, accessibility, acceptability, stability, environmental sensitivity, land use, socio-economic receptors and climate hazards have been studied and site has been selected accordingly. Water supply network design shall facilitate uninterrupted water supply through gravity system without technical constraints.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
	1.2	Lack of integration of IEE/EMP requirements into Construction bid documents	The Environmental staff of 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. 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. Project contractors shall have qualified and experienced environmental staff to plan, arrange, implement, monitor and report	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

			IEE/EMP requirements.			
	1.3	Contractor's Environmental Safeguards Capacity	PMU shall review the contractor capacity with respect to safeguard management and contracts shall be awarded accordingly. 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 prior to the commencement any physical works on ground. PMU shall ensure the project contractors are selected on merit and necessary funds has been allocated in the contract documents for EMP implementation and monitoring.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
	1.4	Relocation of Utilities	Detailed filed surveys will be conducted to assess any sub-surface utilities that might be present under the proposed project alignment within the right of way of the project, shall be relocated prior to the commencement of the work. Based on the utilities that are identified during the detailed surveys, a relocation plan of those utilities will be developed by the respective line agencies in close coordination. In case any utilities can be allowed to remain in place and avoidance of their	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

			damage is possible, the contractor will need to be aware of the location of these services so that disruptions are not caused. In such scenario, the responsibility for any repair of damaged services will lie with the contractor.			
	1.5	Identification of Locations for Labor Camps and ancillary facilities	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. Solid and liquid effluent waste disposal facilities shall also be designed to cater waste of administration/office building etc. 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.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
	1.6	Development of Traffic Management Plan	A comprehensive traffic management plan shall be developed by the contractor and approved by the Executing Agency or the Project Management Unit that will contain the traffic diversion onto alternate routes and management of traffic flows to minimize the congestion and the possibility of accidents. This plan shall be dependent to the EMP and will be implemented by the contractor.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
	1.7	Land Acquisition and	No mitigation measures are required.	-	-	-

		Resettlement Impacts				
	1.8	Topography	Mitigation measures will involve adoption of best engineering design measures keeping in view of the aesthetics of the project area and provision of green areas for the landscape in design. The proposed design has tried to minimize these impacts.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
	1.9	Seismicity	The proposed structure should be designed and constructed keeping in consideration high intensity earthquakes. For seismic hazard analysis, updated structural and seismic evaluations should be conducted by the design engineer/consultant. Moreover, geo-technical investigations must be conducted prior to construction phase.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
	1.10	Flora	The camps, mobility of machinery should be proper planned and well designed to avoid any loss to local green cover; It is recommended to establish the construction camps where no or minimum vegetation exists. The location of construction camp should be selected so, as to have limited environmental impact during construction phase and to reduce the cost and land requirement. Compensation to the forest department for all type of plants (saplings, sub-mature, mature trees and other green assets) will be paid by the proponent as desired by the Punjab, Forest Department and as per law of land.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

	1.11	Fauna	The standard measures must be adopted to minimize noise due to machinery movements and installations; Wildlife movements and routes must be considered during activities and should be avoided to their maximum level; The alternate routes and points are recommended to avoid any damage to locally available fauna; The camps shall be properly fenced and gated to check the entry of animals in search of eatable goods; and Similarly, wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them. Fruit trees along with other broad leaved trees must be considered for plantation to balance the local ecosystem. Proper waste management plan may be considered mandatory to safeguard the local environment.	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project
Construction Phase	2.1	Construction of water distribution networks and Transmission Mains	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	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			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 LG&CD will ensure the identification of disposal sites for unsuitable excavated material. Stock piling of excavated material at places that are congested will be avoided as these piles can create traffic issues and public nuisance.			

	2.3	Site Accessibility during Construction	Selection of access roads/tracks should be based upon certain criteria to ensure high stability, no or minimum tree cutting and crop damage, minimum disturbance to nearby settlements and other social amenities; The approach roads should be selected to avoid any soil degradation and erosion impacts; Special care should be taken for known sensitive area to ensure that all interested parties are aware of the type and location of working. Measures should be taken where necessary to protect such areas physically; and Mitigations for the loss of trees and crops, soil erosion, soil contamination, air and noise pollution, waste generation, and loss of agricultural land provided in below sections will be adopted.	Construction Contractor	CSC, PMU	During Construction at Active Construction Site
	2.4	Traffic Issues	To minimize traffic problems in the proposed project area, following measures will be considered: Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime to reduce traffic load and inconvenience to the local population; Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions on roads;	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			The speed of the vehicles will be controlled (at 20 to 25 km/hr) to reduce the probability of severe accidents, soil erosion, debris flows due to vibrations and dust emission; Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work; Proper sign boards will be provided for smooth flow of traffic; Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents; and Any closure of the roads (especially main roads) and deviations / diversions proposed should be informed to the riders through standard signs and displays. Traffic Management Plan will be implemented to avoid traffic accidents, jams/public inconvenience.			
	2.5	Resource Conservation	Resource Conservation Plan has been developed for the proposed project and attached as **Annexure-VII**.	Construction Contractor	CSC, PMU	During Construction at Active Construction Site
	2.6	Construction Camps/ Camp Sites	Environmental Reinstate any temporary facilities to pre-existing conditions in ecologically sensitive areas. Implement landscaping plan for all facilities in areas where high landscape value and visual vulnerability to the	Construction Contractor	CSC, PMU	During Construction

			proposed activities warrants site-specific landscape restoration measures. Operate equipment in a manner sympathetic to the ambient noise environment. Do not leave equipment idling unnecessary. Provide adequate warnings of impeding works to all potential receptors within a 1 km corridor surrounding the RoW via public notices and local news. Social State land will be a first preference for worker camp location, followed by land where there is a willing lessee. Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values. Training will be provided to all staff on camp management rules and overall discipline and cultural awareness. This will include, in appropriate languages: A briefing on camp rules A community relations orientation to increase awareness about the local area, cultural sensitivities and the project Code of Conduct Awareness-raising on health considerations, including sexually transmitted diseases (STDs). The construction contractor is required to develop a Construction Camp Management			

			Plan to address: Discipline; Community liaison; Ethnic tensions and; Communicable diseases. A Code of Conduct and Camp Rules will be required within the Construction Camp Management Plan, which provides policies and a disciplinary framework with respect to worker behavior. Camp Location The construction contractor will be required to assess the environmental/social sensitivity of any additional or alternative sites prior to their approval for adoption.			
	2.7	Wastewater Generation	To dispose the liquid waste generated from the construction activities, the following steps will be taken by the contractor: Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks. Proper monitoring to check the compliance of PEQS will be carried out; and Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit. The contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of	Construction Contractor	CSC, PMU	During Construction

			wastewater collection, transportation and its disposal.			
	2.8	Disposal of Spoil & Demolition Waste	Waste to be reused in the project or by any other interested parties. All material that is produced shall be transported in tarpaulin covered trucks for disposal at the designated site. At the disposal site, the demolition waste will be disposed off in accordance with the best practices to ensure no residual impact. Disposal trucks will be properly maintained to minimize oil leakages during the construction. Demolition waste will not be disposed off at any other area other than the designated area as chances of asbestos presence in the existing pipelines cannot be ignored. In case asbestos is present in existing pipelines, they need to be demolished ensuring internationally acceptable protocol as part of the best practices to properly handle and dispose of the asbestos to prevent any damage to the health of all individuals exposed to the asbestos. Following precautionary measures must be adopted to handle redundant AC pipelines; • The Asbestos Cement Pipelines falls under Class II non—firable. For handling of this waste the workers must be properly trained with annual refreshers. • Continuous supervision by	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			Competent supervisor must be carried out • Engineering Controls including demarcation, wet methods, drop cloths, clean-up and disposal, etc. must be adopted for transportation of redundant AC pipelines. • Try as much as possible to remove large lengths of pipeline to avoid cutting and damage to pipeline to control release of asbestos fibers. • Respiratory Protection in the form of full face mask and face shield along with protective clothing including gloves, apron etc. must be provided to workers who will be involved in handling of AC pipelines. • Disposal of the AC pipelines must be ensured at designated landfill site. The pipelines must be wrapped in double layer of at least 6mil thick plastic sheet.			
	2.9	Solid Waste Generation	All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper solid waste management system. The contractor will coordinate with local representatives and administration of the concerned solid waste management department for the disposal of solid waste; The contractor must develop a plan of action with the help of concerned solid waste management department for	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			transporting the waste to the disposal site; Toxic waste will be handled, stored, transported and disposed separately; The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and Solid waste will be segregated at source so that it can be re-used or recycled. Waste Management Plan will be developed to implement an efficient and responsive solid waste management system during construction phase. Recyclable wastes e.g. steel bars will be sold to waste vendors; Reusable material will be used as a filling material during ground levelling; Solid waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan; and The site will be restored back to its original conditions after construction completion.			
	2.10	Green House Gas Abatement	Regular motioning of the vehicles for engine efficiency; Avoid idling of construction vehicles; Alternative energy resources shall be considered where possible; and The Contractor shall ensure the compliance with NEQS/PEQS, 2016.	Construction Contractor	CSC, PMU	During Construction at Active Construction Site
	2.11	Emergency Response Plan	Emergency Response Plan has been developed to manage all potential and	Construction	CSC, PMU	During

			actual emergency situation during construction phase. The same is attached as **Annexure IX** of the report.	Contractor		Construction
	2.12	Natural and Man Made Disaster	Mitigation measures include the following: An ERP for earthquakes and manmade disasters should be developed by the contractor, in coordination with SC and the proponent (WASA), should be implemented in close consultation with the RESCUE 1122 Services and other concerned departments; Training of the contractor and WASA staff and employees regarding the emergency procedures and plans should be regularly conducted; Emergency numbers should be clearly posted at all disposal stations; and Minor incidents and near misses should be reported, and preventive measures should be formulated accordingly by the WASA Management.	Construction Contractor	CSC, PMU	During Construction
	2.13	Degradation of Ambient Air Quality	All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; Open burning of solid waste from the Contractor's camps and at construction site should be strictly banned; Preventive measures against dust should be adopted for on-site mixing and unloading	Construction Contractor	CSC, PMU	During Construction

			operations; Construction and spoil materials will be transported trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction works) will comply with the PEQS (as amended) for carbon emissions and noise; Contractors shall comply with submitted work schedule, keeping emission operations away from sensitive receptors and residential areas; Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s); Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions; Construction equipment is generally left idling while the operators are on break or waiting for the completion of another task. Emissions from idling equipment tend to be high. Existing idling control technologies, which automatically shut the engine off after a pre-set time can reduce emissions, without intervention of the operators; Along the project alignment with water pipelines and trunk sewer being laid, water will be sprinkled at high frequency especially during summer season at all construction sites to suppress dust			

			emissions; Construction workers should be provided with masks for protection against the inhalation of dust; Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases; and Regular monitoring of air quality in accordance with PEQS, 2016.			
	2.14	Noise/Vibration	Quieter Equipment: A cost-effective way to reduce noise at a construction worksite is to buy quiet equipment. In addition, equipment in use should be the most suitable for the job. Avoid using equipment that is over-powered and, conversely, avoid using under powered equipment. Whenever possible the quietest equipment alternative should be used. In general, electronic powered equipment is quieter than diesel powered equipment and hydraulically powered equipment is quieter than pneumatic power. Modifying Existing Old Equipment: The most common way to reduce the noise levels of common construction equipment is through worksite modifications. Some common worksite modifications consist of retro-fitting existing equipment with damping materials and mufflers. Barrier Protection: An effective way of reducing noise is to locate noisy equipment behind purpose-built barriers. The barriers can be constructed on the work site from	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			common construction building material (plywood, block, stacks or spoils) or the barriers can be constructed from commercial panels which are lined with sound absorbing material to achieve the maximum shielding effect possible. To be effective, the length of the barrier should be greater than its height. The noise source should not be visible and barrier should be located as close as possible to either the noise source or the receiver. Work Activity Scheduling: Work activity scheduling are administrative means to control noise exposure. Planning how noise sources are sited and organized on a work site can reduce noise hazards. Jobs can be rotated so that exposure time is limited. Transferring workers from a high exposure task to a lower exposure task could make the employee's daily noise exposure acceptable. Maintenance Increased attention to maintenance of tools and equipment will reduce worksite noise levels. Maintaining plant and equipment in good order not only increases its life, but makes it safer to use and quieter. Loose and worn parts should be fixed as soon as possible. Ideally, the worksite should have a system in place for checking and servicing the various machines and power tools. Use of low noise machinery, or machinery			

			with noise shielding and absorption; Contractors shall comply with submitted work schedule, keeping noisy operations away from sensitive receptors, residential areas; implement regular maintenance and repairs; and employ strict implementation of operation procedures; The Contractor shall comply with PESQ, 2016.			
	2.15	Flora	Cutting and / or disturbance of trees shall be avoided, as far as possible; A tree plantation program shall be implemented with the recommendations and technical support of Punjab, Forest Department for the enhancement ecological condition of the area; Final and actual plantation and trees plantation cost will be finalized after assessment by Punjab, Forest Department. All the activities will be executed as per agreement/MOU between proponent and Punjab, Forest department while strictly considering law of land. Open fires should be banned in the area to avoid hazards of fire in the area; Clearing of vegetation cannot be avoided at the areas specified for project structures, but damage to the natural vegetation may be minimized by establishing camp sites, workshops and concrete mixing plants on waste/barren land rather than on forested or green land. However, if such type of land is	Construction Contractor	CSC, PMU	During Construction

			not available, it shall be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth; Construction vehicles, machinery and equipment will remain confined within their designated areas of movement; The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes; and Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel shall be strictly prohibited.			
	2.16	Fauna	Care shall be taken during construction activities for avoiding purposely or chance killing of animals; If any wild species and habitat is found during construction, it must be dealt carefully and local wildlife department officials should be informed; Hunting, poaching and harassing of wild animals shall be strictly prohibited, and Contractor shall be required to instruct and supervise its labor force accordingly and clear orders should be given in this regard; The Contractor must be held responsible for instructing his work force accordingly and for enforcing this restriction. In addition, this shall have to be controlled by the Wildlife Department. Special measures shall be adopted to	Construction Contractor	CSC, PMU	During Construction

			minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding; Noise generating activities shall not be carried out during the night by the work force; Wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them; and Noise produced due to construction activities may be kept to acceptable level.			
	2.17	Community Health and Safety	The World Bank/IFC EHS Guidelines, 2007, defines community health and safety in terms that guarantee as-built infrastructure conforms to acceptable standards (structural safety, flood and fire risk), water supply sources are of suitable potable quality, emergency response planning is in place for built environments, traffic safety provisions are enforced alongside transport hazard assessment and mitigation, and disease prevention measures are taken. The Contractor will prepare the site specific community health and safety plan in compliance with relevant sections of the IFC General Environmental Health and Safety Guidelines (WB/IFC 2007), Pakistan Labor Laws, Punjab Occupational Safety and Health Act (2019); The Contractor will clearly barricade work areas to prevent access by the public, while ensuring passage by providing safe	Construction Contractor	CSC, PMU	During Construction

			pathways for pedestrians around construction zones; The Contractor will exclude parking, waiting vehicles and vendors from areas adjacent to the work by means of clearly marked barricades and posted signage; The Contractor will remove excavated earth, spoil, rubble, cut vegetation and refuse whether generated by the project or discarded by third parties from areas within the construction zone, where it has potential to interfere with the public or generate dust; The Contractor will provide temporary lighting to facilitate construction during night time; The Contractor will remove hazardous conditions on construction sites that cannot be controlled effectively with site access restrictions and will barricade any excavations and materials placed near the public place (if applicable); Hard Barricades will be provided at the excavation deeper than 1.5 meter as per "NZS 3845:1999 Road safety barrier systems"; The Contractor will promptly reinstate any services and reinstall any physical facilities that are cut, disconnected or damaged during construction, and maintain or provide temporary services that are interrupted by construction. The Supervisory Consultant will inspect and certify the adequacy of all reinstated			

			services and facilities; Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas especially near the settlements; An Emergency Preparedness and Response Plan (EPRP) in coordination with the local emergency responders to provide timely first aid response in the event of accidents and hazardous materials response in the event of spills; Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites; Timely public notification on planned construction works; Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links; Any environmental condition that is disagreeable to the public and causes an avoidable nuisance can be addressed with additional provisions over and above those described above, as determined necessary by the supervisory consultant. These requirements will be incorporated into the bidding specification and contract documents, and will be binding on the contractor, at risk of penalty for noncompliance, as charges to be recovered from contractor for unsafe act or condition.			

	2.18	Occupational Health and Safety	Complying with the safety precautions for the construction workers as per International Labour Organization (ILO) Convention No. 62, as far as applicable to the Project Contract; Formulation of layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labourers; Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction; Proper maintenance of facilities for workers shall be monitored; Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, gloves, etc. Ensure strict use of wearing these protective clothing during work activities; Contractor will ensure the provision of medicines, first aid kits, ambulance etc. at the camp site; Provision of proper safety and diversion signage, particularly at sensitive/accident-	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			prone spots; and Disasters such as earthquakes, flooding, due to heavy rain and other manmade disasters such as fires may occur, and that must be considered for minimizing their impacts. Therefore, an Emergency Response Plan for earthquakes and manmade disasters should be developed by the construction contractor; and Contractor(s) shall prepare a comprehensive OHS Plan including work method statements for all hot works to avoid incidents during construction stage. A guideline OHS Plan is provided in **Annex-VIII.** The Contractor will prepare the site specific occupational health and safety plan in compliance with relevant sections of the IFC General EHS Guidelines (WB/IFC 2007), Pakistan Labor Laws and Punjab Occupational Safety and Health Act (2019).			
	2.19	Social and Cultural Conflicts	Local labor especially from nearby communities should be given preference for the construction works; Careful planning and training of work force to minimize disturbance to the local people; Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals; and Adequate training especially for the	Construction Contractor	CSC, PMU	During Construction

			transitive workforce of the station (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.			
	2.20	Communicable Diseases	Arrange to run an active campaign, in the labour camp, to make people aware of the cause, mode of transmission and consequences of HIV/AIDS; Latest / Updated SOPs by WHO, national and provincial Government related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored; Strengthen the existing local health & medical services for the benefit of labour as well as the surrounding villages; Ensure cleanliness and hygienic conditions at the labour camp by ensuring proper drainage and suitable disposal of solid waste. Inoculation against Cholera will be arranged at intervals recommended by the Health Department; Locating a labour camp at least away from the villages (local settlement), and Keep all the camps, offices, material depots, machinery yards and work sites open for the inspection of health and safety measures and related documents.	Construction Contractor	CSC, PMU	During Construction at Active Construction Site/ Camps
	2.21	Communicable diseases incl. COVID-19	All workers must perform complete sanitization at the site as per	Construction Contractor	CSC, PMU	During Construction at

			SOPs/guidelines issued by WHO and the national guidelines issued by the Government of Pakistan (GOP)20. All workers must wear a mask as soon as they arrive at site and must keep wearing it at all times while present at the work site/hospital premises. 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			Active Construction Site/ Camps

			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).			
	2.22	Sensitive Receptors	Impacts of construction equipment, noise, dust and construction related traffic on exposure of sensitive receptors to temporary and short-term construction related activities should be strictly monitored and mitigate immediately. It's the contractor responsibility to work in sensitive area as per EMP to avoid negative impacts & disturbance to sensitive report.	Construction Contractor	CSC, PMU	During Construction at Active Construction Site/ Camps
	2.23	Site restorations	Demobilization of all equipment and machinery; Disposal of any waste material remaining at	Construction Contractor	CSC, PMU	During Construction/ Prior to Operations

			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 through Contractor will ensure that restoration of construction works at water transmission and supply mains will be carried out by contractors. PMU will ensure periodic monitoring of such restorations. Contractors will develop site resortation protocols and will submit to 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.			
Operational Phase	3.1	Water system leaks and water discharges during flushing	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 of with a greater potential for leaks	WASA, Rawalpindi	Env. Expert/ EPAs	During Operations

			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.			

7.3 TRAINING SCHEDULES

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.

The details of capacity building and training program are presented in the **Table 7.2**.

Table 7. 2: Capacity Development and Training Programme

Provided by	Organized by	Contents	Target Audience	Venue	Duration
Pre-construction Phase 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	WASA Rawalpindi Office	One day long training seminar including group exercise/workshop
Construction Phase 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	WASA Rawalpindi Office	One day long training seminar including group exercise/workshop

Operation Phase 3rd party trainer	WASA & PMU	Short seminars on Environmental risks associated with operation phase. Development of Environmental Performance Indicators/ Occupational Health and Safety (OHS) issues	O&M contractor	WASA Rawalpindi Office	One day long training seminar including group exercise/workshop

7.4 IMPACTS & MITIGATION MEASURES

The EMP provides comprehensive mitigation and management measures for the following phases of the project:

- the pre-construction/design,
- construction and
- operation phases

A monitoring plan for the pre-construction/design, construction and operation phases of the project, indicating environmental parameters, mitigation measures of the negative environmental impacts, responsible authority and frequency is provided below as **Table 7.3**, **Table 7.4** and **Table 7.5** below.

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.

During the construction period, the monitoring activities will focus on ensuring that any required environmental mitigation measures are implemented to address possible impacts.

7.5 Environmental Monitoring Program

It will be in the fitness of the things to operate this project under the Environmental Management Plan. Regular monitoring of all the significant environmental issues is essential to check the compliance status of EMP. The main objective of the monitoring will be;

- To verify the results of the environmental study with respects to the proposed project.
- To estimate the trends of concentrated values of the issues, which have been identified as critical and then planning the mitigating measures.
- To assess the efficiency of pollution control mechanism.

To ensure that any additional parameters, other than those identified in the EIA report, do not turn critical after the commissioning of proposed project.

A monitoring plan for the pre-construction/design, construction and operation phases of the project, indicating environmental parameters, mitigation measures of the

negative environmental impacts, responsible authority and frequency is provided below as **Table 7.3**, **Table 7.4** and **Table 7.5**. 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.

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 Federal and Punjab 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 of water supply system will be carried out by WASA Rawalpindi with support from PMU.

Table 7. 3: 'Pre-Construction' Environmental Monitoring Plan for Baseline Development

Parameter to be measured	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Ambient Air Quality	To establish baseline air quality levels	CO,NO_2 & PM_{10} (particulate matter smaller than 10 microns) concentration at receptor level	1-hr and 24-hr concentration levels	At least two random receptor locations (especially one in Federal Area and One in Punjab) in the project area, both upwind and downwind	Once	CSC
Ambient Noise	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
Wastewater Quality in vicinity of project area	To establish wastewater quality in project area	Wastewater quality in project area	Water samples for comparison against NEQS parameters	At two locations within the project area	Once	CSC

Table 7. 4: Construction Phase Monitoring Requirements

Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Noise 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
Air Quality Dust emissions from construction vehicles and equipment	To determine the effectiveness of dust control program on dust at receptor level	CO, NO_2 & PM_{10} (particulate matter smaller than 10 microns) concentration at	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
Wastewater Quality	To determine the effectiveness of mitigation	As per WHO/NEQS	Water samples for comparison against NEQS parameters	upstream and downstream locations of nullahs	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC

Safety precautions by Safety workers	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
Soil Contamination	To prevent contamination of soil from oil and toxic chemical spills and	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
Solid Waste & Effluent disposal Insufficient procedures for waste collection, storage, transportation and disposal	To check the availability of waste management system and implementation	Inspection of solid and liquid effluent generation, collection, segregation, storage, recycling and disposal will be undertaken at all	Visual inspections	At work sites in project area	Once daily	Contractor's Environmental officer, CSC

Table 7. 5: Operation Phase Environmental Monitoring Plan

Parameter to be measured	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Waste Water Quality	To determine the effectiveness of mitigation	As per WHO/NEQS	Water samples for comparison against NEQS parameters	upstream and downstream locations of nullahs	Bi-annual basis on a typical working day	WASA Rawalpindi
Water Quality	To assess whether provided portable water is within limits	As per PEQS	Water samples for comparison against NEQS parameters	At storage tanks and few samples will be taken from users taps	Bi-annual	WASA Rawalpindi

7.6 ENVIRONMENTAL BUDGET

The **Table 7.6** below provides cost estimates for 'Pre-Construction phase' monitoring while **Table 7.7** and **Table 7.8** provides cost estimates for 'Construction phase' and 'Operation phase' monitoring of key environmental parameters.

The costs associated with implementation of the EMP and the necessary mitigation measures are provided as **Table 7.9** below. The **Table 7.10** below provides the cost for capacity development and training programme for project contractors for the proposed project.

Table 7. 6: Annual Cost Estimates for 'Pre-Construction Phase' Environmental Monitoring

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Wastewater Quality	NEQS/WHO	6 (once only at 3 locations for 02 Nullahs)	180,000	6 readings @ PKR 30,000 per sample
Air Quality*	CO, NO_2, SO_2, O_3 PM_{10}	3 (Once only at 3 locations)	210,000	3 readings @ PKR 70,000 per sample
Noise Levels**	dB(A)	3 (Once only at 3 locations)	90,000	3 readings @ PKR 30,000 per reading
Groundwater Quality	PEQS /NEQS	2 (Once only at 2 locations)	60,000	2 readings @ PKR 30,000 per sample
Contingencies			27,000	5% of monitoring cost
		Total (PKR)	**5670,000**	

**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. 7: Annual Cost Estimates for 'Construction Phase' Environmental Monitoring

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Wastewater Quality	PEQS / NEQS / WHO	24 (Quarterly at 3 locations for 02 nullahs)	720,000	24 readings @ PKR 30,000 per sample
Air Quality	CO, NO_2, PM_{10}	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
		Total (PKR)	**1512,000**	

Table 7. 8: Annual Cost Estimates for 'Operation Phase' Environmental Monitoring

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Water Quality	PEQS / NEQS / WHO	12	360,000	12 readings @ PKR 30,000 per sample
Contingencies			18000	5% of monitoring
Total (PKR)			**378,000**	

Table 7. 9: Estimated Costs for EMP Implementation

Item	Sub-Item	Estimated Total Cost (PKR)
Staff, audit and monitoring cost1	1 person for 24 months (@ 100,000 per month)	2,400,000
One International Consultant	1 expert for 3 months (@ 500,000 per month)	1,500,000
Monitoring Activities	Provided separately in Tables 7.7 and 7.8.	-

Mitigation Measures	As prescribed under EMP and IEE/EIA.	40,00,000
(i) Water sprinkling	To suppress dust emissions	800,000
(ii) Solid waste collection & disposal (including hazardous waste)	From construction sites (based on initial estimates)	1,500,000
(iii) Plantation around project	To plant vegetation all along the boundary of WTP	1,500,000
(iv) Hard Barricades	Provision of hard barricades in case the trench is 1.5 meter ddep	1,000,000
Contingencies	5% of EMP implementation cost	635,000
Total Estimated Cost (PKR)		**13,335,000**

Table 7. 10: Cost of Capacity Development and Training Programme for Project Contractor(s)

Provided by	Organized by	Contents	No. of training events	Duration	Cost (PKR)
Pre-construction Phase Monitoring Consultants / Organizations offering specialized services in environmental	CSC & PMU	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring	Two seminars for Contractor management staff and project staff	1 day	100,000/Training
Construction Phase 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	Two seminars for Contractor management staff and project staff dealing in environment and	1 day	100,000/Training
Operation Phase 3rd party trainer	WASA Rawalpindi	Short seminars on Environmental risks associated with operation phase. Development of	Bi-annual seminars	1-2 Day	600,000/Year
Total			**800,000 (PKR 0.8 million)**		

CHAPTER-8

RECOMMENDATIONS & CONCLUSIONS

8.1 RECOMMENDATIONS

Based on the findings of this Environmental Impact Assessment (EIA) Report and survey results, following recommendations have been formalized for smooth functioning of proposed project.

- The present Environmental Impact Assessment (EIA) Report of **Augmentation of Water Supply and Formation of DMAs in Khayaban-e-Sir Syed, Rawalpindi** meets the administrative and legal framework of the EPA Punjab.
- As the project is in feasibility stage, the proponent shall obtain statutory clearances prior to award of contract and ensure conditions/requirements are incorporated in the project design and documents;
- Upon mobilization of the contractors, PMU to provide a safeguards orientation as per EIA and project administration manual;
- Contractor to appoint environmental and social safeguards, responsible for environmental compliance, occupational health and safety and core Labour standards.
- Regular monitoring for leakage shall be carried out to avoid contamination of water supply
- Employment opportunities shall be given to local community as per plans discussed in the EIA report

8.2 CONCLUSION

The EIA Report of **Augmentation of Water Supply and Formation of DMAs in Khayaban-e-Sir Syed, Rawalpindi** – Pakistan is made to fulfill the legal requirement of Punjab Environmental Protection Act, 1997 [Amendment, 2012].

The proposed project " **Augmentation of Water Supply and Formation of DMAs in Khayaban-e-Sir Syed, Rawalpindi** " is of high significance considering the urgent need for improving sustainable water supply system of Khyaban-e-Sir Syed Colony of Rawalpindi.

Primary and secondary data has been collected and used to assess the environmental impacts of the project. This EIA report highlights the potential environmental impacts associated with the Project and recommends mitigation measures accordingly. Any

environmental impacts associated with the project need to be properly mitigated, through the existing institutional arrangements described in this report.

The majority of the environmental impacts are associated with the Design and Construction phase of the proposed project and majority of these impacts are short term and reversible.

Major impacts during construction phase will be related to deep excavations, traffic congestion and community health and safety issues during laying of Conductance Main and replacement of Distribution Pipelines in populated areas of Islamabad and KSS, Rawalpindi.

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 retained by the Construction Supervision Consultant (CSC) to supervise the implementation process. The EMP includes measures to minimize project impacts due to traffic, noise, air pollution, waste generation etc.

The EMP prepared for the proposed project under this EIA 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 further review and approvals. 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.

NOC from concerned department for disposal of mucking material, spoil and municipal solid waste from worker camps will be taken. It will be responsibility of contractor.

Based on the above, this report concludes that there are no potential adverse environmental impacts from proposed project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Formation of DMAs ". Impacts of less significance can be mitigated to an acceptable level by adequate

implementation of the mitigation measures identified and suggested in EMP, hence, no significant or unacceptable change in the baseline environmental conditions will occur. Similarly, the project will have a visible positive impact on the socio-economic conditions of the local residents in terms of 24/7 uninterrupted water supply, enhancement of water quantity for KSS and provision of clean water. Further PMU will ensure that selected construction contractor has contractual obligation with respect to EMP implementation. Also WASA Rawalpindi will ensure appropriate staffing and budgeting for effective implementation and monitoring of project EMP.

Based on the findings of the IEE/EIA, the project 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. The classification of the project as "Category B" as per ADB SPS, 2009 is confirmed and Initial Environmental Examination has been submitted to ADB. Further, EIA Report has been completed for the said project so the project of ‘Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Formation of DMAs, District Rawalpindi’ is recommended for the Environmental Approval and issuance of NOC from the EPA, Punjab.

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ANNEXURE-I

Layout Plan

ANNEXURE-II

Location Map

ANNEXURE-III

Environmental Monitoring Reports

ENVIRONMENTAL SERVICES PAKISTAN

ESPAK

CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number:	ESPAK/648P/22/AA/5654/00576	Date:	05/12/2022
Name of Industry/Client:	Augmentation of Surface Water Supply for Khayaban-e- Sirsyed		
Address:	Rawalpindi		
Validation Officer:	Amin Baig, Research Officer		
Nature of Sample:	Ambient Air	Monitoring Location:	Proposed Underground Tank-2 (GPS: 33.63908°N 73.04876°E)
Date of Sample Collection:	02/12/2022	Grab / Composite:	Continuous 24-Hours
Sample Collected/Sent By:	Farhan Ali, Analyst (Field), ESPAK		
Date of Completion of Analysis:	03/12/2022		

S. No	Parameters	Limit Values (PEQS-24 Hours)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	1.5 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Sulfur Dioxide (SO_2)	120 µg/m³	13 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
3	Ozone (O_3)	130 µg/m³ (1 Hour)	19 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
4	Oxides of Nitrogen as NO	40 µg/m³	15.3 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
5	Oxides of Nitrogen as NO_2	80 µg/m³	28.5 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Particulate Matter $PM_{2.5}$	35 µg/m³	30.2 µg/m³	Particulate Sensor	Within Prescribed Limits
7	Particulate Matter PM_{10}	150 µg/m³	133 µg/m³	Particulate Sensor	Within Prescribed Limits
8	Suspended Particulate Matter (SPM)	500 µg/m³	417 µg/m³	Particulate Sensor	Within Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Ambient Air, 2016

• Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

Note:

- The report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of this report lies with the client.
- The values represent sample conditions when monitoring/testing was carried out.
- The report data is not intended to be used legally by the client.
- Only parameters marked with asterisk (*) are ISO 17025:2017 accredited.

1. Sample Analyzed By: Farhan Ali, Analyst (Field)
2. Name of Chief Analyst with Seal: Muhammad Arfan
3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik
General Manager
Date: 05/12/2022

---------- End of Report ----------

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NOISE MONITORING REPORT

Reference Number:	ESPAK/648P/22/N/5656/00556	Date:	05/12/2022
Name of Industry/Client:	Augmentation of Surface Water Supply for Khayaban-e- Sirsyed		
Address:	Rawalpindi		
Validation Officer:	Amin Baig, Research officer		
Nature of Sample:	Noise		
Date of Sample Collection:	02/12/2022	Grab / Composite:	Continuous 24-Hours
Sample Collected/Sent By:	Farhan Ali, Analyst (Field), ESPAK		
Date of Completion of Analysis:	03/12/2022		
Method/Equipment Used:	Sound Level Meter		

S. No	Measurement Point	Limit Values (PEQS)	Noise Level in dB(A) Leq	Remarks
1	Proposed Underground Tank-2 (GPS: 33.63908°N 73.04876°E)- Day time	65 dB(A)	59 dB(A)	Within Prescribed Limits
2	Proposed Underground Tank-2 (GPS: 33.630185°N 73.051599°E)- Night time	55 dB(A)	51 dB(A)	Within Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Noise in Commercial Area, 2016 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

Note:

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- The values represent sample conditions when monitoring/testing was carried out.
- The report data is not intended to be used legally by the client.
- Only parameters marked with asterisk (*) are ISO 17025:2017 accredited.

1. Sample Analyzed By: Farhan Ali, Analyst (Field)
2. Name of Chief Analyst with Seal: Muhammad Arfan
3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik
General Manager
Date: 05/12/2022

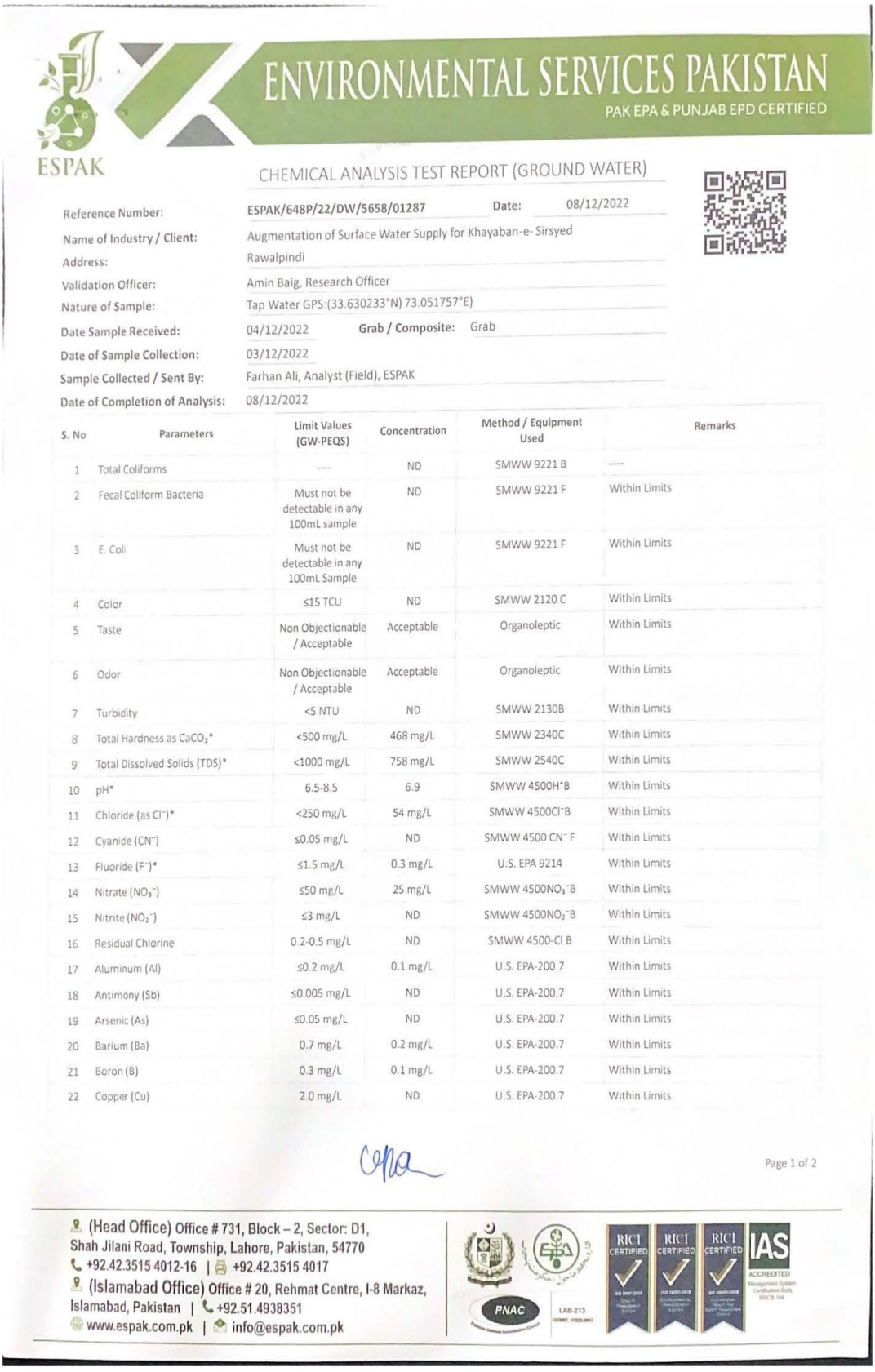
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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

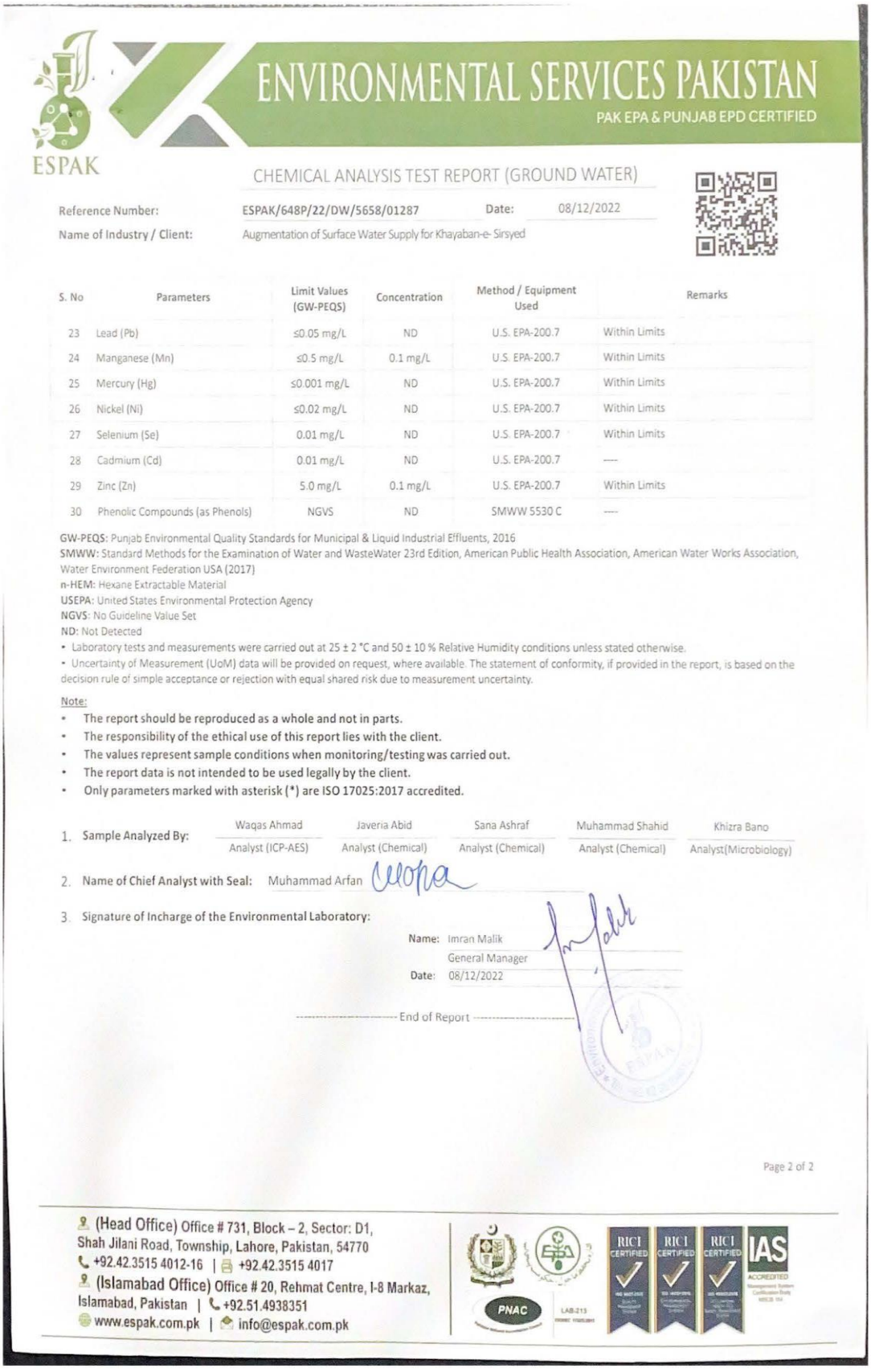
Reference Number:	ESPAK/648P/22/DW/5658/01287 Date: 08/12/2022
Name of Industry / Client:	Augmentation of Surface Water Supply for Khayaban-e- Sirsyed
Address:	Rawalpindi
Validation Officer:	Amin Baig, Research Officer
Nature of Sample:	Tap Water GPS:(33.630233°N) 73.051757°E)
Date Sample Received:	04/12/2022 Grab / Composite: Grab
Date of Sample Collection:	03/12/2022
Sample Collected / Sent By:	Farhan Ali, Analyst (Field), ESPAK
Date of Completion of Analysis:	08/12/2022

S. No	Parameters	Limit Values (GW-PEQS)	Concentration	Method / Equipment Used	Remarks
1	Total Coliforms	----	ND	SMWW 9221 B	----
2	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	ND	SMWW 9221 F	Within Limits
3	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9221 F	Within Limits
4	Color	≤15 TCU	ND	SMWW 2120 C	Within Limits
5	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
6	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
7	Turbidity	<5 NTU	ND	SMWW 2130B	Within Limits
8	Total Hardness as $CaCO_3$*	<500 mg/L	468 mg/L	SMWW 2340C	Within Limits
9	Total Dissolved Solids (TDS)*	<1000 mg/L	758 mg/L	SMWW 2540C	Within Limits
10	pH*	6.5-8.5	6.9	SMWW 4500H*B	Within Limits
11	Chloride (as Cl^-)*	<250 mg/L	54 mg/L	SMWW 4500Cl^-B	Within Limits
12	Cyanide (CN^-)	≤0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
13	Fluoride (F^-)*	≤1.5 mg/L	0.3 mg/L	U.S. EPA 9214	Within Limits
14	Nitrate (NO_3^-)	≤50 mg/L	25 mg/L	SMWW 4500NO_3^-B	Within Limits
15	Nitrite (NO_2^-)	≤3 mg/L	ND	SMWW 4500NO_2^-B	Within Limits
16	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	Within Limits
17	Aluminum (Al)	≤0.2 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
18	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
19	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
20	Barium (Ba)	0.7 mg/L	0.2 mg/L	U.S. EPA-200.7	Within Limits
21	Boron (B)	0.3 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
22	Copper (Cu)	2.0 mg/L	ND	U.S. EPA-200.7	Within Limits

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: ESPAK/648P/22/DW/5658/01287 Date: 08/12/2022

Name of Industry / Client: Augmentation of Surface Water Supply for Khayaban-e- Sirsyed

S. No	Parameters	Limit Values (GW-PEQS)	Concentration	Method / Equipment Used	Remarks
23	Lead (Pb)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
24	Manganese (Mn)	≤0.5 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
25	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
26	Nickel (Ni)	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
27	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
28	Cadmium (Cd)	0.01 mg/L	ND	U.S. EPA-200.7	----
29	Zinc (Zn)	5.0 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
30	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	----

GW-PEQS: Punjab Environmental Quality Standards for Municipal & Liquid Industrial Effluents, 2016
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
n-HEM: Hexane Extractable Material
USEPA: United States Environmental Protection Agency
NGVS: No Guideline Value Set
ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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1. Sample Analyzed By: Waqas Ahmad (Analyst (ICP-AES)); Javeria Abid (Analyst (Chemical)); Sana Ashraf (Analyst (Chemical)); Muhammad Shahid (Analyst (Chemical)); Khizra Bano (Analyst(Microbiology))
2. Name of Chief Analyst with Seal: Muhammad Arfan
3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik
General Manager
Date: 08/12/2022

End of Report

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CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number:	ESPAK/648P/22/AA/5653/00575	**Date:**	05/12/2022
Name of Industry/Client:	Augmentation of Surface Water Supply for Khayaban-e- Sirsyed		
Address:	Rawalpindi		
Validation Officer:	Amin Baig, Research Officer		
Nature of Sample:	Ambient Air	**Monitoring Location:**	Proposed Underground Tank-4 (GPS: 33.630185°N 73.051599°E)
Date of Sample Collection:	03/12/2022	**Grab / Composite:**	Continuous 24-Hours
Sample Collected/Sent By:	Farhan Ali, Analyst (Field), ESPAK		
Date of Completion of Analysis:	04/12/2022		

S. No	Parameters	Limit Values (PEQS-24 Hours)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	1.5 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Sulfur Dioxide (SO_2)	120 µg/m³	11.5 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
3	Ozone (O_3)	130 µg/m³ (1 Hour)	18.8 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
4	Oxides of Nitrogen as NO	40 µg/m³	13.7 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
5	Oxides of Nitrogen as NO_2	80 µg/m³	26.5 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Particulate Matter $PM_{2.5}$	35 µg/m³	34.5 µg/m³	Particulate Sensor	Within Prescribed Limits
7	Particulate Matter PM_{10}	150 µg/m³	133 µg/m³	Particulate Sensor	Within Prescribed Limits
8	Suspended Particulate Matter (SPM)	500 µg/m³	458 µg/m³	Particulate Sensor	Within Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Ambient Air, 2016

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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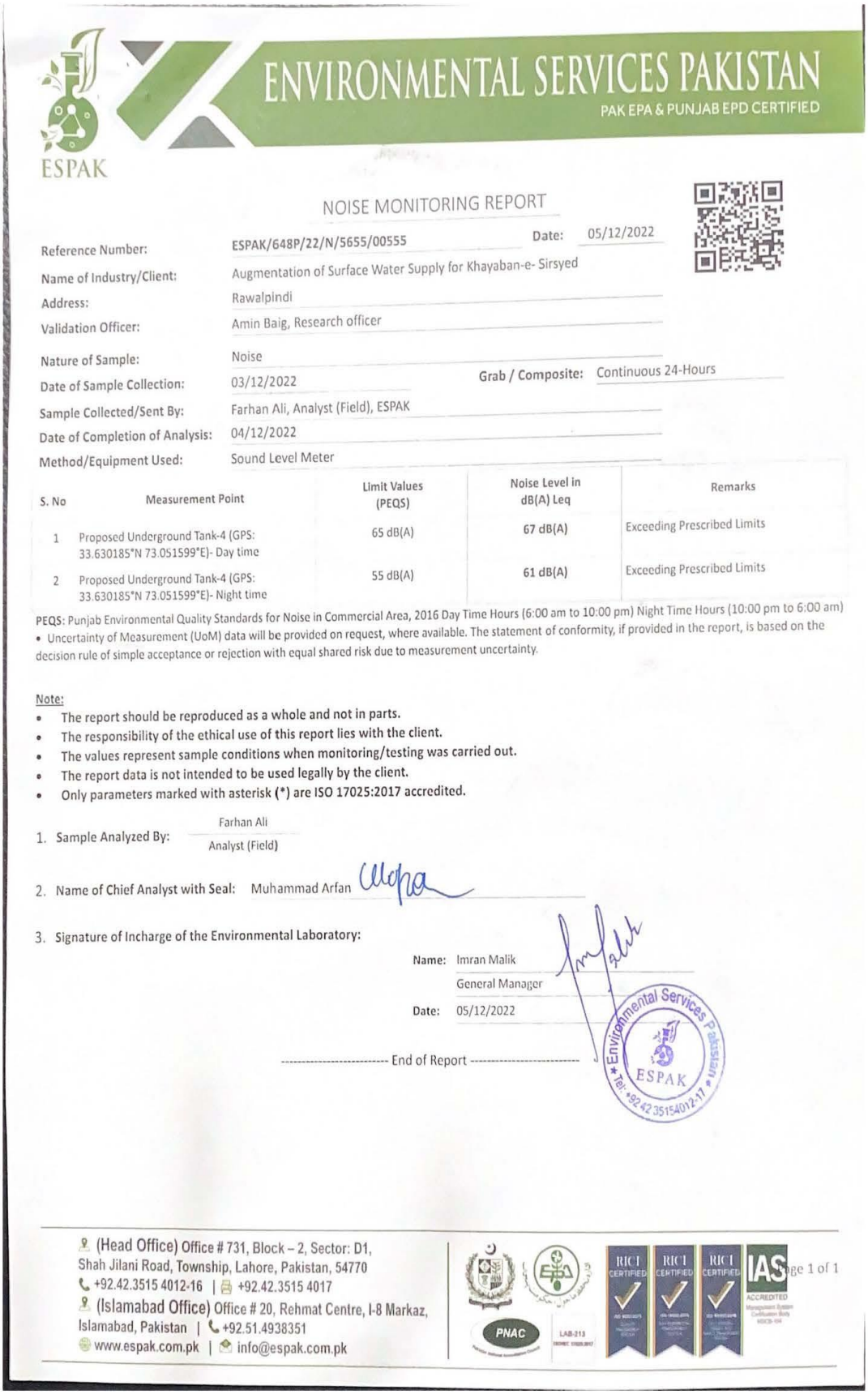
1. Sample Analyzed By: Farhan Ali, Analyst (Field)
2. Name of Chief Analyst with Seal: Muhammad Arfan
3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik
General Manager
Date: 05/12/2022

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NOISE MONITORING REPORT

Reference Number:	ESPAK/648P/22/N/5655/00555	Date:	05/12/2022
Name of Industry/Client:	Augmentation of Surface Water Supply for Khayaban-e- Sirsyed		
Address:	Rawalpindi		
Validation Officer:	Amin Baig, Research officer		
Nature of Sample:	Noise		
Date of Sample Collection:	03/12/2022	Grab / Composite:	Continuous 24-Hours
Sample Collected/Sent By:	Farhan Ali, Analyst (Field), ESPAK		
Date of Completion of Analysis:	04/12/2022		
Method/Equipment Used:	Sound Level Meter		

S. No	Measurement Point	Limit Values (PEQS)	Noise Level in dB(A) Leq	Remarks
1	Proposed Underground Tank-4 (GPS: 33.630185°N 73.051599°E)- Day time	65 dB(A)	67 dB(A)	Exceeding Prescribed Limits
2	Proposed Underground Tank-4 (GPS: 33.630185°N 73.051599°E)- Night time	55 dB(A)	61 dB(A)	Exceeding Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Noise in Commercial Area, 2016 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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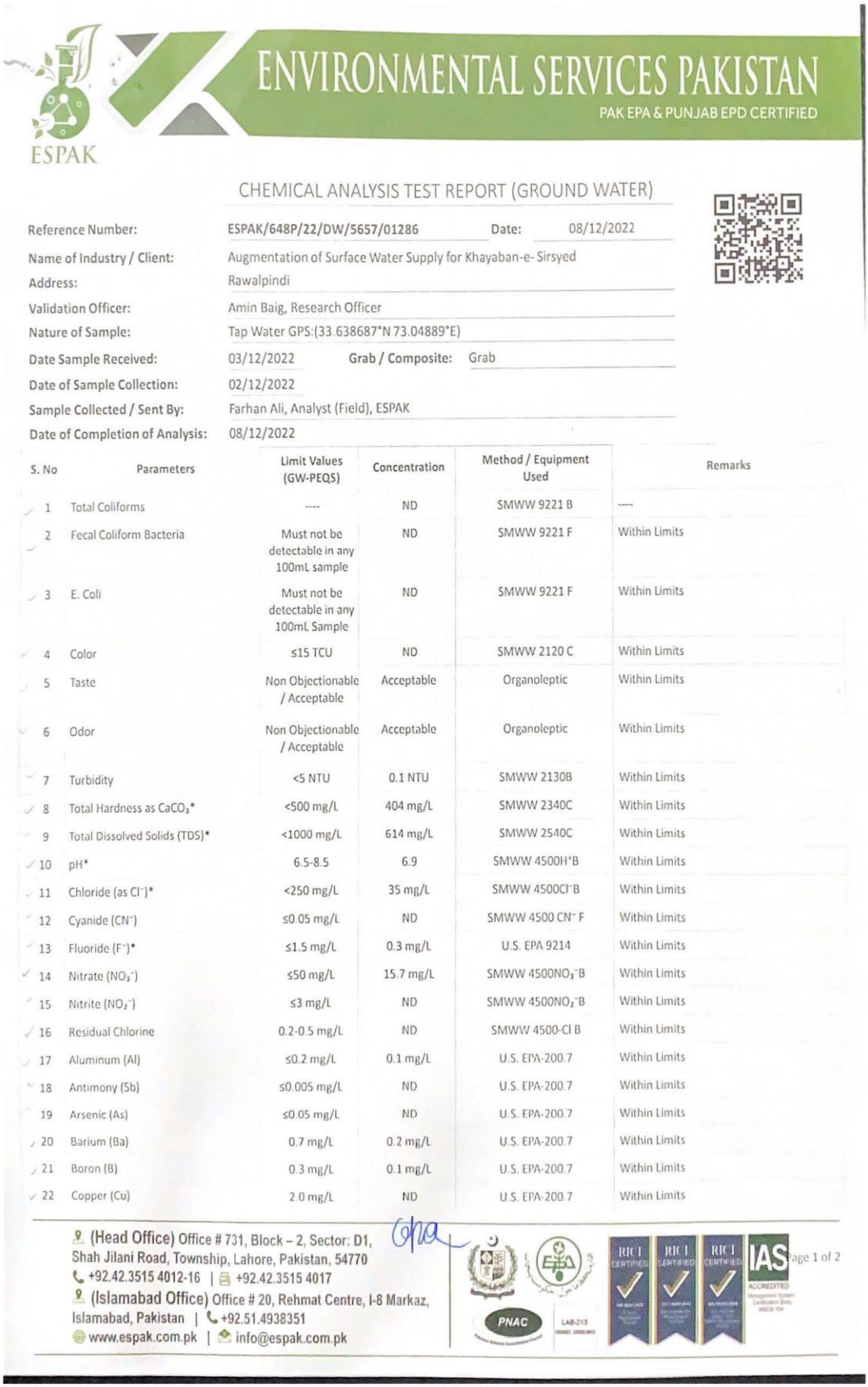
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General Manager
Date: 05/12/2022

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: ESPAK/648P/22/DW/5657/01286 Date: 08/12/2022

Name of Industry / Client: Augmentation of Surface Water Supply for Khayaban-e- Sirsyed

Address: Rawalpindi

Validation Officer: Amin Baig, Research Officer

Nature of Sample: Tap Water GPS:(33.638687°N 73.04889°E)

Date Sample Received: 03/12/2022 Grab / Composite: Grab

Date of Sample Collection: 02/12/2022

Sample Collected / Sent By: Farhan Ali, Analyst (Field), ESPAK

Date of Completion of Analysis: 08/12/2022

S. No	Parameters	Limit Values (GW-PEQS)	Concentration	Method / Equipment Used	Remarks
1	Total Coliforms	----	ND	SMWW 9221 B	----
2	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	ND	SMWW 9221 F	Within Limits
3	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9221 F	Within Limits
4	Color	≤15 TCU	ND	SMWW 2120 C	Within Limits
5	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
6	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
7	Turbidity	<5 NTU	0.1 NTU	SMWW 2130B	Within Limits
8	Total Hardness as $CaCO_3$*	<500 mg/L	404 mg/L	SMWW 2340C	Within Limits
9	Total Dissolved Solids (TDS)*	<1000 mg/L	614 mg/L	SMWW 2540C	Within Limits
10	pH*	6.5-8.5	6.9	SMWW 4500H+B	Within Limits
11	Chloride (as Cl^-)*	<250 mg/L	35 mg/L	SMWW 4500Cl-B	Within Limits
12	Cyanide (CN^-)	≤0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
13	Fluoride (F^-)*	≤1.5 mg/L	0.3 mg/L	U.S. EPA 9214	Within Limits
14	Nitrate (NO_3^-)	≤50 mg/L	15.7 mg/L	SMWW 4500NO_3^-B	Within Limits
15	Nitrite (NO_2^-)	≤3 mg/L	ND	SMWW 4500NO_2^-B	Within Limits
16	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	Within Limits
17	Aluminum (Al)	≤0.2 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
18	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
19	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
20	Barium (Ba)	0.7 mg/L	0.2 mg/L	U.S. EPA-200.7	Within Limits
21	Boron (B)	0.3 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
22	Copper (Cu)	2.0 mg/L	ND	U.S. EPA-200.7	Within Limits

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: ESPAK/648P/22/DW/5657/01286 Date: 08/12/2022

Name of Industry / Client: Augmentation of Surface Water Supply for Khayaban-e- Sirsyed

S. No	Parameters	Limit Values (GW-PEQS)	Concentration	Method / Equipment Used	Remarks
23	Lead (Pb)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
24	Manganese (Mn)	≤0.5 mg/L	ND	U.S. EPA-200.7	Within Limits
25	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
26	Nickel (Ni)	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
27	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
28	Cadmium (Cd)	0.01 mg/L	ND	U.S. EPA-200.7	----
29	Zinc (Zn)	5.0 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
30	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	----

GW-PEQS: Punjab Environmental Quality Standards for Municipal & Liquid Industrial Effluents, 2016
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
n-HEM: Hexane Extractable Material
USEPA: United States Environmental Protection Agency
NGVS: No Guideline Value Set
ND: Not Detected

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2. Name of Chief Analyst with Seal: Muhammad Arfan
3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik
General Manager
Date: 08/12/2022

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ANNEXURE-IV

Calibration Certificates of Monitoring Equipment

Unitech Calibration Services
296, Business Center,
G11 Markaz, Islamabad
051-8869514
info@unitechcal.com

CALIBRATION CERTIFICATE

Certificate Number	00805-21
Instrument Manufacturer:	Environment S.A
Instrument Type:	Ambient Air Quality Monitoring Station
Model Number:	AC32e
Serial Number:	2229e
Calibration Date:	August 16, 2022
Calibration Due Date:	August 15, 2023

Calibration Procedure

The instrument detail above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the latest versions of the international standards
EN ISO/IEC 17025
CISPR-11 Radiated RF emission measurements
CISPR-11 Mains Terminal RF emission measurements
IEC-61000-3-3 Mains Terminal voltage fluctuation measurements
IEC-61000-3-2 where applicable.

Calibration Climate Conditions

The climate test conditions were all maintained within the permitted limits of EN ISO/IEC 17025

Temperature	24.4 °C ± 0.1°C	**Relative Humidity**	39.2% ± 1 %rH
Static Pressure:	998 hPa	**Ambient Noise level:**	53 dB

Measurement Results

Sr.	Parameter(s)	Reference Value	Actual Value	Signal Source/Equipment
1-	NO Gas	5.0 PPB	5.0 PPB	Gas Diluter + Cylinder
		10.0 PPB	10.3 PPB	Gas Diluter + Cylinder
		50.0 PPB	53.6 PPB	Gas Diluter + Cylinder
		100.0 PPB	106.1 PPB	Gas Diluter + Cylinder
2-	NO2 Gas	5.0 PPB	4.11 PPB	Gas Diluter + Cylinder
		10.0 PPB	9.9 PPB	Gas Diluter + Cylinder
		50.0 PPB	50.2 PPB	Gas Diluter + Cylinder
		100.0 PPB	96.7 PPB	Gas Diluter + Cylinder

Note:
The measuring instrument is adjusted by a Calibrator 4 levels of adjustment by a Gas Diluter.

Calibrator Details

Manufacturer	Serial	Description
Teledyne	0564	Gas Diluter Model T700
Honeywell Gases	776317	NO Gas Cylinder 10 PPM
Honeywell Gases	400357	NO2 Gas Cylinder 5 PPM

Calibration by:

Unitech Calibrations

Unitech Calibration Services
296, Business Center,
G11 Markaz, Islamabad
051-8869514
info@unitechcal.com

CALIBRATION CERTIFICATE

Certificate Number	00804-21
Instrument Manufacturer:	Environment S.A
Instrument Type:	Ambient Air Quality Monitoring Station
Model Number:	AF22e
Serial Number:	7504e
Calibration Date:	August 16, 2022
Calibration Due Date:	August 15, 2023

Calibration Procedure

The instrument detail above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the latest versions of the international standards
EN ISO/IEC 17025
CISPR-11 Radiated RF emission measurements
CISPR-11 Mains Terminal RF emission measurements
IEC-61000-3-3 Mains Terminal voltage fluctuation measurements
IEC-61000-3-2 where applicable.

Calibration Climate Conditions

The climate test conditions were all maintained within the permitted limits of EN ISO/IEC 17025

Temperature	24.4 ˚C ± 0.1˚C	**Relative Humidity**	39.2% ± 1 %rH
Static Pressure:	998 hPa	**Ambient Noise level:**	53 dB

Measurement Results

Sr.	Parameter(s)	Reference Value	Actual Value	Signal Source/Equipment
1-	SO2 Gas	20.1 PPB	19.4 PPB	Gas Diluter + Cylinder
		50.2 PPB	48.1 PPB	Gas Diluter + Cylinder
		99.8 PPB	95.7 PPB	Gas Diluter + Cylinder
		502.0 PPB	482.4 PPB	Gas Diluter + Cylinder

Note:
The measuring instrument is adjusted by a Calibrator 4 levels of adjustment by a Gas Diluter.

Calibrator Details

Manufacturer	Serial	Description
Teledyne	0564	Gas Diluter Model T700
Honeywell Gases	776394	SO2 Gas Cylinder 10 PPM

Calibration by:

Unitech Calibrations



Unitech Calibration Services
296, Business Center,
G11 Markaz, Islamabad
051-8869514
info@unitechcal.com

CALIBRATION CERTIFICATE

Certificate Number	00803-21
Instrument Manufacturer:	Environment S.A
Instrument Type:	Ambient Air Quality Monitoring Station
Model Number:	O342e
Serial Number:	8189e
Calibration Date:	August 16, 2022
Calibration Due Date:	August 15, 2023

Calibration Procedure

The instrument detail above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the latest versions of the international standards
EN ISO/IEC 17025
CISPR-11 Radiated RF emission measurements
CISPR-11 Mains Terminal RF emission measurements
IEC-61000-3-3 Mains Terminal voltage fluctuation measurements
IEC-61000-3-2 where applicable.

Calibration Climate Conditions

The climate test conditions were all maintained within the permitted limits of EN ISO/IEC 17025

Temperature	24.4 ˚C ± 0.1˚C	**Relative Humidity**	39.2% ± 1 %rH
Static Pressure:	998 hPa	**Ambient Noise level:**	53 dB

Measurement Results

Sr.	Parameter(s)	Reference Value	Actual Value	Signal Source/Equipment
1-	O3 Gas	25.0 PPB	25 PPB	Ozone Generator
		48.0 PPB	48.6 PPB	Ozone Generator
		81.0 PPB	82.4 PPB	Ozone Generator
		100.0 PPB	101.9 PPB	Ozone Generator

Note:

The measuring instrument is adjusted by a Calibrator 4 levels of adjustment by an Ozone Generator Model T703.

Calibrator Details

Manufacturer	Serial	Description
Teledyne	0182	Ozone Generator Model T703

Calibration by:

Unitech Calibrations

Unitech Calibration Services
296, Business Center,
G11 Markaz, Islamabad
051-8869514
info@unitechcal.com

CALIBRATION CERTIFICATE

Certificate Number	00802-21
Instrument Manufacturer:	Environment S.A
Instrument Type:	Ambient Air Quality Monitoring Station
Model Number:	CO12e
Serial Number:	5891e
Calibration Date:	August 16, 2022
Calibration Due Date:	August 15, 2023

Calibration Procedure

The instrument detail above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the latest versions of the international standards
EN ISO/IEC 17025
CISPR-11 Radiated RF emission measurements
CISPR-11 Mains Terminal RF emission measurements
IEC-61000-3-3 Mains Terminal voltage fluctuation measurements
IEC-61000-3-2 where applicable.

Calibration Climate Conditions

The climate test conditions were all maintained within the permitted limits of EN ISO/IEC 17025

Temperature	24.4 ˚C ± 0.1˚C	**Relative Humidity**	39.2% ± 1 %rH
Static Pressure:	998 hPa	**Ambient Noise level:**	53 dB

Measurement Results

Sr.	Parameter(s)	Reference Value	Actual Value	Signal Source/Equipment
1-	CO Gas	500.0 PPB	499.9 PPB	Gas Diluter + Cylinder
		5.1 PPM	5.0 PPM	Gas Diluter + Cylinder
		10.4 PPM	10.1 PPM	Gas Diluter + Cylinder
		20.0 PPM	19.7 PPM	Gas Diluter + Cylinder

Note:

The measuring instrument is adjusted by a Calibrator 4 levels of adjustment by a Gas Diluter.

Calibrator Details

Manufacturer	Serial	Description
Teledyne	0564	Gas Diluter Model T700
Honeywell Gases	778361	CO Gas Cylinder 100 PPM

Calibration by:

Unitech Calibrations

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ISO 9001-2015 CERTIFIED COMPANY

DEALS IN | Instrumentation | Calibration | Environmental Testing | LiftingEquipments | Inspection | Automation

CALIBRATION CERTIFICATE

CERTIFICATE NO: ESP-104 PAGE NO: 1 OF 1

CUSTOMER NAME: Environmental Services Pakistan. ADDRESS: Office # 731 Block # 2, Sector D-1, Near Riaz Chowk Town Ship, Lahore, Pakistan.	DOC NO. IT-003	
	DOC REV. DATE	REV. NO
	03-03-2018	00

HISTORY OF THE INSTRUMENT:

EQUIPMENT:	Digital Sound Level Meter	PHYSICAL CONDITION:	OK
MAKE/MODEL:	GM 1356	LOCATION:	Field Section
MANUFACTURER:	BENETECH	CODE:	N/A
RANGE:	30 ~ 130 dB	CALIBRATION CONDITION:	23±3°C
UNIT:	dB	HUMIDITY:	45±10%RH
LEAST COUNT:	0.1 dB	CALIBRATIION DATE:	13-08-2022
SERAIL NO:	KI2358262	NEXT CALIBRATION DATE:	12-08-2023

REFERANCE STANDARD INSTRUMENT TRACIBILITY:

Reference Standard Sound Calibrator & Digital Sound Meter. Calibration Certificate No: IT9850-05. Traceable to PMEL APF PAC KAMRA. Which in turn is traceable to International Standards of measurement in accordance with the metrology rule and regulation. Which is in compliance with relevant clauses of ISO/IEC 17025: 2017 Standard requirements.

CALIBRATION RESULTS: (All results in dB)

NOMINAL READING ON INSTRUMENT UNDER CALIBRATION	AVERAGE OBSERVED READING ON THE REFERENCE STANDARD	DEVIATION
94.0	94.1	-0.1
114.0	114.0	0.0

These are test results, not a specification

REMARKS:

The instrument is fit for use.

CALIBRATED BY:		LAB MANAGER :
SIGNATURE: Mohit	IICE TECH Q.C IICE TECH	SIGNATURE:

END

| Office ||Flat No 206, 2nd Floor,142 Ahbab Colony Multan Road Lahore|
|Cell: 0301-6234840, 0331-5696706 | |Email:iice.tech@hotmail.com| iice.tech@yahoo.com |

ANNEXURE-V

Chance Find Procedure

Chance Find Procedure

Project may involve deep excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antique or sensitive remains. Representative of the DG will visit the site and observed the significance of the antique, artifact and cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the DG. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

In case any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department
- The suggestion of the local communities and the concerned authorities will be suitably incorporated during taking the preventive measures to conserve the antique, artifact and cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over; and
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Archeology Department is given below:

Archeology Department

19 Ataturk Ave, Shakar Parian,

Islamabad, Islamabad Capital Territory, Pakistan

ANNEXURE-VI

Traffic Management Plan

1. Objectives of TMP

One of the prime objectives of this TMP is to ensure the safety of all the road users along the work sites, and to address the following issues:

- Safety of pedestrians, bicyclists, and motorists travelling through the construction sites;
- Protection of workers from hazards associated with moving traffic;
- Mitigation of the adverse impact on road capacity and delays to the road users;
- Maintenance of access to adjoining properties; and
- Addressing issues and concerns that may delay the implementation of the proposed project.

2. Operating Policies for TMP

The following policies will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around project sites, while reasonably protecting workers and equipment.

- Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance;
- Inhibit traffic movement as little as possible;
- Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic routes;
- Inspect traffic control elements routinely, both day and night, and make modifications when necessary;
- Pay increased attention to roadside safety in the vicinity of temporary traffic routes;
- Train all persons that select, place, and maintain temporary traffic control devices;
- Keep the public well informed; and
- Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

Policy steps for the TMP are shown in **Figure 1.** However, operating policy for TMP for the construction of the proposed project along various types of roads is shown in Figures 2 to 7.



Figure 1: Policy Steps for the TMP

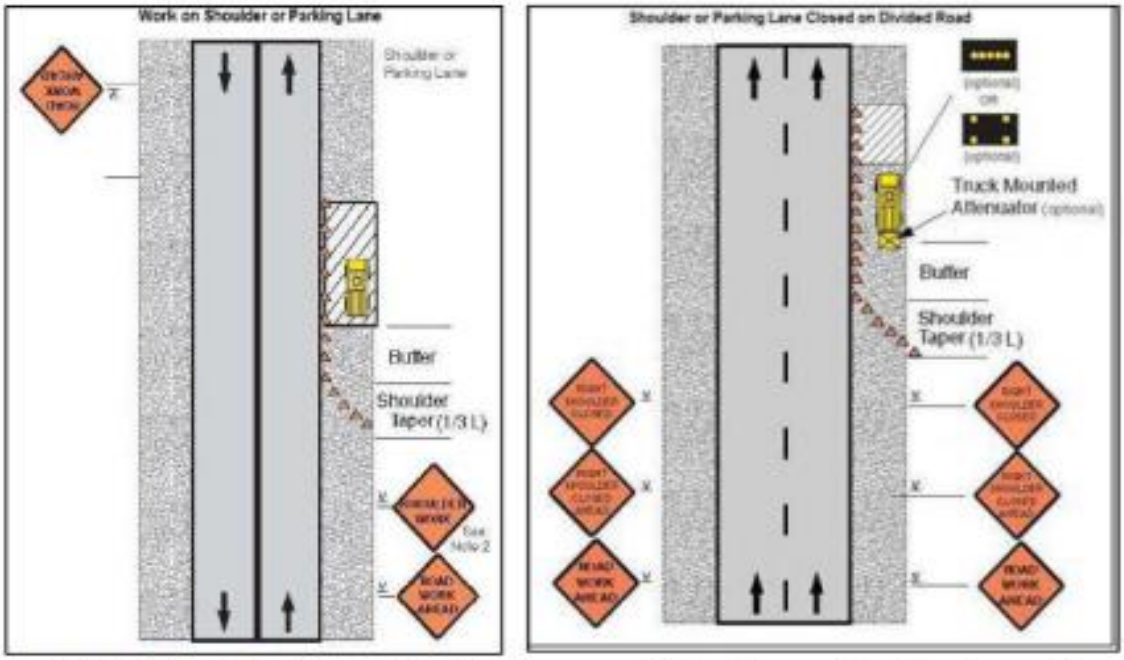


Figure 2: Work on Shoulder and Parking Lane and Shoulder and Parking Lane Closed Divided Road

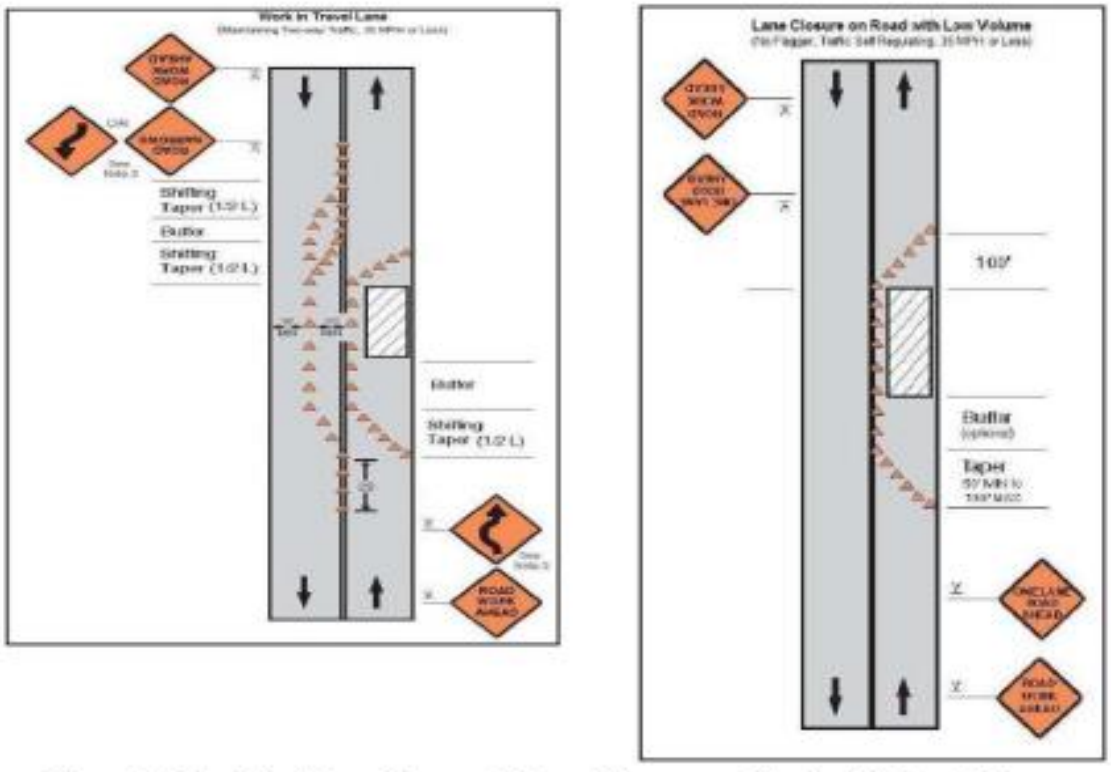


Figure 3: Work in Travel lane and Lane Closure on Road with Low Volume

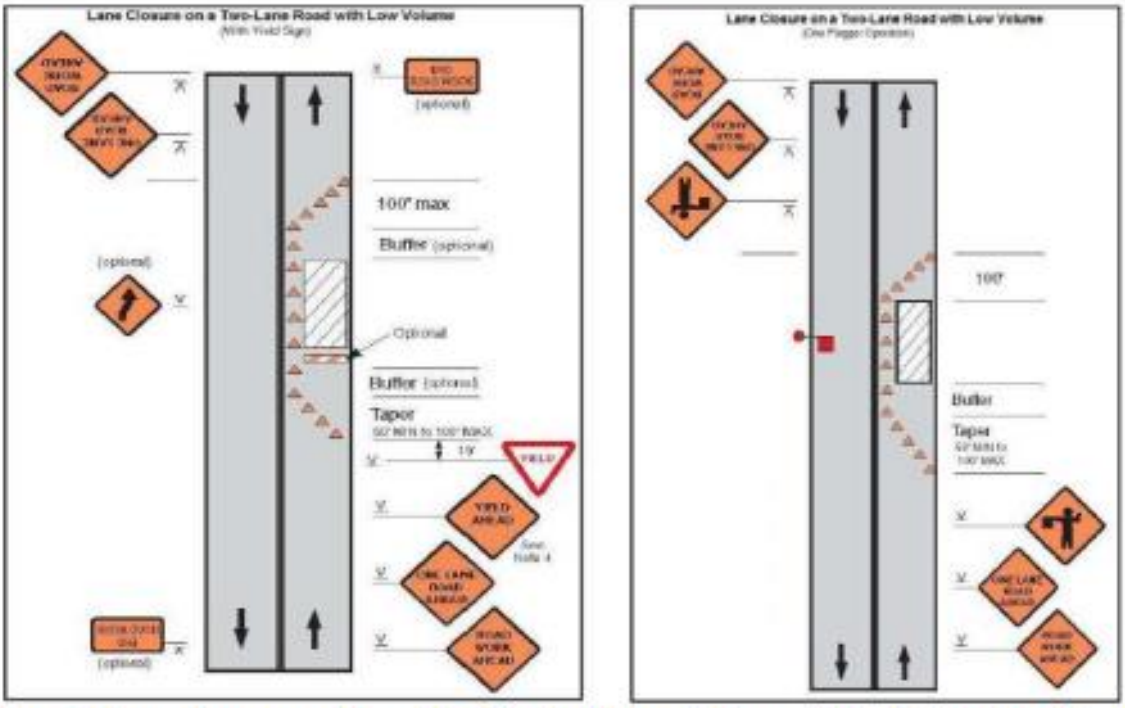


Figure 4: Lane closure on a Two-Line Road with Low Volume (with yield sign) and Lane Closure on a Two-Line Road with Low Volume (one flagger operation)

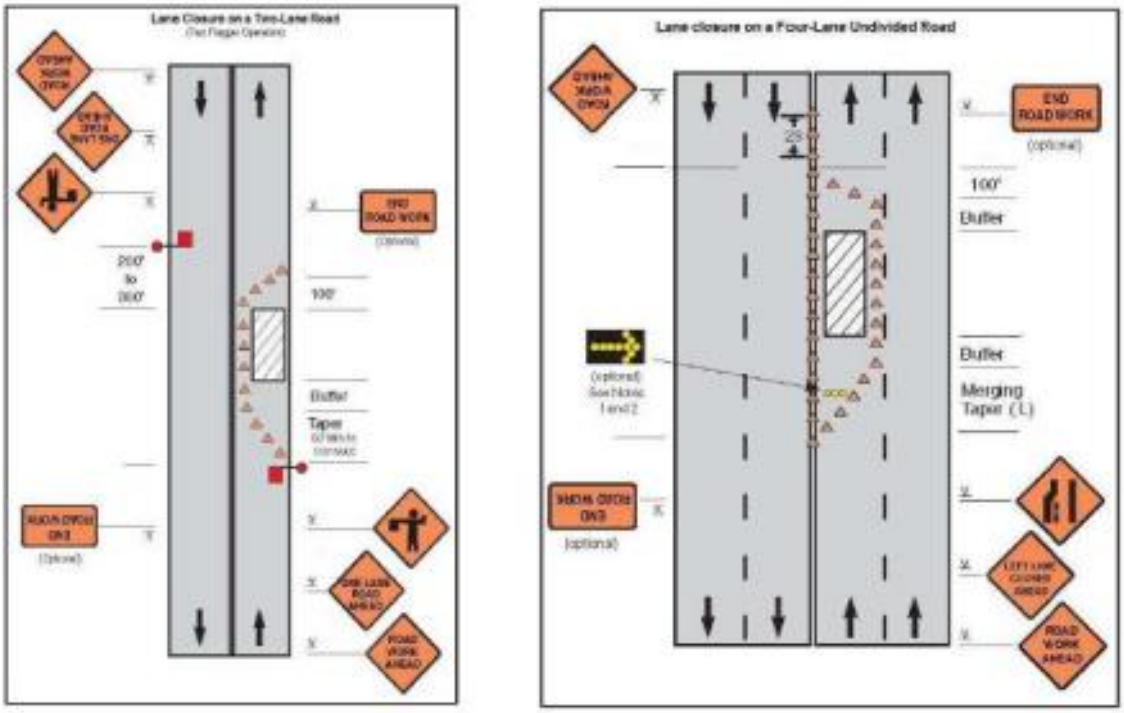


Figure 5: Lane Closure on a Two Lane Road (two flagger operation) and Lane Closure on a Four Lane Undivided Road

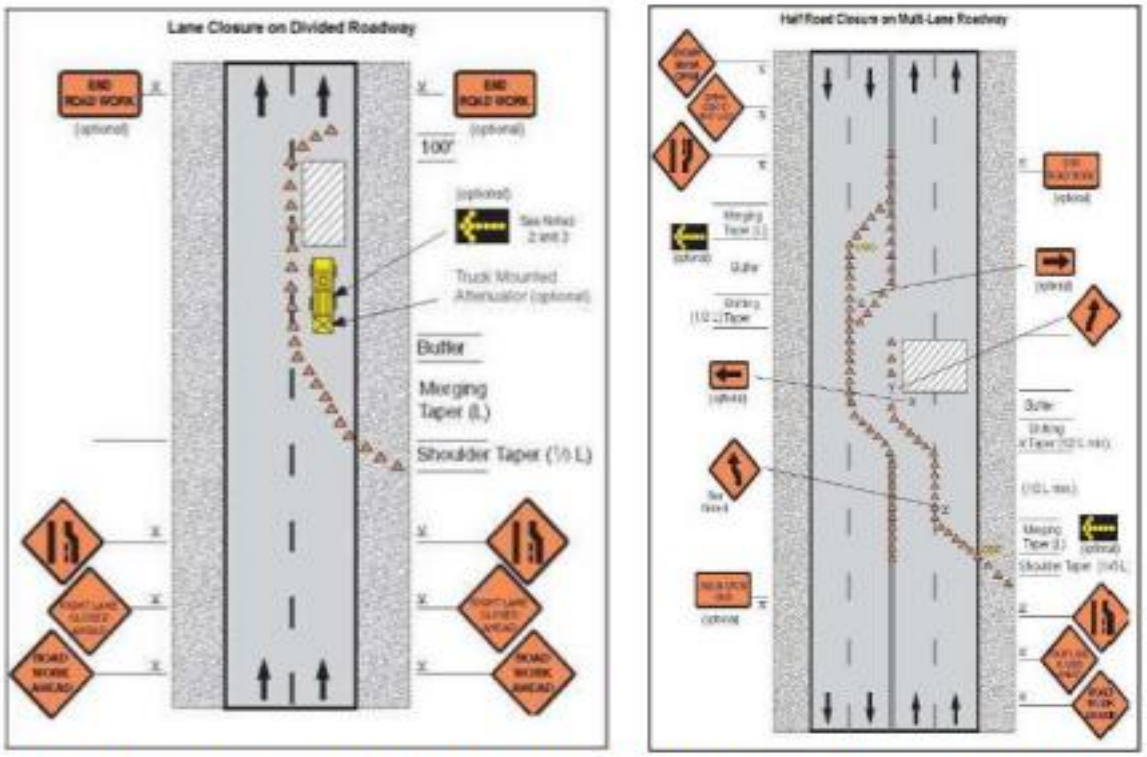


Figure 6: Lane Closure on Divided Roadway and Half Road Closure on Multi-Lane Roadway

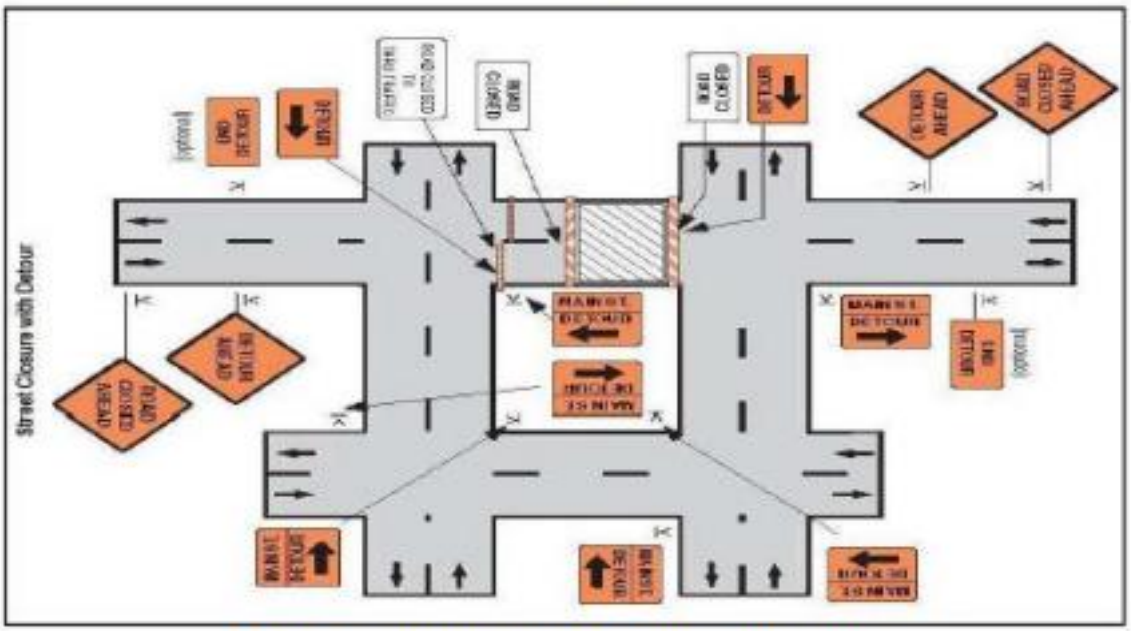


Figure 7: Street and Road Closure with Detour

3. Analyze the Impact Due to Street and Road Closure

Apart from the capacity analysis, final decisions to temporary close a particular street and road and divert the traffic should involve the following steps:

- Approval from the Traffic Police to use the local streets and roads as detours;

- Consultation with businesses, community members, residents, road users and traffic police regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
- determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- determining if additional traffic control or temporary improvements are needed along the detour route;
- considering how access will be provided to the worksite;
- Contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- Publish a notice through print and electronic media about road closure to avoid hindrance to public. As part of this notice, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

If full road-closure of certain routes within the proposed project area is not feasible due to inadequate capacity of the Detour Street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

4. Public Awareness and Notifications

As per discussions in the previous sections, there will be travel delays during the construction, as is the case with most construction projects, although on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets and roads in the proposed project sites lack sufficient capacity to accommodate additional traffic from diverted traffic, as a result of street and road closure to accommodate the construction activities.

The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time, when the roadblocks or traffic diversions take place at the particular streets and roads. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project

will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings, and city level meeting with the elected representatives.

The Project Management Unit (PMU) comprising staff members of WASA, Supervision Consultant and Contractor will also conduct an awareness campaign to educate the public about the following issues:

- Traffic control devices in place at the construction sites (signs, traffic cones, and barriers);
- Defensive driving behavior along the construction sites; and
- Reduced speeds enforced at the construction sites and traffic diversions

It may be necessary to conduct the awareness programs and campaigns on road safety during construction.

The campaign will cater to all types of target groups i.e. children, adults, disabled and drivers.

Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the proposed project area and will also be available at the PIU, and the Contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- Explain why the brochure was prepared, along with a brief description of the proposed project;
- Advise the public to expect the unexpected delays or roadblocks;
- Educate the public about the various traffic control devices and safety measures adopted at the construction sites;
- Educate the public about the safe road user behavior to emulate at the construction sites;
- Inform the public how to stay informed or where to inquire about road safety issues at the construction sites (name, telephone and mobile number of the contact person); and
- Indicate the office hours of authorized representatives.

5. Install Traffic Control Devices at the Construction Sites and Traffic Diversion Routes

The purpose of installing traffic control devices at the construction sites is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the construction sites. The following traffic control devices are used in construction sites:

- Signs;
- Pavement Markings;
- Channelizing Devices;
- Arrow Panels; and
- Warning Lights.

Procedures for installing traffic control devices at any construction sites vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal the roads are narrow but carry traffic. However, regardless of where the construction takes place, all the construction sites should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

Figures 2 to 7 illustrates a typical set-up for installing traffic control devices at the construction sites of the area, depending on the location of work on the road way, and road geometrics:

- Work on shoulder or parking lane;
- Shoulder or parking lane closed on divided road;
- Work in travel lane;
- Lane closure on road with low volume;
- Lane closure on a two-line road with low volume (with yield sign);
- Lane closure on a two-line road with low volume (one flagger operation);
- Lane closure on a two lane road (two flagger operation);
- Lane closure on a four lane undivided road;
- Lane closure on divided roadway;

- Half road closure on multi-lane roadway; and
- Street closure with detour.

The construction sites should take into consideration, for the space required for a buffer zone between the workers and the traffic (lateral and longitudinal), and the transition space required for delineation, as applicable. For the construction works, a 30 centimeter clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 centimeter is necessary to install the temporary traffic signs and cones.

Traffic police should regulate traffic away from the construction sites and enforce the traffic diversion outcome from full street closure in certain areas during construction. Flaggers and personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

In addition to the delineation devices, all the construction workers should wear fluorescent safety, vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

ANNEXURE-VII

Resource Management Plan

1. INTRODUCTION

The most of the resources in this world are finite and non-renewable in nature. We are completely dependent on these resources to fulfill all our daily requirements. Therefore, sustainable development calls for the need to conserve resources in a way that meet our needs of present generation as well as future generation, especially the non-renewable resources.

2. OBJECTIVE OF THE PLAN

The Resource Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resource conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate and prevent pollution contaminating the natural resources.

3. PLANNING

Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

The estimations include the following:

- Estimation of construction material required for the project;
- Estimation of fuel consumption for construction machinery, construction vehicles and generators;
- Estimations of the energy requirements during all the stages of the project; and
- Estimations of water consumption for construction activities and construction camp sites.
- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

4. EXECUTION OF THE PLAN

The planned strategies shall be implemented to conserve the natural resources including

but not limited to the following:

Material

- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed of safely to the designated disposal sites through approved contractors; and
- Reuse of the materials shall be appreciated.

Energy

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;
- Switch off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary use of heating and cooling systems during extreme weathers events;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light; and
- Alternate energy sources shall be considered for electricity generations during construction and operation to conserve fossil fuel as it is non-renewable resource.

Water

- Avoid using potable water for sprinkling, curing and washing of equipment and vehicles.
- Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;

- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected; and
- Ensure protection of canal water from contamination resulting from construction activities.

Pollution

- Emissions shall be reduced and controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in EIA report;
- Waste water shall not be discharged directly into the canal and must be managed as per the recommendations presented in EIA report; and
- Construction waste, and municipal solid waste shall not be dumped and burnt openly, and shall be handled according to the preventative measure given in EIA report.

5. CHECKING AND CORRECTIVE ACTIONS

The R-WASA shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resource Conservation Plan. The Environmental Committee shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues and concerns raised in relation to Resource Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.

ANNEXURE-VIII

Occupational Safety and Health Management Plan

Occupational Health and Safety Management Plan

It is required that all personnel working on the project attend the Health and Safety site induction briefing prior to commencing any work on the site.

The General Site Rules shall act as the main agenda and content of the induction briefing. Additionally, any information specific to the project shall be included in the induction. The induction briefing should be, as far as possible, two way communication with attendees invited to contribute, comment and ask questions regarding health and safety. Other rules are as follows:

- All attendees of the induction briefing will be recorded.
- High visibility jacket/vests, safety helmets and safety footwear (incorporating steel toe- caps and mid-sole) must be worn at all times.
- Safety goggles for protection during all cutting, grinding and drilling operations or where there is risk from impact, dust, chemicals or hot metal.
- Dust masks for protection from dust.
- Ear protection during all operations which produce noise above the level at which you need to raise your voice to be heard. Gloves during concreting work.
- On this site, formal permits must be in place before any of the following operations may be carried out: Permit to Excavate, Hot Work Permit & Confined Spaces Permit. (Where Applicable), thoroughly understand it and get permission from area supervisor (If required).
- Follow the messages and instructions displayed on HSE boards installed on site.
- Be aware of emergency muster (assembly) points and escape routes. In the event of an emergency do not panic, follow the site emergency response procedures.
- Report promptly all accidents to your supervisor and HSE officer at site. Immediately provide first aid for the injured and call for the medic.
- While working alone or in a confined space make sure that your nearby colleague and supervisor are well informed or use a banksman where appropriate.
- Ensure adequate lighting is in place for work on night shifts or for emergency response.

- All Scraps, waste materials and garbage must be disposed of in accordance with the construction waste management Strategy.
- Always clean your work site after completing the job or your shift.
- Maintain appropriate barricades as required.
- Never tamper with electric cables and appliances. Never insert direct cables into sockets, rather use proper plugs.
- Do not enter scaffold that is not tagged safe for access.
- Tools or materials must not be carried while climbing up or down scaffolding or ladders.
- Use pouches or ropes for this purpose.
- Do not smoke or produce naked flame in NO SMOKING area. Use of open fire is prohibited.
- Keep all gangways and aisles clear and clean at work sites.
- Vehicles must be driven at a safe speed, observing speed limits. Drivers must have a valid driving license for the class of vehicle they are operating.
- Vehicles shall only be parked in designated parking areas. Never travel in a vehicle unless in seating equipped with a seatbelt.

1. **Site HSE Roles and Responsibilities**

1.1 Project Manager (PM)

i. Develop and disseminate policies for occupational health and safety management systems and environmental management systems

ii. Provide resources for the management and implementation of occupational health and safety management systems and environmental management systems

iii. Responsible for ensuring the implementation of occupational health, safety and environmental policies

iv. Aware of the relevant maters of environment, health and safety.

v. Allocate Budget and Provide resources for the implementation of HSE Plan in its true spirit.

vi. Attend meetings regarding the Health Safety and Environment.

vii. Report Health Safety and Environment matters to the management of the company as required.

1.2 Construction Manager (CM)

- Responsibilities include, but not limited to:
- Well conversant with international & local, Health, Safety & Environmental rules, regulations and current legislation.
- Ensure that all senior site staff is also conversant with the relevant requirements of current legislations and EPC contractor HSE plan.
- Ensure that site personnel are assigned appropriate duties and responsibilities accordingly to assist in the effective implementation of this HSE Plan.
- Ensure no job is carried on without supervision.
- Approve work methods statements; ensure safety procedures are established and undertaken.
- Funds for essential HSE facilities, equipment and personnel are made available.
- His own personal behavior supports, strengthens and confirms the site's HSE management program.

1.3 Environmentalist/HSE Officer

i. Carry out safety inspection of Work Area, Work Method, Men, Machine & Material and other tools and tackles.

ii. Facilitate inclusion of safety elements into Work Method Statement.

iii. Highlight the requirements of safety through Tool-box/other meetings.

iv. Conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.

v. Advice & co-ordinate for implementation of HSE plan in its true spirits.

vi. Convene HSE meeting & minute the proceeding for circulation & follow-up action.

vii. Plan procurement of PPE & Safety devices and inspect their healthiness.

viii. Report to Project Manager (PM) and Resident Director EPC contractor on all matters pertaining to status of safety and promotional program at site level.

ix. Facilitate administration of First Aid

x. Facilitate screening of workmen and safety induction.

xi. Conduct fire and other emergency Drills and facilitate emergency preparedness

xii. Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.

xiii. Recommend to Site In charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.

xiv. To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.

xv. Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.

xvi. Ensuring that all injuries, accidents, incidents/near misses and hazards are positively and timely reported.

xvii. Assisting Engineers/Area Supervisors in accident/incident investigations, where required Attending and positively contributing in the HSE Committee Meetings.

1.4 Workers

- Use the proper tools and equipment when operating. According to the requirement of operation and different hazard sources using the PPE and protective clothing provided by company, such as, helmets, safety harness, goggles, safety vest, and other personal protective equipment
- Maintain the tool and keep the tool clean after job completion.
- Report to the site supervisor or on-site project manager for the equipment damage and hidden danger.
- Develop personal safety awareness - including workers themselves and others, especially new employees and young people.

- Avoid unnecessary risk generation.
- For known sources of danger, remind new employees to stay away from these hazards.
- It will strictly be forbidden to play in the construction area or to damage the public utilities.
- Provide advice on how to eliminate hazards.

1.5 Sub-Contractor HSE Management

i. Sub-contractor's employees shall immediately correct all unsafe conditions & acts as directed by Contractor Direct supervision. Unsafe acts by any personnel may be grounds for immediate removal and permanent banning from the project site.

ii. Only properly trained employees shall be authorized by sub-contractor to operate equipment, machinery, vehicles & tools.

iii. All Sub-contractors are required to follow safe work practices, and meet the requirements clearly identified in field HSE PLAN.

iv. The Sub-contractor shall erect & maintain safeguards for the protection of workers, any other sub-contractors & the public and eliminate or mitigate HSE hazards created by or otherwise resulting from performance of the work.

2 Communication and HSE Meetings

2.1 HSE Targets and Goals

Pursuant to the Policy Statement, the following HSE Targets and Goals are identified in order to create a positive approach to health, safety, and protection of the environment during all activities of the project; this will be achieved by employing competent and motivated staff:

i. To avoid all personal injuries during the execution of the Project,

ii. To ensure that all personnel employed on the Project are competent to carry out their designated tasks safely.

iii. To create positive health, safety and environment attitudes and perceptions at all levels of the Project organization, and to raise health safety and environmental awareness in general.

iv. To implement a training program that supports the achievement of personnel competency in relation to Health, Safety, and the Environment.

v. To complete the Project without incurring any significant property damage to permanent equipment, or temporary facilities.

vi. To complete the Project with minimum avoidable impact upon the surrounding environment.

vii. To implement a hierarchy of communication forums that ensure that HSE concerns can be raised and addressed at all levels of the organization. To continually monitor and improve HSE performance.

2.2 HSE Score Board

Environmentalist/HSE Officer will arrange a HSE score board and display at the key location of the project site facilities. Information on the HSE Score Board will be updated on daily basis.

2.3 HSE Awareness Sign Boards

HSE awareness signboards shall be displayed at key locations around the site to create and maintain awareness and ownership of HSE issues.

2.4 Internal Site HSE Committee Meeting

Internal HSE Committee Meetings chaired by the Site Manager/Construction Manager, will be held monthly with all Area Supervisors and nominated Engineers, Supervisors and support staff. HSE committee meetings will allow communication of HSE performance and corrective actions. All-important HSE matters of the site as well as the non-compliance reported in the current month will be discussed in these meetings.

1.3 Performance Monitoring

1.3.1 Performance Review in Site HSE Committee Meetings

Performance reviews shall be held on monthly basis in the Internal Site HSE Committee Meetings. The objective of the review is to gather information from

monitoring, inspection and site working activities and to assess the effectiveness of the implementation of HSE procedures on site. The key performance indicators are:

a. Compliance with Health, Safety and Environment standards

b. Identification of areas not addressed in the HSE Plan

c. Achievement of specified HSE objectives

d. HSE statistics, root cause and trend analysis of the statistics

1.3.2 HSE Inspections of Equipment and Tools

a. The Site Manager will ensure that no Civil, Electrical or Mechanical equipment will go to the working area without HSE inspection.

b. Environmentalist/HSE Officer will co-ordinate with Equipment and Plant Department for the inspection of all Civil, Electrical and Mechanical equipment or the inspection of Civil, Electrical and mechanical equipment,

c. If during inspection, any equipment is found sub-standard, Manager Site HSE is authorized to reject this equipment and inform the Site Manager.

1.4 Incident / Accident Reporting and Investigation

1.4.1 Objective

The objective of incident reporting, investigation & analysis is to identify the cause(s) of an incident to allow for preparation of recommendations, to avoid recurrence of such incident(s) in future.

1.4.2 Incident Reporting and Investigation

Any work-related incident, accident, injury, illness, exposure, or property loss must be reported to your supervisor, the SS, and within 1 hour. Motor vehicle accidents must also be reported. A report must be filed for the following circumstances:

a) Accident, injury, illness, or exposure of an employee;

b) Injury of a subcontractor;

c) Damage, loss, or theft of property; and/or

d) Any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment.

e) HSE Officer shall brief the Management about the lost time injury/fatal cases and serious incidents/near-misses.

f) Project Manager and Construction Manager will review the incident report and comments on the recommendations of the Site HSE Staff. They will then assign corrective actions accordingly.

g) Occupational accidents resulting in employee injury or illness will be investigated by the SS. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

h) All employees have the obligation and right to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it may be made orally to your supervisor or other member or management, or you may submit your concern in writing, either signed or anonymously.

i) The Site HSE Staff shall carry out a follow up of the recommendations/corrective actions from time to time where he identifies ongoing non-compliance he shall inform the Project Manager Construction Manager.

1.5 Orientation, Site HSE Induction and Other Training Activities

1.5.1 Initial HSE Orientation Program

Each and every person will undergo a HSE orientation program. On completion of orientation he will be issued an Organizational Identity card. Contractor Site HSE Staff shall perform the initial orientation based on but not limited to the following:

- Explaining Organizational HSE Policy and Standards.
- General HSE rules and regulations for working in a Construction Site, Batching plant, Excavation Area, Mechanical and Electrical work including use of Personal Protective Equipment, incident reporting, getting first aid, emergency response, (HSE inspection, housekeeping, etc.
- Hazards at construction site, works, offices, or any miscellaneous work.
- Specific hazards like height, open excavations, electrical, fire, Fumes (including spray painting) and vehicle safety etc.
- Environmental hazard.

1.5.2 Daily Tool Box Talk by Supervisors/HSE Officer

HSE tool Box talk shall be conducted by Supervisor/HSE Officer for specific work groups prior to the start of work. The tool box is a forum for two- way communication between management and the employees. Tool box talk is focused on a specific job. The agenda shall consist of the following:

- Details of the jobs being intended for immediate execution.
- The relevant hazards and risks involved in executing the job and their control and mitigating measures.
- Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
- Recent non-compliances observed.
- Appreciation of good work done by any person.
- Feedback from employees
- Any doubt clearing session at the end.
- Record of Tool box talk shall be maintained as per format attached.
- Incidents, which may occur in the site/works, shall also be discussed in “tool box talks”.
- Daily tool box talk record format is attached as Annex. “A”.

1.5.3 HSE Training During Project Execution

HSE training shall be arranged by contractor as per the need of the project execution and recommendation of HSE committee of site.

1.5.3.1 Site-Specific Training

Prior to working at this site, an initial site-specific training session or briefing shall be conducted prior to commencement of work activities. During this initial training session, employees shall be instructed on the following topics:

- Personnel responsibilities;

- Content and implementation of the HASP;
- Description of assigned tasks/scope of work;
- Site hazards and controls;
- Site-specific hazardous procedures (e.g., lining activities, etc.);
- Coordination of Site activities;
- Training requirements;
- PPE requirements;
- Emergency information, including local emergency response team phone numbers,
- route to nearest hospital, accident reporting procedures, evacuation routes and procedures, location of assembly points, and emergency response procedures;
- Instruction in the completion of required inspections and forms; and
- Location of safety equipment (e.g., portable eyewash, first aid kit, fire extinguishers, etc.).
- The various components of the project HASP will be presented followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel will not be permitted to enter or work in potentially contaminated areas of the Site until they have completed the Site-specific training session.

1.5.3.2 Safety Meeting/Health and Safety Plan Review

"Tailgate" safety meetings will take place each day prior to beginning the day's work. All Site personnel will attend these safety meetings, which may be contracted personnel, subcontractor personnel, or personnel from contractors. The safety meetings will cover specific health and safety issues, Site activities, changes in Site conditions, and a review of topics covered in the Site-specific pre-entry briefing.

1.5.3.3 Management Employees Training Program

- The management employees training program will be conducted during the project to ensure that all management employees are trained.

- An HSE specialist from contractor head office shall conduct the meetings, during his visit to site.
- The duration of this course would be half day.

Annexure Sub-A

HSE TOOL BOX TALK RECORD	Quality Records Forms	
		Doc. Version 1

Project Title: **AUGMENTATION OF WATER SUPPLY SYSTEM IN KHYABAN-E-SIR SYYAD FROM KHANPUR DAM & CREATION OF DMAS, DISTRICT RAWALPINDI**

Project Section:

Topic: _____ **Date** _____

SR. NO.	NAME OF WORKER / STAFF	CRAFT	AREA	CONTRACTOR	REMARKS

Delivered By **SITE HSE OFFICER**

ANNEXURE-IX

Emergency Response Management Plan

Emergency Response Plan

Contractors are committed and obliged to protecting the community, workers, public and concerned company's property and the surrounding environment; in the emergency situations. These situations shall be handled through the implementation of an Emergency Preparedness and Response Plan (EPRP). The construction contractors shall meet with the local emergency service institutions and law enforcement agencies i.e. Fire and rescue 1122, Police, to review and discuss the construction process, including unique construction equipment(s), the overall construction process, and schedule/phasing. This plan will be communicated to all the concerned and personnel who will be responsible for managing the emergency situations, and those who will be effected by the emergencies.

1.1 Purpose

The purpose of the emergency response plan is to identify the actual and potential hazards and their risks, organize responsibilities, identify the resources and plan to utilize them in order to control and minimize impacts of risks in an efficient way. This plan is applicable to all construction processes and sites, machinery/ equipment and materials. It includes preparation to respond in the event of fires, incidents/ accidents involving personnel injuries, property damages etc., hazardous materials emissions, explosions, and natural disasters i.e. flood, earthquake etc. This plan also includes preparation to respond in the event of riots, arsons, terrorist attacks etc.

1.2 Objectives

The objectives of this plan are;

i. To develop, maintain, implement, check and improve procedures and practices which will ensure efficient utilization of available resources; in order to protect workers and staff from impacts of hazard's risks.

ii. To minimize impacts of emergencies and unplanned happenings.

iii. The plan includes preparedness and response mechanisms.

1.3 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

1.4 Types of Emergencies

Following is a list of the hazards and emergency situations, which need planning and proper handling to minimize their risks.

- Fire
- Road Traffic Accidents,
- Materials/ effluents spills i.e. asphalt, POL, etc.
- Natural disasters i.e. torrential rains, floods, earthquakes
- Occupational accidents i.e. fall, electrocutions, cave-ins
- Arsons, vandals
- Terrorist attacks, etc.

1.5 Responsibilities

1.5.1 Alerting

The following procedures will be prescribed for internal reporting of emergencies:

i. The Emergency Response Coordinator (ERC) will awaken on-site personnel, including visitors, of the nature of the emergency.
ii. The ERC will activate and deploy the concerned ERTs, and notify and inform the project person in-charge, emergency medical assistance/ Rescue 1122, fire department, Police etc., whoever and whenever needed.
iii. Concerned Project Manager (PM) or whosoever is in-charge of the project shall only be authorized to speak on contractors' behalf to outside agencies (police, fire department, medical services, Media etc.) during an emergency situation.
iv. The ERC will identify any need for security measures at the Project Area during any emergency and will notify the concerned project or security person in-charge.

ANNEXURE-X

Dust Management Plan

Dust Management Plan

General

This plan is prepared for the project "Augmentation of Surface Water Supply for Khayaban-e-Sir Syed from Khanpur Dam and Formation of DMAs". 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 /Concrete Batching Plant
- Roads, surfaces and public highways
- Excavations for lying of new conductance and replacement of distribution pipelines
- Static and mobile combustion plant emissions
- 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 /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.
Excavation for Lying new pipelines	
Excavation	Excavation will be carried out by applying green sheets on the edges, especially near Environmental Sensitive Receptors, already highlighted in the **EIA** report.
Handling of Mucking Material	Mucking material will be stored in bonded area to avoid spillage and

	generation of fugitive dust
Loading of material on dumpers	Mucking material will be damped down before loading on dumpers to reduce fugitive dust emission.
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	Where possible, stockpiles will be placed under sheeting. Dusty material will be damped down. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
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	

Cutting, grinding, drilling, sawing, trimming, planning, sanding	These activities will be avoided wherever possible. Equipment and techniques that minimize dust will be implemented. 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-XI

Noise and Vibration Management Plan

Objective

This management plan defines the measures to control and limit noise emissions and vibration levels, at residential properties and other sensitive receptors in the vicinity of the Project.

General Requirements

Best Practicable Means (BPM) of noise control will be applied during construction works to minimize noise (including vibration) at neighboring residential properties and other sensitive receptors arising from construction activities

The general principles of noise management are given below:

Control at source:

Equipment – noise emissions limit for equipment brought to site.

Equipment – method of directly controlling noise e.g. by retrofitting controls to plant and machinery.

Equipment - indirect method of controlling noise e.g. acoustic screens.

Equipment - indirect method of controlling noise e.g. benefits and practicality of using alternative construction methodology to achieve the objective e.g. vibratory piling techniques or hydro- demolition as opposed to more conventional but noisier techniques; selection of quieter tools/machines; application of quieter processes.

Control across site by:

- Administrative and legislative control,
- Control of working hours,
- Control of delivery areas and times,
- Careful choice of compound location,
- Physically screening site,
- Control of noise via Contract specification of limits,
- Noise Monitoring, to check compliance with noise level limits, cessation of works until alternative method is found.

- Many of the activities which generate noise can be mitigated to some degree by careful operation of machinery and use of tools. This may best be addressed by tool box talks and site inductions.

The maintenance of good community relations is vital. Experience shows that construction noise has the potential to cause disturbance but can be tolerated if prior warning and explanation has been given to residents. In particular advice regarding the nature of construction works, the duration of the works and mitigation measures to be implemented can help to reduce people's reaction to noise.

Contractors will consult local residents/communities regarding works and to give them details of a responsible appointed person on site who will be able to deal with queries.

Construction working hours should be carefully managed. All works should take place between normal working hours 07:30 and 18:30, Monday to Friday with the exception of restricted works.

Noise and Vibration Control Measures

In addition to specific requirements of the Local Authority, the Contractor will be required to adopt the following more specific measures:

Control measures

Without prejudice to the other requirements of this section, the Contractor shall comply with the recommendations set out in BS5228:2009 and in particular with the following requirements:

- Vehicles and mechanical plant will be maintained in a good and effective working order and operated in a manner to minimise noise emissions. The contractor will ensure that all plant complies with the relevant statutory requirements;
- Site vehicles will be equipped with broadband, non-tonal reversing alarms;
- Compressor, generator and engine compartment doors will be kept closed and plant turned off when not in use;
- All pneumatic tools will be fitted with silencers/mufflers;
- Care would be taken when unloading vehicles to avoid un-necessary noise;

- Maintenance operations will be undertaken at distance from noise-sensitive receptors;
- Reduce the speed of vehicle movements;
- Ensure that operations are designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors;
- Vehicles should be prohibited from waiting within the site with their engines running or alternatively, located in waiting areas away from sensitive receptors;

Vibration Mitigation

All vibration producing machinery will be identified by the contractor and vibration producing machinery will be operated at low frequency to reduce the vibration impacts.

- Vibration monitoring will be carried out in accordance with German Standard DIN 4150 (heritage structures) and BS 7385: Part 2 – 1993 (other structures).
- vibration monitoring will be undertaken at the nearest buildings to the construction sites during times of vibration intensive works
- Where exceedances of the criteria are recorded, corrective actions would be implemented where soils at risk of vibration induced settlement are identified.

Noise and vibration monitoring

A regular programme of noise and vibration monitoring shall be implemented as a minimum in accordance with of this document.

The Contractor will submit the proposed method, the frequency and the location of monitoring site to the Planning Authority for agreement prior to commencing works. Noise baseline levels will be agreed prior to commencement of construction.

Reference:

https://proaccionaau.blob.core.windows.net/media/4gbpg4vk/ctp-noise-and-vibration-management-plan.pdf.

ANNEXURE-XII

WHO Advice on COVID-19

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.

Decisions 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.

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.[7]

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.[3]

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.[24] 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.[25] 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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ANNEXURE-XIII

Framework for Site Specific EMP

GUIDE FOR DEVELOPMENT OF SSEMP

- **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 and access roads
- Dismantling of existing structures including Utilities
- Preparation of ground for 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	The action will cause major adverse damage on the environment or surrounding communities' e.g. major loss of soil and water resources and quality from storm water runoff major pollution of soil and water resources including contamination from hazardous materials significant effects on ecosystems with isolated deaths of non-vulnerable flora and fauna significant annoyance or nuisance to communities major damage to or movement required to archaeological or historical sites occurrence may result in work being halted and a fine	3
Moderate	No or minimal adverse environmental or social impacts e.g. No measurable or noticeable changes in storm water quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	2
Minor	No or minimal adverse environmental or social impacts e.g. No measurable or noticeable changes in storm water quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	1

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. Judgment 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/IEE** study for the project and should be added in the last column of the table below.

No.	Construction Activity	Hazards to Consider	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 **EIA** 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 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	Camping	Noise and vibration				
		Dust generation				
		Traffic Congestion				
		Community safety				
		Labor safety (PPEs)				
vi	Landscaping	Dust generation				

		Sediment runoff				
		Failure of vegetation to take root				

Step 6: The Site plans are a critical part of the SSEMP and will need to be prepared, otherwise the UMDS 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)[1]: The completed SSEMP 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 SSEMP

- Introduction
- Project Overview
- Scope of SSEMP
- Objectives of SSEMP
- Map of Sensitive Receptors
- Construction Activities
- Activities
- Risk Assessment

[1]ADB, Safeguards Unit for Central & West Asia Department, *Environmental Management for Construction Handbook.*

- 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 (Punjab and Federal)

ANNEXURE-XIV

Tool for Socio-economic Survey

SOCIO-ECONOMIC BASELINE SURVEY OF THE PROJECT AREA

Name of Project _____

Name of Interviewer: _____ Date: _____

a) Settlement: _____ (b) Union Council: _____

c) Tehsil: _____ (d) District: _____

_____

1. Name of Respondent _____

2. What is your father's name _____

3. What is your age

Age years 15 – 25 _____

25 – 35 _____

35 – 45 _____

Above 45 _____

4. Marital Status.

1. Married 2. Unmarried

5. What is your caste /ethnic group _____

6. What is your mother tongue? _____

7. What is your qualification?

1. Illeterate 2. Primary 3. Middle

4. Metric 5. Intermediate 6. Above Inter

8. What is your profession _____

9. Which of the following facilities are available in your house

1. Electricity 2. Water Supply
3. Gas 4. Telephone
5. Sewerage

10. What are the sources of water for your domestic use

1. Public Water Supply 2. Hand Pumps
3. Channel 4. Any other

11. In your opinion, should this Project be implemented here

1. Yes 2. No

If yes, then reasons If no, then reasons

_____ _____

_____ _____

_____ _____

12. In your opinion, what will be possible impacts of the construction of this project area project?

During Construction_____

_____

_____

After Construction _____

_____

_____

13. What protective measures do you suggest to safeguard your interests

_____

_____

_____

14. Is there any health institution in this locality

1. Yes 2. No

If yes, then what is that _____

_____

15. Is there any educational institution in this locality
1. Yes 2. No

If yes, then what is that _____

_____

16. Is there any historical /archeological monument in this locality
1. Yes 2. No

If yes, then what is that _____

_____

17. Is there any shrine /mosque /graveyard in this locality
1. Yes 2. No

If yes, then what is that?

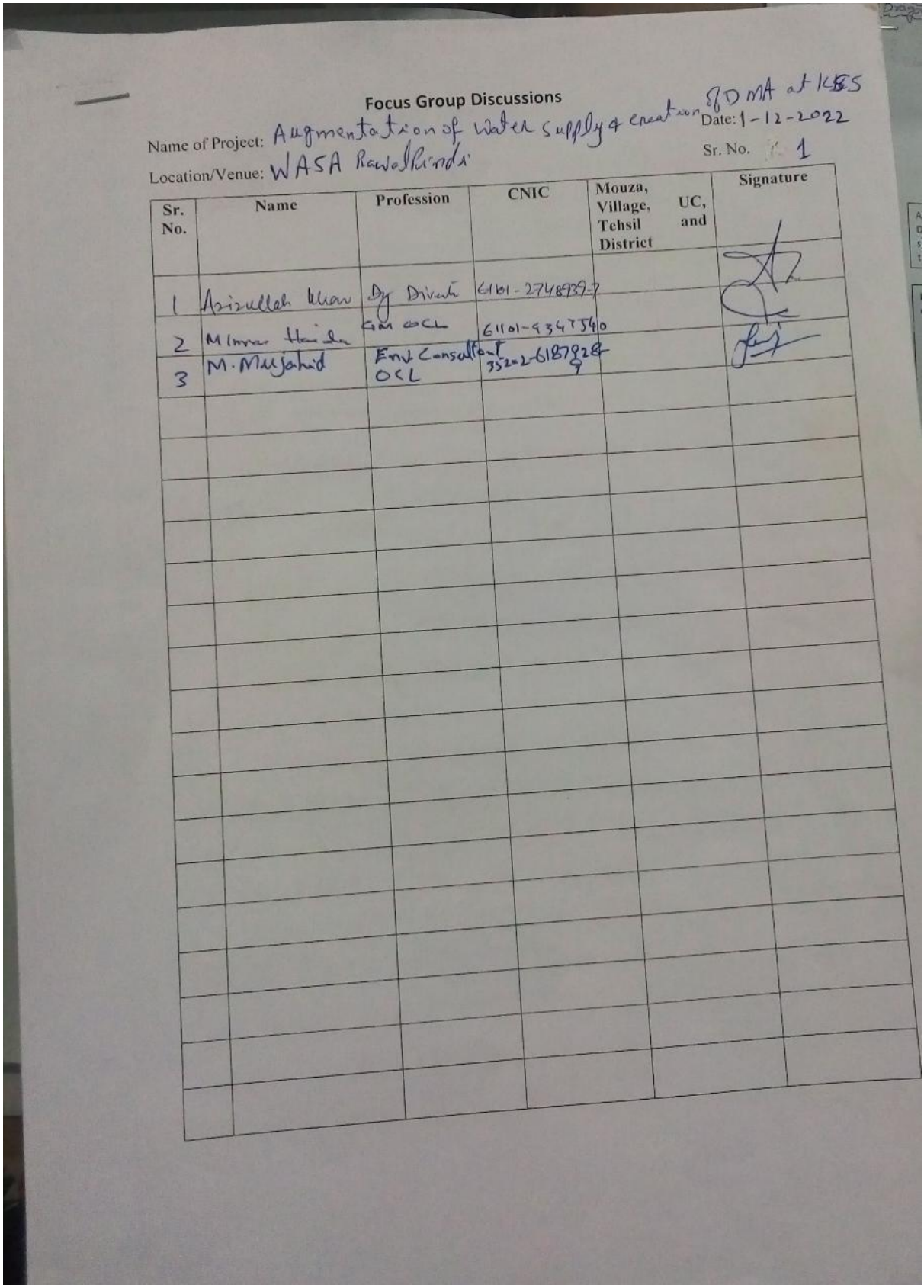
Shrine _____

Mosque _____

Graveyard _____

ANNEXURE-XV

Attendance Sheets of FGDs

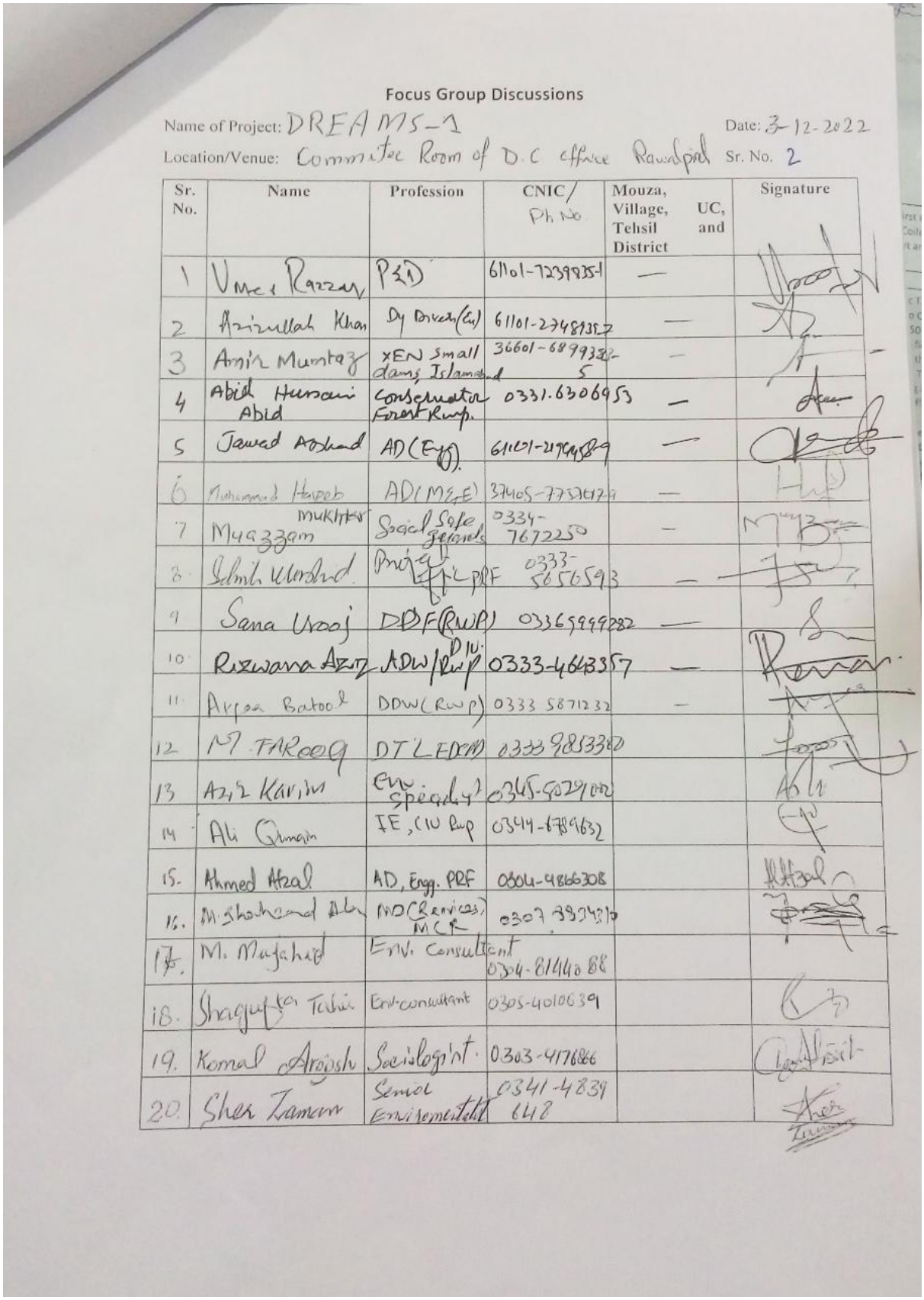


Focus Group Discussions

Name of Project: Augmentation of Water Supply & creation of DMA at KBS Date: 1-12-2022

Location/Venue: WASA Rawalpindi Sr. No. 1

Sr. No.	Name	Profession	CNIC	Mouza, Village, Tehsil and UC, District	Signature
1	Azizullah Khan	Dy Director	61101-2748939-7		
2	Mirza Haider	GM OCL	61101-9347540		
3	M. Mujahid	Env Consultant OCL	3520-6187828-9		



Focus Group Discussions

Name of Project: DREAMS-1 Date: 3-12-2022

Location/Venue: Committee Room of D.C office Rawalpindi Sr. No. 2

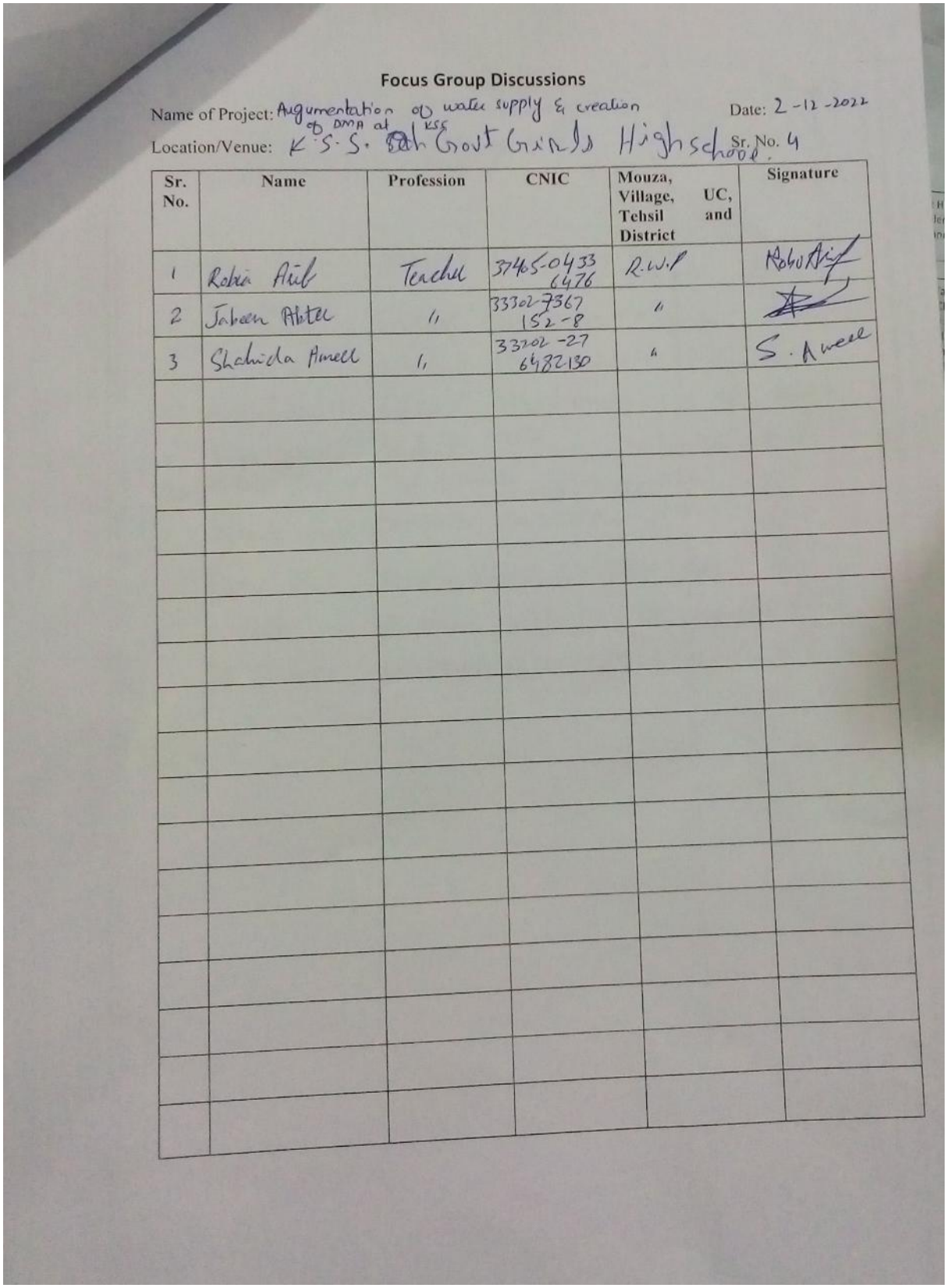
Sr. No.	Name	Profession	CNIC/ Ph. No	Mouza, Village, UC, Tehsil and District	Signature
1	Umer Razzaq	PSO	61101-7239935-1	—	
2	Azizullah Khan	Dy Director(Cw)	61101-2748315-7	—	
3	Amir Mumtaz	XEN Small dams, Islamabad	36601-6899388-5	—	
4	Abid Hussain Abid	Conservator Forest Rwp.	0331.6306953	—	
5	Jawed Ashraf	AD(Engg).	61101-2764589	—	
6	Muhammad Habib	AD(M&E)	37405-7753617-9	—	
7	Mukhtar Magazam	Social Safeguards	0334-7672250	—	
8	Sehrish Khurshid	Proj. Eng. PRF	0333-5656593	—	
9	Sana Urooj	DDF(RWP)	03365999282	—	
10	Rizwana Aziz	ADW/Rwp	0333-4643357	—	
11	Aroosa Batool	DDW(RWP)	0333 5871232	—	
12	M. FAROOQ	DT'L EDSM	0333 9853380		
13	Aziz Karim	Env Specialist	0345-5029002		
14	Ali Qmain	IE, CW Rwp	0344-6789632		
15.	Ahmed Afzal	AD, Engg. PRF	0304-4866308		
16.	M. Shahzad Ali	MD(Services) MCR	0307 3934310		
17.	M. Mujahid	Env. Consultant	0304-8144088		
18.	Shagufta Tahir	Env-consultant	0305-4010639		
19.	Komal Arjosh	Sociologist	0303-4176866		
20.	Sher Zaman	Senior Environmentalist	0341-4839648		

Focus Group Discussions

Name of Project: Augumentation of water supply & creation of DMA at KSS Date: 1-12-22

Location/Venue: KSS-1 (UC-12) Sr. No. 3

Sr. No.	Name	Profession	CNIC	Mouza, Village, Tehsil and UC, District	Signature
01	Muskan	Teaching			Muskan
02	Nagina	Teaching			
03	Tahreem	Teaching	37405-8555617-8	Rawalpindi	
04	[illegible]	Teaching		Rawalpindi	
05	Hira Fatima	Teaching	37405-0703886-6	Rawalpindi	
06	Maam Rabia	Teaching		(RWP)	
07	Maam Sana	Teaching	33100-2099872-8	(RWP)	
08	Maam Aminah	Teaching		(RWP)	
09	Minahil	Teaching		(RWP)	
10	SIDRA	Teaching		(RWP)	
11	Maham	Teaching		(RWP)	

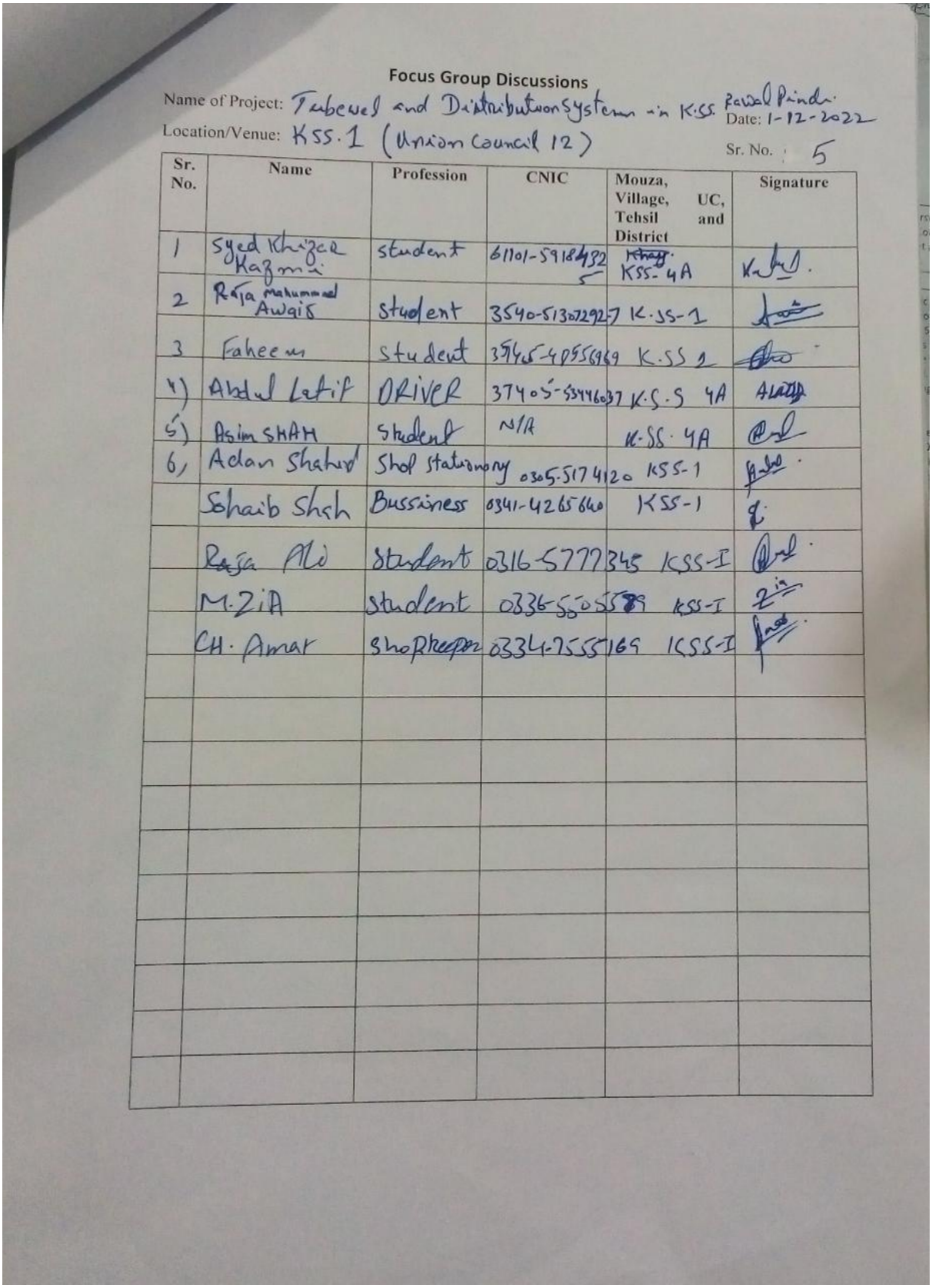


Focus Group Discussions

Name of Project: Augmentation of water supply & creation of DMA at KSS Date: 2-12-2022

Location/Venue: K.S.S. Govt Girls High school Sr. No. 4

Sr. No.	Name	Profession	CNIC	Mouza, Village, UC, Tehsil and District	Signature
1	Rabia Atif	Teacher	3745-0433 6476	R.W.P	Rabia Atif
2	Jabeen Akhter	"	33302-7367 152-8	"	
3	Shahida Ameen	"	33202-27 6432130	"	S. Ameen

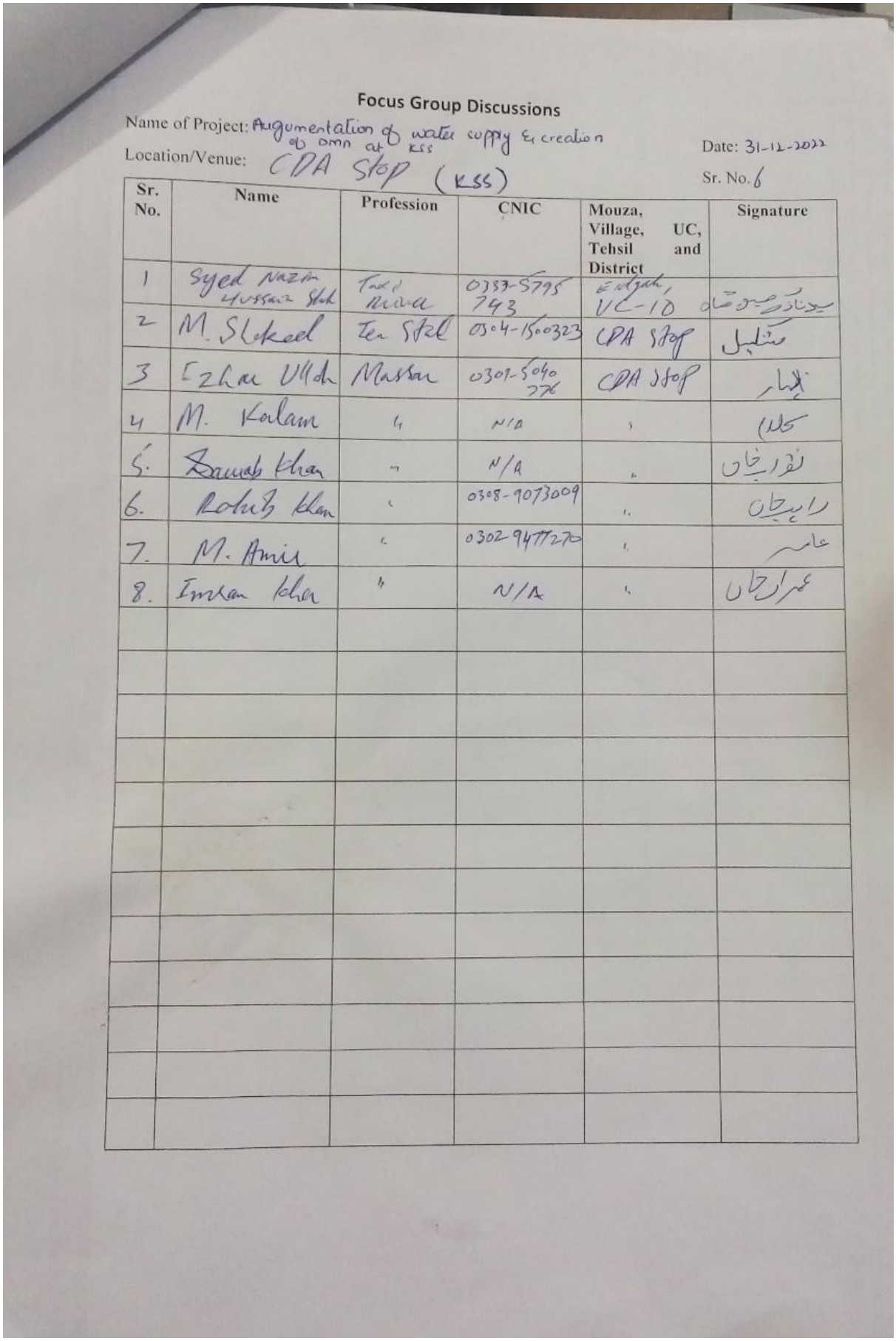


Focus Group Discussions

Name of Project: Tubewell and Distribution System in K.S.S. Rawal Pindi. Date: 1-12-2022

Location/Venue: KSS.1 (Union Council 12) Sr. No. 5

Sr. No.	Name	Profession	CNIC	Mouza, Village, UC, Tehsil and District	Signature
1	Syed Khizar Kazmi	student	61101-5918432-5	KSS-4A	
2	Raja Muhammad Awais	student	3540-5130729-7	K.SS-1	
3	Faheem	student	3545-4055969	K.SS 2	
4)	Abdul Latif	DRIVER	3740[illegible]-5344603-7	K.S.S 4A	
5)	Asim SHAH	Student	N/A	K.SS.4A	
6,	Adan Shahid	Shop stationary	0305-5174120	KSS-1	
	Sohaib Shah	Bussiness	0341-4265640	KSS-1	
	Raza Ali	student	0316-5777345	KSS-I	
	M.ZiA	student	0336-5[illegible]5589	KSS-I	
	CH. Amar	Shopkeeper	0334-7555169	KSS-I	



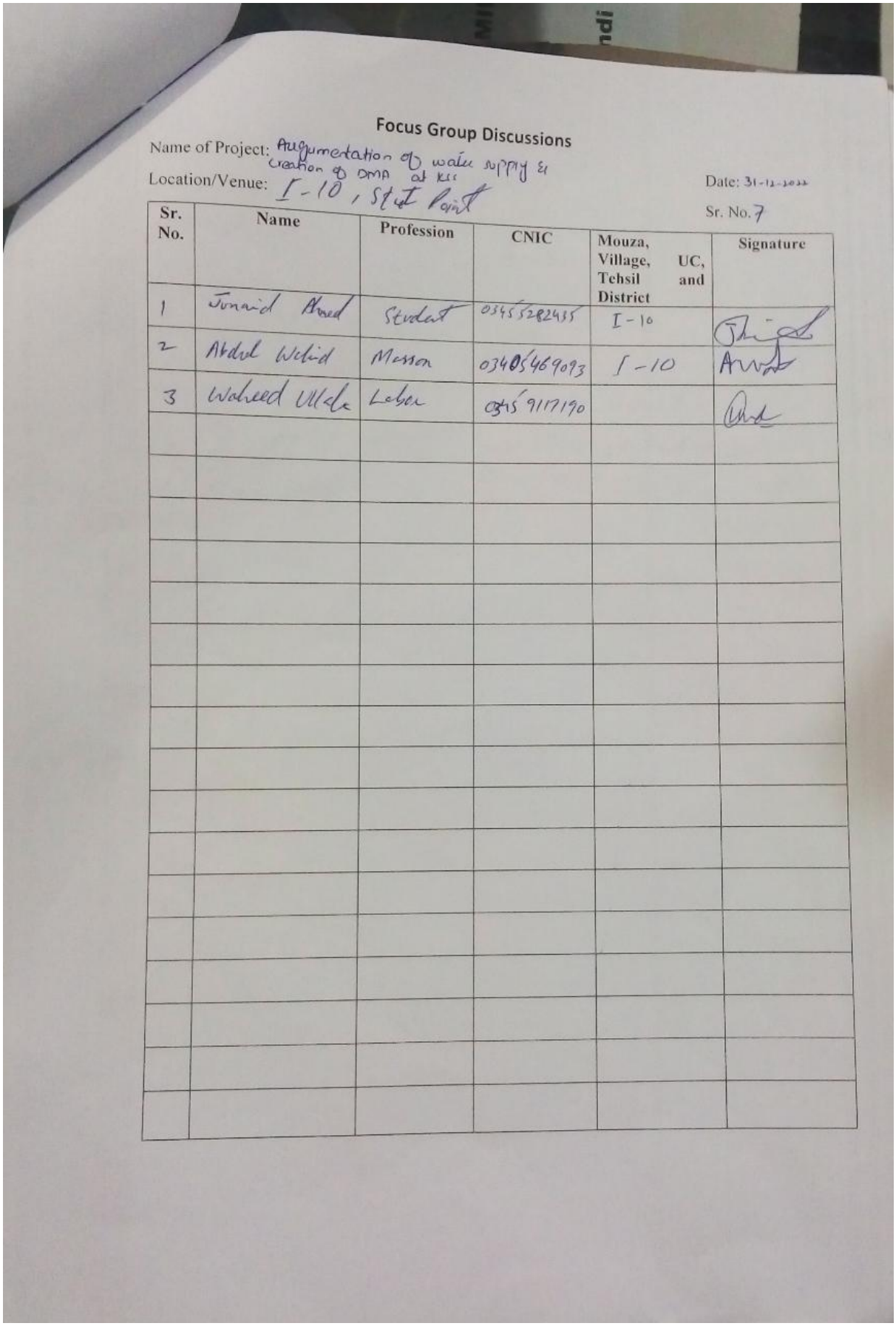
Focus Group Discussions

Name of Project: Augmentation of water supply & creation of DMA at KSS

Location/Venue: CDA Stop (KSS) Date: 31-12-2022

Sr. No. 6

Sr. No.	Name	Profession	CNIC	Mouza, Village, UC, Tehsil and District	Signature
1	Syed Nazim Hussain Shah	Trad Mark	0333-5795743	Eidgah, UC-10	
2	M. Shakeel	Tea Stall	0304-1500323	CDA Stop	
3	Ezhar Ullah	Master	0309-5040776	CDA Stop	
4	M. Kalam	〃	N/A	〃	
5.	Zawab Khan	〃	N/A	〃	
6.	Rohail Khan	〃	0308-9073009	〃	
7.	M. Amir	〃	0302-9477270	〃	
8.	Imran Khan	〃	N/A	〃	



Focus Group Discussions

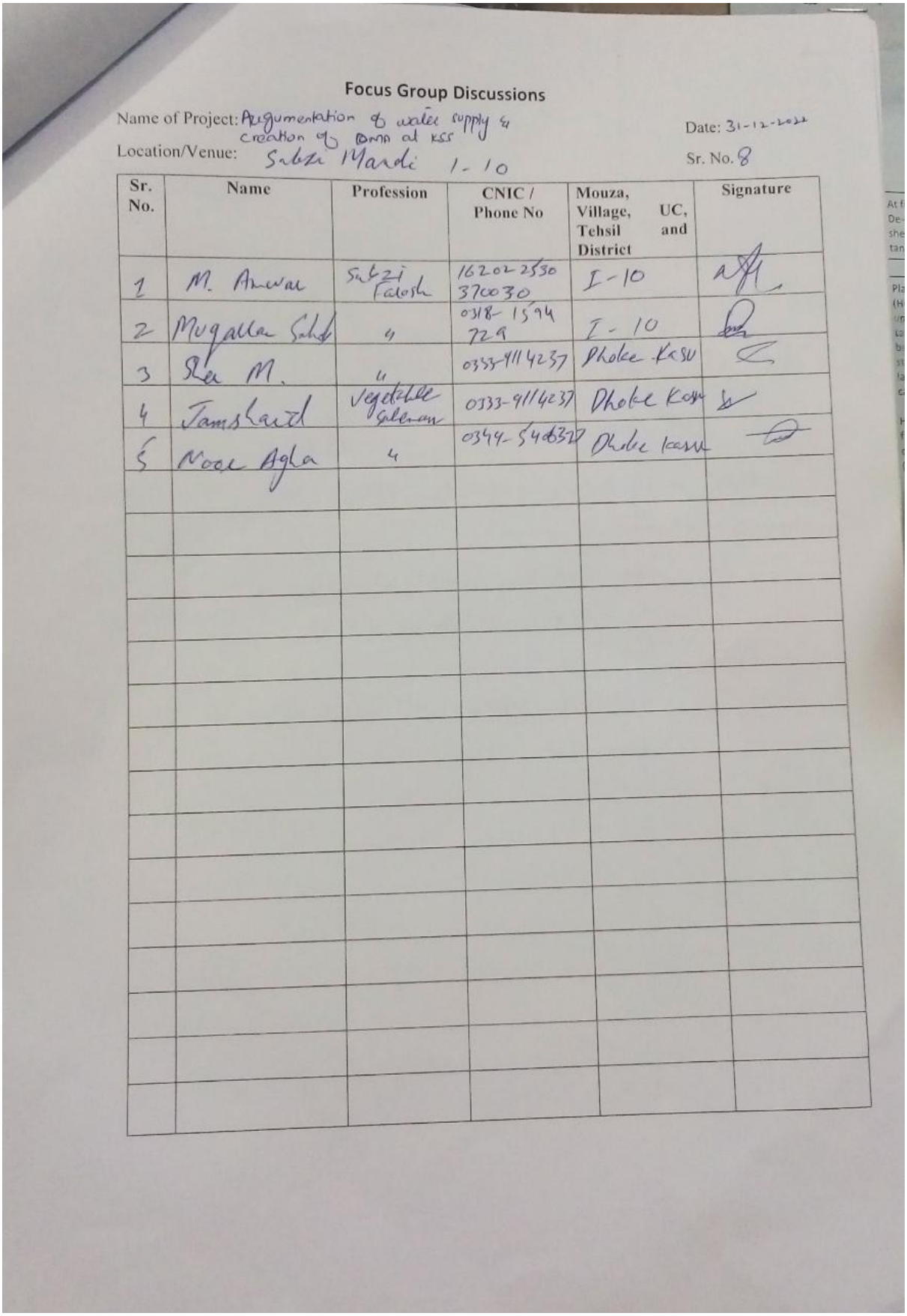
Name of Project: Augumentation of water supply & creation of DMA at KSS

Location/Venue: I-10, Start Point

Date: 31-12-2022

Sr. No. 7

Sr. No.	Name	Profession	CNIC	Mouza, Village, UC, Tehsil and District	Signature
1	Junaid Ahmed	Student	0345 5282435	I-10	
2	Abdul Wahid	Mason	0340 5469093	I-10	
3	Waheed Ullah	Labor	0345 9117190		



Focus Group Discussions

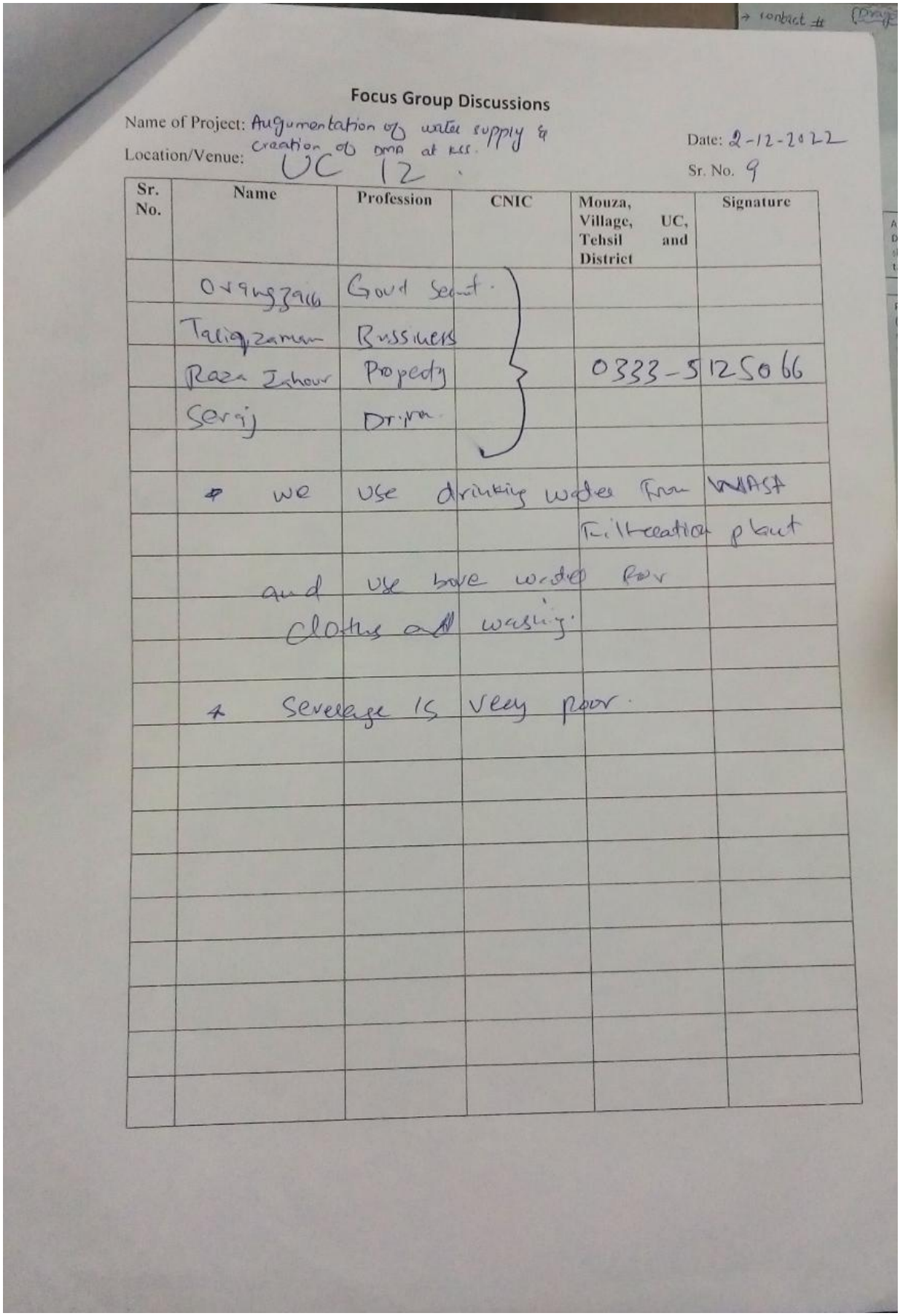
Name of Project: Augumentation of water supply & creation of DMA at KSS

Date: 31-12-2022

Location/Venue: Sabzi Mandi I-10

Sr. No. 8

Sr. No.	Name	Profession	CNIC / Phone No	Mouza, Village, UC, Tehsil and District	Signature
1	M. Anwar	Sabzi Farosh	16202-2530 370030	I-10	
2	Mugalla Sahb	"	0318-1594 729	I-10	
3	Sher M.	"	0333-9114237	Dhoke Kasu	
4	Jamshaid	Vegetable Salesman	0333-9114237	Dhoke Kasu	
5	Noor Agha	"	0344-5463377	Dhoke kasu	



Focus Group Discussions

Name of Project: Augumentation of water supply & creation of DMA at KSS.

Location/Venue: UC 12.

Date: 2-12-2022

Sr. No. 9

Sr. No.	Name	Profession	CNIC	Mouza, Village, UC, Tehsil and District	Signature
	Overseer	Govt Servant.			
	Taliq Zaman	Businessman			
	Raza Ishaq	Property		0333-5125066	
	Seraj	Driver			
	* We use drinking water from WASA				
				Filtration plant	
	and we have water for				
	clothes and washing.				
	* Sewerage is very poor.				