

ENVIRONMENTAL IMPACT ASSESSMENT

REPLACEMENT OF EXISTING CONDUCTANCE MAIN (ECM) FROM RAWAL TREATMENT PLANT TO WATERWORKS (SUFAID TANKI), 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



Document Title: Environmental Impact Assessment of Replacement of ECM, Rawalpindi

Prepared For: REPLACEMENT OF EXISTING CONDUCTANCE MAIN (ECM) FROM RAWAL TREATMENT PLANT TO WATERWORKS (SUFAID TANKI), RAWALPINDI.

Prepared By: PMU & EDCM

Document No:
PMU/EDCM/EIA/ECM/14/06-23

Distribution:
☒Official ☐Public ☒Confidential

Date:
2023

Report Summary:

This document presents findings of Environmental Impact Assessment (EIA) regarding Replacement of 54-inch Existing Conductance Main from Rawal Treatment Plant to Main Waterworks of Sufaid Tanki, Length 10.5km District Rawalpindi.

0	Report	EDCM	RR	SMM
Revisions	Description	Originator	Reviewed	Approved

The preparation of this document by Engineering Design and Construction Management (EDCM) Consultants, Lahore Pakistan, has been undertaken within terms of the brief using all reasonable skills and care. Engineering Design and Construction Management (EDCM) accepts no responsibility for data provided by other bodies and no legal liability arising from the use of data by other persons or opinions contained in this report. The views expressed in this document are those of the authors and do not necessarily reflect the views and policies of the governments. By making any designation of or reference to a particular territory or geographic area, or by using the term "state" in this document, Company does not intend to make any judgments as to the legal or other status of any territory or area.

Please contact pd@piciip.gop.pk if you have questions or comments with respect to content, or if you wish to obtain copyright permission for your intended use that does not fall within these terms.

TABLE OF CONTENTS

GLOSSARY	I
LIST OF ABBREVIATIONS	III
EXECUTIVE SUMMARY	VI
INTRODUCTION	1
1.1 OVERVIEW	1
1.2 PURPOSE OF THE REPORT	4
1.3 IDENTIFICATION OF THE PROJECT AND THE PROPONENT	5
1.4 NATURE AND SIZE OF THE PROJECT	6
1.5 LOCATION OF THE PROJECT	7
1.6 SCOPE OF STUDY	9
1.6.1 UNDERSTANDING OF THE PROPOSED OPERATION	9
1.6.2 REVIEW OF LEGISLATION AND GUIDELINES	10
1.6.3 SECONDARY DATA COLLECTION	10
1.6.4 FIELD DATA COLLECTION (BASELINE SURVEY)	10
1.6.5 PUBLIC CONSULTATION	11
1.6.6 IMPACT IDENTIFICATION AND ASSESSMENT	11
1.6.7 RECOMMENDATIONS FOR MITIGATION MEASURES	11
1.6.8 DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)	11
1.7 PERSONS PERFORMING EIA STUDY	11
1.8 ROLES AND RESPONSIBILITIES	12
1.9 ROLE OF ENVIRONMENTAL PROTECTION AGENCY, PUNJAB	12
1.10 ORGANIZATION OF EIA REPORT	13
POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK	15
2.1 GENERAL	15
2.2 NATIONAL POLICY AND LEGAL FRAMEWORK	15
2.3 REGULATIONS FOR ENVIRONMENTAL ASSESSMENT, PAKISTAN EPA	15
2.4 REGULATORY CLEARANCES, PUNJAB EPA	16
2.5 GUIDELINES FOR ENVIRONMENTAL ASSESSMENT, PAKISTAN EPA	16
2.6 PUNJAB ENVIRONMENTAL QUALITY STANDARDS (NEQS) 2000 & 2010	16
2.7 NATIONAL CONSERVATION STRATEGY, 1992	17
2.8 NATIONAL ENVIRONMENTAL POLICY, 2005	17
2.9 NATIONAL FOREST POLICY, 2001	17
2.10 PAKISTAN LABOUR POLICY, 2010	18
2.11 NATIONAL WATER POLICY 2018	18
2.12 NATIONAL DRINKING WATER POLICY, 2009	19

2.13	NATIONAL CLIMATE CHANGE POLICY, 2012	19
2.14	PUNJAB ENVIRONMENTAL PROTECTION 1997 (AMENDED) ACT, 2012	20
2.15	PAKISTAN ENVIRONMENTAL PROTECTION AGENCY, (REVIEW OF IEE AND EIA) REGULATIONS, 2000	21
2.16	PUNJAB ENVIRONMENTAL QUALITY STANDARDS (PEQS), 2016	22
2.17	GUIDELINES FOR THE PREPARATION AND REVIEW OF ENVIRONMENTAL REPORTS, 1997	22
2.18	GUIDELINES FOR ENVIRONMENTAL ASSESSMENT	22
2.19	PUNJAB PLANTATION AND MAINTENANCE OF TREES ACT, 1974	23
2.20	PAKISTAN ANTIQUITIES ACT 1975 & PUNJAB ANTIQUITIES AMENDMENT ACT 2012	23
2.21	PAKISTAN PENAL CODE, 1860	24
2.22	THE PROTECTION AGAINST HARASSMENT OF WOMEN AT THE WORKPLACE ACT, 2010	24
2.23	LABOUR LAWS AS PART OF CONSTITUTION OF PAKISTAN 1973,	24
2.24	PAKISTAN CLIMATE CHANGE ACT, 2017	25
2.25	NATIONAL CLEAN AIR ACT, 2000	26
2.26	SEISMIC BUILDING CODE OF PAKISTAN 2007	26
2.27	THE PARKS AND HORTICULTURE AUTHORITY ACT, 2012	26
2.28	PUNJAB MUNICIPAL WATER ACT, 2014	26
2.29	PUNJAB ENVIRONMENTAL PROTECTION (MOTOR VEHICLES) RULES, 2013	26
2.30	THE PUNJAB OCCUPATIONAL SAFETY AND HEALTH ACT, 2019	27
2.31	ELECTRICITY ACT, 1910	27
2.32	CUTTING OF TREES (PROHIBITION) ACT, 1975	27
2.33	NATIONAL DISASTER MANAGEMENT ACT, 2010	27
2.34	HAZARDOUS SUBSTANCE RULE, 2003	27
	PROJECT DESCRIPTION	30
3.1	PROJECT INTRODUCTION	30
3.1.1	SALIENT PARAMETERS OF EXISTING LINE	34
3.1.2	EXISTING CONDITION OF CONDUCTANCE MAIN	34
3.1.3	EXISTING CONDUCTANCE MAIN (ECM) DETAILS	36
3.1.4	DESIGN CRITERIA/ PARAMETERS	37
3.2	OBJECTIVES OF THE PROJECT	38
3.3	ALTERNATIVES CONSIDERED & THEIR REASON OF REJECTION	39
3.4	PROJECT LOCATION/ SITE LAYOUT	43
3.5	LAND USE AND VEGETATION FEATURES OF THE PROJECT SITE	44

3.6 ROAD ACCESS	44
3.7 CONSTRUCTION MATERIAL & MACHINERY REQUIREMENT	46
3.8 CONSTRUCTION MATERIALS REQUIREMENT	46
3.9 CONSTRUCTION CAMP (TEMPORARY FACILITY)	46
3.10 WORKFORCE REQUIREMENT	47
3.11 ENERGY/ POWER SOURCE	47
3.12 WATER REQUIREMENT	47
3.13 WASTEWATER GENERATION	47
3.14 SOLID WASTE	47
3.15 PROJECT COST & MAGNITUDE OF OPERTAION	47
3.16 SCHEDULE OF IMPLEMENTATION	47
3.17 DESCRIPTION OF THE PROJECT	49
3.18 DESCRIPTION OF THE PROCESS	49
3.19 DETAILS OF RESTORATION & REHABILITATION PLANS	49
3.20 GOVT. APPROVALS AND LEASES REQUIRED BY THE PROJECT	50
DESCRIPTION OF ENVIRONMENT	52
4.1 GENERAL	52
4.2 PHYSICAL ENVIRONMENT	53
4.2.1 TOPOGRAPHY	53
4.2.2 LAND USE OF THE PROPOSED PROJECT	53
4.2.3 HYDROLOGY	54
4.2.4 GEOLOGY AND SOIL	57
4.2.5 CLIMATE	57
4.2.6 SEISMOLOGY	58
4.2.7 TEMPERATURE	58
4.2.8 RAINFALL	59
4.2.9 RELATIVE HUMIDITY	60
4.2.10 FLOODS	61
4.3 ECOLOGICAL RESOURCES	65
4.3.1 FORESTRY (FLORA)	66
4.3.2 AGRICULTURE AND CROP PATTERN	67
4.3.3 FAUNA/WILDLIFE	67
4.3.4 PROTECTED AREAS / CRITICAL HABITAT (GAME RESERVES/ WILDLIFE SANCTUARIES/RESERVE FORESTS)	71
4.4 SOCIOECONOMIC ENVIRONMENT	74
4.4.1 ADMINISTRATIVE SETUP	76
4.4.2 DEMOGRAPHY & POPULATION	77

4.4.3	RELIGION	79
4.4.4	ARCHAEOLOGICAL AND CULTURAL SITE	79
4.4.5	ETHNICITY IN THE PROJECT AREA	79
4.4.6	LANGUAGE AND DIALECTS	79
4.4.7	DWELLINGS	79
4.4.8	ECONOMICS OF RAWALPINDI / ISLAMABAD	79
4.4.9	EDUCATION FACILITIES IN PROJECT AREA	80
4.4.10	SOCIAL AMENITIES IN THE PROJECT AREA	80
4.4.11	MAJOR SOURCE OF DRINKING WATER	80
4.4.12	HEALTH FACILITIES IN PROJECT AREA	80
4.4.13	ENVIRONMENTAL SENSITIVE RECEPTORS	80
4.5	BASELINE ENVIRONMENTAL QUALITY	85
4.5.1	AMBIENT AIR QUALITY	87
4.5.2	NOISE LEVEL	87
4.5.3	WATER QUALITY	91
	PUBLIC CONSULTATION	93
5.1	GENERAL	93
5.2	PROPOSERS' ENVIRONMENT MANAGEMENT TEAM	94
5.3	THE RESPONSIBLE AUTHORITY	94
5.4	OTHER DEPARTMENT & AGENCIES	94
5.5	ENVIRONMENTAL PRACTITIONERS & EXPERTS	98
5.6	AFFECTED & WIDER COMMUNITY	99
	SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES	
6.1	GENERAL	115
6.2	METHODOLOGY FOR IMPACT IDENTIFICATION	115
6.3	IMPACT CHARACTERIZATION	116
2.35	POTENTIAL POSITIVE IMPACTS	117
2.36	POTENTIAL ADVERSE IMPACTS	117
6.4	DESIGN/PRE CONSTRUCTION PHASE	118
6.5	ADVERSE IMPACTS DURING PLANNING AND DESIGN PHASE	119
6.5.1	IMPROPER DESIGNING OF CONDUCTANCE MAIN	119
6.5.2	LACK OF INTEGRATION OF EIA/EMP REQUIREMENTS INTO CONSTRUCTION BID	
	DOCUMENTS	119
6.5.3	CONTRACTOR'S ENVIRONMENTAL SAFEGUARDS CAPACITY	120
6.5.4	RELOCATION OF UTILITIES	121
6.5.5	IDENTIFICATION OF LOCATIONS FOR LABOR CAMPS AND ANCILLARY FACILITIES	121
6.5.6	DEVELOPMENT OF TRAFFIC MANAGEMENT PLAN	122

6.5.7 LAND ACQUISITION AND RESETTLEMENT IMPACTS	123
6.5.8 TOPOGRAPHY	123
6.5.9 SEISMICITY	123
6.6 ADVERSE IMPACTS DURING CONSTRUCTION PHASE	124
6.6.1 IMPACT SCREENING MATRIX	124
6.6.2 EXCAVATION OF WORKING CHAMBERS FOR INSERTION OF CONDUCTANCE MAIN WITHIN ECM	126
6.6.3 SITE ACCESSIBILITY DURING CONSTRUCTION	128
6.6.4 TRAFFIC ISSUES	129
6.6.5 WASTEWATER GENERATION	130
6.6.6 SOLID WASTE GENERATION	131
6.6.7 EMISSIONS OF GREEN HOUSE GASES (GHG)	132
6.6.8 AIR QUALITY	133
6.6.9 NOISE/VIBRATION	135
6.6.10 RESOURCE CONSERVATION	138
6.6.11 POTENTIAL EMERGENCIES	138
6.6.12 NATURAL AND MAN-MADE DISASTERS	139
6.6.13 COMMUNITY HEALTH AND SAFETY	139
6.6.14 OCCUPATIONAL HEALTH AND SAFETY	142
6.6.15 CONSTRUCTION CAMPS/CAMP SITES	144
6.6.16 FLORA	146
6.6.17 FAUNA	147
6.6.18 SOCIAL AND CULTURAL CONFLICTS	148
6.6.19 COMMUNICABLE DISEASES	148
6.6.20 IMPACTS ON SENSITIVE RECEPTORS	150
6.6.21 IMPACTS DURING SITE RESTORATIONS	150
6.7 ANTICIPATED IMPACTS DURING OPERATIONAL PHASE	151
6.7.1 WATER SYSTEM LEAKS AND WATER DISCHARGES DURING FLUSHING	152
6.7.2 IMPROVED DRINKING WATER AVAILABILITY	153
6.7.3 IMPROVEMENTS IN PUBLIC HEALTH	153
6.7.3 CUMULATIVE IMPACTS	153
6.8 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES	154
ENVIRONMENTAL MANAGEMENT & MONITORING PLAN	156
7.1 INTRODUCTION	156
7.2 ENVIRONMENTAL MANAGEMENT	156
7.3 INSTITUTIONAL ARRANGEMENT	157
7.3.1 ENVIRONMENTAL COMMITTEE AND ITS RESPONSIBILITIES	157

7.4	TRAINING SCHEDULES	198
7.5	IMPACTS & MITIGATION MEASURES	200
7.6	ENVIRONMENTAL MONITORING PROGRAM	200
7.7	ENVIRONMENTAL BUDGET	206
	RECOMMENDATIONS & CONCLUSIONS	211
8.1	RECOMMENDATIONS	211
8.2	CONCLUSION	211
	LIST OF REFERENCES	214

LIST OF TABLES

Table 1. 1: Design Parameters of Horizon 2016-2040	4
Table 1. 2: EIA Team.....	12
Table 3. 1: Detail of the Syphons.....	36
Table 3. 2: Summary of Conductance Main Inventory.....	36
Table 3. 3: Climatic Parameters for the project	37
Table 3. 4: Comparison of Alternatives	42
Table 3. 5: Estimated Contractor's Equipment and Machinery.....	46
Table 3. 6: Design Life of Water Supply Infrastructure	48
Table 3. 7: Theoretical per capita water demand.....	48
Table 4. 1: Yearly Mean Temperature (2018-2022).....	59
Table 4. 2: Mean Yearly Rainfall (2018-2022)	60
Table 4. 3: Mean Yearly Humidity (2018-2022).....	61
Table 4. 4: Names of Trees/shrubs & Herbs of the Region	66
Table 4. 5: List of indigenous Mammals	68
Table 4. 6: List of Reptiles observed in Project Area	68
Table 4. 7: List of Amphibians observed in Project Area.....	69
Table 4. 8: Birds Found in Study Area	69
Table 4. 9: Forests Located near the Project Area	72
Table 4. 10: Administrative subdivision of Rawalpindi	76
Table 4. 11: Environmental Sensitive Receptors along the COI of proponed project area	81
Table 4. 12: Detail of Air Quality Sampling Locations.....	87
Table 4. 13: Ambient Air Quality Results	88
Table 4. 14: Detail of location for Noise Levels Monitoring	89
Table 4. 15: Results of Noise level Monitoring.....	90
Table 4. 16: Detail of Water Quality Sampling Location.....	91
Table 5. 1: Finding of Consultation with Government Stakeholders	95
Table 5. 2: Environmental Experts and their recommendations.....	98
Table 5. 3: Consultation with Project Affected People.....	101
Table 5. 4: Response of Stakeholder during FGDs.....	108
Table 6. 1: 'Activity Wise' screening of possible Impacts during Design/Pre- Construction phase.....	118

Table 6. 2: Screening of Possible Impacts during Construction Phase.....	124
Table 6. 3: Estimated Wastewater Generated by Workers in Construction Camps	130
Table 6. 4: Noise Produced by Construction Equipment.....	135
Table 6. 5: Screening of Possibal Impacts during Operation Phase	151
Table 7. 1: Environmental Management Plan.....	161
Table 7. 2: Capacity Development and Training Programme	199
Table 7. 3: ‘Pre-Construction’ Environmental Monitoring Plan for Baseline Development	202
Table 7. 4: Construction Phase Monitoring Requirements.....	203
Table 7. 5: Operation Phase Environmental Monitoring Plan.....	205
Table 7. 6: Annual Cost Estimates for ‘Pre-Construction Phase’ Environmental Monitoring	207
Table 7. 7: Annual Cost Estimates for ‘Construction Phase’ Environmental Monitoring	207
Table 7. 8: Annual Cost Estimates for ‘Operation Phase’ Environmental Monitoring.....	208
Table 7. 9: Estimated Costs for EMP Implementation	208
Table 7. 10: Cost of Capacity Development and Training Programme for Project Contractor(s)	209

LIST OF FIGURES

Figure ES- 1: Location of the Project	ix
Figure 1. 1: Boundary Map of Rawalpindi City	3
Figure 1. 2: Location Map of the Project.....	8
Figure 3. 1: Location Map of the Project.....	32
Figure 3. 2: Route of Conductance Main.....	33
Figure 3. 3: Site Visit Glimpse	34
Figure 3. 4: Detail of Access Road	45
Figure 4. 1: Location of Water sources for WASA Rawalpindi.....	56
Figure 4. 2: Seismic Zones of Pakistan.....	58
Figure 4. 3: Yearly Mean Temperature (2018-2022).....	59
Figure 4. 4: Mean Yearly Rainfall (mm) 2018-2022.....	60
Figure 4. 5: Mean Yearly Humidity (2018-2022).....	61
Figure 4. 6: Areas with Volnurable to Flood	63

Figure 4. 7: Flora Fauna found in Project Area	70
Figure 4. 8: Results of IBAT A.....	71
Figure 4. 9: Results of IBAT B.....	72
Figure 4. 10: Location of Forests near project site	73
Figure 4. 11: Socioeconomic Conditions of the project area.....	76
Figure 4. 12: Demographic features of Rawalpindi.....	78
Figure 4. 13: Environmental Sensitive Receptors.....	84
Figure 4. 14: Locations of Environmental Monitoring Points	86
Figure 4. 15: Photos of Environmental Monitoring.....	90
Figure 5. 1: Photographs of Consultations with Institutional Stakeholders.....	97
Figure 5. 2: Photographs of Stakeholder Consultation	111

LIST OF ANNEXURES

ANNEXURE-I	
<i>Layout Plan</i>	216
ANNEXURE-II	
<i>Location Map</i>	217
ANNEXURE-III	
<i>Map for tentative locations of working Chamber and Land Use</i>	218
ANNEXURE-IV	
<i>IBAT Findings</i>	223
ANNEXURE-V	
<i>Chance Find Procedure</i>	233
ANNEXURE-VI	
<i>Traffic Management Plan</i>	235
ANNEXURE-VII	
<i>Resource Conservation Plan</i>	245
ANNEXURE-VIII	
<i>Occupational Safety and Health Management Plan</i>	249
ANNEXURE-IX	
<i>Emergency Response Management Plan</i>	262
ANNEXURE-X	
<i>Dust Management Plan</i>	278

ANNEXURE-XI	
<i>Noise and Vibration Management Plan</i>	284
ANNEXURE-XII	
<i>WHO Advice on COVID-19</i>	288
ANNEXURE-XIII	292
<i>Template for Site Specific EMP</i>	292
ANNEXURE-XIV	
<i>Tool for Socio-economic Survey</i>	301
ANNEXURE-XV	
<i>Environmental Testing & Monitoring Reports</i>	305
ANNEXURE-XVI	
<i>Calibration Certificate of Noise and Air Quality Measuring Instruments</i>	316
ANNEXURE-XVII	
<i>Attendance Sheets of FGDs</i>	322

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 measures:** 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

AP	Affected Persons
IAP	Impact Assessment Survey
RDA	Rawalpindi Development Authority
CDA	Capital Development Authority
ADB	Asian Development Bank
AIP	Access to Information Policy
AMSL	Above Mean Sea Level
BC	Before Construction
BOQ	Bill of Quantities
COVID-19	Corona Virus Infectious Disease-2019
CSC	Construction Supervision Consultant
CoI	Corridor of Impact
DC	During Construction
DO	During Operation
IBAT	Integrated Biodiversity Assessment Tool
EA	Executing Agency
ECM	Existing Conductance Main (ECM)
EDCM	Engineering Design Construction Management
EHS	Environmental, Health, and Safety
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
GoP	Government of Pakistan
GRC	Grievance Redressal Committee
GRM	Grievance Redressal Mechanism
GWSS	Gravity Water Supply Scheme
HDPE	High Density Polyethylene
IA	Implementing Agency
IEE	Initial Environmental Examination
IFC	International Finance Corporation
FFC	Flood Forecasting Commission
KPI	Key Performance Indicator
LAA	Land Acquisition Act (of 1984)

LEA	Equivalent sound pressure level
LPCD	liters per person (capita) per day
MGD	Million Gallons per Day
MSDS	Material Safety Data Sheet
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEQ	National Environmental Quality Standards
OHS	Occupational Health and Safety
O&M	Operation & Maintenance
PAP	Project Affected Persons
PC	Public consultation
PCC	Plain Cement Concrete
PEP Act	Pakistan Environment Protection Act 1997
PEPC	Pakistan Environmental Protection Council
PGA	Peak Ground Acceleration
PMU	Project Management Unit
PPE	Personal Protective Equipment
RCC	Reinforced Cement Concrete
REA	Rapid Environmental Assessment
RP	Resettlement Plan
SOPs	Standard Operating Procedures
SS	Suspended Solids
TDS	Total Dissolved Solid
PM	Particulate Matter
SPS	Safeguard Policy Statement
SSEMP	Site Specific Environmental Management Plan
TMA	Tehsil Municipal Administration
TMP	Traffic Management Plan
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. TITLE & LOCATION OF PROJECT:

The local Government and Community Development Department, Government of Punjab, through the Water and Sanitation Agency, Rawalpindi (WASA), is planning to implement a project, “Replacement of Existing Conductance Main from Rawal Lake Filtration Plant to Water Works Sufaid Tanki”, with the financial support of Asian Development Bank (ADB).

The city of Rawalpindi mainly depends on the rainfall for both surface and groundwater resources (as the perched aquifers deplete rapidly due to lesser rainfall, The perched aquifer is usually above the normal ground water table due to presence of rock or other impermeable sediment layer). Water supply, being the foremost utility for citizens, is currently the most affected municipal service in the city.

To fulfill the water requirements of Rawalpindi, the Water and Sanitation Agency (WASA) of Rawalpindi is utilizing both underground as well as surface water resources. The water utilization from Rawal Dam is 10 MGD, from Khanpur Dam 6 MGD and from tube wells is 35 MGD. Total water availability from different water sources to Rawalpindi City, excluding cantonment board is 51 MGD. Whereas, the demand of water is 80 MGD. So, the current water deficit is 29 MGD, which will further increase in future.

The water will be taken from Transmission Main of Rawal lake filtration plant. Rawal filtration plant has approved capacity of 28 MGD for Rawalpindi city but only 23MGD is currently supplied to the city, due to nonfunctioning of Existing Conductance Main (ECM). The New Conductance Main will supply 5 MGD water to Rawalpindi and help to utilize the full allocated water supply of 28MGD from Rawal lake Filtration plant.

The project, under referenced EIA study is about the Replacement of Existing Conductance Main (ECM), from Rawal Lake Filtration Plant to Water Works (Sufaid Tanki), Rawalpindi with a total length of 9.1 km. The project comprises of two parts;

- i. Replacement of 36” (900mm) dia. PRCC pipe from Water Works (Sufaid Tanki) to 6th road, satellite town with a length of 2.520 km.

- ii. Insertion of 36” (900mm) dia. HDPE pipe into existing 54” line (1350 mm) dia. PRCC pipe from 6th road satellite town to Rawal Lake filtration plant with a length of 6.580 km.

The project location plan is shown below in **Figure ES-1**.

The old PRCC Conductance main (Existing conductance main ECM) was laid in 1979 under “Rawalpindi Greater Water Supply Project” from Rawal Lake Filtration Plant to Bifurcation Point for MES line near 6th Road, in A-Block Satellite Town during augmentation of Rawal lake Filtration Plant. This conductance main remained functional till 2001 and now is abandoned due to heavy leakages from joints. A new conductance main (Duplicate conductance main DCM) was laid down in 2001 which is supplying water to city. The carrying capacity of DCM is 23 MGD. Approximately 5MGD of water is not being treated by the treatment plant due to non- functionality of the old PRCC line. The available treatment capacity of the plant dictates the replacement of this line so that Rawalpindi citizens can be benefited with 5MGD of water, which can fulfill the water requirement of about 125,000 persons. The proposed project will not involve the installation of any pumping machinery as the water will be flowing through gravity from Sector I-10 of Islamabad to Sufaid Tanki, Rawalpindi.

The main benefits of this project are management of leakage points, reduction of water supply deficit and enhancement and sustainable water supply to Rawalpindi by reducing pressure on ground water resource.

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. Based on the anticipated impacts of the project, the proposed project falls under Category B of the ADB's SPS, 2009 and Initial Environmental Examination report need to be prepared for approval from ADB. IEE report for ADB has been prepared and submitted accordingly.

A project falling under any category specified in Schedule I or II of the IEE/EIA Regulations (SRO 339 (IO/2000)) need to obtain environmental approval under section 12 of the Punjab Environmental Protection Act, 1997 (Amendment 2012) (in case of Punjab EPA) / Pakistan Environmental Protection Act 1997 (in case of Federal EPA). As per Schedule-II (F-1) of

IEE/EIA Regulations, 2000, and Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022, the proposed project falls under category of projects requiring Environmental Impact Assessment (EIA) for EPA Punjab and Federal EPA. Therefore, this Environmental Impact Assessment (EIA) is prepared for submission to EPA Punjab and to obtain NOC from EPA.

The proposed project lies in the Rawalpindi District of Punjab region of Pakistan. The proposed project will be completed with an estimated construction period of 24 months with total cost of approx. **4.72 Million USD @ 277.9/USD (1,320.03 Million PKR)**. The cost includes the hiring of staff, arrangements for water sprinkling, provision of PPEs to workers, tree plantation, the arrangement of first aid kits at the site, and waste management, etc.

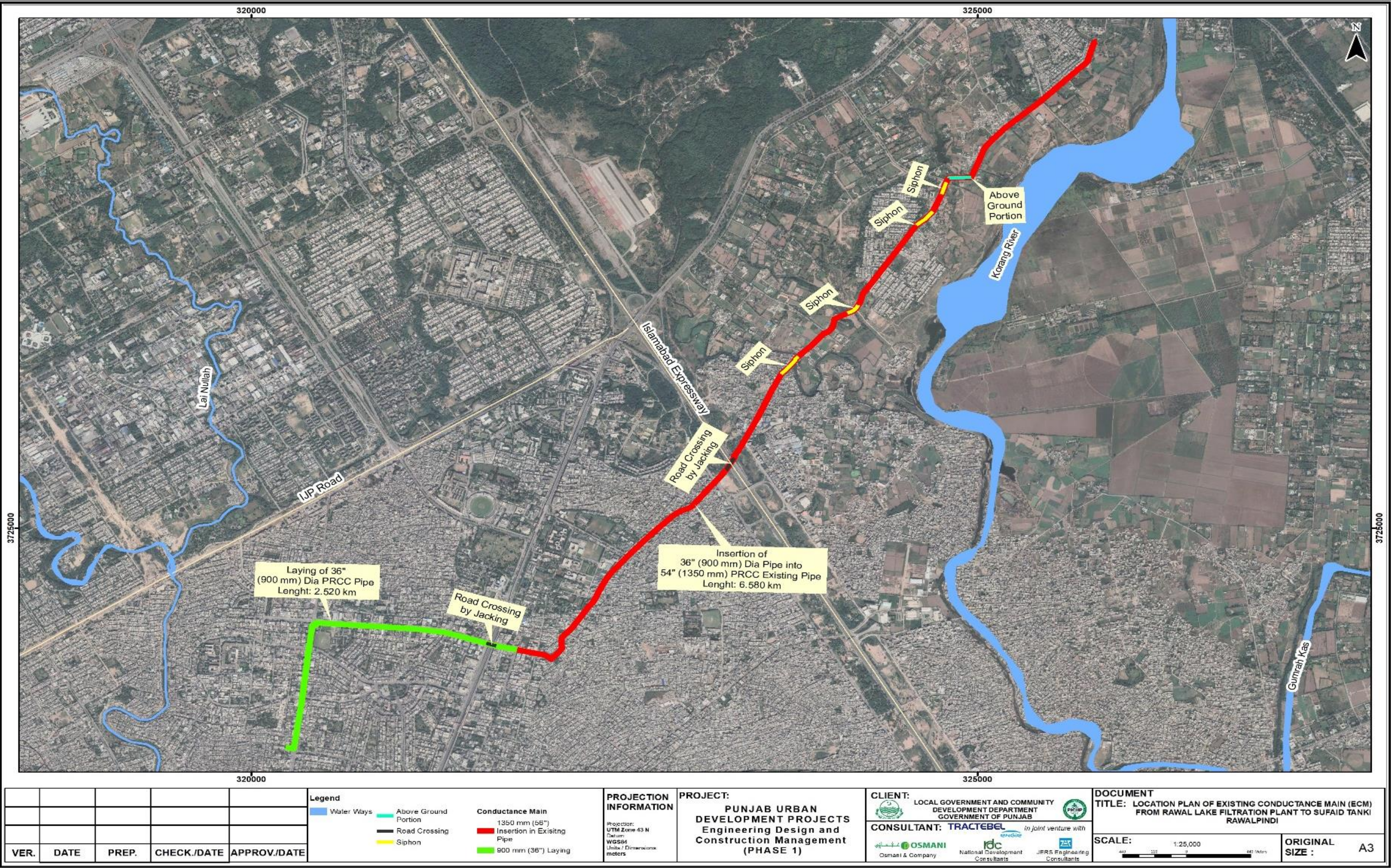


Figure ES- 1: Location of the Project

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 “**Replacement of 54-inch Existing Conductance Main from Rawal Treatment Plant to Main Waterworks of Sufaid Tanki, Length 10.5km, Rawalpindi**”. The 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 Replacement of 54-inch Existing Conductance Main from Rawal Treatment Plant to Main Waterworks of Sufaid Tanki, Length 10.5km 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) Consultant** 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 Replacement of 54-inch Existing Conductance Main from Rawal Treatment Plant to Main Waterworks of Sufaid Tanki, Length 9.1km District Rawalpindi. The proposed project will pass from the following area;

- Rawal Lake Filtration Plant (Start Point)
- Street 6
- Margalla Road

- Swan Road
- Islamabad Expressway Crossing
- Dhok Kala Khan Road
- Malik Mirza Road
- Muhammad Iqbal Road
- 6th road
- Murree Road crossing
- Saidpur Road
- Sufaid Tanki (End Point)

Four options are considered for construction of new line. The size of new line is calculated on the basis of available discharge from the WTP and working head available at final discharge point. Following are the four alternative options;

1. Laying of New Pipeline (Option 1)
2. Insertion of New Pipe in existing pipe (Option 2)
3. Minimum (0.6m) dismantling of the existing pipe at the top (Option 3)
4. Dismantling of existing pipe at the top.

Option 2 was selected as final option for proposed project because it involves minimum disturbance to environment and it is also cost effective.

Following are the main components of proposed activity.

- Replacement of 36" (900mm) dia. PRCC pipe from Water Works (Sufaid Tanki) to 6th road, satellite town with a length of 2.520 km.
- Insertion of 36" (900mm) dia. HDPE pipe into existing 54" line (1350 mm) dia. PRCC pipe from 6th road satellite town to Rawal Lake filtration plant with a length of 6.580 km.

The proposed project lies in the Rawalpindi District of Punjab region of Pakistan. The proposed project will be completed with an estimated construction period of 24 months with total cost of approx. **4.72 Million USD @ 277.9/USD (1,320.03 Million PKR)**. The detail of estimated cost for implementation of Mitigation measures prescribed in the Environmental Management Plan (EMP) has been calculated and given in Chapter 5 of this

EIA Report. The cost includes the hiring of staff, arrangements for water sprinkling, provision of PPEs to workers, tree plantation, the arrangement of first aid kits at the site, and waste management, etc.

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 are management of leakage points, reduction of water supply deficit and enhancement and sustainable water supply to Rawalpindi by reducing pressure on ground water resource.

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.

As per legal requirement under Section 12 of Punjab Environmental Protection Act, 1997 (Amendment 2012) this project requires 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.

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 in compliance with applicable National/Punjab Environmental Quality Standards (NEQS / PEQS) and other international standards like World Health Organization (WHO). The tests were performed by experienced staff from an EPA certified environmental laboratory. Furthermore, 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.

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

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. 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 / 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.

Selection of location for the construction of water distribution networks and Transmission Mains	- Improper Designing of Distribution Networks and Transmission Main	- 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. - 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 & bid Documents	- Lack of integration of EIA/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. • 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.

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.
Excavation of Chambers for Insertion of New Conductance Main within Existing Conductance Main	- 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;

Wastewater generation	- Discharge of wastewater in open area;	- 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. - 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 are 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 in compliance with applicable National/Punjab Environmental Quality Standards (NEQS / PEQS) and other international standards like World Health Organization (WHO). The monitoring results shows that Particulate Matter (PM₁₀), Carbon monoxide (CO) and Sulphur dioxide (SO₂) were exceeding the limits, set by PEQS/NEQS for ambient air. The 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.

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 replacement of Existing Conductance Main (ECM) to supply water to the residents of Rawalpindi is of high significance considering the urgent need for improving sustainable water supply system of Rawalpindi city. Therefore, it is concluded that the project needs to be executed to fulfill the water demands of Rawalpindi. Further Recommendations have been given on the basis of identified impacts to make this development sustainable. Contractor will be bound to follow the requirements of Environmental Management Plan given in the EIA report. Site Specific Environmental Management Plan (SSEMP) shall be developed and implemented by the contractor under the guidelines of SSEMP, given under this EIA report. 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.

Water and Sanitation Agency (WASA), Rawalpindi is responsible to provide water supply and sewerage services to 1.77 million (2022) people living in 66 Union Councils of the City of Rawalpindi. WASA Rawalpindi 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 WASA Rawalpindi, 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.

The project is about the Replacement of Existing Conductance Main (ECM) from Rawal Lake Filtration Plant to Water Works (Sufaid Tanki) Rawalpindi with a total length of 9.1 km. The project comprises of two parts (i) Replacement of 36" (900mm) dia. PRCC pipe from Water Works (Sufaid Tanki) to 6th road satellite town with a length of 2.520 km. (ii) Insertion of 36" (900mm) dia. PRCC pipe into existing 54" line (1350 mm) dia. PRCC pipe from 6th road satellite town to Rawal Lake filtration plant with a length of 6.580 km. The project is designed with the information that at present (2022) two conductance mains exist to convey water from treatment plant to the city.

The old PRCC Conductance main (Existing conductance main ECM) was laid in 1979 under "Rawalpindi Greater Water Supply Project" from Rawal Lake Filtration Plant to Bifurcation Point for MES line near 6th Road, in A-Block Satellite Town during augmentation of Rawal lake Filtration Plant. This conductance main remained functional till 2001 and now is abandoned due to heavy leakages from joints. A new conductance main (Duplicate conductance main DCM) laid in 2001 is only under use

to convey water to the city. Its flow carrying capacity is about 22 MGD. Approximately 5MGD of water is not being treated by the treatment plant due to non-functionality of the old PRCC line. The available treatment capacity of plant dictates the replacement of this line so that Rawalpindi citizens can be benefited with 5MGD of water, which can fulfill the water requirement of about 125,000 persons.

To fulfill the water requirements of Rawalpindi, the Water and Sanitation Agency (WASA) of Rawalpindi is utilizing both underground as well as surface water sources. The water utilization from Rawal Dam is 10 MGD, from Khanpur Dam 6 MGD and from tube wells is 35 MGD. Total water availability from different water sources to Rawalpindi City, excluding cantonment board is 51 MGD. Whereas, the demand of water is 80 MGD. So, the current water deficit is 29 MGD, which will further increase in future. Since, water demand of Rawalpindi city is increasing day by day, there is need to tap more water. Five (5) MGD water may be tapped from Rawal filtration through replacement of existing conductance main which is currently abundant due to heavy leakages. Replacement will enhance the water supply from Rawal Lake Filtration Plant from 23 to 28 MGD. After replacement of existing conductance main, the water deficit will be decreased from 29 MGD to 24 MGD.

Rawalpindi is the capital city of the Rawalpindi division, and it is the fourth-largest city of Pakistan. The population estimate for 2022 is 2.32 million, and the projected population for 2050 is 5.82 million with growth rate of 2.02%. This population considers both Cantonment and MC area. Increase in population; water demand is also increasing for the city. Currently, the main water sources are groundwater (Tubewells) and surface water sources (Rawal Lake and Khanpur Dam) in the city. 20. The City of Rawalpindi consists of the urban and the peri-urban areas of the Rawal Town and the Potohar Town. The **Figure 1.1** shows the existing MC boundary and the RDA boundary; covering the urban and the peri-urban areas and the Cantonment boundary.

The city of Rawalpindi is currently facing major challenges of municipal administration. One of these issues is the uninterrupted supply of clean water. The situation is going even worse due to depleted underground water reservoirs.



The increase in population is increasing the demand of water as well and the supply and demand gap is increasing continuously. The water deficit is calculated for the year 2021 and project design life i.e. year 2040 keeping in view the per capita water demand of around 182 lpcd (40 gpcd). These design parameters of the Master Plan are shown in **Table 1.1**.

Table 1. 1: Design Parameters of Horizon 2016-2040

Parameters	Urban Areas	Peri-urban Areas	Rural Areas
Target population 2040	1,778,796	580,959	243,994
Water demand 2040 (m ³ /d (MGD))	324,000 (71)	106,000 (23)	45,000 (10)
Production (2016), (m ³ /d (MGD))	272,000 (59.9)	15,000 (3.3)	0
NRW (2016)	0.3	-	-
Total water supply deficit (2040), (m ³ /d (MGD))	134,000 (29)	91,000 (20)	45,000 (10)
Total production (2016), (m ³ /d (MGD))	287,000 (63)		
Total deficit (2040), (m ³ /d (MGD))	270,000 (59)		

**Source: PDUP-EDCM Consultants*

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 a sustainable source of water. The main benefits of this project include the following;

- Replacement of old distribution lines to control leakages and mixing of water.
- Efficient use of already available OHRs and GSTs in city.
- Enhancement in supply of water supply to residents of Rawalpindi.
- Shifting on surface water use to secure ground water resource. Surface water reservoir has sufficient water to cater this need.

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, 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 “**Replacement of Existing Conductance Main (ECM) from Rawal Treatment Plant to Waterworks (Sufaid Tanki), 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

	Replacement of ECM, Rawalpindi
Contact Details:	Cell: 042-99210013-4 / 042-99268484 Email ID: pd@piciip.gop.pk

b. Consultant

Engineering Design and Construction Management (EDCM) Consultants

1.4 NATURE AND SIZE OF THE PROJECT

The proposed Project is about the provision of drinking water to the residents of the Rawalpindi, namely, **“Replacement of Existing Conductance Main (ECM) from Rawal Treatment Plant to Waterworks (Sufaid Tanki), Rawalpindi”**.

The following Project is designed with the information that at present (2022) two conductance mains exist to convey water from treatment plant to the city. The old PRCC Conductance main (Existing conductance main ECM) was laid in 1979 from Rawal Lake Filtration Plant to Bifurcation Point for MES line near 6th Road, in A-Block Satellite Town. This conductance main remained functional till 2001 and now is abandoned due to heavy leakages from joints. A new conductance main (Duplicate conductance main DCM) laid in 2001 is only under use to convey water to the city. Approximately 5MGD of water is not being treated by the treatment plant due to non-functionality of the old PRCC line. As the Rawal Lake Water Treatment Plant (WTP) has installed capacity for 28MGD water treatment, therefore this project has been conceived under DREAM-1 to replace the ECM for obtaining additional 5MGD. This project will fulfill water requirement of about 125,000 persons. Water from Rawal Lake treatment plant will be supplied to Sufaid Tanki under gravity. No pumping is involved which make this project self-sustainable.

The water availability for Rawalpindi city from Rawal Dam is 10 MGD, from Khanpur Dam 6 MGD and from tube wells 35 MGD. Total water availability from different water sources to Rawalpindi City excluding cantonment board is 51 MGD whereas the demand is 80 MGD. So, current water deficit is 29 MGD which will further increase in future. The proposed Conductance Main will pass through the residential and commercial areas of Islamabad and Rawalpindi.

A diameter of 36” (900) mm is currently proposed for replacement of conductance main. HDPE pipe is recommended to use for replacement of conductance main. The HDPE is environmental friendly option due to its long life and less prone to leakage. Unlike MS pipelines it will not be rusted and it is cheaper and hydraulically efficient than MS pipe.

Execution of the proposed project would be beneficial for the citizens of Rawalpindi.

The main benefits of this project include the following;

- Reduction in water supply deficit.
- Enhanced water availability and consistency due to dependence on Surface Source.
- Improved water quality due to replacement of old leaking conductance main.
- No electricity consumption due to gravity flow from Rawal filtration plant to waterworks.
- Reduction in NRW due to metering at strategic locations.
- Enhanced Management by the responsible agency.

1.5 LOCATION OF THE PROJECT

The proposed project will pass from the following area;

- Rawal Lake Filtration Plant (Start Point)
- Street 6
- Margalla Road
- Swan Road
- Islamabad Expressway Crossing
- Dhok Kala Khan Road
- Malik Mirza Road
- Muhammad Iqbal Road
- 6th road
- Murree Road crossing
- Saidpur Road
- Sufaid Tanki (End Point)

The project location plan is shown in **Figure 1.2**.

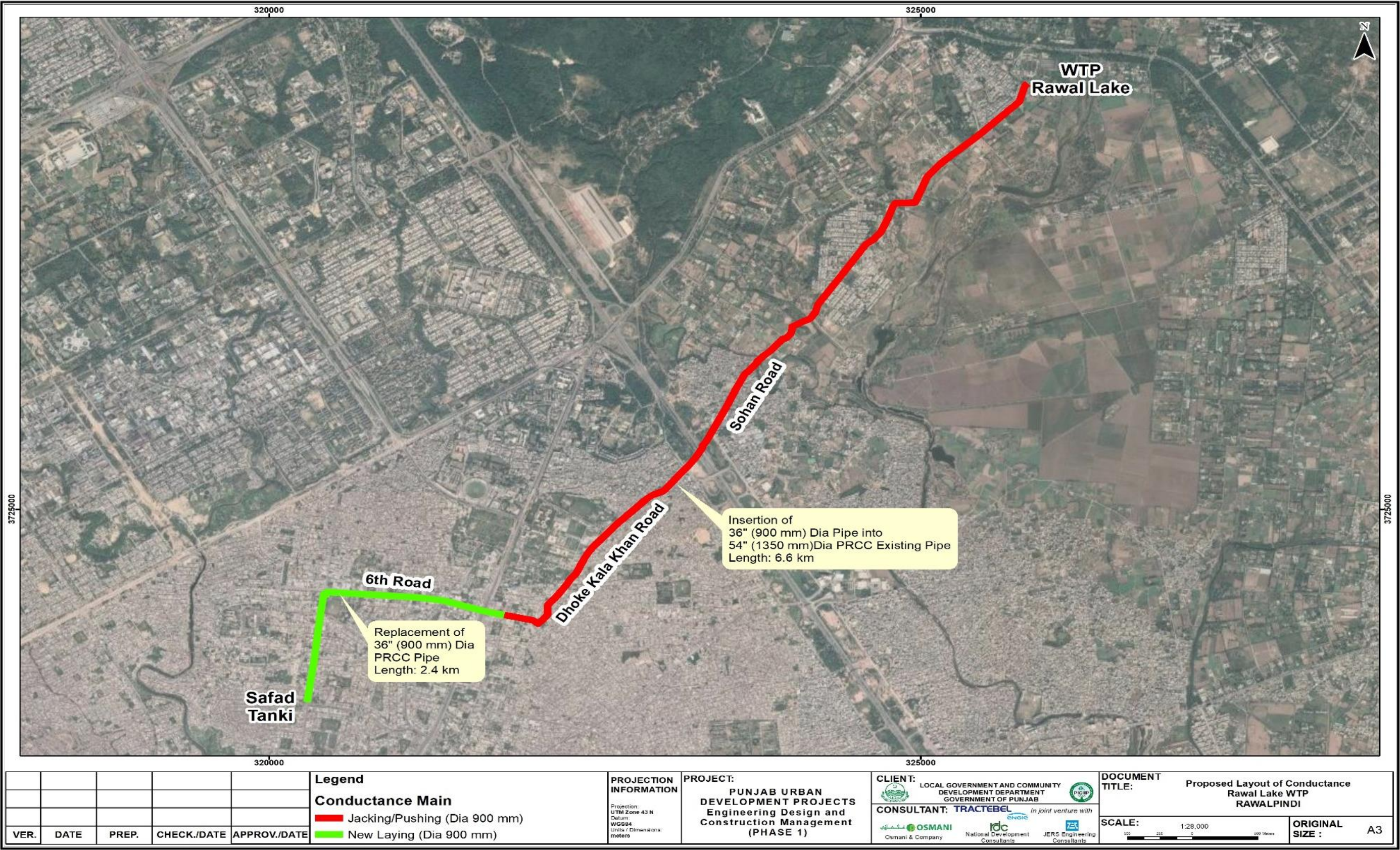


Figure 1. 2: Location Map of the Project

1.6 SCOPE OF STUDY

The scope of EIA will include environmental assessment of project activities including design, construction and operation of replacement of Existing Conductance Main from Rawal Lake to Water Works (approximately 9.1 km). 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 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 (WASA Rawalpindi) 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 (WASA Rawalpindi) 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, 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 of information from the ADB, PMU PICICP, CIU and WASA Rawalpindi, design of Osmani & Company Limited (OCL) and Engineering Design and Construction Management (EDCM) technical team on the proposed project activities and understanding the activities to identify potential impacts of implementing these 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. Rapid Environmental Assessment (REA) was completed and has submitted to ADB. The key environmental sensitive receptors and stakeholders within the project area were identified.

Baseline surveys were conducted to by the multidisciplinary team of environmentalists, social expert and data enumerators to identify and establish environmental and social impacts of the project.

1.6.5 Public Consultation

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

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 ADB/PMU Team 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 1.2.**

Table 1. 2: EIA Team

Members	Status in Project
ADB/PMU Team	
Mr. Saad Malik	ADB's Environmental Consultant
Mr. Aziz Karim	Individual Consultant (Environmental Consultant)
Mr. Waqas Afzal	Deputy Director (Social & Environmental Safeguards)
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	Environmentalism (IEE / EIA specialist)
Mr. Babar Ali	Environmentalism (IEE / EIA specialist)
Mr. Sami Ullah	Social Expert (Env. Team)
Mis. Komal Aroosh	Jr. Social Expert (Female Enumerator)
Ms. Shagufta Tahir	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 "Replacement of Existing Conductance Main (ECM) from Rawal Lake Filtration Plant to Water Works (Sufaid Tanki) Rawalpindi". 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.

2.2 NATIONAL POLICY AND LEGAL FRAMEWORK

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.

Prior to the adoption of the 18th Constitutional Amendment, the Pakistan Environmental Protection Act (PEPA) 1997 was the governing law for environmental conservation in the country. Under PEPA 1997, the Pakistan Environmental Protection Council (PEPC) and Pak EPA were primarily responsible for administering PEPA 1997. Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved, and the provinces have been empowered for environmental protection and conservation.

2.3 REGULATIONS FOR ENVIRONMENTAL ASSESSMENT, PAKISTAN EPA

Under Section 12 (and subsequent amendment) of the PEPA (1997), a project falling under any category specified in Schedule I of the IEE/EIA Regulations (SRO 339 (I0/2000), requires the proponent of the project to file an IEE with the concerned provincial EPA. Projects falling under any category specified in Schedule II require

the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.

2.4 REGULATORY CLEARANCES, PUNJAB EPA

In accordance with provincial regulatory requirements, an IEE/EIA report satisfying the requirements of the Punjab Environmental Protection Act, 1997 (Amendment 2012) is to be submitted to Punjab Environmental Protection Agency (Punjab EPA) for review and approval, and subsequent issuance of Environmental Approval (EA) before the commencement of construction.

2.5 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;

2.6 PUNJAB ENVIRONMENTAL QUALITY STANDARDS (NEQS) 2000 & 2010

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.

2.7 NATIONAL CONSERVATION STRATEGY, 1992

Pakistan National Conservation Strategy (NCS), which was approved by the federal cabinet in March 1992, is the principal policy document on environmental issues in the Country. 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 are pollution prevention during construction and conserving biodiversity and forestry.

2.8 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.

Clause (b) of sub-section 5.1 states that Environmental Protection Act, 1997, will be diligently enforced for all developmental projects.

2.9 National Forest Policy, 2001

The goal of this policy is to foster the sustainable development of Renewable Natural Resources (RNR) in Pakistan, through maintenance and rehabilitation of these essential resources and enhancement of sustainable livelihoods of rural masses, particularly women, children and other deserving groups.

The various components of the policy include:

- Reducing poverty, powerlessness and unemployment;
- Population planning in critical ecosystems;
- Reducing the impact of socio-economic factors;
- Providing substitutes to firewood in the mountain-woods;
- Reducing political interferences in Forestry and Wildlife Departments;

- Renovating and invigorating the institutions of RNR;
- Supporting Local Governments in the sustainable development of their RNR;
- Policies for fragile ecosystems;
- Riverside forests;
- Irrigated plantations;
- Preservation of sensitive and unique forests;
- Wildlife conservation;
- Rangelands and desert ecosystems; and
- Planting trees and fodder on farmlands.

The proposed project does not pass through a Reserve Forest or other notified areas. However, other relevant components like wildlife conservation, planting trees will be applicable.

2.10 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.

The labour will be employed for construction and operation of the proposed project. The provision of policy will apply to all the labour employed.

2.11 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. The proposed project will comply with these standards.

2.12 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.

This policy will be applicable as the proposed Project is about the provision of drinking water residents of the Rawalpindi.

2.13 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.

This policy document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.

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

2.14 PUNJAB ENVIRONMENTAL PROTECTION 1997 (AMENDED) ACT, 2012

The Punjab Environmental Protection Act, 1997 (Amended, 2017) is comprehensive legislation and provides the legislative framework for protection, conservation, rehabilitation and improvement of the environment. The 'environment' has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses 'a' to 'f'.

The notable points of the law are:

- No proponent of a project shall commence construction or operation unless he has filed an EIA / IEE with the Provincial Agency designated by the Provincial EPAs an EIA / IEE, and has obtained an approval;
- Establishment and formation of the Punjab Environmental Protection Council (PEPC);
- Prohibition of certain discharges or emissions;
- Punjab Environmental Quality Standards (PEQS) for wastewater, air emissions and noise; and
- Provincial Government can issue notices and enforce them to protect the environment.

In the amendment of 2012, legislative powers related to environment and ecology are given to provincial governments from the Federal government. The provinces are required to enact their own legislation for environmental protection. Other amendments include increasing the penalties for violations.

For the proposed Project, Environmental Protection Department (EPD)/Environmental Protection Agency (EPA), Government of Punjab (GoPb) is the concerned authority. The capability of regulatory institutions for environmental management is ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.

The provision of the act is applicable to proposed Project for conducting an IEE/EIA according to section 12 and to obtain environmental approval from the Punjab EPA.

The section 11 of the act is applicable in term of compliance with Punjab Environmental Quality Standards (PEQS). Similarly, section 13 of the act prohibits the import of hazardous waste.

The provisions of section 16 are also applicable to comply with the discharge or emission of any effluent, waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 17, penalties will apply if anyone fails to comply with the provisions of section 11, 12, 13 and 16.

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

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.

2.16 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.

All projects to be implemented in Punjab must conform to PEQS during all the phases i.e. construction and operation.

2.17 GUIDELINES FOR THE PREPARATION AND REVIEW OF ENVIRONMENTAL REPORTS, 1997

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.

2.18 GUIDELINES FOR ENVIRONMENTAL ASSESSMENT

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 Environmental Protection Agency, 1997;
- Guidelines for Public Consultation, Pakistan Environmental Protection Agency, May, 1997; and
- Sectoral Guidelines: Pakistan Environmental Assessment Procedures, Pakistan Environmental Protection Agency, October 1997.

2.19 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.

2.20 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.

The law will be applicable to the project mainly due to its two provisions:

According to the law, any construction activity within 61 m or 200 ft. of protected antiquities, are prohibited.

The provisions of this act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the construction of proposed Project.

2.21 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.

The provisions of the Penal Code, 1860 are applicable to the project in terms of penalties for effecting human lives and public property. It also addresses the control of noise, air emissions and effluent disposal.

2.22 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.

2.23 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.

The labour laws will be relevant as it would deal with employment of labour for the construction of propose project.

Following are the major labour laws which are applicable to the project:

- Bonded Labour System (Abolition) Act, 1992
- Employment of Child Act, 1991
- Minimum Wages Ordinance, 1961
- Industrial Relations Act, 2010
- West Pakistan Minimum Wages for Unskilled Workers' Ordinance, 1969
- 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.

2.24 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.

2.25 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.

2.26 SEISMIC BUILDING CODE OF PAKISTAN 2007

This code stipulates the minimum requirements for seismic safety of building and structures and the provisions of the Building Code of Pakistan (Seismic Provisions-2007) shall apply for engineering design of buildings, like structures and related components.

Construction of buildings shall be considered as violation of professional engineering work specified under clause (XXV) of section 2 of the Act.

This Code is applicable to the proposed project as it includes the formation of structures.

2.27 THE PARKS AND HORTICULTURE AUTHORITY ACT, 2012

This act entails regulation, development, and maintenance of public parks, green belts and green areas in the Punjab; regulation of billboards, sky signs and outdoor advertisements; to promote open and unrestricted views of the Punjab.

This act will be applicable if any green belt will be involved.

2.28 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.

2.29 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.

2.30 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.

The Act will trigger during construction and operational phase to ensure health and safety of workers at workplace associated with the project activities.

2.31 ELECTRICITY ACT, 1910

The Act provides a legal basis for distribution of Power. It enables a licensee to conduct operations for supply of electricity and binds the license to payment of compensation in respect of any damages caused during the construction, Operation and Maintenance (O&M) of Power distribution facilities.

This act will be applicable if any damages occur during construction of the power facilities.

2.32 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.

2.33 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.

2.34 HAZARDOUS SUBSTANCE RULE, 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.

This rule is applicable to the proposed project due to involvement of hazardous waste handling, use and disposal during the construction and operational stages.

CHAPTER-3

PROJECT DESCRIPTION

3.1 PROJECT INTRODUCTION

Drinking water supply demand is increasing rapidly while the opportunities for further development of water resources or maintaining their use to existing levels are diminishing. The current per capita water availability at 40 gallons per person is low, placing Pakistan in the category of a high water stress country. Similarly, the surface water sources storage capacity has already been reduced. Immediate need is for the development and management of water resources and supply systems, along with the introduction of water-use efficiency, curtailing environmental degradation from water sources, and institutional strengthening.

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 about 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.

The project is about the Replacement of Existing Conductance Main (ECM) from Rawal Lake Filtration Plant to Water Works (Sufaid Tanki) Rawalpindi with a total length of 9.1 km.

The project comprises of two parts;

- Replacement of 36" (900mm) dia. PRCC pipe from Water Works (Sufaid Tanki) to 6th road satellite town with a length of 2.520 km.
- Insertion of 36" (900mm) dia. PRCC pipe into existing 54" line (1350 mm) dia. PRCC pipe from 6th road satellite town to Rawal Lake filtration plant with a length of 6.580 km.

The project is designed with the information that at present (2022) two conductance mains exist to convey water from treatment plant to the city. The location map is shown as **Figure 3.1**. Project is designed with the information that at present (2022) two conductance mains exist to convey water from treatment plant to the city. The old

PRCC Conductance main (Existing conductance main ECM) was laid in 1979 from Rawal Lake Filtration Plant to Bifurcation Point for MES line near 6th Road, in A-Block Satellite Town. This conductance main remained functional till 2001 and now is abandoned due to heavy leakages from joints. A new conductance main (Duplicate conductance main DCM) laid in 2001 is only under use to convey water to the city. Approximately 5MGD of water is not being treated by the treatment plant due to non-functionality of the old PRCC line. As the Rawal Lake Water Treatment Plant (WTP) has installed capacity for 28MGD water treatment, therefore this project has been conceived under DREAM-1 to replace the ECM for obtaining additional 5MGD. This project will fulfill water requirement of about 125,000 persons. Water from Rawal Lake treatment plant will be supplied to Sufaid Tanki under gravity. No pumping is involved which make this project self-sustainable.

The water availability for Rawalpindi city from Rawal Dam is 10 MGD, from Khanpur Dam 6 MGD and from tube wells 35 MGD. Total water availability from different water sources to Rawalpindi City excluding cantonment board is 51 MGD whereas the demand is 80 MGD. So, current water deficit is 29 MGD which will further increase in future. The proposed Conductance Main will pass through the residential and commercial areas of Islamabad and Rawalpindi. **Figure 3.2** shows the route of Conductance Main.

A diameter of 36" (900) mm is currently proposed for replacement of conductance main. HDPE pipe is recommended to use for replacement of conductance main. The HDPE is environmental friendly option due to its long life and less prone to leakage. Unlike MS pipelines it will not be rusted and it is cheaper and hydraulically efficient than MS pipe.

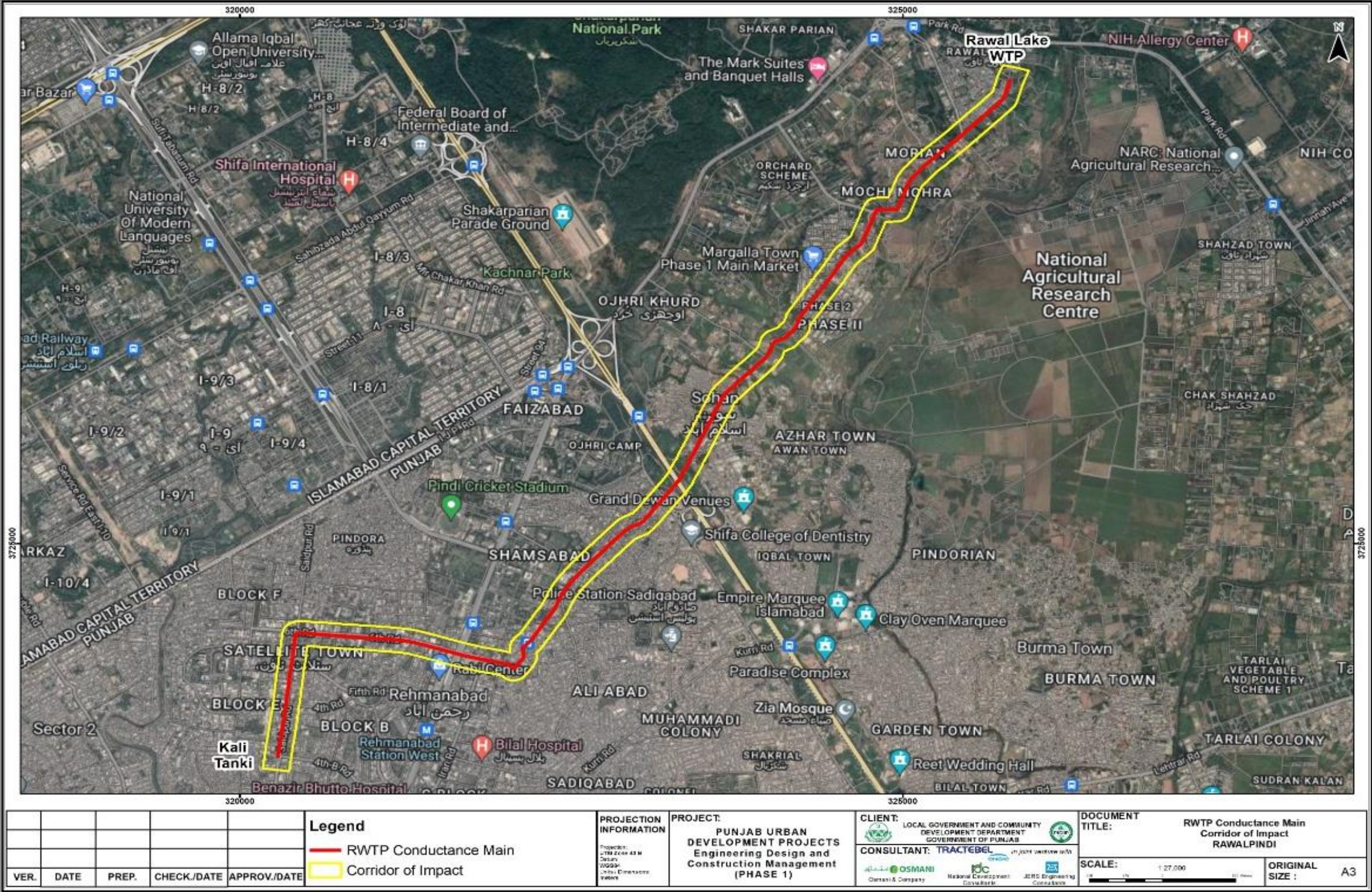


Figure 3. 1: Location Map of the Project

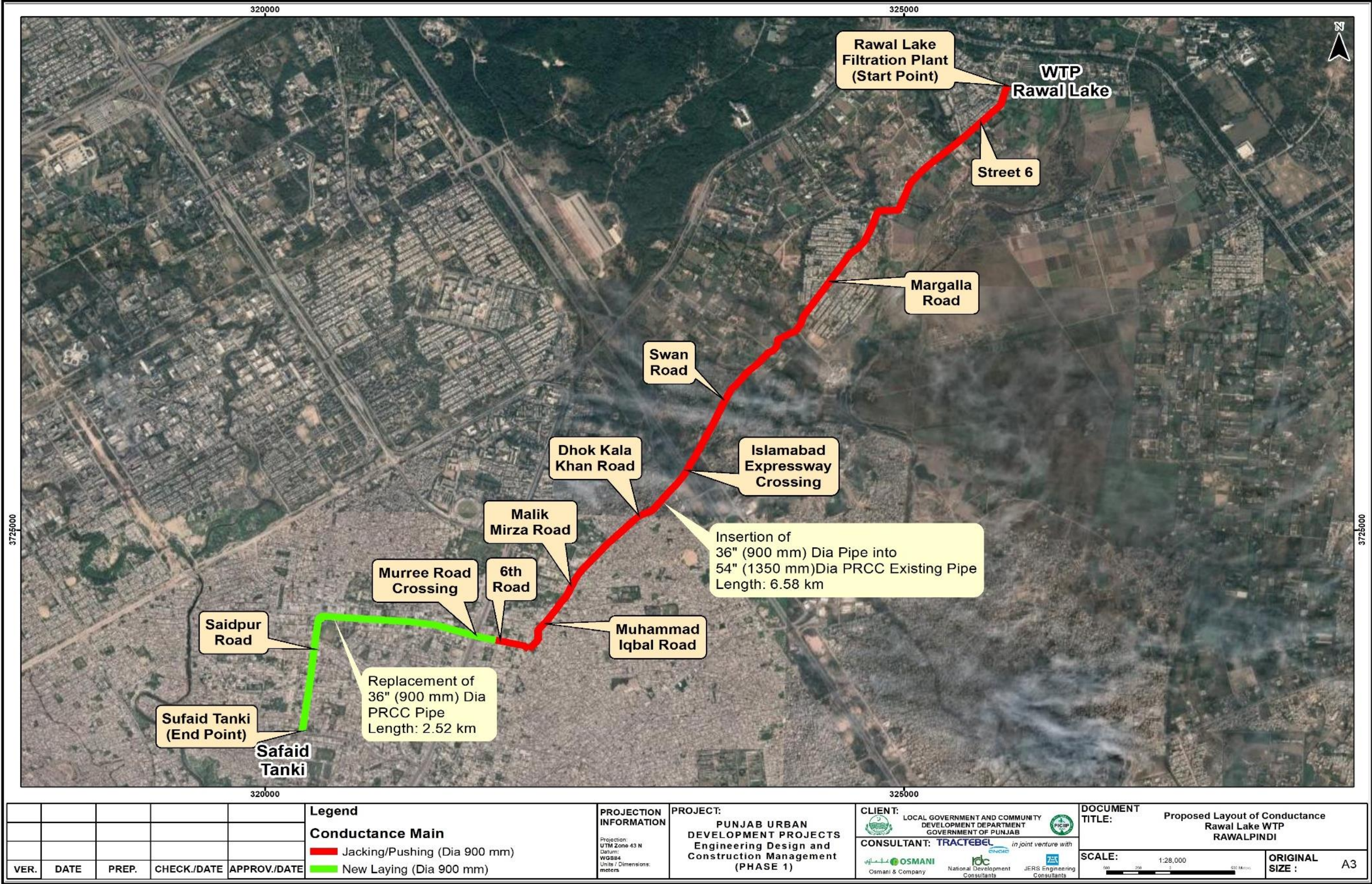


Figure 3. 2: Route of Conduance Main

3.1.1 Salient Parameters of Existing Line

Existing pipe line consists of two sizes (54 & 36 inch.) Salient parameters of this line are as under

- Internal diameter of line 54- inches (1370mm), wall thickness 3-inches (76.2 mm). outer diameter of line 60 inches (1520 mm)
- Pipe material is Pressurized reinforced concrete pipe (PRCC)
- Total length of 1370mm dia. pipe is 6800 m
- Length of 36 inch. Dia line is 2300 m, which is working at many reaches by connecting with the existing system. This segment cannot be disturbed and new line will be laid parallel to existing one.
- During structural condition survey it is observed that the existing line is not choked totally, but some deposition 1.0-1.5 ft was found in some of the reaches, similarly some dewatering will also be required due leakages from valves where it is connected with duplicate conductance main (DCM) or other lines of WASA.

3.1.2 Existing Condition of Conductance Main

A site visit was carried out from 10th to 13th April 2022 in order to check existing condition of conductance main. Pictorial view of site visit is presented as **Figure 3.3**.

Figure 3. 3: Site Visit Glimpse





Valve chamber at conductance main



Another above ground part of conductance main



A view of syphon at conductance main



Discussing about valve near Murree Road



Discussion about conductance main at site



Discussion at site about crossing near Islamabad Highway

3.1.3 Existing Conductance Main (ECM) Details

ECM starts from a sluice valve at the exit point of water filtration plant. It passes through local roads having encroachments at almost 50 feet distance on each side. There are 4 syphons along the route of conductance main. The detail of the syphons are discussed in **Table 3.1**.

Table 3. 1: Detail of the Syphons

Syphon No	Details
Syphon No. 1	Syphon no. 1 starts at RD 1+700 and terminates at RD 1+800 having length 100 meters.
Syphon No. 2	Syphon no. 2 starts at RD 1+950 and terminates at RD 2+100 having length 150 meters.
Syphon No. 3	Syphon no. 3 starts at RD 2+850 and terminates at RD 2+950 having length 100 meters.
Syphon No. 4	Syphon no. 4 starts at RD 3+450 and terminates at RD 3+630 having length 170 meters. After running along the community roads, it crosses Islamabad Expressway at RD 4+360 and cross Murree Road at RD 6+700.

Existing conductance main is above ground at 2 places. Total length of above ground portion is 200m. After crossing Islamabad expressway, more populated area and narrow streets (Rawalpindi city area) start through which conductance main is passing.

Functional portion of Conductance main starts near Murree Road at RD 6+500 and ends at RD 8+750. After RD 8+750 conductance main becomes again dysfunctional. RD wise route of conductance main is attached as **Annexure III**. And a summary of conductance main inventory is shown in **Table 3.2**.

Table 3. 2: Summary of Conductance Main Inventory

Sr. No.	Item	No's
1	Flow meter chamber	1
2	30 degree horizontal bend	2
3	Access Chamber	4
4	Syphons (Nullah crossing under bed)	4
5	Washout	12
6	Double air Valve and access chamber	15
7	19 degree Horizontal Bend	1
8	Branch to stnadpipe and access chamber	1
9	68 degree horizontal bend	2
10	crossover connection chamber	4
11	Rolled bend, 21 degree horizontal bend, 7 degree vertical bend	1
12	42 degree horizontal bend	2

Sr. No.	Item	No's
13	26 degree horizontal bend	1
14	6 degree vertical bend	1
15	38 degree horizontal bend	1
16	28 degree horizontal bend	1
17	58 degree horizontal bend	1
18	56 degree horizontal bend	5
19	60 degree horizontal bend	2
20	40 degree horizontal bend	3
21	Tee for crossover branch	4
22	single air valve and access chamber	1
23	drainage ditch	1
24	66 degree horizontal bend	1
25	45 degree horizontal bend	8
26	17 degree horizontal bend	1
27	20 degree horizontal bend	1
28	50 degree horizontal bend	1
29	access Chamber (Type I-B)	4
30	90 degree horizontal bend	3
31	7 degree vertical bend	1
32	23 degree horizontal bend	3
33	33 degree horizontal bend	3

3.1.4 Design Criteria/ Parameters

Designing Concept & Objective: The objective of the feasibility study is to provide guidance for the selection of projects for development of the water sector to resolve the escalating problems resulting from the lack of a holistic approach in the water sector management (water source monitoring and management, asset & consumer database management, O&M plans for infrastructure and machinery, tariff structure and revenue collection system etc.) which in turn leads to unsustainable/uncontrolled use of water sources, the deteriorating condition of the existing infrastructure and the distrust of consumers in the public water supply.

Climatic Consideration: Local climatic conditions, i.e. the temperature, wind velocity, thunderstorm levels, relative humidity, etc., control the selection of materials to be used. The **Table 3.5** shows the climatic parameters, considered in designing of the project.

Table 3. 3: Climatic Parameters for the project

Maximum Temperature	48.3oC
Minimum Temperature	-3.9oC
Annual Mean temperature	43oC (maximum) to 30oC

(2022)	(minimum)
Maximum Rainfall	340 mm/month
Annual Relative Humidity	39.6%

3.1.5 Category of the Project

Based on the findings of the IEE/EIA, the project is unlikely to cause any significant, irreversible or unprecedented environmental impacts. The potential impacts localized, temporary in nature and can be addressed through proven mitigation measures. Hence, the classification of the project as Category B per ADB SPS, 2009 is confirmed and IEE report has been submitted to ADB per requirement. Further as per legal requirement under Section 12 of Punjab Environmental Protection Act, 1997 (Amendment 2012) this project requires 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. No further study or assessment is required at this stage.

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 Rawalpindi. Scope of work will comprise of provision of following civil works:

- Excavation of working chambers /Trenches
- Dismantling of existing non-functional conductance main at working chamber's locations
- Insertion of HDPE 900mm dia. PN-10 in existing 1350mmdia.PRCC pipe.
- Laying of new conductance main
- Installation of measuring devices, valves etc
- Nullah crossings with MS pipe
- Connections with existing lines.
- Shifting /restoration of underground services
- Restoration work, Temporary works, Site management and General management etc.

The main benefits of this project include the following;

- Reduction in water supply deficit.
- Enhanced water availability and consistency due to dependence on Surface Source.
- Improved water quality due to replacement of old leaking conductance main.
- No electricity consumption due to gravity flow from Rawal filtration plant to waterworks.
- Reduction in NRW due to metering at strategic locations.
- 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

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. The report identifies potential environmental impacts of each alternative, develops comparative analysis matrix with respect to replacement of ECM and environmental impacts to suggest the most feasible alternative that can be taken up for development.

The following alternatives that have been assessed for are as follows:

Zero Alternative: No Project Option

Alternative I: Laying of New Pipe line

Alternative – II: Insertion of New Pipeline in Existing Conductance Main

Alternative – III: Minimum (0.6m) dismantling of Existing pipe at the top

Alternative – IV: Dismantling of Existing Pipe at the top up-to Half Dia

Zero Alternative “No Project Option”: The “no action” alternative is required to ensure the consideration of the original environment without any development. This is necessary for the decision-makers in considering 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 water shortage in the area, eliminate job opportunities, residents have to pay higher cost to buy water containers from private dealers, environmental impacts due to transportation of private containers and further depletion of ground water of Rawalpindi due to extraction of ground water by local population with electrical pumps. The no project option will

result in further depletion of resources and water scarcity in Rawalpindi due to increasing demand of water from increasing community / population.

The “No project option” reveals the shortage of water in the area, further depletion of ground water resource, higher cost of buying water containers from private contractors, therefore is not recommended.

Laying of New Pipe Line (Alternative-I): The existing conductance main (ECM) line is 1350 mm dia. and is made of PRCC. This pipe line can serve propose of base for new line laying/construction. Size of new line is calculated on the bases of available discharge from the WTP and working head available at final discharge point. Which will mainly govern the working efficiency of line? This will simply include laying of new line on new location parallel to the existing line. This may include:

- Dismantling of existing road and structure
- Excavation of trench
- Laying of pipe
- Back filling
- Restoration of pavement
- Construction of chambers
- Relocation of underground services

This option is only feasible where reasonable bank space along the road is available.

Insertion of New Pipe in Existing Pipe (Alternative-II): This option is feasible when joints are leak proof for the required head before jacking and pushing which will further have supported by PCC filling which will work as an additional measure to protect leakages. Furthermore, special care is to be taken for PCC filling excluding the joints in first stage, which can be filled after testing. Pipes joints can be identified over the length of selected /inserted reach and cut /hole for filling of PCC around pipe can be made which can also be used for inspection during testing and shall be filled after testing. In this way this option becomes the most favorable option for execution of project,

- Dismantling of existing road and structure at working chamber locations
- Excavation of chambers
- Jacking /pushing of pipe
- PCC filling in gap between old pipe and new pipe

- Back filling at chambers
- Construction of chambers

This option is only feasible when joints are leak proof for the required head before jacking and pushing because any leakage of joints during testing will require excavation over whole the selected reach. Furthermore, special care is to be taken for PCC filling excluding the joints in first stage, which can be filled after testing. Pipes joints can be identified over the length of selected /inserted reach and cut /hole for filling of PCC around pipe can be made which can also be used for inspection during testing and filled after testing. In this way this option becomes the most favorable option for execution of project.

Minimum (0.6 m) Dismantling of existing pipe at the top (Alternative-III): This option includes excavation of over cover of the existing line, breaking of existing pipe on top (min. 0.6m). Insertion of new pipe in existing pipe by jacking /pushing method. The main activities included are:

- Dismantling of existing road and structure over the pipe line
- Excavation of trench 1.0-0.6 m
- Jacking /pushing of pipe
- PCC filling in gap between old pipe and new pipe in above ground situations
- Sand filling in gap between old pipe and new pipe in underground situations where 0.75 m earth cover is available
- Back filling at chambers
- Construction of chambers

This option requires jacking and pushing method and encasing of PCC/sand. Access to Joints will facilitate any repair required during testing. No new corridor or bank space along the road is required for new line. This option will require continuous excavation throughout the existing pipe alignment.

Dismantling of Existing Pipe at the Top Up-To Half Dia. (Alternative-IV): This option includes excavation of over cover of the existing line, breaking of existing pipe from top to half of its' dia. placing of new pipe in the half cut existing pipe and so on. The main activities included are:

- Dismantling of existing road and structure over the pipe line
- Excavation of trench min. 2-1.5 m wide
- Placing of new pipe in existing pipe

- PCC filling in gap between old pipe and new pipe and around/above the new pipe in above ground situations
- Sand filling in gap between old pipe and new pipe and around /above new pipe in underground situations where 0.75 m earth cover is available
- Back filling at chambers
- Construction of chambers

Comparison / Analysis of Alternatives: The comparison between all four alternatives based on environmental, social and economic impacts is described in **Table 3.4**. The alternative to be selected must qualify the basic criteria of cost effectiveness, environmentally sustainable and socially acceptable.

Table 3. 4: Comparison of Alternatives

Parameters	Laying of New Pipe line	Insertion of New Pipeline in Existing Conductance Main	Minimum (0.6m) dismantling of Existing pipe at the top	Dismantling of Existing Pipe at the top up-to Half Dia
Cost	It would be most expensive option as it will involve excavation and removal of old pipeline for Laying of new line.	This would comparatively involve less cost as less excavation will be involve	This would be costly option as it will involve excavation and cutting of upper edge of existing pipe line	This would be costly option as in involve excavation and cutting of top half of the existing pipe line
Environmental Aspects	New laying of pipeline will involve excavation of the whole route of existing conductance main and it will involve generation of huge construction waste, noise, air emission and disturbance to	This option will produce less construction waste. Chambers will be built for pulling and pushing of new pipeline.	This will also involve generation of more construction waste, noise and air pollution due to excavation of whole route of ECM and cutting of ECM	This will also involve generation of more construction waste, noise and air emissions due to excavation of whole route of ECM and cutting of ECM

	other buried services.			
Social Aspects	It will involve more space for storage of mucking material and new pipelines and excavation of whole area will cause hindrance in free movement of community for short time. Disturbance will be more serious while working in congested area of Dhoke Kala Khan and Sohan Market. Safety and health issues will also arise due to deep excavations.	Minimum disturbance will occur in movement of people because it will not involve excavation of trenches	It will involve more social impacts due to large excavations. Free Movement of people will be disturbed. Safety and health issues will also arise due to deep excavations.	It will involve more social impacts due to large excavations. Free Movement of people will be disturbed. Safety and health issues will also arise due to deep excavations.

Conclusion: Based on the discussion of available option and comparing their economic, environmental and socioeconomic aspects the Alternative-II is recommended for this project. This will have minimum adverse impacts and maximum positive impacts, therefore is recommended.

3.4 PROJECT LOCATION/ SITE LAYOUT

Rawalpindi is the capital city of the Rawalpindi division, and it is the fourth-largest city of Pakistan. The population estimate for 2022 is 2.32 million, and the projected population for 2050 is 5.82 million with growth rate of 2.02%. This population considers both Cantonment and MC area. Increase in population; water demand is also increasing for the city. Currently, the main water sources are groundwater (Tubewells) and surface water sources (Rawal Lake and Khanpur Dam) in the city.

The project is about the Replacement of Existing Conductance Main (ECM) from Rawal Lake Filtration Plant to Water Works (Sufaid Tanki) Rawalpindi with a total length of 9.1 km. The project comprises of two parts (i) Replacement of 36” (900mm) dia. PRCC pipe from Water Works (Sufaid Tanki) to 6th road satellite town with a length of 2.520 km. (ii) Insertion of 36” (900mm) dia. PRCC pipe into existing 54” line (1350 mm) dia. PRCC pipe from 6th road satellite town to Rawal Lake filtration plant with a length of 6.580 km. The project is designed with the information that at present (2022) two conductance mains exist to convey water from treatment plant to the city. The project location is shown in **Figure 3.1**.

3.5 LAND USE AND VEGETATION FEATURES OF THE PROJECT SITE

The land use of the project area is mainly residential and commercial with some educational facilities, medical facilities, religious sites and recreational facilities. The details of the land-use of the project area are discussed in detail in Chapter 4. The study area has a variety of trees shrubs, herbs and grasses along the roadsides and in the lawns of administrative buildings, educational institutions and parks.

3.6 ROAD ACCESS

The proposed project can be accessed through various route along the 9.1km length of proposed replaceable Conductance Main. The Conductance Main is starting from Rawal Lake Filtration Plant and passing through Street 6, Margalla Road, Swan Road, Islamabad Expressway Crossing, Dhok Kala Khan Road, Malik Mirza Road, Muhammad Iqbal Road, 6th road, Murree Road crossing, Saidpur Road. Detail of the access routes to project site is given as **Figure 3.4**.

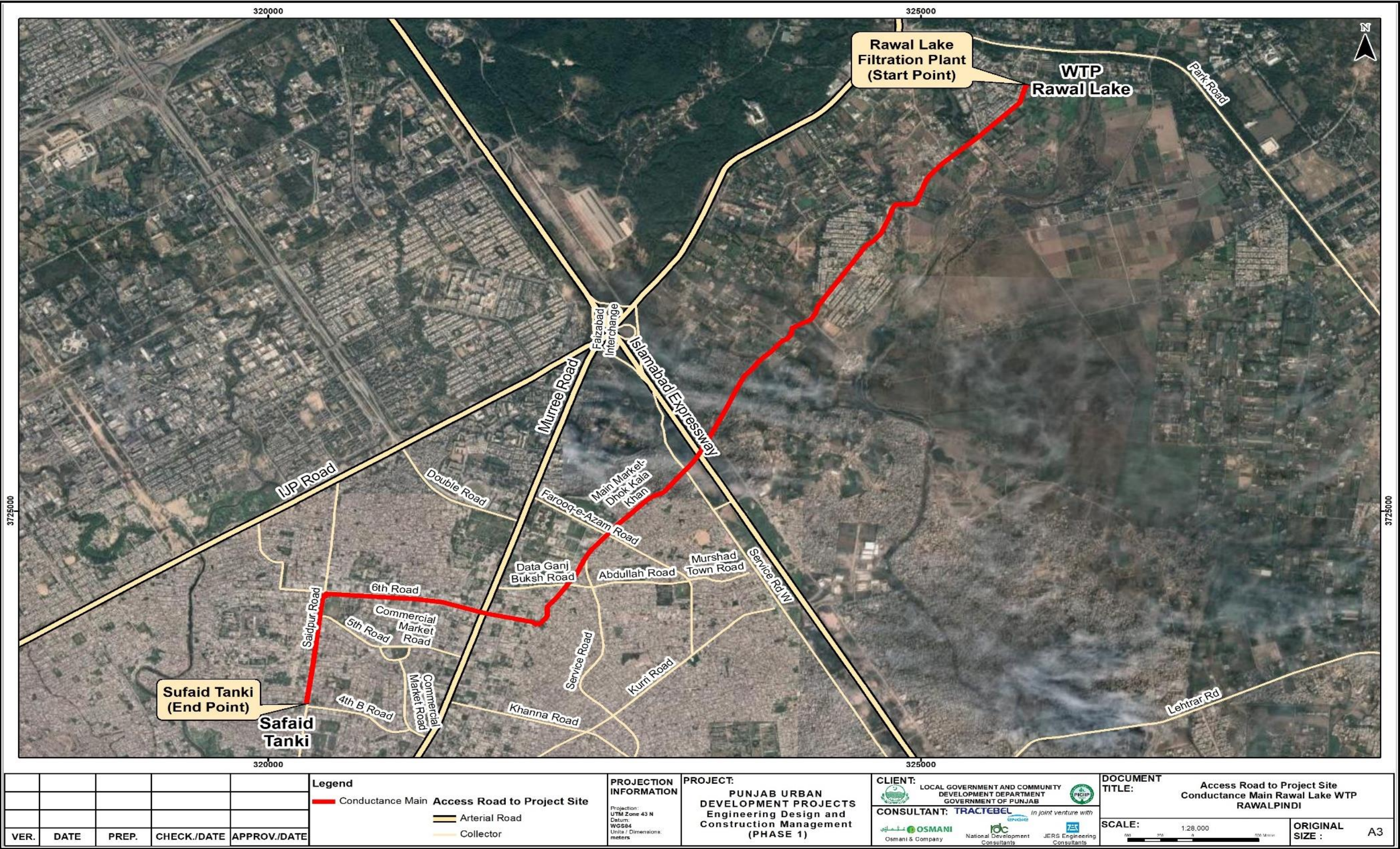


Figure 3. 4: Detail of Access Road

3.7 CONSTRUCTION MATERIAL & MACHINERY REQUIREMENT

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 3.7** below, outlines the approximate number of major machinery and vehicles that are envisaged to be required for the project construction works.

Table 3. 5: Estimated Contractor's Equipment and Machinery

Sr. No.	Machinery / Equipment	Quantity required*
1	Excavators	2
2	Batching Plants	2-4
4	Loaders	1
5	Power Generators	2
6	Tractor Trolley	2
7	Compactor / Roller	1
8	Crane	1
10	Concrete Pump	1
11	Vibro Hammer	1
13	Watering Tanks (moveable)	1
14	Cars/Pickups	4

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

3.8 CONSTRUCTION MATERIALS REQUIREMENT

During the construction phase, construction materials in considerable volumes will be required. Typical material required for replacement of ECM and associated supply network is available locally and same will be utilized.

3.9 CONSTRUCTION CAMP (TEMPORARY FACILITY)

The camp site will be selected keeping in view the availability of adequate area inclusive of parking areas for machinery, stores and workshops, access to communication and local markets. It should be at appropriate distance away from sensitive areas of the vicinity. The site location will be selected by the finalized after approval from the proponent.

3.10 WORKFORCE REQUIREMENT

The estimated number of workers (including skilled and semi-skilled labour) required for whole construction period is approx. 150.

3.11 ENERGY/ POWER SOURCE

The main source of electricity/electric power during construction phase will be diesel generators. The electric power shall be supplied by the Islamabad Electric Supply Company (IESCO) during operational phase.

3.12 WATER REQUIREMENT

According to WASA Average Daily Per Capita Water Consumption (50 gallons/day) the water consumption is estimated to be 7,500 gallons per day for 150 construction workers and it is anticipated that about 2 tankers (approx. 1200 liters) per day shall be required during construction phase of the project for sprinkling of water.

3.13 WASTEWATER GENERATION

The wastewater generation is estimated to be 6,000 gallons per day for 150 construction workers during construction phase of the proposed project. (*Source: Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain).

3.14 SOLID WASTE

The solid waste generation is estimated to be 90 kilograms per day, (0.6kg/person) for 150 construction workers during construction phase of the proposed project. Based on the number of employees, it is estimated that 7 to 8 kg solid waste will be produced during operation phase.

3.15 PROJECT COST & MAGNITUDE OF OPERTAION

The proposed project lies in the Rawalpindi District of Punjab region of Pakistan. The proposed project will be completed with an estimated construction period of 24 months with total cost of approx. 4.72 Million USD @ 277.9/USD (1,320.03 Million PKR).

3.16 SCHEDULE OF IMPLEMENTATION

Design Horizon and Planning Phases: The overall design horizon is the year 2050, divided in the following distinct implementation phases:

1. Immediate measures (years 2021 - 2025)
2. Short-term measures (years 2026 - 2030)
3. Medium-term measures (years 2031 - 2040)

4. Long-term measures (years 2041 - 2050)

Design Life of Infrastructure: To determine required re-investment for outlived infrastructure and respective M&E installations, the following design life of civil works tube-wells, pumping machinery, distribution network, transmission main etc. are considered for spatial planning. The details of the design life are discussed in **Table 3.8.**

Table 3. 6: Design Life of Water Supply Infrastructure

Component	Design life [years]
Civil works for buildings	50
Civil works for process units, reservoirs	50
Tube wells	15
Transmission mains, primary & secondary network	30
Tertiary distribution network	30
Valves, actuators, bulk instrumentation	15
Consumer water meters	10
Filter media (water treatment)	15
M&E plant and equipment	15
Pumps	15
SCADA & PLC Systems	15
Computers, Server	5
Vehicles, trucks	10

Summary of Theoretical per Capita Water Demand: Taking into consideration the different water consumptions as described in the preceding sub-chapters, the calculated theoretical per capita water demand is summarized in the below given **Table 3.9.** It is calculated in the following way:

$$\text{Water consumption (net)} = \text{domestic (net)} + 35\% \times \text{domestic (net)}$$

$$\text{Water demand (gross)} = \text{Total water consumption (net)} / (100\% - \text{NRW } \%).$$

Table 3. 7: Theoretical per capita water demand

Details		2021	until 2030	2031 - 2040	2041 - 2050
Domestic consumption (net)	lpcd	80	80	94	108
	gpcd	18	18	21	24
Non-domestic		35%	35%	35%	35%
Total water consumption (net)	lpcd	108	108	127.44	145.8
	gpcd	24	24	28	32

Details		2021	until 2030	2031 - 2040	2041 - 2050
NRW		40%	40%	30%	20%
Water Demand (gross)	lpcd	180.00	180.00	182.06	182.25
	gpcd	40	40	40	40

Design Flows: Design flow is taken as 5-mgd or 9.27 cusec or 0.263 m³/Sec

Flow Velocity: For the feasibility design stage, the flow velocities should range between 0.5-1.5 m/sec for Transmission mains.

Water Metering: To establish a sustainably managed water supply system in the cities, water metering is essential as it allows not only for continuous monitoring of the network and reduction of non-revenue water, but it is also of supreme importance for cost recovery by the water utility. As such the Consultant proposes to adopt metering at conductance main by installing bulk water meters at feeding and disposal points.

Pipe materials: Water supply pipes available nowadays are manufactured in different materials, here are some of the major types discussed below along with their advantages and disadvantages which are considered in selection of the pipe.

- Mild Steel (MS)
- Ductile Iron (DI)
- Galvanized Iron (GI)
- High Density Polyethylene (HDPE)
- Un-plasticized Polyvinyl Chloride (uPVC)
- Glass Reinforced Pipe (GRP)

3.17 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.”

3.18 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.”

3.19 DETAILS OF RESTORATION & REHABILITATION PLANS

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

3.20 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 chapter provides the description of the baseline conditions along the proposed Project within the Corridor of Impact (CoI). The CoI, taken for the assessment of direct impact is 100-meter radius from the project site.

Considering the potential impacts of the Proposed Project, existing baseline environmental conditions of the proposed project 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 presented in the forthcoming sections has been collected from the primary and secondary sources. For primary data acquisition, the Environment and Social team conducted the field visit during the months of December, 2022.

The major objective of the field visits was to collect the baseline data on physical, eco-biological and social aspects along with identification, assessment and categorization of the significant environmental and social impacts of the proposed Project. The secondary data was collected from published sources/reports and relevant departments, which were also verified through visual observations during detailed surveys. The required information/ data of a baseline study was classified into two main categories i.e. Primary data and Secondary data. The primary data was collected directly from the concerned communities and affected households while secondary data was the information gathered through secondary sources such as census report, research publications, topographic sheets, other published data related to the project such as wildlife, livestock, fishery, forestry, agriculture, horticulture, climate etc.

Corridor of Impact: The proposed areas where the replacement project is proposed is passing through highly populate areas of Rawalpindi. The Project Corridor of Impact (COI) is referred to all those areas in the region within 100m from the project corridor and which may be affected directly or indirectly by the project activities. The required right of way (RoW) for project, measures between approx.15ft.

This Chapter gives an overview of the environmental and social baseline information of proposed project area, with special reference to impacts on the CoI. The information has been compiled from primary and secondary sources of data. Major environmental components are:

- a. Physical Environment
- b. Biological Environment
- c. Socioeconomic Environment

4.2 PHYSICAL ENVIRONMENT

The following section provides an overview of the information on physical environment of the project area collected from primary as well as secondary sources. The major parameters covered include Topography, Geology, Seismicity, Soil, Climate, Water Resources, Ambient Air Quality & Noise, Solid Waste and Land-use along the Proposed Project.

4.2.1 Topography

The Project is located in Rawalpindi Tehsil division which falls in the Salt Range and Potohar Plateau. The terrain mainly consists of plains and mountains (reaching an elevation of over 1,175 m) traversed by ravines and nullahs originating from the mountains. 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 foot of Margalla range stands at an elevation of about 620 m and the top of the mountain is about 1,200 m. The terrain of Rawalpindi gradually falls off towards Lai Nullah in the west and the Kurang River in the east. Lai Nullah enters the city from the southwest and joins the Soan River in the southern side. Occasionally it overflows during the rainy season, causing considerable damage. Four major tributaries, namely Saidpur Kas, Tenawali Kas, Bedarawali Kas, and Johd Kas, originate from Margalla Hills¹.

4.2.2 Land use of the Proposed Project

There are different types of land use i.e. open, built-up, cultivated land, graveyards, green belt, rivers, road/track, stream/ Nullah, residential and commercial details structures, trees/ bushes and water ponds etc. Some scattered houses as well as

¹Source: Iqbal M. Sheikh et al., (Environmental Geology of the Islamabad-Rawalpindi Area, Northern Pakistan) by Geological Survey of Pakistan.

densely populated houses have also been observed along the entire alignment of the project area.

4.2.3 Hydrology

In the Rawalpindi City area, the groundwater occurs in the alluvial deposits; comprising silty sandy gravely beds and the thick conglomerate beds. The thickness, extension and the depth of these conglomerates' beds vary from place to place and are the main aquifer. The groundwater of the Rawalpindi area gets recharged from the rainfall and the foothills of the Margala Hills in the north and the Murree Hills in the northeast; through the extensive drainage system. Although, the groundwater availability was not a problem in the Rawalpindi area in the past, as it was present at the shallow depth. However, with the passage of time; the groundwater extraction by the WASA's water supply tube-wells has damaged the aquifer by the depletion of the water level to the dangerous limits.

In the Rawalpindi area, during the construction of the WASA tube-wells; the subsurface strata encountered the alternate beds of the silty clay/clayey silt, sandy beds and the thick conglomerates bed; down to the depth of 122 m to 183 m.

Since the aquifer layers are confined in the thick clay beds and their depth, thickness and extension vary from place to place. Therefore, in some tube-wells, semi artesian conditions have also been reported during their construction.

The behaviour of the underlain aquifer is not homogenous. The discharges of the WASA water supply tube-wells varies from place to place. The present water level in the city area has dropped to 91 m to 107 m deep, where as in 1980; the average depth was 12 m. The depletion in the water level in the city area has gone so deep due to the over groundwater abstraction by the water supply tube-wells. This indicates that the aquifer is being mined against its recharge.

The thickness of the alluvial material containing the previous beds reduces towards the western area of the Rawalpindi City and ultimately disappear and the rocks of the Murree.

Groundwater: The Rawalpindi City is one of the major cities of Pakistan, having a population of 2.00 million. To meet the city's water demand, the Water and Sanitation Agency (WASA) has installed a total of 495 water supply tube-wells in and around the city.

The reported depth of the WASA tube-wells ranges from 122 m to 183 m and pumping setting depth range from 107 m to 122 m.

As reported, the Rawalpindi WASA office supplies 231,851 m³/day (51 MGD) of water to the city, out of which 127,290 – 136,383 m³/day (28 - 30 MGD) of the groundwater is being abstracted by operating the tube-wells and remaining from the surface water sources. So, the average discharge of each operating tube-well is from 10.91 m³/hour to 16.4 m³/hour. The poor discharges of the operating water supply tube-wells are due to the poor permeability of the conglomerate's aquifers. The conglomerate's aquifers generally yield the low discharge due to the cementation and have the higher drawdown.

Surface Water: The water treatment plant located near Rawal Dam had an initial capacity of 14.0 MGD with the provision to increase that capacity to 28.0 MGD to meet the future water demand. Due to acute water shortage experienced in 1972-73, extension of 7.0 MGD was planned and its construction was completed in 1979 by public health Engineering Department. With this increase i.e., 07 MGD, the total capacity of the treatment plant became 21 MGD. With further increase in population and the consequent increase in the water demand, the capacity of the Rawal lake filtration plant was further augmented by 7 MGD during implementation of the urban water supply & sanitation project in year 2001-02. Presently, total capacity of the treatment plant stands at 28

The water from the Rawal Dam is distributed among the following consumers

- City area- 45,461 m³/d (10 MGD)
- Bulk consumers, MES, NIH & NARC – 59,099 m³/d (13 MGD)

Similarly, Khanpur Dam is another source of surface water for Rawalpindi, located on the Haro River near the Potohar Plateau and the village of Khanpur, Khyber Pakhtunkhwa, almost 40 kilometers (25 miles) from Islamabad. The Khanpur Dam supplies water to Rawalpindi and Islamabad for the domestic consumption, 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). Depending on the amount of water in the dam, a maximum of 66,373 m³/d (14.6 MGD) of water can be provided through the Sangjani treatment plant. Due to a lack of water in Khanpur reservoir, the designed storage has not been achieved most of the time, and the actual supply of water from this dam is only 27,277 m³/d (6 MGD). The location of the different water sources is shown in **Figure 4.1**.

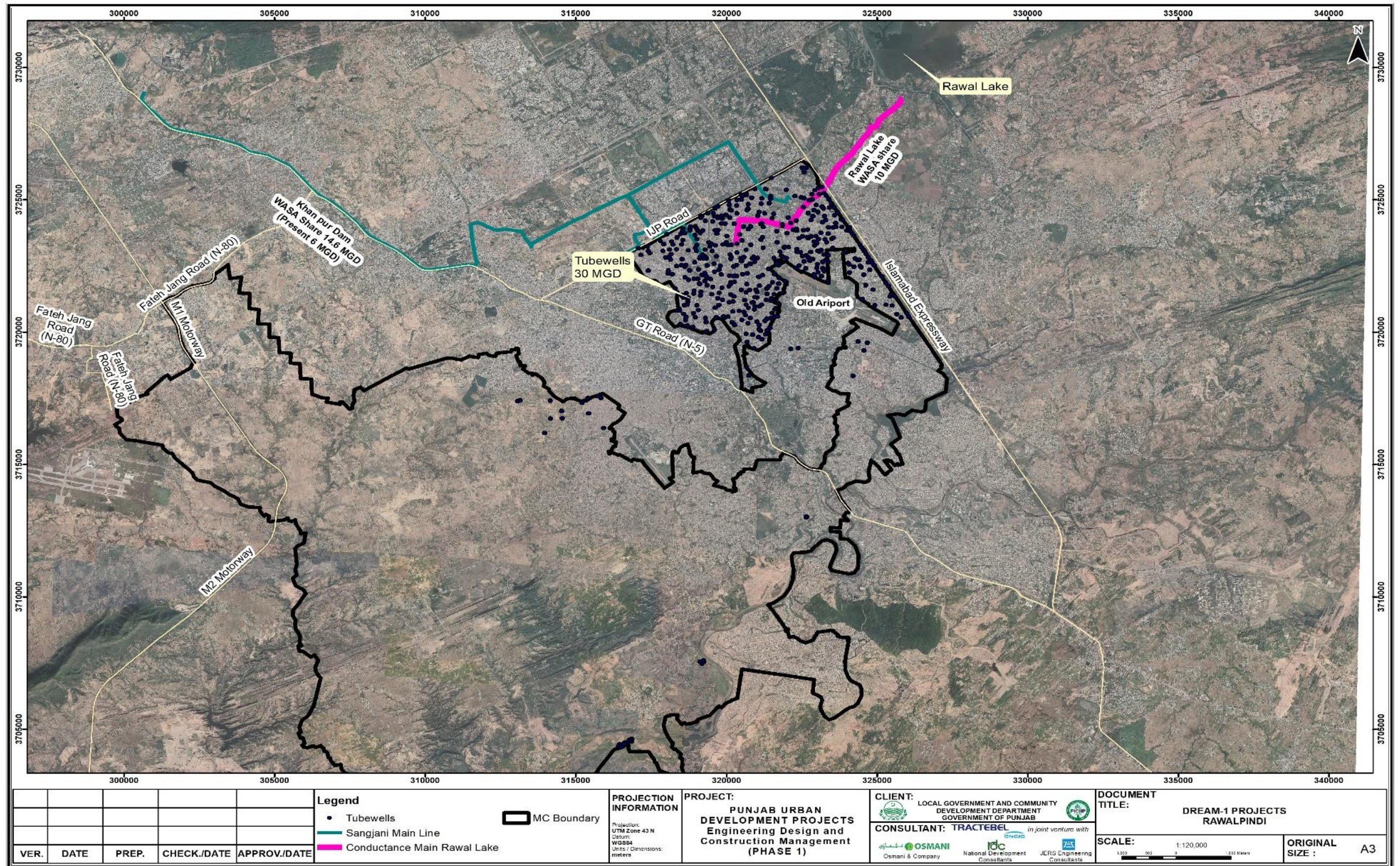


Figure 4. 1: Location of Water sources for WASA Rawalpindi

4.2.4 Geology and Soil

Limestone is the character of the Margallah range, and this is the main source of fertility of those villages laying at its base. It is found also but in limited quantity in Murree hills. The alluvial deposits occur chiefly in the lower portion of Kahuta Tehsil. In Rawalpindi Tehsil and the low hills, limestone is common and, in the plains, Kankar deposits can be found. The pebble ridges, described as alluvial deposits in Kahuta hills are also the remarkable structural features of Rawalpindi Tehsil.

The potohar plains were mainly formed during quaternary period. They are composed of alluvial (clayorsil) and gravel caps. The clay of the district exhibits five district strata or layers. The lowest layer is of course pebbles with sand or clay. Stratum is that of alluvium deposit by older system of the Soan basin over the pebble bed. During this period the Soan was mighty river, bigger than the present-day Indus. The next upper layer consists of the alluvium deposits of the present river system, the air borne top layer of silt or clay called Loess and at the top is the gravely conglomerate and loose gravel caps deposits. Pebbles beds, pebbles mounds and pebble ridges form a conspicuous feature of the landscape.²

4.2.5 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.

² **Source:** Iqbal M. Sheikh et al., (*Environmental Geology of the Islamabad-Rawalpindi Area, Northern Pakistan*) by Geological Survey of Pakistan

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.

4.2.6 Seismology

On the basis of SAARC Seismic Microzonation, Pakistan has been divided into four zones. The project area is falling in moderate hazard zone. The boundaries of these zones are defined on the basis as shown in **Figure 4.2**.

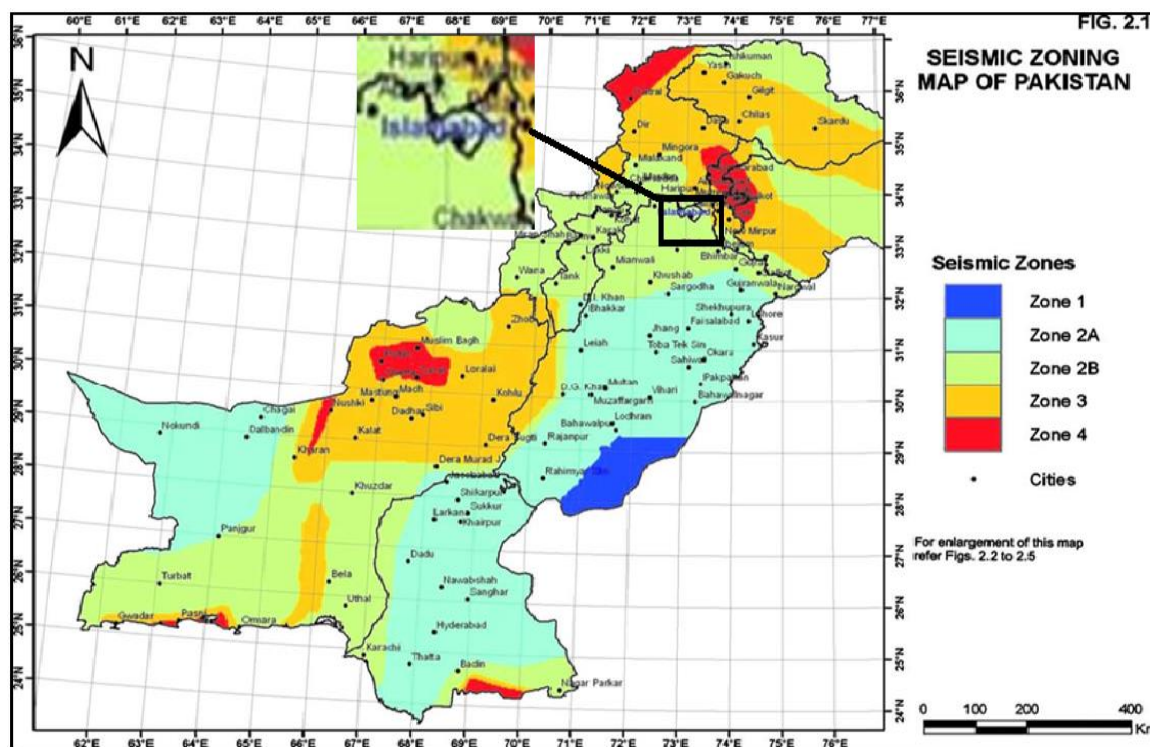


Figure 4. 2: Seismic Zones of Pakistan

4.2.7 Temperature

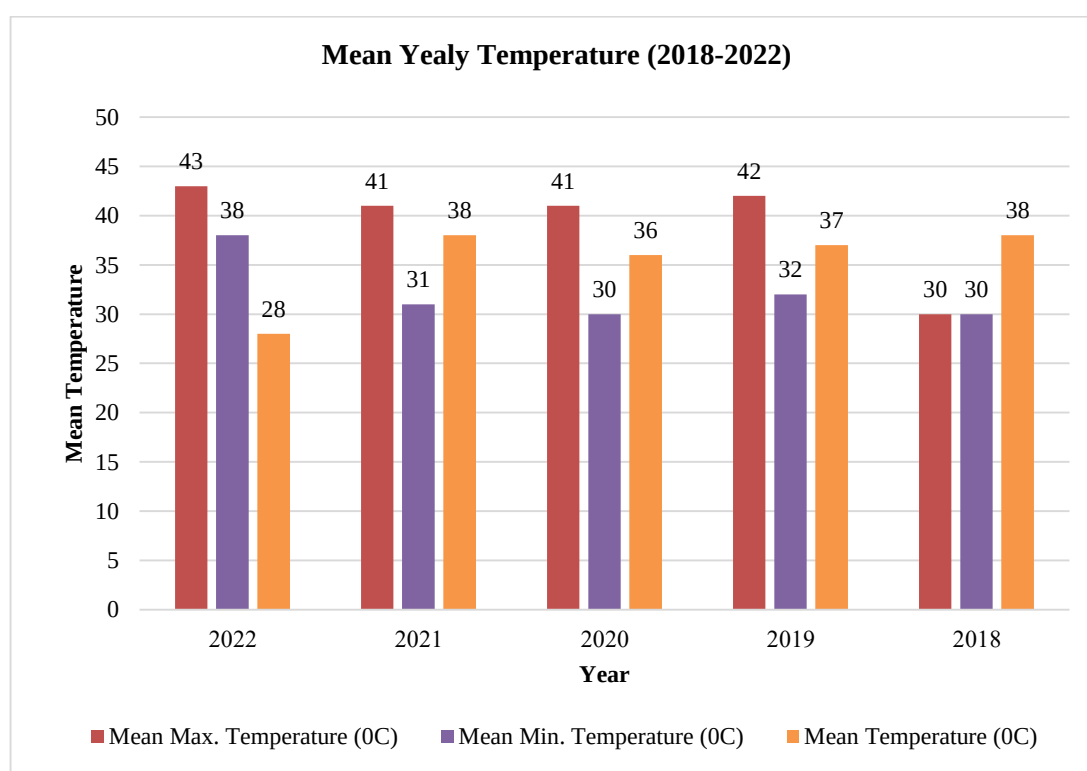
The proposed Project Area will be subjected to long periods of high temperature in summers and low temperature in winter. The mean monthly temperature (max & min) of Rawalpindi for the 2018 to 2022 years are 38, 37, 36, 38 & 28C. The mean yearly temperature data is presented in **Table 4.1**.

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 4.3**.

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

Sr. No.	Year	Mean Max. Temperature (0C)	Mean Min. Temperature (0C)	Mean Temperature (0C)
1	2022	43	38	28
2	2021	41	31	38
3	2020	41	30	36
4	2019	42	32	37
5	2018	30	30	38

*Source: Worldweatheronline.com

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

4.2.8 Rainfall

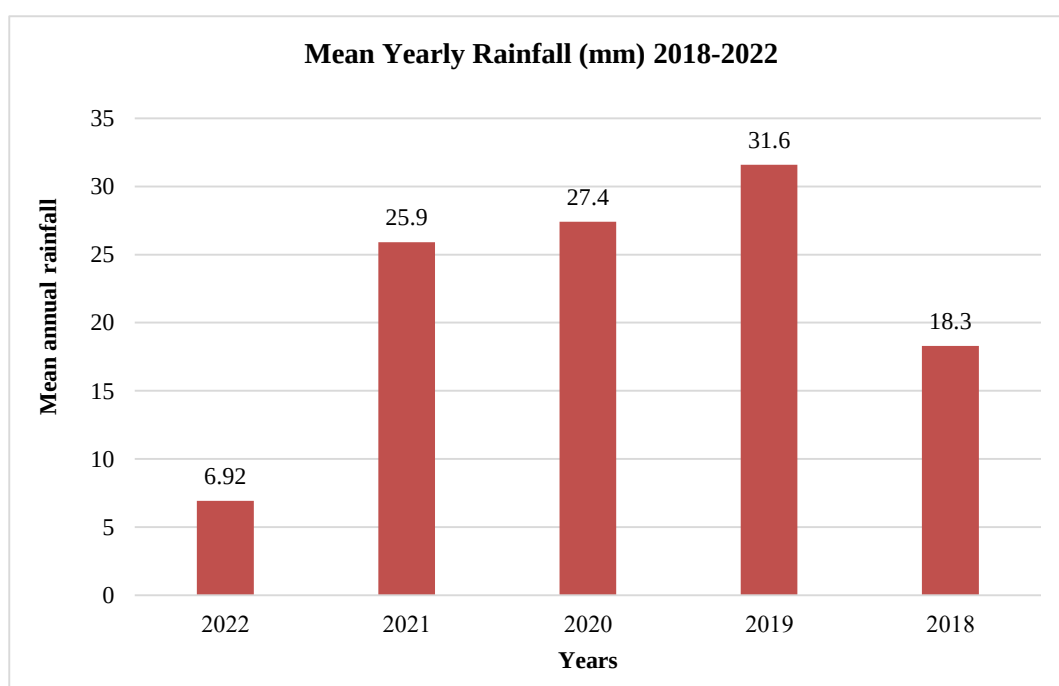
Mean yearly rainfall data for the year 2018 - 2022 is 18.3, 31.6, 27.4, 25.9 & 6.92mm. The maximum rainfall occurs during the months of July and August, which is about 50% of the annual rainfall. Winter rains generally occur during the months of January to March, whereas, November is normally the months with least precipitation. The mean yearly data is given in **Table 4.2**.

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

Sr. No.	Months	Mean Yearly Rainfall (mm)
1	2022	6.92
2	2021	25.9
3	2020	27.4
4	2019	31.6
5	2018	18.3

**Source: Worldweatheronline.com*

Graphical representations of mean yearly rainfall in District Rawalpindi are provided below in Error! Reference source not found.. The maximum rainfall occurs during the monsoon season in the months of July and August. The maximum rainfall occurs during the monsoon season during the month of July.

**Figure 4. 4: Mean Yearly Rainfall (mm) 2018-2022**

4.2.9 Relative Humidity

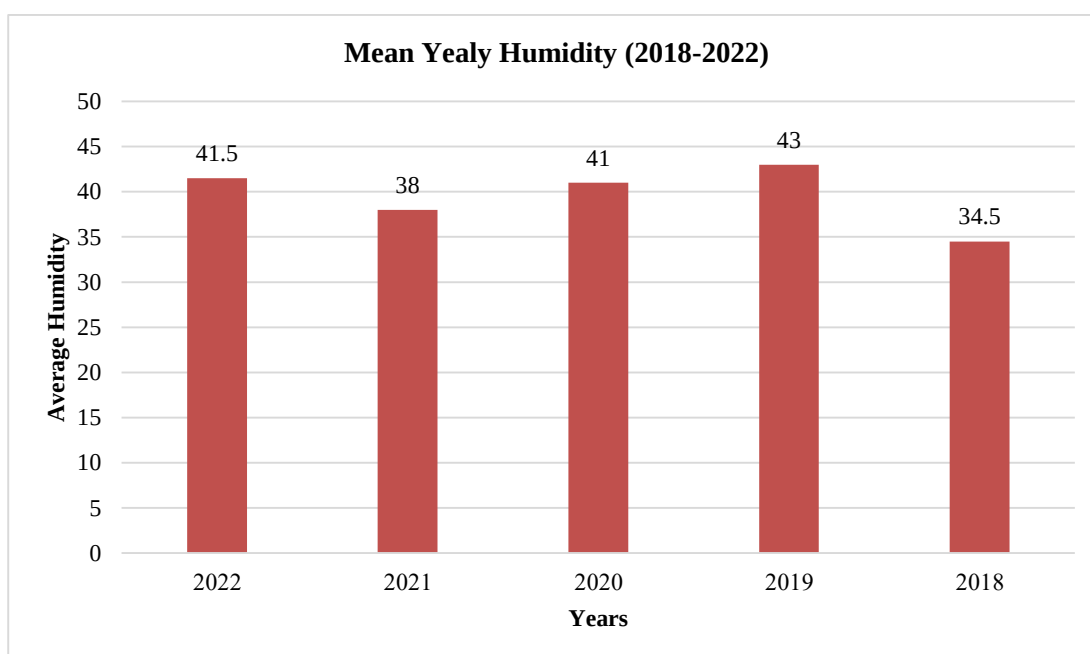
The relative humidity data at of the Rawalpindi District is given in **Table 4.3**. The average yearly humidity for the year 2018- 2022 is 34.4, 43.0, 41.0, 38.0, and 41.5. Relative humidity levels are mostly high during the month of August, whereas, these are extremely lower during the highest temperature i.e., May and June.

Table 4. 3: Mean Yearly 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: Worldweatheronline.com

Graphical representations of average yearly Humidity of District Rawalpindi are provided below in **Figure 4.5**.

**Figure 4. 5: Mean Yearly Humidity (2018-2022)**

4.2.10 Floods

Disaster management in Pakistan basically revolves around flood disasters, with a primary focus on rescue and relief. The existing institutional structures responsible for disaster management are geared to reactive short-term responses. Experience has shown that abnormal heavy rains in catchment areas result in flash floods in Lai Nullah especially in 2001, 2010, 2011, 2012, 2014 and 2015.

Though the flood water recedes within a period of 3-8 hours, it causes considerable damage in the city area. Local drains from Chah Sultan and Cantonment area also

fall in it which further aggravates the situation, especially when these drains cannot find their way into Nullah Lai which is already in flood, causing inundation of surrounding low lying areas (back water effect). EFlash Flood urban flood due to Lai Nullah is being planned every year for medium and high risk. The potential sites/vulnerable areas have been pointed out across the board.

- Dhoke Naju
- Zain-ul-Haq Colony
- Both sides of Bridge at Ratta.
- Bhoosa Godown
- Mohanpura Neae Jinnah Road Bridge.
- Javaid Colony,
- Tipu Road,
- Chamanzer Colony,
- Nadeem Colony.
- Dhoke Chiragh Din
- Mohallah Raja Sultan
- New phagwari
- Mohallah Raja Sultan
- Gawalmandi.
- Dhoke Ellahi Buksh.

The area of high flood vulnerability is shown in **Figure 4.6**.

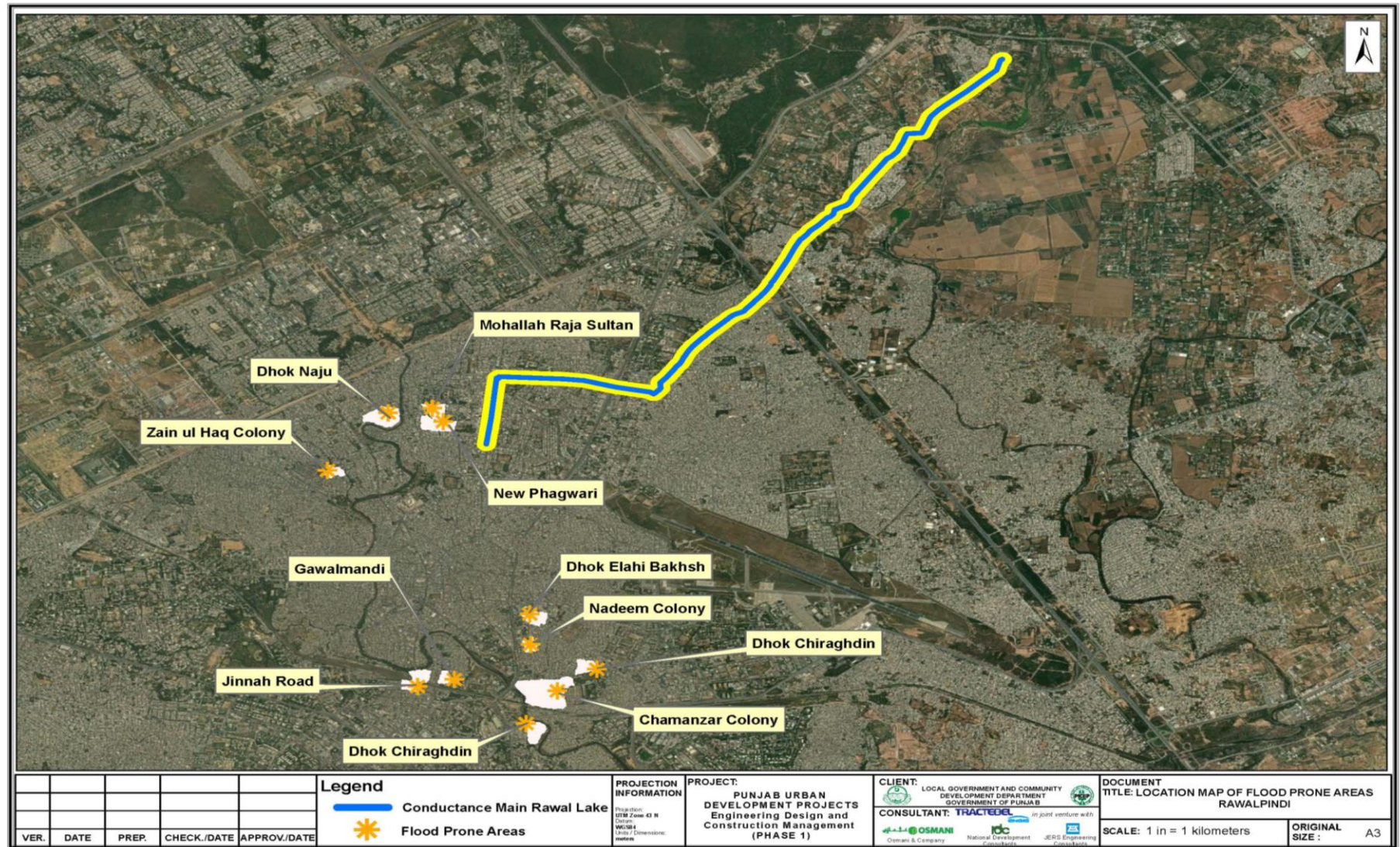


Figure 4. 6: Areas with Vulnerable to Flood

Mainly heavy rainfall during monsoon season is the main triggering factor for urban flash flooding along with contributing factors of throwing of garbage in the main stream of Lia Nullah as well as in tributaries of nearby vulnerable areas.

The management and/or administration of the Lai Nullah area, there are a number of other agencies that have a role in the this area, namely: the Capital Development Authority (CDA), responsible for master planning of Islamabad; the Small Dams Organization (SDO) is responsible for maintenance of Rawal Dam, of the main sources for water supply in the twin cities; the Rawalpindi Development Authority (RDA) deals with surface drainage or flood mitigation projects; the Tehsil Municipal Administration (TMA) is responsible for the execution and management of development plans, the enforcement of all municipal laws and rules, and the prevention of encroachments. Finally, after the 2001 flood it was decided that the joint flood management problem of Islamabad and Rawalpindi should be tackled by the Flood Forecasting Commission (FFC) through medium and long term planning and implementation of measures. FFC was assigned the task to act as a coordinating agency between the Federal Capital and Rawalpindi Administrations.

Extreme flood years were 1981, 1988, 1997 and 2001, the latter having been the largest among the recorded events (considered as a national disaster). The intensity and amount of rainfall caused the water level of Lai Nullah and its tributaries to rise remarkably and flooding Rawalpindi (where the damages were several times larger than in Islamabad).³

A damage, loss, and needs assessment following the unprecedented floods in Pakistan calls for ‘building back better’, based on the principles of the poor first, transparency, inclusion, and climate resilience was carried out for 2022 flood losses. The assessment estimates total damages to exceed USD 14.9 billion, and total economic losses to reach about USD 15.2 billion. Estimated needs for rehabilitation and reconstruction in a resilient way are at least USD 16.3 billion, not including much needed new investments beyond the affected assets, to support Pakistan’s adaptation to climate change and overall resilience of the country to future climate shocks.

³ *Source: WMO/GWP Associated Programme on Flood Management Pakistan: Lai Nullah basin flood problem, Islamabad – Rawalpindi cities by Ahmed kamal Federal Flood Commission, Government of Pakistan.

Housing; Agriculture and Livestock; and Transport and Communications sectors suffered the most significant damage, at USD 5.6 billion, USD 3.7 billion, and USD 3.3 billion, respectively. Sindh is the worst affected province with close to 70 percent of total damages and losses, followed by Balochistan, Khyber Pakhtunkhwa, and Punjab.

The Ministry of Planning, Development and Special Initiatives led the Post-Disaster Needs Assessment (PDNA), which was conducted jointly with the Asian Development Bank (ADB), the European Union (EU), the United Nations agencies with technical facilitation by the United Nations Development Programme (UNDP), and the World Bank. The PDNA, in addition to estimating damages, economic losses and recovery and reconstruction needs, also assesses broader macro-economic and human impacts and recommends principles along which to develop a comprehensive recovery and reconstruction framework⁴.

4.3 ECOLOGICAL RESOURCES

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 data⁵. 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. No tree cutting or damage to vegetation is anticipated in the above said project.

The climate of the project area has a typical version of humid subtropical and dry climate, with five seasons. The surrounding area majorly lies in sub-tropical scrub zone. The dominant trees species of this natural zone are, Kau (*Olea ferruginea*), Phulai (*Acacia modesta*) and sanatha (*Dodonaea viscosa*).

In order to improve the landscape and living environment of the Rawalpindi traits like color or blossom, shade, form or shape, scent and free from disease and nuisance are considered during the selection of trees and shrubs for given location. So, the study

⁴ <https://www.worldbank.org/en/news/press-release/2022/10/28/pakistan-flood-damages-and-economic-losses-over-usd-30-billion-and-reconstruction-needs-over-usd-16-billion-new-assessme>

⁵ (Flora of Pakistan-MI-Sheikh, Birds of Pakistan-ZB-Mirza-Mammals of Pakistan-TJ Roberts, Previous EIAs of the proposed area, Manual of silviculture for Pakistan [1965] Champion, Sir H.G.; Pakistan Forest Inst., Peshawar eng; Seth, S.K. Khattak, G.M.)

area in general is under significant biotic pressure and under retrogression due to various factors such as unsustainable practices, Natural hazards causing the habitat loss, soil erosion and lack of proper functioning of ecosystems. Areas have been accessible to humans for a long time resulting in low diversity and wildlife abundance.

4.3.1 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.

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 agricultural lands, which is the dominant land use in the tract.

The Project site is proposed water supply project. The present ecological conditions of the project area are fallen in the category of agricultural and degraded land. The project area is designated as agriculture area, so no green developmental activities were considered in the past to improve its ecological balance in the targeted area.

The detail of vegetative species of the region is 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	<i>Ficus benghalensis</i>
2	Phulai	<i>Acacia modesta</i>
3	Wild olive	<i>Olea ferruginea</i>
4	Sanatha	<i>Dodonaea viscosa</i>
5	Dhak	<i>Butea frondosa</i>
6	Anar	<i>Punica granatum</i>
7	Pear	<i>Pyrus pasha</i>
8	Sukh Chain	<i>Pongamia pinnata</i>
9	Amaltas	<i>Cassia fistula</i>
10	Bottle Brush	<i>Callistemon spp</i>

Sr. No.	Common Name	Scientific Name
11	Jasmine	Jasminum humile
12	Holmskioldia	Holmskioldia 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

Source: TAS for LAI Expressway Project, 2022

4.3.2 Agriculture and Crop Pattern

Agricultural holdings are small and average is about 5 to 10 Kanals per family. There are generally two' crops in a year. Rabi crop is followed by a Kharif crop, and then the land lies fallow for a year until the Rabi sowing. This system is locally known as Do-Fasli Do-Sala. Wheat, bajra and maize are the common crops. Principal crop during Rabi is wheat and Jawar, maize and fodder are the main crops of Kharif. There are no fruit orchards in the project area. Apart from the wheat crops, whatever area is available is used for growing fodder crops for stall feeding of livestock.

The people of this area, do not generally take much pains in crop husbandry, because of unfavorable conditions for agriculture. The cultivators generally content themselves with sowing the seeds broadcast after shallow plugging and leave the rest to Nature. The use of improved agricultural implements and fertilizers is not very common except for cash crops like potatoes and orchards.

4.3.3 Fauna/Wildlife

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 in study area. Fauna of the tract consists of mammals, reptiles, amphibians and birds. The details are given as under;

Mammals: The study was once considered as good habitat to many wild species but due to 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 are quite common. Foxes are also common, and the piercing bark of the fox is usually heard in the hills. Wild boars are quite common. Hare are to be 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
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

Source: TAS for LAI Expressway Project, 2022

Reptiles: The study supports a good variety of reptiles. In project area, the most common reptile that is worth mentioning and is occasionally witnessed by the hikers is Monitor Lizard. These are generally large reptiles, although some can be as small as 12 centimeters in length. They have long necks, powerful tails and claws, and well-developed limbs. The reptiles that are found near or around the Study Area are given in the **Table 4.6** below:

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

Sr. No.	Local/ English Name	Scientific Name
1	Fringed toed Lizard	Acanthodactylus cantoris

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

Source: TAS for LAI Expressway Project, 2022

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

Source: TAS for LAI Expressway Project, 2022

Birds – Avifauna: 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 **Figure 4.7** and presented 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	Acrida thestritis
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

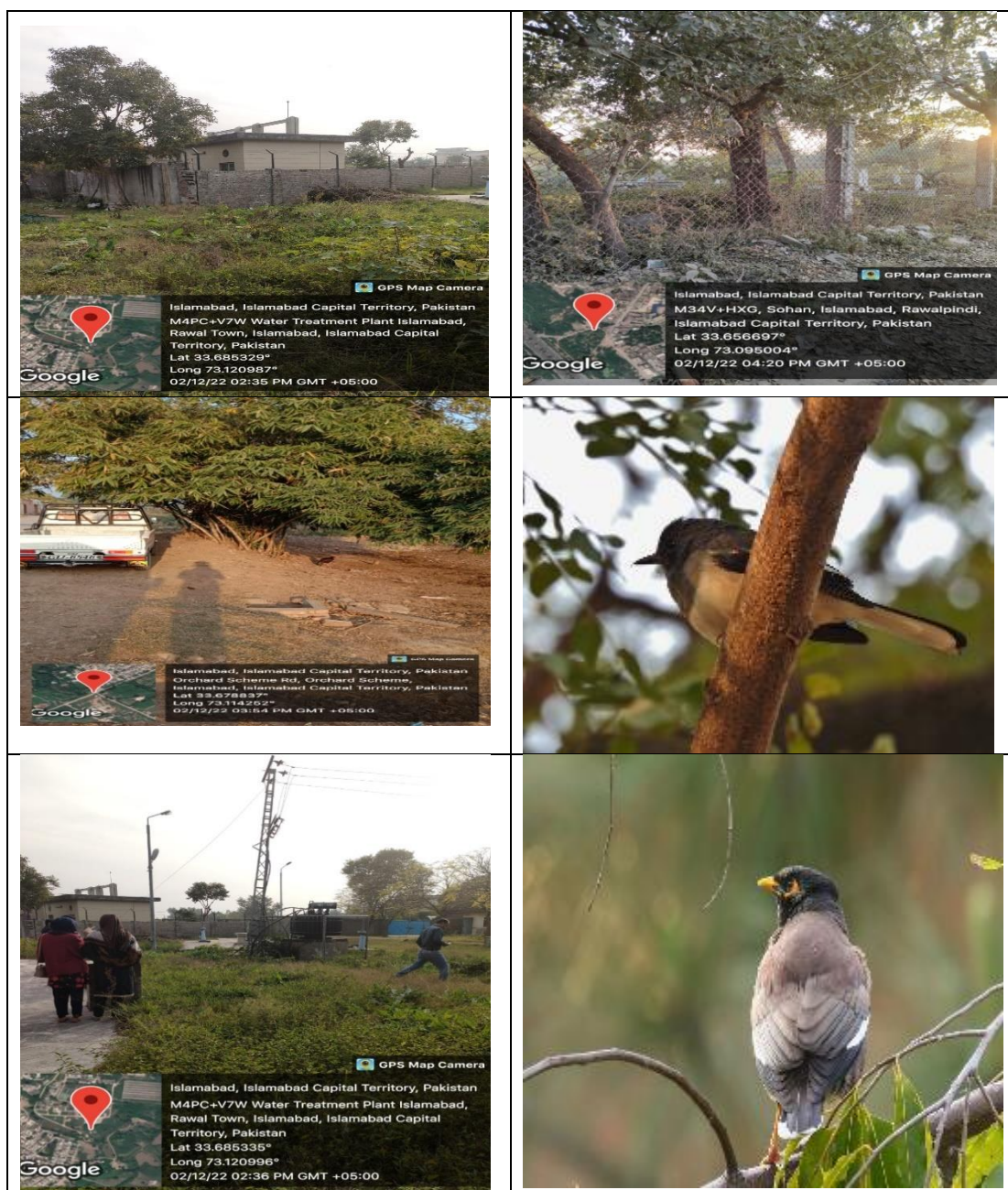


Figure 4. 7: Flora Fauna found in Project Area

Wetlands: There are no designated wetlands in falling in the project area.

Fish Species: There are 15 fish species belonging to 11 genera that are present in Rawal Lake. The fish species in Rawal Lake and its tributaries include: Doula (Channa channa), Rahu (Labeorohita), Thaila (Catla catla), Mori (Cirrhinus mrigala), Carp fish (Cyprinus carpio) and Talapia (Tilapia mossambica).

Terrestrial Fauna: The reservoir is of considerable importance for wintering waterfowl, especially *Anas platyrhynchos*.

Resident mammals include the Red fox, Indian pangolin, Indian crested porcupine, jungle cat, Persian jackal, Central Asian boar and yellow-throated marten.

Reptiles include Indian Cobra and Russell's viper. It is a good place for birds watching, as the majority of Birds of Islamabad are found here.

***Source:** Small Dams Organization (Govt. Of the Punjab, Irrigation Department, Development Zone, Lahore, Small Dams Organization, and Islamabad).

4.3.4 Protected Areas / Critical Habitat (Game Reserves/ Wildlife Sanctuaries/Reserve Forests)

Margala Hills National Park is the nearest protected area which is located at approximate distance of 10 km from project site. Screening was carried out for biodiversity features of the area by using Integrated Biodiversity Assessment Tool (IBAT) for proposed project to identify the biodiversity features and species that are located within the following buffers: 1 km, 3 km and 5 km. Result of IBAT screening shows that there were no protected and/or key biodiversity areas found within 5 km buffer from the alignment of proposed Conductance Main. The result of IBAT shows that there is no Game Reserve, Reserve Forests and wild sanctuaries reported in the project alignment. The results of IBAT are shown in **Figure 4.8** and **Figure 4.9**. The detailed IBAT report is attached as **Annexure-IV** of this report.

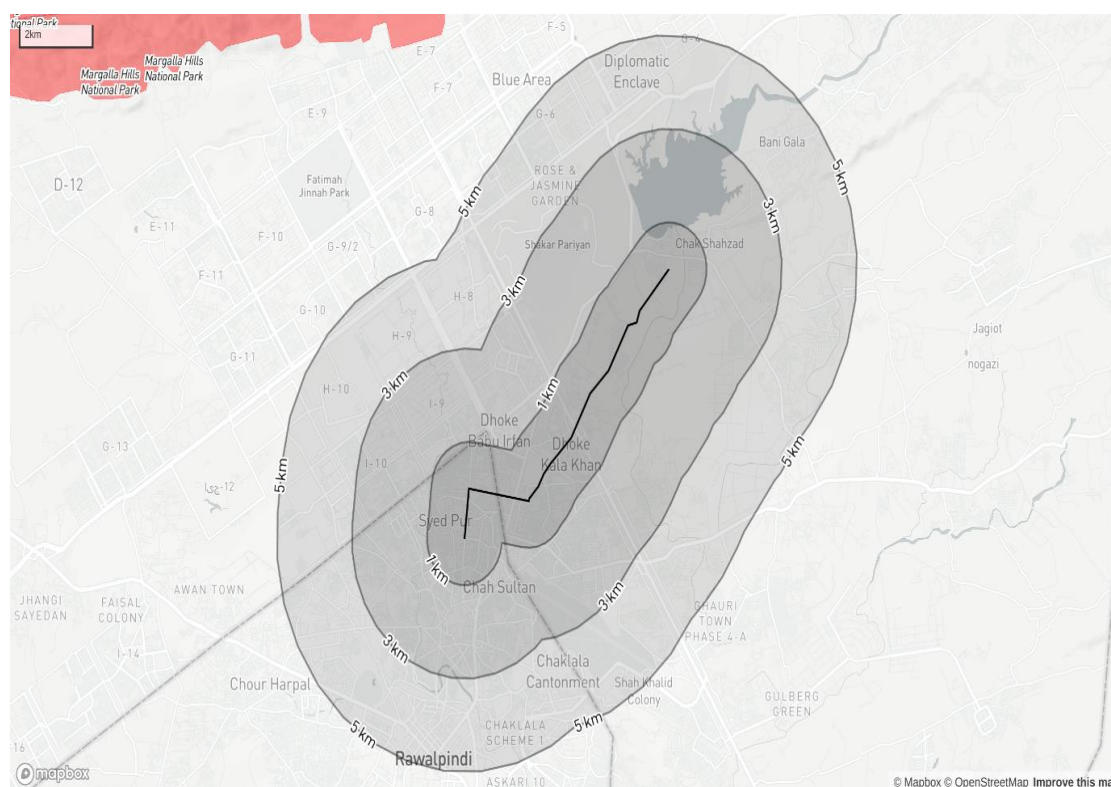


Figure 4. 8: Results of IBAT A

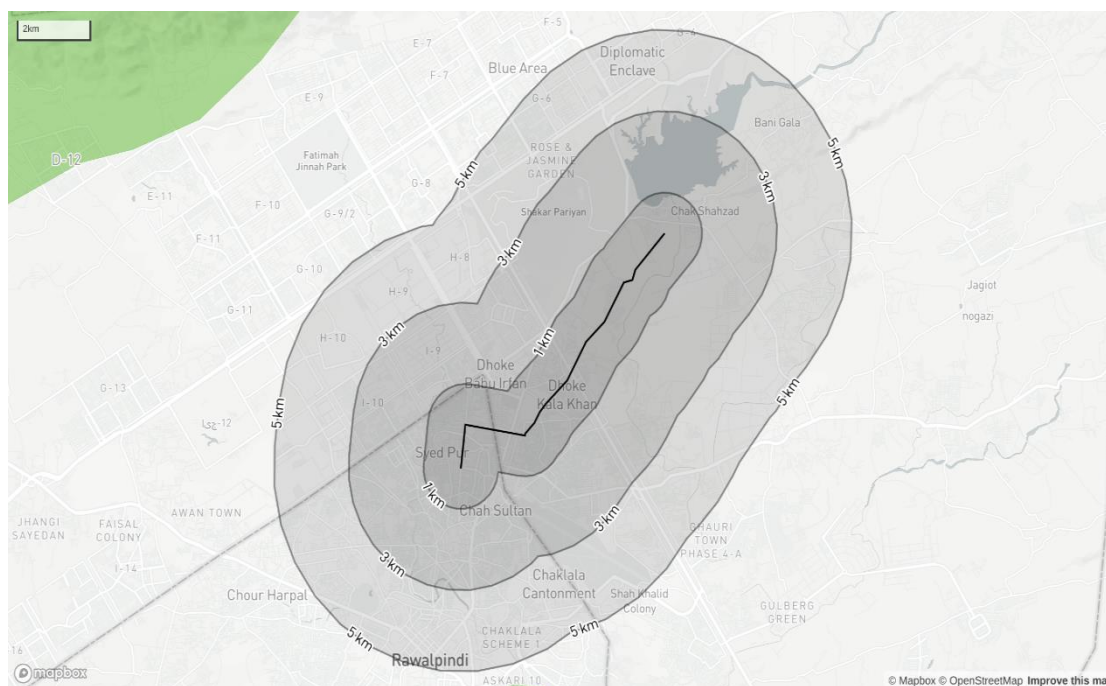


Figure 4. 9: Results of IBAT B

These two figures show presence/absence of endangered species around the project site with two different angles. Further the forests located near the project area are listed in **Table .49**. However, no impact is anticipated due to the proposed interventions as the project area is far away from the boundary of below listed forests.

Table 4. 9: Forests Located near the Project Area

Sr. No.	Name	Area (Acre)
1	Takhar Pari Forest	2,210
2	Margala Hills National Park	42,962
2	Khairi Murat Reserved Forest	12,680
3	Dhungi Reserved Forest	4,746
4	Adiala Reserved Forest	1,330

Source: TAS for LAI Expressway Project, 2022

Figure 4.10 shows the location and approximate distance of nearest forests from the project site.

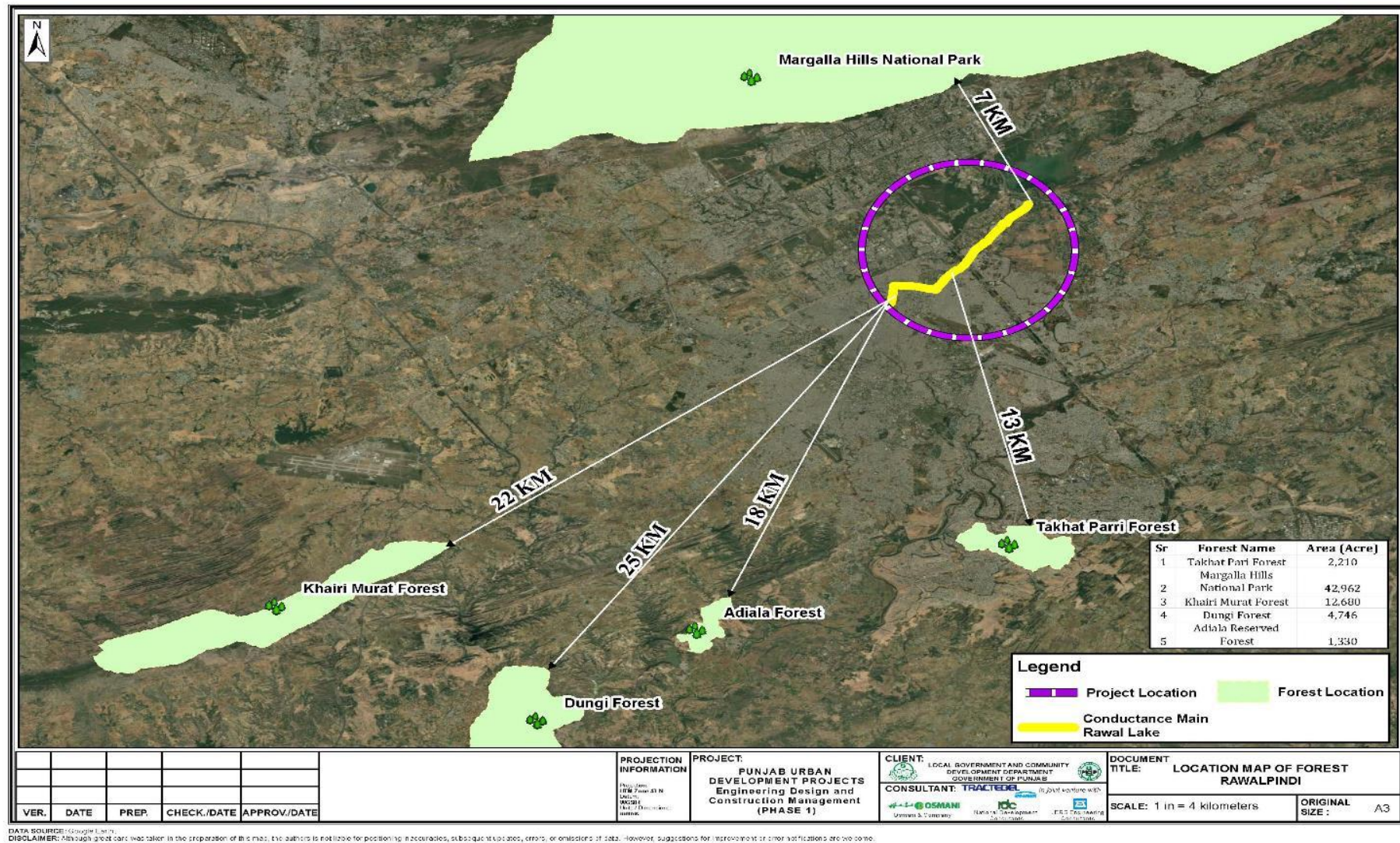


Figure 4. 10: Location of Forests near project site

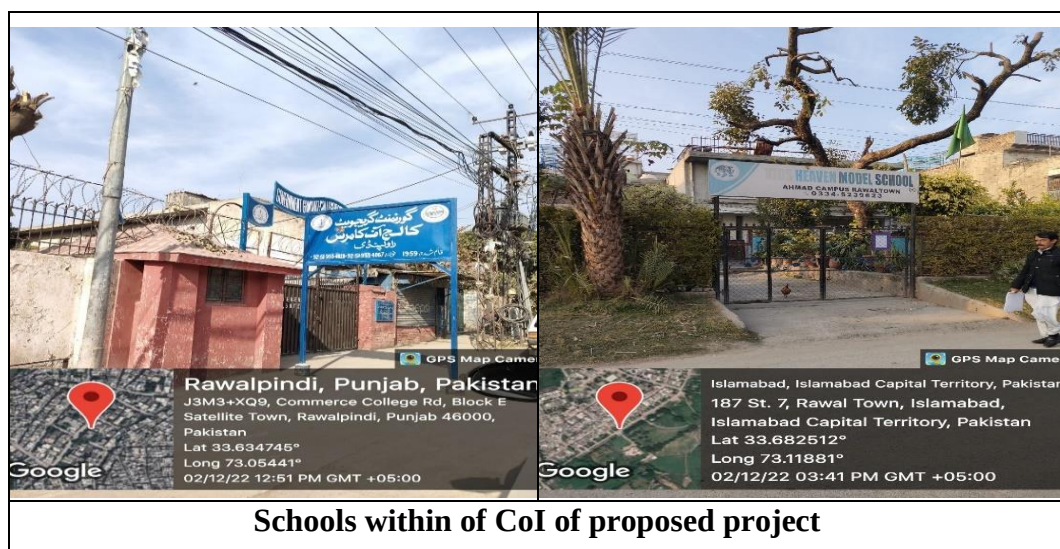
4.4 SOCIOECONOMIC ENVIRONMENT

This section includes a summary of the prevailing socio-economic conditions in the project area and the population that will be potentially affected by the project. To ascertain the socio-economic condition of the project area, primary and secondary data was collected including social and physical infrastructure in the project area.

To assess the socioeconomic conditions of the project area, consultations are being carried out with participants in the area. 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 ECM Pipelines. 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 Rawal Town, Orchard Scheme, Dhoke Kala Khan, Satellite Town, Asghar Mall Scheme, Shamsabad, etc. **Figure 4.11** shows socioeconomic conditions of the area.



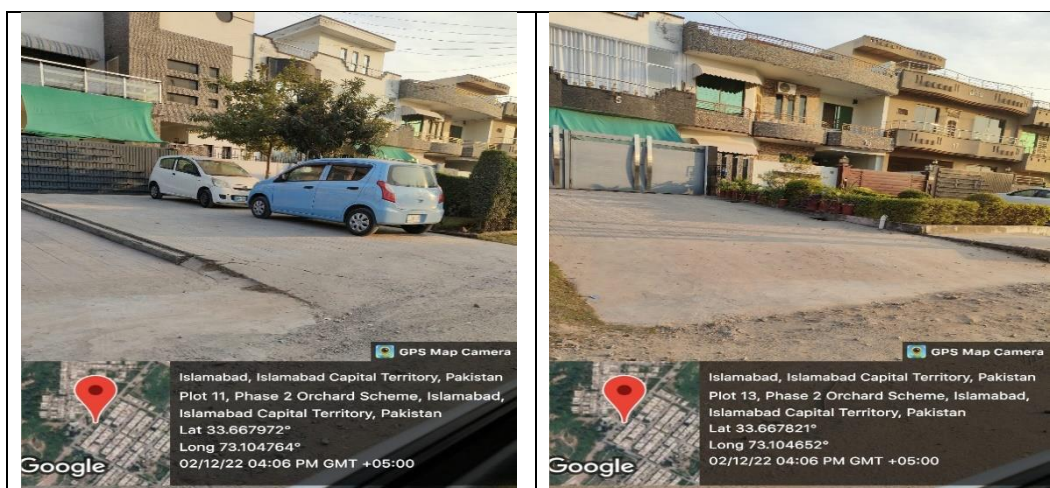
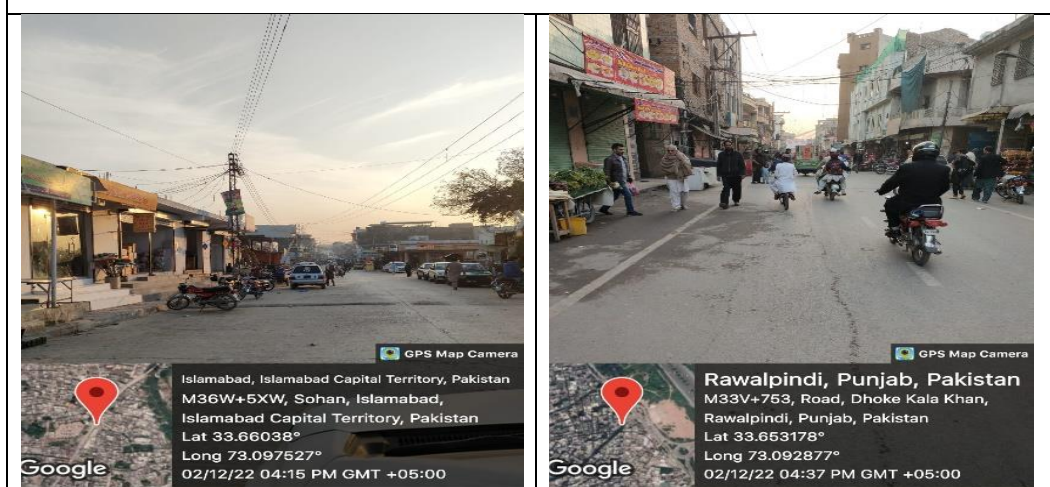
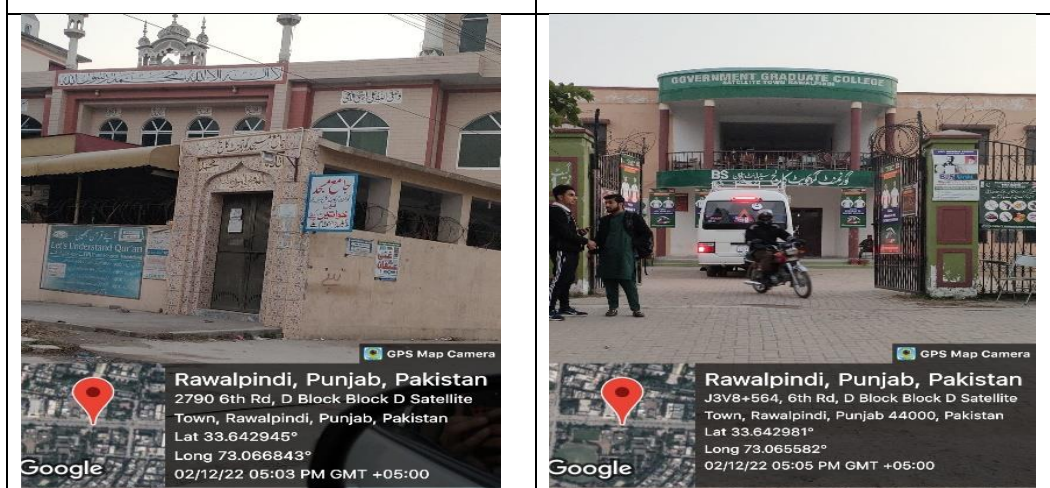
**Houses in Islamabad area of project****Sohan Market, Islamabad****Dhoke Kala Khan Market area****Mosque near Satellite Town****School in Satellite Town**



Figure 4. 11: Socioeconomic Conditions of the project area

4.4.1 Administrative Setup

The proposed project components are located in two territories, Rawalpindi and Islamabad. Start of New Conductance Main is from Rawal Town of Islamabad and it will run parallel to Saidpur road and enter into Rawalpindi. 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 4.10 shows the Administrative subdivision of Rawalpindi District.

Table 4. 10: 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

Sr. No.	Tehsil	Headquarters	Area (km ²)	Population (2017)
4	Kallar Syedan	Kallar Syedan	421	217,273
5	Kahuta	Kahuta	NA	220,576
6	Potohar	Potohar	NA	NA

4.4.2 Demography & Population

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.

Similarly, the population of Islamabad was 2.01M and total area is 906.50 Sq. Km. Islamabad city is divided into five major zones: Zone I, Zone II, Zone III, Zone IV, & Zone V. Zone IV is the largest in area while Zone I is the largest developed residential area. Zone 1 is divided into sectors. Each residential sector is identified by a letter of the alphabet and a number, and covers an area of approximately 2 km × 2 km. **Figure 4.12** showing the demographic features of Rawalpindi.

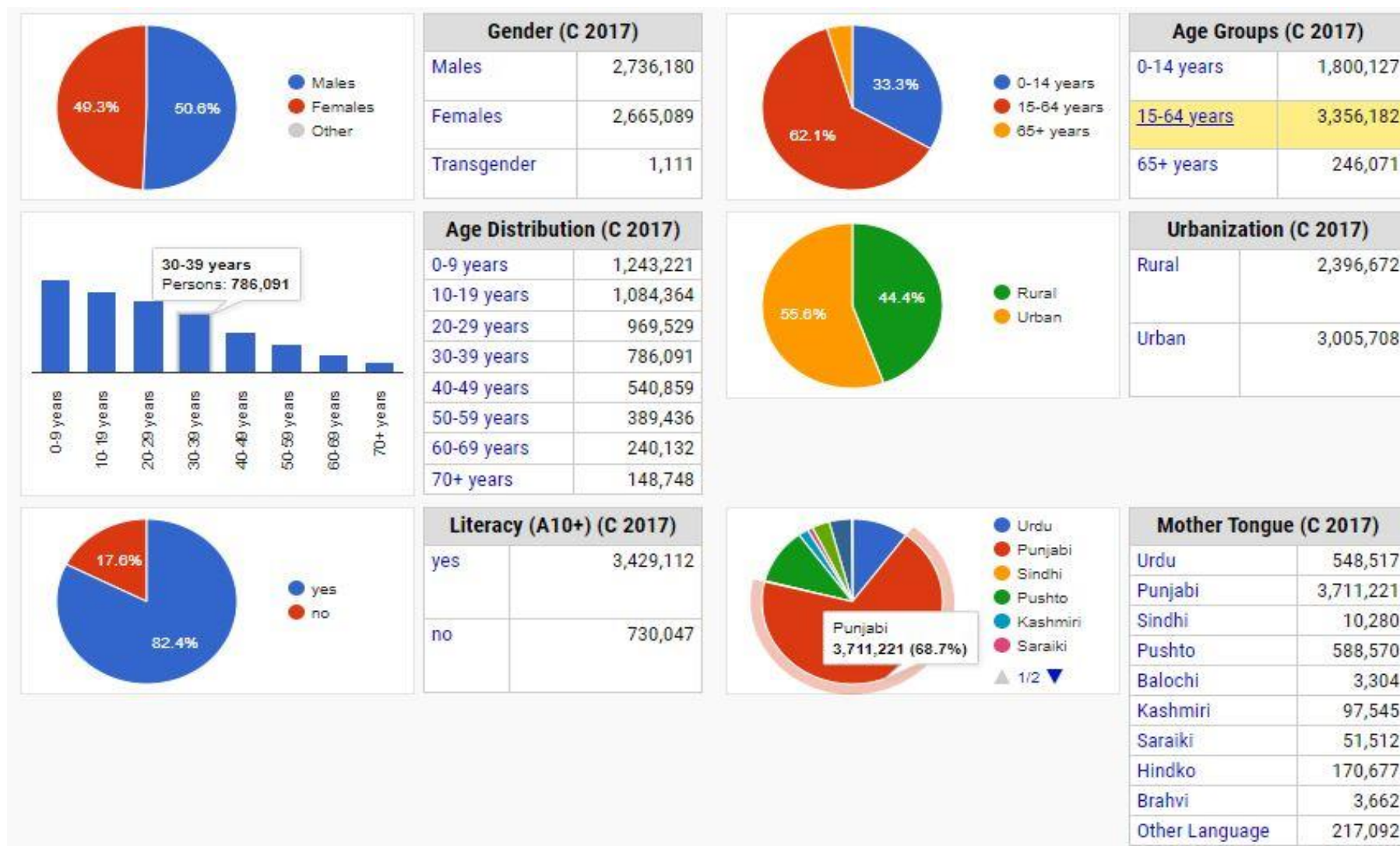


Figure 4.12: Demographic features of Rawalpindi

4.4.3 Religion

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.

4.4.4 Archaeological and Cultural Site

No archaeological and cultural site was observed in close proximity of proposed project. However, if any archaeological antiquity discovered Archeological Chance Find procedure shall be adopted. Archeological Chance Find procedure has been attached as **Annexure-V**.

4.4.5 Ethnicity in the Project Area

During Social survey of the proposed project site it was found that the entire population is Muslims and they did not consider themselves to be called any other type of population such as indigenous peoples.

4.4.6 Language and Dialects

The major language of the area is Hindko, Punjab, Urdu and Pashto. People also speak other languages like Kashmiri, Saraiki and Brahvi.

4.4.7 Dwellings

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.

4.4.8 Economics of Rawalpindi / Islamabad

The economy of majority of the people of study area is based on their private business and government jobs. People lived in Rawal Town, Satellite town etc. areas are well settled with high rate 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.

4.4.9 Education Facilities in Project area

The cities of Islamabad and falls under category of large cities and they are among the hub of educational facilities. The Government and private Schools, Colleges and etc. are present in the study area. The **Figure 4.11** shows the presence of number of Schools and other educational institutes.

4.4.10 Social Amenities in the project area

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, schools are available in Rawalpindi and Islamabad.

4.4.11 Major Source of Drinking Water

Currently, there are two main source of water supply in people of project area. The major source is water supply from RWASA and CDA. While the other source of water is ground water. Some households have installed their own electrical pumps on bore holes.

4.4.12 Health Facilities in project area

Health facilities in the form of Government and Private health care institutes is present in and around the project area. **Figure 4.11** 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, Riphia International Hospital, Islamabad International Hospital and Research Centre etc.

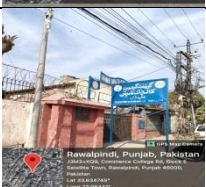
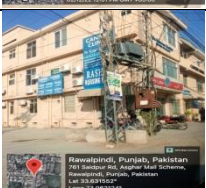
4.4.13 Environmental Sensitive Receptors

Sensitive receptors are people/places more susceptible to the adverse effects of exposure to the pollutants and social disturbance, due to the developmental projects. Thus, sensitive receptors are necessary to be identified, to evaluate the potential impacts of the proposed project on public health and the environment and adopt necessary mitigation measures to minimize the impact.

The sensitive receptors identified for the proposed project within or near the CoI include educational institutes, health care facilities like hospitals, site of religious and cultural importance etc. They are prone to sensitivity during construction phase, due to emission of air pollutants, noise and vibration, traffic jams/access, temporary edifice of construction camps, and mobilization issues. The map of sensitive receptors of the study area is shown in **Figure 4.13**. **Table 4.11** shows the detail of Environmental Sensitive Receptors along the COI of proposed project area.

Table 4. 11: Environmental Sensitive Receptors along the COI of proposed project area

Sr. No.	Pictorial View	Coordinates	Description
1.		33.683295° N 73.1194° E	Park
2.		33.682512° N 73.11881° E	School
3.		33.668149° N 73.104829° E	Mosque
4.		33.67479° N 73.109504° E	Park
5.		33.67121° N 73.107386° E	Mosque
6.		33.643176° N 73.063077° E	College

7.			33.642989° N 73.065909° E	College
8.			33.642588° N 73.063685° E	College
9.			33.643022° N 73.064618° E	College
10.			33.661336° N 73.098103° E	School
11.			33.648914° N 73.085216° E	School and College
12.			33.642945° N 73.066843° E	Mosque
13.			33.642981° N 73.065582° E	College
14.			33.634745° N 73.05441° E	College
15.			33.631552° N 73.062124° E	Medical Clinic

16.		33.635171° N 73.06259° E	Medical Clinic
-----	---	-----------------------------	----------------

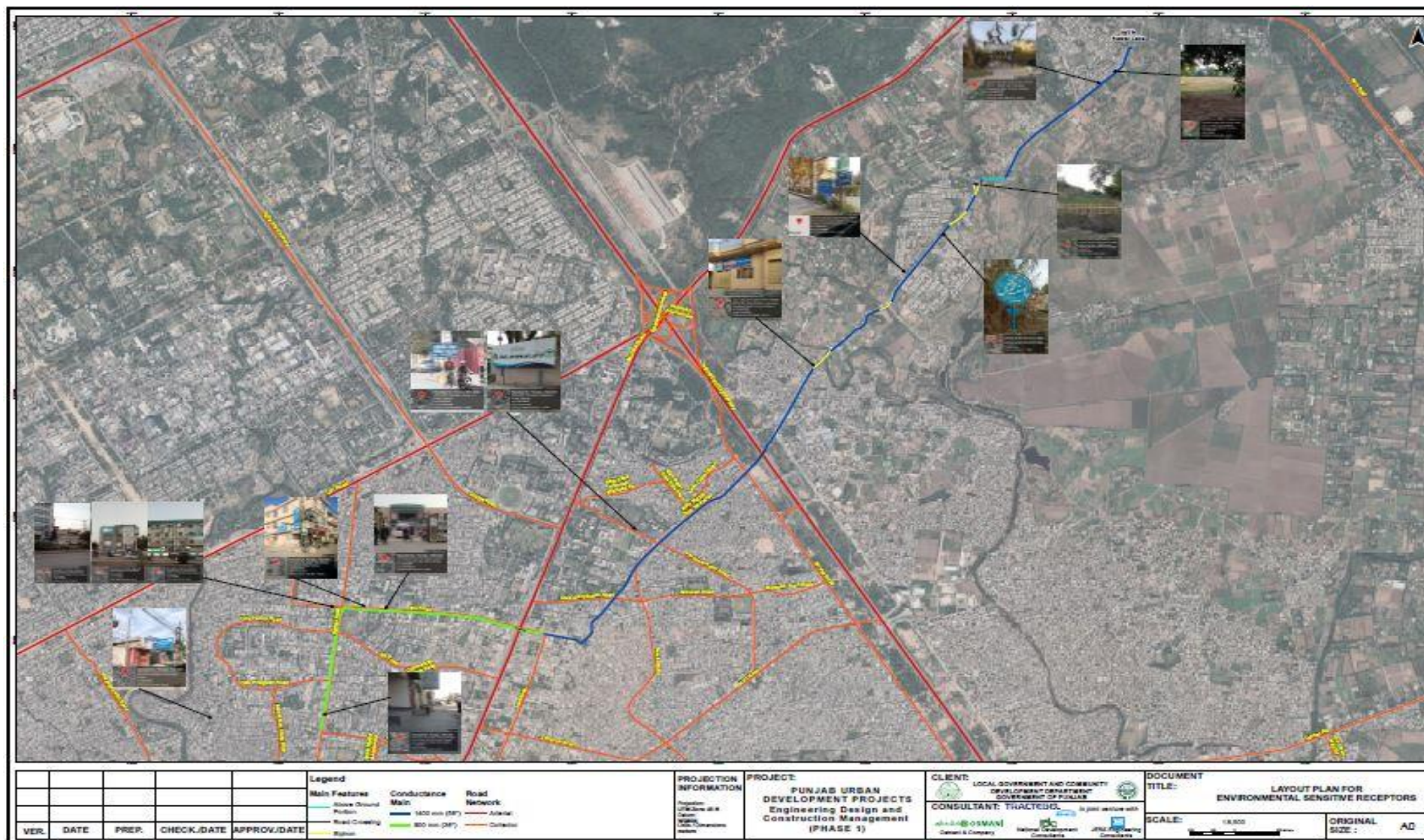


Figure 4. 13: Environmental Sensitive Receptors

Local Government and Community Development Department Government of Punjab

4.5 BASELINE ENVIRONMENTAL QUALITY

Environmental monitoring was carried out for water, air and noise levels at two locations along the proposed project line. Two 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. Locations of the sampling points are marked on the layout map. The map is shown as **Figure 4.14** of this report. The results of Environmental Monitoring are attached as **Annexure-XV**. The monitoring is carried out with calibrated equipment. Calibration certificates of the equipment are attached as **Annexure-XVI**.

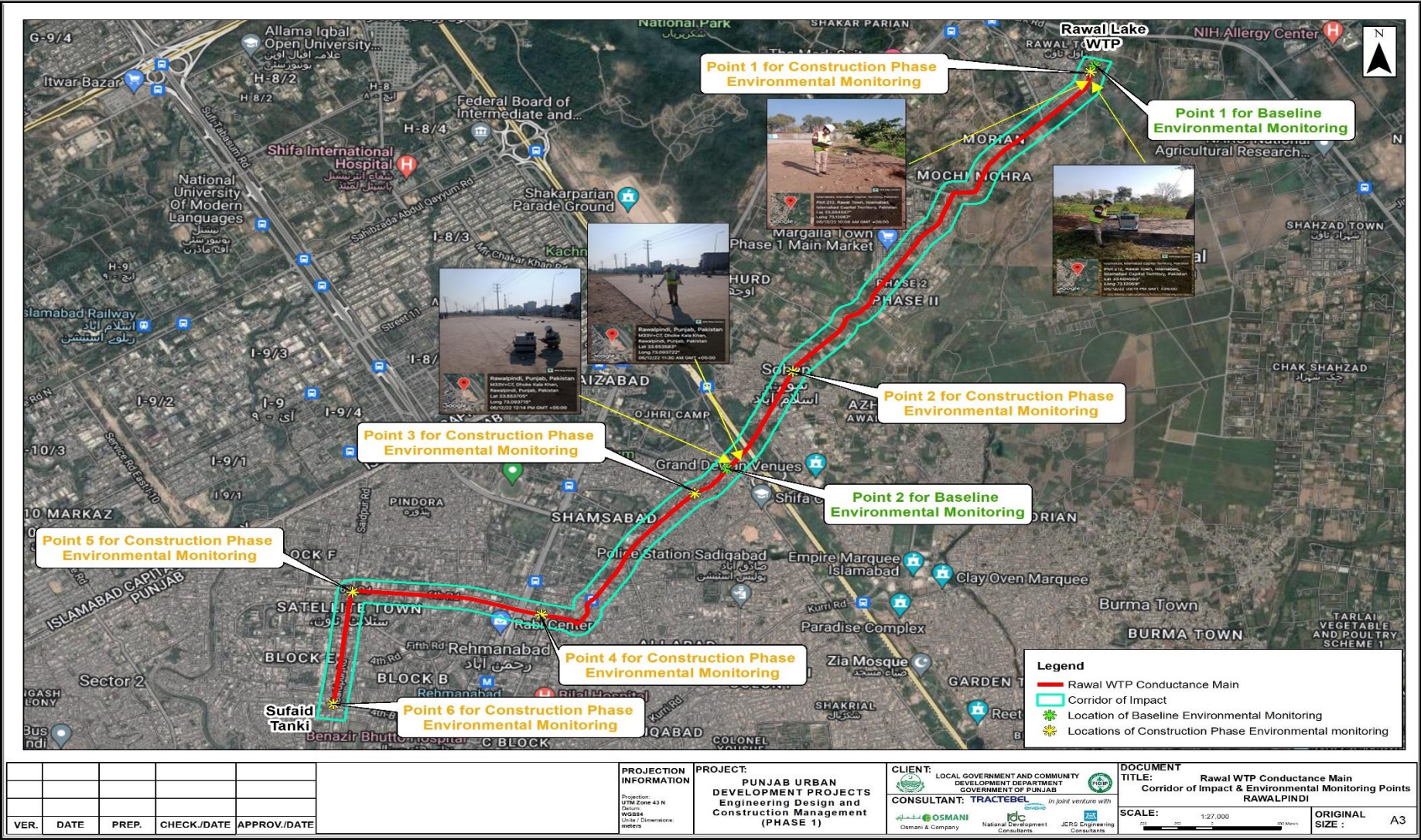


Figure 4. 14: Locations of Environmental Monitoring Points

4.5.1 Ambient Air Quality

There is no major anthropogenic source found near and around the proposed project site area, other than local road and a few cooking stoves in villages. The agricultural land results in windblown dust in dry conditions. The pollutants selected for evaluation, based on the expected emissions from the project activities and the level of risk to human health posed by these pollutants, are as follows:

- Respirable particulate matter: PM₁₀
- Sulfur dioxide (SO₂)
- Oxides of Nitrogen (NO_x): Mainly Nitrogen dioxide (NO₂) and Nitric oxide (NO)
- Carbon Monoxide (CO)

Reason for selection of Monitoring point

The sampling locations were identified to check the ambient air quality near the treatment plant and the other sample was taken from Dhoke Kala Khan where commercial activities at its peak in the area. Further, these are the main points where more environmental receptors are available and potential for exposure is high.

The rationale for selection and detail of sampling locations is given below in **Table 4.12**.

Table 4. 12: Detail of Air Quality Sampling Locations

Sample ID	Coordinates	Location	Rational for selection
A-1	Lat/ 33.684562 Long. 73.120684	Near Rawal Lake WTP	The sampling locations were selected based on the presence of Environmental Sensitive Receptors (like health care institutes, educational institutes and places of religious importance) and scale of construction activity.
A-2	Lay. 33.653705 Long. 73.093715	Near Dhoke Kala Khan	The sampling locations were selected based on the presence of Environmental Sensitive Receptors (like health care institutes, educational institutes and places of religious importance) and scale of construction activity.

Sampling location and coordinates are marked on the pictures given in **Figure 4.14**.

Results of Analysis

Ambient Air Quality sampling was carried out at two locations (i) Near Rawal Lake Filtration Plant (ii) Dhok Kala Khan Road on 5-6 December, 2022. The complete lab results for ambient air quality at all two locations and results are given in **Table 4.13** below. The lab reports are attached as **Annexure XV**.

All parameters analyzed are within NEQS/PEQS limits for ambient air. However, values of PM₁₀, CO and SO₂ exceeded the limiting value set by WHO. The major source of particulate matter, Carbon monoxide and Sulphur dioxide are traffic and commercial activities in the area.

Table 4. 13: Ambient Air Quality Results

Near Rawal Lake Filtration Plant						
Sr. No	Parameters	NEQS	WHO	Units	Results	Test Method
1	PM ₁₀	150	45	µg/m ³	124.8	40 CFR Part 50, App J (US-EPA)
2	CO	10	4	µg/m ³	4.38	40 CFR Part 50, App. C (US-EPA)
3	NO _x (NO ₂ , NO)	80	25	µg/m ³	35.6	40 CFR Part 50, App. F (US-EPA)
4	SO ₂	120	24hrs 40	µg/m ³	49.4	EQSA-0197-114 (US-EPA)
Dhoke Kala Khan Road						
Sr. No.	Parameters	NEQS	WHO	Units	Results	Test Method
1	PM ₁₀	150	45	µg/m ³	139.8	40 CFR Part 50, App J (US-EPA)
2	CO	10	4	µg/m ³	5.6	40 CFR Part 50, App. C (US-EPA)
3	NO _x (NO ₂ , NO)	80	25	µg/m ³	38.4	40 CFR Part 50, App. F (US-EPA)
4	SO ₂	120	24hrs 40	µg/m ³	62.5	EQSA-0197-114 (US-EPA)

4.5.2 Noise Level

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 5-6 December, 2022, considered

representative of the nearby receptors of possible noise disturbance from the project. The summary of results is shown in **Table 4.15**. The detail monitoring report is attached as **Annexure XV**.

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 Dhoke Kala khan. Dhoke Kala khan 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 4.14**.

The location of noise levels sampling with rational for selection of site is given below in **Table 4.14**.

Table 4. 14: Detail of location for Noise Levels Monitoring

Sample ID	Coordinates	Location	Rational for selection
N-1	Lat 33.684594 Long. 73.120671	Near Rawal Lake WTP	The sampling locations were selected based on the presence of Environmental Sensitive Receptors (like health care institutes, educational institutes and places of religious importance) and scale of construction activity.
N-2	Lat. 33.653685 Long. 73.093652	Near Dhoke Kala Khan	The sampling locations were selected based on the presence of Environmental Sensitive Receptors (like health care institutes, educational institutes and places of religious importance) and scale of construction activity.

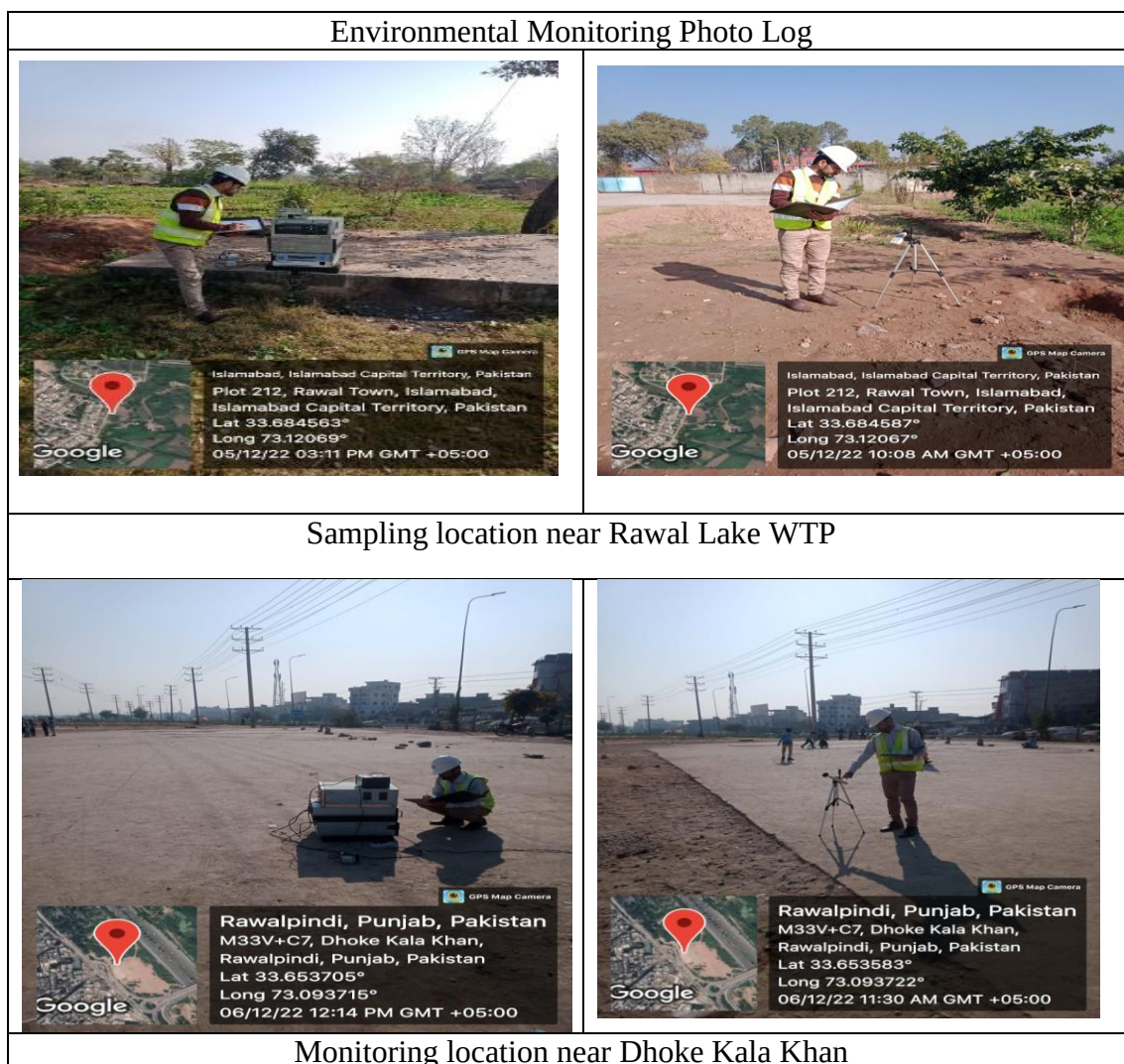
Results and Analysis

The results of noise levels monitoring are presented below in **Table 4.15**. All parameters analyzed were within NEQS limits values for ambient noise levels in the day time.

Table 4. 15: Results of Noise level Monitoring

Near Rawal Lake Filtration Plant							
Day Average (24hrs)	Noise (db(A))		PEQS/NEQS Limits		WHO Limits		Remarks
	Day	Night	Day Time	Night Time	Day	Night	
57.31	55.9	54.7	65	55	70	70	Within limits
Dhoke Kala Khan							
Day Average (24hrs)	Noise (db(A))		PEQS/NEQS Limits		WHO limits		Remarks
	Day	Night	Day Time	Night Time	Day	Night	
59.8	57.3	51.1	65	55	70	70	Within limits

The photographic evidence of Baseline Environmental Monitoring of Drinking Water, Ambient Air and Noise level is shown in **Figure 4.15**.

**Figure 4. 15: Photos of Environmental Monitoring**

4.5.3 Water Quality

Water sampling was carried out at two locations (i) Near Rawal Lake Filtration Plant (ii) Dhoke Kala Khan Road on 5-6 December, 2022. Ground water samples were taken for analysis. The complete lab results for drinking water quality of the sample collected at two locations are given below. The lab reports are attached as **Annexure XV**.

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. 16: Detail of Water Quality Sampling Location

Sample	Coordinated	Location	Sample Taken	Rationale of Selection
W.1	Lat. 33.684651 Long. 73.120621	Near Rawal WTP	Drinking water (Tap Water)	The sampling locations were identified to check the water quality near the treatment plant (source).
W.2	Lat. 33.653685 Long. 73.093652	Dhoke Kala Khan	Drinking Water (Tap water)	Sample was taken from midway to check if contamination is added in water due to leakage of DCM pipe line.

The sampling locations were identified to check the water quality near the treatment plant (source) and the other sample was taken from midway to check if contamination is added in water due to leakage of DCM pipe line. Sampling location and coordinates are marked on the pictures given in **Figure 4.14**.

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 water samples were taken from nearby house. Tap water was taken for analysis.

CHAPTER-5

PUBLIC CONSULTATION

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 EPA/ADB's Public Communication Policy.

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. In this EIA the consultation process was performed to satisfy the EPA requirements.

The public consultation process was carried out by the Environmental team in Dec, 2022. The methodology used for public consultation included the Focus Group Discussions (FGDs) and one-to-one (individual) consultations. 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.

Total 94 persons were consulted in these FGDs and individual consultations. Out of these 94 participants, 29 (30.9) were females and 65 (69.1) were male members. The participants of the consultation were briefed on the proposed project activities and information on positive and negative impacts associated with constructional and operational stage and proper mitigation of adverse impacts were shared during these consultations. Socio-economic tool, based on questionnaires for conducting field survey is attached as **Annexure XIV**. The attendance sheets of FGDs are attached as **Annexure-XVII** of this report.

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 group meetings i.e. with DG RDA, Rawalpindi, Additional Deputy Commissioner (Revenue), Rawalpindi, Managing Director (WASA, Local Government and Community Development Department Government of Punjab

Rawalpindi), Chief Engineer, Irrigation Department, Rawalpindi, Chief Officer, District Officer, Rawalpindi, Project Director, Small Dam, Rawalpindi, Chief Officer, Metropolitan Corporation, Rawalpindi, Divisional Forest Officer, Forest Department, Rawalpindi, Program Director, PMU PICIIP, Lahore, Dy Program Director, PMU PRF, Lahore, Technical Advisor, PMU PRF, Lahore, Wildlife, Fisheries and etc. Details of this consultation process are described below.

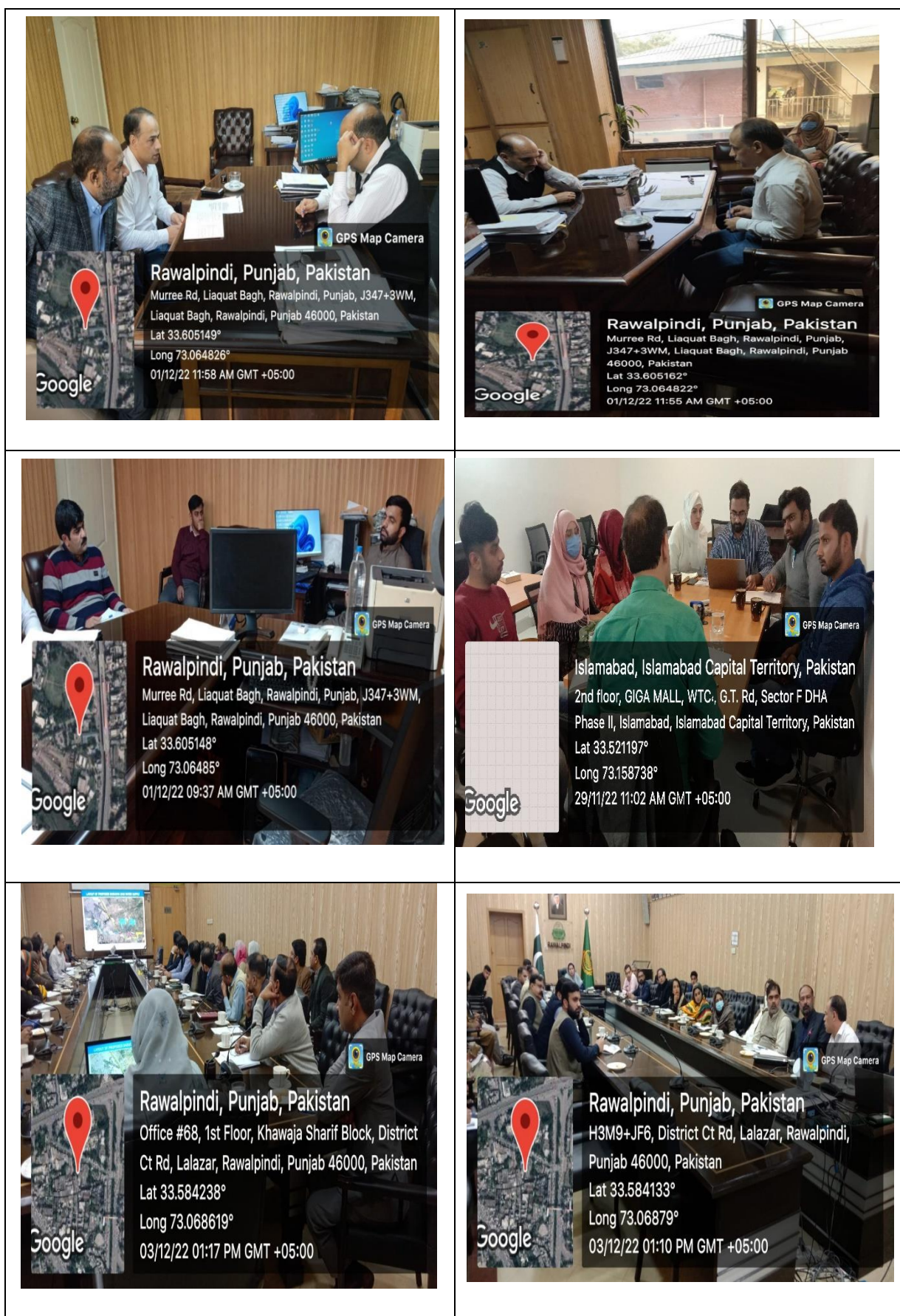
Officials of the Govt. departments have been consulted and briefed on the salient features of the project. Mostly suggestions were that proper mitigation plan shall be designed and then implemented in the construction and operation phase of the project activities. Details of consultation meetings with official stake holders are mentioned in **Table 5.1** and photographs are attached as **Figure 5.1**.

Although the engagement is in its initial stages, at some point prior to and during construction phase Punjab EPA, as well as other government departments are expected to be increasingly involved in the stakeholder consultation process.

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

2	Mr. Azizullah Khan [Ex. Deputy Director]	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 local residents in fact they recommended that new societies are emerging future population along with this project should also be served with the clean water supply.
3	Mr. Amir Mumtaz [XEN Small Dam Islamabad]	
4	Mr. Abid Hussain Abid [Forest Conservator Rawalpindi]	
5	Mr. Jawad Arshad [AD (Engineer)]	
6	Mr. M. Haseeb [AD(M & E)]	
7	Mr. Muazzam Mukhtar [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

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. 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.

Secondary Stakeholders: The secondary stakeholders are typically general public including women residing in the project area for example, people living in the project area particularly those affected by the footprint of proposed project. 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 WASA, 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 Peoples: 421. The consultation with project affected peoples was carried out during the site visits. All data of group discussion, individual discussion was recorded. Total 82 persons were consulted in these FGDs and individual consultations. Out of these 82 participants, 17 (20.7) were females and 65 (79.3) were male members. Details of stakeholder consultations are mentioned in **Table 5.3** for individual consultation and **Table 5.4** for FGDs. Pictures of stakeholder consultations is attached as **Figure 5.2**.

Summary of Affected persons Concern: The summary of consulted people during the site visit is discussed below;

- Dust, noise, and traffic issues are three of the most significant barriers to any development, so it is imperative that the construction work be handled properly to avoid these issues.
- The stated project will be helpful to provide and managing the life better with provision of clean water.
- The provision of clean water is the right of every citizen.
- Proper NEQS/PEQS should be followed to avoid noise and dust pollution during construction.
- It is requested to handle the construction materials properly and work skillfully.
- Proper monitoring of materials during construction should be carried out to prevent any risky circumstances.
- Good project to solve water crisis issues of the area.
- It is a positive move toward the community's economic empowerment. This project will augment standard of living.

Table 5. 3: Consultation with Project Affected People

Sr.#	Date	Location/ Venue/ Address	Specifics of Participant	Feedback/ Concerns	Replies
Public Consultation					
1.	03-12-2022	Saidpur Road, Satellite town, Rawalpindi	Mr Asmatullah [Optical Centre, Owner]	- The provision of clean water is the right of every citizen, so I have no issue regarding this project.	-
2.	03-12-2022	Saidpur Road, Satellite town, Rawalpindi.	Mr. Adnan Khan [Optical Centre, Worker]	- Proper PEQS should be followed to avoid noise and dust pollution during construction.	- EDCM & Social Environmental Consultant will make sure that PEQS be followed during and after Construction of the project.
3.	03-12-2022	Saidpur Road, Satellite town, Rawalpindi.	Mr. Sami Ullah [Optical Centre, Worker]	- I have no issue regarding this project.	-
4.	03-12-2022	Kali Tanki Stop, Rawalpindi	Mr. M. Aslam [Carpet Seller]	- No objection. It is requested to handle the construction materials properly and work skilfully.	- EDCM & Social Environmental Consultant will make sure that the construction materials be handled carefully and avoid them spreading on the road.
5.	03-12-2022	Kali Tanki Stop, Rawalpindi.	Mr. M. Shan [Carpet Seller]	- No objection and satisfied with this project.	-
6.	03-12-2022	Kali Tanki Stop, Rawalpindi.	Mr. Adeel Ahmad [Cloth Shop Seller]	- It seems a decent project so I have no issue regarding this project.	-
7.	03-12-2022	Satellite town, Block-B,	Mam Mirha	- I have no issue with the development of this project. It is requested to monitor the	- EDCM & Social Environmental Consultant will make sure to fulfill

		Rawalpindi	[Housewife]	pipeline maintenance on a daily basis.	the daily maintenances of the pipelines after & during construction of the project.
8.	03-12-2022	Satellite town, Block-B, Rawalpindi	Mam Rashmile [Housewife]	- Satisfied with the project. Regular monitoring should be carried out to avoid the leakages.	- EDCM & Social Environmental Consultant will ensure that the necessary steps are taken to prevent the water leakage.
9.	03-12-2022	Satellite town, Block-B, Rawalpindi	Mam Noor [Housewife]	- Dust, noise, and traffic issues are three of the most significant barriers to any development, so it is imperative that the construction work be handled properly to avoid these issues.	- To overcome these significant barriers EDCM & Social Environmental Consultant will ensure that materials is handled carefully during construction & that is not spread on the road.
10.	03-12-2022	Satellite town, Block-B, Rawalpindi	Mam Hadia [Housewife]	- I have no objections, as it seems like a good project to handle the water issues.	-
11.	03-12-2022	Satellite town, Block-B, Rawalpindi	Mam Hooria [Housewife]	- I have no objections to this initiative.	-
12.	03-12-2022	Satellite town, Rawalpindi	Mr. Ashraf Gulam Abbas [Police Officer]	- No issue regarding the project. The stated project will be helpful to provide and managing the life better with provision of clean water.	-
13.	03-12-2022	Dhok Kashmirian, Rawalpindi.	Mr. Safdar Zahoor [Vegetable Seller]	- Proper monitoring of materials during construction should be carried out to prevent any risky circumstances.	- EDCM & Social Environmental Consultant will ensure to meet the terms of monitoring plan to prevent the risk during construction.

14.	03-12-2022	Dhok Paracha, Rawalpindi.	Mr. Shaban Abid [Tyre Service Shop]	- No issue regarding this project.	-
15.	03-12-2022	Gosia Chowk, Dhok Kala Khan, Rawalpindi	Mr. Yasir Mehmood [Shopkeeper]	- I have no issue as stated the said project will be helpful to increase the source of employment.	-
16.	03-12-2022	Gosia Chowk, Dhok Kala Khan, Rawalpindi.	Mr. Abdul Wahab [Shopkeeper]	- No issue regarding this project.	-
17.	03-12-2022	Gosia Chowk, Dhok Kala Khan, Rawalpindi.	Mr. Shams ur Rehman [Shop Keeper]	- This is a good project to solve water crisis issues in the country. I have no objection.	-
18.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Khalida [Teacher]	- This is a good thing that existing project is expanding as this will benefit locals and water related issues will be further resolved.	-
19.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Shafi Ullah [Shopkeeper]	- I have no objections, regarding this project.	-
20.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Abdul Rasheed [Shopkeeper]	- It is a positive move toward the community's economic empowerment. This project will augment standard of living.	-
21.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Abdullah [Shopkeeper]	- I hope the technical staff and programme management are sufficiently skilled to maintain a peaceful and orderly workplace.	- EDCM & Social Environmental Consultant will ensure that all the project management requirements are satisfied.
22.	03-12-2022	Dhok Kala Khan	Mr. Umar Farooq	- I have no issue regarding this project. I	-

		Market, Rawalpindi.	[Shopkeeper]	hope this project may be helpful in providing a better lifestyle.	
23.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. M. Adnan [Shopkeeper]	- No issue regarding this project. It is requested to monitor the construction work properly to avoid inconvenience, especially during our earning hours.	- EDCM & Social Environmental Consultant will ensure that the construction activities are carried out in accordance with the standards and that locals are not inconvenienced during working hours.
24.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Wajeeha [Housewife]	- It is requested to handle the construction work properly to avoid any inconvenience.	- Construction operations will be carried out in accordance with the norms & the EDCM & Social Environmental Consultant will make sure that locals are not inconvenienced during working hours.
25.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Abdul Hameed [Shopkeeper]	- No objection and satisfied with this project.	-
26.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Yousaf Maseeh [Shopkeeper]	- Requested to handle construction work properly. Stated project shall not affect our daily lives and sources of income.	- EDCM & Social Environmental Consultant will make sure to handle the materials during construction carefully & it will not affect the daily lives of locals.
27.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Shahid Hussain [Shopkeeper]	- I have no objection regarding this project.	-
28.	03-12-2022	Dhok Kala Khan Market,	Mr. M. Usman	- No issue. Handle the construction work in such a way that it does not affect our	- EDCM & Social Environmental Consultant will ensure to handle

		Rawalpindi.	[Shopkeeper]	work.	the materials during construction carefully& it will not affect the earnings of locals.
29.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Atiq ur Rehman [Shopkeeper]	- I have no issue regarding this project. It is requested to handle the construction work properly.	- EDCM & Social Environmental Consultant will ensure to handle the materials during construction carefully.
30.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Ambreen [Housewife]	- Adequate standards should be followed to prevent pollution during construction. I do not have any issue with this project.	- EDCM & Social Environmental Consultant will make sure to comply with the PEQS during and after Construction of the projects to prevent pollution during construction.
31.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Shahryar [Shopkeeper]	- No opposition. It is requested that you work carefully and with correct handling of the construction supplies.	- EDCM & Social Environmental Consultant will ensure that materials are handled carefully during construction to avoid disrupting resident's living standard.
32.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Zaiba [Housewife]	- No issues and pleased with the project.	-
33.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Tabraiz [Shopkeeper]	- This project appears reasonable, thus I don't see any problems with it.	-
34.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Shahbaz [Shopkeeper]	- To avoid any potentially dangerous situations, construction work should be properly monitored.	- EDCM & Social Environmental Consultant will ensure compliance with the EMP Plans to avoid potential hazard.

35.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Amina [Teacher]	- Try to solve the traffic issues, while the project is still being built. I have no issue.	- The EDCM & Social Environmental Consultant will ensure compliance with the improvement in traffic issues during construction.
36.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Ibrahim [Shopkeeper]	- It is requested to handle the construction work properly. The project should not implement our source of income.	- In order to improve traffic problems while construction is underway, the EDCM & social environmental consultant will verify compliance.
37.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Mujahid [Shopkeeper]	- The project seems good, hope this initiative will help to tackle the water crisis.	- The EDCM & Social Environmental Consultant will ensure to help the water crisis issues.
38.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Umar Gill [Shopkeeper]	- The expansion of an on-going project is a good thing because it will help the community and further handle water-related problems.	-
39.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Abida [Housewife]	- In regards to this project, I have no issues.	-
40.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Rehman Ullah [Shopkeeper]	- I have no issue. I'm hoping that this initiative will contribute to a higher quality of life.	-
41.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Akhtar [Shopkeeper]	- No issue, It is requested to monitor the construction properly to prevent any disruption	- By adhering to monitoring during project construction, the EDCM & social environmental consultant guaranteed that disruption is avoided.

42.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mr. Shoukat Ali [Shopkeeper]	- I have no issue regarding this project.	-
43.	03-12-2022	Dhok Kala Khan Market, Rawalpindi.	Mam Tayyaba [Housewife]	- Handle the construction work properly plus pipelines should also be monitored on a regular basis.	- The EDCM & social environmental consultants will ensure to prevent disruption by adhering to the monitoring requirement throughout the construction of project.
44.	03-12-2022	Dhok Kala Khan, Rawalpindi.	Mr. Zawyan [Unemployed]	- Proper monitoring of pipelines should be carried out on a weekly basis, at least.	- The EDCM & environmental consultants will ensure to carry out monitoring of pipelines on regular basis after construction of the project.
45.	03-12-2022	Dhok Kala Khan, Rawalpindi.	Mr. Hadi [Shopkeeper]	- No issue. Handle the materials properly, during construction.	- The EDCM & environmental consultants will ensure to handle the materials properly.
46.	03-12-2022	Dhok Kala Khan, Rawalpindi.	Mr. Hidayat Ullah [Shopkeeper]	- Proper monitoring of pipelines should be carried out to avoid any leakages.	- The EDCM & environmental experts will ensure to comply the regular monitoring of pipeline after the project execution.
47.	03-12-2022	Dhok Kala Khan, Rawalpindi.	Mr. Ibrar [Student]	- I do not have any issue regarding this project. It is requested to monitor the pipelines on a regular basis.	- The EDCM & environmental consultants will ensure to carry out monitoring of pipelines on regular basis after construction of the project.
48.	03-12-2022	Dhok Kala Khan, Rawalpindi.	Mr. Khizar Qazmi [Data Analyst]	- Hopefully, this project will aid in the resolution of water woes. I have no issue.	- The EDCM & social environmental experts will ensure cooperation to assist with water

					crisis challenges.
49.	03-12-2022	Rawal Town, Islamabad	Mr. Hafiz Rameez [Govt. Employee]	- It is requested to work properly and do not disturb the daily lives of locals.	- The EDCM & social environmental experts will ensure that no interferences with locals' living standards occur.
50.	03-12-2022	WASA Colony, Rawalpindi	Mam. Huma Hidayat Ullah [Housewife]	- I do not have any issue regarding this project. Proper PEQS should be followed to avoid noise and dust pollution during construction.	- The EDCM & social environmental advisor will make sure to follow the PEQS both before & after project construction.
51.	03-12-2022	WASA Colony, Rawalpindi	Mr. Shahbaz Fyaz Khan [Freelancer]	- It's a good project, such projects should promote in the country to help the water shortage.	

Table 5. 4: Response of Stakeholder during FGDs

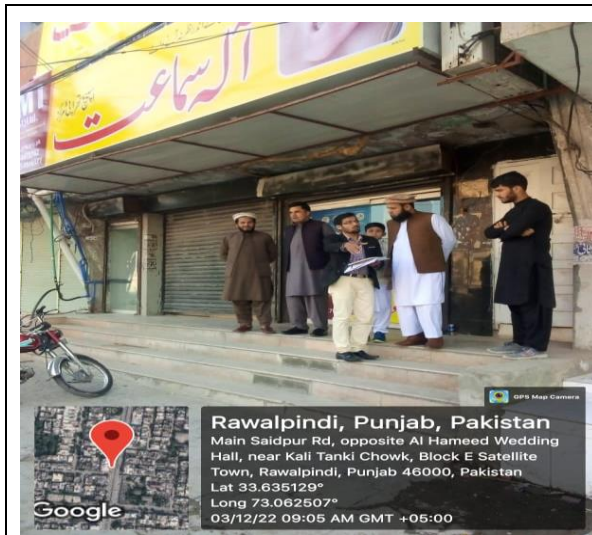
Sr. #	Name & Profession	Location	Feedback/Concerns	Replies
FGD at Satellite town, Block-B, Rawalpindi				
1.	Mr. Rana Imran [Technician]	Satellite town, Block-B, Rawalpindi	In the overall FGD, no opposition was reported. They appear pleased that this initiative is being carried out as their daily growing water demand will be satisfied by the implementation of this project. It was requested that the construction materials be handled correctly and with caution. It is important to adhere to appropriate standards when working on a construction site. While the project is still being built, they also demanded that the traffic-related problems be resolved.	The EDCM & Social Environmental Consultant will ensure compliance with the improvement in traffic issues during construction and will make sure to adhere to PEQS both during & after project construction.
2.	Mr. Usman [CSO]			
3.	Mr. Saeed Shah [Technician]			
4.	Mr. M. Naveed [CSO]			
5.	Mr. Zahid Iqbal [Office Boy]			

FGD at Dhok Kala Khan, Rawalpindi.				
1.	Mr. Abraiz Akhtar [Scrap dealer]	Dhok Kala Khan, Rawalpindi.	The proposal appears satisfied, according to the following FGD, as this endeavor will help address the water shortage. It is beneficial to expand an ongoing project since it will benefit the neighborhood and better address water-related issues. They also requested that the traffic-related issues be fixed while the project is still being built. Additionally, it was required to handle the task expertly both during and after construction.	EDCM & Social Environmental Consultant will make sure that the construction materials be handled carefully and avoid them spreading on the road and will make sure to handle the traffic issues properly. It will definitely be helpful to resolve the water related issues.
2.	Mr. Saleem Iqbal [Scrap dealer]			
3.	Mr. Malik Zaheer [Scrap dealer]			
4.	Mr. Shaheen Iqbal [Scrap dealer]			
FGD at Dhok Kala Khan, Rawalpindi.				
1.	Mr. M. Riaz [Bykea Service Employ]	Dhok Kala Khan, Rawalpindi.	The FGD suggested that the following project be implemented in order to better solve water-related concerns and meet water demand. In order to prevent any disruption in their income, they asked that the construction be finished quickly, and while the project is still being developed, the traffic-related problems should be resolved.	The EDCM & Social Environmental advisor will guarantee adherence to PEQS both before & after project construction as well as compliance with the improvement in traffic concerns during construction. Better income resource will be made available and water will be supplied at a reasonable price.
2.	Mr. Kashif [Bykea Service Employ]			
3.	Mr. Ilyas Maseeh [Bykea Service Employ]			
FGD at Dhok Kala Khan, Rawalpindi.				
1.	Mam Sumaira Rajpoot [Teacher]	Dhok Kala Khan, Rawalpindi.	The FGD participants approve the implementation of the project. They think that the project will raise people's living standards. It was requested that the scheduling of transit during construction be controlled to avoid obstructing their normal routine. Try to discover solutions	The EDCM and Social Environmental Advisor will ensure PEQS adherence, as well as compliance with the reduction of traffic-related concerns.
2.	Mam Mehreen Batool [Teacher]			
3.	Mam Rehana Munir			

	[Teacher]		for issues associated with construction, such as dust, traffic, and machine noise.	
4.	Mam Hira Shehzadi [Teacher]			
FGD at Dhok Kala Khan, Rawalpindi.				
1.	Mam Ambreen BiBi [Housewife]	Dhok Kala Khan, Rawalpindi	The FGD participants appear pleased with the manner in which this project was implemented because it would give them cheap and convenient access to water. They will have access to a reliable source of drinking water. They also believe that carrying out the project will make it easier to fight the local ailments. They hope the project's development will be completed skillfully. In short, they approved of the project's implementation.	The EDCM and Social Environmental Advisor will ensure that water is provided at a fair price and better revenue resources are made available.
2.	Mam Parveen BIBi [Housewife]			
3.	Mam Khadija BiBi [Housewife]			
4.	Mam Urooj Fatima [Housewife]			
5.	Mam Areeba Rani [Housewife]			
FGD at Satellite town, Block-B, Rawalpindi.				
1.	Mam Umtal Samina [Housewife]	Satellite town, Block-B, Rawalpindi	They encourage the development and implementation of the project since it will aid in the solution of the water-related issues. The project idea is to increase the water supply level and build the better water supply system, so they were encouraging the idea. It was requested that everyone have easy access to clean water.	The EDCM and Social Environmental Advisor will ensure to resolve the water related issues rising in the area and provision of clean water with ease.
2.	Mam Sunaina Akbar [Housewife]			
3.	Mam Rashida Kanwal [Housewife]			

Figure 5. 2: Photographs of Stakeholder Consultation





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. A brief qualitative description of each aspect and the affected environment in both RoW and the project's corridor of impact 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:

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

Likelihood Scale

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

Consequence Scale

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

Risk Score Table

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

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.

2.35 Potential Positive Impacts

The positive impacts due to the proposed project are mentioned below:

- 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 Rawal Lake 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 enhancing the employment possibilities of inhabitants.

2.36 Potential Adverse Impacts

Apart from positive impacts, 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 IEE/EMP requirements into Construction bid documents	3/ Likely	2/ Moderate	6/ Medium	Low/ Short Term
3	Contractor’s Environmental Safeguards Capacity	3/ Likely	2/ Moderate	6/ Medium	Low/ Short Term
4	Relocation of existing utilities	3/ Likely	2/ Moderate	6/ Medium	Low/ Short Term
5	Identification of Locations for Labor Camps and ancillary facilities	3/ Likely	2/ Moderate	6/ Medium	Medium/ Short Term
6	Traffic Issues/ Traffic Management Plan	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	Topographic Impact	2/Unlikely	2/ Moderate	4/ Low	Low Residual Impact
9	Seismic Impacts	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 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 water works through Conductance Main 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 will be studied and site will be selected accordingly.
- Water supply network will be designed on the gravity flow to facilitate uninterrupted water supply through gravity system.

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 duration of the construction activity for the proposed project is expected to be 24 months and a considerable amount of work force will be engaged. As a result, worker camps will need to be developed and ancillary facilities will need to be provided such as electricity, washrooms for labor with suitable effluent and sewage

disposal facilities as well as water for their everyday use for drinking and bathing etc.

Mitigation measures

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 laying 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 is involved for the proposed project. However, excavation of land is involved for the proposed Project. A minor physical change in the topography due to excavation of land is expected in the project area. 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.

6.6 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

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
1	Excavation of Chambers for Insertion of New Conductance Main within Existing Conductance Main	3 / Likely	2 / Moderate	6 / Medium	Low / Short term
2	Site Accessibility	3 / Likely	2 / Moderate	6 / Medium	Low / Short
3	Traffic Issues	3 / Likely	2 / Moderate	6 / Medium	Low / Short
4	Resource Conservation	3 / Likely	2 / Moderate	6 / Medium	Low / Short

S/No.	Potential Issue	Likelihood (Certain, Likely, Unlikely, Rare)	Consequence (Catastrophic, Major, Moderate, Minor)	Risk Level (Significant, Medium, Low)	Residual Impact (Short term, Long term)
5	Community Health & Safety	3 / Likely	2 / Moderate	6 / Medium	Low / Short
6	Occupational Health & Safety	3 / Likely	2 / Moderate	6 / Medium	Low / Short
7	Construction Camps/ Camp Site	3 / Likely	2 / Moderate	6 / Medium	Low / Short
6	Waste water generation	3 / Likely	2 / Moderate	6 / Medium	Low / Short
7	Solid Waste Generation	3 / Likely	2 / Moderate	6 / Medium	Low / Short
8	GHG Emissions	3 / Likely	2 / Moderate	6 / Medium	Low / Short
9	Potential Emergencies	3 / Likely	2 / Moderate	6 / Medium	Low / Short
10	Natural and Man Made Disaster	3 / Likely	2 / Moderate	6 / Medium	Low / Short
11	Degradation of air quality due to construction works	3 / Likely	2 / Moderate	6 / Medium	Low / Short term
12	Noise/ Vibration	3 / Likely	2 / Moderate	6 / Medium	Low / Short
13	Flora	3 / Likely	2 / Moderate	6 / Medium	Low / Short
14	Fauna	3 / Likely	2 / Moderate	6 / Medium	Low / Short
15	Social and Cultural Conflicts	3 / Likely	2 / Moderate	6 / Medium	Low / Short
16	Communicable diseases incl. COVID-19	3 / Likely	2 / Moderate	6 / Medium	Low / Short
17	Impact on Sensitive Receptors	3 / Likely	2 / Moderate	6 / Medium	Low / Short

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

6.6.2 Excavation of Working Chambers for Insertion of Conductance Main within ECM

Impacts

Construction activity for Conductance Main will be conducted along the roads within the existing Right of Way of the water lines.

Working Chambers of 8/2.5 meters will be excavated for pulling and pushing of PCM within the ECM. These working chambers will be used to insert the new conductance main of 36-inch dia into existing Conductance Main of 54-inch dia. Trench will be excavated for 36-inch line in Satellite Town using excavator and where it is not feasible will be done manually. Excavated soil will be placed along the trench. A bed of sand of 150 mm thick will be prepared at the bottom and pipes will be placed and laying of local sand around water supply line shall be done. Excavated soil will be backfilled and compacted. Where the pipes are laid, handheld pneumatic drill will be used to break the road surface.

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 project locations such as residents, business and community in general.

These anticipated impacts are temporary and for short duration. Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be (i) constructed by small teams working at a time; (ii) any excavation done near sensitive area like school, religious places and house will be protected as per standard construction practices.

Mitigation measures

Mitigation measures adopted for construction of Conductance Main are provided below:

- Prior to starting of work, the contractor shall prepare a method statement for water supply pipeline works. This shall be simple and explain the contractor's

work process that is actually conducted on site, with safety and safeguard concerns.

- Method Statement is very important, particularly for water supply pipeline works along the roads.
- Method Statement can be prepared for each stretch (say 1 km) /specific site based on the project area.

Method Statement shall be in a Table format with appended site layout map and cover the following:

Work description

- No. of workers (skilled & unskilled)
- Details of Plant, equipment & machinery, vehicles
- Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing)
- PPE (helmet, gloves, boots, etc.) details for each type of work
- Details of materials at each site (type & quantity)
- Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc.)
- Construction waste/debris generated (details & quantity)
- Detail the sequence of work process (step-by-step) including specific details of each work
- Contractor's supervision & management arrangements for the work
- Emergency: Designate (i) responsible person on site, and (ii) first aider
- Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc.
- The following shall be included in the site layout plan:
- Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone.
- Location of temporary stockpiles and provision of bunds
- Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil
- Wetting of soil to arrest dust generation by sprinkling water

- Waste/surplus soil utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil utilization/disposal site in consultation with CSC/PMU.

PMU 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.

The New Conductance Main will be pulled/pushed within the ECM by constructing chambers of 8x2.5 meters. The location of chambers will be readjusted to avoid dislocation, if required. Tentative location of chambers is marked on layout attached as **Annexure-I**.

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.

Mitigation measures

- 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 effects 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 Wastewater Generation

Potential Impact

One (01) construction camp will be proposed to be established during construction period for the subject 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 6.3** 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. 3: Estimated Wastewater Generated by Workers in Construction Camps⁶

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 (40) = 7,500 liters/day

⁶ (*Source: Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain)

$$*** = (7,500) \times (80\%) = 6,000 \text{ liters/day}$$

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.

6.6.6 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.

6.6.7 Emissions of Green House Gases (GHG)**Potential Impact**

The main sources of greenhouse gases (CO₂, CH₄, NO_x 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, 2016.

Residual Impacts

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

6.6.8 Air Quality**Potential Impact**

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.

6.6.9 Noise/Vibration

Potential Impact

The laying of water pipelines 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 6.4** below as reference.

Table 6. 4: 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

Sr. No.	Equipment	Noise dB(A) at 15ft from Source
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., et al (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

Noise and Vibration management plan has been developed for the guidance of construction contractor. The management plan is attached as Annexure-XI of the report. 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.

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.

6.6.10 Resource Conservation

Potential Impact

During the construction, overburden on local resources (like water, electricity, construction material etc.) is possible if construction facilities such as workers camp and construction camp built near rural areas and can create problems for local communities. There are possibilities that conflicts may arise due to conflicting demands of resources between construction workers and local community.

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.

6.6.11 Potential Emergencies

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 situation 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.

6.6.12 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.

6.6.13 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, 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);
- 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.

6.6.14 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 IX**.

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.

6.6.15 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.

Mitigation measures

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 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 impending 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:
 - 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 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.

6.6.16 Flora

Potential Impact

The project has no impact on destruction of vegetation. No tree cutting is anticipated during the construction phase of the project. Labor camp area will be selected away from the residential by keeping in view that movement of vehicle does not disturb the flora of the area.

Mitigation measures

- The proponent shall implement the program with the help of Forest Department and with the consultation of concerned consultant ecologist;
- Open fires should be banned in the area to avoid hazards of fire in the area;
- 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 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 COVID-19 and 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 COVID-19 & 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 reduce the chances of spread of communicable diseases among workers and nearby community. Therefore, the impact will be low.

6.6.20 Impacts on Sensitive Receptors

Potential Impacts

Replacement of ECM from Rawal Lake Filtration Plan to Water Work (Sufaid Tanki) 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.

6.6.21 Impacts during Site restorations

Impacts

After completion of construction activities, 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 aesthetics within city. Before closure of typical construction day area need to be cleared from all type of waste and construction material.

Mitigation measures

- Demobilization of all equipment and machinery;
- Disposal of any waste material remaining at the time of completion of the operation;

- Backfilling of all excavation followed by compactions;
- Dismantling and removal of fence or barriers surrounding the campsite area;
- 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 ANTICIPATED IMPACTS DURING OPERATIONAL PHASE

The anticipated impacts related to the proposed project have been studied for the operational phase and discussed hereunder. The potential impacts from operation phase are provided as **Table 6.5** below.

Table 6. 5: Screening of Possibal 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
3	Improvements in Public Health	Positive impacts expected			Long term positive



6.7.1 Water system leaks and water discharges during flushing

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 or with a greater potential for leaks because of their location, pressure stresses, and other risk factors.

Discharge the flush water into a municipal sewerage system with adequate capacity;

Discharge the flush water into a separate storm sewer system

Minimize erosion during flushing, for example by avoiding discharge areas that are susceptible to erosion and spreading the flow to reduce flow velocities

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

Impacts

The continued supply of treated quality water by proposed project will be an indispensable facility in Rawalpindi. The proposed water supply system will facilitate the domestic as well as commercial water requirements of people living in Rawalpindi. 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 measures required.

Residual Impact

No residual impacts.

6.7.3 Improvements in Public Health

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.

Residual Impacts

No residual impacts.

6.7.3 Cumulative Impacts

Based on the scoping exercise of the site and based on discussions with the public sector agencies responsible for development in the project area. No other infrastructure works are planned to be conducted in the project area while these project works shall be conducted. Thus, no cumulative impacts are expected.

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 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 enhancing the employment possibilities of inhabitants.

CHAPTER-7

ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

7.1 INTRODUCTION

The EIA has identified 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 the EIA has recommended mitigation measures in the EMP. The proposed mitigation measures have been based on the understanding of the sensitivity and behavior of environmental receptors in the project area, the legislative controls that apply to the project and a review of good industry practices for projects of similar nature. For residual impacts (impacts remaining after applying the recommended mitigation measures) and for impacts in which there can be a level of uncertainty in prediction at the IEE/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 Replacement of Existing Conductance Main (ECM) 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.

7.2 ENVIRONMENTAL MANAGEMENT

The EMP attached with this report ensures the following:

- Delivery of the prescribed environmental outcomes during all phases of this sub- project;
- Formulating a system for compliance with applicable legislative requirements and obligations and commitments for this sub-project.

- Ensure that project design process incorporates best practice environmental design and sustainability principles to minimize potential impacts of construction and operation on the environment and community.
- Ensure that the construction and operation work procedures minimize potential impacts on the environment and community.
- Develop, implement and monitor measures that minimize pollution and optimize resource use.

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.

7.3 INSTITUTIONAL ARRANGEMENT

7.3.1 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 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 PUNJAB government requirements;
- 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 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;
- 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 SSEMPs prepared by the contractor.
- Undertakes environmental management capacity building activities for relevant project focal staff.

The Punjab EPA will have the following responsibilities with regards to this landfill project:

- Provides regulatory compliance works for the project.
- Reviews and approves environmental assessment report of landfill, 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 EIA/IEE and EMP;
- Preparation of site specific EMPs (SSEMPs) as required. SSEMPs will be prepared by Contractor's Environment Specialist, site incharge, 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 **Appendix XIV**.
- 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 RWASA 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
- RWASA would be responsible to ensure that contractors engaged during operation phase of the project are executing activities in compliance to EIA/IEE/EMP.

- RWASA will be required to have qualified Environmental Specialist designated to ensure all mitigation measures are implemented in true letter and spirit.

EMP Legend

CSC	Construction Supervision Consultant
BC	Before Construction
DC	During Construction
PMU	Project Management Unit
DO	During Operation

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 Transmission 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 EIA/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	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

			its implementation cost must be reflected in the BOQ. - EIA/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 EIA/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	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

			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.			
	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	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

			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.			
	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	Design Consultant	PMU, LG&CD	BC: during detailed designing of the project

			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.			
	1.6	Traffic Issues	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.	Construction Contractor	CSC, PMU	During Construction/ Prior to Operations
	1.7	Topographic Change	Mitigation measures will involve	Design	PMU,	BC: during

			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.	Consultant	LG&CD	detailed designing of the project
	1.8	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
Construction Phase	2.1	Excavation of Chambers for Insertion of New Conductance Main within Existing	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	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

		Conductance Main	on site, with safety and safeguard concerns. • Method Statement is very important, particularly for water supply pipeline works along the roads. • Method Statement can be prepared for each stretch (say 1 km) /specific site based on the project area. • Method Statement shall be in a Table format with appended site layout map and cover the following: • Work description: • No. of workers (skilled & unskilled) • Details of Plant, equipment & machinery, vehicles • Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing) • PPE (helmet, gloves, boots, etc.) details for each type of work			
--	--	------------------	--	--	--	--

			• Details of materials at each site (type & quantity) • Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc.) • Construction waste/debris generated (details & quantity) • Detail the sequence of work process (step-by-step) including specific details of each work. • Contractor's supervision & management arrangements for the work • Emergency: Designate (i) responsible person on site, and (ii) first aider • Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc. • The following shall be included in the			
--	--	--	---	--	--	--

			site layout plan: • Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone. • Location of temporary stockpiles and provision of bunds. • Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil • Wetting of soil to arrest dust generation by sprinkling water • Waste/surplus soil utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil utilization/disposal site in consultation with CSC/PMU. • PMU 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.			
	2.2	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,	Construction Contractor	CSC, PMU	During Construction

			air and noise pollution, waste generation, and loss of agricultural land provided in below sections will be adopted.			
	2.3	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; • The speed of the vehicles will be controlled (at 20 to 25 km/hr) to reduce the probability of severe accidents, soil	Construction Contractor	CSC, PMU	During Construction

			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; • Any closure of the roads (especially main roads) and deviations / diversions proposed should be informed to the riders through standard signs and displays; and • Traffic Management Plan will be implemented to avoid traffic accidents, jams/public inconvenience.			
	2.4	Community Health	• The World Bank/IFC EHS Guidelines,	Construction	CSC, PMU	During

		and Safety	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	Contractor		Construction
--	--	------------	---	------------	--	--------------

			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.			
	2.5	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;	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			• 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-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 Annexure-IX. • 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).			
	2.6	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	Construction Contractor	CSC, PMU	During Construction

			with details of wastewater collection, transportation and its disposal.			
	2.7	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 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	Construction Contractor	CSC, PMU	During Construction

			the nature of the waste; • 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; and • Solid waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan.			
	2.8	Emissions of Green House Gas (GHG)	• Regular motioning of the vehicles for engine efficiency; • Avoid idling of construction vehicles;	Construction Contractor	CSC, PMU	During Construction

			• Alternative energy resources shall be considered where possible; and • The Contractor shall ensure the compliance with PEQS, 2016.			
	2.9	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 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	Construction Contractor	CSC, PMU	During Construction

			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.			
	2.10	Noise/Vibration	• Quieter Equipment: A cost-effective way to reduce noise at a construction worksite is to buy quiet equipment. In	Construction Contractor	CSC, PMU	During Construction at Active

			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			Construction Site
--	--	--	---	--	--	-------------------

			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.			
	2.11	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	Construction Contractor	CSC, PMU	During Construction

			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.			
	2.12	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	Construction Contractor	CSC, PMU	During Construction

			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.			
	2.13	Social and Cultural	• Local labor especially from nearby	Construction	CSC, PMU	During

		Conflicts	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.	Contractor		Construction
	2.14	Community Disturbance, Health and Safety	• Maintaining regular communication with local communities and other stakeholders to minimize tensions arising from project activities; • Maintaining a grievance procedure to	Construction Contractor	CSC, PMU	During Construction at Active Construction Site

			facilitate stakeholders in expressing concerns; • Proper traffic diversion plans before the start of the construction; • Appropriate budget for traffic/safety sign boards; • Timely completion of the proposed Project; • Maximum the unskilled labor and where possible skilled labor should be arranged locally; and • Environmental and Social Cell of the Contractor will be responsible for stakeholder engagement and timely information dissemination.			
--	--	--	---	--	--	--

	2.15	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	Construction Contractor	CSC, PMU	During Construction at Active Construction Site/ Camps
--	------	-----------------------	--	-------------------------	----------	--

			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.			
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 because of their location, pressure stresses, and other risk factors.	WASA, Rawalpindi	Env. Expert/EPAs	During Operations

			• 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.			
--	--	--	---	--	--	--

7.4 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 this 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 3 rd 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

7.5 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** respectively.

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.

7.6 Environmental Monitoring Program

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**, respectively.

An environmental management and monitoring plan (EMMP) establishes the linkages between the environmental and social impacts, mitigation strategy, and the agencies responsible for execution. Thus, the EMMP covers:

- A comprehensive listing of mitigation measures (actions).
- The institution(s)/ person(s) responsible for implementation of specific actions.
- The parameters to be monitored to ensure the effective implementation of the actions.

- A timescale for the implementation of actions has been indicated subject to the project life cycle and indicated as Design Phase, Construction and During Operations.

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.

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	Once	PMU / Design Consultant
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	At two random receptor locations in the project area	Once	PMU / Design Consultant
Quality in vicinity of project area	To establish water quality in project area	water quality in project area	Water samples for comparison against NEQS parameters	At two locations within the project area	Once	PMU / Design Consultant

Table 7. 4: Construction Phase Monitoring Requirements

Project Activity and Potential Impact	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 receptor level	1-hr and 24-hr concentration levels	At three random receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC
		Visible dust	Visual observation of size of dust clouds, their dispersion and the direction of dispersion	Construction site	Once daily during peak construction period	Contractor's Environmental officer, CSC
Wastewater Quality	To determine the effectiveness of mitigation measures	As per WHO/NEQS	Water samples for comparison against NEQS parameters	workers camp and active construction site (one sample each	Quarterly basis on a typical working day	Contractor's Environmental officer, CSC

Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Safety precautions by Safety workers	To prevent accidents for workers and general public	Number of near miss events and accidents taking	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 leakages	Incidents of oil and toxic chemical spills	Visual inspections	At construction site and at vehicle and machinery refueling	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 work sites in project area	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
Wastewater Quality	To determine the effectiveness of mitigation measures	As per WHO/NEQS	Water samples for comparison against NEQS parameters	Sufaid Tanki water works	Annual basis on a typical working day	WASA Rawalpindi
Drinking Water Quality	To assess whether provided portable water is within limits of PEQS.	As per PEQS	Water samples for comparison against NEQS parameters	At storage tanks and few samples will be taken from users taps	Monthly	WASA Rawalpindi

For evaluating the performance of the environmental management and monitoring plan, performance indicators are identified for the efficient and timely implementation of measures/actions proposed in EMMP. The indicators are defined both for the implementation phase and for the operation phase. QA/QC Consultant will be responsible for compiling the information on these indicators and report to WASA/PMU.

To measure the overall environmental performance of the project, a list of performance indicators is given below:

- The number of inspections carried out by QA/QC Consultant per month.
- The number of non-compliances observed by QA/QC Consultant.
- Availability of environmental, and OHS specialists in QA/QC Consultant.
- Availability of environmental, and OHS specialists with Contractors.
- Timely reporting of documents (as defined in EMMP and monitoring plan).
- Number of training imparted to stakeholders/other capacity building initiatives.
- Number of grievances received.
- Number of grievances resolved.
- Number of constructions related accidents.

7.7 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)	60,000	2 readings @ PKR 70,000 per sample
Noise Levels**	dB(A)	3 (Once only at 3 locations)	60,000	2 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			18,000	5% of monitoring cost
Total (PKR)			378,000	

Table 7. 7: Annual Cost Estimates for ‘Construction Phase’ Environmental Monitoring

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Wastewater Quality	NEQS/WHO	24 (Monthly at 2 locations)	720,000	24 readings @ PKR 30,000 per sample
Air Quality	CO, NO ₂ , PM ₁₀	24 (Monthly at 2 locations)	720,000	24 readings @ PKR 30,000 per sample
Noise Levels	dB(A)	24 (Monthly at 2 locations)	240,000	24 readings @ PKR 10,000 per reading
Contingencies			84,000	5% of monitoring cost
Total (PKR)			1,764,000*	

**Subject to monitoring requirements of EPAs as per conditions of Environmental Approval for construction phase*

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

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Drinking Water Quali	NEQS/WHO	12	360,000	12 readings @ PKR 30,000 per sample
Wastewater Quality	NEQS/PEQS	1	30,000	1 readings @ PKR 30,000 per sample
Contingencies			19,500	5% of monitoring cost
Total (PKR)			409,500	

**Subject to monitoring requirements of EPAs as per conditions of Environmental Approval for operation phase*

Table 7. 9: Estimated Costs for EMP Implementation

Item	Sub-Item	Estimated Total Cost (PKR)
Staff, audit and monitoring cost ¹	1 person for 24 months (@ 100,000 per month)	2,400,000
One International Consultant	1 expert for 6 months (@ 500,000 per month)	3,000,000
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) Hazardous and non-hazardous collection & disposal	From construction sites (based on initial estimates)	1,500,000
(iii) Plantation around project	To plant vegetation all along the boundary of WTP	15,00,000
(iv) Hard Barricades	Provision of hard barricades in case the trench is 1.5 meter deep	10,00,000
(v) SSEMP preparation and Implementation	Preparation and Implementation of SSEMP	1,000,000
Contingencies	5% of EMP implementation cost	320,000
Total Estimated Cost (PKR)		11,520,000

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 management and monitoring	CSC & PMU	Short seminars and courses on: Environmental Management Plan and Environmental Monitoring Plan	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 Indicators Occupational Health and Safety (OHS) issues	Two seminars for Contractor management staff and project staff dealing in environment and social issues	1 day	100,000/Training
Operation Phase 3 rd party trainer	WASA Rawalpindi	Short seminars on Environmental risks associated with operation phase. Development of Environmental Performance Indicators Occupational Health and Safety (OHS) issues	Bi-annual seminars	1-2 Day	600,000/Year
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 Replacement of ECM, Rawalpindi meets the administrative and legal framework of the EPA Punjab.
- 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 IEE/EIA and project administration manual;
- Contractor to appoint environmental safeguards person responsible for environmental safeguards compliance, occupational health and safety and core labour standards;
- PMU will have the right to suspend works or payments if the Contractor is in violation of any of his obligations under the EMP and SSEMP
- Employment opportunities shall be given to local community as per plans discussed in the EIA report.

8.2 CONCLUSION

The EIA Report of Replacement of 54-inch Existing Conductance Main from Rawal Treatment Plant to Main Waterworks of Sufaid Tanki, Length 9.1km, District Rawalpindi – Pakistan is made to fulfill the legal requirement of Punjab Environmental Protection Act, 1997 [Amendment, 2012].

The proposed project “Replacement of Existing Conductance Main (ECM) from Rawal Filtration Plant to Waterworks of Sufaid Tanki, Length 9.1km Rawalpindi” is of high significance considering the urgent need for improving sustainable water supply system of Rawalpindi city.

Primary and secondary data has been collected and used to assess the environmental impacts of the Project. This EIA report highlights all potential environmental impacts

associated with the project and recommends mitigation measures. 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 distribution networks including transmission main and generation of solid waste, sludge and waste water during water treatment plant operation. Major impacts during construction phase will be related to traffic congestion and community health and safety issues during laying of water supply system in populated areas.

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 consultant to supervise the implementation process. The EMP includes measures to minimize project impacts due to traffic, noise, air pollution, waste generation etc.

The EMP contained within 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 review and approval of ADB. In these SSEMPs, aspects such as a detailed traffic management plan, identification of locations for disposal of debris and spoil and any other details which shall become available later must be included for efficient implementation of all proposed mitigation measures and the subsequent monitoring of these measures.

Based on the above, this report concludes that there are no potential adverse environmental impacts from proposed project. Impacts of less significance can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified and suggested, 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 uninterrupted treated water supply and it will fix existing bottleneck of the system.

Following requirements of ADB SPS, PMU will apply pollution prevention and control technologies and practices consistent with international good practice as

reflected in internationally recognized standards such as EHS Guidelines. When Government regulations differ from these levels and measures, PMU will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Mitigation measures to help alleviating potential identified impacts have been recommended and an EMP has been provided for implementation of these mitigation measures. Further PMU WASA will ensure that selected construction contractor has contractual obligation with respect to EMP implementation. Also contractor will ensure appropriate staffing and budgeting for effective implementation and monitoring of project EMP.

The project is located in an area where there are several socio-economic and environmental problems for which the project will provide appropriate solutions.

In national perspective the project will provide an alternate resource not only for the economy of the country but also for the project area.

Based on the findings of the IEE/EIA, the project is unlikely to cause any significant, irreversible or unprecedented environmental impacts. The potential impacts localized, temporary in nature and can be addressed through proven mitigation measures. The classification of the project as Category B per ADB SPS, 2009 is confirmed, and IEE has already been submitted to ADB. Further, EIA Report has been completed for the said project so the project of 'Replacement of 54-inch Existing Conductance Main from Rawal Treatment Plant to Main Waterworks of Sufaid Tanki, Length 10.5km, District Rawalpindi' is recommended for the Environmental Approval and issuance of NOC from the EPA, Punjab.

LIST OF REFERENCES

The following documents, reports were consulted during the preparation of this report.

- » Data & information provided by the **Project Management of Replacement of ECM, Rawalpindi.**
- » Project location/ layout maps etc.
- » Guidelines for the preparation and review of Environmental Reports, Pakistan Environmental Protection Agency, Government of Pakistan, October, 1997/2000.
- » Sectoral Guidelines for Environmental Reports-Major Chemical and Manufacturing Plants, Pakistan Environment Protection Agency, October 1997.
- » Pakistan Environment Protection Agency (Review of IEE and EIA) Regulations, 2000.
- » Hazardous Substances Rules, 2003, Pakistan Environment Protection Agency.
- » Handbook of Environmental Impact Assessment Vol. 1 & 2, Edited by Judith Petts, Blackwell Publishing, Ist Indian Edition, 2005.
- » Punjab Environmental Protection Act, 1997 [Amendment, 2012].
- » Ahmed, M. and Suphachalasai, S. (2014). Assessing the Cost of Climate Change and Adaptation in South Asia. Manila: ADB
- » Anjum, B. F. et al. (2005). Climate Change Perspective in Pakistan. Pakistan Journal of Meteorology. 2(2). pp. 11–21
- » Asian Development Bank (2017a): Mainstreaming Climate Risk Management into Urban Infrastructure Investments through Urban Resilience Assessments (URAs), Peshawar City, Khyber Pakhtunkhwa, Pakistan (UCCRTF TA-8913 PAK).
- » Asian Development Bank (2017b). Climate Change Operational Framework 2017-2030: Enhancing Actions for Low Greenhouse Gas Emissions and Climate-Resilient Development, Retrieved from: <https://www.adb.org/sites/default/files/institutional-document/358881/ccof-2017-2030.pdf>
- » WMO/GWP Associated Programme on Flood Management Pakistan: Lai Nullah basin flood problem, Islamabad – Rawalpindi cities by Ahmed Kamal Federal Flood Commission, Government of Pakistan.

- » 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).
- » ADB, Safeguards Unit for Central & West Asia Department, Environmental Management for Construction Handbook.
- » Asian Development Bank (2017c). Climate Change Profile of Pakistan. ISBN 978-92-9257-721-6 (Print), 978-92-9257-722-3 (e-ISBN). Publication Stock No. TCS178761. DOI: <http://dx.doi.org/10.22617/TCS178761>. Retrieved from: <https://www.adb.org/sites/default/files/publication/357876/climate-change-profile-pakistan.pdf>
- » Asian Development Bank (2014). Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and Pacific
- » National Disaster Management Authority 2008: Seismic Zoning Map of Pakistan
- » EIA for Priority Projects for Urban Development in Sialkot
- » <https://www.worldbank.org/en/news/press-release/2022/10/28/pakistan-flood-damages-and-economic-losses-over-usd-30-billion-and-reconstruction-needs-over-usd-16-billion-new-assessme>
- » 2017 District census report of Rawalpindi. Census publication. Islamabad: Population Census Organization, Statistics Division, Government of Pakistan.
- » Chaudhry, Q. Z. et al. (2009). Climate Change Indicators of Pakistan. Technical Report. No. 22. Islamabad: Pakistan Meteorological Department.
- » IPCC (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- » Rehman, N., Adnan, M. and Ali, S. (2018) ‘Assessment of CMIP5 climate models over South Asia and climate change projections over Pakistan under representative concentration pathways’, Int. J. Global Warming, Vol. 16, No. 4, pp.381–415.

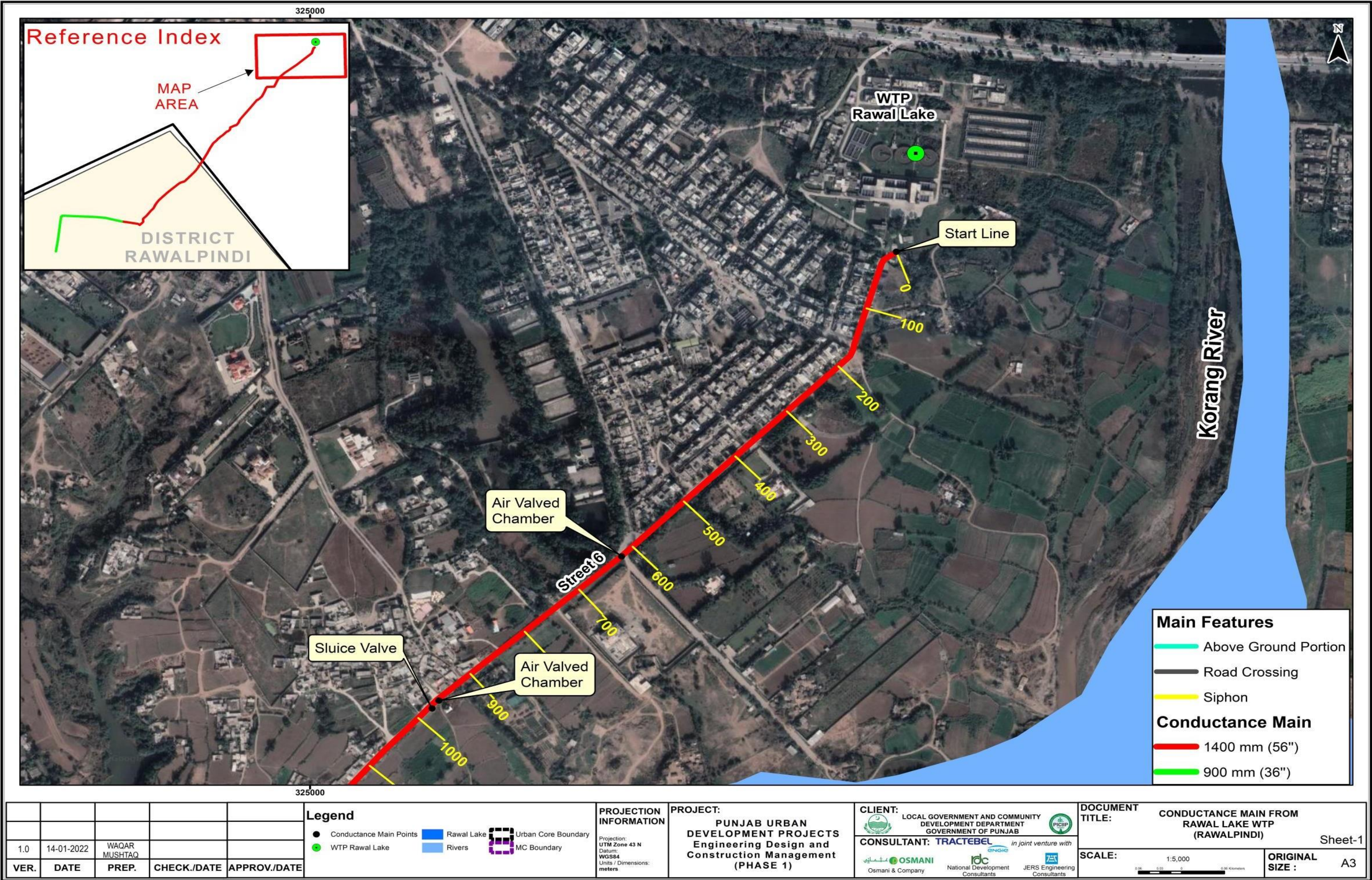
ANNEXURE-I
Layout Plan

ANNEXURE-II

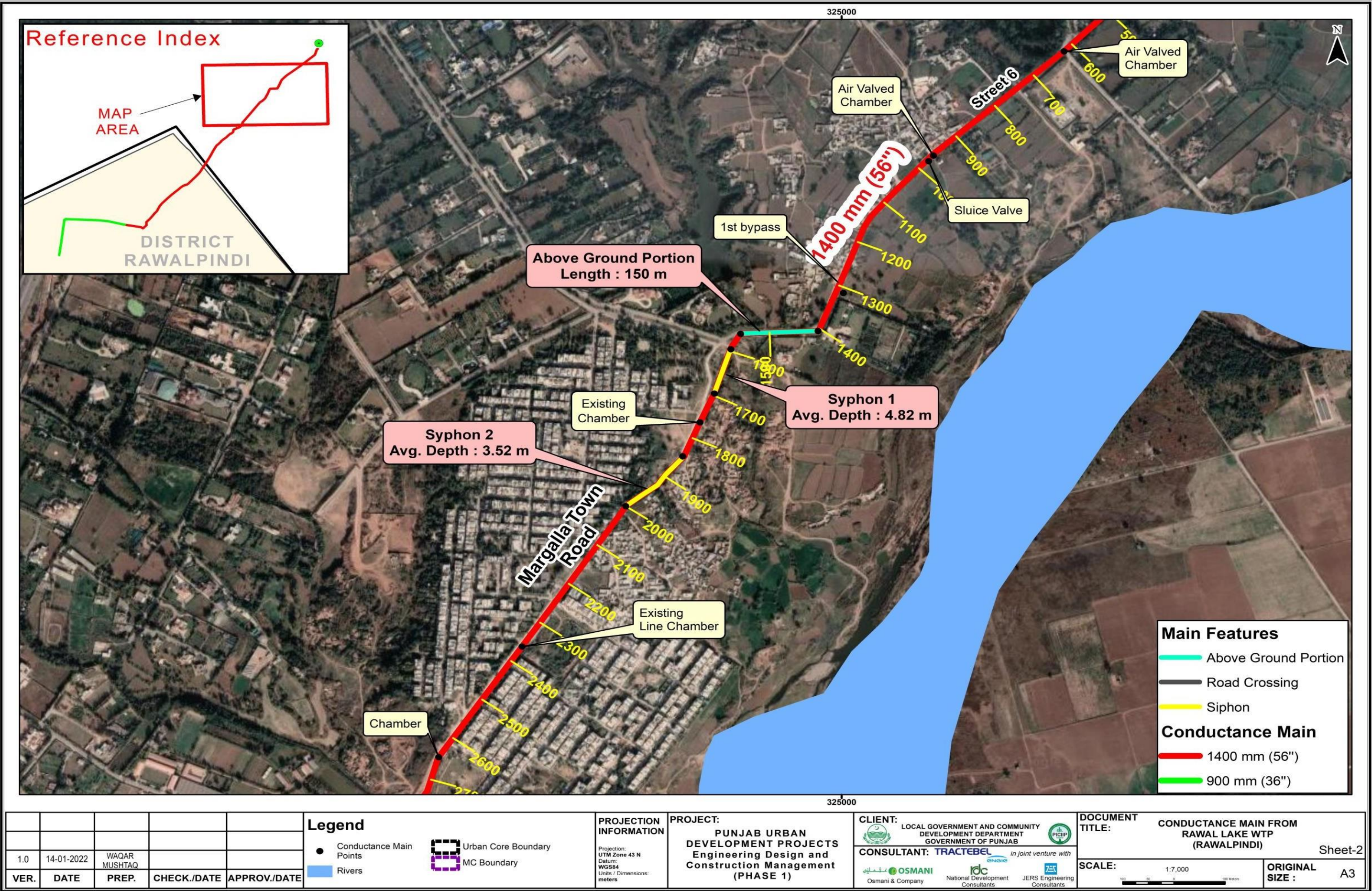
Location Map

ANNEXURE-III

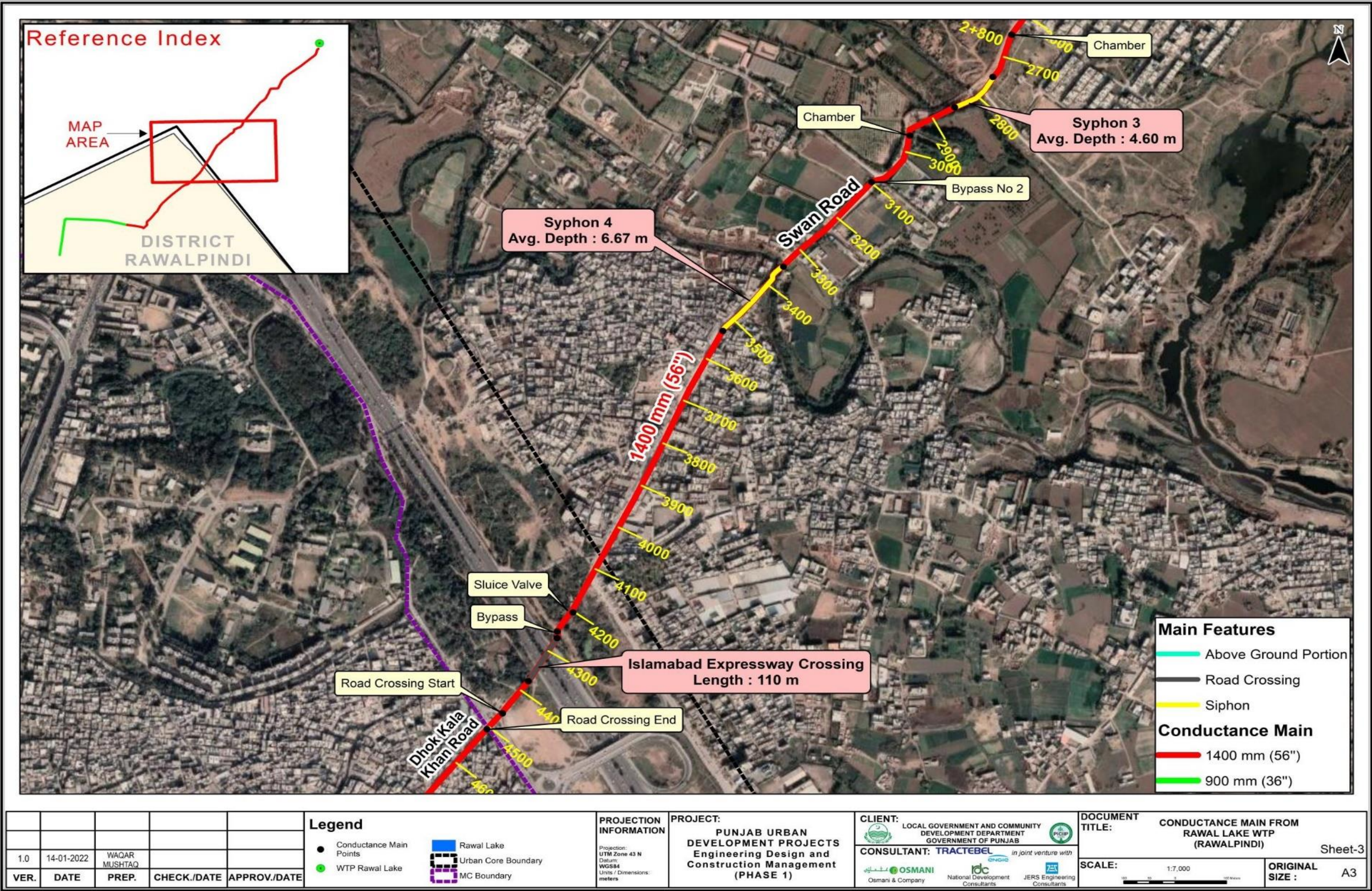
Map for tentative locations of working Chamber and Land Use

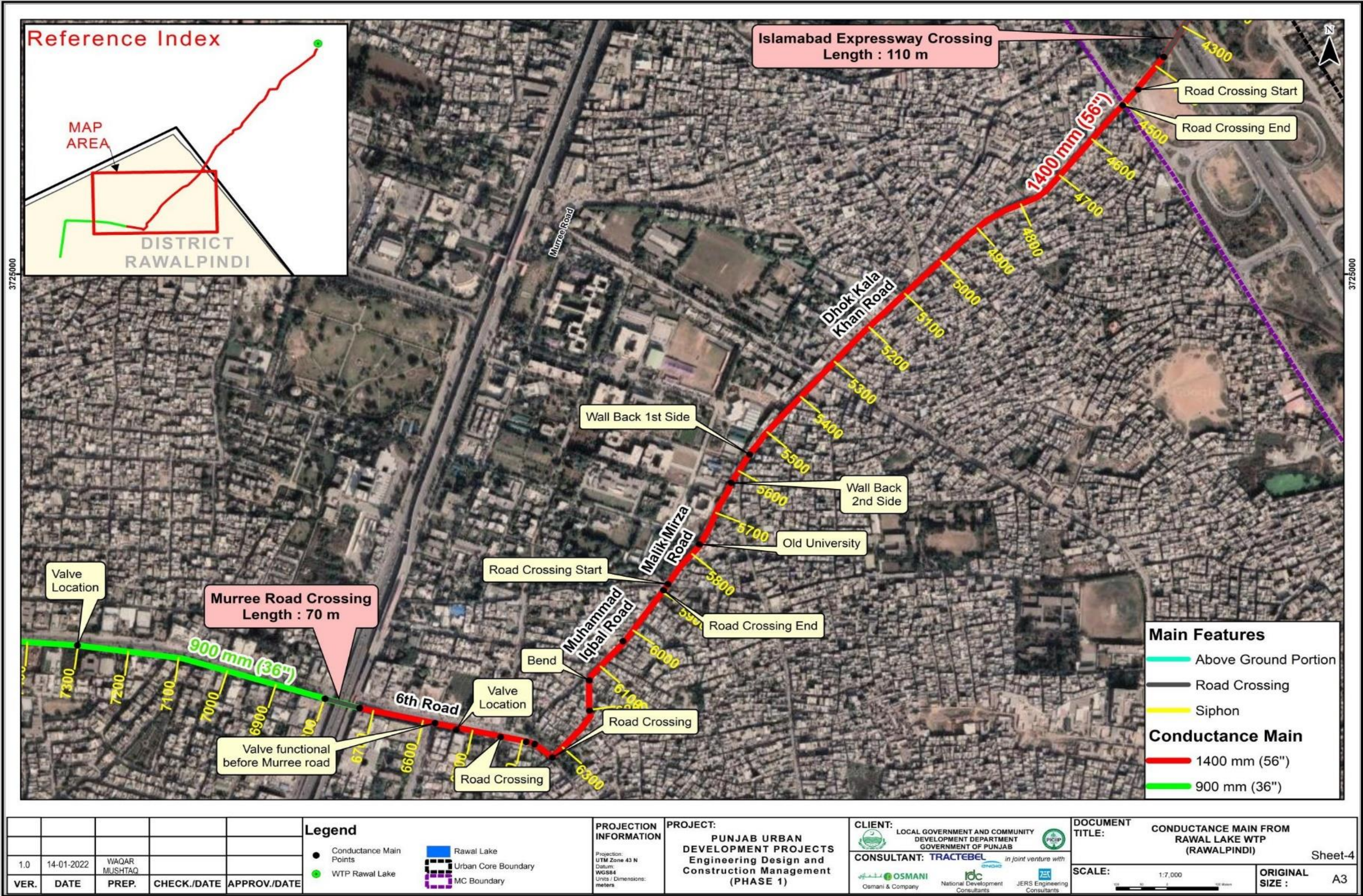


DATA SOURCE: Municipal Corporation
DISCLAIMER: Although great care was taken in the preparation of this map, the authors is not liable for positioning inaccuracies, subsequent updates, errors, or omissions of data. However, suggestions for improvement or error notifications are welcome.



DATA SOURCE: Municipal Corporation
DISCLAIMER: Although great care was taken in the preparation of this map, the authors is not liable for positioning inaccuracies, subsequent updates, errors, or omissions of data. However, suggestions for improvement or error notifications are welcome.





ANNEXURE-IV

IBAT Findings



Integrated Biodiversity Assessment Tool

PROXIMITY REPORT

WTP EXISTING CONDUCTANCE

Country: Pakistan

Location: [33.7, 73.1]

Date of analysis: 21 January 2023 (GMT)

Buffers applied: 1 km | 3 km | 5 km

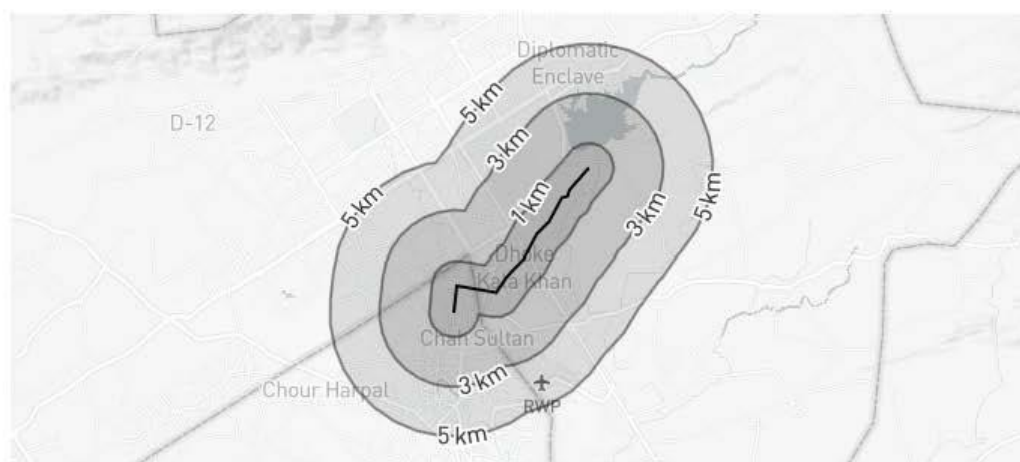
IUCN Red List Biomes: Freshwater, Terrestrial

Generated by: Aziz Karim

Organisation: ADB

Overlaps with:

Protected Areas	0
Key Biodiversity Areas	0
IUCN Red List	49



Displaying project location and buffers: 1 km, 3 km, 5 km





About this report

This report presents the results of [29905-38956] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 3 km, 5 km.

This report is one part of a package generated by IBAT on 21 January 2023 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the [Sensitive Data Access Restrictions Policy for the IUCN Red List](#). This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

- UNEP-WCMC and IUCN, 2023. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - January 2023.
- BirdLife International (on behalf of the KBA Partnership), 2022. Key Biodiversity Areas - November 2022.
- IUCN, 2022. IUCN Red List of Threatened Species - December 2022.
- IUCN. The IUCN Red List of Threatened Species. Version 2019.3. (2019). <https://www.iucnredlist.org>
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarrem, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). <https://doi.org/10.1038/s41586-020-2784-9>





Protected Areas

The following protected areas are found within 1 km, 3 km, 5 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km, 3 km, 5 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No KBAs within buffer distance

IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Glyptothorax kashmirensis		ACTINOPTERYGII	CR	Decreasing	Freshwater
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
Hardella thurjii	Crowned River Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Nilssonia gangetica	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Nilssonia hurum</i>	Indian Peacock Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Schistura afasciata</i>		ACTINOPTERYGII	EN	Decreasing	Freshwater
<i>Oxyura leucocephala</i>	White-headed Duck	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Rynchops albicollis</i>	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Neophron percnopterus</i>	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Falco cherrug</i>	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
<i>Tor putitora</i>		ACTINOPTERYGII	EN	Decreasing	Freshwater
<i>Glyptothorax punjabensis</i>		ACTINOPTERYGII	EN	Decreasing	Freshwater
<i>Glyptothorax stocki</i>		ACTINOPTERYGII	EN	Decreasing	Freshwater
<i>Glyptothorax sufi</i>		ACTINOPTERYGII	EN	Decreasing	Freshwater
<i>Paraschistura nasceri</i>		ACTINOPTERYGII	EN	Decreasing	Freshwater
<i>Manis crassicaudata</i>	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Picrorhiza kurroa	Picrorrhiza	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Tecomella undulata	Desert Teak	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Atropa acuminata	Indian Belladonna	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Trillium govanianum	Himalayan Trillium	LILIOPSIDA	EN	Decreasing	Terrestrial
Pangshura tecta	Indian Roofed Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Wallago attu		ACTINOPTERYGII	VU	Decreasing	Freshwater
Aythya ferina	Common Pochard	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Columba eversmanni	Yellow-eyed Pigeon	AVES	VU	Decreasing	Terrestrial, Freshwater
Sterna aurantia	River Tern	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Clanga clanga	Greater Spotted Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Aquila rapax	Tawny Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Aquila heliaca</i>	Eastern Imperial Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
<i>Lissemys punctata</i>	Indian Flapshell Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
<i>Barilius naseeri</i>		ACTINOPTERYGII	VU	Unknown	Freshwater
<i>Paraschistura alepidota</i>		ACTINOPTERYGII	VU	Decreasing	Freshwater
<i>Schizothorax plagiostomus</i>	Snow Trout	ACTINOPTERYGII	VU	Decreasing	Freshwater
<i>Allopaa barmoachensis</i>	Barmoach Frog	AMPHIBIA	VU	Decreasing	Terrestrial, Freshwater
<i>Triplophysa hazaraensis</i>		ACTINOPTERYGII	VU	Decreasing	Freshwater
<i>Bagarius bagarius</i>		ACTINOPTERYGII	VU	Decreasing	Freshwater
<i>Acinonyx jubatus</i>	Cheetah	MAMMALIA	VU	Decreasing	Terrestrial
<i>Panthera pardus</i>	Leopard	MAMMALIA	VU	Decreasing	Terrestrial
<i>Ursus thibetanus</i>	Asiatic Black Bear	MAMMALIA	VU	Decreasing	Terrestrial
<i>Catreus wallichii</i>	Cheer Pheasant	AVES	VU	Decreasing	Terrestrial
<i>Saxicola macrorhynchus</i>	White-browed Bushchat	AVES	VU	Decreasing	Terrestrial
<i>Ovis vignei</i>	Urial	MAMMALIA	VU	Decreasing	Terrestrial





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ulmus villosa		MAGNOLIOPSIDA	VU	Decreasing	Terrestrial
Paris polyphylla	Love Apple	LILIOPSIDA	VU	Decreasing	Terrestrial
Fritillaria cirrhosa	Yellow Himalayan Fritillary	LILIOPSIDA	VU	Decreasing	Terrestrial





Recommended citation

IBAT Proximity Report. Generated under licence 29905 38956 from the Integrated Biodiversity Assessment Tool on 21 January 2023 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.



ANNEXURE-V
Chance Find Procedure

Archeological 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.

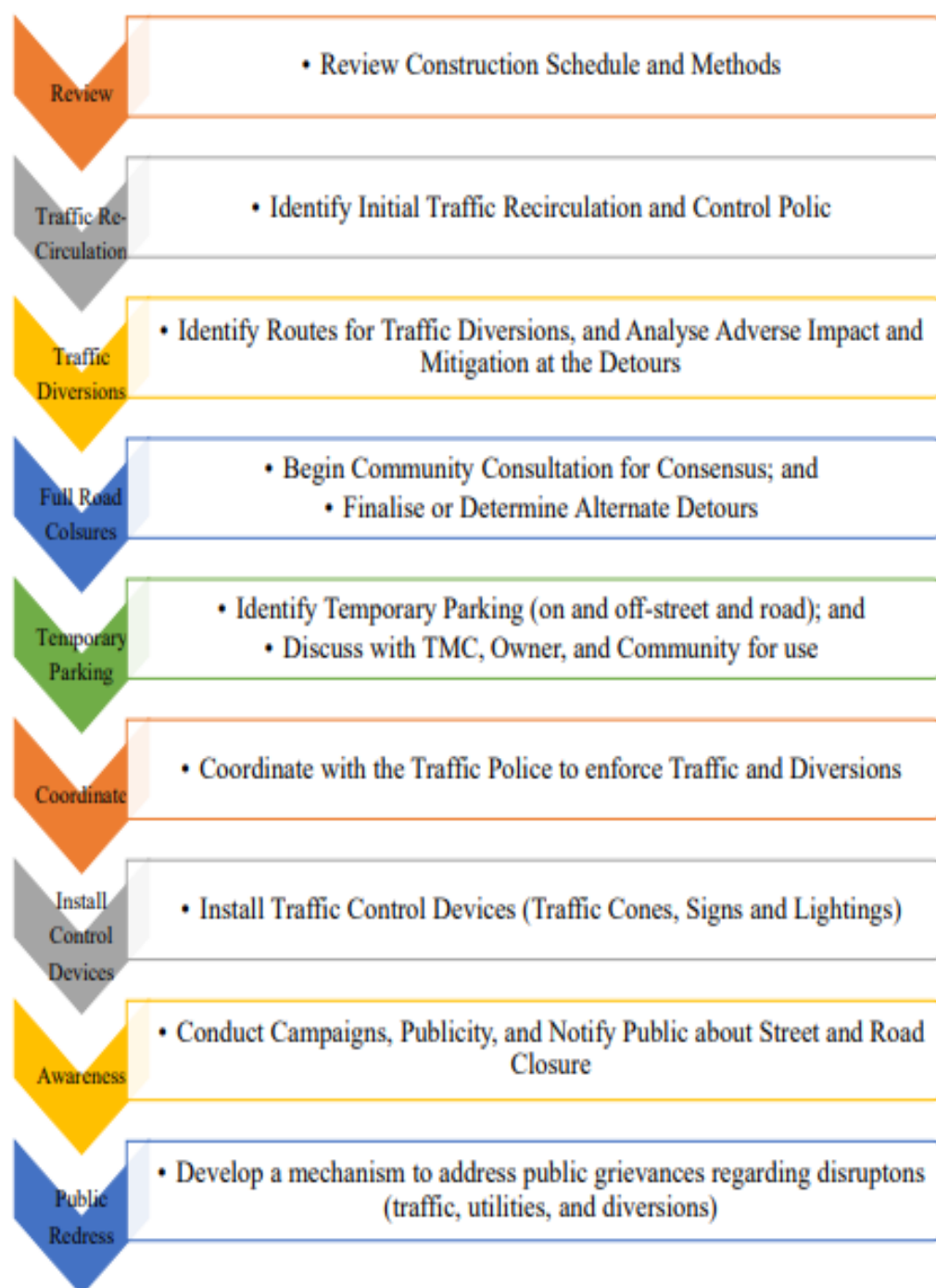


Figure 1: Policy Steps for the TMP

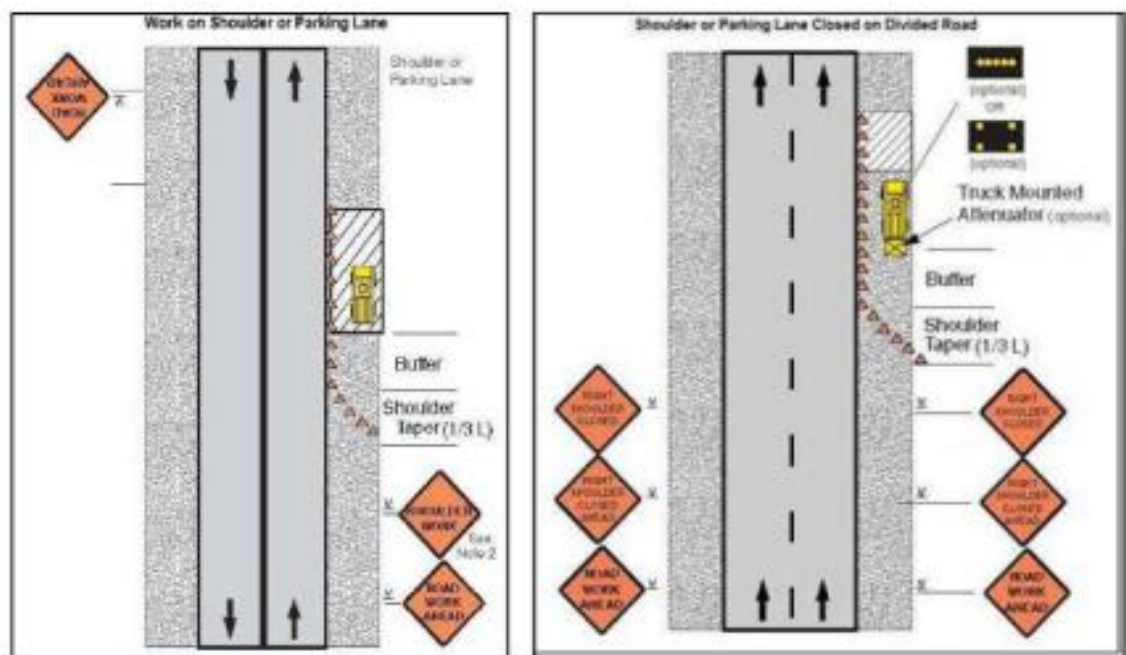


Figure 2: Work on Shoulder and Parking Lane and Shoulder and Parking Lane Closed on Divided Road

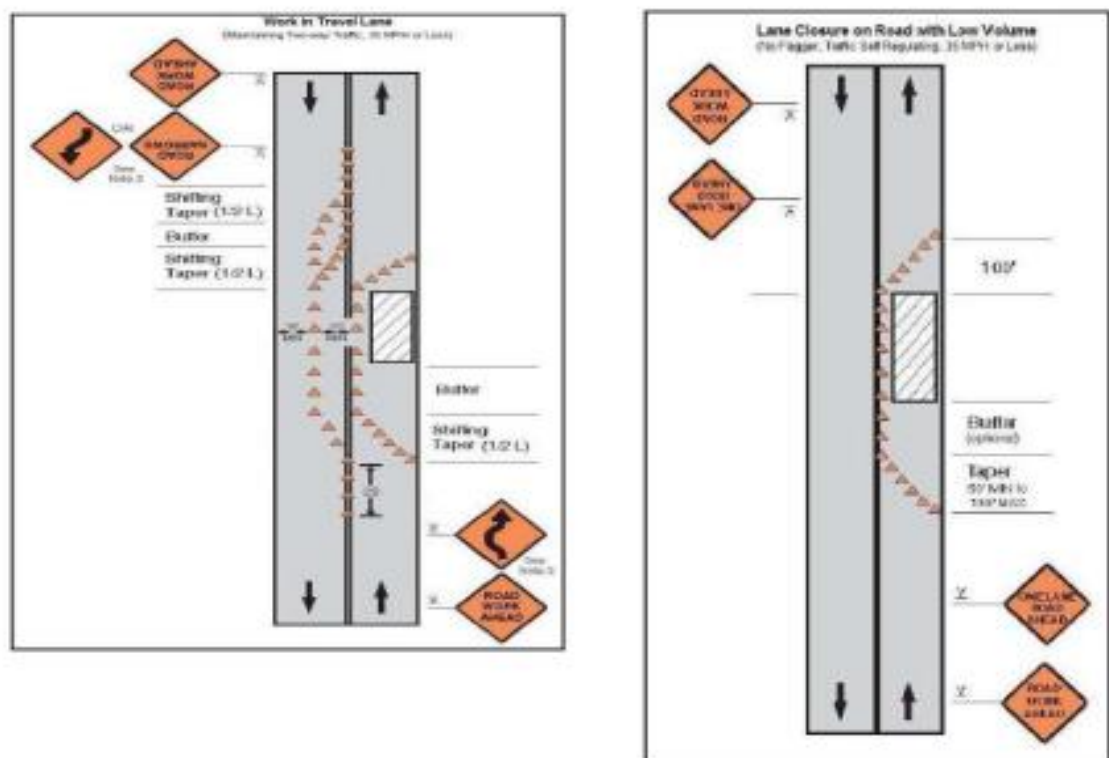


Figure 3: Work in Travel lane and Lane Closure on Road with Low Volume

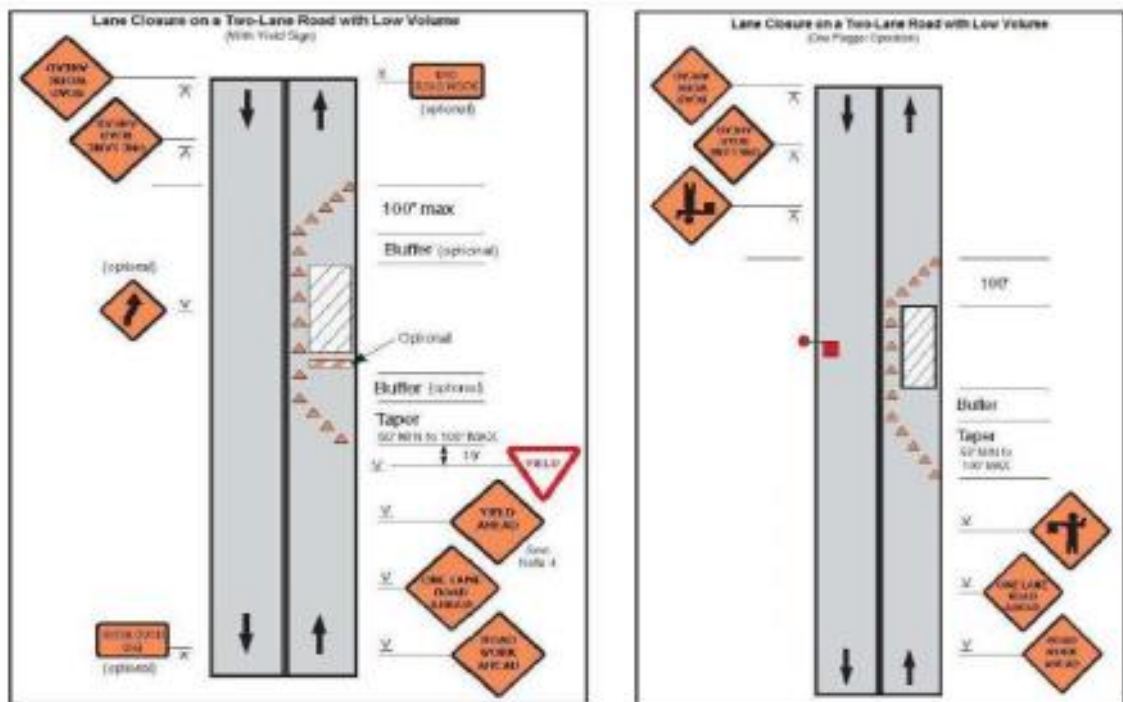


Figure 4: Lane closure on a Two-Line Road with Low Volume (with yield sign) and Lane Closure on a Two-Line Road with Low Volume (one flagger operation)

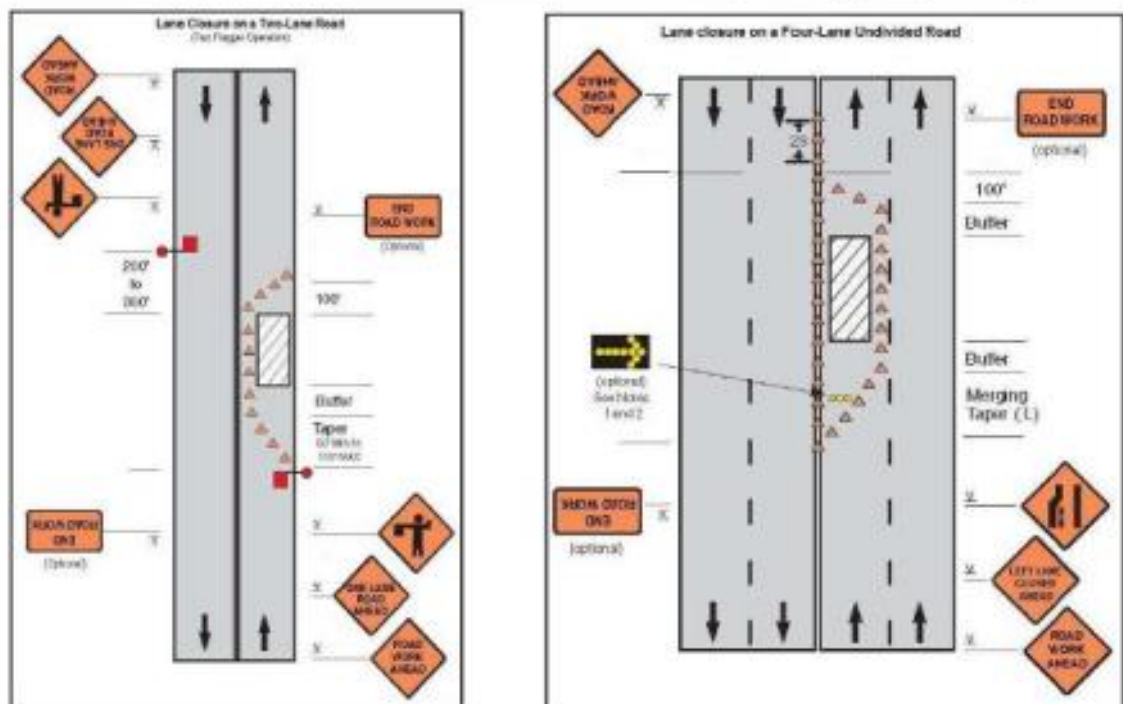


Figure 5: Lane Closure on a Two Lane Road (two flagger operation) and Lane Closure on a Four Lane Undivided Road

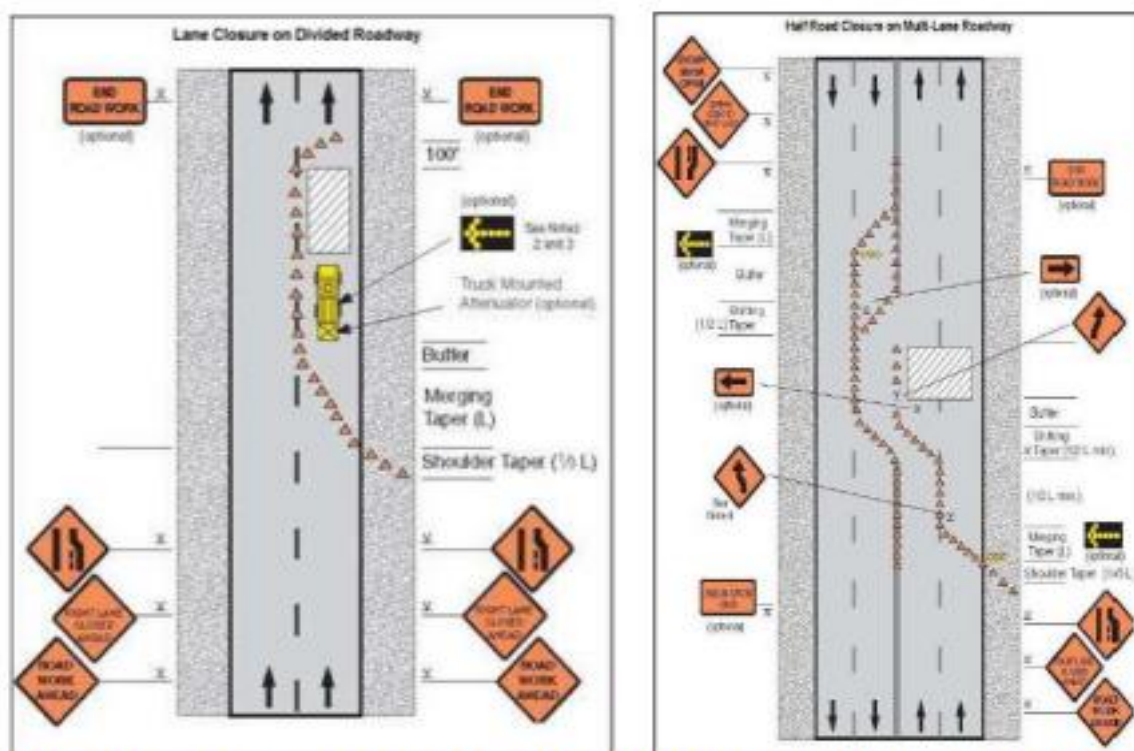


Figure 6: Lane Closure on Divided Roadway and Half Road Closure on Multi-Lane Roadway

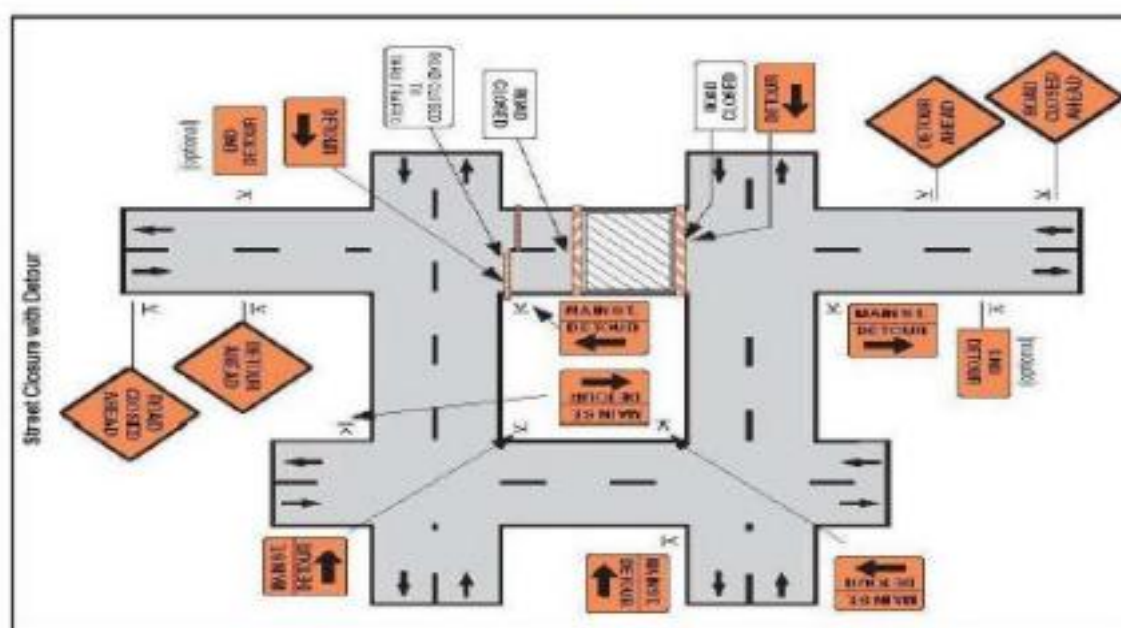


Figure 7: Street and Road Closure with Detour

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;
- Map for tentative locations of working Chamber and Land Use 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 Conservation 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 weather 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 matters 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: <u>REHABILITATION OF CONDUCTANCE MAIN FROM RAWAL LAKE TO SUFAID TANKI, RAWALPINDI</u>					
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. 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.
- v. When any person identifies an emergency situation, or the potential for an emergency situation, and reports it to the ERC, the ERC will then activate the Emergency Response Team.
- vi. The supervision consultant shall be notified in writing within 24 hours of any emergency situation.

1.5.1 On Site Person In-charge

The Contractor's on-site in-charge shall be responsible for handling emergency situations for concerned site. He will act as Emergency Response Coordinator (ERC) and shall be responsible for ensuring that all subcontractors, staff, on-site visitors and others adhere to the appropriate emergency response procedures as stated in this Plan.

1.5.2 Emergency Response Team (ERT)

Emergency Response Team shall be formed at all camps, each team comprised of 3 or 5 members including and lead by the ER Coordinator or the concerned person in-charge. All the members of the ER Team shall be trained in basic First Aid, search & rescue and firefighting; that will further provide search& rescue, first aid and arrange transportation in case of accidents and emergencies, and extinguish fires, guide workers and staff to assembly points and other safe places. The ERT shall assist the ER Coordinator in accidents investigation. The contact details of the ERTs shall be posted at prominent places so that all workers are aware of them.

Project Manager	Person Incharge (ERT)
Environmental/HSE Manager	HSE Coordinator (ERT)
Admin / Labour Team Lead	ERT Team Member

1.5.3 Safety Training

On-site induction, Tool Box Talks (TBT), trainings shall be organized by the Emergency Response Coordinator/ HSE Officer/ Engineer regarding the health & Safety measures from potential and existing hazards, environmental protection, etc. New workers and staff shall be orientated regarding their work and the potential hazards, and safety from them. All trainings shall be recorded and communicated to the Supervision Consultant.

1.5.4 Site Inspections

The concerned HSE Officer/Engineer shall visit and inspect all the worksites, plants, machines, workshops, laboratories, working platforms, safety equipment etc., on regular basis, record and notify findings to the concerned Project Manager/ person in- charge. In- case of any observations i.e. unsafe equipment, un-safe acts, violations, absence of safety equipment, etc. required control and mitigation measures must be communicated to the concerned person Incharge and workers/staff must implement those measures immediately.

1.5.5 First Aid Post / Box

First aid post shall be established at all camps & plants or first aid box provided as per the requirement. The concerned ERTs shall be trained in basic first aid. The first aid post/ or the facilities where first aid box are kept shall be indicated prominently.

1.6 Emergency Response Procedures

1.6.1 Fire

Fire is a major cause of deaths, disabilities and deaths at house hold and work-places. Most of ten fires are caused by in appropriate and unsafe use of materials and equipment. All personnel at camp and plants shall be trained in fire safety and use of fire Extinguishers. Fire extinguishers, no Smoking signs etc. shall be installed at all camps, offices, plants, stores,

fueling stations, workshops etc. In case of fire, areas with potential to be affected shall be evacuated immediately and gathered at the assembly point, or any other safe zone. The ERTs shall be activated. The fire if at initial stages shall be extinguished with keeping in view personnel safety of employees/ workers at priority. The emergency services i.e. fire brigade, rescue 1122 shall be called immediately. All the fire safety equipment and signs shall be regularly inspected and maintained. The reasons for accidents shall be recorded; mitigation or control measures designed and communicated to all employees. The situation must be recorded and reported to the Supervision Consultant within 24 hours of the incident.

1.6.2 Road Traffic Accidents (RTA)

All the drivers at site shall be made aware regarding safe driving practices at the active construction site, borrow areas, camps to avoid accidents. All the drivers shall be trained, motivated and enforced in use of seat belt, obeying speed limit and traffic signs i.e. diversion, speed limits, U-turns, etc. which shall be installed at all required locations. In case of any RTA the concerned ERTs shall be activated; first aid shall be provided to injured person (God Forbid) if any on the spot, transported to the nearest emergency medical facility or the first aid post at the nearest concerned camp. The concerned ER Coordinator or the person in-charge shall be informed immediately. The reasons for accidents shall be investigated, recorded; mitigation or control measures designed and communicated to all employees through a series of trainings, orientations. The situation must be recorded and reported to the Assistant to Employer Representative (AER).

1.6.3 Materials / Effluents Spills

Spillage of liquids hazardous to workers' health, wild life and property shall be avoided. Concerned workers shall be trained in proper and safe handling of such materials. PPEs shall be provided and their use enforced on the concerned workers. In case of liquids and effluents spills the spills must be controlled through spill control kit, collected and properly disposed which does not affect human or wild life. Spillage of significant amount shall be recorded and reported. Concerned workers shall be orientated on the findings of the reasons for spillage and control measures.

1.6.4 Natural Disasters

Since the project area in view of the past weather record is not subject and vulnerable to torrential rains, floods, earthquake; however, the camps shall be established at safe places, and in case of torrential rains, floods workers shall be alerted and mobilized to safe places prior to the impact. In case of earthquake all personnel shall evacuate settlements and gather at the assembly point or any other safe place. The ERTs shall be activated. In case of personnel injuries, first aid shall be provided on the spot and causality(s) transported to the nearest emergency medical facility/ hospital. In case of property damage, its causes shall be recorded and reported to the SC.

1.6.5 Occupational Accidents

All the workers and staff at active construction sites, camps, plants, and workshops shall be trained and orientated on occupational health and safety measures. Tool Box Talks (TBT) shall be organized by the concerned HSE Head/Manager, or site in-charge prior to any new activity or activity potentially hazardous. All such activities shall be recorded and reported accordingly. PPEs shall be provided to all workers and they shall be trained in their proper use and maintenance. All measures needed for the health and safety of workers and staff shall be put in place to a safe and healthy working environment. In case of falls from heights, electrocutions, cave-ins, etc., casualty(s); the ERTs shall be activated; they shall provide first aid and transport causality(s) to the nearest emergency medical facility or the concerned nearest camp/ first aid post. Transportation arrangements must be made immediately and the concerned ER Coordinator or person in-charge must be informed immediately. The happening must be recorded and reported to the Assistant to Employer Representative (AER). The incident must be investigated, findings recorded, control measures devised; and communicated to all concerned, in order to avoid such happenings in future. Daily Tool Box Talk Format and Incident Investigation Format are also formatted for the project.

1.6.6 Arsons / Vandals

All the social disputes among the contractor and workers, subcontractors, and community shall be settled peacefully, with mutual consensus; however, in case of unpleasant situations safety of the workers and staff shall be the priority, and the nearest police station shall be

informed to protect employees. Social framework agreements may be signed to sort out the community matters if any.

1.6.7 Terrorist Attacks

Contractor's own security system will be launched to provide the Security to staff workers and labors and visitors and also security for foreigners, who shall escort them at all construction sites, plants and camps or wherever they move. No foreigners shall be allowed to move outside work areas without Police escort. For security, the contractors have also arranged private security to protect worksites, stores and camps at day and night and prevent, unauthorized trespassing. In case of any terrorist attack (God forbid), safety of the workers and staff shall be the prime priority; however, they shall be trained to protect themselves and seek and move to safe places, moreover the nearest Police/ Elite Force station shall be notified immediately for additional security and further safety.

1.6.8 Emergency Contact Number

Emergency Response personnel/Team will be available during the whole Project and will be utilized to assist during emergency situations or provide first aid as needed.

Project Manager	Person Incharge (ERT)
Environmental/ HSE Manager	HSE Coordinator (ERT)
Admin / Labour Team Lead	ERT Team Member

In case of any emergency, Safety Manager or designated person will be authorized to Contact the external public safety agencies/emergency services. Following are the contacts of emergency services.

Fire	16
Police	15
Edhi Rescuer	115

1.7 Fire Prevention and Fire Fighting

1.7.1 Purpose

The purpose of this procedure is to highlight the fire hazards, precautions and suppression facilities required for the Projects. The responsibilities of various staff for this purpose are stated in the table below:

Sr. No.	Staff	Responsibilities
1	Construction Manager	Ensures that procedure is understood and being applied appropriately.
2	Site Health, Safety and Environment Staff	Responsible for the improvement of this procedure and monitoring compliance and introducing whatever training is required for fire teams, fire wardens and personnel.
3	HSE Supervisors	Office and Camp “FIRE ACTION” notices are displayed at strategic locations, and that sufficient “Emergency Assembly Points” are set up, and regular practice evacuation drills are performed. A number of office/ camp staff are being assigned with the responsibility to act as fire wardens Office/camp staff (in particular new starts) has been briefed and keeps updated on fire and emergency response procedures. Awareness to control flammable materials being used on the premises. Daily checks of the office to ensure that walkways are not blocked, carpet and other fittings are properly secured, fire doors kept closed and that the means of escape are available. Kitchen areas are being monitored to ensure that electrical fittings have been turned off after use and do not present a fire hazard. Training for the use of fire extinguishers has been to staff/workers and signs have been displayed on various locations indicating the emergency procedures. ‘No Smoking’ policy applies in the Meetings/conference rooms. Common social areas, mess halls and toilets, within the camp, are checked before closure of possible ignition sources following each meal time and at end of evening.
4	E & M (Electrical and Mechanical) Manager	E & M Manager shall ensure that the following control measures are in place: • Workshops are maintained in a neat and tidy manner and that waste oil, rags and other flammable materials are removed at the end of each shift or as necessary. • Maintenance crews are properly trained for the use of fire extinguishers, raising the alarm and fire hazards on the work place. • Battery recharging will be conducted in well ventilated separate areas, with no smoking signs and fire extinguishers in place

		• Areas around pedestal grinders and other hot work type activities are kept free of combustibles. • Welding and burning shall be screened and controlled to prevent fire risk and exposure to personnel • That flammable liquid such as gasoline, diesel etc. are not used for cleaning purposes and their container is marked as per the containment. • Provision of adequate storage areas that are located in places where exits, passage ways and stairways are not adversely affected • Flammable liquids are stored safely, in a neat and tidy manner with adequate HSE signs provided
--	--	---

1.7.2 Cutting and Welding

Particular care will be taken while carrying out hot work operations on the locations where combustibles are available. This will include precautions such as; inspection of the surrounding area, removal of any combustible materials, protection by fire blankets and provision of fire extinguishers.

Compressed gas cylinders shall be closed when not in use, and shall be stored, properly secured and used in an upright position at all times. Protective end caps will be fitted when being moved or transported (unless by cylinder trolleys).

Compressed gas cylinders shall be kept clear of electrical equipment and cabling where they are part of an electrical circuit

1.8 Hazard Analysis and Risk Management

Hazard Analysis and Risk management techniques shall be adopted so that potential hazards are identified and evaluated prior to execution, thereby enabling either substitution or adoption of control techniques.

1.8.1 Purpose

To ensure that all steps are taken to control hazards identified in a job and provide a safe working environment.

1.8.2 Typical Hazards

Following are examples of typical hazards that can be encountered:

- Falling objects
- Welding
- Gas cutting
- Grinding
- Erection of steel work
- Installation of pipeline etc.
- Transportation / Lifting of heavy equipment
- Excavation Work

1.8.3 Control Hazard

The hierarchy of Risk/Hazard Control is used to determine risk reduction measure in order of their effectiveness, as follows:

- Elimination or substitution of the task / job step or substance.
- Engineering Control Including guarding and mechanical aids such as scaffolding, extraction ventilation and alike.
- Administrative Controls Including permits, training, signage, reduction in time or personnel exposure personal Protective Equipment

1.9 Personal Protective Equipment

1.9.1 Purpose

This procedure has been developed to ensure that all site personnel on the project are provided with, and wear or hold, appropriate Personal Protective Equipment (PPE) to protect them against work related hazards which may endanger their health, safety and environment.

1.9.2 Scope

This procedure applies to all contractor personnel employed including all of Sub- contractor's deployed at the project.

1.9.3 Definitions

Personal Protective Equipment is defined as equipment designed to be worn or held by personnel to protect themselves against work related hazards which may endanger their health and safety.

1.9.4 Instructions

The risks posed in any particular work activity shall be assessed, and adequate PPE selected in accordance with the following criteria:

- Gives protection against risk(s) without itself leading to any increased risk is suitable for the personnel involved in the work including correct fitting. Is compatible with the work activity.

1.9.5 Basic Personal Protective Equipment (PPE)

Basic and minimum PPE requirements for the safe execution of proposed project are as:

- Safety helmet of plastic construction, manufactured in accordance with standard.
- Safety footwear with steel toe protection manufactured in accordance with standard.
- The construction and sole materials shall be chosen in accordance with the activity and adequate for the place of work.
- In addition to above, EPC contractor shall also supply coveralls to employees working in workshops.

1.9.5.1 Eye and Face Protection

Suitable protective goggles, face shield or screens shall be worn by personnel involved in, assisting with or adjacent to any activity where there may be a danger of projected debris, dust, sparks or other particles; corrosive fluids or mists; excessive heat, light or other harmful radiation.

1.9.5.2 Respiratory Protection

Respiratory Protective Equipment shall be available to all persons who are exposed to any situation in which there is a possibility of the atmosphere being or becoming deficient in oxygen or containing any harmful substance, whether particle, dust mist, vapors or gas.

1.9.5.3 Hearing Protection

Hearing protection shall be made available to all workers exposed to noise levels of 85 dB (A) or above. The selection of type of protection shall be in accordance with the type of noise hazard and the work being performed. In all work environments where the noise level is at or above 85 dB (A), prominent signs in English and in local language shall be displayed indicating the need for ear protection. A visual sign in the form of a line drawing of ear muffs shall also be displayed.

1.9.5.4 Hand and Arm Protection

Adequate hand and arm protection shall be available for all manual labour. The type of protection worn shall be selected according to the hazard to be protected against. These include but not limited to:

- Impacts, cuts, abrasions and infections.
- Extreme temperatures.
- Chemical, toxic, corrosive and other hazardous substances.

WORK ACTIVITIES	SUITABLE PPE
Excavators, breakers, Chippers, drillers.	Protective goggles, hand gloves, Safety helmets and Safety shoes.
Mixing cement, concrete, Lime mortar, asphalt material, refractory material.	Safety goggles, gloves and protective foot wears.
Electricians	Insulated tools, Rubber hand gloves and electrical resistant shoes, mat.
Grinders	Protective goggles and leather hand gloves
Gas cutters, welder's helper	Colored goggles, leather hand gloves.
Welders	Welding screen, safety shoes with rubber sole, Leather hand gloves.
Workers engaged in	Dust mask, hand gloves
High noise level area i.e. D.G operator working, near piling work, compressor operator etc.	Ear plug / ear muff
Working in dusty	Dust mask, Safety goggles.

1.9.5.5 Harnesses

Harnesses shall be provided, worn and properly secured in all work situations, when other safeguards such as nets, planking, or scaffolding cannot be used. Such situations include, but are not limited to:

- Working on scaffolding.

- Work on any high structure, whether in construction or batching plant site.

1.9.5.6 Transportation

Only vehicles necessary to the construction operation shall be permitted on site.

- It shall be ensured that only authorized and competent personnel are allowed to drive vehicles.
- Loads shall be within the safe weight limit for the vehicle and shall not project beyond the vehicle body in such a manner as to present a hazard to other vehicles, pedestrians or adjacent structures.
- Passengers shall not be carried unless a proper seat is provided.
- Personnel shall not get on or off any vehicle whilst it is in motion.
- All vehicles shall be parked on level ground with the hand brake applied.
- Keys shall be left in the ignition unless at an authorized car park.
- Vehicles shall not block access or emergency points.
- All drivers of vehicles shall be in possession of a valid license for the class of vehicle.
- All drivers shall go through an orientation before entering the site.
- Vehicle Inspection is attached as Annex “A”.

1.9.5.7 Speed Limits

During the project laid down speed limits for the vehicles will be strictly observed.

1.9.5.8 Drivers’ Responsibilities

Drivers’ responsibilities include:

- Take responsibility for the vehicle, the load and passengers being carried.
- Checking of the vehicle prior to the start of the journey.
- Ensuring that all personnel in the vehicle are wearing seat belts.
- Shall not pick up unauthorized persons.

Annex-A**MOTOR VEHICLE WEEKLY SAFETY CHECKLIST**

Department: _____

Vehicle Make: _____ Model: _____ V.I.N.# _____

vii.

Do not operate any vehicle if an unsafe condition exists.	Inspection Date: / /	Inspection Date: / /	Inspection Date: / /	Inspection Date: / /	Inspection Date: / /
	Inspected By:	Inspected By:	Inspected By:	Inspected By:	Inspected By:
Windshield wipers and washers					
Directional Signals					
Lights					
Horn and Mirrors					
Inspection sticker current					
Tag current					
Check for 4000 mile maintenance					
Tire inflation and safe tread depth					
Power steering fluid					
Antifreeze / Coolant					
Motor oil level					
Brake fluid & Brake operation					
Exterior and Interior condition acceptable					
Transmission Fluid & Hydraulics (if applic.)					

Comments: _____

ANNEXURE-X
Dust Management Plan

Dust Management Plan

General

This plan is prepared for the project "Replacement of Existing Conductance Main from Rawal Lake Filtration Plant to Water Works (Sufaid Tanki). 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 laying 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.

Decision makers should consider the following:

1. **Purpose** of mask use: the rationale and reason for mask use should be clear—whether it is to be used for source control (used by infected persons) or prevention of COVID-19 (used by healthy persons)
2. Risk of **exposure** to the COVID-19 virus in the local context:
 - The population: current epidemiology about how widely the virus is circulating (e.g., clusters of cases versus community transmission), as well as local surveillance and testing capacity (e.g., contact tracing and follow up, ability to carry out testing).
 - The individual: working in close contact with public (e.g., community health worker, cashier)
3. **Vulnerability** of the person/population to develop severe disease or be at higher risk of death, e.g. people with comorbidities, such as cardiovascular disease or diabetes mellitus, and older people

4. **Setting** in which the population lives in terms of population density, the ability to carry out physical distancing (e.g. on a crowded bus), and risk of rapid spread (e.g. closed settings, slums, camps/camp-like settings).
5. **Feasibility**: availability and costs of the mask, and tolerability by individuals
6. **Type** of mask: medical mask versus nonmedical mask (see below)

In addition to these factors, potential advantages of the use of mask by healthy people in the community setting include reducing potential exposure risk from infected person during the “pre-symptomatic” period and stigmatization of individuals wearing mask for source control.

However, the following potential risks should be carefully taken into account in any decision-making process:

- self-contamination that can occur by touching and reusing contaminated mask
- depending on type of mask used, potential breathing difficulties
- false sense of security, leading to potentially less adherence to other preventive measures such as physical distancing and hand hygiene
- diversion of mask supplies and consequent shortage of mask for health care workers
- diversion of resources from effective public health measures, such as hand hygiene

Whatever approach is taken, it is important to develop a strong communication strategy to explain to the population the circumstances, criteria, and reasons for decisions. The population should receive clear instructions on what masks to wear, when and how (see mask management section), and on the importance of continuing to strictly follow all other IPC measures (e.g., hand hygiene, physical distancing, and others).

Type of Mask

WHO stresses that it is critical that medical masks and respirators be prioritized for health care workers.

The use of masks made of other materials (e.g., cotton fabric), also known as nonmedical masks, in the community setting has not been well evaluated. There is no current evidence to make a recommendation for or against their use in this setting.

WHO is collaborating with research and development partners to better understand the effectiveness and efficiency of nonmedical masks. WHO is also strongly encouraging countries that issue recommendations for the use of masks in healthy people in the community to conduct research on this critical topic. WHO will update its guidance when new evidence becomes available.

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.

References

1. Water, sanitation, hygiene and waste management for COVID-19 <https://www.who.int/publications-detail/water-sanitation-hygiene-and-waste-management-for-covid-19>
2. Coronavirus disease 2019 (COVID-19) Situation Report – 73. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7_6
3. Yu P, Zhu J, Zhang Z, Han Y. A familial cluster of infection associated with the 2019 novel coronavirus indicating possible person-to-person transmission during the incubation period. *J Infect* 2020 doi:10.1093/jiaa077
4. Huang R, Xia J, Chen Y, Shan C, Wu C. A family cluster of SARS-CoV-2 infection involving 11 patients in Nanjing, China *Lancet Infect Dis* 2020 doi: 10.1016/S1473-3099(20)30147-X
5. Pan X, Chen D, Xia Y et al. Asymptomatic cases in a family cluster with SARS-CoV-2 infection. *Lancet Infect Dis* 2020 doi: 10.1016/S1473-3099(20)30114-6.
6. Tong Z-D, Tang A, Li K-F, Li P, Wang H-L, Yi J-P, et al. Potential presymptomatic transmission of SARS-CoV-2, Zhejiang Province, China, 2020. *Emerg Infect Dis.* 2020 doi: 10.3201/eid2605.200198
7. Wei WE, Li Z, Chiew CJ, Yong SE, et al. Presymptomatic Transmission of SARS-CoV-2 — Singapore, January 23–March 16, 2020. *MMWR*, 1 April 2020/69.
8. Kimball A, Hatfield KM, Arons M, James A, et al. Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility — King County, Washington, March 2020. *MMWR*, 3 April 2020, 69(13);377–381.
9. WorldHealthOrganization.ReportoftheWHO-ChinaJointMissiononCoronavirusDisease2019(COVID-19) 16-24 February 2020 [Internet]. Geneva: World Health Organization; 2020 Available from: <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>
10. Wei WE, Li Z, Chiew CJ, Yong SE, et al. Presymptomatic Transmission of SARS-CoV-2 — Singapore, January 23–March 16, 2020. *MMWR*, 1 April 2020/69.
11. World Health Organization. [Infection prevention and control during health care when COVID-19 is suspected: interim guidance](#), (accessed 29 January 2020).
12. World Health Organization. [Home care for patients with COVID-19 presenting with mild symptoms and management of contacts: interim guidance](#) (accessed 29 January 2020)
13. Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care. *Geneva*: World Health Organization; 2014 (https://apps.who.int/iris/bitstream/handle/10665/112656/9789241507134_eng.pdf, accessed 17 January 2020).
14. Aiello AE, Coulborn RM, Perez V, et al. A randomized intervention trial of mask use and hand hygiene to reduce seasonal influenza-like illness and influenza infections among young adults in a university setting. *International Journal of Infectious Diseases* 2010;14:E320-E20. doi: 10.1016/j.ijid.2010.02.2201
15. Cowling BJ, Fung ROP, Cheng CKY, et al. Preliminary Findings of a Randomized Trial of Non-Pharmaceutical Interventions to Prevent Influenza Transmission in Households. *Plos One* 2008;3(5) doi: 10.1371/journal.pone.0002101
16. Suess T, Remschmidt C, Schink SB, et al. The role of facemasks and hand hygiene in the prevention of influenza transmission in households: results from a cluster randomised trial; Berlin, Germany, 2009-2011. *BMC Infect Dis* 2012;12:26. doi: 10.1186/1471-2334-12-26.[published Online First: 2012/01/28]
17. Aiello AE, Perez V, Coulborn RM, et al. Facemasks, hand hygiene, and influenza among young adults: a randomized intervention trial. *PLoS One* 2012;7(1):e29744. doi:10.1371/journal.pone.0029744. Epub 2012 Jan 25. [published Online First: 2012/02/02]
18. Barasheed O, Almasri N, Badahdah AM, et al. Pilot Randomised Controlled Trial to Test Effectiveness of Facemasks in Preventing Influenza-like Illness Transmission among Australian Hajj Pilgrims in 2011. *Infect Disord Drug Targets* 2014;14(2):110-6. doi: 10.2174/1871526514666141021112855 [published Online First: 2014/10/23]
19. Canini L, Andreoletti L, Ferrari P, et al. Surgical mask to prevent influenza transmission in households: a cluster randomized trial. *PLoS One* 2010;5(11):e13998. doi:10.1371/journal.pone.0013998. [published Online First: 2010/11/26]
20. MacIntyre CR, Zhang Y, Chughtai AA, et al. Cluster randomised controlled trial to examine medical mask use as source control for people with respiratory illness. *BMJ Open* 2016;6(12):e012330. doi: 10.1136/bmjopen-2016-012330. [published Online First: 2017/01/01]
21. Lau JT, Tsui H, Lau M, Yang X. SARS transmission, risk factors, and prevention in Hong Kong. *Emerg Infect Dis.* 2004 Apr;10(4):587-92.
22. Wu J, Xu F, Zhou W et al. Risk factors for SARS among persons without known contact with SARS patients, Beijing, China. *Emerg Infect Dis.* 2004 Feb;10(2):210-6.

ANNEXURE-XIII
Template for Site Specific EMP

Guide for Development of SEMP

- **Step 1: Define Boundaries**
- **Step 2: Identify Sensitive Receptors**
- **Step 3: Specify construction activities**
- **Step 4: Conduct Risk Assessment**
- **Step 5: Assign Environment Management measures**
- **Step 6: Prepare Site Plans**
- **Step 7: Prepare Environment Work Plans (if required)**
- **Step 8: Monitoring**

Step 1: The project area needs to be clearly defined.

Step 2: The mapping of sensitive receptors has already been conducted and needs to be presented clearly in a map.

Step 3: The tentative construction activities to be conducted are as follows:

- Site Surveying and Vegetation (Trees and plants) Clearance
- Establishment of Work Camp 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:

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

Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if 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 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)⁷: 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

⁷ADB, 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. Illiterate

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

Environmental Testing & Monitoring Reports



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

AMBIENT AIR MONITORING REPORT




Project Title: Rehabilitation of Conductance Main (SMGD) from Rawal Lake to Sufaid Tanki

Monitoring Point: Near Dhoke Kala Khan

Monitoring Date: 06-12-2022

Monitoring By: SEAL

Address: District Rawalpindi

Time Duration of Monitoring: 24 Hours

Reporting Date: 12-12-2022

Sample ID: SEAL/LAB/2022/AA/001

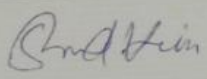
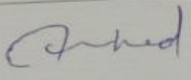
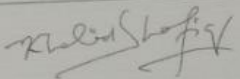
Results:

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM ₁₀)	40 CFR Part 50, App J (US-EPA)	µg/m ³	139.8	150
2	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m ³	5.6	10
3	Oxides of Nitrogen NO _x (NO & NO ₂)	40 CFR Part 50, App F (US-EPA)	µg/m ³	38.4	80
4	Sulphur dioxide SO _x (SO ₂)	EQSA-0197-114 (US-EPA)	µg/m ³	62.5	120

PEQS: Punjab Environmental Quality Standards

Note:

- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiations

ANALYZED BY	REVIEWED BY	APPROVED BY
		
Lab Analyst	Assistant Lab Manager	Lab Manager



HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-976
Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**

EPA CERTIFIED




AMBIENT AIR MONITORING REPORT

Project Title:	Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki	Address:	District Rawalpindi
Monitoring Point:	Near Rawal Lake Water Treatment Plant	Time Duration of Monitoring:	24 Hours
Monitoring Date:	05-12-2022	Reporting Date:	12-12-2022
Monitoring By:	SEAL	Sample ID:	SEAL/LAB/2022/AA/001

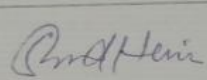
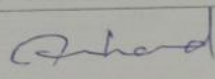
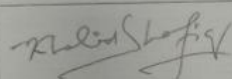
Results:

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM ₁₀)	40 CFR Part 50, App J (US-EPA)	µg/m ³	124.8	150
2	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m ³	4.38	10
3	Oxides of Nitrogen NO _x (NO & NO ₂)	40 CFR Part 50, App F (US-EPA)	µg/m ³	35.6	80
4	Sulphur dioxide SO _x (SO ₂)	EQSA-0197-114 (US-EPA)	µg/m ³	49.4	120

PEQS: Punjab Environmental Quality Standards

Note:

- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiations

ANALYZED BY	REVIEWED BY	APPROVED BY
		
Lab Analyst	Assistant Lab Manager	Lab Manager



HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone E Shahr-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768
Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY




NOISE LEVEL MONITORING REPORT

Project Title:	Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki	Address:	District Rawalpindi
Monitoring Point:	Near Dhoke Kala Khan	Instrument Used:	Digital Sound Level Meter BSWA-308
Monitoring Date:	06-12-2022	Time of Monitoring:	24 Hours
Reporting Date:	12-12-2022	Reference No.:	SEAL/LAB/2022/NM/001
Monitoring By:	SEAL		
Results: -			

Sr. No.	Time	Noise dB(A)		PEQS
1	12:00 PM	65.7		
2	01:00 PM	63.5		
3	02:00 PM	60.8		
4	03:00 PM	64.4		
5	04:00 PM	61.2	Day Time	65
6	05:00 PM	63.7		
7	06:00 PM	58.6		
8	07:00 PM	56.2		
9	08:00 PM	55.6		
10	09:00 PM	52.8		
11	10:00 PM	54.7	Night Time	55
12	11:00 PM	50.2		
13	12:00 AM	48.6		



HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

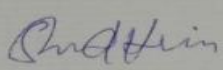
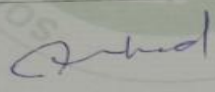
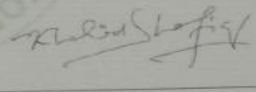
ISO 9001:2015

14	01:00 AM	50.6	Night Time	55
15	02:00 AM	48.5		
16	03:00 AM	52.2		
17	04:00 AM	47.3		
18	05:00 AM	54.6		
19	06:00 AM	62.8		
20	07:00 AM	64.6		
21	08:00 AM	65.0		
22	09:00 AM	61.8	Day Time	65
23	10:00 AM	63.3		
24	11:00 AM	64.5		
Average Noise Level			59.86 dB(A)	

PEQS: Punjab Environmental Quality Standards

Note:

- The average noise levels describe the overall ambient noise levels of the points.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
		
Lab Analyst	Assistant Lab Manager	Lab Manager

OFFICE :
Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone
Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-97
Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**




NOISE LEVEL MONITORING REPORT

Project Title:	Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki	Address:	District Rawalpindi
Monitoring Point:	Near Rawal Lake (WTP)	Instrument Used:	Digital Sound Level Meter BSWA-308
Monitoring Date:	05-12-2022	Time of Monitoring:	24 Hours
Reporting Date:	12-12-2022	Reference No.:	SEAL/LAB/2022/NM/001
Monitoring By:	SEAL		
Results: -			

Sr. No.	Time	Noise dB(A)		PEQS
1	11:00 AM	59.2	Day Time	65
2	12:00 PM	57.4		
3	01:00 PM	60.9		
4	02:00 PM	58.6		
5	03:00 PM	60.2		
6	04:00 PM	57.5		
7	05:00 PM	59.3		
8	06:00 PM	54.1		
9	07:00 PM	53.6		
10	08:00 PM	50.5		
11	09:00 PM	51.1	Night Time	55
12	10:00 PM	49.2		
13	11:00 PM	44.6		



HEAD OFFICE :
 Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat,
 Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
 Email: info@seal.com.pk | nihaasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
 Office No. M-06-07 in Fort Sultan opp. Air Port Telephone
 Shahr-e-Faisal, Karachi, Pakistan. Phone : 92-300-976
 Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**

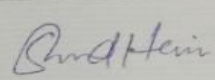
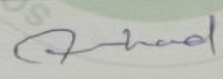
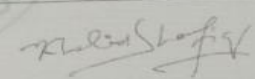



14	12:00 AM	43.5	Night Time	55
15	01:00 AM	44.2		
16	02:00 AM	46.1		
17	03:00 AM	52.5		
18	04:00 AM	54.6		
19	05:00 AM	53.9		
20	06:00 AM	55.8		
21	07:00 AM	64.5		
22	08:00 AM	62.8	Day Time	65
23	09:00 AM	61.3		
24	10:00 AM	62.7		
Average Noise Level			57.31 dB(A)	

PEQS: Punjab Environmental Quality Standards

Note:

- The average noise levels describe the overall ambient noise levels of the points.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
 Lab Analyst	 Assistant Lab Manager	 Lab Manager



HEAD OFFICE :
 Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat,
 Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
 Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

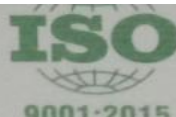
KARACHI OFFICE :
 Office No. M-06-07 in Fort Sultan opp. Air Port Telephone
 Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-97
 Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**

CPA CERTIFIED

GROUND WATER ANALYSIS REPORT

Project Title:	Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki	Address:	District Rawalpindi
Sampling Point:	Tap Water	Location:	Near Dhoke Kala Khan
Sampling Date:	06-12-2022	Nature of Sample:	Ground Water
Sampling By:	SEAL	Date of Completion:	12-12-2022
		Temp. & Humidity	23-27 C° & 50-70 %
		Reference No.:	SEAL/LAB/2022/GW/456

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H ⁺ B	--	7.29	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	326.0	1000
3	Chloride	4500- APHA Cl ⁻ B	mg/l	120.99	250
4	Fluoride	APHA 4500-F ⁻ D	mg/l	0.7	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Non-object.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Non-object.	Unobject.
7	Colour	APHA 2120 B	TCU	1.5	15
8	Nitrate (as NO ₃ ⁻)	APHA 4500-NO ₃ ⁻ E	mg/l	BDL	50
9	Nitrite (as NO ₂ ⁻)	APHA 4500-NO ₂ ⁻ B	mg/l	BDL	3
10	Lead	APHA-Pb B	mg/l	0.01	0.05
11	Total Hardness as CaCO ₃	APHA 2340 C	mg/l	141.96	500
12	Turbidity	APHA 2130 B	NTU	BDL	5
13	Zinc	APHA 3500-Zn B	mg/l	0.3	3
14	Aluminum	APHA 3111 D	mg/l	0.05	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.37	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.08	2
18	Boron	APHA 4500-B C	mg/l	0.045	0.300
19	Barium	APHA 3111 B	mg/l	0.054	0.700

Page 1 of 2



OFFICE :
2, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
info@seal.com.pk | nihalesghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exch. Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY




Project Title: Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki

Sampling Point: Tap Water

Sampling Date: 06-12-2022

Sampling By: SEAL

Address: District Rawalpindi

Location: Near Dhoke Kala Khan

Nature of Sample: Ground Water

Date of Completion: 12-12-2022

Temp. & Humidity: 23-27 C^o & 50-70 %

Reference No.: SEAL/LAB/2022/GW/456

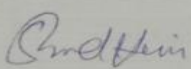
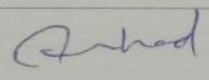
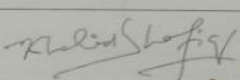
Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.008	0.020
21	Arsenic	APHA 3114 C	mg/l	BDL	0.050
22	Cyanide	APHA 4500-CN ⁻ D	mg/l	0.001	0.05
23	Mercury	APHA 3112	mg/l	BDL	0.001
24	Nickel	APHA 3111 B	mg/l	BDL	0.020
25	Residual Chlorine	APHA 4500-Cl ₂	mg/l	0.31	0.2 – 0.5
26	Total Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

PEQS = Punjab Environmental Quality Standards
BDL (Below Detection Limit)
APHA = American Public Health Association

Note:

- Standard Method for the Examination of Water & Wastewater, 23rd Edition, 2017
- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over samples (if so available) shall be retained for 15 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
		
Lab Analyst	Assistant Lab Manager	Lab Manager



HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Rawalpindi, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihasgashar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange, Shahrah-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**

EPA CERTIFIED




GROUND WATER ANALYSIS REPORT

Project Title:	Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki	Address:	District Rawalpindi
Sampling Point:	Tap Water	Location:	Near Rawal Lake Water Treatment Plant
Sampling Date:	05-12-2022	Nature of Sample:	Ground Water
Sampling By:	SEAL	Date of Completion:	12-12-2022
		Temp. & Humidity	23-27 C ⁰ & 50-70 %
		Reference No.:	SEAL/LAB/2022/GW/455

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H ⁺ B	--	7.18	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	267.0	1000
3	Chloride	4500- APHA Cl ⁻ B	mg/l	9.99	250
4	Fluoride	APHA 4500-F ⁻ D	mg/l	0.7	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Non-object.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Non-object.	Unobject.
7	Colour	APHA 2120 B	TCU	1.5	15
8	Nitrate (as NO ₃ ⁻)	APHA 4500-NO ₃ ⁻ E	mg/l	BDL	50
9	Nitrite (as NO ₂ ⁻)	APHA 4500-NO ₂ ⁻ B	mg/l	BDL	3
10	Lead	APHA-Pb B	mg/l	0.01	0.05
11	Total Hardness as CaCO ₃	APHA 2340 C	mg/l	183.82	500
12	Turbidity	APHA 2130 B	NTU	BDL	5
13	Zinc	APHA 3500-Zn B	mg/l	0.6	3
14	Aluminum	APHA 3111 D	mg/l	0.05	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.37	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.04	2
18	Boron	APHA 4500-B C	mg/l	BDL	0.300
19	Barium	APHA 3111 B	mg/l	BDL	0.700

Page 1 of 2



HEAD OFFICE :
Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
Email: info@seal.com.pk | nihalasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exch Shahr-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT



**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**




Project Title: Rehabilitation of Conductance Main (5MGD) from Rawal Lake to Sufaid Tanki Tap Water

Sampling Point:

Sampling Date: 05-12-2022

Sampling By: SEAL

Address: District Rawalpindi

Location: Near Rawal Lake Water Treatment Plant

Nature of Sample: Ground Water

Date of Completion: 12-12-2022

Temp. & Humidity: 23-27 C° & 50-70 %

Reference No.: SEAL/LAB/2022/GW/455

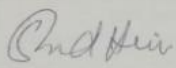
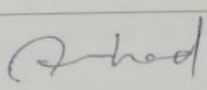
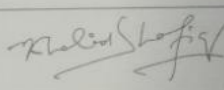
Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.005	0.020
21	Arsenic	APHA 3114 C	mg/l	BDL	0.050
22	Cyanide	APHA 4500-CN D	mg/l	0.001	0.05
23	Mercury	APHA 3112	mg/l	BDL	0.001
24	Nickel	APHA 3111 B	mg/l	BDL	0.020
25	Residual Chlorine	APHA 4500-Cl ₂	mg/l	0.28	0.2 – 0.5
26	Total Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

PEQS = Punjab Environmental Quality Standards
BDL (Below Detection Limit)
APHA = American Public Health Association

Note:

- Standard Method for the Examination of Water & Wastewater, 23rd Edition, 2017
- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over samples (if so available) shall be retained for 15 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
 Lab Analyst	 Assistant Lab Manager	 Lab Manager



HEAD OFFICE :
 Plot # 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore, Pakistan. Phones : +92-42-35922295-96, Fax : +92-42-35922296
 Email: info@seal.com.pk | nihaasghar@gmail.com | hr@seal.com.pk

KARACHI OFFICE :
 Office No. M-06-07 in Fort Sultan opp. Air Port Telephone Exchange Shahr-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
 Email : karachi@seal.com.pk

THIS RECYCLED PAPER PROTECTS OUR ENVIRONMENT

ANNEXURE-XVI
Calibration Certificate of Noise and Air Quality
Measuring Instruments

EPA Certified Lab
EPA/LAB/Certificate-14/2022



Evergreen Calibration & Industrial Services.

Calibration Certificate

Certificate Number : 2837/EGEL/CC/SEAL/2122/K-02

M/s. Evergreen Environmental Laboratory	Date of Issue: 02-08-2022
Address: Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange Shahrah-e-Faisal, Karachi, Pakistan.	Range: CO : 0 to 1 ppm
Description: Carbon Monoxide (CO) Analyzer	Resolution: 0.1ppm
Manufacturer: Teledyne (USA)	Calibration Due: 01-08-2023
Model: M300EU2	S. No: 255

TEMPERATURE: 20 °C ± 2 °C
RELATIVE HUMIDITY: 45% RH ± 10%
CALIBRATION METHOD: Standard Calibration Check Gas

TEST DATA:

Test Description		Criteria	Observation	
Sr. No.	Gas Sensors	Standard Calibration Gases	Instrument Reading	
			Zero	Span
01	CO	0.5 ppb & 30 ppm	0.6 ppb	31 ppm

REPORT: The equipment has been calibrated against standard Gas (Span and Zero) used for Calibration CO Solution of MSA Instrument Division is traceable to international standard of measurement. The instrument was allowed to stabilize before measurements.

REMARKS: It is certified above test data is correct and instrument is in good working conduction.

CALIBRATED BY: _____

TECHNICAL MANAGER: _____

The Calibration interval will vary from customer use and different conditions. Precision Calibration Service is not responsible for future instrument calibration.

This certificate applies only to the item specified and shall not be reproduced except in full, without the written permission of precision calibration service.



Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange
Shahrah-e-Faisal, Karachi, Pakistan.
Ph: +92 (021) 32014331 M: +92 334-2486077
E-mail: info@everglab.com
muhammad.umer@everglab.com

EPA Certified Lab
EPA/LAB/Certificate-14/2022



Evergreen Calibration & Industrial Services.

Calibration Certificate

Certificate Number : 2837/EGEL/CC/SEAL/2122/K-03

M/s. Evergreen Environmental Laboratory	Date of Issue: 02-08-2022
Address: Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange Shahrah-e-Faisal, Karachi, Pakistan.	Range: NO : 0 to 1000 ppb NO ₂ : 0 to 1000 ppb
Description: Oxide of Nitrogen Analyzer (NO, NO ₂ , NO _x)	Resolution: 0.1ppb for NO,NO ₂
Manufacturer: Horiba (Japan)	Calibration Due: 01-08-2023
Model: APNA-360	S. No: NA

TEMPERATURE: 20 °C ± 2 °C
RELATIVE HUMIDITY: 45% RH ± 10%
CALIBRATION METHOD: Standard Calibration Check Gas

TEST DATA:

Test Description		Criteria	Observation	
Sr. No.	Gas Sensors	Standard Calibration Gases	Instrument Reading	
			Zero	Span
01	NO	0.5 ppb & 200 ppb	0.4 ppb	198 ppb
02	NO ₂	0.5 ppb & 200 ppb	0.4 ppb	199 ppb

REPORT: The equipment has been calibrated against standard Gas (Span and Zero) used for Calibration NO,NO₂. Solution of MSA Instrument Division is traceable to international standard of measurement. The instrument was allowed to stabilize before measurements

REMARKS: It is certified above test data is correct and instrument is in good working conduction.



CALIBRATED BY: _____

TECHNICAL MANAGER: _____

The Calibration interval will vary from customer use and different conditions. Precision Calibration Service is not responsible for future instrument calibration.

This certificate applies only to the item specified and shall not be reproduced except in full, without the written permission of precision calibration service.



Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange
Shahrah-e-Faisal, Karachi, Pakistan.
Ph: +92 (021) 32014331 M: +92 334-2486077
E-mail: info@everglab.com
muhammad.umer@everglab.com

EPA Certified Lab
EPA/LAB/Certificate-14/2022



Evergreen Calibration & Industrial Services.

Calibration Certificate

Certificate Number : 2837/EGEL/CC/SEAL/2122/K-04

M/s. Evergreen Environmental Laboratory	Date of Issue: 02-08-2022
Address: Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange Shahr-e-Faisal, Karachi, Pakistan.	Range: SO ₂ : 0 to 1000 ppb
Description: Oxide of Nitrogen Analyzer (NO, NO ₂ , NO _x)	Resolution: 0.1ppb for SO ₂
Manufacturer: Monitor Lab (USA)	Calibration Due: 01-08-2023
Model: ML-9850B	S. No: 344B-154

TEMPERATURE: 20 °C ± 2 °C
RELATIVE HUMIDITY: 45% RH ± 10%
CALIBRATION METHOD: Standard Calibration Check Gas

TEST DATA:

Test Description		Criteria	Observation	
Sr. No.	Gas Sensors	Standard Calibration Gases	Instrument Reading	
			Zero	Span
01	SO ₂	0.5 ppb & 100 ppb	0.4 ppb	199 ppb

REPORT: The equipment has been calibrated against standard Gas (Span and Zero) used for Calibration SO₂. Solution of MSA Instrument Division is traceable to international standard of measurement. The instrument was allowed to stabilize before measurements

REMARKS: It is certified above test data is correct and instrument is in good working conduction.



CALIBRATED BY: _____

TECHNICAL MANAGER: _____

The Calibration interval will vary from customer use and different conditions. Precision Calibration Service is not responsible for future instrument calibration.

This certificate applies only to the item specified and shall not be reproduced except in full, without the written permission of precision calibration service.



Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange
Shahr-e-Faisal, Karachi, Pakistan.
Ph: +92 (021) 32014331 M: +92 334-2486077
E-mail: info@everglab.com
muhammad.umer@everglab.com

EPA Certified Lab
EPA/LAB/Certificate-14/2022

Evergreen Calibration & Industrial Services.

Calibration Certificate

Certificate Number : 2837/EGEL/CC/SEAL/2122/K-05

M/s. Evergreen Environmental Laboratory	Date of Issue: 02-08-2022
Address: Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange Shahrah-e-Faisal, Karachi, Pakistan.	Range: O ₃ : 0 to 200 ppm
Description: Ozone Analyzer	Resolution: 0.1ppb for O ₃
Manufacturer: Monitor Lab.(USA)	Calibration Due: 01-08-2023
Model: ML-9810B	S. No: 433B-132

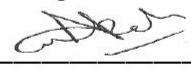
TEMPERATURE: 20 °C ± 2 °C
 RELATIVE HUMIDITY: 45% RH ± 10%
 CALIBRATION METHOD: Standard Calibration Check Gas

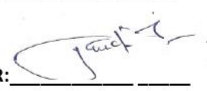
TEST DATA:

Test Description		Criteria	Observation	
Sr. No.	Gas Sensors	Standard Calibration Gases	Instrument Reading	
			Zero	Span
01	O ₃	0.5 ppb & 120ppb	0.4 ppb	119.6 ppb

REPORT: The equipment has been calibrated against standard Gas (Span and Zero) used for Calibration O₃ Solution of MSA Instrument Division is traceable to international standard of measurement. The instrument was allowed to stabilize before measurements.

REMARKS: It is certified above test data is correct and instrument is in good working conduction.

CALIBRATED BY: 

TECHNICAL MANAGER: 

The Calibration interval will vary from customer use and different conditions. Precision Calibration Service is not responsible for future instrument calibration.

This certificate applies only to the item specified and shall not be reproduced except in full, without the written permission of precision calibration service.



Office No M-07 in FORT SULTAN, Opp. Airport Telephone Exchange
 Shahrah-e-Faisal, Karachi, Pakistan.
 Ph: +92 (021) 32014331 M: +92 334-2486077
 E-mail: info@everglab.com
muhammad.umer@everglab.com



CALIBRATION CERTIFICATE



ISO/IEC 17025:2017
Certified

CERTIFICATE NO: SEAL/NMS-014

COMPANY NAME: Solution Environmental & Analytical Laboratory.

ADDRESS: Plot# 12, Water Avenue, Green View Society, Off Kacha Jail Road, Kot Lakhpat, Lahore.

EQUIPMENT DETAIL:

EQUIPMENT NAME	: Sound Level Meter
MANUFACTURER	: Smart Sensor
MAKE/MODEL	: Taiwan
RANGE	: 30 ~ 130 dB
UNIT	: dB
MINIMUM READABILITY	: 0.1 dB
LOCATION	: Lab
EQUIPMENT Sr. #	: N/A
CALIBRATION DATE	: 06-07-2021
NEXT CALIBRATION DATE	: 05-07-2022

CALIBRATION CONDITION:

Temperature : 25 °C
Humidity : 49 %RH

STANDARD CALIBRATION EQUIPMENT:

Sound Level Calibrator
Certificate No: APCIC (3551)

STANDARD EQUIPMENT TRACIBILITY:

Standard equipment is traceable to ISO/IEC 17025 accredited PCSIR LAHORE.
Calibration carried out according to ISO/IEC 17025, and ANSI/NCCL Z540-3 Standards.

RATION RESULTS: All results in dB (A)

OBSERVED VALUE (Under Test Equipment)	STANDARD VALUE (Standard Equipment)	DEVIATION (Under Test Equipment)
94.0	94.0	0.0
114.0	114.0	0.0

These are after calibration results, not specification.

CALIBRATION RESULTS: All results in dB (C)

OBSERVED VALUE (Under Test Equipment)	STANDARD VALUE (Standard Equipment)	DEVIATION (Under Test Equipment)
94.0	94.0	0.0
114.0	114.0	0.0

These are after calibration results, not specification.

REMARKS:

The equipment is fit for use.

CALIBRATED BY:

Muhammad Waseem
(Calibration Engr.)

PREPARED BY:

Faiza Arif Khan
(Office Executive)

COUNTER SIGN.:

Muhammad Nawaz
(CEO)



House # 196, Block G-3, Phase-1, Wapda Town, Lahore.
E-mail: info@unitecheng.com, Web: www.unitecheng.com,
Cell: +92-300-8410717; Ph: +92-42-35181403

ANNEXURE-XVII
Attendance Sheets of FGDs

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, Tehsil District	UC, and	Signature
1	Umair Raza	PSD	61101-72398351	—	—	[Signature]
2	Azizullah Khan	Dy Director (A)	61101-27481352	—	—	[Signature]
3	Amir Murtaza	XEN Small dams, Islamabad	36601-68993325	—	—	[Signature]
4	Abid Hussain Abid	Conservation Forest Rwp.	0331-6306953	—	—	[Signature]
5	Jawad Ashraf	AD (Engg.)	61101-2799889	—	—	[Signature]
6	Muhammad Haseeb	AD (M&E)	37405-7752424	—	—	[Signature]
7	Muhammad Mukhtar Muzammam	Social Safe geology	0334-7672250	—	—	[Signature]
8	Saima Khattak	Project L.P.F.	0333-5656593	—	—	[Signature]
9	Sana Urooj	DDF (RWP)	03365999282	—	—	[Signature]
10	Rizwana Aziz	ADW/PUP	0333-464357	—	—	[Signature]
11	Aysha Batool	DDW (RWP)	0333 5871232	—	—	[Signature]
12	M. FAROOQ	DT L ERM	0333 9853380	—	—	[Signature]
13	Aziz Karim	Env Specialist	0345-5029100	—	—	[Signature]
14	Ali Qumam	IE, CIV Eng	0344-6789632	—	—	[Signature]
15	Ahmed Atzal	AD, Engg. PRF	0304-4866308	—	—	[Signature]
16	M. Shohabul Alam	MD (Services) MCR	0307 3924210	—	—	[Signature]
17	M. Majahid	Env. Consultant	0344-8144088	—	—	[Signature]
18	Shagufta Tabir	Env. consultant	0305-4010639	—	—	[Signature]
19	Komal Arshad	Sociologist	0303-417686	—	—	[Signature]
20	Sher Zamam	Senior Environmentalist	0341-4839 648	—	—	[Signature]

Focus Group Discussions

Name of Project: Rehabilitation of conductance main from Rawal
lake to subaid Tanki Date: 2-12-22
Location/Venue: Dhoke Kala khair - RWP Sr. No. 4

Location/Venue: Dhoke Kala Khan - RWP

Sr. No. 41

[illegible]

Name of Project: Rehabilitation of conductance main from Rawal lake to Sutaid Tanki Date: 2-12-22
Location/Venue: Dholke Kala Khan - Rwp Sr. No. 5

[illegible]

Focused Group Discussions

Name of Project: Rehabilitation of conductance Main from
Rawal lake To Sataid Tanki

Date: 3-12-22

Location/Venue: Dhok Kala Khon, Rawalpindi

Sr. No. 6

[illegible]

Focused Group Discussions

Name of Project: Rehabilitation of conductance main from
Rumal lake to Sufaid Tanki

Date: 3-12-22

Location/Venue: Dhok Kalga Khan, Rawalpindi

Sr. No. 7

[illegible]

Focused Group Discussions

Name of Project: Rehabilitation of Conductana main, from Round lake to Suprid Tanki
Location/Venue: Satellite Town

Date: 3-12-22

Sr. No. 8

[illegible]

Focused Group Discussions

Name of Project: Rehabilitation of conductance main from
Ranial Lake To Sajaid Tanki
Location/Venue: CIU/PMU

Date: 30-11-22

Location/Venue: CIU/PMU

Sr. No. 9

[illegible]