

Punjab Municipal Development Fund Company (PMDFC)

“Rehabilitation and Improvement of
Water Supply System in MC Vehari”

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA)

December-2023



Head Office:

C-3, Jhelum Block, Green Fort-II, Lahore.
Phone: +92 42 35450914-15
Fax: +92 42 35450916,
Email: arslan@asiancon.com

Islamabad:

Office No. 21, 2nd Floor, 44-Zaki Centre,
I-8 Markaz, Islamabad.

Karachi:

Office No. 410, 4th floor, Business Avenue, PECHS,
Block-6, Main Shahrah-e-Faisal, Karachi.

Peshawar:

Syed's Tower, Office No. 1, 4th Floor, Opposit to
Custom House, University Road, Peshawar.



Quality Control Sheet



QUALITY CONTROL SHEET				
DOCUMENT	Environmental & Social Impact Assessment (ESIA)			
PROJECT	“Rehabilitation and Improvement of Water Supply System in MC Vehari”			
CODE				
AUTHOR	UI			
VERIFIED	NA, AB			
TO	Punjab Municipal Development Fund Company (PMDFC)			
NOTES				

Main Table of Contents

EXECUTIVE SUMMARY	1
SECTION - 1: INTRODUCTION	19
SECTION - 2: REGULATORY AND POLICY FRAMEWORK.....	30
SECTION - 3: SCREENING AND SCOPING OF PROJECT	53
SECTION - 4: ANALYSIS OF ALTERNATIVES	56
SECTION - 5: DESCRIPTION OF THE PROJECT.....	60
SECTION - 6: DESCRIPTION OF ENVIRONMENTAL AND SOCIAL BASELINE.....	88
SECTION - 7: POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS AND MITIGATION MEASURES	126
SECTION - 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PROGRAM.....	147
SECTION - 9: STAKEHOLDER AND PUBLIC CONSULTATION	205
SECTION - 10: GRIEVANCE REDRESS MECHANISM	213
SECTION - 11: CONCLUSION AND RECOMMENDATIONS	217

Table of Contents

EXECUTIVE SUMMARY	1
SECTION - 1: INTRODUCTION	19
1.1 Purpose of the Report.....	19
1.2 Project Background	19
1.3 Project Overview	20
1.4 Objective of ESIA.....	21
1.5 Identification of the Project	22
1.6 The Proponent.....	22
1.7 The Consultant	22
1.8 Brief Description of Project.....	23
1.9 Location	24
1.10 Approach & Methodology to Work.....	25
1.10.1 Approach.....	25
1.10.2 Methodology	25
1.11 Structure of Report.....	27
1.12 ESIA Team	28
SECTION - 2: REGULATORY AND POLICY FRAMEWORK.....	30
2.1 National and Provincial Legislative Framework.....	30
2.2 Comparison of International and Local Environmental Legislations.....	43
2.3 International Laws / Treaties	49
2.3.1 The World Bank's Operational Policies	49
2.3.2 World Bank Environmental, Health and Social Guidelines.	50
2.3.3 World Bank Policy Core Principles and Applicability on Project	50
2.3.4 The World Bank's Environmental Code of Practices	51
SECTION - 3: SCREENING AND SCOPING OF PROJECT	53
3.1 Screening of the Project	53
3.2 Spatial and Temporal Boundaries of Environmental Assessment	54

3.3	Important Issues and Concerns Raised During Consultation	54
3.4	Significant Impacts and Factors to be Determined	55
SECTION - 4:	ANALYSIS OF ALTERNATIVES	56
4.1	No Project Option (NPO) / No Project Alternative	56
4.1.1	Advantages of NPO	56
4.1.2	Disadvantages of NPO	56
4.2	Location Alternatives / Site Alternatives	56
4.2.1	Site-01	57
4.2.2	Site-02	57
4.2.3	Preferable Site for Tube-Wells	57
4.3	Design / Technology Alternatives	58
4.3.1	Water Distribution Network	58
4.3.2	Conclusion / Recommended Method	59
4.4	Environmental Alternatives	59
4.5	Economic Alternatives	59
SECTION - 5:	DESCRIPTION OF THE PROJECT	60
5.1	Overview of the Project	60
5.2	Objectives of the Project	60
5.3	Location & Site Layout of the Project	61
5.4	Land-Use on the Site	66
5.5	Road Access	69
5.6	Cost & Magnitude of the Project	69
5.7	Labour Requirement	69
5.8	Schedule of Implementation	69
5.9	Scope of Work	69
5.10	Project Description	70
5.10.1	Water Supply Zones	71
5.10.2	Tube Wells	75
5.10.3	Intermediate Pumping Station	78
5.10.4	Overhead Water Reservoir	78
5.10.5	Design of Transmission Main	79

5.10.6	Water Distribution Network	79
5.11	Water Consumption and Wastewater Generation	83
5.12	Solid Waste.....	83
5.12.1	Waste Management and Disposal	84
5.13	Sources of Construction Material	84
5.14	Machinery & Equipment	84
5.15	Storage of Materials	85
5.16	Construction / Labour Campsite	85
5.16.1	Proposed Campsite Locations	86
5.17	Restoration and Rehabilitation Plans	86
5.17.1	Details of Restoration and Rehabilitation at the End of Project Life	86
5.18	Government & Local Approvals.....	87
SECTION - 6:	DESCRIPTION OF ENVIRONMENTAL AND SOCIAL BASELINE.....	88
6.1	General Characteristics of Project Area	88
6.2	Physical Resources.....	88
6.2.1	Geography, Geology, and Soils.....	88
6.2.2	Topography	90
6.2.3	Climate and Temperature.....	90
6.2.4	Rainfall.....	93
6.2.5	Wind.....	93
6.2.6	Seismicity	94
6.2.7	Ground Water and Water Supply	94
6.2.8	Solid Waste.....	95
6.3	Hydrogeological survey	95
6.3.1	General	95
6.3.2	Geology	95
6.3.3	Hydrogeological Investigation Bari Doab Including Vehari Area in Past.....	95
6.3.4	Groundwater Modelling of Lower Bari Doab Including Vehari Area.....	98
6.3.5	Groundwater Quality in Vehari Area.....	100

6.3.6	Water Resources in Vehari Area	100
6.3.7	Proposed Design for New Water Supply Tubewells for Vehari City	104
6.4	Biological Resources.....	105
6.4.1	Terrestrial Fauna.....	105
6.4.2	Terrestrial Flora	105
6.4.3	Wetlands	105
6.4.4	Wildlife Sanctuaries	105
6.4.5	Wildlife Parks	106
6.4.6	Forests.....	106
6.4.7	Game Reserves	106
6.5	Socio-Economic and Cultural Environment	106
6.5.1	Methodology	107
6.5.2	Socio-economic Environment of Project Area	108
6.5.3	Political and Administrative Setup	109
6.5.4	Land Acquisition and Resettlement.....	109
6.5.5	Physical Cultural Resources	110
6.5.6	Demographic Profile	110
6.5.7	Occupation and Sources of Income.....	114
6.5.8	Housing Profile	117
6.5.9	Social Amenities	118
6.5.10	Availability of Social Services.....	120
6.5.11	Water Supply.....	121
SECTION - 7:	POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS AND MITIGATION MEASURES	126
7.1	General	126
7.2	Approaches and Methodology	126
7.2.1	Project Interaction Matrix	126
7.2.2	Checklist.....	127
7.2.3	Overlays	127
7.3	Characteristics of Impacts.....	127

7.4	Environmental & Social Impacts and Their Mitigations During Pre-Construction Phase	129
7.4.1	Impacts Regarding Project Location.....	129
7.4.2	Impacts Regarding Project Design	130
7.5	Impacts and Their Mitigations During Construction Phase	130
7.5.1	Physical Impacts.....	130
7.5.2	Ecological Environment	136
7.5.3	Socioeconomic Environment	136
7.6	Environmental Impacts and Mitigation Measures During Project Operation.....	140
7.6.1	Consumption of Contaminated Water	140
7.6.2	Solid Waste Generation	141
7.6.3	Visual Impacts.....	141
7.6.4	Impacts to Occupational Health and Safety	142
7.6.5	Impacts on Community Health and Safety	142
7.6.6	Impacts on Traffic	142
7.6.7	Impact on Air Quality	143
7.6.8	Noise and Vibration Emission Impacts	143
7.7	Assessing Impacts	144
7.7.1	Approach to Assessment.....	144
7.7.2	Negative Impacts.....	144
7.7.3	Positive Impacts.....	145
7.8	Cumulative and Induced Impacts.....	145
7.9	Potential Environmental Enhancement Measures	146
SECTION - 8:	ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PROGRAM.....	147
8.1	Objective	147
8.2	Institutional Arrangements.....	147
8.2.1	MC Vehari	147
8.3	Mitigation Plan.....	148
8.4	Monitoring Plan.....	148
8.4.1	Monitoring Mechanism	149

8.5	Reports	149
8.6	Inclusion of ESIA In Bidding / Contract Documents.....	150
8.7	Monitoring of Environmental and Social Non-Compliance	150
8.8	Environmental and Social Management and Monitoring Plan	150
8.8.1	Rehabilitation and Improvement of Water Supply System in MC Vehari – Tube Wells	151
8.8.2	Rehabilitation and Improvement of Water Supply System in MC Vehari – Distribution Network	177
8.9	Proposed ESIA Reporting and Reviewing Procedure of EPA	202
8.10	Contractor’s Training	202
SECTION - 9:	STAKEHOLDER AND PUBLIC CONSULTATION	205
9.1	Proponents Environmental Management Team	205
9.2	Responsible Authority	205
9.3	Project Stakeholders	205
9.3.1	Modes of Consultations	206
9.3.2	Environmental Practitioner and Expert	207
9.3.3	Disclosure of Project Information.....	208
9.3.4	Future Consultation Plan.....	208
9.4	Summary of Issues Raised by Affected and Wider Community	208
SECTION - 10:	GRIEVANCE REDRESS MECHANISM	213
10.1	GRM at Project Site.....	213
10.2	GRM at Regional Level.....	214
10.3	Types of Grievances.....	215
10.3.1	Procedures.....	215
SECTION - 11:	CONCLUSION AND RECOMMENDATIONS	217
11.1	Conclusion.....	217
11.2	Recommendations.....	217

List of Annexures

ANNEXURE - 1:	REFERENCES	220
ANNEXURE - 2:	GLOSSARY	221
ANNEXURE - 3:	LIST OF ABBREVIATION	222
ANNEXURE - 4:	LAYOUT AND GOOGLE MAP OF PROJECT SITE	223
ANNEXURE - 5:	ESIA TEAM	225
ANNEXURE - 6:	TORS	226
ANNEXURE - 7:	IFC'S EHS GUIDELINES FOR CONSTRUCTION AND DECOMMISSIONING	230
ANNEXURE - 8:	COVID-19 PANDEMIC AND HEALTH SAFETY MEASURES	237
ANNEXURE - 9:	ENVIRONMENTAL & SOCIAL SCREENING AND INVOLUNTARY RESETTLEMENT SCREENING CHECKLISTS.....	240
ANNEXURE - 10:	IMPACT MATRIX.....	269
ANNEXURE - 11:	SCREENING CHECKLIST	271
ANNEXURE - 12:	SITE PICTURES	275
ANNEXURE - 13:	LABOR'S SOPS	276
ANNEXURE - 14:	TORS FOR ENVIRONMENT AND HSE SPECIALISTS.....	285
ANNEXURE - 15:	WASTE MANAGEMENT PLAN	287

List of Table

Table 0-1,	Scope of Work	3
Table 0-2,	Summary of Major Impacts During Construction & Operational Phase .	4
Table 0-3,	Summary of Recommendations During Construction & Operation Phase	8
Table 0-4,	Proposed Monitoring Schedule	16
Table 1-1,	Scope of Work	22
Table 1-2,	Scope of Work	24
Table 1-3,	List of Team Members.....	28
Table 2-1,	National and Provincial Legislative Framework	30
Table 2-2,	IFC's Work Environment Noise Limits.....	44
Table 2-3,	Comparison of International and local Air Quality Standards.....	44
Table 2-4,	Comparison of International and Local Noise Standards	45
Table 2-5,	Maximum Permissible Construction Phase Vibration Levels.....	46
Table 2-6,	Comparison of National and International Drinking Water Standards .	46
Table 2-7,	Comparison of National and International Surface Water Standards..	47
Table 2-8,	Assessment of Applicable World Bank Operational Policies	49
Table 4-1,	Comparison of Site Alternatives	58
Table 5-1,	Scope of Work	60
Table 5-2,	Replacement of Problematic Pipes	66
Table 5-3,	Scope of Work	70
Table 5-4,	Population of Each Zone	74
Table 5-5,	Average Water Demand for Each Zone	74
Table 5-6,	Design of Tubewell Machinery	75
Table 5-7,	Design Calculations of Strainer.....	76
Table 5-8,	Head Losses in Transmission Main.....	76
Table 5-9,	Pumping Head Calculation.....	77
Table 5-10,	Waste Management Collection and Disposal Techniques	84
Table 5-11,	Required Machinery / Equipment.....	85
Table 6-1,	Typical Lithologic Log of Test Bore BR-69 Drilled by WAPDA in Bari Doab	102
Table 6-2,	Tube-wells Installed Under PCP (Punjab Cities Program)	104

Table 6-3,	No. of Households Surveyed in the Residential Area.....	110
Table 6-4,	Gender Ratio of Respondents.....	110
Table 6-5,	Age Composition of the Respondents	111
Table 6-6,	Education Level of the Respondents.....	112
Table 6-7,	Marital Statuses of the Respondents.....	113
Table 6-8,	Total Dependents	114
Table 6-9,	Occupational Status of the Respondents	115
Table 6-10,	Household Income Levels.....	116
Table 6-11,	Sources of Income Distribution of the Respondents.....	116
Table 6-12,	Types of Construction.....	117
Table 6-13,	Social Amenities of the Project Area	119
Table 6-14,	Educational Facilities.....	120
Table 6-15,	Health Facilities	120
Table 6-16,	Offices	121
Table 7-1,	Impact Characterization	128
Table 8-1,	Reporting Mechanism.....	149
Table 8-2,	Environmental and Social Management and Monitoring Plan – Tube Wells.....	151
Table 8-3,	Environmental and Social Management and Monitoring Plan – Distribution Network.....	177
Table 8-4,	Environmental Monitoring Plan.....	197
Table 8-5,	Project Rehabilitation and Improvement of Water Supply System in MC Vehari.	201
Table 9-1,	Project Stakeholders.....	205
Table 9-2,	Framework for Consultation.....	206
Table 9-3,	Public Consultation.....	207
Table 9-4,	Institutional / Departmental Consultation	207
Table 9-5,	Summary of Concerns / Suggestions by Public.....	209
Table 9-6,	Summary of Concerns / Suggestion by Stakeholders and Response by Proponent	211

List of Figures

Figure 1-1,	Location Map of MC Vehari.....	24
Figure 3-1,	Google Map of the Project	54
Figure 4-1,	Site Alternative (Site-01 & Site-02) on Google Maps.....	57
Figure 5-1,	Project Location Map	62
Figure 5-2,	Project Layout Map	63
Figure 5-3,	Project Google Map	64
Figure 5-4,	Representative Pictures of Project Sites	68
Figure 5-5,	Water Supply Zones in MC Vehari.....	73
Figure 5-6,	Layout of Transmission Main – Vehari.....	81
Figure 5-7,	Proposed Distribution Network	82
Figure 5-8,	Estimated Water Balance	83
Figure 5-9,	Proposed Locations for Campsite.....	86
Figure 6-1,	Administrative Map of Dist. Vehari.....	89
Figure 6-2,	Topography of Vehari.....	90
Figure 6-3,	Mean Average Temperatures & Precipitation of MC Vehari	91
Figure 6-4,	Maximum Temperature as Per no. of Days	92
Figure 6-5,	Precipitation Amounts as Per no. of Days.....	92
Figure 6-6,	Average Rainfall	93
Figure 6-7,	Average Wind Speed.....	94
Figure 6-8,	Seismic Zones of Pakistan.....	94
Figure 6-9,	Location of Test Bores Drilled in the Vicinity of Project Area along RD-RD Line.....	96
Figure 6-10,	Geological Cross-Section BG-BG Prepared from the Test Bores Fall in Vehari Area	97
Figure 6-11,	The Explanation of Strata Encountered in the Test Bore	97
Figure 6-12,	Example of 3D Representation of Borehole Data.....	99
Figure 6-13,	Discharge of Pakpattan Canal in Vehari Area	101
Figure 6-14,	KSB Pump Installed in Shallow Tubewells Installed Under PCP Showing Discharge 01 Cusec	104
Figure 6-15,	Gender Ratio of Respondents.....	111
Figure 6-16,	Age Composition of the Respondents	111

Figure 6-17,	Education Level of the Respondents	113
Figure 6-18,	Marital Statuses of the Respondents	113
Figure 6-19,	Total Dependents	114
Figure 6-20,	Occupational Status of the Respondents	115
Figure 6-21,	Graph: Household Income of the Respondents	116
Figure 6-22,	Graph: Source of Income	117
Figure 6-23,	Graph: Types of Construction	118
Figure 7-1,	Septic Tank	132
Figure 8-1,	ESIA Implementation Framework	148
Figure 9-1,	Public Consultation.....	210
Figure 9-2,	Representative Pictures of Consultation with Departments / Institutional Stakeholders.....	212
Figure 10-1,	Types of Grievances	215
Figure 10-2,	GRM.....	216

EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) Report has been prepared for the project; Rehabilitation and Improvement of Water Supply System in MC Vehari, which is being funded by the World Bank through the Punjab Municipal Development Fund Company and to be implemented by the Municipal Corporation Vehari and supervised by the consultants appointed by PMDFC.

ES-1. Project Background

In view of growing realization to have a separate agency for municipal development in the province, Government of the Punjab established Punjab Municipal Development Fund Company (PMDFC) with the technical and financial assistance of the World Bank in 1998. PMDFC, registered under the Companies Ordinance 1984 as an independent entity, is a vibrant civil society organization working for the improvement of municipal services in Punjab province. Its role as a technical arm of the Local Government and Community Development (LG & CD) Department over the past few years has been well established. PMDFC resolves to continue striving towards its motto 'Help Build Healthy Cities' with the support of all its stakeholders.

Punjab Cities Program is one the major ongoing projects of PMDFC. The development objective of the Punjab Cities Program for Pakistan is to strengthen the performance of participating urban local governments in urban management and service delivery.

The program focuses on urban management and improvement of municipal services infrastructure for the following sectors:

- Parks
- Water Supply and Filtration Plants
- Solid Waste Management
- Sewerage and Wastewater Treatment Plants
- Roads and Street Lights

ES-2. Project Overview

The Project aims at improvement of infrastructure of municipal services such as laying of water supply system in water shortage area and in enhance the water source of MC Vehari.

The Project has the following main objectives.

- To Rehabilitate the existing pumping machinery of Tube wells and Intermediate pumping station.
- To fulfil the water requirement for water shortage area.
- Improvement of service delivery level of the municipal services.

- Development of New Water source
- Enhancement in water source
- Increase the water storage for community
- To deliver potable water to community at door step.
- Improvement in local and province economy.

On implementation, the project will reduce the general public's complaints about low pressure, deficient quantity and sewage contamination into the water. This will also eliminate the water borne diseases and will improve the health of general public.

Further details are described in section-05: Description of Project.

ES-3. Project Location

The project is located in MC Vehari, Punjab. Vehari is a city of southern Punjab, Pakistan. Vehari is about 100 km (62 mi) from the historical city of Multan. Vehari is located at the Multan-Delhi Road constructed by Indian Muslim Emperor Sher Shah Suri. It is located at 30°2'31" N, 72°21'10" E and an altitude of 135 m (443 ft). *(Location map is provided in Chapter 5: Description of Project)*

ES-4. Project Proponent

Chief Executive Officer of MC Vehari is the proponent of project and intends to get Environmental Approval for the said project as the proponent by submitting this Environmental & Social Impact Assessment Report (ESIA) for the compliance of section 12, PEPA, 1997 (Amended 2012).

ES-5. Brief Description of the Project

Vehari city consists of surface and ground water resources. Surface water sources consists of Pakpattan Canal. Pakpattan canal is flowing at the North of the city. The canal is unlined and recharging the ground water in narrow belts on both sides with fresh water. The majority of the city's subsoil water is brackish and unfit for drinking. Therefore, a large number of tube wells have been installed on the bank of canal to extract fresh subsoil water. Water from these tube wells is either pumped into storage tanks or supplied directly to consumers. Existing water supply system in Vehari City is a combination of the following assets;

- Tube wells
- Transmission Mains
- Overhead Tanks / GSTs
- Piped Distribution Network

Transmission main is damaged at some points which cause hindrance in the delivery of water. Some existing tube wells are also non-functional. Existing water source is not sufficient to fulfil the future water demand. To abstract the fresh underground water, development of new source is very necessary. If water supply system is not improved at this stage, then this infrastructure will be further damaged / degraded giving financial loss to the public as well as private sectors and the growth potential of the city will be adversely affected.

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

Table 0-1, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Construction / installation of tube wells	10 Nos.
2.	Laying of transmission main	41,790 Rft.
3.	Rehabilitation of existing GSTs / OHRs	06 Nos.
4.	Replacement of out-lived pipes	23,840 Rft.

ES-6. Need of ESIA

As per Environmental and Social Management Framework (ESMF) of Punjab Cities Program (PCP), the projects under the scope of Water Supply Distribution Network with new water supply network fall in E1 category and may require to conduct Environmental & Social Impact Assessment (ESIA) study as per scope of work, environmental impacts and categorization given in Schedule I and II of PEPA Review of IEE and EIA Regulations, 2022.

According to the Review of IEE and EIA Regulations, 2022, the project falls under Schedule II (List of projects requiring an EIA), Category F [Water supply, Sewerage System and treatment], sub-clause {Water supply schemes and treatment plants (excluding the Reverse Osmosis, Ultra filtration and such like) with total cost more than Rs. 50 million}.

This project includes construction / installation of 10 tube wells, laying of 41,790 Rft. transmission main, rehabilitation of 06 GSTs / OHRs and replacement of 23,840 Rft. out-lived pipes in MC Vehari.

The project corridor is in direct vicinity of Vehari city that may have minor mitigatable environmental impacts during construction works like dust generation, noise generation etc.

As per Environmental and Social Management Framework (ESMF) of Punjab Cities Program (PCP), all those projects having negative social impacts of significant nature on 01-40 households and / or it requires displacement / resettlement of 01-40 households due to land acquisition, a Social Management Plan (SMP) will be prepared and implemented as a part of the ESMP. An Abbreviated Resettlement Action Plan (ARAP) will also be prepared and implemented. These projects are categorized as S2. While all those projects having negative social impacts of significant nature on more than 40 households and / or it require displacement / resettlement of > 40 households for land acquisition, a Social Assessment (SAR) and Social Management Plan (SMP) will be prepared and included as a part of the EIA. A Resettlement Action Plan (RAP) will also be prepared and implemented in accordance with RPF.

As this project does not initiate any kind of resettlement / displacement issues, but can have minor but mitigatable social impacts like privacy issues, hindrance for traffic movement etc., so this project has been categorized as S2 where social impacts will be mitigated in this ESIA.

ES-7. Major Impacts and Mitigation Measures

In order to identify all the activities associated with the project during construction & operation phase with potential to cause significant environmental & social impacts and harm a thorough review has been conducted. Project will not have significant negative impacts on the nearby community but may pose minor mitigatable impacts on environment in terms of dust, noise etc. And, the project will have positive impacts on the local population and country as a whole.

Table 0-2, Summary of Major Impacts During Construction & Operational Phase

Pollutants	Construction Phase	Operational Phase
Ambient air quality	<ul style="list-style-type: none"> The impact on air quality is expected as a result of construction works, specifically excavation, which will generate dust with motorized equipment also generating gases. Smoke from vehicles, generator and other fuel consuming machinery and 	<ul style="list-style-type: none"> Resources utilization i.e., fuel and energy for the operation of pumps.

Pollutants	Construction Phase	Operational Phase
	<p>construction material.</p>	
Noise and vibration	<ul style="list-style-type: none"> During the construction of the project, a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks, generators and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and neighborhood residential may be disturbed by the noisy activities. 	<ul style="list-style-type: none"> Noise and vibration emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used. Resources utilization i.e utilization of pumps and machinery also cause noise and vibration.
Odor	<ul style="list-style-type: none"> Nil 	<ul style="list-style-type: none"> Nil
Flora and fauna	<p>Impact on Flora</p> <ul style="list-style-type: none"> In this project, low impact is expected on vegetation (like small grass or shrubs but not trees) since the pipeline routes are devoid of significant unique floral and faunal life as per design. No trees will be cut. <p>Disturbance to Fauna</p> <ul style="list-style-type: none"> No impacts. 	<ul style="list-style-type: none"> No significant impact on flora and fauna during operation phase.
Solid Waste	<ul style="list-style-type: none"> Solid waste will be generated due to construction activities and domestic sources. Also due to sludge from septic tank 	<ul style="list-style-type: none"> Solid wastes will mainly emanate from the operational activities related to maintenance and operations, and will include among others; Excavated soil Cement storage bags and other packets from

Pollutants	Construction Phase	Operational Phase
		<p>materials used during repair and maintenance</p> <ul style="list-style-type: none"> Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes
Soil Contamination	<ul style="list-style-type: none"> Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project area and in its nearby surroundings. Spillage from the generators or from moving vehicle will cause contamination of soil at construction sites. Solid wastes generation. Hazardous materials. 	<ul style="list-style-type: none"> Soil can be contaminated due to leaching of oil, fuel, from vehicles or machinery any stored oil. Storage & handling of hazardous chemicals.
Surface and Ground water contamination.	<ul style="list-style-type: none"> Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. 	<ul style="list-style-type: none"> Sewage and sanitary water generated from operational offices / domestic waste may contaminate groundwater, if not disposed of properly.
Health and safety issues	<ul style="list-style-type: none"> Construction activities including excavations, backfilling involve inherent occupational health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer 	<ul style="list-style-type: none"> Health and safety issues will be arising if flue gases or noise exceeds the permissible limits of PEQS, and improper practice of work during storage, handling and transportation of fuel.

Pollutants	Construction Phase	Operational Phase
	<ul style="list-style-type: none"> injury or death. Accidents may also occur. 	
Socioeconomic	<ul style="list-style-type: none"> Disturbance to neighbors by constructional activities. Employment opportunities will be generated for locals. 	<ul style="list-style-type: none"> Employment opportunities will be enhanced as staff will be hired for operational phase.
Gender & privacy issues	<ul style="list-style-type: none"> Project activities may cause hindrance to mobility especially for women in terms of privacy or harassment, during construction stage. Privacy of the community may be disturbed. Harassment issues. 	<ul style="list-style-type: none"> Privacy of the community may be disturbed.
Land acquisition and resettlement	<ul style="list-style-type: none"> No private land will be acquired for the project. Proposed site for installation of tube wells is said to be govt. land as per consultation conducted with MC Vehari. Project site is govt. land; tube wells will be installed on govt. land near chak 59-WB, transmission main will be laid along the road, existing OHRs / GSTs will be rehabilitated and replacement of out-lived pipes will be replaced within MC along the road. 	<ul style="list-style-type: none"> Nil
Mobility issues & Traffic management	<ul style="list-style-type: none"> The roads maybe temporarily blocked at the active construction zone that may create problems of traffic for nearby community. Blockage due to construction waste. 	<ul style="list-style-type: none"> The roads may be temporarily blocked at the active work zone during repair / maintenance in operational phase that may create problems of traffic for nearby

Pollutants	Construction Phase	Operational Phase
	<ul style="list-style-type: none"> Blockage due to machinery and vehicles. 	community.
Loss of livelihood	<ul style="list-style-type: none"> The project is of short duration (12 months) and will not have significant impact on the livelihood of the community. 	<ul style="list-style-type: none"> Nil
Community health and safety	<ul style="list-style-type: none"> The community health and safety must be ensured during construction phase especially the hazard of falls during excavation of trenches. Accidents and disputes can also arise. 	<ul style="list-style-type: none"> The community health and safety must be ensured during repair / maintenance in operational phase especially the hazard of falls during excavation of trenches.
Child protection	<ul style="list-style-type: none"> Child labor might get involved in the construction activities. 	<ul style="list-style-type: none"> Child labor might get involved in the construction activities during repair and maintenance.

Table 0-3, Summary of Recommendations During Construction & Operation Phase

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
Ambient Air Quality	<ul style="list-style-type: none"> Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM, when they are not in use. Equipment and vehicles powered with diesel should be well maintained and tuned to minimize particulate emissions. Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, 	<ul style="list-style-type: none"> It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<p>with tarpaulin.</p> <ul style="list-style-type: none"> To reduce fugitive dust emissions, sprinkling of water by water-trucks will be done. As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area. 	<p>implemented such as dust suppression techniques, regular maintenance and monitoring of vehicles, use of high-quality fuel etc.</p> <ul style="list-style-type: none"> Further, the project will be implemented through the significant use of manual labor and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.
Noise and vibration	<ul style="list-style-type: none"> During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary. Contractor will ensure the use of well-tuned vehicles. Contractor will ensure the use of well-tuned machinery and skilled labor. Attenuation boxes can be installed. Silencer can be fitted to reduce and suppress the noise. Constructional activities 	<ul style="list-style-type: none"> The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<p>should be planned or scheduled.</p> <ul style="list-style-type: none"> Restricting access to noisy area. Shutting down the noisy equipment when not needed. Providing personal protective measures to labors working. Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary. 	
Odor	<ul style="list-style-type: none"> Nil 	<ul style="list-style-type: none"> Nil
Impacts on flora and fauna	<ul style="list-style-type: none"> New trees will be planted at project site by the contractor to make the project more environment friendly and socially sustainable. In any case, if a tree has to be cut / disturbed, the contractor will plant 10 new trees of almost 06 ft. height against each tree cut. The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna and all the minor impacts caused by construction work on flora (like small grass / shrubs) are of temporary and reversible in nature and can be mitigated by appropriate 	<ul style="list-style-type: none"> Maintenance and monitoring of plantation around the project corridor.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<p>good working practices that will be prescribed in ESIA.</p>	
Solid Waste	<ul style="list-style-type: none"> • A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. • The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. • Arrangements should be made for regular garbage collection and removal of sewage from construction site. • A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals. 	<ul style="list-style-type: none"> • The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. • The soil excavated during maintenance will be used as backfill and thereby reducing the generation of waste material and related waste pollution concern. • There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. Site for hazardous waste should be constructed using concrete so infiltration of material in soil cannot take place. • All wastes will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
Soil Erosion / Soil Contamination	<ul style="list-style-type: none"> • Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. • The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. • Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems. 	<ul style="list-style-type: none"> • Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining and use of well-tuned vehicles as well as machinery & generators. • The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. • Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.
Surface and ground water	<ul style="list-style-type: none"> • Sewage from construction camp will be disposed of using septic tank. • Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard. • Construction site effluent drainage should be established in areas with 	<ul style="list-style-type: none"> • During operation / maintenance works, wastewater may be generated from construction / maintenance works which should be disposed-off / discharged after treatment through septic tank.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<p>adequate natural drainage channels in order to facilitate flow of the effluents.</p> <ul style="list-style-type: none"> Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that. 	<ul style="list-style-type: none"> Water supply will be closed down during construction works to ensure that no polluted water gets into water supply.
Health and safety issues	<ul style="list-style-type: none"> Occupational health and safety impacts during construction phase is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained and skilled labor or personnel will be engaged in operating equipment. Health & safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage. First aid boxes should also be present on sites. 	<ul style="list-style-type: none"> Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand-held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment. First aid box should be present on sites. Construction safety SOPs should be followed. Road lights should be maintained on construction sites at night. Labors should be provided with PPEs to avoid accidents.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<ul style="list-style-type: none"> Construction safety SOPs should be followed. Sign boards should be displayed at sites. 	<ul style="list-style-type: none"> Laborers should be trained for healthy team work. Conflicts should be settled according with law. Sign boards should be displayed at sites.
Socioeconomic	<ul style="list-style-type: none"> People will be informed in advance when work is about to start at the site. Job opportunities should be provided to local laborers. Privacy of neighboring areas should not be disturbed. Trainings should be provided to laborers. 	<ul style="list-style-type: none"> Community wellbeing should be considered and neighbor's privacy should not be disturbed. Local people should be preferred for the employment. Working should be scheduled and informed to the concerned public.
Gender issue	<ul style="list-style-type: none"> Workers would be trained to address privacy issues and ethically behaved. Laborers would be strictly asked to cater the privacy issues. Staff's capacity-building / trainings. 	<ul style="list-style-type: none"> Workers would be trained to address privacy issues and ethically behaved. Laborers would be strictly asked to cater the privacy issues. Staff's capacity-building / trainings.
Land acquisition and resettlement	<ul style="list-style-type: none"> No land acquisition is required as the project to be executed on govt. land. Pipeline will be constructed / laid along the road, NOCs / consent letters will be obtained from concerned authorities (Highway Department etc.) 	<ul style="list-style-type: none"> Nil
Traffic management	<ul style="list-style-type: none"> Provision of alternative routes. Water sprinkling at project site at consecutive intervals. 	<ul style="list-style-type: none"> Provision of alternative routes. Indicators / signboards regarding alternate routes should be

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<ul style="list-style-type: none"> Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents. Vehicles should be parked at designated points. Machinery after use should be allocated to designated places. Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience. Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents. In case of any complaint, focal person of GRC may contact (details will be highlighted at project site). 	<ul style="list-style-type: none"> provided at proper distance to avoid accidents. Vehicles should be parked at designated points. Machinery after use should be allocated to designated places. Storage of construction material should be stored at proper places that should not affect mobility. Inform and coordinate the local residents regarding construction time schedule and also to display the details at sub-project site for their convenience
Loss of livelihood	<ul style="list-style-type: none"> As there will be no significant impact hence no mitigation measure is required. 	<ul style="list-style-type: none"> Nil
Community health and safety	<ul style="list-style-type: none"> Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labor 	<ul style="list-style-type: none"> The active construction zone must be cordoned off to avoid injuries due to accidents.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	<p>Organization (ILO) Convention No. 62 will be ensured by the Contractor.</p> <ul style="list-style-type: none"> The active construction zone must be cordoned off to avoid injuries due to accidents. 	
Child protection	<ul style="list-style-type: none"> Child labor must be prohibited on project site. 	<ul style="list-style-type: none"> Child labor must be prohibited on project site.

ES-8. Proposed Environmental Monitoring

To oversee the environmental performance of the project through its lifecycle enforcing the PEQS an Environmental Monitoring Program should be formulated which ensures effective surveillance of the environmental parameters at various stages of the project development and compliances with PEQS and legal obligations. Monitoring for following Environmental Parameters is recommended:

ES-8.1 Ambient Air

Regular monitoring for ambient air should be conducted during construction & operational activities of the project and report should be submitted to EPA Punjab.

ES-8.2 Noise

Regular monitoring for noise level should be maintained periodically during construction & operational phases of the project and report should be submitted to EPA Punjab.

ES-8.3 Water Quality

Regular monitoring of water quality should be conducted during construction & operational phases of the sub-project and report should be submitted to EPA Punjab.

Schedule of Proposed Monitoring

Table 0-4, Proposed Monitoring Schedule

Sr. No.	Parameters	Monitoring Schedule
1	Ambient Air Monitoring	Quarterly
2	Noise Level Monitoring	Quarterly
3	Water Quality Monitoring	Quarterly

ES-9. ESMMP Implementation and Monitoring Arrangements of ESIA

ES-9.1 MC Vehari

Overall responsibility for Environmental Management and Monitoring will rest with MC Vehari. ESM Wing of PMDFC will provide support to ESFPs for managing environmental and social aspects of the project and implementation of the present ESMMP. The specific responsibilities of the institutions involved in the ESMMP implementation are described below:

ES-9.1.1 The Contractor

The Contractor will be responsible for on-field implementation of the ESMMP and environmental protection liabilities under the Punjab Environmental Protection Act (Amendment 2012) and World Bank's Environmental and Social Safeguard Policies. He will also be responsible for compliance of ESIA provisions keeping in view his contract with MC Vehari. The Contractor will train his crews in all aspects for implementation of the ESIA. The contractor will report the progress of ESMMP to the Environmental Specialist of the consultant.

ES-9.1.2 Supervision Consultant

The Environment Specialist of the consultant will be responsible for the on-field supervision and monitoring of the implementation of ESMMP being done by the contractor. The Environment Specialist of the consultant will report the progress to PMDFC's ESM Wing.

ES-9.1.3 PMDFC ESM Wing

MC Vehari will be responsible for implementation of ESMMP with the technical assistance of ESM Wing – PMDFC throughout the project period. ESM Wing would also support communities' participation, consultations and other social activities from the project identification to completion stage. PMDFC's ESM Wing will formulate a comprehensive report to be submitted to the World Bank regarding the progress of implementation of ESMMP.

ES-10. ESIA Implementation and Monitoring Budget

The cost for the implementation of construction stage activities given in this ESIA will be included within the civil works for this project with total cost of the project is 914.19 million PKR. The total cost of ESIA implementation is 5,934,000/- PKR.

ES-11. Grievance Redress Mechanism

A site-based Grievance Redress Mechanism (GRM) for the project will be operational during the implementation of this ESIA. Grievance Redress will be processed as per the World Bank OP 4.12 which requires an appropriate and accessible grievance redress mechanism for affected persons, including

displaced persons and host communities.

A multi-tier GRM has been proposed in the ESMF of PCP. At project site, Chief Officer – MC will act as the Grievance Redress Officer (GRO) of the grievance. Grievance Redress Committee at Regional level will also be notified under umbrella of Punjab Cities Program (PCP). Deputy Program Officer (Environmental & Social Management) (DPO-ESM). DPO-ESM will support ESFPs in steering the GRC functions at both city and regional level.

The GRM will be accessible to diverse members of the communities including women, senior citizens, people with disabilities, laborers / workers, and other vulnerable groups. Culturally appropriate communication mechanisms will be used at all project sites both to spread awareness regarding the GRM process as well as complaints management. *ESMF GRM will be integrated with the PCP's overall program GRM hotline to be developed by the Consultants under the scope of PCP.*

A Grievance Redress Committee (GRC – PMDFC / LG&CDD) will be responsible to oversee the overall functions of the GRM at a strategic level including monthly reviews. It will be headed by the Secretary LG&CDD.

If the complainant is not satisfied, the complaint will have the option to seek redress through the court of law. *(This mechanism developed for GRM is tentative and will be finalized after hiring of consultant for GRM).*

SECTION - 1: INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) has been prepared for the project "Rehabilitation and Improvement of Water Supply System in MC Vehari" which is being funded in by the World Bank through the Punjab Municipal Development Fund Project and to be implemented by the Municipal Corporation Vehari and supervised by consultants appointed by PMDFC. This report has been prepared to meet compliance with environmental regulations and requirements under Punjab Environmental Protection Act (PEPA) (Amended 2012) and the World Bank's Safeguard policies applicable to this project.

1.1 Purpose of the Report

Environmental and Social Impact Assessment (ESIA) report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore for the compliance of Section 12 of Punjab Environment Protection Act – 1997 (Amended 2012) for obtaining No Objection Certificate (NOC) before starting the construction activity at the project site. The other relevant regulations and guidelines considered while preparing this ESIA 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 writer
- Guidelines for sensitive and critical areas
- Detailed sectorial guidelines

Various aspects like environmental, social, physical and other aspects of the project during construction and its regular occupancy are highlighted in this ESIA 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), before issuing the desired Environmental Approval.

1.2 Project Background

In view of growing realization to have a separate agency for municipal development in the province, Government of the Punjab established Punjab Municipal Development Fund Company (PMDFC) with the technical and financial assistance of the World Bank in 1998. PMDFC, registered under the Companies Ordinance 1984 as an independent entity, is a vibrant civil society organization working for the improvement of municipal services in Punjab province. Its role as a technical arm of the Local Government and Community Development Department (LG&CDD) over the past few years

has been well established. PMDFC resolves to continue striving towards its motto 'Help Build Healthy Cities' with the support of all its stakeholders.

Punjab Cities Program is one the major ongoing projects of PMDFC. The development objective of the Punjab Cities Program for Pakistan is to strengthen the performance of participating urban local governments in urban management and service delivery.

The program focuses on urban management and improvement of municipal services infrastructure for the following sectors:

- Parks
- Water Supply and Filtration Plants
- Solid Waste Management
- Sewerage and Waste Water Treatment Plants
- Roads and Street Lights

1.3 Project Overview

In the modern era, the access to clean water for everyone is becoming rare day by day, especially in district headquarter city, the supply of water free from any harmful impurity is one of the most basic needs. To cope up with this problem water filtration system according to the existing nature of water is designed and water supply system is proposed accordingly. For ease of public, drinking water supply network is designed to provide better water in colonies and wards and in various drinking stations within the city area.

The major reason of unsatisfactory service delivery is the lack of proper maintenance of the municipal infrastructure in all sectors causing consumer dissatisfaction at one end and degradation of the infrastructure on the other end apart from very low revenue recovery as the consumers are reluctant to pay because of deteriorated service delivery.

Vehari city consists of surface and ground water resources. Surface water sources consists of Pakpattan Canal. Pakpattan canal is flowing at the North of the city. The canal is unlined and recharging the ground water in narrow belts on both sides with fresh water. The majority of the city's subsoil water is brackish and unfit for drinking. Therefore, a large number of tube wells have been installed on the bank of canal to extract fresh subsoil water. Water from these tube wells is either pumped into storage tanks or supplied directly to consumers.

Existing water supply system in Vehari City is a combination of the following assets;

- Tube wells
- Transmission Mains
- Overhead Tanks / GSTs
- Piped Distribution Network

Transmission main is damaged at some points which cause hindrance in the delivery of water. Some existing tube wells are also non-functional.

Existing water source is not sufficient to fulfil the future water demand. To abstract the fresh underground water, development of new source is very necessary.

If water supply system is not improved at this stage, then this infrastructure will be further damaged / degraded giving financial loss to the public as well as private sectors and the growth potential of the city will be adversely affected.

To fulfil the future water demand, new source has been identified. The project comprises of tube wells, transmission main, pumping machinery, electrification & other allied works.

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

1.4 Objective of ESIA

The major objective of this ESIA study is the identification of the possible and induced impacts of the proposed project on both short-term and long-term basis. The impact identification process focuses particularly on biophysical, socio-economic and cultural aspects of the environment. Based on the level and nature of these observations, the ESIA then delineates proper mitigation measures. As a planning tool, the ESIA aims to ensure that environmental, socio-economic and cultural issues throughout the entire project lifecycle are anticipated and considered by the project proponent. It also serves as a framework for establishing project controls to reduce or prevent adverse environmental or socio-economic impacts.

The specific objectives of this ESIA are:

- To assess the existing environmental and socioeconomic conditions of the project area;
- To identify potential impacts of the proposed project on the physical, ecological and social aspects of the project area, to predict and evaluate these impacts and determine their significance;
- To propose appropriate generic mitigation measures that should be incorporated in the design of the project to avoid or minimize if not eliminate the potentially adverse impacts,

- To assess the compliance status of the proposed activities with respect to the national and provincial environmental legislation and WB's OPs,
- To provide institutional, monitoring, reporting and documentation measures for environmental safeguards compliance,
- To aid decision makers to take informed decisions.

1.5 Identification of the Project

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number of tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

Table 1-1, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Construction / installation of tube wells	10 Nos.
2.	Laying of transmission main	41,790 Rft.
3.	Rehabilitation of existing GSTs / OHRs	06 Nos.
4.	Replacement of out-lived pipes	23,840 Rft.

According to the Review of IEE and EIA Regulations, 2022, the project falls under Schedule II (List of projects requiring an EIA), Category F [Water supply, Sewerage System and treatment], sub-clause {Water supply schemes and treatment plants (excluding the Reverse Osmosis, Ultra filtration and such like) with total cost more than Rs. 50 million}.

Hence this project falls in E-1 category for environmental perspective and S-2 for social perspective due to mitigatable but minor social impacts.

1.6 The Proponent

Chief Executive Officer of Municipal Corporation Vehari, is responsible to get Environmental Approval for the said project as the proponent of this project, by submitting the Environmental and Social Impact Assessment Report for the compliance of section 12, PEPA, 1997 (Amended 2012).

1.7 The Consultant

Asian Consulting Engineers Private Limited (AsCE) JV with Rehman Habib Consultants (Pvt.) Ltd. is providing their services to conduct environmental assessment for the project. Asian Consulting Engineers Private Limited is an

independent consulting company working in the field of environment. AsCE provides consulting services and sustainable solutions for infrastructure projects, industrial projects and social development projects.

The contact details for the company are given as under:-

Asian Consulting Engineers Private Limited

Tel: +92 42 35450914-5 | **Fax:** +92 42 35450916 | **Mobile:** +92 321 4260133

E-mail: arslan.hanif@asiancon.com, aleem.butt@asiancon.com

Address: C-3, Jhelum Block, Green Forts-II, Lahore, Pakistan.

1.8 Brief Description of Project

Vehari city consists of surface and ground water resources. Surface water sources consists of Pakpattan Canal. Pakpattan canal is flowing at the North of the city. The canal is unlined and recharging the ground water in narrow belts on both sides with fresh water. The majority of the city's subsoil water is brackish and unfit for drinking. Therefore, a large number of tube wells have been installed on the bank of canal to extract fresh subsoil water. Water from these tube wells is either pumped into storage tanks or supplied directly to consumers.

Existing water supply system in Vehari City is a combination of the following assets;

- Tube wells
- Transmission Mains
- Overhead Tanks / GSTs
- Piped Distribution Network

Transmission main is damaged at some points which cause hindrance in the delivery of water. Some existing tube wells are also non-functional.

Existing water source is not sufficient to fulfil the future water demand. To abstract the fresh underground water, development of new source is very necessary.

If water supply system is not improved at this stage, then this infrastructure will be further damaged / degraded giving financial loss to the public as well as private sectors and the growth potential of the city will be adversely affected.

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number of tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main

- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

Table 1-2, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1	Construction / installation of tube wells	10 Nos.
2	Laying of transmission main	41,790 Rft.
3	Rehabilitation of existing GSTs / OHRs	06 Nos.
4	Replacement of out-lived pipes	23,840 Rft.

1.9 Location

The project is located in MC Vehari, Punjab. Vehari is a city of southern Punjab, Pakistan. Vehari is about 100 km (62 mi) from the historical city of Multan. Vehari is located at the Multan-Delhi Road constructed by Indian Muslim Emperor Sher Shah Suri. It is located at 30°2'31" N, 72°21'10" E and an altitude of 135 m (443 ft). Location map of MC Vehari is given below in **Figure 1-1**;

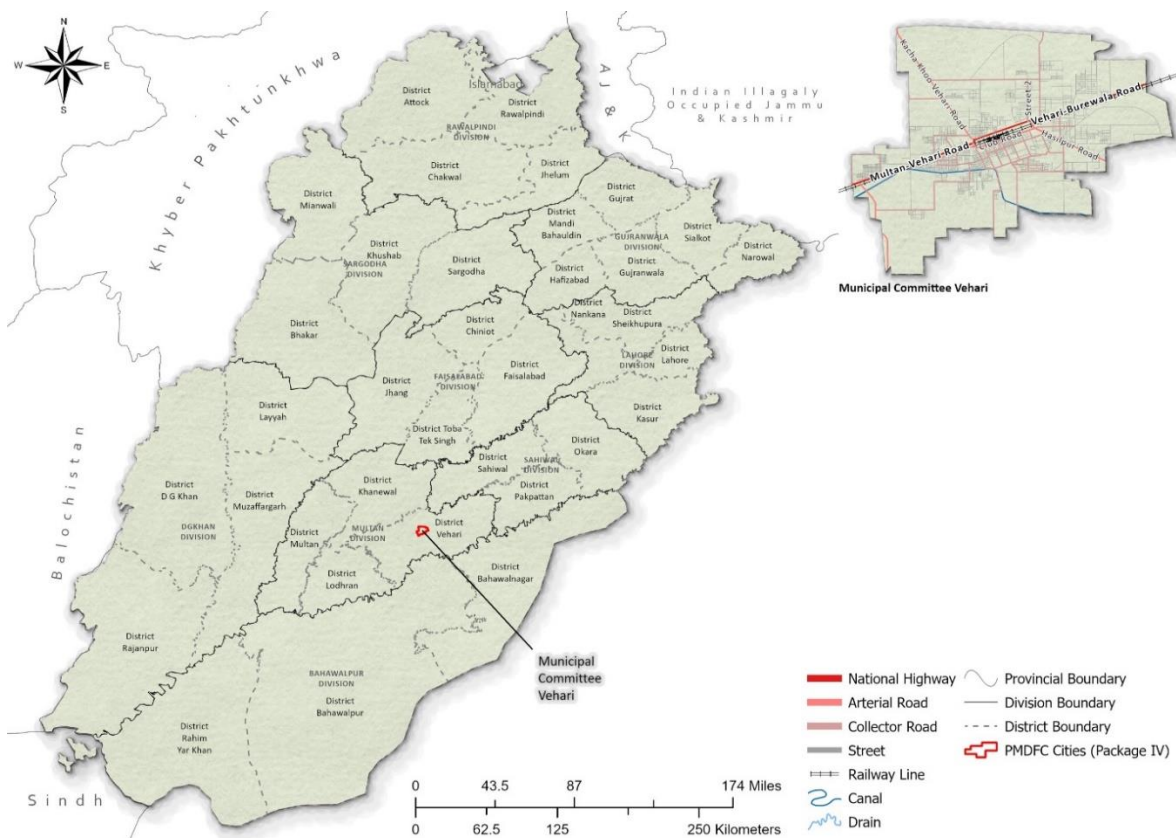


Figure 1-1, Location Map of MC Vehari

1.10 Approach & Methodology to Work

1.10.1 Approach

The study has been conducted in accordance with Environmental Protection Agency (EPA), Government of Pakistan (GOP) Guidelines, 1997 and the World Bank Safeguards policies applicable to this project. The study is based on both primary and secondary data and information. The primary data includes data collected from field i.e., information about land-use; environmental sampling and analysis for air, water and noise; biodiversity & ecological survey; social survey including demographic characteristics, income dependency & quality of life, occupation, agriculture and cropping pattern and social amenities etc. The secondary data includes a review of relevant information from literature. Discussions were held with stakeholders including government officials, community representatives and a wide range of people living in the area. The main purpose of this approach was to obtain an impartial impression of the people's perceptions about the project and its environmental and social impacts.

1.10.2 Methodology

The following methodology was adopted for carrying out the ESIA study of the proposed project:

A) Orientation

Meetings and discussions were held among the members of the ESIA Consulting Team. This activity is aimed at achieving a common ground of understanding of various issues of the Study.

B) Data Collection Planning

Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the ESIA Consulting Team. The plan included: identification of specific data requirements and their sources; determination of time schedules and responsibilities for their collection and indication of the logistics and other supporting needs for the execution of the data acquisition plan. Field surveys were then conducted based on the data collection plan.

C) Detailed Field Survey

Detailed site visits for collection of data were conducted in September, October and November, 2022, and July, April and September, 2023. The data collected from field include:

- Identification of environmental sensitive receptors including air sensitive receivers, noise sensitive receivers and water bodies expected to receive pollutant load;
- Sampling and analysis for air, noise and water;
- Ecological survey;

- Socioeconomic survey including public consultation;
- Stakeholders' consultation;

Meetings with different departments at MC Vehari were held and following data was collected.

D) **Sampling & Analysis of Physical Environmental Parameters**

EPA certified laboratory was hired for physical environmental sampling and analysis of air, water and noise quality. Samples were collected from two (02) locations for analysis in the laboratory.

E) **Review of Secondary Data**

Previous environmental and social soundness assessment for Vehari and other published and unpublished information was collected in order to gain a complete understanding of existing environmental conditions of the area including:

- **Physical Environment:** topography, geology, soils, surface and ground water resources and climate;
- **Biological Environment:** habitat types, flora and fauna (particularly rare or endangered species), critical habitats/zones and vegetation communities within the project area;
- **Socio-economic Environment:** settlements, socio-economic conditions, infrastructure and land use.
- **Heritage Aspects:** sites of cultural, archaeological or historical significance.

F) **Corridor of Impact (COI)**

COI include the project's actual Right of Way (ROW) as well as the area in the surroundings in which positive and adverse impacts may be foreseen due to the implementation of the proposed project. The area of influence is the area likely to be affected by the project, including all its ancillary aspects, such as relocation and access roads, borrow and disposal areas and construction camps, as well as unplanned developments induced by the project (e.g., spontaneous settlement, logging, or shifting agriculture along access roads).

G) **Stakeholder Consultations**

For this ESIA study, stakeholder consultation was carried out through questioners and one on one meetings. The ESIA team met with the government functionaries, affected persons and local communities in project area. The objective of the consultation was to disseminate information about the project and its expected impact, long-term as well as short-term, among primary and secondary stakeholders and to gather information on relevant issues so that the feedback received could be used to address these issues at an early stage.

H) Environmental and Social Impact Assessment

The data collected from the field was analyzed and the impacts of the proposed project on the physical, biological and socio-economic environment prevalent in the project area were identified and characterized with respect to significance and probability of occurrence at the design, construction, operation and decommissioning phases. The impacts were analyzed using various tools such as;

- Overlay Mapping
- Screening Checklists
- Impacts matrix

Possible mitigation measures and implementation mechanisms are proposed so that the impacts can be mitigated / controlled and the project implementation remains sustainable.

I) Development of Environmental and Social Management & Monitoring Plan (ESMMP)

An ESMMP for the proposed project activities is prepared. The ESMMP provides a plan for implementing and managing the mitigation and monitoring measures recommended in the ESIA. The ESMMP includes the following:

- Mitigation and monitoring plan.
- Definition of roles and responsibilities of the proponent, contractors and monitoring teams.
- Requirements for communication, documentation and training during the project.
- Restrictions on design, timing and conduct of the project.
- Change Management Plan to cover unforeseen events / environmental conditions during the project.

1.11 Structure of Report

The structure of this report is listed below:

Section 1: Introduction briefly presents the project background, objectives, methodology and need of the ESIA study.

Section 2: Regulatory and Policy Framework Lists national as well as provincial laws, regulations and procedures and applicable World Bank Operational Policies (OPs).

Section 3: Screening and Scoping of Project will discuss whether the project requires an EIA or IEE and will discuss the spatial and temporal boundaries of the project. Important issues raised by the community during the consultative sessions and significant impact that are determined during the initial visits.

Section 4: Analysis of Alternatives enlists possible design, site / location alternatives for Rehabilitation and Improvement of Water Supply System in MC Vehari, and their influence of environment and social situation.

Section 5: Description of the Project provides an overall description of the project including proposed alignment, design considerations and concepts, manpower requirement, waste generation, machinery and material requirements.

Section 6: Description of Environmental and Social Baseline gives a description of baseline physical, biological and socio-economic conditions of the project area.

Section 7: Potential Environmental and Social Impacts and their Mitigations Measures identifies, predicts and evaluates impacts of the project activities during the construction and operation stages and deals with the measures proposed to mitigate potential environmental impacts of the proposed project.

Section 8: Environmental and Social Management and Monitoring Program outlines organizational framework, mitigation and monitoring plans training requirements, defines roles and responsibilities, estimates budgets requirements for satisfactory implementation.

Section 9: Stakeholder and Public Consultation identifies the main stakeholders and their concerns rose during scoping sessions and deals with the measures to mitigate the social impacts.

Section 10: Grievance Redress Mechanism committees for grievance redressal and process for amicable resolution of any grievance faced by the community.

Section 11: Conclusion and Recommendation provides the results / conclusion of the ESIA study for the project and recommendations.

1.12 ESIA Team

A multidisciplinary team conducted the ESIA study. The team consisted of environmentalists, ecologists and sociologists.

The team of experts are given as under:-

Table 1-3, List of Team Members

Sr. No.	Team Member	Position Held	Qualifications
1	Aleem Butt	Chief Environmentalist, Team Leader – ESIA	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; M.Sc. Environmental Sciences, Punjab University (PU), Lahore; NEBOSH, Lead Auditor
2	Noman Ashraf	Environmental Specialist	M.Phil. Environmental Sciences, Government College University

Sr. No.	Team Member	Position Held	Qualifications
			(GCU) Lahore; PGD, Environmental Law, University of the Punjab, Lahore
3	M. Umair Iqbal	Environmentalist	BS Environmental Science, Government College University, Faisalabad
4	Waqar Saleem	Sociologist and Resettlement Specialist	M.Phil. Sociology, University of Sargodha
5	Asma Butt	Sociologist	M.Phil. Sociology, University of Punjab
6	Muhammad Ibrar	Ecologist	M.Phil. Zoology, University of Punjab
7	Sajjad Hussain	Chief Chemist	M.Phil. Chemistry, Govt. College University, Lahore

SECTION - 2: REGULATORY AND POLICY FRAMEWORK

This chapter provides details of the national / provincial legislation, regulations, EPA guidelines, World Bank Operational Policies and guidelines which are relevant and applicable to the project.

2.1 National and Provincial Legislative Framework

Table 2-1, National and Provincial Legislative Framework

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
1.	National Environmental Policy 2005	In March 2005, Government of Pakistan (GoP) launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.	The core areas that are relevant in the context of the proposed project are pollution prevention during construction and conserving biodiversity and forestry.
2.	Punjab Environmental Protection Act, 1997 (Amended 2012)	The Punjab Environmental Protection Act, 1997 (Amended, 2012 & 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 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 EPA. The section 11 of the act is applicable in term of compliance with Punjab Environmental Quality Standards (PEQS).

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>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'.</p> <p>The notable points of the law are:</p> <ul style="list-style-type: none"> • 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. <p>In the recent amendment of 2012, legislative powers related to environment and ecology are given to provincial</p>	<p>Similarly, section 13 of the act prohibits the import of hazardous waste.</p> <p>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.</p>

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>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.</p> <p>For the proposed Project, Environmental Protection Department (EPD) / Environmental Protection Agency (EPA), Government of Punjab (GoP) 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.</p>	
3.	Punjab Environmental Quality Standards (PEQS), 2016	<p>PEQS promulgated recently in 2016. Specified standards under PEQS are for:</p> <ul style="list-style-type: none"> • 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 	
4.	Punjab Environmental Protection, (Review of IEE	<p>These regulations set out: Key policy and procedural requirements for filing an EIA; The purpose of environmental</p>	<p>The provisions of these regulations are applicable for environmental screening</p>

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
	and EIA) Regulations, 2022	<p>assessment;</p> <p>The goals of sustainable development;</p> <p>The requirement that environmental assessment be integrated with feasibility studies;</p> <p>The jurisdiction of the Federal and Provincial EPA's and Planning & Development (P&D) Departments;</p> <p>The responsibilities of proponents;</p> <p>Duties of responsible authorities;</p> <p>Provides schedules of proposals that the project requires either IEE or an EIA;</p> <p>The environmental screening process of the projects under schedule I, II and III; and</p> <p>The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.</p>	<p>of the project, which implies that an environmental study is required for the proposed project. The process described in the regulation will be useful for MC Vehari to follow the procedure to file an Environmental study with Punjab-EPA and to understand its review process along with timelines to be followed.</p>
5.	Pakistan Penal Code, 1860	<p>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.</p>	<p>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.</p>
6.	The Canal and Drainage Act 1873 and amendment 2016	<p>The Canal and Drainage Act 1873 (CDA) focuses on construction and maintenance of drainage channels and defines powers</p>	<p>This act will be applicable as the project is for rehabilitation and improvement of water supply system in MC</p>

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		to prohibit obstruction or order their removal. It also covers issues related to canal navigation. It briefly addresses issues relating to environmental pollution. Section 70(5) of the CDA clearly states that no one is allowed to "corrupt or foul the water of any canal so as to render it less fit for the purposes for which it is ordinarily used." In addition, Section 73 of the CDA gives power to arrest without warrant or to be taken before the magistrate a person who has wilfully damaged or obstructed the canal or "rendered it less useful."	Vehari, as constructional waste should not be discharged in any canal or drainage system within treatment.
7.	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 and also due to sanitation services.
8.	Motor Vehicle Rules 1969	It defines powers and responsibilities of Motor Vehicle Examiners (MVEs). The establishment of MVE inspection system is one of the regulatory measures that can be taken to tackle the ambient air quality problems associated with the vehicular emissions during operation phase.	This act is applicable to the gaseous emission that will be released from project vehicles.
9.	Pakistan Labour Policy, 2010	The main objective of the Labour Policy, 2010 is the social	This act is applicable to protect the rights of

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts:</p> <ul style="list-style-type: none"> • Legal Framework; • Advocacy: rights of workers and employers; • Skill development and employment; and • Manpower export 	labour involved in project implementation.
10.	The Bonded Labour System (Abolition) ACT 1992	<p>According to this act, forced labour is any type of work or kind of service in which someone engages involuntarily and under implied coercion a manifest threat of a party or oppression measures. The bonded labour can exist in following forms under different situations:</p> <ul style="list-style-type: none"> • Bonded labour in exchange of advance / an amount of money given before services are rendered, received by a person or his family. • Bonded labour as a consequence of some social or customary obligations. • Bonded labour in exchange of an economic benefit / consideration received by a person or his family, • Bonded labour of a guarantor in exchange for debtor who was unable to pay off his debt. <p>Bonded labour is prevalent in</p>	This act is applicable to protect the rights of labour involved in the project implementation.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		agriculture sector, brick kilns, domestic work and begging.	
11.	Punjab Forest Act (Amended), 2010	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. There is no protected forest situated in and around the Project area.	This act provides guidelines to protect the trees present around the project corridor.
12.	Employment of Child 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.
13.	The Land Acquisition Act, 1894	The Land Acquisition Act, 1894, is a "law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition". The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements	This act will not trigger as it applies to the projects which require land acquisition.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. The land needed for the construction of development projects will be acquired under normal conditions based on prevailing market prices or negotiated prices between client and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.</p>	
14.	The Punjab Land Acquisition Rules, 1983,	It describes the land acquisition procedure for public purposes or for a company.	This act will not be triggered as it applies to the projects which require land acquisition.
15.	Provincial Wildlife Act, 1974	The Punjab Wildlife Act (1974) is developed for the regulation of activities relating to protection, conservation and management of wildlife in Punjab.	This act will not trigger as no wildlife will be disturbed.
16.	Pakistan Antiquities Act 1975 and Punjab Antiquities Amendment Act 2012	<p>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:</p> <ul style="list-style-type: none"> • "Ancient" is any object 	<p>The law will be applicable to the project mainly due to its two provisions:</p> <ul style="list-style-type: none"> • According to the law, any construction activity within 61 meter or 200 ft. of

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>that is at least 75 years old;</p> <ul style="list-style-type: none"> • 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. 	<p>protected antiquities, are prohibited.</p> <ul style="list-style-type: none"> • 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.
17.	The Punjab Special Premises (Preservation) Ordinance, 1985	It is expedient to preserve certain premises of historical, cultural and architectural value in the Punjab and to control and regulate alterations therein and demolition and re-erection thereof and for matters	The provisions of this act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the construction

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		ancillary thereto;	of proposed project.
18.	Katchi Abadis Act, 1987	The Katchi Abadis Act covers the urban squatter's rehabilitation rights by providing plots in public resettlement areas or cash assistance.	This act applies to the projects which requires land acquisition.
19.	Land Revenue Act, 1967	Determination of disputes under section 44 of LR Act 1967 sub-section (2) If in any such dispute, the Revenue Officer is unable to satisfy himself as to which of the parties thereto is in possession of any property to which the dispute relates, he shall (a) if he be not below the rank of Assistant Collector of the first grade, ascertain, after an inquiry in which an opportunity shall be given to all the parties, to the dispute of being heard and adducing evidence in support of their claims, who is the person best entitled to the property, and shall by written order direct that the person be put in possession thereof, and that entry in accordance with that order be made in the record or register; and (b) if he be below the rank of Assistant Collector of the first grade, report the matter to the Assistant Collector of the first grade, who shall thereupon proceed in the manner provided in clause (a). (3) A direction under sub-section (3) shall be subject to any decree or order which may be subsequently passed	This act applies to the projects which requires land acquisition. This project does not require land acquisition.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		by any Court of competent jurisdiction.	
20.	Punjab Alienation of Land Act, 1900	Under section 13, sub-section 11 of Punjab Alienation of Land Act 1900: Any member of an agricultural tribe may make a lease or farm of his land for any term not exceeding twenty years, and any lease or farm made by a member of an agricultural tribe for a longer term than twenty years shall if the lessee or farmer is not a member of the same tribe or of a tribe in the same group, be deemed to be a tease or farm for the term permitted by this section. Under section 13, sub-section 12. (1) During the currency of a mortgage made under section form 6 in form (a) or form (b) or of a lease or farm under this Act, the owner shall be at liberty to make a further temporary alienation of the same land for such term as together with the term of the current mortgage, lease or farm will make up a term not exceeding the full term of twenty years.	This act will not be triggered as there will be no loss of agricultural land during project implementation.
21.	Colonization of Government Lands Act, 1912	This Act shall, unless the Provincial Government, otherwise directs, apply to land to which the provisions of the Government Tenants (Punjab) Act 1893, have been applied and to any other land to which the Provincial Government may by notification in the Official Gazette apply it and	This act will be triggered as tube wells and transmission lines are proposed at the govt. lands.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>which at the time of the notification was the property of the Provincial Government, Provided that unless the Provincial Government by general or special order otherwise directs nothing in Sections 20, 21, 22 and 23, or in the proviso to section 14, of this Act shall, apply to tenancies specified in Schedule I of this Act, or to any class of tenancies created hereafter which the Provincial Government may declare to be scheduled tenancies under this section.</p>	
22.	<p>Punjab Restriction of Employment of Children Ordinance, 2016</p>	<p>According to the sub-section 11(a) of this Act, an occupier who employs or permits a child (person under the age of 15 years) to work in an establishment shall be liable to punishment with imprisonment for a term which may extend to six months, but which shall not be less than seven days, and a mandatory fine between 10,000 and 50,000 rupees.</p>	<p>The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.</p>
23.	<p>The West Pakistan Maternity Benefit Ordinance, 1958</p>	<p>The West Pakistan Maternity Benefit Ordinance of 1958 was a legislation enacted in the former state of West Pakistan, which is now part of present-day Pakistan. The ordinance was established to provide maternity benefits to women in employment. The ordinance mandated that every woman employed in an establishment was entitled to maternity</p>	<p>The relevance of this act to the project will be to facilitate pregnant women worker.</p>

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		<p>benefits, including paid leave before and after childbirth. The main provisions of the ordinance included:</p> <p>Duration of Maternity Leave: Twelve weeks (06 weeks before the expected date of childbirth and 06 weeks after the childbirth).</p> <p>Payment During Maternity Leave: During the maternity leave, the female employee is entitled to receive her full wages.</p> <p>Medical Allowance: The employer is also responsible for paying a medical bonus of a certain amount to the pregnant woman.</p> <p>Job Protection: A woman availing maternity leave cannot be terminated from her job during her absence due to pregnancy.</p> <p>Limitation on Heavy Work: Prohibits employers from assigning heavy or dangerous work to pregnant women during the pregnancy and for a specified period after childbirth.</p> <p>Notice Requirement: An employee intending to avail maternity leave must provide her employer with a notice stating the expected date of childbirth at least six weeks before taking leave.</p>	
24.	Protection of Trees and Brushwood Act,	Act refers to save trees / brushwood / greenery / plantations to make the	This act will be triggered as saving trees / plantations is one of the

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
	1949	environment better for living.	major parts of this ESIA.
25.	Guidelines for Public Consultation, 1997	<p>The Federal EPA provides these guidelines to deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures the incorporation of their concerns in any impact assessment study. These guidelines cover:</p> <ul style="list-style-type: none"> • Consultation, involvement and participation of stakeholders • Effective public consultation (planning, stages of EIA where consultation is appropriate) • Facilitation involvement (including the poor, women and Non-Governmental Organizations (NGOs)) 	This act will be applicable to this project as public consultation is an essential / mandatory part of ESIA.

2.2 Comparison of International and Local Environmental Legislations

In order to select the most stringent standards applicable, a mix of local (PEQS) and international (IFC) regulations have been adopted. The IFC's Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines; Environmental, Noise Management has noise level guidelines for daytime and night time, which are applicable. It shall be ensured that all necessary noise mitigation measures are implemented to minimize the noise levels in the project area.

The **Table 2-2** presents IFC workplace noise standards that are applicable to the construction workers. It should also be noted that IFC EHS guidelines advise that where existing ambient noise levels already exceed thresholds, the project should not result in an increase of more than 3 dB(A) over existing ambient noise at the nearest receptor location off-site.

Table 2-2, IFC's Work Environment Noise Limits

Sr. No.	Type of Work / Workplace	IFC's General EHS Guidelines
1	Heavy Industry (no demand for oral communication)	85 Equivalent level Leq, 8h
2	Light industry (decreasing demand for oral communication)	50-65 Equivalent level Leq, 8h

A comparison of applicable local and international guidelines for ambient air quality has been provided in **Table 2-3** below. In the case of most pollutants, the PEQS standards for ambient air quality are more stringent in comparison to USEPA and WHO / IFC standards. The applicable and most stringent parameters for each respective pollutant are highlighted in green.

Table 2-3, Comparison of International and local Air Quality Standards

Sr. No.	Pollutants	USEPA		WHO / IFC		PEQS	
		Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
1.	SO ₂	3 hrs 1 hr	0.5 ppm 75 ppb	24 hr.	40 ug/m ³	Annual Mean 24 hrs	80 ug/m ³ 120 ug/m ³
2.	CO	8 hrs 1 hr	9 ppm (11 mg/m ³) 35 ppm (43 mg/m ³)	-	-	8 hrs 1 hr	5 mg/m ³ 10 mg/m ³
3.	NO ₂	Annual Mean 1 hr	100 ug/m ³ (53 ppb) 100 ppb	24Hour Annual Mean	25 ug/m ³ 10 ug/m ³	Annual Mean 24 hrs	40 ug/m ³ 80 ug/m ³
4.	O ₃	8 hrs	0.07ppm (148 ug/m ³)	8 hrs daily maximum 8hr mean peak season	100 ug/m ³ 60 ug/m ³	1 hr	130 ug/m ³
5.	TSP	-	-	-	-	Annual Mean 24 hrs	360 ug/m ³ 500 ug/m ³
6.	PM ₁₀	24 hrs	150 ug/m ³	Annual Mean 24 hr	15 ug/m ³ 45 ug/m ³	Annual Mean 24 hrs	120 ug/m ³ 150 ug/m ³
7.	PM _{2.5}	Annual Mean 24 hrs	15 ug/m ³ 35 ug/m ³	Annual Mean 24 hr	5 ug/m ³ 15 ug/m ³	Annual Average 24 hrs 1 hr	15 ug/m ³ 35 ug/m ³ 15 ug/m ³

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

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

Similar to the standards for air quality, the comparison of noise standards provided in **Table 2-4** clearly shows that PEQS standards for noise are more stringent in comparison to the IFC standards. The only exception is the daytime noise level standard for Industrial areas where the IFC standard is more stringent i.e., 70 dB(A) in comparison to PEQS i.e., 75 dB(A) and so for this particular parameter, the IFC standard will be used. Apart from this one exception, the PEQS standards have been used for the proposed project. Further, the IFC EHS guidelines advise that where existing ambient noise levels already exceed thresholds, the sub-project should not result in an increase of more than 3 dB over existing ambient noise at the nearest receptor location off-site.

Table 2-4, Comparison of International and Local Noise Standards

Sr. No.	Category of Area / Zone	Limites in db(A) Leq			
		PEQS		WHO / IFC	
		Day-Time 06:00 – 22:00	Night-Time 22:00-06:00	Day-Time 07:00 – 22:00	Night-Time 22:00-07:00
1	Residential area (A)	55	45	55	45
2	Commercial area (B)	65	55	70	70
3	Industrial area (C)	75	65	70	70
4	Silence zone (D)	50	45	55	45

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

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

Table 2-5 presents the vibration levels below which there is no risk of damage to buildings. These limits apply to vibration frequencies below 15Hz where the most conservative limits are required and are presented for both transient and continuous vibrations. For protected or potentially vulnerable buildings, the recommended construction vibration limit is reduced by half.

Table 2-5, Maximum Permissible Construction Phase Vibration Levels

Building Type	Vibration Limit - PPV for Transient Vibrations for Frequencies <15Hz	Vibration Limit – PPV for Continuous Vibrations for Frequencies <15Hz
Structurally sound and not protected structures	12.5 mm/s	6.25 mm/s
Protected and / or vulnerable structures	6 mm/s	3 mm/s

Source: British Standard (7385-2) ‘Evaluation and Measurement for Vibration in Buildings, A Guide to Damage Levels Arising from Ground borne Vibration, 1993.

The comparison of water quality standards provided in **Table 2-6** and **Table 2-7** clearly shows the PEQS standards for surface and drinking water quality as compare to WHO and FAO standards.

Table 2-6, Comparison of National and International Drinking Water Standards

Sr. No.	Parameters	Units	PEQS	WHO Standards
1.	Temperature (During Sample Collection)	OC	NS	NS
2.	Colour	Pt-Co	≤15TCU	<15TCU
3.	pH	pH unit	6.5-8.5	6.5-8.5
4.	Turbidity	NTU	<5	<5
5.	Total, Hardness	mg/L	<500.00	NS
6.	Total Dissolved Solid (TDS)	mg/L	<1000.00	<1000.00
7.	Total Suspended Solid (TSS)	mg/L	NS	NS
8.	Ammonia	mg/L	NS	NS
9.	Fluoride F-	mg/L	<1.50	1.50
10.	Sulfate (SO ₄ -2)	mg/L	NS	NS
11.	Chloride (Cl-)	mg/L	<250.00	250
12.	Nitrate (NO ₃ -)	mg/L	<50.00	50.00
13.	Odor	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable
14.	Taste	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable
15.	Sodium	mg/L	NS	NS
16.	Iodine	ppm	NS	NS
17.	Arsenic (As)	mg/L	< 0.05	0.01

Sr. No.	Parameters	Units	PEQS	WHO Standards
18.	Iron (Fe 3+)	mg/L	NS	NS
19.	Zinc (Zn 2+)	mg/L	5.0	3.0
20.	Conductivity	µS/cm	NS	NS
21.	Bicarbonate	mg/L	NS	NS
22.	Nitrite	mg/L	<3	3
23.	Magnesium	mg/L	NS	NS
24.	Calcium as Ca	mg/L	NS	NS
25.	Phosphate	mg/L	NS	NS
26.	Potassium	mg/L	NS	NS
27.	Boron	mg/L	<0.3	0.3
28.	SAR Iodine (I)	mg/L	NS	NS
29.	Aluminum	mg/L	< 0.2	0.2
30.	Antimony	mg/L	<0.005	0.02
31.	Cadmium	mg/L	0.01	0.003
32.	Mercury	mg/L	<0.001	0.001
33.	Nickel	mg/L	<0.02	0.02
34.	Selenium	mg/L	0.01	0.01
35.	Barium	mg/L	0.7	0.7
36.	Total Chromium	mg/L	<0.05	0.05
37.	Copper	mg/L	2	2
38.	Lead	mg/L	<0.05	0.01
39.	Cyanide (CN)	mg/L	<0.05	0.07
40.	Manganese	mg/L	<0.5	0.5
41.	Total Coliforms	cfu/100ml	0/100 ml	0/100 ml
42.	Fecal Coli forms (E.Coli)	cfu/ml	0/100 ml	0/100 ml

NS = Not Specified

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

Table 2-7, Comparison of National and International Surface Water Standards

Sr. No.	Parameters	Units	PEQS (Regional)	WHO Class – V (Agriculture)	FAO Standards
1.	Temperature	OC	--	--	--
2.	pH	pH unit	6-9	<5.3	6.0-8.5
3.	COD	mg/L	150	>30	--

Sr. No.	Parameters	Units	PEQS (Regional)	WHO Class – V (Agriculture)	FAO Standards
4.	(BOD ₅)	mg/L	80	--	--
5.	Solids, Total Dissolved (TDS)	mg/L	3500	--	0-2000
6.	Solids, Total Suspended (TSS)	mg/L	200	--	--
7.	Chloride	mg/L	1000	--	0-1065
8.	Fluoride (F-)	mg/L	10	--	--
9.	Oil & grease	mg/L	10	--	--
10.	Phenols, Total (Phenolic Compounds)	mg/L	0.10	--	--
11.	Cyanide (CN-)	mg/L	01.00	--	--
12.	Anionic Detergents as MBAS	mg/L	20.00	--	--
13.	Sulfate (SO ₄ ²⁻)	mg/L	600	--	0-960
14.	Sulfide (S)	mg/L	01.00	--	--
15.	Ammonia NH ₃	mg/L	40.00	--	--
16.	Cadmium (Cd)	mg/L	0.10	>0.0039 mg/L	--
17.	Chromium (Cr) as Hexavalent & Trivalent	mg/L	1.00	>0.016 mg/L	--
18.	Copper (Cu)	mg/L	1.00	>0.018 mg/L	--
19.	Lead	mg/L	0.50	>0.082 mg/L	--
20.	Nickel	mg/L	1.00	>1.4 mg/L	--
21.	Zinc	mg/L	5.00	>0.12 mg/L	--
22.	Iron	mg/L	8.00	--	--
23.	Manganese	mg/L	1.50	--	--
24.	Selenium	mg/L	0.50	--	--
25.	Silver	mg/L	1.00	--	--
26.	Arsenic	mg/L	1.00	>0.36 mg/L	--
27.	Barium	mg/L	1.50	--	--
28.	Magnesium	mg/L	--	--	0-61
29.	Nitrate	mg/L	--	--	0-10
30.	Sodium	mg/L	--	--	0-920
31.	Boron	mg/L	6.00	--	0-2
32.	Mercury	mg/L	0.01	>0.0024 mg/L	--
33.	Chlorine	mg/L	01.00	--	--
34.	Total Toxic Metals	mg/L	02.00	--	--
35.	Turbidity	NTU	NS	--	--

Sr. No.	Parameters	Units	PEQS (Regional)	WHO Class – V (Agriculture)	FAO Standards
36.	Oxygen, Dissolved	mg/L	NS	--	--
37.	Pesticides	µg/L	NS	--	--
38.	Nutrients as Potassium	mg/L	--	--	0-2
39.	Nutrients as Nitrogen	mg/L	--	--	--
40.	Nutrients as Phosphorous	mg/L	--	--	--
41.	Total Coliform	MPN/10 0ml	--	--	--
42.	Fecal Coliform	MPN/10 0ml	--	--	--

NS = Not Specified

The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed sub-project. Other are same in both case.

PEQS standards for ambient air quality, noise, water and wastewater were adopted as more parameter are covered in PEQS as compare to WHO and FAO guidelines may provide a clearer picture of baseline environmental conditions of the sub project area. Moreover, IFC itself guides that local standard i.e., PEQS should take precedence over any other international regulations.

2.3 International Laws / Treaties

2.3.1 The World Bank’s Operational Policies

The World Bank (WB) has approved a series of Operational Policies which define the conduct of WB operations. A summary of the status of those Operational Policies which relate to environmental and social impacts are provided in the following sections **Table 2-8**.

Table 2-8, Assessment of Applicable World Bank Operational Policies

Safeguard Policy	Triggered?	Explanation
Environmental Assessment OP / 4.01	Yes	This project has been categorized as ‘Category E-1’. The project activities under this category may potentially cause negative environmental and social impacts. The project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.
Physical Cultural Resource OP / 4.11	No	The project does not lie in any near any cultural and heritage resource therefore OP 4.11 will not be triggered.

Safeguard Policy	Triggered?	Explanation
Involuntary Resettlement OP / 4.12	No.	OP 4.12 is not triggered as the project does not require any land acquisition, therefore there will be no involuntary resettlement, livelihood impacts, or restrictions on access. Consequently, there is no need of a Resettlement Action Plan. If the situation changes, PMDFC will take immediate steps to prepare a RAP / ARAP.

2.3.2 World Bank Environmental, Health and Social Guidelines

The principal World Bank publications that contain environmental and social guidelines are listed below.

- Environment, Health, and Safety (EHS) Guidelines prepared by International Finance Corporation and World Bank in 2007
- Pollution Prevention and Abatement Handbook 1998: Towards Cleaner Production
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross-Sectoral Issues.
- Social Analysis Sourcebook
- WB Committee on disability-inclusive development
- WB guidelines on labour influx
- WB Group Gender Strategy

Labor's SOPs are attached as **Annexure - 13**:

2.3.3 World Bank Policy Core Principles and Applicability on Project

Core Principles	Applicability
<p>Core Principle 1 Environmental and social management procedures and processes are designed to;</p> <p>(a) avoid, minimize, or mitigate against adverse impacts;</p> <p>(b) promote environmental and social sustainability in program design; and</p> <p>(c) promote informed decision making relating to a program's environmental and social effects.</p>	<p>ESIA prepared under the light of this Principle in order to mitigate negative impacts envisaged in this project. ESMMP implementation and monitoring arrangements of ESIA will help in achieving environmental and social sustainability.</p>
<p>Core Principle 2 Environmental and social management procedures and processes are designed to avoid, minimize, and mitigate against adverse effects on natural habitats and</p>	<p>Table 8-2 prepared to mitigate all impacts anticipated during the course of the project.</p>

Core Principles	Applicability
physical cultural resources resulting from the program.	
<p>Core Principle 3 Program procedures ensure adequate measures to protect public and worker safety against the potential risks associated with (a) construction and / or operations of facilities or other operational practices developed or promoted under the Program and (b) exposure to toxic chemicals, hazardous wastes, and otherwise dangerous materials</p>	<p>All the mitigation measures have been incorporated in the Table 8-2 to address risks associated with workers and community health and safety. Contractor will ensure compliance with these attributes.</p>
<p>Core Principle 4 Land acquisition and loss of access to natural resources are managed in a way that avoids or minimizes displacement, and affected people are assisted in improving, or at least restoring, their livelihoods and living standards</p>	<p>This core principle doesn't trigger in this project as no land acquisition is required during the rehabilitation of existing water supply and construction of new tube wells and transmission lines.</p>
<p>Core Principle 5 Due consideration is given to cultural appropriateness of, and equitable access to, program benefits, giving special attention to rights and interests of indigenous peoples and to the needs or concerns of vulnerable groups.</p>	<p>No indigenous / Vulnerable groups exist along with ROW of the project.</p>
<p>Core Principle 6 Avoid exacerbating social conflict, especially in fragile states, post-conflict areas, or areas subject to territorial disputes.</p>	<p>This principle doesn't trigger in this project.</p>

2.3.4 The World Bank’s Environmental Code of Practices

The World Bank’s Environmental Code of Practices (ECoPs) address less significant environmental impacts and all general construction related impacts of the proposed project implementation. The ECoPs provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues during execution of sub-project. The list of ECoPs is provided below;

- ECP 1: Waste Management
- ECP 2: Fuels and Hazardous Substances Management
- ECP 3: Water Resources Management
- ECP 4: Drainage Management

- ECP 5: Soil Quality Management
- ECP 6: Erosion and Sediment Control
- ECP 7: Borrow Areas Development and Operation
- ECP 8: Air Quality Management
- ECP 9: Noise and Vibration Management
- ECP 10: Protection of Flora
- ECP 11: Protection of Fauna
- ECP 12: Protection of Fisheries
- ECP 13: Road Transport and Road Traffic Management
- ECP 14: Construction Camp Management
- ECP 15: Cultural and Religious Issues
- ECP 16: Workers Health and Safe

SECTION - 3: SCREENING AND SCOPING OF PROJECT

3.1 Screening of the Project

As per the Environmental and Social Framework (ESMF) of the project, the projects are categorized in E1, E2 and E3 category and S1, S2 and S3 category based on the magnitude and severity of the environmental and social impacts of the project.

For this project, as per Environmental and Social Management Framework (ESMF) of Punjab Cities Program (PCP), the projects under the scope of Water Supply Distribution Network with new water supply network fall in E1 category and may require to conduct Environmental & Social Impact Assessment (ESIA) study as per scope of work, environmental impacts and categorization given in Schedule I and II of PEPA Review of IEE and EIA Regulations, 2022.

According to the Review of IEE and EIA Regulations, 2022, the project falls under Schedule II (List of projects requiring an EIA), Category F [Water supply, Sewerage System and treatment], sub-clause {Water supply schemes and treatment plants (excluding the Reverse Osmosis, Ultra filtration and such like) with total cost more than Rs. 50 million}.

This project includes construction / installation of 10 tube wells, laying of 41,790 Rft. transmission main, rehabilitation of 06 GSTs / OHRs and replacement of 23,840 Rft. out-lived pipes in MC Vehari.

The project corridor is in direct vicinity of Vehari city that may have minor mitigatable environmental impacts during construction works like dust generation, noise generation etc.

As per Environmental and Social Management Framework (ESMF) of Punjab Cities Program (PCP), all those projects having negative social impacts of significant nature on 01-40 households and / or it requires displacement / resettlement of 01-40 households due to land acquisition, a Social Management Plan (SMP) will be prepared and implemented as a part of the ESMP. An Abbreviated Resettlement Action Plan (ARAP) will also be prepared and implemented. These projects are categorized as S2. While all those projects having negative social impacts of significant nature on more than 40 households and / or it require displacement / resettlement of > 40 households for land acquisition, a Social Assessment (SAR) and Social Management Plan (SMP) will be prepared and included as a part of the EIA. A Resettlement Action Plan (RAP) will also be prepared and implemented in accordance with RPF.

As this project does not initiate any kind of resettlement / displacement issues, but can have minor but mitigatable social impacts like privacy issues, hindrance for traffic movement etc., so this project has been categorized as S2 where mitigation measures for social impacts will be incorporated in this ESIA.

3.2 Spatial and Temporal Boundaries of Environmental Assessment

Spatial Boundaries	Temporal Boundaries
REGIONAL: Impacts could extend to the region surrounding the proposed project.	YEAR ROUND: Significant throughout the year.
LOCAL: Impacts limited to the local area in close proximity to the proposed project.	SEASONAL: Significant on a seasonal basis, depending on nature of valued environmental component (VEC).

The spatial and temporal boundaries of the project can be observed through **Figure 3-1**.

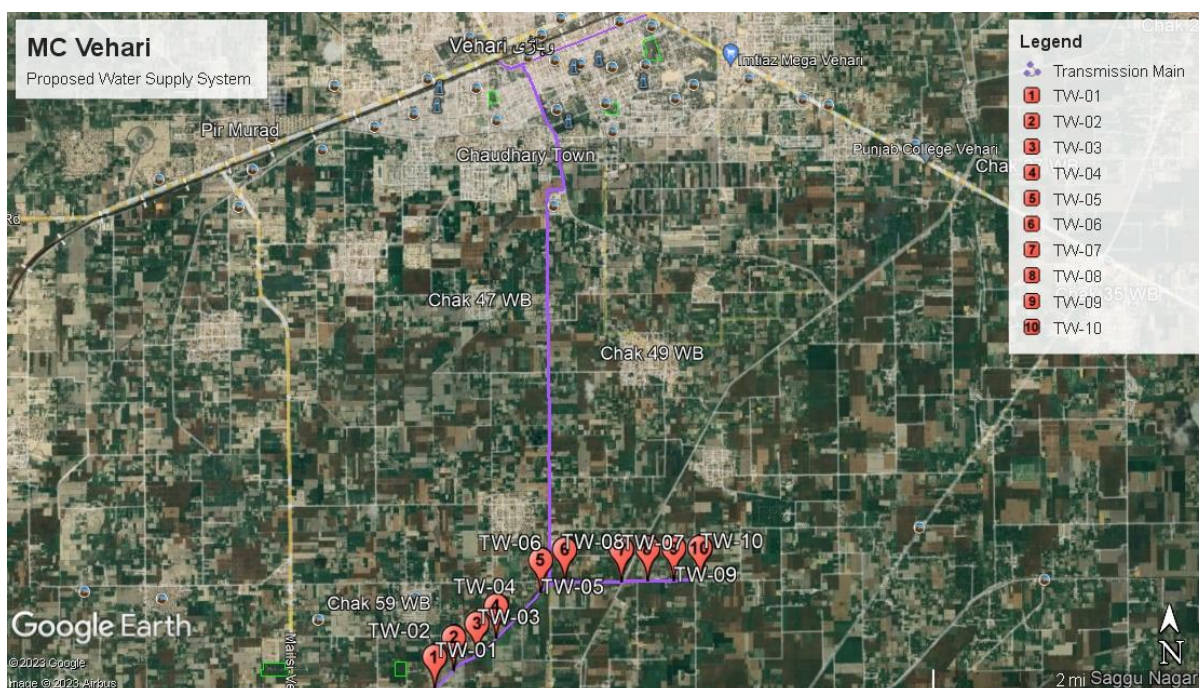


Figure 3-1, Google Map of the Project

3.3 Important Issues and Concerns Raised During Consultation

During the survey, respondents were inquired about their views regarding the proposed project. Almost all respondents showed their concerns about the proposed project. Some of the respondents had positive thinking and they were in favour of the project. But few respondents showed their concerns regarding construction phase dust and noise issues. They expressed vividly that such projects should be completed in time.

During the survey, respondents were inquired about their views regarding the perceived impacts of the project during construction phase. Almost all respondents express their positive and negative views. The views are:

- There will be noise and dust pollution
- There will be health and safety issues

3.4 Significant Impacts and Factors to be Determined

- Soil Contamination and Erosion
- Ground water contamination
- Air quality deterioration
- Noise
- Waste material
- Labor HSE issues
- Impacts on flora and fauna

SECTION - 4: ANALYSIS OF ALTERNATIVES

This chapter deals with the analytical overview of different alternatives that have been considered. The alternative analysis is mainly aimed to mitigate the adverse social & environmental impacts in the project and make technically feasible and economic & financially viable alternative. The analysis has been carried out critically so as to justify the need of the project and to select the most feasible alternative. Besides the economic viability; environmental sustainability and social soundness of the project has also been considered while analyzing different alternatives.

4.1 No Project Option (NPO) / No Project Alternative

This project is for the improvement / rehabilitation of water supply system of MC Vehari.

A no project alternative entails no changes in the existing status of the site. Adopting no project alternative / NPO will have different advantages and disadvantages as well;

4.1.1 Advantages of NPO

Adopting no project alternative / NPO will save the World Bank's money, the efforts, time and resources that can be utilized on another project elsewhere in the province and short-term negative impacts that are envisaged during the execution of the project.

4.1.2 Disadvantages of NPO

Adopting NPO will generate more environmental, social and health issues in MC Vehari as this project is for the betterment / improvement of the water supply system of MC Vehari; the people will be deprived of clean water supply and will have to resort to alternative water sources, that will incur them with extra charges. The pressure on the alternative water sources will increase and the significant water source from the canal will be wasted. Existing GSTs / OHRs will not be rehabilitated. Adopting NPO will require much more resources to rectify the issues that can be resolved through this project.

Therefore, in the light of the above discussion, proposed project is very much needed for the community and NPO is not acceptable for the project.

4.2 Location Alternatives / Site Alternatives

Two (02) different sites were considered for construction / installation of tube wells for Vehari. Environmental and Social Experts along with Project Design Engineers visited the sites to check / finalize which site is more suited and feasible as per design and environmental & social perspectives. Details of these sites are given below;

4.2.1 Site-01

Site-01 is located at Vehari – Hasilpur Road near Chak 35 WB and Adda 27 Bhattha / Basti Naseemabad Road, at south – east side of Vehari. As per site visit and consultations, that land is privately owned agricultural land. Location marked at Google Maps is given below in Figure 4-1;

4.2.2 Site-02

Site-02 is located near chak 59-WB at southern side of Vehari. As per PMDFC, MC Vehari and consultation conducted with locals, that land is govt. owned and freely available for the construction of tube wells. Location marked at Google Maps and pictorial view of site are given below in **Figure 4-1**;

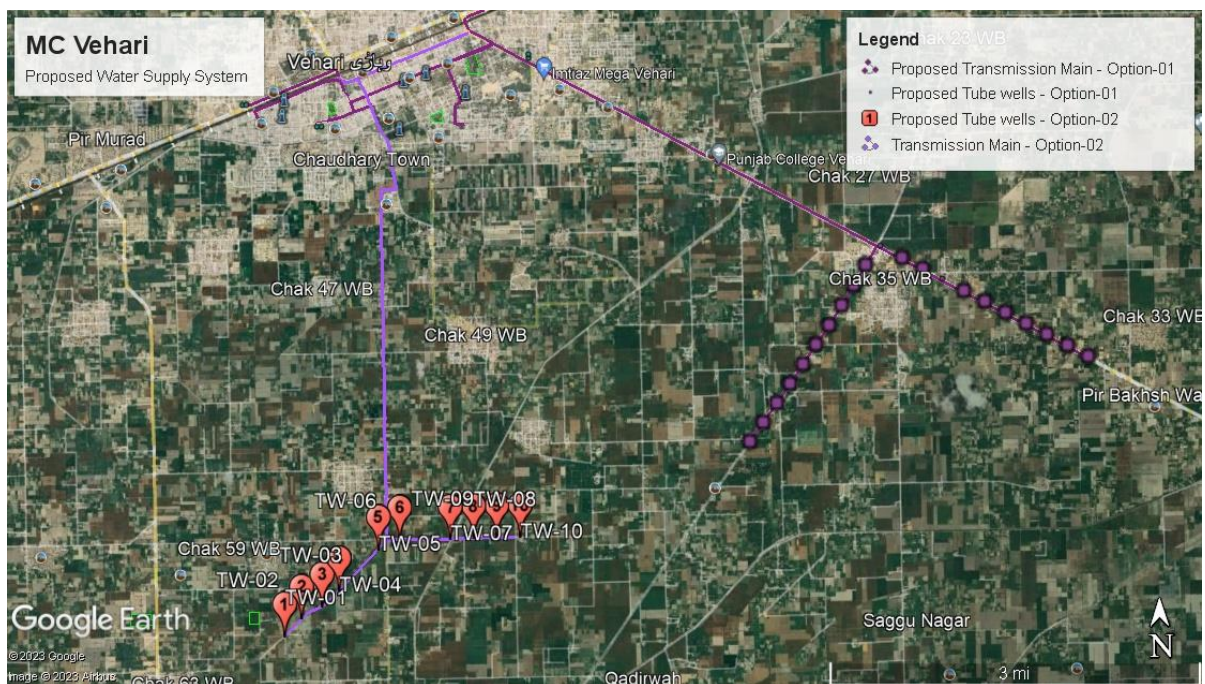


Figure 4-1, Site Alternative (Site-01 & Site-02) on Google Maps

4.2.3 Preferable Site for Tube-Wells

Considering the design criteria, both sites are favourable for construction of tube wells but site-01 requires land acquisition while site-02 is govt. land which is easily / freely available for the construction / installation of tube wells. As land acquisition for private land is an extensive and economic process, while improvement & rehabilitation of water supply system is a dire need of MC Vehari as per consultation conducted with local residents and MC; therefore, considering the environmental and social factors, it is determined that site-02 is more preferable location as compared to site-01 for construction / installation of tube wells. Comparison of both sites is given under in **Table 4-1**;

Table 4-1, Comparison of Site Alternatives

Site-01	Site-02
Not Preferable	Preferable
<ul style="list-style-type: none"> Entirely private land Agricultural land Crops are cultivated Compensations to be provided for land, crops and livelihood Economically expensive as land acquisition for private land is required and compensation has to be provided for livelihood, crops and land Site located on main Vehari – Hasilpur Road HSE related impacts on nearby settlements (dust, noise, odor, accidents etc.) 	<ul style="list-style-type: none"> Entirely govt. land No land acquisition and resettlement are required No major settlements near site

4.3 Design / Technology Alternatives

4.3.1 Water Distribution Network

The purpose of a distribution network is to distribute the potable water from the storage reservoir over the area to be provided, and deliver it to the individual consumer in such a way that at any tap point and at any time sufficient water of good quality can be withdrawn. There are two types of water distribution system;

A) Branched System

The design of a branched system is generally straight forward, where the direction of water flow in all pipes and the flow rate can be readily determined. One of the advantages of a branched system is generally lower costs.

The disadvantages are;

- A main break will cause all downstream consumers to be out of service
- It results in poor chlorine residuals and aging of water in low demand areas.
- During high demands, the velocities are faster, hence head losses are higher

B) Looped System

A distribution network is looped when there are only few or no pipe dead-ends, such that water can move through the system freely.

The advantages of a looped system are;

- The lower water velocities in the main reduce head losses, resulting in greater capacity.
- Main breaks can be isolated, minimizing service interruptions to consumers.
- Usually, better chlorine residual content is achieved.

The disadvantage is generally more costs because of the need for more pipes to create the loops.

4.3.2 Conclusion / Recommended Method

Keeping in view, technical and financial viability of aforementioned systems and previous planning experiences, loop system will be adopted being most efficient and dependable system.

4.4 Environmental Alternatives

The environmental conditions of the project were overall in compliance with the PEQS as per the baseline environmental reports attached with this ESIA report. The construction works during this project will lead to momentary dust / particulate and gaseous pollution, that will eventually subside.

Overall, this project will lead to the improvement of environmental quality of project site as tree plantation will be ensured near project site and clean drinking water will be supplied to the residents of MC Vehari.

4.5 Economic Alternatives

Raw material for construction will be purchased from nearby area / from local vendors, so that the transportation cost of material might be saved. Efforts will be made to save any unnecessary expenses to be taken out of the World Bank and public funds.

SECTION - 5: DESCRIPTION OF THE PROJECT

This chapter presents all aspects of the project. It describes the nature of the project, its location, designs and site layout / plan. It presents the activities that will be involved during all stages of project; how product will form, detail of process and machinery as well as details on supportive resources i.e., man power and utility requirements.

5.1 Overview of the Project

Following project has been designed to improve the existing infrastructure of water supply system with the provision of better living standards and the environment for urban populations in project area.

“Rehabilitation and Improvement of Water Supply System in MC Vehari”

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

Table 5-1, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Construction / installation of tube wells	10 Nos.
2.	Laying of transmission main	41,790 Rft.
3.	Rehabilitation of existing GSTs / OHRs	06 Nos.
4.	Replacement of out-lived pipes	23,840 Rft.

5.2 Objectives of the Project

The project aims at improvement of infrastructure of municipal services such as laying of water supply system in water shortage area and in enhance the water source of MC Vehari.

The project has the following main objectives.

- To rehabilitate the existing pumping machinery of Tube wells and Intermediate pumping station.
- To fulfil the water requirement for water shortage area.
- Improvement of service delivery level of the municipal services.
- Development of New Water source
- Enhancement in water source

- Increase the water storage for community
- To deliver potable water to community at door step.
- Improvement in local and province economy.

On implementation, the project will reduce the general public's complaints about low pressure, deficient quantity and sewage contamination into the water. This will also eliminate the water borne diseases and will improve the health of general public.

5.3 Location & Site Layout of the Project

The project is located in MC Vehari, Punjab. Vehari is a city of southern Punjab, Pakistan. Vehari is about 100 km (62 mi) from the historical city of Multan. Vehari is located at the Multan-Delhi Road constructed by Indian Muslim Emperor Sher Shah Suri. It is located at 30°2'31" N, 72°21'10" E and an altitude of 135 m (443 ft). Project location map, site layout map and google map are given below in **Figure 5-1**, **Figure 5-2** and **Figure 5-3** respectively;

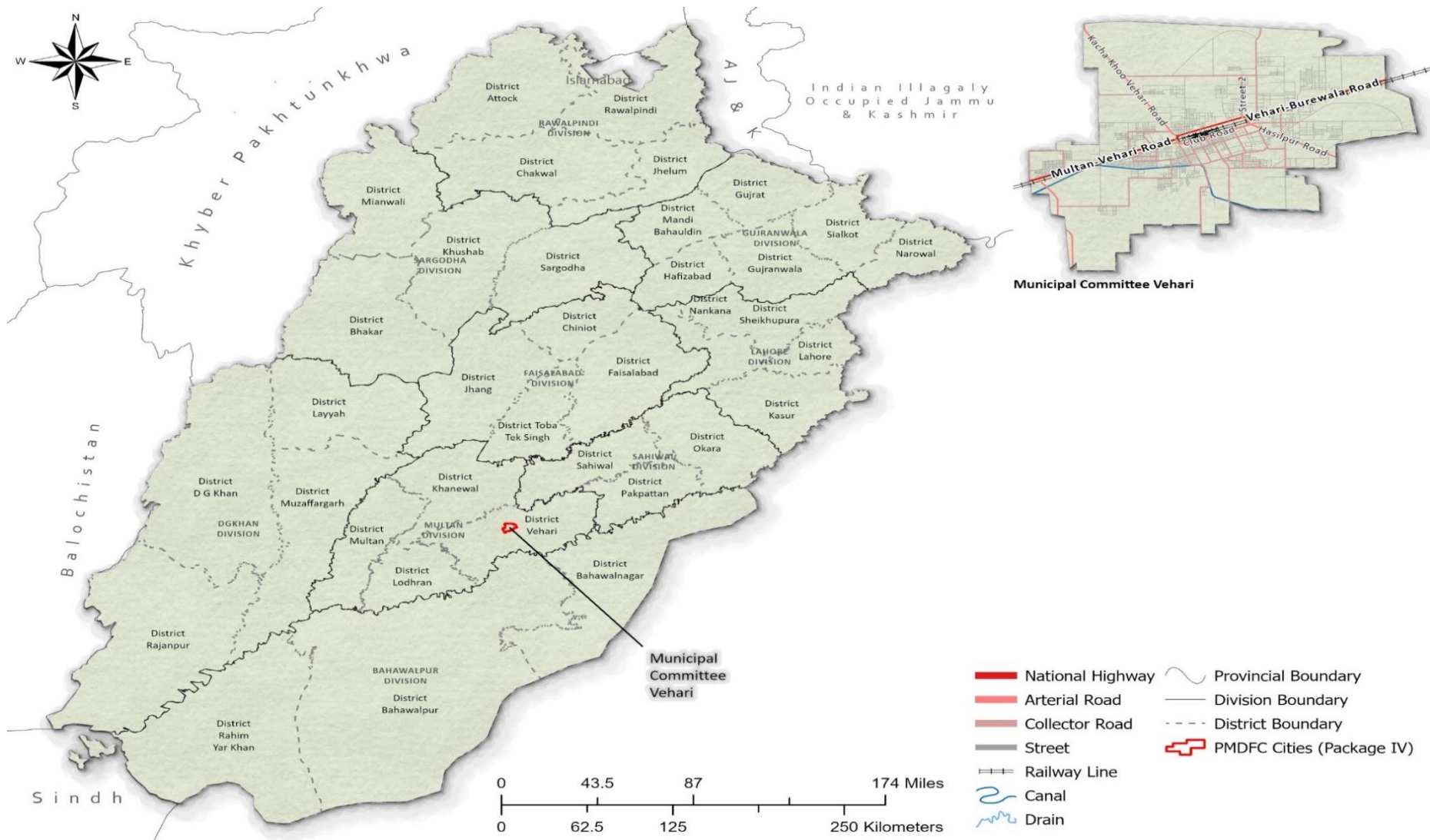


Figure 5-1, Project Location Map

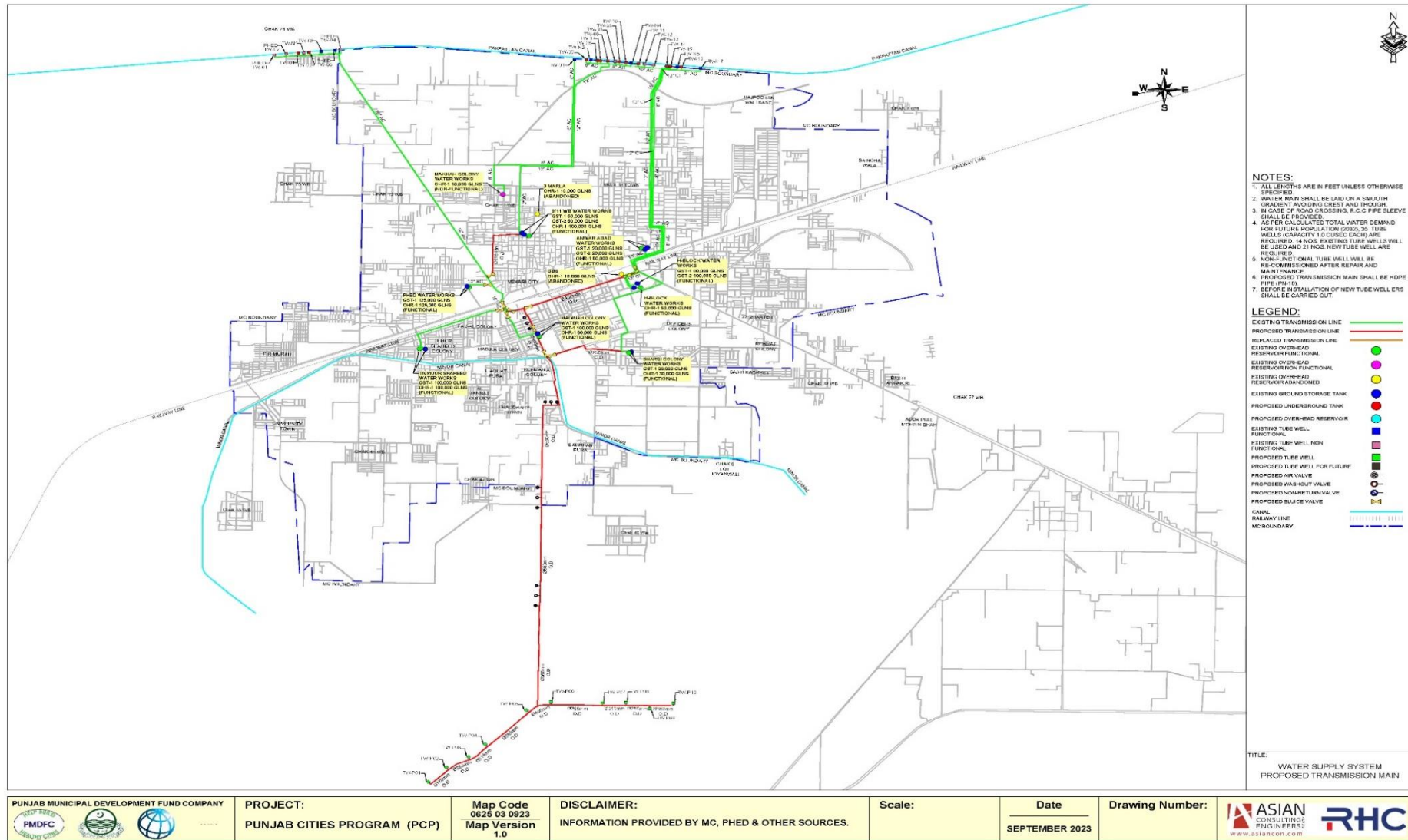


Figure 5-2, Project Layout Map

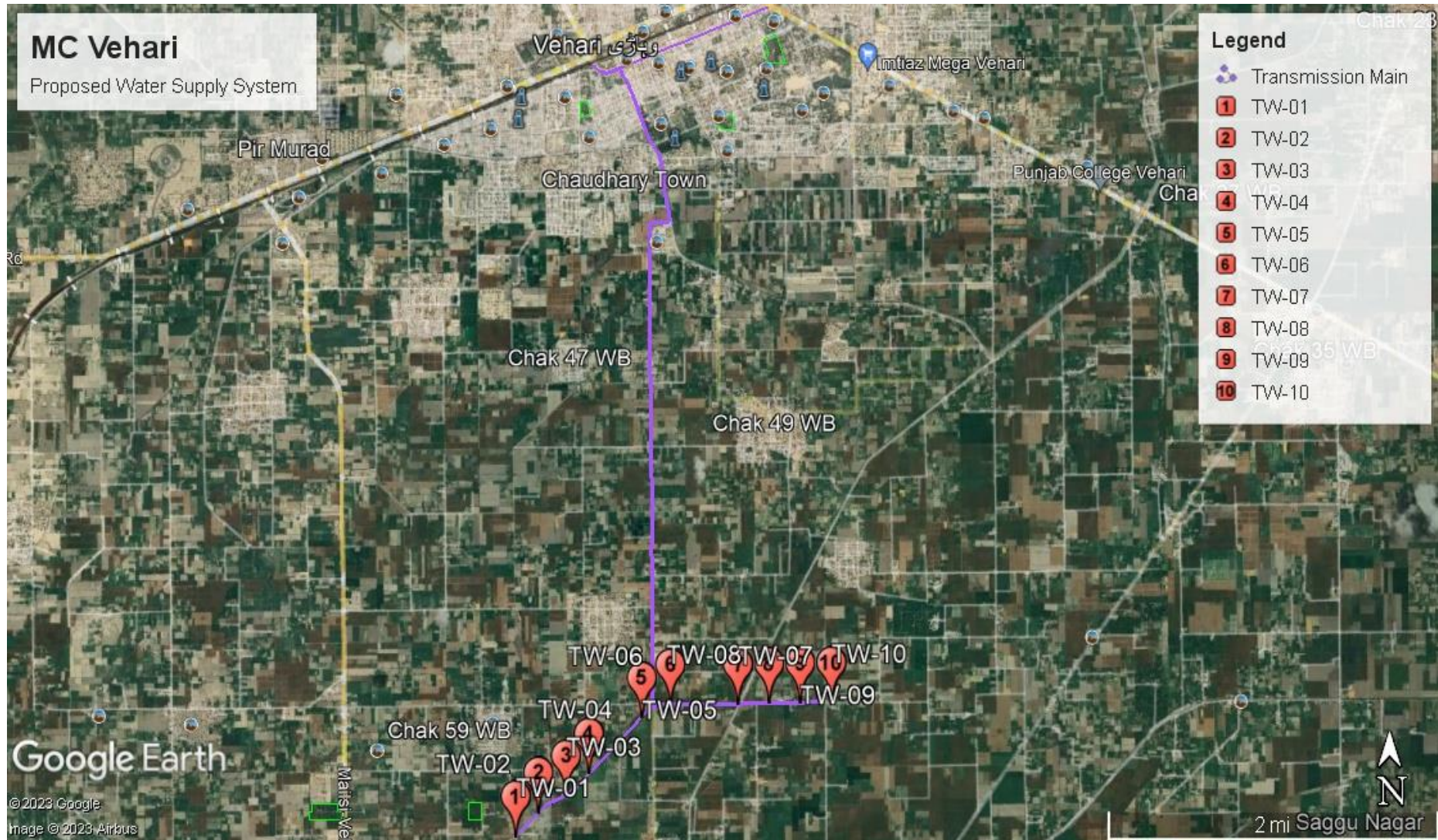


Figure 5-3, Project Google Map

The site has been selected on the recommendation of MC Vehari and PMDFC. 10 tube wells will be constructed / installed near chak 59-WB on govt. owned land, at southern side of Vehari. Transmission main of 41,790 Rft. will be constructed / laid from proposed site for tube wells (near chak 59-WB) to Vehari city. Following 06 water works (GSTs / OHRs) will be rehabilitated:

- 9/11-WB
- H-Block
- Madina Colony
- Anwar Abad
- People's Colony
- Sharqi Colony

Rehabilitation of following existing intermediate pumping stations (IPS) and Outlived pipes will be carried out;

A) 9/11-WB

- Two pump units 2 cusec each, 120 ft Head + 50HP motors each (one working + one standby)
- Replacement of transformer (50KVA)
- Roof replacement of GST (RCC Slab 35' dia). Also elevate 1 or 2 ft from Ground level (35ft + 35ft dia)
- OHR maintenance 30ft dia and 25ft depth (Weather sheet, Ladder Repair, Pillars plinth protection and plaster required)
- OHR to be cleaned from inside
- Pavement (soling) required (300 ft²)

B) Anwar Abad

- Two pump units 2 cusec each, 120 ft Head + 50HP motors each (one working + one standby)
- Leakage Maintenance of GST. (25ft dia)
- OHR maintenance 25ft dia and 15ft depth (Weather sheet)
- OHR to be cleaned from inside
- Pump House maintenance (Normal cracks in walls, Plaster and Paint Damaged)

C) H-Block

- Leakage Maintenance of GST. (50 ft)
- Overflow pipe replacement
- OHR maintenance 25ft dia and 15ft depth (Weather sheet, Window glasses and ladder replacement)
- OHR to be cleaned from inside

- Pump House maintenance (Walls are cracked need plaster and paint).
- Boundary Wall Replacement (Front side 200ft and Eastern side 150ft)

D) People's Colony

- Leakage maintenance of GST. (40ft dia)
- OHR maintenance 30ft dia and 25ft depth (Weather sheet)
- OHR base maintenance (leakage in the base)
- OHR needs to be cleaned from inside
- Washout valve of 8 inch at OHR.
- Pump House maintenance (Plaster and paint)
- Boundary Wall Replacement (750ft)

E) Madina Colony

- OHR maintenance 25ft dia and 15ft depth (Weather sheet, minor repairs required)
- OHR to be cleaned from inside
- OHR Railing replacement
- Roof of Pump House needs maintenance (Roof Treatment *Rain water seeps into pump house during rain, Plaster plus paint also required)
- New Washroom construction

F) Sharqi Colony

- Leakage maintenance of GST. (20ft dia)
- OHR maintenance 20ft dia and 15ft depth (Weather sheet)
- OHR to be cleaned from inside
- OHR pillars maintenance (Plinth protection and Plaster required)

In few areas of MC Vehari, pipes in distribution system are damaged. The areas where replacement is required are Anwar Abad, people's Colony, Chak 9/11-WB and Bhatta Ikran-ul-Haq area. Replacement of pipes required in these areas is given below in **Table 5-2**.

Table 5-2, Replacement of Problematic Pipes

Pipe Dia (in.)	Replacement Required (ft.)
03	16,840
04	4,000
06	3,000

5.4 Land-Use on the Site

This project includes construction / installation of 10 tube wells, laying of 41,790 Rft. transmission main, rehabilitation of 06 GSTs / OHRs and replacement of

23,840 Rft. out-lived pipes in MC Vehari. Site of proposed tube wells is located near chak 59-WB at southern side of Vehari city. As per consultation conducted with MC, PMDFC and nearby local residents, proposed site is govt. owned for the construction / installation of tube wells. Transmission main will be constructed / laid along the road / in ROW of road. Existing problematic pipes will be rehabilitated in Anwar Abad, People's Colony, Chak 9/11-WB and Bhatt Ikran-ul-Haq within MC Vehari. And, existing water works (GSTs / OHRs) will be rehabilitated within MC Vehari.

Representative pictures of project sites are given below in **Figure 5-4**;



Figure 5-4, Representative Pictures of Project Sites

5.5 Road Access

The main roads near project site are Lahore – Multan Road, Mailsi – Vehari Road, Vehari – Kacha Khuh Road, Vehari – Hasilpur Road, Chak 59-WB Road, Seed Farm Road, Jinnah Road and other minor / link roads within / along Vehari.

5.6 Cost & Magnitude of the Project

Total cost of project is estimated to be 914.19 million PKR. The magnitude of the project is to improve water supply system of almost whole of the MC Vehari.

5.7 Labour Requirement

At the peak of construction activities, up to 30 labourers are likely to be employed for the work at project out of which approximately 75% of the workforce will be from the project area while almost 25% of labour (skilled) would be hired from outside the project area.

During operation phase, 12 employees would be required which would include supervisor W.S.S, Foreman W. S. S, oil man, electrician, plumber, tube well operators and chowkidars.

5.8 Schedule of Implementation

Detailed feasibility studies and designing of the project have been completed. Necessary legal, administrative and financial formalities have been also completed. The project is expected to be completed within 12 months from the date of project execution / environmental approval. Subsequently, the construction, operational and maintenance aspects of the project will be undertaken by the proponent.

5.9 Scope of Work

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

Table 5-3, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1	Construction / installation of tube wells	10 Nos.
2	Laying of transmission main	41,790 Rft.
3	Rehabilitation of existing GSTs / OHRs	06 Nos.
4	Replacement of out-lived pipes	23,840 Rft.

5.10 Project Description

Vehari city consists of surface and ground water resources. Surface water sources consists of Pakpattan Canal. Pakpattan canal is flowing at the North of the city. The canal is unlined and recharging the ground water in narrow belts on both sides with fresh water. The majority of the city's subsoil water is brackish and unfit for drinking. Therefore, a large number of tube wells have been installed on the bank of canal to extract fresh subsoil water. Water from these tube wells is either pumped into storage tanks or supplied directly to consumers. Existing water supply system in Vehari City is a combination of the following assets;

- Tube wells
- Transmission Mains
- Overhead Tanks / GSTs
- Piped Distribution Network

Transmission main is damaged at some points which cause hindrance in the delivery of water. Some existing tube wells are also non-functional. Existing water source is not sufficient to fulfil the future water demand. To abstract the fresh underground water, development of new source is very necessary. If water supply system is not improved at this stage, then this infrastructure will be further damaged / degraded giving financial loss to the public as well as private sectors and the growth potential of the city will be adversely affected.

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

5.10.1 Water Supply Zones

According to the Detailed Design of Water Supply of Vehari City, whole city has been divided into seven zones to make the water supply operation easy. Each zone has its own serving area. In order to handle water supply maintenance issues, each zone is connected to other. Intermediate Pumping Stations (IPS) have been proposed based upon the demand and population of each zone. The layout of these zones has been shown in **Figure 5-5**. Population of each zone is presented in **Table 5-4**. Detail of these zones is given below;

A) Zone-01

This zone is lying in the north-east part of the city. The projected population of zone-1 for year 2032 is 37,584 persons. It includes areas of Lalazar Colony, Anwar Abad, Muslim town, Chak 9/WB Joia Wala & Ghafoor Town. Muslim town and Ghafoor town are mostly the unserved areas of this zone. So, distribution system has been proposed in these areas. 355mm diameter line has been proposed upto the proposed water works. Transmission Main of dia. 8" AC from Chak 24/WB Scheme serves the Sharqi Colony.

B) Zone 2

This zone comprises of central part of the city located in north of the railway track. This zone is restricted by Vehari-Kacha Khuh Road in the west and railway line in the south. It includes the areas of Katchi Abadi 9/WB, Katchi Abadi 11/WB, Makkah Colony, 3&5 Marla Housing scheme. This zone has mostly contaminated area. The projected population of zone-2 for year 2032 is 46,173 persons. This zone has been connected with zone-1 & Zone-3 through proposed lines in order to handle maintenance issues.

C) Zone 3

This zone lies in the north of Railway track and west of Vehari-Kacha Khuh Road. It includes areas in the western part of the city. It includes stadium town, college town, Allama Iqbal Town, Wukla Colony, Makkah Colony & Pir Murad. Pir Murad is unserved part of this zone. The projected population of zone-3 for year 2032 is 22,655 persons. A transmission main of 355mm dia. has been proposed upto proposed water works. Main distribution line of dia. 400mm from proposed water works will pass through Lahore-Multan Road and serve the area of Pir Murad. From this line, further lines are distributing into the streets.

D) Zone-4

The zone-4 lying in the south of Railway track and western part of the city. It includes the areas of People colony, Temur Shaheed Colony, Sirhind Colony & Jannat Colony. The projected population of zone-4 for year 2032 is 32,690 persons. Transmission main of 355mm have been proposed upto proposed

water works. Transmission lines of 16" AC pipe upto Temur Shaheed and Madinah colony have been replaced with bigger diameters.

E) Zone-5

The zone 5 lies in the south of railway track and east of sub zone 4. The projected population of zone-5 for year 2032 is 15,528 persons. It comprises of areas in the south of railway line which includes cotton colony, A, B,E,F Blocks, Madinah Colony, Rehmania Colony, Liaqat Pura, Wahdat Colony, Al Jannat Colony & Canal View. Distribution lines have been proposed in Rehmania colony, Wahdat Colony and Canal View.

F) Zone-6

This zone covers the eastern part of city and located south of the railway track and lying beneath zone-1. This zone is restricted by Hospital Road in the south and railway line in the North. It includes the areas of C, D, G, H Block, 32 Quarter, Chak 41, Iffikhar Block, Tariq Bin Ziad Colony, Danewal, Haider Colony & Green Town. The projected population of sub zone-5 for year 2032 is 34,718 persons. Main Distribution line of 225mm that emerges from proposed water works and serves some portion of 32-Quarter and Green town.

G) Zone-7

This zone is lying in the south side of railway track and vehari city. It includes the areas of Bhatta Ikram ul Haq and Sharqi colony. The projected population of sub-zone-4 for year 2032 is 15,303 persons. This zone is mostly covered by existing distribution system

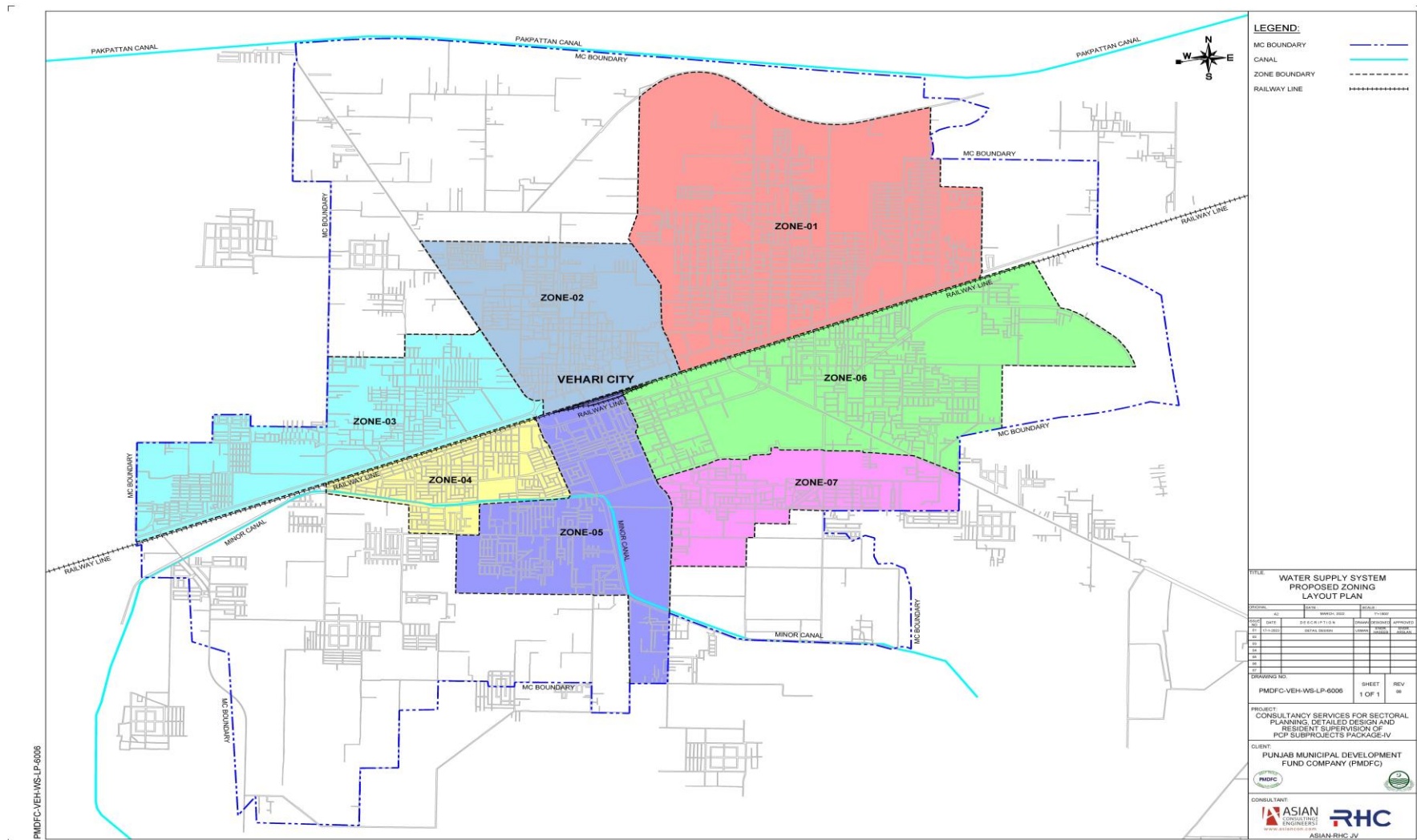


Figure 5-5, Water Supply Zones in MC Vehari

Table 5-4, Population of Each Zone

Zone	Population as per Census	
	2017	2032
Zone-1	28,629	37,584
Zone-2	35,172	46,173
Zone-3	17,257	22,655
Zone-4	24,901	32,690
Zone-5	11,828	15,528
Zone-6	26,446	34,718
Zone-7	11,657	15,303
Total	155,890	204,650

H) Water Demand

Total water demand for the project area is calculated on the basis of design criteria as discussed above. Based on the agreed criteria, water demand of each zone is estimated as;

Table 5-5, Average Water Demand for Each Zone

Zone	Projected Population	Domestic Water Demand	Non-Domestic Water Demand	UFW	Total Average Water Demand
	2032	(GPD)	(GPD)	(GPD)	(GPD)
Zone-01	37,584	1,127,511	225,502	135,301	1,488,315
Zone-02	46,173	1,385,198	277,040	166,224	1,828,461
Zone-03	22,655	679,642	135,928	81,557	897,127
Zone-04	32,690	980,690	196,138	117,683	1,294,510
Zone-05	15,528	465,829	93,166	55,899	614,894
Zone-06	34,718	1,041,537	208,307	124,984	1,374,829
Zone-07	15,303	459,094	91,819	55,091	606,004
Total Served Population	204,650	6,139,500	1,227,900	736,740	8,104,140

Based on the above calculations;

Average Water Demand	=	8,104,140 GPD
	=	15.0 Cusec
Maximum Day Demand	=	15.0 x 1.5
	=	22.5 Cusec
Peak Demand	=	22.5 x 1.5
	=	33.75 Cusec

5.10.2 Tube Wells

On the basis of above recommendation, total water abstraction for Vehari City will be as;

As per total demand of water, calculation for the tubewells is as;

Maximum Day Demand	=	22.5 Cusec
	=	12,156,210 GPD
Capacity of one Tubewell	=	1.0 Cusec
	=	538,171 GPD
Working Hours	=	16 hours
Production of One tube well @ 16 hrs	=	358,380 GPD
Total Required Tubewells	=	33.8 Nos.
Say	=	34 Nos.

Based on the above calculation, it is observed that total 34 Nos. Tubewells having capacity 1.0 cusec (each) are required to fulfil the water demand of MC Vehari. After evaluation of existing system, it is concluded that 07 Nos. tubewells are currently working and 07 Nos. tubewells are Non-Functional due to maintenance miscellaneous items. After Re-commissioning of Non-Functional Tubewells, total 14 Nos will be functional. 20 Nos. additional tubewells will be required to fulfil the water demand of MC Vehari up to 2032. However, due to phasing of tubewells with years, 10 new tubewells are being proposed at this stage and remaining tubewells will be installed in future.

A) Design of Tube Well

Capacity and design of tubewell including pump setting depth, size of strainer etc is provided in groundwater study. As per ground water study report, capacity of proposed tubewell is 1.0 Cusecs with pump setting depth of 140 ft.

Table 5-6, Design of Tubewell Machinery

Design of Tubewell Machinery	
Capacity of Tubewell	= 1.0 Cusec
Pump Setting	= 150 Feet
MS Housing	= 200 Feet
Strainer	= 96 Feet 10 Inch Dia
Entrance Velocity	= 0.05 ft/sec
Open area of strainer	= 10%
Total Bore Depth	= 400 Feet
Pumping Head	= 280 Feet

Strainer length calculations are given in **Table 5-7**

Table 5-7, Design Calculations of Strainer

Sizing of Stainer:			
Tube well capacity	=	1	cusec
Entrance velocity of water	=	0.05	ft/sec
Internal diameter of strainer	=	10	inch
Slot area	=	10	% of total strainer area.
Total surface area of strainer	=	$\pi DL \times 10$	
Area of slots	=	100	
	=		
L	=	Length of strainer	
D	=	Diameter of strainer	
	=		
Q	=	A x V	
Q	=	0.1	X $\pi DL \times V$
L	=	76	
Assuming 25% factor of safety			
L	=	1.25 X	76
L	=	96	ft

B) Head Loss and Pumping Head calculations

The transmission main of 12.74 kms will be laid to carry the water from Chak 59WB to the Vehari city. Head loss calculation is given in **Table 5-8**.

Table 5-8, Head Losses in Transmission Main

Data:			
Discharge	=	7.00	ft ³ /sec
Length	=	18,170	ft
Velocity in pipe	=	5.00	ft/sec
Cross sectional area	=	1.40	sq. ft
Diameter of pipe	=	16.03	inches
Adopted size (Internal Dia)	=	20	inches
Adopted Size (External Dia)	=	560	mm
Cross sectional area of adopted pipe	=	2.08	sq. ft
Actual velocity in pipe	=	3.37	ft/sec
V ² /2g	=	0.18	
Pipe			
Hazen William Formula		$V = 1.318 \times C \times R^{0.63} \times S^{0.54}$	
V	=	3.37	ft/sec
C	=	130	
R=D/4	=	0.406	ft
R ^{.63}	=	0.5671	

Data:			
S ^Λ .54	=	0.0347	
S	=	0.0020	ft/ft
L	=	18,170	ft
h _L = Ls x length of pipe	=	36.03	ft
20 % of head loss in fittings	=	7.21	ft
Total head loss in Transmission Main (Fittings + Pipe) (a)	=	43.23	ft

Following Table shows the head losses in transmission lines of different diameter, actual velocities in the pipe and internal diameter adopted.

Sr. No.	External Diameter (mm)	Length (ft)	Flow (cusec)	Diameter adopted (internal) (in)	Actual Velocity (ft/s)	Head loss (including 20% losses in fitting) (ft)
b)	500	2616	5	17.35	3.05	5.916
c)	450	5143	5	15.61	1.88	5.376
d)	400	574	5	13.88	4.61	3.612
e)	355	2164	4	12.65	4.56	16.656
f)	315	1000	3	11.22	4.24	8.544
g)	250	1000	2	8.91	4.36	12.276
h)	180	1000	1	6.41	4.06	12.684

C) Pumping Head

Table 5-9, Pumping Head Calculation

Calculations of Pump Head			
NSL at Tubewells	=	452	ft
NSL at Delivery	=	462	ft
Elevation Difference (1)	=	10	ft
Depth of Water (i)	=	120	ft
Draw Down (ii)		15	ft
Seasonal Variations (iii)	=	15	ft
Suction Head (i+ ii+ iii) (2)	=	150	ft
Head Losses in Pipe & Fittings (a+ b+ c+ d+ e+ f+ g+ h) (3)	=	108.22	ft

Calculations of Pump Head			
Terminal Head (4)	=	10	ft
Total Head (1 + 2 + 3 + 4)	=	278.22	ft
Say	=	280	ft

D) Specifications of Pumping Machinery

Vertical shaft deep well turbine KSB pump with lowering of 150 ft including multistage bowl assembly, impeller of led free bronze capable to discharge of 1.0 cfs clear water against a total head of 280 ft, 1450 RPM, electric motor of high efficiency class -F insulation A.C.400-V 3-phase 50 Hz, 4 pole 50 HP electric motor IP-55 suitable to operate the Vertical Turbine pump to discharge 1.0-cfs at 280 ft head.

5.10.3 Intermediate Pumping Station

Intermediate pumping stations (IPS) are proposed in each proposed zone. An intermediate pumping station comprises a storage tank and pumping machinery installed in a pump house.

A) Ground Storage Tank

The capacity of ground storage tank at intermediate pumping station is adopted as 04 hours storage of total average daily demand. Based on average water demand of the project area, required storage is calculated as;

Average Water Demand	=	8,104,140 GPD
	=	337,672 GPH
Total Storage Required @ 6 hrs storage	=	1,841,850 Gallons
Existing available Storage	=	685,000 Gallons
Additional Required	=	400,000 Gallons

Based on above calculation, we have proposed additional 04 IPS, the capacity of each tank is 100,000 Gallons.

B) Pumping Machinery

Each storage tank is provided with pumping machinery to deliver water to overhead water reservoir or direct supply to community. Vertical turbine pumps are proposed with bowl assembly. Each ground storage tank is provided with two pumps, one for operation and 2nd for standby.

5.10.4 Overhead Water Reservoir

Overhead Reservoirs (OHRs) are also key component of water distribution system. In water supply system OHRs serve the following functions:

- Store water for use during electric load-shedding and during maintenance works of tube-wells / pumps.
- Provide balancing of flow and pressure during peak hours.

Storage Capacity of Overhead reservoirs should be based on around 1/10th of average day demand.

Based on average water demand of the project area, required storage is calculated as;

Average Water Demand	=	8,308,374 GPD
	=	346,182 GPH
Total Volume required @ 2.5 hr storage	=	767,438 Gallons
Existing available Storage	=	515,000 Gallons
Additional Required	=	400,000 Gallons

Based on above calculation, additional 04 OHRs are required, the capacity of each OHR is 100,000 Gallons.

5.10.5 Design of Transmission Main

Transmission main for the project area is designed to carry water at a rate equivalent to the maximum day demand of the system for a given design year.

The source of water supply is selected near Chak 59WB so a transmission main is proposed to carry the water up to the city. The maximum diameter of proposed transmission main is 560 mm and material is HDPE of PN-10 pressure rating is proposed for this transmission main. Layout plan of proposed transmission main is shown as **Figure 5-6**.

5.10.6 Water Distribution Network

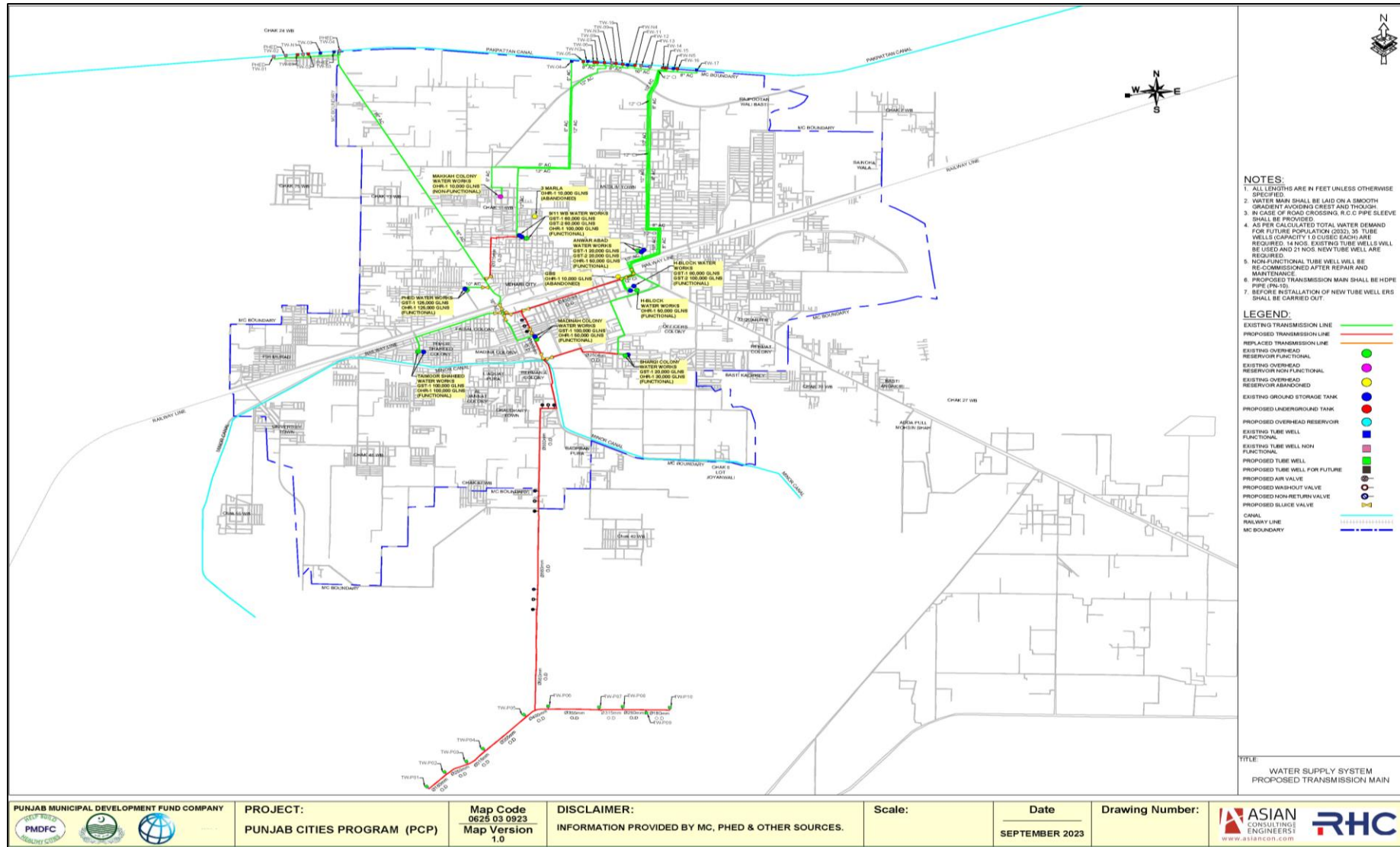
Detailed design of Water Supply System has been developed after consultations with various stake holders including PMDFC and MC Vehari. The team of engineers conducted site visits to gather data about existing system, overall planning, selection of routes and identification of site for construction of tubewells, GSTs and OHRs. After analysing the existing water supply system, pipe network has been proposed in the unserved areas and rehabilitation of existing outlived/under-size distribution network.

Salient features of the proposed network are as follow:

- Water supply network is planned in Grid system encompassing the complete project area (Vehari City);
- The network has been proposed considering the future population of the project area.

- Zones have been proposed for efficient and effective water management.
- Dead ends are avoided as much as possible;
- Network is proposed on existing roads and if no roads are available then katcha tracks are used to complete the loop;

On the basis of these features Network for water supply system has been given in **Figure 5-7**.



	PROJECT: PUNJAB CITIES PROGRAM (PCP)	Map Code: 0625 03 0923 Map Version: 1.0	DISCLAIMER: INFORMATION PROVIDED BY MC, PHED & OTHER SOURCES.	Scale:	Date: SEPTEMBER 2023	Drawing Number:	
	<p>Figure 5-6, Layout of Transmission Main – Vehari</p>						

5.11 Water Consumption and Wastewater Generation

Ground water will be the main source of water during construction phase. In constructional phase, 50 gallons/day/person water will be used. During operation, 50 gallons/day/person water will be use. Wastewater produced will be domestic wastewater.

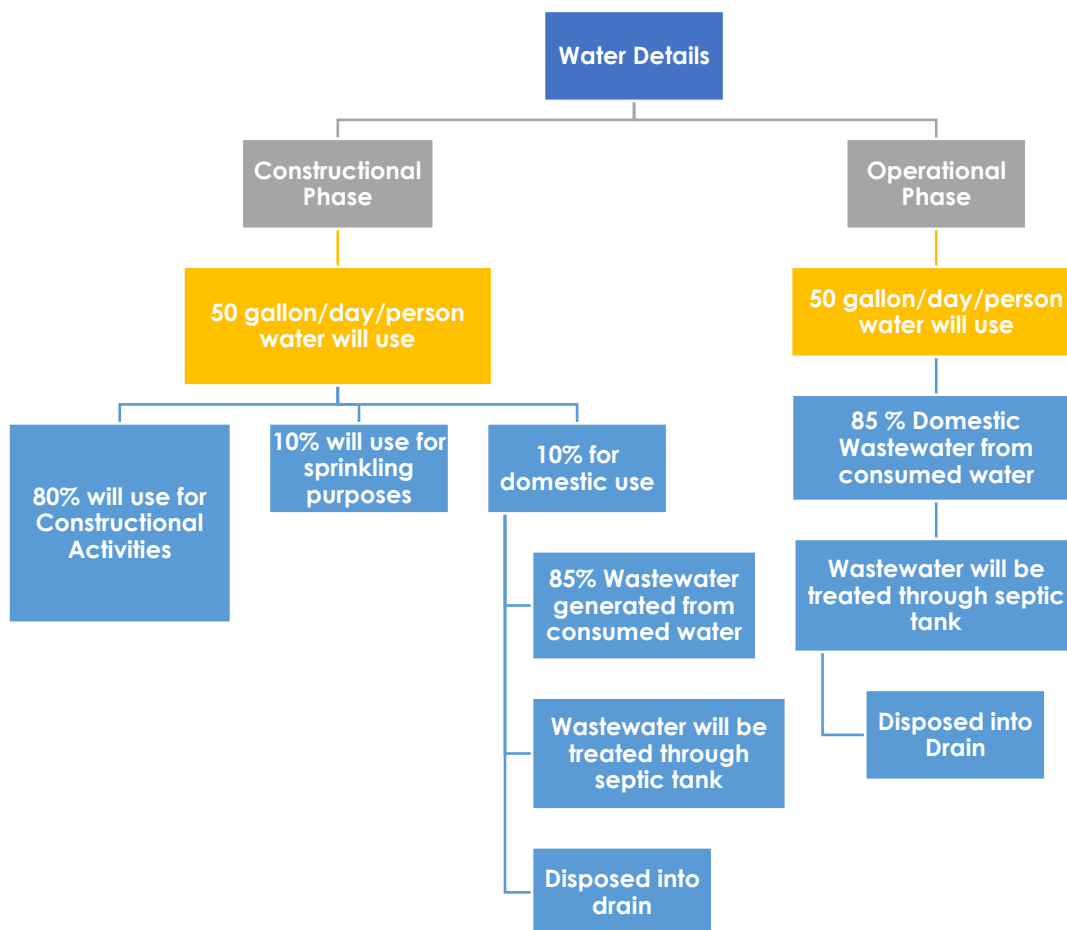


Figure 5-8, Estimated Water Balance

5.12 Solid Waste

The amount of solid waste produced during construction phase will be 0.45kg/day/person. In constructional phase, all waste materials such as landscape and land clearing debris, gravel and aggregate products, concrete, masonry scrap and rubble (brick, concrete masonry, stone), and plastics and paper from cement bags will be recycled during the construction activities and maintenance purposes. Solid waste generated during construction phase will be placed in separate bins. During operation phase, the amount of solid waste will be 0.45 kg/day/paeron. Only domestic waste will be produced that will be handed over to local waste contractor.

5.12.1 Waste Management and Disposal

The main types of waste expected to be generated and requiring disposal include:

- Fuel, oils, and chemicals;
- Sewage;
- Campsite waste;
- Medical waste;
- Demolition waste;
- Packing waste; and,
- Excess construction material.

Table 5-10, Waste Management Collection and Disposal Techniques

Activity	Best practices
Generation of construction material	<ul style="list-style-type: none"> • Implement resource conservation, and encourage staff (through training) to reduce waste, reuse waste and recycle waste wherever possible • Prohibit staff from fouling the site
Disposal of recyclable waste	<ul style="list-style-type: none"> • Sell recyclable waste to local vendors
Disposal of construction material	<ul style="list-style-type: none"> • Do not burn materials which may lead to the release of toxic or hazardous substances • Do use burn on site when surrounding vegetation is dry and combustible.
Disposal of hazardous	<ul style="list-style-type: none"> • Handover to specialized and certified disposal contractor
Generation of construction waste	<ul style="list-style-type: none"> • Reduce construction waste by reusing waste as a fill material (prior to testing to confirm

5.13 Sources of Construction Material

Construction material will be acquired from the nearest possible / local sources through approved vendor / contractors of the government.

5.14 Machinery & Equipment

It is estimated that the equipment / machinery given below will be required to complete the different project engineering activities:

Table 5-11, Required Machinery / Equipment

Sr. No.	Equipment / Machinery	Sr. No.	Equipment / Machinery
1.	Bore hole drilling machine	2.	Excavator
3.	Trucks	4.	Total Station and ancillaries
5.	Pipe jacking equipment	6.	Rock breaker
7.	Back Hoe Excavator	8.	Water bowser
9.	Jack hammer	10.	Pipeline pressure testing equipment
11.	Compressor	12.	Butt fusion equipment
13.	Generator	14.	Water pumps

Contractor will use well-tuned machinery to minimize air pollution and noise. Contractor will never park his machinery on the working area to avoid obstacles in the mobility of commuters. Machinery with poor exhaust and making nuisance will not be allowed to work on-site.

5.15 Storage of Materials

50,000/- is annually paid to the owner of the land to whom land is rented out as per defined local government rates. As this project is of short duration, henceforth, land will be rented out with due mutual discussion between owner of the land and the contractor.

5.16 Construction / Labour Campsite

Location of the construction camps should be at areas which are acceptable from environmental, cultural or social point of view. Location of construction camps should be away from communities in order to avoid social conflict with the surrounding communities. Contractor will submit to the relevant MC for approval of a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective. The Contractor's staff quarters and labour camps shall be provided with all necessary services for drainage, lighting, roads, paths, parking places, fencing, sanitation, cook-houses, fire prevention and firefighting equipment. All labour camps, workshops and storage areas shall be built on hard compacted ground with sufficient bunding and spill kits so as to prevent the loss or infiltration of leaked or spill fluids into surrounding soils, ground water or water courses. Traffic signage shall be maintained in the camps. The Contractor shall establish a drainage network, including end discharge, to drain storm water away from camps and settlements. (*Labour*

Management Plan is given in Table 01 of EHS SOPs for Labour / workers prepared for PCP's projects, attached as **Annexure - 14:**)

5.16.1 Proposed Campsite Locations

Two locations have been proposed / suggested for contractor's campsite. Both the locations are near project site. Location 01 is near the site proposed locations for tube wells at the direct distance of almost 05 km from Vehari City, while location-02 is at the center of Vehari city and proposed tube well's location at the direct distance of almost 03 km from Vehari city. Locations of proposed campsites marked on Google Maps are shown below in **Figure 5-9.**

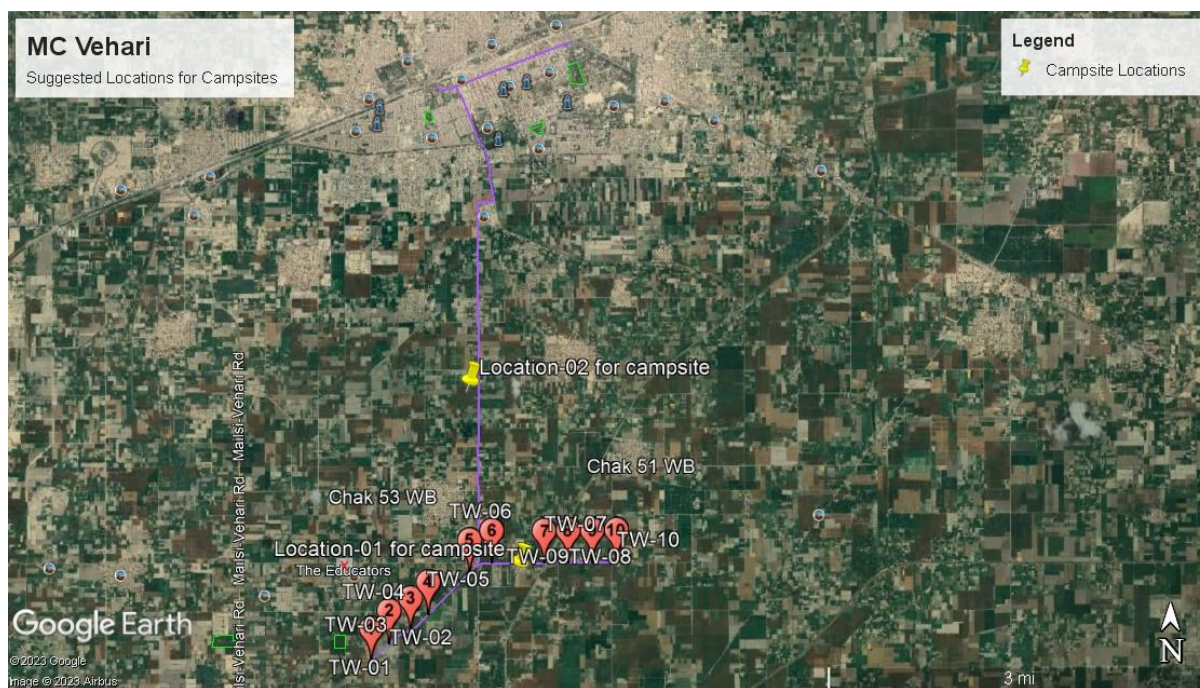


Figure 5-9, Proposed Locations for Campsite

5.17 Restoration and Rehabilitation Plans

All possible precautions will be taken to prevent an untoward incident in terms of life and property losses. On completion of the project, solid waste will be removed from the site in order to maintain aesthetics of the area. All measures will be undertaken for ensuring occupational safety, security and clean environment during the working hours. Plantation and landscaping will also be done by the proponent after the completion of project.

5.17.1 Details of Restoration and Rehabilitation at the End of Project Life

At the end of the life of the project, it will be duly dismantled with special precautions to avoid / minimize pollution and at the same time taking all safety precautions to protect human life and property around the building. The materials capable of recycling / reuse will be either sold in the market or to be reused for other suitable purposes. Existing utilities being affected by the

project activities will be rehabilitated to its original state.

5.18 Government & Local Approvals

The proponent will apply for all relevant approvals from government departments and submit all the Consent Letters / NOCs to EPA as received.

SECTION - 6: DESCRIPTION OF ENVIRONMENTAL AND SOCIAL BASELINE

This section describes project area and its surroundings to establish baseline, which are expected to be affected by the project. The baseline description includes physical, ecological and socioeconomic aspects of the project area.

Multiple site visits were conducted to collect primary data on physical, ecological and socioeconomic aspects. Environmental surveys, interviews with general public and various governmental and non-governmental organizations were carried out to collect the baseline data. Furthermore, sensitive receptors of potential project impacts were identified. Secondary data was collected from available literature and District Census Report (DCR) etc.

6.1 General Characteristics of Project Area

This project includes construction / installation of tube wells, laying of transmission main, rehabilitation of GSTs / OHRs and replacement of out-lived pipes in MC Vehari. Project activities include;

- Construction / installation of 10 number of tube wells, including excavation, piping, external electrification of proposed tube wells & other basic facilities and site restoration.
- Construction / laying of 41,790 Rft. transmission main
- Rehabilitation of 06 existing GSTs / OHRs
- Replacement of 23,840 Rft. out-lived pipes

The main roads near project site are Lahore – Multan Road, Mailsi – Vehari Road, Vehari – Kacha Khuh Road, Vehari – Hasilpur Road, Chak 59-WB Road, Seed Farm Road, Jinnah Road and other minor / link roads within / along Vehari.

6.2 Physical Resources

6.2.1 Geography, Geology, and Soils¹

The district is located between 29°36'N71°44'E and 30°22'N72°53'E. The city of Vehari is the capital of the district. The district was created in 1976 out of the three tehsils of Multan District (Vehari, Burewala and Mailsi). The name Vehari means low lying settlement by a flood water channel. It is a part of Indus plain and has the best cultivated land which is suitable for cotton, wheat and other crops.

Vehari district is situated in the heart of Nili Bar. It is purely the result of construction of Pakpattan canal from Sulemanki Head Works on the Sutlej and the institution of Nili Bar colony project in 1925, so called because of the

¹ <https://vehari.punjab.gov.pk/geography>

bluish tings of the water of the Sutlej.

Total area of Vehari is 1,854 square miles. Vehari is 96 kilometers (60 miles) distant from Multan city. It is situated at Multan-Delhi Road constructed by Mughal Emperor Sher Shah Suri. It is 443 feet above sea level. Vehari is 62nd largest city of Pakistan. To the east of Vehari is district Bahawalnagar and Pakpattan, to the west Khanewal and Lodhran, to the south are the river Satluj and Bahawalpur; whereas Sahiwal is to the north of it. By eastern-west, it is 80 miles long and 40 miles from northern-south. The estimated population count of Vehari is 3.5 million.

The strata are generally fine to medium grained sand with some amount of silt at 5m depth. Coarse sand was encountered at places. The colour is generally grey to brownish grey. Strata are loose to medium dense. At top, strata are generally dry with some roots of vegetation but at depth moisture is observed. Fine to medium grained medium dense sand with grey colour was encountered upto 6m depth. The stratum is dry. From 6m to 10m depth, the stratum is medium grained sand.

Chemical analysis shows that sulphate contents of soil is within the permissible limit of 0.2%. Sulphate concentration in water samples exceeds the limiting value of 200ppm at depth of 27.5m while at depth of 91.5m sulphate, concentration is within the limit. For construction point of view, water should be used at deeper depth. Alternatively, sulphate resistant cement will be used for construction activities.

District Vehari

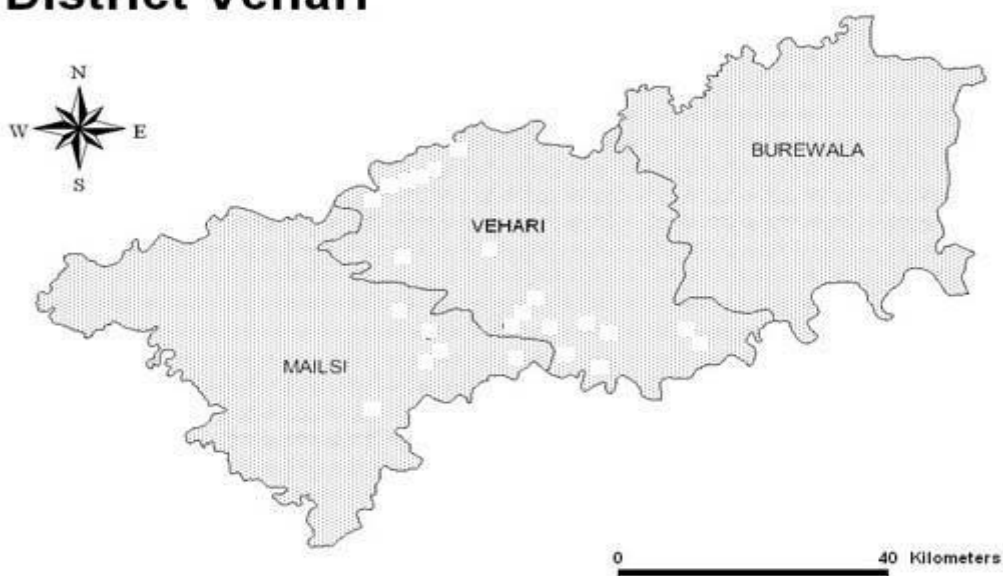


Figure 6-1, Administrative Map of Dist. Vehari

6.2.2 Topography

Vehari (Punjab), Pakistan maximum elevation is 149 meters and minimum elevation is 134 m. with an average of 138m.

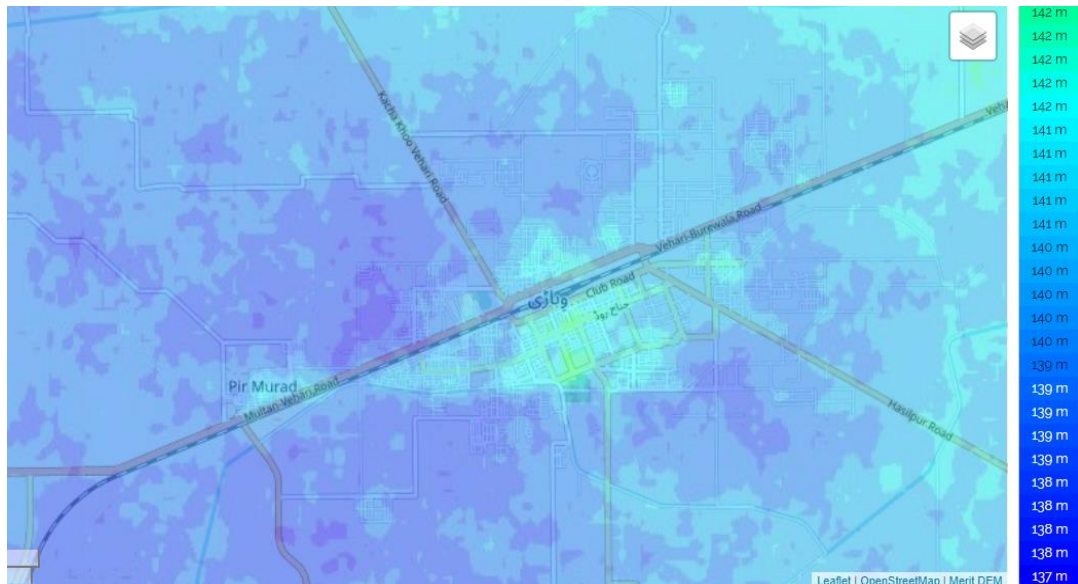


Figure 6-2, Topography of Vehari

6.2.3 Climate and Temperature²

The climate of the district is hot and dry. Although this city experiences all the four major seasons of the country: a cool and mostly dry winter (from December till February), hot and dry spring (from March till May) and the summer is a rainy season (especially in monsoon period starting from June till September). Summer is one of the hottest seasons with extremely high temperatures. The maximum and minimum temperature ranges between 45°C and 28°C in summer. During winter, the temperature fluctuates between 21°C and 5°C. In October and November, the weather is moderate. The exact timing of these seasons may vary. However, the summer is one of the hottest seasons with extremely high temperatures.

²

<https://vehari.punjab.gov.pk/climate#:~:text=The%20maximum%20and%20minimum%20temperature,of%20these%200seasons%20may%20vary.>

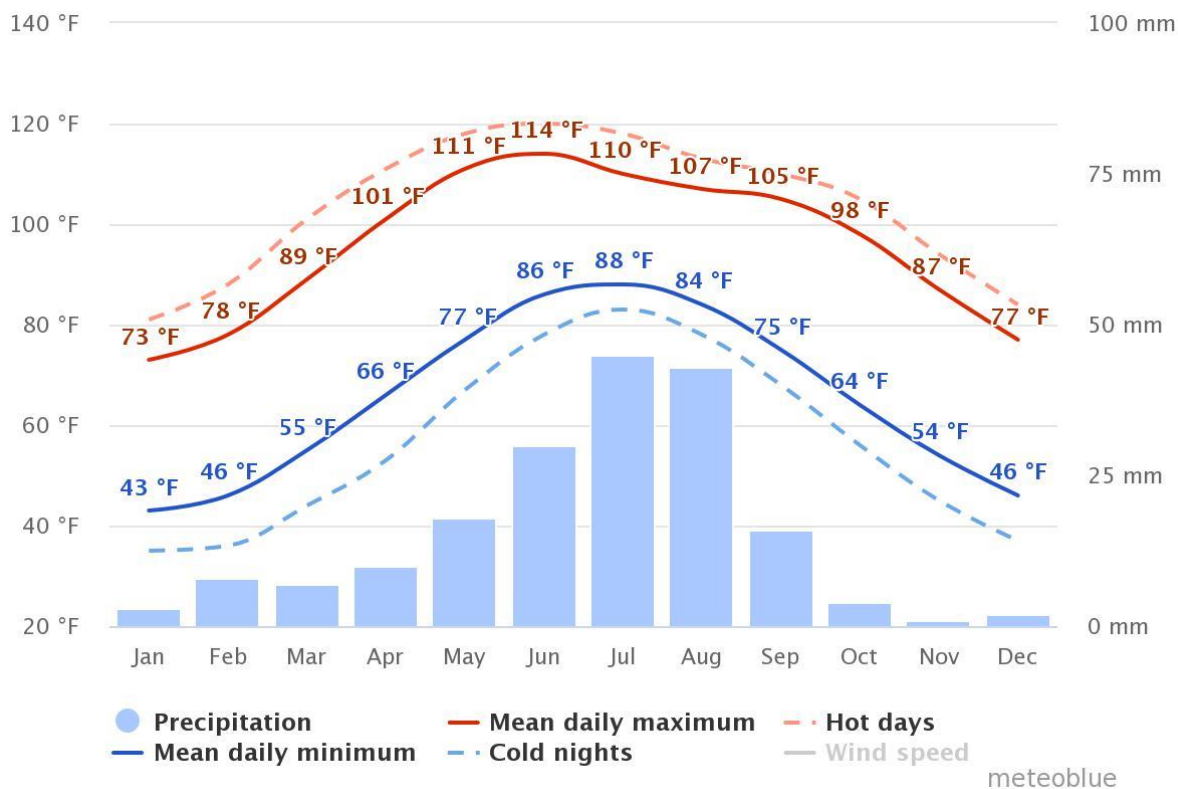


Figure 6-3, Mean Average Temperatures & Precipitation of MC Vehari

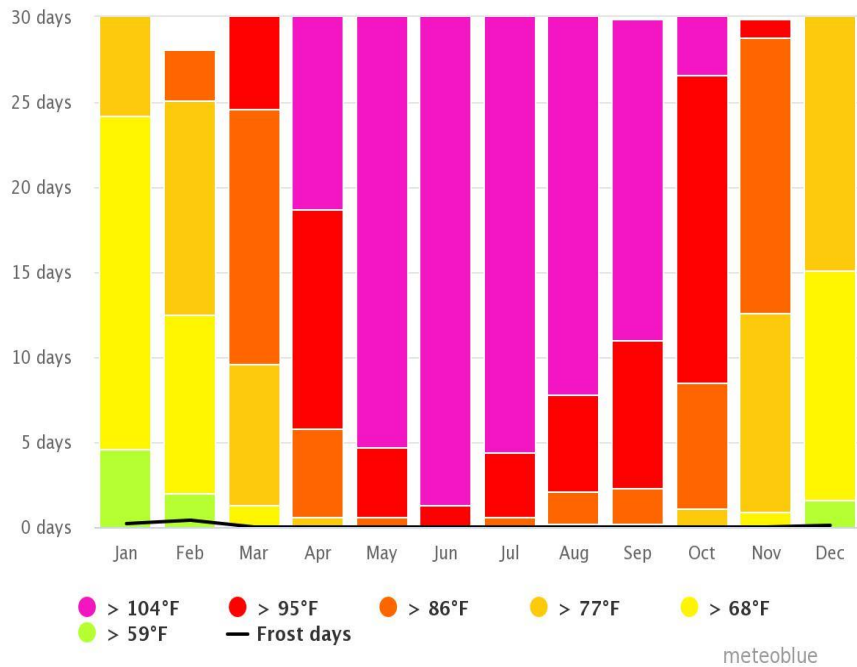


Figure 6-4, Maximum Temperature as Per no. of Days

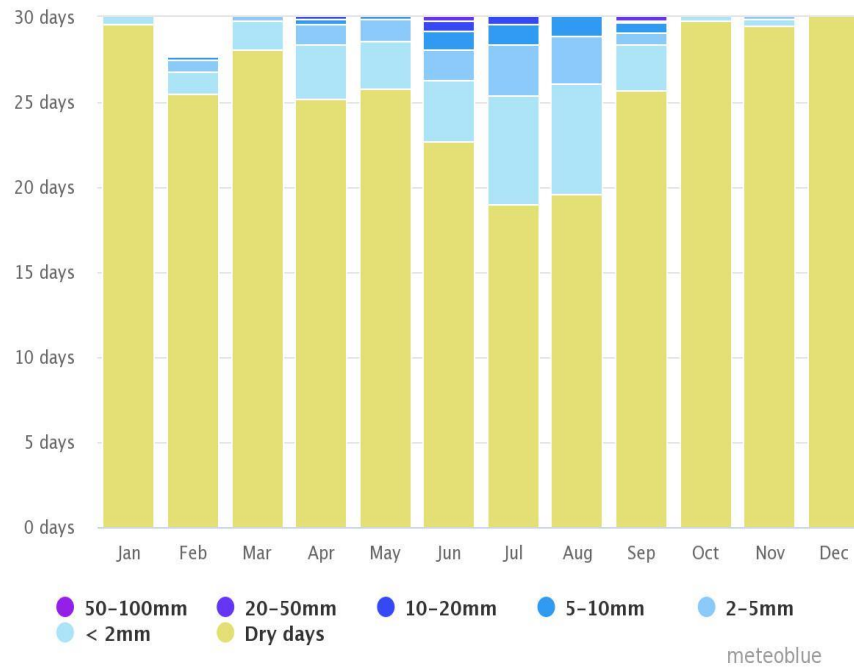


Figure 6-5, Precipitation Amounts as Per no. of Days

The maximum temperature diagram **Figure 6-4** for Vehari displays how many days per month reach certain temperatures. The precipitation diagram **Figure 6-5** for Vehari shows on how many days per month, certain precipitation amounts are reached. In tropical and monsoon climates, the amounts may be underestimated.

6.2.4 Rainfall³

The rainy period of the year lasts for 7.2 months, from February 23 to September 29, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Vehari is August, with an average rainfall of 1.3 inches.

The rainless period of the year lasts for 4.8 months, from September 29 to February 23. The month with the least rain in Vehari is November, with an average rainfall of 0.1 inches.

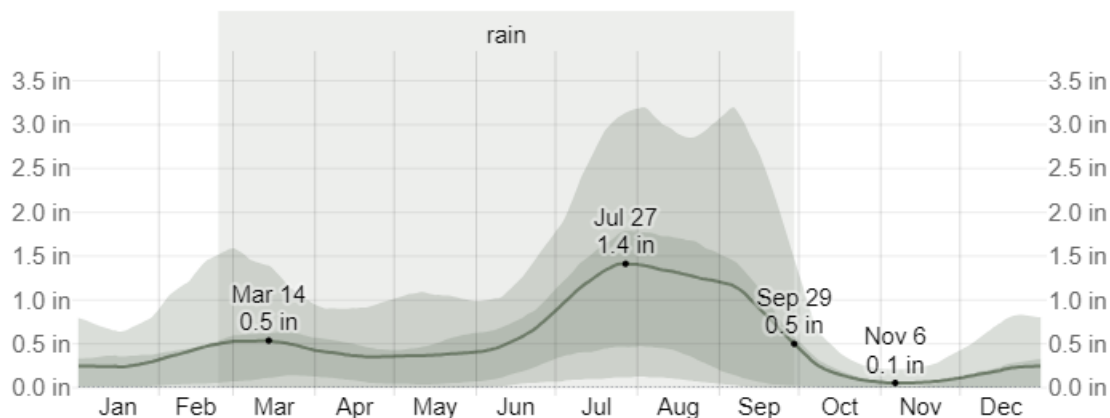


Figure 6-6, Average Rainfall

6.2.5 Wind⁴

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Vehari experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 4.0 months, from May 11 to September 9, with average wind speeds of more than 7.0 miles per hour. The windiest month of the year in Vehari is June, with an average hourly wind speed of 8.8 miles per hour.

The predominant average hourly wind direction in Vehari varies throughout the year. The wind is most often from the west for 3.4 weeks, from April 21 to May 15, with a peak percentage of 32% on May 14. The wind is most often from the south for 5.9 months, from May 15 to November 12, with a peak percentage of 61% on August 12. The wind is most often from the north for 5.3 months, from November 12 to April 21, with a peak percentage of 40% on January 1.

³ https://weatherspark.com/y/107370/Average-Weather-in-Vih%C4%81ri-Pakistan-Year-Round#google_vignette

⁴ https://weatherspark.com/y/107370/Average-Weather-in-Vih%C4%81ri-Pakistan-Year-Round#google_vignette

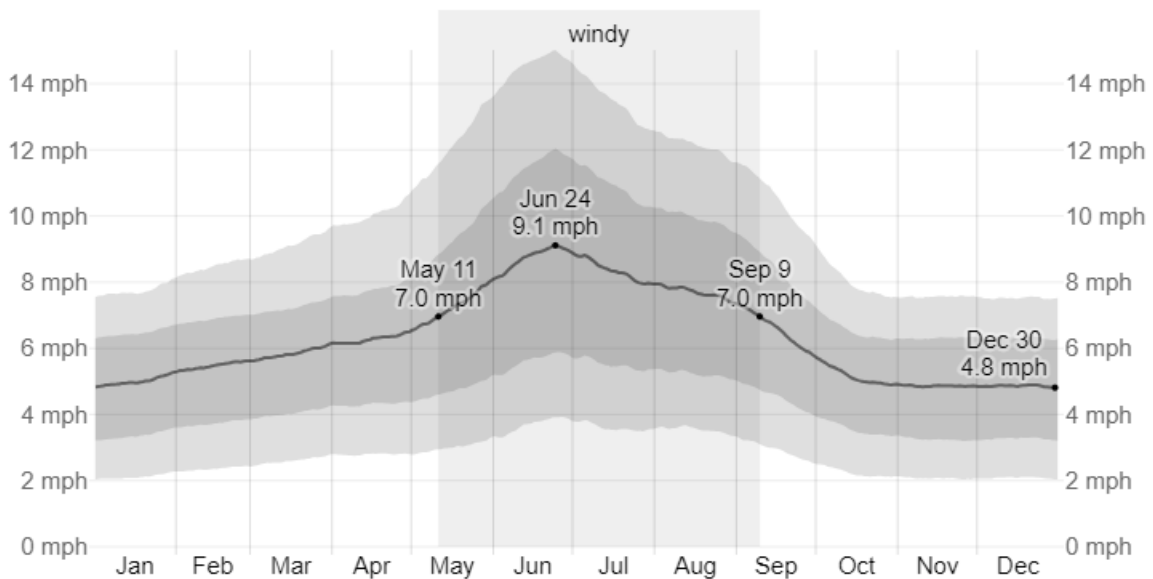


Figure 6-7, Average Wind Speed

6.2.6 Seismicity

According to Seismic Zoning of Pakistan, the project area lies in Zone 2A and represents minor to moderate damage due to earthquakes.

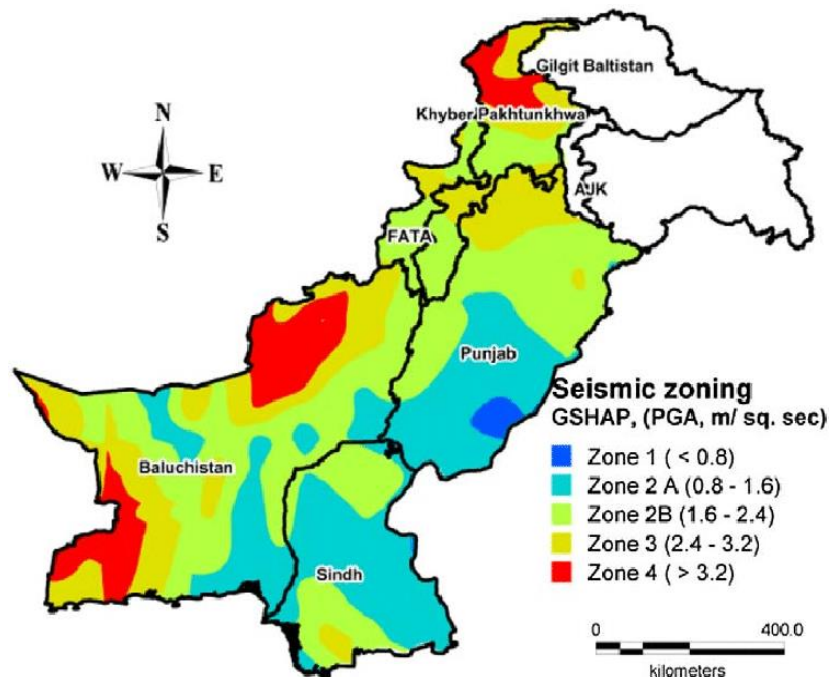


Figure 6-8, Seismic Zones of Pakistan

6.2.7 Ground Water and Water Supply

MC Vehari consists of surface and ground water resources. Surface water sources consists of Pakpattan Canal. Pakpattan canal is flowing at the North of the city. The canal is unlined and recharging the ground water in narrow belts on both sides with fresh water. The majority of the city's subsoil water is

brackish and unfit for drinking. Therefore, a large number of tube wells have been installed on the bank of canal to extract fresh subsoil water. Water from these tube wells is either pumped into storage tanks or supplied directly to consumers.

Since about 75 % of the Vehari Town is covered by water supply whereas the rest of the population is constrained to drink shallow brackish water through privately installed hand pumps/power pumps. The quality of water from these shallow sources is not so good and is mostly contaminated. Therefore, situation necessitates expansion of distribution network to those areas which are without piped water supply.

To feed the present water supply system, there are 19 tube wells out of which 8 tube wells are operational and working 12 to 16 hours/day (*Planning Report Vehari, Planning Report, 2011*)

6.2.8 Solid Waste

In the study area, MC Vehari is responsible for solid waste management and working towards its continual improvement for collection and disposal efficiency.

6.3 Hydrogeological survey

6.3.1 General

Vehari city is located on the left bank the of abandoned Beas River, which is central part of Lower Bari Doab (area between Ravi River and Sutlej the River) in southern part of Punjab plain. This hydrogeological report of Vehari city has been prepared as a part of PMDFC Project.

6.3.2 Geology

Vehari City is located in central part of Lower Bari Doab (upland located between Ravi River and Sutlej River) and falls in southern Punjab Plain. The alluvium of lower Punjab plain derived from the mountains range located in northeast and has been deposited by the present and ancestral tributaries of the Indus River such as Beas and Sutlej Rivers. The alluvial complex of Pleistocene to the recent age represents the latest phase of sedimentation of fluvial sediments in the subsiding trough through a fore deep adjacent to the rising Himalayan ranges. The Punjab Plain is underlain by unconsolidated alluvium to a depth in excess of 1000 ft. (>305m). In general terms, the alluvium was described as comprising medium to fine sand to silty clayey but with a predominated of medium to fine sandy sediments.

6.3.3 Hydrogeological Investigation Bari Doab Including Vehari Area in Past

The Punjab Plain is underlain by unconsolidated alluvium to a depth in excess of 1000 ft. (>305m) It is reported that these sediments were saturated within a few feet of land surface. In general terms, the alluvium was described as

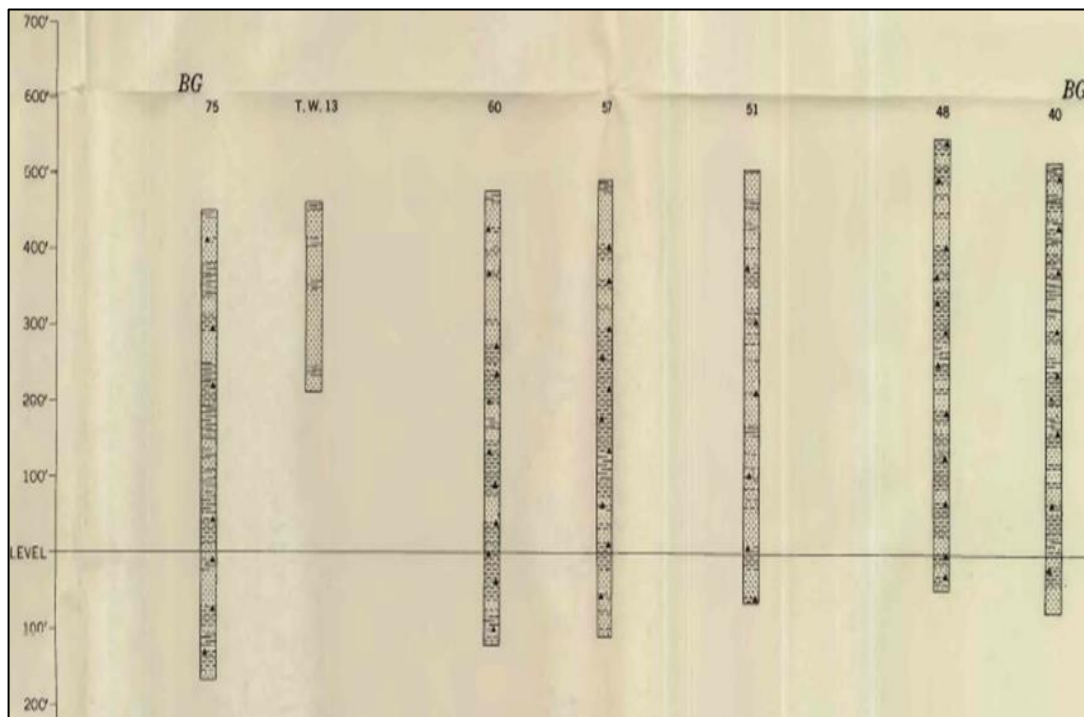


Figure 6-10, Geological Cross-Section BG-BG Prepared from the Test Bores Fall in Vehari Area

(Source WASID report WAPDA)

The explanation of the strata encountered in the test bore are given below in **Figure 6-11**.

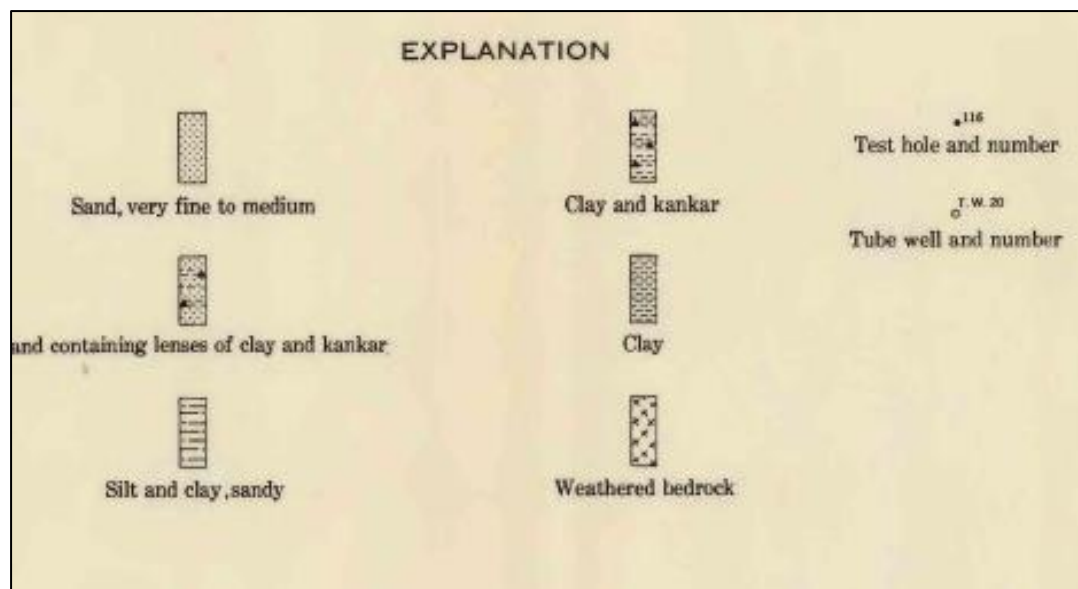


Figure 6-11, The Explanation of Strata Encountered in the Test Bore

As reported that Bari Doab is underlain by unconsolidated alluvium to a depth in excess of 700 ft. (>213m). In general terms, the alluvium was described as comprising very fine to medium sand to silty clayey material, but with a predominated of sandy sediments.

Vehari City is located along the old ruminates of Beas River in central part of lower Bari Doab (the upland area between Ravi River and Sutlej River) in Lower Punjab Plain. Beas river had a great impact on the groundwater regime in this area in past.

From Figure 6-10, it is revealed that Test bore-57 and Test bore-60 drilled to depth more than 500 ft. In the vicinity of the Vehari area have encountered the very fine sand to medium sandy material throughout.

The locations of 27 test wells in Bari Doab used to determine the aquifer parameters. The reported measured values of horizontal permeability are ranged of 10-3 m/s to 10-4 m/s that is the characteristic for a fine sand aquifer of alluvial origin. The specific capacity of WASID test well-13 at Sheranwala rest house in west of Vehari and test well-12 at Luddan in south of Vehari City was reported 35 gpm/ft. dd (drawdown) and 38 gpm/ft. dd respectfully. The reported specific capacities indicate the potential of aquifer in and around the Vehari area.

6.3.4 Groundwater Modelling of Lower Bari Doab Including Vehari Area

Recently very detailed hydrogeological study for Groundwater Modelling of Lower Bari Doab including Vehari Area has been carried out by Lahmeyer International GmbH, Germany and National Consultant Pvt. Pakistan in 2013. During this study, 3D representation of bore holes located in Bari Doab including Vehari area have been prepared as given below in **Figure 6-12**.

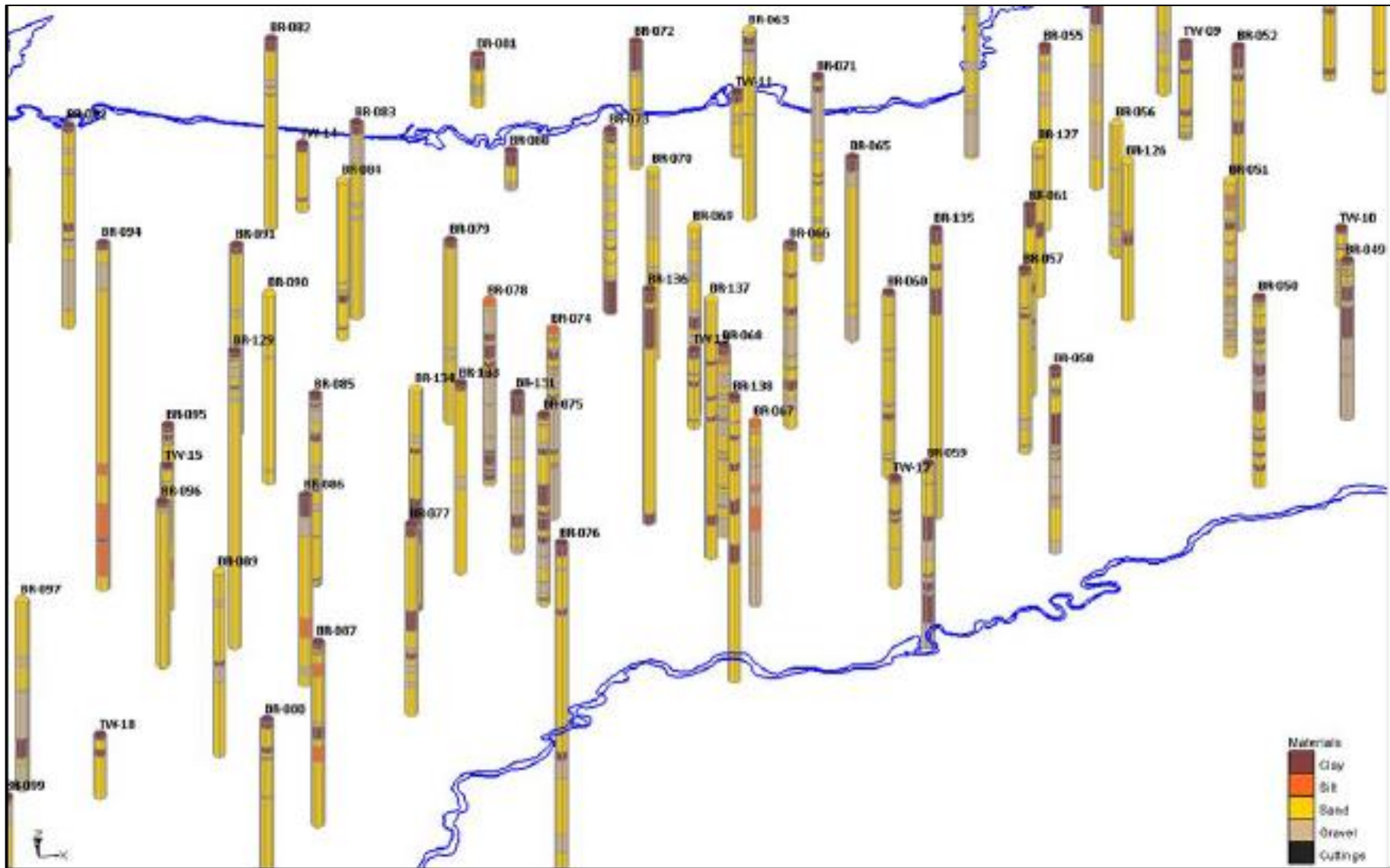


Figure 6-12, Example of 3D Representation of Borehole Data

It can be seen that that alluvial complex under Lower Bari zone including Vehari area consists principally of very fine to medium sand with silty and clay lens of varying thickness and extension down up to 700 ft. depth. The study has reported that aquifer under in and around the Vehari area is homogeneous in nature and exists under water table conditions. Therefore, the aquifer is capable for installation of high capacity tubewells.

6.3.5 Groundwater Quality in Vehari Area

Vehari area is located along the central part of Bari Doab (the high land of Doab), therefore the groundwater quality is brackish like other Doabs in Punjab. The areas located near the rivers are continuously flushed by the river water, displacing the original more brackish depositional water. As a result, groundwater quality is fresh along the active flood plain of Ravi and Sutlej Rivers and becomes marginal in the abandoned flood plain of the both rivers and ultimately becomes brackish in Vehari area, which is central al part of Doab.

The abandoned course of Beas River in Bari Doab Joined the Sutlej River in central part of Bari Doab. The Beas River however must have meandered its course through the Lower Bari Doab for a considerable time. The infiltration of river water has restricted the widespread dilution to 300 to 400 ft. of the saline groundwater zone in Bari Doab. Groundwater beneath this contain generally more than 4000 PPM of TDS (total dissolved Solid) in a narrow-elongated zone.

Many groundwater studies have indicated that there has been substantial change in the quality of pumped water over the last 50 years in the area. The findings of the PPTA project (Project Preparatory Assistance by Asian Development Bank) regarding the development of water quality conditions in the Lower Bari area are partially contradictory and are not conclusive.

6.3.6 Water Resources in Vehari Area

Surface water and groundwater both water sources are available in Vehari City area. The detail of both sources is given as below:

A) Surface Water Source

Vehari City being located on high land in central part of Doab area. Ravi River flows in northwest and Sutlej River in southeast are at a quite distance away from the Vehari. City. Pakpattan Canal flows along north-western periphery of Vehari City is the only surface water is available in the vicinity of Vehari area. Pakpattan canal was much big canal having discharge 6,594 cusecs at it head in the in past. The canal irrigation system in Bari Doab has been modified in new scenario of changing cropping intensity from 46% to 170% in area and discharge has been reduces to 245 cusec.at RD 512+413 near Vehari as shown in **Figure 6-13**.



Figure 6-13, Discharge of Pakpattan Canal in Vehari Area

B) Ground Water Source

Vehari area underlies a thick sub surface strata (aquifer) of more than 700 ft. thick, comprises principally fine to medium sandy beds with silty clay / clayey silt layers of varying thickness and extension. These beds were deposited by meandering rivers activities; therefore, the thickness and extension of these beds are varying from place to places. The sandy beds are mostly fine to medium grained having more or less homogeneous nature and exists underwater table condition. The aquifer is capable to yield moderate capacity tube wells due its thickness sandy material and reasonable vertical conductivity.

A typical geologic log of Test Bore BR-69 showing the strata encountered in located at 17 miles on Mian Chanu Burewala road in Bari Doab. (From WAPDA report from 1980). The water level was reported 37 ft.

Table 6-1, Typical Lithologic Log of Test Bore BR-69 Drilled by WAPDA in Bari Doab

Strata	Description of Lithology	Thickness (ft.)	Depth below land surface (ft.)
Sand	Grey fine to very fine	37	37
Sand with Kankars	Fine sand with 10 to 20% kankars	26	63
Sand	Grey fine to medium coarse	41	104
Kankars	Kankars with minor sand	41	145
Sand	Grey fine to very fine	12	157
Kankars	Kankars with minor sand	11	168
Sand	Grey medium to coarse with kankars	100	268
Clay +Kankars	Earthy brown with kankars	21	289
Silty clay	Earthy brown with kankars	41	330
Sand	Grey medium to coarse with minor kankars	20	350
Gravelly +sand	Kankars with medium to coarse sand	25	375
Sand	grey medium to coarse sand with kankars	161	636
Gravelly Sand	Grey medium-coarse sand with 20-30% gravel	73	609
Sand	Light grey fine to medium coarse sand	10	619

Note: Groundwater level was reported 37 ft. at the test bore site.

Source Groundwater modelling of Bari Doab

C) Recharge Source to Groundwater in Vehari City Area

Perennial Pakpattan Canal passing along the north western periphery of the city is the main recharge source to the Vehari area. The Beas River however must have meandered its course (along northwest of the Vehari City) through the Lower Bari Doab for a considerable time in past. The infiltration of river water has restricted the widespread dilution to 300 to 400 ft. of the saline groundwater zone in Bari Doab. Groundwater beneath this contain generally more than 4000 PPM of TDS (total dissolved Solid) in a narrow-elongated zone.

The other recharge sources are the rain water and water losses from canal irrigation system and field supply. The return flow from the field canal irrigation supply have developed a thin fresh ground water layer in the area. Otherwise, the groundwater quality is brackish, not fit for drinking purpose in the Vehari area.

The fresh groundwater source in the city area is canal water losses along the Pakpattan canal, where fresh groundwater lens has developed under the canal over brackish groundwater. The thickness of fresh groundwater lens (interface of fresh groundwater and brackish groundwater) under the canal depends upon:

- Discharge of canal
- Type of upper strata
- Canal built in cutting of fill

The Pakpattan canal was a very big canal in past having discharge 6,594 cfs at Sulemanki head. In the changed scenario of cropping intensity in area, the canal has been remodelled and existing discharge of Pakpattan canal reduced to 245 cusecs near Vehari area. The reduction of discharge of canal have definitely affected the fresh groundwater recharge to the Vehari city, where groundwater is not fit for drinking purpose.

D) Reported Design of the W/S Tubewells

Till 1999, water supply tubewells in Vehari were installed and maintained by Public Health Engineering Department (PHED). Later on, Government policy changed and presently PHED installs W/S tubewells and are being maintained by Municipal Community of Vehari City. Later on, three W/S tubewells have been installed Under PCP (Punjab Cities Program) in year 2020.

E) W/S Tubewells Installed BY PHED For MU Vehari City

The reported design of W/S tubewells installed along Pakpattan Canal by PHED is as below:

- | | | |
|------------------------------------|-----------|-----------|
| • MS housing pipe of diameter | 12 inches | =100 ft. |
| • MS housing pipe of diameter | 10 inches | =200 ft. |
| • Fiber glass strainer of diameter | 10 inches | =110 ft. |
| • Fiber glass bail plug diameter | 10 inches | =10 ft. |
| • Total depth. | | = 420 ft. |

The reported average depth of the tubewells installed by PHED is around 400 ft. The design discharge of these tubewells is one cusec each and pump setting depth 100 ft.

F) W/S Tubewells Installed under PCP (Punjab Cities Program)

Under PCP (Punjab Cities Program) in year 2020, three W/S tubewells have been installed in Vehari City. The reported discharge and design of new W/S tubewells are given as below:

Table 6-2, Tube-wells Installed Under PCP (Punjab Cities Program)

Description	T/W-1	T/W-2	T/W-3
MS housing pipe dia. of 12 inches	123 ft.	135 ft.,	140 ft.
Fiber glass strainer dia. Of 10 inches	90 ft.	110 ft.	100 ft.
Fiber glass bail plug dia. Of 10 inches	10 ft.	10 ft.	10 ft.
Total depth.	223 ft.	255 ft.	250ft.

The design discharge of these tubewells is one cusec each and pump setting depth 100 ft.

The superintendent Farhat Ali in-charge of water supply system of MU Vehari has reported that community has reservations against the groundwater quality from new shallow tubewells of 250 ft. depth. Whereas, groundwater quality was not issue from old 400 ft deep water supply tubewells.



Figure 6-14, KSB Pump Installed in Shallow Tubewells Installed Under PCP Showing Discharge 01 Cusec

Considering the VES-1, VES-2, VES-3 and VES-4 conducted along Pakpattan canal, the interface of fresh and poor groundwater has been reported at around 300ft. to 400 ft. (100m to 130m). Therefore, depth and discharge of new water supply tubewells along Pakpattan Canal to be consider below 300ft and discharge around 0.5 cusec.

6.3.7 Proposed Design for New Water Supply Tubewells for Vehari City

For Vehari City number of water supply tubewells are installed along the Pakpattan Canal, where lens of fresh groundwater has been developed by the canal water losses over poor groundwater. These tubewells are installed of depth 400 ft. and capacity one cusec each by PHED for MC Vehari in different phase's during 1999 to 2011. Most of the tubewells have abandoned due to bores failure after completing their normal life. In year 2020 three W/S tubewells have been installed under PCP along Pakpattan

Canal. Their depth has been reduced from 400ft. of old tubewells to 250 ft. in new scenario of reduction of canal discharge.

The proposed design for new water supply tubewells at Chak 59 WB area are given as following:

A) Proposed design of W/S Tubewells at Chak 59 WB

The Design for water supply tubewells is proposed as below:

- VES data for new site must be considered before construction starts.
- Reported water level in area =120 ft.
- Depth of the tubewells be kept around = 400 ft.
- MS housing pipe dia. of 12 inches = 200 ft.
- Fiber glass strainer dia. Of 10 inches =100 ft.
- MS housing pipe dia. of 10 inches = 90 ft.
- Fiber glass bail plug dia. Of 10 inches =10 ft.
- Slot size (depend upon strata) =0.5 mm to 1mm
- Design Discharge of tubewell =1 cusec
- Expected drawdown in tubewells =10 ft. to 15 ft.
- Total depth. = +-400 ft.

The discharge and pump setting will depend upon data of DNT data (development and testing data) of tubewell.

6.4 Biological Resources

6.4.1 Terrestrial Fauna

Terrestrial fauna of the area is of common domestic nature. Buffaloes, cows, goats, donkeys, hens, dogs, cats and horse etc. are the commonly available animals in the Project Area. The bird community, found in the area, includes variety of residential birds such as crow, sparrow, parrots and doves.

6.4.2 Terrestrial Flora

The major crops cultivated around the proposed project site are Wheat, Millet, Maize, Jawar and cotton. The trees comprise largely of Keekar (*Acacia nilotica*), Phulai (*Acacia modesta*), Shisham or Tahli (*Dalbergiasissoo*), Peeple (*Ficusindica*), and Eucalyptus (*Eucalyptus citriodora*).

6.4.3 Wetlands

There are no wetlands nearby project site and in Vehari.

6.4.4 Wildlife Sanctuaries

There are no wildlife sanctuaries nearby project site and in Vehari.

6.4.5 Wildlife Parks

There are no wildlife parks nearby project site and in Vehari.

6.4.6 Forests⁵

Forest Department of District Vehari falls under administrative control of Sahiwal Forest Division, controlled by Divisional Forest Officer, Sahiwal. There are two administrative units in District Vehari i.e. Sub Divisional Forest Officer, Vehari and Range Forest Officer, Burewala. Vehari Forests Sub Division comprises of Canal Side Plantation and Roadside Plantation along provincial highways of Tehsil Vehari and Mailsi, whereas Burewala Forest Range comprises of Canal Side Plantation and Roadside Plantation along Provincial Highways of Tehsil Burewala and Rakh Jamlera Plantation situated near Satluj River. The existing set-up was constituted on July 01, 1994 as a result of transfer of Canal Side Plantation from Irrigation Department to Forest Department.

6.4.7 Game Reserves

Head Islam and Siphon, Mailsi are game reserves found in District Vehari but no game reserve is found nearby project site / area.

6.5 Socio-Economic and Cultural Environment

This section addresses the socio-economic and cultural dimensions of the project's geographical area. The available reports and documents were thoroughly examined during the desk study. A team of experts conducted on-site visits to assess the proposed "Rehabilitation and Improvement of Water Supply System in Municipal Committee (MC) Vehari" sub-project, collecting baseline data from both directly and indirectly impacted individuals.

The project would have wide-ranging positive impacts on public health, economic development, environmental sustainability, and community satisfaction. It aligns with broader goals of sustainable development and contributes to the overall well-being of the community. The analytical insights provided by this report play a pivotal role in assisting project planners, local authorities, and policymakers in making well-informed decisions and ensuring the suitability and appropriateness of vital services such as the Installation of new Tubewells, Rehabilitation of Existing Tubewells, Repair and Rehabilitation of Aging Pipelines, Construction and Repair of Transmission Mains, and the Construction of Overhead Reservoir Tanks.

The rehabilitation and improvement of the water supply system in the Municipal Committee (MC) of Vehari aimed at enhancing and upgrading the water infrastructure within the city area of Vehari. This project will address issues related to water quality, distribution, and overall efficiency of the water supply system.

⁵ <https://vehari.punjab.gov.pk/forest>

Social surveys of the proposed project are research tools used to collect data from individuals or groups within a population to understand various aspects of social life. The basic objectives of social surveys include:

- To obtain primary data from diverse sources, providing a comprehensive understanding of the project's social implications.
- To disseminate information to the public regarding the objectives and purpose of the proposed project.
- To understand the specific needs and concerns of residents regarding the water supply system.
- To identify and evaluate potential social impacts associated with the implementation of the proposed project.
- To get feedback from the community about the project related social issues.
- To address and incorporate mitigation measures for social issues identified in the survey, aiming to minimize any adverse effects on the community.

6.5.1 Methodology

A socio-economic survey of the settlements around the project area was conducted by a team of experts using a specific methodology which is described and discussed in this section. The methodology, underlying principles, and practices adopted for the survey were designed to ensure that accurate and comprehensive data could be collected, that would accurately reflect the true socio-economic characteristics of the respondents.

Initially, a preliminary survey was conducted by the team of experts then a comprehensive field survey was carried out afterwards.

Population statistics were collected from the secondary data source which is District Census Report (DCR). According to the (DCR) 2017, the total population of Vehari City is estimated to be 145,647 individuals.

The sample size of 69 individuals was determined using the Standard Statistical Formula with a confidence level of 90% and a confidence interval of 10%. The respondents were selected through Simple Random Sampling, which falls under the type of Probability Sampling techniques. Data from the respondents was collected using an Interview Schedule technique. A total of 69 questionnaires were designed to collect baseline data on demographic and socio-economic indicators. In addition, extensive Consultations and Focus Group Discussions (FGDs) were conducted during the socio-economic survey in order to inform individuals about project-related activities and record their opinions.

During the survey, participants were asked for information regarding their Demographic characteristics including name, age, location, education level, language, marital status, and caste etc.

In the Occupation and Sources of Income section of the survey questionnaire, respondents were asked about their occupation, income, and sources of income.

The infrastructure present in the Sub Project Area part of the survey questionnaire sought information from respondents regarding amenities such as water supply, electricity, sewerage/drainage system, and telephone facilities.

The Availability of Social Services section of the survey questionnaire included questions on facilities like health services, educational institutions, and offices etc.

Lastly, the respondents' information and perceptions about the project were assessed in the Water Supply section of the checklist.

In order to quantify the existing baseline conditions of the study area, collected data was digitized and analyzed by using Statistical Package for Social Sciences (SPSS) software and Microsoft Excel because they offer quicker and easier access to basic functions and are also useful for obtaining precise and accurate baseline data results.

6.5.2 Socio-economic Environment of Project Area

Vehari is a city located in the Vehari District of the Punjab province in Pakistan. It is the capital of the Vehari District and is situated near the eastern bank of the Sutlej River. Vehari means a low-lying settlement by a flood water channel. The city is known for its agricultural significance, and the surrounding region is primarily engaged in agriculture, with crops such as cotton, wheat, and sugarcane being prominent. Vehari has dozens of cotton processing factories and cottonseed oil manufacturing plants; sugarcane farming and processing is also common. Agricultural products include mangoes in the summer and guava and other citrus fruits like oranges in the winter.

Vehari has a mix of urban and rural characteristics, with a variety of markets, educational institutions, and health facilities serving the local population. The city is well-connected by road and is linked to other major cities in the region. The railway infrastructure in Vehari city also exists, however, in a deteriorated state.

Vehari, like many cities in Pakistan, is likely characterized by cultural diversity. The population may consist of people from various ethnic, linguistic, and cultural backgrounds, contributing to a rich tapestry of traditions and practices. Traditional music, dance, and local festivals are integral parts of the local culture. Society is influenced by both traditional values and modern

influences, creating a blend of customs and practices. The socio-cultural environment in Vehari is likely shaped by traditional norms and values, influenced by both local customs and broader Pakistani cultural practices. Respect for elders, hospitality, and community solidarity may be the most important aspects of the social fabric.

Punjabi serves as the predominant language spoken in the designated area with Urdu and Saraiki being secondary languages used. People may also communicate in other regional languages and dialects. The region might have a tradition of arts and crafts, including pottery, embroidery, and other handicrafts. These skills are often passed down through generations.

Vehari, being a city in the Punjab province of Pakistan, likely offers a variety of local cuisines that reflect the rich culinary traditions of the region. Some of the common dishes include: Sarson da Saag and Makki di Roti, Biryani, Nehari, Karhi Pakora, Samosas and traditional Sweets and Desserts.

The project area is characterized by a strong presence of Punjabi culture. Inhabitants of this area come from diverse backgrounds, with the majority belonging to low-income and middle-income socioeconomic classes, although there are also some individuals from higher income brackets. The most prevalent dress style among the people in the project area is Shalwar Kameez. Traditional attire is commonly worn by females, who often embellish their outfits with ornamental accessories as well. Additionally, various castes can be found residing within the project area.

6.5.3 Political and Administrative Setup

The designated sub-project area is situated in Vehari City, which functions as one of the subdivisions within the broader Vehari district. Similar to other cities in Pakistan, Vehari is expected to operate under a local government system comprising municipal committees or union councils. These entities are tasked with managing local administration, delivering public services, and facilitating infrastructure development. They actively engage in resolving community issues, overseeing local development initiatives, and striving to enhance the overall well-being of residents. The political landscape of Vehari City is influenced by the participation of various political parties in elections at different levels. Additionally, Vehari City maintains its own police force, responsible for upholding law and order within the city.

6.5.4 Land Acquisition and Resettlement

During the survey, it was identified that sub-project land for construction and rehabilitation of Water Supply System is government owned and does not fall in any sensitive zone. The sub-project is the construction of 10 new Tubewells, rehabilitation of 03 existing Tubewells, Laying of Main Transmission and Replacement of house connections.

6.5.5 Physical Cultural Resources

Sensitive receptors like mosques, graveyards, schools, university, hospitals and clinics have been found around the project area. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sites of religious importance and other sensitive receptors

6.5.6 Demographic Profile

A demographic profile or information is the gathering of data about individuals concerning certain characteristics such as gender, age, occupation, income, qualification, and residence. A detailed description of the socio-demographic characteristics of the respondents is given below.

A) Households Surveyed in the Residential Area

For the present study, the sub-project area has been categorized into seven zones, all situated within Vehari City. The Table provides details on the primary areas and the corresponding number of households surveyed in the proximity of the study area.

Table 6-3, No. of Households Surveyed in the Residential Area

Sr. No.	Zone	Area Name	No. of Households
1.	Zone-1	Lalazar Colony, Muslim Town	14
2.	Zone-2	Kachi Abadi 11 W.B	08
3.	Zone-3	Allama Iqbal Town	10
4.	Zone-4	Jannat Colony	09
5.	Zone-5	Madinah Colony	03
6.	Zone-6	Tariq Bin Ziad Colony	21
7.	Zone-7	Sharqi Colony	04
Total			69

The table indicates that the majority of the households surveyed were present in the Zone-6. The survey revealed that a significant portion of these areas lacks a government water supply system, and in the areas where such a system is in place, rehabilitation is needed.

B) Gender Ratio of Respondents

The gender ratio of respondents contacted is shown in the following **Table 6-4.**

Table 6-4, Gender Ratio of Respondents

Sr. No.	Gender	Frequency	Percentage (%)
1.	Male	44	63.8
2.	Female	25	36.2
Total		69	100

Based on the data, the majority of survey participants, accounting for 63.8%, identified themselves as male, while 36.2% identifying as female.

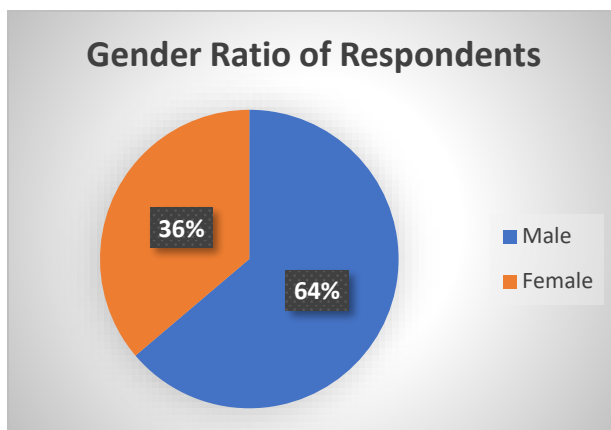


Figure 6-15, Gender Ratio of Respondents

C) Age

The demographic characteristic of age is shown in the Table.

Table 6-5, Age Composition of the Respondents

Sr. No.	Frequency Distribution	Number	Percentage (%)
1.	14- 30	26	37.7
2.	31 - 45	28	40.6
3.	46 - 60	10	14.5
4.	61 & Above	05	7.2
	Total	69	100

Based on the data in this table, it can be observed that 37.7% of participants fall within the age range of 14-30 years, while 40.6% are aged between 31-45 years. Additionally, individuals ranging from 46-60 years make up 14.5% of respondents, and those aged above 61 constitute a further 7.2%.

These figures in the table shows that respondents are mature enough to express their opinions about the project.

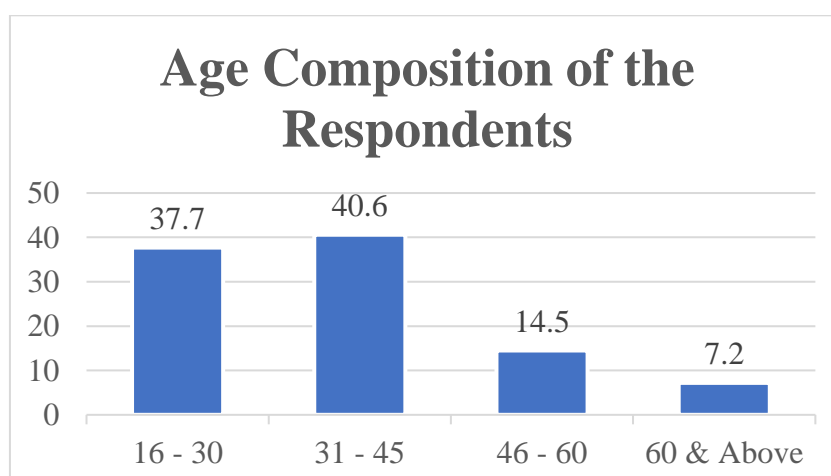


Figure 6-16, Age Composition of the Respondents

D) Caste

The survey revealed that the study area predominantly consists of the following major castes: Arain, Jutt, Malik, Rana, Dogar, Rehmani, Awan, Mughal, Rajpoot, Sheikh, Sial, Joiya, and Gujjar.

E) Language

The most common widely spoken primary language in the project area is Punjabi which is also known as the mother tongue in Vehari City. Additionally, Urdu, Saraiki, and English are also spoken and understood by residents of this region.

F) Education

Education distribution of the survey is shown in the following table.

Table 6-6, Education Level of the Respondents

Sr. No.	Education Level	Number	Percentage (%)
1.	Illiterate	09	13.1
2.	Primary	04	5.8
3.	Middle	03	4.3
4.	Matric	06	8.7
5.	Intermediate	02	2.9
6.	Bachelor's	18	26.1
7.	Master's	27	39.1
	Total	69	100

Based on the data presented in this table, it is evident that a significant portion of respondents possess advanced levels of education. Specifically, 13.1% are unable to read or write, while 5.8% have received primary level education. Additionally, 4.3% have received middle level education and 8.7% hold matriculation certificates. Furthermore, 2.9% hold Intermediate certificates and 26.1% have obtained bachelor's degrees; however, the majority of participants (39.1%) possess master's degrees. In conclusion, the survey results indicate that a considerable number of respondents exhibit a high educational attainment level.

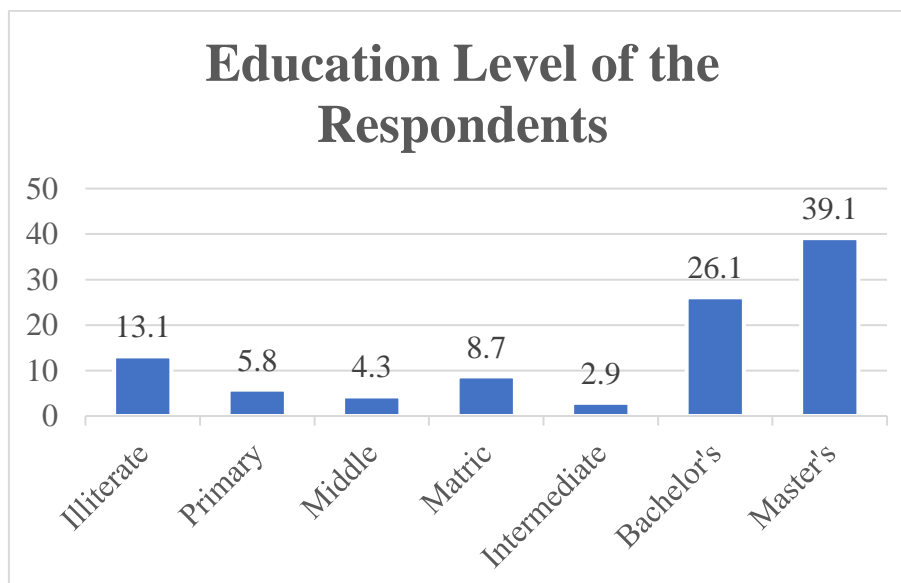


Figure 6-17, Education Level of the Respondents

G) **Marital Status**

Marital status distribution of the survey is shown in the **Table 6-7**.

Table 6-7, Marital Statuses of the Respondents

Sr. No.	Marital Status	Number	Percentage (%)
1	Married	54	78.3
2	Unmarried	15	21.7
3	Divorced	0	0
	Total	69	100

According to the survey, 78.3% of the respondents are married and 21.7% are unmarried or single.

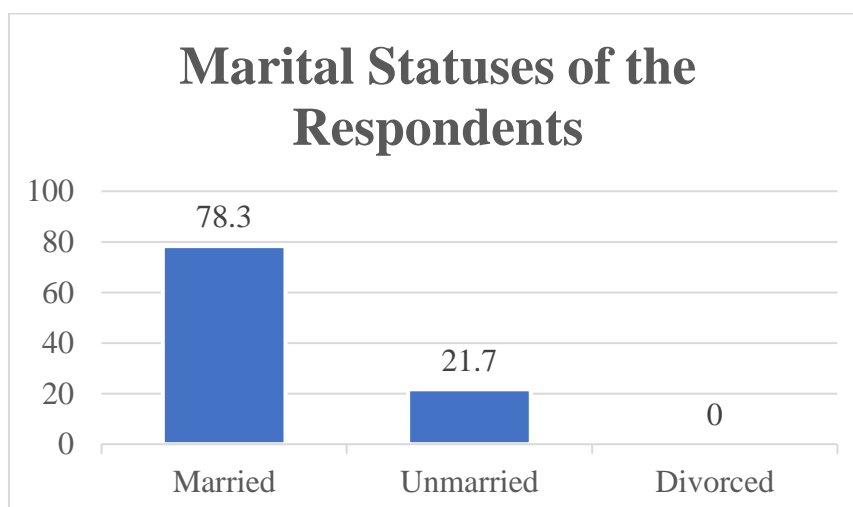


Figure 6-18, Marital Statuses of the Respondents

H) Total Dependents

The number of individuals who rely on the respondents is shown in the following **Table 6-8**.

Table 6-8, Total Dependents

Sr. No.	Total Dependents (Individuals)	Number	Percentage (%)
1.	No Dependent	16	23.2
2.	1-4	32	46.4
3.	5-8	13	18.8
4.	9-12	05	7.2
5.	More than 12	03	4.3
	Total	69	100

The table illustrates the count of people dependent on the survey participants. Most participants, precisely 46.4%, support 1 to 4 dependents. Additionally, 18.8% are responsible for 5 to 8 individuals, 7.2% are responsible for 9 to 12 individuals while 23.2% have no dependents. Moreover, 4.3% have more than 12 dependents.

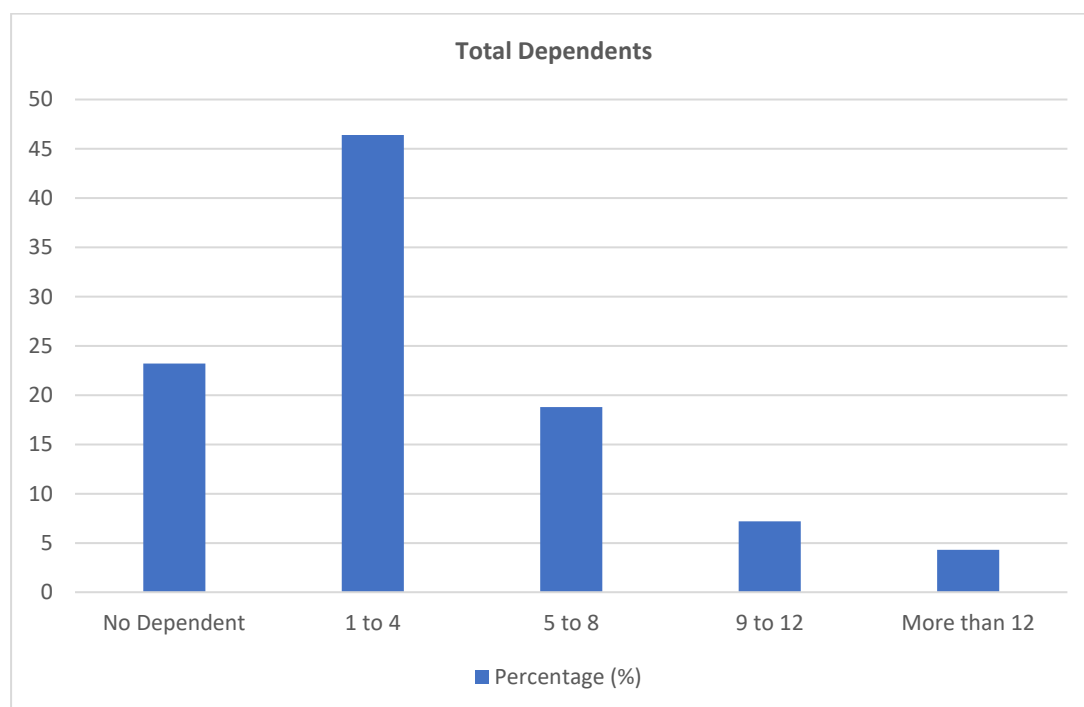


Figure 6-19, Total Dependents

6.5.7 Occupation and Sources of Income

The economic characteristics include occupation, income, and sources of income etc.

A) Occupation

Occupations of the selected respondents are shown in the **Table 6-9**.

Table 6-9, Occupational Status of the Respondents

Sr. No.	Occupation	Number	Percentage (%)
1.	Farmer	13	18.8
2.	Government Job	22	31.9
3.	Private Job	19	27.5
4.	Business	04	5.8
5.	Unemployed	11	15.9
Total		69	100

The above table represents the occupational distribution of the respondents. According to the data, 15.9% of respondents are without a job. Among those considered "economically active," 18.8% are engaged in farming, 31.9% are employed in government positions, and 27.5% of respondents are working in the private sector. Additionally, 5.8% of participants are involved in business activities.

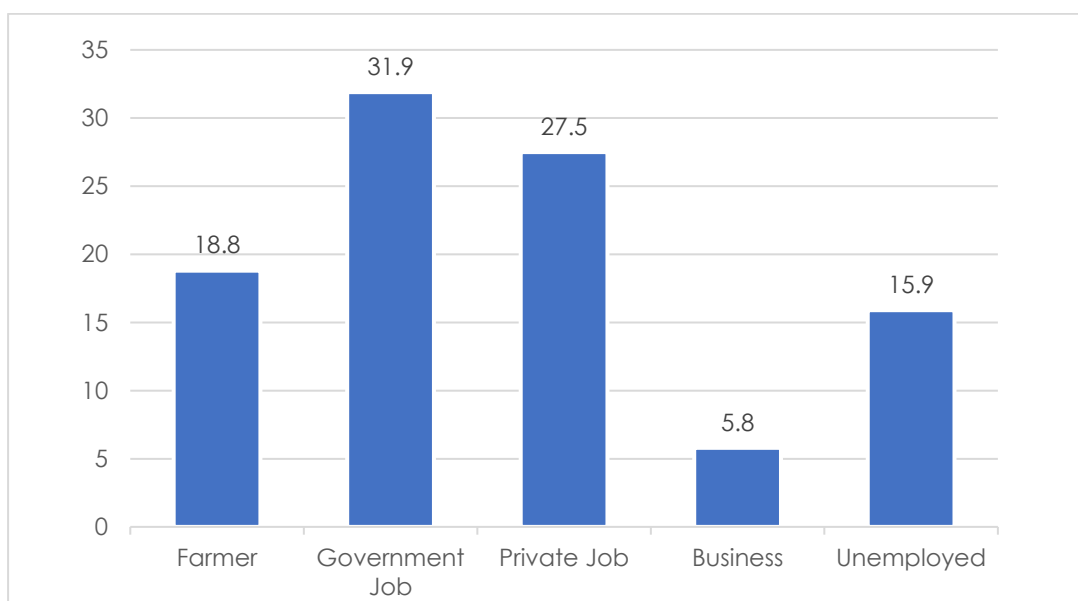


Figure 6-20, Occupational Status of the Respondents

B) Household Income Levels

During the socio-economic survey, respondents were inquired about their total family monthly income from all sources. **Table 6-10** shows the income levels of the respondents.

Table 6-10, Household Income Levels

Sr. No.	Income Level (Pak Rupees)	Number	Percentage (%)
1	Less than Rs. 32,000	11	19
2	Rs. 32,000-50,000	12	20.7
3	Rs. 50,001-75,000	14	24.1
4	Rs. 75,001-90,000	17	29.3
5	More than Rs. 90,000	04	6.9
	Total	58	100

Based on the data presented in the table, it can be observed that 19% of the participants earn less than Rs. 32,000 per month. Additionally, 20.7% fall within the income bracket of Rs. 32,000 to Rs. 50,000 per month, while 24.1% earn between Rs. 50,001 and Rs. 75,000 monthly. Furthermore, 29.3% have a monthly income ranging from Rs. 75,001 to Rs. 90,000, and 6.9% of respondents earn more than Rs. 90,000 monthly.

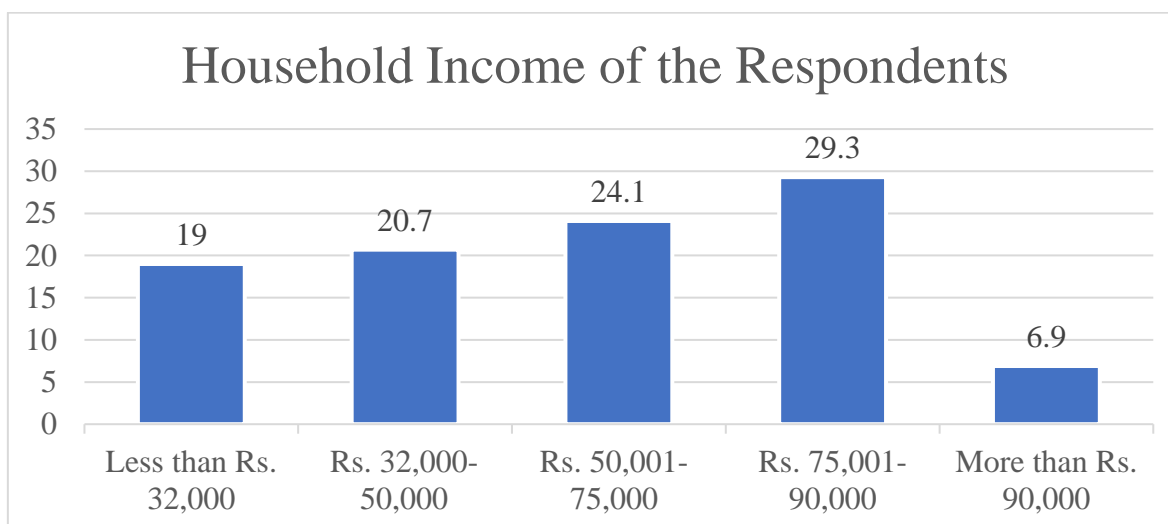


Figure 6-21, Graph: Household Income of the Respondents

C) Sources of Income

Sources of income survey findings of selected respondents are shown in the following **Table 6-11**.

Table 6-11, Sources of Income Distribution of the Respondents

Sr. No.	Source	Number	Percentage (%)
1	Service	40	69
2	Agriculture/Livestock	14	24.1
3	Business	04	6.9
4	Labor	0	0
5	Any Other	0	0
	Total	58	100

Based on the data presented in the table, it can be observed that 69% of participants are involved in service-related occupations, while 24.1% are engaged in agriculture and livestock activities. Another 6.9% of respondents reported being self-employed as business owners or entrepreneurs.

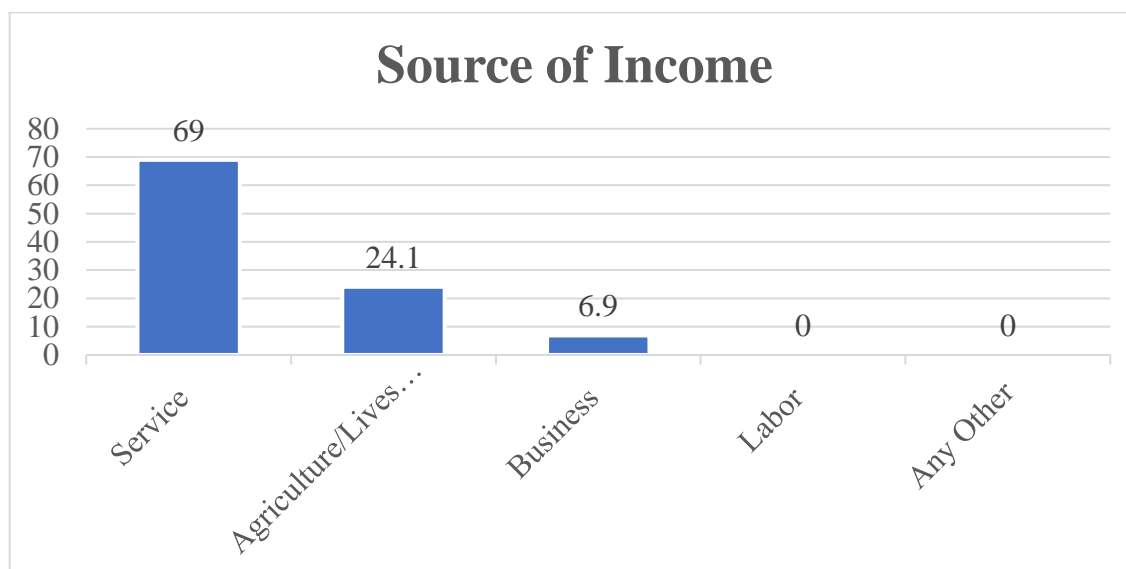


Figure 6-22, Graph: Source of Income

6.5.8 Housing Profile

The housing profile shows the housing conditions of the respondents.

A) Types of Construction

Table 6-12 shows the type of construction of the house in the Project Area.

Table 6-12, Types of Construction

Sr. No.	Construction Type	Number	Percentage (%)
1	Pacca Houses	65	94.2
2	Katcha Houses	0	0
3	Semi Pacca	04	5.8
	Total	69	100

Based on the data presented in the table, it can be observed that majority of the respondents i.e., 94.2% reported living in pacca (concrete) houses while a small proportion of respondents i.e., 5.8% living in semi pacca houses. However, none of the participants reside in katcha (mud) houses.

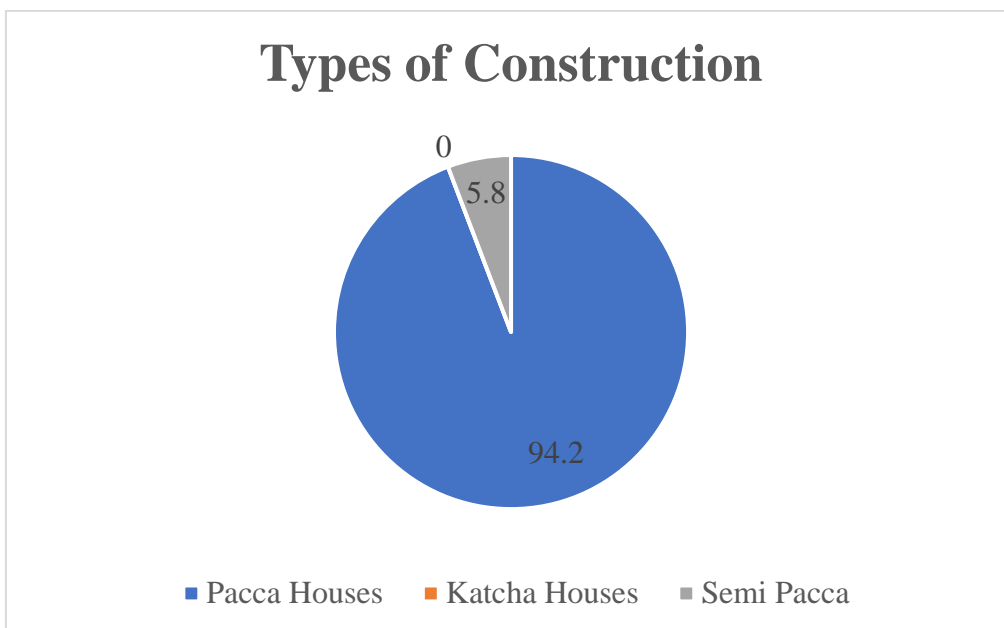


Figure 6-23, Graph: Types of Construction

B) Estimated Number of Houses in the Sub Project Area

Based on the survey findings, a large portion of participants indicated that Vehari City is home to an estimated 28,000 to 35,000 residences. The average number of houses in the city was calculated at around 31,500.

C) Estimated Household Size

Based on the survey findings, a significant number of participants indicated that households typically consist of four to nine members. However, the average household size was found to be around 6.5 individuals.

D) Estimated Population

Estimated Population = Household Size * No. of Houses

$$31,500 * 6 = 189,000$$

According to survey participants, the total estimated population of Vehari City is approximately 189,000 people.

6.5.9 Social Amenities

In the socio-economic survey conducted to establish the social foundation of the project area, participants were asked about the utilities in their locality. All respondents reported having access to electricity at their homes. PTCL services were accessible in various areas, and a majority of participants owned mobile phones. Some households used solar panels for electricity and water supply. However, a small number of respondents expressed discontent with the water supply, sewerage and drainage facilities. The **Table 6-13** illustrates the status of social amenities on a scale.

Table 6-13, Social Amenities of the Project Area

Sr. No.	Social Amenities	Scale	Number	Percentage (%)
1	Truck / Bus Terminals	Yes	69	100
		No	0	0
		Total	69	100
2	Railway Tracks	Yes	69	100
		No	0	0
		Total	69	100
3	Gas Pipelines	Yes	44	63.8
		No	25	36.2
		Total	69	100
4	Shopping Area/Markets	Yes	69	100
		No	0	0
		Total	69	100
5	Tubewells	Yes	19	27.5
		No	50	72.5
		Total	69	100
6	Telephone Lines	Yes	69	100
		No	0	0
		Total	69	100
7	Water Supply Network	Yes	18	26.1
		No	51	73.9
		Total	69	100
8	Sewerage System	Yes	23	33.3
		No	46	66.7
		Total	69	100
9	Drainage System	Yes	69	100
		No	0	0
		Total	69	100
10	Electricity Transmission Lines	Yes	69	100
		No	0	0
		Total	69	100
11	Storm Water drains	Yes	0	0
		No	69	100
		Total	69	100
12	Disposal Stations	Yes	69	100
		No	0	0
		Total	69	100

A) Mode of Transport

The survey revealed that a significant portion of the participants opt for cars and motorcycles as their primary mode of transportation. However, there are

also some respondents who rely on cycles and public transport to commute.

6.5.10 Availability of Social Services

Social services include healthcare, education and employment support etc. The detail information on each of these services is given below.

A) Educational Facilities

There are number of government and private educational institutions are present in Vehari City that are imparting education from the level of mosque or primary up to post graduate levels.

Table 6-14, Educational Facilities

Sr. No.	Name of Institution	Education Level	For Boys / Girls
1.	National Institute of Technology	Higher Secondary	Co-Education
2.	The Wise Computer & Science Academy	Secondary	Co-Education
3.	ZiTA College Vehari	Higher Secondary	Co-Education
4.	COMSATS University Vehari Campus	Higher Secondary	Co-Education
5.	Divisional Public School Vehari	Secondary	Co-Education
6.	Aspire Group of Colleges Vehari	Higher Secondary	Co-Education

B) Health Facilities

In Vehari City, numerous healthcare facilities are available. However, if residents of Burewala Tehsil require specialized medical services, they must travel to Lahore and Multan due to the lack of advanced healthcare facilities locally.

Table 6-15, Health Facilities

Sr. No.	Health Facilities	Government / Private
1.	District Head Quarter Hospital Vehari	Government
2.	Peer Hospital Vehari	Private
3.	National Hospital	Private
4.	AlShifa Hospital Vehari	Private

C) Offices

In the survey, the offices which is identified within the project area is shown in the **Table 6-16**.

Table 6-16, Offices

Sr. No.	Office	Government / Private
1.	Municipal Committee Vehari	Government
2.	Regional Passport Office Vehari	Government
3.	Vehari Stockist	Private
4.	Oriflame Vehari	Private
5.	Excise & Taxation	Government

6.5.11 Water Supply

In the present sub-project survey, various questions related to water supply system were asked from the respondents. A detailed analysis of each question is given below.

A) Current Issues Related to Water Supply

The survey revealed several significant water-related concerns. These include:

- Less availability of water.
- No water supply is available in many areas of city.
- Low quality of water.
- Ground water mixes with sewer water through cracks and leaks.

The survey highlighted issues related to the scarcity of water as well as the substandard quality of available water resources.

B) Water Availability Time Duration

Government-provided water is accessible only during specific periods, typically in the morning and evening. This limited availability of government water supply at specific times can pose challenges for households and their daily water needs. Therefore, it is important for households to store water or purchase additional water in order to ensure their water needs are met during the periods of water supply interruption.

C) Water Contamination

The respondents were of the view that water contaminants are present in the government water supply. However, the water from boreholes and motor pumps also contains contaminants such as chemicals, pathogens, heavy metals, and other substances that compromise the quality and safety of water.

D) Water Borne Diseases

During the survey, individuals expressed that several prevalent waterborne

illnesses were present in numerous areas of Vehari City. These diseases include Typhoid, Hepatitis, Cholera and Dysentery. These illnesses are caused by the consumption of contaminated water or the exposure to water that harbors pathogenic microorganisms. Contaminated water can contain various disease-causing agents such as bacteria, viruses, parasites, and other pathogens. Ingesting or coming into contact with such microorganism-contaminated water can lead to the development of waterborne ailments.

E) Reasons of Water Contamination

Water contamination can occur due to various factors, and the sources of contamination are diverse. Here are some common reasons for water contamination:

- Ground water mixes with sewer water through cracks and leaks.
- Storm water mixes with sewer water.
- Ground water containing industrial and agriculture waste.

F) Mixing of Industrial / Household Effluents

The mixing of industrial / household effluents can occur in various ways and can lead to a range of environmental and public health concerns for residents of Vehari City. During heavy rainfall, industrial / household and storm water mixes with each other due to leakage of water pipelines.

G) Water Supply Pipelines

Survey participants reported that the current water supply pipelines are damaged and water losses. This indicates the urgent need for infrastructure repairs and improvements to ensure a reliable water supply.

H) Government Installed Tubewells

Government-installed tube wells are fewer in number and cannot meet the demands of a growing population. Therefore, it is important to explore alternative methods for accessing and distributing water resources effectively, such as rainwater harvesting and groundwater recharge to address the increasing demand for freshwater.

I) Reasons of Less Availability of Water

Here are some common reasons for less availability of water:

- Less number of tubewells in area can lead to less availability of water.
- Rapid increase in population can lead to increase in consumption of water.
- Poor water management practices can lead to scarcity of water.
- Changes in climate patterns can lead to heatwaves and less rainfall.

J) Using Water from Government's Water Supply System

Most of the survey participants rely on privately sourced water. This is because areas with government-provided water experience a scarcity, with the supply occurring only twice a day in limited quantities. This scarcity drives households to seek alternative water sources through private motors or boreholes.

K) Private Water System

Majority of the survey respondents indicated that they have no choice but to obtain their water from private sources due to the lack of reliable and accessible government-supported sources. As a result, these households bear the burden of higher prices and potential water shortages.

L) Community Using Water from Private Water System

A private water supply system caters to the needs of approximately 70% to 80% of the local population.

M) Community Using Water from Government's Water Supply System

The participants believed that around 20% to 30% of the population depends on the government-provided water supply system.

N) Bill Payment

Residents of Vehari City are currently exempt from paying any fees to the Municipal Committee (MC).

O) Water Requirement

The respondents are of the view that the water requirement depends on various factors such as family size, climate conditions, and economic activities. Therefore, it is important to consider these factors when addressing water supply challenges and implementing effective water resource management strategies. Additionally, the sustainable use and management of water resources require a holistic and integrated approach that takes into account the needs of different sectors, such as agriculture, industry, and households.

P) Requirements of Water Being Fulfilled by Current Water Supply System

The respondents are of the view that current water requirements are not fulfilled by the current water system and that alternative water supply options need to be explored and implemented. Specifically for drinking purposes we purchase the mineral water. The alternative water supply options include rainwater tanks, stormwater harvesting, and wastewater reuse. By incorporating these alternative water supply options, the urban water system can become more sustainable and resilient to challenges such as climate variability, increasing population, and drought.

Q) **Purpose of More Water**

The purpose of having an ample and sustainable water supply is important for various aspects of human life. Some primary purposes include:

- For drinking
- For sanitation
- For bathing
- For dishwashing
- For irrigation
- For industrial use
- For ensuring food security

R) **Future After 20 Years**

After 20 years, the population of Vehari City is expected to increase, leading to increased water demand for agriculture, industry, and domestic use. Moreover, climate change is likely to impact precipitation patterns, leading to more extreme weather events such as droughts and floods. Changes in temperature and precipitation can affect water availability and distribution. Population growth, increased urbanization, and industrial development contribute to the strain on water resources. Pollution from industrial, agricultural, and urban sources can degrade water quality. Efforts to ensure access to clean and safe water will be essential for public health and ecosystem.

S) **Government's Effort**

Governments play an important role in ensuring reliable and sustainable water supply for residents. Here are several efforts that governments can undertake to facilitate residents with water supply:

- Invest in water infrastructure, including dams, reservoirs, pipelines, and water treatment plants, to improve water storage, distribution, and purification systems.
- Implement regular maintenance and repair programs to ensure the efficiency and longevity of existing water infrastructure. Timely repairs can prevent water leakages and losses.
- Adopt and invest in advanced technologies for water management, including smart metering, leak detection systems, and water quality monitoring, to enhance efficiency and reduce losses.
- Launch public awareness campaigns promoting water conservation practices. Encourage residents to adopt water-saving technologies and behaviors.
- Explore and develop alternative water sources such as rainwater harvesting, groundwater recharge, and desalination to supplement traditional water supplies.

T) Project that Government Should Initiate

Respondents are of the view that Government should construct tubewells and surface water treatment plants to improve access to safe and reliable water sources.

U) Average Rain Fall

Average rainfall throughout the year in Vehari City is very low.

V) Willing to Place Containers on Rooftop

Majority of the respondents are not willing to place water containers on rooftop because building's structure may not support the weight of the water container and if there is leakage in container then it will damage the roof.

W) Campaign on Stopping the Wastage of Water

During the survey, the respondents showed several concerns about the government initiative of campaign. If government initiates a campaign on stopping the wastage of water. Some common concerns would be about the state of existing water infrastructure. Residents may worry that issues such as leaks or inefficient systems contribute to water wastage and expect the government to address these concerns. Moreover, the campaign should reach to all residents, regardless of their socioeconomic status.

A. If Government Install a System that Stores Water for Reusing Purposes

During the survey, the respondents were of the view that the installation of a water storage and reuse system by the government is a positive step towards sustainable water management. However, if the government install's this system, then the residents are concerned about the quality of the stored water. Proper water treatment and maintenance of the storage infrastructure are crucial to ensure that the reused water meets safety standards. Moreover, the Government should ensure that the stored water is free from contaminants and pathogens. Furthermore, regular upkeep and monitoring by the government are necessary to prevent leaks, corrosion, or other issues that could compromise the system.

SECTION - 7: POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS AND MITIGATION MEASURES

7.1 General

This chapter identifies the potential impacts related with preconstruction, construction and operation phases of the project on the physical, ecological and socioeconomic domains of the environment. Accordingly, mitigation measures have been proposed to mitigate the negative impacts and to enhance the positive impacts.

7.2 Approaches and Methodology

During the preparation for the project construction phase, the future contractors must be notified and prepared to cooperate with the executing agency, project management, supervising consultants and local population in the mitigation of impacts. Furthermore, the contractors must document the implementation of ESIA in full and be ready to engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the ESIA must be audited and this will be considered as the most important part of planning. In this regard, the proponent must fulfil the requirements of the law and guidance prepared by EPA and the World Bank on the environmental and social aspects of projects and the recommendations already made for project in this ESIA, ESMF for PCP, under EIA/IEE regulation and Punjab Environmental Protection Act (2012).

For impact identification, various ESIA methodologies are available including the checklists, interaction matrices, networks and overlays. Among these four methods, following three are used in ESIA of this project; Rehabilitation and Improvement of Water Supply System in MC Vehari:

- Project Interaction Matrix
- Checklists
- Overlays

7.2.1 Project Interaction Matrix

Interaction matrix is a two-dimensional matrix wherein the project actions are placed along one axis (i.e., along y-axis) and on the other axis there are different environmental parameters likely to be affected by the proposed project actions grouped into categories i.e., Physical, Ecological & Socioeconomic Environment. Interaction matrix is used in this project due to the following reasons:

- It provides cause-effect relationship between the project actions and resulting consequences impacts.
- It provides nature (+ve or -ve) and weighting of different impacts.
- It provides cumulative impacts of a project.

Matrix grouped project actions into temporal phases. For the impact assessment, project interaction matrix is used by dividing the project action into different phases (preconstruction, construction and operation). The environmental impacts are divided into three main categories including physical, ecological and socioeconomic domains. The environmental impacts of the project actions are identified and weighed into the following categories:

+3	=	Extremely Beneficial
+2	=	Potentially Positive
+1	=	Slightly Positive
0	=	Insignificant
-1	=	Slightly Negative
-2	=	Potentially Negative
-3	=	Extremely Negative

The assignment of significance is based on the previous knowledge and professional judgment of ESIA team experts. It may be noted that the environmental parameters, which are not related to the implementation of the project have not been considered in the matrix.

7.2.2 Checklist

The assignment of significance is based on the previous knowledge and professional judgment of ESIA team experts. The project checklist has been developed for "without" and "with mitigation." It may be noted that the environmental parameters, which are not related to the implementation of the project, have not been considered in the matrix.

7.2.3 Overlays

In order to identify spatial based impacts, overlays were used. An overlay is based on a set of transparent maps, each of which represents the spatial distribution of an environmental characteristic (for example, susceptibility to erosion). Information for an array of variables is collected for the standard geographical units within the study area, and recorded on a series of maps, typically one for each variable. These maps are overlaid to produce a composite. The resulting composite maps characterize the area's physical, social, ecological, land use and other relevant characteristics, relative to the location of the proposed development.

7.3 Characteristics of Impacts

The predicted impacts have been characterized; various aspects of the impact characterized include:

- Nature (direct / indirect)
- Duration of impact (Short term, medium term, long term)
- Geological extend (local, regional)
- Timing (project phase)
- Reversibility of impact (Reversible / Irreversible)
- Likelihood of the impact (certain, likely, unlikely, rare)
- Impact consequence severity (major, moderate, minor)
- Significance of impact (high, medium, low)

The above aspects of environmental characterization are defined in **Table 7-1**.

Table 7-1, Impact Characterization

Impact Characterization	
Nature	<p>Direct: The environmental parameter is directly changed by the project.</p> <p>Indirect: The environmental parameter changes as a result of change in another parameter.</p>
Duration of Impacts	<p>Short-term: Lasting only for the duration of the project such as noise from the construction activities.</p> <p>Medium-term: Lasting for a period of few months to a year after the project before naturally reverting to the original condition such as loss of vegetation due to clearing of campsite, contamination of soil or water by fuels or oil.</p> <p>Long-term: Lasting for a period much greater than medium term impact before naturally reverting to the original condition such as loss of soil due to soil erosion.</p>
Geographical Extent	Local, regional (spatial dimension)
Timing	Construction and Operation
Reversibility of Impact	<p>Reversible: When a receptor resumes its pre-project condition.</p> <p>Irreversible: When a receptor does not or cannot resume its pre-project condition.</p>
Likelihood of the Impact	<p>Almost Certain: Impact expected to occur under most circumstances.</p> <p>Likely: Impact will probably occur under most circumstances.</p> <p>Possibly: Impact may possibly occur at some time.</p> <p>Unlikely: Impact could occur at some time.</p> <p>Rare: Impact may occur but only under exceptional circumstances.</p>
Impact Consequences	<p>Major: When an activity causes irreversible damage to a unique environmental feature; causes a decline in</p>

Impact Characterization	
Severity	<p>abundance or change in distribution over more than one generation of an entire population of species of flora and fauna; has long term effects (period of years) on socioeconomic activities of significance on regional level.</p> <p>Moderate: When an activity causes long-term (period of years), reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of flora or fauna: have short-term effects (period of years) on socioeconomic activities of significance on regional level.</p> <p>Minor: When an activity causes short-term (period of a few months), reversible damage to a unique environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short-term (period of months) effects on socioeconomic activities of local significance.</p> <p>Negligible: When no measurable damage to physical, socioeconomic, or biological environment above the existing level of impact occurs.</p>
	<p>Categorized as High, Medium, Low.</p> <p>Based on the consequence, likelihood, reversibility, geographical extent, and duration; level of public concern, and conformance with legislative of statutory requirements.</p>

The impact characterization due to design, location, construction and operational phase is given in their respective sections.

7.4 Environmental & Social Impacts and Their Mitigations During Pre-Construction Phase

7.4.1 Impacts Regarding Project Location

The project is for sewerage system that will be constructed / executed on the govt. owned land. Tube wells will be constructed / installed on govt. land, transmission main will be laid along / in ROW of road (govt. land), existing distribution network and OHRs / GSTs will be rehabilitated. All the relevant stakeholders to be consulted before execution of the project.

A) Impact Significance

- High

B) Mitigations

All the relevant stakeholder must be consulted before execution of the

project. Applications will be submitted for relevant NOCs / consent letters that will be submitted to EPA upon issuance.

- C) Residual Impact:** The impact of project location will be low adverse in nature after taking the above-mentioned mitigations.

7.4.2 Impacts Regarding Project Design

The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).

A) Impact Significance

- Medium

B) Mitigations

The design is made by taking in considerations that minimum impacts will occur on the environment.

- C) Residual Impact:** The impact of project design will be low adverse in nature after taking the above-mentioned mitigations.

7.5 Impacts and Their Mitigations During Construction Phase

7.5.1 Physical Impacts

A) Soil Contamination

- Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites.
- Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.

1. Impact Significance

- Medium

2. Mitigations

Good engineering practices will help in controlling soil erosion at construction sites. Following measures will be adopted as per site conditions:

- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators.

- The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste.
- Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination.
- Ground shall be leveled to avoid slopes.
- Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.

3. **Residual Impact:** The impact of soil contamination will be low adverse in nature after taking the above-mentioned mitigations

B) Contamination of Surface and Groundwater Resources

Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly or there can be leakage / seepage through the ground if accidental spills occur.

1. Mitigation Measures of Impacts on Water Resources

- Sewage from construction camp will be disposed of using septic tank which has been designed properly keeping in view the following parameters:
 - Soil stratigraphy at site
 - Depth of groundwater table
 - Discharge of sewage from construction camp
- The septic tank has been designed by the Design Consultant according to the relevant standards. The example of the septic tank is shown in **Figure 7-1** below;

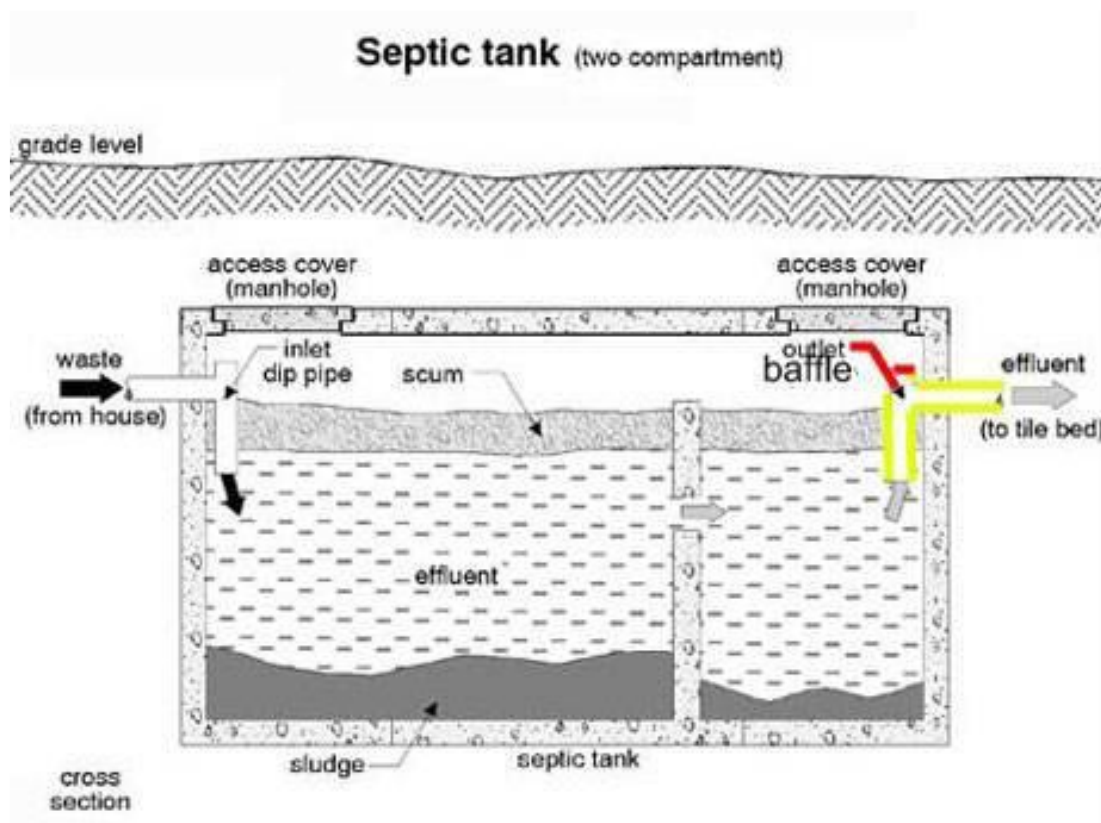


Figure 7-1, Septic Tank

- Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard.
- Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents.
- Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.

2. **Residual Impact:** The impact of Surface and ground water quality will be low adverse in nature after taking the above-mentioned mitigations.

C) Impacts on Ambient Air Quality

The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.

It is not expected that significant impact will occur on local residents or that

emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.

Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. Sources of air pollutants from the construction works will include traffic in and out of the site emitting and earth works at site during the excavation of trenches.

1. Impact Significance

- High

2. Mitigation Measures of Impacts on Ambient Air Quality

- Tuning of vehicles should be made mandatory to reduce the emissions of NO_x, SO_x, CO and PM₁₀.
- Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions.
- Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.
- The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done.
- As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.

3. Residual Impact: The impact of ambient air quality will be low adverse in nature after taking the above-mentioned mitigations.

D) Impacts on Ambient Noise Levels & Vibration

During the implementation of the project, a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and neighbourhood residential may be disturbed by the noisy activities. The impact will be significant when compared to the without project situation.

During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with

very limited use of mechanized machinery which would be sources of noise and vibration.

1. Impact Significance

- High

2. Mitigation Measures of Impacts on Noise & Vibration

- During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary.
- For the construction machinery generating noise level in excess of that prescribed in PEQS and WHO limits, Contractor will make arrangements to bring the noise level within applicable limits (including proper tuning of vehicles and mufflers / silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn.
- As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier.
- Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective / mitigation measures applied where necessary.

3. **Residual Impact:** The impact of Ambient Noise and vibration will be low adverse in nature after taking the above-mentioned mitigations.

E) Disposal of Construction Debris & Garbage

During construction phase of the project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas.

Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites.

1. Impact Significance

- High

2. Mitigations

- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site.

- The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping.
 - Arrangements should be made for regular garbage collection and removal of sewage from the construction site.
 - A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals.
- 3. Residual Impact:** The impact of construction Debris and Garbage will be low adverse in nature after taking the above-mentioned mitigations.

F) Traffic Annoyance

There construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorised and non-motorised traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.

1. Impact Significance

- Medium

2. Mitigation

- During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the project area.
- The contractor will prepare a detailed Traffic Management Plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary).
- The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorised equipment like excavators.
- The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.

- 3. Residual Impact:** The impact of traffic annoyance will be low adverse in nature after taking the above-mentioned mitigations.

G) Impact on Utilities

The utilities (ground) along the project area that may be damaged as a result of the excavation for the pipelines include fibre optic cables, sewerage lines, existing water pipelines and in exception cases electricity lines. Damage to

these utilities due to excavation may cause interruptions to services associated with the same.

1. Impact Significance

- Medium

2. Mitigation

This impact is not expected to be significant because there is no utilities present in the project routes. However, as a general rule, before excavation, the location and routes of all utilities have been identified and in case of the need for relocating utilities that may be along the proposed lines, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.

- 3. Residual Impact:** The impact on utilities will be low adverse in nature after taking the above-mentioned mitigations.

7.5.2 Ecological Environment

A) Impacts on Ecological Environment

1. Impact on Flora

No tree is expected to be cut during execution of the project, low impact on small grass and bushes is expected.

2. Disturbance to Fauna

- No impacts on fauna is envisaged.

3. Impact significance

- High

4. Mitigations

In this project, low impact is expected on vegetation and any fauna in the area since the pipeline routes are devoid of significant unique floral and faunal life.

The clearing of project sites through excavations will not adversely affect flora and fauna and all the impacts caused by construction work on flora and fauna are of temporary and reversible in nature and can be mitigated by appropriate good working practices that are prescribed in this ESIA. As it is suggested to plant 10 new trees of almost 06 ft. height if a tree has to be cut due to any mishap / accident.

- 5. Residual Impact:** The impact on flora and fauna will be low adverse in nature after taking the above-mentioned mitigations.

7.5.3 Socioeconomic Environment

A) Impacts to Occupational Health and Safety

Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety(H&S) issues, the workforce may suffer injury or death.

1. Impact Significance

- High

2. Mitigations Measures of Impacts to Occupational Health and Safety

Occupational health and safety impacts during construction are considered to be of moderate insignificance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment.

Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.

3. Residual Impact: The impact to Occupational Health and Safety will be low adverse in nature after taking the above-mentioned mitigations.

B) Impacts on Local Population

- No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project.
- The population residing in and the surroundings of the project area will be affected during the construction phase as follows:
 - There is potential hazard risk from open trenches in the vicinity of populated areas during the construction.
 - Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase.
 - Community may face the noise and dust problems during the construction activities.
 - Theft problems to the community by the Contractor's workers and vice versa.

1. Impact Significance

- Medium

2. Mitigations Measures of Impacts on Local Population / Workforce

- The potential hazard risk from open trenches in the vicinity of populated areas should be mitigated by appropriate warnings and fencing.
- Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours.
- Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust.
- Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with tarpaulin to help contain the construction materials being transported to the specific site.
- The Contractor should warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring labor / workers, Contractor has to ensure that the workers should be of good repute / character.
- Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized.
- The contractor will prepare an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts.

3. **Residual Impact:** The impact on Local Population/Workforce will be low adverse in nature after taking the above-mentioned mitigations.

C) Impacts on Public Health and Safety Hazard

- Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for the safety of the workers as well as for local residents.
- The storage of all solid waste shall be practiced so as to prevent the attraction, harborage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odors, unsightliness or public nuisance.

1. Impact Significance

- Medium

2. Mitigation Measures of Impacts on Public Health and Safety Hazards

- Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the

safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor.

- The active construction zone must be cordoned off to avoid injuries due to accidents.

3. **Residual Impact:** The impact on Public Health and Safety Hazard will be low adverse in nature after taking the above-mentioned mitigations.

D) **Public Health Diseases**

There is a potential induced impact during construction causing increased incidence of HIV / AIDS and communicable diseases due to new entrants in communities for employment. There is a potential induced impact when increased income in the communities, from construction worker salaries, leads to domestic abuse in the home. Both these impacts can be mitigated by the HIV / AIDS and sensitivities awareness programs set out in the ESIA.

E) **Resettlement Impacts**

No person will be displaced due to the project activities. Therefore, there is no need for the development of a resettlement action plan or abbreviated resettlement action plan.

F) **Gender Based Violence**

Gender-Based Violence (GBV) is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed (i.e., gender) differences between males and females. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private. The construction phase of the project is likely to exacerbate any of the various forms of GBV described below and could be perpetrated between workers themselves, between bosses and workers and between workers and the community members.

The term GBV is used to underscore systemic inequality between males and females (which exists in every society in the world) and acts as a unifying and foundational characteristic of most forms of violence perpetrated against women and girls. The 1993 United Nations Declaration on the Elimination of Violence against Women defines violence against women as "any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women." The nine core types of GBV are;

- Rape
- Sexual Assault
- Sexual Harassment

- Sexual Exploitation and Abuse
- Sexual favours
- Physical Assault
- Forced Marriage
- Denial of Resources, Opportunities or Services
- Psychological / Emotional Abuse

The Contractor will ensure the relevant Code of Conduct already included as part of the bidding documents is signed at the corporate and individual workers levels in regard to observing GBV aspects of the project.

G) **Child Protection**

Violence Against Children (VAC) is defined as physical, sexual, emotional and / or psychological harm, neglect or negligent treatment of minor children (i.e., under the age of 18), including exposure to such harm that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labor, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.

The Contractor will ensure the Code of Conduct is signed at the Corporate and individual workers levels in regard to observing Child Protection aspects of the project. This will be complied with under the supervision of the PMDFC and Supervision Consultant.

H) **Labor Influx and Recruitment**

The project will involve recruitment of labourers which may lead to influx of persons looking for work in the project area. The significance of labour influx is expected to be low or moderate and mostly unskilled in nature. The Contractor will comply with the national labour laws and develop a code of conduct and submitted to PMDFC before commencement of construction.

1. **Residual Impact:** The impact of vibration will be low adverse in nature after taking the above-mentioned mitigations.

7.6 **Environmental Impacts and Mitigation Measures During Project Operation**

7.6.1 **Consumption of Contaminated Water**

Consumption of (untreated) contaminated domestic water could lead to health impacts on the consumers of the water from the pipeline. The maintenance of the pipelines requires excavations and unblocking the pipe which could lead to contamination of the water during the process.

A) Impact Significance:

High

B) Mitigation Measures

The water supply will be closed down during construction phase ensure that no polluted water gets into water supply.

C) Residual Impact: The impact of Consumption of contaminated domestic water will be low adverse in nature after taking the above-mentioned mitigations.

7.6.2 Solid Waste Generation

Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others:

- Excavated soil
- Cement storage bags and other packets from materials used during repair and maintenance.
- Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes.

A) Impact Significance:

- Low

B) Mitigation Measures

- The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labour which would reduce wastes associated with oil spills, repair and maintenance.
- The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern.
- There will be limited hazardous wastes generated from this project including the cement bags, grease and oil.
- All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project.

C) Residual Impact: The impact of solid waste generation will be low adverse in nature after taking the above-mentioned mitigations.

7.6.3 Visual Impacts

Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and maintenance which could be an eye-sore and a health hazard. This impact is not considered to be significant

and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil / spoil.

A) Impact Significance

- Medium

B) Mitigation

The trenches should be backfilled immediately and excess spoil material is disposed of as soon as possible.

C) Residual Impact: The visual impact will be low adverse in nature after taking the above-mentioned mitigations.

7.6.4 Impacts to Occupational Health and Safety

Operation and maintenance of the pipeline / tube wells will involve workers whose safety may be at risk as a result of operation of equipment among others.

A) Mitigation Measure

- The construction activities will mostly use hand-held tools in digging the trenches with very limited use of excavators.
- Experienced and trained personnel will be engaged in operating equipment.

B) Impact Significance

- Medium

C) Residual Impact: The impact to Occupational Health and Safety will be low adverse in nature after taking the above-mentioned mitigations.

7.6.5 Impacts on Community Health and Safety

No specific serious adverse impacts on community health and safety are expected as a result of operation activities of the project. There is potential hazard risk from open trenches during the repair phases that could lead to community health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance.

7.6.6 Impacts on Traffic

The maintenance and repair activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorised and non-motorised traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk

for accidents especially where construction is on-going with little room for pedestrian access.

A) Impact Significance:

- Medium

B) Mitigation

- The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during repair and maintenance activities including need for diversions (if necessary).
- The method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators.
- The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.

C) Residual Impact: The impact of traffic will be low adverse in nature after taking the above-mentioned mitigations.

7.6.7 Impact on Air Quality

The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route and tube wells site only. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works. It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.

Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.

A) Residual Impact: The impact of air quality will be low adverse in nature after taking the above-mentioned mitigations.

7.6.8 Noise and Vibration Emission Impacts

Noise and vibration emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment.

A) **Mitigation Measure**

Experienced only in cases where motorized equipment is used. The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.

B) **Impact Significance**

This impact is expected to be low in nature and short term.

C) **Residual Impact:** The impact of noise and vibration will be low adverse in nature after taking the above-mentioned mitigations.

7.7 **Assessing Impacts**

Planning for environmental assessment depends upon reliably predicting project impacts on resources and managing those impacts to achieve the greatest gain or the smallest loss. The basis of the prediction is the knowledge of the proposed project and of local resources with which it is expected to interact. Two types of information are, therefore, needed: a comprehensive description of all resources likely to be affected by each of the project components, and an understanding of the project component itself. The baseline information given in the previous section includes all resources, natural and human and all aspects of those resources that may be expected to be touched, directly or indirectly, by the project. Conversely, project information will include all aspects of construction or operation that might affect the environment.

7.7.1 **Approach to Assessment**

Various components of the project will interact with local resources in different ways. Therefore, it is useful to divide the project into units small enough that the interactions may be examined individually as well as collectively. The main construction components of the project are Excavations, Concrete, Mixing, Finishing. Various aspects of each component are treated separately. They are examined both in terms of construction period and much longer period of project operation.

Some component of the project has positive and some have negative impact on environment and on the different factors like socioeconomic features of the community.

7.7.2 **Negative Impacts**

This project has no major / potential negative impacts on environment as well on the socio-economic features of community. Anyhow it has some impacts which have discussed as well as their mitigatory measures have well defined

in the previous section.

7.7.3 Positive Impacts

The positive impacts of the project are given as under:

- The project is in MC Vehari; there will be demand for workers, both skilled and unskilled. This will include opportunities for local people, both directly on the construction site and also indirectly in related service work.
- Safe drinking water in adequate amount will be provided to community during operation. As new pipeline and tubewells will be installed that will reduce the wastage of drinking water due to leakage and its contamination.

7.8 Cumulative and Induced Impacts

The cumulative impact assessment (CIA) examined the interaction between the project's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and / or activities can result in cumulative impacts, both positive and negative. The project's potential cumulative effects were considered with respect to valued components (VCs) in environmental and socioeconomic categories, in four areas:

- of any potential residual project effects that may occur incrementally over time;
- consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
- potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed project;
- and, future developments that are reasonably foreseeable and sufficiently certain to proceed.

The project has identified the VCs as air quality, noise, water quality, socioeconomic and socio-community components, and human health. The spatial boundary of the project is the area near Chak 59-WB where tube wells will be constructed / installed, transmission main route from tube wells to existing distribution network of Vehari, OHRs / GSTs to be rehabilitated. Key VCs identified included air quality, water quality and noise that can impact public health, access to livelihood opportunities. The overall perception of stakeholders in the long-term perspective was highly positive and they considered it as an important development for the local economy.

While the project will meet the Punjab Environmental Quality Standards

(PEQS) for air quality, mitigation of noise will be required to meet at least the baseline levels within the corridor of impact.

7.9 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. Good housekeeping practices will be the order of the day.

SECTION - 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PROGRAM

8.1 Objective

The purpose of Environmental and Social Management and Monitoring Plan (ESMMP) for improvement and extension of sewerage system in Vehari city is to ensure that all necessary identified measures have been adopted in order to protect the environment and social situations and to comply with country's environmental legislation and applicable World Bank Core Principles. After the preparation of ESMF, PMDFC's ESM Wing outlined site-specific ESMMP for the Contractors and executing agency. Environmental and Social Screening Checklists were prepared by PMDFC's ESM Wing with the help of the field teams and was used to assess the potential impacts of project on the basis of its scale / size, nature and significant negative impacts.

8.2 Institutional Arrangements

8.2.1 MC Vehari

Overall responsibility for Environmental Management and Monitoring will rest with MC Vehari. ESM Wing of PMDFC will provide support to ESFPs for managing environmental and social aspects of the project and implementation of the present ESIA. The specific responsibilities of the institutions involved in the ESIA implementation are described below:

A) The Contractor

The Contractor will be responsible for on-field implementation of the ESIA and environmental protection liabilities under the Punjab Environmental Protection Act (Amendment 2012) and World Bank's Environmental and Social Safeguard Policies. He will also be responsible for compliance of ESIA provisions keeping in view his contract with MC Vehari. The Contractor will train his crews in all aspects for implementation of the ESIA. The contractor will report the progress of ESIA to the Environmental Specialist of the consultant.

The ESIA will be an integral part of the contract document. The bid would include a detailed environmental mitigation budget as part of the engineering costs of the respective works. Contractor will engage environmentalist to fulfil the above requirements.

B) Supervision Consultant

The Environment Specialist of the consultant will be responsible for the on-field supervision and monitoring of the implementation of ESIA being done by the contractor. The contractor will report the progress of ESIA to the Environmental Specialist of consultant. And the Environment Specialist of the consultant will report the progress to PMDFC's ESM Wing.

C) PMDFC's ESM Wing

MC Vehari will be responsible for implementation of ESIA with the technical assistance of ESM Wing – PMDFC throughout the project period. ESM Wing would also support communities' participation, consultations and other social activities from the project identification to completion stage. PMDFC's ESM Wing will formulate a comprehensive report to be submitted to the World Bank regarding the progress of implementation of ESIA.

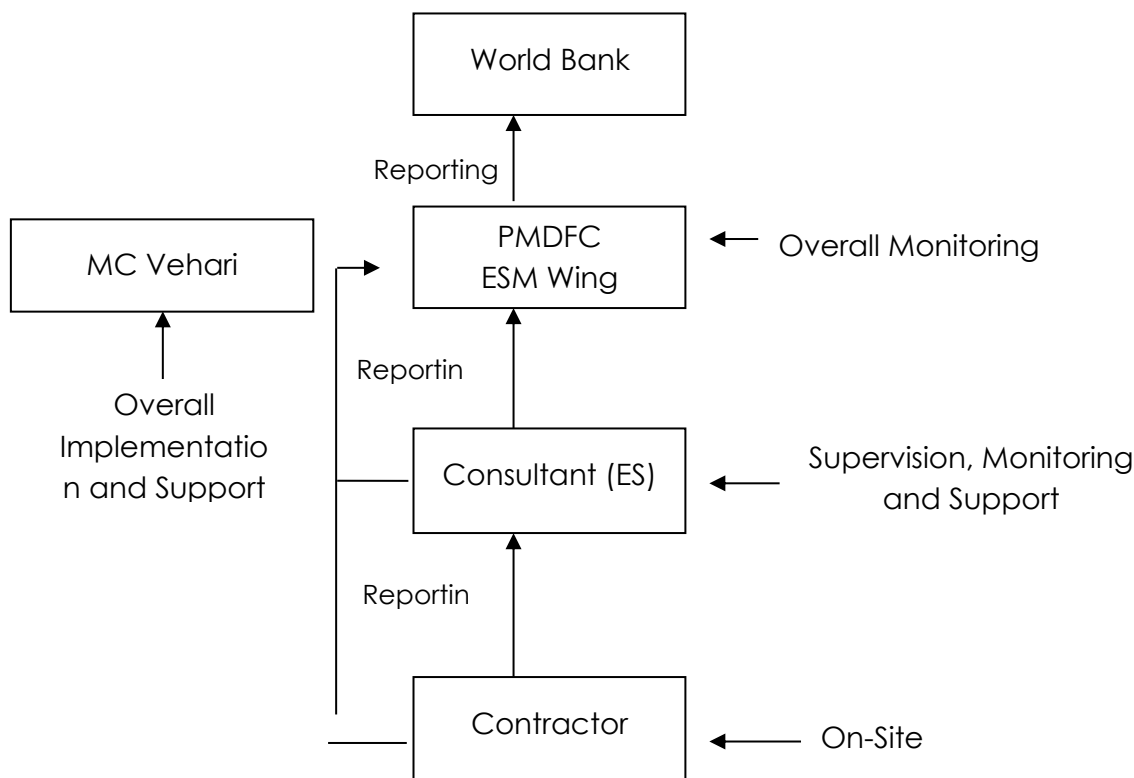


Figure 8-1, ESIA Implementation Framework

8.3 Mitigation Plan

The mitigation plan, being a key component of ESIA includes measures to mitigate potential negative impacts and enhance its positive impacts during construction phase of the project. The Contractor is responsible for implementation of ESIA with the co-operation of executing and implementing agencies and local communities of the project.

8.4 Monitoring Plan

Monitoring Plan is also associated with mitigation plan during the different stages of the project. It ensures that mitigation measures are being effectively implemented. The monitoring of the project is very imperative for implementation of the ESIA. The ESFPs will carry out the monitoring at the field level on a continuous basis. The DPO-ESM will perform periodic monitoring during their site visits.

8.4.1 Monitoring Mechanism

Safeguards implementation monitoring is an essential tool for testing whether the adopted environmental and social management measures are meeting their stated objectives. Two complementary methodology approaches are being applied to monitor the proposed actions under the ESIA:

- **Compliance Monitoring:** Which checks whether the actions proposed by the ESIA have been carried out by visual observation, photographic documentation and the use of checklists prepared for the ESIA;
- **Effects Monitoring:** Which records the consequences of program activities on the biophysical and social environment; as applicable, these effects are repeatedly measured by applying selected indicators.

The plan also defines the monitoring mechanism and identifies a set of verifiable monitoring parameters to ensure that all proposed mitigation measures laid down in the ESIA are completely and effectively implemented.

Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at two levels. At the PMDFC, the environmental team will do ESIA compliance monitoring to ensure that the mitigation plans are being effectively implemented.

8.5 Reports

The Contractor will submit weekly compliance monitoring checklist and PMDFC ESM Wing will submit quarterly and annual monitoring reports as well as a final report of the project based on safeguard implementation status. The monitoring reports will also include process and outcome of consultations with the project affected persons, if any. The distribution of periodic reports is given in **Table 8-1**.

Table 8-1, Reporting Mechanism

Distribution of Periodic Reports Report	Prepared by	Reviewed by	Approval
Weekly	Contractor	Supervision Consultant / Environment Specialist (consultant)	PMDFC – ESM / World Bank
Quarterly	Contractor / Environment Specialist (consultant)	Supervision Consultant / Environment Specialist (consultant) / ESM – PMDFC	PMDFC – ESM / World Bank
Annual	Contractor / Environment Specialist	Supervision Consultant / Environment Specialist (consultant) / ESM –	PMDFC – ESM / World Bank

Distribution of Periodic Reports Report	Prepared by	Reviewed by	Approval
	(consultant)	PMDFC	
Final	Contractor / Environment Specialist (consultant)	Supervision Consultant / Environment Specialist (consultant) / ESM – PMDFC	PMDFC – ESM / World Bank

8.6 Inclusion of ESIA In Bidding / Contract Documents

The present ESIA will be included in the bidding / contract documents and their implementation will be a contractual binding for the Contractors. In addition, the Contractor's guidelines prepared by PMDFC / safeguards procedures will also be made part of contracts.

8.7 Monitoring of Environmental and Social Non-Compliance

Any environmental and social non-compliance during first half of the reporting month will be considered as a "minor deviation." In case of non-compliance attains the status of "non-mitigation" during the second half of the reporting month, it would be considered a "moderate non-compliance." In case of non-compliance continues in the second month, it will fall in the category of "undone" and as such would be considered as a major non-compliance and eventually leading to serious action including the suspension of Contractor's payment or any other penalty as may be considered appropriate with the recommendation of the DPO-ESM / Engineer. No payment will be made to Contractor against non-compliance and no arrears will be paid thereof.

8.8 Environmental and Social Management and Monitoring Plan

The environmental and social impacts based on the aspects defined by the components activities its mitigation measures, monitoring indicators, frequency and responsibility has been discussed in Environmental and Social Management and Monitoring Plan (ESMMP) in Table 8-2.

8.8.1 Rehabilitation and Improvement of Water Supply System in MC Vehari – Tube Wells

Table 8-2, Environmental and Social Management and Monitoring Plan – Tube Wells

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
A. Impacts due to Project Location								
Site Selection	The project is for water supply system that will be constructed / developed on govt. owned land. Proposed land for the construction of tub wells is said to be govt. land as per MC and PMDFC. Transmission main will be laid along / in ROW of roads, existing distribution network and OHRs / GSTs will be rehabilitated. Therefore, this project does not generate resettlement issues.				All the relevant stakeholders must be consulted before execution of the project.	MC / PMDFC	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	-
B. Impacts due to Project Design								
Project Design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).				The design is made by taking in consideration that minimum impact will occur on the environment.	Design consultant	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	-
C. Construction Phase / Repair / Rehabilitation								
Physical Impacts								
Labour Camp Management	<ul style="list-style-type: none"> • Campsites for construction workers are the important locations that have 				<ul style="list-style-type: none"> • Labor camps should be away from the residential areas. 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<p>significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.</p> <ul style="list-style-type: none"> There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. Health & Safety issues 				<ul style="list-style-type: none"> Provide adequate health care facilities within construction sites. Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. Ensuring that children and minors are not employed directly or indirectly on the project. Children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). Communication on hiring criteria, minimum age, and applicable laws. Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones 		<ul style="list-style-type: none"> ESM-PMDFC 	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<p>and replacing them with the damaged ones.</p> <ul style="list-style-type: none"> • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. • EHS SOPs of Labor developed by PMDFC must be followed. 			
Soil contamination	<ul style="list-style-type: none"> • Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project Site and in its nearby surroundings. • Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites. • Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. 				<ul style="list-style-type: none"> • Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. • The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. • Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed by the 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	<ul style="list-style-type: none"> • Equipment washing method and frequency to be regulated / controlled. • Vegetation to control erosion.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.				Contractor and implemented to avoid the litter and any other waste problems.			
Contamination of Surface and Groundwater Resources	<ul style="list-style-type: none"> Sewage and sanitary wastewater generated from the construction site may contaminate groundwater and surface water, if not disposed of properly. 				<ul style="list-style-type: none"> Sewage from construction camp will be disposed of using septic tank. Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard. Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	<ul style="list-style-type: none"> Checking of septic tanks constructed for sewage. Monitoring of surface water quality through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Ambient Air Quality	The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.	High	Medium	Low	<ul style="list-style-type: none"> • Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM. • Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions. • Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. • The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done. • As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area. 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	Ambient air quality monitoring through EPA certified Lab
Noise and vibration	<ul style="list-style-type: none"> • During the implementation of the project a large amount of equipment and 	Low	Medium	High	<ul style="list-style-type: none"> • During the construction phase of the project, it is expected that elevated levels of noise will be 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant 	Noise level monitoring by

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<p>construction machinery will be utilized for construction.</p> <ul style="list-style-type: none"> The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and Neighborhood residential may be disturbed by the noise activities. During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be 				<p>produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary.</p> <ul style="list-style-type: none"> For the construction machinery generating noise level in excess of that prescribed in PEQS and WHO limits, Contractor will make arrangements to bring the noise level within applicable limits (including proper tuning of vehicles and mufflers / silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn. As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier. Regular monitoring to determine compliance will be done by the Supervision Consultant and 		<ul style="list-style-type: none"> ESM-PMDFC 	<p>an EPA certified lab</p>

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	sources of noise and vibration.				corrective / mitigation measures applied where necessary.			
Disposal of Construction Debris & Garbage	<ul style="list-style-type: none"> During construction phase of the project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas. Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites. 				<ul style="list-style-type: none"> A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. Arrangements should be made for regular garbage collection and removal of sewage from the construction site. A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	<ul style="list-style-type: none"> Placement of solid waste storage containers at camp sites. Collection and disposal into MC's containers.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Traffic annoyance	There construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.				<ul style="list-style-type: none"> • During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the sub-project area. • The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary). • The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. • The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary. 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Impact on Utilities	Construction activities can result in major or minor impacts on existing utilities.				<ul style="list-style-type: none"> Although there are no impacts expected to be anticipated on utilities. However, as a general rule, before excavation, the location and routes of all utilities must be identified and in case of the need for relocating utilities that may be along the proposed location, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	
Emergency Response Plan	Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.				<ul style="list-style-type: none"> Measures for fire prevention and firefighting. Indicators on site (for example, heavy rainfall) that will prompt the shutdown of specified areas of work. Procedure for shutdown of site, including transfer of plant, materials and personnel to safe areas (for example in the event of a flood). Emergency evacuation procedure for staff and members 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Following EHS SOPS

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<p>of the public likely to be impacted by an emergency event on site (for example: fire or blast).</p> <ul style="list-style-type: none"> • Where practicable, avoiding or minimizing the use of hazardous materials. • Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. • The contractor will prepare emergency shutdown procedures and evacuations to cover all staffs and affected members of the public in the event of any emergency incident (such as traffic accident and fire). The contractor will ensure emergency access routes are well-known and have appropriate signage. • Identification of locations of hazardous materials and associated activities on an emergency plan. 			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<ul style="list-style-type: none"> Training should incorporate information from Material Safety Data Sheets for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language. 			
Ecological Impacts								
Biodiversity (Fauna and Flora)	<p>Impact on Flora: No trees are expected to be cut during execution of the project.</p> <p>Disturbance to Fauna: No negative impacts on fauna are envisaged.</p>				<ul style="list-style-type: none"> The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. In case of any mishap / accident, if a tree is disturbed or cut, 10 new trees of almost 06 ft. height will be planted by the contractor. New trees of almost 06 ft. height must be planted at / near project site to make the project more environment friendly. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Maintenance and monitoring of tree plantation
Social Impacts								
Project will have positive outcomes for the local communities as by the provision of good state of art infrastructure.								
Health and Safety Measures	Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and				Occupational health and safety impacts during construction is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Following EHS labor SOPs

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	Safety (H&S) issues, the workforce may suffer injury or death. Impact Significance.				trenches. Experienced and trained personnel will be engaged in operating equipment. Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.			
Job opportunities	<ul style="list-style-type: none"> It will lead to an increase in economic activity and contribute to local area economic development. 				Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need will be met from the project areas. The project will also require skilled workers and these may be available from the community. It is anticipated that approximately 75% of the workforce will be from project area while 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive impact on social norms, culture and economy of the area.	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-
Impacts on Local Population	<ul style="list-style-type: none"> No specific serious adverse impacts on community health and safety are expected as a result of 				<ul style="list-style-type: none"> The potential hazard risk from open trenches in the vicinity of populated areas should be 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<p>construction and operation of the project.</p> <ul style="list-style-type: none"> The population residing in and the surroundings of the project area will be affected during the construction phase as follows: There is potential hazard risk from open trenches in the vicinity of populated areas during the construction Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase Community may face the noise and dust problems during the construction activities. Theft problems to the community by the Contractor's workers and vice versa. 				<p>mitigated by appropriate warnings and fencing.</p> <ul style="list-style-type: none"> Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours. Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with tarpaulin to help contain the construction materials being transported to the specific site. The Contractor should warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring labor/workers, Contractor 			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<p>has to ensure that the workers should be of good repute / character.</p> <ul style="list-style-type: none"> Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized. The contractor will prepare an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts. 			
Impacts on Public Health and Safety Hazard	<ul style="list-style-type: none"> Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for the safety of the workers as well as for local residents. The storage of all solid waste shall be practiced so as to prevent the attraction, harborage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which 				<ul style="list-style-type: none"> Contractor will have rented out houses for Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor. The active construction zone must be cordoned off to avoid injuries due to accidents. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	create safety hazards, odors, unsightliness or public nuisance.							
Gender issue	<ul style="list-style-type: none"> Project activities may cause hindrance to mobility especially for women during construction stage. Privacy of the community may be disturbed. 				<ul style="list-style-type: none"> Workers would be trained to address privacy issues and ethically behaved. Labor would be strictly asked to cater the privacy issues. staff capacity-building 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-
Traffic Management	<ul style="list-style-type: none"> Blocking of road may hamper public mobility due to increase in number of vehicles Road Safety 				<ul style="list-style-type: none"> Provision of alternative routes Water sprinkling at project site at consecutive intervals Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<ul style="list-style-type: none"> In case of any complaint, focal person of GRC may contact (details will be highlighted at project site). 			
Economic Issues	<p>Economic issues may arise due to loss of;</p> <ul style="list-style-type: none"> land, structures / assets productive plants livelihood <p>And, disturbance to</p> <ul style="list-style-type: none"> shopkeepers vendors (mobile / permanent) 				<ul style="list-style-type: none"> No land acquisition is involved 10 new trees of almost 06 ft. height must be planted against each tree cut. No shops were found to be affected as located out of ROW. No permanent vendors were observed during social and environmental assessment survey In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-
D. Operation / Maintenance Phase								
Consumption of Contaminated Water	Consumption of (untreated) contaminated domestic water could lead to health impacts on the consumers of the water from the pipeline. The maintenance of the pipelines requires excavations and unblocking the pipe which could lead to				<ul style="list-style-type: none"> The water supply will be closed down during construction phase ensure that no polluted water gets into water supply. 	Contractor	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD ES (Consultant) 	<ul style="list-style-type: none"> Monitoring of water quality through EPA certified lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	contamination of the water during the process.							
Solid Waste Generation	<p>Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others:</p> <ul style="list-style-type: none"> Excavated soil Cement storage bags and other packets from materials used during repair and maintenance. Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes. 				<ul style="list-style-type: none"> The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	<ul style="list-style-type: none"> Placement of solid waste storage containers at camp sites. Collection and disposal into MC's containers
Visual Impacts	Visual related impacts mainly include re-opening the trenches where the pipelines are laid to				<ul style="list-style-type: none"> This impact is not considered to be significant and will be experienced for a short period of 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	facilitate repair and maintenance which could be an eye-sore and a health hazard.				<p>time because of the immediate backfilling of the trenches by the excavated soil / spoil</p> <ul style="list-style-type: none"> The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible. 			
Impacts to Occupational Health and Safety	Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others				<ul style="list-style-type: none"> Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment. 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	Following EHS labor SOPs
Impacts on Community Health and Safety	No specific serious adverse impacts on community health and safety are expected as a result of operation activities of sewerage system. There is potential hazard risk from open trenches during the repair				<ul style="list-style-type: none"> Health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	phases that could lead to community health and safety risks				insignificant, short term and localized during the operation phase with respect to repairs and maintenance.			
Impacts on Traffic	Repair and maintenance activities will take place within the boundary of tube wells site / area, traffic will be disturbed only if heavy machinery / vehicles will be utilized.				<ul style="list-style-type: none"> The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during repair and maintenance activities including need for diversions (if necessary). The method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary. 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	Traffic management plan
Impact on Air Quality	The impact on air quality during repairs and maintenance (operation phase) is expected to occur at the site of WWTP or at disposal stations. The impact				<ul style="list-style-type: none"> It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				<p>air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.</p> <ul style="list-style-type: none"> Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. 			
Noise and Vibration Emission Impacts	Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.				<ul style="list-style-type: none"> The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones. 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-(PMDFC)) 	

A) Environmental Monitoring Plan

Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented.

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
•	Noise and vibration	<ul style="list-style-type: none"> Use of machineries and equipment having less noise. Provision for personal protective equipment (PPE's), ear muffs / ear plugs to workers. Noise level testing will be carried through EPA certified Lab. 	Project Site	Quarterly	It will be conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
•	Dust	<ul style="list-style-type: none"> Provision for personal protective equipment (PPEs) – mask. Avoiding construction activities during nights. Sprinkling of water and removal of excess matter / construction debris from the site as soon as possible. 	Project Site	Quarterly	It will be conducted during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
•	Air Quality	<ul style="list-style-type: none"> Air quality will be analyzed in through EPA certified 	Project Site	Quarterly	It will be conducted	<ul style="list-style-type: none"> ESFPs DPO-ESM

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
		Lab.			before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	<ul style="list-style-type: none"> SPO ID/PD
<ul style="list-style-type: none"> Provision of first aid in case of any emergency 	<ul style="list-style-type: none"> First Aid will be provided immediately to save the life of affected peoples. Ambulance will be called up to shift the affected persons to the nearest medical facility. 	Project Site	Immediate as per need	First Aid Box will be provided at site.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD 	
<ul style="list-style-type: none"> Health, Safety and Environmental needs 	<ul style="list-style-type: none"> Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour. 	Project Site	Once during construction activities	During construction of project, Health Safety attributes will be provided and environmental compliance report should be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD 	
<ul style="list-style-type: none"> Public Consultation 	<ul style="list-style-type: none"> Local residents in the 	Project Site	<ul style="list-style-type: none"> Two times 	During and after	<ul style="list-style-type: none"> ESFPs 	

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
		project area will be informed about the project details, project schedule and GRM		(during and post construction) <ul style="list-style-type: none"> In case of any complaint, emergency visit will be organized. 	completion of project; social compliance report will be submitted.	<ul style="list-style-type: none"> DPO-ESM SPO ID/PD
•	Vehicle Movement / Mobility issues	<ul style="list-style-type: none"> Provision of alternative routes Indicators / signboards regarding alternate routes should be provided at proper distance In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site. 	Project Site	<ul style="list-style-type: none"> During construction, alternative routes will be provided. In case of any complaint, emergency visit will be organized. 	During and after completion of project; environmental and social monitoring report will be submitted	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
•	Obstruction in public access	<ul style="list-style-type: none"> Provision of alternate routes Construction should start from either side of the road 	Project Site	Once during construction activities	During and after completion of project; environmental and social monitoring report will be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
•	Economic Losses	<ul style="list-style-type: none"> • loss of land, • damage to structures • damage to trees / plants • negative impacts on livelihood in form of blockage of passage for shopkeepers as well as vendors (Mobile / permanent) 	Project Site	<p>Three times (pre, during and post construction)</p> <p>In case of any complaint, emergency visit will be organized.</p>	During and after completion of project; environmental and social monitoring report will be submitted	<ul style="list-style-type: none"> • ESFPs • DPO-ESM • SPO ID/PD
•	Privacy Issues	<ul style="list-style-type: none"> • Contractors would be trained to address privacy issues / behave ethically. • Labor will be strictly asked to respect privacy of local residents. • Training on observing / respecting and local norms. 	Scheme Site	Once during construction	During and after completion of project; environmental and social monitoring report will be submitted	<ul style="list-style-type: none"> • ESFPs • DPO-ESM • SPO ID/PD

B) ESIA Implementation Budget – Tube Wells

Project: Rehabilitation and Improvement of Water Supply System in MC Vehari.

Item	Quantity	Tentative Cost per Item (PKR)	Total Cost (PKR)
Labor Safety			
Face Masks (3 PLY) - box	110	400	44,000
Safety Hard Helmets	15	3,000	45,000
Safety Shoes	15	3,000	45,000
Hand Gloves	30	1,000	30,000
Ear Plugs	15	500	7,500
Reflective Safety Vest	15	1,000	15,000
Safety Goggles	15	500	7,500
First Aid Box Complete	3	10,000	30,000
Infrared Thermometer (Benetech GM-2200 or equivalent)	1	40,000	40,000
Sub-Total			264,000
Working Site Safety			
Safety Signs	5	15,000	75,000
Safety Cones	10	1,000	10,000
Safety Tape	30	1,500	45,000
Portable Delineator with chain	25	2,200	55,000

Emergency Portable Lights	5	3,000	15,000
Solid Waste Collection Drums with Cover	5	12,000	60,000
Fire Fighting Equipment Purchase and refilling	3	10,000	30,000
Sub-Total			290,000
Others			
Hiring of Environmental Specialist (for 06 months)	1	100,000	600,000
Hiring of HSE Expert (for 06 months)	1	100,000	600,000
Training (HSE & Environment related trainings)	Lump sum		100,000
Pole Hanging Waste Bins	8	12,000	96,000
Digital Sound Level Meter	1	30,000	30,000
Labor Campsite Management	Lump sum		100,000
Water Sprinkling	Lump sum		100,000
Environmental Monitoring (Ambient Air, Noise Level, Drinking Water, Surface Water & Vehicular Emission Monitoring)	2	200,000	400,000
Sub-Total (PKR)			2,026,000
Grand Total (PKR)			2,580,000
15% Contingency (PKR)			387,000
Grand Total with 15% Contingency (PKR)			2,967,000

8.8.2 Rehabilitation and Improvement of Water Supply System in MC Vehari – Distribution Network

Table 8-3, Environmental and Social Management and Monitoring Plan – Distribution Network

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
E. Impacts due to Project Location								
Site Selection	The project is for water supply system that will be constructed / developed on govt. owned land. Transmission main will be laid along / in ROW of roads, existing distribution network and OHRs / GSTs will be rehabilitated. Therefore, this project does not generate resettlement issues.				All the relevant stakeholders must be consulted before execution of the project.	MC / PMDFC	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	-
F. Impacts due to Project Design								
Project Design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).				The design is made by taking in consideration that minimum impact will occur on the environment.	Design consultant	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	-
G. Construction Phase / Repair / Rehabilitation								
Physical Impacts								
Labour Camp Management	<ul style="list-style-type: none"> • Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and 				<ul style="list-style-type: none"> • Labor camps should be away from the residential areas. • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant • ESM-PMDFC 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<p>infrastructure of nearby communities.</p> <ul style="list-style-type: none"> • There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. • Health & Safety issues 				<ul style="list-style-type: none"> • Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Ensuring that children and minors are not employed directly or indirectly on the project. • Children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). • Communication on hiring criteria, minimum age, and applicable laws. • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training 			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<p>and protective clothing to workers involved in hazardous operations and proper performance of their job.</p> <ul style="list-style-type: none"> EHS SOPs of Labor developed by PMDFC must be followed. 			
Soil contamination	<ul style="list-style-type: none"> Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project Site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites. Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the 				<ul style="list-style-type: none"> Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. Ground shall be leveled to avoid slopes. Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	<ul style="list-style-type: none"> Equipment washing method and frequency to be regulated / controlled. Vegetation to control erosion.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	physical environment of the project area.							
Contamination of Surface and Groundwater Resources	<ul style="list-style-type: none"> Sewage and sanitary wastewater generated from the construction site may contaminate groundwater and surface water, if not disposed of properly. 				<ul style="list-style-type: none"> Sewage from construction camp will be disposed of using septic tank. Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard. Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	<ul style="list-style-type: none"> Checking of septic tanks constructed for sewage. Monitoring of surface water quality through EPA certified Lab
Ambient Air Quality	The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the				<ul style="list-style-type: none"> Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM. Equipment and vehicles powered with diesel should be well 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Ambient air quality monitoring through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				<p>maintained to minimize particulate emissions.</p> <ul style="list-style-type: none"> Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done. As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area. 			
Noise and vibration	<ul style="list-style-type: none"> During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and 				<ul style="list-style-type: none"> During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Noise level monitoring by an EPA certified lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<p>other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and Neighborhood residential may be disturbed by the noisy activities.</p> <ul style="list-style-type: none"> • During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. • The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration. 				<ul style="list-style-type: none"> • For the construction machinery generating noise level in excess of that prescribed in PEQS and WHO limits, Contractor will make arrangements to bring the noise level within applicable limits (including proper tuning of vehicles and mufflers / silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn. • As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier. • Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective / mitigation measures applied where necessary. 			
Disposal of Construction	<ul style="list-style-type: none"> • During construction phase of the project, large quantity of construction waste will 				<ul style="list-style-type: none"> • A site waste management plan should be made the responsibility of the construction contractor to 	Contractor	<ul style="list-style-type: none"> • ESFPs • Supervisory Consultant 	<ul style="list-style-type: none"> • Placement of solid waste storage

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Debris & Garbage	<p>produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas.</p> <ul style="list-style-type: none"> Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites. 				<p>provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site.</p> <ul style="list-style-type: none"> The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. Arrangements should be made for regular garbage collection and removal of sewage from the construction site. A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals. 		<ul style="list-style-type: none"> ESM-PMDFC 	<p>containers at camp sites.</p> <ul style="list-style-type: none"> Collection and disposal into MC's containers.
Traffic annoyance	<p>These construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential</p>				<ul style="list-style-type: none"> During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.				<p>flow very low in the sub-project area.</p> <ul style="list-style-type: none"> The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary). The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary. 			
Impact on Utilities	Construction activities can result in major or minor impacts on existing utilities.				<ul style="list-style-type: none"> Although there are no impacts expected to be anticipated on utilities. However, as a general rule, before excavation, the location and routes of all utilities must be identified and in case of the need for relocating utilities that may be 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					along the proposed location, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.			
Emergency Response Plan	Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.				<ul style="list-style-type: none"> Measures for fire prevention and firefighting. Indicators on site (for example, heavy rainfall) that will prompt the shutdown of specified areas of work. Procedure for shutdown of site, including transfer of plant, materials and personnel to safe areas (for example in the event of a flood). Emergency evacuation procedure for staff and members of the public likely to be impacted by an emergency event on site (for example: fire or blast). Where practicable, avoiding or minimizing the use of hazardous materials. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Following EHS SOPS

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<ul style="list-style-type: none"> Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. The contractor will prepare emergency shutdown procedures and evacuations to cover all staffs and affected members of the public in the event of any emergency incident (such as traffic accident and fire). The contractor will ensure emergency access routes are well-known and have appropriate signage. Identification of locations of hazardous materials and associated activities on an emergency plan. Training should incorporate information from Material Safety Data Sheets for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language. 			
Ecological Impacts								

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Biodiversity (Fauna and Flora)	<p>Impact on Flora: No trees are expected to be cut during execution of the project.</p> <p>Disturbance to Fauna: No negative impacts on fauna are envisaged.</p>				<ul style="list-style-type: none"> The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. In case of any mishap / accident, if a tree is disturbed or cut, 10 new trees of almost 06 ft. height will be planted by the contractor. New trees of almost 06 ft. height must be planted at / near project site to make the project more environment friendly. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Maintenance and monitoring of tree plantation
Social Impacts								
Project will have positive outcomes for the local communities as by the provision of good state of art infrastructure.								
Health and Safety Measures	Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer injury or death. Impact Significance.				Occupational health and safety impacts during construction is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment. Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots,	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Following EHS labor SOPs

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.			
Job opportunities	<ul style="list-style-type: none"> It will lead to an increase in economic activity and contribute to local area economic development. 				Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need will be met from the project areas. The project will also require skilled workers and these may be available from the community. It is anticipated that approximately 75% of the workforce will be from project area while 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive impact on social norms, culture and economy of the area.	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-
Impacts on Local Population	<ul style="list-style-type: none"> No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project. The population residing in and the surroundings of the project area will be affected during the construction phase as follows: 				<ul style="list-style-type: none"> The potential hazard risk from open trenches in the vicinity of populated areas should be mitigated by appropriate warnings and fencing. Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<ul style="list-style-type: none"> There is potential hazard risk from open trenches in the vicinity of populated areas during the construction Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase Community may face the noise and dust problems during the construction activities. Theft problems to the community by the Contractor's workers and vice versa. 				<ul style="list-style-type: none"> Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with tarpaulin to help contain the construction materials being transported to the specific site. The Contractor should warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring labor/workers, Contractor has to ensure that the workers should be of good repute / character. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized. 			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					<ul style="list-style-type: none"> The contractor will prepare an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts. 			
Impacts on Public Health and Safety Hazard	<ul style="list-style-type: none"> Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for the safety of the workers as well as for local residents. The storage of all solid waste shall be practiced so as to prevent the attraction, harborage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odors, unsightliness or public nuisance. 				<ul style="list-style-type: none"> Contractor will have rented out houses for Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor. The active construction zone must be cordoned off to avoid injuries due to accidents. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-
Gender issue	<ul style="list-style-type: none"> Project activities may cause hindrance to mobility especially for women during construction stage. 				<ul style="list-style-type: none"> Workers would be trained to address privacy issues and ethically behaved. Labor would be strictly asked to cater the privacy issues. 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<ul style="list-style-type: none"> Privacy of the community may be disturbed. 				<ul style="list-style-type: none"> staff capacity-building 			
Traffic Management	<ul style="list-style-type: none"> Blocking of road may hamper public mobility due to increase in number of vehicles Road Safety 				<ul style="list-style-type: none"> Provision of alternative routes Water sprinkling at project site at consecutive intervals Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; In case of any complaint, focal person of GRC may contact (details will be highlighted at project site). 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant ESM-PMDFC 	Traffic management plan
Economic Issues	Economic issues may arise due to loss of; <ul style="list-style-type: none"> land, 				<ul style="list-style-type: none"> No land acquisition is involved 	Contractor	<ul style="list-style-type: none"> ESFPs Supervisory Consultant 	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<ul style="list-style-type: none"> structures / assets productive plants livelihood And, disturbance to <ul style="list-style-type: none"> shopkeepers vendors (mobile / permanent) 				<ul style="list-style-type: none"> 10 new trees of almost 06 ft. height must be planted against each tree cut. No shops were found to be affected as located out of ROW. No permanent vendors were observed during social and environmental assessment survey In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site. 		<ul style="list-style-type: none"> ESM-PMDFC 	
H. Operation / Maintenance Phase								
Consumption of Contaminated Water	Consumption of (untreated) contaminated domestic water could lead to health impacts on the consumers of the water from the pipeline. The maintenance of the pipelines requires excavations and unblocking the pipe which could lead to contamination of the water during the process.				<ul style="list-style-type: none"> The water supply will be closed down during construction phase ensure that no polluted water gets into water supply. 	Contractor	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD ES (Consultant) 	<ul style="list-style-type: none"> Monitoring of water quality through EPA certified lab
Solid Waste Generation	Solid wastes will mainly emanate from the operation activities related to				<ul style="list-style-type: none"> The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	<ul style="list-style-type: none"> Placement of solid waste storage

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	<p>maintenance operations and will include among others:</p> <ul style="list-style-type: none"> Excavated soil Cement storage bags and other packets from materials used during repair and maintenance. Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes. 				<p>reduce wastes associated with oil spills, repair and maintenance.</p> <ul style="list-style-type: none"> The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project 			<p>containers at camp sites.</p> <ul style="list-style-type: none"> Collection and disposal into MC's containers
Visual Impacts	<p>Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and maintenance which could be an eye-sore and a health hazard.</p>				<ul style="list-style-type: none"> This impact is not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil / spoil The impact significance is expected to be low in nature, short term and reversible if the trenches 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					are backfilled immediately and excess spoil material is disposed of as soon as possible.			
Impacts to Occupational Health and Safety	Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others.				<ul style="list-style-type: none"> Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment. 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	Following EHS labor SOPS
Impacts on Community Health and Safety	No specific serious adverse impacts on community health and safety are expected as a result of operation activities of sewerage system. There is potential hazard risk from open trenches during the repair phases that could lead to community health and safety risks				<ul style="list-style-type: none"> Health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance. 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	-
Impacts on Traffic	Repair and maintenance activities will take place within the boundary of transmission				<ul style="list-style-type: none"> The contractor will prepare a detailed traffic management plan 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	main, distribution network, OHRs; traffic will be disturbed only if heavy machinery / vehicles will be utilized.				<p>(TMP) which will elaborate how traffic will be managed during repair and maintenance activities including need for diversions (if necessary).</p> <ul style="list-style-type: none"> The method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary. 			
Impact on Air Quality	The impact on air quality during repairs and maintenance (operation phase) is expected to occur at the site of WWTP or at disposal stations. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The				<ul style="list-style-type: none"> It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are 	Contractor	<ul style="list-style-type: none"> ESFPs ESM-PMDFC) 	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				<p>implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.</p> <ul style="list-style-type: none"> Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. 			
Noise and Vibration Emission Impacts	Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.				<ul style="list-style-type: none"> The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones. 	Contractor	<ul style="list-style-type: none"> ESFPs ESM- (PMDFC)) 	

A) Environmental Monitoring Plan

Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented.

Table 8-4, Environmental Monitoring Plan

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
1.	Noise and vibration	<ul style="list-style-type: none"> Use of machineries and equipment having less noise. Provision for personal protective equipment (PPE's), ear muffs / ear plugs to workers. Noise level testing will be carried through EPA certified Lab. 	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
2.	Dust	<ul style="list-style-type: none"> Provision for personal protective equipment (PPE's) Mask. Avoiding construction activities during nights. Sprinkling of water and removal of excess matter / construction debris from the site as soon as possible. 	Scheme Site	Quarterly	It will be conducted during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
3.	Air Quality	<ul style="list-style-type: none"> Air quality will be analyzed 	Scheme Site	Quarterly	It will be	<ul style="list-style-type: none"> ESFPs

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
		in through EPA certified Lab.			conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	<ul style="list-style-type: none"> DPO-ESM SPO ID/PD
4.	Provision of first aid in case of any emergency	<ul style="list-style-type: none"> First Aid will be provided immediately to save the life of affected peoples. Ambulance will be called up to shift the affected persons to the nearest medical facility. 	Scheme Site	Immediate as per need	First Aid Box will be provided at site.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
5.	Health, Safety and Environmental needs	<ul style="list-style-type: none"> Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour. 	Scheme Site	Once during construction activities	During construction of project, Health Safety attributes will be provided and environmental compliance report should be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
6.	Public Consultation	<ul style="list-style-type: none"> Local residents in the sub-project area will be informed about the sub-project details, sub-project schedule and GRM 	Scheme Site	<ul style="list-style-type: none"> Two times (during and post construction) In case of any complaint, emergency visit will be organized. 	During and after completion of project; social compliance report will be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
7.	Vehicle Movement / Mobility issues	<ul style="list-style-type: none"> Provision of alternative routes Indicators/signboards regarding alternate routes should be provided at proper distance In case of any complaint, focal person of GRC may contact and his contact details will be provided at sub-project site. 	Scheme Site	<ul style="list-style-type: none"> During construction, alternative routes will be provided. In case of any complaint, emergency visit will be organized. 	During and after completion of project; environmental and social monitoring report will be submitted	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD
8.	Obstruction in public access	<ul style="list-style-type: none"> Provision of alternate routes Construction should start from either side of the road 	Scheme Site	Once during construction activities	During and after completion of project; environmental and social monitoring report will be submitted.	<ul style="list-style-type: none"> ESFPs DPO-ESM SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
9.	Economic Losses	<ul style="list-style-type: none"> • loss of land, • damage to structures • damage to trees/plants • negative impacts on livelihood in form of blockage of passage for shopkeepers as well as vendors (Mobile / permanent) 	Scheme Site	<p>Three times (pre, during and post construction)</p> <p>In case of any complaint, emergency visit will be organized.</p>	During and after completion of project; environmental and social monitoring report will be submitted	<ul style="list-style-type: none"> • ESFPs • DPO-ESM • SPO ID/PD
10	Privacy Issues	<ul style="list-style-type: none"> • Contractors would be trained to address privacy issues / behave ethically. • Labor will be strictly asked to respect privacy of local residents. • Training on observing / respecting and local norms. 	Scheme Site	Once during construction	During and after completion of project; environmental and social monitoring report will be submitted	<ul style="list-style-type: none"> • ESFPs • DPO-ESM • SPO ID/PD

B) ESIA Implementation Budget – Distribution Network

Table 8-5, Project Rehabilitation and Improvement of Water Supply System in MC Vehari.

Item	Quantity	Tentative Cost per Item (PKR)	Total Cost (PKR)
Labor Safety			
Face Masks (3 PLY) - box	110	400	44,000
Safety Hard Helmets	15	3,000	45,000
Safety Shoes	15	3,000	45,000
Hand Gloves	30	1,000	30,000
Ear Plugs	15	500	7,500
Reflective Safety Vest	15	1,000	15,000
Safety Goggles	15	500	7,500
First Aid Box Complete	3	10,000	30,000
Infrared Thermometer (Benetech GM-2200 or equivalent)	1	40,000	40,000
Sub-Total			264,000
Working Site Safety			
Safety Signs	5	15,000	75,000
Safety Cones	10	1,000	10,000
Safety Tape	30	1,500	45,000
Portable Delineator with chain	25	2,200	55,000
Emergency Portable Lights	5	3,000	15,000
Solid Waste Collection Drums with Cover	5	12,000	60,000
Fire Fighting Equipment Purchase and refilling	3	10,000	30,000
Sub-Total			290,000
Others			
Hiring of Environmental Specialist (for 06 months)	1	100,000	600,000
Hiring of HSE Expert (for 06 months)	1	100,000	600,000
Training (HSE & Environment related trainings)	Lump sum		100,000
Pole Hanging Waste Bins	8	12,000	96,000
Digital Sound Level Meter	1	30,000	30,000
Labor Campsite Management	Lump sum		100,000
Water Sprinkling	Lump sum		100,000
Environmental Monitoring (Ambient Air, Noise Level, Drinking Water, Surface Water & Vehicular Emission Monitoring)	2	200,000	400,000
Sub-Total (PKR)			2,026,000
Grand Total (PKR)			2,580,000

15% Contingency (PKR)	387,000
Grand Total with 15% Contingency (PKR)	2,967,000

8.9 Proposed ESIA Reporting and Reviewing Procedure of EPA

All the precautionary measures are suggested in ESIA to minimize the pollution created / anticipated impacts by construction and operation of project.

Reporting and reviewing procedure are following:

- ESIA report & file submission
- SIR letter
- Review of ESIA report
- Issuance of query letters by EPA
- Submission of satisfactory replies of query letter
- Public hearing
- Expert committee meeting and presentation
- DG EPA meeting and presentation
- NOC issuance
- Proper follow-up of case from submission to Issuance of NOC

8.10 Contractor's Training

In order to comply with the anticipated environment and social attributes as described in ESIA of the PCP funded scheme of MC Vehari, meetings will be held with the contractors of MC Vehari, to ensure the socially acceptable and environmentally sustainable situation during execution of the project.

The Contractor will also be briefed about procedures and methods for complying with environmental and social management conditions, and any specific conditions specified in an ESIA; a description of specific mitigation measures that will be implemented in order to minimize adverse impacts; a description of all planned monitoring activities.

Trainings for contractors will be organized when the bidding process will be completed. Contractors shall be bound for environmental and social compliance.

Contractors have to comply with the following responsibilities:

- Observation of timings and make a schedule that the surrounding communities should not be affected from noise pollution, air emissions and disturbances in their routine work.
- Usage of machinery / equipment producing negligible / low noise.
- Ensure health, safety and protective measures including safety equipment, safe drinking water, first aid boxes etc. to the workforce as per nature of their jobs.
- Water sprinkling to avoid air pollution.

- Indicate alternate routes and provide indicators on suitable places during work timings.
- Local labor should be preferred to work.
- Child labor is strictly prohibited as per labor law. All labor should be more than 14 years of age individually.
- Proper disposal of wastes and garbage.
- Health, safety and protective measures for the labor.
- Notice board of emergency numbers should be placed on proper place.

Contractors shall also provide safety equipment i.e., PPEs, safe drinking water, first aid boxes etc. to the workforce as per nature of their jobs. By ensuring all these mitigation measures; not only their company profile shall boost up but also enable them to qualify and win the future projects.

Components	Audience	Level	Modality	Frequency	Responsibility
ESMF Site Specific requirements and E&S Management and Mitigation Plan	MO-I MO-P and MC field staff ⁶	Training	Briefing Presentations Mock Activities	Before execution of project and time to time instructions	PMDFC ESM team
ESIA Implementation and Monitoring Plan	MO-I MO-P MC field staff	Training	Briefing Presentations Mock Activities		
	Contractor	Awareness and sensitization	Briefing	At the time of Contract signing and before execution	DPO-ESM ESFPs
	Labor	Awareness and sensitization	Briefing	Before execution and time to time during execution	DPO-ESM ESFPs
EHS SOPs for Labor/Workers (including women workers)	Contractor	Awareness and sensitization	Briefing and Illustrations	Before execution and time to time during execution	DPO-ESM ESFPs

⁶ For ESFPs and MC field staff, PMDFC will organize time to time trainings and a training / capacity building program has been designed in this regard

Components	Audience	Level	Modality	Frequency	Responsibility
	Labor workers /	Awareness and sensitization on SOPs Training on Use of PPEs	Presentations Illustrations Mock activities Resource material	Before execution and time to time during execution	DPO-ESM ESFPs
GRM	Contractor	Awareness and sensitization	Briefing	Before execution and time to time during execution	DPO-ESM ESFPs
	Labor workers /	Awareness and sensitization	Briefing and resource material	Before execution and time to time during execution	DPO-ESM ESFPs
	Public communities /	Awareness	Briefing during public consultation Resource material	Before and during execution	DPO-ESM ESFPs

SECTION - 9: STAKEHOLDER AND PUBLIC CONSULTATION

9.1 Proponents Environmental Management Team

The Environmental and social management team will be taking charge of the proposed project consists of the following members;

- ESFPs – MC Vehari
- ESM wing of PMDFC
- The Contractor

9.2 Responsible Authority

Overall responsibility for Environmental Management and Monitoring will rest with MC Vehari. ESM Wing will provide support to ESFPs for managing environmental and social aspects of the project and implementation of the present ESIA.

The EPA shall be the responsible authority for reviewing, site inspection and provision of environmental approval for the project.

9.3 Project Stakeholders

Project stakeholders were engaged in the review and discussions on various project aspects social and environmental issues at the early stage of impact assessments for feedback. There are two categories of stakeholders in project.

Table 9-1, Project Stakeholders

Individual / Community stakeholders	All project affected persons, households and communities. Project beneficiaries for instance, residents of the project area, users of the road, vulnerable and gender.
Institutional Stakeholders	Environmental Protection Agency, Irrigation Department, Municipal Corporation, Highway Department, Railway Department The contractors, construction workers, financing institutions like the World Bank, mass media / civil society members, consultants and project advisors.

Public disclosure of information, which give high priority to public consultation and participation in designing and implementation of a socially and environmentally responsible project, is derived from various policy / legislative tools, as summarized in **Table 9-2**.

Table 9-2, Framework for Consultation

Legal / Policy Source	Regulations / Safeguard Policy Requirements
Government of Pakistan	Environmental Protection Agency (EPA) 1997 Guidelines for Public Consultation requires public consultation and involvement in project planning and implementation. The policy and procedures require proponents to consult with affected community and relevant NGO during preparation reports. The guidelines contain a number of references of need for Public Involvement Pakistan Environmental protection agency guidelines 2000.
World Bank	OP.4.01, Clause 15 described that for all Categories A and B projects proposed for IBRD or IDA financing, during the EA process, the borrower consults project affected groups and local non-governmental organizations (NGOs) about the project's environmental aspects and takes their views into account. The borrower initiates such consultations as early as possible. In addition, the borrower consults with such groups throughout project implementation as necessary to address EA-related issues that affect them. Environmental and Social Standard 10 (Stakeholder Engagement and Information Disclosure) recognizes the importance of open and transparent engagement.

9.3.1 Modes of Consultations

Consultation with the public and institutional stakeholders was done in September, October and November, 2023 using the following Consultative meetings held with the general stakeholders.

The concerns raised by the stakeholders were considered in developing the ESIA, in order to enhance project acceptability among the general public on social considerations.

There are two types of stakeholders related to the project i.e., primary and secondary stakeholders. Primary stakeholders are those which are directly affected by the project activities and secondary stakeholders are those which are affected indirectly.

A) Primary Stakeholders: Affected Wider Community

The project area is of both commercial and residential in nature. Project area inhabitants are direct beneficiaries of project interventions as it will resolve their long-standing issue of sewerage system. **Table 9-3** provides public consultation record, **Table 9-5** provides suggestions / concerns given by general public and **Figure 9-2** shows representative pictures of public consultation.

Table 9-3, Public Consultation

Sr. No.	Name	Contact No.	Profession / Designation
1	Muhammad Bilal	0307-1119033	Shopkeeper
2	Muhammad Salman	0317-7140994	Student
3	Mushtaq Ahmad	0307-6847246	Farmer
4	Muhammad Islam	0300-0769668	Hawker
5	Muhammad Aslam	0300-0769668	Rickshaw driver
6	Sultan Ali	0302-7716423	Hawker
7	Abdul Khalid	0301-6570338	Works at bus terminal
8	Maqbool Hussain	0305-9117698	Shopkeeper
9	Muhammad Jamil	0302-9949450	Hawker

B) Secondary Stakeholders: Department and Agencies

The project area lies in the jurisdiction of MC Vehari and MC has an ambit of providing safe and properly working water supply system / facilities to the citizens. Public has filed complaints about issues of current water supply system, that's why MC Vehari has suggested the project for improvement and extension of sewerage system in the city. Several other institutional stakeholders were also engaged in the consultation process. Error! Reference source not found. provides institutional / departmental consultations record, summary of institutional stakeholder consultation is given in Error! Reference source not found. and representative pictorial view of institutional consultation is shown in **Figure 9-2**.

Table 9-4, Institutional / Departmental Consultation

Sr. No.	Department	Person	Designation
1	EPA	Sarfraz Anjum	Deputy director
2	Municipal Corporation	Muhammad Sharif	Assistant Floriculture Superintendent
3	Municipal Corporation	Shoaib Iqbal	Assistant Engineer
4	Municipal Corporation		CO
5	Forest	Mumtaz Ahmad	Block Officer
6	Highway Department	Shahid Ghafoor	Sr. Sub Engineer

9.3.2 Environmental Practitioner and Expert

Team of Asian Consulting Engineers Private Limited visited the project site, had discussion with stakeholders and consulted with the local people of nearby to evaluate the project's socio-economic impacts. People of the

area belong to different professions like mostly belong to employment, own businesses, farming, doctors, some of them communicated but according to social value of the area they mostly hesitate to communicate comfortably. People provide the massive information about the project and have positive remarks regarding the project development. Team Asian have endeavoured to hold consultative sessions with a number of prominent stakeholders (Project proponent, Government departments, line agencies, and affected persons of the project area) to evince their views on the project and their opinions, suggestions, understanding on various issues and concerns. The consultations aimed specifically at:

- Dissemination of project information through discussions, education and liaison.
- Eliciting the comments and feedback on the project.
- Documentation of information narrated by the stakeholders.
- Documentation of mitigation measures proposed by the stakeholders.
- Incorporation of public concerns and their addresses in the ESIA.

9.3.3 Disclosure of Project Information

The project's ESIA will be uploaded on the project's websites, hard copies shall be sent to all institutional stakeholder's offices. The ESIA will be disclosed internally within the Bank. Before start of physical works on the project, the ESIA will be thoroughly briefed to the Contractor to implement ESIA provisions in its letter & spirit. Contractor will keep copy of ESIA on the site and will also brief his labor about its attributes. PCP's ESM team also designed HSE Booklet and flexes to guide Contractor about HSE aspects required to be addressed during the construction phase. Contractor will also install project information boards on the project site. Contractor's Environmentalist will implement ESIA in its true essence.

9.3.4 Future Consultation Plan

The stakeholder consultation is a continuous process, and should be carried out throughout the life of project. The consultations carried out during the present ESIA stage and reported are essential among the initial steps in this process. During the subsequent project phases as well, participation of the project stakeholders needs to be ensured. MC's supervision staff / ESFPs and ESM Wing of PMDFC will ensure time to time consultation with locals to get their feedback on project activities and their related complaints.

9.4 Summary of Issues Raised by Affected and Wider Community

A summary of the key issues raised by stakeholders and how these are being addressed by project proponent is provided in Table below.

Table 9-5, Summary of Concerns / Suggestions by Public

Location	Name / Designation / Department	Concern / Suggestion	Response
MC Vehari	Muhammad Bilal	Will this project generate employment options for locals?	Contractor will be bound to hire local labour.
	Muhammad Salman	Will the current water supply be interrupted during project construction phase?	Water supply will be interrupted for a short period of time, that will be pre-informed to the residents. It will be made sure that least inconvenience to the residents.
	Mushtaq Ahmad	Will my land be acquired during the construction of new tube wells or transmission lines?	Land acquisition is not anticipated for this project, the project will be developed on govt. land.
	Muhammad Islam	The sub-project is a good initiative and will improve the water supply of the area.	Efforts will be made to improve the water supply of the area.
	Muhammad Aslam	Concerns about the maintenance of the sanitation system raised.	Efforts will be made to improve the current sewerage issues through this project.
	Sultan Ali	OHRs should be rehabilitated as a part of the project.	GSTs / OHRs will be rehabilitated as a part of this project.
	Abdul Khalid	Privacy of people should be upheld during construction phase of the project.	Contractors will provide trainings to workers regarding gender and privacy issues
	Maqbool Hussain	Choked or Damaged sewer lines should be repaired.	Efforts will be made to improve the current sewerage issues through this project.
	Muhammad Jamil	Will there be any road closure during the construction phase of the project?	In case of road closures, the nearby community will be informed beforehand and alternative routes will be provided.

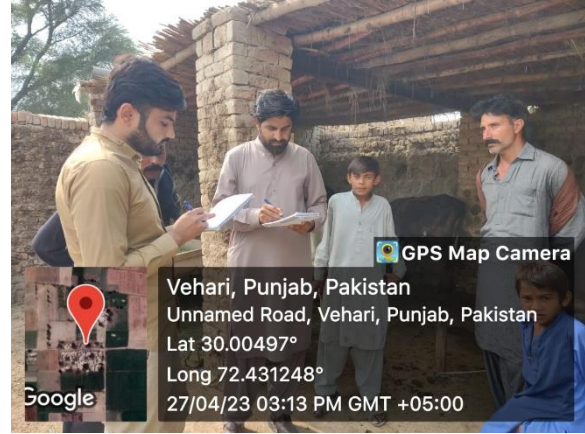


Figure 9-1, Public Consultation

Table 9-6, Summary of Concerns / Suggestion by Stakeholders and Response by Proponent

Person	Concern / Suggestion	Response
Sarfraz Anjum, DO – EPA	EPA should be kept in loop during the project process. NOC from EPA head office should be obtained before commencement of works.	Comments are noted.
Shahid Ghafoor, Sr. Sub. Engr. – Highway Department	As the pipelines will be laid along the road, NOC should be obtained from highway department if ROW of any road under jurisdiction of highway department is to be utilized.	Comments are noted.
Mumtaz Ahmad, Block Officer – Forest Department	At this project site, there is no tree plantation done by forest department, anyhow, cutting of tree plantation should be avoided.	No tree will be cut in this project, anyhow, if a tree has to be cut then the contractor will plant 10 new trees of almost 06 ft. height against each tree cut.
Muhammad Nazar, Sub-Engr. – MC Vehari	This project is a dire need of MC Vehari and should be initiated as soon as possible.	Comments are noted.



Assistant Floriculture – MC



EPA



Highway Department



Forest Dept.



Sub. Engr., MC



CO – MC

Figure 9-2, Representative Pictures of Consultation with Departments / Institutional Stakeholders

SECTION - 10: GRIEVANCE REDRESS MECHANISM

In order to receive and facilitate the resolution of affected people's concerns, compliments, and grievance about the project's environmental and social performance, an Environmental Grievance Redress Mechanism (GRM) has already been established. The GRM will address affected people's concerns and complaints proactively and promptly using an understandable and transparent process that is gender responsive, culturally appropriate and readily accessible to all segments of the affected people at no costs and without retribution.

The Grievance Redress Mechanism (GRM) will be consistent with the requirements of the World Bank Core Principle "1.2f Responsiveness and accountability through stakeholder consultation, timely dissemination of program information, and through responsive grievance redress measures". Under Core Principle 1: "Environmental and social management procedures and processes are designed to: (a) avoid, minimize or mitigate adverse impacts; (b) promote environmental and social sustainability in program design; and (c) promote informed decision making relating to a program's environmental and social effects" to ensure mitigation of communities' concerns, risk management, and maximization of environmental and social benefits. The overall objective of the GRM is therefore to provide a robust system of procedures and processes that provides for transparent and rapid resolution of concerns and complaints identified at the local level.

The GRM will be accessible to diverse members of the communities, including women, senior citizens, and people with disabilities, laborers / workers, and other vulnerable groups. Culturally appropriate communication mechanisms will be used at all Sub-project sites both to spread awareness regarding the GRM process as well as complaints management. *ESMF GRM will be integrated with the PCP's overall program GRM hotline to be developed by the Consultants under the scope of PCP.*

10.1 GRM at Project Site

Grievance Redress Mechanism (GRM) is to provide a robust system of procedures and processes that provides for transparent and rapid resolution of concerns and complaints identified at the local level. For integration of GRM into existing Complaint Tracking System (CTS), Grievance Redress Committee (GRC)-MC Vehari will be notified under umbrella of Punjab Cities Program (PCP) comprising of the following members and TORs.

- | | |
|--|-------------|
| • Chief Officer MC Vehari | Chairperson |
| • Municipal Officer (Infrastructure Development) | Convener |
| • Municipal Officer (Planning) | Member |
| • Municipal Officer (Regulation) | Member |

TORs of GRC – MC Vehari are as following:

- ESFPs designated by the MC Vehari for environmental and social management will be responsible to manage the GRM effectively. The ESFPs with the support of DPO-ESM will play an instrumental role in steering the GRC functions both at city and regional level.
- CO MC Vehari will be responsible to share monthly recorded grievances data with regional GRC.

10.2 GRM at Regional Level

Grievance Redress Committee at Regional level will also be notified under umbrella of Punjab Cities Program (PCP) comprising of the following members and TORs:

- | | |
|-----------|------------------------|
| • DPO ESM | Chairperson & Convener |
| • DPO ID | Member |
| • DPO IS | Member |

TORs of GRC-Regional are as followed:

- Committee will be responsible to manage the GRM effectively as per data provided by MC Vehari GRC.
- DPO-ESM will support ESFPs in steering the GRC functions both at city and regional level.
- DPO-ESM will maintain monthly complaint records from ESFPs.

A Grievance Redress Committee (GRC-PMDFC/LG&CDD) will be responsible to oversee the overall functions of the GRM at a strategic level including monthly reviews. It will be headed by the Secretary LG&CDD.

10.3 Types of Grievances

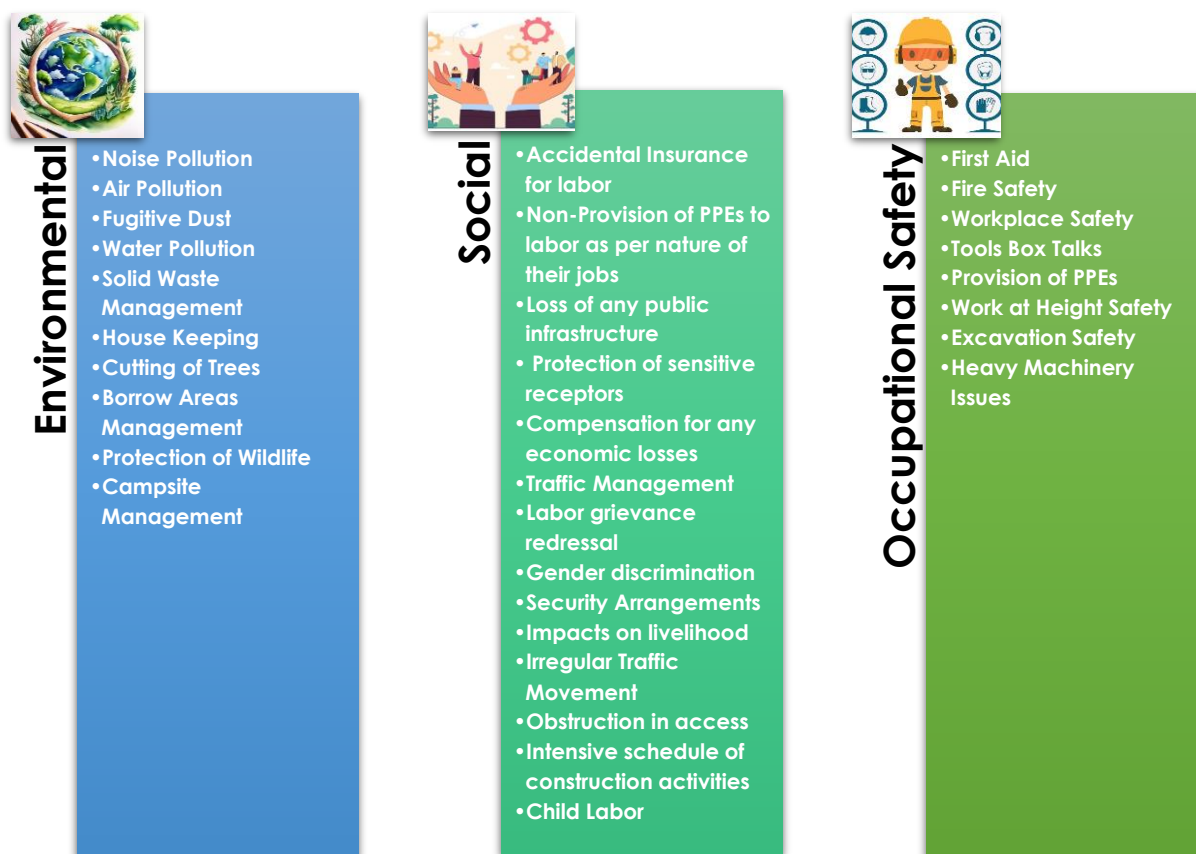


Figure 10-1, Types of Grievances

10.3.1 Procedures

The tracking and documenting of grievance resolutions will include the following elements:

- Tracking complainant(s) from projects sites (field and community level) to CPMT;
- Dedicated staff to update the database routinely;
- Promote transparency, publicize how complaints are being handled, and periodically evaluate the overall functioning of the mechanism;
- Processes for informing stakeholders about the status of a case; and
- Procedures to retrieve data for reporting purposes, including the periodic reports form ESFPs and DPO-ESM and document into the monthly progress reports.

Public Complaints Center (PCC) which will be responsible to receive, log, and resolve complaints in local offices. The Grievance Redress Committee at the

MC level will review and identify actions to be taken to address the complaints at its weekly meetings.

If not satisfactorily resolved by the MC and regional level, then the grievance will be referred for consideration by GRC at the PMDFC/LG&CDD level within a week.

Every effort will be made to address or resolve grievances within the following fixed timelines, which will be an indicator against the performance of the handling system. Acknowledgement of a written submission will be issued to the complainant within three working days.

If the complainant is not satisfied, the complaint will have the option to seek redress through the court of law. *(This mechanism developed for GRM is tentative and will be finalized after hiring of consultant for GRM).*

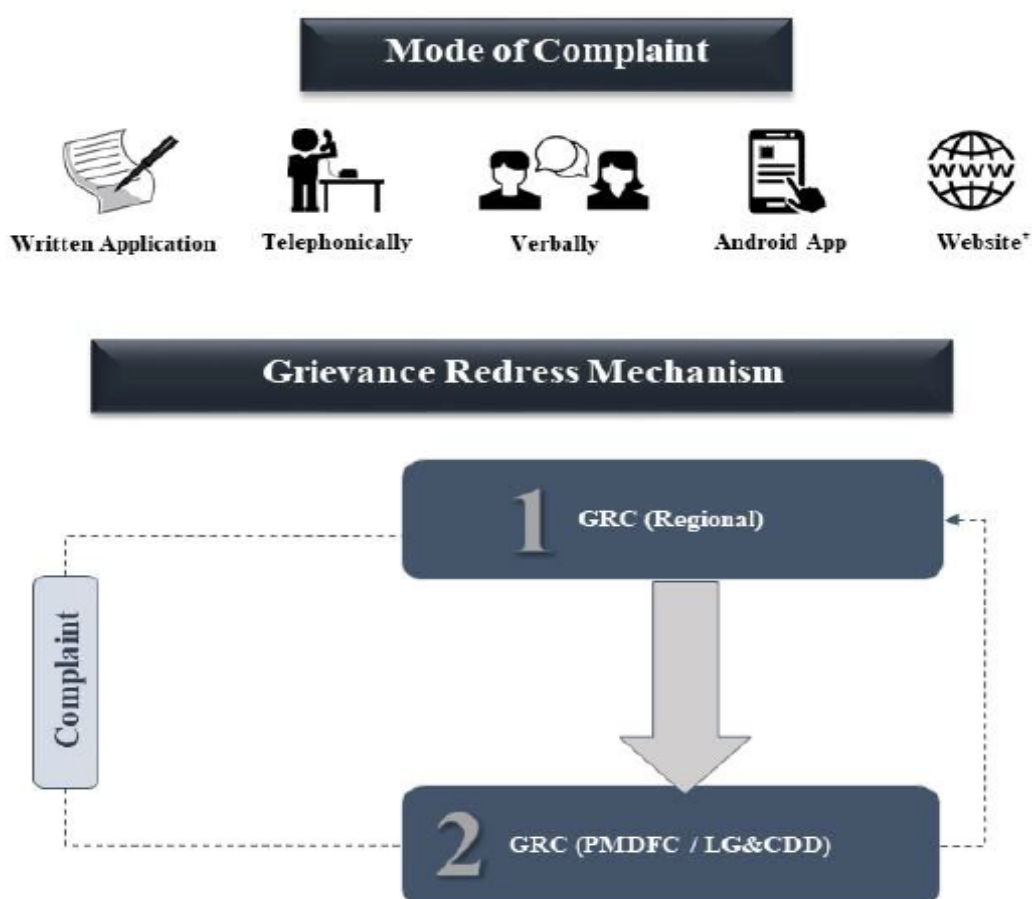


Figure 10-2, GRM

SECTION - 11: CONCLUSION AND RECOMMENDATIONS

Based on the study conducted for Environmental and Social Impact Assessment (ESIA) for the subject project, the following conclusions are made:

11.1 Conclusion

The ESIA study reveals that the project is economically viable and socially acceptable, and the proponent will implement the project in the environment friendly manner. The proponent will adopt all the necessary measures to control any impact if resulting from the project. The proponent will ensure safe drinking water, safe working environment, proper training and first aid facility to all workers and staff. The project will generate additional jobs during construction and operation phases.

11.2 Recommendations

In view of the comprehensive screening process and findings of the present study there is no need of conducting further investigations.

- Tree plantation inside and near the project area is recommended.
- The management will continue to assist the local communities as a corporate social responsibility (CSR).
- Any seepage and leakage will be controlled through proper mitigation measures.
- Sound proof room should be constructed for generator to control its sound (If required).
- Use of narcotics and smoking must be prohibited during working, filling or handling of fuel.
- PPEs must be provided to workers such as gloves, masks, ear muffs etc.
- Proper solid waste management system must be adopted.
- Safety signs, safety board's etc. must be placed on site during various developmental stages.
- Machinery will never be left in running condition.
- First Aid measures, health & safety Equipment (PPEs) will be provided to workers.
- Fire Fighting station & system will be installed.
- The management of subject project will assist the local communities as a corporate social responsibility.
- Jobs and employment will be provided to the local area.

The present ESIA report is enough to meet the administrative and legal framework. After the complete study of the project, it is concluded that project will not have significant adverse impacts on the nearby community

and on environment. Overall, the project will have positive impacts on the local population and country as a whole. Therefore, it is requested for the environmental approval for the subject project.

Project will be executed on government owned land. Tube wells will be installed on govt. land, transmission main will be laid in ROW of roads, existing distribution network and OHRs / GSTs will be rehabilitated. So, NOCs / Consent Letters from concerned departments should be obtained before execution of the project by MC Vehari.

ANNEXURES

ANNEXURE - 1: REFERENCES

- <https://www.epa.gov/sites/production/files/2015-10/documents/njmc-wpp-2.pdf>
- Schedule I of Punjab Environmental Protection Act 1997 (Amended 2012)
- section 12 of Punjab Environmental Protection Act 1997 (Amended 2012)
- Pakistan Environmental protection act 1997
- Punjab Environmental Protection Act 1997 (Amended 2012)
- Guideline for the Environmental Assessment
- Regulations of Environmental Assessment, Regulations 2000
- National Conservation Strategy- Pakistan
- Guideline for the public consultation
- National Resettlement Policy and Ordinance
- National Environmental Quality Standards (Self-monitoring and reporting by the industry)
- Labor laws
- Canal and Drainage Act, 1873
- National Environmental Policy 2005.
- The Land Acquisition act, 1894
- The Punjab local Governmental ordinance, 2001.
- Meteorological data from meteorological department and website
- Pakistan Biosafety rules 2005
- Pakistan Environmental agency (review of IEE/EIA) regulation 2000.
- Punjab Portal (<http://www.punjab.gov.pk/attock>)
- Attock Chamber of Commerce Industries (<http://www.acci.org.pk/Attock.html>)
- Sectorial Guideline for environmental reports, industrial states
- Pakistan Environmental Protection ordinance (PEPO), 1983
- OSHAS 1800 for health and safety
- Census 2017

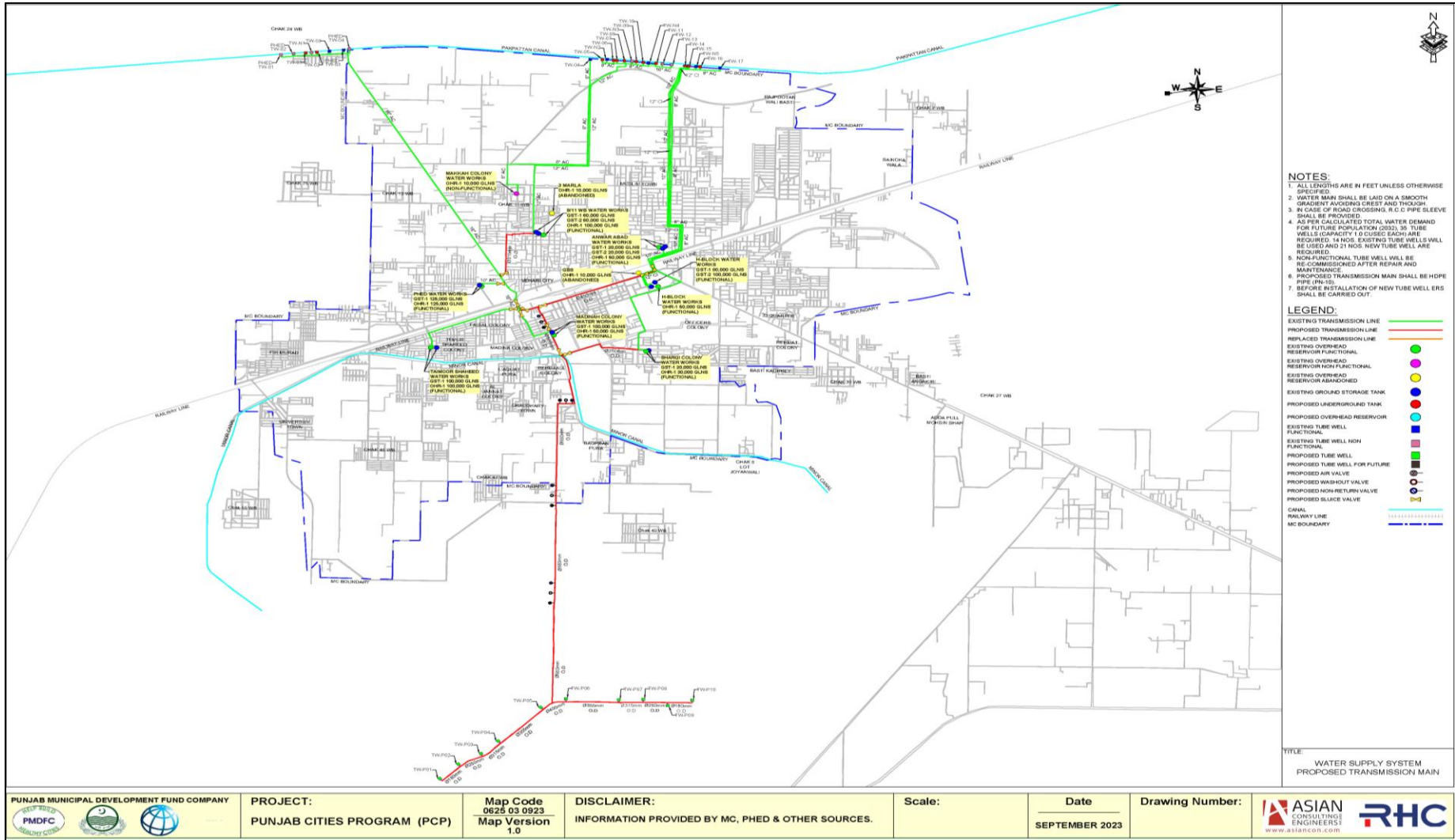
ANNEXURE - 2: GLOSSARY

Words	Dictionary
Mitigation	The action of lessening in severity or intensity
Legislation	law enacted by a legislative body
Compliance	Acting according to certain accepted standards
Flora	All the plant life in a particular region or period
Fauna	All the animal life in a particular region or period
Demarcated	Separate clearly, as if by boundaries
Screening	The display of a motion picture
Substitutions	An event in which one thing is substituted for another
Regulations	An authoritative rule
Stakeholders	A person or organization with an interest or concern in something
Vulnerable	Susceptible to attack

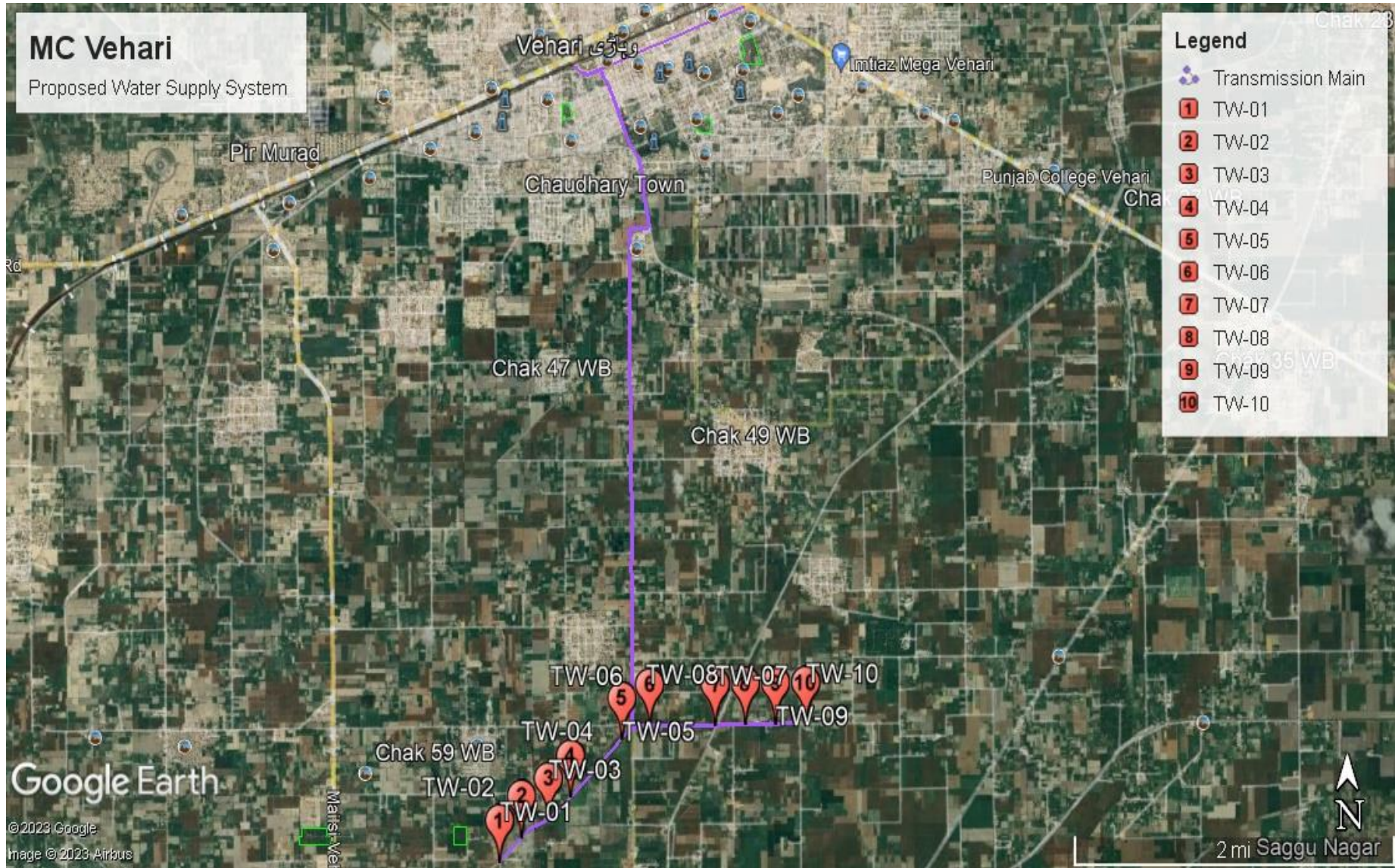
ANNEXURE - 3: LIST OF ABBREVIATION

PEPA	Punjab Environmental Protection Act
NEQS	National Environmental Quality Standards
PEQS	Punjab Environmental Quality Standards
WAPDA	Water and Power Development Authority
EMP	Environmental Management plan
ESMMP	Environmental and Social Management & Monitoring Plan
TW	Tube Well
GSTs	Ground Water Storage Tanks
OHRs	Overhead Reservoirs
EPA	Environmental Protection Agency
W.H.O	World Health Organization
SWM	Solid Waste Management
CSR	Corporate Social Responsibility
MSWs	Municipal Solid Wastes
TMA	Town Municipal Authority
MC	Municipal Corporation
PPEs	Personal protective equipment's
PM	Particulate Matter
ESIA	Environmental and Social Impact Assessment
ARAP	Abbreviated Resettlement Action Plan
RAP	Resettlement Action Plan
APs	Affected Persons
ESFPs	Environment and Social Focal Persons
DPO-ESM	Deputy Program Officer- Environment and Social Management
DPO ID	Deputy Program Officer Infrastructure Development
DPO IS	Deputy Program Officer – Infrastructure Strengthening
PD	Project Director
GRC	Grievance Redress Committee
LG and CDD	Local Government and Community Development Department
SDO	Sub Divisional Officer
PMDFC	Punjab Municipal Development Fund Company
PCP	Punjab Cities Program
AsCE	Asian Consulting Engineers Private Limited

ANNEXURE - 4: LAYOUT AND GOOGLE MAP OF PROJECT SITE



Project Layout Map



Project Google Map

ANNEXURE - 5: ESIA TEAM

Sr. No.	Team Member	Position Held	Qualifications
1.	Aleem Butt	Chief Environmentalist, Team Leader – ESIA	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; M.Sc. Environmental Sciences, Punjab University (PU), Lahore; NEBOSH, Lead Auditor
2.	Noman Ashraf	Environmental Specialist	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; PGD, Environmental Law, University of the Punjab, Lahore
3.	M. Umair Iqbal	Environmentalist	BS Environmental Science, Government College University, Faisalabad
4.	Waqar Saleem	Sociologist and Resettlement Specialist	M.Phil. Sociology, University of Sargodha
5.	Asma Butt	Sociologist	M.Phil. Sociology, University of Punjab
6.	Muhammad Ibrar	Ecologist	M.Phil. Zoology, University of Punjab
7.	Sajjad Hussain	Chief Chemist	M.Phil. Chemistry, Govt. College University, Lahore

ANNEXURE - 6: TORS

Terms of References

These terms of references are being submitted for the subject ESIA study under Clause 5 (f) of policy and procedure for the filing, review and approval of environmental assessment. These TORs of ESIA have been prepared by the environmental consultants, in consultation with the sub-project proponent. Proposal and TORs for the ESIA accepted by Punjab Municipal Development Fund Company (PMDFC).

Introduction of Project

The project aims at improvement of infrastructure of municipal services such as rehabilitation and improvement of water supply system in MC Vehari.

The project comprises of construction of tube wells, transmission main, rehabilitation of distribution lines and GSTs / OHRs and other allied works.

Cost of Project:

The capital cost of the project will be about 914.19 Million PKR.

Name of Proponent

Chief Executive Officer of MC Vehari is the project proponent.

Environmental Consultant & Client

MC Vehari has appointed the Asian Consulting Engineers Private Limited, as the Consultant for the subject project to conduct the ESIA. Asian Consulting Engineers Private Limited will be called as "Consultant" and MC Vehari as the "Client".

Objective of the ESIA Study

The Objective of study includes Compliance of section 12 of PEPA 1997 (Amended 2012), PEQS and fulfilment of HSE conditions.

Purpose of the ESIA

The key objectives of the ESIA are to:

- Document the ecological and socioeconomic baseline conditions of the study area and the affected communities
- Inform and obtain input from stakeholders, (e.g., governmental authorities, the public, and indigenous communities) and capture their relevant issues and concerns
- Assess in detail the environmental, social, and health impacts that would result from the project
- Suggestion of environmental and social mitigation measures to identified environmental Impacts
- Develop the EMPs as discussed above, based on the mitigation measures developed in the ESIA.

- Meet the requirements or recommendations of the applicable National Environmental Laws and Guidelines

Scope of Services

ESIA for the subject project is construction and / or rehabilitation of tube wells, transmission main, distribution lines and GSTs / OHRs in MC Vehari.

Accordance with:

1. The Punjab Environmental Protection Act, 1997 (amended 2012) and the
 - Various guidelines developed by the Punjab Environmental Protection Agency
 - Pakistan Environment Protection Agency Guidelines
 - Guidelines of Labor & Human Resource Department
 - Punjab Local Government Guidelines
 - Punjab Food Authority Guidelines
2. Methodology for carrying out this study
 - Project Description
 - Site Selection
 - Project Alternatives
3. Process Description
 - Detailed review of the processes
 - Design Parameters
 - Process flow chart
 - Details related top Plant and Equipment
4. Environmental profile of the environmental study area
 - Climatology
 - Geographical features
 - Geological and Hydrological features
 - Historical review
 - Land Use
 - Ecology, i.e., Flora and Fauna etc.
5. Analysis of EPA required environmental parameters
 - Sampling for Air, Water, and Noise Level
 - Ambient Air Quality will be monitored at the existing sub-project site by using certified instruments/methods to check the concentration of pollutants in ambient air before construction.
 - Groundwater quality of the area will be checked through analyzing EPA Smart Parameters. 2-3 representative samples will be collected to

- check the groundwater quality by using certified sampling techniques and analysis procedures.
 - Noise Level will be monitored at 5 to 6 localities at existing project site
6. Investigate Socio-Economic and Socio-Environmental aspects and cultural values within and around the operating facility
 - Administrative Set up
 - Cultural and Social Values
 - Social Cohesion
 - Interviews from different groups
 7. Development activities and Waste Management
 8. Identify and evaluate major environmental impacts
 9. Identify mitigation measures and develop Environmental Management and Monitoring plan
 10. Conclusions based on the study conducted for this ESIA.

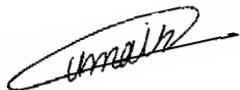
ESIA Proceedings

1. All other requirements, as set forth by
 - The Punjab Environmental Protection Act, 1997 (Amended 2012) and the
 - Various guidelines developed by PEPA
 - Any other legal requirements existing within Pakistan
2. 1-2 Site Visits for data acquisition
3. Environmental Monitoring
4. Preparation of Lab Analysis Report
5. Preparation of Environmental and social Impact Assessment (ESIA)
6. Submission of all ESIA report in office of DG EPA Punjab
7. Conduction of Public Hearing of ESIA
8. Briefing & Presentation at the site to District Officer/Inspector for Environmental Management.
9. Reply to technical Environmental Objections / Review
10. Presentation in the office of DG EPA, Punjab
11. Issuance of NOC

Client's Responsibility

We expect the following inputs from the clients:

- As soon as the proposal is accepted, the Consultants will request for the nomination of senior officer to be nominated as Coordinator who will be responsible for all coordination activities as required by the Consultants and to whom the Consultants will refer for information and assistance. All correspondence between the Consultants and the CLIENT will be routed through the coordinator.
- Asian will require free access to all relevant information available with the Client.
- Assess and identify major potential issues and impacts particularly those which may have influence on design, construction and operation at any stage.
- The report developed for the CLIENT shall be the property of the CLIENT and the Consultants shall adhere to confidentiality morally as well as legally.
- Client will provide relevant documents as:
 1. Signed application on company letter head (pattern will be provided)
 2. Undertaking on Rs. 100/- Stamp Paper (pattern will be provided)
 3. Affidavit on Rs. 100/- Stamp Paper (pattern will be provided)
 4. Copy of CNIC of proponent
 5. Signature on Schedule IV (pattern will be provided)
 6. Layout Map of the project
 7. Other NOCs / Certificates form other concerned departments (if any)
 - Project proponent will provide the Bank Drafts of amount of Rs. 30,000/- in favor of D.G. EPA Punjab which is review fee for EIA.
 - If any legal litigation arises from stakeholders during the preceding of EIA, the consultant will not be responsible for the delay in the approval process due to legal litigation.

Signature: 
 Name: Muhammad Umair Iqbal
 Designation: Environmentalist
 Date: _____

Signature: _____
 Name _____
 Designation _____
 Date: _____

ANNEXURE - 7: IFC'S EHS GUIDELINES FOR CONSTRUCTION AND DECOMMISSIONING

General EHS Guidelines [Complete version] at: www.ifc.org/ehsguidelines



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

4.0 Construction and Decommissioning

4.1 Environment.....	89
Noise and Vibration.....	89
Soil Erosion.....	89
Air Quality.....	90
Solid Waste.....	90
Hazardous Materials.....	91
Wastewater Discharges.....	91
Contaminated Land.....	91
4.2 Occupational Health and Safety.....	92
4.3 Community Health and Safety.....	94
General Site Hazards.....	94
Disease Prevention.....	94
Traffic Safety.....	95

Applicability and Approach

This section provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. Cross referencing is made to various other sections of the General EHS Guidelines.

4.1 Environment { TC "4.1 Environment" }

Noise and Vibration

During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. Some recommended noise reduction and control strategies to consider in areas close to community areas include:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are

planned during periods of the day that will result in least disturbance

- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
- Avoiding or minimizing project transportation through community areas

Soil Erosion

Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.

Recommended soil erosion and water system management approaches include:

Sediment mobilization and transport

- Reducing or preventing erosion by:
 - Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical
 - Contouring and minimizing length and steepness of slopes
 - Mulching to stabilize exposed areas
 - Re-vegetating areas promptly
 - Designing channels and ditches for post-construction flows
 - Lining steep channel and slopes (e.g. use jute matting)
- Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

Clean runoff management

- Segregating or diverting clean water runoff to prevent it mixing with water containing a high solids content, to minimize the volume of water to be treated prior to release

Road design

- Limiting access road gradients to reduce runoff-induced erosion
- Providing adequate road drainage based on road width, surface material, compaction, and maintenance

Disturbance to water bodies

- Depending on the potential for adverse impacts, installing free-spanning structures (e.g., single span bridges) for road watercourse crossings
- Restricting the duration and timing of in-stream activities to lower low periods, and avoiding periods critical to biological cycles of valued flora and fauna (e.g., migration, spawning, etc.)
- For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediments to moving water
- Consider using trenchless technology for pipeline crossings (e.g., suspended crossings) or installation by directional drilling

Structural (slope) stability

- Providing effective short term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented
- Providing adequate drainage systems to minimize and control infiltration

Air Quality

Construction and decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site. Techniques to consider for the reduction and control of air emissions from construction and decommissioning sites include:

- Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone)
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- Selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition
- Managing emissions from mobile sources according to Section 1.1
- Avoiding open burning of solid (refer to solid waste management guidance in Section 1.6)

Solid Waste

Non-hazardous solid waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office, kitchen, and dormitory wastes when these types of operations are part of construction project activities. *Hazardous solid waste* includes contaminated soils, which could potentially be encountered on-site due to previous land use activities, or small



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills. Techniques for preventing and controlling non-hazardous and hazardous construction site solid waste include those already discussed in Section 1.6.

Hazardous Materials

Construction and decommissioning activities may pose the potential for release of petroleum based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. These materials may also be encountered during decommissioning activities in building components or industrial process equipment. Techniques for prevention, minimization, and control of these impacts include:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
- Using impervious surfaces for refueling areas and other fluid transfer areas
- Training workers on the correct transfer and handling of fuels and chemicals and the response to spills
- Providing portable spill containment and cleanup equipment on site and training in the equipment deployment
- Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal according to Sections 1.5 and 1.6 on Hazardous Materials and Hazardous Waste Management, respectively
- Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos-containing flooring or insulation) and decontaminating or properly managing contaminated building materials

Wastewater Discharges

Construction and decommissioning activities may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Sanitary wastewater in construction and other sites should be managed as described in Section 1.3.

Contaminated Land

Land contamination may be encountered in sites under construction or decommissioning due to known or unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy should include:

- Managing contaminated media with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction or post decommissioning
- Understanding the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction or decommissioning activities
- Preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment consistent with the approach for Contaminated Land in Section 1.6
- Preparation of a management plan to manage obsolete, abandoned, hazardous materials or oil consistent with the approach to hazardous waste management described in Section 1.6.



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

Successful implementation of any management strategy may require identification and cooperation with whoever is responsible and liable for the contamination.

4.2 Occupational Health and Safety

TC "4.2 Occupational Health and Safety" \f C \l "2" }

Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction and decommissioning sites. Recommendations for their prevention and control include:

- Training of workers in lifting and materials handling techniques in construction and decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Planning work site layout to minimize the need for manual transfer of heavy loads
- Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
- Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks

Slips and Falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction and decommissioning sites.

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths
- Cleaning up excessive waste debris and liquid spills regularly
- Locating electrical cords and ropes in common areas and marked corridors
- Use of slip retardant footwear

Work in Heights

Falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures are among the most common cause of fatal or permanent disabling injury at construction or decommissioning sites. If fall hazards exist, a fall protection plan should be in place which includes one or more of the following aspects, depending on the nature of the fall hazard⁹⁵:

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support 5000 pounds (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. The tie in point of the fall arresting system should also be able to support 5000 pounds
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as

⁹⁵ Additional information on identification of fall hazards and design of protection systems can be found in the United States Occupational Health and Safety Administration's (US OSHA) web site: <http://www.osha.gov/SLTC/fallprotection/index.html>



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces

Struck By Objects

Construction and demolition activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities. Techniques for the prevention and control of these hazards include:

- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged
- Evacuating work areas during blasting operations, and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of

a turn while moving. Techniques for the prevention and control of these impacts include:

- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle
- Ensuring moving equipment is outfitted with audible back-up alarms
- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Dust

- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- PPE, such as dusk masks, should be used where dust levels are excessive

Confined Spaces and Excavations

Examples of confined spaces that may be present in construction or demolition sites include: silos, vats, hoppers, utility vaults, tanks, sewers, pipes, and access shafts. Ditches and trenches may also be considered a confined space when access or egress is limited. In addition to the guidance provided in Section 2.8 the occupational hazards associated with confined spaces and excavations in construction and decommissioning sites should be prevented according to the following recommendations:



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

- Controlling site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated

Other Site Hazards

Construction and decommissioning sites may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms, which should be prevented through the implementation of project-specific plans and other applicable management practices, including:

- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation, construction, dismantling or demolition
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements prior to dismantling or demolition including, for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury⁹⁶
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including

respirators, clothing/protective suits, gloves and eye protection

4.3 Community Health and Safety { TC "4.3 Community Health and Safety" \f C \1 "2" }

General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

Disease Prevention

Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities. Recommendations for the prevention and control of communicable and vector-borne diseases also applicable to

⁹⁶ Additional information on the management and removal of asbestos containing building materials can be found in ASTM Standard E2356 and E1368



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



WORLD BANK GROUP

construction phase activities are provided in Section 3.6 (Disease Prevention).

Traffic Safety

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities. The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of procedures described in Section 3.4 (Traffic Safety).

ANNEXURE - 8: COVID-19 PANDEMIC AND HEALTH SAFETY MEASURES

Given the unprecedented nature of the COVID-19 pandemic, contractors are bound to take all necessary precautions to maintain the health and safety related measures at site and to ensure suitable arrangements regarding hygiene requirements for the prevention of pandemic.

Following are the measures that should be implemented at the construction site to avoid the spread of Covid-19:

Activities	Adaptive Measures
Pre- Execution Phase	
<p>i. Profile preparation</p>	<ul style="list-style-type: none"> • Detail profile of sub-project workforce • Enlist the names, addresses and contact nos. • Breakdown of the workforce (workers from local communities and those who have on site accommodation) • Assigning the task against each person • Schedule the key activities and their duration at site
<p>ii. Initial Screening</p>	<ul style="list-style-type: none"> • All enlisted workforce should go through initial screening process • Ensuring the availability of Thermogun on site • Record keeping against initial screening • Identifying all workers who are initially at more risk of contracting Covid-19
During Execution Phase	
<p>1. Preliminary Screening</p>	<p>Regular Screening:</p> <ul style="list-style-type: none"> • Regular screening by using Thermogun on daily basis before starting civil work at site • Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site • If a worker has symptoms of COVID-19 (e.g., fever, dry cough, fatigue) the worker should be removed immediately from work activities and isolated on designated site. • Co-workers (i.e., workers with whom the sick worker was in close contact) should be required to stop work, and to quarantine themselves for 14 days, even if they have no symptoms.

	<p>Sequential Screening: Concerned THQ medical staff is requested for screening at regular intervals. List should also be shared with THQ for avoiding future inconvenience or hire health safety officer on weekly basis.</p>
<p>2. Special Arrangements regarding PPEs</p>	<ul style="list-style-type: none"> • Ensuring availability of handwashing facilities (sanitizers/soaps) on site • Presence of closed waste bins at key places throughout site, including at entrances/exits to work areas (toilet, canteen or food distribution, or provision of drinking water; in worker accommodation; at waste stations; at stores; and in common spaces). • Special arrangements regarding PPEs and sanitation at site • Record keeping of stock availability on daily basis
<p>3. Restricted Movement/ Demobilization of staff</p>	<ul style="list-style-type: none"> • Encourage employees to wash their hands at least for 20 seconds with soap and stay at least one meter away from people who are coughing or sneezing • Breakdown of workers who reside at home (i.e., workers from the communities), workers who lodge within the local communities and workers in on-site accommodation. Workers accommodated on site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. • Workers from local communities, who return home daily, weekly or monthly, will be more difficult to manage. They should be subject to health checks at entry to the site (as set out above) and at some point, circumstances may make it necessary to require them to either use accommodation on site or not to come to work. • All workers should be provided separate accommodation.
<p>4. Training sessions</p>	<ul style="list-style-type: none"> • Health and safety training for Contractor's Personnel (which include sub-project workers and all personnel that the Contractor uses on site, including staff and other employees of the Contractor and Subcontractors and any other

	<p>personnel assisting the Contractor in carrying out sub-project activities.</p> <ul style="list-style-type: none"> • Sessions related to safety procedures, use of construction PPEs, occupational health and safety issues, and code of conduct specially privacy issues including social distancing. • Arranging daily briefings with workforce, reminding workers to self-monitor for possible symptoms (fever, cough) and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell. • Placing posters and sign boards around the site in local languages. • Appointing one person on daily basis among the workforce who will serve as trainer for conducting awareness session and encouraging the rest to take preventive measures.
<p>5. Operationalization of Grievance Redress Mechanism</p>	<ul style="list-style-type: none"> • Effective implementation of GRM at site • Encouraging to report any COVID-19 related health issue and concerns about the health of their co-workers and other staff as well. • In case of unavailability of the PPEs at site, grievance would be lodged directly to PMDFC.
<p>6. Role of PMDFC</p>	<ul style="list-style-type: none"> • PMDFC is required to arrange regular meetings with Contractors and workforce to monitor all procedural implementation of COVID-19 prevention related mechanism. • Arrange meeting with concerned DHQs for immediate support and guidance in case of emergency. • During inspection visit by PMDFC Staff, if a worker is found to has symptoms of COVID-19, the worker should be removed immediately from work activities and isolated on designated site.
<p>Post Execution Phase</p>	
<p>A. Post Screening</p>	<ul style="list-style-type: none"> • Screening should be done at the end of the day on daily basis, if a worker is found to have any symptoms of COVID-19, he should be immediately reported to concerned health department.
<p>B. Cleaning and waste disposal</p>	<ul style="list-style-type: none"> • All waste (PPEs and sanitation related) shall be disposed of properly at designated sites.

ANNEXURE - 9: ENVIRONMENTAL & SOCIAL SCREENING AND INVOLUNTARY RESETTLEMENT SCREENING CHECKLISTS

Environmental & Social Screening Checklist

Instructions:

Environmental and Social Focal Persons (ESFPs)⁷ nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.

Deputy Program Officers-Environmental and Social Management (DPO-ESM) deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist.

It is to be attached with the main document⁸ of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM.

This checklist focuses on environmental and social impacts. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used.

(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP: Mr. Badar Majeed

Name of MC: Vehari

Sub-Project Sector: Water Supply System

Sub-Project Title: Rehabilitation and Improvement of Water Supply System in MC Vehari – Tubewells

Sub- Project Categorization:	E-1 ✓	S-1
	E-2	S-2 ✓
	E-3	S-3

Date of Screening: 23rd September, 2023

Anticipated Project Activities:

The project includes construction / installation of 10 number tube wells. The project activities include excavation, piping, installation of tube wells, external electrification of proposed tube wells & other basic facilities and site restoration.

Estimated Cost of Subproject: 914.19 Million PKR

Completion Time/Duration of whole Subproject: 12 Months

Estimated Labor for whole Subproject: Approx. 30

⁷ In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

⁸ It is meant as PC-I and/or engineering estimates of sub-project

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following:			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area has been reported within the project area.
Any surface water body (river, canal, stream, lake, wetland) within 250 meter of the proposed sub project ⁹	✓		A surface water body (Minor) exists within 250-meter boundary of the proposed sub-project.
Estuarine		✓	No estuarine has been reported within the project area.
Special area for protecting biodiversity		✓	No special area for protecting biodiversity has been reported within the sub-project area.
Buffer zone of protected area		✓	No buffer zone of protected area has been reported within the project area.
Mangroves Forest		✓	No mangroves forest has been reported within the project area.
Man-made forest /game reserve, orchid / crops or any other area of environmental importance		✓	Not reported.
Socially sensitive /important areas/communities/ people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject ¹⁰	✓		Sites of religious importance like mosques have been found within 100 m of the proposed subproject. Around 01 no. of mosque have been found within 100 m boundary. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be

⁹ Ibid.

¹⁰ According to Environmental Assessment Guidelines adopted by Punjab EPA

			adopted to encounter the impact near sensitive receptors.
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meters of the proposed sub project ¹¹		✓	No sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meters of the proposed sub project.
Any graveyard of local community (Muslims or Christians)		✓	Not reported within 100 m boundary of proposed subproject.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments ¹² of the society and women or children)?		✓	No demographic or socio-economic aspects of the sub-project area that are already vulnerable found.
Already existing infrastructure ¹³ (including public amenities) which may be required to dismantle or may be affected temporarily by any means?	✓		No existing infrastructure will be required to dismantle. Tube wells are proposed on govt. owned land.
B. Potential Environmental Impacts			
Will the Sub-Project cause...			
1. Disturbance to habitats / biodiversity of environmentally sensitive or protected areas?		✓	There will be no disturbance to habitats / biodiversity or protected areas.
2. Cutting of trees?		✓	No cutting of trees is anticipated during sub-project activities.
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	There will not be any disruption to habitats/biodiversity of surrounding ecosystem/environment.
4. Generation of wastewater during construction or operation?	✓		The wastewater will be generated from the contractor camp site during construction phase which will be treated through wastewater treatment plant or septic tank before final disposal to the nearest drain. However, no wastewater

¹¹ Ibid.

¹²due to caste, creed, religion or gender e.g., transgender

¹³Sewerage /Drainage system, Water supply lines, tube-wells, WAPDA/Telephone transmission lines/electric poles, Railway tracks, Gas pipelines, Roads, Shops/Plazas, Banks, Industry, Disposal stations etc.

			generation is anticipated during project operation.
5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?		✓	The wastewater discharge from construction camps will be properly treated before the final disposal. No ground water contamination is anticipated, the septic tank develop will be properly lined in order to avoid percolation and contamination of ground water.
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	Surface water body like distributary / minor is present near sub-project site that may get polluted due to liquid and solid waste disposal during the construction activities. Adequate measures like retaining walls/breast walls have been proposed to avoid/reduce siltation in the water bodies/ponds close to the alignment.
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	This will be a temporary impact during the construction phase. Storing all material and chemicals required for construction in well secured and managed sites, installing silt traps near all water bodies prior to construction activities, disposing all waste soil and other debris to approved locations, locating labor camps at approved locations, providing proper sanitary facilities and solid waste management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping will be done. The turbine installed for the extraction will be operated within its capacity.

<p>9. Serious contamination of soil due to construction works?</p>	<p>✓</p>	<p>Soil may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The contractor is required to adopt the proper mitigation that include good housekeeping, training of his staff, disposal of waste on approved landfill and implementation of waste management plans.</p>
<p>10. Aggravation of solid waste problems in the area?</p>	<p>✓</p>	<p>The solid waste problem during construction activities will be mitigated by adopting the proper solid waste management plan.</p>
<p>11. Generation of hazardous waste?</p>	<p>✓</p>	<p>Oil, fuel, batteries and other hazardous chemicals that will be used during construction activities will be stored at the site, if required, in well closed containers at designated locations. The hazardous waste will be disposed of through EPA approved contractor.</p>
<p>12. Increased air pollution due to sub-project construction and operation?</p>	<p>✓</p>	<p>Adaptation of speed limits for construction vehicles and timely servicing and maintaining them up to the given standards will reduce the volume of air emissions to the surrounding. Frequent monitoring of air quality will support to review the effectiveness of the mitigation measures. The scrubber will be installed on asphalt and batching plant in order to limit the air emissions within PEQS limits.</p>

<p>13. Noise and vibration due to sub-project construction or operation?</p>	✓	<p>Blasting is not involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level.</p> <p>Further regular monitoring of noise levels will be adopted based on baseline data gathered during the pre-construction stage and continuous monitoring is proposed during construction stage as a mitigatory measure.</p>
<p>14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?</p>	✓	<p>Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Mitigation will be proposed like filled top-soil which will naturally restrict mosquito breeding. The tyres should remain dry in order to avoid the mosquito breeding.</p>
<p>15. Use of chemicals during construction?</p>	✓	<p>All chemicals will be stored in proper containers in order to avoid the leakages. The storage facility of chemicals should be properly ventilated</p>

			and have emergency measures of firefighting and emergency exists. The workers using the chemicals should have training and should wear the PPEs.
C: Potential Social Impacts Will the Sub-Project cause...			
1. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	There will be no impairment of historical/cultural areas and there will be no disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs).
2. Displacement or involuntary resettlement of people? (physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	There is no physical and economic displacement or involuntary resettlement of the people.
3. Disproportionate impacts on the poor, women and children and or other vulnerable groups ¹⁴ (mentioned above)?		✓	There is no impact on the poor, women and children or other vulnerable group.
4. Temporary impediments in movements of people/transport and animals?		✓	The movement will be restricted for few hours only which the resident/people will be informed prior to the construction activities.
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	It's a small-scale sub-project and therefore, there will be no large population influx on the locals. However, during construction activities, separate sanitary facilities and water will be adequately supplied to the labor force by the contractor to avoid and conflict with the local community on the use of their water resources.
6. Social conflicts if workers from other areas are hired?		✓	Contractor will be bound to hire the locals for unskilled work during construction and hence such conflict is not anticipated, however, awareness programs will be conducted for both labor force and local

¹⁴ Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

			community in order to minimize possible conflicts.
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Also, it is proposed to prepare a separate health and safety plan to be implemented during construction and operation phases, and a regular monitoring schedule to be proposed under close supervision and coordination of a professional Occupational Health & Safety Officer of the Project Implementation Consultant.
8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS. The regular monitoring schedule to be proposed under close supervision of the consultant.
9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS and a regular monitoring schedule to be proposed under close management of a professional Occupational Health & Safety officer.
10. Any impact on sensitive receptors (mentioned above)	✓		The sensitive receptors may be subject to the impact like vibration, noise and emission which will be mitigated by installing acoustic equipment, silencers, maintenance of machinery, limiting the time specific construction activity near the receptors and with regular monitoring of construction activities near the sensitive receptors.

11. Any impact of negative nature on already existing infrastructure including public amenities?		✓	No already existing infrastructure will be disturbed.
--	--	---	---

Prepared By:

Name: Aleem Butt (Environmental Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Appendix A-Environmental and Social Categorization of Sub-Projects

Using the Environmental and Social Screening Checklist, E & S Categorization of sub-projects of PCP is and will be carried out as following:

For Environmental Category:

E-1 = All those sub-projects having adverse environmental impacts and or those sub-projects that come under Schedule I and II of Pakistan Environment Protection Agency Review of IEE and EIA Regulations 2000 will need to submit **Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA)**¹⁵ report

E-2 = All those sub-projects which will have moderate negative environmental impacts will need to submit **Environmental and Social Management Plans (ESMP)**¹⁶

E-3 = All those sub-projects which will have no negative environmental impacts will be categorized as E3 and for those, no further process will be required¹⁷ after E & S Screening

For Social Category:

S-1= All those sub-projects having negative social impacts of significant nature on > 40 households and or it require displacement/resettlement of > 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Resettlement Action Plan (RAP)

S-2= All those sub-projects having negative social impacts of significant nature on 1 – 40 households and or it require displacement/resettlement of 1- 40 households for land

¹⁵ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E1 Category sub-projects will be covered in IEE/EIA report

¹⁶ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E2 Category sub-projects will be covered in the ESMP

¹⁷ .For all those sub-projects which will have no negative environmental impacts and are categorized as E3 but they require construction labor/workers for the execution ,will follow the Environment, Health and Safety SOPs prepared for PCP and they will follow the instructions given by ESM team of PCP

acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Abbreviated Resettlement Action Plan (ARAP)

S-3= All those sub-projects having no negative social impacts and or they are not involved in displacement/resettlement of any nature, will be categorized as S3 and No further process will be required after E & S Screening

Appendix B-Important Definitions

1. Environmentally sensitive areas ¹⁸

Environmentally sensitive areas are landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context.

2. Cultural heritage¹⁹

- Tangible cultural heritage:
 - movable cultural heritage (paintings, sculptures, coins, manuscripts)
 - immovable cultural heritage (monuments, archaeological sites, and so on)
 - underwater cultural heritage (shipwrecks, underwater ruins and cities)
- Intangible cultural heritage: oral traditions, performing arts, rituals

3. Wetlands

- Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.²⁰
- areas of marsh, fen, peat and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".²¹

4. Buffer zone of protected area

Areas peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area.²²

5. Special area for protecting biodiversity/ Key Biodiversity Areas (KBA)

Sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems ²³

6. Estuarine

Area of the mouth of a river where it broadens into the sea, and where fresh and seawater intermingle to produce brackish water. The estuarine environment is very rich in wildlife, particularly aquatic, but it is very vulnerable to damage as a result of human activities.²⁴

¹⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0169204694020169>

¹⁹ <http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/>

²⁰ <https://www.epa.gov/wetlands/what-wetland>

²¹ <https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf>

²² <https://www.biodiversitya-z.org/content/buffer-zones.pdf>

²³ <https://biodiversitya-z.org/content/key-biodiversity-areas-kba>

²⁴ <https://biodiversitya-z.org/content/estuary>

7. Hazardous substance means-

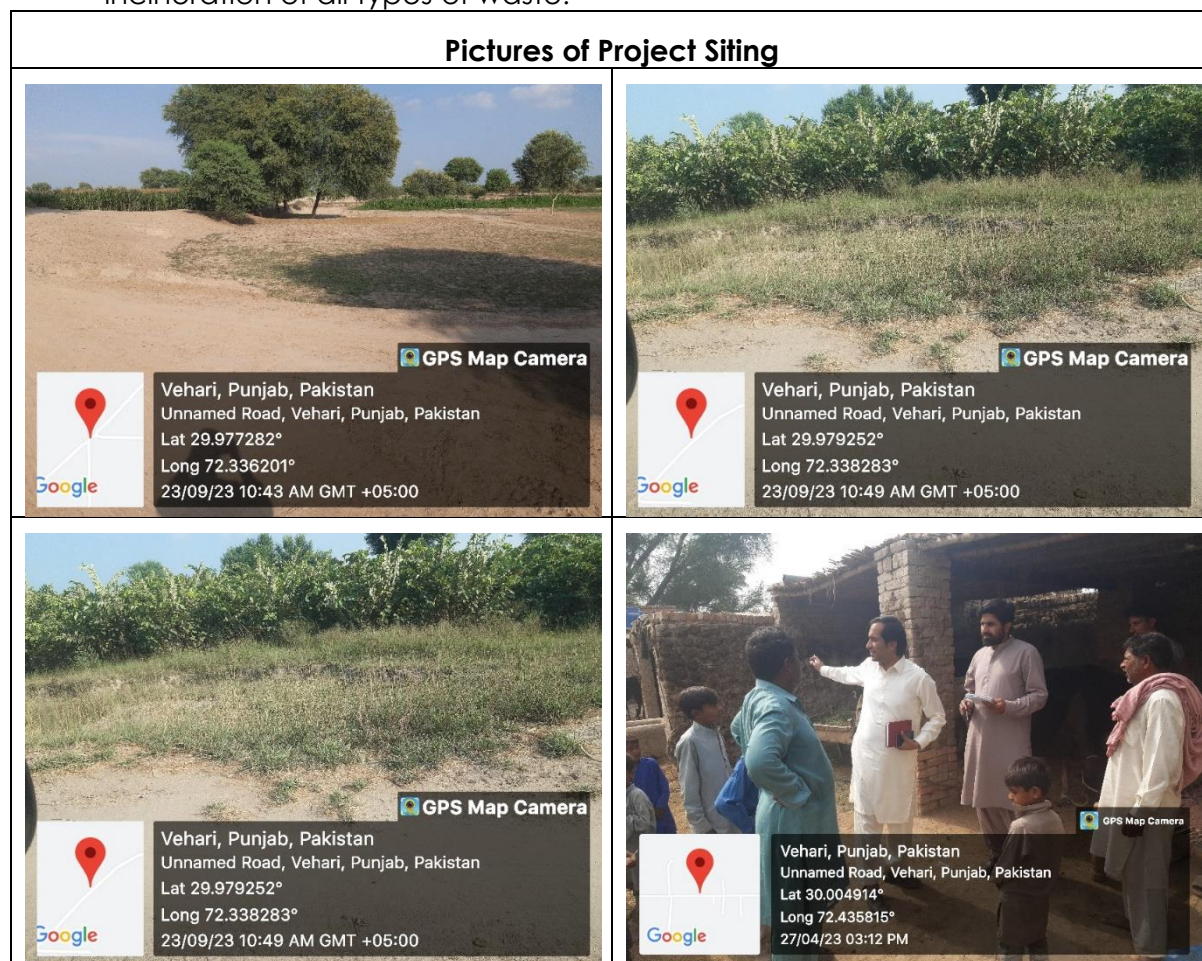
(a) A substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and

(b) Any substance which may be prescribed as a hazardous substance;

Hazardous waste means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;²⁵

8. Waste

Waste means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.²⁶



²⁵ Punjab Environmental Protection Act 2012

²⁶ *ibid*

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of ESFP: Mr. Badar Majeed

Name of MC: Vehari

Sub-Project Sector: Water Supply System

Sub-Project Title: Rehabilitation and Improvement of Water Supply System in MC Vehari – Tube wells

Sub- Project Categorization:

S-1

S-2 ✓

S-3

Date of Screening: 23rd September, 2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Project does not require land acquisition. Project land is govt. owned as per consultation conducted with MC and PMDFC.
If yes, then describe the type of land being acquired from the categories below:				
Land (Quantify and describe types of land being acquired in "remarks column".				
Government and LG owned land free of occupation (agriculture or settlement)	✓			
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)				
Private land		✓		
Residential		✓		
Commercial		✓		
Agricultural		✓		

Communal		✓		
Others (specify in "remarks").				
Name of owner/owners and type of ownership document if available.				
If land is being acquired, describe any structures constructed on it		✓		Land is not being acquired as the proposed land is govt. owned as per consultation with MC / PMDFC.
Land-based assets:		✓		
Residential structures		✓		
Commercial structures (specify in "remarks")		✓		
Community structures (specify in "remarks")		✓		
Agriculture structures (specify in "remarks")		✓		
Public utilities (specify in "remarks")		✓		
Others (specify in "remarks")		✓		
If agricultural land is being acquired, specify the following:				
Agriculture related impacts		✓		
Crops and vegetables (specify types and cropping area in "remarks").		✓		
Trees (specify number and types in "remarks").		✓		
Others (specify in "remarks").				
Affected Persons (APs)		✓		
Will any people be displaced from the land when acquired? Yes/No		✓		
Number of APs		✓		
Males		✓		
Females		✓		
Titled land owners		✓		

Tenants and sharecroppers		✓		
Leaseholders		✓		
Agriculture wage laborers		✓		
Encroachers and squatters (specify in remarks column)		✓		
Vulnerable APs (e.g., women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		
Others (specify in "remarks")				
How will people be affected?				

Prepared By:

Name: Muhammad Waqar Saleem
(Social & Resettlement Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Environmental & Social Screening Checklist

Instructions:

Environmental and Social Focal Persons (ESFPs)²⁷ nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.

Deputy Program Officers-Environmental and Social Management (DPO-ESM) deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist.

It is to be attached with the main document²⁸ of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM.

This checklist focuses on environmental and social impacts. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used.

(iii) The purpose of this E&S Screening Checklists is to identify potential “Negative” impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the “remarks” section to discuss any anticipated mitigation measures.

Name of ESFP: Mr. Badar Majeed

Name of MC: Vehari

Sub-Project Sector: Water Supply System

Sub-Project Title: Rehabilitation and Improvement of Water Supply System in MC Vehari – Transmission / Distribution Network

Sub- Project Categorization:	E-1 ✓	S-1
	E-2	S-2 ✓
	E-3	S-3

Date of Screening: 23rd September, 2023

Anticipated Project Activities:

The project includes construction and / or rehabilitation of transmission / distribution network including rehabilitation of existing GSTs / OHRs. The project activities include excavation, piping, installation of supply lines, rehabilitation of existing GSTs / OHRs & other basic facilities and site restoration.

Estimated Cost of whole Subproject: 914.19 Million PKR

²⁷ In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

²⁸ It is meant as PC-I and/or engineering estimates of sub-project

Completion Time/Duration for whole subproject: 12 Months

Estimated Labor for whole Subproject: Approx. 30

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following:			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area has been reported within the project area.
Any surface water body (river, canal, stream, lake, wetland) within 250 meters of the proposed sub project ²⁹	✓		A surface water body (Minor) exists within 250-meter boundary of the proposed sub-project.
Estuarine		✓	No estuarine has been reported within the project area.
Special area for protecting biodiversity		✓	No special area for protecting biodiversity has been reported within the sub-project area.
Buffer zone of protected area		✓	No buffer zone of protected area has been reported within the project area.
Mangroves Forest		✓	No mangroves forest has been reported within the project area.
Man-made forest /game reserve, orchid / crops or any other area of environmental importance		✓	Not reported.
Socially sensitive /important areas/communities/ people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject ³⁰	✓		Sites of religious importance like mosques and graveyard have been found within 100 m of the proposed subproject. Around 09 no. of mosques and 01 no. of graveyard have been found within 100 m boundary. The mitigation measures like operating the equipment with

²⁹ Ibid.

³⁰ According to Environmental Assessment Guidelines adopted by Punjab EPA

			muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meters of the proposed sub project ³¹	✓		Sensitive receptors like schools, colleges, hospital and clinics have been found. Around 06 no. of schools, 03 no. of hospitals and 01 no. of clinics have been found within 100 meter of project boundary. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.
Any graveyard of local community (Muslims or Christians)	✓		01 graveyard has existed within 100 m boundary of the proposed sub-project.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments ³² of the society and women or children)?		✓	No demographic or socio-economic aspects of the sub-project area that are already vulnerable found.
Already existing infrastructure ³³ (including public amenities) which may be required to dismantle or may be affected temporarily by any means?	✓		Already existing infrastructure like road will be disturbed. Contractor will be bound to restore and rehabilitate the site area to its original state after the completion of construction works.
B. Potential Environmental Impacts			
Will the Sub-Project cause...			

³¹ Ibid.

³² due to caste, creed, religion or gender e.g., transgender

³³ Sewerage /Drainage system, Water supply lines, tube-wells, WAPDA/Telephone transmission lines/electric poles, Railway tracks, Gas pipelines, Roads, Shops/Plazas, Banks, Industry, Disposal stations etc.

16. Disturbance to habitats / biodiversity of environmentally sensitive or protected areas?		✓	There will be no disturbance to habitats / biodiversity or protected areas.
17. Cutting of trees?		✓	No cutting of trees is anticipated during sub-project activities.
18. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	There will not be any disruption to habitats/biodiversity of surrounding ecosystem/environment.
19. Generation of wastewater during construction or operation?	✓		The wastewater will be generated from the contractor camp site during construction phase which will be treated through wastewater treatment plant or septic tank before final disposal to the nearest drain. However, no wastewater generation is anticipated during project operation.
20. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?		✓	The wastewater discharge from construction camps will be properly treated before the final disposal. No ground water contamination is anticipated, the septic tank develop will be properly lined in order to avoid percolation and contamination of ground water.
21. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	Surface water body like distributary is present near sub-project site that may get polluted due to liquid and solid waste disposal during the construction activities. Adequate measures like retaining walls/breast walls have been proposed to avoid/reduce siltation in the water bodies/ponds close to the alignment.
22. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓		This will be a temporary impact during the construction phase. Storing all material and chemicals required for construction in well secured and managed sites, installing silt traps near all water bodies prior to construction activities,

			disposing all waste soil and other debris to approved locations, locating labor camps at approved locations, providing proper sanitary facilities and solid waste management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.
23. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping will be done. The turbine installed for the extraction will be operated within its capacity.
24. Serious contamination of soil due to construction works?	✓		Soil may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The contractor is required to adopt the proper mitigation that include good housekeeping, training of his staff, disposal of waste on approved landfill and implementation of waste management plans.
25. Aggravation of solid waste problems in the area?		✓	The solid waste problem during construction activities will be mitigated by adopting the proper solid waste management plan.
26. Generation of hazardous waste?	✓		Oil, fuel, batteries and other hazardous chemicals that will be used during construction activities will be stored at the site, if required, in well closed containers at designated locations. The hazardous waste will be disposed of through EPA approved contractor.
27. Increased air pollution due to sub-project construction and operation?	✓		Adaptation of speed limits for construction vehicles and

		<p>timely servicing and maintaining them up to the given standards will reduce the volume of air emissions to the surrounding. Frequent monitoring of air quality will support to review the effectiveness of the mitigation measures. The scrubber will be installed on asphalt and batching plant in order to limit the air emissions within PEQS limits.</p>
<p>28. Noise and vibration due to sub-project construction or operation?</p>	<p>✓</p>	<p>Blasting is not involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level.</p> <p>Further regular monitoring of noise levels will be adopted based on baseline data gathered during the pre-construction stage and continuous monitoring is proposed during construction stage as a mitigatory measure.</p>
<p>29. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?</p>	<p>✓</p>	<p>Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may</p>

			provide breeding grounds for mosquitoes including dengue. Mitigation will be proposed like filled top-soil which will naturally restrict mosquito breeding. The tyres should remain dry in order to avoid the mosquito breeding.
30. Use of chemicals during construction?	✓		All chemicals will be stored in proper containers in order to avoid the leakages. The storage facility of chemicals should be properly ventilated and have emergency measures of firefighting and emergency exists. The workers using the chemicals should have training and should wear the PPEs.
C: Potential Social Impacts			
Will the Sub-Project cause...			
12. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	There will be no impairment of historical/cultural areas and there will be no disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs).
13. Displacement or involuntary resettlement of people? (physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	There is no physical and economic displacement or involuntary resettlement of the people.
14. Disproportionate impacts on the poor, women and children and or other vulnerable groups ³⁴ (mentioned above)?		✓	There is no impact on the poor, women and children or other vulnerable group.
15. Temporary impediments in movements of people/transport and animals?		✓	The movement will be restricted for few hours only which the resident/people will be informed prior to the construction activities.
16. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	It's a small-scale sub-project and therefore, there will be no large population influx on the locals. However, during construction activities, separate sanitary facilities and water will

³⁴ Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

			be adequately supplied to the labor force by the contractor to avoid and conflict with the local community on the use of their water resources.
17. Social conflicts if workers from other areas are hired?		✓	Contractor will be bound to hire the locals for unskilled work during construction and hence such conflict is not anticipated, however, awareness programs will be conducted for both labor force and local community in order to minimize possible conflicts.
18. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Also, it is proposed to prepare a separate health and safety plan to be implemented during construction and operation phases, and a regular monitoring schedule to be proposed under close supervision and coordination of a professional Occupational Health & Safety Officer of the Project Implementation Consultant.
19. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS. The regular monitoring schedule to be proposed under close supervision of the consultant.
20. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS and a regular monitoring schedule to be proposed under close management of a professional Occupational Health & Safety officer.

<p>21. Any impact on sensitive receptors (mentioned above)</p>	✓	<p>The sensitive receptors may be subject to the impact like vibration, noise and emission which will be mitigated by installing acoustic equipment, silencers, maintenance of machinery, limiting the time specific construction activity near the receptors and with regular monitoring of construction activities near the sensitive receptors.</p>
<p>22. Any impact of negative nature on already existing infrastructure including public amenities?</p>	✓	<p>Already existing infrastructure like road will be disturbed. Contractor will be bound to restore and rehabilitate the site area to its original state after the completion of construction works.</p>

Prepared By:

Name: Aleem Butt (Environmental Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Appendix A-Environmental and Social Categorization of Sub-Projects

Using the Environmental and Social Screening Checklist, E & S Categorization of sub-projects of PCP is and will be carried out as following:

For Environmental Category:

E-1 = All those sub-projects having adverse environmental impacts and or those sub-projects that come under Schedule I and II of Pakistan Environment Protection Agency Review of IEE and EIA Regulations 2000 will need to submit **Initial Environmental Examination (IEE)** or **Environmental Impact Assessment (EIA)**³⁵ report

E-2 = All those sub-projects which will have moderate negative environmental impacts will need to submit **Environmental and Social Management Plans (ESMP)**³⁶

³⁵ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E1 Category sub-projects will be covered in IEE/EIA report

³⁶ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E2 Category sub-projects will be covered in the ESMP

E-3 = All those sub-projects which will have no negative environmental impacts will be categorized as E3 and for those, no further process will be required³⁷ after E & S Screening

For Social Category:

S-1= All those sub-projects having negative social impacts of significant nature on > 40 households and or it require displacement/resettlement of > 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Resettlement Action Plan (RAP)

S-2= All those sub-projects having negative social impacts of significant nature on 1 – 40 households and or it require displacement/resettlement of 1- 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Abbreviated Resettlement Action Plan (ARAP)

S-3= All those sub-projects having no negative social impacts and or they are not involved in displacement/resettlement of any nature, will be categorized as S3 and No further process will be required after E & S Screening

Appendix B-Important Definitions

9. Environmentally sensitive areas ³⁸

Environmentally sensitive areas are landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context.

10. Cultural heritage³⁹

- Tangible cultural heritage:
 - movable cultural heritage (paintings, sculptures, coins, manuscripts)
 - immovable cultural heritage (monuments, archaeological sites, and so on)
 - underwater cultural heritage (shipwrecks, underwater ruins and cities)
- Intangible cultural heritage: oral traditions, performing arts, rituals

11. Wetlands

- Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.⁴⁰
- areas of marsh, fen, peat and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".⁴¹

12. Buffer zone of protected area

³⁷ .For all those sub-projects which will have no negative environmental impacts and are categorized as E3 but they require construction labor/workers for the execution ,will follow the Environment, Health and Safety SOPs prepared for PCP and they will follow the instructions given by ESM team of PCP

³⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0169204694020169>

³⁹ <http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/>

⁴⁰ <https://www.epa.gov/wetlands/what-wetland>

⁴¹ <https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf>

Areas peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area.⁴²

13. Special area for protecting biodiversity/ Key Biodiversity Areas (KBA)

Sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems ⁴³

14. Estuarine

Area of the mouth of a river where it broadens into the sea, and where fresh and seawater intermingle to produce brackish water. The estuarine environment is very rich in wildlife, particularly aquatic, but it is very vulnerable to damage as a result of human activities.⁴⁴

15. Hazardous substance means-

(a) A substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is 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

(b) Any substance which may be prescribed as a hazardous substance;

Hazardous waste means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste; ⁴⁵

16. Waste

Waste means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste. ⁴⁶

⁴² <https://www.biodiversitya-z.org/content/buffer-zones.pdf>

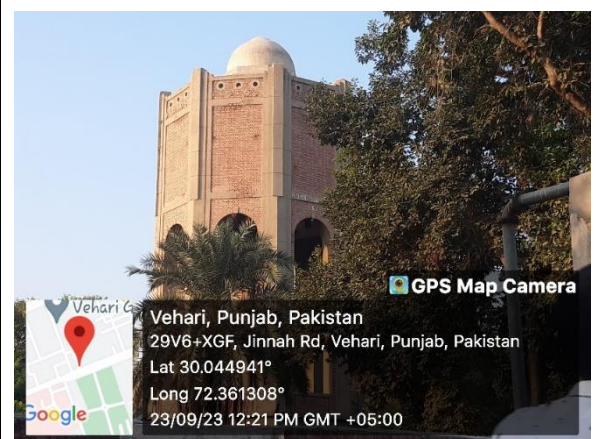
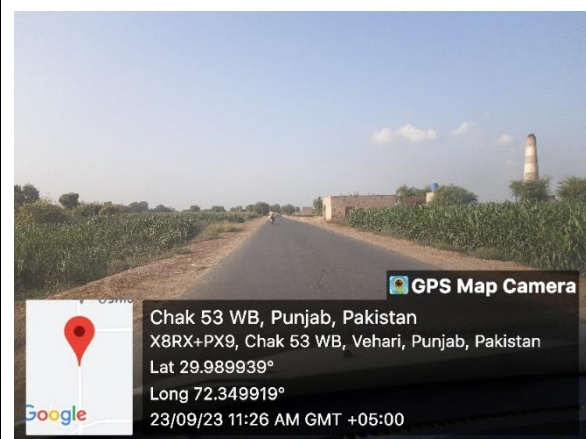
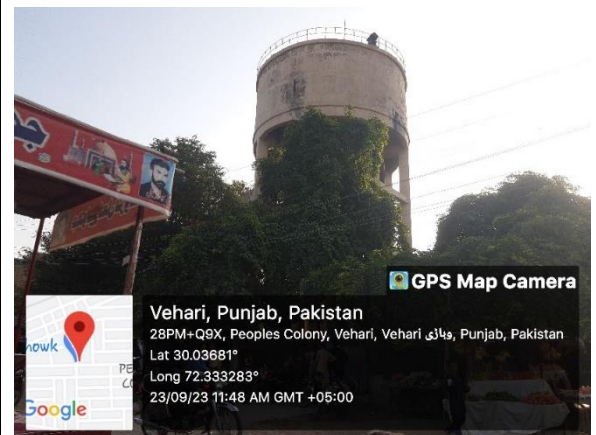
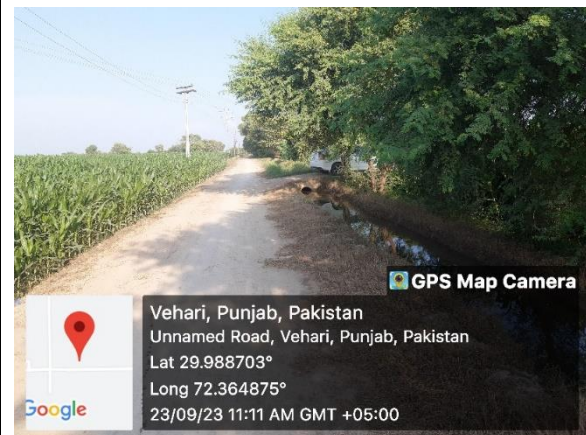
⁴³ <https://biodiversitya-z.org/content/key-biodiversity-areas-kba>

⁴⁴ <https://biodiversitya-z.org/content/estuary>

⁴⁵ Punjab Environmental Protection Act 2012

⁴⁶ *ibid*

Pictures of Project Siting



INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of ESFP: Mr. Badar Majeed

Name of MC: Vehari

Sub-Project Sector: Water Supply System

Sub-Project Title: Rehabilitation and Improvement of Water Supply System in MC Vehari – Transmission / Distribution Network

Sub- Project Categorization: S-1

S-2 ✓

S-3

Date of Screening: 23rd September, 2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Project does not require land acquisition. Project land is govt. owned as per consultation conducted with MC and PMDFC.
If yes, then describe the type of land being acquired from the categories below:				
Land (Quantify and describe types of land being acquired in "remarks column".				
Government and LG owned land free of occupation (agriculture or settlement)	✓			
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)				
Private land		✓		
Residential		✓		
Commercial		✓		
Agricultural		✓		

Communal		✓		
Others (specify in "remarks").				
Name of owner/owners and type of ownership document if available.				
If land is being acquired, describe any structures constructed on it		✓		Land is not being acquired as the proposed land is govt. owned as per consultation with MC / PMDFC.
Land-based assets:		✓		
Residential structures		✓		
Commercial structures (specify in "remarks")		✓		
Community structures (specify in "remarks")		✓		
Agriculture structures (specify in "remarks")		✓		
Public utilities (specify in "remarks")		✓		
Others (specify in "remarks")		✓		
If agricultural land is being acquired, specify the following:				
Agriculture related impacts		✓		
Crops and vegetables (specify types and cropping area in "remarks").		✓		
Trees (specify number and types in "remarks").		✓		
Others (specify in "remarks").				
Affected Persons (APs)		✓		
Will any people be displaced from the land when acquired? Yes/No		✓		
Number of APs		✓		
Males		✓		
Females		✓		
Titled land owners		✓		

Tenants and sharecroppers		✓		
Leaseholders		✓		
Agriculture wage laborers		✓		
Encroachers and squatters (specify in remarks column)		✓		
Vulnerable APs (e.g., women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in “remarks”.		✓		
Others (specify in “remarks”)				
How will people be affected?				

Prepared By:

Name: Muhammad Waqar Saleem
(Social & Resettlement Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

ANNEXURE - 10: IMPACT MATRIX

Project Impact Matrix																															
Environmental Component	Physical, Ecological and Social Environment																														
	Land Acquisition	Downstream Water Users	Air Quality	Noise	Soil Contamination	Aesthetic	Liquid and Solid Waste	Material Quarries and Borrow Pits	Surface Water	Irrigation Water	Wastewater	Soil degradation	Flora	Fauna	Livestock Grazing	Fishery	Mobility of Locals	Cultural Issues	Water Ponds	Gender Issues	Health & Safety of Workers	Archeological/Historical and Religious Sites	Security Situation	Human Health	Ground Water	Agriculture	Drinking Water	Livelihood	Employment Opportunities	Economic Uplift	
Project Component	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
A. Planning & Design Phase	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Site Selection	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Topography survey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geological investigation	0	0	-1	0	-1	-1	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-1	0	0	-1	0	0	0	0	0	0	
Seismic Investigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B. Construction Phase	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Clearing of land, Digging and excavation	0	0	-2	-2	-1	-3	-1	-3	0	0	-1	-1	-1	-1	0	0	-2	0	0	-1	-1	0	0	-1	0	0	0	1	3		
Storage of material	0	0	0	0	-1	0	-1	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0	
Loading and hauling	0	0	-1	-1	-2	-1	-1	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0	
Construction Camps	0	0	0	-1	-1	-2	-2	-1	0	0	-1	-1	0	0	0	0	-1	0	-1	-1	0	0	0	0	0	0	0	0	0	0	
Use of Heavy Machinery	0	0	-1	-3	-1	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	
Wastewater Disposal	0	0	0	0	-1	-1	-1	0	0	0	-1	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	-1	0	0	0	0	
Solid Waste Disposal	0	0	0	0	-1	-2	-2	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Leakages & Spillage	0	0	0	0	-2	-1	-2	0	0	0	-2	-2	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0	-1	0	0	
C. Operational Phase	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Rehabilitation / maintenance works	0	0	-2	-1	-1	0	-1	0	-1	0	-1	-1	0	0	0	0	0	0	0	0	-2	0	-1	-1	0	1	0	1	3	3	

ANNEXURE - 11: SCREENING CHECKLIST

Adverse Impact -, Significant Adverse --, Beneficial Impact +, Highly Beneficial ++,
No Impact 0

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
1	Atmosphere					
a	Ambient Air	0	--	0	-	0
b	Primary Pollutants	0	--	0	-	0
c	Secondary Pollutants	0	-	0	0	0
d	Noise	0	--	0	-	0
e	Vibration	0	-	0	-	0
2	Climate					
a	Temperature	0	0	-	0	-
b	Precipitation	0	0	0	0	0
c	Relative Humidity	0	0	0	0	0
e	Evaporation	0	0	0	0	0
3	Water Resources					
a	Surface Water	0	0	0	0	0
	Rivers	0	0	0	0	0
	Streams	0	0	0	0	0
	Springs	0	0	0	0	0
	Wetland	0	0	0	0	0
	Flow	0	0	0	0	0
	Quality	0	0	0	0	0
	Usage	0	0	0	0	0
	Sediments	0	0	0	0	0
	Chemicals	0	0	0	0	0
	Pollution	0	0	0	0	0
	Erosion	0	0	0	0	0
b	Ground Water					
	Sources	0	0	++	+	++
	Depth	0	0	++	+	++
	Quantity	0	0	++	+	++
	Potential Extraction	0	0	++	+	++

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
	Usage	0	0	++	+	++
	Domestic Supply	0	0	0	0	0
	Industrial Water Supply	0	0	+	0	+
	Irrigation	0	0	0	0	0
	Hydropower Generation	0	0	0	0	0
	Quality	0	-	+	0	+
4	Land Resources					
a	Topography	0	0	0	0	0
b	Soil	0	-	0	0	0
c	Major Land use	0	0	0	0	0
5	Ecological Environment					
a	Terrestrial Ecology					
	Flora	0	-	0	0	+
	Fauna	0	0	0	0	0
b	Aquatic Ecology					
	Aquatic Flora	0	-	0	0	0
	Aquatic Fauna	0	0	0	0	0
	Fisheries	0	0	0	0	0
c	Wildlife	0	0	0	0	0
d	Forestry	0	0	0	0	0
e	Beneficial Plants and Animals	0	0	0	0	+
f	Endangered Species	0	0	0	0	0
6	Socio-economic Environment					
a	Institutional and Administrative Setup	0	0	0	0	+
b	Demography	0	0	0	0	0
c	Gender issues	0	0	0	0	0
d	Social Equity	0	0	0	0	0
e	Settlement Patterns	0	0	0	0	0

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
f	Land Holdings & Titling	0	0	0	0	0
g	Common Resource Rights	0	0	0	0	0
h	Fish	0	0	0	0	0
i	Wood	0	0	0	0	0
j	Grazing	0	0	0	0	0
k	Fodder	0	0	0	0	0
l	Domestic Energy and Fuel	0	0	0	0	0
m	Domestic Water Supply	0	0	0	0	0
n	Sanitation	0	0	0	0	0
o	Health	0	-	0	0	0
p	Waterborne Disease	0	-	-	0	+
q	Common Diseases	0	0	0	0	0
r	Mental Health	0	0	0	0	0
s	Human Nutrition	0	0	0	0	0
t	Education & Literacy	0	0	0	0	0
u	Cultural & Historical Sites	0	0	0	0	0
v	Religious Sites	0	0	0	0	0
w	Aesthetics	0	0	0	0	0
x	Landscape	0	0	0	0	0
y	Livelihood	0	0	0	0	0
z	Agriculture	0	-	0	-	0
	Livestock	0	0	0	0	0
	Forestry	0	0	0	0	0
	Fisheries	0	0	0	0	0
	Industry	0	0	0	++	++
	Other Cash Income	0	+	+	+	++
7	Transport, Infrastructure & Communication					

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
a	Roads	0	-	0	0	0
b	Tracks	0	-	0	0	0
c	Bridges	0	0	0	0	0
d	Pedestrian Tracks	0	-	0	0	0
e	Navigation	0	0	0	0	0
f	Energy and Power	0	-	0	0	0
g	Telecommunication	0	0	0	0	0
8	Natural Risks and Hazards					
a	Earthquake	0	0	0	0	0
b	Landslides	0	0	0	0	0
c	Storms	0	0	0	0	0
d	Floods	0	0	0	0	0
e	Erosion	0	0	0	0	0
f	Drought	0	0	0	0	0
g	Human Disease	0	0	0	0	0
h	Pollution	0	--	0	-	0
i	Social Instability	0	0	0	0	+
j	Economic Instability	0	+	+	0	++
k	Political Instability	0	0	0	0	0
9	External Constraints					
a	Upstream Constraints	0	0	0	0	0
b	Upstream Impacts	0	0	0	0	0
c	Downstream Constraints	0	0	0	0	0
d	Downstream Impacts	0	0	0	0	0

ANNEXURE - 12: SITE PICTURES



ANNEXURE - 13: LABOR’S SOPS

PUNJAB CITIES PROGRAM

ENVIRONMENT, HEALTH AND SAFETY SOPs FOR LABOR/WORKERS

Labor /workers play key role in the infrastructure development and construction activities. The objective of preparation of the EHS SOPs for Labor/Workers is to address environment, health and safety issues related to the proposed sub-project implementation. These SOPs will provide guidelines to be followed by the contractors for effective management of EHS issues related to labor/workers/daily wagers (including women). These SOPs will be annexed in the general conditions of all the contracts carried out under the PCP. These SOPs are designed for Punjab Cities Program and will be applicable to all types of labor/workers/daily wagers (including women), hired for the construction activities under PCP. Following are the anticipated Environment, Health and Safety issues and their recommended mitigation measures.

Table 1: Construction Camp Management

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	<p>Camp sites for construction workers are the important locations that have significant impacts such as health and safety hazards on labor/workers</p> <p>Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.</p>	<p>The Contractor shall:</p> <p>Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view.</p> <p>Consider the location of construction camps away from communities in order to avoid social conflict with the surrounding communities.</p> <p>Submit to the relevant MC for approval of a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps.</p> <p>Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters</p>
Construction Camp Facilities	<p>Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will generate social issues and impacts on health and environment.</p>	<p>Contractor shall provide the following facilities in the campsites:</p> <p>Adequate ventilation facilities</p> <p>Safe and reliable drinking water supply for personal hygiene (washing or bathing)</p> <p>Adequate housing for all workers</p> <p>Safe and reliable drinking water supply. Water supply from tube wells that meets the Punjab Environment Quality Standards</p> <p>Hygienic sanitary facilities, hand washing facilities and sewerage system.</p> <p>The toilets and domestic waste water will be collected</p>

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		<p>through a common sewerage.</p> <p>Provide separate latrines and bathing places for males and females with total isolation by wall or by location. Female toilets should be clearly marked in language or signage clearly understood by the persons using them to avoid miscommunication. The minimum number of toilet facilities required is one toilet for every ten persons.</p> <p>Storm water drainage facilities. Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the silt retention pond to natural drainage via a grassed swale at least 20 meters in length with suitable longitudinal gradient.</p> <p>Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon.</p> <p>Provide child crèches for women working on the construction site. The crèche should have facilities for dormitory, kitchen, indoor/outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers</p> <p>Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by construction camps to be discouraged/prohibited to the extent possible.</p>
Disposal of Labor Camp waste	Management of wastes is crucial to minimize impacts on the environment as well as on the health of the workers/labor	<p>The Contractor shall:</p> <p>Ensure proper collection and disposal of solid wastes within the construction camps</p> <p>Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level.</p> <p>Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems at their own.</p> <p>Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition. Cover the bed of the pit with impervious layer of materials (clayey, thin concrete) to protect groundwater from</p>

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		<p>contamination.</p> <p>Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play with.</p> <p>All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.</p>
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	<p>The Contractor shall:</p> <p>Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass.</p> <p>Make available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking.</p> <p>Conduct awareness campaigns to educate workers on preserving the protecting of biodiversity in the project area, and relevant government regulations and punishments on wildlife protection.</p>
Health and Hygiene	There will be a potential for diseases to be transmitted including COVID-19, malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	<p>The Contractor shall:</p> <p>Provide adequate health care facilities within construction sites.</p> <p>Provide first aid box facility at the construction site round the clock. Maintain stock of medicines in the first aid facility in camp sites facility and appoint fulltime designated first aider or nurse.</p> <p>Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals and telephone/mobile facility to call for Emergency Services 1122.</p> <p>Initial health screening of the laborers coming from outside areas</p> <p>Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work</p> <p>Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis</p> <p>Provide adequate drainage facilities throughout camps to ensure that disease vectors habitats (stagnant water bodies, puddles) do not form.</p> <p>Regular mosquito repellent sprays in monsoon.</p> <p>Carryout short training sessions on best hygiene practices to</p>

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		<p>be mandatorily participated by all workers.</p> <p>Place display boards at strategic locations within the camps containing messages on best hygienic practices</p> <p>Place display boards of contact information of nearest dispensary/health clinic/hospital</p>
Safety	<p>In adequate safety facilities to the construction camps may create security problems and fire hazards</p>	<p>The Contractor shall:</p> <p>Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry in to the camp area.</p> <p>Maintain register to keep track on a head count of persons present in the camp at any given time.</p> <p>Encourage use of flame proof material for the construction of labor housing/site office. Ensure that these houses/rooms are of sound construction and capable of withstanding storms/cyclones.</p> <p>Provide appropriate type of firefighting equipment suitable for the construction camps</p> <p>Display emergency contact numbers clearly and prominently at strategic places in camps.</p> <p>Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractor.</p>
Food Safety	<p>There is potential for exposure to poisonous substances by ingestion</p>	<p>Suitable arrangements are to be made for provision of clean eating areas where workers are not exposed to the hazardous or noxious substances</p>
Site Restoration	<p>Restoration of the construction camps to original condition requires demolition of construction camps.</p>	<p>The Contractor shall:</p> <p>Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work.</p> <p>Dismantle camps in phases as the work decreases (do not wait for completion of the entire work).</p> <p>Give prior notice to the laborers before demolishing their camps/units</p> <p>Maintain the noise levels within the national standards during demolition activities</p> <p>Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material.</p> <p>Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site by MCs/ESFPs.</p> <p>Handover the construction camps with all built facilities as it is if agreement between both parties (contractor and land-owner) has been made so.</p>

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		<p>Restore the site to its original condition or to an agreed condition with the landowner defined prior to the commencement of the works (in writing).</p> <p>Not make false promises to the laborers for future employment in O&M of the project.</p>

Table 2: Cultural and Religious Issues

Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	Disturbance in performance of religious activities	<p>The Contractor shall:</p> <p>Provide separate prayer facilities (men and women) to the construction workers.</p> <p>Show appropriate and non-biased behavior with all construction workers irrespective of their religious or cultural affinities</p> <p>Allow the workers to participate in praying during construction time</p> <p>Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters</p> <p>In case of working during COVID-19 pandemic, SOPs for prayers in Mosque issued by the Government of Punjab, will be applicable and it will be responsibility of contractor to sensitize the labor/workers about it</p>

Table 3: Workers/Labor Health and Safety at Construction Site

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
Construction Activities	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise,	<p>The Contractor shall:</p> <p>Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labor Office guideline on ‘Safety and Health in Construction; World Bank Group’s ‘Environmental Health and Safety Guidelines’) and contractor’s own national standards or statutory regulations, in addition to complying with the national acts and rules of the Government of Pakistan</p> <p>Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of</p>

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
	dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc) and (iii) road accidents from construction traffic.	hazards in the work areas, Provide Personal Protection Equipment (PPEs) ¹ for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job Appoint an environment, health and safety manager to look after the health and safety of the workers Inform the local authorities responsible for health, religious and security before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters
	Child and pregnant labor	The Contractor shall: not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Employment of Children Act (2015) ² and Pakistani Labor Laws and policies respectively .

¹ Table 4 presents general examples of occupational hazards and types of PPE available for different purposes.

² The ECA 2015 defines a child as a person who has not completed his/her 14th year of age. The ECA states that no child shall be employed or permitted to work in any of the occupations set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the Act is carried out

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	<p>Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work</p> <p>Document and report occupational accidents, diseases, and incidents.</p> <p>Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice.</p> <p>Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures.</p> <p>Provide awareness to the construction drivers to strictly follow the driving rules</p> <p>Provide adequate lighting in the construction area and along the roads</p>
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	<p>The contractor shall provide separate portable toilets and hand washing facilities at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities should be at least six m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment.</p> <p>Contractor should provide bottled drinking water facilities to the construction workers at all the construction sites.</p>
Other issues	Potential risks on health and hygiene of construction workers and general public	<p>The Contractor shall follow the following management measures to reduce health risks to the construction workers and nearby community:</p> <p>Drainage Management</p> <p>Air Quality Management</p> <p>Noise and Vibration Management</p> <p>Road Transport and Road Traffic Management</p>
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	<p>The Contractor shall:</p> <p>Train all construction workers in basic sanitation and health care issues (e.g., how to avoid COVID-19, malaria and transmission of sexually transmitted infections (STI) HIV/AIDS.</p> <p>Train all construction workers in general health and safety matters, and on the specific hazards of their work Training should consist of basic hazard awareness, site specific</p>

3 .SOPs issued by the GoPunjab during COVID-19 Pandemic will be implemented

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
		<p>hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate.</p> <p>Commence the COVID-19, malaria, HIV/AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counseling and testing.</p> <p>Implement COVID-19, malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.</p>

Table 4: Summary of Recommended Personal Protective Equipment According to Hazard4

Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic Helmets with top and side impact protection.
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).
Foot protection	Falling or rolling objects, pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available.
	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.
Body/leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.

4 Source: IFC Environmental, Health, and Safety (EHS) Guidelines

ANNEXURE - 14: TORS FOR ENVIRONMENT AND HSE SPECIALISTS

A qualified Environment Specialist, HSE Specialist, and environmental inspectors will be hired by the contractor to implement ESIA during the construction activities. The contractor will be responsible for implementing the impact mitigation measures of the ESIA during the construction phase of the project. The key responsibilities with qualifications for safeguard staff of contract are given as under;

Environment Specialist (ES)

The main responsibilities of the C-ES include, but are not necessarily limited to the following;

- Responsible for all Environment Safeguard related matters at the site.
- Screen all construction activities for construction environment impacts and implement its mitigations.
- Prepare the Site-Specific Environmental Management Plan (SSEMP) and ensure its effective implementation.
- Ensure that all facilities (establishment of camp, asphalt and batching plants, borrow areas) will be selected in light of the EMP requirements.
- Maintain close liaison with Environment Specialist – Supervisory Consultant with respect to the implementation of ESMMP requirements and compliance to Punjab Environmental Protection Agency (PEPA) Environmental Approval;
- Monitor all the construction work and ensure that work has been undertaken in accordance with the ESMMP.
- Carry out site visits of construction camp, construction site(s), quarries, and borrow pits to review environmental status and rectify the non-compliances.
- Ensure that all waste generated from the construction site, camps, asphalt plants, etc. has been properly disposed of.
- Prepare the corrective action plan for the major non-compliances
- Supervise the environmental monitoring is being carried out as pre-defined frequencies mentioned in EMP.
- Implementation of the mitigation measures at the construction site;
- Responsible for the compliance of EMP recommendations and will also be responsible for effective liaison with local people
- Provision of proper Personal Protective Equipment (PPEs) to the workers and train them for their proper use;

Qualification Requirement

- Post Graduate degree in environmental engineering, environmental management, environmental sciences, Civil Engineering, or relevant areas

- 05 years of professional experience in implementing environment safeguard preferably on donor-funded projects or large-scale development projects
- Excellent written and spoken communication skills in English;

HSE Specialist

The main responsibilities of the HSE specialist include, but are not necessarily limited to the following:-

- Responsible for all HSE related matters at the site.
- Prepare the Health, Safety and Environment (HSE) Management Plan; Emergency Preparedness and Response Plan; Restoration and Rehabilitation Plan; Waste Management Plan; Disaster Management Plan; Drinking Water Supply and Sanitation Plan, Traffic Management Plan, Dust Control / Water Sprinkling Plan etc.
- Responsible for the Implementation of the HSE Plan, waste management plan, emergency response plan, disaster management plan etc.
- Screen all construction activities for construction HSE impacts and implement its mitigations
- Responsible for performing regular risk assessments during the construction activities and enforcing preventive measures.
- Perform the accident investigation, data analysis, and recurrence prevention programs and procedures
- Responsible for appropriateness of all safety equipment used at the site
- Perform periodic HSE-related and risk assessments at site and implement its mitigations.
- Impart training programs and workshops for the contractor's staff;
- Strong coordination with the Supervision Consultant.

Qualification Requirement

- Post Graduate degree in Health and Safety, Environmental Science / Management, Environmental Engineering, Civil Engineering, or other relevant discipline.
- 05 years of professional experience in managing health & safety on major roads & infrastructure projects.
- Must have NEBOSH International General Certificate in Occupational Health & Safety and certification in ISO 45001:2018 Occupational health and safety management systems.

ANNEXURE - 15: WASTE MANAGEMENT PLAN

As the project will generate significant volume of wastes of various types, the contractor will therefore implement its Waste Management Plan.

The following objectives form the basis for the waste management plan of the Campsite:

- Progressive reduction of wastes with the target to minimize overall emissions / discharges, which have adverse impact on the environment,
- Establishment, Implementation and maintenance of waste segregation aimed at enhancing recycling,
- Ensure effective waste handling and disposal processes.

Type of Waste

The major categories of wastes envisaged from the sub-project are outlined as follows:

- Solid wastes: These include felled vegetation, woods from crates, metals, papers and other scraps which are due to be removed during site clean-up, domestic waste (waste generated from camp kitchens, packing materials, boxes and plastics).
- Liquid wastes: These include non-hazardous operational waste generated from work construction sites e.g., sanitary water etc.
- Gaseous wastes: These include combustion products from construction engines, natural gas leaks etc.

Waste Minimization / Reduction

Waste minimization implies reduction to the greatest extent possible of the volume or toxicity of waste materials. The four principles of waste minimization (reduce, reuse, recycle and recover) shall be adopted as applicable.

Waste Segregation

Waste segregation and characterization shall be carried out on wastes that are similar and shall be combined to simplify storage, treatment, recycling and effective implementation of appropriate waste disposal methods. Wastes shall be segregated at source into clearly designated bins at strategic locations. Particular attention shall be given to the work area where a variety of wastes shall be generated.

Waste Disposal

All debris, spoilt materials, and other wastes shall be cleared regularly from the site and disposed at approved dump sites operated by designated waste disposal authorities. Instructions on material safety handling sheet shall be strictly adhered to and shall form the basis for the disposal of wastes related to such products. Wastes in transits shall be accompanied and tracked by waste disposal notes. The note shall contain such information as date of

dispatch, description of wastes, waste quantity, container type, designated disposal site and method, consignee name, means of transport and confirmation of actual disposal time and date. Special attention will be accorded to wastes removed from the sites and also drums of waste oil that might contain dangerous substances; these are to be transported to a site designated by MC for safe storage and subsequent testing prior to disposal.

Waste management audit of facilities shall be carried out in consultation with the key stakeholders, and findings shall be properly documented and followed up. Accommodation, catering services areas and work site shall maintain acceptable standard of hygiene and good house-keeping.

Contractor should be committed to effectively manage all their activities, including:

- Approved storage and use of raw materials and substances.
- Waste Management Plan - Waste minimization (promoting reduce, reuse, recycling, recovery including energy recovery and safe disposal).
- Monitoring and review of environmental performance.

Waste Management

The construction waste from the project site consists of asphalt waste, batteries, containers / drums, excavated natural material, oil filters, motor oil, scrap material and concrete waste. The waste from labour camp consists of the municipal waste of both solid and liquid effluent.

The liquid waste from campsite will be disposed of by using the septic tank.

Each type of solid waste has been managed separately and is discussed in the following table: **Error! Reference source not found.**

Sr. No	Type of Waste	Mode of Disposal / Use
A	Asphalt Waste	Reuse in applications such as base, and sub-base and some will be blended for use in new asphalt
B	Batteries	Sell to the scrap metal recyclers
C	Empty containers / drums	Sell to the scrap metal recyclers
D	Excavated natural material	Reuse offsites
E	Oil filters	Sell to recyclers
F	Motor oil	Sell to oil recycler for reprocessing and recovery
G	Scrap material	Sell to the scrap metal recyclers
H	Concrete Waste	Reuse in pavement base and sub-base
I	Municipal Solid Waste	Dispose in landfill site