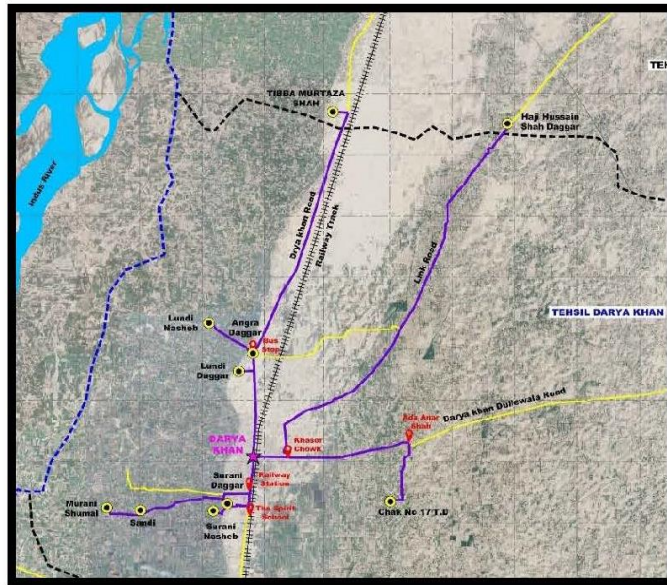


ENVIRONMENTAL IMPACT ASSESSMENT (EIA)



Draft Report

PUNJAB RURAL SUSTAINABLE WATER SUPPLY & SANITATION PROJECT (PRSWSSP), CLUSTER CENTRAL-I

10 Villages of Tehsil Darya Khan

(Surani Daggar, Surani Nasheeb, Sandi, Morani Shumali, Angra
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JUNE 2023

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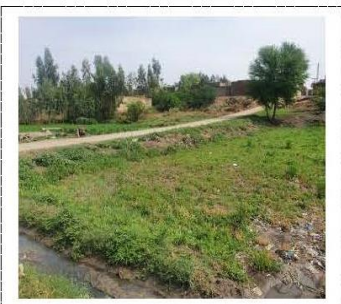


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Annex XV	Covid-19 SOPs



LIST OF ABBREVIATION

ABR	Anaerobic Baffled Reactor
AoI	Area of influence
BDL	Below detection limit
BHU	Basic Health Unit
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
BOQs	Bills of Quantities
CBD	Convention on the Biological Diversity
CBO	Community Based Organization
CC	Construction Contractor
CFT	Cubic foot
CO	Carbon Mono Oxide
COD	Chemical Oxygen Demand
DC	Design Consultant
DG	Directorate General
EA	Environmental Assessment
ECO	Economic Cooperation Organization
EDCS	Engineering, Design & Supervision Consultancy Services
EE	Environmental Engineer
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
ENE	East-Northeast
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
ERPs	Emergency Response Procedures
ESC	Environmental and Social Cell
ESMF	Environmental Social & Management Framework
EMMP	Environment Management and Monitoring Plan
ESS	Environmental & Social Safeguard
GAP	Gender Action Plan
GBV	Gender Based Violence
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GPD	Gallons per Day
GRC	Grievance Redressal Committee
GRM	Grievance Redress Mechanisms
HDPE	High Density Polyethylene
HHS	Households
HSE	Health, Safety & Environment
IEE	Initial Environmental Examination
LG	Local Government
LPG	Liquefied Petroleum Gas
MGD	Million Gallon per Day



MS	Medical Superintend
MSDS	Material Safety Data Sheets
NCS	National Conservation Strategy
NESPAK	National Engineering Services Pakistan
NGOs	Non-Governmental Organizations
NO	Nitrogen Oxide
NO ₂	Nitrogen Di Oxide
NOC	No Objection Certificate
NTU	Nephelometric Turbidity Unit
NW	North west
O&M	Operational and Maintenance
O ₃	Ozone
OHS	Occupational Health & Safety
OHT	Overhead Tank
OIC	Organization of the Islamic Conference
OP	Operational Policy
PATs	Pakistan Approaches to Total Sanitation
PCC	Public Complaints Center
PD	Project Director
PDWP	Provincial Development working party
PEPA	Punjab Environmental Protection Agency
PEQS	Punjab Environmental Quality Standards
PGA	Peak Ground Acceleration
PICs	Public Information Centers
PIMU	Project Implementation and monitoring unit
PIU	Programme implementation unit
PKR	Pakistan Rupees
PLGA	Punjab Local Government (Amendment)
PM	Particulate Matter
PPE	Personal Protective Equipment
PRMSC	Punjab Rural Municipal Services Company
PRSWSSP	Punjab Rural Sustainable Water Supply and Sanitation Project
PWA	Punjab Water Act
RCC	Reinforced Cement Concrete
ROW	Right of Way
SAARC	South Asian Association for Regional Cooperation
SBC	Seismic Building Code
SC	Supervision Consultant
SDS	Social Development Specialist
SDU	Service Delivery Unit
SEA	Sexual Exploitation and abuse
SH	Sexual Harassment
SO ₂	Sulfur Di Oxide
SOP	Standard Operating Procedures
SPM	Suspended particulate Matter
STDs	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections



STP	Sewage Treatment Plant
SWM	Solid Waste Management
TC	Total Coliforms
TCU	True Color Unit
TDS	Total Dissolve Solids
THQ	Tehsil Head quarter
TOR	Terms of Reference
TPV	Third Party Verification
TSS	Total Suspended Solid
UNCCD	United Nation Convention to Combat Desertification
UNESCO	United Nation Educational Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNO	United Nations Organization
WASH	Water, Sanitation and Hygiene
WB	World Bank
WBG	World Bank Guideline
WHO	World Health Organization
WWTP	Wastewater Treatment Plant



Executive Summary

1. Introduction

The Government of Punjab has launched a project for service improvement in rural areas of Punjab namely Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP). To implement this project Punjab Rural Municipal Services Company (PRMSC) has been established under Section 42 of Companies Act 2017. PRMSC has hired the services of National Engineering Services Pakistan (Pvt.) Ltd. (NESPAK) for the proposed project titled “Consultancy Services for Engineering Design and Construction Supervision of Punjab Rural Sustainable Water Supply & Sanitation Project (PRSWSS) Cluster: Central-I”.

The goal of PRSWSSP is to improve sanitation conditions, provide clean drinking water, and improve living conditions through solid waste management, behavior change, and capacity building for the sustainability of the project in rural settlements of Punjab.

Through various studies, it has been proven that poor condition of Water, Sanitation, and Hygiene (WASH) not only affects the health of the masses but also adversely affects the economic growth of the region. Recently, a number of mega initiatives have been launched by the Government, and international organizations in the urban areas of all provinces of Pakistan for the improvement of water and sanitation but the rural areas still remain neglected. Rural settlements of Punjab, which hold 73% of the province’s population living in 23,000 revenue villages, are in dire need of investments to improve WASH.

Outcomes of various studies and sector assessments, have identified requirements for improving climate resilience and planned economic growth of 2,000 villages that will be part of the project. Poverty, water contamination, stunting, and sanitation condition of the areas have been taken as basic parameters for the selection of project sites/tehsils.

As per Punjab Environmental Protection Agency (PEPA), review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations 2022, Schedule-II, EIA is required for ‘Water Supply, Sewerage System and Treatment (Category F).

2. Policy, Legal and Administrative Framework

The national and provincial Government has promulgated laws/acts, regulations, and standards for the protection, conservation, rehabilitation, and improvement of the environment. The Punjab Environmental Protection Department (EPD) is the regulatory authority, which has provided guidelines for conducting Environmental Impact Assessment (EIA) studies and has the authority to issue regulatory clearance/ No Objection Certificates (NOCs) for various projects.

3. Project Description

There are 10 selected Mouzas/ villages of Tehsil Darya Khan of District Bhakkar. These villages have been selected on priority basis in Central-I cluster as per the request of the Client and World Bank (WB).



The villages in the project area are facing grave issues related to water supply and sewerage. The underlying issues related to water supply and sewerage in the all ten (10) Mouzas/ villages are summarized below:

Water Supply Issues:

- Groundwater is Sweet but smelly and not consumable;
- No water supply Network in the villages;
- Most of the Household use shallow groundwater;
- Shallow ground water is not fit for drinking;
- Polluted Groundwater is causing water borne diseases; and
- People in most of the villages are facing health issues like hepatitis, kidney stones and joint pains.

Sewerage Issues:

- Sewerage system does not exist in most villages of Darya Khan;
- Existing open drains are damaged and collect sewage only from some houses;
- No proper Disposal Point in all the villages;
- Sewage collected in soakage pits and open plots seeps into ground and contaminates groundwater; and
- Raw sewage ponds are a breeding ground for diseases

The project is scheduled to be completed in 10 months. The estimated total cost for the construction of the proposed project is **1522.35** million PKR. This cost is tentative and will be finalized with the detailed technical design of the proposed project. The total man power required on site for proposed Project during construction will be approximately 160 workers per day.

4. Baseline Profile

A. Physical Environment

Darya Khan is located on the eastern bank of the Indus River. Topography of Darya Khan is predominantly flat, with gentle slopes and a lack of significant elevation changes. The flat terrain is suitable for agriculture, and the region is known for its production of crops such as wheat, cotton, and sugarcane. The area around Darya Khan consists of fertile flood plains along the Indus River.

Darya Khan, a tehsil of district Bhakkar, is located at 31.81°N, 71.33°E. The region around Darya Khan is predominantly composed of alluvial deposits, which are sedimentary materials transported and deposited by the Indus River over time. These deposits consist of sand, silt, clay, and gravel and they contribute to the fertile soil in the flood plains, supporting agricultural activities. The sedimentary rocks in the vicinity of Darya Khan primarily consist of sandstone and shale. Sandstone is a common rock type formed from the consolidation of sand grains. Shale is a fine-grained sedimentary rock composed of clay minerals. These rocks are



important reservoirs of groundwater and can also serve as potential sources of construction materials.

The project area has extreme climate. It has hot summer and cold winters. The summer starts from May and lasts till September. June is the hottest month. The mean maximum and minimum temperature are 46 °C and 27 °C respectively for month of June. The winter seasons lasts from November to February. January is the coldest month. The mean maximum and mean minimum temperature are 21 °C and 3 °C in January.

Highest intensity of precipitation is also observed in the months of June, July and August ranges between 5-10 mm

Fresh groundwater is available in the project area, which is also compatible with the general hydrogeological conditions of the Project area. Medium resistivity zone (31 - 150 ohm-meters) below water table is available for fresh groundwater exploration. This zone is encountered with appreciable thickness at all resistivity observation points from VES-1 to VES-5.

The Project Area is located in Seismic Zone 2A. The Zone 2A has Peak Ground Acceleration (PGA) in the range of 0.08 g to 0.16 g.

B. Biological Environment

The following section describes the biological environment of the project area.

In the area common animals found are dogs, cats, house rats and bats. Domestic livestock that was observed during field visit include buffalo, cattle, goats, sheep, hens and donkeys that are used by the local residents for their living and mobilization purposes. Some other fauna at project area is Jungle Cat (*Felis chaus*), Wild Pig (*Suss crofa*), Desert Wolf (*Canis lupus pallipes*), Common Grey Mongoose (*Herpestes edwardsi*), Long-eared Hedgehog (*Hemiechinus collaris*), Desert Jird (*Meriones hurrianae*), Yellowbellied Scotophil Bat (*Scotophilus heathii*), Kuhl's Pipistrelle (*Pepistrellus kuhlii*).

Major crops ripen and cultivated is wheat. In few places, tobacco is also cultivated.

Major crops that are cultivated in project area are Sugarcane, wheat, maize and Rice that cultivated in the project area and the major floral species of the project area are *Prosopis spicigera*, *Tamarix aphylla*, *Capparis decidua*, *Salvadora oleoides*, *Chenopodium* (*Prosopis spicigera*), *karir* (*Capparis aphylla*), *Beri* (*Zizyphus jujuba*), *Van* (*Salvadora oleoides*), *kikar* (*Acacia nilotica*), *Shisham* (*Dalbergia sissoo*) and *Aak* (*Calotropis spp*).

There are no endangered species of either flora or fauna in the project area. Neither any wetlands nor any wildlife is present in and around the project area.

C. Social Environment

Socioeconomic baseline was established using primary and secondary data. Detailed site visits were conducted by Social Experts to appraise the prevailing socioeconomic conditions and to assess the socioeconomic impacts of the proposed project. During the field surveys,



interviews and consultation meetings were held with the local representatives i.e., Numberdars, residents (Males & Females), shopkeepers, land owners, agriculturists, and their laborers, etc., in all ten villages.

Primary data was collected through a socioeconomic survey with the help of a structured questionnaire. A sample size of 80 respondents was adopted for the social survey. Secondary data was collected from the Pakistan Bureau of Statistics (Census 2017), established literature, and research.

5. Public Consultation and Information Disclosure

Engagement with stakeholders and disclosure is an integral part of the project's environmental and social assessment. The methods used for public consultation with project stakeholders in order to ascertain their stakes regarding project implementation were general/public meetings, rapid participatory appraisal, and on-site meetings.

Different categories of interested parties including project staff, government officials, and local communities were consulted to predict the nature and scale of risks, challenges, and impacts of the project perceived by them.

6. Anticipated Environmental Impacts and Mitigation Measures

The construction activities would cause changes in topography, soil contamination, surface & groundwater pollution, air pollution, noise & vibration, solid waste generation, disturbance to flora and fauna, overburdening of resources, construction camps issues, health & safety issues, emergency situations, traffic disruption, and social issues.

Anticipated impacts during the operational stage will include water pollution, air pollution, soil contamination, ecological disturbance, solid waste generation, occupational health & safety issues, and emergency situations.

The positive impacts of the project include the provision of clean water at stand-post, improvement in public health, hygiene, and sanitation, landscape, economic development, employment generation, and development of deprived villages.

7. Environmental Management and Monitoring Plan

Recommended mitigation measures to control potential adverse impacts are described in the Environmental Management and Monitoring Plan (EMMP). EMMP shall become the part of construction contract agreement and shall be strictly enforced during the implementation of the proposed project.

The proponent PIMU-PRMSC will be responsible for compliance with environmental and social safeguard requirements of the proposed project.

The proposed project activities will be monitored and managed by the PIMU-PRMSC. The Environmental and Social Cell (ESC) staffed by qualified environmental and social specialists has already been established under PRSWSSP. The ESC will be the custodian of the EMMP.



ESC will support ensuring the compliance of EMMP. ESC will submit progress reports for the implementation of the EMMP to EPD as per environmental approval/ NOC conditions for the PRSWSSP.

Grievance Redress Mechanism (GRM)

The Grievance Redressal Mechanism (GRM) will be consistent with the requirements of the World Bank safeguard policies to ensure the mitigation of community 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 village level.

The PIMU at the Local Government & Community Development Department (LG&CDD) level will serve as the Secretariat for the Grievance Redressal Committee (GRC Directorate) that will be responsible for providing oversight on the entire GRM process at a strategic level and monitoring complaints management.

The complaints may be lodged through:

- Tracking complainant(s) from subprojects sites (field and community level) to PIMU;
- 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, from Village and Tehsil, and document them into the monthly progress reports at PIMU.

GR (Village level) will be responsible to receive, log, and resolve complaints at the village level. The Grievance Redress Committee at the village Panchayats will review and identify actions to be taken to address the complaints at its weekly meeting. If not resolved timely then the complaint would be referred to GRC-Tehsil Level (SDU-TO) within 3 days after receiving.

GRC-SDU-TO will try to resolve the complaints in a satisfactory manner anyhow, if not satisfactorily resolved by the village panchayats/councils and Tehsil level, then the grievance will be referred for consideration by GRC at the PIMU/LG&CDD level within one week.

Every effort will be made to address or resolve grievances within the following fixed timelines, which will be an indicator of the performance of the handling system. Acknowledgment 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.

Environmental Budget

The total estimated cost for the implementation of EMMP is worked out to be about **PKR 37.30 million**.

1 INTRODUCTION

1.0 General

The Government of Punjab has launched a project for service improvement in rural areas of Punjab namely Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP). To implement this project Punjab Rural Municipal Services Company (PRMSC) has been established under Section 42 of Companies Act 2017. PRMSC has hired the services of National Engineering Services Pakistan (Pvt.) Ltd. (NESPAK) for the proposed project titled “Consultancy Services for Engineering Design and Construction Supervision of Punjab Rural Sustainable Water Supply & Sanitation Project (PRSWSS) Cluster: Central-I”.

The goal of PRSWSSP is to improve sanitation conditions, provide clean drinking water, improve living conditions through solid waste management, behavior change, and capacity building for the sustainability of the project in rural settlements of Punjab.

This Environmental Impact Assessment (EIA) has been prepared for the proposed project as per requirement of EPD. The current study covers various impacts of the design, construction, and operation of water supply, sewerage, and solid waste management facilities. It is to be noted that this EIA remains a live document, subject to modifications as the project design and technical specifications are finalized or modified prior to the implementation stage.

1.1 Project Background

Punjab is the most populous province of Pakistan with 110 million inhabitants out of which 70 million population resides in rural areas¹. Despite being the largest province with reference to population, the people living in rural areas of Punjab have been deprived of improved water and sanitation facilities for so long.

Poverty and Shared Prosperity Report, 2020² reveals that 4 out of 5 people live below the international poverty line in rural areas. Studies conducted in different periods of time have linked improved water and sanitation facilities with the alleviation of poverty and urged governments to provide high-quality water and sanitation facilities in order to uplift the people from the marshes of poverty and devastating socio-economic conditions.

Despite making significant efforts by the people at the helm of the affairs in Pakistan to improve the prevailing situation, 44% population of Punjab still does not have access to improved water and sanitation facilities as per globally established standards. Reports show that 3 in 5 households in Punjab use E-Coli contaminated water and every 25th household in Punjab lacks access to the improved sources of drinking water. Similarly, the situation of sanitation is also immensely deplorable.

Through various studies, it has been proven that poor condition of Water, Sanitation and Hygiene (WASH) not only affects the health of masses, but it also adversely affects the economic growth of the region. Recently, a number of mega initiatives have been launched

¹ https://pwd.punjab.gov.pk/population_profile

² <https://www.worldbank.org/en/publication/poverty-and-shared-prosperity-2020>

by the Government, and international organizations in the urban areas of all provinces of Pakistan for the improvement of water and sanitation but the rural areas still remain neglected. Rural settlements of Punjab, which hold 73% of the province's population living in 23,000 revenue villages, are in dire need of investments to improve WASH.

Outcomes of various studies and sector assessments, have identified requirements for improving climate resilience and planned economic growth of 2,000 villages that will be part of the project. Poverty, water contamination, stunting, and sanitation condition of the areas have been taken as basic parameters for the selection of project sites/tehsils.

The Government of Punjab, with the assistance of the World Bank, will finance complete detailed engineering designs through Engineering, Design & Supervision Consultancy Services (EDCS) under the pilot phase project in the revenue villages of Geographical based Cluster named "Central-I" of selected districts. The services will assist in; (i) design documentation, including Sub-scheme/Project Document (PC-I), Bill of Quantities, for water supply and sanitation services to achieve economies of scale and desired results, and (ii) resident supervision of infrastructure development.

As per Punjab Environmental Protection Agency (PEPA), review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations 2022, Schedule-II, EIA is required for 'Water Supply, Sewerage System and Treatment (Category F).

1.2 Objective of EIA

The objective of this EIA is the identification of possible environmental and social impacts of the proposed project on both short and long-term bases. Based on the level and nature of these observations, the EIA delineates proper mitigation measures. As a planning tool, the EIA 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 EIA are:

- To assess the existing environmental and socioeconomic conditions of the project area;
- To identify potential impacts of the proposed interventions on the environmental, ecological, and social aspects of the project area, to predict and evaluate these impacts and determine their significance;
- To propose appropriate mitigation measures that should be incorporated in the design of the project to avoid or minimize (if cannot 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; and
- To aid decision-makers in taking informed decisions.



1.3 Scope of EIA

The EIA identifies the potentially significant impacts of the proposed project and suggests the applicable mitigation measures to avoid, minimize or reduce the magnitude of the impacts. It will also indicate the institutional and training requirements to implement mitigation measures during the construction and operation of the proposed project.

The current EIA presents a preliminary roadmap for the environment and social management for the construction and operation of the water supply scheme, sewerage network, sewage treatment plant (STP), aseptic tank/ soakage pit and stand posts all selected 10 Mouzas of Tehsil Darya khan i.e., Surani Daggar, Surani Nasheb, Sandi, Morani Shumali, Angra Daggar, Lundi Daggar, Lundi Nasheb, Haji Hussain shah Daggar, Tibba Murtaza Shah Nasheb and Chak No. 17 TDA.

1.4 Contractual Requirements/ Obligations of EIA

The impacts and their mitigation measures, summarized in EIA, will be part of the Bidding Documents to ensure that contractors implement EIA recommendations at all project stages. The EIA requirements will be part of the Contract and the details prescribed in the EIA will be mandatory. The EIA will be equally applicable to Subcontractors, including nominated Subcontractors (if any).

At the stage of the bidding process, the Contractor will be instructed to carefully consider the requirements for environmental management and monitoring plan contained in this EMMP when preparing the bid and pricing the items of Work. The Contractor will need to accept that the prescriptions and clauses detailed in the EMMP are an integral part of the Contract for relevant items of Work; unless separate items are included in the Bill of Quantities (BoQs). The Contractor will need to accept that separate payment will not be made in respect to compliance with the EMMP. The Contractor should, therefore, be aware that in case the Contractor or Subcontractors fail to implement the EMMP recommendations, the Engineer shall take necessary action(s) to ensure that the EMMP is properly implemented and/or to rectify the damages caused by such negligence.

1.5 Proponent and the Consultant



1.6 Approach & Methodology to Work

1.6.1 Approach

The study has been conducted in accordance Punjab Environmental Protection Agency (PEPA) guidelines were also considered in preparation of this document. The study is based on both primary and secondary data and information. The primary data includes data collected from field i.e., information about existing conditions; environmental sampling and analyses for air, water and noise; environmental sensitive receptors, ecological survey; social survey including demographic characteristics, income dependency & quality of life, occupation, and social amenities etc. The secondary data includes a review of relevant information from literature and previous reports. Discussions were held with stakeholders including government officials, community representatives and a wide range of local communities. The main purpose of this approach was to obtain an impartial impression of the people's perceptions of the project and its environmental and social impacts.

The assessment remains subject to change with respect to the finalization of technical specifications and alignment of the proposed sewer, water supply lines & location of overhead tanks, pumping station, stand post and STP.

1.6.2 Methodology

The following methodology was adopted to develop the EIA of the proposed Project:

A. Orientation



Meetings and discussions were held among the members of the EIA Consulting Team. This activity is aimed at achieving a common ground of understanding 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 EIA Consulting Team. The plan included; identification of specific data requirements and their sources; determination of time schedules and responsibilities for their collection and the 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 the collection of data were conducted from March 14 to March 19, 2023 and April 16 to April 18, 2023. The data collected from the field include:

- Identification of environmentally sensitive receptors including air-sensitive receivers, noise-sensitive receivers, and water bodies expected to receive pollutant load;
- Sampling and analysis for air, noise wastewater, and groundwater;
- Ecological survey;
- Socioeconomic survey including public consultation;
- Stakeholders' consultations.

D. Sampling & Analysis of Physical Environmental Parameters

M/s Pak Green Services Laboratory (EPA Certified Laboratory) was hired for environmental monitoring. The Laboratory was mobilized on 14 & 15 March, 2023 for collection of water and wastewater samples as well as air and noise monitoring.

E. Review of Secondary Data

Previous environmental and social soundness assessment for tehsil Darya Khan 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 groundwater resources, and climate;
- **Biological environment:** 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. Review of Environmental and Social Laws and Institutional Requirements



The project needs to comply with all the applicable national and provincial environmental and social policies, laws, guidelines, acts, and legislations. All these requirements and policies were reviewed.

G. Area of Influence (Aoi)

The area of influence is the area likely to be affected by the project, including all its ancillary aspects. The Aoi includes the areas where positive and adverse impacts may be foreseen due to the execution of the proposed project.

A team of environmental and social/ gender experts, including environmental engineers, sociologists, ecologists, gender specialists & enumerators etc., carried out the environmental and social survey of the Aoi to familiarize themselves with the local conditions and the environmental settings. During the survey, information regarding the topography, soil, rock, surface water, groundwater, flora and fauna, forested areas, and social settings along the Aoi was collected.

H. Environmental and Social Baseline Survey of the Project

An environmental and social survey was carried out within the Aoi to establish the baseline of the project area from March 14 to March 19, 2023 and April 16 to April 18, 2023. Prior to the start of field activities, comprehensive checklists, proformas, and maps were developed to gather the following information:

(i) Physical Environment

The following information was acquired for the establishment of the physical environment baseline:

- Topography;
- Water resources (including available surface and groundwater resources and natural streams, hydrology, water supply, water contamination etc.);
- Climate data (including temperature, precipitation, humidity, wind speed, direction etc.);
- Water, surface water, ambient air quality and noise level monitoring data;
- Existing water supply and sewerage systems;
- Seismology;
- Land resources (including land use pattern, soil & geology); and
- Environmental Sensitive Receptors.

(ii) Ecological Environment

- Flora (trees, herbs, shrubs, grasses, and overall vegetation including valuable or rare trees and their loss due to implementation of the Project, etc.);
- Fauna/ Wildlife (Mammals, reptiles, amphibians, and avifauna.);
- Agriculture and livestock;
- Reserved forests, Community forests/ Private forests, and wildlife sensitive or notified areas in Aoi;
- Migratory birds' corridors; and



- Endangered species (both flora and fauna).

(iii) Socio-Economic Environment

A sample survey was carried out within the Aol in order to develop the socio-economic baseline information of the general settled population. Several socio-economic parameters were covered in the socio-economic baseline survey of the sample population settled along the Aol in the light of primary and secondary data. These aspects include but are not limited to the following:

- Demographic characteristics;
- Literacy status/ education;
- Nature of business/occupation;
- Livelihood/income;
- Living standard of the population;
- Social Infrastructure available;
- Gender issues;
- Housing construction patterns;
- Mode of transport;
- Basic amenities of the project area;
- Health facilities/ Educational facilities.; and
- Other aspects.

I. Stakeholder Consultations

For the current study, stakeholder consultations were carried out through following techniques:

- Formal/ informal meetings;
- Individual interviews;
- Group Discussions; and
- Scoping Sessions

The study team met with the government functionaries, affected persons and local communities in and around the project area. The objective of the consultation was to disseminate information on 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.

J. Impact Assessment and Mitigation Measures

A logical and systematic approach was adopted for impact identification and assessment. The process began during the screening and continued through scoping which identified the key issues and classified them into different categories. The tools were used for impact assessment, through Checklists (Environmental and social screening) for both the construction and operational phase.

Identification of potential environmental and social impacts in terms of their nature, magnitude, extent, location, timing, and duration was carried out. The impacts were correlated to the Project location, design stage, construction as well as operation stage. Based on the impacts prediction methods and as a result of public/stakeholder consultations, EIA team screened the adverse environmental and social impacts for inclusion in the mitigation measures and environmental and social management plan. Stakeholder consultations (which provided feedback on the impacts from the stakeholder's viewpoint) were used to screen out the insignificant impacts.

EIA team proposed practicable, economically feasible and socially acceptable mitigation measures for the significant adverse environmental and social impacts. These measures were based on exploring the ways to achieve the project objectives by causing the least disturbance to the existing environment by alternative ways, proposing changes in the Project design, through improved monitoring and management practices (storage of construction materials, labor camps, waste disposal, disposal of construction debris, etc. or through monetary compensation).

K. Environmental Management and Monitoring Plan

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

1.7 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 study.

Section 2: Legal and Administrative Framework Lists national as well as provincial laws, regulations and procedures.

Section 3: Project Description provides an overall description of the project including proposed networks, design considerations and concepts, manpower requirement, waste generation, machinery and material requirements.

Section 4: Baseline Profile gives a description of baseline physical, biological and socio-economic conditions of the project area.

Section 5: Public Consultation and Information Disclosure identify the main stakeholders and their concerns raised during scoping sessions and deal with the measures to mitigate the social impacts.



Section 6: Potential Environmental and Social Impacts and their Mitigations Measures

identify, predict, and evaluate the impacts of the project activities during the construction and operation stages and deal with the measures proposed to mitigate potential environmental impacts of the proposed project.

Section 7: Environmental Management and Monitoring Plan This section outlines the organizational framework, mitigation, and monitoring plans, and training requirements, defines roles and responsibilities and estimates budget requirements for satisfactory implementation.



2 LEGAL AND ADMINISTRATION FRAMEWORK

2.1 General

This section deals with the current environmental policy as well as legal and administrative framework required to develop Environmental Impact Assessment (EIA) for the proposed interventions in selected villages of Tehsil Darya Khan. All relevant provisions of environmental policies laid down by the Government of Pakistan, Government of Punjab has been duly discussed and the project proponent will be required to adhere to these regulations throughout the course of the project. The institutional arrangement for compliance to these laws has been described in EMMP (Section 7).



2.2 Summary of Key National Strategies, Policies, Acts and Legislation

The summary of key national strategies, policies, acts and legislation from environmental perspective are briefly described in **Table 2.1** below:

Table 2.1: Key National Strategies / Policies, Legislation / Acts, Laws And Regulations and Their Relevance to the Project

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
1	Fatal Accidents Act 1855	An act to provide compensation to family's loss occasioned by the death of a person caused by actionable wrong. It is enacted as follows: - Suit for compensation to the family of a person for loss occasioned to it by his death by actionable wrong - Not more than one suit to be brought - Plaintiff shall deliver particulars etc. - Interpretation clause	The provisions of this act would be applicable if any fatal accident occurs during the execution of construction works for the proposed Project.
2	Pakistan Penal Code 1860	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.	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.
3	Land Acquisition Act, 1894 (Including Later Amendments)	The primary law for acquisition of land for public purposes in Pakistan is 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 made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately.	State's land will be preferred for the construction of overhead tanks, pumping stations, STP, stand post and soakage pit/ aseptic tank. However, in some villages state land is not present in near vicinity, so private land will be acquired on voluntary land donation (VLD) bases.
4	Protection of Trees and Brushwood Act, 1949	This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department.	This act will be applicable to the proposed project in term of Tree Cutting.



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
5	Pakistan Antiquities Act 1975	The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area, which may contain articles of archaeological significance. NOC would be requested from DG Archeological Department for construction within 200 feet of cultural heritage sites.	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.
6	National Conservation Strategy 1992	Pakistan National Conservation Strategy (NCS), which was approved by the federal cabinet in March 1992, is the principal policy document on environmental issues in the Country. The NCS outlines the Country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment.	The core areas that are relevant in the context of the proposed project are pollution prevention during construction, conserving, biodiversity and supporting forestry and plantation.
7	Guidelines for Public Consultation, 1997	The Pakistan Environmental Protection Act 1997 requires public participation during the review of an EIA (Section 12(3)). The "Policy and procedures for the filing, review, and approval of environmental assessments" requires proponents to consult with the affected community and relevant NGOs during the preparation of an environmental report. Public involvement is a feature of environmental assessment and can lead to better and more acceptable decision-making. The objectives of public involvement include: • Informing the stakeholders about what is proposed;	These guidelines are applicable for the preparation of the EIA.



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
		providing an opportunity for those otherwise unrepresented to present their views and values, therefore allowing more sensitive consideration of mitigation measures and tradeoffs	
8	National Sanitation Policy, 2006	The National Sanitation Policy of Pakistan, 2006, stresses on the safe disposal of excreta away from the dwellings, creation of an open defecation-free environment and, promotion of health and hygienic practices in the country.	This policy is applicable to the project for the efficient management of solid waste or wastewater during construction or operation phase of the project. This project primarily focused on provision of improve sanitation services in Darya Khan.
9	Pakistan Labor laws	The labor laws are a comprehensive set of laws in Pakistan dealing with the following aspects: - Contract of Employment; - Termination of Contract; - Working Time and Rest Time; - Working hours; - Paid Leave; - Maternity Leave and Maternity Protection; - Other Leave Entitlements; - Minimum Age and Protection of Young Workers; - Equality; - Pay Issues; - Workers' Representation in the Enterprise; - Trade Union and Employers Association Regulation; and Other Laws.	The labor laws will be relevant as it will deal with employment of labor for the construction of proposed Project. Following are the major labor laws which are applicable to the project: - Bonded Labor System (Abolition) Act, 1992 - Employment of Child Act, 1991 - Minimum Wages Ordinance, 1961 - Industrial Relations Act, 2010
10	Pakistan Approaches to Total Sanitation, 2010	The PATS contains number of branded total sanitation models, having a key role of communities, which include: - Community Led Total Sanitation - School Led Total Sanitation - Component Sharing - Sanitation Marketing - Disaster Response	The applicable models of PATS will be adopted where it is necessary.



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
		The above models may be adopted by the provincial and local governments in accordance to what suits best in their local context and in accordance with the reinforcement values of PATS.	
11	Protection Against Harassment of Women at the Workplace Act, 2010	The Protection Against Harassment of Women at the Workplace Act refers to sexual harassment at the workplace.	This Act will be applicable to the project if women are employed for the construction of the proposed Project or women living in near vicinity of the project area.
12	Canal and Drainage Act 1873 and Amendment Act, 2016	This Act prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.	This act is applicable to the project for the efficient management of wastewater disposal during the construction or operation phase of the project.
13	Panchayats and Neighborhood's Councils Act, 2019	The Panchayats and Neighborhoods Councils Act, 2019 (PVPNCA 2019) was repealed in February 2021 through an amendment to the PLGA 2019. The result was the Punjab Local Government (Amendment) Ordinance 2021 that established a new tier of local government at the village level called Village Councils, which incorporated the main functions of village panchayats prescribed in the PVPNCA 2019 with regard to water, sanitation, and waste management.	This act is applicable to the proposed project, village councils is informed about the project and will remain in contact during the construction or operation phase of the project.
14	National Climate Change Act, 2021	The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. In view of Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. The policy covers measure to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity, and other vulnerable ecosystems. Notwithstanding the fact that Pakistan's contribution to global Greenhouse Gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate	This policy document is a 'live' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
		change has been highlighted by giving due importance to mitigation efforts in sectors such as energy, forestry, agriculture, and livestock.	

2.3 Key Provincial Strategies / Policies, Legislation / Acts, Laws and Regulations

The provincial policies, strategies, acts and laws relevant for the environmental safeguard of the project activities are given below in **Table 2.2**.

After the 18th amendment to the constitution of Pakistan, many subjects, including environmental protection and pollution prevention, have been devolved to the provincial jurisdiction. Therefore, the apex environmental statute governing the proposed project will be the Punjab Environmental Protection Act 1997 (Amended 2012, 2017 & 2022). However, detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are still in various stages of formulation and discussion. The following description presents a brief overview of the relevance of various existing provincial policies, legislation and guidelines.



Table 2.2: Key Provincial strategies / policies, legislation / Acts, Laws and Regulations and Their Relevance to the Project

Sr. No.	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to project
1	Punjab Land Revenue Act, 1967	The Land (Punjab) Revenue Act, 1967 was enacted on 7 December, 1967 and then was amended for the province of Punjab to consolidate and amend the laws related to the land revenue in Punjab. It expedites the consolidation and maintenance of the record of rights, assessment and collection of land revenue, appointment of land officers and all the matters relating and arising in connection with the administration of land revenue.	The provisions of this act would be applicable during the implementation of the proposed project.
2	Punjab Plantation and Maintenance of Trees Act, 1974	The Punjab Plantation and Maintenance of Trees Act, (1974) regulates tree plantations and enforces measures for their protection. The requirements of this act are applicable in terms of planting new trees and their maintenance by the occupier of the proposed Project land who would have the physical possession.	This act would be implemented if any tree cutting activity involved during construction.
3	The Punjab Wildlife (Protection, reservation, Conservation & Management) Act, 1974	This act provides for the protection, preservation, conservation and management of wildlife in the Province of Punjab. This act defines the wildlife sanctuary, game reserves, protected areas, and national parks. It also defines the rules and responsibilities of the relevant authorities and the relevant personnel to protect ecological resources. It also describes the penalties and punishments on offenses against the sections given in the act.	This policy is to avoid any disturbance to ecological system near project area due to construction activities.
4	Punjab Land Acquisition Rules, 1983	This Law provides for the acquisition of land needed for public purposes and for Companies, and determines the amount of compensation to be made on account of such acquisition. The Collector of the District may make a preliminary investigation on any land in any locality that may be needed for any public purpose or for a Company. The Commissioner, for land acquired for a public purpose, or the Provincial Government for land acquired for a Company, when satisfied of the result of the investigation, shall publish a notification in the Official Gazette. Following this, a declaration of intended acquisition shall be published, and shall state the district or other territorial division in which the land is situate, the purpose for which it is needed, its approximate area, and, where a plan shall have been made of the land, the place where such plan may be inspected (Part II). The amount of compensation shall then be settled, and if any dispute arises the Collector may	The provisions of this act would be applicable during the execution of the proposed project.



Sr. No.	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to project
		refer such dispute to the decision of the Court (Part IV and V). Part VI deals with procedures for the temporary occupation and use of any waste or arable land needed for any public purpose or for a Company. The acquisition of land for companies is provided for in Part VII. Part VIII contains provisions of miscellaneous nature.	
5	The Motor Vehicles Rules, 2000	Subject to the provisions of this Act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards customary under clause (g) of sub-section (I) of section 6.	During Construction all these rules will be followed to avoid emission of air pollutant.
6	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. The proposed project is semi- urban in nature and no protected forest is situated in and around the Project area.	During construction there will be no clearing of any forest for cultivation in this site. Incase If any site observed permission will be seek prior construction activities.
7	Punjab Drinking Water Policy 2011	The overall objective of Punjab's Water Policy is to provide clear policy directions to the Government of Punjab on the sustainable management and development of water from all sources of water (surface water, groundwater and rainwater), for all sub-sectors of water use (domestic, stock water, agriculture, industry).	This policy is applicable and drinking water supply will be designed according to PDWP policy guidelines.
8	Punjab Environmental Tribunal Rules, 2012	According to Section-31 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Tribunal shall make every effort to dispose of a complaint or an appeal or other proceedings regarding environmental problems associated with the construction and development of any project within sixty days from the date of filing of the complaint, appeal or other proceedings but any decision of the Tribunal shall not be rendered invalid by reason of any delay in the disposal of complaint, appeal or other proceedings.	This is applicable to dispose of a complaint or an appeal or other proceedings regarding environmental problems associated with the construction and development of any project within sixty days from the date of filing of the complaint, appeal or other proceedings.
9	Punjab Antiquities Amendment Act, 2012	The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The law will be applicable to	The provisions of this act would be applicable, if any accidental



Sr. No.	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to project
		the proposed project mainly due to its provision that "any construction activity within 61 meter or 200 ft. of protected antiquities, are prohibited". The provisions of this act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the construction of proposed Project.	archaeological discoveries may occur during the excavation works for the construction of proposed Project.
10	Punjab Environmental Quality Standards (PEQS), 2016	In exercise of the powers conferred under clause (c) of sub-section (1) of section 4 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Environmental Protection Council has approved the Punjab Environmental Quality Standards (PEQS), 2016. They endow information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions in order to regulate environmental pollution. Results of environmental monitoring (ambient air, water and noise) conceded out at different locations in study area are compared with PEQS values and are conversed in later chapter of the report.	These standards are applicable in compliance with all the Punjab Environmental Quality standards of different Environmental Parameters during Construction and operational phase.
11	The Punjab Flood Plain Regulation Act, 2016	This act regulates construction in the flood plains in the Punjab. According to this act, no construction can be carried out in flood plains without prior approval in writing from canal officer.	Construction work will be carried out in underground for installing of water supply lines and sewerage lines.
12	Punjab Restriction on Employment of Children Act, 2016	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. This act will trigger if contract higher skilled and unskilled labor under age 15.	The relevance of this act to the project will be to prohibit child employment for construction of the proposed project
13	Punjab Protection of Women against Violence Act, 2016	This act counters gender-based discrimination, violence against women, and economic and social empowerment of women. This act will entail if gender-based violence observed in the project area during construction phase.	This Act will be applicable to the project if women are employed for the construction of the proposed Project or women living in near vicinity of the project area.
14	Punjab Tehsil / Town municipal Administration (Works)	According to Chapter VIII-A Occupational Safety &Hazard 50 A Workplace Safety: - 1. the Contractor shall ensure that:	All the mentioned clauses will be applicable on construction labor/workers/ and sewer

Sr. No.	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to project
	rules, 2003 (amendments, 2016)	a) any hazard at the place of work, during the execution of work, shall not cause any loss of life. b) The work shall not loss to the property of any other person; c) Before commencing the work, all the safety equipment is in place and safety measures have been taken as necessarily required at the place of work: d) All necessary safety requirements are strictly adhered to at the place of work; and e) Protective safety equipment for workers, as specified by the local government engineer, are functional and in working order. 50 B the Local Government Engineer shall ensure that: 1. All the safety measures, during the operation and maintenance of existing infrastructure, according to the nature of work, have been adopted to secure life and property; and 2. All precautionary measures and use of sewer safety 3. equipment specified in Schedule have been taken in respect of; 4. Sanitation functions; or Cleanliness of sewer, manholes and descending sanitary workers in the sewer manholes.	men/sanitary workers during execution of subprojects.
15	Punjab Environmental Protection Act 1997 (Amended 2022)	Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. The Punjab Environmental Protection Act, 1997 (as Amended up to 2022) is comprehensive legislation and provides the legislative framework for protection, conservation, rehabilitation and improvement of the environment. The „environment“ has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses „a“ to „f“.	All projects to be implemented in Punjab must comply with PEQS during all the phases i.e., construction and operation. No Objection Certificate (NOC) shall be required from Punjab Environmental Protection Department (EPD) Punjab, before commencement of construction.

Sr. No.	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to project
16	Punjab Policy on Controlling Smog, 2017	The Punjab Environmental Protection Department issued this policy on controlling smog in 2017. It imposed a complete ban on open burning of rice stubble, solid waste and other hazardous materials. It focuses the reasons behind the formation of dense smog in the Punjab, especially in Lahore and its environs, on the onset of winters each year and provide a short and medium to long term plan, including measure for protection of school going children; minimizing road accidents and creating mass awareness on precautionary measures for citizens at large.	During construction and operational phases all PEQS will be followed in accordance with to compliance and to minimize pollution load to control smog.
17	Punjab Labor Policy, 2018	Through this Labor Policy, the Government resolves to demonstrate its commitment to work for the protection of labor and ensuring its dignity through coordinated efforts and policy integration. The Punjab Labor Policy, 2018 also intends to guide and support the Government and the stakeholders in developing strategies, plans and programs for the protection and promotion of the rights and benefits of working community without jeopardizing the genuine concerns of the employers.	The labor policy will be relevant as it will deal with the protection of labor.
18	Punjab Growth Strategy 2018	The document endorses Punjab's health sector vision and strategy, which emphasizes improvement of water, sanitation and hygiene services to prevent communicable diseases.	This strategy will be adopted in design of proposed project.
19	Punjab Occupational Safety and Health Act, 2019	This law was enacted to ensure occupational safety and health of the persons at workplace. It aims at protection of workers against risks arising out of the occupational hazards and to promote safe and healthy working environment catering to the physiological and psychological needs of the employees at workplace.	This act will be applicable to the proposed project in term of the health and safety during the construction and operational phases of the project.
20	Punjab Water Act 2019	An Act to comprehensively manage and regulate water resources in the Punjab in the interest of conservation and sustainability. It is expedient to provide for comprehensive management of all water resources in the Punjab and to regulate their use in the interest of conservation and sustainability and matters connected with and ancillary thereto.	This act will be applicable to the proposed project. The drinking water supply will be designed in light of PWA, 2019.
21	Punjab Local Government Act 2022	It is expedient to reconstitute the local governments and consolidate laws relating to powers and functions of local governments for establishing an effective elected local government system for meaningful devolution of	All project activities to be implemented must comply with Punjab Local



Sr. No.	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to project
		political, administrative and financial responsibility and authority to the directly elected representatives of the local governments as envisaged under Article 140A of the Constitution to promote good governance, effective delivery of services and transparent decision making through institutionalized participation of the people at local level; and to deal with ancillary matters.	Government Act during all the phases i.e., construction and operation.

2.4 Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labor Influx

This guidance note provides guidance on identifying, assessing and managing the risks of adverse social and environmental impacts that are associated with the temporary influx of labor resulting from Bank supported projects. The guidance note contains guiding principles and recommendations to be considered as part of the design and implementation of projects with civil works that require labor from outside the project's area of influence.

2.5 International Protocol/Conventions

As Pakistan is a member of a number of international organizations such as United Nations Organization (UNO), Organization of the Islamic Conference (OIC), South Asian Association for Regional Cooperation (SAARC), Economic Cooperation Organization (ECO) etc., so it has to follow the international protocols and obligations related to the environment. The major protocols, ratification dates by Pakistan and obligations related to the proposed project are provided in the **Table 2.3** below.

Table 2.3: International Agreements/Conventions Relevant to the Project

Sr. No	Agreement/ Convention	Ratification	Description/Relevance
1.	UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972 Web Link: http://whc.unesco.org/en/%20convention%20text/	Pakistan ratified this convention on 23 July 1976.	Convention concerning the Protection of the World Cultural and Natural Heritage - requires parties to adopt a general policy on the protection of the natural and cultural heritage, to set up services for such protection, to develop scientific and technical studies, to take appropriate legal, technical, scientific and administrative measures and to foster training and education for such protection. The proposed project design and ESS team paid due attention to archaeological sites and local norms. Both of these factors will also be considered during project implementation.
2.	Convention on Conservation of Migratory Species of Wild Animals, 1979 https://www.cms.int/	Pakistan signed this convention in 1981 and ratified it in December 1987.	Convention on the Conservation of Migratory Species deals with the conservation and protection of the migratory species. Species covered in the Convention should be given special attention during EA and monitoring and any impacts identified should be mitigated to acceptable levels.
3.	The Rio Declaration, 1992	Pakistan signed the treaty on 13Jun 1992 and ratified on 1 June 1994	The Rio Declaration comprises 27 principles which address important issues such as; sustainable development to integrate environmental

Sr. No	Agreement/ Convention	Ratification	Description/Relevance
	Web Link: http://www.unesco.org/education/pdf/RIO_E.PDF		protection into the development process; common but differentiated responsibilities to conserve, protect and restore the earth's ecosystems; public participation and information access at the national level, reduce and eliminate unsustainable patterns of production and consumption.
4.	Convention on Biological Diversity, 1994 Web Link: https://www.cbd.int/	Pakistan signed this treaty in 1992 and it was ratified by cabinet in 1994.	The Convention on the Biological Diversity (CBD) has three main goals: Conservation of biological diversity (or biodiversity); sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources.

2.6 Institution Responsible for Planning, Policies and Regulations

The institutional setting in Punjab has traditionally comprised various agencies at federal, provincial and LG levels with separate land areas, separate legal and administrative frameworks, and engaging in little institutional coordination.

2.6.1 Environmental Protection Agency, Punjab

Implementation of Punjab Environmental Protection Act 1997 (Amended 2012, 2017 & 2022) is the mandate of the Punjab-EPD. Punjab-EPD is headed by a Director General, and sections are headed by Directors, i.e., Director Technical, Director Administration and Finance, and Director Laboratory. Punjab-EPD has established District Environment Offices at district level.

As the proposed Project falls in Tehsil Darya Khan of District Bhakkar Punjab, therefore, Punjab-EPD will be responsible for reviewing the report, issuing environmental approval and overall monitoring of the proposed project activities.



3 PROJECT DESCRIPTION

The proposed subproject encompasses selected 10 Mouzas/Villages of Tehsil Darya Khan of District Bhakkar i.e., Surani Daggar, Surani Nasheb, Sandi, Morani Shumali, Angra Daggar, Lundi Daggar, Lundi Nasheb, Haji Hussain Shah Daggar, Tibba Murtaza Shah Nasheb and Chak No. 17 TDA. These villages have been selected on priority basis in Central-I cluster as per the request of the Client and World Bank (WB).

3.1 Need and Purpose of Project

The villages in the project area are facing grave issues related to water supply and sewerage. The underlying issues related to water supply and sewerage in the all ten (10) villages are summarized below:

Water Supply Issues:

- Groundwater is Sweet but smelly and not consumable;
- No water supply Network in the villages;
- Most of the Household use shallow groundwater;
- Shallow ground water is not fit for drinking;
- Polluted Groundwater is causing water borne diseases; and
- People in most of the villages are facing health issues like hepatitis, kidney stones and joint pains.

Sewerage Issues:

- Sewerage system does not exist in most villages of Darya Khan;
- Existing open drains are damaged and collect sewage only from some houses;
- No proper Disposal Point in all the villages;
- Sewage collected in soakage pits and open plots seeps into ground and contaminates groundwater; and
- Raw sewage ponds are a breeding ground for diseases

3.2 Project Location

There are 10 selected Mouzas/ villages of Tehsil Darya Khan, Chak No.17/T.D.A. is located on Darya Khan – Dullewala road, at approx. 12 km towards east of Darya Khan, Sandi is located on Darya Khan – Kallur Kot Road, at approx. 9 km towards south-west of Tehsil Headquarter, Lundi Nasheb is located on Darya Khan – Kallur Kot Road, at approx. 8 km towards north of Tehsil Headquarter, Morani Shumali is located on Darya Khan – Kallur Kot Road, at approx. 10.5 km towards south-west of Tehsil Headquarter, Angra Daggar is located on Darya Khan – Kallur Kot Road, at approx. 5.5 km towards North of Tehsil Headquarter, Haji Hussain Shah Daggar is located on Darya Khan – Kallur Kot Road, at approx. 24 km towards north-east of Tehsil Headquarter, Surani Daggar is located on Darya Khan – Kallur Kot Road, at approx. 3 km towards south-west of Tehsil Headquarter, Surani Nasheb is located on Darya Khan – Kallur Kot Road, at approx. 4 km towards south-west of Tehsil Headquarter and Lundi Daggar is located on Darya Khan – Kallur Kot Road, at approx. 5.5



km towards North of Tehsil Headquarter. The location map of all (10) villages is shown in **Figure 3.1**.

3.3 Objective of Project

The project development objective is to provide equitable and sustainable access to safely managed water and sanitation and reduce child stunting.

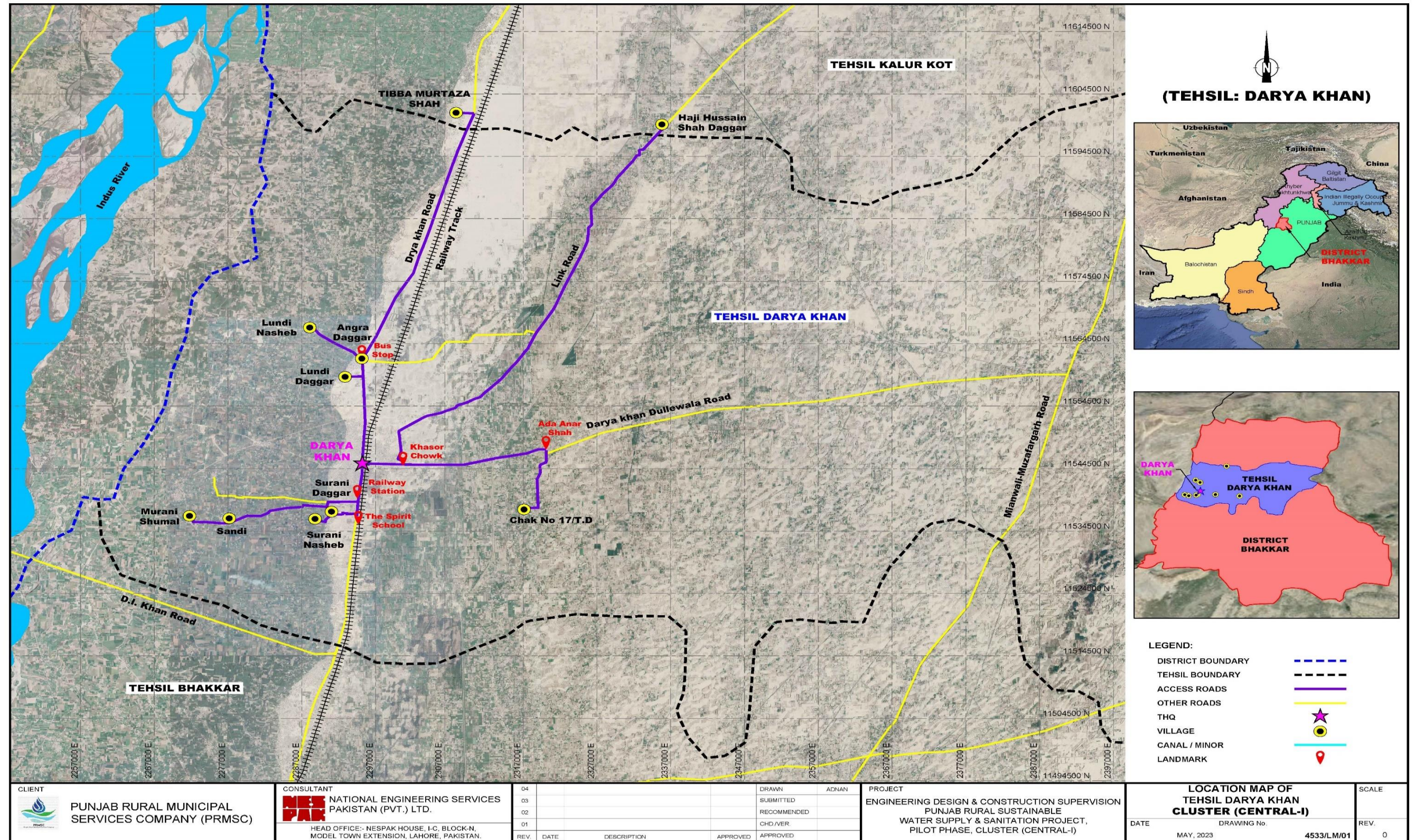


Figure 3.1 : Location map of all ten (10) villages



3.4 Project Description

3.4.1 Existing System

A. Existing Water Supply System

There is no existing water supply system in all selected ten (10) Mouzas/ villages. The ground water is sweet but smelly and turns yellow after few hours of its extraction. Ground water is available at the depth of approximately 20-25 ft. Shallow handpumps of 30-35 ft bore depths are installed which are used to pump groundwater for domestic purposes such as bathing and washing dishes. In Angra Daggar water filtration plant is present but it is not operational. One redundant Tubewell room and non-functional overhead reservoir (OHR) are also present in this village. Private domestic boreholes are main water source in all selected villages of tehsil Darya khan.

B. Existing Sewerage System

There is no existing sewerage pipe network or disposal station in selected Mouzas/ villages, Sewage is collected through unplanned drains except Lundi Nasheb and Angra Daggar. In Lundi Nasheb Sewerage system is present in about 50% of the main habitation. The sewerage scheme was laid in 2017-18 by Public Health Engineering Division, Bhakkar according to villagers. Sewage is collected by RCC pipes along main roads and disposed into a disposal station, built on private land. Disposal station is currently nonoperational. The sewage is stagnated around the disposal station and used to irrigate nearby crops/farmlands via irrigation water courses. Other 50% of the main habitation has unplanned open drains which dispose sewage in the ponds on private land or into fields for irrigation use. In Angra Daggar sewage is collected through open drains. There is small length of pipe that is collecting sewage from few streets but there is no existing disposal station in the village.

Most of the household has built a soakage pit and all sewage generated is being discharged into it. The soakage pit is cleaned/drained once completely filled.

3.4.2 Proposed System

A. Criteria for selection of facilities

According to minutes of the meeting received vide letter No. PRMSC/PRWSWSSP/EDCS/Central-I/494 dated 27.01.2023, the Client instructed the Consultants to provide interventions in major settlements of revenue villages based on the number of households (2023) as per criteria mentioned below in **Table 3.1** & Minutes of meeting attached as **Annex-I**.

Table 3.1: Criteria for selection of facilities

No. of Households	Intervention for Water Supply System	Intervention for Sewerage System
HH<40	Behavior Change/Communication Campaign only	Behavior Change/Communication Campaign only
40<HH<200	Public Standposts with Chlorination (Non-Piped System)	Septic Tanks and Soakage Pits (Non-Piped System)



No. of Households	Intervention for Water Supply System	Intervention for Sewerage System
HH>200	Piped Water Supply System with Chlorination	Piped Sewage Collection System with Treatment Plant

Based on criteria referred above in **Table 3.1**, the number of households in five (05) villages are greater than 200 therefore, piped network (water supply and sewerage system) along with sewerage treatment plant (STP) has been proposed. In remaining villages, the number of households are between 40 to 200, therefore community stand post for clean drinking water has been proposed and septic tanks & soakage pits will be provided for disposal of sewage.

B. Design Principle of Sewerage system

Proper sewerage system is not present in these villages. There are multiple disposal points in each village. The main objective of the proposed sewerage system is to converge the whole system towards a single point and then dispose of into pumping point that would eventually pump into proposed treatment plant. Following components are proposed in the villages:

- House connections chambers;
- Lateral sewer lines; these will dispose of into trunk lines;
- Trunk sewer lines;
- Sewage Pumping station;
- Sewage Treatment Plant;
- Septic tanks and Soakage pits.

Sewer line will be laid in the center of the street and house connection chambers will be provided in middle of two houses on both sides of the street to collect sewage into sewer line. Typical detail of house connections with single sewer line is shown in **Figure 3.2**.

Summary of Proposed Sewerage System in Revenue villages of Darya Khan (With Pipe Network) is given in below **Table 3.2** & Schematic of Proposed Sewerage System (For Piped System) is shown below in **Figure 3.3**.

Table 3.2: Summary of Proposed Sewerage System in Revenue villages of Darya Khan (With Pipe Network)

Sr. No.	Village Name	Total Served Population (2050)	Sewage Design Flow	Length of Sewerage Network	Final Disposal Point
		(Persons)	(cusecs)	(ft)	
1	Tibba Tarkhana Wala (Surani Daggar)	2,912	0.44	20,953	Nearby Water Course
2	Sandi	1,949	0.30	15,407	Nearby Water Course



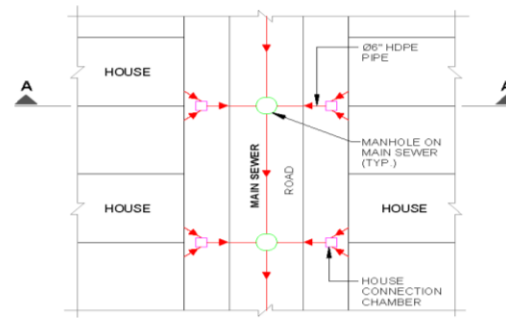
3	Angra Daggar/Tibba Khichiyana Wala (Lundi Daggar)	8,710	1.21	35,675	Nearby Water Course
4	Lundi Nasheb	4,946	0.75	11,150	Nearby Water Course
5	Haji Hussain Shah Daggar/Tibba Murtaza Shah Nasheb	9,998	1.35	38,847	Nearby Water Course

In case of aseptic tank and soakage pits, aseptic tank will be connected to two (02) households. Last chamber of septic tank will also have filter media in it and outlet will be connected to a soakage pit. Effluent from soakage pit will be directly discharged into the ground. Details are given in below **Table 3.3** & Schematic of Proposed Septic Tank with Soakage Pit (For Un-Piped System) is given below in **Figure 3.4**.

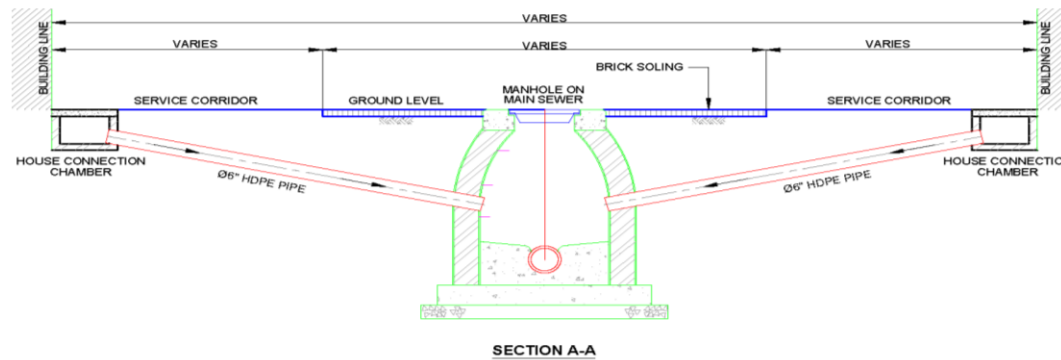
Table 3.3: Summary of Proposed Sewerage System in Revenue villages of Darya Khan (Without Pipe Network)

Sr. No.	Settlement Name	Population (2023)	No. of Households (2023)	No. of Septic Tanks	No. of Soakage Pits
1	Basti Sheikhan Wali (Surani Daggar)	1,183	123	74	74
2	Basti Baleli (Surani Nasheb)	669	69	42	42
3	Basti Morani Shumali	1,391	144	87	87
4	Tibba Hamid Shah (Lundi Daggar)	1,397	145	87	87
5	Basti Chah Thalla (Haji Hussain Shah)	1,362	141	85	85
6	Chah Shera Khu 01 (Chak 17/TDA)	1,156	120	72	72
7	Chah Shera Khu 02 (Chak 17/TDA)	726	75	45	45

***Note:** Each septic tank and soakage pit will be connected with two houses. However, an additional quantity of 20% has been taken.



TYPICAL HOUSE CONNECTION DETAIL



SECTION A-A

Figure 3.2: Typical Detail of Proposed House Connections with Sewer Line

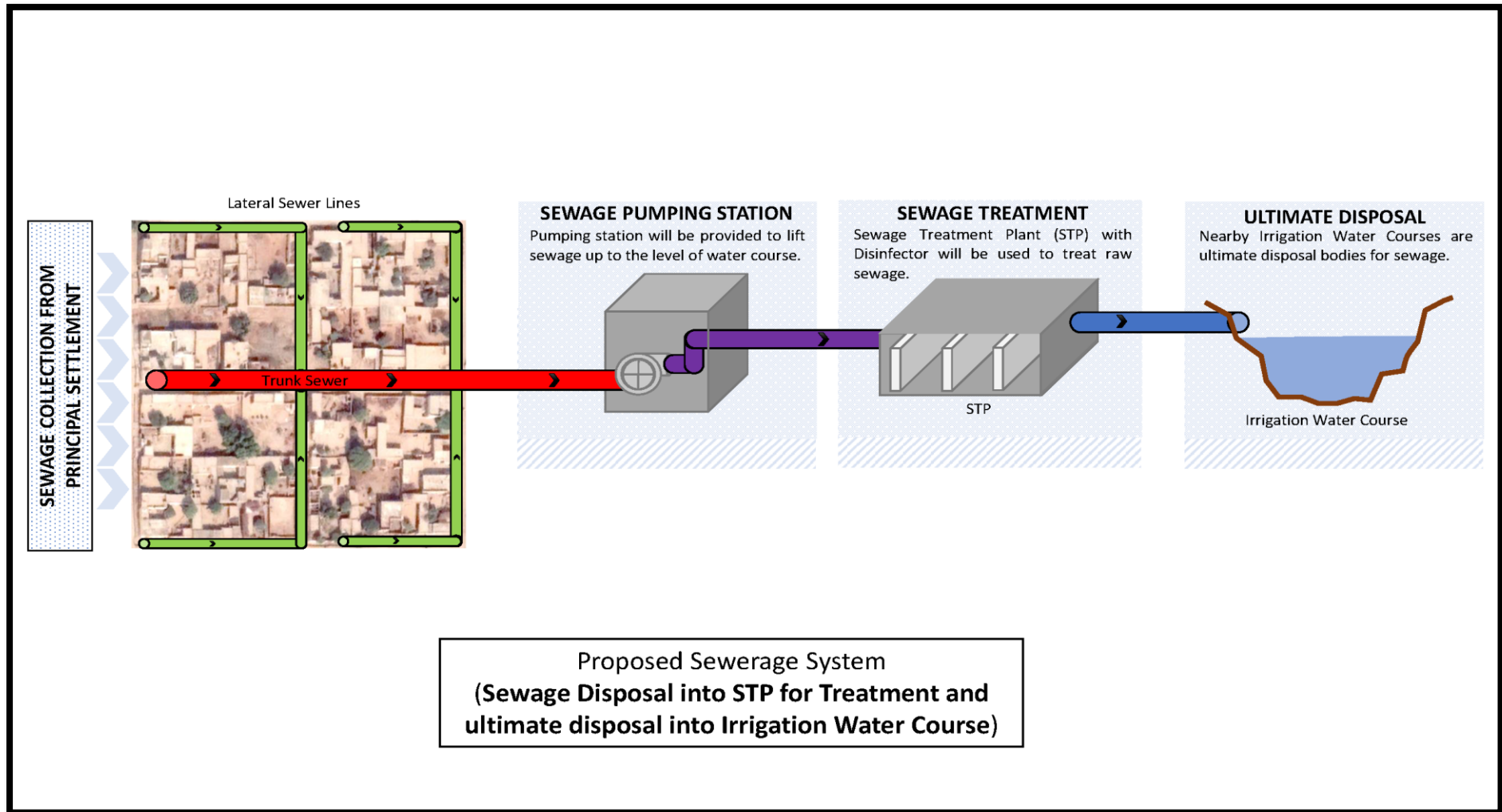


Figure 3.3: Schematic of Proposed Sewerage System (For Piped System)

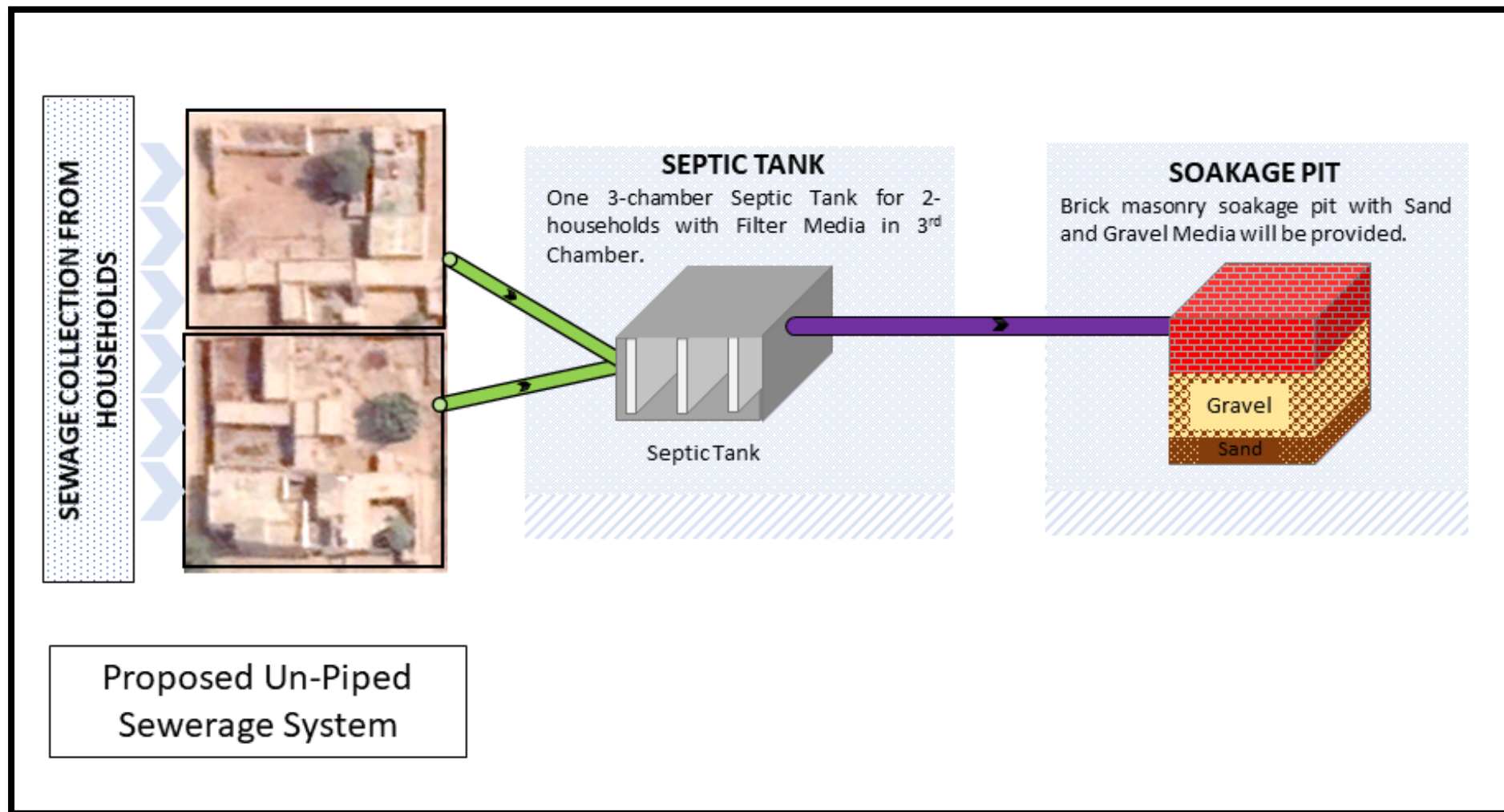


Figure 3.4: Schematic of Proposed Septic Tank with Soakage Pit (For Un-Piped System)



C. Design Principal of Water Supply System

Based on findings of extensive surveys by the technical teams, a comprehensive water supply system is required. Groundwater will be extracted through Tubewell that will fill the overhead tank and water will be supplied through tanks. Main loop of the water supply system will be designed by considering overhead Tanks as source i.e., Fill and Draw Method.

For minor settlements, Public Standpost will be provided. A small pump will be installed along with drinking water storage tanks. Taps would be attached to these tanks; hence residents of minor settlements would be able to collect drinking water from these tanks. Schematic Diagram of Proposed Water Supply System can be seen in **Figure 3.5**.

The water supply system in villages is based on the criteria established by the Client in approved feasibility report of priority villages. Based on that, following water supply system would be provided in remaining villages as given in below **Table 3.4**:

Table 3.4: Village Wise Summary of Proposed System

Sr No.	Revenue Villages	Selected Settlements	Type of System
1	Surani Daggar	Basti Sheikhan Wali	StandPost
		Tibba Tarkhana Wala/Tibba Dhola/Tibba Baleli	Piped Network
2	Surani Nasheb	Basti Baleli	StandPost
3	Sandi	Basti Sandi	Piped Network
4	Murani Shumali	Basti Murani Shumali	StandPost
5	Angra Daggar	Basti Angra Daggar	Piped Network
6	Lundi Daggar	Tibba Khichiyan Wala	
		Tibba Hamid Shah	StandPost
7	Lundi Nasheb	Basti Lundi Nasheb/Basti Jorhan Wala	Piped Network
8	Haji Hussain Shah/ Tibba Murtaza Shah	Basti Ahmad Shah	Piped Network
9	Haji Hussain Shah	Basti Chah Thalla	StandPost
10	Chak No. 17/TDA	Basti Chah Shera Khu 01	StandPost
		Basti Chah Shera Khu 02	StandPost



3.4.3 Components of Water Supply System

Following components are proposed for water supply system in all the villages. These includes the following:

- Tubewells/Water Pumps
- Water Storage Tanks
- Water Supply Network

i. Tubewells/Water Pumps

On the recommendation of groundwater source study, groundwater will be extracted through tubewells. These tubewells would fill the overhead water tanks/standposts and they will provide water to the village. The pumping capacity required for each settlement is as following in **Table 3.5**.

Table 3.5: Pumping Capacity Required for Each Settlement

Sr. No.	Revenue Villages	Selected Settlements	Pumping requirement
			Cusecs
1	Surani Daggar	Basti Sheikhan Wali	StandPost
		Tibba Tarkhana Wala/Tibba Dhola/Tibba Baleli	0.25
2	Surani Nasheb	Basti Baleli	StandPost
3	Sandi	Basti Sandi	0.25
4	Murani Shumali	Basti Murani Shumali	StandPost
5	Angra Daggar	Basti Angra Daggar	0.50
6	Lundi Daggar	Tibba Khichiyan Wala	
		Tibba Hamid Shah	StandPost
7	Lundi Nasheb	Basti Lundi Nasheb/Basti Jorhan Wala	0.25+0.25(Phase-II)
8	Haji Hussain Shah/ Tibba Murtaza Shah	Basti Ahmad Shah	0.50
9	Haji Hussain Shah	Basti Chah Thalla	StandPost
10	Chak No. 17/TDA	Basti Chah Shera Khu 01	StandPost
		Basti Chah Shera Khu 02	StandPost

ii. Water Storage Tanks

Fill and draw system is proposed for villages. Hence, to provide reliable supply of water, tubewells will fill overhead water tanks and these tanks will provide water to the village.



Overhead water tank is designed on 1/3rd storage capacity of average day demand. Hence, OHT will be filled 3 times a day to provide a continuous supply of water for 24 hours.

Typical elevation and section of OHT is shown in **Figure 3.6**. Five (05) number of Overhead water tanks are provided for 06 settlements. The capacity of these tanks for planning year 2050 of each settlement is given in following **Table 3.6**.

Table 3.6: Capacity of Tanks

Sr. No	Village Name	Population	Total Water Demand @ 15 GPCD	Overhead Water Tank Capacity
		(Year 2050)		
		Persons	Gallons	Gallons
1	Surani Daggar	2,912	43,678	15,000
2	Sandi	1,949	29,229	10,000
3	Angra Daggar	6,402	96,028	50,000
4	Lundi Daggar	2,308	34,624	
5	Lundi Nasheb	4,946	74,183	25,000
6	Haji Hussain Shah	9,998	149,965	50,000

iii. Water Supply Network

Overhead tank will supply water to the village. A water supply network will be provided for this purpose. A main loop will cover the whole village, this loop will provide water to secondary and tertiary network. HDPE pipe would be used for water network.

iv. Public Stand-Post

As discussed earlier, a public standpost will be provided for settlement which has a household count between 40-200.

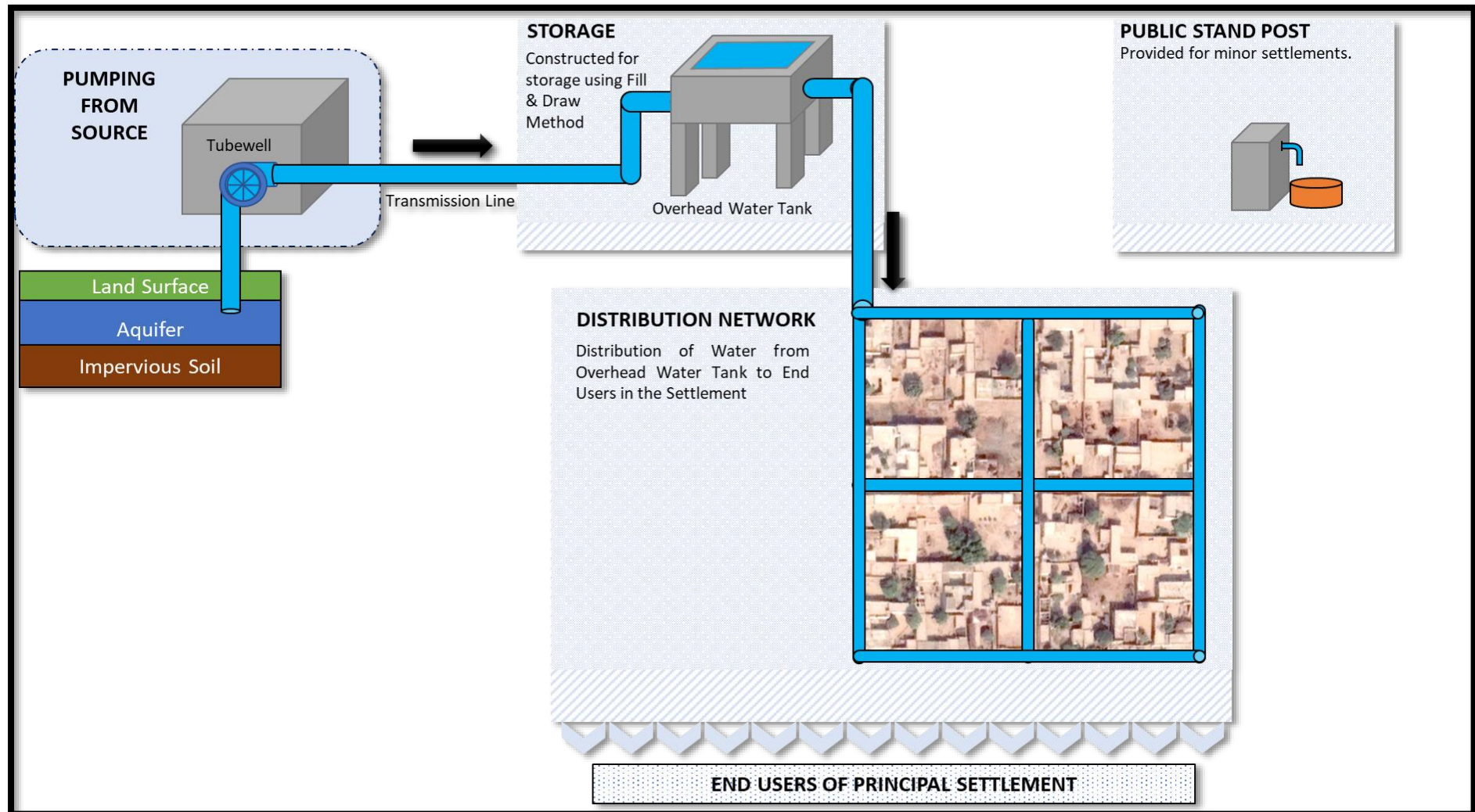


Figure 3.5: Schematic Of Water Supply System of Villages

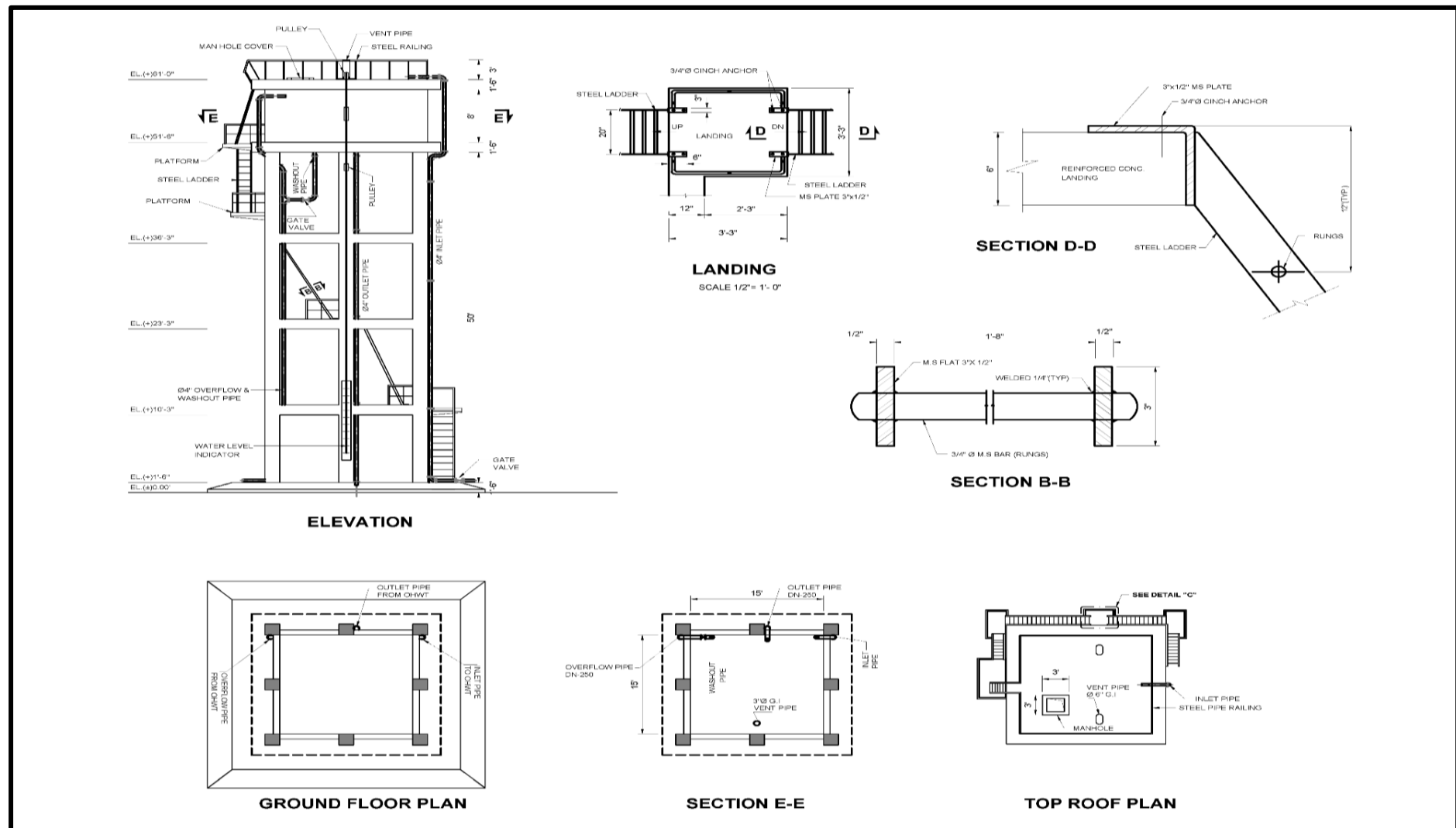


Figure 3.6: Typical Elevation and Section of Overhead Water Tank



D. Proposed Solid Waste Management System

The waste will be temporarily stored at the community-based waste collection point which is also referred as waste enclosure. One waste enclosure is proposed for each village. The internal dimensions of the waste enclosure are kept as 16'-0"x12'-0". The waste collection vehicle will collect solid waste from proposed enclosures. The Client will procure those collection vehicles which will collect solid waste from each settlement on weekly basis. The vehicle will be loaded manually by sanitary workers or waste loaders. Further, precast concrete panels are proposed as roof of waste enclosure to protect solid waste from rain water and subsequent leachate production.

3.5 Project Cost

The estimated total cost for construction of proposed project is **1522.35** million PKR. This cost is tentative and will be finalized with the detailed technical design of the proposed project.

3.6 Land Acquisition

The water supply and sewerage network will not involve any impacts on land. However, land will be required for the construction of overhead tank and sewerage treatment plant in (Tibba Tarkhana wala, Sandi, Angra Daggar, Tibba Khichiyan Wala, Lundi Nasheb & in Haji Hussain Shah/Tibba Murtaza Shah) and for stand posts in remaining villages. Government land will be preferred for this purpose. If Government land is not available then land will be acquired through voluntarily land donation (VLD). Locals are willing to donate their land voluntarily. Following in **Table 3.7** represent the type of availability of land in different villages.

Table 3.7: Type of availability of Land in different villages

Sr No.	Mouza	Settlement Name	Water Supply Component	Sewerage System	Available Land
1	Surani Daggar	Basti Sheikhan Wali	T/w+Standpost	Septic Tanks/Soakage Pits	VLD
		Tibba Tarkhana Wala/Tibba Dhola/Tibba Baleli	OHT+Pipe Network	Pipe Network+PS+ABR	VLD
2	Surani Nasheb	Basti Baleli	T/w+Standpost	Septic Tanks/Soakage Pits	VLD
3	Sandi	Basti Sandi	OHWT+Pipe Network	Pipe Network+PS+ABR	Govt. Land
4	Murani Shumali	Basti Morani Shumali	T/w+Standpost	Septic Tanks/Soakage Pits	Govt. Land
5	Angra Daggar	Basti Angra Daggar	OHT+Pipe Network	Pipe Network+PS+ABR	VLD
6	Lundi Daggar	Tibba Khichiyan Wala	OHT+Pipe Network	Pipe Network+PS+ABR	Govt. Land
		Tibba Hamid Shah	T/w+Standpost	Septic Tanks/Soakage Pits	VLD



7	Lundi Nasheb	Basti Lundi Nasheb/Basti Jorhan Wala	OHT+Pipe Netwrok	Pipe Network+PS+ABR Septic Tanks+Soakage Pits(Lower Topographic Area)	VLD
8	Haji Hussain Shah/ Tibba Murtaza Shah	Tibba Murtaza Shah	OHT+Pipe Netwrok	Pipe Network+PS+ABR	VLD
9	Haji Hussain Shah	Basti Chah Thalla	T/w+Standpost	Septic Tanks/Soakage Pits	VLD
10	Chak No. 17/TDA	Basti Chah Shera Khu 01	T/w+Standpost	Septic Tanks/Soakage Pits	Govt. Land
		Basti Chah Shera Khu 02	T/w+Standpost	Septic Tanks/Soakage Pits	VLD

3.7 Project Administrative Jurisdiction

The proposed project falls under the jurisdiction of Deputy Commissioner of Bhakkar, Punjab province.

3.8 Project Implementation Schedule

The project is scheduled to be completed in 10 months.

3.9 Construction Activities and Required Machinery

Construction activities involve following:

- Earth work
- Structure/ Concrete works
- Pipe laying

Table 3.8 presents the list of expected machinery required for construction. The number of these machines will be finalized with the detailed design of the proposed road:

Table 3.8: List of expected Machinery/Equipment

1	Mobile Crane	15	Jack Hammer
2	Wood Shuttering	16	Plate Compactor
3	Formwork	17	Concrete Mixer Machine
4	Steel Cage Shuttering Unit	18	Motor graders
5	Dumpers	19	Pneumatic Tyred Roller (PTR)
6	Mini/ Hand Roller	20	Tandem Roller
7	Road/Power Roller	21	Generators
8	Light Weight Compactor	22	Welding Plant
9	Ramming Machine	23	Transit Mixer
10	Water Sprinkler and Water Tanker	24	Vibrators



11	Excavator	25	Scaffolding
12	Tractor with Front Blade and Trolley	26	Tower Crane
13	Loader	27	Light Transport
14	Road Cutter	28	Barricades

3.10 Construction Camps

Camp sites will be selected based on following considerations:

- Number of workforces deployed
- Type and quantity of machinery mobilized
- Availability of adequate area for establishing camp sites including parking areas for machinery, stores and workshops,
- Access to communication and local markets
- Appropriate distance from sensitive areas including settlements and religious and/or cultural facilities

Final locations will be selected by the contractor with the assistance of Supervision Consultant. Care will be taken to safeguard the existing environment of the area and location shall be selected away from settlements. The contractors may acquire land on lease from private landowners.

3.11 Construction Materials

The materials used in construction of water supply, sewerage, overhead tanks, stand post & soakage pits/ aseptic tanks would include coarse aggregates (crush), bricks, fine aggregates (sand), soil, water, pipes (RCC), cement, reinforcement etc.

3.12 Workforce Requirement

Manpower demand estimation is an essential component to facilitate deployment of manpower.

Workforce during Construction Phase

Total man power required on site for proposed Project will be approximately 160 workers per day, depending on the type of construction. They will be inside of the area of possession, under the supervision of a Contractor who will be awarded the contract.

Workforce during Operation Phase

Total man power required during operation phase for proposed Project will be approximately 68 workers comprising skilled and unskilled staff.



3.13 Solid Waste Generation

Due to construction activities waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and waste construction materials. Solid waste generated during construction and camp sites will be safely disposed of in demarcated waste disposal sites.

Construction Phase

The solid waste generation is estimated to be 44.8³ kg/day for 160 construction workers during construction phase of the proposed Project.

Operation Phase

The solid waste generation is estimated to be 19.04⁴ kg/day for 68 staff members during operation phase of the proposed project at full development.

3.14 Water requirement

Construction Phase

The water consumption is estimated to be 800 gallons/day for 160 construction workers during construction phase of the proposed Project.

Operation Phase

The water consumption is estimated to be 340 gallons/day for 68 workers during operation phase of the proposed project.

3.15 Power Requirement During Construction Phase

The main source of electricity/electric power during construction phase will be diesel generators for construction camps and construction machinery.

3.16 Wastewater Generation during Construction Phase

The wastewater generation is estimated to be 640⁵ gallons/day for 160 construction workers during construction phase of the proposed project. Temporary toilets with cesspit will be adequately installed and treated periodically, and after the completion of work, the ground will be restored.

³ 0.28kg/capita/day)

⁴ 0.28kg/capita/day)

⁵ Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain (Domestic sewage generation = 80% of water consumed/day)



4 Baseline Profile

4.1 General

This chapter presents the current environment around the proposed development which has been considered with respect to physical, ecological and socio-economic resources. An environmental baseline study is intended to establish a database against which potential project impacts can be predicted and managed later. The EIA of the proposed project covers a comprehensive description of the project area, including the resources which are expected to be affected by the project, as well as, those which are not expected to be directly affected by the construction and operation of the project. The prevailing environmental conditions around the proposed project have been considered with respect to physical, biological and socio-economic aspects.

EIA team conducted the reconnaissance and detailed surveys of the project area for baseline data collection during field visits from March 14 to March 19, 2023 and April 16 to April 18, 2023. The prime objective of the field visits was to collect the baseline data on physical, eco-biological and environmental & social aspects along with identification, assessment and categorization of the significant environmental and social impacts of the proposed Project. The secondary data was collected from published sources/reports and relevant departments, which were also verified through visual observations during reconnaissance and detailed surveys.

4.2 Purpose of the Baseline Study

An environmental baseline study is intended to identify and establish all the physical, biological and social environmental conditions, prevailing earlier the execution of the project, in order to use this information as a reference datum to associate future changes and judge them if the conditions have changed for better or worse. As such, it must include all resources, which can reasonably be affected by the project. The baseline description is intended to accomplish the following objectives:

- To deliver proponent of the project with adequate knowledge about socio-economic set-up, physical environment aspects, social aspects, ecological features, built-up structures and infrastructure of the project area; and
- To allow the planners to assess the potential efficacy of the actions to alleviate the adverse impacts and improve benefits.

4.3 Delineation of Study Area/ Area of Influence (Aol)

The impacts of the project activities are limited and within the boundary of project area. Therefore, the whole village has been considered as Area of Influence (Aol). **Figure 4.1**, to **Figure 4.11** represents the Aol of the Surani Daggar, Surani Nasheb, Sandi, Murani Shumali, Angra Daggar, Lundi Daggar, Lundi Nasheb, Haji Hussain Shah/Tibba Murtaza Shah, Haji Hussain Shah, Chak No. 17 /TDA respectively.

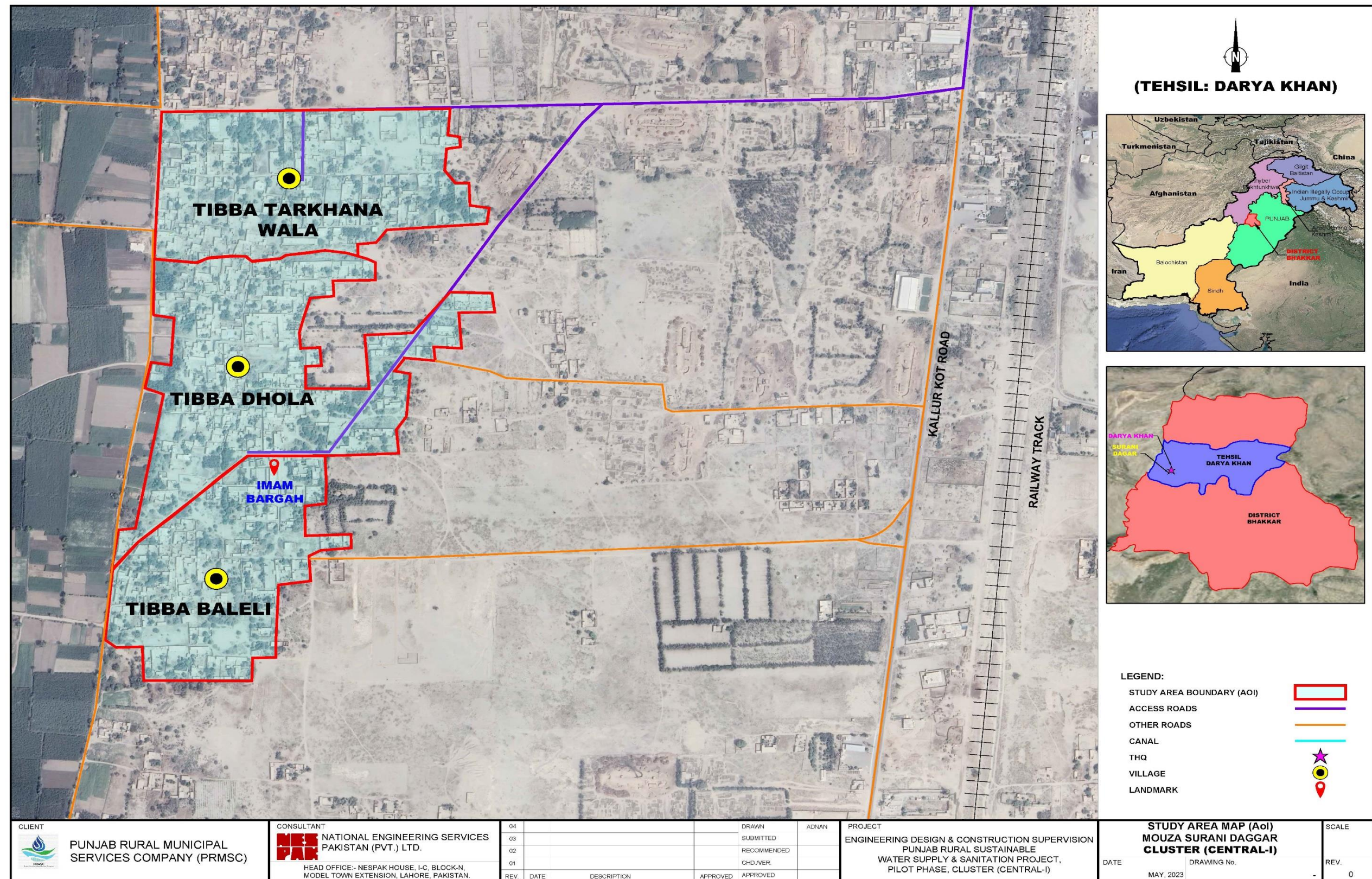


Figure 4.1: Study Area Map / Aol of Mauza Surani Daggar

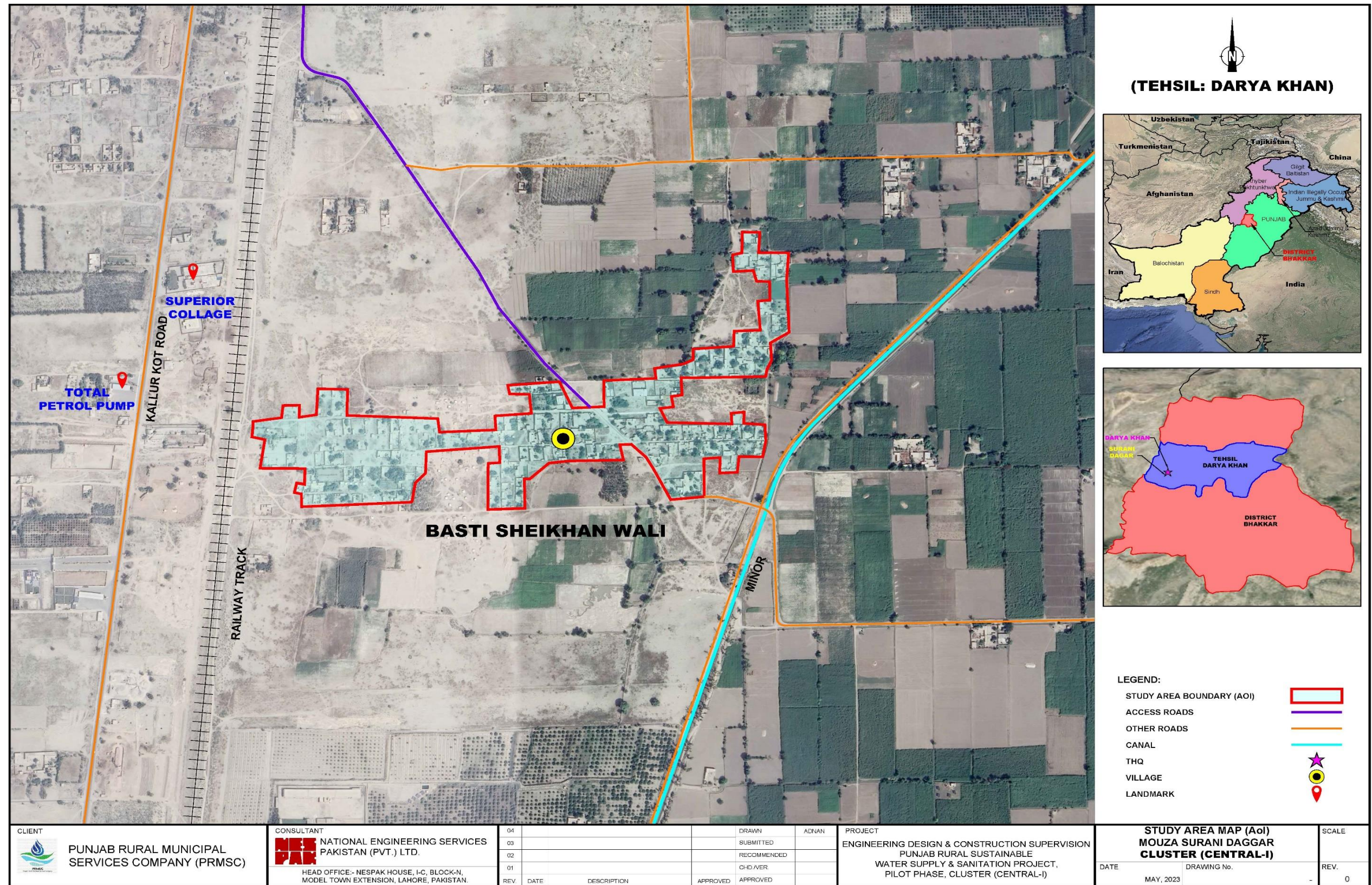


Figure 4.2: Study Area Map / Aol Of Mauza Surani Daggar (Basti Shekhan Wali)

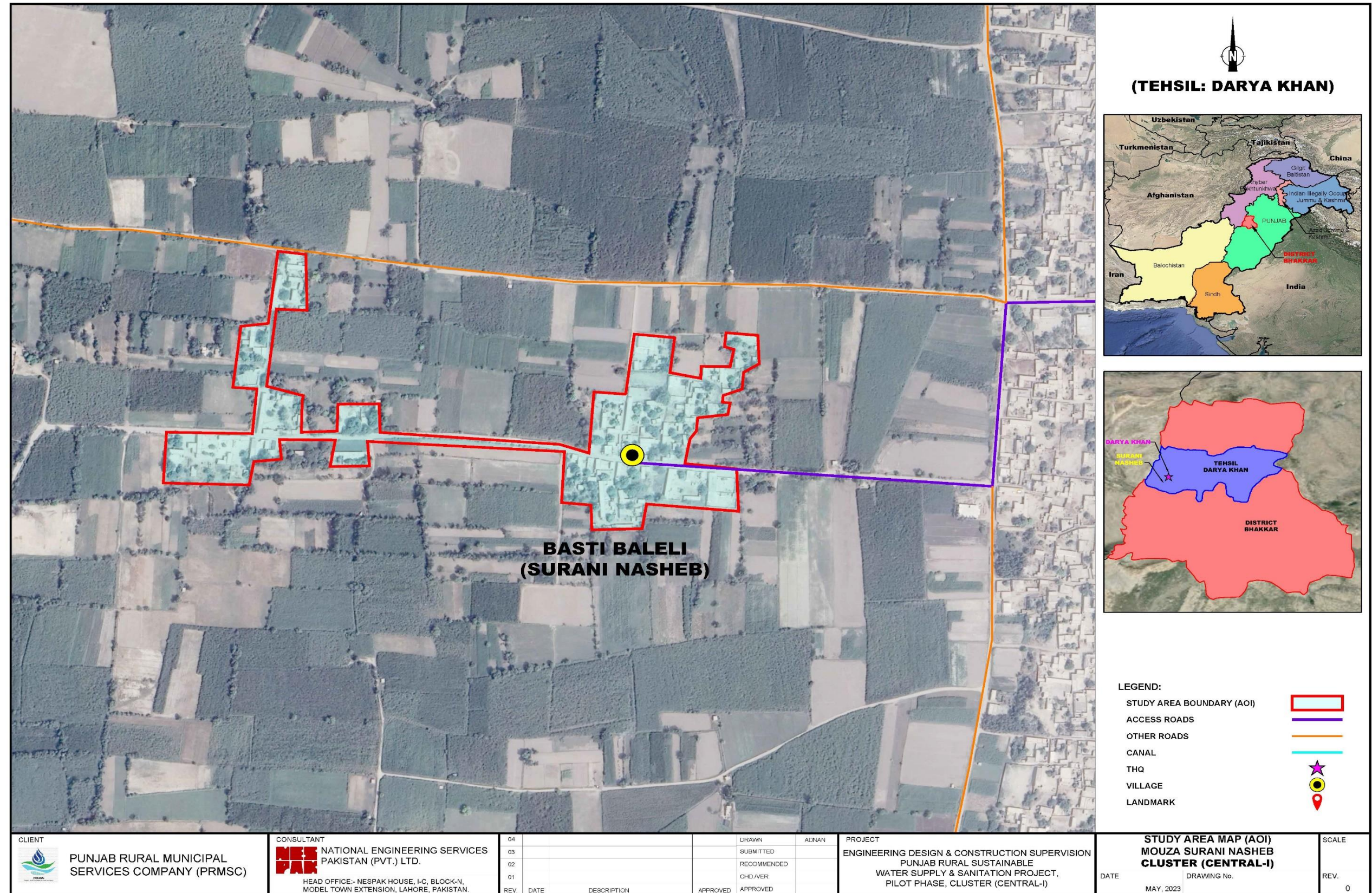


Figure 4.3: Study Area Map / Aol of Mauza Surani Nasheb

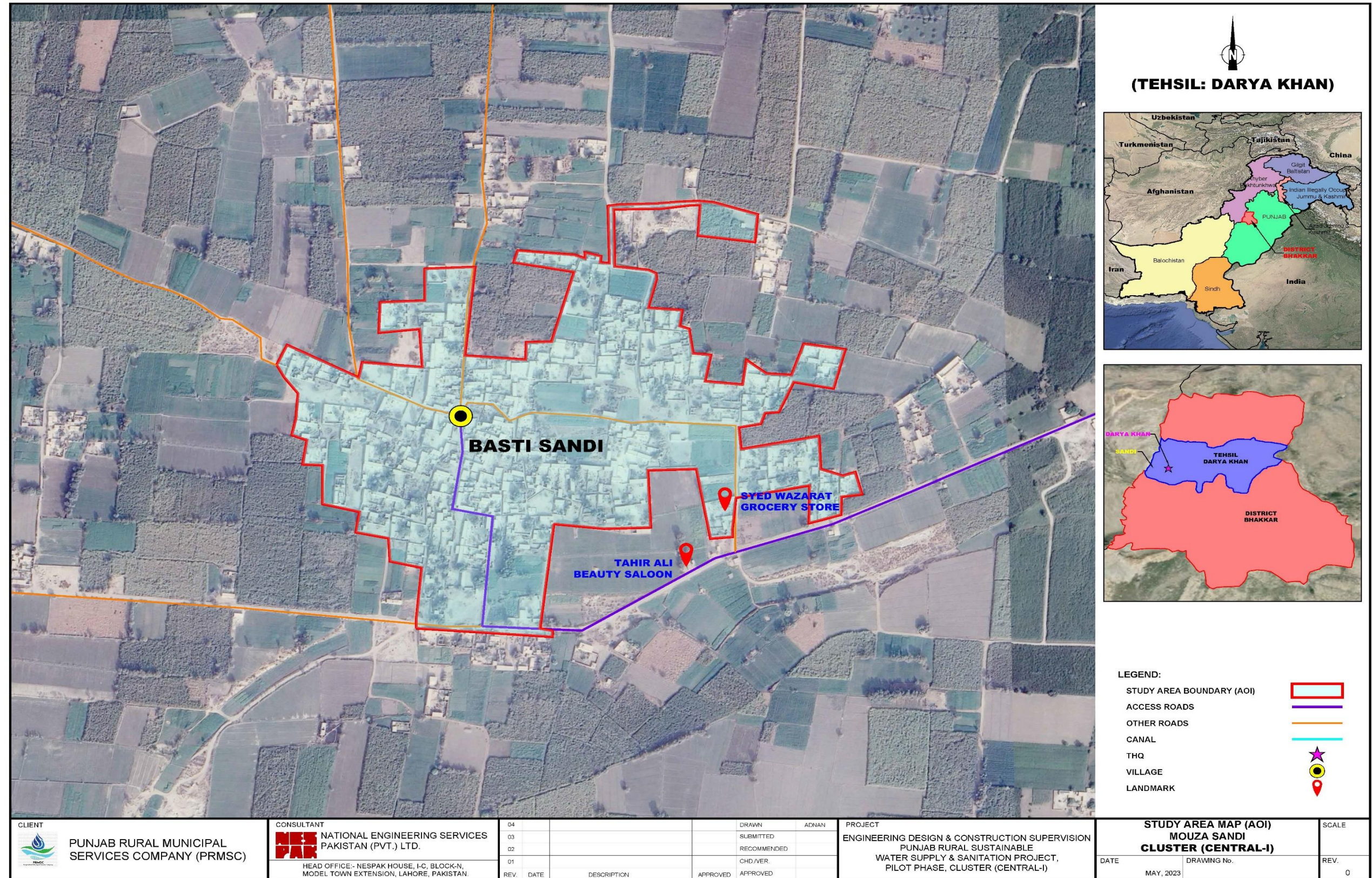


Figure 4.4: Study Area Map / Aol of Mauza Sandi

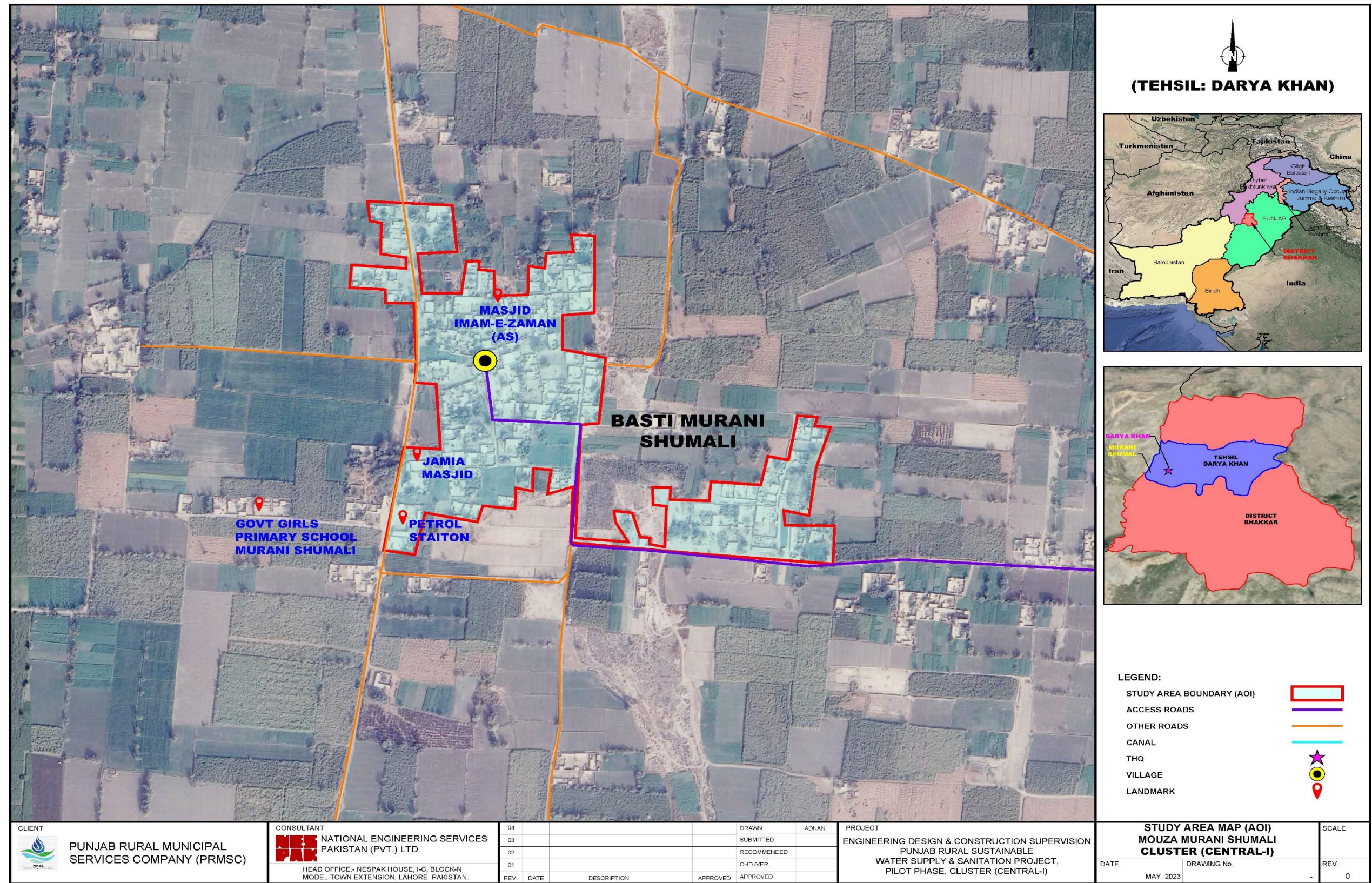


Figure 4.5: Study Area Map / Aol of Mauza Murani Shumali

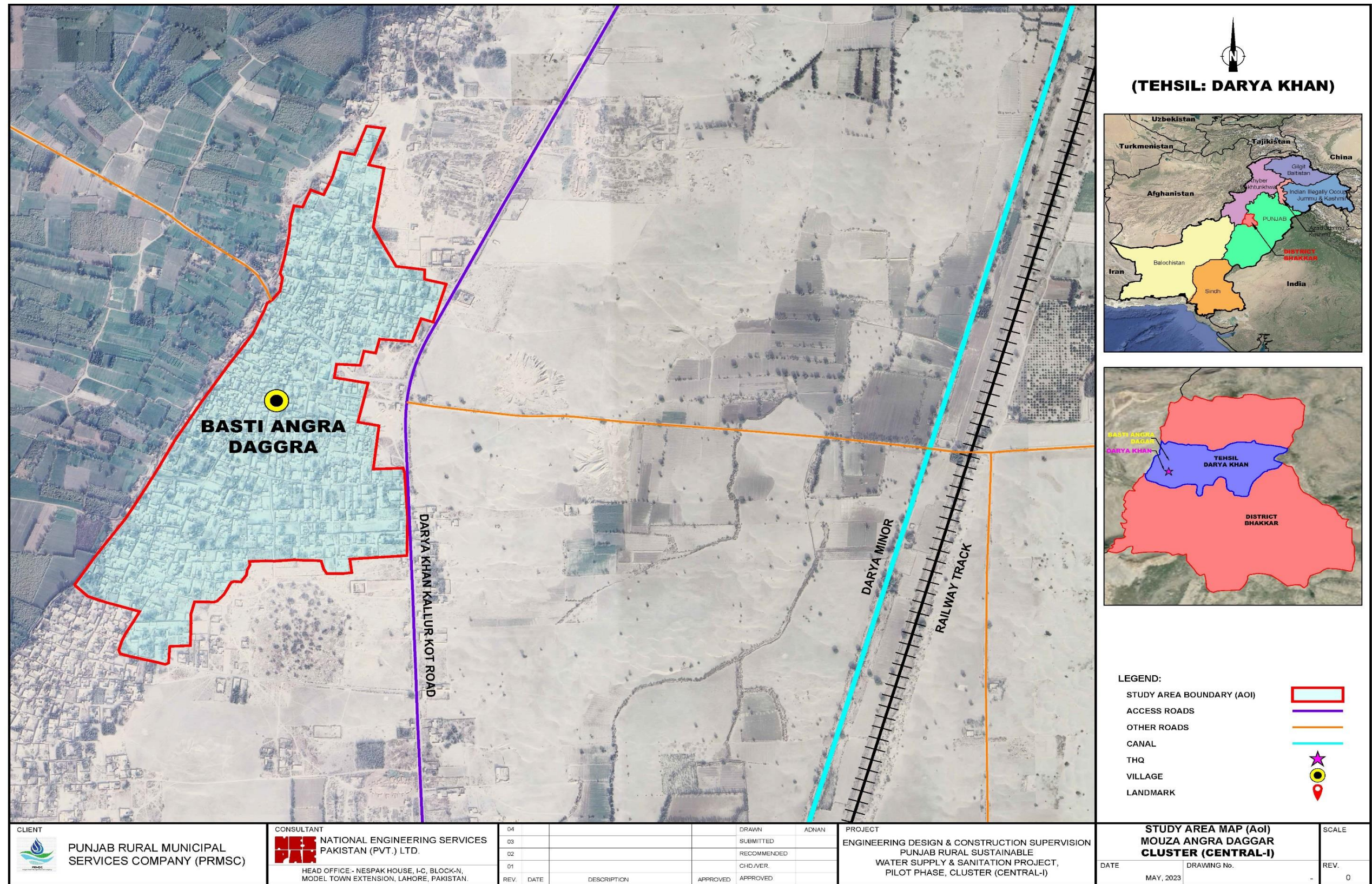


Figure 4.6: Study Area Map / Aol of Mauza Angra Daggar

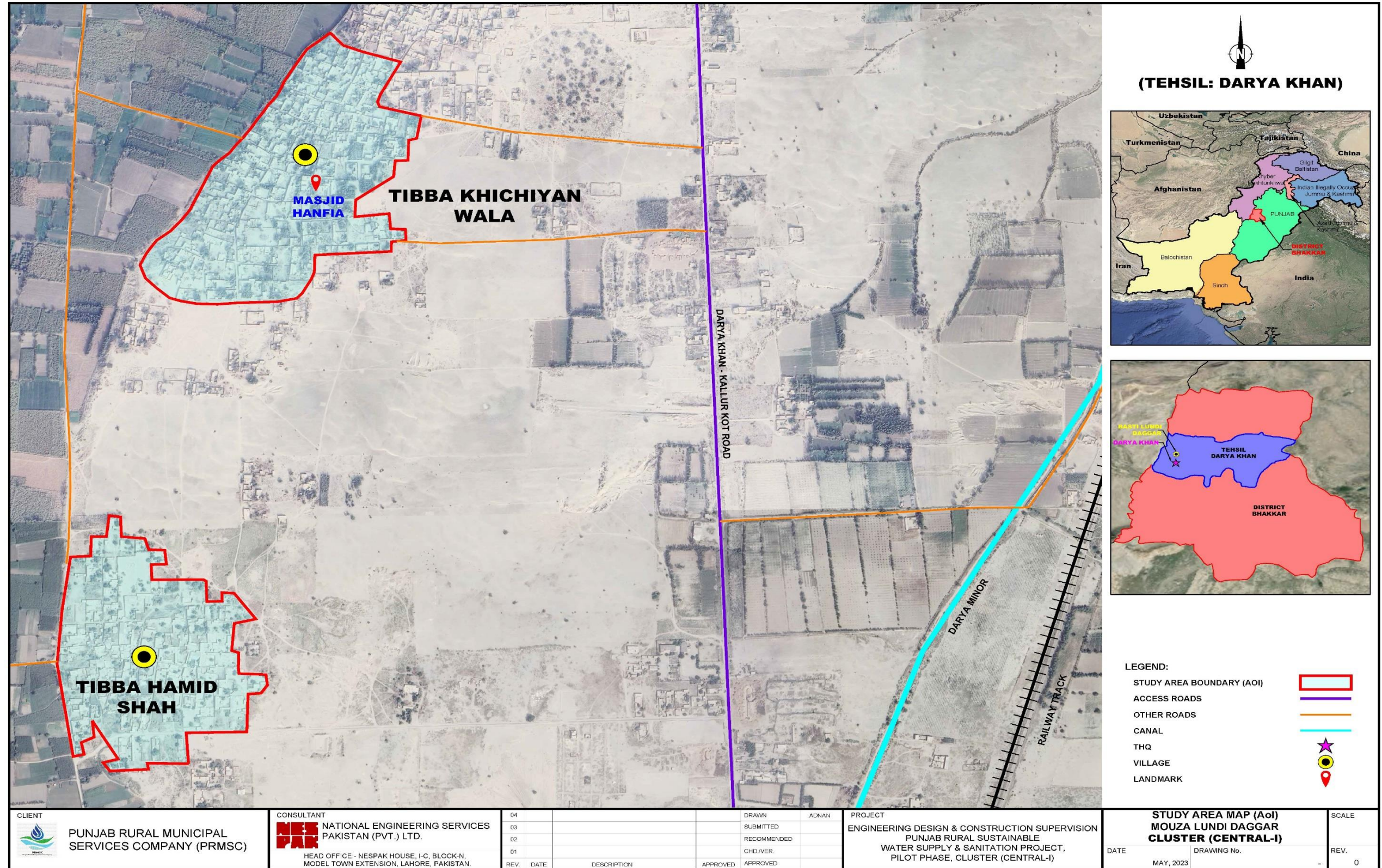


Figure 4.7: Study Area Map / Aol of Mauza Lundi Daggar

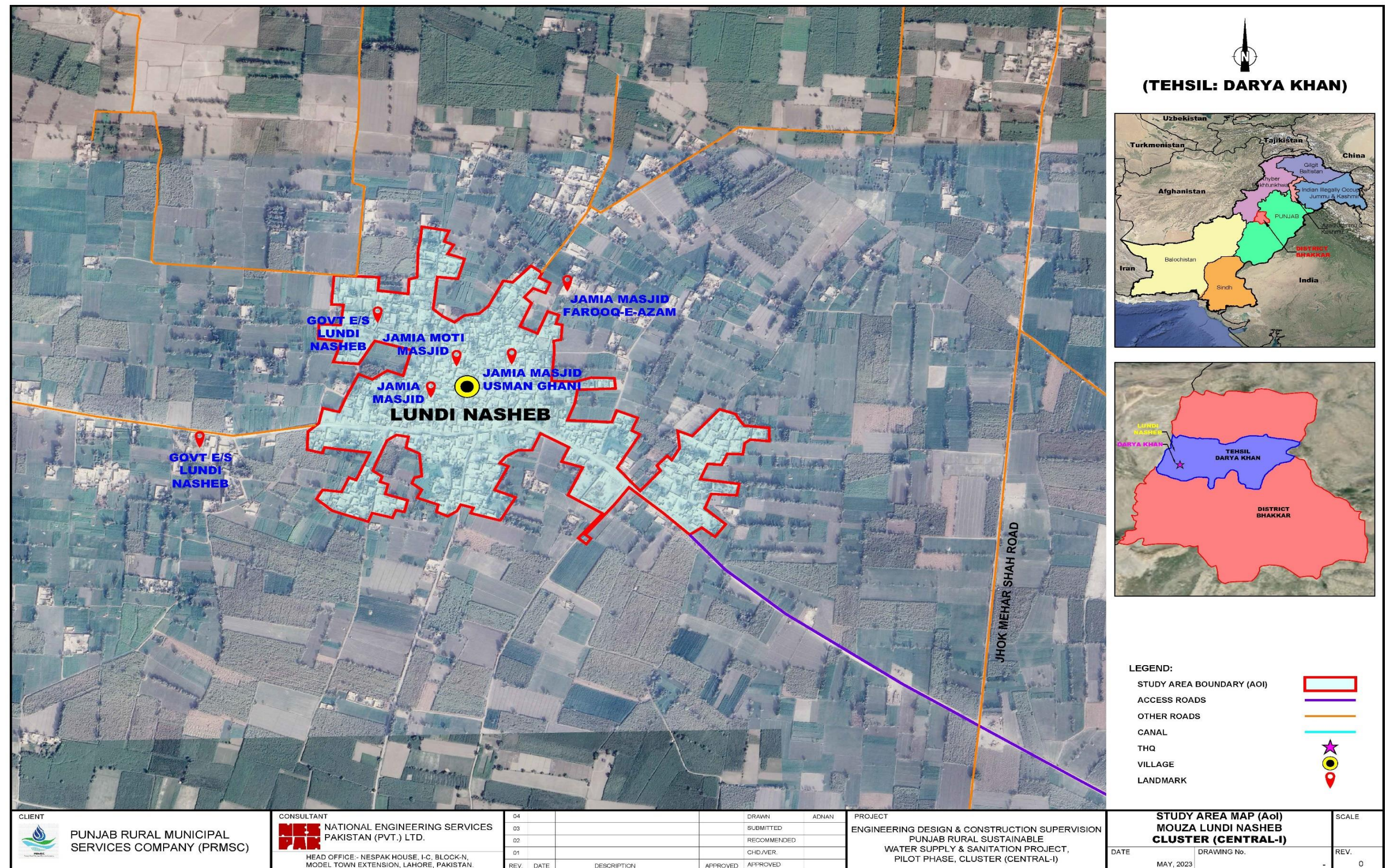


Figure 4.8: Study Area Map / Aol of Mauza Lundi Nasheb

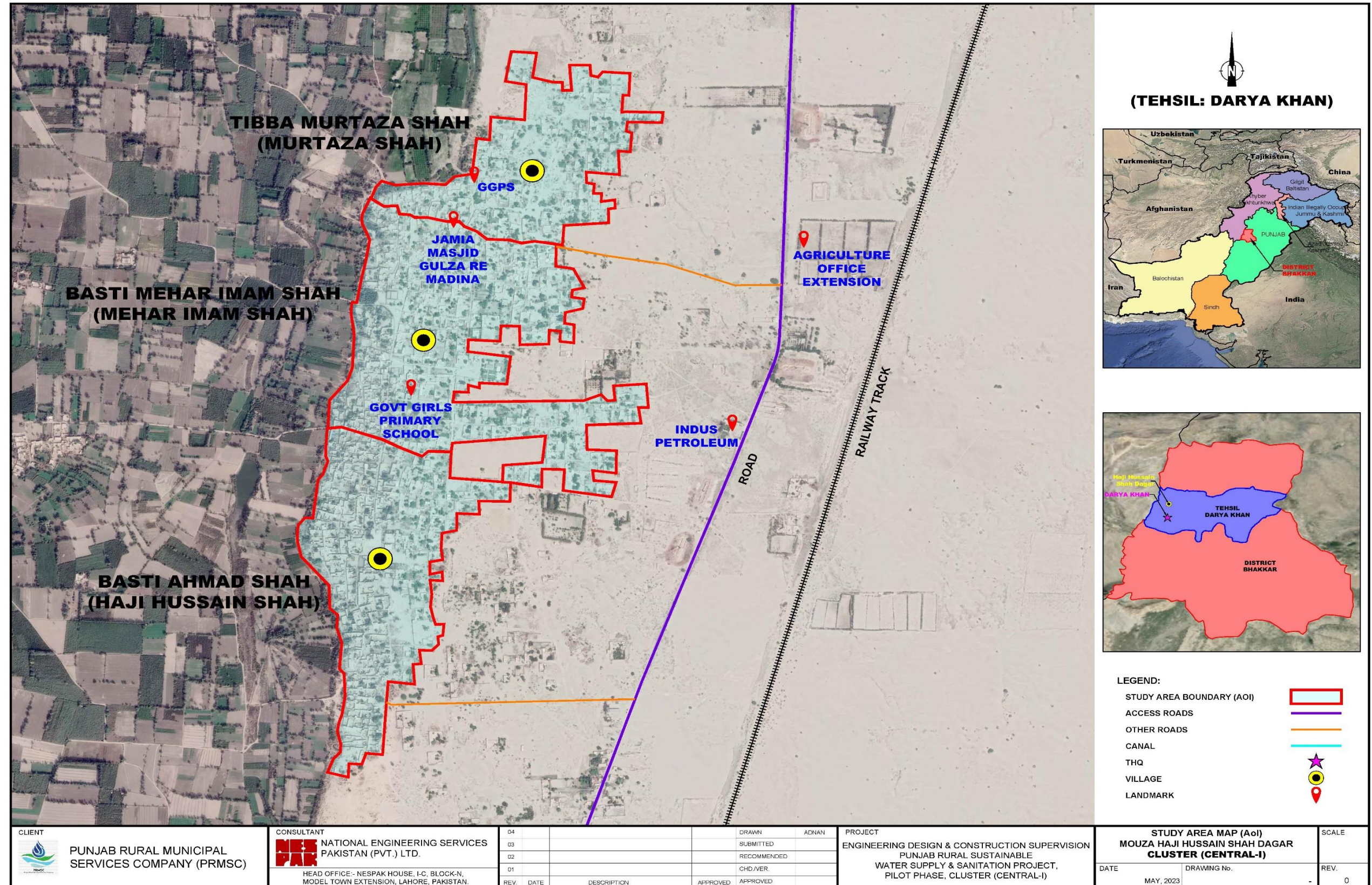


Figure 4.9: Study Area Map / Aol of Mauza Haji Hussain Shah

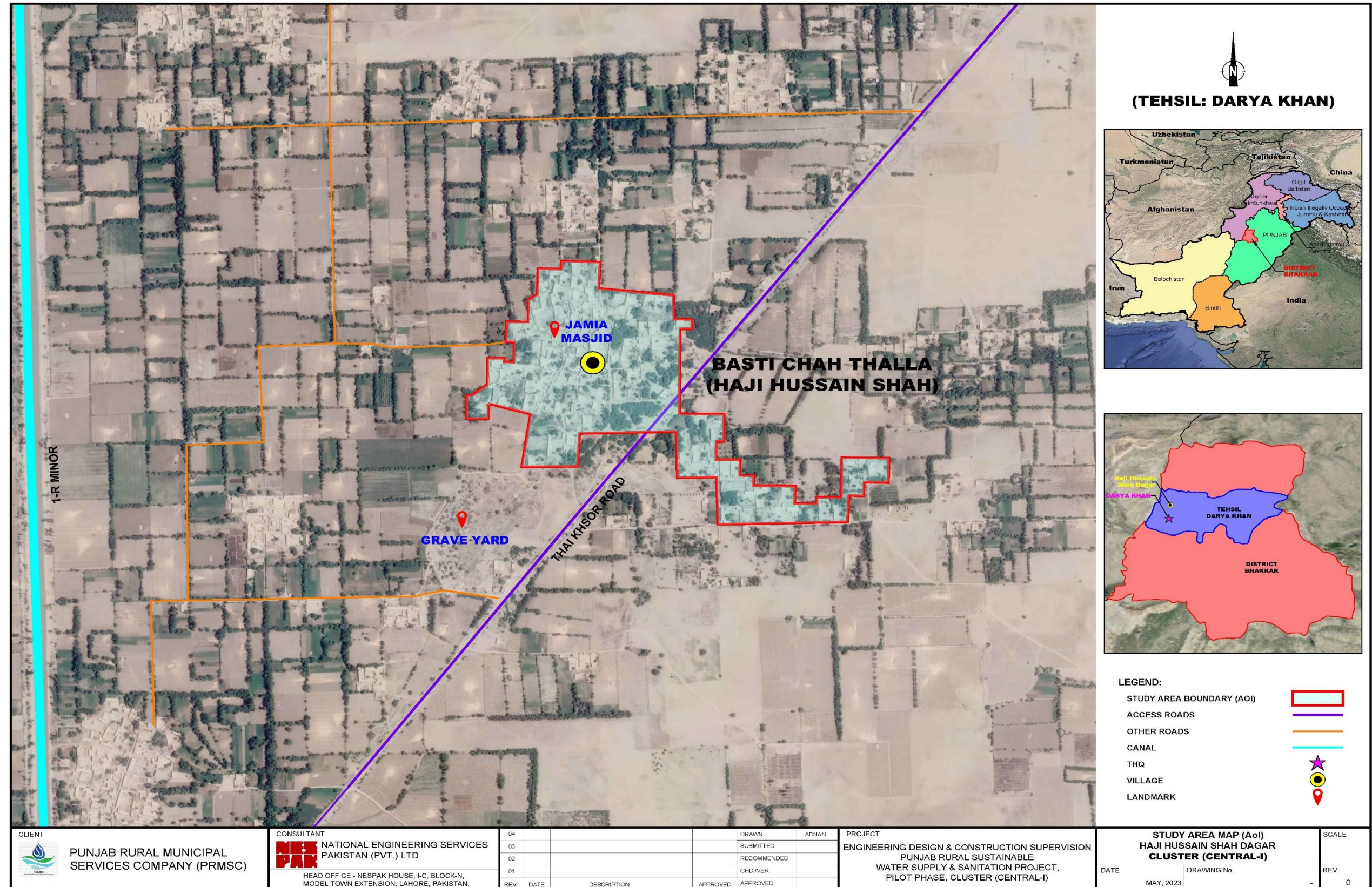


Figure 4.10: Study Area Map / AoI of Mauza Haji Hussain Shah Daggar

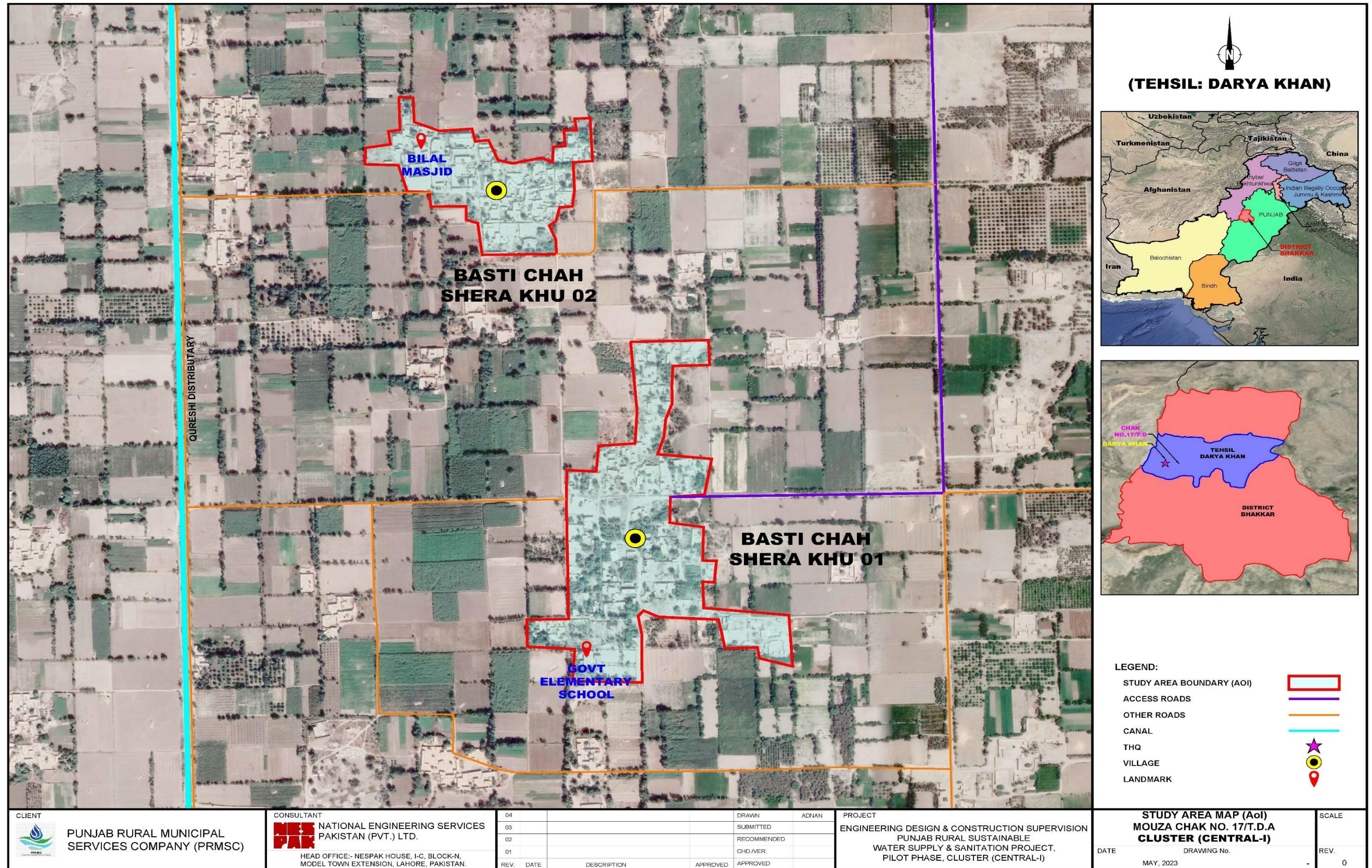


Figure 4.11: Study Area Map / Aol of Chak No.17/TDA



As per the national and provincial regulations along with the requirements of World Bank's OP's, impacts and risks have been analyzed within the project Aol. Environmental and social impacts and risks will also be analyzed for all relevant stages of the project cycle, including pre-construction, construction and operation phases of the project.

4.4 Physical Environment

The physical environment includes topography, geology, soil, climate, hydrology, drainage, seismology, surface water, groundwater and ambient air.

4.4.1 Topography

Darya Khan is located on the eastern bank of the Indus River. Topography of Darya Khan is predominantly flat, with gentle slopes and a lack of significant elevation changes. The flat terrain is suitable for agriculture, and the region is known for its production of crops such as wheat, cotton, and sugarcane. The area around Darya Khan consists of fertile flood plains along the Indus River. These plains are periodically inundated during monsoon seasons, depositing rich sediment that contributes to the agricultural productivity of the region. While the Indus River and its flood plains offer fertile land, the surrounding areas of Darya Khan are generally arid. The terrain features dry, barren expanses, with sparse vegetation and sand dunes in some areas.

4.4.2 Geology

Darya Khan, a tehsil of district Bhakkar, is located at 31.81°N, 71.33°E. The region around Darya Khan is predominantly composed of alluvial deposits, which are sedimentary materials transported and deposited by the Indus River over time. These deposits consist of sand, silt, clay, and gravel and they contribute to the fertile soil in the flood plains, supporting agricultural activities. The sedimentary rocks in the vicinity of Darya Khan primarily consist of sandstone and shale. Sandstone is a common rock type formed from the consolidation of sand grains. Shale is a fine-grained sedimentary rock composed of clay minerals. These rocks are important reservoirs of groundwater and can also serve as potential sources of construction materials.

Its area consists of a riverine tract along the Indus River, called Kaccha, and most of the tehsil area lies in the desolate plain of the Thal desert.⁶ The tehsil mostly consists of hilly, sandy soil from aeolian processes in the Thal desert.⁷ No fault lines traverse through the project area.

⁶ Draft Initial Environmental Examination (IEE) Report, Tranche-III: Conversion of 66Kv Existing Grid Station Rakh Dargan (Tehsil Darya Khan, District Bhakkar) into 132Kv Grid Station & Construction of 3km Double Circuit 132Kv Transmission Line from Piplan Bhakkar In & Out Rakh Dargan Grid station

⁷ Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSS)

4.4.3 Climate and Meteorology

i. Average Temperatures

Figure 4.12 represents mean monthly maximum and minimum temperatures for different months of the last 30 years. The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Darya Khan. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.⁸

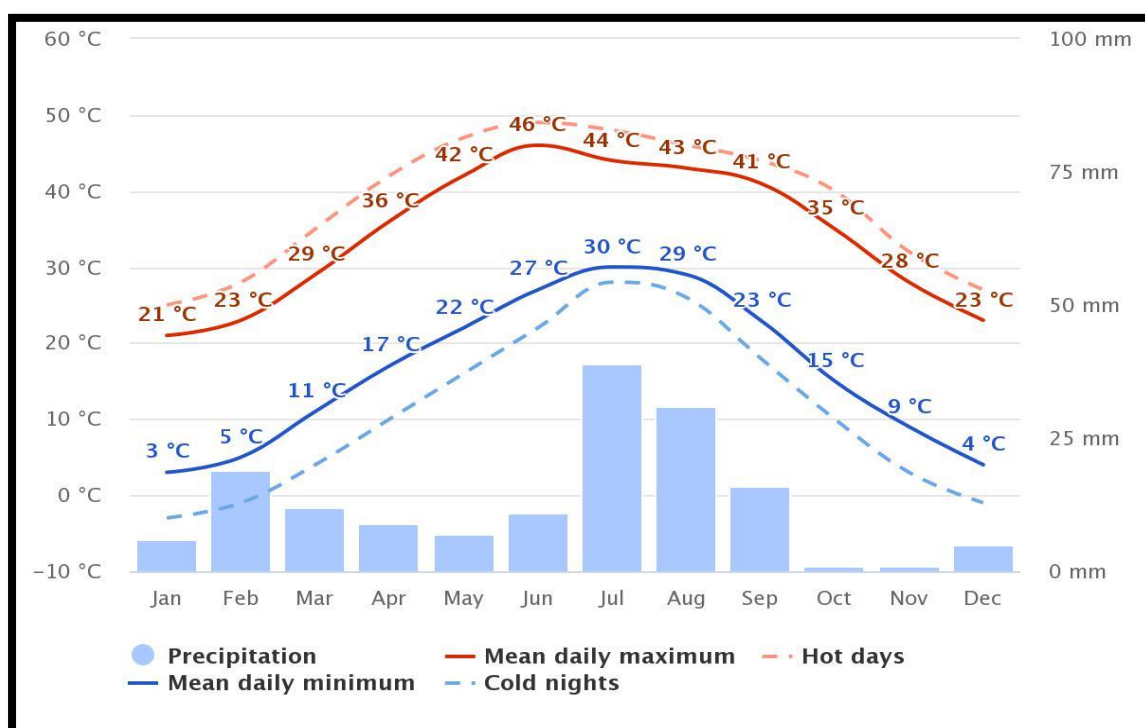


Figure 4.12: Average Temperatures

As it can be seen from **Figure 4.12**. The project area has extreme climate. It has hot summer and cold winters. The summer starts from May and lasts till September. June is the hottest month. The mean maximum and minimum temperature are 46 °C and 27 °C respectively for month of June. The winter seasons lasts from November to February. January is the coldest month. The mean maximum and mean minimum temperature are 21 °C and 3 °C in January. The maximum temperatures are presented in **Figure 4.13**.

⁸ https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/darya-khan_pakistan_1180454

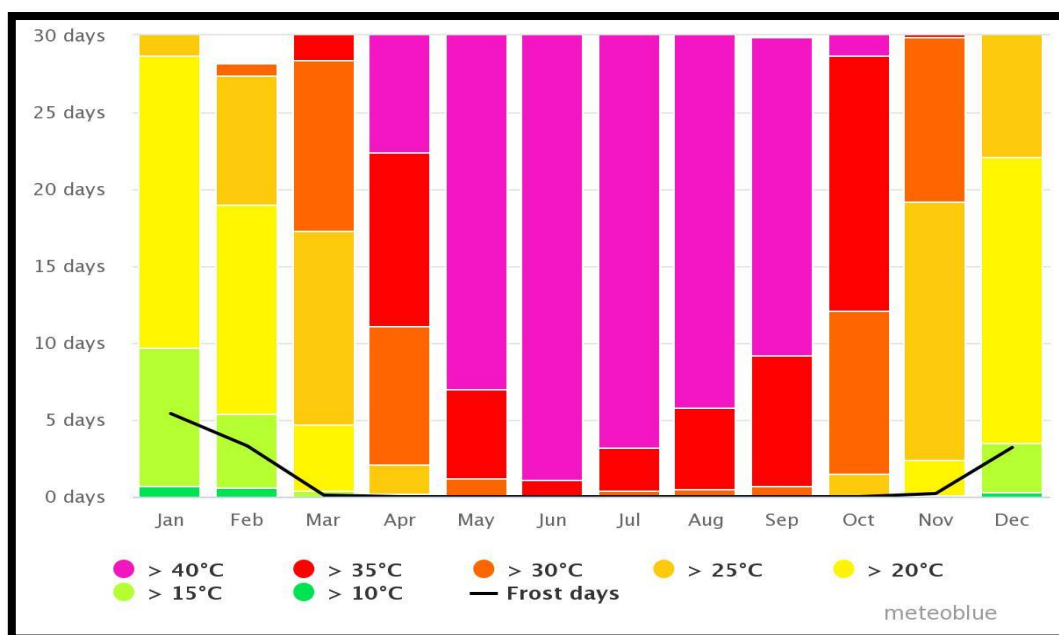


Figure 4.13: Maximum Temperatures

Figure 4.14 shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

It is clear from the chart that most of the times of year sunny days dominate. A few days per month are partly cloudy and with seldom overcast days. The maximum participation days are observed during June to August.⁹

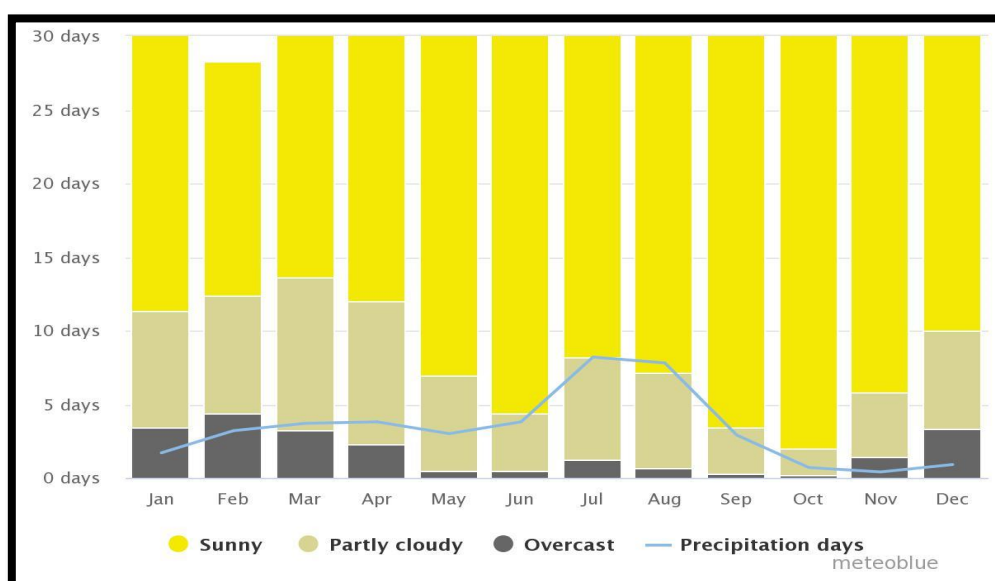


Figure 4.14: Cloudy, Sunny And Precipitation Days

⁹ https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/darya-khan_pakistan_1180454

Figure 4.15 shows on how many days per month, certain precipitation amounts are reached. It can be seen from the chart that the precipitation in June, July and August is maximum and ranges between 2-5 mm. Highest intensity of precipitation is also observed in the months of June, July and August ranges between 5-10mm or 10-20 mm as Shown in **Figure 4.15**.

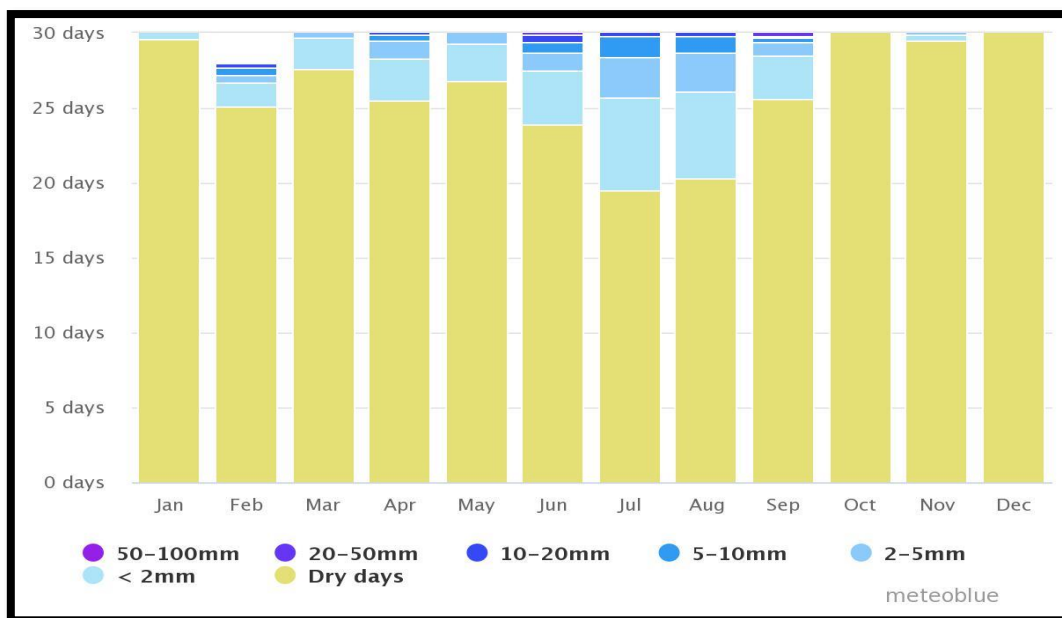


Figure 4.15: Precipitation Amounts

ii. Wind

Figure 4.16 shows the days per month, during which the wind reaches a certain speed. Maximum wind speeds can be observed in the months of March to June which is >28 km/h. Wind speed >12 and >19 km/h dominates throughout the year.

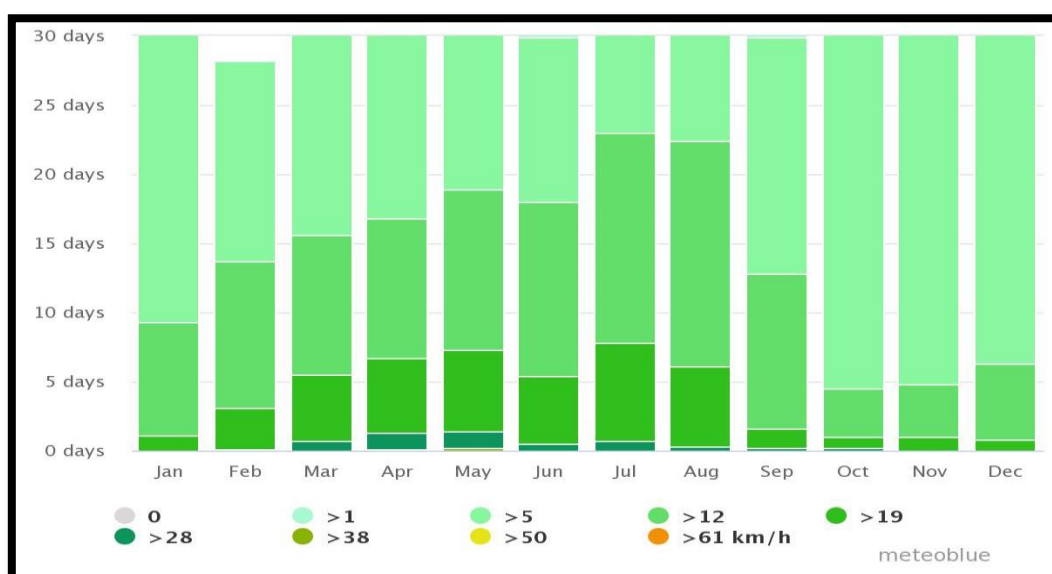


Figure 4.16: Wind Speed

The wind rose for Darya Khan shows how many hours per year the wind blows from the indicated direction. Wind rose is shown in **Figure 4.17**. It can be seen from the wind rose that dominant wind direction is towards North (N), NNW NW and NNE.

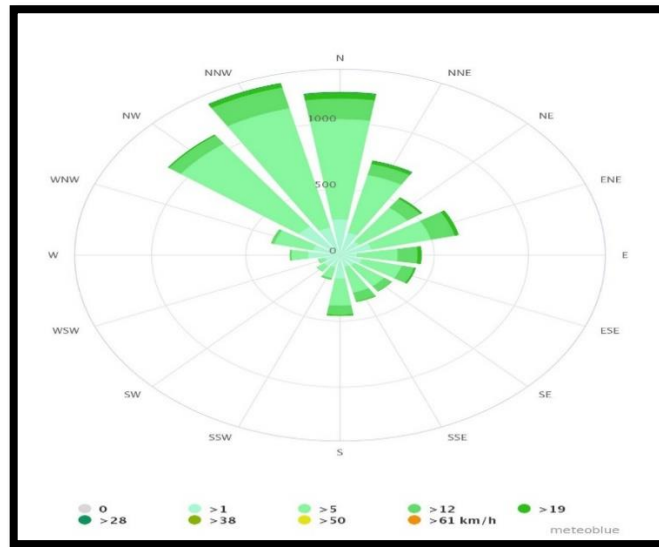


Figure 4.17: Wind Rose

4.4.4 Water Resources

The description of the water resources of Darya Khan is as under. Hydrology map of Darya Khan is shown in **Figure 4.18**.

A. Surface water

The nearest surface water resource is the Hukam Distributary existing at a distance of 90 m from Basti Sheikhan Wali settlement of Surani Daggar. Hukam Distributary is located on Eastern side of the project boundary of Surani Nasheb, Sandi and Murani Shumali. Darya Minor is located at a distance of 1.1 km from the project boundary of Angra Daggar and Lundi Daggar. Similarly, Darya Minor is also located at a distance of 3.2 km from Lundi Nasheb. Thal Canal, Hukam Distributary and 1R Minor is located from the project boundary of Basti Chah Thalla settlement (Haji Hussain Shah). Panj Girain Sub Minor is located near to the Tibba Murtaza Shah (Haji Hussain Shah) and Qureshi Distributary and Bahadur Minor is located at a distance of 320 m approximately from the project boundary of Chak No.17/TDA.

B. Groundwater

Fresh groundwater is available in the project area, which is also compatible with the general hydrogeological conditions of the Project area. Medium resistivity zone (31 - 150 ohm-meters) below water table is available for fresh groundwater exploration. This zone is encountered with appreciable thickness at all resistivity observation points from VES-1 to VES-5. The locations of resistivity observation points from VES-1 to VES-5 have been identified for test well drilling



for further exploration of fresh groundwater. The expected yield cannot be determined from the results of the electrical resistivity survey as it depends upon the hydraulic conductivity, storage coefficient and recharge-ability of the aquifer, which are determined after test drilling and pump out testing of the aquifer.

Electric logging of each of the test hole is also recommended under the supervision of hydrogeologist to know the exact depth and thickness of the water bearing horizons and for accurate designing of the tube well assembly, if sufficient thickness of water bearing strata is available and it is decided to convert the test hole into a tube well.

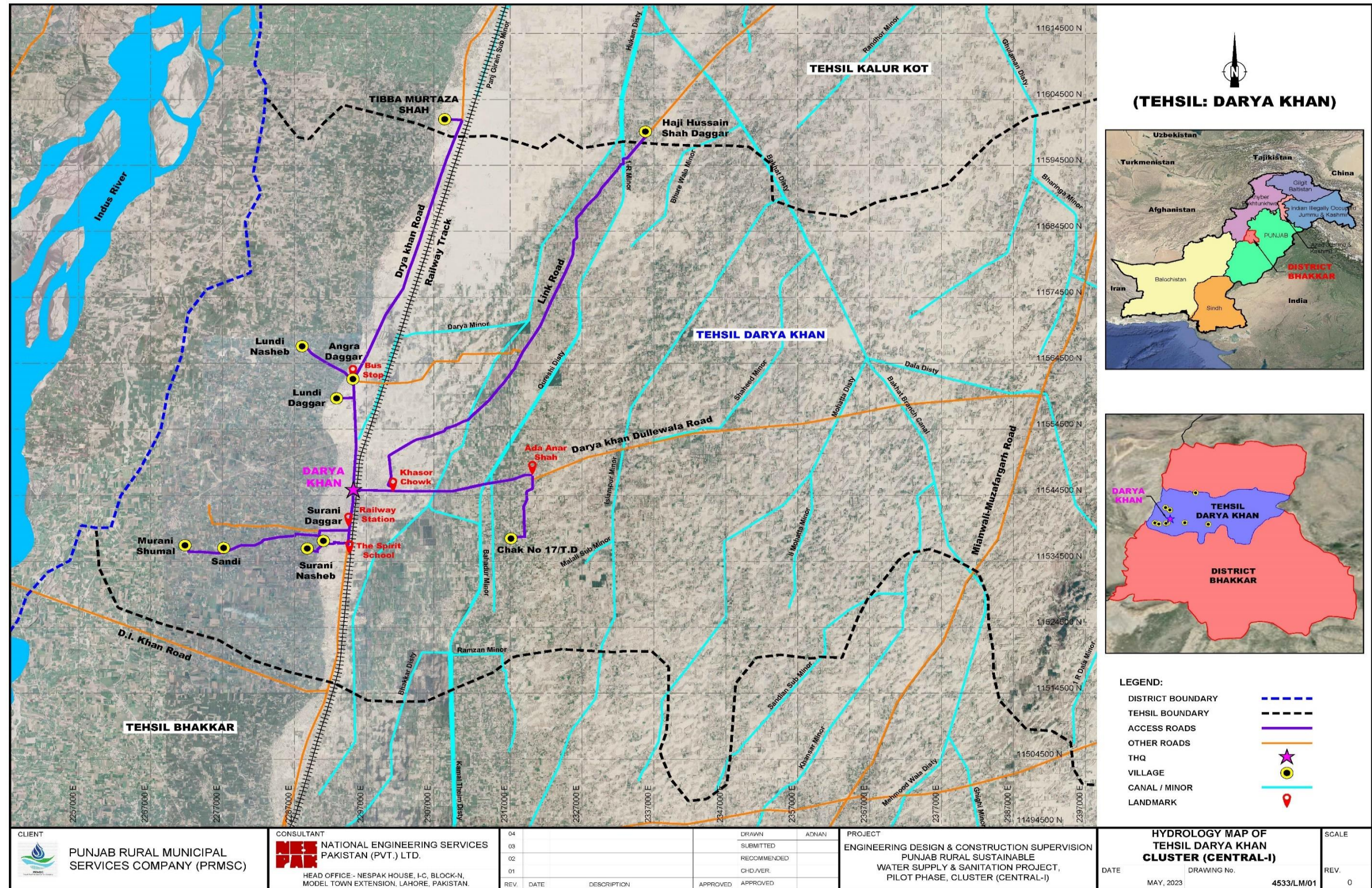


Figure 4.18: Hydrology Map of Darya Khan



4.4.5 Environmental Monitoring, Sampling and Testing for Proposed Project

In order to determine the ambient air, noise levels, groundwater/ drinking water and wastewater quality of the study area. Where, (07) samples of groundwater, 01 samples of wastewater, 01 sample each of ambient air & noise was taken.

The sampling locations for the environmental monitoring of ambient air, noise, groundwater/ drinking water and wastewater for all villages is shown in **Figure 4.19**.

The task of environmental monitoring and testing was awarded to EPA approved environmental laboratory i.e., M/S Pak-green Laboratories.

A. Ambient Air Quality

The ambient air quality for priority pollutants such as NO, NO₂, SO₂, CO, O₃, PM₁₀, PM_{2.5} and Suspended Particles Matter (SPM) was carried out from March. 12, 2023 to March. 14, 2023 by Pak Green Laboratory. The monitoring period was 24 hours. The results of ambient air quality monitoring are given in **Table 4.1** and Lab reports are attached as **Annex-II**.

Table 4.1: Ambient Air Quality Results

Sr. No.	Parameters		Unit	Location	PEQS
				Darya Khan	
1	Carbon monoxide	Avg. sampling time	mg/m ³ (8 Hour)	1.140	5
2	Sulphur dioxide		µg/m ³	21.75	120
3	Ozone		µg/m ³ (1 Hour)	59.6	130
4	Nitric oxide		µg/m ³	0.43	40
5	Nitrogen Dioxide		µg/m ³	7.06	80
6	PM _(2.5)		µg/m ³	47.6*	35
7	PM ₍₁₀₎		µg/m ³	161.3*	150
8	Suspended particulate Matter (SPM)		µg/m ³	389.6	500

B. Noise Level

Noise level monitoring was carried out at the same locations where ambient air quality was monitored. Noise levels were monitored with the help of a portable digital sound meter at the project site for 24 (twenty-four) hours. The results of noise monitoring are given in **Table 4.2** and Lab reports are attached as **Annex-II**.

Table 4.2: Noise Monitoring Results

Sr. No.	Location	Equivalent Noise Level (L _{eq}) dB(A)		PEQS Limit dB(A)	
		Day Time	Night Time	Day Time	Night Time
1	Surani Daggar	63.6	55.6	75	65

C. Groundwater/ Drinking Water Quality

Groundwater/ Drinking water samples were collected from project area of Darya Khan from March 14, 2023 by Pak Green Laboratory (**See Plate 4.1**) and was analyzed for chemical and microbiological parameters. The analysis results of groundwater samples are compared with PEQS. The detailed monitored results for drinking water quality are given in **Table 4.3** and attached as **Annex-II** respectively.



Sampling of Ground water



Sampling of Wastewater

Plate 4.1: Sampling of Ground water & Wastewater



Table 4.3: Results of Ground water

Sr. No.	Measuring Parameter	Units	PEQS Limits	Chak No 52 Hand pump	Lundi Nasheb Hand pump	Angra Daggar Handpump	Murani Shumali Handpump	Sorani Nasheb Handpump	Sandi Hnadpump	Sorani Daggar Handpump
1	PH @ 25 ° C		6.5-8.5	7.527 at 22.4°C	7.547 at 23.9°C	7.929 at 23.4°C	7.844 at 23.4°C	7.958 at 22.6°C	7.854 at 23.6°C	8.077 at 22.9 °C
2	Colour	TCU	<15TCU	0	0	0	0	0	0	0
3	Taste		Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable
5	Odour		Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Turbidity	NTU	5	0.40	0.35	0.45	0.34	0.45	0.41	0.34
6	Total Dissolved Solids	TDS (mg/L)	<1000	1050	500	615	375	490	650	645
7	Total Hardness as CaCO ₃	(mg/L)	<500	290	280	280	220	300	400	250
8	Aluminium	Al ⁺³ (mg/L)	≤0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9	Antimony	Sb (mg/L)	≤0.005	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Arsenic	As (mg/L)	≤50	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11	Barium	Ba (mg/L)	0.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12	Boron	B(mg/L)	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Cadmium	Cd. ² (mg/L)	0.003	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14	Chloride	Cl ¹⁻ (mg/L)	<250	80	25	50	15	30	25	60
15	Chromium	Cr (mg/L)	≤0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Copper	Cu ²⁺ (mg/L)	2.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Flouride	F ⁻ (mg/L)	≤1.5	0.7	0.3	0.4	0.2	0.3	0.3	0.4



Sr. No.	Measuring Parameter	Units	PEQS Limits	Chak No 52 Hand pump	Lundi Nasheb Hand pump	Angra Daggar Handpump	Murani Shumali Handpump	Sorani Nasheb Handpump	Sandi Hnadpump	Sorani Daggar Handpump
18	Lead	Pb. ² (mg/L)	≤0.005	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Manganese	Mn ²⁺ (mg/L)	≤0.5	BDL	BDL	BDL	0.1247	0.0628	0.1084	BDL
20	Mercury	Hg. ² (mg/L)	≤0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Nickel	Ni. ² (mg/L)	≤0.02	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Nitrate	NO ₃ ⁻ (mg/L)	≤50	0.026	BDL	BDL	BDL	BDL	0.040	0.018
23	Nitrite	NO ₂ ⁻ (mg/L)	≤3	0.008	BDL	BDL	BDL	BDL	BDL	BDL
24	Selenium	Se. ² (mg/L)	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Residual Chlorine	Cl ₂ (mg/L)	0.2-0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Zinc	Zn. ² (mg/L)	5	0.0167	0.0238	BDL	0.0071	0.0298	0.0069	0.3646
27	Phenolic compound	Phol (mg/L)	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Sodium	(mg/L)	-	160.5996	38.2954	50.6885	23.1494	22.6897	33.4622	65.4039
29	Potassium	(mg/L)	-	50.6472	8.8874	16.3295	7.4875	15.8868	10.5799	25.4039
30	Total Iron	(mg/L)	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31	Total Coliform	TC (count/100ml)	0/100ml	NIL	35.7*	80.9*	NIL	100.4*	NIL	NIL
32	Escherichia Coli	E.Coli (count/100ml)	0/100ml	NIL	NIL	344.1*	NIL	569.8*	NIL	NIL
33	Feacal Coliform	F.Coli (count/100ml)	0/100ml	NIL	NIL	90.6*	NIL	120.4*	NIL	NIL

D. Wastewater Quality

Wastewater Sample was collected on March 14, 2023 by Pak Green Laboratory from project area and Wastewater was analyzed for its parameters. The analysis results of wastewater samples are compared with PEQS. The detailed monitored results for wastewater quality are given in **Table 4.4** and attached as **Annex-II** respectively.

Table 4.4: Results of Wastewater

Sr. No.	Measuring Parameter	Units	PEQS Limits	Darya Khan Main Drain
1	Temperature	°C	---	23.1
2	PH @ 25 ° C	pH	6.5 to 8.5	7.431 at 23.1°C
3	Biological Oxygen Demand	BOD5 (mg/L)	80	208*
6	Chemical Oxygen Demand	COD (mg/L)	150	328*
9	Total Suspended Solids	TSS (mg/L)	200	450*
11	Total Dissolved Solids (TDS)	TDS (mg/L)	3500	1300
12	Oil & Grease	O.Gr(mg/L)	10	BDL
13	Phenolic Compound	Phol (mg/L)	--	BDL
14	Chloride	Cl ⁻ (mg/L)	<250	140
15	Fluoride	F ⁻ (mg/L)	≤1.5	0.6
16	Anionic Detergent	Det (mg/L)	20	0.714
17	Sulphate	SO ₄ -2(mg/L)	600	119
18	Sulphide	S ⁻² mg/L	1.0	BDL
19	Ammonia	NH ₃ (mg/L)	40	37.6
20	Cadmium	Cd. ² (mg/L)	0.01	BDL
21	Chromium	Cr (mg/L)	≤0.05	BDL
22	Copper	Cu ²⁺ (mg/L)	2.0	0.0615
23	Lead	Pb. ² (mg/L)	≤0.005	0.1139*
24	Mercury	(Hg) (mg/L)	≤0.001	BDL
25	Selenium	Se. ² (mg/L)	0.01	BDL
26	Nickel	Ni. ² (mg/L)	≤0.02	BDL
27	Silver	Ag (mg/L)	1.0	BDL
28	Zinc	Zn. ² (mg/L)	5.0	0.2296
29	Arsenic	As (mg/L)	≤50	0.0111
30	Barium	Ba (mg/L)	0.7	BDL
31	Total Iron	Fe ²⁺ (mg/L)	8.0	4.5765
32	Manganese	Mn. ² (mg/L)	≤0.5	0.1937
33	Boron	B(mg/L)	6.0	BDL



Sr. No.	Measuring Parameter	Units	PEQS Limits	Darya Khan Main Drain
34	Chlorine	mg/L	1.0	BDL
35	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	(mg/L)	2.0	0.185
36	Sodium	(mg/L)	-	141.3078
37	Cyanide	CN ⁻ (mg/L)	1.0	BDL

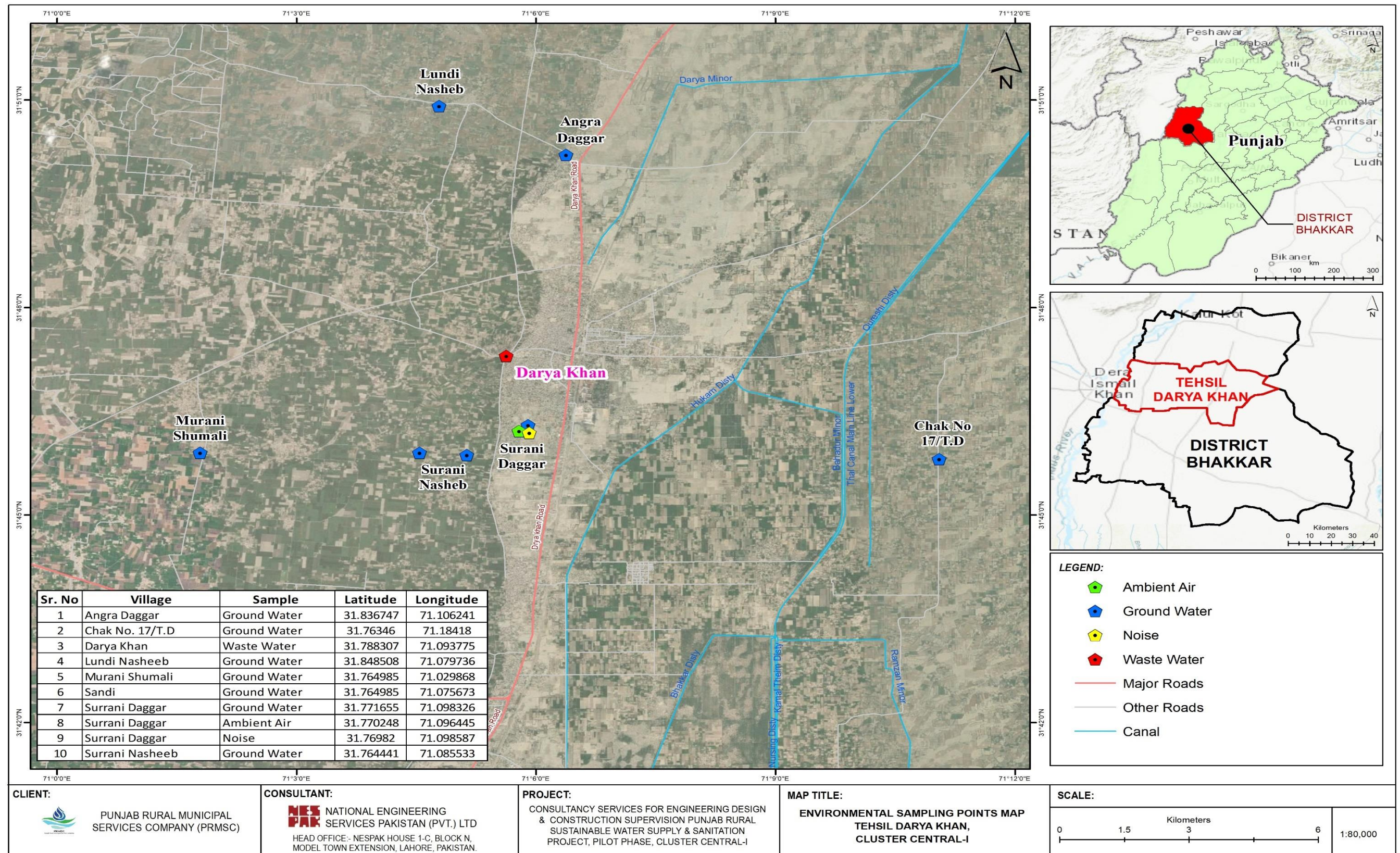


Figure 4.19: Environmental Sampling Points Location At Darya Khan



4.4.6 Seismology

Tehsil Darya Khan is located in a low Hazard earthquake zone. **Figure 4.20** shows the seismic zoning map of Darya Khan with the project area falling under Seismic Zone-2A. The Zone 2A has Peak Ground Acceleration (PGA) in the range of 0.08 g to 0.16 g.

The seismic zoning on the basis of Peak Ground Acceleration (PGA) is summarized in **Table 4.5**.

Table 4.5: Seismic Zones

Seismic Zone	Peak Horizontal Ground Acceleration “g” is the acceleration due to gravity
1	0.05 to 0.08g
2A	0.08 to 0.16g
2B	0.16 to 0.24g
3	0.24 to 0.32g
4	> 0.32g

SOURCE: BUILDING CODE OF PAKISTAN, SEISMIC PROVISIONS –

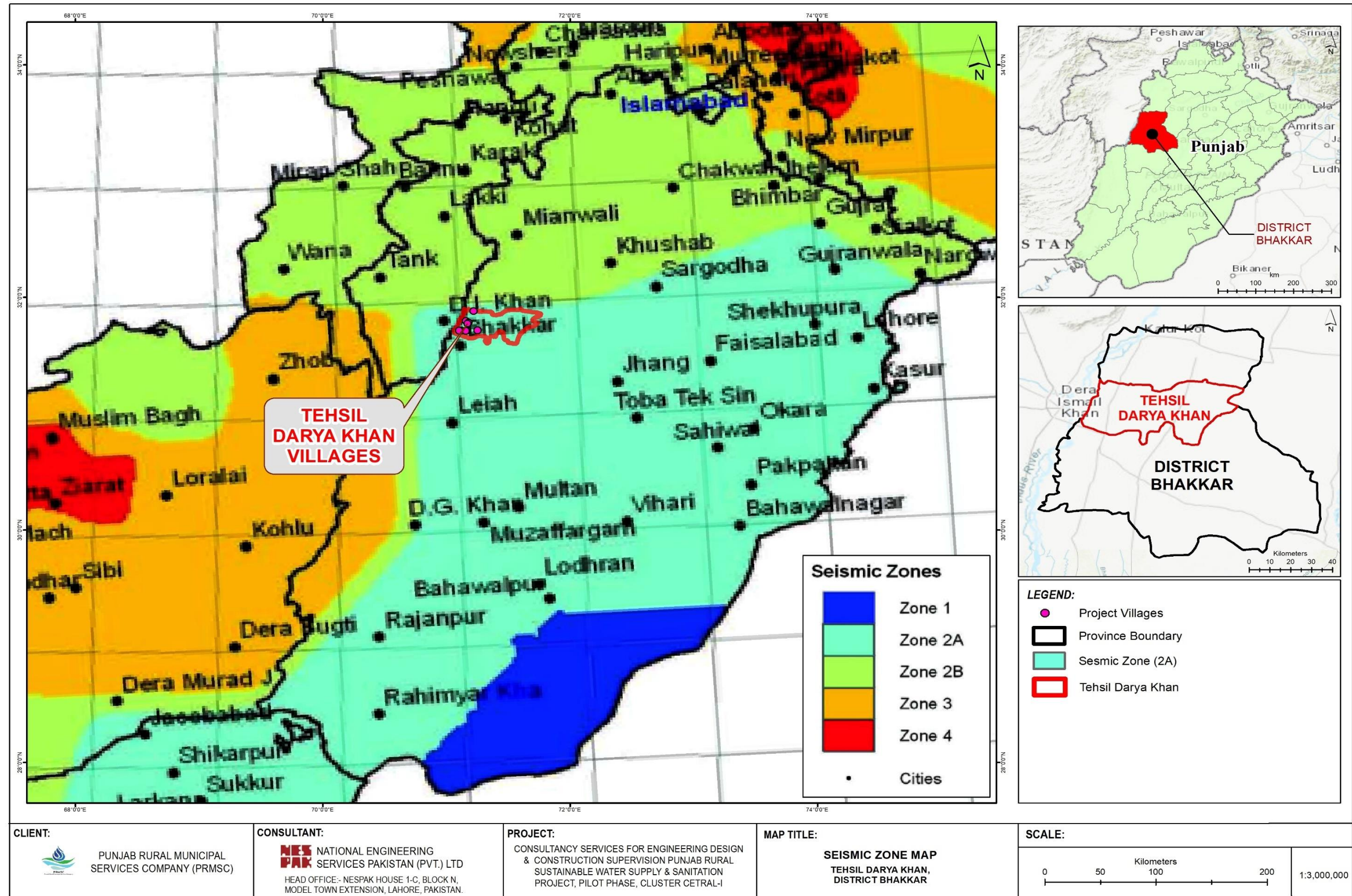


Figure 4.20: Seismic Zone Map of Project Area

4.4.7 Land use of Project Area

The project area comprises agricultural land, open land along with built up area. There are schools, mosques, and graveyards etc. Mostly roads are unpaved. The fertile land in the region is suitable for growing crops such as wheat, cotton, sugarcane, and vegetables. Farmers engage in both rain-fed and irrigated agriculture, depending on the availability of water resources. A view of project villages is shown in **Plate 4.2**.



Surani Daggar



Angra Daggar



Basti Murani Shumail



Basti Sandi



Chak 17/TDA



Haji Hussain Shah



Lundi Daggar



Lundi Nasheb

Plate 4.2: Landuse in project Area of Darya Khan



4.4.8 Environmental Sensitive Receptors

The structure coming within the project boundary considered as sensitive receptors. Sensitive receptors and their respective sensitivity for the villages are listed in **Table 4.6** to **4.14** respectively. Maps of sensitive receptors area attached as **Annex-III**.

Table 4.6: Environmental Sensitive Receptors and Their Sensitivity in Surani Daggar

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Surani Daggar	Govt. Primary School	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
B	Holy Places/ Shrines	
Surani Daggar	Mosque (3) Madrassa Imam Bargah	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.
C	Graveyard	
Surani Daggar	Graveyard	Sensitivity due to access at the time of funeral, dust, further noise and vibrations especially during excavation.

Table 4.7: Environmental Sensitive Receptors And Their Sensitivity In Surani Nasheb

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Surani Nasheb	Govt. Primary School	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
B	Holy Places/ Shrines	
Surani Nasheb	Mosque (3)	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.



**Table 4.8: Environmental Sensitive Receptors and Their Sensitivity
in Sandi**

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Sandi	Masjid al Ghamana	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
B	Holy Places/ Shrines	
Sandi	Govt. Boys Primary School	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.
C	Graveyard	
Sandi	Graveyard	Sensitivity due to access at the time of funeral, dust, further noise and vibrations especially during excavation.

**Table 4.9: Environmental Sensitive Receptors and their Sensitivity
in Murani Shumali**

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Holy Places / Shrines	
Murani Shumail	Masjid	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.

**Table 4.10: Environmental Sensitive Receptors and their Sensitivity
In Angra Daggar**

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Angra Daggar	Govt. Girls Elementary School	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
B	Holy Places/ Shrines	
Angra Daggar	Madrassa	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.
	Masjid	



S.N.	Name/Type of Physical Sensitive Receptor	Remarks
C	Health Institutions / Health Care	
Angra Daggar	Yashfeen Matab	Sensitivity due to access, dust, noise and vibrations especially during excavation. Noise and vibration may affect on mental health of staff.

Table 4.11: Environmental Sensitive Receptors and their Sensitivity in Lundi Daggar

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Lundi Daggar	Govt. Primary School	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
	Govt. Model Primary School	
B	Holy Places / Shrines	
Lundi Daggar	Masjid	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.

Table 4.12: Environmental Sensitive Receptors and their Sensitivity in Lundi Nasheeb

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Lundi Nasheeb	Govt. Boys Primary School	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
B	Holy Places / Shrines	
Lundi Nasheeb	Masjid	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.
	Masjid	
	Masjid	



**Table 4.13: Environmental Sensitive Receptors and their Sensitivity
in Haji Hussain Shah**

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
Haji Hussain Shah	Govt. Girls Elementary school	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
B	Holy Places / Shrines	
Haji Hussain Shah	Jaamia Masjid	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.
	Masjid	
	Masjid (Chah Thalla)	

**Table 4.14: Environmental Sensitive Receptors and Their Sensitivity
in Chak no. 17/TDA**

S.N.	Name/Type of Physical Sensitive Receptor	Remarks
A	Educational institutions	
17/TDA	Govt Girls Elementary School	Sensitivity due to access, dust, noise and vibrations especially during teaching hours.
	Govt Elementary School	
B	Holy Places/ Shrines	
17/TDA	Masjid	Holy places are sensitive due to access to fulfill the religious rituals. Noise and Vibration will cause direct impact during prayer hours.
	Darbar Sahi Suki Beer wali	
C	Health Institutions / Health Care	
17/TDA	Farooq Homeopathic	Sensitivity due to access, dust, noise and vibrations especially during excavation. Noise and vibration may affect on mental health of staff.



4.5 Biological Environment

Tehsil Darya Khan is rich in biodiversity because of its diverse landscape and geographical location. The variety of ecosystem is evident as this area is home to various species. The following section describes the biological environment of the project area.

4.5.1 Flora

The major floral species of the project area include:

- i. Prosopis spicigera,
- ii. Tamarix aphylla,
- iii. Capparis decidua
- iv. Salvadora oleoides
- v. Chenopodium (Prosopis spicigera),
- vi. karir (Capparis aphylla),
- vii. Beri (Zizyphus jujuba),
- viii. Van (Salvadora oleoides),
- ix. kikar (Acacia nilotica),
- x. Shisham (Dalbergia sissoo)
- xi. Aak (Calotropis spp).

A. Major Crops

Major crops that are cultivated in project area are Sugarcane, wheat, maize and Rice that cultivated in the project area.

4.5.2 Fauna

In the area common animals found are dogs, cats, house rats and bats. Domestic livestock that was observed during field visit include buffalo, cattle, goats, sheep, hens and donkeys that are used by the local residents for their living and mobilization purposes. Some other fauna at project area is as followed;

- i. Jungle Cat (Felis chaus),
- ii. Wild Pig (Sus scrofa),
- iii. Desert Wolf (Canis lupus pallipes),
- iv. Common Grey Mongoose (Herpestes edwardsi),
- v. Long-eared Hedgehog (Hemiechinus collaris),
- vi. Desert Jird (Meriones hurrianae),
- vii. Yellowbellied Scotophil Bat (Scotophilus heathii),
- viii. Kuhl's Pipistrelle (Pipistrellus kuhlii).

A. Endangered Species

There are no endangered species of flora and fauna observed in the Study Area.



4.6 Socioeconomic Environment

4.6.1 Socio-Economic Baseline Structure

This sub-section provides a socioeconomic assessment pertaining to the demographic and socio-economic conditions of the respondents of the proposed project area. Detailed site visits were conducted by Social Experts to appraise the prevailing socioeconomic conditions and to assess the socioeconomic impacts of the proposed project. During the field surveys, interviews and consultation meetings were held with the local representatives i.e., Numberdars, residents' shopkeepers, land owners, agriculturists, and their laborers of Darya Khan. The survey tool used for the socio-economic survey tool is attached as **Annex-IV**.

4.6.2 Objectives of Socio-economic Survey

To assess the socioeconomic conditions of the respondents, a social survey was carried out with the following objectives:

- Observe and document the existing socio-economic conditions of the respondents;
- Gain information about the demographic characteristics of the project area;
- Identify the economic resource dependency of the respondents;
Explore the situation of civic amenities, drinking water conditions, sewerage, solid waste management, education, health facilities, etc.
- Get feedback from the community about existing and potentially social issues; and
- Evaluate the possibilities of addressing their concern through relevant authorities

4.6.3 Methodology Adopted for Data Collection

Data collection for the socioeconomic study of the proposed project involved primary data for the socio-economic baseline study and secondary data to know the latest statistics of the project area.

A. Primary Data

Primary data was collected through a socioeconomic survey with the help of a structured questionnaire. Total 80 respondents were asked about their concerns in the projected area.

B. Secondary Data

Secondary data was collected from the Pakistan Bureau of Statistics (Census 2017), established literature, and research. The latest census (2017) released the number of households, population statistics for all sexes of census 2017 as shown in **Table 4.15**.



Table 4.15: Secondary Data Result of Project Area

Village Name	Area (Acre)	Population				Literacy rate
		Male	Female	Transgender	All Sexes	
Sorani Nasheb	894	549	470	-	1,019	53.57%
Haji Hussain Shah	6215	3,124	2,849	-	5,873	39.83%
Lundi Daggar/Angra Daggar	4343	5,815	5,403	-	11,218	54.82%
Basti Sandi	1309	1,232	1,182	-	2,414	42.14%
Sorani Daggar	1278	1,969	1,805	-	3,774	38.34%
Morani Shumali	1002	912	862	1	1,775	48%
Morani Sandi	1309	1,232	1,182	-	2,414	42.14%
Lundi Nasheb	2545	2,341	2,240	-	4,581	51.29%

4.6.4 Findings of Socioeconomic Survey

A. Demographic Characteristics of the Population

The census and socio-economic survey results reveal that the majority of the respondents were aged between 16-25 and 26-35 years. Maximum age limit of any respondents was 55 or above 55 years, people which indicates that the respondents were mature enough to respond to the interviewers and were able to understand the proposed project interventions and give their feedback and suggestions regarding the proposed project. **Figure 4.21** presents the age compositions of the respondents.

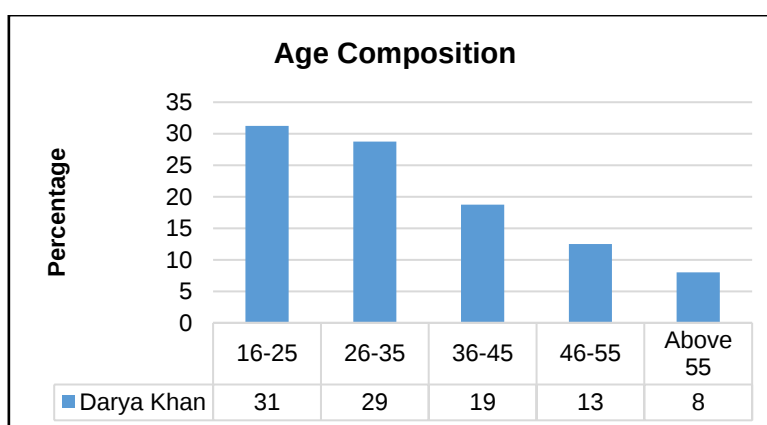


Figure 4.21: Age Composition of the Respondents

B. Qualification of the Respondents

Majority of the respondents in project area illiterate. While the second most common level of education attainment is up to matric level. Whereas a small percentage of people get higher education up to graduation. This shows that the trend of school-going children in the proposed project area is low which might be due to financial constraints as well as a lack of educational facilities. The Proposed area do not have any proper education institute, and all the schooling



facilities are outside the villager's range. So due to financial reasons they have to cut off the ties with school at early age and have to earn for their families as the respondents of the selected area are laborer or farmer by profession. The qualification status of the respondents is given in below **Figure 4.22**

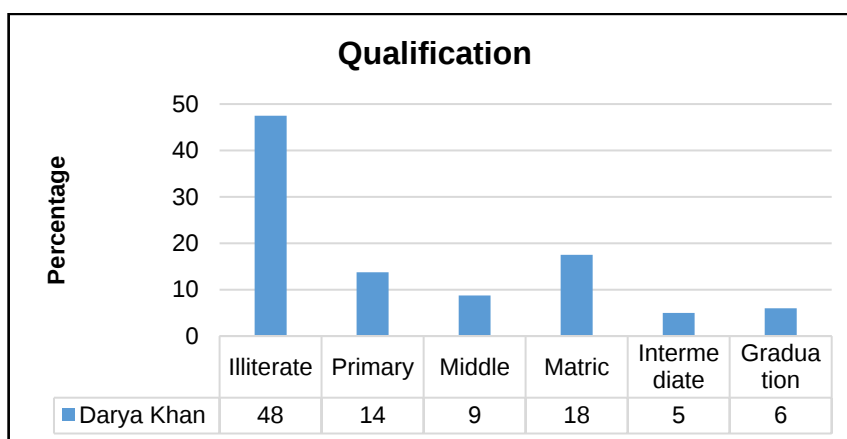


Figure 4.22: Qualification of the Respondents

C. Profession of the Respondents

The majority of the respondents in the proposed area are linked to Agriculture. Most of them were labor and the rest of the respondents used to work as farmer. The trend of job gets reported as the respondents were Health care officers, contract employees, shopkeepers, security guard, and driver. Majority of female respondents do not work in the field as they are house wives and busy in household chores. **Figure 4.23**, presents percentages of the various professions of the respondents

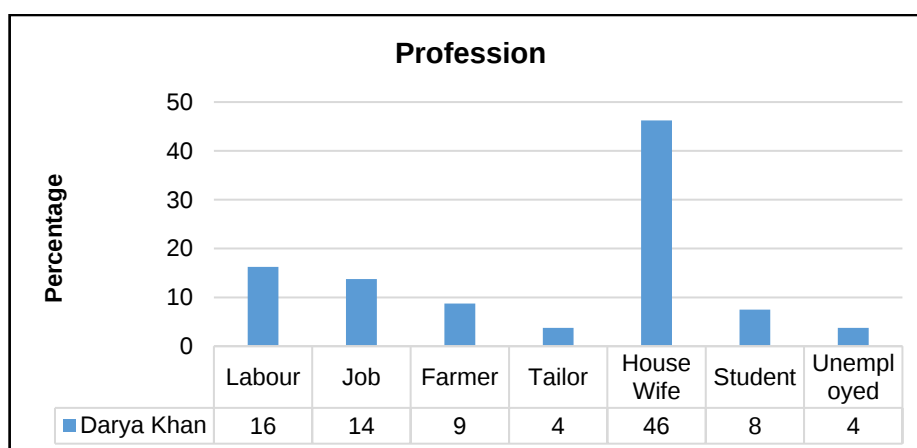


Figure 4.23: Profession of the Respondents

D. Marital Status and Family System

Survey findings reveal that the ratio of married respondents was higher than unmarried. majority of the respondents lives together in one household as joint family system. **Figure 4.24 & Figure 4.25** present the marital status of the respondents.

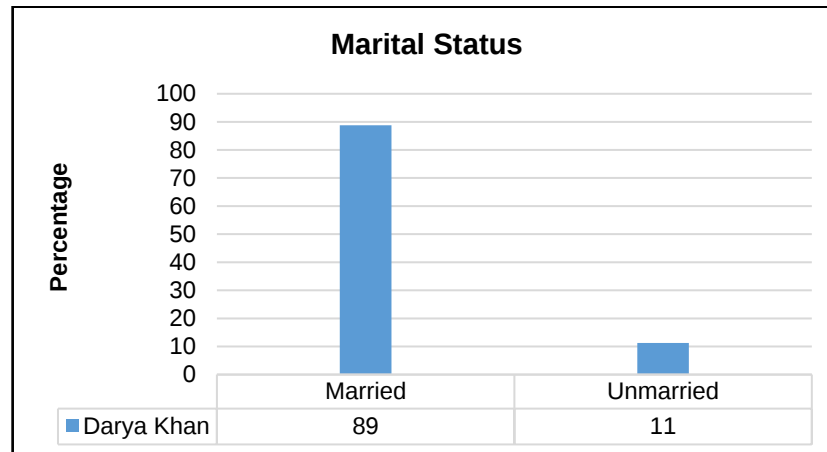


Figure 4.24: Marital Status of the Respondents

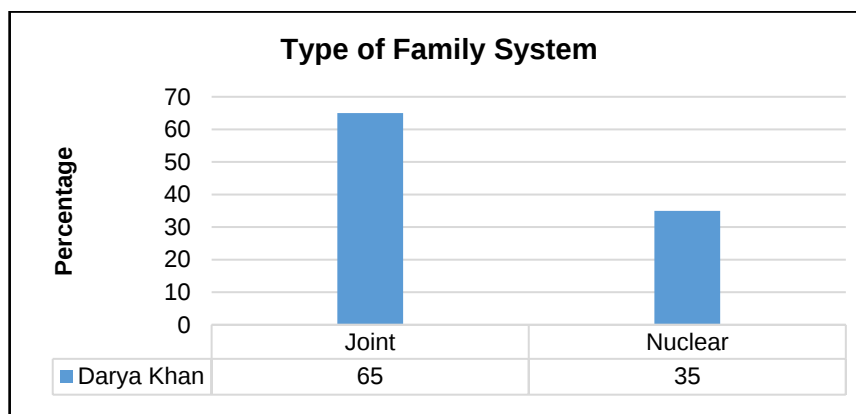


Figure 4.25: Family System of Respondents

E. Religion

The survey area is predominantly made up of Muslim-community, during consultation meeting the respondent were inquire about the existence of any other minority to exclude any religious biasness. But no other religion was reported by the respondents of any village.

F. Caste System

Extreme diversity in the caste system of the respondents was observed in the projected area. Majority of the villagers have their caste according to the tradition and history of evolution of the respected area. The major castes include Baloch, Bhatti, Angra and Khokhar. Some other castes include as Dodhi, Duli, Machi, Bhomi, Solan, Jouri, Sonaar, Barokha and Theti were also reported on minimal level. The percentages of various castes in the proposed project sites are given in **Figure 4.26**

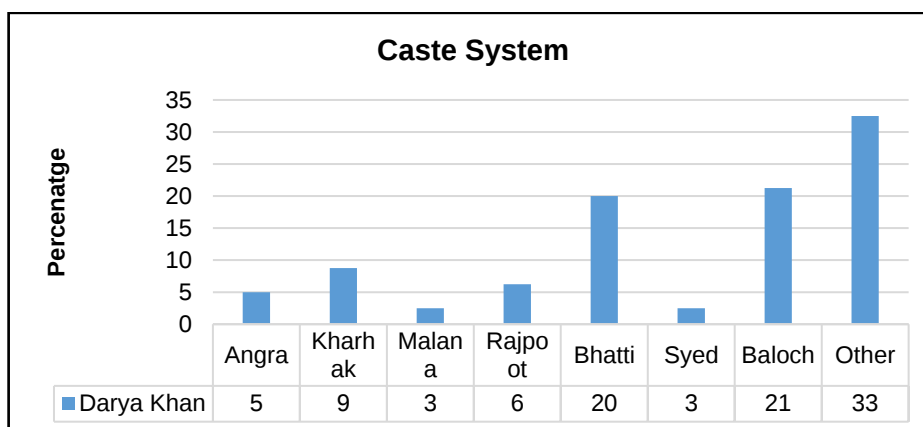


Figure 4.26: Caste System of the Respondents

G. Languages Spoken

The dominant languages in the respondents are Punjabi but a small population resides in the area also speak in their local language as Saraiki. **Figure 4.27** represent the percentage of language spoken by the respondents.

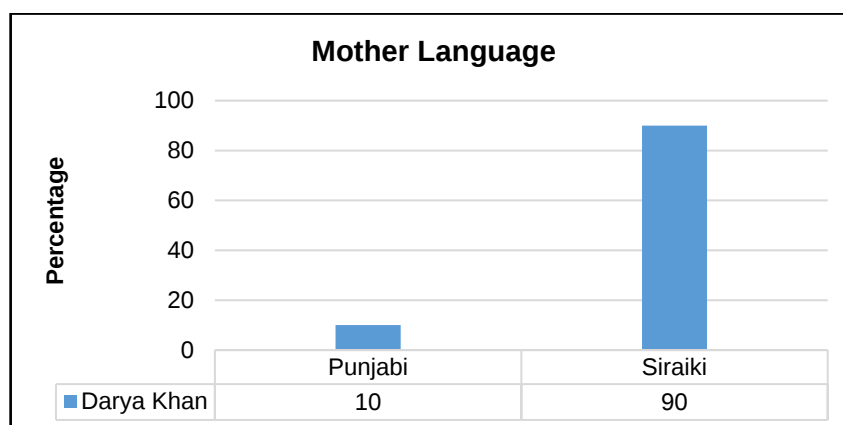


Figure 4.27: Mother Language of the Respondents

4.6.5 Socio-Economic Characteristics

A. Monthly Income of the Respondents

The monthly income earned from various sources varied widely among individuals with the lowest earning reported being less than PKR 15,000 and the highest earning above PKR 50,000. Mostly, people are appraised that their monthly income is hand to mouth to meet their household demands.

Majority of the participants works in the fields or laborers are financially weak with very limited income i.e., Less than 15,000 and resources to meet the needs of their families. Small number of populations earn 25,001-35,000. While a minor percentage of people who earn up to 50,000 are observe to works as Government employee, have agriculture land and have profit from agriculture crops. Ratio lie under the name of No income are from the female respondents and

few students. Percentage of the average monthly income of the respondents is shown **Figure 4.28**

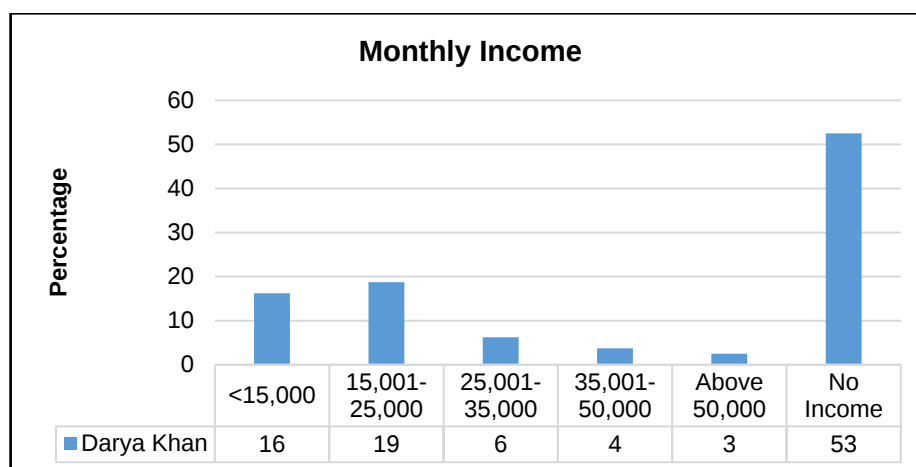


Figure 4.28: Monthly Income of the Respondents

B. Ownership Status of the Houses

Majority of the respondents owned their homes and no renters were reported. Whereas, some people used to live in other dwellings (living on other person's land e.g., Namberdar or any effective person of the area) were also observed. Percentage of the ownership of the houses of the respondents is shown in **Figure 4.29**.

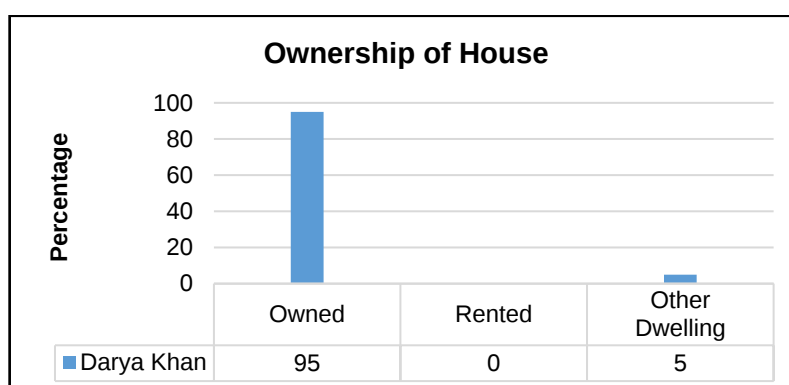


Figure 4.29: Ownership of the Houses of the Respondents

C. Housing Construction Pattern

Survey result highlights the mixed ratio of nature of houses. Respondents have Katcha houses though the proposed project areas lack basic amenities, however, rest of the population build paccay houses with the passage of time, i.e., RCC roof, stone walls with cement mortar, cement plastering & flooring. A few mud/ katcha and semi katcha houses was reported. However, a few semi-pacca houses were reported in Nature of construction of houses is shown in **Figure 4.30**

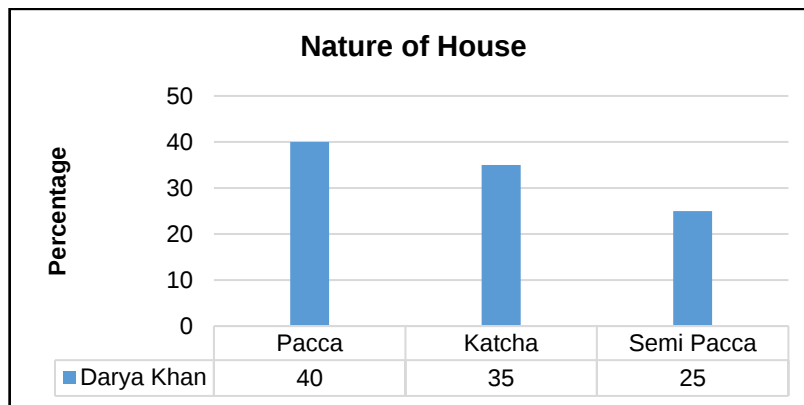


Figure 4.30:Nature of Construction of houses

D. Health Facilities

Poor health conditions in the project area are one of the reasons behind the initiation of the proposed project. The health of the people in the proposed project area is continuously deteriorating due to inadequate water and sanitation facilities. Most of people suffer from water-borne diseases.

Majority of the respondents seek medical facilities from THQ Darya Khan and DHQ Bhakkar, whereas, for better health consultation and treatment, the population travel to Toba Taik Singh and Lahore. Few numbers of People used to go to get medical facilities at local level in Haji Hussain Shah.

E. Source of Water in Community

Majority of people in project area use handpump and bored water at their houses. Source of water in community is shown in **Figure 4.31**

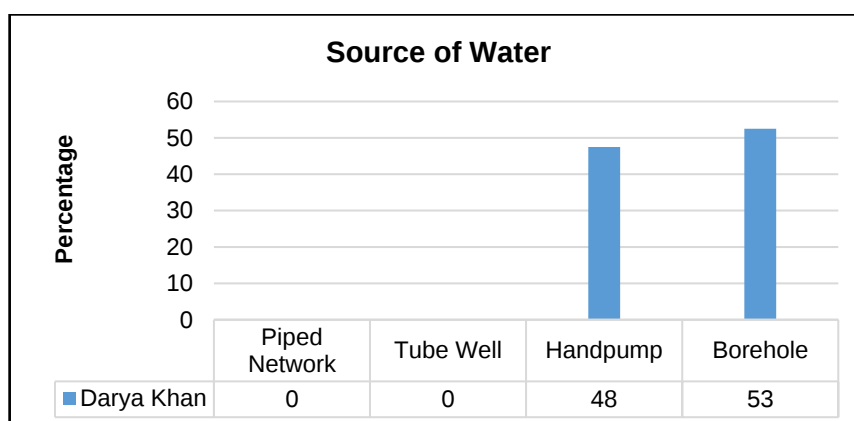


Figure 4.31:Source of Water in Community

F. Source of Drinking Water

In all villages of project areas majority of people use hand pumps and bored water in their houses, or some people use handpump situated in Mosque or near their residential area. as



they are the only sources of water in community. However according to respondents' water is undrinkable and causes multiple diseases in local community. Source of water in community is shown in **Figure 4.32**

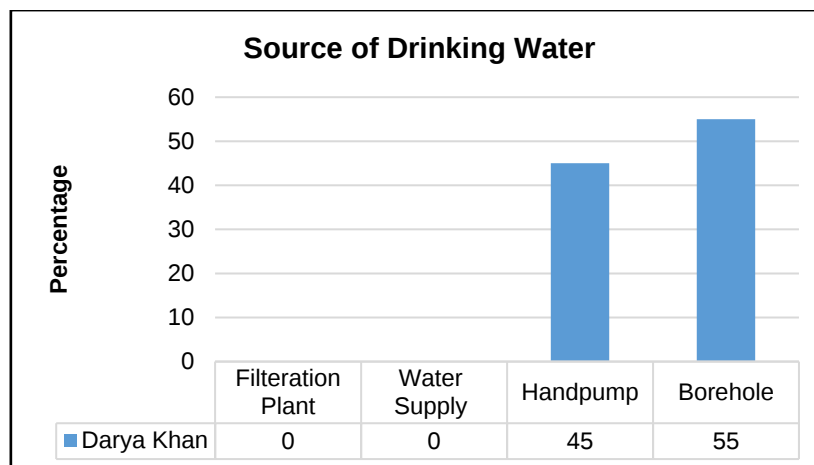


Figure 4.32:Source of Drinking Water in Community

G. Satisfaction with Water Quality

The survey is carried out to check whether the population is satisfied with the water quality or not. So, the majority of the respondent's shows maximum level of satisfaction. Whereas the unsatisfaction in rest of the population cause due to bad quality of water as the participants claims that the water being used turns to yellow after being exposed in air, filthy, have smell issue and cause various disease in the community. Satisfaction with water quality has been shown in **Figure 4.33**



Figure 4.33:Satisfaction with the Water Quality

H. Type of Sewerage System

Two types of major sewerage system were reported in the survey i.e., soakage pits and open drains, while in rest of the population, there is no sewerage system and the sewage is being disposed of in open fields/Plots. Small number of participants report the presence of piped network for waste water disposal as show in **Figure 4.34**

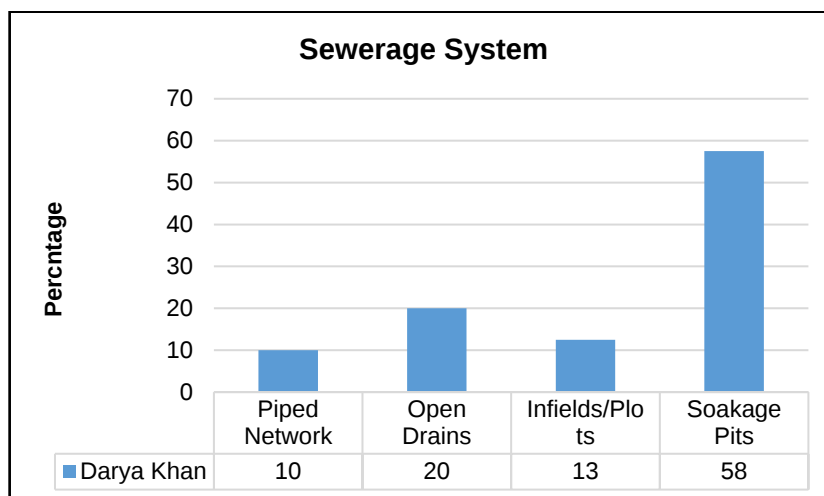


Figure 4.34: Type of Sewerage System

I. Type of Solid Waste Management

According to survey analysis, almost all respondents (100 percent) in all the villages use open dumping method for the disposal of solid waste.

J. Major Disease

Disease like Gastrointestinal, High Blood Pressure, migraine, Diabetes, Malaria and joints swelling are seen in almost all of the villages. However, cases of Typhoid also found. High ratio of female with migraine and anemia has been reported. As projected population share the water being used is contaminated, bitter in taste, yellow after being exposed to air and contain smell. Rate of still birth cases, irregular menstrual cycle in almost every village. Cases of mentally retarded child by births and having chest infection in children found.

K. Major Crops

Major crops of the villages of project areas are Wheat and sugarcane, most of the respondents who work as farmer on capitalist's land, share that the production of crops vary from season to season. As the survey is conducted in April, the crops are enriched with the production of wheat, while some of the respondents grow fodder for animals. Many respondents with agriculture land claims to grow Vegetables and beans. Canal, Bored/Electric Motors and tube well use for the irrigation of the crops.

L. Availability of NGOs

A Non-Government Organization (NGO) named National Rural Support Programme (NRSP) Pakistan is working in the project area and running to facilitate the local community.



They work to help the community at local level and working to release the potential according to their profession and skills in men and women. They are also working in agriculture field to raise the production of crops and help to the farmer to generate maximum level of income.

This government initiative is particularly commendable as it focuses on addressing the severe health issues faced by children and women due to the consumption of contaminated water.

The villagers are already receiving services from NGOs, which include:

- Imparting WASH-related training to the locals.
- Offering food banks in the form of goats to help meet their expenses.
- Establishing washroom facilities in areas where such opportunities are lacking.
- Constructing approximately 432 houses throughout the tehsil.
- Installing filtration plants.
- Providing green water taps for drinkable water and coloring red those taps connected to non-drinkable water sources.

M. Willingness to Pay Tariff Amount

Almost all the people approve the implementation of the project. Respondents from all the villages share the significance and need for the implementation of the project. Many participants give positive response for the willingness to pay the bill/tariff for the implementation of the project. Here **Figure 4.35** show the responds of the participant for their willingness to pay tariff.

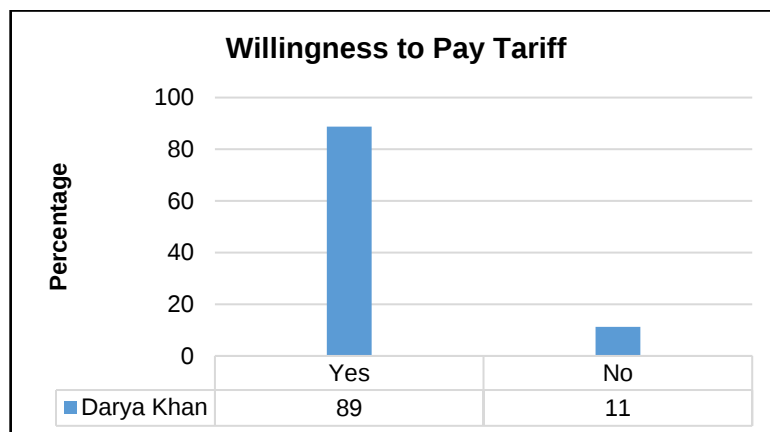


Figure 4.35: Willingness to Pay Tariff

N. Amount of Tariff

It is suggested that by considering the economic condition of local community, the respondents were asked about their suggestion about how much tariff the local community can pay easily. The amount divided into categories after the responses of the participants. Majority of the answers lie in 100 to 200 of category. **Figure 4.36** draw the image perfectly

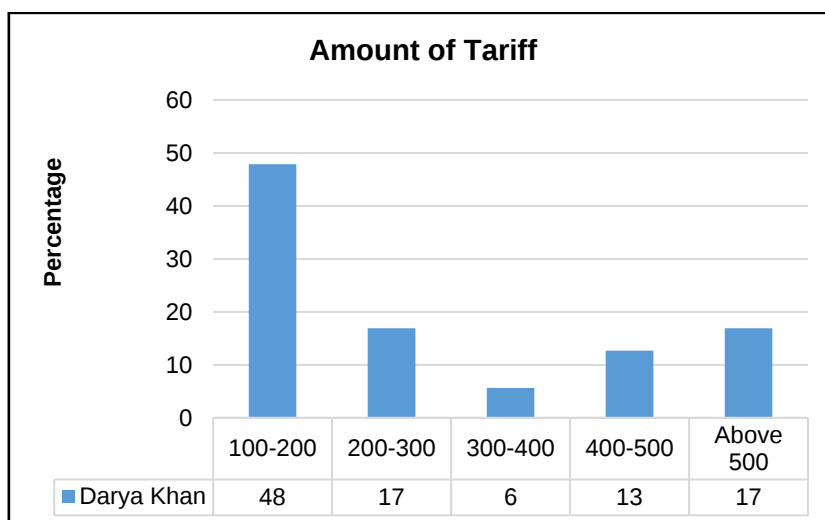


Figure 4.36: Amount of Tariff

4.7 Gender Situation Analysis

4.7.1 Introduction

This section presents findings of Gender Situation Survey. The survey was aimed at identification of women related issues, in general and water and sanitation related issue, in specific. The problems and issues identified in the gender survey shall be used as a basis of further planning and improvements in all rural settlements.

4.7.2 Purpose and Objectives

Following are some prime objectives of Gender Situation Survey:

- a. To address gender related issues;
- b. To specify division of labor and time allocation;
- c. To address awareness and attitudes towards education and skills;
- d. To facilitate and encourage involvement and participation of women;
- e. To ensure tangible benefits to women;
- f. To assess existing situation of water supply and sewerage facilities at household level;
- g. To recognize a sense of responsibility about the usage, benefits and scarcity of water and efficient sewerage disposal;
- h. To work closely with the females of all settlements to address sanitation and hygiene practices;
- i. To estimate willingness to pay for improved water and sanitation facilities; and
- j. To check knowledge and implementation of project execution;

4.7.3 Conducting Field Survey & Data Collection

Gender consultation meetings and interviews were conducted randomly with 47 women of the projected area during month of April 2023. The meeting was conducting by keeping in view the projection of piped network in each village. During the survey, efforts were made to include



such female respondents in the study, who were mature enough to give response, have awareness & well connected with the other community to identify the impacts caused due to proposed project. The number of women were contacted by Simple Random Sampling Technique for above mentioned sample size.

The women of project area were proactive in participation and showed their significant support for project execution. The gender survey tool is attached as **Annex-V**.

4.7.4 Results of Gender Situation Survey

A. Age Composition of Female Respondents

The gender situation survey **Figure 4.37** shows that larger percentage of women falling in age group of 16-to-25-year participants in the survey, while second most occurring age group is 26-35 and so on. Women in the age group of 26-35 years enthusiastically participated in the survey and their views have greater significance and have better vision than other age groups.

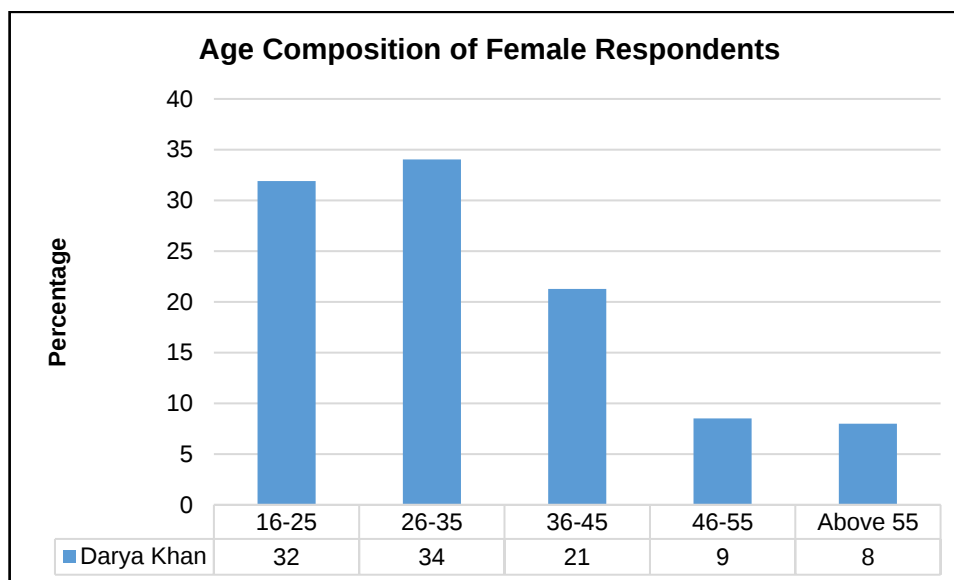


Figure 4.37: Age Composition of Female Respondents

B. Educational Status of the Female Respondents

From survey results **Figure 4.38** it was found that majority of the respondents were found literate. The literacy rate of some of the females is higher than rest of them. The literacy rate actually measures the percentage of population aged 15 and above who are able to read and write. This shows that the trend of school-going children in the proposed project area varies which might be due to financial constraints as well as a lack of educational facilities. Because the survey tool is design in such way to understand the willingness of female education and all the women show great urge to pursue their education and share the suggestion of provision of educational facilities for girls. Due to unviability of the school and colleges in the project area, many females share that their family didn't allow them to go outside of their residential area because of safety precautions. So, they have to quite schooling and be the part of household chores.

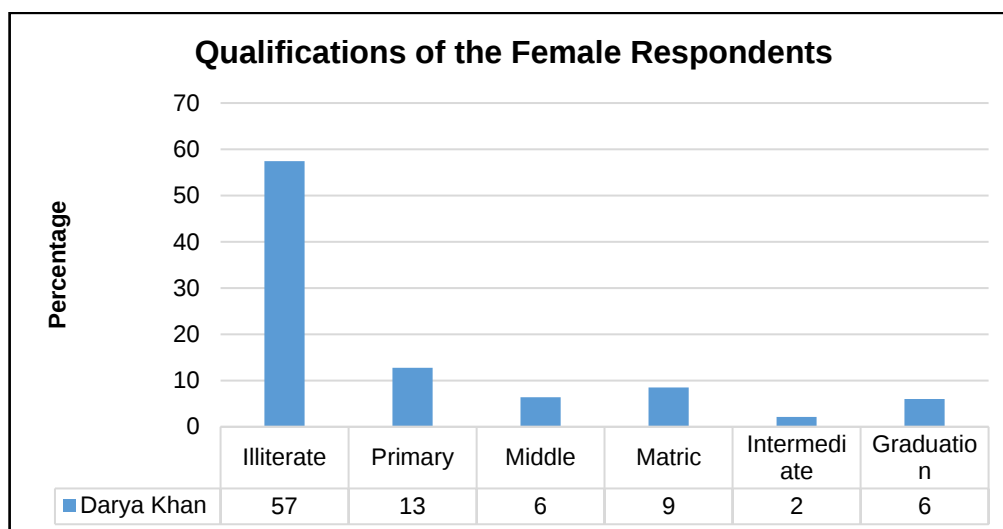


Figure 4.38: Qualification of Female Respondents

C. Marital Status of Female Respondents

In sampled respondents, the percentage share of married respondents was higher than that of unmarried. Majority of the respondents were found married during the gender survey. Whereas only a few cases of unmarried women reported from as shown in **Figure 4.39**.

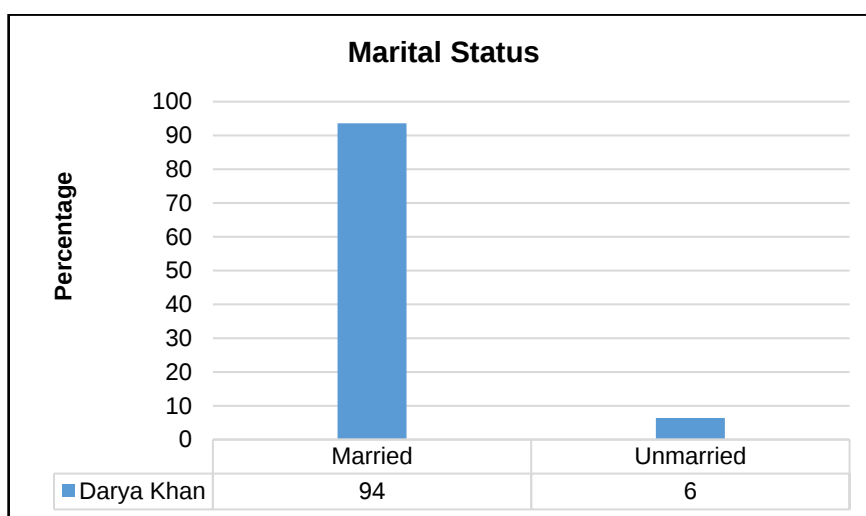


Figure 4.39: Marital Status of Female Respondents

D. Age of Female Respondents at Time of Marriage

A small proportion of young girls are forced to marry under the age of 16, due to socio-economic and cultural reasons. Greater percentage of females got married between the age of 16-25. As the trend of educating girls is not in the perspective the residential people, so when the females hit puberty, they engaged them with ties of marriage relationship. The minimum age of marriage set by the Federal Shariat Court (FSC) of Pakistan is 16 years¹⁰

¹⁰ <https://www.dawn.com/news/1654648>

under the Child Marriage Restraint Act (CMRA) 1929. Survey findings are summarized in **Figure 4.40** below:

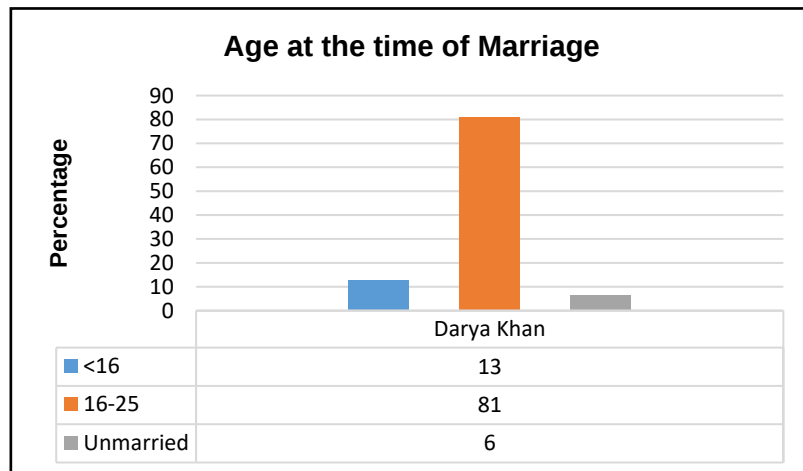


Figure 4.40: Age at the Time of Marriage

E. Number of Children of Female Respondents

The number of children has been divided on the bases of the responses of the respondents as shown in **Figure 4.41**. Majority of the respondents have up to 5 number of children. While rest of the population of females are unmarried.

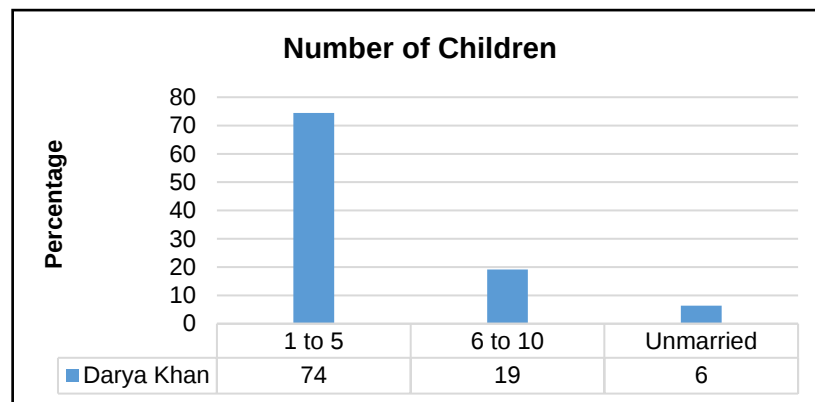


Figure 4.41: Number of Children

F. Occupation of Female Respondents

According to Gender Situation Survey Findings **Figure 4.42**, it has been seen that majority of the female respondents are engaged in household activities and look after their children and other family members. While some of them work as tailor, house maids, farmer in agriculture and laborer, lady health worker, have a small shop and teacher to meet their expenses and to support their families, their salaries are used to fulfill the household expenses.

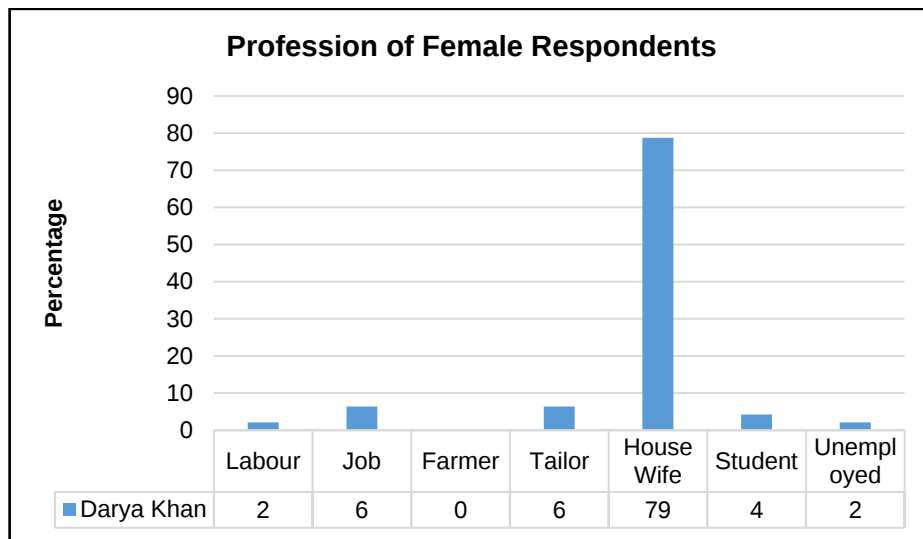


Figure 4.42: Nature of Work of Working Women

G. Monthly Income of Female Respondents

As discussed earlier, majority of the females busy in household activities and taking care of their children and family members, result in no employment and generate zero income, shows in **Figure 4.43**. While on the other hand, females who work earn less than 15,000, but their income is used to fulfill the household expenses by their own will.

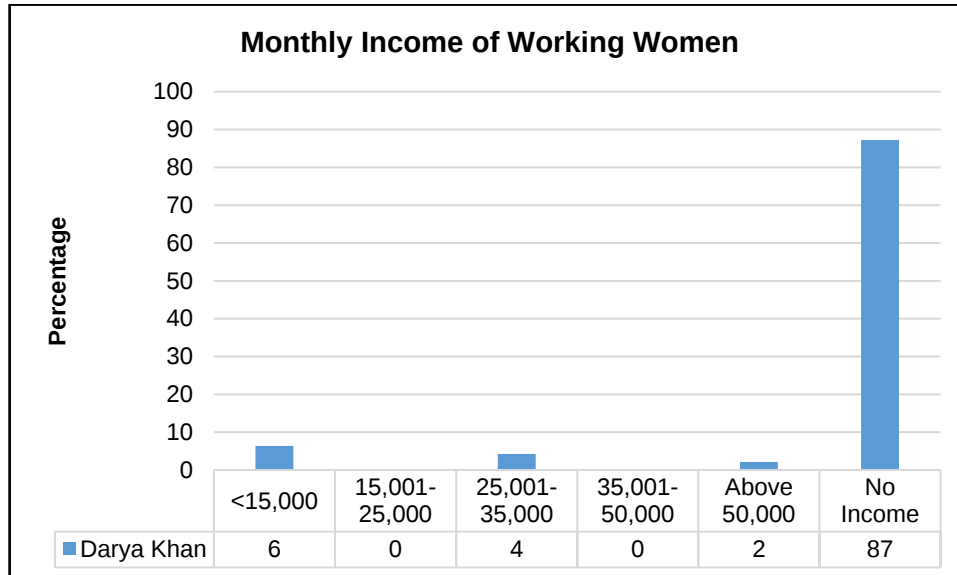


Figure 4.43: Monthly Income of Working Women

H. Power to spend the money

Figure 4.44 shows the majority of respondents have power to spend their money the way they like.

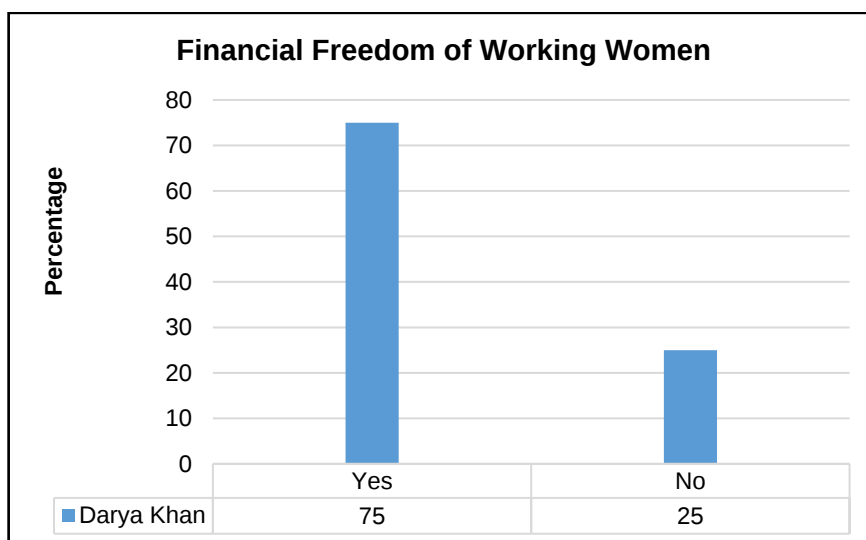


Figure 4.44: Power to spend the money

I. Reasons of not Working

The survey was designed in such way to assess the reasons behind of which women do not work outside their houses. Majority of the female didn't do work because of busy in completing household tasks and taking care of their children. While other responses that were received i.e., lack of resources, lack of skills to be a tailor or do any embroidery work and others are busy in household chores. While all the female participants work and help their family members financially. Survey findings are summarized in **Figure 4.45** below:

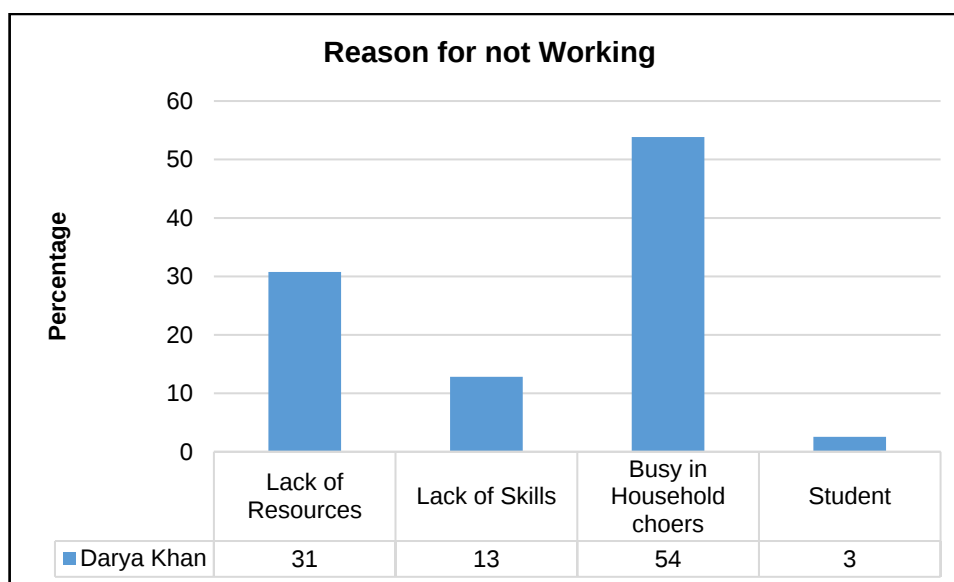


Figure 4.45: Reasons of Not Working

J. Monthly Savings

Figure 4.46 shows the money saving from household income every month. It is evident from the findings that majority of the 50 % respondents couldn't save money from their monthly income, as their all income goes towards the household expenses.

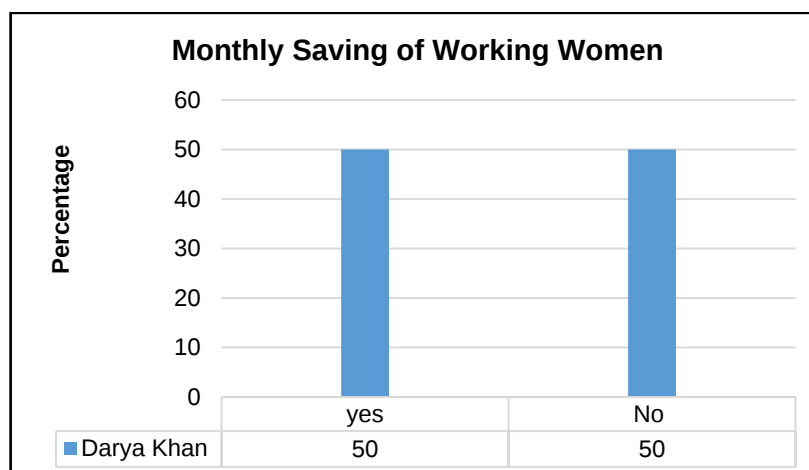


Figure 4.46: Monthly Saving of Working Women

K. Participation in Decision Making

The majority female respondents in all the villages don't take part in decision making for any kind affairs. While visible percentage of the women works as job employee play vital role in decision making for domestic affairs. Survey findings are summarized in **Figure 4.47** below:

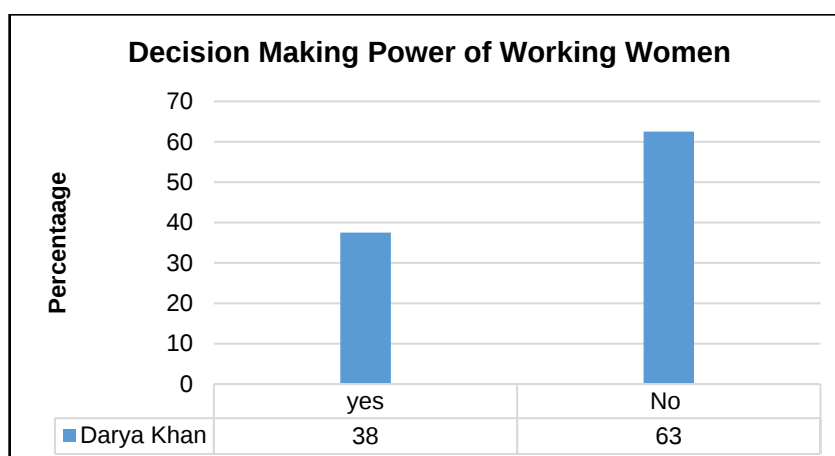


Figure 4.47: Participation in Decision Making

L. Types of Household Tasks

The women were inquired about the household task that are in their daily practices. Many women with Sewing and embroidery skills share they perform all the household tasks including Laundry, doing dishes, cooking and cleaning house. The large percentage of respondents from all rural settlements claim that they only perform their own household chores because of lack of skills in any kind specific task like other as sewing etc. While the percentage who didn't perform any task are due to their age factor. Survey findings are summarized in **Figure 4.48** below:

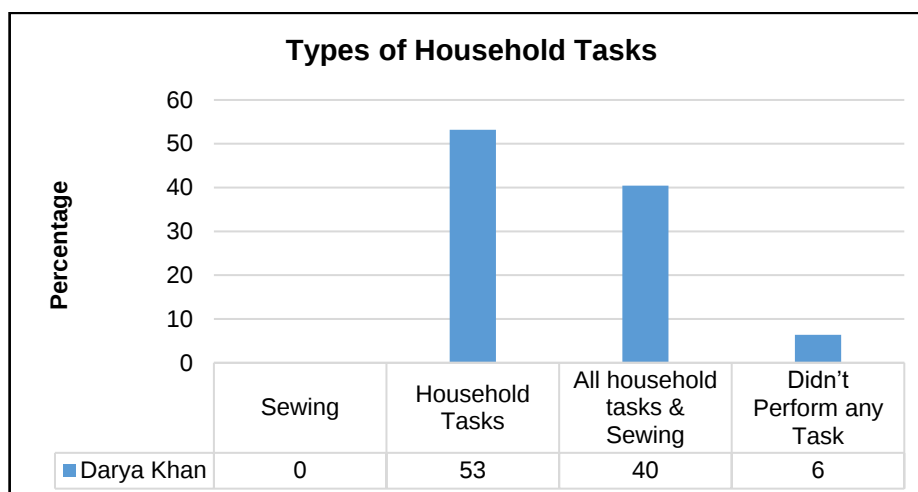


Figure 4.48: Types of Household Tasks of Women

M. Knowledge level of adolescent girls on Menstrual Hygiene

According to majority of respondents (100 percent) in all the settlements women were not aware about the menstrual hygiene. During consultation, women were inquired about their awareness level and safety precautions that they perform while menstrual cycle. And the response was quite negatives because many females didn't focus on their hygiene during cycle. After a brief lecture on the, adequate and clean water supply is necessary to maintain the menstrual hygiene, significant level of maintenance of hygiene and its impact on them and their children health, majority of females show positive attitude and share their suggestion to have a training session about the usage of sanitary products and day to day activities to keep their body clean.

N. Type of sanitary material use during Menstrual Cycle

Females were less aware of menstrual hygiene but they know the importance of usage of Sanitary Hygiene product to keep them safe. But due to unavailability of product in local area market, and the trend to sell sanitary products was not found in majority of the villages. Females have to use cotton pads or Cloth menstrual pad which is made at home. While few numbers of females, buy sanitary products from city. Few respondents were at the stage of menopause, but they also use cloth menstrual pads during their cycle previously. Responses are shown in **Figure 4.49**.

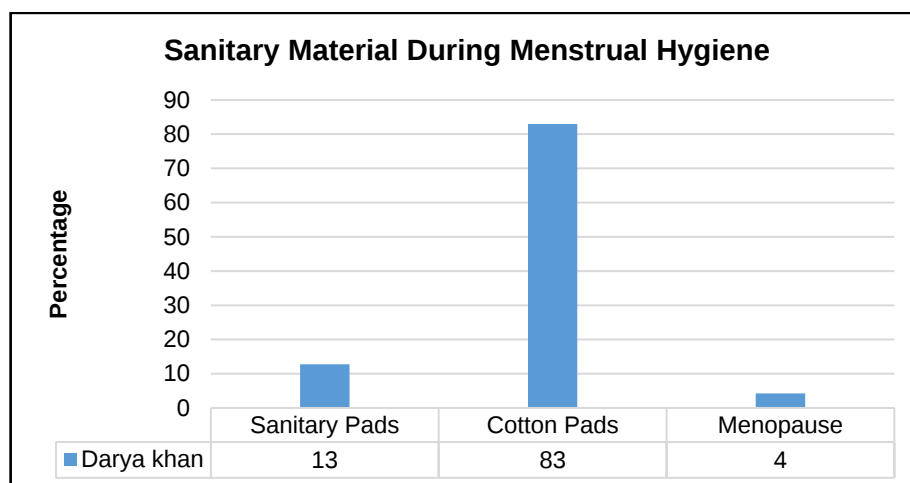


Figure 4.49: Type of sanitary material for use

O. Willingness/need to learn skills for earning the Livelihoods

To earn the livelihoods were sought by learning new skills. Because of less access to adequate trainings and less representation of women in activities requiring different skills, majority of the respondents showed an urge and need of learning new skills to earn their livelihood in all the villages. Females mention the skills they wanted to learn, as any vocational and training centers that many females already have skill of sewing and embroidery, beautician. So, if there is any institute for skills development than they can hire trainers from the community and it will be also convenient for the project team.

P. Education of Women

The survey results reveal the low trend of educational attainment of young girls in the project area so the all of the women from all the villages are in favor of women education. Many females share the importance of attainment of education for children especially for females. They share the females have to build home and take of the family so it is important if female is well educated. They can pursue their career as well and help their family members financially. The most important task of female as mother can be performed very well when the mother is educated and raised the children brilliantly. One of the females, share that young female faces restriction in order to get education because most of the females get married after reaching puberty. The culture of education is not active in some of the household of mentioned village.

Q. Gender-based Violence or Domestic Violence

Survey findings show that the majority of respondents in all settlements do not face any gender-based violence or domestic violence.

R. Free Movement of Women

Women were enquired whether they are free to move around or not. The survey results reveal that in all the settlements of projected area, 100 percent females do not have restriction in mobility, except in some of the respondents. Where one female share that there is cultural



restriction for women as it consider to be against the norms and values community. While the rest of the females feel safe and secure to move outside of their houses. All the population of the projected area live with harmony like families and know each other better than anyone. As it shows in **Figure 4.50**.

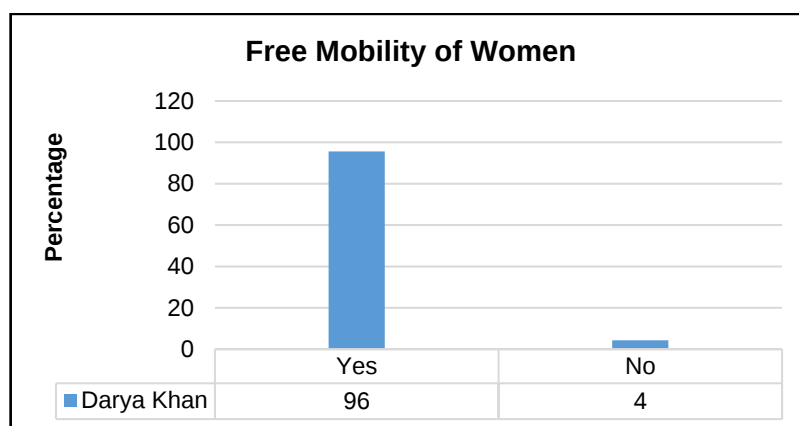


Figure 4.50: Mobility of Women in Community

S. Sexual Harassment

Higher percentages in survey findings show that all females, do not face any sexual harassment in their areas. All the population of the projected area live with harmony like families and know each other better than anyone. Sexual Harassment (SH) and Sexual Exploitation and Abuse (SEA) issues reported as females do not feel secure to go anywhere.

T. Source of Water for Domestic Use

Majority of people in project area use handpump and bored water at their houses. Source of water in community is shown in **Figure 4.51**.

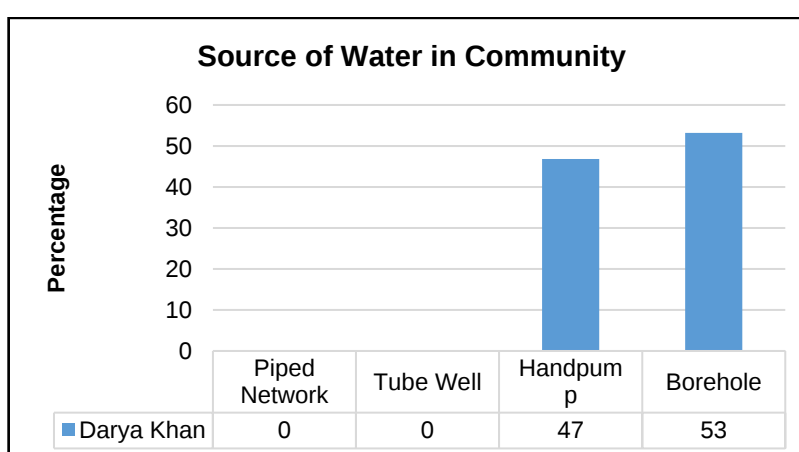


Figure 4.51: Source of Water for Domestic Use

U. Source of Drinking Water

In project areas majority of people use hand pumps and bored water in their houses, because these are the only source of water in locality. However according to respondents' water is



undrinkable and causes multiple diseases in local community. Source of water in community is shown in **Figure 4.52**.

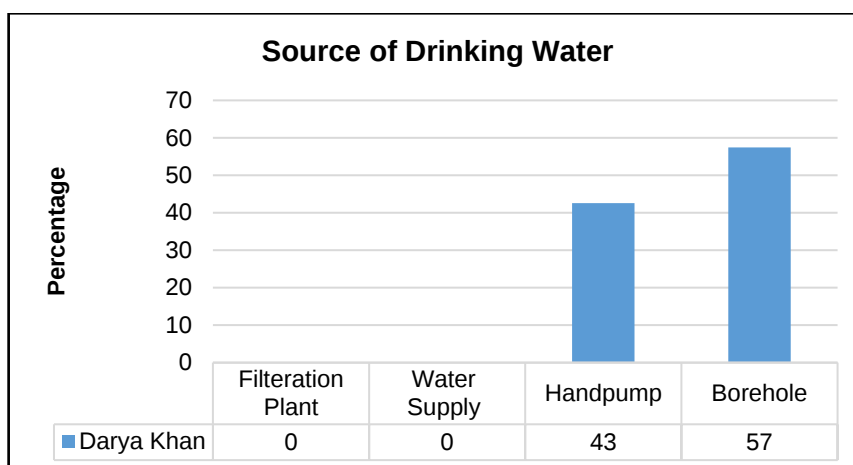


Figure 4.52: Source of Drinking Water

O. Satisfaction with Water Quality

The survey is carried out to check whether the population is satisfied with the water quality or not. So, the female shows maximum level of dissatisfaction. While the rest of the participants from other give mixture of concerns. As the females have more engagement with water as compare to the males. Satisfaction with water quality has been shown in **Figure 4.53**.

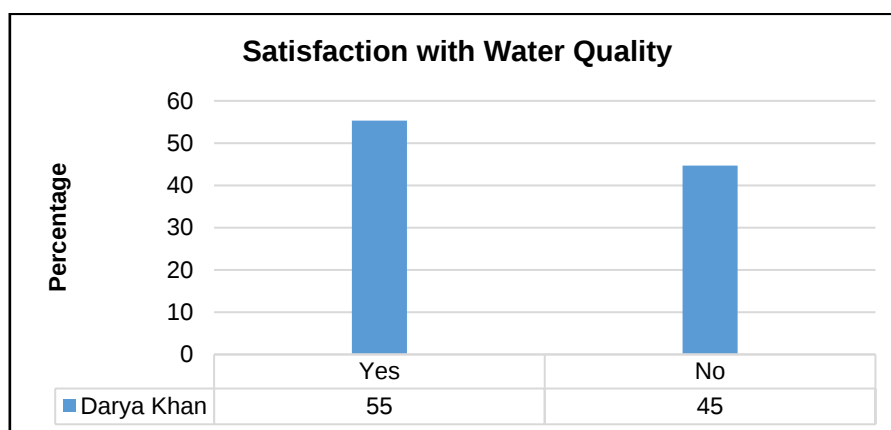


Figure 4.53: Satisfaction with the Water Quality

P. Type of Sewerage System

Two types of major sewerage system were reported in the survey i.e., soakage pits and open drains, while in rest of the population, there is no sewerage system and the sewage is being disposed of in open fields/Plots. Percentage of type of sewerage system in projected villages has been shown in **Figure 4.54**

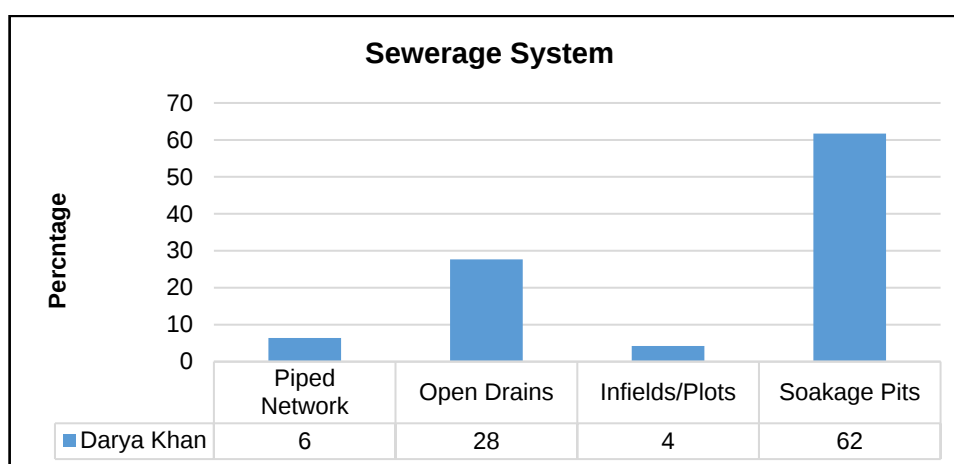


Figure 4.54: Type of Sewerage System

Q. Type of Solid Waste Management

According to survey analysis, almost all respondents (100 percent) in all the villages use open dumping method for the disposal of solid wastage.

V. Pressing Needs of Women in Project Area

Women were asked to share the pressing needs of Women in their areas. Women share the utmost need of the area is clear water supply system. Women are meant do the household chores, engagement with water is higher in women than in men. So clear and sweet water is one of the major needs upraise by females' respondents. Second, sewerage system and solid waste management system should be prevailed in the community. Apart from these, female wanted the initiative to build educational facility as middle and higher schools for girls. Many young females wanted to continue their schooling but due to absence of schools and colleges they have to quiet, as they can't travel far from their houses. Females share that there should be health care facility at local level and female health care officer is mandatory. Majority of the female concerns to THQ in Darya Khan. As pregnant females have to travel to cities for their routine checkup. It will be convenient for women If any health care officer will be available at community level. One of the Respondent who works as Lady Health Worker share that there should be training session for the females to give first aid. Females of the projected area also suggested the provision of sui gas as they have to use woods and animal's fesses for domestic purposes.

4.7.5 Conclusion

Social and gender consultations meeting held at a common place and in encouraging atmosphere where all the respondents easily assembled and shared their opinions/apprehensions. All the respondents participated actively in this consultation meeting and showed their significant support for the project execution. The key findings of gender consultations have been described hereunder;

- Literacy can better be viewed by having a glimpse of the literacy rate persisting among the respondents of the project rea. Lack of educational facilities and difficulty to access schools and colleges, prevailing ignorance add to less literacy among population.



- Larger percentage of participants falling in the age group of 16-25 years. Respondents in the age group of 26-35 years enthusiastically participated in the survey and their views have greater significance and have better vision than other age groups.
- Majority of respondents in projected area are Farmer, Labor and have private job by profession, while the female participants engaged in household activities and look after their children and other family members. While rest of female are working women and work as tailor, house maids to meet their household expenses.
- Majority of the population are satisfied with the water quality.
- The projected population expressed the availability of piped network, but not functional so the community build soakage pits at house level and open drains to dispose waste water.
- There is no Solid Waste Management system.
- According to the participants, adequate and clean water supply is necessary to maintain the health system of community. As water is the basic necessity of lives.
- Provision of drinking water and water for domestic use was ranked as the utmost need of the people from the projected area. The second most demanding need is the provision of Sewerage, Solid Waste Management, educational, Health institutes.
- The projected population show willingness to give about 100 to 200 rupees for improved water and sanitation services.

The respondents were asked to express their view about the proposed project, majority showed positive attitude towards the proposed water supply and sewerage system and were optimistic about the effects and thought of abundant benefits like more development of the area, better standard of living, minimizing the drinking water and sewer issues and uplifting the water and sewerage system of the Project Area.



5 PUBLIC CONSULTATION

5.1 General

This section describes the outcomes of the public consultation sessions held with different stakeholders that may be directly or indirectly affected by the proposed project. The consultation with stakeholders (Govt. departments, farmers, teachers, businessman, women's etc.) during project planning, designing and implementation stages is a key to sustainable development. Likewise, participation of stakeholders is essential to meet the objectives of meaningful consultation for preparation of EIA. The adequacy of the public consultation is one of the basic criteria used to determine the project compliance with the national / international safeguard policies.

5.2 Objectives and Principles of Consultation

The consultation process provides a forum where information relevant to the project is disseminated to and asked from the stakeholder. This participation is necessary because it paves a pathway between the investor and the public and enables the provision of much needed local knowledge and indigenous know-how which must be integrated into the project design. This not only fosters goodwill and success in the project but also leads to a conflict-free project implementation.

The stakeholders including government representatives, other regulators and the NGOs were met to appraise and discuss the environmental and social perspective of project activities. Their valuable concerns and suggestions were noted and thereafter incorporated in this section.

The objectives of the consultation process are to:

- Identify, Inform and involve all stakeholders and local residents including females, minorities and disables, in the consultative and participation process;
- Share information with stakeholders on the construction of the proposed project and expected impacts on the physical, biological and socio-economic environment;
- Understand stakeholders concerns and perceptions regarding various aspects of the project, including the existing available facilities and the likely impacts of construction and operation related activities of proposed Project; and
- Provide an opportunity to the public to provide valuable suggestions in the project design in a positive manner.

5.3 Consultation and Participation Process

To ascertain the perceptions of different stakeholders about the project scope, its implementation, operation and evaluation, consultation meetings were conducted. The consultation process was carried out in accordance with the World Bank Guidelines on public consultation. A series of consultation sessions were carried out with stakeholders (Govt. departments, farmers, teachers, businessman, women's etc.) of Surani Dagggar, Surani Nasheb, Sandi, Morani Shumali, Angra Dagggar, Lundi Dagggar, Lundi Nasheb, Haji Hussain



shah Daggar, Tibba Murtaza Shah Nasheb and Chak No. 17 TDA to gain solicit responses for the project interventions. The tool used for the consultation and participation process has been attached as **Annex-VI**. The meetings were held in the month of March and April 2023.

The consultant staff preferably chose sites that are easily accessible and barrier-free to accommodate all persons. The consultative sessions/meetings are held mostly at Dera/houses with both men and women separately. These consultative sessions were designed to exchange information, to discuss the strengths, weaknesses, opportunities, and threats of an idea or project. The consultation meetings proved very useful in information sharing and consensus building.

5.4 Identification of 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 the project:

Individual/Community Stakeholders

Project beneficiaries for instance, Residents of the project area, Shopkeepers, Employees, Teachers, Farmers and Women.

Institutional Stakeholders

Public Health Department, NGOs, Livestock Department, THQ, EPD, PRMSC and Govt Middle School for Boys.

5.5 Information Dissemination

Following information was discussed and disclosed to the stakeholders during the consultation meetings:

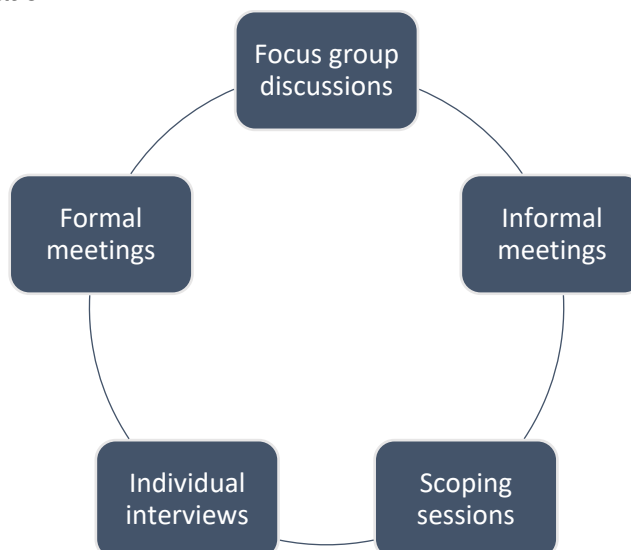
- Introduction of the project;
- Description of various project components, their activities and impacts;
- Discuss social and environmental impacts;
- Needs, priorities and reactions of the affected people regarding the proposed projects impacts; and
- Need of Grievance Redress Mechanism (GRM) in all villages to address the issues & concerns of stakeholders.

For information dissemination to community, culturally appropriate techniques and local language was used.



5.6 Methods of Public Consultation

Public Consultations were carried out in order to establish stakeholder's opinions regarding project implementation. The following methods were used for public consultation and stakeholder's participation:



5.7 Summary of Formal & Informal Meetings

The concerns raised by all stakeholders were considered in developing the EIA, in order to enhance project acceptability among the general public on social considerations. **Table 5.1** provides a summary of formal & informal consultation meetings with the local community (Male & Female) & formal consultations with institutional stakeholders.

A. Formal Consultations with Local Community

Table 5.1: Schedule of Meetings with Local Community

Sr. No.	Name of Village	Date / Time	Venue (Place / Institution)	No. of Participants
1	Morani Sandi	17-03-2023 02:45 pm to 04:00 pm	Dera Liaqat Morani Sandi	05 Participants
2	Morani Shumali	17-03-2023 12:50 pm to 02:15 pm	Ahmad Nawaz Khan Dera, Morani Shumali	07 Participants
3	Lundi Daggar	17-03-2023 03:40 pm to 04:15 pm	Tibba Khichianwala, Lundi Daggar	05 Participants
4	Lundi Nasheb	18-03-2023 11:15 am to 12:45 pm	Dera M. Bhatti, Lundi Nasheb	05 Participants



Sr. No.	Name of Village	Date / Time	Venue (Place / Institution)	No. of Participants
Gender Consultations				
5	Sorani Nasheb	16-04-2023 03:10 pm to 04:15 pm	Gulam Abbas House, Sorani Nasheb	06 Participants
6	Sorani Daggar	16-04-2023 02:00 pm to 03:10 pm	Ahsan Abbas House, Sorani Daggar	06 Participants
7	Lundi Nasheb	17-04-2023 12:00 pm to 01:10 pm	Qamar Zaman House, Lundi Nasheb	11 Participants
8	Angra/Lundi Daggar	17-04-2023 11:00 am to 12:15 pm	Karim Illahi Bhetak, Angra/Lundi Daggar	12 Participants
9	Haji Hussain Shah	18-04-2023 10:30 am to 11:45 am	Mukhtiyar House, Haji Hussain Shah	07 Participants
10	Sandi	18-04-2023 12:45 pm to 01:30 pm	Non-Formal Basic Education School, Sandi	05 Participants

B. Formal Consultations with Institutional Stakeholders

Table 5.2: Summary of Formal Consultation Meeting with Institutional Stakeholders

Sr. No.	Date	Department	Representatives of Departments	Consultant / Client Team
1	17-04-2023	Public Health Department	Mr. Saeed Shah (<u>SDO</u>)	Mr. Abdul Manan (<u>Sr. Engineer</u>) Mr. Saqib Ismail (<u>Tehsil Manager</u>)
2	17-04-2023	NGOs (National Rural Support Programme (NRSP))	Mr. Messam Abbas (<u>Project Director</u>)	Mr. Abdul Manan (<u>Sr. Engineer</u>) Mr. Saqib Ismail (<u>Tehsil Manager</u>)
3	17-04-2023	Livestock Department	Dr. Zeeshan Tahir (<u>Deputy Director</u>)	Mr. Abdul Manan (<u>Sr. Engineer</u>) Mr. Saqib Ismail (<u>Tehsil Manager</u>)
4	17-04-2023	Tehsil Headquarter Hospital THQ	Dr. Atif (<u>Admin Officer</u>)	Mr. Abdul Manan (<u>Sr. Engineer</u>) Mr. Saqib Ismail (<u>Tehsil Manager</u>)



Sr. No.	Date	Department	Representatives of Departments	Consultant / Client Team
5	18-04-2023	Environmental Protection Department	Mr. Farooq (<u>Assistance Director</u>)	Mr. Abdul Manan (<u>Sr. Engineer</u>) Mr. Samiullah (<u>Deputy Manager</u>)
6	18-04-2023	Punjab Rural Municipal Service Company	Mr. Saqib Ismail (<u>Tehsil Manager</u>)	Mr. Abdul Manan (<u>Sr. Engineer</u>) Mr. Anns Ali (<u>Jr. Engineer</u>) Ms. Jaweria Islam (<u>Social/Gender Expert</u>)
7	18-04-2023	Govt Middle School for Boys	Principal of Govt. Middle School for Boys	Mr. Anns Ali (<u>Jr. Engineer</u>) Mr. Sohail Akhtar (<u>BCC Representative</u>)

5.8 Approach Adopted for The Consultation

To hold the meetings, people were informed one day before the meeting to assemble in the villages. In addition, the consultant team contacted the council members and community representatives of each village and informed about the purpose of these consultation meetings. The representatives played a positive role in information dissemination to locals of villages. The meetings held in an encouraging environment where people expressed their concerns and views freely. Formal meetings and interviews were also conducted with females and vulnerable of the community, to explore their needs, problems and priorities related to project execution.

5.9 Stakeholders Concerns Towards the Project

Concerns raised by the participants, particularly with regard to environmental and social impacts of the project have been listed in below **Table 5.3**, which shows concern and responses as derived from selected schemes of Tehsil Darya Khan.

5.9.1 Concerns and Issues

Following **Table 5.3** shows concerns and responses of public consultation meetings while the photolog of consultation meetings/ Gender consultation meetings has been attached as **Annex-VII**.



Table 5.3: Findings of the Consultation Meetings

Sr. No.	Concerns Raised	Response
1	In Surani Daggar there is no sewerage system and the sewage is being disposed of in open lands which create nuisance.	The sewage will be connected through a piped network and will be disposed of after adequate treatment through a wastewater treatment plant and through septic tanks/soakage pits.
2	The residents of village also demanded that PRMSC should bind the contractor to hire the relevant skilled and unskilled labor/ workers from the local community.	The local community shall be preferred as skilled and semi-skilled labours.
3	The public water supply is not available in the selected villages and the people rely on conventional methods of water collection i.e., Boreholes etc.	The objective of the proposed project is to provide clean drinking water to all the residents of the community at their doorsteps through a piped network and public standposts in case of smaller community size.
4	Respondents raised the concern that educational institutes are limited in the town and a great percentage of the boys and girls quit the education as it is difficult for them to go to the education facilities	Provision of educational facilities is not the mandate of the proposed project; however, the concern has been noted and will be reported to the higher authorities.
5	The health facilities are inadequate	The proposed project is not envisioned to provide health facilities. However, use of clean drinking water and proper sanitation facilities to be provided under the proposed project will result in eradication of health issues.
6	There are mosques in the village, and efforts should be made to minimize the impacts on them due to construction activities.	The construction work shall be planned to keep in view the prayer timings. Furthermore, the work will be executed in packages to minimize the disturbance.
7	Along the route the commuters will face mobility issues, which must be avoided to the maximum	Traffic management plan shall be developed to avoid the disruption of commuters during construction time.
8	There is no collection of solid waste and the waste is dumped directly in the open plots and streets which create nuisance	A comprehensive solid waste collection system will be developed and waste containers shall be placed at appropriate locations in the villages. PRMSC will collect the solid waste through bins and will transport it to the designated disposal site.
9	The residents of the village are ready to pay the bills for the improved water supply and sanitation services but need some clarity regarding mechanism of bill collection.	All the water connections will be metered and the billing will be based on the water consumption.
10	Noise and dust will be generated from construction activities and may cause health issues.	Regular sprinkling of water will be carried out to control the dust emissions at the construction site, whereas construction activities will be avoided during night time.



Sr. No.	Concerns Raised	Response
11	Recreation facilities such as parks and playgrounds should be provided.	Provision of recreation facilities is not the mandate of the proposed project; however, the concern has been noted and will be reported to the higher authorities.
12	Solid waste produced during construction time is a major concern, should not be piled up in the project area;	The construction and other waste generated at the site shall be collected, stored and transported to the final disposal site by the contractor on daily basis.

5.10 Gender Consultations

Following **Table 5.4** shows concerns and responses of gender consultation meetings while the photolog of consultation meetings has been attached as **Annex-VII**.

Table 5.4: Findings of the Gender Consultation Meetings

Sr. No.	Concerns Raised	Response
1	Majority of women highlighted the concern of water quality. At present, the water which is being consumed is brackish and turns yellow as it is exposed to atmosphere for few minutes.	The objective of the proposed project is to provide clean drinking water to all the residents of the community.
2	Major population of Sorani Nasheb diagnosed by Hepatitis type A, B and C due to poor quality of water. As borehole for drinking water and soakage pits situated nearby, result in filthy water.	Waterborne diseases shall be reduced and there will be an improvement in public health with the provision of clean and healthy drinking water
3	Gastrointestinal and skin allergy cases are also cause due to poor water quality.	Health concerns will be resolve after the implementation of project.
4	Many female respondents mention the open drain system which cause sludge after rain. Cause various viral infection as malaria, diarrhoea, jaundice fever and breathing issue as well.	The objective of the project is to provide piped network sewerage system to avoid the issue of wastewater ponding in the open plots and will result in environmental improvement of the area.
5	Women from Landi Nasheb and Haji Hussain Shah mention the availability of piped network for sewerage system but not in function due to neglected maintenance and get clogged.	The objective of the project is to provide piped network sewerage system to resolve all issues of the village.
6	Female respondents share the issue of solid waste management, as there is no proper system and the waste is directly dumped in an open plot cause many viral infections and inconvenient for the mobility.	Provision of solid waste management system is not the mandate of the current assignment. However, a waste transfer station will be established in each village. The PRMSC will hire contractor for collection of solid waste who will be responsible to collect the waste at household level and transfer to the designated transfer station site. Collected solid waste from the transfer



		stations will be transferred to the landfill site, frequently.
7	The respondents raised the issue of unavailability of any health care facility and BHU in local area. The projected population have to go to Darya khan or Bhakkar for any kind medical	The proposed project is not envisioned to provide health facilities. However, use of clean drinking water and provision of improved sanitation facilities will result in net health improvement of the project areas
8	Females of the projected area suggested the provision of sui gas as they have to use woods and animal's fesses for domestic purposes.	Provision of Sui Gas Facility is not the mandate of the but the issue has been noted and will be reported to the higher authorities.
9	Provision of schools and colleges highlighted from young females of Sorani Nasheb, as most of higher education institute are in the town and majority of students quite studying due to difficulty in access.	Provision of educational facilities is not the mandate of the proposed project; however, the concern has been noted and will be reported to the higher authorities
10	Many females share the issue facing irregular menstrual cycle.	The issue has been noted and will be reported to the higher authorities.
11	Females from Sorani Nasheb and Landi Nasheb share the experience of swelling hand & feet's veins and abdomen during menstrual cycle. Especially the imbalance brackish color.	The issue has been noted and will be reported to the higher authorities.
12	Majority of cases of chest infection and mentally retarded children by birth reported in Sorani Nasheb.	The issue has been noted and will be reported to the higher authorities.
13	Female Health Care officer from Landi Daggar share the provision of Vocational Training Center and also suggested the idea of training young male and females for first aid so the absence of medical institute can be cover.	The issue has been noted and will be reported to the higher authorities.
14	Females suggested, training for the proper maintenance of hygiene and usage of sanitary material during menstrual hygiene	The suggestion has been noted and will be reported to the higher authorities.
15	Presence of domestic violence reported from the female participants of Sorani Daggar during consultation but neither of the respondent share their experience at the time of in-depth interview.	The issue has been noted and will be reported to the higher authorities.
16	House wives from Mouzza Sandi share the hurdle for not working professionally due to cultural barrier as 50 percent of the community think is against the norms and gender role of women to work outside of the house.	The issue has been noted and will be reported to the higher authorities.
17	Same reason for the girl's education as 60 percent of the female from Mouzza Sandi are illiterate	The issue has been noted and will be reported to the higher authorities.
18	One of the participants from Sorani Nasheb have a small shop of daily usage, suggested to provide sanitary material as the females will be comfortable to buy from her and the hygienic	The issue has been noted and will be reported to the higher authorities



	system of the women in locality could be improved.	
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5.11 Consultation with Institutional Stakeholders

Table 5.5 shows the concerns of institutional stakeholders while the photolog of the consultation meeting in each department has been attached as **Annex-VII**.

Table 5.5: Concerns of Relevant Government Departments

Sr. No.	Department	Points of Discussion /Apprehensions	Response
1	Public Health Department Mr. Saeed Shah (<u>SDO</u>)	Consultant's team described the project location and proposed activities to Sub Divisional Officer and inquired about their apprehensions/ suggestions regarding the project; No water supply system or sewerage system currently exists in any of the villages of tehsil Darya Khan. However, the proposed project will bring benefits to the villages involved in the project.	The primary goal of the proposed project is to ensure that all residents in the selected villages have access to clean drinking water and a proper sewerage system. By implementing this project, the aim is to improve the overall living conditions and promote a healthier environment for the residents by establishing adequate water and sewerage infrastructure.
2	NGOs (National Rural Support Programme (NRSP)) Mr. Messam Abbas (<u>Project Director</u>)	The consultant's team described the project location and proposed activities and inquired about their apprehensions/ suggestions regarding the project; This government initiative is particularly commendable as it focuses on addressing the severe health issues faced by children and women due to the consumption of contaminated water. The villagers are already receiving services from NGOs, which include: • Imparting WASH-related training to the locals. • Offering food banks in the form of goats to help meet their expenses. • Establishing washroom facilities in areas where such opportunities are lacking. • Constructing approximately 432 houses throughout the tehsil. • Installing filtration plants.	The successful operation of this NGO indicates that the local community will play a vital role in ensuring the success of their area. They will actively contribute and volunteer in the collection of tariffs and will make a significant impact on the achievement of this project.



Sr. No.	Department	Points of Discussion /Apprehensions	Response
		• Providing green water taps for drinkable water and coloring red those taps connected to non-drinkable water sources.	
3	Livestock Department Dr. Zeeshan Tahir (Deputy Director)	The consultant's team described the project location and proposed activities to Deputy Director and inquired about their apprehensions/ suggestions regarding the project; • During the discussion, waterborne diseases and viral diseases in animals were addressed, highlighting the insufficient research and development in the livestock sector. • They provide us census data of animals and birds for Tehsil Darya Khan. Which are as follows ➤ 108,563 Cows ➤ 49,975 Buffalos ➤ 51,891 Sheep ➤ 111,051 Goat ➤ 535 Duck ➤ 57,199 pigeons ➤ 7,919 Fancy Bird ➤ 372 Camel ➤ 1,191 Camel Female ➤ 11,997 Donkey ➤ 178 Horse ➤ 14 Mule	The proposed project aims to ensure access to clean drinking water for all residents in the selected villages, including water suitable for portable use and animal-related activities. By implementing this project, waterborne diseases in animals will be effectively addressed and resolved.
4	Tehsil Headquarter Hospital THQ Dr. Atif (Admin Officer)	The consultant's team presented the project location and proposed activities to Dr. Atif, seeking his input and addressing any concerns. The following points were discussed: • The majority of people seek medical consultation when they have an immediate need. • Nutrient and mineral deficiencies are prevalent among many children. • Health-Card facility is available in Hospital and free medicine are provided to patients. • There is a significant concern regarding waterborne diseases.	The objective of the proposed project is to provide clean drinking water to all the residents of the selected villages. Waterborne diseases will be resolved after the implementation of this project.



Sr. No.	Department	Points of Discussion /Apprehensions	Response
		- Common diseases include diarrhea, vomiting/stomach issues, breast cancer, and hepatitis. - The lack of infrastructure and transportation facilities in villages makes it challenging for patients to reach the THQ (Tehsil Headquarters).	
5	Environmental Protection Department Mr. Farooq (Assistance Director)	The consultant's team presented the proposed activities to Mr. Farooq (Assistant Director) seeking his input and addressing any concern. The following point was discussed; Insufficient management during the construction phase can give rise to solid waste management issues, leading to the creation of environmental hazards and nuisance conditions.	To prevent any issues related to solid waste management (SWM), a comprehensive mitigation plan will be implemented. A designated area will be allocated for the storage of solid waste, which will then be disposed of on a weekly or bi-weekly basis.
6	Govt Middle School for Boys Principal of Govt. Middle School for Boys	The consultant's team presented the proposed activities with the principal of school seeking his input and addressing any concerns. The following point was discussed; The residents of the local areas are experiencing severe health issues due to the inadequate provision of a clean water supply system, resulting in various diseases. Providing access to clean water can help prevent these diseases that arise as a result of an improper water supply system.	The aim of the proposed project is to ensure access to clean drinking water for all residents in the selected villages. The implementation of this project will effectively address waterborne diseases and provide a long-term solution.

5.12 Pressing Needs of the Consulted Villages Suggested by Local People

Local people were also inquired about the pressing needs of the project area as perceived by them. The foremost preferred needs are providing water supply and sewerage systems. Apart from this schools, hospital/ dispensary and roads are preferences of locals. Due to restricted mobility, they suggested that a friendly grievance mechanism should be developed in all villages to address their concerns during construction time. Guidance and support to local people in the preparation of required documents for compensation were also recommended.



6 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 General

This chapter identifies the beneficial as well as the potentially significant adverse environmental and social impacts of the proposed project activities during design/ pre-construction, construction and operational phases of the proposed project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation and remedial measures are proposed in this chapter. A brief description of each aspect and the affected environment in the project area are presented below.

6.2 Scoping of Impacts

Potential environmental and social impacts from the proposed Project on key environmental and socio-economic features in the Project area were identified through the following actions:

- Demarcation of the Area of Influence (AoI);
- Desk study of engineering investigations, studies and designs;
- Environmental monitoring of air, noise, surface water, wastewater and groundwater;
- Detailed review and analysis of primary and secondary data available for all environmental parameters in Project area such as physical, ecological and social resources;
- Socio-Economic survey to assess the extent of land acquisition, occupation, income and poverty levels of the affected households;
- Consultations with executing and implementing agencies, local government, affected community, and traditional and religious leaders of community;
- Stakeholder consultations with relevant departments, government agencies, NGOs and locals; and
- Knowledge assimilation of international best practices on environmental assessment of infrastructure projects.

6.3 Methodology

Selection of an appropriate and customized methodology for the impact assessment is critical for the EIA study. The impacts have been assessed on the basis of proposed project life cycle i.e., Pre-Construction, Construction and Operational and Maintenance (O&M) stages. For the identification of the potentially significant and non-significant environmental and social impacts, different tools were utilized as detailed below:

6.3.1 Screening Checklist

Based on the findings of desk studies and processed satellite imageries, screening checklists was prepared to screen out the potentially significant adverse environmental and social impacts during pre-construction, construction and operational phase of the proposed project. The objective of the impact screening is to assess the significance of the issues related to the atmosphere, climate, water resources, land resources, ecological environment, socio-economic environment, transport, infrastructure and communication, natural risks, hazards and external constraints of the Project for the proposed development. After the compilation of



baseline information, processing of acquired satellite imagery, the screening checklist was filled to screen out the adverse impact of the proposed Project during the pre-construction, construction and operational phases. Then a screening report was prepared and submitted for the perusal to the PRMSC and WB.

6.3.2 Notion of Significance

The “notion of significance” is based on the following criteria:

Extent: The scale of impact, i.e., limited to the immediate areas of development activity (the site); limited to within a distance reach of the development or affecting the region as a whole; or occurring at a national or international scale;

Duration and Frequency: A prediction/forecasting of the lifetime of the impact: i.e., short-term; medium term; long term with the impact ceasing after the operational life of the development; or considered permanent and how many times the event will occur during that period;

Intensity: A description of the intensity (magnitude/size) of the impact: i.e., high, medium, low, or negligible (no impact). The specialist studies must attempt to quantify the magnitude of impacts and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact;

Reversible/Irreversible: Changes considered irreversible, for example, the loss of biodiversity due to a change in water quality;

Probability: The likelihood that the event will actually occur; and

Legal Restriction: If the action is likely to affect, or be affected by a legal restriction.

Taking into account these criteria, potential significance was classified as either:

Low: an impact for which no mitigation is necessary;

Medium: an impact that requires effective mitigation; and

High: an impact, which, if not mitigated, could stop the Project from proceeding.

The potentially significant impacts were then further investigated in more detail to make a comprehensive assessment of the actual impacts.

6.3.3 Study Area/ Area of Influence

Refer Chapter 4: Description of the Environment, **Section 4.3**.

6.4 Anticipated Impacts during Pre-Construction/Design Phase

Impacts envisaged during Pre-construction/ Design Phase and the recommended mitigation measures are given below:



6.4.1 Layout Planning & Design

Potential Impact

Incompatible layout plans and engineering designs of the proposed project can undermine the overall aesthetics and ambience of the project area. Misutilization of the available spaces may result in design with low social acceptability and functionality. This impact will be permanent and moderate adverse in nature.

Mitigation Measures

- All structural, layout and engineering designs of the project are in strict accordance with the applicable national and international guidelines/ codes/ standards and engineering practices;
- The layouts of water supply and sewerage networks have been adjusted to cover the whole project area. The water supply system is based on loop design and sewerage system is based on gravity where the slopes have been provided to ensure gravity flow with adequate velocity.

6.4.2 Environmentally Responsive Design Considerations

Potential Impact

Designing of the project components without considering the prospective and futuristic needs can result in structures with low social acceptability and functionality. Improper designed sewers may not carry the waste load, leading to system-failure and financial loss. The alignment of sewer lines and locations of sewerage pumping station, stand post, aseptic tank/soakage pits and STP must be properly planned, else it may lead to both technical and social problems along with environmental issues of backflow creating foul smell and unhygienic conditions.

There are chances of infiltration from sewers which may contaminate the soil and underground water resources. The seepage may also affect the water supply lines and contaminate the potable water.

The construction of high-rise overhead water tanks may cause visual obstruction. The surrounding community may face privacy issues and it may also cause blockage of direct sunlight.

Mitigation Measures

- All sewer lines including trunk, lateral and branch sewer lines have been designed considering the future population and waste generation rate;
- Limited the sewer depth where possible;
- Sewers will be laid away from water supply lines (at least 1 m, wherever possible);
- In all cases, the sewer lines shall be laid below water pipeline (the difference between top of the sewer and bottom of water pipeline shall be at least 300 mm);



- For shallower sewers, use of small inspection chambers in lieu of manholes;
- Designed manhole covers to withstand anticipated loads & ensure that the covers can be readily replaced if broken to minimize silt/ garbage entry;
- Ensured sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to ensure self-cleansing velocity in order prevent to built-up of solids and hydrogen sulfide generation;
- All structural, layout and engineering designing are in strict accordance with the applicable by-laws and engineering parameters;
- The location of groundwater storage tanks, overhead water tanks, pumping stations and STP have been finalized in close consultation with local community and representatives of local authorities.

6.4.3 Groundwater

Potential Impact

Groundwater contamination may occur during construction by the improper handling of construction material (fuel, lubricant, bitumen, asphalt etc.) or sanitary water from construction camps and domestic sewage. During operation probability of seepage through the sewers may also contaminate groundwater. This impact is permanent and moderate negative in nature.

Mitigation Measures

- Efficient seepage control measures have been considered in selection of pipe materials during the planning stage;
- Procedure for efficient jointing of selected sewer pipes will be applied to avoid leakage from pipes;
- Alternate sewage disposal arrangements have been suggested in design to cater the sewage flow, generated from the project area, during construction phase.

6.4.4 Surface Water

Potential Impact

There is no existing piped sewerage network or pumping station in the village except in Lundi Naheb. Thus, endangering the environment of the vicinity. The openly flooded sewage causes nuisance in terms of foul smell and serves as breeding ground for disease causing vectors. Some sewage is also used to irrigate nearby crops.

There will be net environmental improvement in terms of sewage collection thus reducing sewage ponding in the project area and enabling adequate treatment of wastewater.

Mitigation Measures

- The sewage will be collected through a piped network or disposed into aseptic tank and soakage pit;
- An STP based on ABR technology will be established to treat the sewage for pipe network



system;

- The treated effluent will be discharged into the existing watercourses for agricultural purposes.

6.4.5 Seismic Hazard

Potential Impact

According to the seismic zoning map of Pakistan, the project area is located in Seismic Zone 2A, where 2A (moderate damage) represents peak horizontal ground acceleration from 0.8 to 0.16 g. A low to moderate intensity earthquake impacting the project site can adversely impact the development. This factor requires special consideration of the designers as project structures (especially overhead water tanks, aseptic tanks, soakage pits and STP) may be affected negatively in case of earthquake tremors and the significance of damage depends upon the severity of earthquake.

Mitigation Measures

- The components of the proposed project include laying of underground water supply network, sewer lines, construction of overhead water tanks, pumping station and STP have been designed to withstand moderate earthquakes; and
- To mitigate the seismic hazard, Seismic Building Code of Pakistan 2007 (SBC-07) has been adopted. This code specifies minimum requirements for seismic safety of buildings/ structures and has to be applied and used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering.

6.4.6 Damage to Existing Infrastructure

Potential Impact

The proposed project interventions are mostly subsurface activities and are likely to affect the existing infrastructure. There are no public utilities except the electric poles which might get affected during construction activities and movement of machinery and the community will face temporary electricity cuts. Furthermore, the roads will be cut for laying of water and sewerage pipes and will create accessibility issues.

Mitigation Measures

- Alignment has been selected carefully to minimize disturbance to public utilities;
- Relocation of the public utilities shall be planned and approved in consultation with relevant departments/authorities/stakeholders before project commencement if any, to avoid inconvenience to the public;
- The local community will be informed before relocation of services (if any) and schedule of relocation services will be prepared after consultation with the community to minimize inconvenience to the public;
- Construction contractor will be directed to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. and;



- The sanitation plan (**Annex-VIII**) will be adopted to avoid sanitation related issues.

6.4.7 Physical Cultural Resources

Potential Impact

No historical/ archeological site is present in the project area. However, some cultural resources including mosques, graveyard and shrines are present. Physical and cultural resources identified in the project area are listed in **Section 4.4.8**. People visit the mosques five times a day. Shrines and graveyard are visited occasionally by the surrounding community and devotees. These will not be directly affected but the people may face access issues in visiting these facilities.

Mitigation Measures

- The alternative access routes will be provided in case the access has to be restricted during execution period; and
- There must not be any physical impact on the physical and cultural resources in the project area.

6.4.8 Ecology

A. Flora

Potential Impact

No trees are envisaged to be disturbed due to proposed project activities since the sewers/ water lines and aseptic tanks/ soakage pits are mostly laid on roads/streets and overhead water tanks & STP have been proposed in open lands with no surrounding trees. However, setting up of construction camp and movement of heavy vehicles will require significant space due to which available vegetation is expected to be disturbed. This impact is site-specific, temporary, reversible, possible, low significant and needs to be encountered prior to the start of construction stage.

Mitigation Measures

- The camps, mobility of machinery and construction activities will be properly planned to avoid any loss to local green cover;
- It is recommended to establish the construction camps where minimum or no vegetation exists;
- Similarly, the alternate routes for movement of machinery, roads and points for camps are recommended where no loss of vegetation is expected; and
- The location of construction camp will be selected so, as to have limited environmental effect during construction phase and to reduce the cost and land requirement.



B. Fauna

Potential Impact

The impact on fauna of the project area will be insignificant, except few insects that will be disturbed/ killed during excavation operations. Most of the fauna found in the project area are the livestock and are unlikely to be affected by the project interventions except disturbance due to noise. The movement and installations of machinery and vehicles and setting up of camps will disturb the animals and birds and the birds may have to move from their natural habitats. The waste from contractor's camp may attract the animals and birds and can be hazardous to them, furthermore, they can be the victim of poaching/ hunting. This impact is site-specific, temporary, reversible, possible, and low significant.

Mitigation Measures

- Muffling devices will be used in the construction machinery to minimize the noise due to machinery movements and installations;
- The camps shall be properly fenced and gated to check the entry of animals in search of eatable goods; and
- Similarly, wastes of the camps shall be properly disposed of to prevent it being eaten by animals.

6.4.9 Fire Fighting System

Potential Impact

In case of fire hazards, inefficient firefighting system at campsite may cause severe damage to the camp site and surrounding crops and houses. This will be a moderate adverse impact.

Mitigation Measures

- Contractor will provide firefighting system for construction camp, workshop and construction site; and
- A separate fire alarm system will also be installed at construction camp and near the construction site.

Following provisions for fire safety shall also be made in the proposed project site during the design phase. These will be:

- Sufficient number of emergencies exits and routes;
- Assigning of special telephone number to be dialed to inform about the fire to emergency response team;
- Smoke detection equipment; and
- Alarms required to warn people of fire.



6.4.10 Land Acquisition

Potential Impact

Major part of the project involves laying of sewers/ water supply lines, aseptic tanks, soakage pits. Right of Way (ROW) of existing streets/ roads will be used for this purpose. Additional land will be required for establishment of overhead tanks, pumping stations and STP for which the state land will be preferred. In some villages private land acquisition will be required on voluntary land donation bases (VLD). Locals are willing to donate their land voluntarily.

6.5 Anticipated Impacts during Construction Phase

Anticipated Impacts during Construction Phase and the recommended mitigation measures are given below:

6.5.1 Topography

Potential Impact

The construction activities are not expected to impact the topography of the area significantly except for those areas where physical activities i.e., earthwork is involved as well as stocking of material. The excavated material is to be mostly backfilled and the excessive material will be transported to strengthen the roadsides or will be dumped at the designated locations. This impact is site-specific, temporary, reversible, possible, and low significant.

Mitigation Measures

- Material stockpiles will be removed as soon as work is completed and the area will be reinstated;
- Temporary storage sites will be allocated for the storage of excavated material;
- Temporary storage sites will be lined and must not allow infiltration;
- The stockpiles must be covered with tarpaulin sheets or other adequate material;
- Piling of material at large extent will not be allowed and the contractor will timely remove excavated material from the site.

6.5.2 Soil Erosion

Potential Impact

The soil would be exposed to erosion due to excavations for laying of sewers and water supply pipes. Construction activities such as clearing, excavation, filling, grading and setting up construction camps will affect the existing soil condition in the study area/ AoI. The clearing of vegetation can also loosen the soil and make it more susceptible to erosion due to wind and rain. There is also a possibility of silt runoff during rainy season causing soil erosion. During the rain, the eroded soil will mix with stagnant water to transform into slush, which can affect movement of vehicles and machinery and construction workers as well as limit the movements



of local people. This impact can be categorized as low adverse, site-specific, long term, permanent, highly probable and reversible.

Mitigation Measures

- Good engineering practices will help to control or minimize the soil erosion both at the construction sites and in peripheral areas. Special slope protection measures will be adopted during the construction stage;
- Use of heavy machinery will be restricted as far as possible to avoid the destruction of soil structure;
- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations should be avoided;
- Stored excavated material shall be covered and preferably reused, e.g., in construction as backfill etc.

6.5.3 Soil Contamination

Potential Impact

Contamination of soil may be caused by oil and chemical spills from construction machinery or uncontrolled runoff from equipment washing yards. This impact is permanent and minor negative in nature.

Mitigation Measures

- Chemicals/ hazardous products and wastes will be stored on impermeable surfaces in secure, covered areas with clear labelling of containers and with a tray or bund to contain leaks;
- All construction wastes from the site will be regularly removed and transported to approved waste disposal sites;
- Washing yards will be paved to avoid seepage of runoff from the yard;
- Awareness in emergency spill response procedures will be conducted through trainings;
- Oil leakages, chemicals and other liquids spills will be avoided/ minimized by providing appropriate storage places depending on the type of material for storage. Oil and other lubrication material will be stored in water proof tanks especially built for oil storage. These tanks will be stored away from the main road and residential areas or safety purposes. Access to these tanks will only be allowed to the authorized personnel. Safety equipment like fire extinguishers will be placed near these places along with signs for danger and fire; and
- Supervisors must be familiar with the Material Safety Data Sheets (MSDS) of each chemical used at site. MSDS are provided with each chemical drum. Chemicals will be stored as per the instructions of MSDS. Utmost care will be taken during the handling of these chemicals. Precautions will be taken to prevent spills and all workers will be trained in proper handling, storage and disposal of hazardous or toxic materials.



6.5.4 Trench Failure

Potential Impact

The major construction activities involve excavation operations for laying water supply and sewerage lines. The major hazard associated with the excavation operations is trench failure. The unstable slopes may fail and settle in the trenches which may cause injuries and fatalities to the workers. This impact is probable, site specific and high adverse in nature.

Mitigation Measures

- Provision of adequate shuttering in the trenches;
- Leftover shuttering may also be used in case of loose soil strata.

6.5.5 Construction Camps/Camp Sites

Potential Impact

Improper construction camp location and mismanagement of construction camp activities can lead to various social and environmental impacts which may include noise, health and safety, traffic problems, soil degradation, loss of vegetation and assets on the selected land, solid waste and water pollution. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increased tension between local communities and workers residing in the construction camps. This impact is temporary and moderate negative in nature.

Mitigation Measures

- Working hours of noisy activities will be limited to normal daytime working hours when near identified sensitive receptors;
- Waste Management Plan will be implemented to include procedures for the classification, storage and disposal of all construction wastes and the training of employees who handle hazardous materials; and
- Construction camps will be established away from populated areas.
- Regular training of workers will be carried out regarding local cultural norms, human behaviour, gender issues by the contractor during construction activities at site.

6.5.6 Water Quality

Potential Impact

Runoff from the construction works site may contain increased load of sediments, suspended solids and other contaminants. Potential sources of pollution from the site include:

- Runoff and erosion from exposed soil surfaces, earthwork areas and stockpiles e.g., grouting and cement material with the rain;
- Wash water from dust suppression sprays;



- Fuel and lubricants from maintenance of construction vehicles and mechanical equipment;
- Spillage of liquids stored on-site such as oil, diesel, and solvents etc. are likely to result in water pollution; and
- Uncontrolled discharge of debris and garbage such as packaging, construction material and refuse.

Construction waste, if left unattended will result in forming leachate that will percolate through the soil strata and will reach underground water table and hence, will end up contaminating groundwater. There is a probability that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater and channels carrying water.

Mitigation Measures

- Protection of groundwater reserves from any source of contamination such as the construction and oily waste by making the ground impermeable through sheets or compaction;
- Stockpiles of cement and other construction materials will be kept covered when not being used;
- Maintenance of vehicles will be carried out only on impermeable areas where any oil spillages can be contained;
- Careful planning of the works to avoid soil excavation works during rainy seasons;
- No activity will be undertaken in monsoon and careful attention must be paid to weather forecast before excavation operations.
- All kinds of waste will be stored in covered containers and disposed of safely as soon as possible; and
- The contractor will ensure that construction debris do not find their way into the drainage or irrigation canals which may get clogged.

6.5.7 Air Quality

Potential Impact

Air quality will be affected by various construction activities. Emissions may be spread over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. In certain climatic condition such as hot summer, airborne dust can become a major nuisance if control techniques are not properly employed. The critical sources of air pollution during the construction phase will be:

- Unpaved road surface;
- Transportation of materials;
- Excavation operations
- Construction equipment;
- Vehicular exhaust; and
- Burning of fuel for cooking by workers.



The air emissions may cause health impacts such as dryness and roughness of the throat, eyes, nose, etc. to the workers, staff of the contractor and the residents of area. These emissions may also affect the bio-physical environment. List of air sensitive receivers is given in **Section 4.4.8**. The impact is major negative and temporary in nature.

Mitigation Measures

- All vehicles, machinery, equipment and generators used during construction activities will be kept in good working condition, properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the contractor's camps will be strictly banned;
- Fuel with substantially lower sulphur content will be preferred;
- Personal Protective Equipment (PPEs) like masks, goggles and gloves etc. will be provided to workers;
- PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works.
- Regular water sprinkling on the site and access roads will be carried out to suppress excessive dust emission(s);
- Excavated trenches will be restored immediately to original level and paved after laying of sewer pipes;
- Blowing of dust and particulate matter from stockpiled loose materials (e.g., sand, soil) will be avoided either by sheeting them with tarpaulin or plastic sheets or by sprinkling them with light shower of water;
- Vehicle speed in the project area will be prescribed not more than 20 km/hr and controlled accordingly;
- Diversion will be provided for local traffic movement; and
- The vehicles carrying construction materials and the construction material storage areas will be covered with tarpaulin.

6.5.8 Dust

Potential Impact

During construction stage, the dust level may increase considerably. Earthworks, site clearing, stockpiling and hauling of materials will generate dust and affect the local air shed. Local people and the workers may be exposed to high dust levels during landscaping, access road and site preparation. This impact is site-specific, temporary, reversible, likely and medium significant.

Mitigation Measures

- Blowing of dust from potential sources at the worksite will be avoided by shielding them from the exterior, for example using polythene curtains or raising a fence of corrugated sheets around areas of active constructions;
- Blowing of dust and particulate matter from stockpiled loose materials (e.g., sand, soil) can be avoided either by sheeting them with tarpaulin or plastic sheets or by sprinkling them with light shower of water;



- Preventive measures against dust will be adopted for on-site mixing and unloading operations. Regular water sprinkling of the site will be carried out to suppress excessive dust emission(s);
- All excavation work will be sprinkled with water to control dust;
- Tyres of all the vehicles leaving the site will be washed. No earth, mud, dust and the like will be deposited on the public road; and
- Construction workers will be provided with masks for protection against the inhalation of dust.

6.5.9 Noise

Potential Impact

Noise level is expected to increase during construction activities. Main sources of noise and vibration will be heavy machinery such as excavators and other equipment. Noise generated by construction machinery is likely to affect sensitive receptors located within AoI. Health risks associated with exposure to continuous noise levels include high blood pressure, hypertension, annoyance and sleep disturbance, temporary threshold shift etc. The impacts of noise will be temporary and highly adverse in nature.

Mitigation Measures

- Construction workers will be provided suitable hearing protection like ear cap, or earmuffs and training them in their use;
- Selection of up-to-date and well-maintained equipment with reduced noise levels will be ensured by suitable in-built damping techniques or appropriate muffling devices; and
- Residents will be notified earlier before commencement of excavation operations.

6.5.10 Municipal and Construction Waste/ Wastewater

Potential Impact

Due to construction activities municipal and construction waste will be generated from construction activities. The construction waste will include wastewater, oil spillage from machinery, domestic waste and construction waste etc.

Improper dumping of waste may generate odor and attract mosquitoes and other disease vectors. Empty containers containing the toxic, flammable and corrosive materials may pose hazard to the workers. This may result in health risk to workforce and public, if disposal site is improperly selected. This impact is temporary and minor negative in nature.

Mitigation Measures

- Solid waste generated during construction and camp sites will be safely disposed of in demarcated waste disposal sites and the contractor will provide and implement a comprehensive waste management plan;
- Burning of waste will be prohibited;



- Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc;
- Emergency Response plan will be prepared to address the accidental spillage of fuels and hazardous goods;
- Containers with covers will be provided on site to store waste; and
- Training of workforce involved in the storage, handling and transportation of hazardous material regarding emergency procedures.

6.5.11 Chance of Finding Artifacts

Potential Impact

During excavation, there is a chance of finding artifacts. In case of finding any artifact, the contractor will immediately stop the activities and report through Supervision Consultant to Directorate General (DG) of Archeology, Government of Punjab to take further appropriate action to preserve those antiques or sensitive remains. Chance Finds Procedure (as given in **Annex-IX**) will be adopted in case of any accidental discovery of cultural heritage.

6.5.12 Resource Conservation

Potential Impact

The materials used in construction of proposed project would include coarse aggregates (crush), fine aggregates (sand), brick ballast, water and cement etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use.

Diesel and residual fuel oils will be used to operate construction machinery and equipment. Sustainable use of energy resources is very important not to continue future use but it will also help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is very important.

Mitigation Measures

- Wastage of water will be reduced by training the workers involved in water use;
- Wastage of water will be controlled through providing proper valves and through controlling pressure of the water;
- Water jets and sprays will be used for watering surfaces rather than using overflow system;
- Source of water will be carefully selected. Water use will not disturb the existing community water supplies;
- Reuse of construction waste materials will be considered;
- Unnecessary equipment washings will be avoided;
- The efficient and well-maintained equipment and machinery will be used;
- The equipment and machinery will be turned off when not in use;
- Regular maintenance of machinery to avoid fuel leakages; and
- Resource conservation plan (attached as **Annex-X**) will be followed.



6.5.13 Biodiversity Conservation

Flora

Potential Impact

On account of construction of the proposed water supply, sewerage system, aseptic tank/soakage pits and stand post no trees are envisaged to be cut/disturbed. Hence there will be no direct impact on the flora of project area. However, the dust emissions due to excavation operations will stick on the leaves of existing trees and may close their stomata thus hindering the photosynthesis process. Reduced photosynthesis may also reduce the productivity of existing trees. This impact is however temporary but minor negative in nature.

Exhaust of noxious gases from movement of heavy machinery to be used for digging, will further pollute air which will adversely affect health and vigor of plants.

Further, during construction activities the Contractor's workers may damage the vegetation and trees (for use as fire-wood to fulfill the camps requirements).

Mitigation Measures

- Campsites will be established on vacant land as far as possible, at least 500 m away from the residential areas;
- Construction vehicles, machinery and equipment will remain confined within their designated areas of movement;
- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands;
- Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/ bushes for fuel will not be allowed.

Fauna

Potential Impact

The local animals mostly cats, dogs and jackals and specially the livestock i.e., goats and cows will get disturbed due to construction activities, especially the noisy activities. However, there will be no damage to their health and life. Some reptiles and insects may get killed/ injured during excavation operations.

Mitigation Measures

- Excavations will be limited to the approved engineering drawings;
- Harassing of animals will be prohibited.

6.5.14 Health and Safety

A. Occupational Health and Safety

Potential Impact

Health risks and workers safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment. The health and safety issues are also associated with the operation of construction machinery and equipment, which may cause minor and severe injuries to workers. It will be a long term and severe negative impact. Health & Safety plan is attached as **Annex-XI**.

Mitigation Measures

- Obligatory insurance against accidents for labourers/workers;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Layout plan for camp site, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices will be followed by the contractor to ensure no health risks for labourers, including use of Personal Protective Equipment (PPE) i.e., oxygen masks/ kits etc.;
- Protection devices (ear muffs) will be provided to the workers doing job in the vicinity of high noise generating machines i.e., excavators;
- Elaboration of a contingency planning in case of major accidents; and
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads.
- Use of safety signs at the construction site, as shown below.



B. Community Health and Safety

Potential Impact

The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. This is a temporary and moderate negative impact. Quality of groundwater resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents etc. The labors with different transmittable diseases (e.g., COVID-19) may cause spread out of those diseases in the local



residents. Open trenches and deep manhole may cause accidents for the local residents. The piling of excavated material on the site may cause health issues to the locals and passerby.

Mitigation Measures

- There will be proper control on construction activities and oil spillage leakage of vehicles;
- The laborers with different transmittable diseases will be restricted within the construction site;
- The site will be restricted for the entry of irrelevant people particularly children;
- Efforts will be made to create awareness about road safety among the drivers operating construction vehicles;
- Timely public notification on planned construction works;
- Seeking cooperation with local educational facilities (school teachers) for road safety campaigns;
- Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots;
- Setting up speed limits in close consultation with the traffic police; and
- Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements and by eliminating any unusable impounding of water;
- During construction work, pedestrian and vehicular passages will be provided for crossing near settlement;
- Wastes will be temporarily stored at appropriate locations and then will be transferred to the ultimate disposal point;
- COVID-19 SOPs will be followed at work site and construction camps; and
- Open trenches and deep excavated manholes will be protected by fence/barricade to avoid any accident.

C. Emergency Response (Natural and Man-Made Disasters)

Potential Impact

Natural disasters and accidents such as fire, falls, slips and trips may result in injuries, financial losses and may even lead to deaths. The workers will be trained and facilitated to cope with such emergencies.

Mitigation Measures

- The Emergency Response Plan (**Annex-XII**) will be implemented in close consultation with the fire-fighting department, bomb disposal squad and paramedics, as required;
- Training of the staff/employees regarding the emergency procedures/plans will be regularly conducted;
- Emergency numbers will be clearly posted; and
- Minor incidents and near misses will be reported and preventive measures will be formulated accordingly.



6.5.15 Traffic Management

Potential Impact

The traffic influx within the villages is very low. Most of the traffic within the villages include motorbikes and few cars. The project interventions will not create traffic congestion issues in the project area. However, their movement will be disturbed due to the excavation and construction works and people may face accessibility issues. This impact is temporary and major negative in nature.

Mitigation Measures

- The construction activities will be carried out in pockets/reaches, once a patch has been completed (i.e., pipes are laid and covered) then excavation on new patch shall be started;
- Local community will be taken on board to plan alternate access routes in connecting streets to ensure mobility of local traffic; and
- Plan work in a minimum possible time.

6.5.16 Nuisance/ Disturbance to Social Sensitive Areas (Educational, Health and Religious Places)

Potential Impact

Since the proposed interventions will be carried out within the village's boundaries, therefore, the socially sensitive sites/places including schools, hospitals and religious centers will be temporarily affected due to dust, noise and the community will face accessibility issues due to open trenches. Dust due to earthworks will create health hazard to children and people with ailments. This impact is temporary and major negative in nature.

Mitigation Measures

- No work will be conducted near the religious places during religious congregations;
- Material transport to the site will be scheduled considering school timings;
- Notify concerned schools, hospitals/dispensary etc. 2 weeks prior to the work; conduct a 30 minutes awareness program on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts; and
- Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.

6.5.17 Accessibility

Potential Impact

Excavation for soakage pits/ aseptic tank and pipe/sewer laying work in the project area will obstruct access to residences, commercial buildings and businesses adjacent to the proposed project alignment. Disruption of access to commercial establishments may affect livelihood. The potential impacts are negative and moderate but short-term and temporary.



Mitigation Measures

- Leave space for access between mounds of excavated soil;
- Consult affected business people to inform them in advance about the work schedule;
- If there are any holidays (i.e., Eid or Muharram etc.), the Contractor will complete the backfilling work of the trenches and will not leave any trench open before holidays;
- Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints; and
- Rehabilitate the site after completion of work following the Site Rehabilitation Plan (attached as **Annex-XIII**)

6.5.18 Resilience to Climate Change

Potential Impact

Due to climate change, the project area is vulnerable to recurrent urban flooding. Torrential rains and heavy rainfall mostly occur in the month of July under the effect of tropical storms.

There are chances that the open trenches may get flooded during rainy season. Flooding can hamper the construction of overhead storage tanks, pumping station, soakage pits/ aseptic tanks, stand posts and STP. This impact can be categorized as direct, local, medium term, temporary and reversible.

Mitigation Measures

- Project components have been designed to withstand flooding;
- The capacity of the sewerage/ drainage system has been designed and constructed based on extreme weather conditions predicted under international climate change models for Darya Khan region to cater for extreme storm water runoff.

6.5.19 Liquid and Solid Waste from Construction Camps

Potential Impact

Development of construction camps will generate significant quantities of liquid and solid waste. A total of ten (10) nos. construction camps will be established in all ten villages accommodating approximately 160 skilled and unskilled staff for all villages.

The water consumption at the campsites will be approximately 5 gallon/capita/day and will subsequently generate about 70 to 80% of this water as sewage. Disposal of wastewater without treatment will pollute the soil and surface water/ groundwater resources of the area.

Hence water demand will be 800 gallons/day for all eight camps during the construction stage and estimated generated wastewater will be about 640 gallons/day for all ten camps.



Construction Camps will generate about 0.28 kg/capita/day domestic solid waste comprising kitchen waste, garbage, putrescible waste, rubbish, and small portion of ashes and residues. Estimated quantity of solid waste will be approximately 44.8 kg/day from all site. This impact is medium term, reversible, possible and low adverse.

Mitigation Measures

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

- The waste generated from the camp site will be disposed of at existing dumping site of the Tehsil Darya Khan by the Contractor;
- Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste;
- Domestic and chemical effluents from the construction camp will be disposed of by the development of on-site sanitation systems i.e., septic tank prior to discharge to nearby drain. Septic tank will be located adjacent to the construction camp. Proper monitoring to check the compliance of PEQS will be carried out;
- All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper SWM system. Toxic waste will be handled, stored, transported and disposed separately;
- The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and
- Solid waste will be segregated at source so that it can be re-used or recycled.

6.5.20 Flammable and Hazardous Materials

Potential Impact

Flammable materials to be used during the construction activities include diesel, furnace oil, petrol, Liquefied Petroleum Gas (LPG), kerosene oil and machinery fuels. These materials present little risk to the environment, if properly transported stored and used; otherwise, they are potentially very dangerous. Improper storage and handling practices for these flammable and explosive materials can pose dangers of fire and blasts in the area. Training of employees involved in the transportation of hazardous material regarding emergency procedures should be ensured.

Unsafe disposal of excavated material may not only create the environmental degradation but also a nuisance for the surrounding community. Moreover, trenches, if left open, may prove to be hazardous to labor and locals of the area. This impact is site-specific, temporary, reversible, possible, and low significant.

Mitigation Measures

- Safety procedures will be followed by the contractor and labors strictly while using, handling and storage of these materials;
- Trainings will be provided to the contractor's staff for handling and using of flammable



materials and explosives;

- For safety of construction labors and immediate communities, it is suggested that contractor's staff will be trained about the procedures of safe use, handling and storage of materials;
- Emphasis will be to decrease the volume of mucking material by reusing and then the disposal at the marked area in environment friendly way. In order to reduce the volume of disposal material, maximum part of the excavated material can be used in other activities filling of borrow areas and natural depressions in the project area. In order to increase the aesthetics of the area, native grass can be planted by dumping the surplus material in the proposed area with suitable soil cover.

6.5.21 Gender Based Violence (GBV)

Potential Impacts

During construction phase, gender-based violence might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. Sexual harassment against women might occur as a consequence of mixing of men and women at the construction site, and moving on the roads and markets. This impact is negative in nature during construction stage.

Mitigation Measures

With the effective measures and monitoring, the risk of gender-based violence could be minimized by adopting the following mitigation measures:

- Awareness will be created among the females at individual and community levels about the construction sites;
- Workers will not be allowed to crowd in the residential communities within the site;
- Alternative routes for pedestrian will be provided to avoid mixing of women with workers;
- Raise awareness among the communities of the potential risks of GBV, and establish response services in the nearby communities that can respond to instances of GBV (particularly those related to issues of labor influx);
- The Contractor will make sure that no discrimination is made on the basis of gender while hiring of workers;
- Provisions of gender disaggregate bathing, changing, and sanitation facilities; and
- Contractor will take proper measures to address and resolve issues relating to harassment, intimidation, and exploitation, especially in relation to women.

6.5.22 Influx of Labor

Potential Impacts

For the implementation of project activities, skilled and unskilled labor is required by the contractor. Mostly, skilled and unskilled workers have been associated with the contractor since long which they utilize, where they are required for the projects, and while other workers



are hired from the different areas that belong to different cultural backgrounds. Social problems and conflicts that are associated with labor influx are as follows:

- Risk of social conflict: Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources;
- Increased risk of illegitimate behaviour and crime: The influx of workers and service providers into communities may increase the rate of crimes and a perception of insecurity by the local community. Such illegitimate behaviour and crimes can include theft, physical assaults, substance abuse, sexual assault and human trafficking;
- Increased risk of communicable diseases and burden on local health services: The influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), or the incoming workers may be exposed to diseases to which they have low resistance. Workers with health concerns relating to substance abuse, mental issues or STDs may not wish to visit the project's medical facility and instead go anonymously to local medical providers, this can result in an additional burden on local health resources; and
- Local inflation of prices, accommodations and rents: A significant increase in demand for goods and services due to labor influx may lead to local price hikes and crowding out of community consumers. Depending on project worker income and form of accommodation provided, there may be increased demand for accommodations, which again may lead to price hikes and crowding out of local residents.

Mitigation Measures

- Labour camp(s) will be established away from residential population;
- Preference will be given to the local people to work with contractor, and contractor should hire maximum labour force from the project area because this will reduce the labour influx;
- Awareness will be created among the work force to ensure respect for local customs;
- Construction work will be completed within the stipulated time to move workers to next location;
- Labor force will be shuffled with the time;
- An effective GRM has been established for the project to resolve all issues related to the community. Thus, progress regarding resolving the issues should be monitored closely.
- Create awareness among workers on proper sanitation and hygiene practices to endorse proper health and maintain good housekeeping practices at all project sites;
- Provide adequate personal hygiene facilities in good condition with adequate supply of clean water;
- Make arrangements to treat the affected workers on time to control the movement of vectors disease;
- Sensitize workers and surrounding communities on awareness and prevention of HIV/AIDS and sexually transmitted infections (STI) through training, awareness campaigns and workshops during community meetings;
- Provide proper and free HIV/AIDS and STI health screening and counselling for site workers and community members;
- Develop and enforce a strict code of conduct for workers to regulate behaviour in the local



communities;

- Prohibiting drugs, alcohol, weapons, and ammunition on the worksite among personnel;
- Site security preparations must be contained within the Bills of Materials (BOMs) to avoid any delays which might be caused due to insecurity;
- Appropriate fencing, security check points, gates and security guards should be provided at the construction sites to ensure the security of all plant, equipment, machinery and materials, as well as to secure the safety of site staff; and
- The Contractor must guarantee that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft.

6.5.23 Social/ Cultural Conflicts

Potential Impact

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

Mitigation Measures

- Public notification through announcements in local mosques during the entire construction phase to avoid any inconvenience in accessibility to the locals;
- Establishment of formal links with affected communities;
- Plan for social grievance redress mechanisms including the local leaders and community representatives;
- Local labor will preferably be employed for construction works;
- Careful planning and training of workforce to minimize disturbance to the local people; and
- Contractor will preferably arrange their own sources of water.

6.5.24 Child Labor

Potential Impact

Due to poverty and feeble financial situation of the area, the underaged children might get involved with the contractor various construction works. This will be the violation of the Child Labor Act. Furthermore, SEA/SH issues might arise which will create social conflicts. This impact is adverse and temporary in nature.

Mitigation Measures

- Standard clause in the contracts related to child labor explicit prohibitions, etc. and contractor will ensure compliance to the contractual provisions on bonded and child labor, equal wages for similar work explicit prohibitions, etc.



6.5.25 Economic Activity

Potential Impact

Due to the construction of the proposed Project, economic activity will be generated in the project area as the laborers and semi-skilled staff will have an opportunity to work in the project area. This will provide them an opportunity to develop their skills and capacities. It will also benefit the local vendors of the project area. This is a positive impact.

6.6 Anticipated Impacts during Operational Phase

Anticipated impacts during Operational Phase and the recommended mitigation measures have been described under biophysical and socio-economic categories as follows:

6.6.1 Soil

Potential Impact of STP

The soil quality may be affected due to leakage/ infiltration from sewer lines and STP bed. The sludge generated from cleaning/ maintenance of pumping stations, manholes, sewers and STP may contaminate the soil. The liner of the STP, while desludging may get dried and cracks may lead to the seepage of wastewater and thus contaminate the soil. Improper disposal of scum and sludge is another concern. This is a moderate negative impact.

Potential Impact of Leachate from Dumping Site

There is no arrangement of leachate collection and no liner material is present there which will result in contamination of soil due to leachate. The situation will exacerbate in the rainy seasons. This is moderate negative impact.

Mitigation Measures

- Sludge shall be treated prior to ultimate use/disposal. Various options for sludge treatment include Digestion, Drying/ Dewatering, Composting, Lime Stabilization, Heat Treatment must be considered etc;
- The liner of STP & aseptic tank must be regularly maintained and checked for any cracks and leakages;
- An engineering landfill site must be constructed (under a separate project) to avoid the issues of leachate contamination.

6.6.2 Air Quality

Potential Impact of Sewerage System

The operation of sewerage scheme will result in generation of gases including H₂S and CH₄. H₂S is a foul-smelling poisonous gas which might be harmful for the sewer-men and could be fatal sometimes. CH₄ is natural gas also referred to as a greenhouse gas. Pakistan is signatory to the



United Nations Framework Convention on Climate Change (UNFCCC) and adopted Kyoto Protocol in 1997. Under the Kyoto Protocol, Pakistan is committed to reduce GHG emissions into the environment to prevent interference with climate change. The GHG emissions for the proposed project are a concern due to the anaerobic conditions in the sewer lines and wet wells of the disposal station and aseptic tanks/ soakage pits.

Potential Impact of STP

The proposed STP is based on Anaerobic Baffled Reactor (ABR) technology which will generate significant amount of CH₄. Methane is the primary contributor to the formation of ground-level ozone, a hazardous air pollutant and greenhouse gas. This impact is permanent and high adverse in nature.

Mitigation Measures

- Provision of exhaust gas vents at appropriate locations in the design;
- Sewer-men will cover their faces with gas mask while entering the sewer for cleaning or maintenance purposes;
- It's better to use sucking machinery for cleaning of sewers;
- Use gas detector before inspection;
- Adequate tree plantation must be done around the STP to control the spread of odour; and
- Options for capture CH₄ and H₂S that can be used commercially may be considered.

6.6.3 Odour

Potential Impact of STP

STP & septic tank/soakage pits are designed on adequate waste loading and function well if they are not overloaded. The overloading will result in malfunctioning of STP & septic tank/soakage pits and it will result in significant odour generation in the vicinity. This impact is temporary and high adverse in nature.

Mitigation Measures

- The STP & septic tank/soakage pits should not be overloaded and personnel dealing in operation should be trained to avoid operational issues;
- Adequate tree plantation must be undertaken to avoid spread of odour in the vicinity.

6.6.4 Solid Waste

Potential Impact of Sewerage System

Domestic and hazardous wastes would be generated during cleaning and maintenance activities. The solid waste during operational phase will consist of plastics, metal and organic wastes present in sewer lines which can cause blockage in sewerage system. This impact is major negative and permanent in nature.



Potential Impact of STP

Solid waste will be separated from the wastewater through screens. If these wastes are not properly handled, odour will be generated and efficiency of STP will be reduced over time. This impact is moderate negative and temporary in nature.

Protentional Impact of Solid Waste Management

The waste containers, if not emptied timely, will create nuisance and attract mosquitoes and diseases vectors. The situation will exacerbate in the rainy seasons. Furthermore, there would be littering during transportation of waste from the villages to the dumping site.

Mitigation Measures

- Waste shall be collected, stored and disposed of according to relevant standards in approved facilities;
- An organized collection system and its implementation through a licensed contractor;
- The containers will be timely removed and the fine will be imposed on contractor in case of violations;
- Closed containers will be used for transportation of waste to the dumping site;
- Schedule inspection of the sewer lines and STP to keep it clean and to identify any hazardous material; and
- Solid waste bins shall be placed at appropriate locations to avoid its mixing in wastewater.

6.6.5 Sludge

Potential Impact

Sludge is semi solid material which will be settled at the bottom of the STP & septic tank/soakage pit. Significant amount of sludge will not be produced in ABR; however, periodic desludging will be done to achieve good removal efficiency. The removed sludge in wet form, if left unattended will create nuisance i.e., odor, soil contamination, groundwater contamination (through percolation/ seepage) and will serve as breeding ground for disease vector.

Mitigation Measures

- Appropriate sludge treatment must be undertaken before disposal of sludge;
- The sludge must never be left unattended and should be transferred to designated dumping site after adequate treatment;
- Dried sludge can be used as a land conditioner in the fields.



6.6.6 Water Quality

Potential Impact of STP

The major portion of treated wastewater from the STP will be discharged in watercourses and will be used for agricultural purposes. However, accidental discharges of untreated wastewater due to the overflow, syphoning or disruption in operation during maintenance of the treatment plant may cause contamination.

There is probability of the seepage of wastewater from the bed of STP that may contain high concentrations of organic matter and heavy metals. Improper functioning or choking of inlet or outlet of the treated wastewater may also cause the groundwater contamination. The impact is moderate negative and permanent in nature.

Mitigation Measures

- Use the suitable lining material to control the seepage and groundwater contamination;
- In case of maintenance/sludge removal, alternative ponds shall remain functional; and
- Inlet and outlet pipework access/maintenance pits should be inspected regularly for blockages. These pits should be covered at other times.

6.6.7 Resilience to Climate Change

Potential Impact of STP

Temperature is the controlling factor and most important parameter of STP. The STPs are designed to treat wastewater within specified range of temperature which is based on past meteorological data. The climatic changes in temperature may affect the functioning of STP.

Furthermore, flooding and unpredicted rainfall events may halt the STP operations.

Mitigation Measures

- The design of STPs is robust and they can handle the wide range of temperatures;
- The water must be bypassed during rain and flooding.

6.6.8 Community Health Hazards

Potential Impact of Sewerage System

During desludging and cleaning operations the sludge will be piled up temporarily along the manholes and will be a hazard for passers-by and local community. This impact is temporary and moderate negative in nature.



Potential Impact of STP

The treated wastewater from STP will be used in agricultures in nearby areas. The community using the part will be exposed to the effects of treated wastewater. This impact is permanent and moderate negative in nature.

Mitigation Measures

Proper management of the STP is essential to avoid the adverse impacts. Moreover, proper methods to manage the treated effluent from STP have to be undertaken to ensure that it does not affect the environment around the area or cause health hazards to the people living there. Health and safety hazards during the operation phase can be prevented by appropriate precaution measures. To minimize the adverse impacts mitigation measures to be adopted are as follows:

- The treated wastewater shall be routed to the agricultural area in a way that there must not be physical contact of the community;
- The community must be educated on the effects of treated wastewater to avoid health issues;
- The sludge must be timely removed from the site and the area must be barricaded during desludging and cleaning periods.

6.6.9 Occupational Health and Safety Hazards

Following occupational hazards are associated with treated wastewater handling:

Potential Impact

Infections

- Infections resulting from direct contact with treated wastewater, and from infected wounds; and
- Intestinal infections that are transmitted by flies feeding on the STP.

Chronic Diseases

- There is a chance of spreading of an epidemic of coronavirus disease (COVID-19) due to close interaction of the work force during operation of the STP.

Mitigation Measures

The mitigation measures proposed to be adopted are as follows:

- The Contractor should prepare OHS and ERPs during operation phase;
- Instructing the workforce on handling of treated wastewater;
- Provide basic medical training to the specified work staff and basic medical service and supplies to workers;
- Obligatory insurance of work laborers against accidents;



- Provision of safety measures such as emergency sirens, firefighting equipment, first aid, and contingency measures in case of accidents; and
- Management should strictly enforce the recommended SOP to avoiding spreading of coronavirus disease.

6.7 Positive Impacts

6.7.1 Improved Water Supply System

Clean water is the dire need of ten selected villages of Darya Khan. Provision of adequate water supply system/ stand posts with reasonable supply of water will provide relief to the community and will resolve the major issue of “water” in the project area. Further there will be net improvement in community’s health.

6.7.2 Improved Sewerage System

The proposed project will improve the overall sewerage and drainage system of the project area. Currently, the open wastewater drains in the streets result in foul odor, serves as breeding ground for disease vector and results in inconvenience to the road users and local community. The project will improve this situation by controlling overflows and proper disposal of wastewater/ storm water.

6.7.3 Improvement in Public Health, Hygiene and Sanitation

With the improvement in sewerage and drainage system, improvement in health, hygiene and sanitation will also be observed. Foul odor will be eliminated and there would be no breeding grounds for diseases vectors. Thus, the project will improve public health, hygiene and sanitation conditions in the project area.

6.7.4 Landscape

Potential Impact

During the operation stage, new saplings of different plants would be planted to enhance the aesthetics to create a buffer zone and to compensate the environmental losses. This will have a positive impact of permanent nature. The presence of adequate flora at available spaces along the boundary of STP will help in absorbing flue gases and other air quality related impacts of proposed project operation. The plants will be beneficial in dust and noise suppression for the nearby community.

Mitigation Measures

- The saplings planted in the project area against the trees affected and for enhancement of environment should be properly maintained throughout their growth.

6.7.5 Other Positive Impacts

Some other positive impacts include the following:



- Economic development
- Employment generation
- Development of deprived areas
- Formation of model villages of tehsil Darya Khan.

6.8 Operational Sustainability

The sewer pipes, STP and other components of the project will not function without maintenance, as silt inevitably collects in areas of low flow over time. Improper operation and maintenance of sewerage system may result in illegal ingress of municipal solid waste into manholes/sewers, deposition of silt/sludge reducing capacity of sewers significantly.

Mitigation Measures

- Routine/ preventative maintenance and desilting shall be carried out as with the passage of time depositing silt becomes so hard that the blockage problems are experienced;
- Major causes of deposition of silt and floating matters in the sewers are the mixing of solid waste and smaller diameter sewer pipes. Placement of sufficient number of solid waste litter bins/containers shall be ensured along the roads and in streets to avoid entrance of solid waste into sewers;
- Immediate response to all sewer/drainage related complaints followed by prompt correction of defective condition;
- Regular cleaning of sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning shall be conducted more frequently for problem areas;
- Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or ex-filtration;
- Any repairs will be conducted by sealing off the affected sewer and pumping the contents into tankers, after which the faulty section will be exposed and repaired following the same basic procedure as when the sewer was built. Trenches will be dug around the faulty section and the leaking joint will be re-sealed, or the pipe will be removed and replaced.

6.9 Cumulative Impacts

The project activities will be undertaken within the boundaries of all ten villages. Currently, no development and construction activity are being undertaken within these villages, therefore, there will be no cumulative impact of these activities.

6.10 Induced Impacts

Beside some direct environmental and social impacts, the proposed project may have some induced impacts to the physical features of environment. The project is envisaged to improve the sewerage system of the project area but the ultimate disposal of sewage is the point of concern. However, the sewage is planned to be disposed of into the treatment plant which will ultimately discharge into the watercourses after adequate treatment.



7 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

7.1 General

This section aims to address the measures which need to be adopted during each phase of the project to avoid, contain, mitigate or compensate for the potential impacts identified in **Section 6**. The Environmental Management & Monitoring Plan (EMMP) is the major part of this section and forms the gist of this study. EMMP not only includes Best Management Practices (BMPs) but also includes monitoring indicators, frequency, responsibility, and estimated environmental budget. This ensures that mitigation, monitoring, and management consideration form a part of the documentation used for decision making and the basic benefit of defining the responsibilities is to make sure that the suggested mitigation measure will be implemented at the construction and operation stages of the project. A summary of the mitigation measures for potential impacts have also been given in this section to support EMMP. Moreover, a framework for the implementation of EMMP has been discussed in this section.

7.2 Objectives of EMMP

The main objectives of EMMP are to:

- Provide details of the project impacts along with the proposed mitigation measures and the corresponding implementation activities;
- Define the roles and responsibilities of the Project Proponent, Contractor, Supervisory Consultants, and other players and effectively communicate environmental issues among them;
- Define a monitoring mechanism, and reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented, and identify the resources required to implement the EMMP and outline the corresponding financing arrangements.
- Ensure that the project will adopt COVID-19 best international standard operating procedures (SOPs) during the construction and operational phases.

7.3 Implementation of Environmental Management & Monitoring Plan (EMMP)

The institutional arrangement for the implementation of EMMP for PRSWSSP is presented in **Figure 7.1**. The proponent PIMU-PRMSC will be responsible for compliance of environmental and social safeguard requirements of the proposed project.

The proposed project activities will be monitored and managed by the PIMU-PRMSC. The Environmental and Social Cell (ESC) staffed by qualified environmental and social specialists has already been established under PRSWSSP. The ESC will be the custodian of the EMMP. ESC will support ensuring the compliance of EMMP. ESC will submit progress reports for the implementation of the EMMP to EPD as per environmental approval/ NOC conditions for the PRSWSSP.

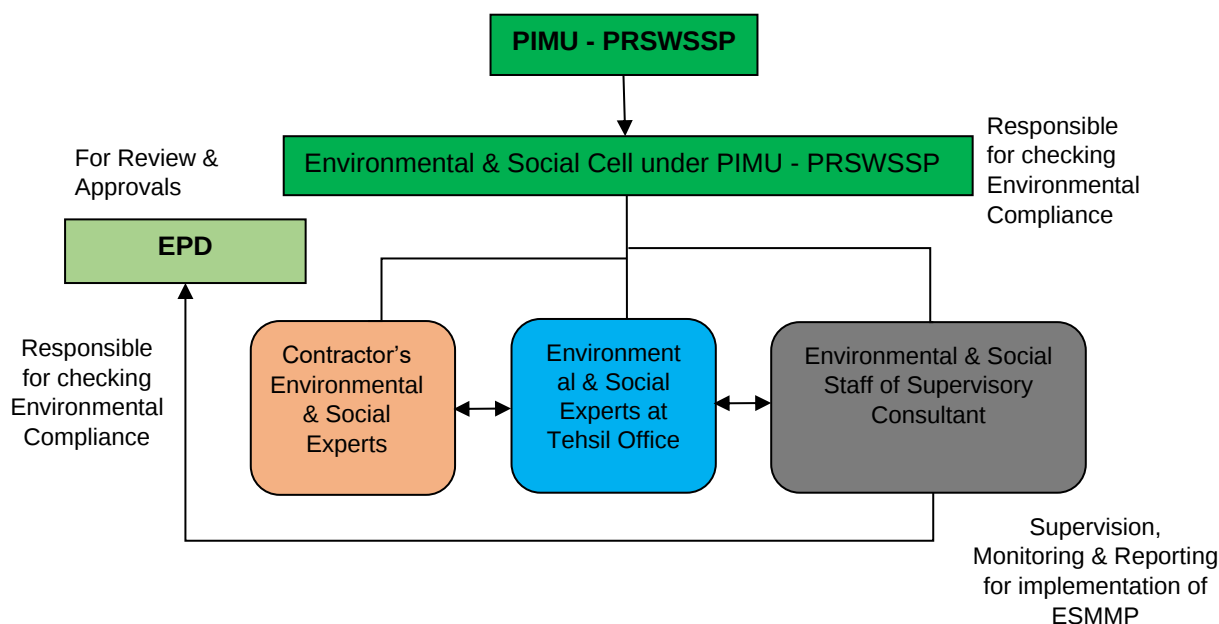


Figure 7.1: Organizational Setup for implementation of ESMMP

7.3.1 Roles and Responsibilities of the Functionaries involved in ESMP Implementation

A. Environmental Protection Department

As per Punjab Environmental Protection (Amendment) Act, 2012, Punjab EPD is responsible for environmental protection and pollution control. The Punjab EPD is responsible for the approval of the EIA/ IEE of all the developmental projects under their jurisdictions. As per Punjab Environmental Protection (Review of Initial IEE/EIA) Regulations 2022, Schedule-II, EIA is required for 'Water Supply, Sewerage System and Treatment (Category F) & Waste Storage and Disposal (Category G). Based on the EIA, Punjab EPD will monitor (as and when required) the project activities.

B. PIMU-PRMSC

The Project Director of PIMU-PRMSC is the in-charge for the financial and technical matters related to PRSWSSP. His responsibilities for monitoring the EMMP will consist of:

- Ensuring that the required environmental training is provided to the concerned PIU staff;
- To carry out random site visits to the construction sites to review the environmental performance of the Contractor;
- Review monitoring reports for the progress of environment-related activities;
- Make sure that the Contractor is implementing the additional measures suggested by the Supervision Consultant (SC) in environmental monitoring reports;
- To assist the Contractor in obtaining necessary approvals from the concerned departments;



- Maintaining interface with the other line departments/ stakeholders; and
- Reporting to the Punjab EPD on the status of ESMMP implementation.

C. Environmental and Social Cell (ESC)

ESC has already been established in the PIMU-PRMSC which is responsible to:

- Make sure that all the contractual obligations related to environmental and social compliance are met;
- Monitor the progress regarding the implementation of environmental and social safeguards as provided in the ESMMP;
- Oversee the compliance of all the monitoring programs as given in ESMMP;
- Check randomly whether monitoring of the environmental aspects of the proposed project during construction and operational phases is being properly carried out;
- Document and disclose monitoring results and identify necessary corrective and preventive actions in the periodic monitoring reports, and make follow-up on these actions to ensure progress toward the desired outcomes;
- Make sure that the contractor implements the additional measures suggested by the SC and PIMU; and
- Report the status of ESMMP compliance to the Project Director, PIMU-PRMSC.

D. Supervisory Consultant (SC)

The roles and responsibilities of SC will be:

- To oversee the performance of the Contractor to make sure that the Contractor is complying with ESMMP;
- Ensuring that the day-to-day construction activities are carried out in an environmentally and socially sound and sustainable manner;
- Strong coordination with the Contractor and PIMU-PRMSC;
- Preparing training materials and implementing programs;
- Ensure the implementation of the mitigation measures suggested in ESMMP;
- To supervise and monitor environmental activities being performed at the site;
- Periodic reporting as mentioned in ESMMP; and
- Suggest any additional mitigation measures (if required).

E. Construction Contractor (CC)

Contractors will be bound to appoint site-based Environmental and Social managers with relevant educational backgrounds and experience for PRSWSSP. The contractors' Environmental and Social manager will carry out the following activities:

- Implementation of the mitigation measures at the construction site;
- Contractor will be bound through the contract to take actions against all the special and general provisions of the contract document;



- Contractor will make sure the compliance of ESMMP recommendations related to construction and will also be responsible for effective liaison with local heads of the community;
- Provision of proper Personal Protective Equipment (PPE) to the workers and train them for their proper use;
- Compliance with international best SOPs for COVID-19;
- To conduct the environmental and health & safety trainings to the workers/labour; and
- Coordinate with the Environmental Specialist and Social Development Specialist (SDS) of SC and PIMU.

In addition to the above, the CC shall also follow the Environmental Code of Practice (ECOPs) attached as **Annex–XIV**.

A. Environmental & Social Experts at Tehsil Office

The Tehsil Office will be responsible for:

- Monitoring of environmental compliance in close liaison with the SC;
- Reporting to ESC-PRMSC regarding compliance status;
- Identifying gaps in the implementation of EMMP and support the Contractor in rectifying the gaps.

B. Design Consultant (DC)

The DC will be responsible for:

- Preparation of environmental responsive design;
- Incorporation of technical design features in consideration of baseline environmental features;
- Designing of components based on futuristic and prospective needs of the project area.

7.3.2 Institutional Arrangement for Implementation of ESMMP by PIMU-PRMSC during O&M Phase

The proposed project will be administrated by PIMU-PRMSC during the O&M phase. The Project Director, PRMSC with his ESC will be responsible for the following:

- Compliance with ESMMP requirements for the O&M phase;
- Coordinating with the operational staff working under the ESC to monitor environmental compliance during project operation;
- Advising on, and monitoring tree plantations along the buffer zone of the project area;
- Reporting on the progress of environmental compliance to the Punjab EPD;
- Assessing the long-term environmental impacts of project operation;
- Sustaining a working partnership among the PIMU-PRMSC, Punjab Local Government Department, Punjab EPD, Agriculture, Irrigation, Forest and Wildlife departments of



Punjab, NGOs, and other related public-private sector organizations.

7.4 Reporting

The contractor will prepare and submit monthly monitoring reports for compliance of implementation to the supervision consultant (SC) environmental team.

The distribution of periodic reports is given in **Table 7.1**.

Table 7.1: Distribution of Periodic Reports

Report	Prepared by	Reviewed by	Distribution
Monthly	Contractor	Reviewed by PIMU-Environmental Unit; PRSWSSP	The Engineer, PRMSC and EPD
Quarterly	Contractor	Reviewed by PIMU-Environmental Unit; PRSWSSP	The Engineer, PRMSC and EPD
Annual	Contractor	Reviewed by PIMU-Environmental Unit; PRSWSSP	The Engineer, PRMSC and EPD
Final	Contractor	Reviewed by PIMU-Environmental Unit; PRSWSSP	The Engineer, PRMSC and EPD

7.5 Non-Compliance with the EMMP

The implementation of the proposed EMMP involves inputs from various functionaries as discussed earlier. The contractor will be primarily responsible for ensuring the implementation of the mitigation measures proposed in the EMMP, which will be part of the contract documents. The provision of the environmental mitigation cost will be made in the total cost of the project. However, if the contractor fails to comply with the implementation of EMMP and submission of the monthly compliance reports, deductions will be made from the payments to the Contractor claimed under the heads of environmental components.

7.6 Contractors EMMP

The contractor will prepare a site-specific Contractor's EMMP (C- EMMP) based on the current EMMP and will get it approved by PIMU-PRMSC before the start of work. This will ensure the implementation of the EMMP based on the site conditions at the time of execution, by the contractor.

The C- EMMP will include the following sub-plans:

- Traffic management plan;
- OHS plan;
- Pollution prevention plan; and
- Camp management plan.



7.7 Inclusion of EMMP in Bidding/ Contract Documents

The present EMMP will be included in the bidding/ contract documents and their implementation will be contractual binding for the contractors.

7.8 Environmental Management and Monitoring Plan

Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at three levels. At the PIMU level, the ESC will do EMMP monitoring to ensure that the mitigation plans are being effectively implemented. The environmental engineer of the Supervision Consultant will regularly monitor the EMMP implementation by the contractor. At the contractor's level, the environmental monitoring checklist will be filled on daily basis by their environmental manager and countersigned by the environmental engineer (EE) of the Supervision Consultant.

Table 7.2 outlines the parameters that will be monitored, the expected frequencies of monitoring, and the responsible agency for monitoring.



Table 7.2: Environmental Management & Monitoring Plan (EMMP)

Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Pre-Construction / Design Phase							
Layout Planning & Design	Incompatible layout plans and engineering designs of the proposed project can undermine the overall aesthetics and ambiance of the project area	- All structural, layout and engineering designs of the project are in strict accordance with the applicable national and international guidelines/ codes/ standards and engineering practices; - The layouts of water supply and sewerage networks have been adjusted to cover the whole project area. The water supply system is based on loop design and sewerage system is based on gravity where the slopes have been provided to ensure gravity flow with adequate velocity.	DC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	PIMU	N/A
Groundwater	During operation probability of seepage through the sewers may also contaminate groundwater.	- Efficient seepage control measures have been considered in selection of pipe materials during the planning stage; - Procedure for efficient jointing of selected sewer pipes will be applied to avoid leakage from pipes; - Alternate sewage disposal arrangements have been suggested in design to cater the sewage flow, generated from the project area, during construction phase.	DC, PIMU-PRMSC	Design provisions	Once (Before Design)	PIMU	N/A
Damage to Existing Infrastructure	There are no public utilities except the electric poles which might get affected during construction activities and	- Alignment has been selected carefully to minimize disturbance to public utilities; - Relocation of the public utilities shall be planned and approved in consultation with relevant	DC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	PIMU	N/A
			DC, PIMU-PRMSC	Design provisions	Once (after completion of	PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	movement of machinery and the community will face temporary electricity cuts.	departments/authorities/stakeholders before project commencement if any, to avoid inconvenience to the public; - The local community will be informed before relocation of services (if any) and schedule of relocation services will be prepared after consultation with the community to minimize inconvenience to the public; - Construction contractor will be directed to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. and; - The sanitation plan (Annex-VIII) will be adopted to avoid sanitation related issues.			Detailed Design)		
Physical Cultural Resources	No historical/ archeological site is present in the project area. However, some cultural resources including mosques, graveyards and shrines are present. These will not be directly affected but the people may face access issues in visiting these facilities.	- The alternative access routes will be provided in case the access has to be restricted during execution period; and - There must not be any physical impact on the physical and cultural resources in the project area.	DC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Surface Water	Thus, endangering the environment of the vicinity. The openly flooded sewage causes nuisance in terms of foul smell and serves as breeding ground for disease causing vectors. Some sewage is also used to irrigate nearby crops.	• The sewage will be collected through a piped network or disposed into aseptic tank and soakage pit; • An STP based on ABR technology will be established to treat the sewage for pipe network system; • The treated effluent will be discharged into the existing watercourses for agricultural purposes.	DC, PIMU-PRMSC	Design provisions	Once (Before Design)	PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Seismic Hazard	A low to moderate intensity earthquake impacting the project site can adversely impact the development. This factor requires special consideration of the designers as project structures (especially overhead water tanks, aseptic tanks, soakage pits and STP) may be affected negatively in case of earthquake tremors and the significance of damage depends upon the severity of earthquake.	- The components of the proposed project include laying of underground water supply network, sewer lines, construction of overhead water tanks, pumping station and STP have been designed to withstand moderate earthquakes; and - To mitigate the seismic hazard, Seismic Building Code of Pakistan 2007 (SBC-07) has been adopted. This code specifies minimum requirements for seismic safety of buildings/ structures and has to be applied and used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering.	DC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	PIMU	N/A
Environmentally Responsive Design Considerations	Designing of the project components without considering the prospective and futuristic needs can result in structures with low	- All sewer lines including trunk, lateral and branch sewer lines have been designed considering the future population and waste generation rate; - Limited the sewer depth where possible;	DC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	social acceptability and functionality. Improper designed sewers may not carry the waste load, leading to system-failure and financial loss.	- Sewers will be laid away from water supply lines (at least 1 m, wherever possible); - In all cases, the sewer lines shall be laid below water pipeline (the difference between top of the sewer and bottom of water pipeline shall be at least 300 mm); - For shallower sewers, use of small inspection chambers in lieu of manholes; - Designed manhole covers to withstand anticipated loads & ensure that the covers can be readily replaced if broken to minimize silt/garbage entry; - Ensured sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to ensure self-cleansing velocity in order prevent to built-up of solids and hydrogen sulfide generation; - All structural, layout and engineering designing are in strict accordance with the applicable by-laws and engineering parameters; - The location of groundwater storage tanks, overhead water tanks, pumping stations and STP have been finalized in close consultation with local community and representatives of local authorities.					
Fire Fighting System	In case of fire hazards, inefficient		DC, PIMU-PRMSC	Design provisions	Once (after completion of	PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	firefighting system at campsite may cause severe damage to the camp site and surrounding crops and houses. This will be a moderate adverse impact.	- Contractor will provide firefighting system for construction camp, workshop and construction site; and - A separate fire alarm system will also be installed at construction camp and near the construction site.	DC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	PIMU	N/A
Anticipated Impacts during the Construction Phase							
Topography	The construction activities are not expected to impact the topography of the area significantly except for those areas where physical activities i.e., earthwork is involved as well as stocking of material. The excavated material is to be mostly backfilled and the excessive material will be transported to strengthen the roadsides or will be dumped at the designated locations. This	• Material stockpiles will be removed as soon as work is completed and the area will be reinstated;	CC, SC, PIMU-PRMSC	Stockpiles and heaps of waste visible at the site.	Weekly	SC and PIMU	N/A
		• Temporary storage sites will be allocated for the storage of excavated material;	CC, SC, PIMU-PRMSC	Site allocation and preparation	Once	SC and PIMU	N/A
		• Temporary storage sites will be lined and must not allow infiltration	CC, SC, PIMU-PRMSC	Site allocation and preparation	Once	SC and PIMU	N/A
		• The stockpiles must be covered with tarpaulin sheets or other adequate material;	CC, SC, PIMU-PRMSC	Provision of tarpaulin	Once	SC and PIMU	N/A
		• Pilling of material at large extent will not be allowed and the contractor will timely remove excavated material from the site.	CC, SC, PIMU-PRMSC	Stockpiles and heaps of waste visible at the site.	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	impact is site-specific, temporary, reversible, possible, and low significant						
Soil Erosion	The soil would be exposed to erosion due to excavations for laying of sewers and water supply pipes. Construction activities such as clearing, excavation, filling, grading and setting up construction camps will affect the existing soil condition in the study area/ Aol. The clearing of vegetation can also loosen the soil and make it more susceptible to erosion due to wind and rain. There is also a possibility of silt runoff during rainy season causing soil erosion. During the rain, the eroded	Good engineering practices will help to control or minimize the soil erosion both at the construction sites and in peripheral areas. Special slope protection measures will be adopted during the construction stage;	CC, SC, PIMU-PRMSC	Provision of shuttering	Once	SC and PIMU	N/A
		Use of heavy machinery will be restricted as far as possible to avoid the destruction of soil structure;	CC, SC, PIMU-PRMSC	Movement of machinery	Hauling of machinery	SC and PIMU	N/A
		Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations should be avoided;	CC, SC, PIMU-PRMSC	Excavations beyond the specified spots	During excavation works	SC and PIMU	N/A
		Stored excavated material shall be covered and preferably reused, e.g., in construction as backfill etc.	CC, SC, PIMU-PRMSC	Wastage of excavated material; Backfilling	During backfilling	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	soil will mix with stagnant water to transform into slush, which can affect movement of vehicles and machinery and construction workers as well as limit the movements of local people. This impact can be categorized as low adverse, site-specific, long term, permanent, highly probable and reversible.						
Soil Contamination	Contamination of soil may be caused by oil and chemical spills from construction machinery or uncontrolled runoff from equipment washing yards. This impact is permanent and minor negative in nature.	Chemicals/ hazardous products and wastes will be stored on impermeable surfaces in secure, covered areas with clear labelling of containers and with a tray or bund to contain leaks;	CC, SC, PIMU-PRMSC	Monitoring compliance to Regular disposal of Chemical/ Hazardous waste; Photographic record;	Monthly	SC and PIMU	N/A
		All construction wastes from the site will be regularly removed and transported to approved waste disposal sites;	CC, SC, PIMU-PRMSC	No fall of transported material;	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
				Damaged road repaired. Record of harmful incidents that occurred.			
		• Washing yards will be paved to avoid seepage of runoff from the yard;	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
		• Awareness in emergency spill response procedures will be conducted through trainings;	CC, SC, PIMU-PRMSC	Training Sessions	Once	SC and PIMU	
		• Oil leakages, chemicals and other liquids spills will be avoided/minimized by providing appropriate storage places depending on the type of material for storage	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
Trench Failure	The major construction activities involve excavation operations for laying water supply and sewerage lines. The major hazard associated with the excavation operations is trench failure. The unstable slopes may fail and settle in the trenches which may cause injuries and	• Provision of adequate shuttering in the trenches;	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
		• Leftover shuttering may also be used in case of loose soil strata.	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	fatalities to the workers. This impact is probable, site specific and high adverse in nature.						
Construction Camps/Camp Sites	Improper construction camp location and mismanagement of construction camp activities can lead to various social and environmental impacts which may include noise, health and safety, traffic problems, soil degradation, loss of vegetation and assets on the selected land, solid waste and water pollution. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increased tension between	Working hours of noisy activities will be limited to normal daytime working hours when near identified sensitive receptors;	CC, SC, PIMU-PRMSC	Field Observations	Weekly	SC and PIMU	N/A
		Waste Management Plan will be implemented to include procedures for the classification, storage and disposal of all construction wastes and the training of employees who handle hazardous materials; and	CC, SC, PIMU-PRMSC	Compliance to waste management plan;	Monthly	SC and PIMU	N/A
		Construction camps will be established away from populated areas.	CC, SC, PIMU-PRMSC	Camp established at least 500m away from the nearest community; Local hired workforce;	Once	SC and PIMU	N/A
		Regular training of workers will be carried out regarding local cultural norms, human behaviour, gender issues by the contractor during construction activities at site.	CC, SC, PIMU-PRMSC	Any complaint from the local community.	Weekly check complaint register	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	local communities and workers residing in the construction camps. This impact is temporary and moderate negative in nature.						
Water Quality	Runoff and erosion from exposed soil surfaces, earthwork areas and stockpiles e.g., grouting and cement material with the rain. Construction waste, if left unattended will result in forming leachate that will percolate through the soil strata and will reach underground water table and hence, will end up contaminating groundwater. There is a probability that various materials like fuel, lubricant	Protection of groundwater reserves from any source of contamination such as the construction and oily waste by making the ground impermeable through sheets or compaction;	CC, SC, PIMU-PRMSC	Monitoring compliance; Water quality testing.	Quadrimesterly	SC and PIMU	N/A
		Stockpiles of cement and other construction materials will be kept covered when not being used;	CC, SC, PIMU-PRMSC	Use of tarpaulin for protection; Visual Inspection	Weekly	SC and PIMU	N/A
		Maintenance of vehicles will be carried out only on impermeable areas where any oil spillages can be contained;	CC, SC, PIMU-PRMSC	Any spill observed; Availability of sealed containers for used oils and lubricants; Disposal options (e.g., local vendor) explored.	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	oil and other oily products, which are used during the construction phase may contaminate groundwater and channels carrying water.						
		Careful planning of the works to avoid soil excavation works during rainy seasons;	CC, SC, PIMU-PRMSC	Visual Inspection	During rainy season	SC and PIMU	N/A
		No activity will be undertaken in monsoon and careful attention must be paid to weather forecast before excavation operations.	CC, SC, PIMU-PRMSC	Visual Inspection	During rainy season	SC and PIMU	N/A
		All kinds of waste will be stored in covered containers and disposed of safely as soon as possible;	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
		The contractor will ensure that construction debris do not find their way into the drainage or irrigation canals which may get clogged.	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
Air Quality	Air quality will be affected by various construction activities. Emissions may be spread over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. In certain climatic condition such as hot summer, airborne dust can become a	All vehicles, machinery, equipment and generators used during construction activities will be kept in good working condition, properly tuned and maintained in order to minimize the exhaust emissions;	CC, SC, PIMU-PRMSC	Dust emission controlled;	Weekly	SC and PIMU	N/A
		Open burning of solid waste from the contractor's camps will be strictly banned;	CC, SC, PIMU-PRMSC	Monitoring compliance to disposal of waste;	Weekly	SC and PIMU	N/A
		Fuel with substantially lower sulphur content will be preferred;	CC, SC, PIMU-PRMSC	-	-	SC and PIMU	N/A
		Personal Protective Equipment (PPEs) like masks, goggles and gloves etc. will be provided to workers;	CC, SC, PIMU-PRMSC	Implementation of HSE; Visual Inspection	Daily	SC and PIMU	See Table. 7.5. PPE cost is



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	major nuisance if control techniques are not properly employed	• PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works. • Regular water sprinkling on the site and access roads will be carried out to suppress excessive dust emission(s) • Excavated trenches will be restored immediately to original level and paved after laying of sewer pipes; • Vehicle speed in the project area will be prescribed not more than 20 km/hr and controlled accordingly; • Diversion will be provided for local traffic movement; • The vehicles carrying construction materials and the construction material storage areas will be covered with tarpaulin.	CC, SC, PIMU-PRMSC	Monitoring of machinery and equipment;	Daily	SC and PIMU	included in HSE. N/A
			CC, SC, PIMU-PRMSC	Visual Monitoring	Daily	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Use of tarpaulin for protection	Daily	SC and PIMU	N/A
Dust	During construction stage, the dust level may increase considerably. Earthworks, site clearing, stockpiling and hauling of materials will generate dust and affect the local air shed. Local people	• Blowing of dust from potential sources at the worksite will be avoided by shielding them from the exterior, for example using polythene curtains or raising a fence of corrugated sheets around areas of active constructions • All excavation work will be sprinkled with water to control dust; • Tires of all the vehicles leaving the site will be washed. No earth, mud,	CC, SC, PIMU-PRMSC	Visual Inspection Air levels measured.	Daily	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	and the workers may be exposed to high dust levels during landscaping, access road and site preparation. This impact is site-specific, temporary, reversible, likely and medium significant.	dust and the like will be deposited on the public road;					
Noise	Noise level is expected to increase during construction activities. Main sources of noise and vibration will be heavy machinery such as excavators and other equipment. Noise generated by construction machinery is likely to affect sensitive receptors located within Aol. Health risks associated with exposure to continuous noise levels include high blood pressure,	Construction workers will be provided suitable hearing protection like ear cap, or earmuffs and training them in their use;	CC, SC, PIMU-PRMSC	Visual inspections; Noise levels measured.	Daily	SC and PIMU	N/A
		Selection of up-to-date and well-maintained equipment with reduced noise levels will be ensured by suitable in-built damping techniques or appropriate muffling devices	CC, SC, PIMU-PRMSC	Visual inspections; Noise levels measured.	Daily	SC and PIMU	N/A
		Residents will be notified earlier before commencement of excavation operations.	CC, SC, PIMU-PRMSC	Visual inspections;	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	hypertension, annoyance and sleep disturbance, temporary threshold shift etc. The impacts of noise will be temporary and highly adverse in nature.						
Municipal and Construction Waste/ Wastewater	Due to construction activities municipal and construction waste will be generated from construction activities. The construction waste will include wastewater, oil spillage from machinery, domestic waste and construction waste etc.	• Solid waste generated during construction and camp sites will be safely disposed of in demarcated waste disposal sites and the contractor will provide and implement a comprehensive waste management plan;	CC, SC, PIMU-PRMSC	Monitoring compliance;	Weekly	SC and PIMU	N/A
		• Burning of waste will be prohibited;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc;	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
		• Emergency Response plan will be prepared to address the accidental spillage of fuels and hazardous goods;	CC, SC, PIMU-PRMSC	Visual Inspection	Weekly	SC and PIMU	N/A
		• Containers with covers will be provided on site to store waste	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
Resource Conservation	The materials used in construction of proposed project would include coarse aggregates	• Wastage of water will be reduced by training the workers involved in water use;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• Wastage of water will be controlled through providing proper valves and	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	(crush), fine aggregates (sand), brick ballast, water and cement etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use. Excessive water consumption for drinking and washing purposes by the construction staff may undermine water resources in the project area and in certain cases may disturb the existing water supplies in the project area.	through controlling pressure of the water;					
		• Water jets and sprays will be used for watering surfaces rather than using overflow system;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• Source of water will be carefully selected. Water use will not disturb the existing community water supplies	CC, SC, PIMU-PRMSC	Any conflict on the water availability.	Fortnightly	SC and PIMU	N/A
		• Reuse of construction waste materials will be considered;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• Unnecessary equipment washings will be avoided;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• The equipment and machinery will be turned off when not in use;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• Regular maintenance of machinery to avoid fuel leakages;	CC, SC, PIMU-PRMSC	Log of vehicle and equipment repairs;	Daily	SC and PIMU	N/A
Biodiversity Conservation	FLORA On account of construction of the proposed water supply and sewerage system,	• Campsites will be established on vacant land as far as possible, at least 500 m away from the residential areas;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		• Construction vehicles, machinery and equipment will remain confined	CC, SC, PIMU-PRMSC	Log Book of vehicle inventory	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	no trees are envisaged to be cut/disturbed. Hence there will be no direct impact on the flora of project area. However, the dust emissions due to excavation operations will stick on the leaves of existing trees and may close their stomata thus hindering the photosynthesis process.	within their designated areas of movement;					
		The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands;	CC, SC, PIMU-PRMSC	Any conflict with locals.	Daily	SC and PIMU	N/A
		Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/ bushes for fuel will not be allowed.	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
	FAUNA The local animals mostly cats, dogs and jackals and specially the livestock i.e., goats and cows will get disturbed due to construction activities, specially the noisy activities. However, there will be no damage to their health and life. Some reptiles and insects may get killed/ injured	Excavations will be limited to the approved engineering drawings;	CC, SC, PIMU-PRMSC	Visual inspections; Photographic records.	Daily	SC and PIMU	N/A
		Harassing of animals will be prohibited	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	during excavation operations.						
Health and Safety	Health risks and worker's safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment. The health and safety issues are also associated with the operation of construction machinery and equipment, which may cause minor and severe injuries to workers. It will be a long term and severe negative impact.	• Obligatory insurance against accidents for labourers/workers;	CC, SC, PIMU-PRMSC	Accident/ Incident reported.	If happened	SC and PIMU	N/A
		• Providing basic medical training to specified work staff and basic medical service and supplies to workers;	CC, SC, PIMU-PRMSC	Maintained Training Record; Pictorial evidence	Weekly	SC and PIMU	N/A
		• Layout plan for camp site, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Work safety measures and good workmanship practices will be followed by the contractor to ensure no health risks for labourers, including use of Personal Protective Equipment (PPE) i.e., oxygen masks/ kits etc.;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	See Table. 7.5 below. PPE Cost is included in HSE
		• Protection devices (ear muffs) will be provided to the workers doing job in the vicinity of high noise generating machines i.e., excavators;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Use of safety signs at the construction site, as shown below.	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
		COVID-19 SOPs (attached as Annex-XV) will be followed at work site and construction camps;	CC, SC, PIMU-PRMSC			SC and PIMU	N/A
Traffic Management	The traffic influx within the villages is very low. Most of the traffic within the villages include motorbikes and few cars. The project interventions will not create traffic congestion issues in the project area. However, their movement will be disturbed due to the excavation and construction works and people may face accessibility issues. This impact is temporary and major negative in nature.	The construction activities will be carried out in pockets/reaches, once a patch has been completed (i.e., pipes are laid and covered) then excavation on new patch shall be started;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		Local community will be taken on board to plan alternate access routes in connecting streets to ensure mobility of local traffic;	CC, SC, PIMU-PRMSC	Alternate route maps	Daily	SC and PIMU	N/A
		Plan work in a minimum possible time.	CC, SC, PIMU-PRMSC	Check targeted timeline	Daily	SC and PIMU	N/A
Nuisance/ Disturbance to Social Sensitive Areas	Since the proposed interventions will be carried out within the villages boundaries, therefore, the	No work will be conducted near the religious places during religious congregations;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		Material transport to the site will be scheduled considering school timings;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	socially sensitive sites/places including schools, hospitals and religious centers will be temporarily affected due to dust, noise and the community will face accessibility issues due to open trenches. Dust due to earthworks will create health hazard to children and people with ailments. This impact is temporary and major negative in nature.	Notify concerned schools, hospitals/dispensary etc. 2 weeks prior to the work; conduct a 30 minutes awareness program on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
Accessibility	Excavation of trenches and pipe/sewer laying work in the project area will obstruct access to residences, commercial buildings and businesses adjacent to the	Leave space for access between mounds of excavated soil;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		Consult affected business people to inform them in advance about the work schedule;	CC, SC, PIMU-PRMSC	Consultation meeting; Pictorial evidence	Weekly	SC and PIMU	N/A
		If there are any holidays (i.e., Eid or Muharram etc.), the Contractor will	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	proposed project alignment. Disruption of access to commercial establishments may affect livelihood. The potential impacts are negative and moderate but short-term and temporary.	complete the backfilling work of the trenches and will not leave any trench open before holidays; • Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints;		Designated borrow and quarry areas used for access material; Visual inspection			
			CC, SC, PIMU-PRMSC		Weekly	SC and PIMU	N/A
Resilience to Climate Change	There are chances that the open trenches may get flooded during rainy season. Flooding can hamper the construction of overhead storage tanks, pumping station and STP. This impact can be categorized as direct, local, medium term, temporary and reversible.	• Project components have been designed to withstand flooding; • The capacity of the sewerage/ drainage system has been designed and constructed based on extreme weather conditions predicted under international climate change models for Darya Khan region to cater for extreme storm water runoff.	CC, SC, PIMU-PRMSC	Design provisions	Once (after completion of Detailed Design)	SC and PIMU	N/A
			CC, SC, PIMU-PRMSC	Check Meteorological department prediction of rain	Before construction	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Liquid and Solid Waste from Construction Camps	Development of construction camps will generate significant quantities of liquid and solid waste. A total of ten no. s construction camps will be established in all villages accommodating i.e., total 160 workers for all villages.	The waste generated from the camp site will be disposed of at existing dumping site of the Tehsil Darya Khan by the Contractor;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste;	CC, SC, PIMU-PRMSC	Through Trainings Photographic record;	Monthly	SC and PIMU	N/A
		Domestic and chemical effluents from the construction camp will be disposed of by the development of on-site sanitation systems i.e., septic tank prior to discharge to nearby drain. Septic tank will be located adjacent to the construction camp. Proper monitoring to check the compliance of PEQS will be carried out;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper SWM system. Toxic waste will be handled, stored, transported and disposed separately;	CC, SC, PIMU-PRMSC	Monitoring compliance to Regular disposal of waste; Photographic record;	Weekly	SC and PIMU	N/A
		The waste will be properly sealed in containers with proper labels indicating the nature of the waste;	CC, SC, PIMU-PRMSC	Covered disposal containers placed at camp;	Weekly	SC and PIMU	N/A
		Solid waste will be segregated at source so that it can be re-used or recycled	CC, SC, PIMU-PRMSC	Covered disposal	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
				containers placed at camp;			
Flammable and Hazardous Materials	Flammable materials to be used during the construction activities include diesel, furnace oil, petrol, Liquefied Petroleum Gas (LPG), kerosene oil and machinery fuels. These materials present little risk to the environment, if properly transported stored and used; otherwise, they are potentially very dangerous. Improper storage and handling practices for these flammable and explosive materials can pose dangers of fire and blasts in the area.	Safety procedures will be followed by the contractor and labors strictly while using, handling and storage of these materials;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		Trainings will be provided to the contractor's staff for handling and using of flammable materials and explosives;	CC, SC, PIMU-PRMSC	Monitoring compliance to handling of flammable material through inventory register; Photographic record;	Daily	SC and PIMU	N/A
		For safety of construction labors and immediate communities, it is suggested that contractor's staff will be trained about the procedures of safe use, handling and storage of materials;	CC, SC, PIMU-PRMSC	Visual observation	Twice a week	SC and PIMU	N/A
		Emphasis will be to decrease the volume of mucking material by reusing and then the disposal at the marked area in environment friendly way. In order to reduce the volume of disposal material, maximum part of the excavated material can be used in other activities filling of borrow areas and natural depressions in the project area. In order to increase the aesthetics of the area, native grass	CC, SC, PIMU-PRMSC	Visual inspection	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
		can be planted by dumping the surplus material in the proposed area with suitable soil cover.					
Gender Based Violence (GBV)	During construction phase, gender-based violence might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. Sexual harassment against women might occur as a consequence of mixing of men and women at the construction site, and moving on the roads and markets. This impact is negative in nature during construction stage.	Awareness will be created among the females at individual and community levels about the construction sites;	CC, SC, PIMU-PRMSC	Through Consultations	Monthly	SC and PIMU	N/A
		Workers will not be allowed to crowd in the residential communities within the site;	CC, SC, PIMU-PRMSC	Visual observation	Twice a week	SC and PIMU	N/A
		Alternative routes for pedestrian will be provided to avoid mixing of women with workers;	CC, SC, PIMU-PRMSC	Visual Inspection	Daily	SC and PIMU	N/A
		Raise awareness among the communities of the potential risks of GBV, and establish response services in the nearby communities that can respond to instances of GBV (particularly those related to issues of labor influx);	CC, SC, PIMU-PRMSC	Reported issues; Visual inspections	Daily	SC and PIMU	N/A
		The Contractor will make sure that no discrimination is made on the basis of gender while hiring of workers;	CC, SC, PIMU-PRMSC	Hiring Criteria	Before Hiring	SC and PIMU	N/A
		Provisions of gender disaggregate bathing, changing, and sanitation facilities;	CC, SC, PIMU-PRMSC	Design provisions	Once (before construction of construction camps)	SC and PIMU	N/A
		Contractor will take proper measures to address and resolve issues relating to harassment, intimidation, and exploitation, especially in relation to women.	CC, SC, PIMU-PRMSC	Visual inspection; Complaints reported	Daily	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Influx of Labor	Risk of social conflict: Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources; Increased risk of illegitimate behaviour and crime: The influx of workers and service providers into communities may increase the rate of crimes and a perception of insecurity by the local community. Such illegitimate behaviour and crimes can include theft, physical assaults, substance abuse, sexual assault and	• Labour camp(s) will be established away from residential population;	CC, SC, PIMU-PRMSC	As per approved site	Once	SC and PIMU	N/A
		• Preference will be given to the local people to work with contractor, and contractor should hire maximum labour force from the project area because this will reduce the labour influx	CC, SC, PIMU-PRMSC	Hiring Criteria	Once before hiring	SC and PIMU	N/A
		• Awareness will be created among the work force to ensure respect for local customs;	CC, SC, PIMU-PRMSC	Monitor training record	Monthly	SC and PIMU	N/A
		• Construction work will be completed within the stipulated time to move workers to next location;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Labor force will be shuffled with the time;	CC, SC, PIMU-PRMSC	Visual inspection	Weekly	SC and PIMU	N/A
		• Create awareness among workers on proper sanitation and hygiene practices to endorse proper health and maintain good housekeeping practices at all project sites;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Provide adequate personal hygiene facilities in good condition with adequate supply of clean water;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Make arrangements to treat the affected workers on time to control the movement of vectors disease	CC, SC, PIMU-PRMSC	Visual inspection; Complaint reported	Daily	SC and PIMU	N/A
		• Sensitize workers and surrounding communities on awareness and prevention of HIV/AIDS and sexually transmitted infections (STI) through training, awareness campaigns and	CC, SC, PIMU-PRMSC	Complaint reported	Weekly	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	human trafficking;	workshops during community meetings;					
		• Provide proper and free HIV/AIDS and STI health screening and counselling for site workers and community members;	CC, SC, PIMU-PRMSC	Hiring protocols	Before hiring	SC and PIMU	N/A
		• Develop and enforce a strict code of conduct for workers to regulate behaviour in the local communities;	CC, SC, PIMU-PRMSC	Visual inspection; Complaint reported	Weekly	SC and PIMU	N/A
		• Prohibiting drugs, alcohol, weapons, and ammunition on the worksite among personnel;	CC, SC, PIMU-PRMSC	Visual inspection; Complaints reported	Daily	SC and PIMU	N/A
		• The Contractor must guarantee that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft.	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
Social/ Cultural Conflicts	During the construction phase of the project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local	• Public notification through announcements in local mosques during the entire construction phase to avoid any inconvenience in accessibility to the locals;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Establishment of formal links with affected communities;	CC, SC, PIMU-PRMSC	Visual inspection	Weekly	SC and PIMU	N/A
		• Plan for social grievance redress mechanisms including the local leaders and community representatives;	CC, SC, PIMU-PRMSC	During construction of the work	Weekly	SC and PIMU	N/A
		• Local labor will preferably be employed for construction works;	CC, SC, PIMU-PRMSC	Hiring Policies	Once (Before Hiring)	SC and PIMU	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	biophysical resources. Furthermore, difference in cultural values may also cause discomfort to local residents. This impact is temporary and minor negative in nature.	• Careful planning and training of workforce to minimize disturbance to the local people;	CC, SC, PIMU-PRMSC	Visual inspection	Daily	SC and PIMU	N/A
		• Contractor will preferably arrange their own sources of water.	CC, SC, PIMU-PRMSC	Visual observations	Daily	SC and PIMU	



Child Labor	Due to poverty and feeble financial situation of the area, the underaged children might get involved with the contractor various construction works. This will be the violation of the Child Labor Act. Furthermore, SEA/SH issues might arise which will create social conflicts. This impact is adverse and temporary in nature.	Standard clause in the contracts related to child labor explicit prohibitions, etc.) and contractor will ensure compliance to the contractual provisions on bonded and child labor, equal wages for similar work explicit prohibitions, etc.).	CC, SC, PIMU-PRMSC	Visual Observation	Daily	SC and PIMU	N/A
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Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Anticipated Impacts during Operational Phase							
Soil	The soil quality may be affected due to leakage/ infiltration from sewer lines and STP bed. The sludge generated from cleaning/ maintenance of pumping stations, manholes, sewers and STP may contaminate the soil. The liner of the STP, while desludging may get dried and cracks may lead to the seepage of wastewater and thus contaminate the soil. Improper disposal of scum and sludge is another concern. This is a moderate negative impact.	- Sludge shall be treated prior to ultimate use/disposal. Various options for sludge treatment include Digestion, Drying/ Dewatering, Composting, Lime Stabilization, Heat Treatment must be considered etc; - The liner of STP & aseptic tank must be regularly maintained and checked for any cracks and leakages;	PIMU-PRMSC	Visual inspection	Weekly	PIMU-PRMSC	N/A
Air Quality	The operation of sewerage scheme will result in generation of gases including	Provision of exhaust gas vents at appropriate locations in the design	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A
		Sewer-men will cover their faces with gas mask while entering the sewer for cleaning or maintenance	PIMU-PRMSC	Visual inspection; Use of PPEs	Weekly	PIMU-PRMSC	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	H ₂ S and CH ₄ . H ₂ S is a foul-smelling poisonous gas which might be harmful for the sewer-men and could be fatal sometimes. CH ₄ is natural gas also referred to as a greenhouse gas	purposes;					
		• It's better to use sucking machinery for cleaning of sewers;	PIMU-PRMSC	Availability	Once	PIMU-PRMSC	N/A
		• Use gas detector before inspection;	PIMU-PRMSC	Visual inspection	Daily	PIMU-PRMSC	N/A
		• Adequate tree plantation must be done around the STP to control the spread of odour;	PIMU-PRMSC	Visual inspection	Weekly	PIMU-PRMSC	N/A
Odour	STP are designed on adequate waste loading and function well if they are not overloaded. The overloading will result in malfunctioning of STP and it will result in significant odour generation in the vicinity. This impact is temporary and high adverse in nature.	• The STP should not be overloaded and personnel dealing in operation should be trained to avoid operational issues;	PIMU-PRMSC	Visual inspection	Daily	PIMU-PRMSC	N/A
		• Adequate tree plantation must be undertaken to avoid spread of odour in the vicinity.	PIMU-PRMSC	Implementation of tree plantation plan	Once	PIMU-PRMSC	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Solid Waste	Domestic and hazardous wastes would be generated during cleaning and maintenance activities. The solid waste during operational phase will consist of plastics, metal and organic wastes present in sewer lines which can cause blockage in sewerage system. Solid waste will be separated from the wastewater through screens. If these wastes are not properly handled, odour will be generated and efficiency of STP will be reduced over time.	• Waste shall be collected, stored and disposed of according to relevant standards in approved facilities;	PIMU-PRMSC	Visual inspection	Daily	PIMU-PRMSC	N/A
		• An organized collection system and its implementation through a licensed contractor;	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A
		• The containers will be timely removed and the fine will be imposed on contractor in case of violations;	PIMU-PRMSC	Visual inspection	Weekly	PIMU-PRMSC	N/A
		• Closed containers will be used for transportation of waste to the dumping site;	PIMU-PRMSC	Visual inspection	Weekly	PIMU-PRMSC	N/A
		• Schedule inspection of the sewer lines and STP to keep it clean and to identify any hazardous material; and	PIMU-PRMSC	Visual inspection	yearly	PIMU-PRMSC	N/A
		• Solid waste bins shall be placed at appropriate locations to avoid its mixing in wastewater.	PIMU-PRMSC	Visual inspection	Daily	PIMU-PRMSC	N/A
Sludge	Sludge is semi solid material which will be settled at the bottom of the STP due to anaerobic	• Appropriate sludge treatment must be undertaken before disposal of sludge;	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A
		• Sludge must not be disposed outside the demarcated boundaries of the nominated dumping site. The sludge	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	decomposition of biomass. Significant amount of sludge will not be produced in ABR; however, periodic desludging will be done to achieve good removal efficiency. The removed sludge in wet form, if left unattended will create nuisance i.e., odor, soil contamination, groundwater contamination (through percolation/ seepage) and will serve as breeding ground for disease vector.	must never be left unattended and should be transferred to designated dumping site after adequate treatment.					



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
Water Quality	The major portion of treated wastewater from the STP will be discharged in watercourses and will be used for agricultural purposes. However, accidental discharges of untreated wastewater due to the overflow, syphoning or disruption in operation during maintenance of the treatment plant may cause contamination.	Use the suitable lining material to control the seepage and groundwater contamination;	PIMU-PRMSC	Groundwater testing	Biannually	PIMU-PRMSC	N/A
		In case of maintenance/sludge removal, alternative ponds shall remain functional; and	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A
		Inlet and outlet pipework access/maintenance pits should be inspected regularly for blockages. These pits should be covered at other times.	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A
Community Health Hazards	During desludging and cleaning the sludge may get piled up temporarily along the manholes and will be a hazard for	The treated wastewater shall be routed to the agricultural area in a way that there must not be physical contact of the community;	PIMU-PRMSC	Visual inspection	Daily	PIMU-PRMSC	N/A
		The community must be educated on the effects of treated wastewater to avoid health issues;	PIMU-PRMSC	Through Seminars	Yearly	PIMU-PRMSC	N/A
		The sludge must be timely removed from the site and the	PIMU-PRMSC	Visual inspection	yearly	PIMU-PRMSC	N/A



Activity	Impacts	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility	Cost
	passers-by and local community. This impact is temporary and moderate negative in nature. The open manhole covers are a threat to health and increase the vulnerability of the accidents.	area must be barricaded during desludging and cleaning periods.					
Occupational Health and Safety Hazards	Infections resulting from direct contact with treated wastewater, and from infected wounds; and Intestinal infections that are transmitted by flies feeding on the STP.	• The Contractor should prepare OHS and ERPs during operation phase;	PIMU-PRMSC	Implementation of OHS & ERPs	Daily	PIMU-PRMSC	N/A
		• Instructing the workforce on handling of treated wastewater;	PIMU-PRMSC	Visual inspection	Daily	PIMU-PRMSC	N/A
		• Provide basic medical training to the specified work staff and basic medical service and supplies to workers;	PIMU-PRMSC	Visual inspection;	Daily	PIMU-PRMSC	N/A
		• Obligatory insurance of work laborers against accidents;	PIMU-PRMSC	Visual inspection	Fortnightly	PIMU-PRMSC	N/A
		• Provision of safety measures such as emergency sirens, firefighting equipment, first aid, and contingency measures in case of accidents;	PIMU-PRMSC	Visual inspection	Monthly	PIMU-PRMSC	N/A



KEY

CC	Construction Contractor
DC	Design Consultant
SC	Supervision Consultant
PIMU-PRMSC	Project Implementation Unit – Punjab Rural Municipal Services Company



7.9 Gender Action Plan

A Gender Action Plan (GAP) is a systematic framework for ensuring that women participate in and benefit from development programs and projects. The GAP for PRSWSS has been developed in adherence to World Bank Gender and Development Policy Framework, OP/ BP 4.20. The World Bank recognizes that gender issues are important dimensions of its poverty reduction, economic growth, human well-being, and development effectiveness agenda. The objective of a Gender Action Plan (GAP) is to ensure the mainstreaming of gender issues and concerns into all aspects of the project throughout the project lifecycle through detailed planning, implementation, monitoring, and evaluation activities.

The GAP will safeguard the interest of the community women adjacent to the project sites; promote their participation in project planning and activities (if applicable) and ensure safer and healthier living conditions for them. It will also contain actions that will be adhered to by all the agencies (Contractors, Sub-Contractors) involved in the implementation of the project during the project lifecycle along with the project proponent.

7.9.1 Objectives of Gender Action Plan

The GAP illustrates the specific activities to address gender-specific concerns and social impacts associated with the proposed project. The objectives of the GAP are as follows:

- To undertake preparatory work to address gender issues in the project;
- To include special features in the project design to address gender impacts;
- To promote women's participation in the project;
- To maximize women's access to project benefits;
- To ensure tangible benefits to women;
- To minimize the higher vulnerability of women arising due to the project activities like securing land, and security concerns during construction;
- To propose specific measures to enable the affected women-especially those who are poor/vulnerable, to cope with project impacts;
- To ensure implementation of the gender design elements and gender monitoring and evaluation.



Table 7.3: Gender Action Plan

Issues	Measures	Responsible Agency	Monitoring Indicators
Pre-Construction Phase			
Announcement for Employment Opportunities	• Announce employment opportunities and recruitment notices widely, targeted at affected women as well as men. • Encourage women's participation and provide pieces of training regarding employment opportunities	CC and PIMU-PRMSC	• Notice of employment opportunities by the distribution of brochures and pamphlets/leaflets, outside the construction site. • As most of the females are uneducated, announcements should be made in local mosques as well consultative meetings may be convened for the hiring of the female workforce.
Communication/ Consultations and Information Dissemination	• Information dissemination to the community including female members through continuous consultative meetings and distribution of brochures and pamphlets/leaflets. • Involve the females in the regular consultative process of the project.	PIMU-PRMSC	• Lack of awareness among females about the project impacts and its mitigation measures.
Construction Phase			
Women Workforce	• Preference may be given to women from project-affected families to work as unskilled workers/ labor (wherever feasible) during the construction phase and they receive equal wages for the work	CC and PIMU-PRMSC	• Less labor force participation of women than men
Equal Wage	• Ensure equal pay for equal work of women and men for all construction and maintenance work	CC and PIMU-PRMSC	• Women doing the same work as men but receive unequal wages (reflected in payrolls)
Restrictions on Women's Mobility	• Identify barriers to women's mobility and take reforms to fix those barriers.	PIMU-PRMSC	• Unrestricted movement of females. They could not go outside without male or along with another woman



Issues	Measures	Responsible Agency	Monitoring Indicators
An influx of Labor, especially if from outside the project area.	- Awareness training for community and Labor. - Referrals to prevention and treatment services - Strengthen prevention in contractor documents - create or strengthen SEA/SH referral helplines	Contractor	Sexual Harassment (SH) and Sexual Exploitation and Abuse (SEA) issues reported as females do not feel secure going anywhere.
Safety and Security concerns	- Labor camps to be established away from the residential areas - Presence of security personnel on the project site during the execution	Contractor	Safety and security concerns of females during construction time
Gender Sensitive Grievance Redress Mechanism and Complaints Handling	- Develop Gender-sensitive GRM to address all complaints of the local females - Awareness about the Gender-sensitive GRM and complaint-handling process through consultative meetings, distribution of pamphlets, and mobile penetration. - Ensure that the existing GRM is accessible to the local community is gender-sensitive, and has SEA/SH Protocols - Carrying out project implementation activities in consultation with the community/ local women to avoid peak hours working activities of women. - There should be female staff to interact with local females. - Training – capacity development for gender-inclusive project design	PIMU-PRMSC	- Complaints about the disorder of pressing needs of women/ local community relating to the project that may affect women's mobility during the construction activities - Difficulties in having access to social amenities - Disturbance in privacy during construction activities.
Through the Project Lifecycle			
Women in Decision Making	Women should be trained and empowered to be part of decision-making processes – their	PIMU-PRMSC to facilitate training with help of any local NGO/ CBO	No decision-making regarding households and business affairs.



Issues	Measures	Responsible Agency	Monitoring Indicators
	understanding and knowledge about their households and business affairs.		• No freedom to decide on career or marriages • Less participation in decision-making of different matters
Area Safety	• Support the relevant departments in enhancing the safety and security of women in public spaces, focusing on gender-based violence, harassment issues, and female vulnerability and risk.	PIMU-PRMSC	• Reporting of GBV and harassment issues
Lack of Security	• Security arrangements in liaison with line departments	CC and PIMU-PRMSC	Safety and security concerns of females
Need for Skill Training and Capacity Building	• Improve and develop practical skills and opportunities for women population to enhance their participation in earning the livelihoods/businesses	PIMU-PRMSC to facilitate training with help of any local NGO/ CBOs	• Deficiency of knowledge about skill training • Less access to adequate training • Less representation of women in activities requiring different skills
Educational Attainment	• Spread awareness to provide education to young girls • Support reforms aimed at improving the education system and increasing capital accumulation with links to skills acquisition and school to-work transition	PIMU-PRMSC	• The low trend of educational attainment of young girls • Lack of emphasis in the educational system on the skills required for effective and sustainable school-to-work transition
Gender Discrimination in Educational Attainment	• Identify barriers and take reforms for removing gender discrimination in the education system	PIMU-PRMSC	• Young girls are often taken out of school to share the family responsibilities such as caring for younger siblings, etc. • If a family has to choose between educating a son or a daughter because of financial restrictions, typically the son is chosen. Negative parental attitudes towards educating



Issues	Measures	Responsible Agency	Monitoring Indicators
			daughters can also be a barrier to a girl's education. • Many parents view educating sons as an investment because the sons will be responsible for caring for aging parents
Poor Transportation System	• Transport infrastructure should be provided for girls to fulfill certain all social needs • Support reforms aimed to provide better access to all means of transport •	PIMU-PRMSC	• Girls in rural areas do not have adequate public transport to get to secondary school • Access and mobility are one of the key problems faced by the women
Child, Early and Forced Marriages	• Interpretation and enforcement of legislations/laws exist to address child, early and forced marriages • Training to law enforcement on gender discrimination and violence against women, including investigations into child marriages; • Implementing support programs that empower girls at risk or who are currently in child marriages. • Increasing access to education for girls, including by providing incentives for families to keep their daughters in school • Enhance economic opportunities for girls and their families through employment options and supports • Increasing and improving access to reproductive healthcare for all girls and women in rural areas • Providing continuing formal education and vocational training opportunities for married girls and women.	PIMU-PRMSC	• A huge proportion of young girls are forced to marry under the age of 18 due to socioeconomic and cultural reasons.



Issues	Measures	Responsible Agency	Monitoring Indicators
Unavailability of Mother Child Care Centers and other Medical Facilities	Reforms and policies to improve maternal and child undernutrition, increase education quality mother-child care health and nutrition, and other medical facilities. Appointment and availability of doctors in the communities to treat mother-child care and other health-related issues;	PIMU-PRMSC	- Lack of Mother-child care centers and other medical institutions - Not having enough money to afford private doctors and their costly treatments in the big cities
Occurrence of Diseases	Support health institutions to take reforms for improving health quality and provide a safe and healthy environment	PIMU-PRMSC	Reporting of various diseases like hepatitis, diarrhea, skin issues, cough, etc. due to the usage of brackish water, improper sewerage, and sanitation system.
Menstrual Hygiene Awareness	- Built awareness programs and generate data to aware women of menstrual hygiene. - Conduct pieces of training using female trainers - Encourage women's participation in awareness programs - An adequate water supply is necessary to maintain a hygienic environment.	PIMU-PRMSC	- Females were less aware of menstrual hygiene. - The majority of women use pieces of cloth because of less awareness about sanitary materials. - Females have less money to buy the sanitary pads
Customer Service Centers	- Provision of Customer Service Centers for the registration of complaints/grievances regarding water and sanitation-related issues. - Hiring of female staff to interact with local females	PIMU-PRMSC	Inadequate Customer Service Centers in the rural area
Gender based Violence / Domestic Violence	- Provision in GRM for GBV related issues - Agencies can direct resources toward programs best suited to their communities. - Increased awareness can be spread to communities and service providers alike about the diverse ways that GBV may be experienced, particularly at various intersections of social oppression and marginalization	PIMU-PRMSC and local NGOs/ CBOs	Reporting of GBV related issues



Issues	Measures	Responsible Agency	Monitoring Indicators
Reporting of Sexual Harassment (SH) and Sexual Exploitation and Abuse (SEA) issues	• Harassment cases should be properly addressed and reported through GRM • Awareness training for community and Labor. • Referrals to prevention and treatment services • Strengthen Prevention in Contractor Documents • Create or Strengthen SEA/SH Referral Helplines	PIMU-PRMSC and local NGOs/ CBOs	• Sexual Harassment (SH) and Sexual Exploitation • and Abuse (SEA) issues reported as females do not feel secure to go anywhere.



7.10 Grievance Redressal Mechanism (GRM)

The Grievance Redress Mechanism (GRM), outlines the policy and procedure for documenting, addressing, responding, and employing methods to resolve project grievances and complaints that may emerge during and after PRSWSSP sub-projects implementation. It will also cater to managing any disconnects that emerge from the field level and that have significant implications for the effective implementation of the sub-project interventions.

In an effort to deter fraud and corruption, the use of a dedicated mobile application has been proposed for reporting grievances from the field level to district and provincial headquarters. This will not only provide a coherent system of checks and balances but will also enable swift redressal and effective monitoring of complaints.

The PIMU at the LG&CDD level will serve as the Secretariat for the Grievance Redressal Committee (GRC Directorate) that will be responsible for providing oversight on the entire GRM process at a strategic level and monitoring complaints management.

Water supply & sanitation are imperative daily basis facilities. Due to, continuous use and all-time requirement, there is a tendency for routine O&M requirements of the facilities. O&M will be needed as soon as project interventions are completed in the village. Due to the huge number of beneficiaries spread, a comprehensive complaint redressal model is indispensable for Service Delivery Unit (SDU). The Grievance Redress Mechanism (GRM) will be consistent with the Component 4 Project Management and Monitoring sub-component 4.2 Grievance Redressal Model is part of the Project of PRSWSSP. Project activities may cause social friction if Projects do not have an effective GRM.

7.10.1 Objectives

The Grievance Redressal Mechanism (GRM) will be consistent with the requirements of the World Bank safeguard policies to ensure the mitigation of community 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 village level.

The GRM will be accessible to diverse members of the community, including women, senior citizens, 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. This GRM will be integrated with the PRSWSSP overall project GRM hotline

7.10.2 Disclosure of GRM

The final processes and procedures for the GRM will be translated into local languages and disseminated at all sub-project locations. These shall be made available (in both leaflet and poster format) to all subproject locations through the offices of each SDU. Dedicated male and female Grievance Focal Persons for each sub-project location will play an instrumental role in

spreading awareness regarding the GRM, including the use of information technology for reporting and monitoring complaints.

7.10.3 Records and Monitoring

The Project Director's Office will maintain an electronic database at the PIMU that will provide a summary of complaints received and mitigations. The PD office will also provide an analysis of the grievances at each sub-project location using a pre-designed Monitoring and Evaluation (M&E) template that will give insight into the type of complaints received and a qualitative and quantitative review of grievance redressal. The PD's office will also be responsible for uploading the actions and results for each grievance for each sub-project location on a periodic basis to the Project website. The dedicated mobile application that will be used to communicate grievances will provide the basis for recording complaints both at the provincial and district levels.

Apart from the electronic database that will be maintained at the PIMU level, a manual register of all complaints and actions taken will be maintained by the Environmental and Social Focal Persons at the Office of the SDU-TOs and a manual register of all day-to-day complaints and their grievance redressal details will be maintained by VOs their office.

7.10.4 Proposed Institutional Mechanisms

It is proposed to establish the following prior to commencing project implementation activities including pre-construction activities:

Tehsil Level-Public Complaints Center (PCC) in SDU-TO will be responsible to receive, log, and resolve complaints at the site and in Village-level. The complainant would be able to launch a complaint on a toll-free number, mobile application, message, or telephone.



Tier 1: Village level –Panchayat/Village Councils made under Punjab Local Government (Amendment) Ordinance 2021 will act as the 1st tier of GRM at the village/community level.

Tier 2: Grievance Redress Committee (GRC-Tehsil Level) in SDU-TO will be established for each district that will manage GRM aspects for all sub-project locations in each district including decisions to be taken, actions and monitoring of complaints resolution at the sub-project level.

Tier 3: PIMU Level-GRC at PMIU (LG&CDD) will be responsible to oversee the overall functions of the GRM at a strategic level including monthly review.

7.10.5 GRM Process Implementation

The grievance redress process is described hereunder:

Through the envisaged system, the complainant would be able to launch a complaint on a toll-free number, mobile application, message, or telephone (GRM can accept anonymous grievances).

Details of the complaints and the complainants will be entered into the system and a complaint number will be provided to the complainant through SMS.

In SDU a specific person will be designated to monitor the system and issue necessary instruction to relevant quarter for necessary action.

The GRM will provide an interface to complainants to check the status of their complaint and a dashboard for SDU & PIMU to monitor the progress on the complaints.

The system will bridge the gap between the masses and the service provider.

Monitoring officers will precisely know the details of pending complaints in every SDU. The performance of the SDU could also be easily monitored through it.

The GRM will have a built-in escalation system for moving unresolved complaints to higher levels.

7.10.6 Mode of Complaint

The complainant can lodge their complaints by opting the following modes:

Written Application	Telephonically	Verbally	Android Application	Website

7.10.7 GRM Procedures and Timelines

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

- Tracking complainant(s) from subprojects sites (field and community level) to PIMU;
- 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, from Village and Tehsil and document them into the monthly progress reports at PIMU.

GR (Village level) will be responsible to receive, log, and resolve complaints at the village level. The Grievance Redress Committee at the village Panchayats will review and identify



actions to be taken to address the complaints at its weekly meeting. If not resolved timely then complaint would be referred to GRC-Tehsil Level (SDU-TO) within 3 days after receiving.

GRC-SDU-TO will try to resolve the complaints in a satisfactory manner anyhow, if not satisfactorily resolved by the village panchayats/councils and Tehsil level, then the grievance will be referred for consideration by GRC at the PIMU/LG&CDD level within one week.

Every effort will be made to address or resolve grievances within the following fixed timelines, which will be an indicator of the performance of the handling system. Acknowledgment 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.

7.11 Cost for testing of Environmental Monitoring

Testing and analysis for ambient air, noise, and ground and surface water will be undertaken during the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters will be selected and quantitative analysis will be carried out. The results of the analysis will be compared with the guidelines; standards and pre-project conditions to investigate whether the EMMP and its implementation are effective for the mitigation of impacts or not. The cost of environmental monitoring is 3,726,000/- PKR for the parameters to be analyzed during construction and operation phase of the project.

7.12 Institutional Capacity & Strengthening

In order to ensure that the EMMP provisions are implemented efficiently and effectively, training and capacity building/ strengthening of the implementing parties are required. Therefore, based on the assessment of the institutional capacities of the parties involved in the implementation of the EMMP, the following broad areas of capacity building/strengthening have been identified and recommended for effective implementation of the EMMP.

Table 7.4 shows the positions proposed for institutional strengthening for effective implementation of environmental and social mitigation measures along with their responsibilities while the cost of institutional strengthening is 9,000,000/- PKR.

7.13 Training Program

The environmental and social training will help to ensure that the requirements of the EMMP are clearly understood and followed by all project personnel. The primary responsibility of providing this training to all project personnel will be that of the contractor and ESC. The training will be provided to different professional groups separately such as managers, skilled personnel, unskilled labors, and camp staff. Capacity building will be aimed at strengthening the ESC, and operational staff in the field of environmental management and social development. Training cost is 13,350,000/- PKR.



Table 7.4: Institutional Strengthening

Institutional Strengthening	Position	Scheduling (Months)	Responsibility
Contractor	Environmental/ HSE Expert	01 (Intermittent Input)	▪ Responsible for the overall implementation of ESMF processes and procedures in the light of WB policies and Guidelines and local policies and procedures; ▪ Closely follow up the integration of safeguard assessment information and inclusion of safeguards self-screening process at the project development and design stage; ▪ Provide technical support during proposal development, project design, appraisal process, and resource mobilization plan for the sub-projects in all locations; ▪ Undertake follow-up monitoring to ensure that proposed mitigation measures are implemented according to an agreed-upon environmental and social mitigation implementation plan; ▪ Closely provide assistance and design capacity building/training program for the overall implementation of ESMF from PIMU to village level and deliver capacity building training to the field teams to close knowledge/skill gaps and minimize the likelihood of risks happening to sub-projects; ▪ Ensure that appropriate environmental and social mitigation measures are proposed and met; ▪ Undertake to follow-up monitoring to ensure that proposed mitigation measures are implemented according to an agreed-upon environmental and social mitigation and implementation plan; ▪ At the PIMU level, maintain the record of all information, documents evidence, and reports including progress reports, TPV Reports, training reports, EMMP, Screening Checklists, etc.; ▪ Closely work with SSS and Gender Specialists at the PIMU level and provide technical assistance and advice to the Environment/ Water Quality Officers based at SDU-TO



Institutional Strengthening	Position	Scheduling (Months)	Responsibility
	Social / Resettlement Expert	01 (Intermittent Input)	▪ Responsible for the overall implementation of social safeguard of ESMF and RPF and VLD processes and procedures in the light of WB policies and Guidelines and local policies and procedures; ▪ Closely follow up the integration of safeguard assessment information and inclusion of safeguards self-screening process at the project development and design stage; ▪ Provide technical support during proposal development, project design, appraisal process, and resource mobilization plan for the sub-projects in all locations; ▪ Review all the E&S Screening checklists from social safeguards point of view and ensure the correct categorization of each subproject and visit the project sites for Resettlement Checklists (if required); ▪ Overall responsible for the implementation of GRM and Public Disclosure of Information processes and procedures; ▪ Undertake follow-up monitoring to ensure that proposed mitigation measures are implemented according to an agreed-upon mitigation and implementation plan Closely provide assistance and design capacity building/training program for the overall implementation of social safeguards and RPF from PIMU to village level and deliver capacity building training to the field teams to close knowledge/skill gaps and minimize the likelihood of risks to happen to sub-projects; ▪ Ensure that appropriate social mitigation measures are proposed and met prepare SMPs either separately or integrated with EMMP; ▪ Undertake follow-up monitoring to ensure that proposed mitigation measures are implemented according to an agreed-upon social mitigation and implementation plan; ▪ Assist PIMU in hiring consultants (if required for preparation of ARAPs); ▪ At the PIMU level, maintain the record of all information, documents evidence and reports including progress reports, TPV Reports, training reports, SMPs/ ARAPs and Screening Checklists etc. ▪ Closely work with ESS and Gender Specialists at PIMU level and SDU-TO team.



Institutional Strengthening	Position	Scheduling (Months)	Responsibility
	Gender Specialist	01 (Intermittent Input)	▪ Ensure implementation of World Bank Gender guidelines and policy; ▪ Provide direct technical assistance and guidance on women's economic empowerment to the PRSWSSP and its delivery partners; ▪ Support the development of tools, systems, processes and approaches that continuously improve technical excellence and impact in the area of transformative approaches to women's economic empowerment; ▪ Lead, coordinate, support, and/or conduct gender and power analyses, effectiveness and efficacy studies, appraisal, evaluation and needs assessments as required by the PRSWSSP; ▪ Assist with quantitative/qualitative assessments in targeted communities to assess effectiveness of interventions and impact; ▪ Support delivery partners to understand the role of gender equality and women's economic empowerment for the PRSWSSP impact groups; ▪ Ensure gender equality and women's economic empowerment criteria are well integrated into market systems approaches; ▪ Work closely with other technical specialists to integrate gender across all PRSWSSP components; ▪ Facilitate and support a strong learning and knowledge-sharing community around gender-transformative practices amongst delivery partners; ▪ Represent work being done in gender transformation and women's economic empowerment under the PRSWSSP in relevant internal and external forums.



7.14 Cost for Health and Safety

Cost of Health and Safety during construction phase is worked out is to be 11,230,500 PKR. This includes the cost of PPEs and other safety items.

7.15 EMMP Cost

The total cost for implementation of EMMP has been worked out as **PKR 37,306,500/-**. The cost in the construction phase shall be the responsibility of the Contractor while PRMSC shall bear the cost in the operational phase. Breakup given in below **Table 7.5**.

Table 7.5: EMMP Cost for Darya Khan

Sr No.	Description	Amount PKR
1	Environmental Monitoring	3,726,000
2	Training	13,350,000
3	Health & Safety	11,230,500
4	Institutional Strengthening (Intermittent Input)	9,000,000
Grand Total (RS.)		37,306,500
Grand Total in Million (RS.)		37.30