PRMSC
Punjab Rural Municipal Services Company

Model Village (Misaali Gaon) Project

PUNJAB RURAL MUNICIPAL SERVICES COMPANY

LOCAL GOVERNMENT & COMMUNITY DEVELOPMENT DEPARTMENT (LG&CD)
GOVERNMENT OF THE PUNJAB

PRMSC

Punjab Rural Municipal Services Company

"Model Village (Misaali Gaon) Project,
Lahore Division"

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

October-2025

ECSP

Quality Control Sheet

QUALITY CONTROL SHEET	
DOCUMENT	**Environmental Impact Assessment (EIA)**
PROJECT	**"Model Village (Misaali Gaon) Project, Lahore Division"**
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EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) Report has been prepared for Model Village (Misaali Gaon) Project – Lahore Division that aims at the improvement and development of integrated water supply and sanitation / hygiene systems while enhancing the overall aesthetics and liveability of rural communities through the provision of soling, street lighting, and community parks in rural areas / villages of Lahore Division by the Govt. of Punjab through Misaali Gaon (Model Village) initiative under the Annual Development Plan (ADP).

ES-1. Project Background

The Punjab Rural Municipal Services Company (PRMSC) is currently implementing the Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP), a transformative initiative funded by the World Bank aimed at safe drinking water and improved sanitation infrastructure. Following the successful completion of the pilot phase of PRSWSSP, the Government of Punjab has entrusted PRMSC with the execution, implementation, operation, and maintenance of the newly launched "Misaali Gaon" (Model Village) initiative under the Annual Development Plan (ADP).

The Misaali Gaon project aligns with Sustainable Development Goal 6 (Clean Water and Sanitation) and envisions a holistic transformation of village-level infrastructure. It focuses on the development of integrated water and sanitation systems while enhancing the overall aesthetics and liveability of rural communities through the provision of soling, street lighting, and community parks.

The project aims to deliver integrated socio-environmental benefits through the provision of safe drinking water and improved sanitation and hygiene infrastructure. By addressing waterborne health risks and enhancing community-level public health standards, the initiative is expected to contribute significantly to poverty reduction, gender uplift, environmental enhancement, and human capital development within the service areas.

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

ES-2. Overview

The Government of Punjab has launched a project for service improvement

in rural areas of the Punjab through Punjab Rural Municipal Services Company (PRMSC) which has been established under the section 42 of Companies Act 2017. This has been established through various studies that poor condition of WASH not only affects the health of population, but it also adversely affects the economic growth of that area. The WASH program works on long-term prevention and control measures for improving health, reducing poverty, and improving socio-economic development as well as responding to global emergencies and outbreaks of life-threatening illnesses. A number of mega initiatives have been taken 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 is almost 73% the provinces population living in 23,000 revenue villages, requires investments for improvement of WASH on urgent basis.

Pre-Feasibility Studies (PFS) and sectoral assessments have identified the urgent need for improvement in WASH facilities across Punjab's villages. Recognizing this, the Government of Punjab has endorsed the selection of Misaali Gaon villages for interventions in water supply, sanitation, and infrastructure. The project is being implemented through the Punjab Rural Municipal Services Company (PRMSC).

In Pakistan, water resources, specifically ground water, are under severe threat both in terms of quantity and quality. The ground water is stored in the pores of the soil through the infiltration of surface water. In cases where there is excessive use of groundwater for agricultural and all other purposes, sweet water zones are depleted causing the intrusion of saline / brackish water from saline zones.

In addition, when there is an excessive ground water extraction and decline of aquifer recharge, the quality of water is affected. Increase in the concentrations of arsenic and other potentially harmful contaminants are major threats to the health of the users.

In view of this situation, the Government of the Punjab through PRMSC, intends to develop projects for safe drinking water supply to the under-served rural population using localized and customized solutions with regard to sources, treatment technologies and supply options. The projects are also intended to promote sustainable O&M models with community engagement and participation. The target area is rural areas / villages of Punjab in 10 divisions including: Bahawalpur, Dera Ghazi Khan, Faisalabad, Gujranwala, Gujrat, Lahore, Multan, Rawalpindi, Sahiwal, and Sargodha. For this purpose, PRMSC has engaged ECSP Private Limited as the Engineering, Design & Supervision Consultant (EDCS). In the Lahore Division, the Misaali Gaon initiative will be implemented across 42 rural settlements, distributed within 3 districts: Kasur, Nankana and Sheikhupura. These villages have been

prioritized based on accessibility constraints, service delivery gaps, and community need, as identified through field surveys and consultations with local representatives. As given below in Table 0-1;

Table 0-1, Summary of Villages under the Project

Sr. No.	Division	Districts	No. of Villages
1.	Lahore	Kasur	22
2.		Nankana	10
3.		Sheikhupura	10
4.		Lahore	00

If any additional village or settlement is included in the project at a later stage by the Government of Punjab, it will be accommodated within the scope of this same EIA. This Environmental Impact Assessment (EIA) Report is prepared according to the Environmental and Social laws of Government of Punjab (GoP) – EPA Punjab, for Lahore division. It will be used to identify and mitigate the environmental and social impacts that may emerge during implementation of proposed project "Moden Village (Misaali Gaon) Project" in Lahore Division which will be executed by PRMSC from the financial grant under ADP by the Govt. of Punjab.

ES-3. Project Location

The project is located in Lahore division, Punjab. Lahore Division, located in the central part of Punjab, comprises four districts: Lahore, Kasur, Nankana and Sheikhupura. Covering an area of approximately 11,727 km², the division has a population exceeding 22.77 million (PBS 2023 projections), with about 6.42 million residing in rural areas. The rural populations are distributed approximately as follows: Kasur with 2.8 million, Nankana with 1.28 million, and Sheikhupura with about 2.53 million rural inhabitants. Three project location maps illustrating the proposed 42 target villages within the Lahore Division — including 22 villages in district Kasur as Figure 0-1, 10 villages in district Nankana as Figure 0-2, 10 villages in district Sheikhupura as Figure 0-3 — are provided below;

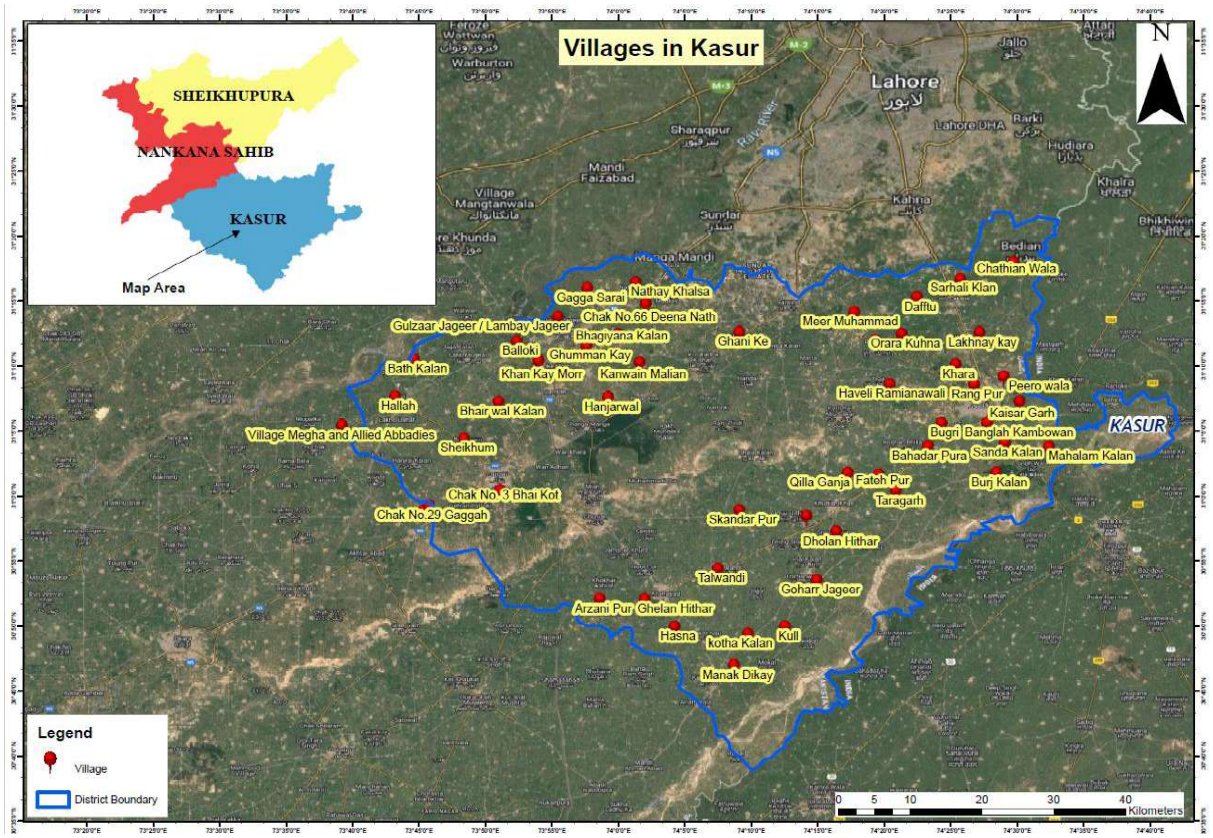

Figure 0-1, Project Location Map – Kasur District

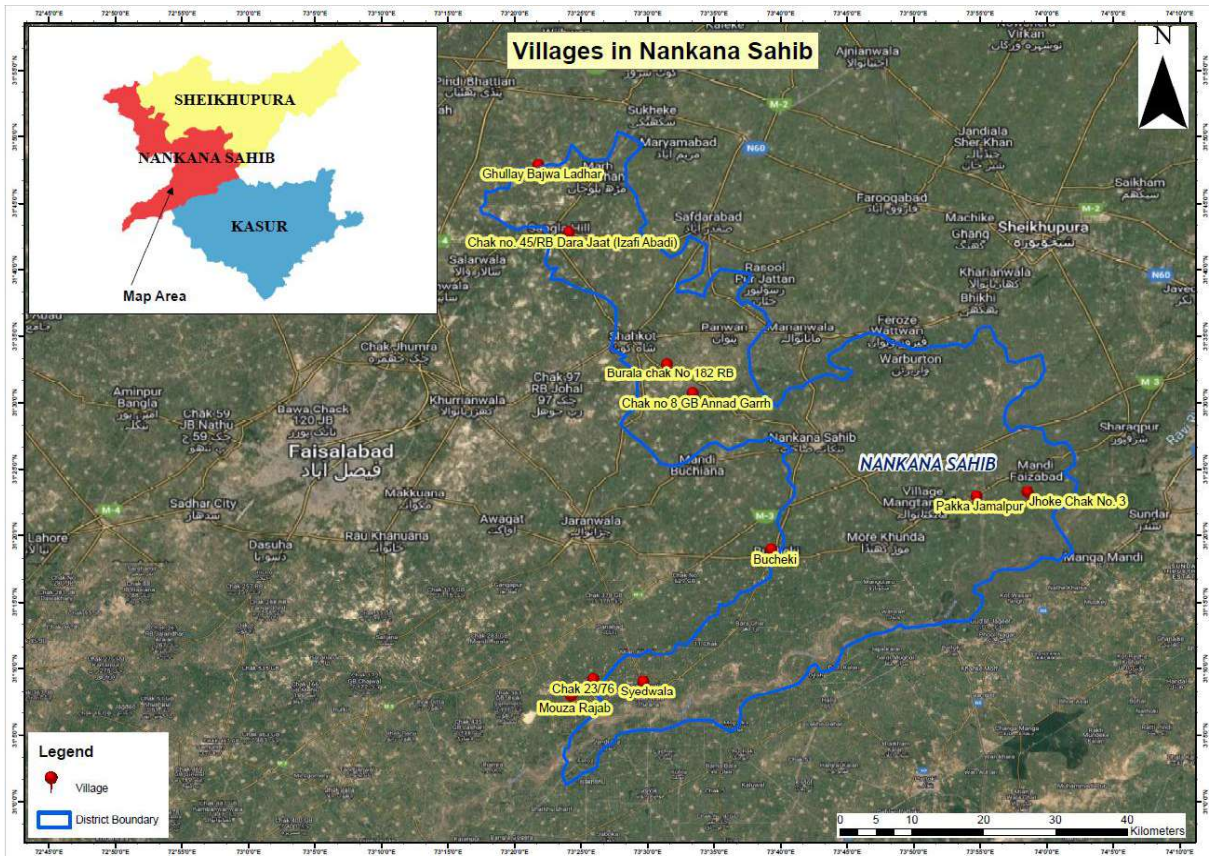

Figure 0-2, Project Location Map – Nankana District

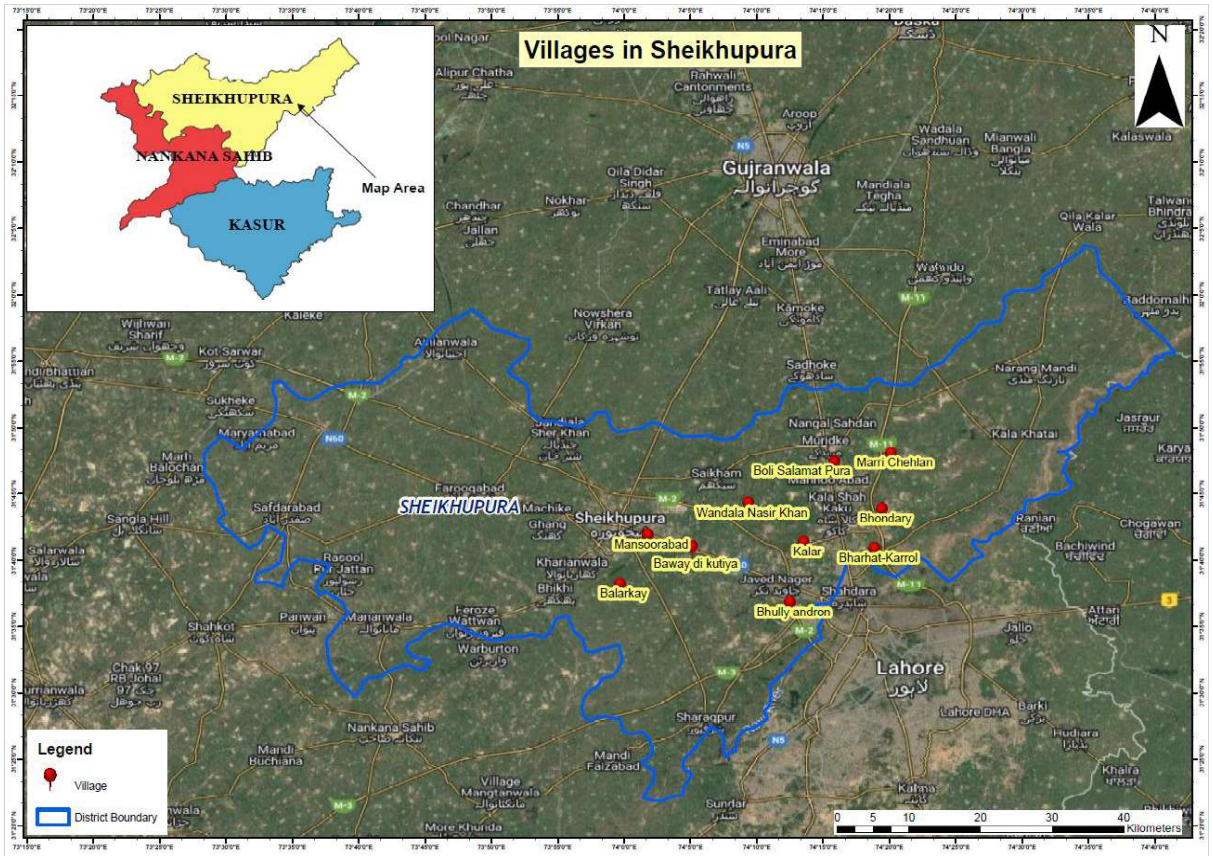

Figure 0-3, Project Location Map – Sheikhupura District

ES-4. Project Proponent

Chief Executive Officer of Punjab Rural Municipal Services Company (PRMSC) is the proponent of project and intends to get Environmental approval for the said project as the proponent by submitting the Environmental Impact Assessment (EIA) Report for the compliance of section 12, PEPA, 1997 (Amended 2012).

ES-5. Brief Description of Project

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

- **Provision of Household Water Supply Systems:** A core component of the project is the provision of safe and sustainable water supply systems, as per criteria given in Table 0-2;

Table 0-2, Criteria for Water Supply Systems

No. of Households in Village	Intervention for Water Supply System
HH<500	Direct pumping system from tubewell with motorized pump and distribution network.
HH>500	Tube well with OHR (minimum 10,000-gallon capacity) and full distribution pipeline.

- **Rehabilitation of the Drainage System:** The existing drainage network will be upgraded to ensure the efficient disposal of both greywater and stormwater. This will prevent localized flooding and the accumulation of stagnant water, which are breeding grounds for mosquitoes and other disease vectors. The project will introduce climate-adaptive drainage solutions that can withstand seasonal flooding and extreme weather events.
- **Provision of Sewerage Treatment Plants:** In villages where piped sewerage network is proposed, wastewater treatment plant will be constructed to treat the collected sewage. The treated effluent will be reused for irrigation purposes, subject to compliance with applicable effluent standards.
- **Paving of Internal Streets:** The internal streets of the village will be paved with locally appropriate materials to improve accessibility, especially during the rainy season. This will significantly reduce mud and dust, making it easier for residents to move around, and ensure that children can safely access schools and the elderly can access healthcare services.
- **Revitalization of the Sewage Pond:** The existing sewage pond will be revitalized through bioremediation techniques. This sustainable method will naturally treat wastewater, reduce pathogens, eliminate foul odors, and restore ecological balance in the area. The revitalization will improve environmental conditions, making the pond safer and more hygienic for nearby residents.

ES-6. Need of EIA

This project involves construction / installation piped network along with tube wells, OHRs, Standposts, WWTPs and Septic tanks with soakage pits.

The project will be executed in the rural areas / villages that may have minor mitigatable environmental impacts during construction works like dust generation and noise etc. There is no resettlement required in the project as the project will be established on government owned land.

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

After the review of the legal framework and the scope of project, it has been decided to conduct EIA of the said project.

ES-7. Major Impacts & their Mitigation Measures

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

Table 0-3, Summary of Major Impacts during Construction & Operation Phase

Pollutant	Constructional Phase	Operational phase
Ambient Air Quality	• The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. Smoke from vehicles, Generator and other fuel consuming machinery and Construction material.	• Resources utilization i.e., fuel and energy for the operation of pumps and tube wells.
Noise and vibration	• During the implementation of the project, a large amount of equipment and construction machinery will be utilized for construction. • The equipment would include excavators, concrete mixer, trucks, generator and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the	• Noise and vibration emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.

Pollutant	Constructional Phase	Operational phase
	project area and neighborhood residential may be disturbed by the noisy activities.	• Resources utilization i.e utilization of pumps and machinery also cause noise and vibration.
Odor	• Nil	• Nil
Flora and fauna	**Impact on Flora:** • A few trees and vegetation (like small grass) are present near the sites for proposed project activities. However, it will be made sure that no tree is cut during the construction. **Disturbance to Fauna:** • No impacts.	• No significant impact on flora and fauna during operation phase.
Solid Waste	• Solid waste will be generated due to construction activities and domestic sources. Also, due to sludge from septic tank.	Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others: • Excavated soil. • Cement storage bags and other packets from materials used during repair and maintenance.
Soil Contamination	• Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project site and in its nearby surroundings. • Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites.	• Soil can be contaminated due to leaching of oil, fuel, from vehicles or machinery any stored oil. Storage & handling of hazardous chemicals.
Surface and Ground water contamination.	• Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. • Construction / installation of	• Nill.

Pollutant	Constructional Phase	Operational phase
	tube-wells (project components) on the embankment of canals, if any, may have the proximity to pollute surface water bodies during construction activities.	
Health and safety issues	• Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer injury or death. • Accidents may also occur.	• Health and safety issues will be arising if flue gases or noise exceed the permissible limits of PEQS, and improper practice of work during storage, handling and transportation of fuel.
Socioeconomic	• Disturbance to neighbors by constructional activities • People's earning routes associated with the sites will be temporarily disturbed. • Employment opportunities will be enhanced	• Employment opportunities will be enhanced as staff will be hired for the operational purposes.
Gender & privacy issues	• Project activities may cause hindrance to mobility especially for women in terms of privacy or harassment, during construction stage. • Privacy of the community may be disturbed. • Harassment issues.	• Privacy of the community may be disturbed during repair and maintenance works.
Land acquisition	• Project will be executed on the lands owned by PRMSC / government owned land.	• Nil
Mobility issues & Traffic management	• The roads maybe temporarily blocked at the active construction zone that may create problems of traffic for nearby community. • Blockage due to construction waste.	• The roads maybe temporarily blocked at the active construction zone during repair / maintenance in operation phase that may create problems of

Pollutant	Constructional Phase	Operational phase
	• Blockage due to machinery and vehicles.	traffic for nearby community.
Loss of livelihood	• The project is of short duration and will not have significant impact on the livelihood of the community.	• Nil
Community health and safety	• The community health and safety must be ensured during construction phase especially the hazard of falls during excavation of trenches. • Accidents & disputes can also arise	• The community health and safety must be ensured during repair / maintenance in operation phase especially the hazard of falls during excavation of trenches.
Resettlement issues	• There are no resettlement issues during this project	• Nil
Child protection	• Child labor might get involved in the construction activity.	• Child labor might get involved in the construction activity during repair and maintenance.

Table 0-4, Summary of Recommendations during Construction & Operation Phase

Pollutants	Recommendations during Construction phase	Recommendations during maintenance / Operation phase
Ambient Air Quality	• Tuning off vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM_{10} when they are not in use. • Equipment and vehicles powered with diesel should be well maintained and tuned to minimize particulate emissions. • Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. • To mitigate fugitive dust, sprinkling of water will be done. • As well as the temporary boundary wall made of wood can be constructed that will act as barrier for air emissions going towards residential area.	• It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance and monitoring of vehicles, use of high-quality fuel, etc.
Noise and vibration	• During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary. Contractor will ensure the use of well-tuned vehicles. • Contractor will ensure the use of well-tuned machinery and skilled labor. • Attenuation boxes can be installed. • Silencer can be fitted to reduce and suppress the noise. • Constructional activities should be planned or scheduled. • Restricting access to noisy area	• The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.

Pollutants	Recommendations during Construction phase	Recommendations during maintenance / Operation phase
	• Shutting down the noisy equipment when not needed. • Providing personal protective measures to labors working. • Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.	
Odor	• Nil	• Nil
Impacts on flora and fauna	• In this project, low impact is expected on vegetation (like small grass or shrubs but not trees) since the pipeline routes are devoid of significant unique floral and faunal life, as per design. No tree will be cut. • The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna and all the minor impacts caused by construction work on flora (like small grass / shrubs) are of temporary and reversible in nature and can be mitigated by appropriate good working practices that will be prescribed in EIA.	• Maintenance and monitoring of plantation around the project corridor.
Solid Waste	• A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. • The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. • Arrangements should be made for regular garbage collection	• The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. • The soil excavated during maintenance will be used as backfill and thereby reducing the generation of waste material and related waste pollution concern.

Pollutants	Recommendations during Construction phase	Recommendations during maintenance / Operation phase
	and removal of sewage from the construction site. • A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals. • All wastes will be disposed in an approved waste disposal site. The contractor will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project.	• There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. Site for hazardous waste should we constructed using concrete so infiltration of material in soil cannot take place.
Soil erosion / Soil Contamination	• Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. • The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. • Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.	• Soil contamination can be curtailed by reducing the oil spill at project areas by well maintaining and use of well-tuned vehicles as well as machinery & generators. • Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed and implemented to avoid the litter and any other waste problems.
Surface and ground water	• Sewage from construction camp will be disposed of using septic tank. • Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency	• The water supply will be closed down during construction phase ensure that no polluted water gets into water supply.

Pollutants	Recommendations during Construction phase	Recommendations during maintenance / Operation phase
	Response Procedures in case of any spill hazard. • Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. • Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.	
Health and safety issues	• Occupational health and safety impacts during construction phase is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained and skilled labor or personnel will be engaged in operating equipment. • Heath safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage. • First aid box should be present on sites. • Construction safety SOPs should be followed. • Road lights should be maintained on construction sites at night. • Labors should be trained for healthy team work.	• Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. • Experienced and trained personnel will be engaged in operating equipment. • First aid box should be present on sites. • Construction safety SOPs should be followed. • Road lights should be maintained on construction sites at night. • Labors should be provided with PPEs to avoid accidents. • Labors should be trained for healthy team work

Pollutants	Recommendations during Construction phase	Recommendations during maintenance / Operation phase
	• Labors should be provided with PPEs to avoid accidents. • Conflicts should be settled according with law. • Labors should be trained for healthy team work. • Sign boards should be displayed at sites.	• Conflicts should be settled according with law. • Labors should be trained for healthy team work. • Sign boards should be displayed at sites.
Socioeconomic	• People will be informed in advance when work is about to start at the site. • Community wellbeing should be considered and neighbor's privacy should not be disturbed. • Job opportunities will be provided to local people of the area.	• Community wellbeing should be considered and neighbor's privacy should not be disturbed. • Local people should be preferred for the employment. • Working should be scheduled and informed to the concerned public.
Gender issue	• Workers would be trained to address privacy issues and ethically behaved. • Laborers would be strictly asked to cater the privacy issues. • staff capacity-building.	• Workers would be trained to address privacy issues and ethically behaved. • Laborers would be strictly asked to cater the privacy issues. • Staff capacity-building
Land acquisition	• Project will be executed on govt. owned lands, so there will be no land acquisition.	• Nil
Traffic management	• Provision of alternative routes. • Water sprinkling at project site at consecutive intervals. • Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents. • Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience • Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and	• Provision of alternative routes • Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents • Vehicles should be parked at designated points • Machinery after use should be allocated to designated places • Storage of construction material should store at

Pollutants	Recommendations during Construction phase	Recommendations during maintenance / Operation phase
	inconvenience to the local residents; • In case of any complaint, focal person of GRC may contact (details will be highlighted at project site).	proper places that should not affect mobility • Inform and coordinate the local residents regarding construction time schedule and also to display the details at sub-project site for their convenience
Loss of livelihood	• As there will be no significant impact hence no mitigation measure is required	• Nil
Community health and safety	• Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labor Organization (ILO) Convention No. 62 and local laws will be ensured by the Contractor. • The active construction zone must be cordoned off to avoid injuries due to accidents.	• The active construction zone must be cordoned off to avoid injuries due to accidents.
Resettlement issues	• As no resettlement is required hence there will be no need for mitigation measures	• Nil
Child protection	• Child labor must be prohibited on project site.	• Child labor must be prohibited on project site.

ES-8. Proposed Environmental Monitoring

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

Ambient Air

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

Punjab.

Noise

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

Water Quality

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

Table 0-5, Proposed Monitoring Schedule

Sr. No.	Parameters	Monitoring Schedules
1	Ambient Air Monitoring (NO_x, CO_x, SO_x, VOCs, PM_{10})	Quarterly
2	Noise Level	Quarterly
3	Water quality	Quarterly

Note: *Environmental Monitoring data log book should be maintained by project proponent.*

ES-9. EIA Implementation and Monitoring Arrangements of EIA

LG&CDD / PRMSC-HO

Local Government and Community Development Department (LG&CDD) and / or Punjab Rural Municipal Services Company (PRMSC), Government of Punjab is the Implementing Agency for the Model Village (Misaali Gaon) Project. The implementation of the project will be done through Project Implementation & Management Unit (PIMU) at LG&CDD / PRMSC. The Project Director (PD) based at PIMU will be assisted with team of experts, officers and supporting staff to ensure execution of the project as per action plan.

Service Delivery Units (SDU) at Divisional Level (SDU-DO)

In the next step, there will be Service Delivery Units (SDU) at divisional levels. They will support and coordinate with ESS and SSS throughout implementation of EIA at field level developed by the consultant.

Consultants

The safeguard team of the consultants will be responsible for the on-field supervision and monitoring of the implementation of EIA being done by the contractor. The contractor will report the progress of EIA to the safeguard team of the consultants. And the safeguard team of the consultants will report the progress to SDU-DO. SDU-DO will then report to PIMU / PRMSC-HO.

The Contractor

The Contractor will be responsible for on-field implementation of the EIA and environmental protection liabilities under the Punjab Environmental Protection Act (Amendment 2012) and other relevant Environmental and Social Safeguard policies. He will also be responsible for compliance of ESMP provisions keeping in view his contract with PRMSC. The Contractor will train his crews in all aspects for implementation of the EIA.

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

ES-10. EIA Implementation and Monitoring Budget

The costs for the implementation of construction stage activities given in this EIA will be included within the civil works contract for this project with total cost of project is PKR 4832.37million. The total cost of EIA implementation is PKR 63 million. Detail is given in Figure 8-2, ESMMP Implementation Budget for Each Village.

ES-11. Grievance Redress Mechanism

Grievance Redress Mechanism will be applicable throughout the project. It will deal all the public issues regarding Environment and social. GRM will hold the diversity of community and will interact to all the community members. GRM will go in stages in accordance with Punjab Local Government Ordinance 2021 and relevant policies.

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

Tehsil Level-Public Complaints Center (PCC) will be responsible to receive, log, and resolve complaints at site and in village level. Complainant would be able to launch complaint on a toll-free number, app, message or call.

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

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

Teir 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.

SECTION - 1: INTRODUCTION

This Environmental Impact Assessment (EIA) Report has been prepared for Model Village (Misaali Gaon) Project – Lahore Division that aims at the improvement and development of integrated water supply and sanitation / hygiene systems while enhancing the overall aesthetics and liveability of rural communities through the provision of soling, street lighting, and community parks in rural areas / villages of Lahore Division by the Govt. of Punjab through Misaali Gaon (Model Village) initiative under the Annual Development Plan (ADP). This report has been prepared to meet compliance with environmental regulations and requirements under Punjab Environmental Protection Act (PEPA) (Amended 2012) and other safeguard policies applicable to the project.

1.1 Purpose of the Report

Environmental Impact Assessment (EIA) Report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore for the compliance of Section 12 of Punjab Environment Protection Act-1997 (Amended 2012) for obtaining No Objection Certificate (NOC) before starting the construction activity at the project site. The other relevant regulations and guidelines considered while preparing this EIA report include:

- Policy and procedures for filing, review and approval of environmental assessments
- Guidelines for the preparation and review of environmental reports
- Guidelines for public participation writer
- Guidelines for sensitive and critical areas
- Detailed sectorial guidelines

Various aspects like environmental, social, physical and other aspects of the project at both during construction and its regular occupancy are highlighted in this EIA report. Measures necessary to be adopted to mitigate any environmental impacts on any part of the environment around, are also described. All the important information is also provided as described under the format used to help decision makers (EPA Punjab), before issuing the desired Environmental Approval.

1.2 Project Background

The Punjab Rural Municipal Services Company (PRMSC) is currently implementing the Punjab Rural Sustainable Water Supply and Sanitation Project (PRSWSSP), a transformative initiative funded by the World Bank aimed at safe drinking water and improved sanitation infrastructure. Following the successful completion of the pilot phase of PRSWSSP, the Government of Punjab has entrusted PRMSC with the execution,

implementation, operation, and maintenance of the newly launched "Misaali Gaon" (Model Village) initiative under the Annual Development Plan (ADP).

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

The project is located in Lahore division, Punjab. Lahore Division, located in the central part of Punjab, comprises four districts: Lahore, Kasur, Nankana and Sheikhupura. Covering an area of approximately 11,727 km², the division has a population exceeding 22.77 million (PBS 2023 projections), with about 6.42 million residing in rural areas. The rural populations are distributed approximately as follows: Kasur with 2.8 million, Nankana with 1.28 million, and Sheikhupura with about 2.53 million rural inhabitants.

Lahore, Kasur, Nankana and Sheikhupura districts are located in the central region of Punjab under the administrative control of Lahore Division. The project is going only in three district Kasur, Nankana and Sheikhupura districts. The district Kasur comprises of four tehsils; Kasur, Chunian, Kot Radha Kishan and Pattoki. District Nankana comprises of four tehsils; Nankana Sahib, Sangla Hill, Shah Kot. The district Sheikhupura comprises of five tehsils; Ferozwala, Muridke, Safdarabad, Sharak pur, Sheikhupura with a predominantly rural population primarily dependent on agriculture and small industry.

Despite being a key industrial and agricultural region with extensive canal irrigation networks, the rural communities across Kasur, Nankana and Sheikhupura districts face significant challenges related to Water, Sanitation, and Hygiene (WASH). While water resources are abundantly used for agriculture, access to safe, reliable drinking water remains limited. Many rural households depend on untreated groundwater, canal water, or hand pumps, which are often contaminated with microbial pathogens.

Open defecation, unmanaged wastewater disposal, clogged or open drains, and unpaved village streets intensify problems during monsoon seasons, causing flooding, water stagnation, and outbreaks of waterborne diseases. Limited solid waste management and inadequate sanitation infrastructure further aggravate these issues.

Recent WASH assessments and community diagnostics reveal critical service gaps across the division's rural areas:

- Only 44–48% of rural households have access to safely managed drinking water, defined as water that is on premises, uncontaminated, and available when needed.

- Up to 67% of tested water samples contain E. Coli, indicating widespread fecal contamination.
- Approximately 20% of rural households lack basic sanitation facilities and rely on open defecation or unimproved latrines.
- Most rural streets remain unpaved, contributing to water pooling, vector breeding, and reduced accessibility during rains, impacting school attendance and healthcare access.
- Wastewater treatment facilities are largely absent, with greywater and sewage discharged untreated into fields, canals, or natural depressions.

The peri-urban fringes of Kasur, Nankana and Sheikhupura districts are experiencing unregulated growth fueled by migration from smaller villages due to inadequate services. These informal settlements typically lack structured WASH infrastructure, worsening groundwater contamination, environmental degradation, and health risks, especially among vulnerable groups such as women, children, and the elderly.

These pressing issues necessitate an integrated, climate-resilient, and community-led WASH intervention across rural and peri-urban areas of the division. The proposed project aims to:

- Provide household-level water supply systems, using direct pumping for villages with fewer than 500 households, and Overhead Reservoirs (OHRs) with piped distribution in larger communities.
- Rehabilitate and extend closed drainage networks to manage stormwater and greywater, preventing flooding and environmental contamination.
- Revitalize existing sewage ponds using bioremediation techniques for decentralized and natural wastewater treatment.
- Pave internal village streets with durable, locally available materials to ensure all-season access.
- Mobilize communities through awareness campaigns and train local groups for the operation and maintenance of infrastructure, promoting ownership and sustainability.

By targeting historically underserved rural and peri-urban populations, this project aims to reduce health risks, enhance climate adaptation, and contribute to the socio-economic upliftment of vulnerable communities. It aligns with the Government of Punjab's commitment to inclusive, equitable, and sustainable rural development, and supports SDG-6 (Clean Water and Sanitation) and SDG-11 (Sustainable Cities and Communities).

1.3 Overview of the Project

The Government of Punjab has launched a project for service improvement

in rural areas of the Punjab through Punjab Rural Municipal Services Company (PRMSC) which has been established under the section 42 of Companies Act 2017. This has been established through various studies that poor condition of WASH not only affects the health of population, but it also adversely affects the economic growth of that area. The WASH program works on long-term prevention and control measures for improving health, reducing poverty, and improving socio-economic development as well as responding to global emergencies and outbreaks of life-threatening illnesses. A number of mega initiatives have been taken 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 is almost 73% the provinces population living in 23,000 revenue villages, requires investments for improvement of WASH on urgent basis.

Pre-Feasibility Studies (PFS) and sectoral assessments have identified the urgent need for improvement in WASH facilities across Punjab's villages. Recognizing this, the Government of Punjab has endorsed the selection of Misaali Gaon villages for interventions in water supply, sanitation, and infrastructure. The project is being implemented through the Punjab Rural Municipal Services Company (PRMSC).

In Pakistan, water resources, specifically ground water, are under severe threat both in terms of quantity and quality. The ground water is stored in the pores of the soil through the infiltration of surface water. In cases where there is excessive use of groundwater for agricultural and all other purposes, sweet water zones are depleted causing the intrusion of saline / brackish water from saline zones.

In addition, when there is an excessive ground water extraction and decline of aquifer recharge, the quality of water is affected. Increase in the concentrations of arsenic and other potentially harmful contaminants are major threats to the health of the users.

In view of this situation, the Government of the Punjab through PRMSC, intends to develop projects for safe drinking water supply to the under-served rural population using localized and customized solutions with regard to sources, treatment technologies and supply options. The projects are also intended to promote sustainable O&M models with community engagement and participation. The target area is rural areas / villages of Punjab in 10 divisions including: Bahawalpur, Dera Ghazi Khan, Faisalabad, Gujranwala, Gujrat, Lahore, Multan, Rawalpindi, Sahiwal, and Sargodha. For this purpose, PRMSC has engaged ECSP Private Limited as the Engineering, Design & Supervision Consultant (EDCS). In the Lahore Division, the Misaali Gaon initiative will be implemented across 42 rural settlements, distributed within 3 districts: Kasur, Nankana and Sheikhupura. These villages have been

prioritized based on accessibility constraints, service delivery gaps, and community need, as identified through field surveys and consultations with local representatives. As given below in Table 1-1;

Table 1-1, Summary of Villages under the Project

Sr. No.	Division	Districts	No. of Villages
1.	Lahore	Kasur	22
2.		Nankana	10
3.		Sheikhupura	10
4.		Lahore	00

If any additional village or settlement is included in the project at a later stage by the Government of Punjab, it will be accommodated within the scope of this same EIA. This Environmental Impact Assessment (EIA) Report is prepared according to the Environmental and Social laws of Government of Punjab (GoP) – EPA Punjab, for Lahore division. It will be used to identify and mitigate the environmental and social impacts that may emerge during implementation of proposed project "Moden Village (Misaali Gaon) Project" in Lahore Division which will be executed by PRMSC from the financial grant under ADP by the Govt. of Punjab.

The proposed project aims to:

- Provide household-level water supply systems, using direct pumping for villages with fewer than 500 households, and Overhead Reservoirs (OHRs) with piped distribution in larger communities.
- Rehabilitate and extend closed drainage networks to manage stormwater and greywater, preventing flooding and environmental contamination.
- Revitalize existing sewage ponds using bioremediation techniques for decentralized and natural wastewater treatment.
- Pave internal village streets with durable, locally available materials to ensure all-season access.
- Mobilize communities through awareness campaigns and train local groups for the operation and maintenance of infrastructure, promoting ownership and sustainability.

1.4 Project Objectives

- Rehabilitate and upgrade the existing village drainage system to ensure efficient disposal of greywater and stormwater, preventing localized flooding and stagnant water accumulation.
- Construct and pave internal streets using locally appropriate materials to improve mobility, especially during rainy seasons, and to reduce dust, mud, and physical hazards.

- Revitalize the existing sewage pond using bioremediation techniques to treat wastewater naturally, improve environmental conditions, and eliminate foul odors.
- Ensure that women, children, and elderly residents benefit from infrastructure that is accessible, safe, and responsive to their specific needs.
- Encourage better hygiene practices and community participation in maintenance by conducting awareness activities alongside infrastructure development.
- Reduce maintenance costs for individual households by implementing durable and low-maintenance solutions for streets, drainage system and treatment technology.
- Create short-term job opportunities for local residents during construction activities, thereby supporting economic development and local skills building.
- Prevent groundwater and soil contamination by replacing open drains and unmanaged wastewater disposal with a controlled, closed-system solution.
- Eliminate breeding grounds for mosquitoes and disease vectors through proper stormwater drainage and wastewater management.
- Support future data-driven planning and service expansion through systematic house numbering and visual mapping using signboards and markings.
- Establish a local operations and maintenance framework by training selected community members to oversee the upkeep of installed infrastructure, ensuring sustainability.

1.5 Project Area

As mentioned above, the project covers 42 Villages of Lahore Division.

1.5.1 Priority Villages

Amongst above mentioned 42 villages, 22 villages of district Kasur, 10 villages of district Nankana, 10 villages of district Sheikhupura will be developed under this project. Details of the villages is given below in Table 1-2;

Table 1-2, Details / Names of the Villages

Sr. No.	Division	District	Tehsil	Village / Darkha
1.	Lahore	Kasur	Kasur	Rao Khan wala
2.	Lahore	Kasur	Kasur	Orara
3.	Lahore	Kasur	Kasur	Rangpur

Sr. No.	Division	District	Tehsil	Village / Darkha
4.	Lahore	Kasur	Kasur	Peru Wala
5.	Lahore	Kasur	Kasur	Ramiyana
6.	Lahore	Kasur	Kasur	Bugri
7.	Lahore	Kasur	Kasur	Kacha pakka
8.	Lahore	Kasur	Kasur	Qilla ganja
9.	Lahore	Kasur	Chunian	Kotha
10.	Lahore	Kasur	Chunian	Nirmalki
11.	Lahore	Kasur	Pattoki	Shaikham kalan
12.	Lahore	Kasur	Pattoki	Balloki chak no 30
13.	Lahore	Kasur	Pattoki	Bath Kalan and allied abadies, UC Bath Kalan
14.	Lahore	Kasur	Pattoki	Village Megha and Allied Abbadies
15.	Lahore	Kasur	Pattoki	Kanwain Malian
16.	Lahore	Kasur	Pattoki	Hanjarwal
17.	Lahore	Kasur	Kasur	Mahalam, Tehsil Kasur
18.	Lahore	Kasur	Kasur	Sandah, Tehsil Kasur
19.	Lahore	Kasur	Kasur	Village Ghaniye Key, UC Handal, Tehsil Kot Radha Kishan
20.	Lahore	Kasur	Kasur	Village Meer Muhammad, UC Sattoki
21.	Lahore	Kasur	Kasur	Nathey khalisa
22.	Lahore	Kasur	Kasur	Hanjarwal 31 Chak
23.	Lahore	Nankana	Nankana	Syedwala, Tehsil Nankana
24.	Lahore	Nankana	Nankana	Bucheki, Tehsil Nankana
25.	Lahore	Nankana Sahib	Sangla Hill	Chak #116 ghullay bajwa Ladhar
26.	Lahore	Nankana Sahib	Sangla Hill	Chak no. 45/RB Dara Jaat (Izafi Abadi)
27.	Lahore	Nankana Sahib	Shahkot	Burala chak NO 182 RB
28.	Lahore	Nankana Sahib	Nankana Sahib	Check NO 8 GB Annad garrh
29.	Lahore	Nankana Sahib	Nankana Sahib	Murtaza Salimpur Pakka Jamalpur, Tehsil Nankana Sahib
30.	Lahore	Nankana Sahib	Nankana Sahib	Jhok Chak 03 Bhucckoki Khayi, Tehsil Nankana Sahib
31.	Lahore	Nankana Sahib	Nankana Sahib	Chak 23/76
32.	Lahore	Nankana Sahib	Nankana Sahib	Mouza Rajab

Sr. No.	Division	District	Tehsil	Village / Darkha
33.	Lahore	Sheikhupura	Ferozewala	Bhondary
34.	Lahore	Sheikhupura	Muridke	Marri Chehlan
35.	Lahore	Sheikhupura	Ferozewala	Kalar
36.	Lahore	Sheikhupura	Ferozewala	Wandala Nasir Khan
37.	Lahore	Sheikhupura	Ferozewala	Baway di Kutiya
38.	Lahore	Sheikhupura	Ferozewala	Bhully andron
39.	Lahore	Sheikhupura	Muridke	Village Bharhat-Karrol District Sheikhupura
40.	Lahore	Sheikhupura	Muridke	Village Boli Salamat Pura
41.	Lahore	Sheikhupura	Ferozewala	Village Mansoorabad
42.	Lahore	Sheikhupura	Ferozewala	Village Balarkay

If any additional village or settlement is included in the project at a later stage by the Government of Punjab, it will be accommodated within the scope of this same EIA. Project location map of Kasur district showing 22 villages is given below in Figure 1-1;

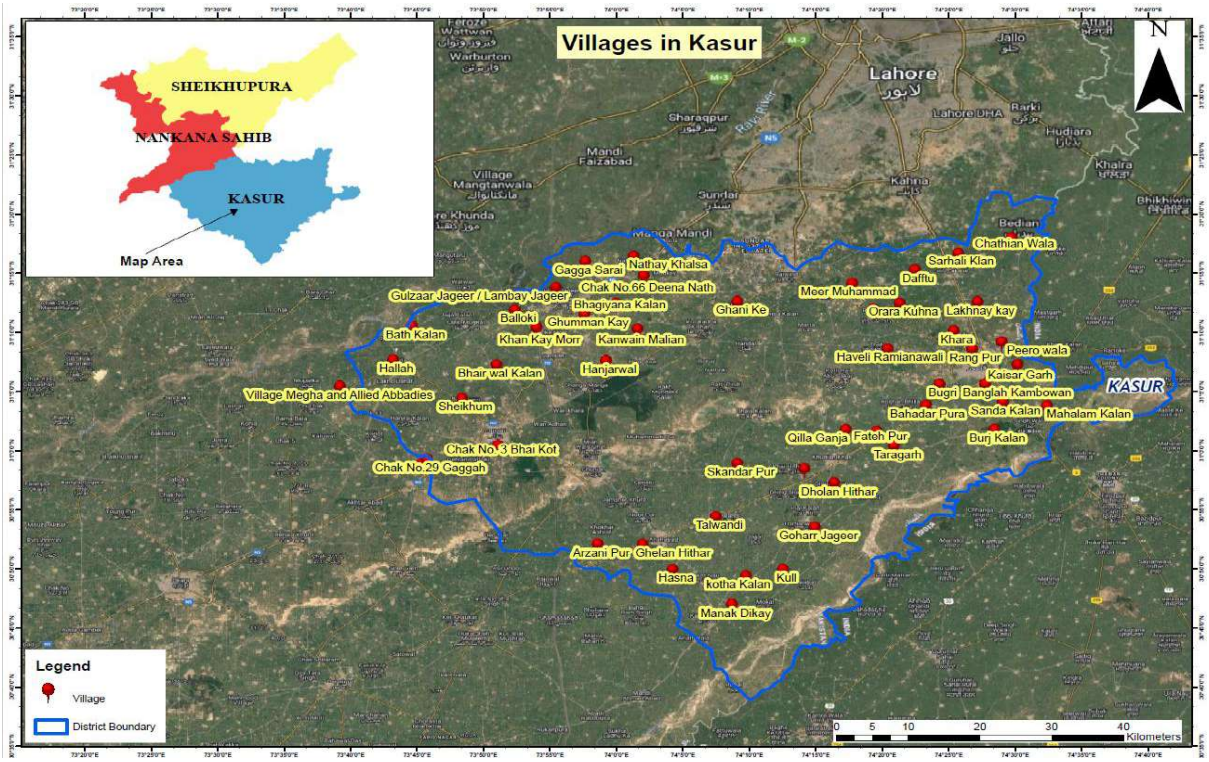

Figure 1-1, Project Location Map – Kasur District

Project location map of Nankana Sahib district showing 10 villages is given below in Figure 1-2;

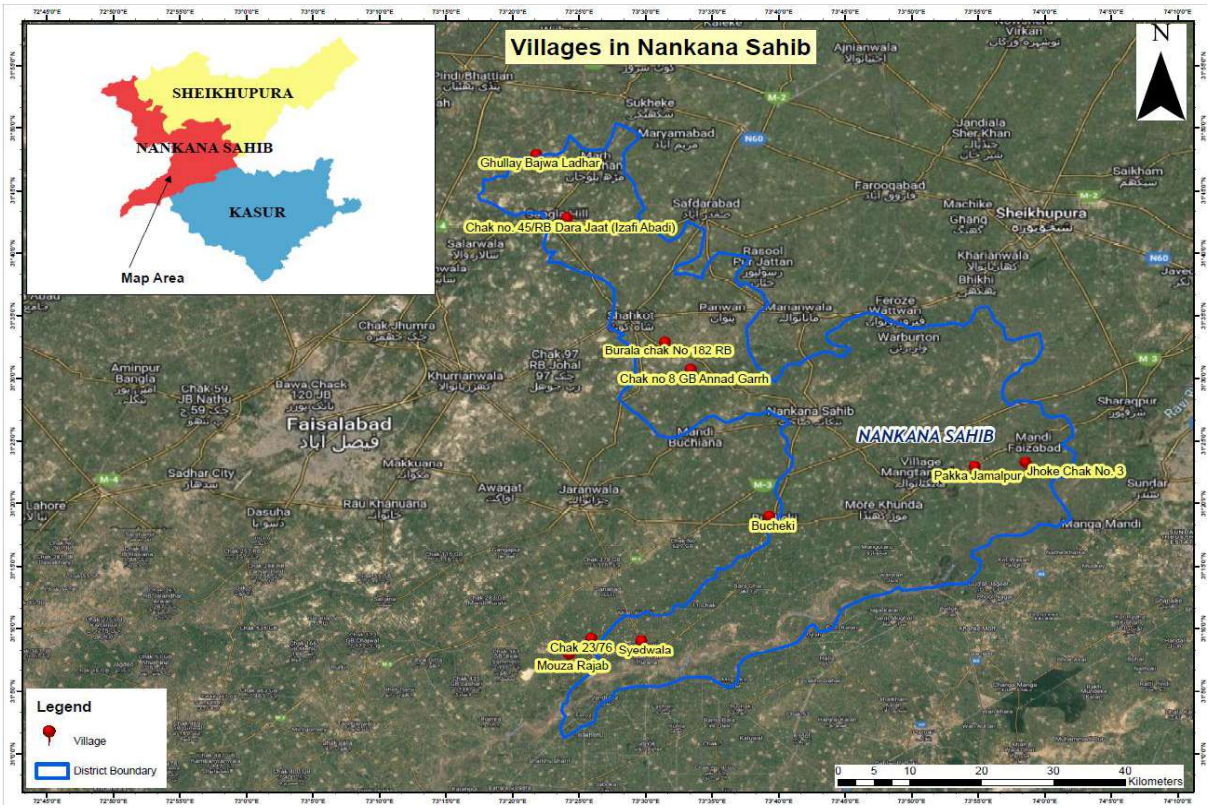

Figure 1-2, Project Location Map – Nankana Sahib District

Project location map of Sheikhupra district showing 10 villages is given below in Figure 1-3;

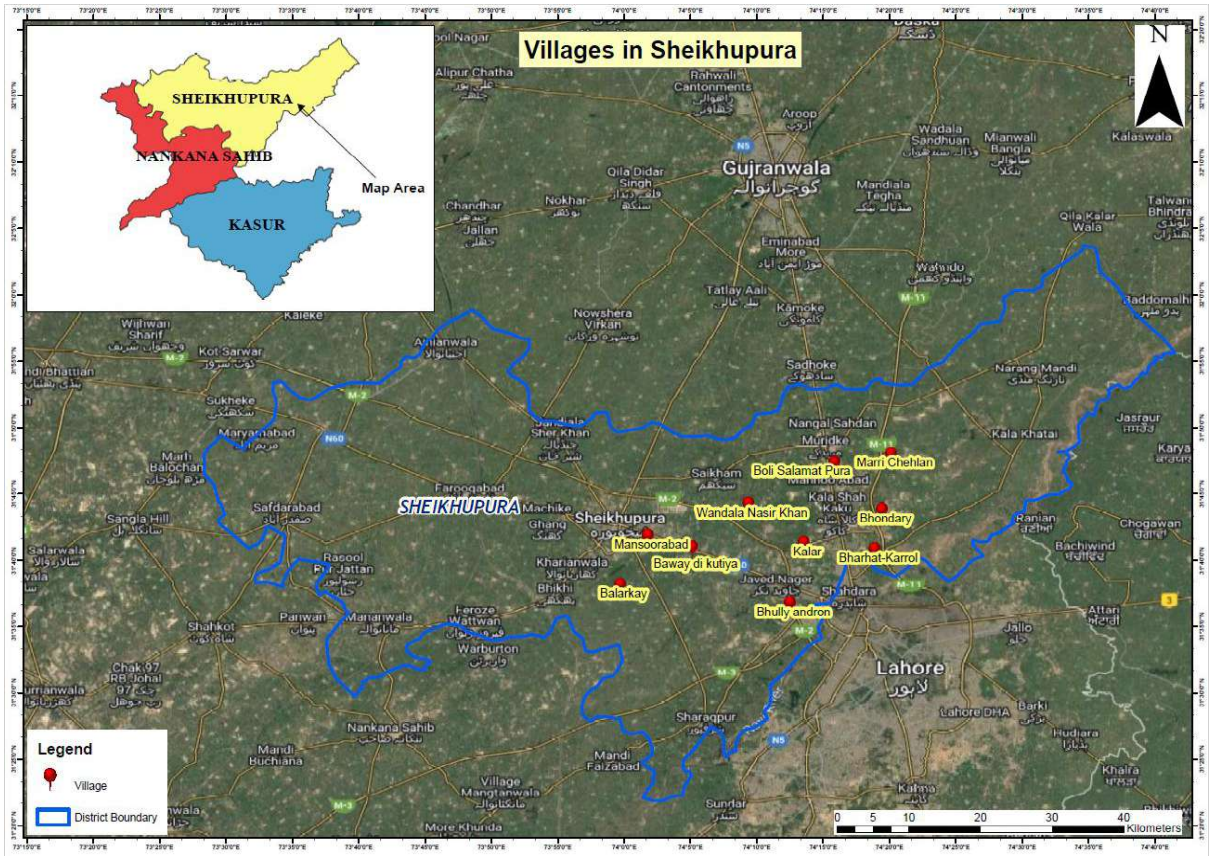

Figure 1-3, Project Location Map – Sheikhupura District

1.6 Objectives of EIA

The major objective of this EIA study is the identification of the possible and induced impacts of the proposed project on both short and long-term basis. The impact identification process focuses particularly on biophysical, socio-economic and cultural aspects of the environment. Based on the level and nature of these observations, the EIA then 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 project on the physical, ecological and social aspects of the project area, to predict and evaluate these impacts and determine their significance;

- To propose appropriate generic mitigation measures that should be incorporated in the design of the project to avoid or minimize if not eliminate the potentially adverse impacts;
- To assess the compliance status of the proposed activities with respect to the national and provincial environmental legislation and WB's OPs,
- To provide institutional, monitoring, reporting and documentation measures for environmental safeguards compliance;
- To aid decision makers to take informed decisions.

1.7 Identification of the Project

In Pakistan, water resources, specifically ground water, are under severe threat both in terms of quantity and quality. The ground water is stored in the pores of the soil through the infiltration of surface water. In cases where there is excessive use of groundwater for agricultural and all other purposes, sweet water zones are depleted causing the intrusion of saline / brackish water from saline zones.

In addition, when there is an excessive ground water extraction and decline of aquifer recharge, the quality of water is affected. Increase in the concentrations of arsenic and other potentially harmful contaminants are major threats to the health of the users.

In view of this situation, the Government of the Punjab through PRMSC, intends to develop projects for safe drinking water supply to the under-served rural population using localized and customized solutions with regard to sources, treatment technologies and supply options. The projects are also intended to promote sustainable O&M models with community engagement and participation. The target area is rural areas / villages of Punjab in 10 divisions including: Bahawalpur, Dera Ghazi Khan, Faisalabad, Gujranwala, Gujrat, Lahore, Multan, Rawalpindi, Sahiwal, and Sargodha. For this purpose, PRMSC has engaged ECSP Private Limited as the Engineering, Design & Supervision Consultant (EDCS). In the Lahore Division, the Misaali Gaon initiative will be implemented across 42 rural settlements, distributed within 3 districts: Kasur, Nankana and Sheikhupura. These villages have been prioritized based on accessibility constraints, service delivery gaps, and community need, as identified through field surveys and consultations with local representatives

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

- **Provision of Household Water Supply Systems:** A core component of the project is the provision of safe and sustainable water supply systems, as per criteria given in Table 1-3;

Table 1-3, Criteria for Water Supply Systems

No. of Households in Village	Intervention for Water Supply System
HH<500	Direct pumping system from tubewell with motorized pump and distribution network.
HH>500	Tube well with OHR (minimum 10,000-gallon capacity) and full distribution pipeline.

- **Rehabilitation of the Drainage System:** The existing drainage network will be upgraded to ensure the efficient disposal of both greywater and stormwater. This will prevent localized flooding and the accumulation of stagnant water, which are breeding grounds for mosquitoes and other disease vectors. The project will introduce climate-adaptive drainage solutions that can withstand seasonal flooding and extreme weather events.
- **Provision of Sewerage Treatment Plants:** In villages where piped sewerage network is proposed, wastewater treatment plant will be constructed to treat the collected sewage. The treated effluent will be reused for irrigation purposes, subject to compliance with applicable effluent standards.
- **Paving of Internal Streets:** The internal streets of the village will be paved with locally appropriate materials to improve accessibility, especially during the rainy season. This will significantly reduce mud and dust, making it easier for residents to move around, and ensure that children can safely access schools and the elderly can access healthcare services.
- **Revitalization of the Sewage Pond:** The existing sewage pond will be revitalized through bioremediation techniques. This sustainable method will naturally treat wastewater, reduce pathogens, eliminate foul odors, and restore ecological balance in the area. The revitalization will improve environmental conditions, making the pond safer and more hygienic for nearby residents.

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

System Schemes].

1.8 The Proponent

Chief Executive Officer of PRMSC, is responsible to get Environmental approval for the said project as the proponent by submitting the Environmental Impact Assessment Report for the compliance of section 12, PEPA, 1997 (Amended 2012).

1.9 The Consultant

Engineering Consultancy Services Punjab (ECSP) Pvt. Ltd. is providing the services to conduct environmental assessment for the project. Engineering Consultancy Services Punjab (Pvt.) Ltd. is an independent consulting company working in the field of environment. ECSP provides consulting services and sustainable solutions for infrastructure projects, industrial projects and social development projects.

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

Engineering Consultancy Services Punjab (Pvt.) Ltd.
Tel: | **Fax:** | **Mobile:** 042-35717681
E-mail: info@ecsp.com.pk
Address: 83 A/E-I, Main Boulevard Gulberg, Block E-1 Gulberg III, Lahore.

1.10 Brief Description of Project

1.10.1 Nature & Size of Project

This project has been formulated on the basis of demand from public residing in the project area. Project is based on dire need basis because of existing water supply and sanitation system unable to serve ever increasing load and to meet the needs of water supply and sanitation needs of the community. The people are mainly relying upon ground water to meet their domestic demands including drinking water requirements. The residents have installed in-house handpumps / motor pumps to meet their demands including that of drinking water. Multiple water borne and sewerage related diseases been observed in project area / villages. Some of the common diseases are typhoid, cholera hepatitis, diarrhea, intestinal worms and malaria etc. in sub-project area / villages.

If water supply system & sanitations services system is not improved / developed at this stage, then people residing there will be adversely affected.

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community

engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

- **Provision of Household Water Supply Systems:** A core component of the project is the provision of safe and sustainable water supply systems at the household level: For villages with less than 500 households, a direct pumping system will be installed, providing water directly to individual household from a tube well or submersible pump, supported by a distribution network. And, for villages with more than 500 households, the system will include an Overhead Reservoir (OHR) to ensure adequate pressure, storage, and equitable water distribution across all homes. This setup will consist of a tube well, OHR, distribution pipeline.
- **Rehabilitation of the Drainage System:** The existing drainage network will be upgraded to ensure the efficient disposal of both greywater and stormwater. This will prevent localized flooding and the accumulation of stagnant water, which are breeding grounds for mosquitoes and other disease vectors. The project will introduce climate-adaptive drainage solutions that can withstand seasonal flooding and extreme weather events.
- **Provision of Sewerage Treatment Plants:** In villages where piped sewerage network is proposed, wastewater treatment plant will be constructed to treat the collected sewage. The treated effluent will be reused for irrigation purposes, subject to compliance with applicable effluent standards.
- **Paving of Internal Streets:** The internal streets of the village will be paved with locally appropriate materials to improve accessibility, especially during the rainy season. This will significantly reduce mud and dust, making it easier for residents to move around, and ensure that children can safely access schools and the elderly can access healthcare services.
- **Revitalization of the Sewage Pond:** The existing sewage pond will be revitalized through bioremediation techniques. This sustainable method will naturally treat wastewater, reduce pathogens, eliminate foul odors, and restore ecological balance in the area. The revitalization will improve environmental conditions, making the pond safer and more hygienic for nearby residents.
- **Community Engagement and Awareness:** The project will involve local residents through awareness campaigns and community participation, fostering a sense of ownership and encouraging better hygiene practices. The community will also be trained to participate in the long-term maintenance and upkeep of the infrastructure, ensuring sustainability.

- **Job Creation and Economic Development:** The construction phase will create short-term job opportunities for local residents, contributing to the local economy and building the skill set of the workforce. Local labor will be employed for tasks such as street paving, drainage system installation, and general infrastructure work.

1.11 Project Location

The project is located in Lahore division, Punjab. Lahore Division, located in the central part of Punjab, comprises four districts: Lahore, Kasur, Nankana and Sheikhupura. Covering an area of approximately 11,727 km², the division has a population exceeding 22.77 million (PBS 2023 projections), with about 6.42 million residing in rural areas. The rural populations are distributed approximately as follows: Kasur with 2.8 million, Nankana with 1.28 million, and Sheikhupura with about 2.53 million rural inhabitants. Details of the villages is given below in Table 1-4;

Table 1-4, Details / Names of the Villages

Sr. No.	Division	District	Tehsil	Village / Darkha
1.	Lahore	Kasur	Kasur	Rao Khan wala
2.	Lahore	Kasur	Kasur	Orara
3.	Lahore	Kasur	Kasur	Rangpur
4.	Lahore	Kasur	Kasur	Peru Wala
5.	Lahore	Kasur	Kasur	Ramiyana
6.	Lahore	Kasur	Kasur	Bugri
7.	Lahore	Kasur	Kasur	Kacha pakka
8.	Lahore	Kasur	Kasur	Qilla ganja
9.	Lahore	Kasur	Chunian	Kotha
10.	Lahore	Kasur	Chunian	Nirmalki
11.	Lahore	Kasur	Pattoki	Shaikham kalan
12.	Lahore	Kasur	Pattoki	Balloki chak no 30
13.	Lahore	Kasur	Pattoki	Bath Kalan and allied abadies, UC Bath Kalan
14.	Lahore	Kasur	Pattoki	Village Megha and Allied Abbadies
15.	Lahore	Kasur	Pattoki	Kanwain Malian
16.	Lahore	Kasur	Pattoki	Hanjarwal
17.	Lahore	Kasur	Kasur	Mahalam, Tehsil Kasur
18.	Lahore	Kasur	Kasur	Sandah, Tehsil Kasur
19.	Lahore	Kasur	Kasur	Village Ghaniye Key, UC Handal, Tehsil Kot Radha Kishan
20.	Lahore	Kasur	Kasur	Village Meer Muhammad, UC Sattoki

Sr. No.	Division	District	Tehsil	Village / Darkha
21.	Lahore	Kasur	Kasur	Nathey khalisa
22.	Lahore	Kasur	Kasur	Hanjarwal 31 Chak
23.	Lahore	Nankana	Nankana	Syedwala, Tehsil Nankana
24.	Lahore	Nankana	Nankana	Bucheki, Tehsil Nankana
25.	Lahore	Nankana Sahib	Sangla Hill	Chak #116 ghullay bajwa Ladhar
26.	Lahore	Nankana Sahib	Sangla Hill	Chak no. 45/RB Dara Jaat (Izafi Abadi)
27.	Lahore	Nankana Sahib	Shahkot	Burala chak NO 182 RB
28.	Lahore	Nankana Sahib	Nankana Sahib	Check NO 8 GB Annad garrh
29.	Lahore	Nankana Sahib	Nankana Sahib	Murtaza Salimpur Pakka Jamalpur, Tehsil Nankana Sahib
30.	Lahore	Nankana Sahib	Nankana Sahib	Jhok Chak 03 Bhucckoki Khayi, Tehsil Nankana Sahib
31.	Lahore	Nankana Sahib	Nankana Sahib	Chak 23/76
32.	Lahore	Nankana Sahib	Nankana Sahib	Mouza Rajab
33.	Lahore	Sheikhupura	Ferozewala	Bhondary
34.	Lahore	Sheikhupura	Muridke	Marri Chehlan
35.	Lahore	Sheikhupura	Ferozewala	Kalar
36.	Lahore	Sheikhupura	Ferozewala	Wandala Nasir Khan
37.	Lahore	Sheikhupura	Ferozewala	Baway di Kutiya
38.	Lahore	Sheikhupura	Ferozewala	Bhully andron
39.	Lahore	Sheikhupura	Muridke	Village Bharhat-Karrol District Sheikhupura
40.	Lahore	Sheikhupura	Muridke	Village Boli Salamat Pura
41.	Lahore	Sheikhupura	Ferozewala	Village Mansoorabad
42.	Lahore	Sheikhupura	Ferozewala	Village Balarkay

Three project location maps illustrating the proposed 42 target villages within the Lahore Division — including 22 villages in district Kasur, 10 villages in district Nankana and 10 villages in district Sheikhupura, are given below as Figure 1-4, Figure 1-5 and Figure 1-6, respectively;

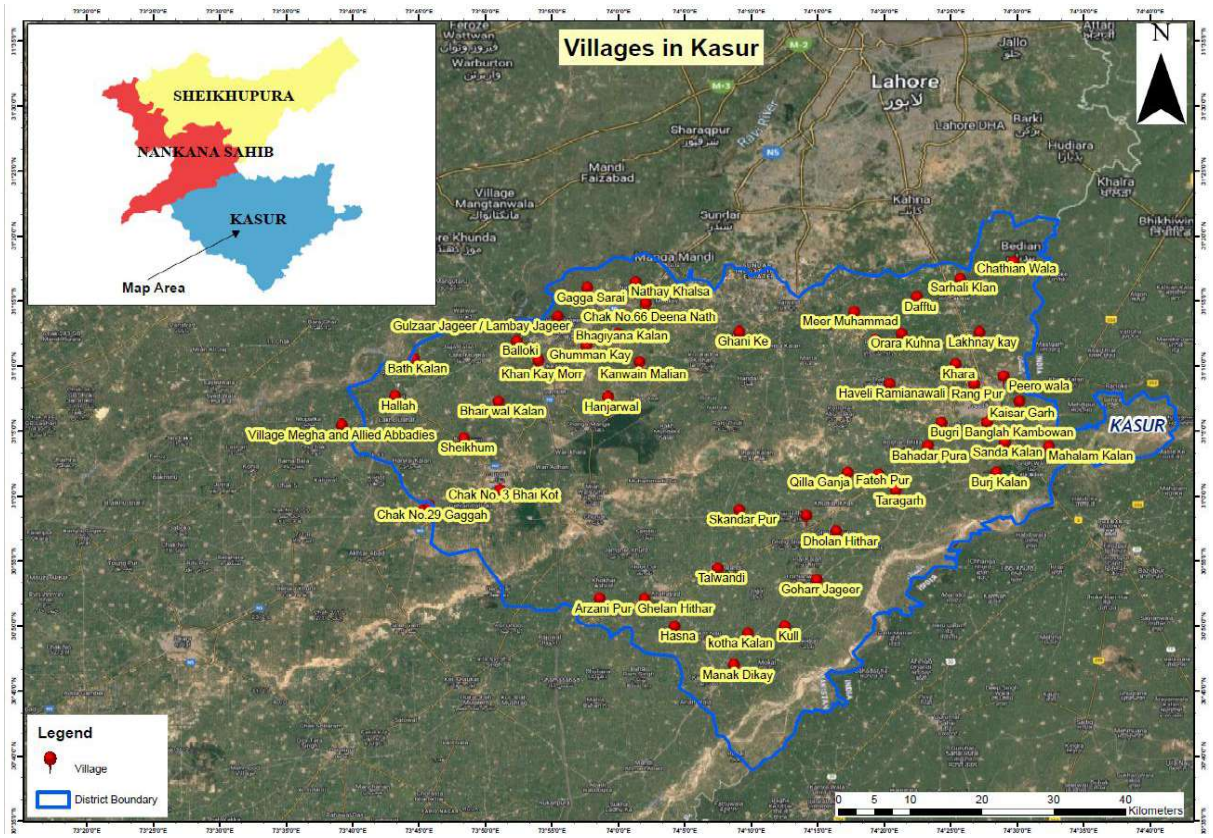

Figure 1-4, Project Location Map – Kasur District

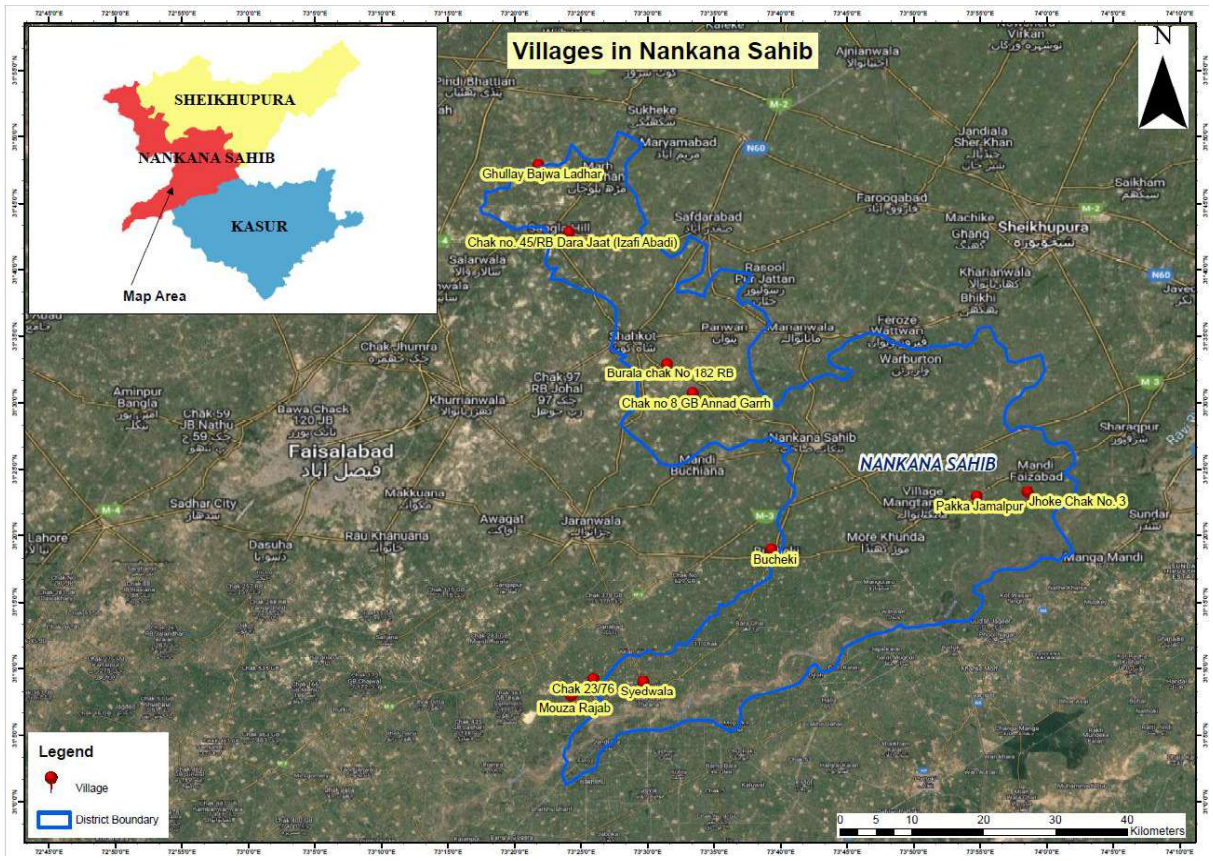

Figure 1-5, Project Location Map – Nankana District

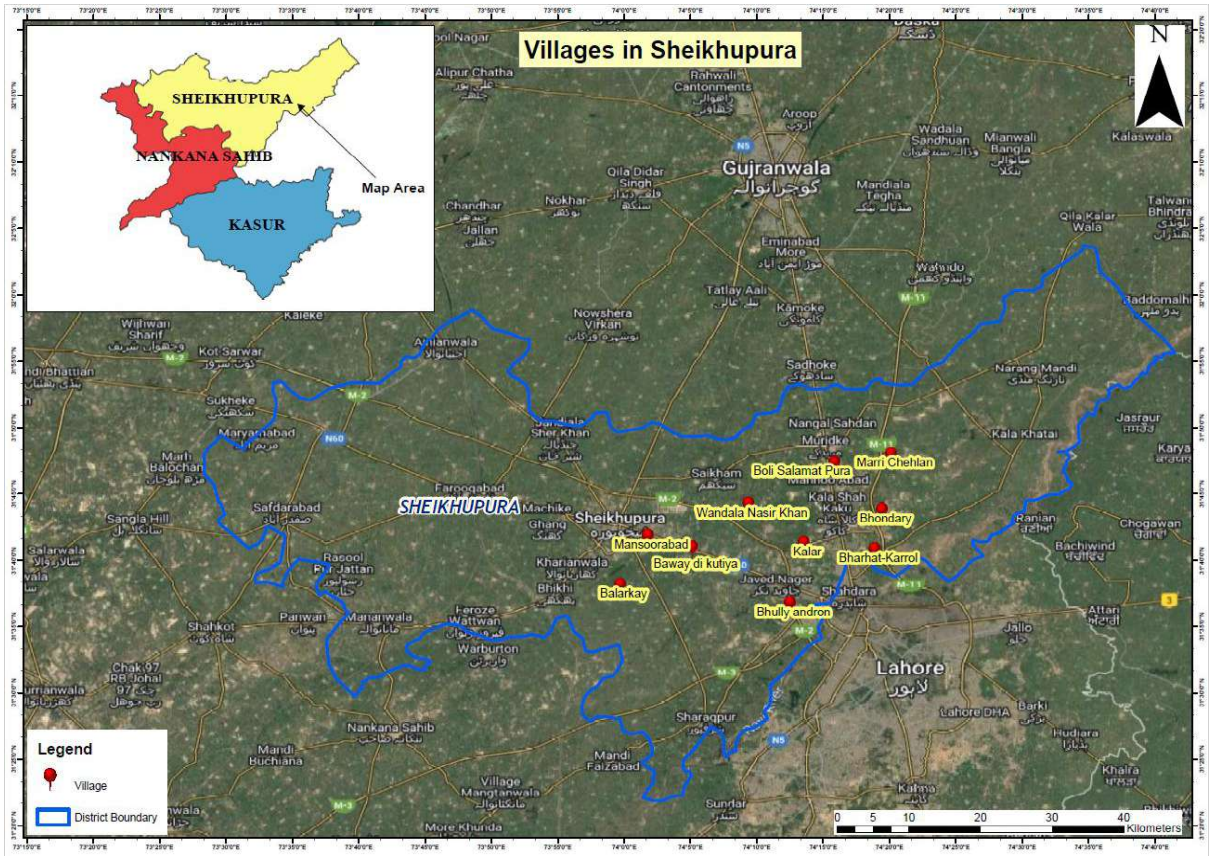

Figure 1-6, Project Location Map – Sheikhupura District

1.12 Approach & Methodology to Work

1.12.1 Approach

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

1.12.2 Methodology

The following methodology was adopted for carrying out the EIA study 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 of various issues of the study.

b) Data Collection Planning

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

c) Detailed Field Survey

Detailed site visits for collection of data were conducted. The data collected from field include:

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

Meetings with different departments were held and subsequent data was collected.

d) Sampling & Analysis of Physical Environmental Parameters

Solution Environmental & Analytical Laboratory Pvt. Ltd. (SEAL), which is an EPA certified laboratory, was hired for environmental sampling / monitoring and analysis of air quality, water and noise quality. Samples were collected from two (02) locations for analysis in the laboratory.

e) Review of Secondary Data

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

- **Physical environment:** topography, geology, soils, surface and ground water resources and climate;

- **Biological environment:** habitat types, flora and fauna (particularly rare or endangered species), critical habitats / zones and vegetation communities within the sub-project area;
- **Socio-economic environment:** settlements, socio-economic conditions, infrastructure and land use.
- **Heritage aspects:** sites of cultural, archaeological or historical significance.

f) Corridor of Impact (COI) / Area of Impact (AOI)

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

g) Stakeholder Consultations

For this EIA study, stakeholder consultation was carried out through questioners and one on one meeting. The EIA team met with the government functionaries, affected persons and local communities along the proposed route. 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.

h) Environmental and Social Impact Assessment

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

- Overlay Mapping
- Screening Checklists
- Impacts matrix

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

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

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

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

1.13 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 EIA study.

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

Section 3: Scoping will discuss the spatial and temporal boundaries of the project. Important issued raised by the community during the consultative sessions and significant impact that are determined during the initial visits.

Section 4: Project Description provides an overall description of the project including proposed alignment, design considerations and concepts, manpower requirement, waste generation, machinery and material requirements.

Section 5: Project Alternatives enlists possible design alternatives for the said project and their influence on environment and social situation.

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

Section 7: Public Consultation and Information Disclosure identify the main stakeholders and their concerns rose during scoping sessions and deals with the measures to mitigate the social impacts.

Section 8: Potential Environmental and Social Impacts and their Mitigations Measures identify, predicts and evaluates impacts of the project activities during the construction and operation stages and deals with the measures proposed to mitigate potential environmental impacts of the proposed

project.

Section 9: Environmental and Social Management Plan:

This section outlines organizational framework, mitigation and monitoring plans training requirements, defines roles and responsibilities, estimates budgets requirements for satisfactory implementation.

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

1.14 EIA Team

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

The team of experts are given as under;

Table 1-5, List of EIA Team Members

Sr. No	Name	Designation	Department
1.	Hussain Kamran	Senior Manager (Environment & Social)	PRMSC
2.	Rameen Saleem	RA (Environment & Social Safeguard)	PRMSC
3.	M. Shuaib Kabir Khan	RA (Environment & Social Safeguard)	PRMSC
4.	Hafiz Musa Khokhar	Economist	PRMSC
5.	Haji Aman Ullah Saifi	Social & BCC Specialist	PRMSC
6.	Asma Abdul Ghuffar	Gender Specialist	PRMSC
7.	Zoha Imran Butt	Environment Specialist	ECSP
8.	Huba Bint E Asla	Environmentalist	ECSP
9.	Sidra Rao	Environmentalist	ECSP
10.	Mr. Umar Kamal	Sociologist and Resettlement Specialist	ECSP
11.	Muhammad Arshad	Chief Chemist	ECSP

SECTION - 2: REGULATORY AND POLICY REVIEW

2.1 Overview

This chapter provides details of the national / provincial legislations, regulations and EPA guidelines which are relevant and applicable to the sub-project.

2.2 National and Provincial Legislative Framework

Table 2-1, National and Provincial Legislative Framework

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
1.	National Environmental Policy 2005	In March 2005, Government of Pakistan (GoP) launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.	The core areas that are relevant in the context of the proposed project are pollution prevention during construction and conserving biodiversity and forestry.
2.	Punjab Environmental Protection Act, 1997 (Amended 2012)	The Punjab Environmental Protection Act, 1997 (Amended, 2012 & 2017) is comprehensive legislation and provides the legislative framework for protection, conservation, rehabilitation and improvement of the environment. The 'environment' has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living	The provision of the act is applicable to proposed project for conducting an IEE / EIA according to section 12 and to obtain environmental approval from the EPA. The section 11 of the act is applicable in

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses 'a' to 'f'. The notable points of the law are: • No proponent of a project shall commence construction or operation unless he has filed an EIA/IEE with the Provincial Agency designated by the Provincial EPAs an EIA/IEE, and has obtained an approval; • Establishment and formation of the Punjab Environmental Protection Council (PEPC); • Prohibition of certain discharges or emissions; • Punjab Environmental Quality Standards (PEQS) for wastewater, air emissions and noise; and • Provincial Government can issue notices and enforce them to protect the environment. In the recent amendment of 2012, legislatives powers related to environment and ecology are given to provincial governments from the Federal government. The provinces are required to enact their own legislation for environmental protection. Other amendments include increasing the penalties for violations. For the proposed Project, Environmental Protection	term of compliance with Punjab Environmental Quality Standards (PEQS). Similarly, section 13 of the act prohibits the import of hazardous waste. The provisions of section 16 are also applicable to comply with the discharge or emission of any effluent, waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 17, penalties will apply if anyone fails to comply with the provisions of section 11, 12, 13 and 16.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		Department (EPD)/Environmental Protection Agency (EPA), Government of Punjab (GoP) is the concerned authority. The capability of regulatory institutions for environmental management is ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.	
3.	Punjab Environmental Quality Standards (PEQS), 2016	PEQS promulgated recently in 2016. Specified standards under PEQS are for: • Drinking Water; • Ambient Air; • Noise; • Industrial Gaseous Emissions; • Municipal and Liquid Industrial Effluents; • Motor vehicle exhaust and noise	The provisions of these regulations / standards for environmental monitoring to assess the impact of project activities on the environment.
4.	Pakistan Environmental Protection Agency, (Review of IEE / EIA) Regulations, 2000	These regulations set out: • Key policy and procedural requirements for filing an EIA; • The purpose of environmental assessment; • The goals of sustainable development; • The requirement that environmental assessment be integrated with feasibility studies; • The jurisdiction of the Federal and Provincial EPA's and Planning &Development (P&D) Departments;	The provisions of these regulations are applicable for environmental screening of the project, which implies that an Environmental study is required for the proposed project. The process described in the regulation will be useful for PRMSC to follow the procedure to file an Environmental study with Punjab-EPA and to understand its review process along

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		• The responsibilities of proponents; • Duties of responsible authorities; • Provides schedules of proposals that the project requires either IEE or an EIA; • The environmental screening process of the projects under schedule I, II and III; and The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.	with timelines to be followed.
5.	Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023	These rules regulate activities contributing to air pollution and smog. The rules impose mandatory controls on fugitive dust emissions, vehicular and machinery exhaust, and strictly prohibit open burning of solid waste, crop residue, or construction debris. They require all construction and development projects to adopt dust suppression measures such as water sprinkling, material covering, plantation buffers, and use of emission-compliant equipment and fuels. The rules also emphasize public awareness, institutional coordination, and plantation drives for air quality improvement.	The construction activities such as excavation, transportation of materials, and operation of machinery, may generate dust and emissions contributing to smog. Therefore, the Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023 are applicable.
6.	Pakistan Penal Code, 1860	The Code deals with the offences where public or private property or human lives are affected due to intentional or accidental misconduct of an individual or organization. The Code also	The provisions of the Penal Code, 1860 are applicable to the project in terms of penalties for effecting human

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		addresses control of noise, noxious emissions and disposal of effluents.	lives and public property. It also addresses the control of noise, air emissions and effluent disposal.
7.	The Canal and Drainage Act 1873 and amendment 2016	The Canal and Drainage Act 1873 (CDA) focus on construction and maintenance of drainage channels and defines powers to prohibit obstruction or order their removal. It also covers issues related to canal navigation. It briefly addresses issues relating to environmental pollution. Section 70(5) of the CDA clearly states that no one is allowed to "corrupt or foul the water of any canal so as to render it less fit for the purposes for which it is ordinarily used." In addition, Section 73 of the CDA gives power to arrest without warrant or to be taken before the magistrate a person who has willfully damaged or obstructed the canal or "rendered it less useful."	This act will be applicable as the project is for improvement and development of water supply and sewerage system and some of the tube wells may be installed at the bank of canals passing over there near the revenue villages or pipelines may cross the them.
8.	Punjab Water Act, 2019	This act provides a framework for comprehensive management of all water resources in the Punjab and to regulate their use in the interest of conservation and sustainability	This act will be applicable as the project is for improvement and development of water supply system.
9.	Punjab Water Policy, 2018	This Punjab Water Policy is a sectoral policy document at provincial level. 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	This act will be applicable as the project is for improvement and development of water supply system.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		water use (domestic, stock water, agriculture, industry, commercial and environment) and for all regions (Indus basin canal commands and outside the canal commands) at the basin level through equitable water allocations, management and development.	
10.	Punjab Municipal Water Act, 2014	The basic aim of the Act is to recognize, regulate and manage present and future municipal water supply and sanitation services and to establish rights of access to basic water supply and basic sanitation, and to ensure conservation of water resources in the province. This Act is in draft stage.	This Act will elicit if there is misappropriation of water supply during construction activities.
11.	Motor Vehicle Rules 1969	It defines powers and responsibilities of Motor Vehicle Examiners (MVEs). The establishment of MVE inspection system is one of the regulatory measures that can be taken to tackle the ambient air quality problems associated with the vehicular emissions during operation phase.	This act is applicable to the gaseous emission that will be released from project vehicles.
12.	Pakistan Labour Policy, 2010	The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts: • Legal Framework; • Advocacy: rights of workers and employers; • Skill development and employment; and • Manpower export	This act is applicable to protect; the rights of labor involved in the project implementation.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
13.	The Bonded Labour System (Abolition) ACT 1992	According to this act, forced labour is any type of work or kind of service in which someone engages involuntarily and under implied coercion a manifest threat of a party or oppression measures. The bonded labour can exist in following forms under different situations: • Bonded labour in exchange of advance / an amount of money given before services are rendered, received by a person or his family. • Bonded labour as a consequence of some social or customary obligations. • Bonded labour in exchange of an economic benefit / consideration received by a person or his family, • Bonded labour of a guarantor in exchange for debtor who was unable to pay off his debt. Bonded labour is prevalent in agriculture sector, brick kilns, domestic work and begging.	This act is applicable to protect; the rights of labor involved in the project implementation.
14.	Punjab Forest Act (Amended), 2010	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. There is no protected forest situated in and around the Project area.	This act provides guidelines to protect the trees present in the project corridor.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
15.	Employment of Child Act 1991	Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any construction, or any other hazardous employment. In accordance with this Article, the Employment of Child Act 1991 prohibits child labour (a child is under 14 years old).	The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.
16.	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. The land needed for the construction of development projects will be acquired under normal conditions based on prevailing market prices or negotiated prices between client and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.	This act will not trigger as no land acquisition is required.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
17.	The Punjab Land Acquisition Rules, 1983,	It describes the land acquisition procedure for public purposes or for a company.	This act will not trigger as no land acquisition is required.
18.	Provincial Wildlife Act, 1974	The Punjab Wildlife Act (1974) is developed for the regulation of activities relating to protection, conservation and management of wildlife in Punjab.	This act will not trigger as no trees will be cut and no habitat loss will occur.
19.	Pakistan Antiquities Act 1975 and Punjab Antiquities Amendment Act 2012	The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The Antiquities Act, 1975 (amended in 1990) states the following: • "Ancient" is any object that is at least 75 years old; • All accidental discoveries of artefacts must be reported to the Federal Department of Archaeology; • The Government is the owner of all buried antiquities discovered on any site, whether protected or otherwise; • All new construction within a distance of 200 feet from protected antiquities is forbidden; • No changes or repairs can be made to a protected monument, even if it is owned privately, without approval of the responsible authorities; and The cultural heritage laws of Pakistan are uniformly applicable to all categories of sites regardless of their state of	The law will be applicable to the project mainly due to its two provisions: • According to the law, 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.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		preservation and classification as monuments of national or world heritage.	
20.	The Punjab Special Premises (Preservation) Ordinance, 1985	It is expedient to preserve certain premises of historical, cultural and architectural value in the Punjab and to control and regulate alterations therein and demolition and re-erection thereof and for matters ancillary thereto;	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.
21.	Katchi Abadis Act, 1987	The Katchi Abadis Act covers the urban squatter's rehabilitation rights by providing plots in public resettlement areas or cash assistance.	This act is not triggered as there is no resettlement required in this project
22.	Land Revenue Act, 1967	Determination of disputes under section 44 of LR Act 1967 sub-section (2) If in any such dispute, the Revenue Officer is unable to satisfy himself as to which of the parties thereto is in possession of any property to which the dispute relates, he shall (a) if he be not below the rank of Assistant Collector of the first grade, ascertain, after an inquiry in which an opportunity shall be given to all the parties, to the dispute of being heard and adducing evidence in support of their claims, who is the person best entitled to the property, and shall by written order direct that the person be put in possession thereof, and that entry in accordance with that order be made in the record or register; and (b) if he be below the rank of Assistant Collector of the first grade, report the matter to the	This act will not trigger as no land acquisition is required.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
		Assistant Collector of the first grade, who shall thereupon proceed in the manner provided in clause (a). (3) A direction under sub-section (3) shall be subject to any decree or order which may be subsequently passed by any Court of competent jurisdiction.	
23.	Colonization of Government Lands Act, 1912	This Act shall, unless the Provincial Government, otherwise directs, apply to land to which the provisions of the Government Tenants (Punjab) Act 1893, have been applied and to any other land to which the Provincial Government may by notification in the Official Gazette apply it and which at the time of the notification was the property of the Provincial Government ,Provided that unless the Provincial Government by general or special order otherwise directs nothing in Sections 20, 21, 22 and 23, or in the proviso to section 14, of this Act shall, apply to tenancies specified in Schedule I of this Act, or to any class of tenancies created hereafter which the Provincial Government may declare to be scheduled tenancies under this section.	This act might be triggered if Tube wells / OHRs / WWTPs are proposed at the government land.
24.	Protection of Trees and Brushwood Act, 1949	Act refers to save trees / brushwood / greenery / plantations to make the environment better for living.	This act will be triggered as saving trees / plantations is one of the major parts of this EIA.
25.	National Forest Policy, 2015	This act is for the protection of forests.	This act will not be triggered as there is no forest present in project area.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance with the project
26.	Punjab Restriction of Employment of Children Ordinance, 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.	The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.
27.	Guidelines for Public Consultation, 1997	Act refers to the guidelines for conducting public consultations.	This act will be triggered as consultation with public is main component of this EIA.

SECTION - 3: SCREENING AND SCOPING OF PROJECT

3.1 Screening of the Project

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

3.2 Spatial and Temporal Boundaries of Environmental Assessment

Spatial Boundaries	Temporal Boundaries
Regional: Impact could extend to the region surrounding the proposed project.	Year Round: Significant throughout the year.
Local: Impact limited to the local area in close proximity to the proposed project.	Seasonal: Significant on a seasonal basis, depending on nature of valued environmental component (VEC).

The spatial and temporal boundaries of the project can be observed through Figure 3-1, Figure 3-2 and Figure 3-3.

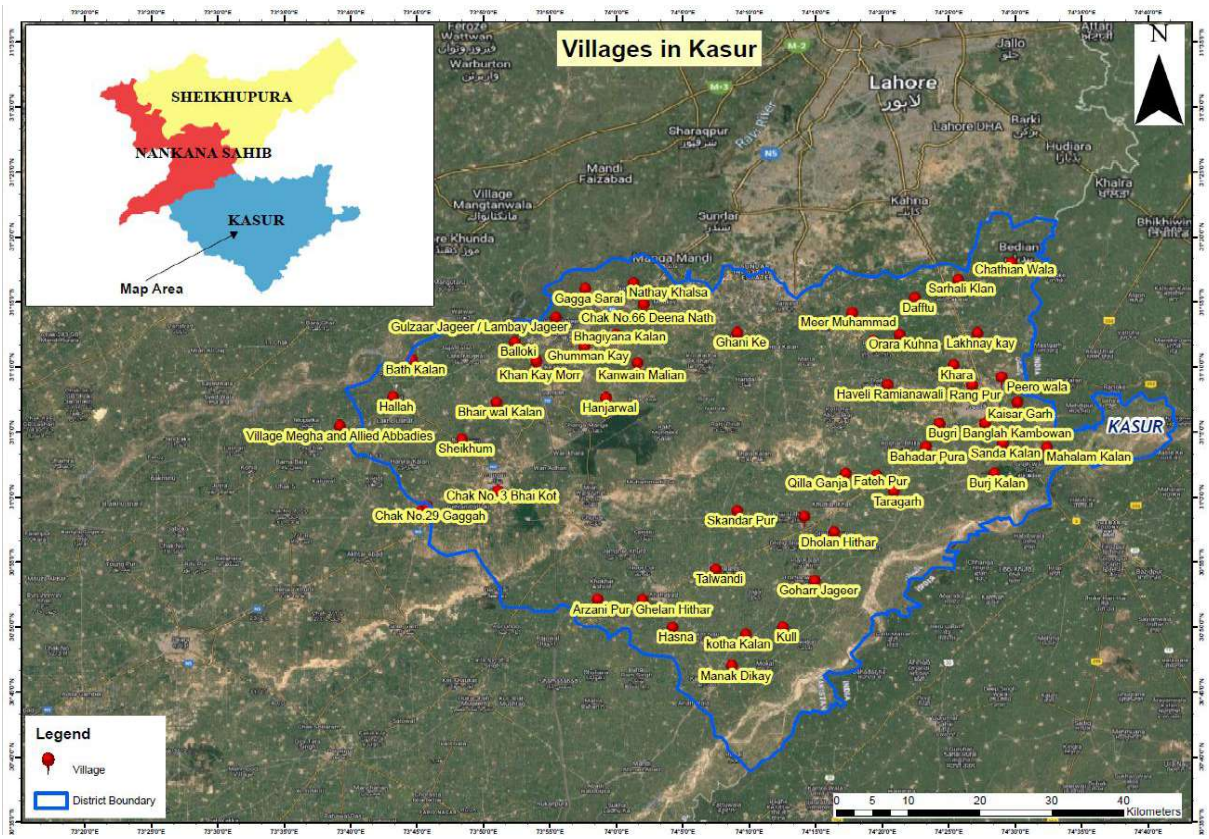

Figure 3-1, Project Location Map – Kasur District

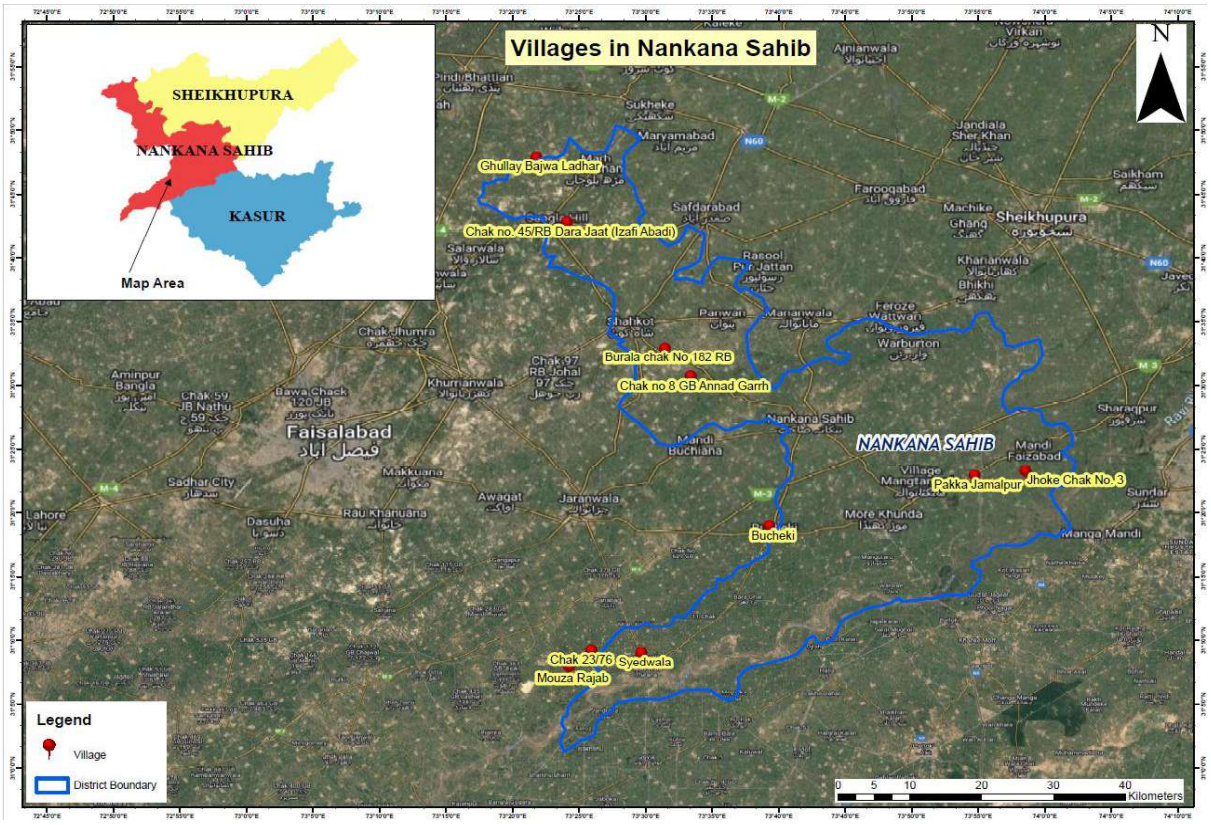

Figure 3-2, Project Location Map – Nankana District

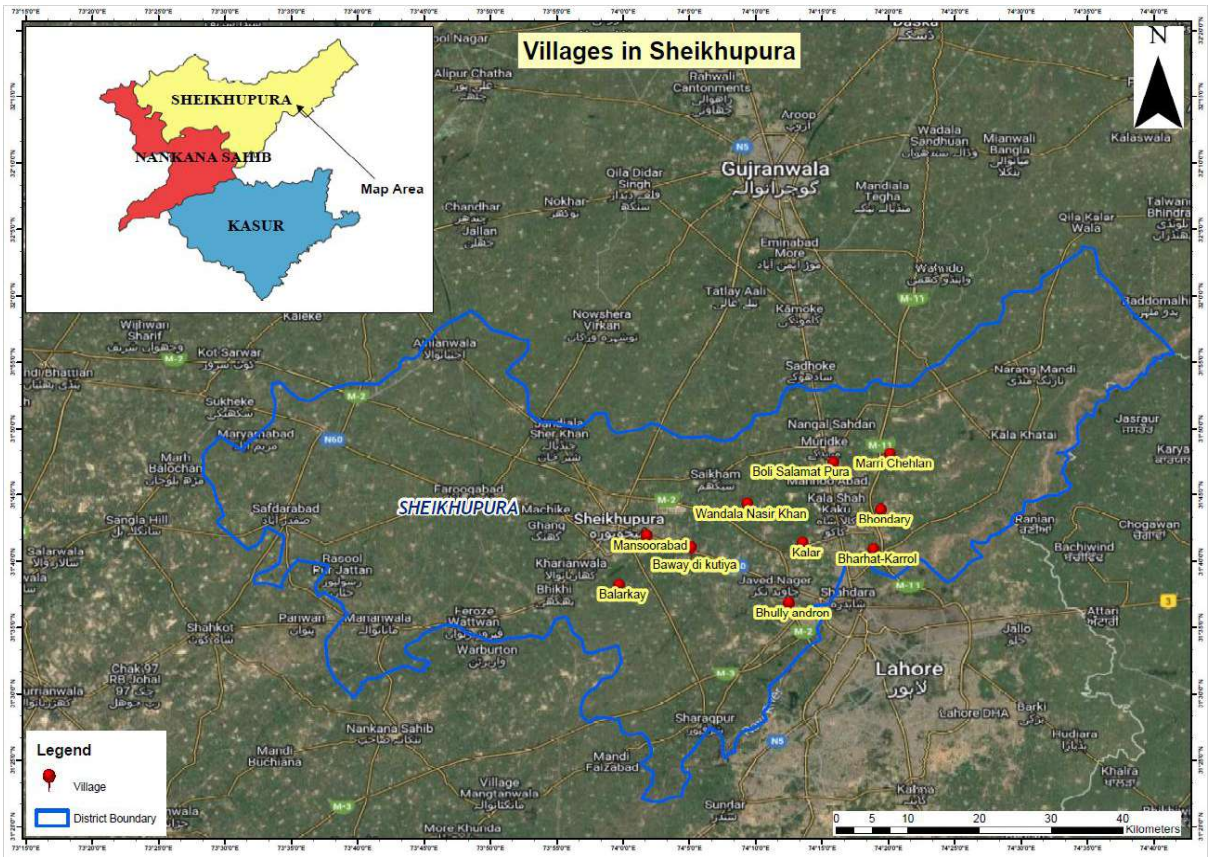

Figure 3-3, Project Location Map – Sheikhupura District

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3.3 Important Issues and Concerns Raised During Consultation

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

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

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

3.4 Significant Impacts and Factors to be Determined

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

SECTION - 4: ANALYSIS OF ALTERNATIVES

This chapter deals with the analytical overview of different alternatives that have been considered. The analysis has been carried out critically so as to justify the need of the project and to select the most feasible alternative. Besides the economic viability; environmental sustainability and social soundness of the project have also been considered while analyzing different alternatives.

4.1 Location Alternatives

Project area / villages have poor / insufficient water supply and sanitation services systems. The project involves improvement and development of water supply and sanitation services system in selected villages of Lahore division. So, there is no other location / site alternatives envisaged because no other site available will serve for this purpose. If No Project Option (NPO) is applied then the people will be deprived of clean water supply and sanitation services, and will have to resort to alternative water sources. That will incur them with extra charges. The pressure on the alternative water sources will increase and the significant water source from the canal will be wasted.

4.2 Design / Technology Alternatives

The development will be constructed using modern, locally and internationally accepted technology and materials to achieve public health, safety, security and environmental aesthetic requirements.

Trenchless technology offers a cost-effective alternative for rehabilitating buried water supply infrastructure. There is an estimated 20% reduction in direct and indirect costs when appropriate trenchless methods specific to prevalent site conditions are used in place of open trenching. There will be no excavation for trenches so there will be less pollution due to dust and particulate emission.

However, due to limitations such as labor capacity and training in incorporating the trenchless system. The tradition trench water supply system will be implemented for the project.

For wastewater treatment, two technology options are considered: Waste Stabilization Ponds (WSPs) and Anaerobic Baffled Reactors (ABRs).

WSPs consist of one or multiple interconnected ponds where wastewater is treated through natural aerobic and anaerobic processes. They reduce organic matter and pathogens through prolonged retention periods. Treated effluent may be discharged into surface water or reused for irrigation if it meets effluent standards. WSPs are widely used in developing countries with warm climates due to their simplicity and low operational requirements. However, they require large land areas, as treatment rates are relatively slow.

ABRs, on the other hand, are compact anaerobic treatment units functioning as improved septic tanks with multiple baffled chambers (typically three to

six). Wastewater flows upward through these chambers, increasing contact time with active sludge and enabling high BOD reduction (up to 90%). ABRs are suitable for areas with limited land availability as they are usually installed underground.

ABRs are comparatively suitable due to following reasons;

- Compatible with rural infrastructure.
- Underground installation requires less surface area than Wastewater Stabilization Ponds.
- High BOD removal (up to 90%) with minimal maintenance.
- Ideal for village-level treatment where full sewer systems or centralized STPs are not feasible.
- Sludge removal is required once a year only, making it low-maintenance for local authorities.
- Treated water can be reused or safely discharged to disposal ponds.

4.3 Environmental Alternatives

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

Overall, this project will lead to the improvement of environmental quality of project site.

4.4 Economic Alternatives

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

SECTION - 5: DESCRIPTION OF THE PROJECT

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

5.1 Area Description

The project is located in Lahore division, Punjab. Lahore Division, located in the central part of Punjab, comprises four districts: Lahore, Kasur, Nankana and Sheikhupura. Covering an area of approximately 11,727 km², the division has a population exceeding 22.77 million (PBS 2023 projections), with about 6.42 million residing in rural areas. The rural populations are distributed approximately as follows: Kasur with 2.8 million, Nankana with 1.28 million, and Sheikhupura with about 2.53 million rural inhabitants.

Following project has been designed to improve the existing infrastructure of the water supply and sewerage system with the provision of better living standards and the environment for rural populations in and around its project locations.

"Model village (Misaali Gaon) Project – Lahore Division"

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

- **Provision of Household Water Supply Systems:** A core component of the project is the provision of safe and sustainable water supply systems at the household level: For villages with less than 500 households, a direct pumping system will be installed, providing water directly to individual household from a tube well or submersible pump, supported by a distribution network. And, for villages with more than 500 households, the system will include an Overhead Reservoir (OHR) to ensure adequate pressure, storage, and equitable water distribution across all homes. This setup will consist of a tube well, OHR, distribution pipeline.
- **Rehabilitation of the Drainage System:** The existing drainage network will be upgraded to ensure the efficient disposal of both greywater and stormwater. This will prevent localized flooding and the accumulation of stagnant water, which are breeding grounds for mosquitoes and other disease vectors. The project will introduce climate-adaptive drainage solutions that can withstand seasonal flooding and extreme weather events.

- **Provision of Sewerage Treatment Plants:** In villages where piped sewerage network is proposed, wastewater treatment plant will be constructed to treat the collected sewage. The treated effluent will be reused for irrigation purposes, subject to compliance with applicable effluent standards.
- **Paving of Internal Streets:** The internal streets of the village will be paved with locally appropriate materials to improve accessibility, especially during the rainy season. This will significantly reduce mud and dust, making it easier for residents to move around, and ensure that children can safely access schools and the elderly can access healthcare services.
- **Revitalization of the Sewage Pond:** The existing sewage pond will be revitalized through bioremediation techniques. This sustainable method will naturally treat wastewater, reduce pathogens, eliminate foul odors, and restore ecological balance in the area. The revitalization will improve environmental conditions, making the pond safer and more hygienic for nearby residents.
- **Community Engagement and Awareness:** The project will involve local residents through awareness campaigns and community participation, fostering a sense of ownership and encouraging better hygiene practices. The community will also be trained to participate in the long-term maintenance and upkeep of the infrastructure, ensuring sustainability.
- **Job Creation and Economic Development:** The construction phase will create short-term job opportunities for local residents, contributing to the local economy and building the skill set of the workforce. Local labor will be employed for tasks such as street paving, drainage system installation, and general infrastructure work.

5.2 Objectives of the Project

The project aims to deliver integrated socio-environmental benefits through the provision of safe drinking water and improved sanitation and hygiene infrastructure. By addressing waterborne health risks and enhancing community-level public health standards, the initiative is expected to contribute significantly to poverty reduction, gender uplift, environmental enhancement, and human capital development within the service areas. Major objectives include the following;

- Rehabilitate and upgrade the existing village drainage system to ensure efficient disposal of greywater and stormwater, preventing localized flooding and stagnant water accumulation.
- Construct and pave internal streets using locally appropriate materials to improve mobility, especially during rainy seasons, and to reduce dust, mud, and physical hazards.

- Revitalize the existing sewage pond using bioremediation techniques to treat wastewater naturally, improve environmental conditions, and eliminate foul odors.
- Ensure that women, children, and elderly residents benefit from infrastructure that is accessible, safe, and responsive to their specific needs.
- Encourage better hygiene practices and community participation in maintenance by conducting awareness activities alongside infrastructure development.
- Reduce maintenance costs for individual households by implementing durable and low-maintenance solutions for streets, drainage system and treatment technology.
- Create short-term job opportunities for local residents during construction activities, thereby supporting economic development and local skills building.
- Prevent groundwater and soil contamination by replacing open drains and unmanaged wastewater disposal with a controlled, closed-system solution.
- Eliminate breeding grounds for mosquitoes and disease vectors through proper stormwater drainage and wastewater management.
- Support future data-driven planning and service expansion through systematic house numbering and visual mapping using signboards and markings.
- Establish a local operations and maintenance framework by training selected community members to oversee the upkeep of installed infrastructure, ensuring sustainability.

5.3 Location & Site Layout of Project

The project is located in Lahore division, Punjab. Lahore Division, located in the central part of Punjab, comprises four districts: Lahore, Kasur, Nankana and Sheikhupura. Covering an area of approximately 11,727 km², the division has a population exceeding 22.77 million (PBS 2023 projections), with about 6.42 million residing in rural areas. The rural populations are distributed approximately as follows: Kasur with 2.8 million, Nankana with 1.28 million, and Sheikhupura with about 2.53 million rural inhabitants. Three project location maps illustrating the proposed 42 target villages within the Lahore Division — including 22 villages in district Kasur, 10 villages in district Nankana and 10 villages in district Sheikhupura will be developed under this project. Details of the villages is given below in Table 5-1;

Table 5-1, Details / Names of the Villages

Sr. No.	Division	District	Tehsil	Village / Darkha
1.	Lahore	Kasur	Kasur	Rao Khan wala

Sr. No.	Division	District	Tehsil	Village / Darkha
2.	Lahore	Kasur	Kasur	Orara
3.	Lahore	Kasur	Kasur	Rangpur
4.	Lahore	Kasur	Kasur	Peru Wala
5.	Lahore	Kasur	Kasur	Ramiyana
6.	Lahore	Kasur	Kasur	Bugri
7.	Lahore	Kasur	Kasur	Kacha pakka
8.	Lahore	Kasur	Kasur	Qilla ganja
9.	Lahore	Kasur	Chunian	Kotha
10.	Lahore	Kasur	Chunian	Nirmalki
11.	Lahore	Kasur	Pattoki	Shaikham kalan
12.	Lahore	Kasur	Pattoki	Balloki chak no 30
13.	Lahore	Kasur	Pattoki	Bath Kalan and allied abadies, UC Bath Kalan
14.	Lahore	Kasur	Pattoki	Village Megha and Allied Abbadies
15.	Lahore	Kasur	Pattoki	Kanwain Malian
16.	Lahore	Kasur	Pattoki	Hanjarwal
17.	Lahore	Kasur	Kasur	Mahalam, Tehsil Kasur
18.	Lahore	Kasur	Kasur	Sandah, Tehsil Kasur
19.	Lahore	Kasur	Kasur	Village Ghaniye Key, UC Handal, Tehsil Kot Radha Kishan
20.	Lahore	Kasur	Kasur	Village Meer Muhammad, UC Sattoki
21.	Lahore	Kasur	Kasur	Nathey khalisa
22.	Lahore	Kasur	Kasur	Hanjarwal 31 Chak
23.	Lahore	Nankana	Nankana	Syedwala, Tehsil Nankana
24.	Lahore	Nankana	Nankana	Bucheki, Tehsil Nankana
25.	Lahore	Nankana Sahib	Sangla Hill	Chak #116 ghullay bajwa Ladhar
26.	Lahore	Nankana Sahib	Sangla Hill	Chak no. 45/RB Dara Jaat (Izafi Abadi)
27.	Lahore	Nankana Sahib	Shahkot	Burala chak NO 182 RB
28.	Lahore	Nankana Sahib	Nankana Sahib	Check NO 8 GB Annad garrh
29.	Lahore	Nankana Sahib	Nankana Sahib	Murtaza Salimpur Pakka Jamalpur, Tehsil Nankana Sahib
30.	Lahore	Nankana Sahib	Nankana Sahib	Jhok Chak 03 Bhucckoki Khayi, Tehsil Nankana Sahib
31.	Lahore	Nankana Sahib	Nankana Sahib	Chak 23/76
32.	Lahore	Nankana Sahib	Nankana Sahib	Mouza Rajab

Sr. No.	Division	District	Tehsil	Village / Darkha
33.	Lahore	Sheikhupura	Ferozewala	Bhondary
34.	Lahore	Sheikhupura	Muridke	Marri Chehlan
35.	Lahore	Sheikhupura	Ferozewala	Kalar
36.	Lahore	Sheikhupura	Ferozewala	Wandala Nasir Khan
37.	Lahore	Sheikhupura	Ferozewala	Baway di Kutiya
38.	Lahore	Sheikhupura	Ferozewala	Bhully andron
39.	Lahore	Sheikhupura	Muridke	Village Bharhat-Karrol District Sheikhupura
40.	Lahore	Sheikhupura	Muridke	Village Boli Salamat Pura
41.	Lahore	Sheikhupura	Ferozewala	Village Mansoorabad
42.	Lahore	Sheikhupura	Ferozewala	Village Balarkay

Three project location maps illustrating the proposed 42 target villages within the Lahore Division — including 22 villages in district Kasur as Figure 5-1, 10 villages in district Nankana as Figure 5-2, 10 villages in district Sheikhupura as Figure 5-3 — are provided below;

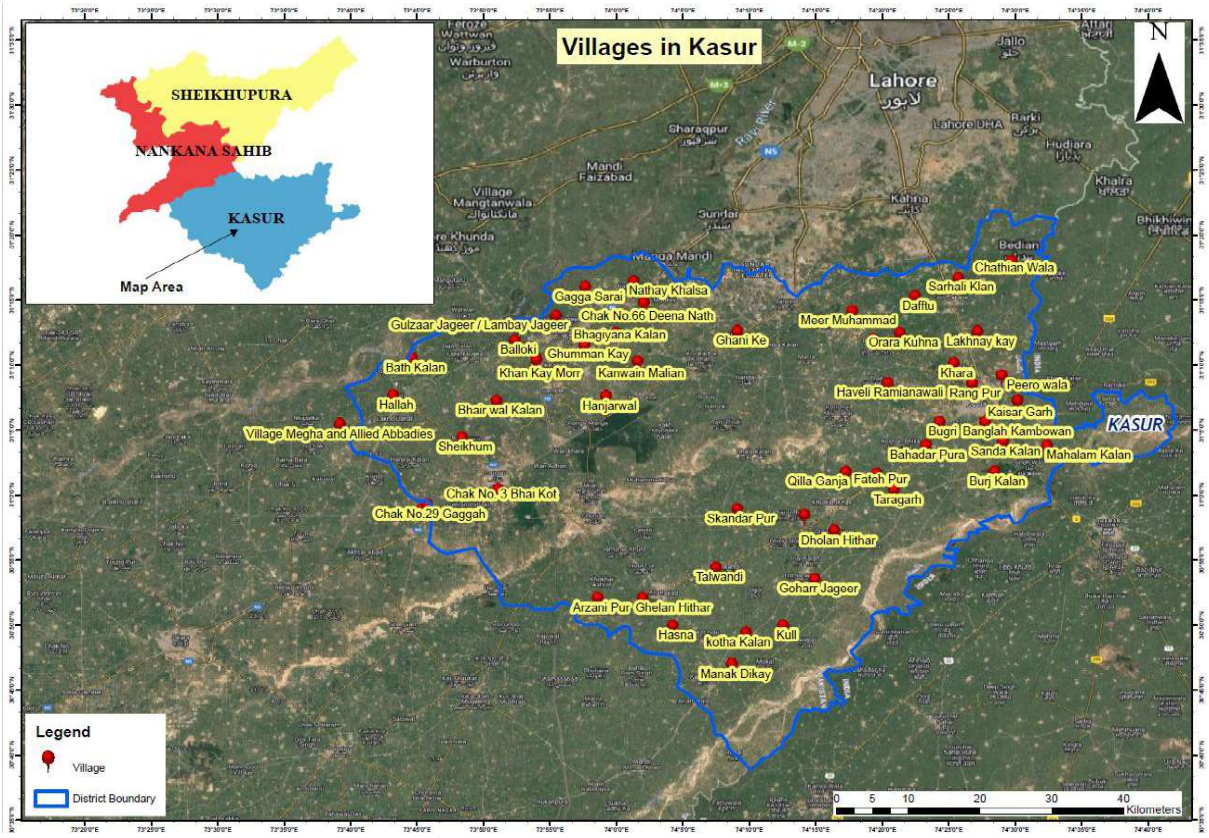


Figure 5-1, Project Location Map – Kasur District

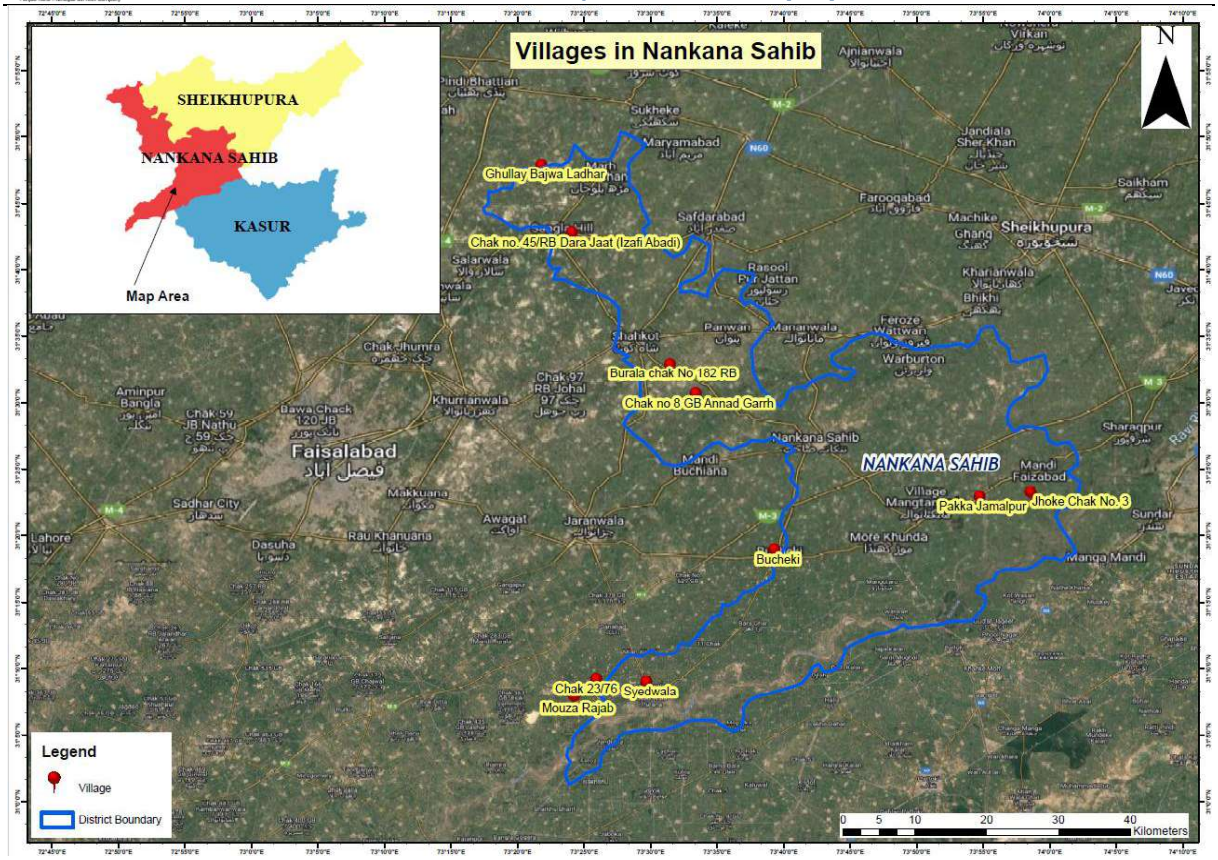


Figure 5-2, Project Location Map – Nankana District

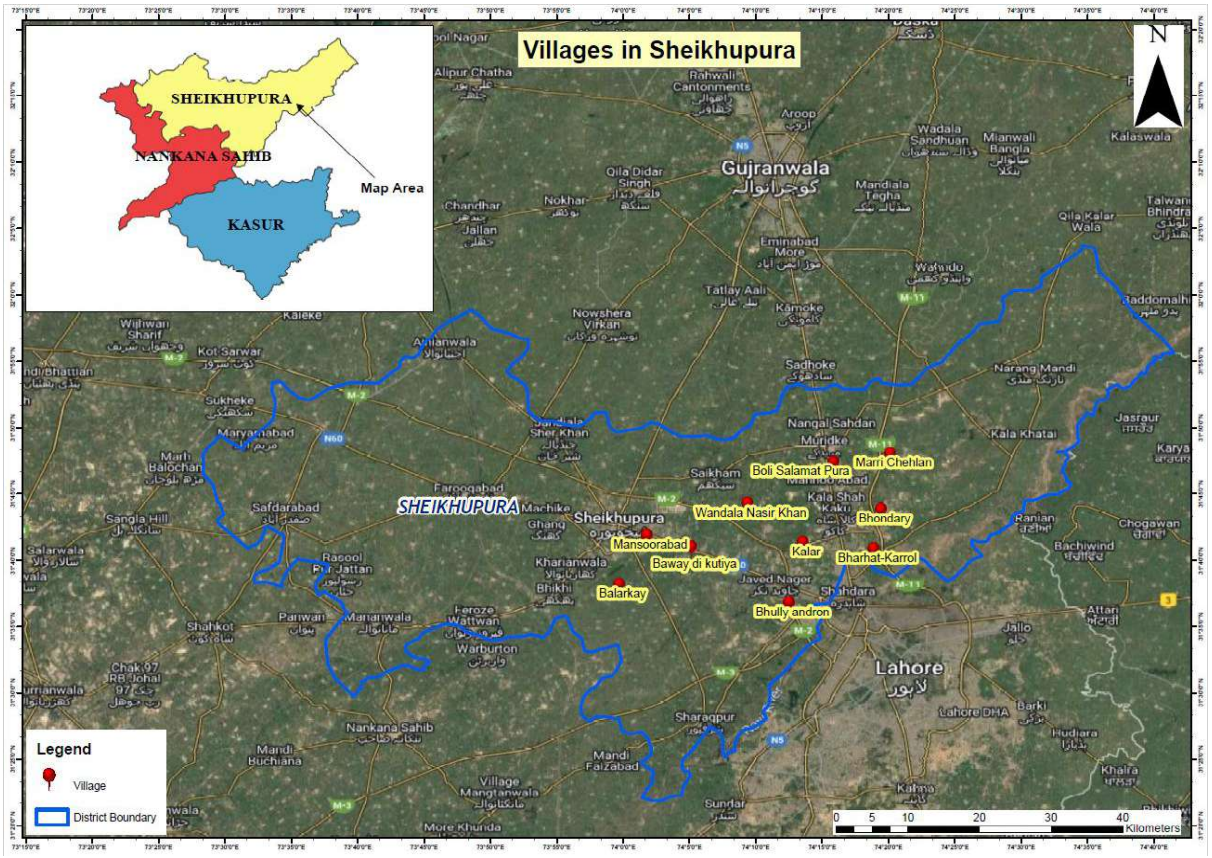


Figure 5-3, Project Location Map – Sheikhupura District

5.4 Land Use

A few trees and vegetation (like small grass / shrubs) are present near the site for proposed installation of tube wells / OHRs / STPs, but no tree will be cut. No trees will be affected during the construction of transmission lines as well. But, in any case / mishap / misfortune, if a tree has to be cut then efforts will be made to transplant that tree to nearby available open area / space. And for each tree cut, 10 new trees of almost 06 ft. height will be planted.

Figure 5-4, Representative Pictures of the Site

5.5 Road Access

Lahore Division possesses an extensive and well-developed road infrastructure, forming one of the most advanced transport networks in Punjab. The division is traversed by national highways, motorways, and provincial roads, providing seamless connectivity between urban centers and rural settlements. The Lahore-Islamabad Motorway (M-2), Lahore-Abdul

Hakeem Motorway (M-3), and Lahore-Multan Motorway (M-4) serve as major arterial routes facilitating trade and passenger movement across Punjab and beyond. The National Highway (N-5), running through Lahore and Sheikhupura, connects the division to Karachi in the south and Peshawar in the north. Within the division, a dense network of metalled district and rural access roads links small towns and villages to major markets, industrial areas, and service centers. Lahore city, being the provincial capital, also serves as a hub for inter-city transport with extensive public bus networks, BRT corridors (Metrobus System), and upcoming Orange Line Metro Train. Overall, the division's road access plays a vital role in supporting trade, mobility, and socio-economic development.

5.6 Cost & Magnitude of the Project

The costs for the implementation of construction stage activities given in this EIA will be included within the civil works contract for this project with total cost of project is PKR 4832.37 million.

5.7 Labour Requirement

At the peak of construction activities, up to 30 nos. of laborers per village are likely to be employed for the works at project, out of which 05 per village would be skilled employees and 25 per village would be construction workers. It is anticipated that approximately 75% of the workforce will be from the project area while some 25% of labour (skilled) would be hired from outside the project area.

5.8 Schedule of Implementation

The project is expected to be completed within 09 months for each village, from the date of environmental approval / commencement of construction works. Subsequently the construction, operational and maintenance aspects of the project will be undertaken by the proponent.

5.9 Scope of Work

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

- **Provision of Household Water Supply Systems:** A core component of the project is the provision of safe and sustainable water supply systems at the household level: For villages with less than 500 households, a direct pumping system will be installed, providing water directly to individual household from a tube well or submersible pump, supported by a distribution network. And, for villages with more than

500 households, the system will include an Overhead Reservoir (OHR) to ensure adequate pressure, storage, and equitable water distribution across all homes. This setup will consist of a tube well, OHR, distribution pipeline.

- **Rehabilitation of the Drainage System:** The existing drainage network will be upgraded to ensure the efficient disposal of both greywater and stormwater. This will prevent localized flooding and the accumulation of stagnant water, which are breeding grounds for mosquitoes and other disease vectors. The project will introduce climate-adaptive drainage solutions that can withstand seasonal flooding and extreme weather events.
- **Provision of Sewerage Treatment Plants:** In villages where piped sewerage network is proposed, wastewater treatment plant will be constructed to treat the collected sewage. The treated effluent will be reused for irrigation purposes, subject to compliance with applicable effluent standards.
- **Paving of Internal Streets:** The internal streets of the village will be paved with locally appropriate materials to improve accessibility, especially during the rainy season. This will significantly reduce mud and dust, making it easier for residents to move around, and ensure that children can safely access schools and the elderly can access healthcare services.
- **Revitalization of the Sewage Pond:** The existing sewage pond will be revitalized through bioremediation techniques. This sustainable method will naturally treat wastewater, reduce pathogens, eliminate foul odors, and restore ecological balance in the area. The revitalization will improve environmental conditions, making the pond safer and more hygienic for nearby residents.

5.10 Project Description

The project is located in Lahore division, Punjab. Lahore Division, located in the central part of Punjab, comprises four districts: Lahore, Kasur, Nankana and Sheikhupura. Covering an area of approximately 11,727 km², the division has a population exceeding 22.77 million (PBS 2023 projections), with about 6.42 million residing in rural areas. The rural populations are distributed approximately as follows: Kasur with 2.8 million, Nankana with 1.28 million, and Sheikhupura with about 2.53 million rural inhabitants. Details of the villages is given below in Table 5-2;

Table 5-2, Details / Names of the Villages

Sr. No.	Division	District	Tehsil	Village / Darkha
1.	Lahore	Kasur	Kasur	Rao Khan wala
2.	Lahore	Kasur	Kasur	Orara

Sr. No.	Division	District	Tehsil	Village / Darkha
3.	Lahore	Kasur	Kasur	Rangpur
4.	Lahore	Kasur	Kasur	Peru Wala
5.	Lahore	Kasur	Kasur	Ramiyana
6.	Lahore	Kasur	Kasur	Bugri
7.	Lahore	Kasur	Kasur	Kacha pakka
8.	Lahore	Kasur	Kasur	Qilla ganja
9.	Lahore	Kasur	Chunian	Kotha
10.	Lahore	Kasur	Chunian	Nirmalki
11.	Lahore	Kasur	Pattoki	Shaikham kalan
12.	Lahore	Kasur	Pattoki	Balloki chak no 30
13.	Lahore	Kasur	Pattoki	Bath Kalan and allied abadies, UC Bath Kalan
14.	Lahore	Kasur	Pattoki	Village Megha and Allied Abbadies
15.	Lahore	Kasur	Pattoki	Kanwain Malian
16.	Lahore	Kasur	Pattoki	Hanjarwal
17.	Lahore	Kasur	Kasur	Mahalam, Tehsil Kasur
18.	Lahore	Kasur	Kasur	Sandah, Tehsil Kasur
19.	Lahore	Kasur	Kasur	Village Ghaniye Key, UC Handal, Tehsil Kot Radha Kishan
20.	Lahore	Kasur	Kasur	Village Meer Muhammad, UC Sattoki
21.	Lahore	Kasur	Kasur	Nathey khalisa
22.	Lahore	Kasur	Kasur	Hanjarwal 31 Chak
23.	Lahore	Nankana	Nankana	Syedwala, Tehsil Nankana
24.	Lahore	Nankana	Nankana	Bucheki, Tehsil Nankana
25.	Lahore	Nankana Sahib	Sangla Hill	Chak #116 ghullay bajwa Ladhar
26.	Lahore	Nankana Sahib	Sangla Hill	Chak no. 45/RB Dara Jaat (Izafi Abadi)
27.	Lahore	Nankana Sahib	Shahkot	Burala chak NO 182 RB
28.	Lahore	Nankana Sahib	Nankana Sahib	Check NO 8 GB Annad garrh
29.	Lahore	Nankana Sahib	Nankana Sahib	Murtaza Salimpur Pakka Jamalpur, Tehsil Nankana Sahib
30.	Lahore	Nankana Sahib	Nankana Sahib	Jhok Chak 03 Bhucckoki Khayi, Tehsil Nankana Sahib
31.	Lahore	Nankana Sahib	Nankana Sahib	Chak 23/76
32.	Lahore	Nankana Sahib	Nankana Sahib	Mouza Rajab
33.	Lahore	Sheikhupura	Ferozewala	Bhondary

Sr. No.	Division	District	Tehsil	Village / Darkha
34.	Lahore	Sheikhupura	Muridke	Marri Chehlan
35.	Lahore	Sheikhupura	Ferozewala	Kalar
36.	Lahore	Sheikhupura	Ferozewala	Wandala Nasir Khan
37.	Lahore	Sheikhupura	Ferozewala	Baway di Kutiya
38.	Lahore	Sheikhupura	Ferozewala	Bhully andron
39.	Lahore	Sheikhupura	Muridke	Village Bharhat-Karrol District Sheikhupura
40.	Lahore	Sheikhupura	Muridke	Village Boli Salamat Pura
41.	Lahore	Sheikhupura	Ferozewala	Village Mansoorabad
42.	Lahore	Sheikhupura	Ferozewala	Village Balarkay

If any additional village or settlement is included in the project at a later stage by the Government of Punjab, it will be accommodated within the scope of this same EIA. Three project location maps illustrating the proposed 42 target villages within the Lahore Division — including 22 villages in district Kasur, 10 villages in district Nankana and 10 villages in district Sheikhupura, are given below in Figure 5-5, Figure 5-6 and Figure 5-7, respectively;

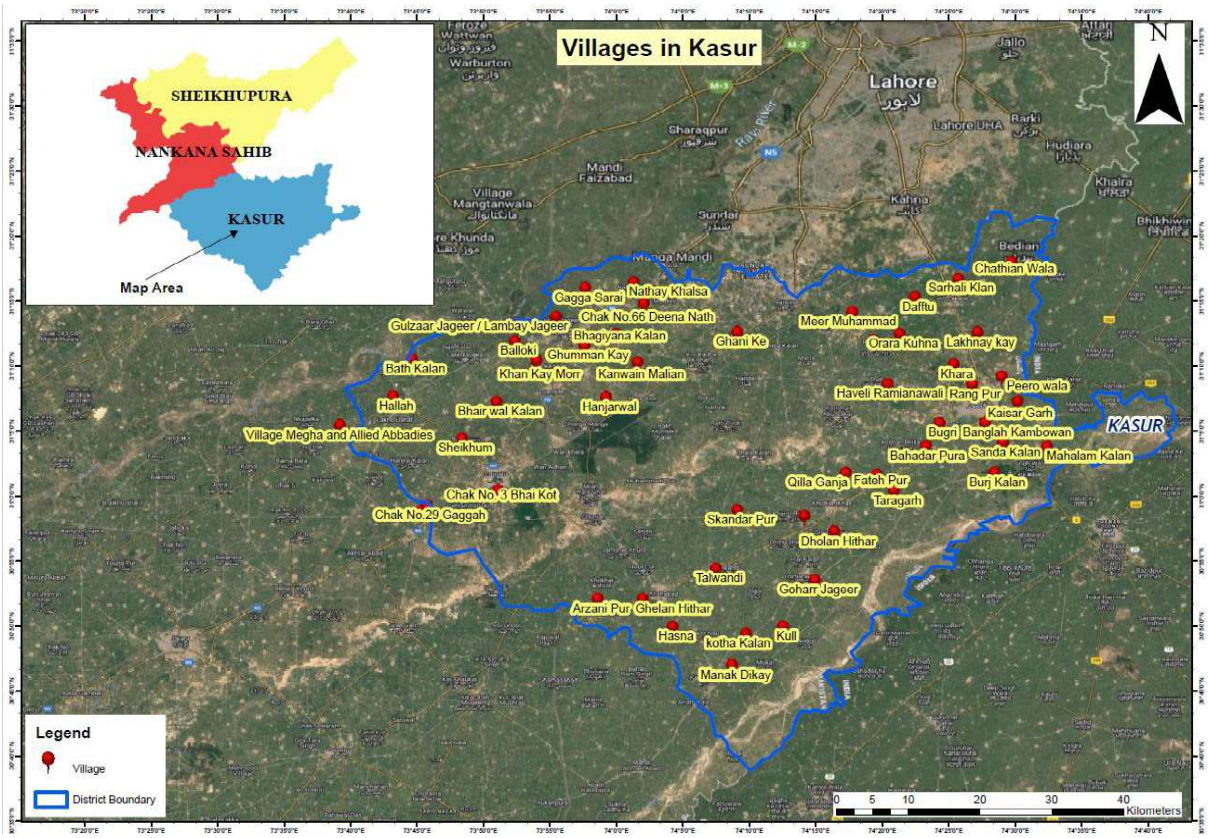


Figure 5-5, Project Location Map – Kasur District

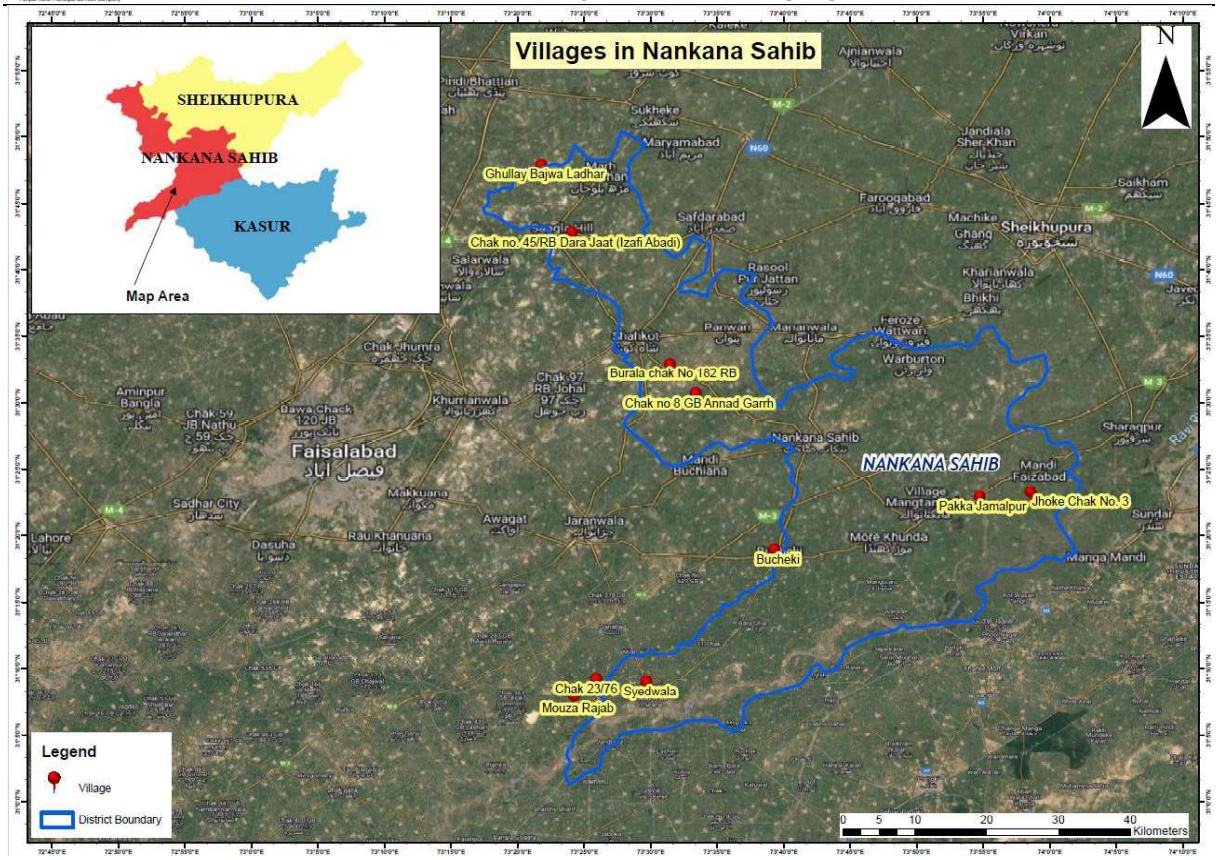


Figure 5-6, Project Location Map – Nankana District

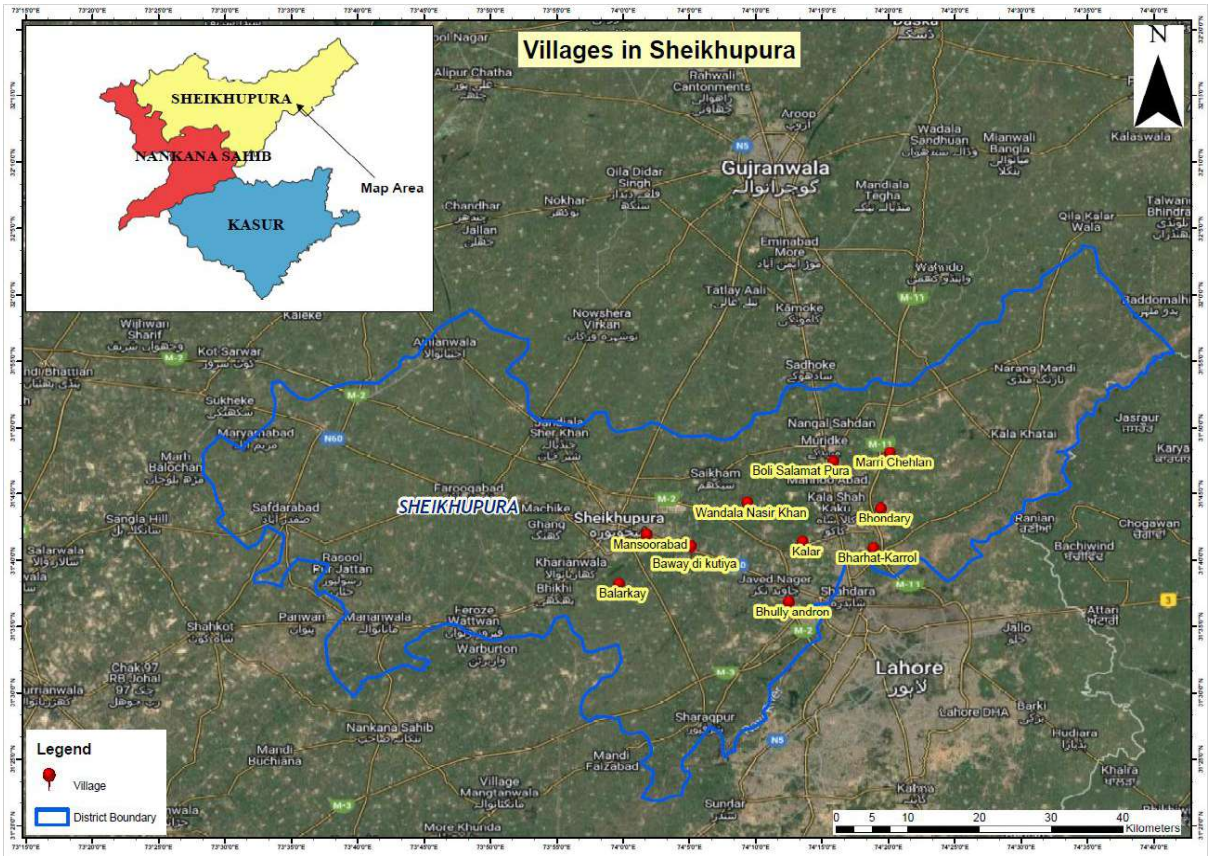


Figure 5-7, Project Location Map – Sheikhupura District

The project consists of a series of integrated infrastructure interventions designed to uplift the living standards and public health conditions of selected villages under the Misaali Gaon initiative. These interventions cover water supply, drainage, sanitation, street paving, and community engagement. The overarching goal is to build climate-resilient, inclusive, and sustainable rural settlements.

- **Provision of Household Water Supply Systems:** A core component of the project is the provision of safe and sustainable water supply systems, as per criteria given in Table 5-3;

Table 5-3, Criteria for Water Supply Systems

No. of Households in Village	Intervention for Water Supply System
HH<500	Direct pumping system from tubewell with motorized pump and distribution network.
HH>500	Tube well with OHR (minimum 10,000-gallon capacity) and full distribution pipeline.

- **Rehabilitation of the Drainage System:** The existing drainage network will be upgraded to ensure the efficient disposal of both greywater and stormwater. This will prevent localized flooding and the accumulation of stagnant water, which are breeding grounds for mosquitoes and other disease vectors. The project will introduce climate-adaptive drainage solutions that can withstand seasonal flooding and extreme weather events.
- **Provision of Sewerage Treatment Plants:** In villages where piped sewerage network is proposed, wastewater treatment plant will be constructed to treat the collected sewage. The treated effluent will be reused for irrigation purposes, subject to compliance with applicable effluent standards.
- **Paving of Internal Streets:** The internal streets of the village will be paved with locally appropriate materials to improve accessibility, especially during the rainy season. This will significantly reduce mud and dust, making it easier for residents to move around, and ensure that children can safely access schools and the elderly can access healthcare services.
- **Revitalization of the Sewage Pond:** The existing sewage pond will be revitalized through bioremediation techniques. This sustainable method will naturally treat wastewater, reduce pathogens, eliminate foul odors, and restore ecological balance in the area. The revitalization will improve environmental conditions, making the pond safer and more hygienic for nearby residents.

5.10.1 Water Supply Design Criteria

A) Water Source

Ground water is the only source of potable water for the residents of rural areas. Ground water quality would be checked, if found appropriate than deep well would be recommended. Water abstraction shall be carried through tube wells. After abstraction from tube wells, water shall be stored in reservoirs / stand post and then distributed to the locals through water distribution system in case of OHRs. In case of brackish water, standalone Reverse Osmosis would be last option.

B) Population Estimation and Projection

Population estimation has been carried out using the following sources. District Census Reports 2023 and field validations using household size based on District Census report for each tehsil.

The population projection shall be carried out according to the geometric projection method: -

$P_n = P_o (1 + r)^n$

Where:

P_n = Projected population by the end of n^{th} year

P_o = Population of base year, year of known population

r = Population growth rate per year

n = No. of years, counted from base year i.e., design period

Population growth rate as mentioned in district census report or maximum 1.5% may be used.

C) Design Horizon and Planning Phases

The overall design horizon is the year 2050.

D) Design Life of Infrastructure

The following design life of civil works tube-wells, pumping machinery, distribution network, transmission main etc. are considered.

Table 5-4, Design Life of Water Supply System

Component	Design life [years]
Civil works for buildings	50
Civil works for process units, reservoirs	50
Tube wells machinery	15
Transmission mains, primary & secondary network	30

Component	Design life [years]
Tertiary distribution network	25
Valves, actuators, bulk instrumentation	15

E) Water Demand

Water demand will vary on seasonal, daily and hourly basis. The magnitude of such variation is defined by the following factors.

1. Total Average Water Demand

Total average day demand is the total of domestic, non-domestic water demand and unaccounted-for water.

2. Maximum Day Water Demand

Maximum day water demand will be taken as 1.5 times the average day demand. Maximum day water demand will be utilized for the source establishment, design of transmission mains, pumping equipment and service reservoirs.

3. Peak Hour Demand

Peak hour Demand factor will be taken as 1.5 times the maximum day demand (or 2.25 times of average day demand). Peak hour demand will be used for the design of distribution network.

4. Domestic Water Demand

For the current project, 50 litres per person per day (11 gpcd) would be adopted.

F) Flow Velocity

For the preliminary planning at the present stage the flow velocities should range between

- Distribution network: 0.5 to 2 m/second
- Rising mains: 0.3 to 1.5 m/second

G) Pipe Material

Pipe material is proposed for the water supply as follow:

- For Rising Mains: HDPE Pipe of PN-6 or higher as per requirement
- For Distribution Network: HDPE Pipe of PN-6

H) Minimum Pipe Size

For plane areas the existing 3 inches (90mm) standard of minimum pipe size is appropriate; however, for hilly areas a minimum pipe size of 1 ½ inches (38 mm) is recommended to be adopted.

In case where either the width of pacca roads or the sheet widths are more than 30 feet, then distribution pipelines should preferably be provided on both sides of the roads and street pavements.

I) Cover Over Pipes

An earth cover of 3 feet (about one meter) should be provided over laid water supply pipe lines of all sizes except in hilly areas. Road cuts are to be backfilled with pit/river sand.

J) Valves

1. Sluice Valves

Sluice valves will be located at main control points for balancing and regulating the flows.

2. Non-Return Valves

Outside the delivery main of the tube well. In the rising main after 2000 meters.

3. Air valves

- At the summits and
- After 2000-meter intervals in straight reaches to facilitate escape of trapped air.

4. Washouts

- At the lowest points to wash out all kinds of debris.

K) Network Pressure

As per PDSSP criteria, following are the limits for the Terminal Pressure in water supply network:

- For Urban Residential Areas: 12 m (17psi) minimum
- For rural Residential Areas: 8 m (11.4psi.) minimum

Keeping in view the project area, Terminal Pressure of minimum 11.4psi will be maintained in all parts of the network including the remotest and highest points to deliver sufficient quantities of water.

L) Head Loss in Pipelines

The head loss in the pipelines shall be calculated by using Hazen & William formula. This formula, is the most widely used and relates the velocity of the flow, hydraulic mean radius and hydraulic gradient. In terms of head loss due to friction, the formula is:

$$h_L = \frac{10.44 \times L \times Q^{1.85}}{C^{1.852} \times D^{4.8655}}$$

Where:

h_L = head loss due to friction

L = distant between sections or length of pipes (ft)

D = internal diameter of pipe (in)

C = Hazen Williams factor C-Value

Q = Flow rate (gpm)

M) Water Quality Standards

Punjab Environmental Quality Standards (PEQS) for drinking water will be applicable for drinking water supply.

N) Design of Overhead Reservoirs

The Selection of OHR shall be done as per the following criteria. If;

- HHs < 500, Direct Pumping
- HHs > 500, Capacity of OHR shall be calculated as follows;
- Capacity for overhead reservoirs should be based on around 1/10th of average day demand.

Note:

The location of the OHRs will be the responsibility of the local representatives. The consultant will review the location technically, environmentally and socially.

5.10.2 Sewerage Design Criteria

The sewerage and drainage system for Misaali Gaon is designed to replace existing unhygienic open drains with covered concrete drains. The system will collect both wastewater and sludge from households and dispose of it in Treatment System, which will be remodelled and lined up to act as safe disposal and partial treatment facilities. Stormwater will continue to be discharged through separate open roadside drains.

Table 5-5, Sewerage Design Parameters

Parameter	Value	Remarks
Sewage Generation	80-85% of water supply	Domestic wastewater
Infiltration Allowance	15%	Added to flows
Peak Flow Factor	4	As per standards
Min Velocity	0.6 m/s	Self-cleansing

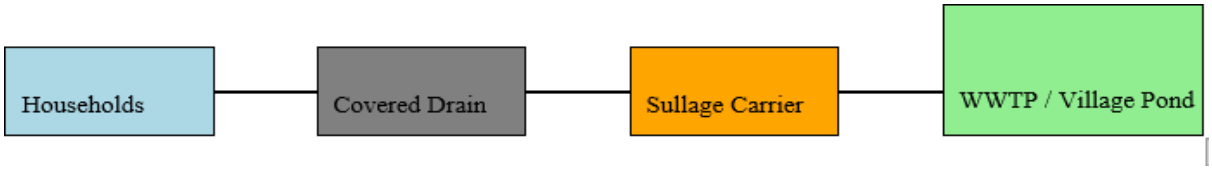


Figure 5-8, Proposed Schematic Diagram of Drainage System

In areas with available land, facultative lagoons or anaerobic bio-reactors

(ABRs) or Floating wetlands may be constructed. Effluent reuse will be limited to non-edible crops, ensuring compliance with Punjab Environmental Quality Standards (PEQS, 2016). Direct discharge into rivers will only be allowed after proper treatment.

A) Septic Tank

For Misali Gaon where possible and feasible, Septic tanks will be constructed before disposing the wastewater into final disposal.

Table 5-6, Specifications of Septic Tank

Parameter	Recommended Value / Range	Units
Per capita wastewater generation (Q)	10	Gallons/person/ day
Detention/retention time (T)	24 – 48	hours
Sludge storage	0.04 – 0.06	m^3 /person year
Total tank capacity (V)	V=Qxt	m^3
Chambering	2 – 3 compartments	—
Length: width ratio	2 : 1 → 4 : 1	—
Liquid depth	1.2 – 1.8	m
Freeboard	0.3	m
Inlet/outlet invert	25 – 50	mm below liquid level
Outlet arrangement	Drop pipe / outlet tee & baffle	—
Construction materials	Brick masonry / RCC / precast concrete	—
Effluent disposal	Soak pit / soak trench / constructed wetland	—
Maintenance / desludging frequency	Every 2 – 3	years
Design population range (communal)	10 – 50 (typical)	persons
Scum & sludge removal access	Manholes + removable covers	—
Ventilation / gas outlet	Dedicated vent or vented manhole	—
Groundwater separation	Min. 1.0 – 1.5 m	vertical separation
Frost / temperature note	Not typically critical in Punjab	—

Table 5-7, Specifications of Soakage Pit

Parameter	Recommended Standard
Shape	Circular or square

Parameter	Recommended Standard
Diameter (for household)	1.0 – 1.2 m
Depth (below invert level)	1.5 – 3.0 m (not exceeding water table depth)
Lining	Brick masonry with open joints, honeycomb structure, or dry-stone packing
Filling material	Brick ballast, gravel, or coarse sand (for filtration and percolation)
Inlet	PVC pipe (100 mm dia) with silt trap chamber before pit
Clearance	At least 30 m away from drinking water source (tubewell/handpump)
Cover	RCC or stone slab with manhole for inspection

B) Anaerobic Baffled Reactor (ABR)

For the Misaali Gaon Project, the proposed wastewater treatment system will utilize the Anaerobic Baffled Reactor (ABR), a low-maintenance, decentralized technology well-suited for rural and peri- urban areas. The ABR is part of the DEWATS approach, which emphasizes gravity-based, low-energy, and robust wastewater treatment systems. ABRs are ideal for treating domestic wastewater with moderate to high organic loads, such as black water and greywater from households.

The ABR system for the project will be designed based on the following standardized design parameters:

Table 5-8, Specifications of ABR

Parameter	Design Value / Range
Settler Hydraulic Retention Time (HRT)	1.5-3.0 hours
ABR (HRT)	Should be > 8 hrs.
Settleable SS/COD ratio	0.35< x< 0.45
Organic Loading Rate (OLR)	Should not be >3kg/m3 reactor /days
Actual up-flow velocity	Should not be > 1.0 (Ideal < 0.7)
Depth at outlet	Between 1 & 3
(Width) in settler	Max width = 3m (if higher, then provide 2 or more Parallel ABR
Inner measurements acc to required volume (Depth) in settler	Max 3 m
Number of Chambers (Baffles)	Minimum 4 (Preferably 6 – 8)
Sludge Accumulation Rate	0.04 liters/person/day
Sludge Removal Frequency	Once every 2 – 3 years
Inlet BOD Concentration	200 – 400 mg/L
Expected BOD Removal Efficiency	60 – 75% (Can go up to 85% with Polishing)
Construction Material	RCC or brick masonry (plastered with

Parameter	Design Value / Range
	cement)
Flow Type	Gravity-based with baffled compartments

1. Functional Components of the ABR System

The Settler (Primary Chamber) is the first component of the ABR system and is designed to remove grit, sand, and other settleable solids from the incoming wastewater. This initial sedimentation process helps to significantly reduce the Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) before the wastewater enters the baffled chambers.

Following the settler, the wastewater flows into the Baffled Chambers, which form the main anaerobic treatment zone. These chambers are separated by vertical baffles, allowing the wastewater to flow in a zigzag pattern. This vertical flow through multiple chambers promotes effective phase separation and increases contact between the wastewater and the anaerobic biomass. As a result, the anaerobic digestion process is enhanced, leading to improved treatment efficiency.

At the end of the system, an Outlet Chamber or Anaerobic Filter (optional) may be included for further polishing of the effluent. This chamber allows any remaining suspended solids or organic matter to be treated before the water is discharged. If higher treatment standards are required, the effluent from the ABR can be further treated using constructed wetlands or polishing ponds, making it suitable for safe discharge or reuse in non-potable applications like irrigation. Layout plan of Settler and ABR is shown in Figure 5-9;

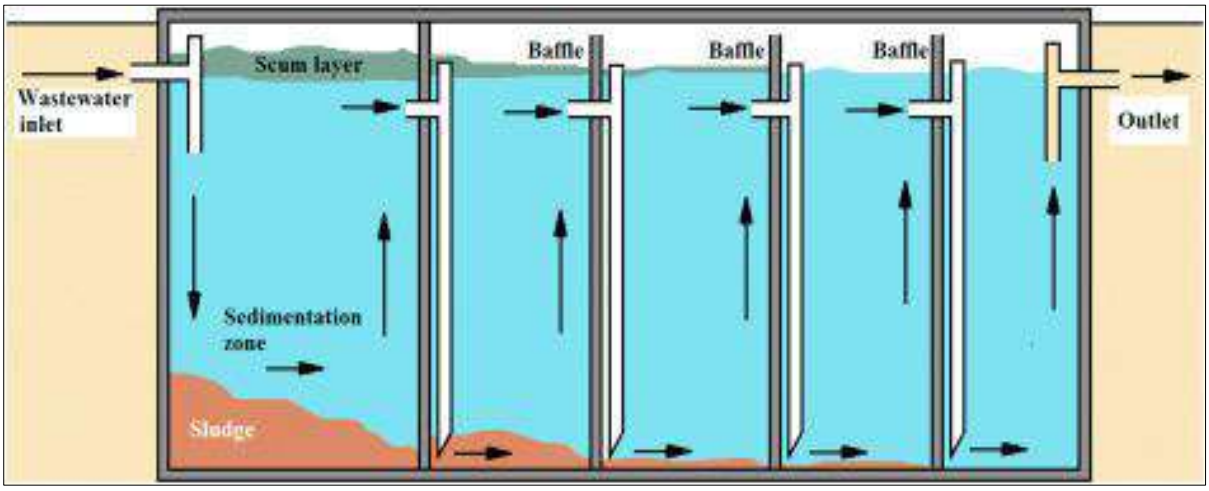


Figure 5-9, Layout Plan of ABR

5.10.3 Pavement Design

Pavement design for a 12 feet wide street in Misaali Gaon will likely involve a flexible pavement structure. This is the most common type of road construction for local, low-volume roads. A flexible pavement consists of

several layers of material, with the highest quality at the surface. The design objective is to distribute the vehicle load to the underlying soil, known as the subgrade, without exceeding its bearing capacity.

Rehabilitation is necessary when the existing pavement shows signs of distress, such as cracking, rutting, or potholes. Instead of complete reconstruction, which is expensive and time-consuming, rehabilitation aims to extend the service life of the pavement and improve its structural capacity. The approach to rehabilitation depends on the type and severity of the damage.

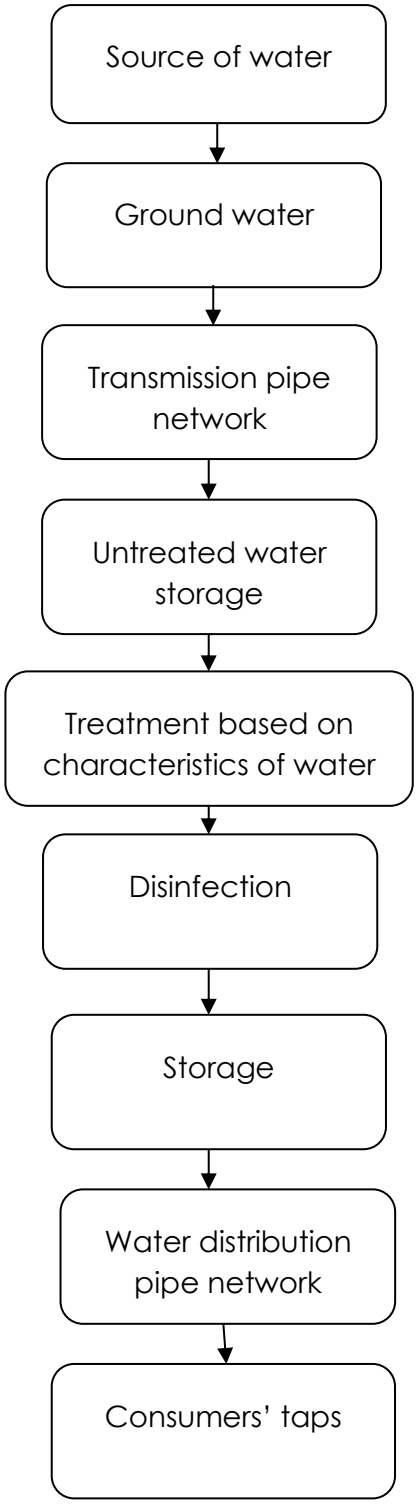


Figure 5-10, Process Flow Diagram of Water Supply

5.11 Water Consumption & Wastewater Disposal

Ground water will be the main source of water during construction phase. In constructional phase, 1,500 gallons/day water will be used for each village. During operation 300 gallons/day water will be used for domestic purpose for

each village. Wastewater produced will be domestic wastewater.

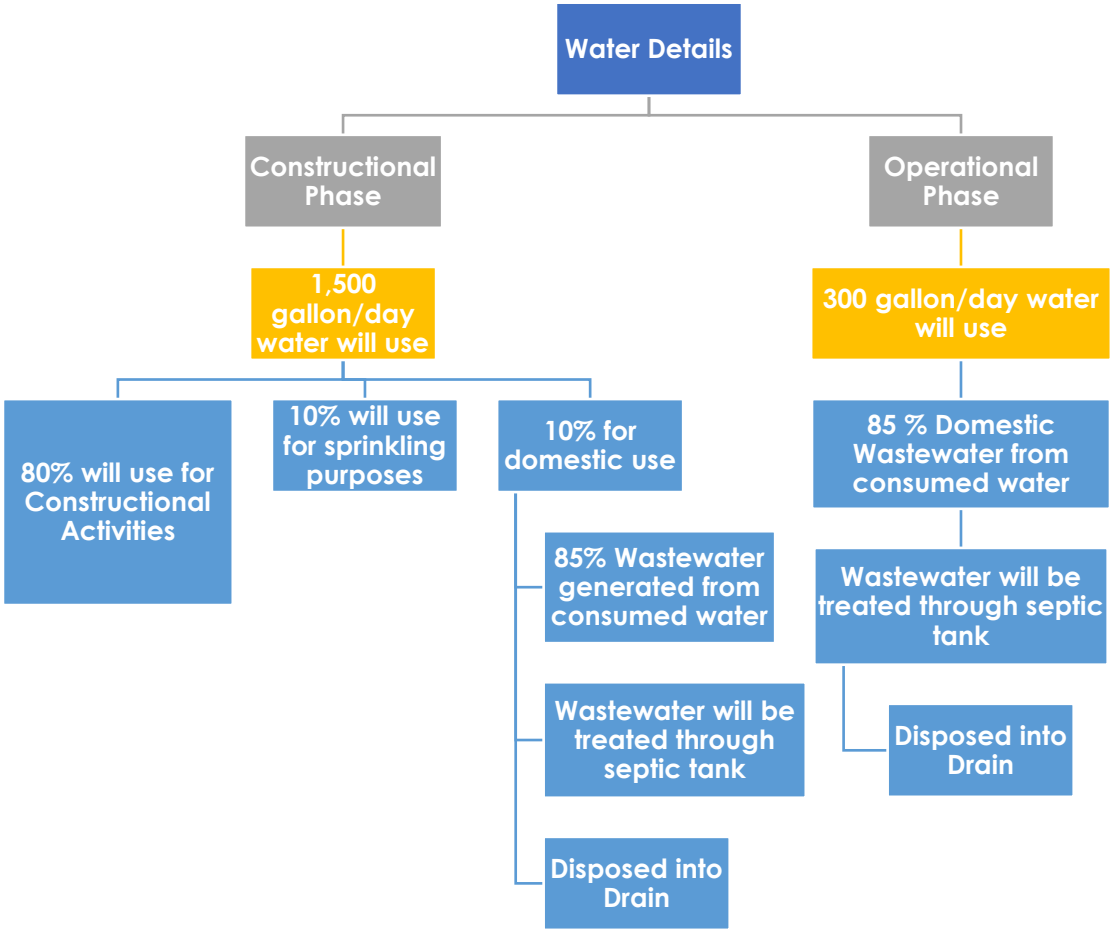


Figure 5-11, Estimated Water Balance for Each Village

5.12 Solid Waste

The amount of solid waste produced during construction phase will be 13.5kg/day for each village. In constructional phase, all waste materials such as landscape and land clearing debris, gravel and aggregate products, concrete, masonry scrap and rubble (brick, concrete masonry, stone), and plastics and paper from cement bags will be recycled during the construction activities and maintenance purposes. Solid waste generated during construction phase will be placed in separate bins. During operation phase, the amount of solid waste will be 2.7 kg/day for each village. Only domestic waste will be produced that will be handed over to local waste contractor.

5.12.1 Waste Management and Disposal

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

a) Fuel, oils, and chemicals;
b) Sewage;
c) Campsite waste;

d) Medical waste;
e) Demolition waste;
f) Packing waste; and,
g) Excess construction material.

Table 5-9, Waste Management Collection and Disposal Techniques

Activity	Best practices
Generation of construction material	• Implement resource conservation, and encourage staff (through training) to reduce waste, reuse waste and recycle waste wherever possible • Prohibit staff from fouling the site
Disposable of recyclable waste	• Sell recyclable waste to local vendors
Disposal of construction material	• Do not burn materials which may lead to the release of toxic or hazardous substances • Do use burn on site when surrounding vegetation is dry and combustible.
Disposal of hazardous	• Handover to specialized and certified disposal contractor
Generation of construction waste	• Reduce construction waste by reusing waste as a fill material (prior to testing to confirm

5.13 Sources of construction material

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

5.14 Machinery & Equipment

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

Table 5-10, Expected Required Machinery / Equipment

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

Contractor will use well-tuned machinery to minimize air pollution and noise. Contractor will never park his machinery on the working area to avoid obstacles in the mobility of commuters. Machinery with poor exhaust and

making nuisance will not be allowed to work on-site.

5.15 Storage of Materials

As this project is of short duration, henceforth, land will be rented out with due mutual discussion between owner of the land and the contractor.

5.16 Description of Work Activities

Following activities are involved during the execution of work.

- Excavation
- Boring/Drilling/Jetting
- Construction of Room
- Plastering & Whitewash
- Installation of Machinery
- Backfilling
- Laying & Fitting of Pipes
- Jointing of Pipes
- Installation of valves
- Disinfection of Installed Water Pipe
- Consumer connections
- Construction of storage tank
- Construction of WWTP

5.17 Construction / Labour Campsite

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

discharge, to drain storm water away from camps and settlements.

5.18 Restoration and Rehabilitation Plans

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

5.18.1 Restoration and Rehabilitation at the End of Project Life

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

5.19 Government & Local Approvals:

The proponent, with the help of EDCS Consultant, will apply for all relevant approvals from government departments and submit all the NOCs to EPA as received.

5.20 Land Requirement & Land Acquisition

Project will be executed on government land. Therefore, no land acquisition is required. If private land has to be acquired as per design criteria and feasibility, owner of that land must be consulted and land should be acquired through proper channel, and for government land; PRMSC must apply for NOC.

5.21 Labor Health & Safety

Contractor will ensure implementation of on-site safety measures to protect area for any mishap / incident / accidents. Contractor will install safety signages to aware public about on-going construction activities. Contractor will also provide information about diversion routes with safety cautions / flagmen. Contractor will also provide personal protective equipment (PPEs) to workers as per nature of their jobs.

5.22 Traffic Management

Contractor will disseminate information about on-going construction activities by installing safety signage for pedestrians as well as traffic. Contractor will install diversion routes sign boards on-site. Flagmen will also be deployed to direct traffic and avoid any mishaps / accidents. Contractor will develop traffic management plan, submit to EDCS Consultant for approval

before the initiation of the project.

5.23 Existence of Utility Services within RoW

Already existing infrastructure like road / brick soling / tuff tiles will be disturbed during the project execution. Contractor will be bound to restore / rehabilitate the site to its original state after the completion of construction works. No tree will be cut. In any case / mishap / misfortune, if a tree has to be cut, utmost efforts will be made to transplant the tree to the nearby open spaces and in case of unavoidable circumstances, for each tree cut, 10 new plants of at least 06 ft. height will be planted. Contractor will be liable to compensate damage to any utility.

5.24 Vegetation Removal / Tree Cutting

The contractor will make every effort to transplant any trees that require removal to suitable nearby open spaces. In cases where transplantation is not feasible, a compensatory plantation ratio of 1:10 will be adopted, whereby ten new saplings of at least 6 feet in height will be planted for each tree removed. Additional plantation will also be undertaken to further enhance the project's environmental sustainability and green cover.

5.25 Area of Impact

The project area is rural in nature. The area of impact would be 100 meters in the periphery of the project. The construction activities are very much limited to reduce impacts on the surrounding area and public.

5.25.1 Direct Impacts

- Project will be temporary hindrance in the movement of transport during its construction phase.
- Project will generate construction waste which can generate solid waste problems temporarily till it will be disposed of on daily basis.
- Mismanagement of construction activities / materials & equipment can directly impact inhabitants along with the alignment of the project.
- Project construction activities may hinder traffic movement along with the alignment.
- Movement of students / commuters across the project alignment will be affected.

5.25.2 Indirect Impacts

- Privacy of women may be disturbed.
- Routine of employees / workers passing through / along the project area might be changed.

SECTION - 6: DESCRIPTION OF ENVIRONMENTAL & SOCIAL BASELINE

6.1 Overview

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

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

6.2 Purpose of Environmental & Social Baseline

Baseline data collection is performed to serve two purposes. First, it helps to understand the current conditions of the area, and how the project needs to be implemented considering these conditions. Second, it helps to assess and predict the possible environmental changes that could occur, once the project is underway.

Baseline data is the data collected about various factors of the project study. This includes;

- Physical – the area, the soil properties, the geological characteristics, the topography, watershed properties, etc.
- Chemical – water, air, noise and soil pollution levels, etc.
- Biological – the biodiversity of the area, types of flora and fauna, species richness, species distribution, types of ecosystems, presence or absence of endangered species and / or sensitive ecosystems etc.
- Socioeconomic – demography, social structure, economic conditions, developmental capabilities, displacement of locals, etc.
- Cultural – location and state of archaeological and / or religious sites.

6.3 General Characteristics of Project Area

The project is for the improvement and development of water supply and sanitation services in following selected villages of Lahore division; as details / names given in following Table 6-1;

Table 6-1, Details / Names of the Villages

Sr. No.	Division	District	Tehsil	Village / Darkha
1.	Lahore	Kasur	Kasur	Rao Khan wala
2.	Lahore	Kasur	Kasur	Orara

Sr. No.	Division	District	Tehsil	Village / Darkha
3.	Lahore	Kasur	Kasur	Rangpur
4.	Lahore	Kasur	Kasur	Peru Wala
5.	Lahore	Kasur	Kasur	Ramiyana
6.	Lahore	Kasur	Kasur	Bugri
7.	Lahore	Kasur	Kasur	Kacha pakka
8.	Lahore	Kasur	Kasur	Qilla ganja
9.	Lahore	Kasur	Chunian	Kotha
10.	Lahore	Kasur	Chunian	Nirmalki
11.	Lahore	Kasur	Pattoki	Shaikham kalan
12.	Lahore	Kasur	Pattoki	Balloki chak no 30
13.	Lahore	Kasur	Pattoki	Bath Kalan and allied abadies, UC Bath Kalan
14.	Lahore	Kasur	Pattoki	Village Megha and Allied Abbadies
15.	Lahore	Kasur	Pattoki	Kanwain Malian
16.	Lahore	Kasur	Pattoki	Hanjarwal
17.	Lahore	Kasur	Kasur	Mahalam, Tehsil Kasur
18.	Lahore	Kasur	Kasur	Sandah, Tehsil Kasur
19.	Lahore	Kasur	Kasur	Village Ghaniye Key, UC Handal, Tehsil Kot Radha Kishan
20.	Lahore	Kasur	Kasur	Village Meer Muhammad, UC Sattoki
21.	Lahore	Kasur	Kasur	Nathey khalisa
22.	Lahore	Kasur	Kasur	Hanjarwal 31 Chak
23.	Lahore	Nankana	Nankana	Syedwala, Tehsil Nankana
24.	Lahore	Nankana	Nankana	Bucheki, Tehsil Nankana
25.	Lahore	Nankana Sahib	Sangla Hill	Chak #116 ghullay bajwa Ladhar
26.	Lahore	Nankana Sahib	Sangla Hill	Chak no. 45/RB Dara Jaat (Izafi Abadi)
27.	Lahore	Nankana Sahib	Shahkot	Burala chak NO 182 RB
28.	Lahore	Nankana Sahib	Nankana Sahib	Check NO 8 GB Annad garrh
29.	Lahore	Nankana Sahib	Nankana Sahib	Murtaza Salimpur Pakka Jamalpur, Tehsil Nankana Sahib
30.	Lahore	Nankana Sahib	Nankana Sahib	Jhok Chak 03 Bhucckoki Khayi, Tehsil Nankana Sahib
31.	Lahore	Nankana Sahib	Nankana Sahib	Chak 23/76
32.	Lahore	Nankana Sahib	Nankana Sahib	Mouza Rajab
33.	Lahore	Sheikhupura	Ferozewala	Bhondary

Sr. No.	Division	District	Tehsil	Village / Darkha
34.	Lahore	Sheikhupura	Muridke	Marri Chehlan
35.	Lahore	Sheikhupura	Ferozewala	Kalar
36.	Lahore	Sheikhupura	Ferozewala	Wandala Nasir Khan
37.	Lahore	Sheikhupura	Ferozewala	Baway di Kutiya
38.	Lahore	Sheikhupura	Ferozewala	Bhully andron
39.	Lahore	Sheikhupura	Muridke	Village Bharhat-Karrol District Sheikhupura
40.	Lahore	Sheikhupura	Muridke	Village Boli Salamat Pura
41.	Lahore	Sheikhupura	Ferozewala	Village Mansoorabad
42.	Lahore	Sheikhupura	Ferozewala	Village Balarkay

If any additional village or settlement is included in the project at a later stage by the Government of Punjab, it will be accommodated within the scope of this same EIA. Division enjoys an extensive and well-developed road network, making it one of the most accessible regions in Punjab. It is strategically located at the crossroads of major national and provincial highways, connecting central Punjab to northern and southern Pakistan. The National Highway N-5 (GT Road) and M-2 Motorway provide north-south connectivity between Lahore, Sheikhupura, Nankana Sahib, and Kasur, and further link to Islamabad, Multan, and Karachi. The Lahore Ring Road facilitates intra-city and inter-district mobility, reducing travel time and congestion within the metropolitan area.

Additionally, the Lahore–Kasur, Lahore–Sheikhupura, and Lahore–Nankana Sahib road corridors are primary routes for passenger and freight transport. Feeder and rural access roads under the Punjab Highway Department and local governments connect smaller towns and rural settlements to major trade centers. The division's road infrastructure supports heavy industrial transport, agricultural logistics, and urban commuting. However, increasing vehicular pressure, poor maintenance in peripheral districts, and encroachment in rural link roads remain key challenges to sustainable transport efficiency.

6.4 Physical Resources

6.4.1 Geography, Geology, and Soils

Lahore Division lies in the alluvial plains of the Punjab region, bounded by the River Ravi to the north and the Sutlej Basin to the south. The topography is generally flat, with gentle slopes from northeast to southwest. Geologically, the division is underlain by Quaternary alluvium deposits comprising fine to coarse sand, silt, and clay layers. These alluvial sediments have been deposited by the Ravi and its distributaries over centuries, creating fertile and well-drained soils ideal for agriculture.

The soils of Lahore Division are predominantly loamy and alluvial, rich in

minerals and organic matter. They are classified as Aridisol and Entisol groups, suitable for multiple cropping cycles when irrigated. In Kasur and Sheikhupura, the soils tend to be slightly alkaline, while parts of Lahore show localized salinity due to urbanization and poor drainage. Continuous groundwater extraction and unregulated construction are causing gradual soil compaction, reducing infiltration capacity and posing challenges for sustainable agriculture.

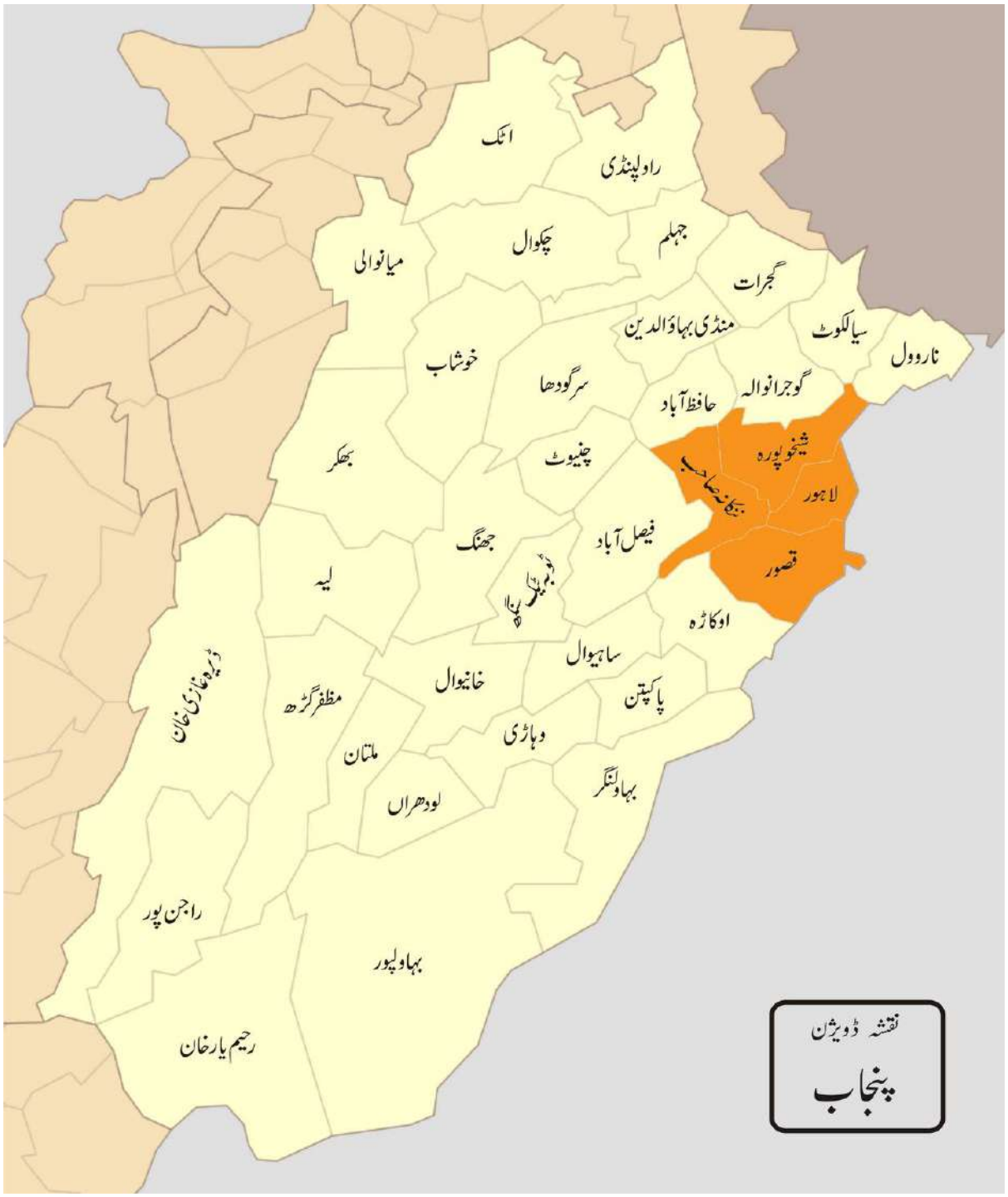


Figure 6-1, Map of Lahore Division

6.4.2 Topography

Topographically, Lahore Division forms part of the flat Indo-Gangetic Plain, with altitudes ranging from 180 to 230 meters above mean sea level. The terrain gently slopes from northeast to southwest, following the natural gradient of the Ravi River. Minor undulations occur in areas near river terraces and abandoned channels. The plain's uniform surface supports extensive agricultural and urban development, but it also increases vulnerability to flooding during monsoon rains, especially in low-lying areas of Kasur and along Hadiara Drain.

In urban Lahore, artificial topographic changes—such as elevated roads, embankments, and drainage channels—have modified natural drainage. The Lahore Canal system provides both irrigation and recreational value, while the Changa Manga forest region in Kasur introduces minor elevation variation due to man-made plantation mounds. Overall, the region's flat topography supports dense settlement, efficient road connectivity, and large-scale irrigation infrastructure.

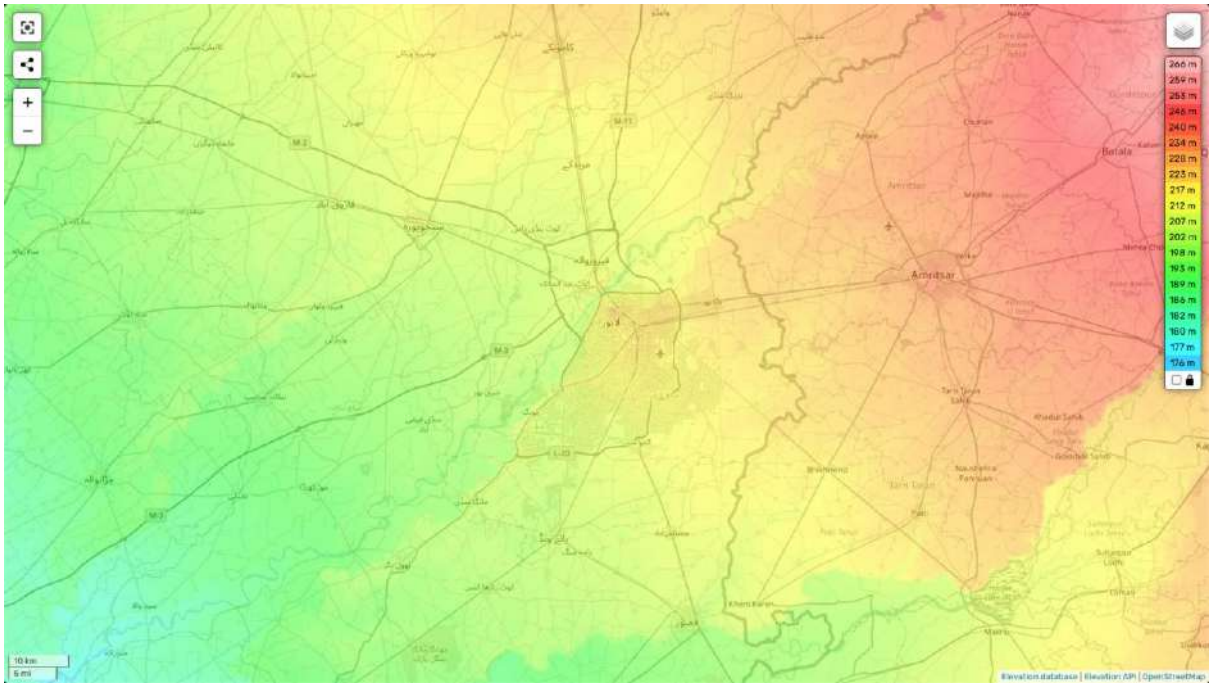


Figure 6-2, Topographical Map of Lahore Division

6.4.3 Climate and Temperature

Lahore Division lies within the subtropical, semi-arid climatic zone of Punjab, characterized by distinct summer, monsoon, winter, and transitional seasons. The climate is primarily influenced by the southwest monsoon winds from the Indian Ocean and continental air masses from the northwest. The seasonal variations are sharp, with hot and dry summers, humid monsoon months, mild winters, and short spring and autumn transitions.

Summer Season (April–June)

The summer season dominates the climatic cycle, beginning in April and intensifying through May and June. During this period, maximum

temperatures often exceed 43–45°C, particularly in the southern parts of Kasur and Sheikhupura districts. The combination of high temperature, low relative humidity, and clear skies leads to high evapotranspiration rates, stressing crops and urban vegetation. Dust storms and hot winds locally known as loo are common, especially during late May and early June.

Urban areas such as Lahore experience pronounced urban heat island effects, caused by dense construction, vehicular emissions, and limited vegetation cover. Consequently, Lahore often records temperatures 2–3°C higher than surrounding rural areas. The summer season also marks the pre-monsoon buildup, with occasional thunderstorms triggered by local convection.

Monsoon Season (July–September)

The southwest monsoon brings a dramatic shift in temperature and humidity. Average monthly temperatures decline to 30–35°C, while relative humidity rises to 70–80%. The division receives the majority of its annual rainfall during this period, averaging 350–400 mm. The monsoon rains provide much-needed relief from the intense summer heat but can also result in urban flooding due to poor drainage infrastructure, particularly in low-lying zones of Lahore and Kasur.

The monsoon also supports agricultural productivity by replenishing soil moisture and recharging shallow aquifers. However, in recent years, climate change has made monsoon patterns more erratic, with concentrated short-duration downpours followed by long dry spells, affecting both urban and rural hydrology.

Winter Season (November–February)

The winter season is cool and dry, characterized by clear skies and reduced humidity. Average daily temperatures range from 8°C to 20°C, though cold waves occasionally bring the temperature down to 3–5°C, especially in January. Fog is a recurrent phenomenon during December and January, causing visibility issues and transportation disruptions along highways and railways.

Lahore experiences radiation fog due to high humidity, low wind speeds, and temperature inversion during calm nights. The winter months also witness the worst air quality levels, as temperature inversion traps vehicular and industrial pollutants near the ground.

Spring and Autumn (March, October–November)

Spring (March) and autumn (October–November) are short but pleasant transitional periods with moderate temperatures ranging between 20°C and 30°C. These seasons are conducive for outdoor activities and agriculture, particularly for sowing wheat and harvesting rice and sugarcane.

Climatic Trends and Climate Change Implications

Recent climatic analyses indicate a rising temperature trend across Lahore Division, with the annual mean temperature increasing by about 0.8°C over the past three decades. The frequency of heat waves, intense rainfall events, and urban flooding has also increased. Declining wind speeds, coupled with high atmospheric particulates, have worsened Lahore's air quality index (AQI), often reaching hazardous levels during winter months.

The urban heat island effect is intensifying due to rapid urbanization, loss of tree cover, and increased impervious surfaces. Mitigation strategies such as urban greening, reflective roofing, improved drainage, and sustainable city planning are critical for climate adaptation.

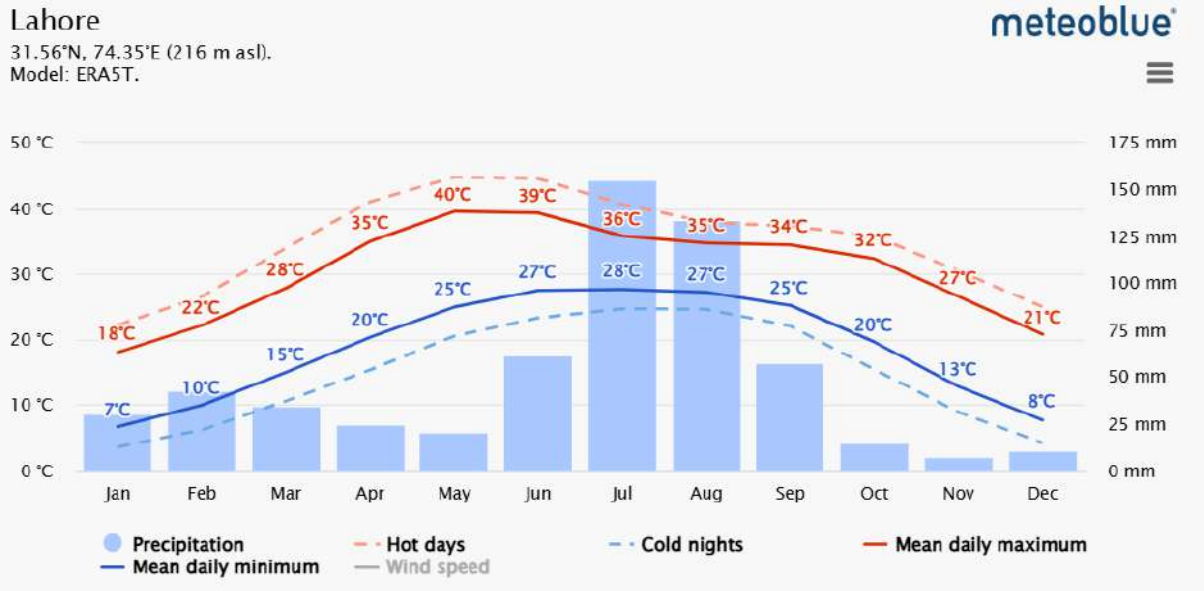


Figure 6-3, Average Annual Maximum and Minimum Temperature, and Precipitation – Lahore

6.4.4 Rainfall

Rainfall in the Lahore Division is highly seasonal and primarily governed by the Southwest Monsoon System, which originates from the Bay of Bengal and the Arabian Sea. The division's rainfall pattern is monomodal, with a distinct wet season from July to September and prolonged dry spells during the remaining months of the year. The average annual rainfall ranges between 600 mm and 700 mm, with considerable spatial and temporal variability across districts.

Monsoon Rainfall (July–September)

The monsoon period contributes approximately 65–75% of the annual rainfall. Heavy showers occur due to the convergence of moist monsoon currents with westerly disturbances. These rains are typically of high intensity but short duration, leading to localized flooding, especially in urban and peri-urban areas of Lahore and Kasur.

Lahore city often records intense rainfall events exceeding 100 mm within a few hours, resulting in urban inundation due to insufficient drainage capacity. The low-lying settlements and old city areas are particularly vulnerable. Kasur

and Sheikhupura, being less urbanized, experience better natural infiltration and runoff dispersion. However, waterlogging in agricultural fields during continuous monsoon spells affects rice and fodder crops.

Pre-Monsoon Showers (May–June)

Occasional pre-monsoon thunderstorms occur in late May and June due to local convection and western disturbances. These early rains temporarily lower temperatures but are often accompanied by gusty winds, dust storms, and lightning, which can cause minor infrastructural damage and crop losses.

Pre-monsoon rains are beneficial for reducing heat stress and preparing agricultural lands for kharif sowing, though their erratic nature makes prediction difficult.

Winter Rainfall (December–February)

Winter rainfall in Lahore Division is primarily associated with western disturbances originating from the Mediterranean region. These systems bring light to moderate rainfall, usually between 20–50 mm per month. Although the total precipitation is limited, it plays a crucial role in replenishing soil moisture and supporting rabi crops, particularly wheat and mustard.

In some years, the absence of winter rains results in prolonged dry spells and reduced groundwater recharge. Conversely, when combined with low temperatures, excessive winter rains may damage ripening crops and delay harvesting operations.

Spatial Variations

Rainfall distribution across Lahore Division is not uniform. Lahore District receives the highest rainfall (average 700 mm annually) due to greater exposure to monsoon currents and urban convective uplift.

Kasur District averages around 600 mm per year, with slightly less intense monsoon activity.

Sheikhupura District and Nankana Sahib District receive between 550–650 mm annually, depending on local topography and proximity to storm tracks.

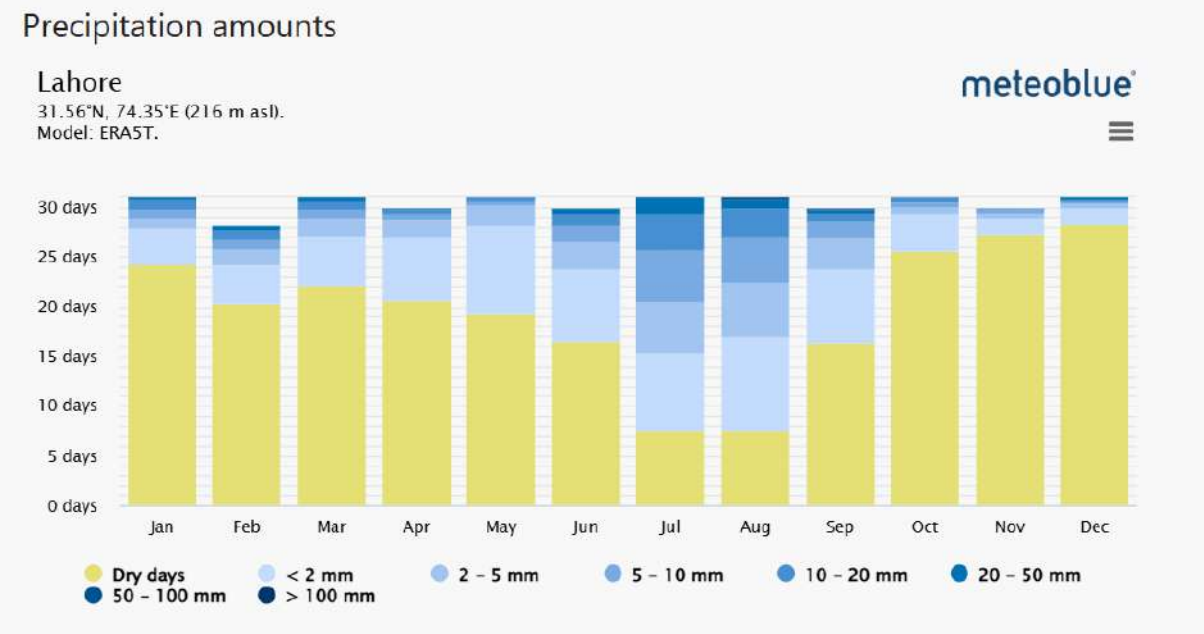


Figure 6-4, Annual Precipitation

6.4.5 Wind Speed and Direction

The wind patterns in the Lahore Division are shaped by its geographic position on the plains of the Punjab region and are strongly influenced by the Southwest Monsoon in summer and the Western Disturbances in winter. Winds show clear seasonal variations in both speed and direction, influencing the local climate, dispersion of air pollutants, and agricultural evapotranspiration.

During the summer months, winds mainly blow from the southwest and southeast due to the influence of the monsoon system and thermal low-pressure zones over the Indo-Gangetic Plain. Average wind speeds range from 8 to 15 km/h, though speeds may rise to 25–30 km/h during pre-monsoon dust storms and thunderstorms. These pre-monsoon winds are typically hot and dry, contributing to hazy conditions and dust accumulation, particularly in the more urbanized areas such as Lahore and Sheikhupura. With the onset of monsoon rains, winds shift to the east-southeast, bringing moist, cooler air that relieves the summer heat. Intense thunderstorms, often accompanied by squalls exceeding 50 km/h, occasionally cause minor infrastructural and agricultural damage but help disperse air pollution and improve visibility.

In winter, the dominant wind direction shifts to the north and northwest as continental high-pressure systems prevail over Central Asia. Wind speeds during this season are lower, usually between 4 and 8 km/h, and the air remains cool and dry. These calm conditions often lead to temperature inversions that trap pollutants close to the surface, contributing to Lahore's well-known smog episodes between November and January. The transitional months of March and October bring variable winds with moderate speeds between 6 and 10 km/h, as weather systems shift from winter to summer or vice versa, creating pleasant climatic conditions.

Overall, wind speeds across the Lahore Division are moderate, averaging around 8–12 km/h annually, with occasional gusts exceeding 40 km/h during storm events. The prevailing directions—northwesterly in winter and southeasterly in summer—play a vital role in local microclimates, pollution dispersion, and the sustainability of agricultural systems. In rural areas such as Kasur and Nankana Sahib, consistent summer winds hold potential for small-scale renewable energy generation, especially when combined with solar systems.

From an environmental management perspective, understanding the wind regime is crucial for effective urban and industrial planning. It informs the siting of emission sources, solid waste facilities, and residential areas to minimize human exposure to air pollutants. At the same time, the increased frequency of dust storms and gusty winds in recent years, linked to deforestation and changing land use, underscores the need for afforestation, shelterbelts, and soil conservation practices to protect both rural and peri-urban landscapes.

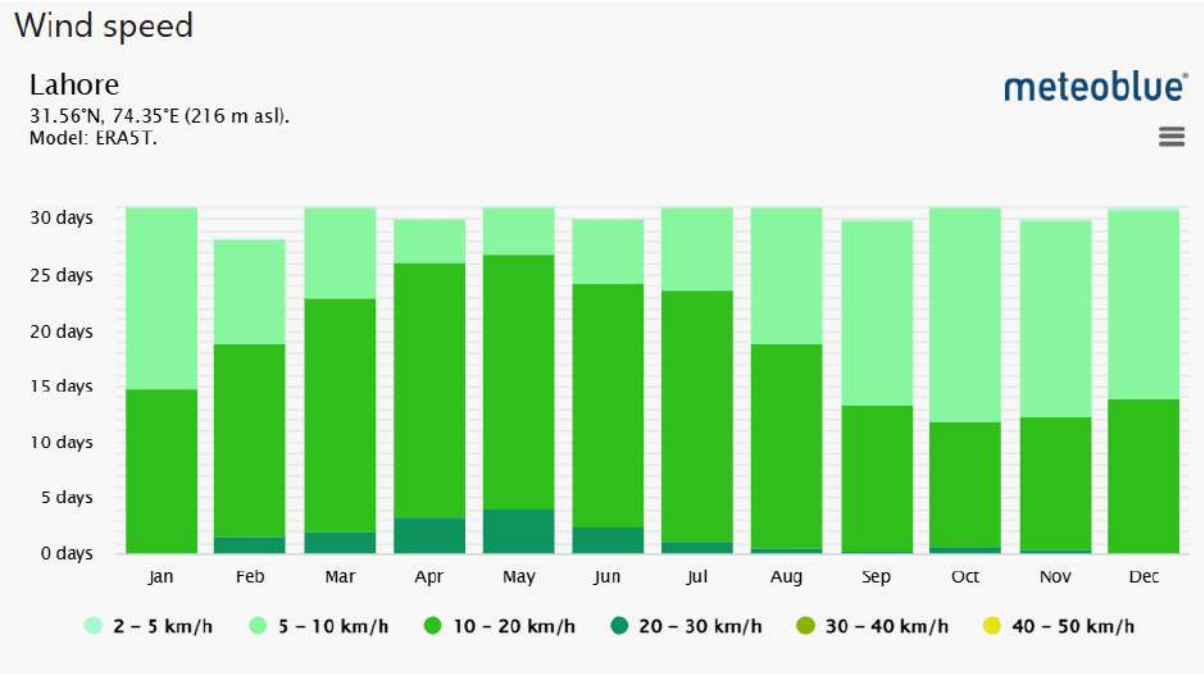


Figure 6-5, Wind Speed

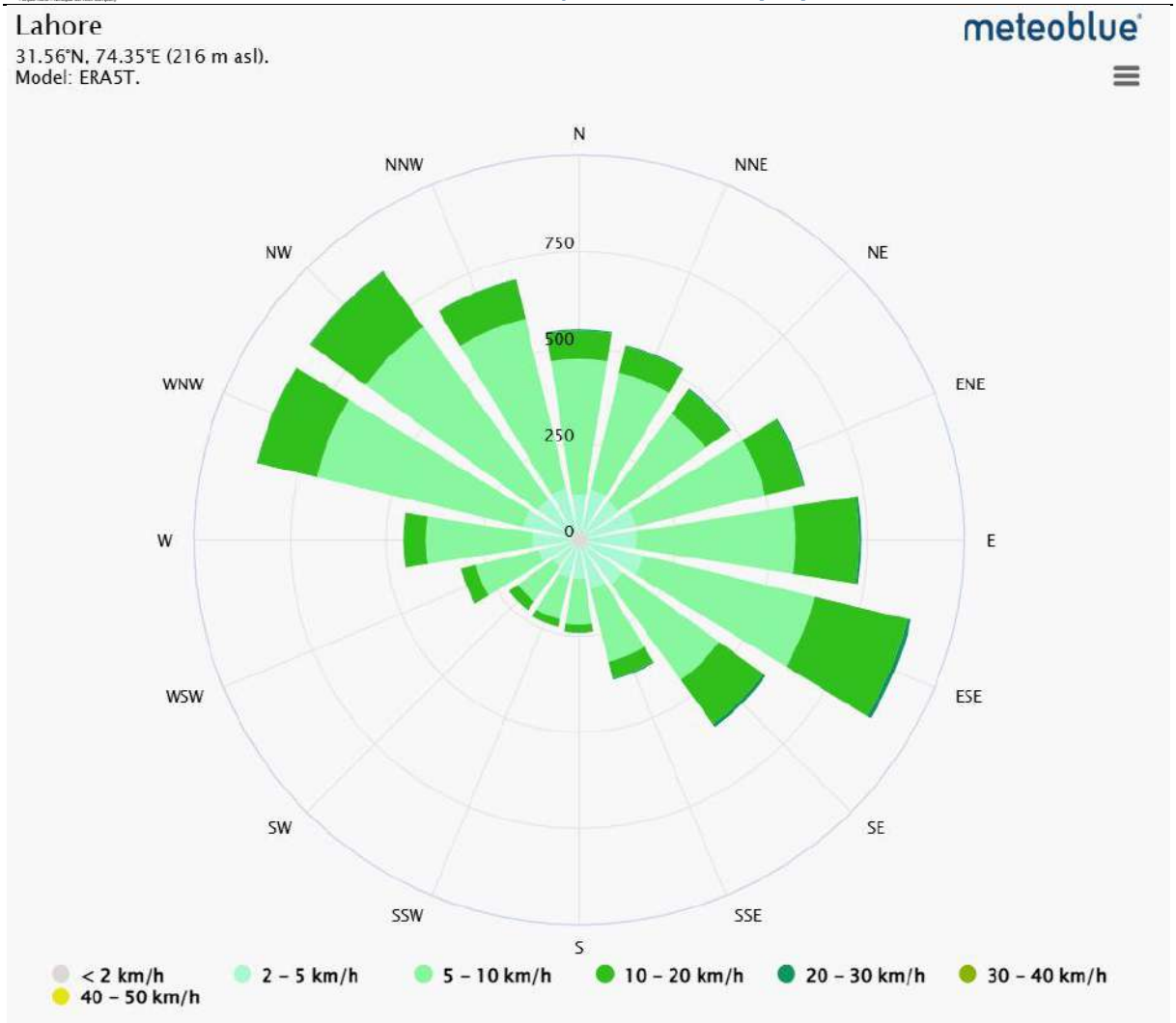


Figure 6-6, Wind Rose

6.4.6 Seismicity

According to Seismic Zoning of Pakistan, Lahore Division lies in a relatively low to moderate seismic activity zone compared to northern regions of Pakistan. The area is classified as Seismic Zone 2B under the Building Code of Pakistan (Seismic Provisions–2007), which indicates a moderate level of seismic hazard. Although not located in the country's primary earthquake-prone belt, the division occasionally experiences mild to moderate tremors originating from distant seismic sources in northern Pakistan, Afghanistan, and the Himalayan foothills.

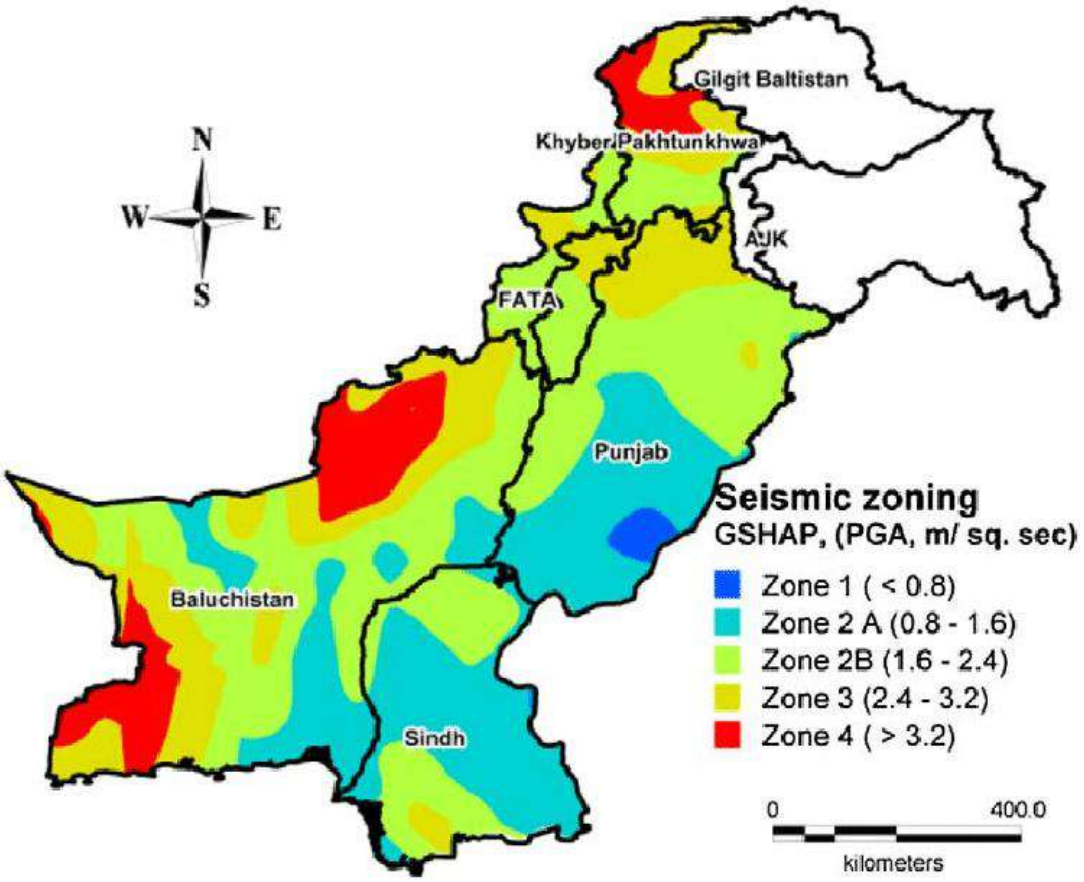


Figure 6-7, Seismic Zones of Pakistan

6.4.7 Ground Water and Water Supply

Groundwater serves as the primary source of water supply across the Lahore Division, catering to domestic, agricultural, and industrial needs. The division lies on the Indo-Gangetic alluvial plain, which hosts one of the most extensive and productive aquifer systems in South Asia. This aquifer extends across Lahore, Kasur, Sheikhupura, and Nankana Sahib districts, comprising unconsolidated alluvial deposits of sand, silt, and clay, allowing high permeability and substantial storage capacity. However, intensive abstraction and rapid urbanization have led to declining groundwater levels and deteriorating water quality, particularly in and around Lahore city.

In Lahore District, groundwater is the principal source of municipal and industrial supply. The Water and Sanitation Agency (WASA) operates over 600 deep tube wells to serve urban areas, drawing water from depths ranging between 120 and 250 feet. The aquifer's yield is generally high, but continuous over-extraction—estimated at more than 1.2 billion cubic meters annually—has led to a steady groundwater decline of 1–3 feet per year. The problem is most severe in central and northern Lahore, where groundwater levels have dropped below 150 feet, compared to 30–40 feet a few decades ago. The situation is exacerbated by reduced recharge due to urban paving, encroachment of recharge zones, and disruption of natural drainage channels.

In Kasur District, the aquifer is comparatively shallow, with tube wells generally tapping water between 50 and 120 feet. While the groundwater quantity is sufficient, quality concerns are significant. The area faces contamination from tannery effluents, agricultural chemicals, and high salinity levels, rendering groundwater unsuitable for direct domestic consumption in several localities. In Sheikhupura and Nankana Sahib, the aquifer remains relatively stable, though industrial expansion around the Lahore–Sheikhupura corridor has raised risks of nitrate and heavy metal contamination. These districts depend heavily on private tube wells and hand pumps for rural water supply, and seasonal variations in water table levels are common due to agricultural withdrawals.

Groundwater quality across the division shows considerable variation. In urban Lahore, bacteriological contamination, arsenic, and total dissolved solids (TDS) levels exceeding WHO limits have been reported in several areas. In peri-urban and rural settlements, mixing of domestic wastewater and inadequate sanitation infrastructure further aggravate the problem. According to studies conducted by PCRWR and WASA, arsenic concentrations in some eastern and southern parts of Lahore exceed 50 µg/L, posing long-term public health risks.

Surface water resources, while limited, contribute to local recharge and supplemental supply. The Ravi River, flowing along the eastern boundary of the division, plays a vital hydrological role but is heavily polluted with untreated municipal and industrial effluents. Canal networks such as the BRB (Bambawali–Ravi–Bedian) Canal, Upper Chenab Canal, and Qadirabad–Balloki Link Canal provide irrigation water and aid in localized recharge during the cropping seasons. However, canal seepage alone cannot compensate for the massive groundwater abstraction rates observed in recent years.

Efforts to address these challenges include the promotion of rainwater harvesting, artificial recharge wells, and groundwater monitoring systems. WASA and the Punjab Irrigation Department are implementing pilot projects aimed at aquifer replenishment through stormwater infiltration basins. Long-term sustainability will depend on the adoption of integrated water resource management approaches that balance urban water demand, agricultural needs, and ecological protection of the aquifer system.

In summary, while Lahore Division possesses a robust and widespread groundwater system, the increasing stress from population growth, industrial activity, and unsustainable extraction has placed the resource under significant pressure. Coordinated management interventions, stringent pollution control, and the restoration of natural recharge mechanisms are essential to secure a reliable and safe water supply for future generations.

Current project is for the improvement and development of water supply &

sanitation services in villages of Lahore division. To check the quality of the water in the area, ground water sample was collected by field officers of Solution Environmental & Analytical Laboratory Pvt. Ltd. (SEAL) – an EPA Certified Lab, and analyzed. Pictorial View of environmental monitoring / sampling is given below in Figure 6-8. The detail of the water quality of the project area is given below:

Table 6-2, Ground Water Analysis Results in Lahore Division

Parameter	Method	Unit	Result	PEQS
pH	APHA 4500-H^+ B	--	7.89	6.5-8.5
Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	829	1000
Chloride	4500- APHA Cl^- B	mg/l	54.4	250
Fluoride	APHA 4500-F^- D	mg/l	0.01	1.5
Taste	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
Odour	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
Colour	APHA 2120 B	TCU	0.12	15
Nitrate (as NO_3^-)	APHA 4500-NO^{3-} E	mg/l	0.1	50
Nitrite (as NO_2^-)	APHA 4500-NO^{2-} B	mg/l	0.0	3
Lead	APHA-Pb B	mg/l	BDL	0.05
Total Hardness as $CaCO_3$	APHA 2340 C	mg/l	128.4	500
Turbidity	APHA 2130 B	NTU	1.7	5
Zinc	APHA 3500-Zn B	mg/l	0.1	5
Aluminum	APHA 3111 D	mg/l	0.0	0.2
Chromium	APHA 3500-Cr B	mg/l	0.1	0.050
Cadmium	APHA 3500-Cd D	mg/l	0.0	0.01
Copper	APHA 3500-Cu C	mg/l	0.0	2
Boron	APHA 4500-B C	mg/l	0.068	0.300
Barium	APHA 3111 B	mg/l	0.047	0.700
Antimony	APHA 3114 C	mg/l	0.0	0.020
Sodium	APHA 3114 C	mg/l	91.0	200
Cyanide	APHA 4500-CN^- D	mg/l	0.006	0.05
Manganese	APHA 3113B	mg/l	0.0	0.5
Nickel	APHA 3111 B	mg/l	0.0	0.020
Residual Chlorine	APHA 4500-Cl_2	mg/l	0.267	0.2 – 0.5
Total Coliform	APHA 9222 B	Number/100 ml	0	0/100 ml
Thermo Coliform	APHA 9222 B	Number/100 ml	0	0/100 ml
E. coli	APHA 9222 C	Number/100 ml	0	0/100 ml

6.4.8 Surface Water

Surface water in the Lahore Division is primarily defined by the Ravi River and an intricate network of irrigation canals, including the BRB Link Canal and the Lahore Branch Canal. While these sources are historically vital for the region's agricultural landscape, they currently play a minimal role in direct domestic water supply. Instead, the Ravi River acts as the most critical source of groundwater recharge, contributing over 80% of the replenishment for the city's aquifer. The Lahore Branch Canal, which flows through the heart of the city, serves the dual purpose of irrigating roughly 400,000 acres of land and providing a scenic public space that aids local environmental cooling.

However, the surface water system faces severe ecological challenges as of 2025. The Ravi River has suffered from extreme pollution due to the discharge of untreated municipal and industrial wastewater, often leaving its flow stagnant or toxic during the dry season. Furthermore, much of the division's surface water potential is lost through inefficiency; nearly 60% of irrigation water is lost during conveyance, and a significant portion of the city's annual monsoon runoff—roughly 0.52 million acre-feet—is wasted as it flows into drainage channels like the Hudiara Drain without being harvested or utilized.

To combat the rapid depletion of the water table, which falls at a rate of nearly three feet annually, authorities are shifting toward surface water utilization. Current initiatives led by WASA Lahore include the development of surface water treatment plants designed to divert and treat water from the BRB Canal for residential use. Additionally, the Pakistan Council of Research in Water Resources (PCRWR) is expanding the use of artificial recharge wells to capture rainwater, while new wastewater treatment plants at Babu Sabu and Kattar Band are aimed at restoring the health of the Ravi River by 2026.

6.4.9 Air Quality

The project area is situated within the Lahore division, a region characterized by a chronic and severe air quality crisis, particularly during the winter months (October to February). As of December 23, 2025, the baseline ambient air quality in Lahore city is recorded at an Air Quality Index (AQI) of approximately 193, with real-time fluctuations reaching peaks of 310 to 350. These levels are classified as "Hazardous" to "Very Unhealthy" under both national and international standard scales. Monitoring data identifies PM2.5 (fine particulate matter) as the primary pollutant of concern, with concentrations frequently exceeding the Punjab Environmental Quality Standards (PEQS) and World Health Organization (WHO) safety limits by significant margins.

Regional data indicates that the pollution is not confined to the urban core but is pervasive across the entire division. Neighboring districts such as Kasur and Sheikhupura have recently reported AQI levels ranging from 169 to 227, often surpassing the city center's readings due to concentrated industrial activity and agricultural residue burning. This regional degradation is

exacerbated by seasonal temperature inversion, which traps pollutants—including vehicular emissions, industrial smoke, and dust—close to the surface, creating the dense smog typical of the Punjab plains in late December.

The current atmospheric ecosystem in the division is under extreme stress, with secondary pollutants such as nitrogen oxides (NOx) and ground-level ozone (O3) also exceeding permissible standards. This baseline condition indicates that the local environment has a limited carrying capacity for additional emissions. Consequently, any proposed project activities during both construction and operational phases must incorporate rigorous mitigation measures—such as advanced dust suppression, emission controls for heavy machinery, and strict adherence to the Environment Protection Department (EPD) protocols—to avoid further compromising the health and safety of the surrounding communities and the local ecological balance.

The monitoring was carried out at designated location by the filed officers of Solution Environmental and Analytical Laboratory Pvt. Ltd. on 16th October, 2025 for the period of 24 hours to determine the baseline ambient air quality of the area and results are presented in Table 6-3. Pictorial view of environmental monitoring / sampling is given below in Figure 6-8.

Table 6-3, Ambient Air Monitoring Results in Lahore Division

Parameter	Method	Unit	Result	PEQS
Particulate Matter (PM_{10})	40 CFR Part 50, App J (US-EPA)	µg/m³	146.8	150
Particulate Matter ($PM_{2.5}$)	40 CFR Part 50, App J (US-EPA)	µg/m³	33.7	35
Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m³	4.8	5
Oxides of Nitrogen as (NO & NO_2)	40 CFR Part 50, App F (US-EPA)	µg/m³	98.5	120
Sulphur dioxide (SO_2)	EQSA-0197-114 (US-EPA)	µg/m³	99.2	120

6.4.10 Noise

Noise from vehicles and other powered mechanical equipment is intermittent. There are also the occasional calls to prayer from the PA systems at the local mosques but there are no significant disturbances to the quiet rural setting. However, the construction from the proposed power expansion will use powered mechanical equipment. Subjective observations were made of background noise and also of individual vehicle pass by events.

Noise level of the project area was monitored by field representative of Solution Environmental and Analytical Laboratory Pvt. Ltd. (SEAL) on 16th October, 2025 for the period of 24 hours to determine the baseline noise levels at project site using digital sound meter and the results are presented in Table 6-4Table 6-4. Pictorial view of environmental monitoring / sampling is given below in Figure 6-8.

Table 6-4, Noise Level Monitoring Results in Lahore Division

Sr. No.	Time	Noise dB(A)	Day/Night	PEQS
1	06:00 AM	59.5	Day Time	75
2	07:00 AM	59.1		
3	08:00 AM	58.9		
4	09:00 AM	61.8		
5	10:00 AM	62.4		
6	11:00 AM	63.8		
7	12:00 PM	62.4		
8	01:00 PM	68.5		
9	02:00 PM	65.4		
10	03:00 PM	62.4		
11	04:00 PM	61.5		
12	05:00 PM	63.5		
13	06:00 PM	62.2		
14	07:00 PM	62.1		
15	08:00 PM	61.3		
16	09:00 PM	62.9		
17	10:00 PM	59.9		
Average Noise Level		**62.21 dB(A)**		
18	11:00 PM	57.4	Night Time	65
19	12:00 AM	55.9		
20	01:00 AM	53.4		
21	02:00 AM	49.1		
22	03:00 AM	47.5		
23	04:00 AM	47.2		
24	05:00 AM	46.8		
Average Noise Level		**51.04 dB(A)**		

Figure 6-8, Pictorial View of Environmental Monitoring / Sampling

6.5 Biological Resources

6.5.1 Wildlife, Fisheries and Aquatic Biology

The Lahore Division hosts a diverse range of wildlife, fisheries, and aquatic species that are typical of the central Punjab plains, although their abundance and distribution have been significantly influenced by urbanization, agriculture, and habitat modification. The division's landscape, comprising riverine belts, agricultural fields, wetlands, parks, and man-made reservoirs, provides habitats for both terrestrial and aquatic fauna. However, the expansion of human settlements and industrial zones, particularly around Lahore and Sheikhupura, has placed increasing pressure on natural ecosystems, leading to habitat fragmentation and a decline in native biodiversity.

The terrestrial wildlife of the division mainly includes small to medium-sized mammals such as Indian mongoose (Herpestes javanicus), wild boar (Sus scrofa), jackal (Canis aureus), Indian hare (Lepus nigricollis), porcupine (Hystrix indica), and palm squirrel (Funambulus pennantii). In the rural and peripheral areas, especially near forest patches of Balloki, Rakh Dera Chahal, and Changa Manga, populations of hog deer (Axis porcinus), jungle cat (Felis chaus), and various rodent species are also reported. Birds constitute the most visible component of the region's wildlife. Resident and migratory species such as black drongo, myna, parakeet, pied bush chat, cattle egret, kingfisher, kites, and doves are common, while winter migratory birds including teal, pintail, mallard, and pochard frequent the wetlands and riverine habitats from November to February.

The wetlands and aquatic ecosystems of the division, although reduced in extent, remain crucial for maintaining ecological balance. Major aquatic habitats include the Ravi River, Balloki Headworks, Barki ponds, Kanjhar Drainage Wetlands, and numerous village ponds and irrigation channels.

These provide breeding and feeding grounds for fish, amphibians, and waterfowl. Common fish species include rohu (Labeo rohita), mori (Cirrhinus mrigala), thaila (Catla catla), and singhara (Mystus seenghala), which are both naturally occurring and commercially cultivated. The Punjab Fisheries Department manages fish seed production and stocking programs in ponds and headworks reservoirs, supporting rural livelihoods and local food supply chains.

However, aquatic biodiversity faces increasing threats from untreated industrial effluents, agricultural runoff, and sewage discharge, particularly in the Ravi River. The river is now among the most polluted water bodies in Pakistan, with high levels of chemical oxygen demand (COD), biochemical oxygen demand (BOD), and heavy metals that severely affect fish populations and aquatic vegetation. Similarly, the destruction of riparian vegetation, excessive sand mining, and alteration of natural flow regimes have degraded habitats essential for amphibians, reptiles, and nesting birds.

To counter these impacts, government initiatives are underway to restore and protect aquatic habitats through the Ravi Riverfront Urban Development Project and Punjab Fisheries Development initiatives, which aim to balance ecological health with controlled human activity. Community-based conservation programs, school awareness campaigns, and fisheries co-management models are also being promoted to sustain fish populations and improve water quality.

In conclusion, while the Lahore Division retains a moderate level of wildlife and aquatic diversity, human-induced pressures continue to threaten ecological balance. Protection of remaining natural habitats, pollution control, wetland restoration, and public engagement are essential to conserving the division's terrestrial and aquatic biodiversity for the long term.

Wild Boar

Jackal

Palm Squirrel

Rohu Fish

Figure 6-9, Fauna in Lahore

6.5.2 Vegetation Cover and Trees

The vegetation cover and tree resources of the Lahore Division are typical of the subtropical thorn forest ecosystem that once dominated the central Punjab plains. However, extensive urbanization, agricultural expansion, and deforestation have greatly altered the region's natural landscape, leading to the loss of native vegetation and the dominance of cultivated, ornamental, and exotic species. Today, the division's vegetation is a mosaic of agricultural crops, urban plantations, roadside trees, parks, and remnant forest patches that still play an essential role in moderating the microclimate, supporting biodiversity, and improving environmental quality.

Historically, the natural vegetation of the Lahore region was characterized by dry subtropical scrub and thorn forests, dominated by species such as kikar (Acacia nilotica), farash (Tamarix aphylla), bair (Zizyphus jujuba), khabal (Salvadora oleoides), and jand (Prosopis cineraria). These trees were well adapted to semi-arid conditions and poor soils, providing shade, fodder, and fuelwood for rural communities. With increasing irrigation and cultivation, most of the natural scrubland was cleared to make way for intensive agriculture, particularly wheat, rice, and sugarcane fields.

At present, vegetation cover varies across the districts of the division. Lahore District is largely urbanized, and its vegetation consists primarily of roadside plantations, urban parks, gardens, and green belts. Common species include neem (Azadirachta indica), shisham (Dalbergia sissoo), amaltas (Cassia fistula), gulmohar (Delonix regia), and ficus species such as banyan and peepal, which are planted for their aesthetic and shading value. The Shalimar Gardens, Lawrence Gardens (Bagh-e-Jinnah), and Racecourse Park serve as significant urban green spaces. The city also has ongoing afforestation and beautification programs under the Parks and Horticulture Authority (PHA) and Urban Unit Punjab, which promote the planting of climate-resilient native trees.

In Kasur, Sheikhupura, and Nankana Sahib, vegetation remains relatively

denser due to a mix of rural settlements, agricultural landscapes, and canal-side plantations. Canal and road alignments are lined with kikar, shisham, siris (Albizia lebbeck), and eucalyptus, the latter introduced widely for its fast growth and timber value. Farm forestry practices are also common, with farmers planting trees along field boundaries to provide shade, wind protection, and fuelwood. Forest plantations such as Changa Manga Forest Reserve (one of the largest man-made forests in the world) and Balloki Forest Range are vital ecological assets that contribute to carbon sequestration, biodiversity conservation, and groundwater recharge.

Shrubs and ground vegetation include lehsura (Cordia myxa), akk (Calotropis procera), karir (Capparis decidua), and various grasses such as dhaman (Cenchrus ciliaris) and khabal (Saccharum spontaneum), which help prevent soil erosion and provide fodder for livestock. Seasonal crops like wheat, maize, and rice also contribute significantly to the vegetative biomass of the region.

Despite various plantation efforts, the overall forest cover in Lahore Division remains below 5%, significantly lower than the national average required for ecological sustainability. The loss of tree cover has aggravated air pollution, heat island effects, and soil degradation, particularly in Lahore city. In response, the Punjab Forest Department, in collaboration with PHA and other institutions, has launched urban forestry and Miyawaki plantation projects, especially along major roads and vacant urban plots. These initiatives aim to improve air quality, enhance aesthetics, and increase canopy cover.

6.5.3 Wetlands

There are no wetlands nearby project site.

6.5.4 Wildlife Sanctuaries and Parks

Lahore Division, though heavily urbanized and industrialized, still retains pockets of natural and semi-natural landscapes that serve as important habitats for wildlife. The division's wildlife sanctuaries and protected areas, though limited in number, play a vital role in conserving biodiversity within this densely populated region. These sanctuaries provide refuge to native species of mammals, birds, reptiles, and amphibians, and serve as key ecological buffers against the pressures of urban sprawl, deforestation, and agricultural expansion.

One of the most prominent protected areas is the Changa Manga Wildlife Sanctuary, located in Kasur District, which is one of the oldest and largest man-made forests in the world. Covering around 12,500 acres, Changa Manga was originally established in the 19th century for timber production but has since been developed into a major conservation and ecotourism site. The forest consists of shisham, kikar, mulberry, and eucalyptus plantations interspersed with wetlands, making it an ideal habitat for species such as nilgai (blue bull), wild boar, jackal, hare, partridge, dove, and a variety of

migratory and resident birds. The Changa Manga Wildlife Park and its adjoining deer enclosure are home to species like chital, blackbuck, and hog deer, bred under controlled conditions for conservation and public awareness.

Another significant protected site is the Balloki Headworks Wildlife Sanctuary, located along the River Ravi between Kasur and Nankana Sahib Districts. This wetland sanctuary attracts thousands of migratory waterfowl during winter months, including teal, pintail, mallard, gadwall, and coot, as well as native aquatic species like snakes, turtles, and amphibians. Managed by the Punjab Wildlife and Parks Department, this site is part of the broader Indus Flyway, which is globally recognized for avian migration between Siberia and South Asia.

In Sheikhupura District, the Jallo Wildlife Park and Lahore Safari Zoo (Raiwind Road) are managed as semi-protected areas, functioning as both conservation and recreation zones. These sites are home to a diverse collection of animals including lion, tiger, leopard, deer species, peacocks, and various exotic birds, though the focus here is more on captive breeding and environmental education than on wilderness conservation. The Jallo Park Wetlands also support local amphibians, aquatic vegetation, and bird species, playing a role in maintaining urban biodiversity within the Lahore metropolitan area.

The Rakh Chandrai and Rakh Dinga Singh Reserve Forests, located on the fringes of Sheikhupura and Nankana Sahib, are smaller protected zones providing limited wildlife habitat amidst agricultural landscapes. These reserves are particularly important for small mammals, reptiles, and birds that depend on mixed woodland and scrub vegetation.

However, wildlife in Lahore Division faces increasing threats due to urbanization, habitat fragmentation, pollution, illegal hunting, and encroachment. The natural ecosystems have been reduced to isolated fragments, limiting the movement and genetic diversity of species. The Punjab Wildlife and Parks Department, in collaboration with conservation organizations like WWF-Pakistan, has initiated programs for habitat restoration, awareness raising, and captive breeding, particularly for endangered species such as the hog deer and blackbuck.

Overall, while the wildlife sanctuaries of Lahore Division are few, they represent essential green and ecological corridors in an otherwise urbanized landscape. Strengthening management, enforcing protection laws, and integrating biodiversity conservation into urban and land-use planning can ensure that these areas continue to serve as vital sanctuaries for wildlife and as spaces for environmental education and recreation for future generations.

6.5.5 Forests

There is no reserved forest areas near the project site.

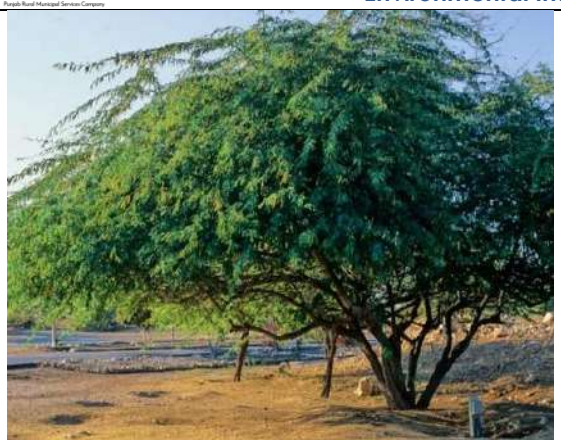
6.5.6 Game reserves

Lahore Division hosts a few designated game reserves that play an important role in conserving wildlife populations and providing controlled hunting and eco-tourism opportunities under the supervision of the Punjab Wildlife and Parks Department. These reserves act as transitional areas between fully protected sanctuaries and unregulated landscapes, maintaining ecological connectivity and supporting sustainable wildlife management in a region where urban and agricultural expansion has severely fragmented natural habitats.

The most notable game reserve in the division is the Changa Manga Game Reserve located within the larger Changa Manga Forest in Kasur District. This reserve spans several hundred acres and is managed to protect and breed various species of deer, including chital (Axis axis), blackbuck (Antilope cervicapra), and hog deer (Axis porcinus). It also supports populations of wild boar, hare, jackal, partridge, and a variety of resident and migratory bird species. The reserve is fenced and managed for both wildlife conservation and public recreation. Controlled hunting is prohibited, and wildlife populations are monitored for ecological balance and research. The presence of water bodies and dense vegetation makes this reserve an ideal habitat for both terrestrial and avian species.

Another key site is the Balloki Game Reserve, situated near the Balloki Headworks along the River Ravi between Kasur and Nankana Sahib districts. This area provides excellent habitat for aquatic birds, reptiles, amphibians, and fish, and it also supports migratory waterfowl during winter months. The reserve is recognized as part of the Indus Flyway (Route No. 4) and plays an essential role in sustaining Pakistan's migratory bird populations. The Punjab Wildlife Department has implemented measures to restrict illegal hunting in this area, particularly during the migratory season.

In Sheikhupura District, smaller reserves such as Rakh Machikey Game Reserve and Rakh Chandrai Game Reserve contribute to regional wildlife conservation efforts. These reserves are mainly composed of scrub forest and irrigated plantations that provide habitats for small mammals, reptiles, and birds. The Punjab Wildlife Department allows regulated hunting of certain game species, such as partridge and hare, under permit systems to ensure sustainability.



Kikar

Bair

Prosopis Spicigera

Shisham

Figure 6-10, Flora in Lahore

6.6 Social and Cultural Resources

6.6.1 Population Communities

The total population of Lahore district is 22,772,710 as per census 2023.

6.6.2 Gender Status

At the time of the 2023 census the Lahore Division had a population of 22,772,710 of which 11,880,327 were males, 10,887,921 females and 4,462 were transgenders. Demographic data is provided in Table 6-5;

6.6.3 Land-use

The land use pattern of Lahore Division reflects a dynamic blend of urban expansion, agricultural dominance, industrial development, and scattered forested and riverine areas. The division's landscape has undergone significant transformation over the past few decades due to rapid urbanization, infrastructure growth, and industrialization, particularly around Lahore city—the provincial capital and one of Pakistan's fastest-growing metropolitan areas. Despite this, agriculture remains the backbone of land use across much of the division, especially in Kasur, Sheikhupura, and Nankana Sahib districts.

A substantial portion of the land—particularly in the southern and western

parts of the division—is utilized for agricultural purposes, accounting for nearly 60–65% of the total area. The fertile alluvial plains of the Ravi River support the cultivation of major crops such as wheat, rice, sugarcane, maize, and fodder, along with vegetables, fruits, and floriculture in peri-urban zones. Kasur and Nankana Sahib districts are especially known for their extensive farmland and livestock production, which form the economic backbone for rural populations. Sheikhupura District combines both agriculture and industry, featuring mixed land use dominated by irrigated fields and growing industrial estates.

Urban areas—particularly in Lahore District—occupy an ever-increasing share of land use. The city of Lahore, along with its adjoining towns such as Raiwind, Shahdara, and Kahna, has expanded rapidly, absorbing former agricultural land and transforming it into residential, commercial, and industrial zones. The Lahore Development Authority (LDA) and related agencies have developed numerous housing societies, transport corridors, and industrial zones, particularly along Ferozepur Road, Multan Road, Ring Road, and the M-2 Motorway corridor. This has led to a distinct pattern of urban sprawl, where agricultural lands are gradually converted into built-up areas.

Industrial land use is significant in Sheikhupura and Kasur districts, where numerous industrial estates and small- to medium-scale factories operate. Sheikhupura hosts major industrial zones such as the Rachna Industrial Estate and Faisalabad–Lahore Industrial Corridor, while Kasur is home to a large number of leather tanning and processing units, especially around the Kot Radha Kishan and Chunian areas. Nankana Sahib, though less industrialized, has seen the development of agro-based industries, particularly food processing and grain storage facilities.

Forests and green areas, though limited in proportion, still contribute to the region's ecological sustainability. The most notable forested areas include Changa Manga Forest (Kasur District), Jallo Park, Rakh Chandrai, and Balloki Plantation, which serve as important carbon sinks, recreational zones, and biodiversity habitats. These forests occupy less than 5% of the division's total area, but play a vital role in reducing pollution, supporting wildlife, and stabilizing the local climate.

The riverine and water bodies of the division, mainly associated with the River Ravi, as well as canals, ponds, and wetlands such as those near Balloki Headworks, also influence land use. These areas are crucial for irrigation, fisheries, and flood control, although many have been encroached upon or degraded by pollution and unregulated development.

Transportation infrastructure—comprising highways, railways, and motorways—also constitutes a notable portion of land use, connecting Lahore Division with the rest of Punjab and beyond. The M-2 and M-3 Motorways, GT Road, and Ring Road Lahore have spurred peri-urban expansion and commercial development along their corridors.

In summary, the land use of Lahore Division is characterized by a highly productive agricultural base, rapidly expanding urban settlements, growing industrial zones, and limited but ecologically valuable green areas. Balancing these competing land uses through sustainable spatial planning and environmental management remains a key challenge for the division's long-term development.

6.6.4 Languages

Lahore Division has a rich and diverse linguistic profile, with Punjabi, Urdu, and English as the main languages. Punjabi, particularly the Majhi dialect, is the native and most widely spoken language across all districts, especially in rural areas of Kasur, Sheikhupura, and Nankana Sahib. In Lahore District, Urdu is more dominant in urban and formal settings due to its use in administration, media, and education, while Punjabi remains common in everyday conversation. English is widely used among the educated and professional classes, serving as the language of business, higher education, and official communication. Smaller communities also speak Pashto, Saraiki, Hindko, and Balochi, reflecting Lahore's status as a multicultural and migratory hub. Overall, the division's linguistic environment is multilingual, balancing cultural tradition with modern communication needs.

6.6.5 Literacy Rate and Education Facilities

Lahore Division has one of the highest literacy rates in Punjab, reflecting its position as the province's educational and intellectual center. The average literacy rate across the division is around 72–75%, significantly higher than the national average. However, there are notable disparities between urban and rural areas as well as among districts.

Lahore District leads with a literacy rate exceeding 80%, supported by a dense network of educational institutions, including public and private schools, colleges, universities, and technical institutes. The city is home to some of Pakistan's premier universities, such as the University of the Punjab, Lahore University of Management Sciences (LUMS), Government College University (GCU), University of Engineering and Technology (UET), and King Edward Medical University, which attract students from across the country.

Sheikhupura District follows with a literacy rate of about 65–68%, where educational infrastructure includes government schools, degree colleges, and a few private universities. The district's proximity to Lahore allows access to advanced educational facilities for its residents.

Kasur District has a literacy rate of approximately 60–63%, with education primarily concentrated in urban areas like Kasur City and Pattoki. Rural areas still face challenges such as inadequate infrastructure, teacher shortages, and low female enrollment, though government and NGO initiatives have improved access in recent years.

Nankana Sahib District, with a literacy rate around 62–65%, has seen growth

in educational facilities, particularly due to its increasing urbanization and religious tourism. Institutions like the University of Nankana Sahib and several colleges have enhanced access to higher education for local residents.

Across the division, female literacy is improving but remains lower than male literacy, especially in rural areas. The Punjab Education Department and initiatives like the Punjab Education Foundation (PEF) and Punjab Schools Education Reforms Program have expanded access through public-private partnerships, free textbooks, and stipend programs. Overall, Lahore Division serves as the educational heart of Punjab, offering a wide range of opportunities from primary to tertiary levels. Continued investment in rural education, teacher training, and gender equity remains essential to ensure balanced educational growth across all districts.

Table 6-5, Demographic Data

Name	Area (Sq. Km)	Population 2023								Population 2017	2017-2023 Avg. Annual Growth Rate (%)
		All Sexes	Males	Females	Transgenders	Sex Ratio	Population Density / Sq. Km.	Urban Proportion	Avg. HH Size		
Lahore Division	11,727	22,772,710	11,880,327	10,887,921	4,462	109.11	1941.90	70.80	6.5	19,389,856	2.72

6.6.6 Health Facilities

Lahore Division has a well-established healthcare infrastructure comprising major public tertiary care hospitals, specialized treatment centres, private sector facilities, and an extensive network of primary and secondary healthcare units. As one of the key medical hubs of Punjab, Lahore attracts patients from surrounding districts due to its access to advanced medical services and specialist care.

The region's tertiary and specialized hospitals provide high-level healthcare facilities. Mayo Hospital, a major public teaching institution affiliated with King Edward Medical University, is one of the largest hospitals in the division, offering extensive inpatient and outpatient services across multiple specialties. Lahore General Hospital (LGH) serves as a major secondary and tertiary care centre, providing general medicine, surgery, emergency, and pediatric services. Specialized institutions include the Punjab Institute of Cardiology (PIC) for cardiovascular care, Lady Willingdon Hospital and Lady Aitchison Hospital for maternal and child health, and the Services Hospital Lahore, which provides comprehensive multispecialty services. Pediatric care is further supported by the Children's Hospital and Institute of Child Health, Lahore, a public-sector facility dedicated to child health.

In addition to public institutions, Lahore Division hosts numerous private and welfare-based hospitals that enhance healthcare accessibility. Notable facilities include Shaukat Khanum Memorial Cancer Hospital & Research Centre, Doctors Hospital, Akram Hospital, Ittefaq Hospital, and Bahria International Hospital, all offering a mix of inpatient, outpatient, and emergency services.

At the community level, healthcare delivery is supported by a tiered system managed by the Primary and Secondary Healthcare Department of the Government of Punjab. District and Tehsil Headquarters Hospitals (DHQ/THQ) serve as intermediate care centres providing inpatient and outpatient services while acting as referral hubs for smaller facilities. Rural Health Centres (RHCs), each with 10–20 beds, cater to populations of up to 100,000 and offer preventive, curative, and diagnostic services, in addition to supervising nearby Basic Health Units (BHUs). One such RHC is located in Raiwind within Lahore District. BHUs operate at the Union Council level, delivering essential maternal and child health services, immunization, and disease control programs, such as the BHU in Kachhi Village. Additionally, urban health clinics have been established in various areas of Lahore City to provide accessible primary care services at the neighbourhood level.

6.6.7 Health Problems

Lahore Division experiences a significant burden of both communicable and non-communicable diseases, influenced by rapid urbanization, high

population density, environmental pollution, and gaps in sanitation infrastructure. Dengue fever, hepatitis B and C, respiratory infections, diarrheal diseases, and skin infections are frequently reported, particularly in peri-urban and low-income neighborhoods. Contamination of drinking water and poor waste management exacerbate waterborne diseases, while overcrowded living conditions and inadequate hygiene accelerate the transmission of infectious illnesses.

Air pollution and seasonal smog have become major health concerns, contributing to rising cases of asthma, bronchitis, and other respiratory disorders, with studies showing a notable proportion of residents experiencing respiratory symptoms. Chronic conditions such as diabetes, hypertension, and anemia are also widespread, particularly among women and the elderly. Despite a relatively well-developed healthcare infrastructure, challenges remain, including overcrowding in public hospitals, shortage of skilled medical staff in certain areas, and the high cost of private healthcare services. Limited health literacy and socioeconomic disparities further intensify public health vulnerabilities across Lahore Division.

6.6.8 Decision-making Method and Conflict Resolutions System

The decision-making process within the Division follows a structured, hierarchical, and participatory approach to ensure transparency, accountability, and timely resolution of issues. Decisions at the operational level are made by departmental heads based on available data, expert advice, and stakeholder consultations. Strategic and policy-level decisions are reviewed and approved by senior management or relevant administrative authorities, ensuring alignment with provincial guidelines and development priorities.

A formal conflict resolution system has been established to address disputes arising between stakeholders, departments, or community representatives. The system emphasizes dialogue, mediation, and consensus-building as primary tools. Conflicts that cannot be resolved at the departmental level are escalated to higher administrative authorities or designated committees, which conduct impartial investigations and recommend solutions based on legal frameworks, project guidelines, and stakeholder interests.

6.6.9 Household Information

According to the 2023 Census, Lahore Division has a predominantly Muslim population, totaling approximately 14,876,512 individuals. Christians form the largest minority group with around 182,945 residents, while other religious communities, including Hindus, Ahmadis, and Scheduled Castes, constitute a very small proportion of the population. The division's households are primarily urban, reflecting Lahore's status as a major metropolitan hub, with

extended and nuclear family structures common across both urban and rural areas.

6.6.10 Settlement of Respondents

The majority of the population in the Lahore Division is native, with approximately 14.85% of the people being migrants.

6.6.11 Family System

In Lahore Division, family structures vary between traditional joint families and nuclear households, reflecting both cultural norms and the influence of urbanization. A significant portion of the population, particularly in rural and peri-urban areas, continues to live in joint family arrangements, where the eldest male member typically serves as the primary decision-maker for family and public matters. This system provides social security during periods of unemployment, illness, or financial hardship, allowing resources and responsibilities to be shared among multiple generations.

Conversely, in urban centers such as Lahore city, many younger families prefer nuclear setups, seeking greater autonomy and flexibility. Despite this shift, the joint family system remains valued for its economic benefits, as combined incomes, pooled labor, and shared responsibilities often make it more efficient and supportive for all members, including elderly relatives and dependents who cannot work.

6.6.12 Source of Livelihood and Income

The economy of Lahore Division is diverse and dynamic, driven by a combination of industrial, commercial, service, and agricultural activities. As the provincial capital and economic hub of Punjab, Lahore city plays a central role in generating employment and income through its extensive industrial base, which includes textiles, pharmaceuticals, food processing, engineering goods, steel, and information technology. The city is also a major center for banking, education, healthcare, and real estate, making the service sector a dominant contributor to the division's GDP.

Agriculture remains significant in the rural parts of Kasur, Sheikhupura, and Nankana Sahib districts, where fertile lands support crops such as wheat, rice, sugarcane, and vegetables. Dairy and livestock farming are also important sources of livelihood for rural communities. The division benefits from well-developed transport infrastructure, facilitating inter-district trade and access to national and international markets.

In addition, Lahore's vibrant commercial activity—including retail markets, small enterprises, and hospitality businesses—supports a wide range of employment opportunities. The tourism and cultural sectors also contribute to the economy, with Lahore's historical monuments, food culture, and festivals

attracting both domestic and foreign visitors, thereby promoting local entrepreneurship and service-based livelihoods.

6.6.13 Agricultural Land Status

Lahore Division features a mixed land-use pattern, with both highly urbanized zones and productive agricultural areas contributing to the regional economy. The division comprises four districts – Lahore, Sheikhupura, Kasur, and Nankana Sahib – where agricultural land remains vital for the livelihoods of rural communities, particularly in the latter three districts. According to estimates from the Punjab Agriculture Department, the total land area of Lahore Division is approximately 4.2 million acres, a substantial portion of which is under cultivation, primarily in the rural belts surrounding Lahore city.

The region supports two major cropping seasons – Kharif (April–June) and Rabi (October–December) – similar to other parts of Punjab. Major Kharif crops include rice, sugarcane, maize, and fodder, while Rabi crops such as wheat, gram, and barley are widely cultivated. Sheikhupura and Kasur districts are particularly known for their high-quality rice and sugarcane production, contributing significantly to the province's agro-economy.

Livestock and dairy farming are also integral to the agricultural profile of Lahore Division, with numerous dairy farms and poultry units operating in peri-urban areas. These contribute not only to local food supply but also to commercial dairy processing industries. Fruit and vegetable cultivation—especially guava, citrus, and seasonal vegetables—is common in Nankana Sahib and Kasur districts, supplying large volumes to Lahore's urban markets.

Despite increasing urbanization around Lahore city, the division continues to maintain a productive agricultural base supported by irrigation from canals and groundwater resources, making it one of the key food-producing regions of Central Punjab.

6.6.14 Road and Rail Network

The Lahore Division has one of the most extensive and well-developed road and rail networks in Punjab, serving as a major transportation and trade hub for both domestic and international routes. The division is traversed by a dense network of national and provincial highways, motorways, and urban arterial roads that link it to all major cities of Pakistan. The M-2 Motorway (Lahore–Islamabad) and M-3 Motorway (Lahore–Abdul Hakeem) are the key high-speed corridors, complemented by the N-5 National Highway that connects Lahore with Kasur, Sheikhupura, and onward to Karachi. The Lahore Ring Road and Orange Line Metro Train provide efficient intra-city connectivity, easing urban congestion.

The rural road network is equally robust, connecting small towns and villages across Nankana Sahib, Sheikhupura, and Kasur with major urban centers,

facilitating the movement of goods, agricultural produce, and labor. The Pakistan Railways Headquarters is located in Lahore, highlighting the division's central role in the national railway system. Major railway lines include the Main Line-1 (ML-1) passing through Lahore and Sheikhupura towards Rawalpindi, and branch lines extending to Kasur and Nankana Sahib. Lahore Railway Station serves as a primary passenger and freight hub, handling both local and long-distance trains. The integrated road and rail systems make Lahore Division a critical transport and logistics center in Pakistan, supporting its industrial, commercial, and agricultural economy.

6.6.15 Community Based Organization (CBOs) and NGOs

There are several Community-Based Organizations (CBOs) and Non-Governmental Organizations (NGOs) active in Lahore Division, including the Akhuwat Foundation, Edhi Foundation, SOS Children's Village, Shaukat Khanum Memorial Trust, and Alkhidmat Foundation, among others. These organizations play a vital role in delivering social welfare services, poverty alleviation programs, healthcare, education, and community development initiatives across both urban and rural areas of the division.

6.6.16 Local Government and Administration

Local government institutions in Lahore Division are active and play a key role in planning, coordination, and implementation of development initiatives at the grassroots level. Elected representatives, including Union Council Chairmen and councilors, oversee local development activities and service delivery within their respective jurisdictions. At the district level, the District Council is responsible for broader development planning and public welfare projects, headed by the Chairman District Council.

The administrative structure of Lahore Division comprises the Commissioner Lahore Division, Deputy Commissioners (DCs) of Lahore, Sheikhupura, Kasur, and Nankana Sahib districts, along with Additional Deputy Commissioners (ADCs), Assistant Commissioners (ACs), revenue officers, and officers in charge of various line departments. These government functionaries ensure effective implementation of provincial policies, coordination among departments, and maintenance of law and order across the division.

6.6.17 Law and Order Situation

The law-and-order situation in Lahore Division, including the proposed project areas, remains stable and well-managed under the supervision of respective district administrations and law enforcement agencies. The police and district authorities maintain effective coordination to ensure public safety, smooth implementation of development projects, and timely response to any local disputes or security concerns.

6.6.18 Community Awareness about Project Works

The communities residing within the project areas of Lahore Division are generally well-informed about the proposed project interventions and implementation activities. Extensive stakeholder consultations and community meetings were conducted during the environmental and social screening, as well as during the preparation of the Environmental Impact Assessment (EIA). Local residents expressed a positive attitude toward the project, recognizing its potential to improve living standards and access to basic services.

The communities residing at project area are well aware about the proposed project works and implementation. During screening and development of EIA, public consultations were held regarding project activities.

6.6.19 Community Demands

During public consultations and baseline data collection activities on project, basic priority needs of the communities were also determined which are as follows:

- Creation of jobs under the project
- Provision of clean, safe, and uninterrupted supply of water
- Improvement of sanitation facilities and solid waste management services
- Upgradation of internal streets and drainage infrastructure in rural settlements

6.7 Physical Cultural Resources

Sites of religious importance like mosques, graveyards and other sensitive receptors like schools have been found in selected villages. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment and regular monitoring and reporting will be adopted to encounter the impacts near sensitive receptors.

6.8 Industries

Industries in Lahore Division are diverse and form a major part of Punjab's industrial economy. The division hosts a wide range of sectors including textiles, pharmaceuticals, food and beverages, engineering goods, steel, and chemicals. Lahore city serves as a major industrial and commercial hub, housing numerous small and medium enterprises (SMEs) along with large-scale manufacturing units in industrial estates such as Quaid-e-Azam Industrial Estate, Sundar Industrial Estate, and Kot Lakhpat Industrial Zone.

In addition to heavy and medium industries, the division also has a strong base of agro-based industries, including rice milling, dairy processing, poultry feed, and packaging units located mainly in Kasur, Sheikhupura, and Nankana Sahib districts. Cottage and handicraft industries, such as leather products, embroidery, and traditional furniture making, also contribute to local employment and income generation.

However, no major industrial unit is located near the proposed project areas, and thus, industrial activities are not expected to have any direct environmental or social impact on the project sites.

6.9 Suitability of Site

The project does not fall in any sensitive zone. The project is for the improvement and development of water supply & sanitation services in villages of Lahore division. Therefore, the site is suitable for the project. This section describes project area and its surroundings to establish baseline, which are expected to be affected by the project. The baseline description includes physical, ecological and socioeconomic aspects of the project area.

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

SECTION - 7: POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

7.1 General

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

7.2 Approaches and Methodology

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

For impact identification, various EIA methodologies are available including the checklists, interaction matrices, networks and overlays. Among these four methods, following three are used in EIA of Model Village (Misaali Gaon) Project – Lahore Division;

1. Project Interaction Matrix
2. Checklists
3. Overlays

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

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

- It provides cumulative impacts of a project.

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

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

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

7.2.1 Checklist

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

7.2.2 Overlays

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

7.3 Characteristics of Impacts

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

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

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

Table 7-1, Impact Characterization

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

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

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

7.4 Environmental Impacts and their Mitigation During Pre-Construction Phase

7.4.1 Environmental Impacts Regarding Project Location

The project is for the improvement and development of water supply and sanitation services in following selected villages of Lahore division; including 22 villages in district Kasur, 10 villages in district Nankana, 10 villages in district

Sheikhupura as details / names given in following Table 7-2;

Table 7-2, Details / Names of the Villages

Sr. No.	Division	District	Tehsil	Village / Darkha
1.	Lahore	Kasur	Kasur	Rao Khan wala
2.	Lahore	Kasur	Kasur	Orara
3.	Lahore	Kasur	Kasur	Rangpur
4.	Lahore	Kasur	Kasur	Peru Wala
5.	Lahore	Kasur	Kasur	Ramiyana
6.	Lahore	Kasur	Kasur	Bugri
7.	Lahore	Kasur	Kasur	Kacha pakka
8.	Lahore	Kasur	Kasur	Qilla ganja
9.	Lahore	Kasur	Chunian	Kotha
10.	Lahore	Kasur	Chunian	Nirmalki
11.	Lahore	Kasur	Pattoki	Shaikham kalan
12.	Lahore	Kasur	Pattoki	Balloki chak no 30
13.	Lahore	Kasur	Pattoki	Bath Kalan and allied abadies, UC Bath Kalan
14.	Lahore	Kasur	Pattoki	Village Megha and Allied Abbadies
15.	Lahore	Kasur	Pattoki	Kanwain Malian
16.	Lahore	Kasur	Pattoki	Hanjarwal
17.	Lahore	Kasur	Kasur	Mahalam, Tehsil Kasur
18.	Lahore	Kasur	Kasur	Sandah, Tehsil Kasur
19.	Lahore	Kasur	Kasur	Village Ghaniye Key, UC Handal, Tehsil Kot Radha Kishan
20.	Lahore	Kasur	Kasur	Village Meer Muhammad, UC Sattoki
21.	Lahore	Kasur	Kasur	Nathey khalisa
22.	Lahore	Kasur	Kasur	Hanjarwal 31 Chak
23.	Lahore	Nankana	Nankana	Syedwala, Tehsil Nankana
24.	Lahore	Nankana	Nankana	Bucheki, Tehsil Nankana
25.	Lahore	Nankana Sahib	Sangla Hill	Chak #116 ghullay bajwa Ladhar
26.	Lahore	Nankana Sahib	Sangla Hill	Chak no. 45/RB Dara Jaat (Izafi Abadi)
27.	Lahore	Nankana Sahib	Shahkot	Burala chak NO 182 RB
28.	Lahore	Nankana Sahib	Nankana Sahib	Check NO 8 GB Annad garrh
29.	Lahore	Nankana Sahib	Nankana Sahib	Murtaza Salimpur Pakka Jamalpur, Tehsil Nankana Sahib

Sr. No.	Division	District	Tehsil	Village / Darkha
30.	Lahore	Nankana Sahib	Nankana Sahib	Jhok Chak 03 Bhucckoki Khayi, Tehsil Nankana Sahib
31.	Lahore	Nankana Sahib	Nankana Sahib	Chak 23/76
32.	Lahore	Nankana Sahib	Nankana Sahib	Mouza Rajab
33.	Lahore	Sheikhupura	Ferozewala	Bhondary
34.	Lahore	Sheikhupura	Muridke	Marri Chehlan
35.	Lahore	Sheikhupura	Ferozewala	Kalar
36.	Lahore	Sheikhupura	Ferozewala	Wandala Nasir Khan
37.	Lahore	Sheikhupura	Ferozewala	Baway di Kutiya
38.	Lahore	Sheikhupura	Ferozewala	Bhully andron
39.	Lahore	Sheikhupura	Muridke	Village Bharhat-Karrol District Sheikhupura
40.	Lahore	Sheikhupura	Muridke	Village Boli Salamat Pura
41.	Lahore	Sheikhupura	Ferozewala	Village Mansoorabad
42.	Lahore	Sheikhupura	Ferozewala	Village Balarkay

For the construction / installation of project components like tube-well, OHRs, soakage pits & septic tanks and WWTPs etc., locations to be selected as per design, feasibility and availability of the land.

Impact Significance: High

Mitigation: All the relevant stakeholders must be consulted. NOCs / Consent letters must be obtained before execution of the project and private land should be acquired through proper channel, if required, after detailed consultation with land owners.

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

7.4.2 Environmental Impacts Regarding Project Design

The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS). Efforts will be made to save the trees present in project area / villages.

Impact Significance: Medium

Mitigation: Project design should be modified in order to save trees that may come in the right of way of the project. The design is made by taking in consideration that minimum impact will occur on the nearby surface water bodies.

Residual Impact: The impact of project design will be low adverse in nature

after taking the above-mentioned mitigations.

7.5 Environmental Impact and their Mitigation During Construction Phase

7.5.1 Physical impacts

A) Soil contamination

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

Impact Significance: Medium

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

- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators;
- The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste;
- Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination;
- Ground shall be leveled to avoid slopes;
- Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.

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

B) Contamination of Surface and Groundwater Resources

Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. The tube wells proposed on the embankment of canal, have the proximity to contaminate the surface water bodies during construction activities such as excavation activities (trenching) and associated run-off, oil leaks, accidental spilling of fuel oils and unintentional disposal construction / material.

Mitigation Measures of Impacts on Water Resources: Sewage from construction camp will be disposed-off using septic tank which has been designed properly keeping in view the following parameters:

- Soil stratigraphy at site
- Depth of groundwater table
- Discharge of sewage from construction camp

The septic tank has been designed by the Design Consultant according to the relevant standards. The example of the septic tank is shown in Figure below;

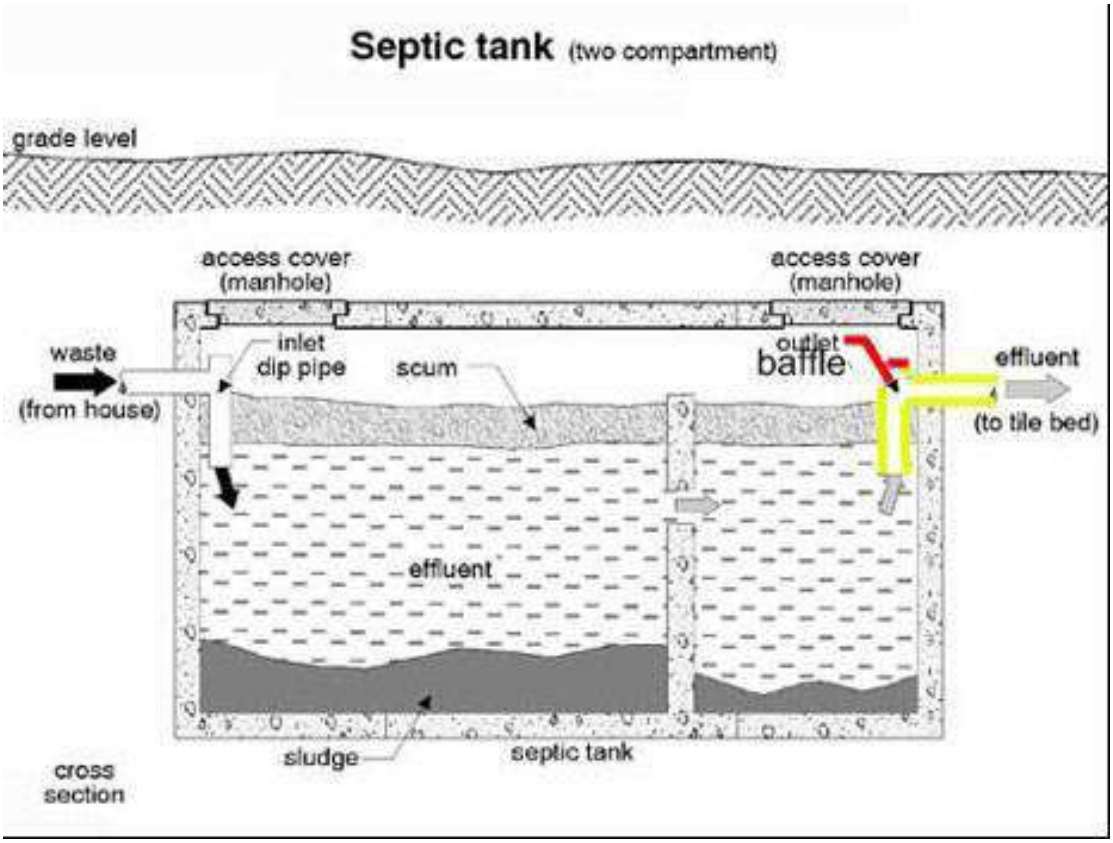


Figure 7-1, Septic Tank

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

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

C) Impact on Ambient Air Quality

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

It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.

Further, the sub-project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. Trenches will be about 1 metre in depth and therefore the amount of spoil material will be minimal with the backfilling using the same spoil material undertaken within 3-5 days of excavating. Sources of air pollutants from the construction works will include traffic in and out of the site emitting and earth works at site during the excavation of trenches.

Impact Significance: High

Mitigation Measures of Impacts on Ambient Air Quality

- Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM_{10}.
- Use of low-sulfur diesel fuel and well-maintained equipment to comply with Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023.
- Prohibition of open burning of any construction waste, vegetation, or plastic material, in line with anti-smog regulations.
- Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions.
- Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.
- The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water by water-bowsers will be done.
- As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.

- Provision of face masks or dust respirators to workers, particularly during peak smog season.
- Tree plantation and green buffer restoration post-construction to improve long-term air quality and assist in smog reduction.

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

D) Impact on Ambient Noise Levels & Vibration

During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project Area and Neighbourhood residential may be disturbed by the noisy activities. The impact will be significant when compared to the without project situation.
During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration.

Impact Significance: High

Mitigation Measures of Impacts on Noise & Vibration

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

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

E) Disposal of Construction Debris & Garbage

During construction phase of the project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas.
Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites.

Impact Significance: High

Mitigations

- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site.
- The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping.
- Arrangements should be made for regular garbage collection and removal of sewage from the construction site.
- A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals / water bodies.

Residual Impact: The impact of construction Debris and Garbage will be low adverse in nature after taking the above-mentioned mitigations.

F) Traffic Annoyance

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

Impact Significance: Medium

Mitigation:

- During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the project area.

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

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

G) Impact on Utilities

The utilities (ground / road / brick soling etc.) along the project area that may be damaged as a result of the excavation for the pipelines include fibre optic cables, sewerage lines, gas pipelines, existing water pipelines and in exception cases electricity lines. Damage to these utilities due to excavation may cause interruptions to services associated with the same.

Impact Significance: High

Mitigation: Contractor will be bound to restore and rehabilitate the site area to its original state after the completion of construction works. Contractor will be responsible to restore any damage to any existing utility.

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

7.5.2 Ecological Environment

A) Impacts on Ecological Environment

Impact on Flora

Tree cutting may be envisaged as per project requirement.

Disturbance to Fauna:

No impacts on fauna is envisaged.

Impact significance:

High

Mitigations

In this project, low impact is expected on vegetation and any fauna in the area since the pipeline routes are devoid of significant unique floral and faunal life.
The clearing of project sites through excavations for the pipelines (reservoir) will not adversely affect flora and fauna and all the impacts caused by

construction work on flora and fauna are of temporary and reversible in nature and can be mitigated by appropriate good working practices that are prescribed in this EIA.
Contractor will make efforts to protect trees. But in case of unavoidable circumstances, 10 new trees of almost 06 ft. will be planted for each tree cut.

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

7.5.3 Socio Economic Environment

A) Impacts to Occupational Health and Safety

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

Impact Significance: High

Mitigations Measures of Impacts to Occupational Health and Safety
Occupational health and safety impacts during construction are considered to be of moderate insignificance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment.
Heath & safety procedure will also prepared by contractor and implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.

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

B) Impacts on Local Population

No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the said project.

The population residing in and the surroundings of the project area will be affected during the construction phase as follows:

- There is potential hazard risk from open trenches in the vicinity of populated areas during the construction
- Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase
- Community may face the noise and dust problems during the construction activities.

- Theft problems to the community by the Contractor's workers and vice versa.

Impact Significance: Medium

Mitigations Measures of Impacts on Local Population / Workforce

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

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

C) Impacts on Public Health and Safety Hazard

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

Impact Significance: Medium

Mitigation Measures of Impacts on Public Health and Safety Hazards

- Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor.
- The active construction zone must be cordoned off to avoid injuries due to accidents.

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

D) Public Health Diseases

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

E) Resettlement Impacts

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

F) Gender Based Violence

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

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

- Rape
- Sexual Assault
- Sexual Harassment

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

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

G) Child Protection

Violence Against Children (VAC) is defined as physical, sexual, emotional and / or psychological harm, neglect or negligent treatment of minor children (i.e., under the age of 18), including exposure to such harm that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labor, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.
The Contractor will ensure the Code of Conduct is signed at the Corporate and individual workers levels in regard to observing Child Protection aspects of the project. This will be complied with under the supervision of the client and Supervision Consultant.

H) Labor Influx and Recruitment

The project will involve recruitment of labourers which may lead to influx of persons looking for work in the project area. The significance of labour influx is expected to be low or moderate and mostly unskilled in nature. The Contractor will comply with the national labour laws and develop a code of conduct and submitted to PRMSC before commencement of construction.
Residual Impact: The impact will be low-adverse in nature after taking the above-mentioned mitigations.

7.6 Environmental Impacts and Mitigation Measures during the Project Operation

7.6.1 Consumption of Contaminated Water

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

Impact Significance: High

Mitigation Measures

The water supply will be closed down during repair and maintenance to ensure that no polluted water gets into water supply.

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

7.6.2 Solid Waste Generation

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

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

Impact Significance: Low

Mitigation Measures

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

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

7.6.3 Visual Impacts

Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and maintenance which could be an eye-sore and a health hazard. This impact is not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil / spoil.

Impact Significance: Medium

Mitigation

The trenches should be backfilled immediately and excess spoil material is disposed of as soon as possible. Further, water sprinkling will be ensured to control fugitive dust.

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

7.6.4 Impacts to Occupational Health and Safety

Operation and maintenance of the pipeline and other project components will involve workers whose safety may be at risk as a result of operation of equipment among others.

Mitigation Measure

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

Impact Significance: Medium

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

7.6.5 Impacts on Community Health and Safety

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

7.6.6 Impacts on Traffic

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

Impact Significance: Medium

Mitigation

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

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

7.6.7 Impact on Air Quality

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

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

7.6.8 Noise and Vibration Emission Impacts

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

Mitigation Measure

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

Impact Significance: Low & Short term

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

7.6.9 Assessing Impacts

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

7.6.10 Approach to Assessment

Various components of the project will interact with local resources in different ways. Therefore, it is useful to divide the project into units small enough that the interactions may be examined individually as well as collectively. The main construction components of the sub-project are Excavations, Concrete, Mixing, Finishing. Each of these is in effect a project itself. Various aspects of each component are treated separately. They are examined both in terms of construction period and much longer period of project operation.
Some component of the project has positive and some have negative impact on environment and on the different factors like socio-economy of the community.

7.6.11 Negative impact

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

7.6.12 Positive Impacts

The positive impacts of the project are given as under-:

- The project is in the villages of Lahore division, there will be demand for workers, both skilled and unskilled. This will include opportunities for

local people, both directly on the construction site and also indirectly in related service work.

- Safe drinking water in adequate amount will be provided to community during operation.
- Sanitation services will be improved as sewerage system will be developed / improved in the villages.

7.7 Cumulative and Induced Impacts

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

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

The project has identified the VCs as air quality, noise, water quality, socioeconomic and socio-community components, and human health. There are no foreseeable projects that will overlap with the project. The spatial boundary of the project is the area / villages within Lahore Division and areas where transmission lines are to be installed, the temporal boundary can be considered as the whole selected village of Lahore division.
Key VCs identified included air quality, water quality and noise that can impact public health, access to livelihood opportunities. The overall perception of stakeholders in the long-term perspective was highly positive and they considered it as an important development for the local economy. While the project will meet the Punjab Environmental Quality Standards (PEQS) for air quality, mitigation of noise will be required to meet at least the baseline levels within the corridor of impact.

7.8 Potential Environmental Enhancement Measures

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of

project in complete accordance with the 5Rs Principles; Reduce, Reuse, Recycle, Refurbish and Retrofit. Good housekeeping practices will be the order of the day.

SECTION - 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

8.1 Objective

The purpose of Environmental and Social Management and Monitoring Plan (ESMMP) for improvement and development of water supply & sanitation services in the villages of Lahore division is to ensure that all necessary identified measures have been adopted in order to protect the environment and social situations and to comply with national and provincial environmental legislation. Environmental and social screening checklists were used to assess the potential impacts of project on the basis of its scale / size, nature and significant negative impacts.

8.2 Institutional Arrangements

Administrative arrangements for the implementation of the project are following:

8.2.1 LG&CDD / PRMSC-HO

Local Government and Community Development Department (LG&CDD) and / or Punjab Rural Municipal Services Company (PRMSC), Government of Punjab is the Implementing Agency for Model Village (Misaali Gaon) Project. The implementation of the project will be done through Project Implementation & Management Unit (PIMU) at LG&CDD / PRMSC-HO. The Project Director (PD) based at PIMU / PRMSC-HO will be assisted with team of experts, officers and supporting staff to ensure execution of the projects as per action plan.

8.2.2 Service Delivery Units (SDU) at Division Level (SDU-DO)

In the next step, there will be Service Delivery Units (SDU) at Division level (SDU-DO). They will be supported by district and tehsil officers. They will support and coordinate with ESS and SSS throughout implementation of EIA / ESMMP at field level.

8.2.3 Consultants

The safeguard team of the consultants will be responsible for the on-field supervision and monitoring of the implementation of EIA / ESMMP being done by the contractor. The contractor will report the progress of EIA / ESMMP to the safeguard team of the consultants. And the safeguard team of the consultants will report the progress to SDU-DO. SDU-DO will then report to PMIU who will then formulate a comprehensive report regarding the progress of implementation of EIA / ESMMP.

8.2.4 The Contractor

The Contractor will be responsible for on-field implementation of EIA, ESMMP, and environmental protection liabilities under the Punjab Environmental Protection Act (Amendment 2012). He will also be responsible for compliance of ESMMP / EIA provisions keeping in view his contract with PRMSC. The Contractor will train his crews in all aspects for implementation of EIA, ESMMP and all other relevant regulations.

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

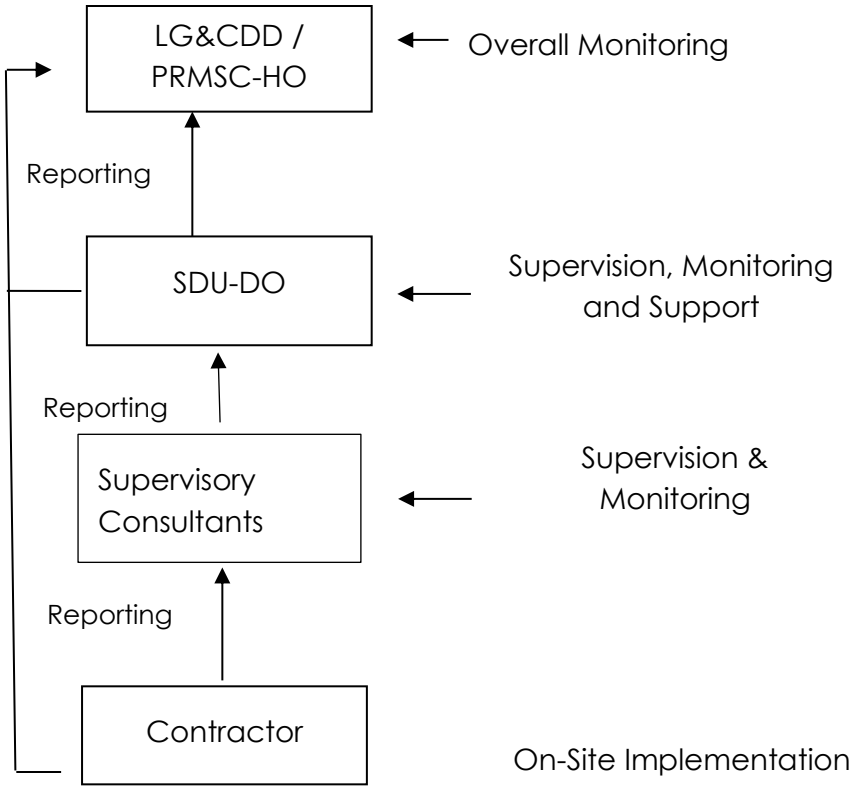


Figure 8-1, Institutional Mechanism

8.3 Mitigation Plan

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

8.4 Monitoring Plan

Monitoring Plan is also associated with mitigation plan during the different stages of the project. It ensures that mitigation measures are being effectively implemented. The monitoring of the project is very imperative for implementation of the ESMMP.

The PRMSC / SDU-DO will carry out the monitoring at the field level on a continuous basis and PIMU / PRMSC-HO at PIMU level.

8.5 Monitoring, Audit and Evaluation

PIMU / PRMSC-HO will monitor the contractor to ensure complete and proper implementation of the works / services in accordance with the contract.

During this phase, environmental and social monitoring will be carried out to ensure that the mitigation measures given in EIA / ESMMP are effectively implemented. The environmental and social monitoring will include the following:

- Environmental and social monitoring to ensure effective implementation of ESMMPs and / or SMPs particularly the mitigation measures included in these documents.
- The monitoring will be conducted with the help of checklists prepared on the basis of the mitigation plans included in environmental and social management instruments.
- Frequent site visits.
- Laboratory analysis will be conducted if so, specified in the ESMMP / EIA.
- Photographic records will be maintained where applicable / useful.
- Preparation of monitoring reports.

8.6 ESMMP Monitoring Mechanism

ESMMP monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be carried out at three levels i.e.at the PIMU / SDU-HO / PRMSC-HO level, at SDU-DO level and at project site level. Project Implementation & Management Unit (PIMU) also referred as Service Delivery Unit, Head Office (SDU-HO), would serve as the lead

implementing entity to monitor all project related functions with the support of line departments and field offices. Similarly, SDU-DO will be responsible for monitoring their respective project areas with the technical support of PIMU. The Environment Specialist / HSE Expert of the consultant will monitor the progress of implementation of ESMMP done by the contractor's environment specialist / HSE Officer.

8.7 Reporting and Documentation

A robust reporting mechanism can enable project progress to be followed up, any prevalent hindrances to project implementation to be identified and rectification measures to be setup if so required. Such a system will allow the PIMU and LG&CDD to track the advancement of the project and reconcile these with the overall objectives and targets of the project. Regular and comprehensive reporting will be conducted throughout the implementation of the project. ES & SSS – PIMU, Consultant and SDUs will ensure a constant surveillance of the project progress and deliverables through preparation and submission of these reports provided in the following;

Table 8-1, Reporting Mechanism

Distribution of Periodic Reports Report	Prepared by	Reviewed by	Approval
Weekly	Contractor / SC / SDU-DO	SC / SDU-DO	SDU-HO
Quarterly	Contractor / SC / SDU-DO	SC / SDU-DO	SDU-HO
Annual	Contractor / SC / SDU-DO	SC / SDU-DO	SDU-HO
Final	Contractor / SC / SDU-DO	SC / SDU-DO	SDU-HO

8.8 Information Disclosure

The EIA will be uploaded on the project websites, once cleared by EPA, copies shall be sent to all institutional stakeholders and all field offices. Before start of physical works on the project, the Executive Summary of the EIA will be translated in national / local languages and will be communicated to stakeholder communities and will be uploaded on the PIMU & LG&CDD websites.

8.9 Inclusion of EIA In Bidding / Contract Documents

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

8.10 Environmental and Social Non-Compliance

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

Table 8-2, Environmental & Social Management & Monitoring Plan

Contractor will be responsible to implement the mitigations given in EIA / ESMMP.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
A. IMPACTS DUE TO PROJECT LOCATION								
Site selection	The project is for improvement & development of water supply & sanitation services in selected villages of Lahore division, that will be developed on government owned land.				All the relevant stakeholders should be consulted. Relevant NOCs / consents will be obtained by PRMSC.	PRMSC	PRMSC	-
B. IMPACTS DUE TO PROJECT DESIGN								
Project design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS). Efforts will be made to save the trees during the project.				Project design will be modified in order to make the project environment friendly and socially sustainable. Trees will not be cut. In any case, if a tree has to be cut, contractor will plant 10 new trees of almost 6ft. height. The design is made by taking in consideration that minimum impact will occur on the nearby surface water bodies.	SC	PRMSC	-
C. REPAIR / REHABILITATION / CONSTRUCTION PHASE								
Physical Impacts								

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
Labour camp management	• Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities. • There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. • Child labour and school drop out • Health Safety attributes				• Labor camps should be at least 1km away from the residential areas. • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. • Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Ensuring that children and minors are not employed directly or indirectly on the project. • Children of less than 18 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). • Communication on hiring criteria, minimum age, and applicable laws.	Contractor	PRMSC / SC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
					• Provide personal protection equipment (PPEs) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. • Maintain the PPEs properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job.			
Soil contamination	• Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project site and in its nearby surroundings. Spillage from the generator or from				• Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. • The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste.	Contractor	PRMSC / SC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	moving vehicle will cause contamination of soil at construction sites. • Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.				• Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.			
Contamination of Surface and Groundwater Resources	• Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. • As some infrastructure to be constructed / developed on the embankment of canal / water body, therefore,				• Sewage from construction camp will be disposed of using septic tank • Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard. • Construction site effluent drainage should be established	Contractor	PRMSC / SC	• Checking of septic tanks constructed for sewage. • Monitoring of surface water quality through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	proximity to surface water bodies may lead to contamination of surface water bodies during construction activities such as excavation activities (trenching) and associated run-off, oil leaks, accidental spilling of fuel oils and unintentional disposal construction/material.				in areas with adequate natural drainage channels in order to facilitate flow of the effluents. • Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.			
Ambient Air Quality	• The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport				• Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM_{10} & $PM_{2.5}$. • Use of low-sulfur diesel fuel and well-maintained equipment to comply with Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023. • Prohibition of open burning of any construction waste, vegetation, or plastic material, in line with anti-smog regulations.	Contractor	PRMSC / SC	Ambient air quality monitoring through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	of material, movement of machinery and vehicles on site and excavation works.				• Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions. • Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. • The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water by water-bowsers will be done. • As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area. • Provision of face masks or dust respirators to workers, particularly during peak smog season. • Tree plantation and green buffer restoration post-construction to improve long-			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
					term air quality and assist in smog reduction.			
Noise and vibration	• During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. • The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and neighbourhood residential may be disturbed by the noisy activities. • During excavation activities (trenching), noise sources will include, vehicles used to transportation of				• During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary. • For the construction machinery generating noise level in excess of that prescribed in PEQS and WHO limits, Contractor will make arrangements to bring the noise level within applicable limits (including proper tuning of vehicles and mufflers / silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn.	Contractor	PRMSC / SC	Noise level monitoring EPA certified lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	materials and equipment to the site. • The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration.				• As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier. • Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective / mitigation measures applied where necessary.			
Disposal of Construction Debris & Garbage	• During construction phase of the project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas. • Construction materials including concrete waste, wood, steel, packaging plastics etc.				• A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. • The organic waste produced during site clearing should be mechanically mulched and	Contractor	PRMSC / SC	Placement of solid waste storage containers at camp sites. Collection and disposal into containers

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites				composted at the site and used for landscaping. • Arrangements should be made for regular garbage collection and removal of sewage from the construction site. • A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals.			
Traffic annoyance	• The construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for				• During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the project area. • The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary).	Contractor	PRMSC / SC	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	accidents especially where construction is on-going with little room for pedestrian access.				• The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. • The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.			
Impact on Utilities	• Project activities may result in disturbance of public utilities like roads / brick soling and others.				• All the public infrastructure / utilities that gets damaged / disturbed during the project execution, will be restored / rehabilitated to its original state.	Contractor	PRMSC / SC	
Generation of wastewater & solid waste	• Construction activities can result in the generation of wastewater, oil spillage from machinery, domestic waste from labour camps and construction related solid waste.				• All the wastes including liquid & solid, will not be disposed-off without treatment. • Services of waste contractor should be obtained			Waste Management
Emergency Response Plan	• Uncontrolled releases of hazardous materials				• Measures for fire prevention and firefighting.	Contractor	PRMSC / SC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.				• Indicators on site (for example, heavy rainfall) that will prompt the shutdown of specified areas of work. • Procedure for shutdown of site, including transfer of plant, materials and personnel to safe areas (for example in the event of a flood). • Emergency evacuation procedure for staff and members of the public likely to be impacted by an emergency event on site (for example: fire or blast). • Where practicable, avoiding or minimizing the use of hazardous materials. • Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. • The contractor will prepare emergency shutdown procedures and evacuations to			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
					cover all staffs and affected members of the public in the event of any emergency incident (such as traffic accident and fire). The contractor will ensure emergency access routes are well-known and have appropriate signage. • Identification of locations of hazardous materials and associated activities on an emergency plan. • Training should incorporate information from Material Safety Data Sheets for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language.			
Ecological Impacts								

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
Biodiversity (Fauna and Flora)	**Impact on Flora** A few trees and vegetation are present near the sites. However, no tree will be cut. **Disturbance to Fauna:** No negative impacts on fauna are envisaged.				• In this project, low impact is expected on vegetation (small grass / shrubs) since the pipeline routes are devoid of significant unique floral and faunal life. • The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. • But, in any case / mishap / misfortune, any tree has to be cut then 10 new trees of almost 6ft. height will be planted.	Contractor	PRMSC / SC	Maintenance and monitoring of tree plantation
Social Impacts								
The project will have positive outcomes for the local communities as by the provision of good state of the art infrastructure.								
Health and Safety Measures	• Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient				• Occupational health and safety impacts during construction is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and	Contractor	PRMSC / SC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	management of Health and Safety (H&S) issues, the workforce may suffer injury or death.				machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment. • Heath safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.			
Job opportunities	• It will lead to an increase in economic activity and contribute to local area economic development.				• Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need will be met from the project areas. The project will also require skilled workers and these may be available from the community. It is anticipated that	Contractor	PRMSC / SC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
					approximately 75% of the workforce will be from the project area while some 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive impact on social norms, culture and economy of the area.			
Impacts on Local Population	• No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of water supply & sanitation system in priority villages. • The population residing in and the surroundings of the project Area will be affected during the construction phase as follows: • There is potential hazard risk from open trenches in the vicinity of populated areas during the construction				• The potential hazard risk from open trenches in the vicinity of populated areas should be mitigated by appropriate warnings and fencing. • Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours. • Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. • Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with	Contractor	PRMSC / SC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	• Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase • Community may face the noise and dust problems during the construction activities. • Theft problems to the community by the Contractor's workers and vice versa.				tarpaulin to help contain the construction materials being transported to the specific site. • The Contractor should warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring labor / workers, Contractor has to ensure that the workers should be of good repute / character. • Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized. • The contractor will prepare an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts.			
Community Health and Safety	• Construction activities, particularly excavation and movement of haul trucks and machinery				• Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance	Contractor	PRMSC / SC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	may prove dangerous for the safety of the workers as well as for local residents. • The storage of all solid waste shall be practiced so as to prevent the attraction, harborage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odors, unsightliness or public nuisance. • 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. Quality of groundwater and				with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor. • The active construction zone must be cordoned off to avoid injuries due to accidents. • There will be proper control on construction activities and oil spillage leakage of vehicles; • The labourers with different transmittable diseases will be restricted within the construction site; • Ensure that the site is 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; • Proper Safety signage at construction sites will be displayed to give awareness among public;			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents, etc. The proposed project will also have potential of air (dust pollution), noise and vibrational impacts on nearby community. The labour works with different transmittable diseases may cause spread out of those diseases in the local residents. The construction areas located near the residential, settlements, may cause accident for the people moving near to those areas.				• Timely public notification on planned construction works; • Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links; • Seeking cooperation with local educational facilities (school teachers) at each village along the route for road safety campaigns; • Provision of proper safety and diversion signage, particularly at urban areas and at sensitive/accident-prone spots; • Setting up speed limits in close consultation with the local stakeholders; and • If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools); • Construction Camp Management Plan (CCMP) and effective implementation of GRM may reduce this impact.			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
					• The communicable disease of most concern during construction phase, like Sexually-Transmitted Disease (STDs) such as HIV/AIDS, will be prevented by successful initiative typically involving health awareness; education initiatives; training heath workers in disease treatment; immunization program and providing health service; and • Reducing the impacts of vector borne diseases will be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which include 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.			
Gender issues	• Construction workers might predominantly be				• The contractor will be required to provide qualified key	Contractor	PRMSC / SC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	younger males. Those who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behavior, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. A large influx of male labor may also lead to an increase in human trafficking whereby women and girls are forced into sex work. During construction phase gender-based violence might arise due to discrimination made				personnel to address the specific risks identified in the project. Contractors will specify key staff with the technical skill and experience to implement the mitigation measures; • The bidding documents will include specific requirements that minimize the use of expatriate workers and encourage hiring of local workers, thereby minimizing labor influx; • The bidders will be required to submit Codes of Conduct (CoCs) with their bids. The CoCs will set clear boundaries for acceptable and unacceptable behaviour of all individuals and companies and will be signed by companies, managers and individuals; • The contractor will be required to establish anti-sexual harassment policies that governs conduct in the workplace;			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	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, bus stops and markets. Educational institutions near the project alignment are also sensitive regarding gender issues. • Project activities may cause hindrance to mobility especially for women during construction stage. • Privacy of the community may be disturbed.				• The contractor will be required to provide mandatory and repeated training to workers on sexual exploitation and abuse and HIV/AIDS prevention and on the content and obligations derived from the code of conduct; and • Provisions will be set in contracts for dedicated payments to contractors for SEA prevention activities (e.g., training) against evidence of completion. The portion of the contract price will be guaranteed by a performance security linked to environmental and social contractor performance. • Workers would be trained to address privacy issues and ethically behaved. • Labors would be strictly asked to cater the privacy issues. • Staff's capacity-building			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
Traffic Management	• Blocking of road may hamper public mobility due to increase in number of vehicles • Road Safety				• Provision of alternative routes • Water sprinkling at project site at consecutive intervals • Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents • Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience. • Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; • In case of any complaint, focal person of GRC may contact (details will be highlighted at project site). • Contractor will be bound to restore / rehabilitate the existing infrastructure like roads / brick soling etc. to its original state.	Contractor	PRMSC / SC	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
Economic Issues	• Economic issues may arise due to; • loss of land, • structures / assets • productive plants • livelihood • shopkeepers • vendors (Mobile/permanent)				• No land acquisition is involved • No Public structures are found to be affected in the project area because they are not falling in ROW • No tree plantation is found • No livelihood will be affected by project activity • No shops were found to be affected as located out of ROW. • No permanent vendors were observed during social and environmental assessment survey • In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site. • Contractor will be bound to nullify the damages to utilities. • Contractor will be responsible not to disturb / damage any infrastructure • If any kind of infrastructure is damaged / disturbed, contractor will be responsible to	Contractor	• PRMSC / SC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
					restore / rehabilitate that in its original state.			
D. OPERATION / MAINTENANACE PHASE								
Consumption of Contaminated Water	• Consumption of (untreated) contaminated domestic water could lead to health impacts on the consumers of the water from the pipeline. Maintenance of the pipelines requires excavations and unblocking the pipe which could lead to contamination of the water during the process				• The water supply will be closed down during maintenance phase ensure that no polluted water gets into water supply.	Contractor	PRMSC	Monitoring of water quality through EPA certified lab
Solid Waste Generation	• Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others: • Excavated soil • Cement storage bags and other packets from materials used during				• The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. • The soil excavated during maintenance will be used as backfill and thereby reducing	Contractor	PRMSC	Placement of solid waste storage containers at camp sites. ▪Collection and disposal into containers

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	repair and maintenance. • Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes.				the generation of soil material and related waste pollution concern. • There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. • All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the sub-project			
Visual Impacts	• Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and maintenance which could be an eye-sore and a health hazard.				• This impact is not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil • The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible. • Water sprinkling will be ensured.	Contractor	PRMSC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
Impacts to Occupational Health and Safety	• Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others.				• Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment.	Contractor	PRMSC	
Impacts on Community Health and Safety	• No specific serious adverse impacts on community health and safety are expected as a result of operation activities of Water Supply System. There is potential hazard risk from open trenches during the repair phases that could lead to community health and safety risks				• Health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance.	Contractor	PRMSC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
Impacts on Traffic	• There maintenance and repair activities will occur in certain sections in populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.				• The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during repair and maintenance activities including need for diversions (if necessary). • The method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. • The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.	Contractor	PRMSC	Traffic management plan
Impact on Air Quality	• The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route only. The impact on air quality is expected as a result of repair works,				• It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air	Contractor	PRMSC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring methods
		High	Medium	Low				
	which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc. • Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.			
Noise and Vibration Emission Impacts	• Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.				• The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.	Contractor	PRMSC	

Table 8-3, Environmental Monitoring & Analysis

Parameter	Details of Actions	Monitoring Frequency	Responsibility
Ambient Air Quality Testing	Air quality will be analyzed through EPD certified Lab.	• Pre-Construction • During Construction - Quarterly	• Contractor • PRMSC
Noise level Testing	Noise level testing with Digital Noise Level Meter	• Pre-Construction • During Construction - Quarterly	• Contractor • PRMSC
Water Testing	Water Quality will be analyzed through EPD certified Lab.	• Pre-Construction • During Construction - Quarterly	• Contractor • PRMSC
Wastewater Testing	Wastewater Quality will be analyzed through EPD certified Lab	• Pre-Construction • During Construction - Quarterly	• Contractor • PRMSC
Vehicular Emission Testing	Dumpers, Asphalt Pavers, Road Rollers & other machinery	• During Construction - Quarterly	• Contractor • PRMSC

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

Figure 8-2, ESMMP Implementation Budget for Each Village

Sr. No.	Item Description	Unit	Unit Rate (PKR)	Quantity (Per Village)	Amount (PKR)
Personal Protective Equipment (PPEs)					
1.	Safety Jackets	Each	654	30	19,620
2.	Safety Helmets	Each	5,668	30	170,040
3.	Safety Gloves	Each	650	50	32,500
4.	Dust Mask (Dust proof mask)	Each	500	100	50,000
5.	Safety Shoes & Toes	Each	8,175	35	286,125
6.	Safety Harness Belt	Each	4,905	3	14,715
7.	Protective Goggles	Each	545	10	5,450
8.	Ear Plugs	Each	175	20	3,500
Health, Safety and Environment (HSE)					
9.	First Aid Kit	Each	27,250	1	27,250
10.	Warning / Safety Signs	Each	500	25	12,500
11.	Green Mesh	S.ft	40	200	8,000
12.	DCP Fire Extinguisher (Dry Chemical Powder)	No.	11,990	1	11,990
13.	CO_2 Fire Extinguisher	No.	14,170	1	14,170
14.	Fire Alarm	No.	10,900	2	21,800
15.	Trapuline	Sq.ft	600	30	18,000
16.	Safety Cones		3,270	12	39,240
17.	Tree Plantation	No.	545	100	54,500
18.	Barricading / Fencing (Reflective tape, poles, safety mesh/netting)	Rft	20	300	6,000
19.	Trainings	Quarterly	27,250	4	109,000
20.	Water Sprinkling	Per Trip	1,500	30	45,000
21.	Medical Screening for Workers	Persons	1,635	30	49,050
Environmental Monitoring					
22.	Ambient Air Quality Monitoring	Each	27,250	3	81,750
23.	Groundwater Quality Test	Each	21,800	3	65,400
24.	Surface Water Quality Test	Each	21,800	3	65,400
25.	waste Water Quality Test	Each	21,800	3	65,400

Sr. No.	Item Description	Unit	Unit Rate (PKR)	Quantity (Per Village)	Amount (PKR)
26.	Noise Level Monitoring	Each	2,725	3	8,175
Site Specific / Contractors Environmental & Social Management Plan					
27.	CESMP Formulation	per village	50,000	1	50,000
HSE Staff					
28.	HSE Supervisor	Per month per village	10,000	12	120,000
Waste Management and Housekeeping					
29.	Handling and disposal of Hazardous Material	3 times per village for duration of contract	11,000	3	33,000
30.	Handling and disposal of Solid Waste Material	3 times per village for duration of contract	11,000	3	33,000
Total ESMMP Implementation Cost (PKR)					**1,520,575**

This ESMMP cost is average cost estimated for one village. For all villages, this ESMMP Cost will be multiplied with the number of villages, i.e., for total 62 villages: 1,520,575 x 42 = 63,864,150/- PKR. So total ESMMP Implementation Cost for Lahore Division is estimated to be **63,864,150.**

8.11 Proposed EMP Reporting and Reviewing Procedure of EPA

All the precautionary measures are suggested in EIA to minimize the pollution creating by construction and operation of project. Reporting and reviewing procedure are following:

- EIA Report & File Submission
- SIR Letter
- Review of EIA Report
- Issuance of Query Letters by EPA
- Submission of satisfactory replies of Query Letter
- Public Hearing
- Expert committee meeting and presentation
- DG EPA Meeting and Presentation
- NOC Issuance
- Proper Follow-up of case from submission to Issuance of NOC

8.12 Contractor's Training

In order to comply with the anticipated environment and social attributes as

described in EIA of the said project, meetings will be held with the contractors to ensure the socially acceptable and environmentally sustainable situation during execution of the project.

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

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

Contractors have to comply with the following responsibilities:

- Observation of timings and make a schedule that the surrounding communities should not be affect from noise pollution, air emissions and disturbances in their routine work.
- Usage of machinery / equipment producing negligible / low noise.
- Ensure health, safety and protective measures including safety equipment, safe drinking water, first aid boxes etc. to the workforce as per nature of their jobs.
- Water sprinkling to avoid air pollution.
- Indicate alternate routes and provide indicators on suitable places during work timings.
- Local labor should be preferred to work.
- Child labor is strictly prohibited as per labor law. All labor should be more than 18 years of age individually.
- Proper disposal of wastes and garbage.
- Health, safety and protective measures for the labor.
- Notice board of emergency numbers should be placed on proper place.

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

SECTION - 9: STAKEHOLDER CONSULTATION

Timely and broad-based stakeholder involvement is an essential element for an effective environmental and social assessment. Stakeholder engagement during Environmental & Social Assessment contributes in the improvement of the project design, environmental compliance and social acceptability.

9.1 General

This section describes the outcomes of stakeholder and public consultation sessions held within project area that can be affected by the project. The objectives of this process were to:

1. Share information with stakeholders on the improvement of the proposed project and expected impacts on the physical, biological and socio-economic environment of the project;
2. Understand stakeholder's concerns regarding various aspects of the project and the likely impacts of construction related activities and operation of the project;
3. Understand the perceptions, assessment of social impacts and concerns of the affected people / local community of the proposed project;
4. Provide an opportunity to the public regarding their valuable suggestions in a positive manner; and
5. Reduce the chances of conflict through the early identification of controversial issues, and consult them to find acceptable solutions.

In preparation for the EIA, two major groups of stakeholders were identified: (i) local communities who are the direct beneficiaries of the project interventions and therefore identified as the primary stakeholders (ii) institutions who have an important role in enabling the realization of the project interventions and therefore identified as the secondary stakeholders.

9.2 Proponent's Environmental Management Team

The Environmental and Social Management Team will be taking charge of the proposed project which consists of the following members;

1) Environmental & Social team of PRMSC – HO
2) Environmental & Social team of PRMSC – DO
3) Relevant team of EDCS Consultant
4) The Contractor

9.3 Responsible Authority

Overall responsibility for Environmental Management and Monitoring will rest

with PRMSC. E&S staff will provide support for managing environmental and social aspects of the project and implementation of EIA.

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

9.4 Project Stakeholders

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

Table 9-1, Project Stakeholders

Individual / community stakeholders	All project affected persons, households and communities. Project beneficiaries for instance, residents of the project area, users of the road, vulnerable and gender.
Institutional Stakeholders	Irrigation department, Environment department, Municipal Corporation, PRMSC, Highway Department. The contractors, construction workers, mass media / civil society members, consultants and project advisors.

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

Table 9-2, Frameworks for Consultation

Legal / Policy Source	Regulations / Safeguard Policy requirements
Government of Pakistan	Pakistan Environmental protection agency guidelines 2000.
Government of Punjab	Environmental Protection Agency (EPA) 1997 Guidelines for Public Consultation requires public consultation and involvement in project planning and implementation. The policy and procedures require proponents to consult with affected community and relevant NGO during preparation reports. The guidelines contain a number of references of need for Public Involvement.

9.5 Modes of Consultations

Public and institutional stakeholder consultations were carried out as part of the EIA process. Scoping sessions were conducted with local communities to

inform them about the proposed project interventions and to gather their feedback. Community members were actively engaged during these consultations, and their concerns and recommendations were duly recorded for incorporation into project planning and mitigation measures.

Methodology selected for selection of interviewee was Random Sampling / Focus Group Discussion. Details of the proposed project and related activities were explained to the local community and their responses were listened and addressed. Overall, the general public appeared to be convinced about the associated benefits of the proposed project. As a whole, public has very positive views about the proposed project and they are in support of it. However, they also raised some concerns during the sessions. The concerns raised by the stakeholders were considered in developing the EIA, in order to enhance project acceptability among the general public on social considerations.

9.5.1 Types of Stakeholders

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

A) Primary Stakeholders: Affected Wider Community

The project area is of both commercial and residential in nature. Project area inhabitants are direct beneficiaries of project interventions as it will resolve their long-standing issue of water supply and sanitation services system. Figure 9-1 shows pictorial record of public consultation.

B) Secondary Stakeholders: Department and Agencies

The project area lies within Lahore division. Several institutional stakeholders were engaged in the consultation process i.e., Irrigation Department, Public Health Department, MC Lahore, EPA Lahore, WAPDA / MEPCO, Highways Department. Figure 9-1 shows the representative pictorial record of institutional stakeholders' consultations.

Findings of consultation meetings with community are summarized in Table 9-3, pictorial view of consultation meeting is shown in Figure 9-1.

Table 9-3, Findings of Consultation Meetings and Responses

Sr. No.	Concerns / Suggestions / Issues Raised by Stakeholders	Response
1.	Employment opportunities should be provided to the locals during the construction phase of the project.	It will be made sure that 75% of the workforce will be employed from the project area.

2.	GSTs or OHRs should be constructed as a part of this project.	OHRs will be constructed as a part of this project.
3.	Privacy of people should be upheld during construction phase of the sub-project.	Contractor will provide trainings to workers regarding gender and privacy issues.
4.	Will there be tree cutting?	Efforts will be made to protect as much trees / plants as possible.
5.	Will there be any closure of roads during construction phase?	In case of road closures, the nearby community will be informed beforehand and alternative routes will be provided.
6.	The greenery of the area should not be disturbed.	Efforts will be made to protect as much trees / plants as possible.
7.	Construction activities should be minimized during schools' opening and closing times.	Contractor will be bound to minimize construction activities during schools' opening and closing times.
8.	Most of the women have to go out to the watercourses for washing clothes.	This issue will be resolved by executing this project after the provision of water at the doorsteps.
9.	Will the issue of municipal solid waste be resolved through this project?	A comprehensive solid waste collection system will be developed and waste containers will 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.
10.	NOCs should be obtained if government land has to be utilized for said project components.	Duly noted, as it is mandatory to obtain the NOC from government department if government land has to be utilized for construction / installation of project components.

Figure 9-1, Representative Photolog of Stakeholder Consultation Meetings

9.6 Environmental Practitioners and Experts

Team of ECSP visited the project site, had discussion with stakeholders and consulted with the local people of nearby areas to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to employment, own businesses, doctors, some of them communicated but according to social value of the area they mostly hesitate to communicate comfortably. People were provided the massive information about the project and have positive remarks regarding the project development. ECSP team have endeavoured to hold consultative sessions with a number of prominent stakeholders (Project Proponent, Government departments, line agencies, and affected persons of Project Area) to evince their views on the project and their opinions, suggestions, understanding on various issues and concerns. The consultations aimed specifically at;

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

9.7 Disclosure of Project Information

The project EIA will be uploaded on the project websites; copies shall be sent to all institutional stakeholder's offices. Before start of physical works on the project, the project EIA will be thoroughly briefed to the Contractor to implement EIA provisions in its letter & spirit. Contractor will keep copy of EIA on the site and will also brief his labor about its attributes. Contractor will also install project information boards on the project site. Contractor will implement EIA in its true essence.

9.8 Future Consultation Plan

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

SECTION - 10: GRIEVANCE REDRESS MECHANISM

The Grievance Redressal Mechanism (GRM) will be consistent with the requirements of national and international policies to ensure 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 field 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 project sites both to spread awareness regarding the GRM process.

The Grievance Redressal Mechanism will be applicable throughout the course of project during the entire project implementation and will cater to both the directly and indirectly affected populations. The GRM is proposed as a requirement of this project to address the public grievances regarding environmental and social issues that may emerge during and after project's implementation. It will also cater to manage any disconnects that emerge from the field level and that has significant implications for effective implementation of the project interventions.

The PIMU / PRMSC-HO 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 of complaints management.

10.1 Communication & Awareness

The final processes and procedures for the GRM will be translated in to local languages and disseminated at all project locations. These shall be made available (in both leaflet and poster format) to all project locations through the offices of each SDU. Dedicated male and female Grievance Focal Persons for each project location will play an instrumental role in spreading awareness regarding the GRM, including the use of information technology for reporting and monitoring of complaints.

10.2 Record & Maintenance

The Project Director's Office will maintain an electronic database at the PIMU / PRMS-HO that will provide a summary of complaints received and mitigations. The PD's office will also provide an analysis of the grievances at each project location using a pre-designed M&E template that will give insight in to the type of complaints received and 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 project location on a periodic basis to the PRMSC 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 for each District at the Office of the SDU-

DOs and a manual register of all day-to-day complaints and their grievance redressal details will be maintained by VOs their office.

10.3 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) will be responsible to receive, log, and resolve complaints at site and in village level. Complainant would be able to launch complaint on a toll-free number, app, message or call.
Teir 1: Village level – Panchayt / Village Councils made under Punjab Local Government (Amendment) Ordinance 2021 will act as the 1st tier of GRM at village community level.
Teir 2: Grievance Redress Committee (GRC – Divisional Level) in SDU-DO will be established for each district that will manage GRM aspects for all project locations in each district including decisions to be taken, actions and monitoring of complaints resolution at project level.
Teir 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.

10.4 GRM Process Implementation

- Through the envisaged system, complainant would be able to launch complaint on a toll-free number, app, message or call. (GRM will be accepted the anonymous grievances).
- To handle the gender related issue a separate toll-free number will be provided to the community and contractor;
- Gender related complaint will be confidential and directly shared with the management through toll free number;
- Details of the complaints and the complainants will be entered in 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. 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.

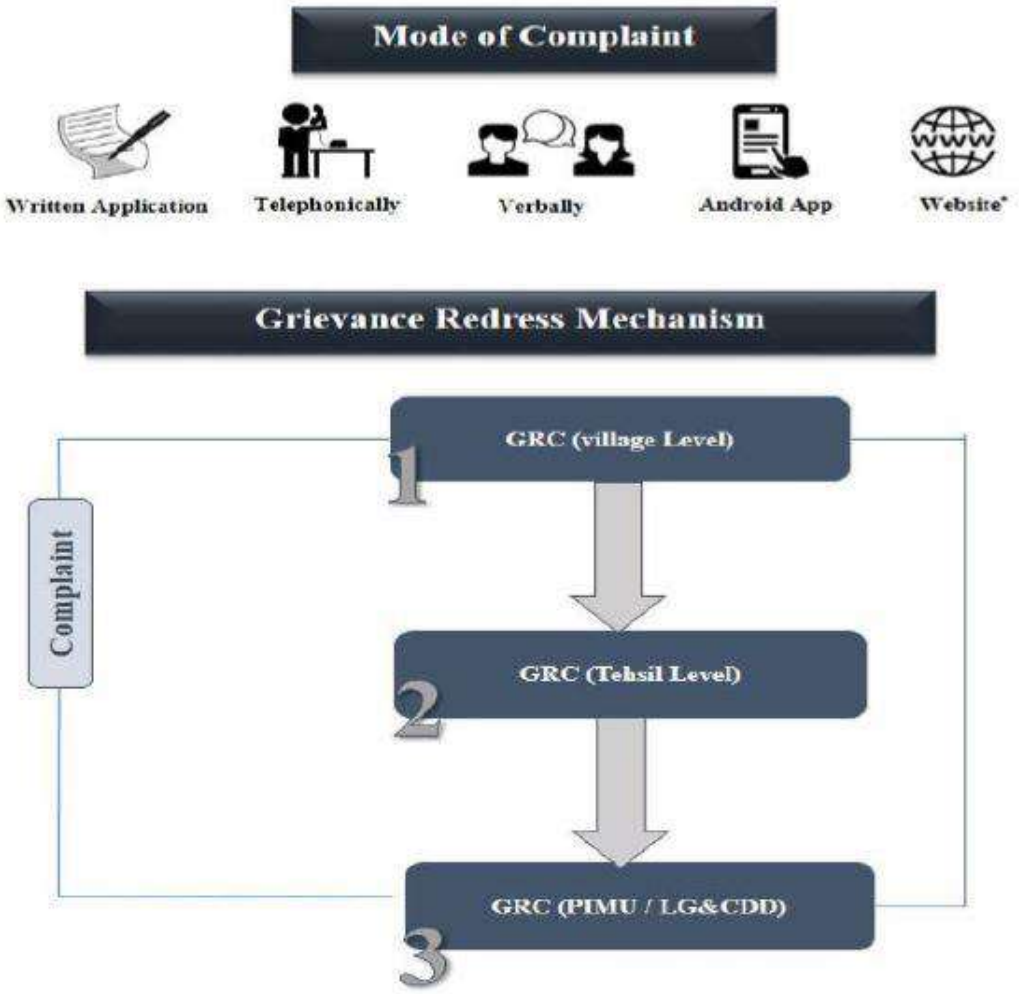


Figure 10-1, Mode of Complaint

10.5 GRM Procedures and Timelines

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

- Tracking complainant(s) from project 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 form Village and Tehsil and document into the monthly progress reports at PIMU.

GR (Village level) will be responsible to receive, log, and resolve complaints at village level. The Grievance Redress Committee at the village Panchayts 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-DO Level (SDU-DO) within 3 days after receiving.

GRC – SDU-DO will try to resolve the complaints in a satisfactory manner anyhow, if not satisfactorily resolved by the village panchayts /councils and Tehsil level, then the grievance will be referred for consideration by GRC at the PIMU / PRMSC-HO level within one week.

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

If the complainant is not satisfied, the complaint will have the option to seek redress through court of law.

10.6 Types of Grievances

Environmental	Social	Occupational Safety
•Noise Pollution •Air Pollution •Fugitive Dust •Water Pollution •Solid Waste Management •House Keeping •Cutting of Trees •Borrow Areas Management •Protection of Wildlife •Campsite Management	•Accidental Insurance for labor •Non-Provision of PPEs to labor as per nature of their jobs •Loss of any public infrastructure • Protection of sensitive receptors •Compensation for any economic losses •Traffic Management •Labor grievance redressal •Gender discrimination •Security Arrangements •Impacts on livelihood •Irregular Traffic Movement •Obstruction in access •Intensive schedule of construction activities •Child Labor	•First Aid •Fire Safety •Workplace Safety •Tools Box Talks •Provision of PPEs •Work at Height Safety •Excavation Safety •Heavy Machinery Issues

SECTION - 11: CONCLUSION AND RECOMMENDATIONS

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

11.1 Conclusion

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

11.2 Recommendations

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

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

The present EIA report is enough to meet the administrative and legal framework. After the complete study of the project, it is concluded that project will not have significant adverse impacts on the nearby community and on environment. Overall, the project will have positive impacts on the local population and country as a whole. Therefore, it is requested for the environmental approval for the subject project.

ANNEXURES

ANNEXURE - 1: REFERENCES

- https://www.epa.gov/
- Schedule I of Punjab Environmental Protection Act 1997 (Amended 2012)
- section 12 of Punjab Environmental Protection Act 1997 (Amended 2012)
- Pakistan Environmental Protection Act 1997
- Punjab Environmental Protection Act 1997 (Amended 2012)
- Guideline for the Environmental Assessment
- Regulations of Environmental Assessment, Regulations 2000
- National Conservation Strategy- Pakistan
- Guideline for the public consultation
- National Resettlement Policy and Ordinance
- National Environmental Quality Standards (Self-monitoring and reporting by the industry)
- Labor laws
- Canal and Drainage Act, 1873
- National Environmental Policy 2005.
- The Land Acquisition act, 1894
- The Punjab local Governmental ordinance, 2001.
- Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023
- Meteorological data from meteorological department and relevant website
- Pakistan Biosafety rules 2005
- Pakistan Environmental agency (review of IEE/EIA) regulation 2000.
- Punjab Portal (http://www.punjab.gov.pk/attock)
- Sectorial Guideline for environmental reports, industrial states
- Pakistan Environmental Protection ordinance (PEPO), 1983
- OSHAS 1800 for health and safety
- Census 2023

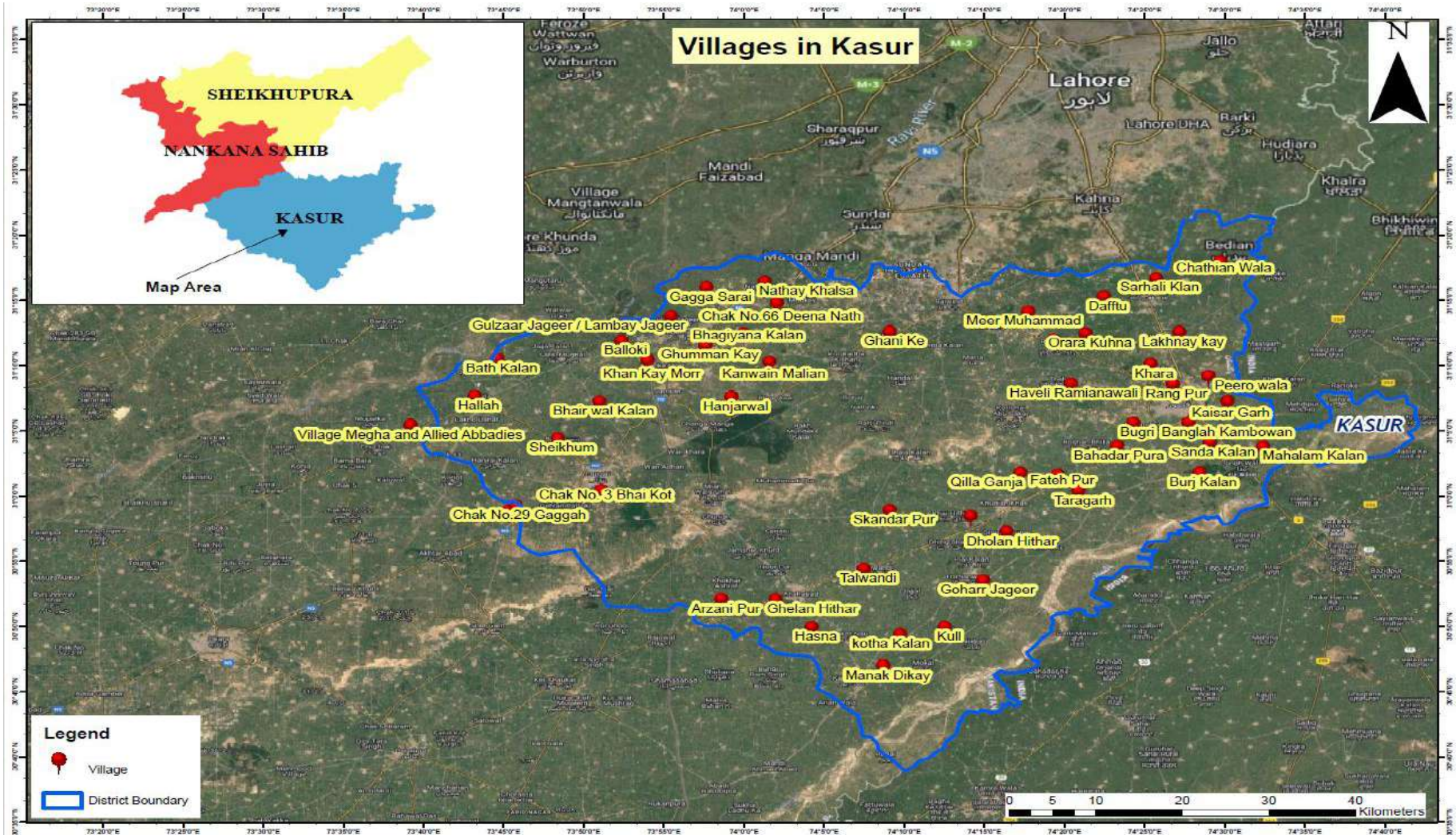
ANNEXURE - 2: GLOSSARY

Words	Dictionary
Mitigation	The action of lessening in severity or intensity
Legislation	law enacted by a legislative body
Compliance	Acting according to certain accepted standards
Flora	All the plant life in a particular region or period
Fauna	All the animal life in a particular region or period
Demarcated	Separate clearly, as if by boundaries
Screening	The display of a motion picture
Substitutions	An event in which one thing is substituted for another
Regulations	An authoritative rule
Stakeholders	A person or organization with an interest or concern in something
Vulnerable	Susceptible to attack

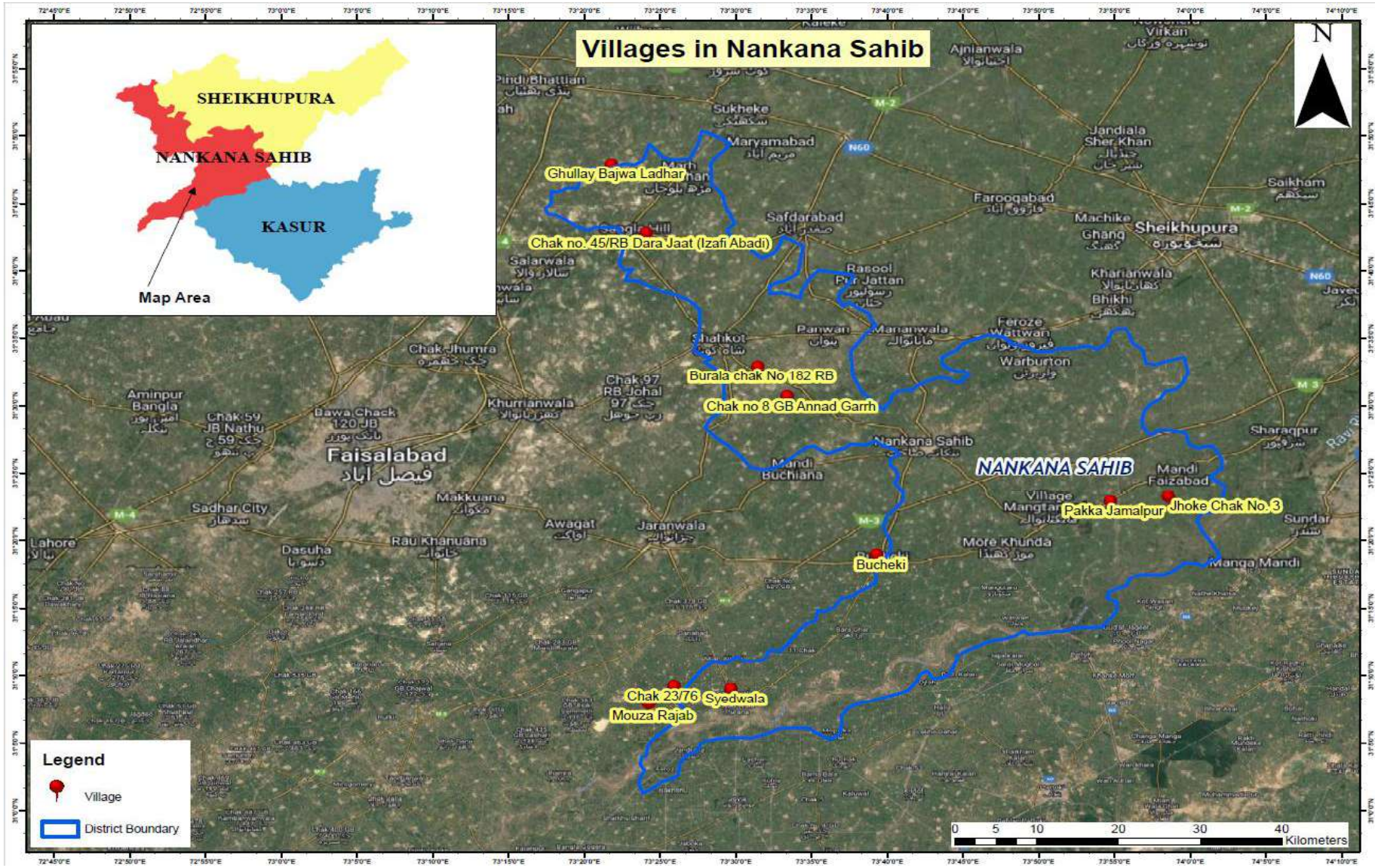
ANNEXURE - 3: LIST OF ABBREVIATIONS

PRMSC	Punjab Rural Municipal Services Company
PRSWSSP	Punjab Rural Sustainable Water Supply and Sanitation Project
ECSP	Engineering Consultancy Services Punjab (Pvt.) Ltd - Consultants
WB	World Bank
ESMP	Environmental & Social Management Plan
APs	Affected Persons
CCR	Community Complaints Register
MC	Municipal Corporation
SDU	Service Delivery Unit
HO	Head Office
DO	Divisional Office
TO	Tehsil Office
EA	Executing Agency
HH	Household
SC	Supervisory Consultant
GoP	Government of Punjab
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
LAA	Land Acquisition Act
M&E	Monitoring and Evaluation
NOC	No Objection Certificate
OP	Operational Policy
O&M	Operation and Maintenance
P&D	Planning & Development
PAP	Project Affected Person
PBS	Pakistan Bureau of Statistics
PD	Project Director
PIU	Project Implementation Unit
ROW	Right of Way
LG&CDD	Local Government and Community Development Department
sq.ft	Square Feet
AOI	Area of Impact
ZOI	Zone of Impact
TORs	Terms of References

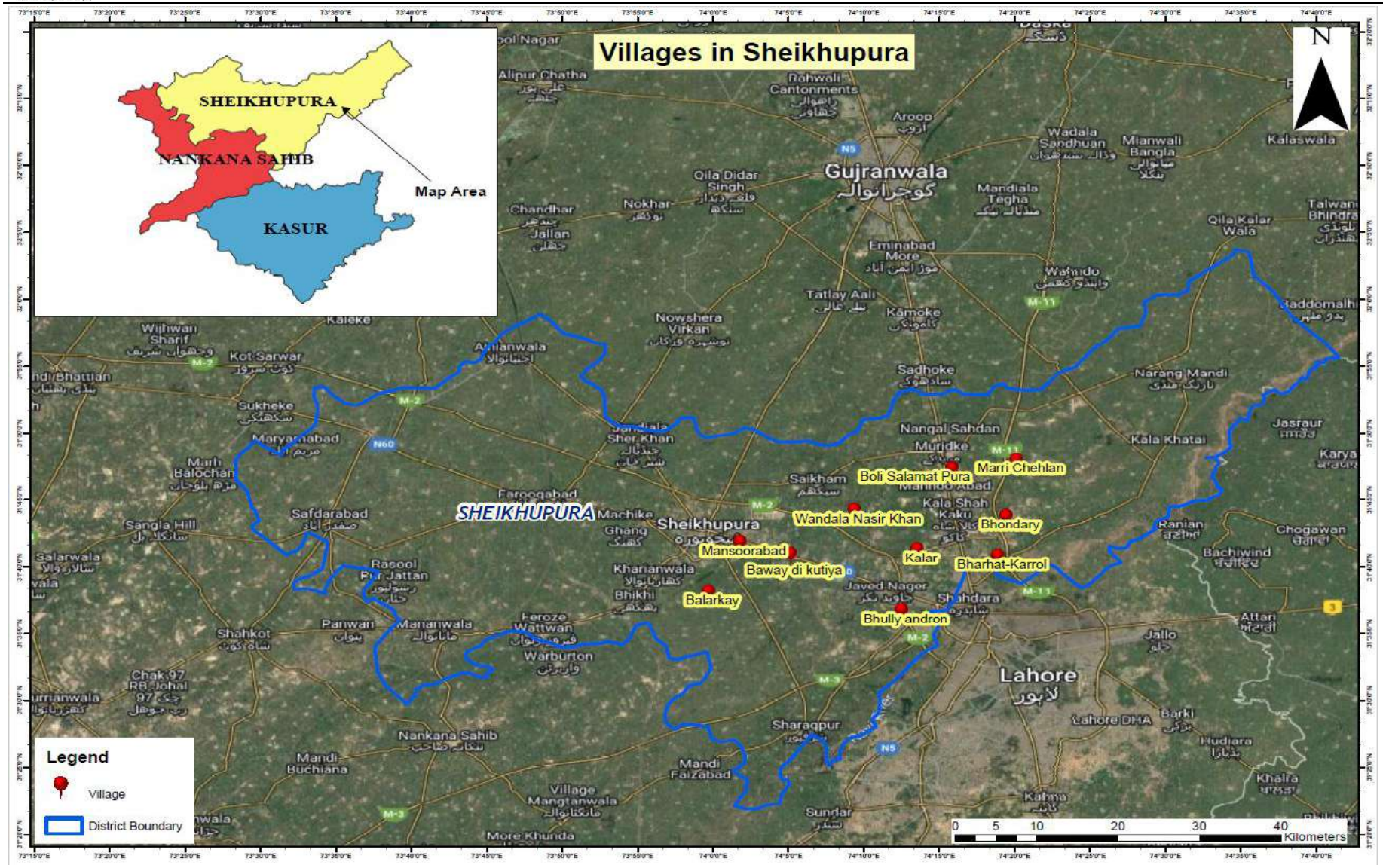
ANNEXURE - 4: GOOGLE MAP / LAYOUT



Project Map – Kasur District



Project Map – Nankana Sahib District



Project Map – Sheikhupura District

ANNEXURE - 5: EIA TEAM

Sr. No	Name	Designation	Department
1.	Hussain Kamran	Senior Manager (Environment & Social)	PRMSC
2.	Rameen Saleem	RA (Environment & Social Safeguard)	PRMSC
3.	M. Shuaib Kabir Khan	RA (Environment & Social Safeguard)	PRMSC
4.	Hafiz Musa Khokhar	Economist	PRMSC
5.	Haji Aman Ullah Saifi	Social & BCC Specialist	PRMSC
6.	Asma Abdul Ghuffar	Gender Specialist	PRMSC
7.	Zoha Imran Butt	Environment Specialist	ECSP
8.	Huba Bint E Asla	Environmentalist	ECSP
9.	Sidra Rao	Environmentalist	ECSP
10.	Mr. Umar Kamal	Sociologist and Resettlement Specialist	ECSP
11.	Muhammad Arshad	Chief Chemist	ECSP

ANNEXURE - 6: LAB REPORTS OF ENVIRONMENTAL MONITORING

SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

AMBIENT AIR MONITORING REPORT

Client Name: ECSP **Address:** Lahore Division

Monitoring Point: Tehsil Kasur
Starting Date: 16-10-2025 **Reporting Date:** 24-10-2025
Monitoring By: SEAL **Reference No.:** SEAL/Lab/2025/AA/005
Results: -

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM_{10})	40 CFR Part 50, App J (US-EPA)	$\mu g/m^3$	146.8	150
2	Particulate Matter ($PM_{2.5}$)	40 CFR Part 50, App J (US-EPA)	$\mu g/m^3$	33.7	35
3	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m^3	4.8	5
4	Oxides of Nitrogen as (NO & NO_2)	40 CFR Part 50, App F (US-EPA)	$\mu g/m^3$	98.5	120
5	Sulphur dioxide (SO_2)	EQSA-0197-114 (US-EPA)	$\mu g/m^3$	99.2	120

PEQS: Punjab Environmental Quality Standards
Note:

- Quality was assured through self-calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.

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

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

NOISE LEVEL MONITORING REPORT

Client Name:	ECSP	**Address:**	Lahore Division
Monitoring Point:	Tehsil Kasur	**Time of Monitoring:**	24 Hours
Starting Date:	16-10-2025	**Reporting Date:**	24-10-2025
Monitoring By:	SEAL	**Reference No.:**	SEAL/Lab/2025/AN/005

Results: -

Sr. No.	Time	Noise dB(A)	Day/Night	PEQS
1	06:00 AM	59.5		
2	07:00 AM	59.1		
3	08:00 AM	58.9		
4	09:00 AM	61.8		
5	10:00 AM	62.4		
6	11:00 AM	63.8		
7	12:00 PM	62.4		
8	01:00 PM	68.5		
9	02:00 PM	65.4	Day Time	75
10	03:00 PM	62.4		
11	04:00 PM	61.5		
12	05:00 PM	63.5		
13	06:00 PM	62.2		
14	07:00 PM	62.1		
15	08:00 PM	61.3		
16	09:00 PM	62.9		
17	10:00 PM	59.9		
Average Noise Level		**62.21 dB(A)**		

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

Client Name: ECSP **Address:** Lahore Division

Monitoring Point: Tehsil Kasur **Time of Monitoring:** 24 Hours
Starting Date: 16-10-2025 **Reporting Date:** 24-10-2025
Monitoring By: SEAL **Reference No.:** SEAL/Lab/2025/AN/005
Results: -

18	11:00 PM	57.4	Night Time	65
19	12:00 AM	55.9		
20	01:00 AM	53.4		
21	02:00 AM	49.1		
22	03:00 AM	47.5		
23	04:00 AM	47.2		
24	05:00 AM	46.8		
Average Noise Level		**51.04 dB(A)**		

PEQS: Punjab Environmental Quality Standards
Note:

- Quality was assured through self-calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.

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

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

GROUND WATER ANALYSIS REPORT

Client Name:	ECSP	**Address:**	Lahore Division
Sampling Point:	Tehsil Kasur	**Nature of Sample:**	Ground Water
Sampling Date:	16-10-2025	**Reporting Date:**	24-10-2025
Sampling By:	SEAL	**Reference No.:**	SEAL/Lab/2025/GW/005

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H^+ B	--	7.89	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	829	1000
3	Chloride	4500- APHA Cl^- B	mg/l	54.4	250
4	Fluoride	APHA 4500-F^- D	mg/l	0.01	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
7	Colour	APHA 2120 B	TCU	0.12	15
8	Nitrate (as NO_3^-)	APHA 4500-NO^{3-} E	mg/l	0.1	50
9	Nitrite (as NO_2^-)	APHA 4500-NO^{2-} B	mg/l	0.0	3
10	Lead	APHA-Pb B	mg/l	BDL	0.05
11	Total Hardness as $CaCO_3$	APHA 2340 C	mg/l	128.4	500
12	Turbidity	APHA 2130 B	NTU	1.7	5
13	Zinc	APHA 3500-Zn B	mg/l	0.1	5
14	Aluminum	APHA 3111 D	mg/l	0.0	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.1	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	0.0	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.0	2
18	Boron	APHA 4500-B C	mg/l	0.068	0.300
19	Barium	APHA 3111 B	mg/l	0.047	0.700

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

EPA CERTIFIED

Client Name:	ECSP	**Address:**	Lahore Division
Sampling Point:	Tehsil Kasur	**Nature of Sample:**	Ground Water
Sampling Date:	16-10-2025	**Reporting Date:**	24-10-2025
Sampling By:	SEAL	**Reference No.:**	SEAL/Lab/2025/GW/005

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.0	0.020
21	Sodium	APHA 3114 C	mg/l	91.0	200
22	Cyanide	APHA 4500-CN^- D	mg/l	0.006	0.05
23	Manganese	APHA 3113B	mg/l	0.0	0.5
24	Nickel	APHA 3111 B	mg/l	0.0	0.020
25	Residual Chlorine	APHA 4500-Cl_2	mg/l	0.267	0.2 – 0.5
26	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

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

Note:

- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over samples (if so available) shall be retained for 10 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

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

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ANNEXURE - 7: TORS

These terms of references are being submitted for the subject EIA study under Clause 5 (f) of policy and procedure for the filing, review and approval of environmental assessment. These TORs of EIA have been prepared by the environmental consultants, in consultation with the project proponent.

Introduction of Project

The project aims at improvement of infrastructure of municipal services such as laying of water supply system and sewerage system in selected revenue villages within Lahore division.

Cost of Project:

The capital cost of the project will be about 4,832.37 million PKR.

Name of Proponent

Chief Executive Officer of PRMSC is the project Proponent.

Environmental Consultant & Client

PRMSC has appointed the ECSP, as the Consultant for the subject project to conduct the EIA. ECSP will be called as "Consultant" and PRMSC as the "Client".

Objective of the EIA study

The Objective of study includes Compliance of section 12 of PEPA 1997 (Amended 2012), PEQS and fulfilment of HSE conditions.

Purpose of the EIA

The key objectives of the EIA are to:

- Document the ecological and socio-economic baseline conditions of the study area and the affected communities
- Inform and obtain input from stakeholders, (e.g., governmental authorities, the public, and indigenous communities) and capture their relevant issues and concerns
- Assess in detail the environmental, social, and health impacts that would result from the project
- Suggestion of environmental and social mitigation measures to identified environmental Impacts
- Develop the EMPs as discussed above, based on the mitigation measures developed in the EIA.
- Meet the requirements or recommendations of the applicable National Environmental Laws and Guidelines

Scope of Services

EIA for the subject project is in accordance with:

1. The Punjab Environmental Protection Act, 1997 (amended 2012) and the

- Various guidelines developed by the Punjab Environmental Protection Agency
- Pakistan Environment Protection Agency Guidelines
- Guidelines of Labor & Human Resource Department
- Punjab Local Government Guidelines
- Punjab Food Authority Guidelines

2. Methodology for carrying out this study
   - Project Description
   - Site Selection
   - Project Alternatives
3. Process Description
   - Detailed review of the processes
   - Design Parameters
   - Process flow chart
   - Details related top Plant and Equipment
4. Environmental profile of the environmental study area
   - Climatology
   - Geographical features
   - Geological and Hydrological features
   - Historical review
   - Land Use
   - Ecology, i.e., Flora and Fauna etc.
5. Analysis of EPA required environmental parameters
   - Sampling for Air, Water, and Noise Level
   - Ambient Air Quality will be monitored at the existing sub-project site by using certified instruments/methods to check the concentration of pollutants in ambient air before construction.
   - Groundwater quality of the area will be checked through analysing EPA Smart Parameters. 2-3 representative samples will be collected to check the groundwater quality by using certified sampling techniques and analysis procedures.
   - Noise Level will be monitored at different localities at existing project site
   - Investigate Socio-Economic and Socio-Environmental aspects and cultural values within and around the operating facility
   - Administrative Set up
   - Cultural and Social Values
   - Social Cohesion

- Interviews from different groups

7. Development activities and Waste Management
8. Identify and evaluate major environmental impacts
9. Identify mitigation measures and develop Environmental Management and Monitoring plan
10. Conclusions based on the study conducted for this EIA.

EIA Proceedings

1. All other requirements, as set forth by
   - The Punjab Environmental Protection Act, 1997 (Amended 2012) and the
   - Various guidelines developed by PEPA
   - Any other legal requirements existing within Pakistan
2. 1-2 Site Visits for data acquisition
3. Environmental Monitoring
4. Preparation of Lab Analysis Report
5. Preparation of Environmental Impact Assessment (EIA)
6. Submission of all EIA report in office of DG EPA Punjab
7. Conduction of Public Hearing of EIA
8. Briefing & Presentation at the site to District Officer/Inspector for Environmental Management.
9. Reply to technical Environmental Objections/Review
10. Presentation in the office of DG EPA, Punjab
11. Issuance of NOC

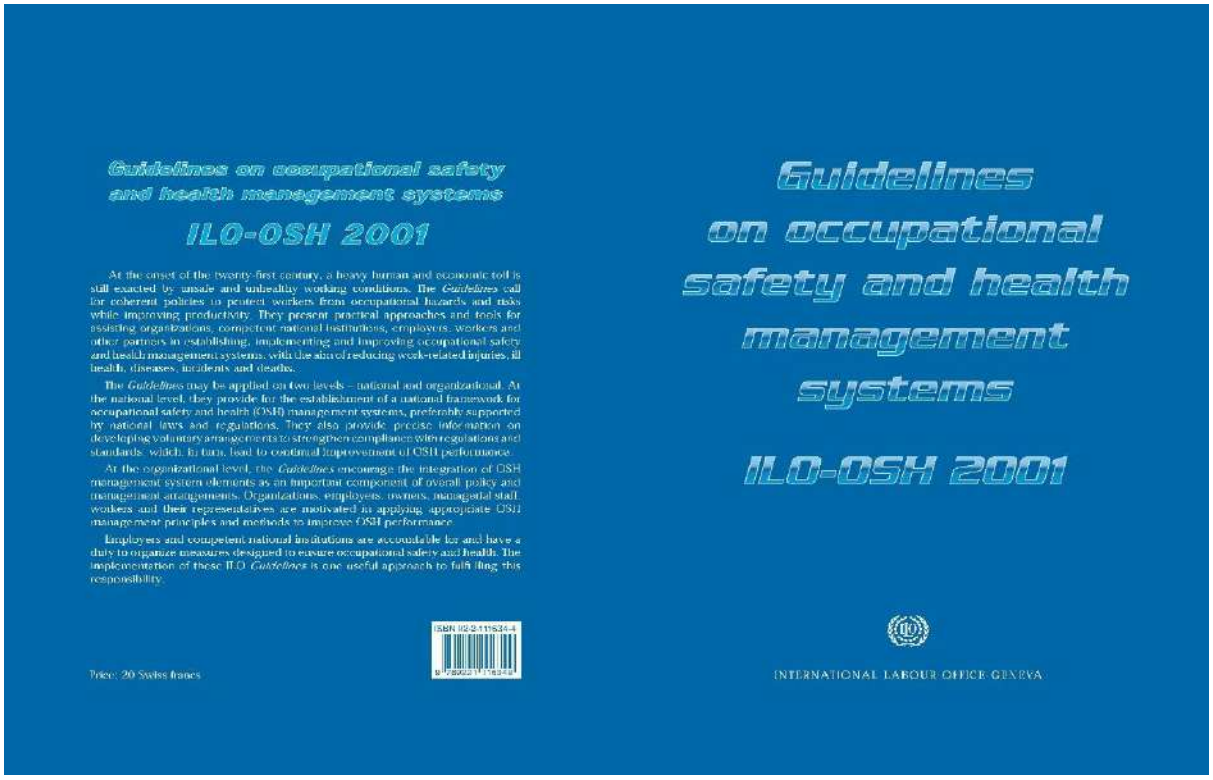
CLIENT'S RESPONSIBILITY

We expect the following inputs from the clients:

- As soon as the Proposal is accepted, the Consultants will request for the nomination of Environmental Specialist to be nominated as Coordinator who will be responsible for all coordination activities as required by the Consultants and to whom the Consultants will refer for information and assistance. All correspondence between the Consultants and the CLIENT will be routed through the coordinator.
- ECSP will require free access to all relevant information available with Client.
- Assess and identify major potential issues and impacts particularly those which may have influence on design, construction and operation at any stage.
- The report developed for the ECSP shall be the property of the CLIENT and the Consultants shall adhere to confidentiality morally as well as legally.
- Client will provide relevant documents as:
    1. Signed application on company letter head (pattern will be provided)
    2. Undertaking on Rs. 100/- Stamp Paper (pattern will be provided)
    3. Affidavit on Rs. 100/- Stamp Paper (pattern will be provided)
    4. Copy of CNIC of proponent
    5. Signature on Schedule IV (pattern will be provided)
    6. Layout Map of the project
    7. Other NOCs / Certificates from other concerned departments (if any)
- Project proponent will provide the Bank Drafts of amount of Rs. 30,000/- in favour of D.G. EPA Punjab which is review fee for EIA.
- If any legal litigation arises from stakeholders during the preceding of EIA, the consultant will not be responsible for the delay in the approval process due to legal litigation.

Signature:	**Signature:**
Name:	**Name:**
Designation:	**Designation:**
Date:	**Date:**

ANNEXURE - 8: ILO GUIDELINES ON OHS



Guidelines on occupational safety and health management systems

ILO-OSH 2001

(Second Edition)*

**This second edition includes additions made by the Office to the bibliography which are indicated with an asterisk (*).*

Guidelines on occupational safety and health management systems

ILO-OSH 2001

INTERNATIONAL LABOUR OFFICE · GENEVA

ILO
Guidelines on occupational safety and health management systems, ILO-OSH 2001
Geneva, International Labour Office, 2001

Guide: occupational safety, occupational health, national level, enterprise level, technical aspect. 13.04.2

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Also published in French: *Principes directeurs concernant les systèmes de gestion de la sécurité et de la santé au travail, ILO-OSH 2001* (ISBN 92-2-211634-8, Geneva, 2002); and in Spanish: *Directrices relativas a los sistemas de gestión de la seguridad y la salud en el trabajo, ILO-OSH 2001* (ISBN 92-2-311634-1, Geneva, 2002).

ILO Cataloguing in Publication Data

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Foreword

The protection of workers against work-related sickness, disease and injury forms part of the historical mandate of the ILO. Disease and injury do not go with the job nor can poverty justify disregard for workers' safety and health. The ILO's primary goal is to promote opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity. We have summarized this as "decent work". Decent work is safe work. And safe work is also a positive factor for productivity and economic growth.

Today, technological progress and intense competitive pressures bring rapid change in working conditions, work processes and organization. Legislation is essential but insufficient on its own to address these changes or to keep pace with new hazards and risks. Organizations must also be able to tackle occupational safety and health challenges continuously and to build effective responses into dynamic management strategies. These *Guidelines on occupational safety and health management systems* will support this effort.

The *Guidelines* were prepared on the basis of a broad-based approach involving the ILO and its tripartite constituents and other stakeholders. They have also been shaped by internationally agreed occupational safety and health principles as defined in relevant international labour standards. Consequently, they provide a unique and powerful instrument for the development of a sustainable safety culture within enterprises and beyond. Workers, organizations, safety and health systems and the environment all stand to benefit.

The ILO is pleased to have led the exercise of drawing up these *Guidelines*. I am confident that they will become an invaluable tool for employers and workers and their organizations, national institutions and all those who have a role in ensuring that workplaces are also safe and healthy places.

Juan Somavia
Director-General

Contents

Introduction

The positive impact of introducing occupational safety and health (OSH) management systems at the *organization*[1] level, both on the reduction of hazards and risks and on productivity, is now recognized by governments, employers and workers.

These guidelines on OSH management systems have been developed by the International Labour Organization (ILO) according to internationally agreed principles defined by the ILO's tripartite constituents. This tripartite approach provides the strength, flexibility and appropriate basis for the development of a sustainable safety culture in the *organization*. The ILO has therefore developed voluntary guidelines on OSH management systems which reflect ILO values and instruments relevant to the protection of workers' safety and health.

The practical recommendations of these guidelines are intended for use by all those who have responsibility for occupational safety and health management. They are not legally binding and are not intended to replace national laws, regulations or accepted standards. Their application does not require certification.

The employer is accountable for and has a duty to organize occupational safety and health. The implementation of an OSH management system is one useful approach to fulfilling this duty. The ILO has designed these guidelines as a practical tool for assisting *organizations* and competent institutions as a means of achieving continual improvement in OSH performance.

[1] See glossary for definition.

1 Objectives

1.1. These guidelines should contribute to the protection of workers from hazards and to the elimination of work-related injuries, ill health, diseases, incidents and deaths.

1.2. At national level, the guidelines should:

(a) be used to establish a national framework for OSH management systems, preferably supported by national laws and regulations;

(b) provide guidance for the development of voluntary arrangements to strengthen compliance with regulations and standards leading to continual improvement in OSH performance; and

(c) provide guidance on the development of both national and tailored guidelines on OSH management systems to respond appropriately to the real needs of *organizations*, according to their size and the nature of their activities.

1.3. At the level of the *organization*, the guidelines are intended to:

(a) provide guidance regarding the integration of OSH management system elements in the *organization* as a component of policy and management arrangements; and

(b) motivate all members of the *organization*, particularly employers, owners, managerial staff, workers and their representatives, in applying appropriate OSH management principles and methods to continually improve OSH performance.

2 A national framework for occupational safety and health management systems

2.1. National policy

2.1.1. A competent institution or institutions should be nominated, as appropriate, to formulate, implement and periodically review a coherent national policy for the establishment and promotion of OSH management systems in *organizations*. This should be done in consultation with the most representative organizations of employers and workers, and with other bodies as appropriate.

2.1.2. The national policy on OSH management systems should establish general principles and procedures to:

(a) promote the implementation and integration of OSH management systems as part of the overall management of an *organization*;

(b) facilitate and improve voluntary arrangements for the systematic identification, planning, implementation and improvement of OSH activities at national and *organization* levels;

(c) promote the participation of workers and their representatives at *organization* level;

(d) implement continual improvement while avoiding unnecessary bureaucracy, administration and costs;

(e) promote collaborative and support arrangements for OSH management systems at the *organization* level by labour inspectorates, occupational safety and health services and other services, and channel their activities into a consistent framework for OSH management;

(f) evaluate the effectiveness of the national policy and framework at appropriate intervals;

(g) evaluate and publicize the effectiveness of OSH management systems and practice by suitable means; and

(h) ensure that the same level of safety and health requirements applies to contractors and their workers as to the workers, including temporary workers, employed directly by the *organization*.

2.1.3. With a view to ensuring the coherence of the national policy and of arrangements for its implementation, the competent institution should establish a national framework for OSH management systems to:

(a) identify and establish the respective functions and responsibilities of the various institutions called upon to implement the national policy, and make appropriate arrangements to ensure the necessary coordination between them;

(b) publish and periodically review national guidelines on the voluntary application and systematic implementation of OSH management systems in *organizations*;

(c) establish criteria, as appropriate, for the designation and respective duties of the institutions responsible for the preparation and promotion of tailored guidelines on OSH management systems; and

(d) ensure that guidance is available to employers, workers and their representatives to take advantage of the national policy.

2.1.4. The competent institution should make arrangements and provide technically sound guidance to labour inspectorates, OSH services and other public or private services, agencies and institutions dealing with OSH, including health-care providers, to encourage and help *organizations* to implement OSH management systems.

2.2. National guidelines

2.2.1. National guidelines on the voluntary application and systematic implementation of OSH management systems should be elaborated based on the model provided in Chapter 3, taking into consideration national conditions and practice.

2.2.2. There should be consistency between the ILO guidelines, the national guidelines and the tailored guidelines, with sufficient flexibility to permit direct application or tailored application at the *organization* level.

2.3. Tailored guidelines

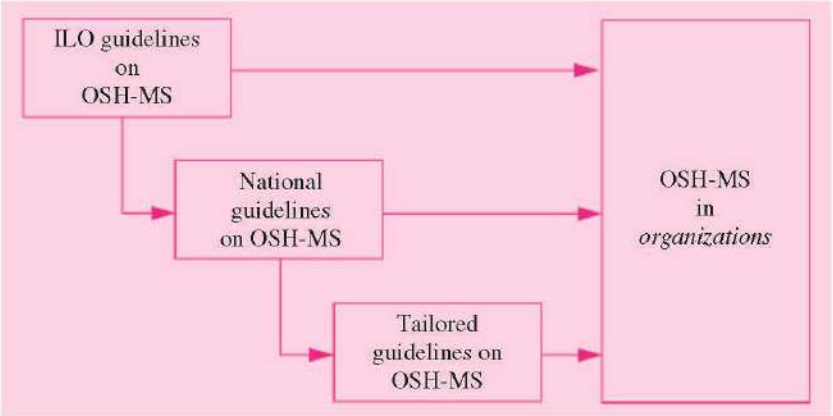
2.3.1. Tailored guidelines, reflecting the overall objectives of the ILO guidelines, should contain the generic elements of the national guidelines and should be designed to reflect the specific conditions and needs of *organizations* or groups of *organizations*, taking into consideration particularly:

(a) their size (large, medium and small) and infrastructure; and

(b) the types of hazards and degree of risks.

2.3.2. The links between the national framework for OSH management systems (OSH-MS) and its essential elements are illustrated in figure 1.

Figure 1. Elements of the national framework for OSH management systems



3 The occupational safety and health management system in the *organization*

Occupational safety and health, including compliance with the OSH requirements pursuant to national laws and regulations, are the responsibility and duty of the employer. The employer should show strong leadership and commitment to OSH activities in the *organization*, and make appropriate arrangements for the establishment of an OSH management system. The system should contain the main elements of policy, organizing, planning and implementation, evaluation and action for improvement, as shown in figure 2.

Figure 2. Main elements of the OSH management system

Policy

3.1. Occupational safety and health policy

3.1.1. The employer, in consultation with workers and their representatives, should set out in writing an OSH policy, which should be:

(a) specific to the *organization* and appropriate to its size and the nature of its activities;

(b) concise, clearly written, dated and made effective by the signature or endorsement of the employer or the most senior accountable person in the *organization*;

(c) communicated and readily accessible to all persons at their place of work;

(d) reviewed for continuing suitability; and

(e) made available to relevant external interested parties, as appropriate.

3.1.2. The OSH policy should include, as a minimum, the following key principles and objectives to which the *organization* is committed:

(a) protecting the safety and health of all members of the *organization* by preventing work-related injuries, ill health, diseases and incidents;

(b) complying with relevant OSH national laws and regulations, voluntary programmes, collective agreements on OSH and other requirements to which the *organization* subscribes;

(c) ensuring that workers and their representatives are consulted and encouraged to participate actively in all elements of the OSH management system; and

(d) continually improving the performance of the OSH management system.

3.1.3. The OSH management system should be compatible with or integrated in other management systems in the *organization*.

3.2. Worker participation

3.2.1. Worker participation is an essential element of the OSH management system in the *organization*.

3.2.2. The employer should ensure that workers and their safety and health representatives are consulted, informed and trained on all aspects of OSH, including emergency arrangements, associated with their work.

3.2.3. The employer should make arrangements for workers and their safety and health representatives to have the time and resources to participate actively in the processes of organizing, planning and implementation, evaluation and action for improvement of the OSH management system.

3.2.4. The employer should ensure, as appropriate, the establishment and efficient functioning of a safety and health committee and the recognition of workers' safety and health representatives, in accordance with national laws and practice.

Organizing

3.3. Responsibility and accountability

3.3.1. The employer should have overall responsibility for the protection of workers' safety and health, and provide leadership for OSH activities in the *organization*.

3.3.2. The employer and senior management should allocate responsibility, accountability and authority for the development, implementation and performance of the OSH management system and the achievement of the relevant OSH objectives. Structures and processes should be established which:

(a) ensure that OSH is a line-management responsibility which is known and accepted at all levels;

(b) define and communicate to the members of the *organization* the responsibility, accountability and authority of persons who identify, evaluate or control OSH hazards and risks;

(c) provide effective supervision, as necessary, to ensure the protection of workers' safety and health;

(d) promote cooperation and communication among members of the *organization*, including workers and their representatives, to implement the elements of the *organization's* OSH management system;

(e) fulfil the principles of OSH management systems contained in relevant national guidelines, tailored guidelines or voluntary programmes, as appropriate, to which the *organization* subscribes;

(f) establish and implement a clear OSH policy and measurable objectives;

(g) establish effective arrangements to identify and eliminate or control work-related hazards and risks, and promote health at work;

(h) establish prevention and health promotion programmes;

(i) ensure effective arrangements for the full participation of workers and their representatives in the fulfilment of the OSH policy;

(j) provide appropriate resources to ensure that persons responsible for OSH, including the safety and health committee, can perform their functions properly; and

(k) ensure effective arrangements for the full participation of workers and their representatives in safety and health committees, where they exist.

3.3.3. A person or persons at the senior management level should be appointed, where appropriate, with responsibility, accountability and authority for:

(a) the development, implementation, periodic review and evaluation of the OSH management system;

(b) periodic reporting to the senior management on the performance of the OSH management system; and

(c) promoting the participation of all members of the *organization*.

3.4. Competence[2] and training

3.4.1. The necessary OSH competence requirements should be defined by the employer, and arrangements established and maintained to ensure that all persons are competent to carry out the safety and health aspects of their duties and responsibilities.

3.4.2. The employer should have, or should have access to, sufficient OSH competence to identify and eliminate or control work-related hazards and risks, and to implement the OSH management system.

3.4.3. Under the arrangements referred to in paragraph 3.4.1, training programmes should:

(a) cover all members of the *organization*, as appropriate;

(b) be conducted by competent persons;

(c) provide effective and timely initial and refresher training at appropriate intervals;

(d) include participants' evaluation of their comprehension and retention of the training;

(e) be reviewed periodically. The review should include the safety and health committee, where it exists, and the training programmes, modified as necessary to ensure their relevance and effectiveness; and

(f) be documented, as appropriate and according to the size and nature of activity of the *organization*.

3.4.4. Training should be provided to all participants at no cost and should take place during working hours, if possible.

3.5. Occupational safety and health management system documentation

3.5.1. According to the size and nature of activity of the *organization*, OSH management system documentation should be established and maintained, and may cover:

(a) the OSH policy and objectives of the *organization*;

(b) the allocated key OSH management roles and responsibilities for the implementation of the OSH management system;

(c) the significant OSH hazards/risks arising from the *organization's* activities, and the arrangements for their prevention and control; and

[2] OSH competence includes education, work experience and training, or a combination of these.

(d) arrangements, procedures, instructions or other internal documents used within the framework of the OSH management system.

3.5.2. The OSH management system documentation should be:

(a) clearly written and presented in a way that is understood by those who have to use it; and

(b) periodically reviewed, revised as necessary, communicated and readily accessible to all appropriate or affected members of the *organization*.

3.5.3. OSH records should be established, managed and maintained locally and according to the needs of the *organization*. They should be identifiable and traceable, and their retention times should be specified.

3.5.4. Workers should have the right to access records relevant to their working environment and health, while respecting the need for confidentiality.

3.5.5. OSH records may include:

(a) records arising from the implementation of the OSH management system;

(b) records of work-related injuries, ill health, diseases and incidents;

(c) records arising from national laws or regulations dealing with OSH;

(d) records of workers' exposures, surveillance of the working environment and workers' health; and

(e) the results of both active and reactive monitoring.

3.6. Communication

3.6.1. Arrangements and procedures should be established and maintained for:

(a) receiving, documenting and responding appropriately to internal and external communications related to OSH;

(b) ensuring the internal communication of OSH information between relevant levels and functions of the *organization*; and

(c) ensuring that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to.

Planning and implementation

3.7. Initial review

3.7.1. The *organization's* existing OSH management system and relevant arrangements should be evaluated by an initial review, as appropriate. In the case

where no OSH management system exists, or if the *organization* is newly established, the initial review should serve as a basis for establishing an OSH management system.

3.7.2. The initial review should be carried out by competent persons, in consultation with workers and/or their representatives, as appropriate. It should:

(a) identify the current applicable national laws and regulations, national guidelines, tailored guidelines, voluntary programmes and other requirements to which the *organization* subscribes;

(b) identify, anticipate and assess hazards and risks to safety and health arising from the existing or proposed work environment and work organization; and

(c) determine whether planned or existing controls are adequate to eliminate hazards or control risks; and

(d) analyse the data provided from workers' health surveillance.

3.7.3. The result of the initial review should:

(a) be documented;

(b) become the basis for making decisions regarding the implementation of the OSH management system; and

(c) provide a baseline from which continual improvement of the *organization's* OSH management system can be measured.

3.8. System planning, development and implementation

3.8.1. The purpose of planning should be to create an OSH management system that supports:

(a) as the minimum, compliance with national laws and regulations;

(b) the elements of the *organization's* OSH management system; and

(c) continual improvement in OSH performance.

3.8.2. Arrangements should be made for adequate and appropriate OSH planning, based on the results of the initial review, subsequent reviews or other available data. These planning arrangements should contribute to the protection of safety and health at work, and should include:

(a) a clear definition, priority setting and quantification, where appropriate, of the *organization's* OSH objectives;

(b) the preparation of a plan for achieving each objective, with defined responsibility and clear performance criteria indicating what is to be done by whom and when;

(c) the selection of measurement criteria for confirming that the objectives are achieved; and

(d) the provision of adequate resources, including human and financial resources and technical support, as appropriate.

3.8.3. The OSH planning arrangements of the *organization* should cover the development and implementation of all the OSH management system elements, as described in Chapter 3 of these guidelines and illustrated in figure 2.

3.9. Occupational safety and health objectives

3.9.1. Consistent with the OSH policy and based on the initial or subsequent reviews, measurable OSH objectives should be established, which are:

(a) specific to the *organization*, and appropriate to and according to its size and nature of activity;
(b) consistent with the relevant and applicable national laws and regulations, and the technical and business obligations of the *organization* with regard to OSH;
(c) focused towards continually improving workers' OSH protection to achieve the best OSH performance;
(d) realistic and achievable;
(e) documented, and communicated to all relevant functions and levels of the *organization*; and
(f) periodically evaluated and if necessary updated.

3.10. Hazard prevention

3.10.1. Prevention and control measures

3.10.1.1. Hazards and risks to workers' safety and health should be identified and assessed on an ongoing basis. Preventive and protective measures should be implemented in the following order of priority:

(a) eliminate the hazard/risk;
(b) control the hazard/risk at source, through the use of engineering controls or organizational measures;
(c) minimize the hazard/risk by the design of safe work systems, which include administrative control measures; and
(d) where residual hazards/risks cannot be controlled by collective measures, the employer should provide for appropriate personal protective equipment, including clothing, at no cost, and should implement measures to ensure its use and maintenance.

3.10.1.2. Hazard prevention and control procedures or arrangements should be established and should:

(a) be adapted to the hazards and risks encountered by the *organization*;
(b) be reviewed and modified if necessary on a regular basis;
(c) comply with national laws and regulations, and reflect good practice; and
(d) consider the current state of knowledge, including information or reports from *organizations*, such as labour inspectorates, occupational safety and health services, and other services as appropriate.

3.10.2. Management of change

3.10.2.1. The impact on OSH of internal changes (such as those in staffing or due to new processes, working procedures, organizational structures or acquisitions) and

of external changes (for example, as a result of amendments of national laws and regulations, organizational mergers, and developments in OSH knowledge and technology) should be evaluated and appropriate preventive steps taken prior to the introduction of changes.

3.10.2.2. A workplace hazard identification and risk assessment should be carried out before any modification or introduction of new work methods, materials, processes or machinery. Such assessment should be done in consultation with and involving workers and their representatives, and the safety and health committee, where appropriate.

3.10.2.3. The implementation of a "decision to change" should ensure that all affected members of the *organization* are properly informed and trained.

3.10.3. Emergency prevention, preparedness and response

3.10.3.1. Emergency prevention, preparedness and response arrangements should be established and maintained. These arrangements should identify the potential for accidents and emergency situations, and address the prevention of OSH risks associated with them. The arrangements should be made according to the size and nature of activity of the *organization*. They should:

(a) ensure that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite;

(b) provide information to, and communication with, the relevant competent authorities, and the neighbourhood and emergency response services;

(c) address first-aid and medical assistance, firefighting and evacuation of all people at the worksite; and

(d) provide relevant information and training to all members of the *organization*, at all levels, including regular exercises in emergency prevention, preparedness and response procedures.

3.10.3.2. Emergency prevention, preparedness and response arrangements should be established in cooperation with external emergency services and other bodies where applicable.

3.10.4. Procurement

3.10.4.1. Procedures should be established and maintained to ensure that:

(a) compliance with safety and health requirements for the *organization* is identified, evaluated and incorporated into purchasing and leasing specifications;

(b) national laws and regulations and the *organization's* own OSH requirements are identified prior to the procurement of goods and services; and

(c) arrangements are made to achieve conformance to the requirements prior to their use.

3.10.5. Contracting

3.10.5.1. Arrangements should be established and maintained for ensuring that the *organization's* safety and health requirements, or at least the equivalent, are applied to contractors and their workers.

3.10.5.2. Arrangements for contractors working on site should:

(a) include OSH criteria in procedures for evaluating and selecting contractors;

(b) establish effective ongoing communication and coordination between appropriate levels of the *organization* and the contractor prior to commencing work. This should include provisions for communicating hazards and the measures to prevent and control them;

(c) include arrangements for reporting of work-related injuries, ill health, diseases and incidents among the contractors' workers while performing work for the *organization*;

(d) provide relevant workplace safety and health hazard awareness and training to contractors or their workers prior to commencing work and as work progresses, as necessary;

(e) regularly monitor OSH performance of contractor activities on site; and

(f) ensure that on-site OSH procedures and arrangements are followed by the contractor(s).

Evaluation

3.11. Performance monitoring and measurement

3.11.1. Procedures to monitor, measure and record OSH performance on a regular basis should be developed, established and periodically reviewed. Responsibility, accountability and authority for monitoring at different levels in the management structure should be allocated.

3.11.2. The selection of performance indicators should be according to the size and nature of activity of the *organization* and the OSH objectives.

3.11.3. Both qualitative and quantitative measures appropriate to the needs of the *organization* should be considered. These should:

(a) be based on the *organization's* identified hazards and risks, the commitments in the OSH policy and the OSH objectives; and

(b) support the *organization's* evaluation process, including the management review.

3.11.4. Performance monitoring and measurement should:

(a) be used as a means of determining the extent to which OSH policy and objectives are being implemented and risks are controlled;

(b) include both active and reactive monitoring, and not be based only upon work-related injury, ill health, disease and incident statistics; and

(c) be recorded.

3.11.5. Monitoring should provide:

(a) feedback on OSH performance;

(b) information to determine whether the day-to-day arrangements for hazard and risk identification, prevention and control are in place and operating effectively; and

(c) the basis for decisions about improvement in hazard identification and risk control, and the OSH management system.

3.11.6. Active monitoring should contain the elements necessary to have a proactive system and should include:

(a) monitoring of the achievement of specific plans, established performance criteria and objectives;

(b) the systematic inspection of work systems, premises, plant and equipment;

(c) surveillance of the working environment, including work organization;

(d) surveillance of workers' health, where appropriate, through suitable medical monitoring or follow-up of workers for early detection of signs and symptoms of harm to health in order to determine the effectiveness of prevention and control measures; and

(e) compliance with applicable national laws and regulations, collective agreements and other commitments on OSH to which the *organization* subscribes.

3.11.7. Reactive monitoring should include the identification, reporting and investigation of:

(a) work-related injuries, ill health (including monitoring of aggregate sickness absence records), diseases and incidents;

(b) other losses, such as damage to property;

(c) deficient safety and health performance, and OSH management system failures; and

(d) workers' rehabilitation and health-restoration programmes.

3.12. Investigation of work-related injuries, ill health, diseases and incidents, and their impact on safety and health performance

3.12.1. The investigation of the origin and underlying causes of work-related injuries, ill health, diseases and incidents should identify any failures in the OSH management system and should be documented.

3.12.2. Such investigations should be carried out by competent persons, with the appropriate participation of workers and their representatives.

3.12.3. The results of such investigations should be communicated to the safety and health committee, where it exists, and the committee should make appropriate recommendations.

3.12.4. The results of investigations, in addition to any recommendations from the safety and health committee, should be communicated to appropriate persons for corrective action, included in the management review and considered for continual improvement activities.

3.12.5. The corrective action resulting from such investigations should be implemented in order to avoid repetition of work-related injuries, ill health, diseases and incidents.

3.12.6. Reports produced by external investigative agencies, such as inspectorates and social insurance institutions, should be acted upon in the same manner as internal investigations, taking into account issues of confidentiality.

3.13. Audit

3.13.1. Arrangements to conduct periodic audits are to be established in order to determine whether the OSH management system and its elements are in place, adequate, and effective in protecting the safety and health of workers and preventing incidents.

3.13.2. An audit policy and programme should be developed, which includes a designation of auditor competency, the audit scope, the frequency of audits, audit methodology and reporting.

3.13.3. The audit includes an evaluation of the *organization's* OSH management system elements or a subset of these, as appropriate. The audit should cover:

(a) OSH policy;
(b) worker participation;
(c) responsibility and accountability;
(d) competence and training;
(e) OSH management system documentation;
(f) communication;
(g) system planning, development and implementation;
(h) prevention and control measures;
(i) management of change;
(j) emergency prevention, preparedness and response;
(k) procurement;
(l) contracting;
(m) performance monitoring and measurement;
(n) investigation of work-related injuries, ill health, diseases and incidents, and their impact on safety and health performance;

(o) audit;
(p) management review;
(q) preventive and corrective action;
(r) continual improvement; and
(s) any other audit criteria or elements that may be appropriate.

3.13.4. The audit conclusion should determine whether the implemented OSH management system elements or a subset of these:

(a) are effective in meeting the *organization's* OSH policy and objectives;
(b) are effective in promoting full worker participation;
(c) respond to the results of OSH performance evaluation and previous audits;
(d) enable the *organization* to achieve compliance with relevant national laws and regulations; and
(e) fulfil the goals of continual improvement and best OSH practice.

3.13.5. Audits should be conducted by competent persons internal or external to the *organization* who are independent of the activity being audited.

3.13.6. The audit results and audit conclusions should be communicated to those responsible for corrective action.

3.13.7. Consultation on selection of the auditor and all stages of the workplace audit, including analysis of results, are subject to worker participation, as appropriate.

3.14. Management review

3.14.1. Management reviews should:

(a) evaluate the overall strategy of the OSH management system to determine whether it meets planned performance objectives;
(b) evaluate the OSH management system's ability to meet the overall needs of the *organization* and its stakeholders, including its workers and the regulatory authorities;
(c) evaluate the need for changes to the OSH management system, including OSH policy and objectives;
(d) identify what action is necessary to remedy any deficiencies in a timely manner, including adaptations of other aspects of the *organization's* management structure and performance measurement;
(e) provide the feedback direction, including the determination of priorities, for meaningful planning and continual improvement;
(f) evaluate progress towards the *organization's* OSH objectives and corrective action activities; and
(g) evaluate the effectiveness of follow-up actions from earlier management reviews.

3.14.2. The frequency and scope of periodic reviews of the OSH management system by the employer or the most senior accountable person should be defined according to the *organization's* needs and conditions.

3.14.3. The management review should consider:

(a) the results of work-related injuries, ill health, diseases and incident investigations; performance monitoring and measurement; and audit activities; and

(b) additional internal and external inputs as well as changes, including organizational changes, that could affect the OSH management system.

3.14.4. The findings of the management review should be recorded and formally communicated to:

(a) the persons responsible for the relevant element(s) of the OSH management system so that they may take appropriate action; and

(b) the safety and health committee, workers and their representatives.

Action for improvement

3.15. Preventive and corrective action

3.15.1. Arrangements should be established and maintained for preventive and corrective action resulting from OSH management system performance monitoring and measurement, OSH management system audits and management reviews. These arrangements should include:

(a) identifying and analysing the root causes of any non-conformities with relevant OSH regulations and/or OSH management systems arrangements; and

(b) initiating, planning, implementing, checking the effectiveness of and documenting corrective and preventive action, including changes to the OSH management system itself.

3.15.2. When the evaluation of the OSH management system or other sources show that preventive and protective measures for hazards and risks are inadequate or likely to become inadequate, the measures should be addressed according to the recognized hierarchy of prevention and control measures, and completed and documented, as appropriate and in a timely manner.

3.16. Continual improvement

3.16.1. Arrangements should be established and maintained for the continual improvement of the relevant elements of the OSH management system and the system as a whole. These arrangements should take into account:

(a) the OSH objectives of the *organization*;

(b) the results of hazard and risk identifications and assessments;
(c) the results of performance monitoring and measurements;
(d) the investigation of work-related injuries, diseases, ill health and incidents, and the results and recommendations of audits;
(e) the outcomes of the management review;
(f) the recommendations for improvement from all members of the *organization*, including the safety and health committee, where it exists;
(g) changes in national laws and regulations, voluntary programmes and collective agreements;
(h) new relevant information; and
(i) the results of health protection and promotion programmes.

3.16.2. The safety and health processes and performance of the *organization* should be compared with others in order to improve health and safety performance.

Glossary

In these guidelines, the following terms have the meanings hereby assigned to them:

Active monitoring: The ongoing activities which check that hazard and risk preventive and protective measures, as well as the arrangements to implement the OSH management system, conform to defined criteria.

Audit: A systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which defined criteria are fulfilled. This does not necessarily mean an independent external audit (an auditor or auditors from outside the *organization*).

Competent institution: A government department or other body with the responsibility to establish a national policy and develop a national framework for OSH management systems in *organizations*, and to provide relevant guidance.

Competent person: A person with suitable training, and sufficient knowledge, experience and skill, for the performance of the specific work.

Continual improvement: Iterative process of enhancing the OSH management system to achieve improvements in overall OSH performance.

Contractor: A person or an *organization* providing services to an employer at the employer's worksite in accordance with agreed specifications, terms and conditions.

Employer: Any physical or legal person that employs one or more workers.

Hazard: The inherent potential to cause injury or damage to people's health.

Hazard assessment: A systematic evaluation of hazards.

Incident: An unsafe occurrence arising out of or in the course of work where no personal injury is caused.

Organization: A company, operation, firm, undertaking, establishment, enterprise, institution or association, or part of it, whether incorporated or not, public or private, that has its own functions and administration. For *organizations* with more than one operating unit, a single operating unit may be defined as an *organization*.

OSH management system: A set of interrelated or interacting elements to establish OSH policy and objectives, and to achieve those objectives.

Reactive monitoring: Checks that failures in the hazard and risk prevention and protection control measures, and the OSH management system, as demonstrated by the occurrence of injuries, ill health, diseases and incidents, are identified and acted upon.

Risk: A combination of the likelihood of an occurrence of a hazardous event and the severity of injury or damage to the health of people caused by this event.

Risk assessment: The process of evaluating the risks to safety and health arising from hazards at work.

Safety and health committee: A committee with representation of workers' safety and health representatives and employers' representatives established and functioning at *organization* level according to national laws, regulations and practice.

Surveillance of the working environment: A generic term which includes the identification and evaluation of environmental factors that may affect workers' health. It covers assessments of sanitary and occupational hygiene conditions, factors in the organization of work which may pose risks to the health of workers, collective and personal protective equipment, exposure of workers to hazardous agents, and control systems designed to eliminate and reduce them. From the standpoint of workers' health, the surveillance of the working environment may focus on, but not be limited to, ergonomics, accident and disease prevention, occupational hygiene in the workplace, work organization, and psychosocial factors in the workplace.

Worker: Any person who performs work, either regularly or temporarily, for an employer.

Workers' health surveillance: A generic term which covers procedures and investigations to assess workers' health in order to detect and identify any abnormality. The results of surveillance should be used to protect and promote the health of the individual, collective health at the workplace, and the health of the exposed working population. Health assessment procedures may include, but are not limited to, medical examinations, biological monitoring, radiological examinations, questionnaires or a review of health records.

Workers and their representatives: Where reference is made in these guidelines to workers and their representatives, the intention is that, where representatives exist, they should be consulted as the means to achieving appropriate worker participation. In some instances it may be appropriate to involve all workers and all representatives.

Workers' representative: In accordance with the Workers' Representatives Convention, 1971 (No. 135), any person who is recognized as such by national law or practice, whether they are:

(a) trade union representatives, namely, representatives designated or elected by trade unions or by members of such unions; or

(b) elected representatives, namely, representatives who are freely elected by the workers of the *[organization]* in accordance with provisions of national laws or regulations or of collective agreements and whose functions do not include activities which are recognized as the exclusive prerogative of trade unions in the country concerned.

Workers' safety and health representative: Workers' representative elected or appointed in accordance with national laws, regulations and practice to represent workers' interests in OSH issues at the workplace.

Work-related injuries, ill health and diseases: Negative impacts on health arising from exposure to chemical, biological, physical, work-organizational and psychosocial factors at work.

Worksite: Physical area where workers need to be or to go due to their work which is under the control of an employer.

Bibliography

Since its foundation in 1919, the ILO has elaborated and adopted a large number of international labour Conventions (and accompanying Recommendations) directly concerned with OSH issues, as well as many codes of practice and technical publications on various aspects of the subject. They represent a formidable body of definitions, principles, obligations, duties and rights, as well as technical guidance reflecting the consensual views of the ILO's tripartite constituents from its 183 member States[3] on most aspects of occupational safety and health.

Relevant ILO Conventions and Recommendations

Conventions

No.	*Title*
115	Radiation Protection, 1960
135	Workers' Representatives, 1971
136	Benzene, 1971
139	Occupational Cancer, 1974
148	Working Environment (Air Pollution, Noise and Vibration), 1977
155	Occupational Safety and Health, 1981
161	Occupational Health Services, 1985
162	Asbestos, 1986
167	Safety and Health in Construction, 1988
170	Chemicals, 1990
174	Prevention of Major Industrial Accidents, 1993
176	Safety and Health in Mines, 1995
*184	Safety and Health in Agriculture, 2001
*187	Promotional Framework for Occupational Safety and Health, 2006
*P155	Protocol of 2002 to the Occupational Safety and Health Convention, 1981

[3] As of October 2009.
*Added by the Office on the occasion of publication of the second edition (reprint of the first edtion with additions to the bibliography).

Recommendations

No.	*Title*
114	Radiation Protection, 1960
144	Benzene, 1971
147	Occupational Cancer, 1974
156	Working Environment (Air Pollution, Noise and Vibration), 1977
164	Occupational Safety and Health, 1981
171	Occupational Health Services, 1985
172	Asbestos, 1986
175	Safety and Health in Construction, 1988
177	Chemicals, 1990
181	Prevention of Major Industrial Accidents, 1993
183	Safety and Health in Mines, 1995
*192	Safety and Health in Agriculture, 2001
*194	List of Occupational Diseases, 2002
*197	Promotional Framework for Occupational Safety and Health, 2006

Selected ILO codes of practice

Prevention of major industrial accidents (Geneva, 1991).
Safety and health in opencast mines (Geneva, 1991).
Safety and health in construction (Geneva, 1992).
Safety in the use of chemicals at work (Geneva, 1993).
Accident prevention on board ship at sea and in port (Geneva, 2nd edition, 1996).
Management of alcohol and drug-related issues in the workplace (Geneva, 1996).
Recording and notification of occupational accidents and diseases (Geneva, 1996).
Protection of workers' personal data (Geneva, 1997).
Safety and health in forestry work (Geneva, 2nd edition, 1998).
Ambient factors in the workplace (Geneva, 2001).
**Use of synthtetic vitreous fibre insulation wools (glass wool, rock wool, slag wool)* (Geneva, 2001).
**HIV/AIDS and the world of work* (Geneva, 2001).
**Safety and health in the non-ferrous metals industries* (Geneva, 2003).
**Workplace violence in services sectors and measures to combat this phenomenon* (Geneva, 2003).
**Safety and health in ports* (Geneva, 2005).
**Safety and health in the iron and steel industry* (Geneva, 2005).
**Safety and health in underground coalmines* (Geneva, 2009).

* Added by the Office on the occasion of publication of the second edition (reprint of the first edtion with additions to the bibliography).

Relevant publications

ILO: *Declaration on Fundamental Principles and Rights at Work and its Follow-up, adopted by the International Labour Conference at its 86th Session, 1998*. Geneva, 1998.

—: *Encyclopaedia of occupational health and safety*, edited by Jeanne Mager Stellman. Geneva, 4th edition, 1998; 4-volume print version and CD-ROM.

—: *Technical and ethical guidelines for workers' health surveillance*. Occupational Safety and Health Series, No. 72. Geneva, 1998.

*—: *Declaration on Social Justice for a Fair Globalization, adopted by the International Labour Conference at its 97th Session, 2008*. Geneva, 2008.

United Nations Conference on Environment and Development (UNCED): *Agenda 21* (Chapter 19 on environmentally sound management of chemicals). Rio de Janeiro, Brazil, 1992.

*Added by the Office on the occasion of publication of the second edition (reprint of the first edtion with additions to the bibliography).

Annex

List of participants and observers at the Meeting of Experts on ILO Guidelines on Occupational Safety and Health Management Systems, Geneva, 19-27 April 2001

Experts appointed after consultations with governments

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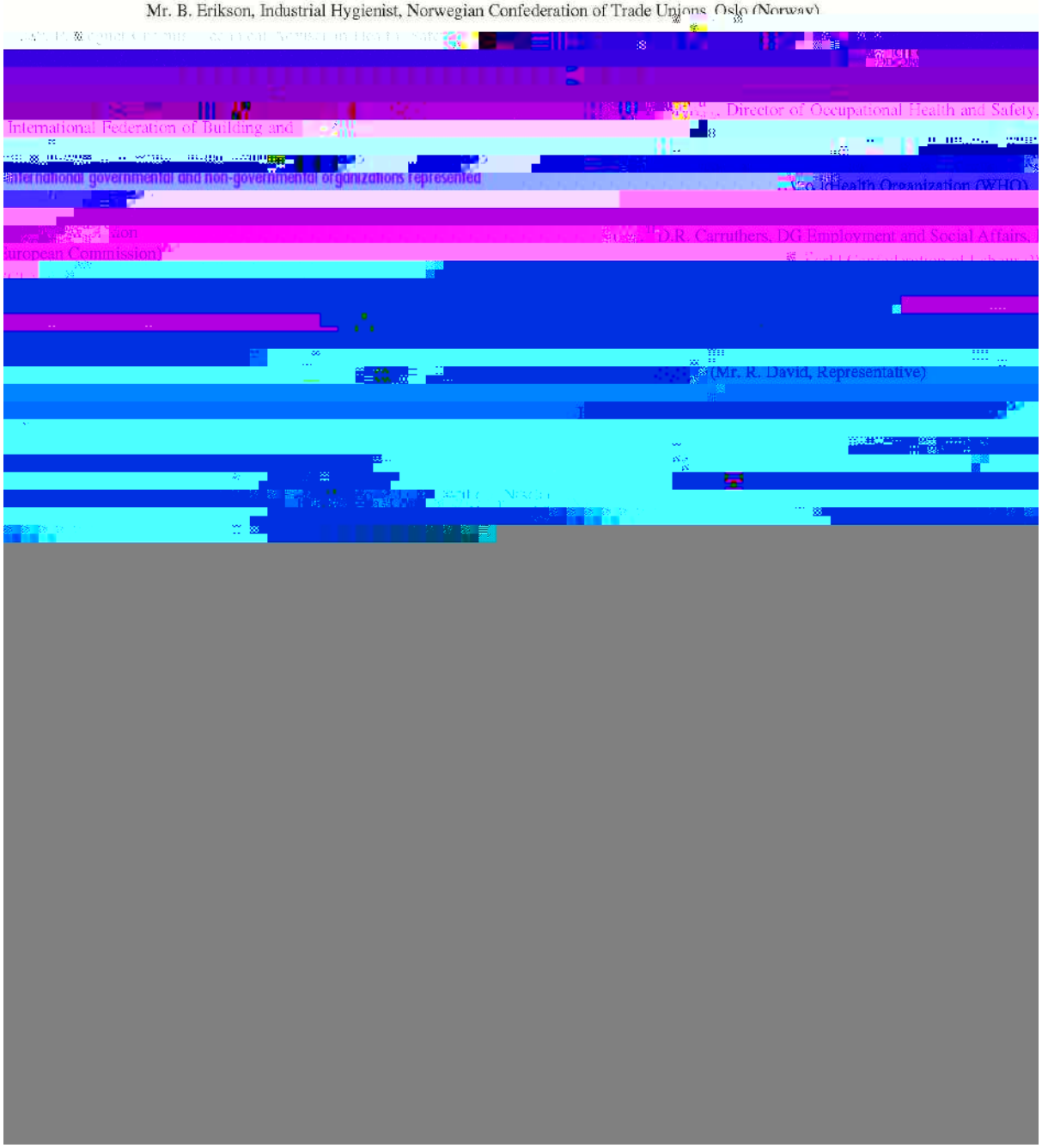

International Construction Institute (ICI) and International Commission on Occupational Safety and Health (ICOSH)
(Dr. B. Goelzer, Representative)

American Industrial Hygiene Association (AIHA)
(Dr. C. Redinger, Representative)
(Dr. Z. Mansdorf, Representative)

Occupational Safety and Health Administration (OSHA), US Department of Labor
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ANNEXURE - 9: IMPACT MATRIX

Environmental Parameters / Project Activities	Physical, Ecological and Social Environment																												
	Land Acquisition	Downstream Water Users	Air Quality	Noise	Soil Contamination	Aesthetic	Liquid and Solid Waste	Borrow Pits	Surface Water	Irrigation Water	Wastewater	Soil	Flora	Fauna	Livestock Grazing	Fishery	Mobility of Locals	Cultural Issues	Water Ponds	Gender Issues	Health& Safety of Workers	Archeological, National and Religious Sites	Security Situation	Human Health	Ground Water	Agriculture	Drinking Water	Livelihood	Income
A. Planning & Design Phase																													
Site Selection	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	-1	-1
Topographic Survey	0	0	-1	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0
Geotechnical Investigation	0	0	-1	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0
Seismic Investigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Acquisition	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-1	0	-1	-1
B. Construction Phase																													
Clearing of Land ,Digging and Excavation	0	0	-1	-2	-1	-3	-1	-3	0	0	0	-1	-1	-1	-2	0	-2	0	0	0	-1	0	0	0	0	0	0	1	2
Storage of Material	0	0	0	0	-1	0	-1	0	0	0	0	-1	-1	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0
Loading and Hauling	0	0	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	-2	0	0	-1	0	0	0	0	0	0	0	0
Construction of Access Road	0	0	-2	-2	-2	-1	-1	0	0	0	0	-2	-1	-1	-1	0	-1	-1	0	-1	-1	0	0	0	0	0	0	1	1
Construction Camps	0	0	0	-1	-1	-2	-2	-1	0	0	-1	-1	-1	-1	-1	0	-1	-1	0	-1	-1	0	0	0	0	0	0	0	0
Crushing	0	0	0	-2	-1	-2	-2	0	0	0	0	0	-1	-1	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0
Use of Heavy Machinery	0	0	-1	-2	-1	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0
Wastewater Disposal	0	0	0	0	-1	0	1	-1	0	0	1	-2	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	-2	0	0
Solid Waste Disposal	0	0	0	0	-1	-2	-2	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	-1	0	0
Leakage & Spillage of Oil	0	0	0	0	-2	0	-2	0	0	0	-2	0	-1	-1	0	0	0	0	0	0	-1	0	0	0	-1	0	-1	0	0
C. Operational Phase																													
Industrial Operations	0	0	-1	-1	-1	1	-1	0	-1	0	-1	1	2	2	0	0	0	0	0	-1	-1	0	1	-1	0	0	0	2	2
International			-1	-1	0	0														-1								2	2
Investments																													
Economy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	3

Beneficial		Adverse
1	Low	-1
2	Medium	-2
3	High	-3

0	Insignificant or No Impact

ANNEXURE - 10: SCREENING CHECKLIST

Adverse Impact -, Significant Adverse --, Beneficial Impact +, Highly Beneficial ++, No Impact 0

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Sub-project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
1	**Atmosphere**					
a	Ambient Air	0	--	0	-	0
b	Primary Pollutants	0	--	0	-	0
c	Secondary Pollutants	0	-	0	0	0
d	Noise	0	--	0	-	0
e	Vibration	0	-	0	-	0
2	**Climate**					
a	Temperature	0	0	-	0	-
b	Precipitation	0	0	0	0	0
c	Relative Humidity	0	0	0	0	0
e	Evaporation	0	0	0	0	0
3	**Water Resources**					
a	Surface Water	0	0	0	0	0
	Rivers	0	0	0	0	0
	Streams	0	0	0	0	0
	Springs	0	0	0	0	0
	Wetland	0	0	0	0	0
	Flow	0	0	0	0	0
	Quality	0	0	0	0	0
	Usage	0	0	0	0	0
	Sediments	0	0	0	0	0
	Chemicals	0	0	0	0	0
	Pollution	0	0	0	0	0
	Erosion	0	0	0	0	0
b	Ground Water					
	Sources	0	0	++	+	++
	Depth	0	0	++	+	++
	Quantity	0	0	++	+	++
	Potential Extraction	0	0	++	+	++

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Sub-project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
	Usage	0	0	++	+	++
	Domestic Supply	0	0	0	0	0
	Industrial Water Supply	0	0	+	0	+
	Irrigation	0	0	0	0	0
	Hydropower Generation	0	0	0	0	0
	Quality	0	-	+	0	+
4	**Land Resources**					
a	Topography	0	0	0	0	0
b	Soil	0	-	0	0	0
c	Major Land use	0	0	0	0	0
5	**Ecological Environment**					
a	Terrestrial Ecology					
	Flora	0	-	0	0	+
	Fauna	0	0	0	0	0
b	Aquatic Ecology					
	Aquatic Flora	0	-	0	0	0
	Aquatic Fauna	0	0	0	0	0
	Fisheries	0	0	0	0	0
c	Wildlife	0	0	0	0	0
d	Forestry	0	0	0	0	0
e	Beneficial Plants and Animals	0	0	0	0	+
f	Endangered Species	0	0	0	0	0
6	**Socio-economic Environment**					
a	Institutional and Administrative Setup	0	0	0	0	+
b	Demography	0	0	0	0	0
c	Gender issues	0	0	0	0	0
d	Social Equity	0	0	0	0	0
e	Settlement Patterns	0	0	0	0	0

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Sub-project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
f	Land Holdings & Titling	0	0	0	0	0
g	Common Resource Rights	0	0	0	0	0
h	Fish	0	0	0	0	0
i	Wood	0	0	0	0	0
j	Grazing	0	0	0	0	0
k	Fodder	0	0	0	0	0
l	Domestic Energy and Fuel	0	0	0	0	0
m	Domestic Water Supply	0	0	0	0	0
n	Sanitation	0	0	0	0	0
o	Health	0	-	0	0	0
p	Waterborne Disease	0	-	-	0	+
q	Common Diseases	0	0	0	0	0
r	Mental Health	0	0	0	0	0
s	Human Nutrition	0	0	0	0	0
t	Education & Literacy	0	0	0	0	0
u	Cultural & Historical Sites	0	0	0	0	0
v	Religious Sites	0	0	0	0	0
w	Aesthetics	0	0	0	0	0
x	Landscape	0	0	0	0	0
y	Livelihood	0	0	0	0	0
z	Agriculture	0	-	0	-	0
	Livestock	0	0	0	0	0
	Forestry	0	0	0	0	0
	Fisheries	0	0	0	0	0
	Industry	0	0	0	++	++
	Other Cash Income	0	+	+	+	++
7	**Transport, Infrastructure & Communication**					

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Sub-project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
a	Roads	0	-	0	0	0
b	Tracks	0	-	0	0	0
c	Bridges	0	0	0	0	0
d	Pedestrian Tracks	0	-	0	0	0
e	Navigation	0	0	0	0	0
f	Energy and Power	0	-	0	0	0
g	Telecommunication	0	0	0	0	0
8	**Natural Risks and Hazards**					
a	Earthquake	0	0	0	0	0
b	Landslides	0	0	0	0	0
c	Storms	0	0	0	0	0
d	Floods	0	0	0	0	0
e	Erosion	0	0	0	0	0
f	Drought	0	0	0	0	0
g	Human Disease	0	0	0	0	0
h	Pollution	0	--	0	-	0
i	Social Instability	0	0	0	0	+
j	Economic Instability	0	+	+	0	++
k	Political Instability	0	0	0	0	0
9	**External Constraints**					
a	Upstream Constraints	0	0	0	0	0
b	Upstream Impacts	0	0	0	0	0
c	Downstream Constraints	0	0	0	0	0
d	Downstream Impacts	0	0	0	0	0

ANNEXURE - 11: PPES ACCORDING TO HAZARDS

Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic Helmets with top and side impact protection.
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).
Foot protection	Falling or rolling objects, pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available.
	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.