



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,
DG Khan Division”

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

October-2025



Quality Control Sheet



PRMSC
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PUNJAB RURAL MUNICIPAL SERVICES COMPANY
LOCAL GOVERNMENT & COMMUNITY DEVELOPMENT DEPARTMENT (LG&CD)
GOVERNMENT OF THE PUNJAB



QUALITY CONTROL SHEET

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EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) Report has been prepared for Model Village (Misaali Gaon) Project – DG Khan 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 DG Khan 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 and TUMAS Limited as the Engineering, Design & Supervision Consultant (EDCS). In the Dera Ghazi Khan division, the Misaali Gaon initiative will be implemented across 36 rural settlements, distributed within four districts: DG Khan, Muzaffargarh, Taunsa and Rajanpur. 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. | Dera Ghazi Khan | DG Khan | 15 |
| 2. | | Muzaffargarh | 08 |
| 3. | | Taunsa | 01 |
| 4. | | Rajanpur | 12 |

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 DG Khan 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 DG Khan 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 DG Khan division, Punjab. Dera Ghazi Khan division, located in the southern part of Punjab, comprises four districts: DG Khan, Muzaffargarh, Taunsa, and Rajanpur. Covering an area of approximately 38,778 km², the division has a population exceeding 12 million (PBS 2023 projections), with about 10.1 million residing in rural areas. The rural populations are distributed approximately as follows: DG Khan District with around 1.6 million rural residents, Muzaffargarh with 2.8 million, Rajanpur with about 1.8 million Taunsa with 243,298 rural inhabitants. Project location map illustrating the proposed 36 target villages within the DG Khan Division — including 15 villages in district DG Khan, 08 villages in district Muzaffargarh, 01 village in district Taunsa and 12 villages in district Rajanpur is provided below in Figure 0-1;

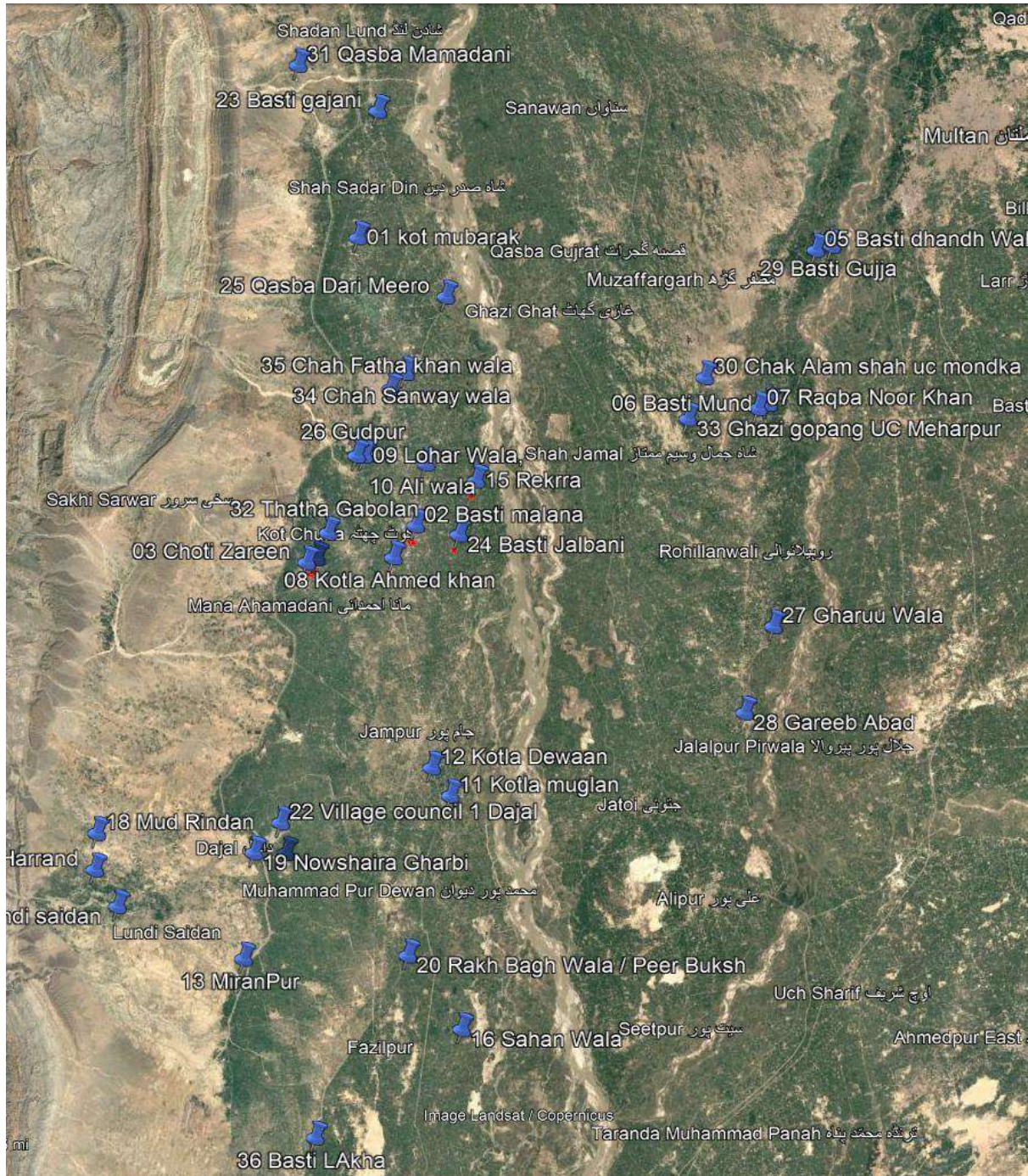


Figure 0-1, Project Location Map

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.

- **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.

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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Resources utilization i.e., fuel and energy for the operation of pumps and tube wells. |

| Pollutant | Constructional Phase | Operational phase |
|---------------------|--|--|
| | generating gases. Smoke from vehicles, Generator and other fuel consuming machinery and Construction material. | |
| Noise and vibration | <ul style="list-style-type: none"> • During the implementation of the project, a large amount of equipment and construction machinery will be utilized for construction. • The equipment would include excavators, concrete mixer, trucks, generator and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and neighborhood residential may be disturbed by the noisy activities. | <ul style="list-style-type: none"> • Noise and vibration emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used. • Resources utilization i.e utilization of pumps and machinery also cause noise and vibration. |
| Odor | <ul style="list-style-type: none"> • Nil | <ul style="list-style-type: none"> • Nil |
| Flora and fauna | <p>Impact on Flora:</p> <ul style="list-style-type: none"> • 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. <p>Disturbance to Fauna:</p> <ul style="list-style-type: none"> • No impacts. | <ul style="list-style-type: none"> • No significant impact on flora and fauna during operation phase. |
| Solid Waste | <ul style="list-style-type: none"> • Solid waste will be generated due to construction activities and domestic sources. Also, due to sludge from septic tank. | <p>Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others:</p> <ul style="list-style-type: none"> • Excavated soil. • Cement storage bags and other packets from materials used during repair and maintenance. |

| Pollutant | Constructional Phase | Operational phase |
|---|--|---|
| Soil Contamination | <ul style="list-style-type: none"> Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites. | <ul style="list-style-type: none"> Soil can be contaminated due to leaching of oil, fuel, from vehicles or machinery any stored oil. Storage & handling of hazardous chemicals. |
| Surface and Ground water contamination. | <ul style="list-style-type: none"> Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. Construction / installation of tube-wells (or project components) on the embankment of canals, if any, may have the proximity to pollute surface water bodies during construction activities. | <ul style="list-style-type: none"> Nil. |
| Health and safety issues | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Disturbance to neighbors by constructional activities People's earning routes associated with the sites will be temporarily disturbed. Employment opportunities will be enhanced | <ul style="list-style-type: none"> Employment opportunities will be enhanced as staff will be hired for the operational purposes. |
| Gender & | <ul style="list-style-type: none"> Project activities may cause hindrance to mobility especially | <ul style="list-style-type: none"> Privacy of the community may be disturbed during |

| Pollutant | Constructional Phase | Operational phase |
|--------------------------------------|---|--|
| privacy issues | <p>for women in terms of privacy or harassment, during construction stage.</p> <ul style="list-style-type: none"> • Privacy of the community may be disturbed. • Harassment issues. | repair and maintenance works. |
| Land acquisition | <ul style="list-style-type: none"> • Project will be executed on the lands owned by PRMSC / government owned land. | <ul style="list-style-type: none"> • Nil |
| Mobility issues & Traffic management | <ul style="list-style-type: none"> • The roads maybe temporarily blocked at the active construction zone that may create problems of traffic for nearby community. • Blockage due to construction waste. • Blockage due to machinery and vehicles. | <ul style="list-style-type: none"> • The roads maybe temporarily blocked at the active construction zone during repair / maintenance in operation phase that may create problems of traffic for nearby community. |
| Loss of livelihood | <ul style="list-style-type: none"> • The project is of short duration and will not have significant impact on the livelihood of the community. | <ul style="list-style-type: none"> • Nil |
| Community health and safety | <ul style="list-style-type: none"> • The community health and safety must be ensured during construction phase especially the hazard of falls during excavation of trenches. • Accidents & disputes can also arise | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • There are no resettlement issues during this project | <ul style="list-style-type: none"> • Nil |
| Child protection | <ul style="list-style-type: none"> • Child labor might get involved in the construction activity. | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Tuning off vehicles should be made mandatory to reduce the emissions of NO_x, SO_x, CO and PM₁₀ 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. | <ul style="list-style-type: none"> • It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance and monitoring of vehicles, use of high-quality fuel, etc. |
| Noise and vibration | <ul style="list-style-type: none"> • During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary. Contractor will ensure the use of well-tuned vehicles. • Contractor will ensure the use of well-tuned machinery and skilled labor. • Attenuation boxes can be installed. • Silencer can be fitted to reduce and suppress the noise. • Constructional activities should be planned or scheduled. • Restricting access to noisy area | <ul style="list-style-type: none"> • The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones. |

| Pollutants | Recommendations during Construction phase | Recommendations during maintenance / Operation phase |
|----------------------------|--|---|
| | <ul style="list-style-type: none"> Shutting down the noisy equipment when not needed. Providing personal protective measures to labors working. Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective / mitigation measures applied where necessary. | |
| Odor | <ul style="list-style-type: none"> Nil | <ul style="list-style-type: none"> Nil |
| Impacts on flora and fauna | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> Maintenance and monitoring of plantation around the project corridor. |
| Solid Waste | <ul style="list-style-type: none"> A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. Arrangements should be made for regular garbage collection | <ul style="list-style-type: none"> The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. The soil excavated during maintenance will be used as backfill and thereby reducing the generation of waste material and related waste pollution concern. |

| Pollutants | Recommendations during Construction phase | Recommendations during maintenance / Operation phase |
|-----------------------------------|---|--|
| | <p>and removal of sewage from the construction site.</p> <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. Site for hazardous waste should be constructed using concrete so infiltration of material in soil cannot take place. |
| Soil erosion / Soil Contamination | <ul style="list-style-type: none"> • Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. • The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. • Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. • Ground shall be leveled to avoid slopes. • Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems. | <ul style="list-style-type: none"> • Soil contamination can be curtailed by reducing the oil spill at project 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 | <ul style="list-style-type: none"> • Sewage from construction camp will be disposed of using septic tank. • Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency | <ul style="list-style-type: none"> • The water supply will be closed down during construction phase ensure that no polluted water gets into water supply. |

| Pollutants | Recommendations during Construction phase | Recommendations during maintenance / Operation phase |
|--------------------------|--|--|
| | <p>Response Procedures in case of any spill hazard.</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Occupational health and safety impacts during construction phase is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained and skilled labor or personnel will be engaged in operating equipment. Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage. First aid 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. | <ul style="list-style-type: none"> Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment. First aid box should be present on sites. Construction safety SOPs should be followed. Road lights should be maintained on construction sites at night. Labors should be provided with PPEs to avoid accidents. Labors should be trained for healthy team work |

| Pollutants | Recommendations during Construction phase | Recommendations during maintenance / Operation phase |
|--------------------|---|--|
| | <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • Conflicts should be settled according with law. • Labors should be trained for healthy team work. • Sign boards should be displayed at sites. |
| Socioeconomic | <ul style="list-style-type: none"> • People will be informed in advance when work is about to start at the site. • Community wellbeing should be considered and neighbor's privacy should not be disturbed. • Job opportunities will be provided to local people of the area. | <ul style="list-style-type: none"> • Community wellbeing should be considered and neighbor's privacy should not be disturbed. • Local people should be preferred for the employment. • Working should be scheduled and informed to the concerned public. |
| Gender issue | <ul style="list-style-type: none"> • Workers would be trained to address privacy issues and ethically behaved. • Laborers would be strictly asked to cater the privacy issues. • staff capacity-building. | <ul style="list-style-type: none"> • Workers would be trained to address privacy issues and ethically behaved. • Laborers would be strictly asked to cater the privacy issues. • Staff capacity-building |
| Land acquisition | <ul style="list-style-type: none"> • Project will be executed on govt. owned lands, so there will be no land acquisition. | <ul style="list-style-type: none"> • Nil |
| Traffic management | <ul style="list-style-type: none"> • Provision of alternative routes. • Water sprinkling at project site at consecutive intervals. • 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 | <ul style="list-style-type: none"> • 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 |
|-----------------------------|---|---|
| | <p>inconvenience to the local residents;</p> <ul style="list-style-type: none"> In case of any complaint, focal person of GRC may contact (details will be highlighted at project site). | <p>proper places that should not affect mobility</p> <ul style="list-style-type: none"> Inform and coordinate the local residents regarding construction time schedule and also to display the details at sub-project site for their convenience |
| Loss of livelihood | <ul style="list-style-type: none"> As there will be no significant impact hence no mitigation measure is required | <ul style="list-style-type: none"> Nil |
| Community health and safety | <ul style="list-style-type: none"> Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labor 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. | <ul style="list-style-type: none"> The active construction zone must be cordoned off to avoid injuries due to accidents. |
| Resettlement issues | <ul style="list-style-type: none"> As no resettlement is required hence there will be no need for mitigation measures | <ul style="list-style-type: none"> Nil |
| Child protection | <ul style="list-style-type: none"> Child labor must be prohibited on project site. | <ul style="list-style-type: none"> Child labor must be prohibited on project site. |

ES-8. Proposed Environmental Monitoring

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

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 3,817.680 Million PKR. The total cost of EIA implementation is 54,740,700. Detail is given in Table 8-4.

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 – DG Khan 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 DG Khan 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 DG Khan division, Punjab. DG Khan division, located in the southern part of Punjab, comprises four districts: DG Khan, Muzaffargarh, Taunsa, and Rajanpur. Covering an area of approximately 38,778 km², the division has a population exceeding 12 million (PBS 2023 projections), with about 10.1 million residing in rural areas. The rural populations are distributed approximately as follows: DG Khan District with around 1.6 million rural residents, Muzaffargarh with 2.8 million, Rajanpur with about 1.8 million Taunsa with 243,298 rural inhabitants.

The selected villages currently suffer from deteriorated municipal infrastructure, leading to a range of socio-economic and public health challenges.

- No organized water supply, forcing residents to rely on hand pumps, dug wells, or contaminated surface water.
- The existing open drainage system is outdated, leading to waterlogging, blocked channels, and unhygienic living conditions, particularly during the monsoon season.
- Open defecation and the lack of effective wastewater management contribute to the spread of waterborne diseases such as diarrhea, typhoid, malaria, and dengue.
- Unpaved internal roads are often impassable in rainy conditions, affecting access to schools, healthcare, and markets, and especially impacting women, children, and the elderly.
- The sewage pond is non-functional, posing environmental and health risks through the release of untreated effluent.

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 and TUMAS Limited as the Engineering, Design & Supervision Consultant (EDCS). In the DG Khan Division, the Misaali Gaon

initiative will be implemented across 36 rural settlements, distributed within four districts: DG Khan, Muzaffargarh, Taunsa and Rajanpur. 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. | Dera Ghazi Khan | DG Khan | 15 |
| 2. | | Muzaffargarh | 08 |
| 3. | | Taunsa | 01 |
| 4. | | Rajanpur | 12 |

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 DG Khan 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 DG Khan 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 36 villages of DG Khan division.

1.5.1 Priority Villages

Amongst above mentioned 36 villages, 15 villages of district DG Khan, 08 villages of district Muzaffargarh, 01 village of district Taunsa and 12 villages of district Rajanpur 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. | DG Khan | DG Khan | DG Khan | Qasba Gajjani, UC Shero Dasti, Tehsil DG Khan |
| 2. | DG Khan | DG Khan | DG Khan | Qasba Dari Meero, DG Khan |
| 3. | DG Khan | DG Khan | Kot Chutta | Village Thatha Gabolan UC Thatha Gabolan Tehsil Kot Chutha |
| 4. | DG Khan | DG Khan | Kot Chutta | Village Kotla Ahmad Khan UC Kotla Ahmad Khan Tehsil Kot Chutta |
| 5. | DG Khan | DG Khan | D. G. Khan | Qasba kot mubark |
| 6. | DG Khan | DG Khan | Kot Chutta | Rekra |
| 7. | DG Khan | DG Khan | D. G. Khan | Ali wala |
| 8. | DG Khan | DG Khan | D. G. Khan | Chah Sanway wala |
| 9. | DG Khan | DG Khan | D. G. Khan | Chah Fatha khan wala |
| 10. | DG Khan | DG Khan | D. G. Khan | Lohar Wala, UC Mamoori, Dera Ghazi Khan |
| 11. | DG Khan | DG Khan | D. G. Khan | Basti Gud pur |
| 12. | DG Khan | DG Khan | Kot Chutta | Basti malana |
| 13. | DG Khan | DG Khan | Kot Chutta | Basti Jalbani, DG Khan |
| 14. | DG Khan | DG Khan | Kot Chutta | Choti Zareen |
| 15. | DG Khan | DG Khan | Kot Chutta | Hassan Aabad |
| 16. | DG Khan | Muzaffargarh | Muzaffargarh | Village Basti Mond, UC Gharewan Tesil Muzaffargarh |
| 17. | DG Khan | Muzaffargarh | Muzaffargarh | Village Raqba Noor Khan, UC Gharewan, Tehsil Muzaffargarh |
| 18. | DG Khan | Muzaffargarh | Muzaffargarh | Basti gujja obleigh hunjra |
| 19. | DG Khan | Muzaffargarh | Muzaffargarh | Basti dhandh Wala UC taliri |
| 20. | DG Khan | Muzaffargarh | Muzaffargarh | Basti Alam shah uc mondka |
| 21. | DG Khan | Muzaffargarh | Muzaffargarh | Ghazi gopang UC Meharpur |
| 22. | DG Khan | Muzaffargarh | Jatoi | Gharuu walla |
| 23. | DG Khan | Muzaffargarh | Jatoi | Gareeb Abad UC Lal Sha |
| 24. | DG Khan | Taunsa | Taunsa | Qasba Mamadani |
| 25. | DG Khan | Rajanpur | Jampur | Village Council #1 Dajal (Union Council Dajal) |
| 26. | DG Khan | Rajanpur | Jampur | Village Council #2 Adjoining Bastis Meo/Pat Wali (Union Council Tufki) |
| 27. | DG Khan | Rajanpur | Rajanpur | Nowshaira Gharbi U/C Nowshaira gharbi |
| 28. | DG Khan | Rajanpur | Rajanpur | Rakh Bagh Wala U/C peer Bakhsh Sharqi |
| 29. | DG Khan | Rajanpur | Rajanpur | Mudd Rindan |

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|----------|----------|-------------------------------------|
| 30. | DG Khan | Rajanpur | Rajanpur | Harand |
| 31. | DG Khan | Rajanpur | Jampur | Kotla muglan U/C Kotla Muglaan |
| 32. | DG Khan | Rajanpur | Jampur | Kotla Dewaan U/C Kotla Dewaan |
| 33. | DG Khan | Rajanpur | Jampur | Miran pur |
| 34. | DG Khan | Rajanpur | Jampur | Lundi saidan |
| 35. | DG Khan | Rajanpur | Rajanpur | Sahan Wala, UC Sahan Wala, Rajanpur |
| 36. | DG Khan | Rajanpur | Rajanpur | Basti Lakha, UC Jahanpur Rajanpur |

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 illustrating the proposed 36 target villages within the DG Khan Division — including 15 villages in district DG Khan, 08 villages in district Muzaffargarh, 01 village in district Taunsa and 12 villages in district Rajanpur is provided below in Figure 1-1;

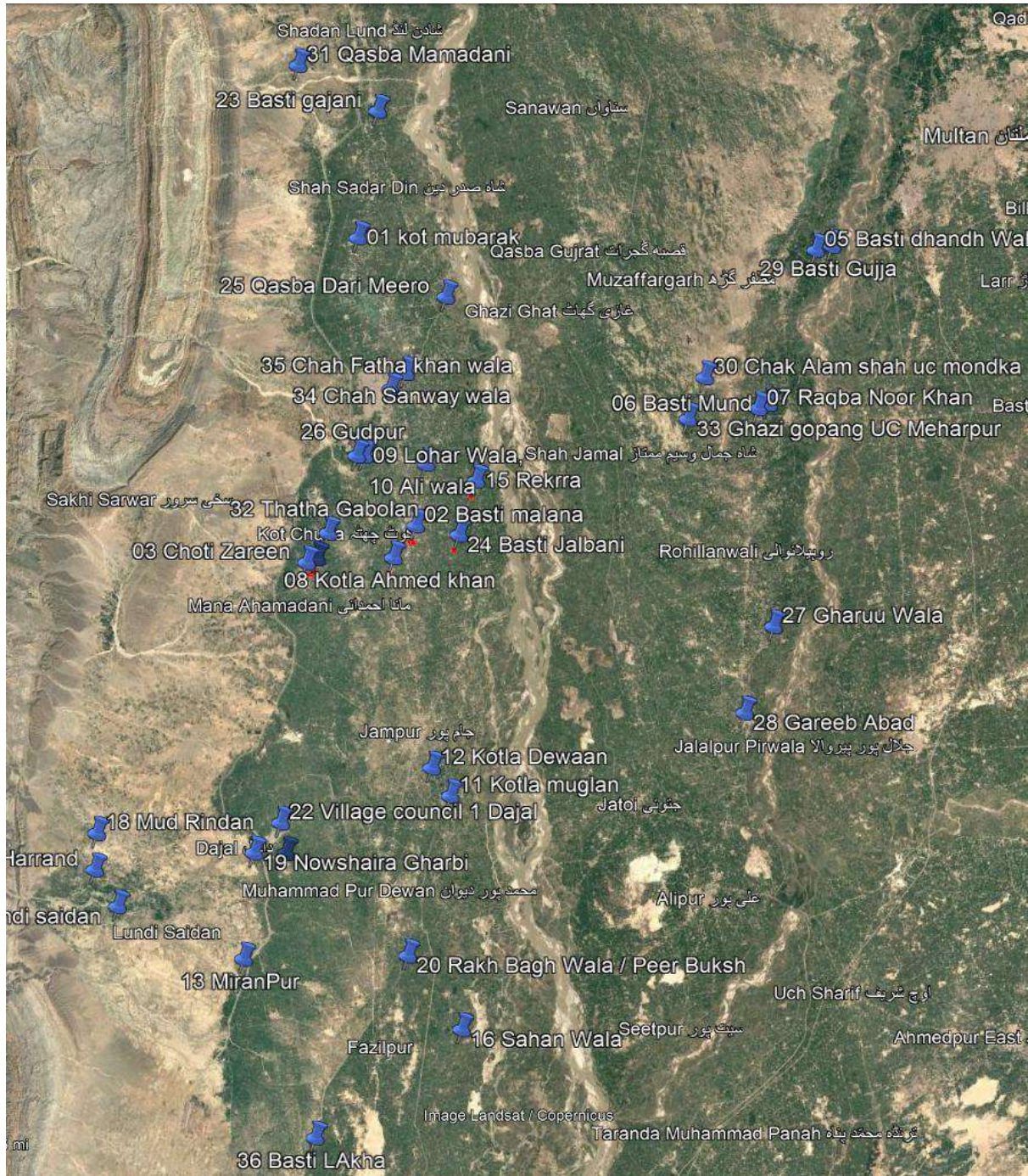


Figure 1-1, Project Location Map

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;
- 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 project is 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 and TUMAS Limited as the Engineering, Design & Supervision Consultant (EDCS). In the DG Khan Division, the Misaali Gaon initiative will be implemented across 36 rural settlements, distributed within

four districts: DG Khan, Muzaffargarh, Taunsa and Rajanpur. 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 0-2;

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.
- **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.

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 (Pvt.) Ltd. (ECSP) in association with TUMAS – Turkish Engineering Consulting and Contracting Company (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. The project in the Dera Ghazi Khan Division has been developed in direct response to the pressing demands of local communities. The selected rural settlements across districts; Dera Ghazi Khan, Muzaffargarh, Taunsa, and Rajanpur suffer from severe deficiencies in basic water supply and sanitation infrastructure, creating an urgent need for intervention. Due to the absence of an organized piped water system, households rely almost entirely on groundwater extraction through hand pumps and motorized pumps to meet daily domestic and drinking requirements. However, these sources are often untested and susceptible to contamination, exposing residents to serious health risks.

In most villages, the sanitation system consists of outdated open drains or, in many locations, no drainage at all. Wastewater either stagnates in streets or flows into open fields, causing waterlogging and foul odors, especially during the monsoon season. Open defecation is still practiced in several settlements, further contributing to the spread of infections. As a result, waterborne and sanitation-related diseases such as diarrhea, typhoid, cholera, hepatitis, intestinal worms, malaria, and dengue are commonly reported among both children and adults.

The deteriorated municipal infrastructure also affects mobility and access to essential services. Most internal roads are unpaved and become muddy and impassable during rains, limiting access to schools, markets, and healthcare facilities. This disproportionately affects vulnerable groups such as women, children, and the elderly. In some locations, old sewage ponds exist but remain non-functional, discharging untreated effluent into the surrounding environment and causing further ecological and public health hazards.

Given these challenges, the proposed project addresses an essential public need by aiming to improve drinking water quality, develop proper wastewater management systems, and restore environmental and public health conditions in DG Khan 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.

1.11 Project Location

The project is located in DG Khan division, Punjab. Dera Ghazi Khan division, located in the southern part of Punjab, comprises four districts: DG Khan,

Muzaffargarh, Taunsa, and Rajanpur. Covering an area of approximately 38,778 km², the division has a population exceeding 12 million (PBS 2023 projections), with about 10.1 million residing in rural areas. The rural populations are distributed approximately as follows: DG Khan District with around 1.6 million rural residents, Muzaffargarh with 2.8 million, Rajanpur with about 1.8 million Taunsa with 243,298 rural inhabitants. Details / names of the villages consisting of 36 proposed target villages within the DG Khan Division — including 15 villages in district DG Khan, 08 villages in district Muzaffargarh, 01 village in district Taunsa and 12 villages in district Rajanpur is provided below in Table 1-4 and project location map is given below in Figure 1-2. Furthermore, 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.

Table 1-4, Details / Names of the Villages

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|--------------|--------------|--|
| 1. | DG Khan | DG Khan | DG Khan | Qasba Gajjani, UC Shero Dasti, Tehsil DG Khan |
| 2. | DG Khan | DG Khan | DG Khan | Qasba Dari Meero, DG Khan |
| 3. | DG Khan | DG Khan | Kot Chutta | Village Thatha Gabolan UC Thatha Gabolan Tehsil Kot Chutha |
| 4. | DG Khan | DG Khan | Kot Chutta | Village Kotla Ahmad Khan UC Kotla Ahmad Khan Tehsil Kot Chutta |
| 5. | DG Khan | DG Khan | D. G. Khan | Qasba kot mubark |
| 6. | DG Khan | DG Khan | Kot Chutta | Rekra |
| 7. | DG Khan | DG Khan | D. G. Khan | Ali wala |
| 8. | DG Khan | DG Khan | D. G. Khan | Chah Sanway wala |
| 9. | DG Khan | DG Khan | D. G. Khan | Chah Fatha khan wala |
| 10. | DG Khan | DG Khan | D. G. Khan | Lohar Wala, UC Mamoori, Dera Ghazi Khan |
| 11. | DG Khan | DG Khan | D. G. Khan | Basti Gud pur |
| 12. | DG Khan | DG Khan | Kot Chutta | Basti malana |
| 13. | DG Khan | DG Khan | Kot Chutta | Basti Jalbani, DG Khan |
| 14. | DG Khan | DG Khan | Kot Chutta | Choti Zareen |
| 15. | DG Khan | DG Khan | Kot Chutta | Hassan Aabad |
| 16. | DG Khan | Muzaffargarh | Muzaffargarh | Village Basti Mond, UC Gharewan Tesil Muzaffargarh |
| 17. | DG Khan | Muzaffargarh | Muzaffargarh | Village Raqba Noor Khan, UC Gharewan, Tehsil Muzaffargarh |
| 18. | DG Khan | Muzaffargarh | Muzaffargarh | Basti gujja obleigh hunjra |
| 19. | DG Khan | Muzaffargarh | Muzaffargarh | Basti dhandh Wala UC taliri |

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|--------------|--------------|--|
| 20. | DG Khan | Muzaffargarh | Muzaffargarh | Basti Alam shah uc mondka |
| 21. | DG Khan | Muzaffargarh | Muzaffargarh | Ghazi gopang UC Meharpur |
| 22. | DG Khan | Muzaffargarh | Jatoi | Gharuu walla |
| 23. | DG Khan | Muzaffargarh | Jatoi | Gareeb Abad UC Lal Sha |
| 24. | DG Khan | Taunsa | Taunsa | Qasba Mamadani |
| 25. | DG Khan | Rajanpur | Jampur | Village Council #1 Dajal (Union Council Dajal) |
| 26. | DG Khan | Rajanpur | Jampur | Village Council #2 Adjoining Bastis Meo/Pat Wali (Union Council Tufki) |
| 27. | DG Khan | Rajanpur | Rajanpur | Nowshaira Gharbi U/C Nowshaira gharbi |
| 28. | DG Khan | Rajanpur | Rajanpur | Rakh Bagh Wala U/C peer Bakhsh Sharqi |
| 29. | DG Khan | Rajanpur | Rajanpur | Mudd Rindan |
| 30. | DG Khan | Rajanpur | Rajanpur | Harand |
| 31. | DG Khan | Rajanpur | Jampur | Kotla muglan U/C Kotla Muglaan |
| 32. | DG Khan | Rajanpur | Jampur | Kotla Dewaan U/C Kotla Dewaan |
| 33. | DG Khan | Rajanpur | Jampur | Miran pur |
| 34. | DG Khan | Rajanpur | Jampur | Lundi saidan |
| 35. | DG Khan | Rajanpur | Rajanpur | Sahan Wala, UC Sahan Wala, Rajanpur |
| 36. | DG Khan | Rajanpur | Rajanpur | Basti Lakha, UC Jahanpur Rajanpur |

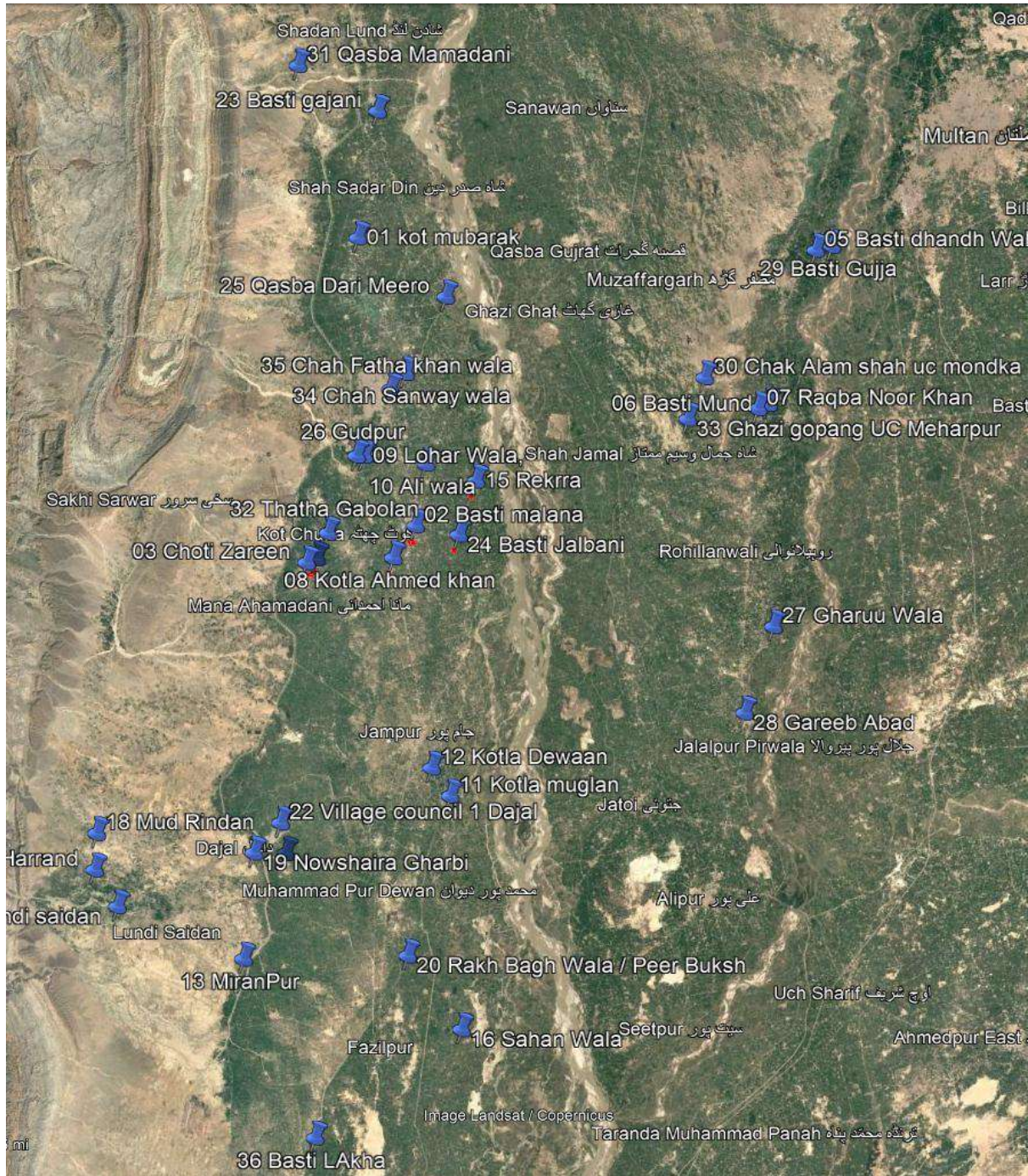


Figure 1-2, Project Location Map

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 for analysis in the laboratory.

e) Review of Secondary Data

Previous environmental and social soundness assessment for DG Khan Division 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 questionnaires 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: Screening and Scoping will discuss the requirement of conducting EIA, and the spatial and temporal boundaries of the project. Important issues raised by the community during the consultative sessions and significant impact that are determined during the initial visits.

Section 4: 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 | OCL |
| 8. | Huba Bint E Asla | Environmentalist | OCL |
| 9. | Sidra Rao | Environmentalist | OCL |

| Sr. No | Name | Designation | Department |
|--------|-----------------|---|------------|
| 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 |
|---------|------------------|--|---|
| | | <p>organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses 'a' to 'f'.</p> <p>The notable points of the law are:</p> <ul style="list-style-type: none"> • No proponent of a project shall commence construction or operation unless he has filed an EIA/IEE with the Provincial Agency designated by the Provincial EPAs an EIA/IEE, and has obtained an approval; • Establishment and formation of the Punjab Environmental Protection Council (PEPC); • Prohibition of certain discharges or emissions; • Punjab Environmental Quality Standards (PEQS) for wastewater, air emissions and noise; and • Provincial Government can issue notices and enforce them to protect the environment. <p>In the recent amendment of 2012, legislative powers related to environment and ecology are given to provincial governments from the Federal government. The provinces are required to enact their own legislation for environmental protection. Other amendments include increasing the penalties for violations.</p> <p>For the proposed Project, Environmental Protection</p> | <p>term of compliance with Punjab Environmental Quality Standards (PEQS). Similarly, section 13 of the act prohibits the import of hazardous waste.</p> <p>The provisions of section 16 are also applicable to comply with the discharge or emission of any effluent, waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 17, penalties will apply if anyone fails to comply with the provisions of section 11, 12, 13 and 16.</p> |

| Sr. No. | Act / Regulation | Description / Brief Coverage | Applicability / Relevance with the project |
|---------|---|---|--|
| | | <p>Department (EPD)/Environmental Protection Agency (EPA), Government of Punjab (GoP) is the concerned authority. The capability of regulatory institutions for environmental management is ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.</p> | |
| 3. | Punjab Environmental Quality Standards (PEQS), 2016 | <p>PEQS promulgated recently in 2016. Specified standards under PEQS are for:</p> <ul style="list-style-type: none"> • Drinking Water; • Ambient Air; • Noise; • Industrial Gaseous Emissions; • Municipal and Liquid Industrial Effluents; • Motor vehicle exhaust and noise | <p>The provisions of these regulations / standards for environmental monitoring to assess the impact of project activities on the environment.</p> |
| 4. | Pakistan Environmental Protection Agency, (Review of IEE / EIA) Regulations, 2000 | <p>These regulations set out:</p> <ul style="list-style-type: none"> • 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; | <p>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</p> |

| Sr. No. | Act / Regulation | Description / Brief Coverage | Applicability / Relevance with the project |
|---------|---|---|---|
| | | <ul style="list-style-type: none"> 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 <p>The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.</p> | 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: <ul style="list-style-type: none"> • 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 | <p>According to this act, forced labour is any type of work or kind of service in which someone engages involuntarily and under implied coercion a manifest threat of a party or oppression measures. The bonded labour can exist in following forms under different situations:</p> <ul style="list-style-type: none"> • Bonded labour in exchange of advance / an amount of money given before services are rendered, received by a person or his family. • Bonded labour as a consequence of some social or customary obligations. • Bonded labour in exchange of an economic benefit / consideration received by a person or his family, • Bonded labour of a guarantor in exchange for debtor who was unable to pay off his debt. <p>Bonded labour is prevalent in agriculture sector, brick kilns, domestic work and begging.</p> | This act is applicable to protect; the rights of labor involved in the project implementation. |
| 14. | Punjab Forest Act (Amended), 2010 | <p>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.</p> | 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 | <p>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.</p> <p>In accordance with this Article, the Employment of Child Act 1991 prohibits child labour (a child is under 14 years old).</p> | <p>The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.</p> |
| 16. | The Land Acquisition Act, 1894 | <p>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.</p> | <p>This act will not trigger as no land acquisition is required.</p> |

| 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 | <p>The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The Antiquities Act, 1975 (amended in 1990) states the following:</p> <ul style="list-style-type: none"> • “Ancient” is any object 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 <p>The cultural heritage laws of Pakistan are uniformly applicable to all categories of sites regardless of their state of</p> | <p>The law will be applicable to the project mainly due to its two provisions:</p> <ul style="list-style-type: none"> • According to the law, any construction activity within 61 meter or 200 ft. of protected antiquities, are prohibited. <p>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.</p> |

| 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 subsection (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 given below;

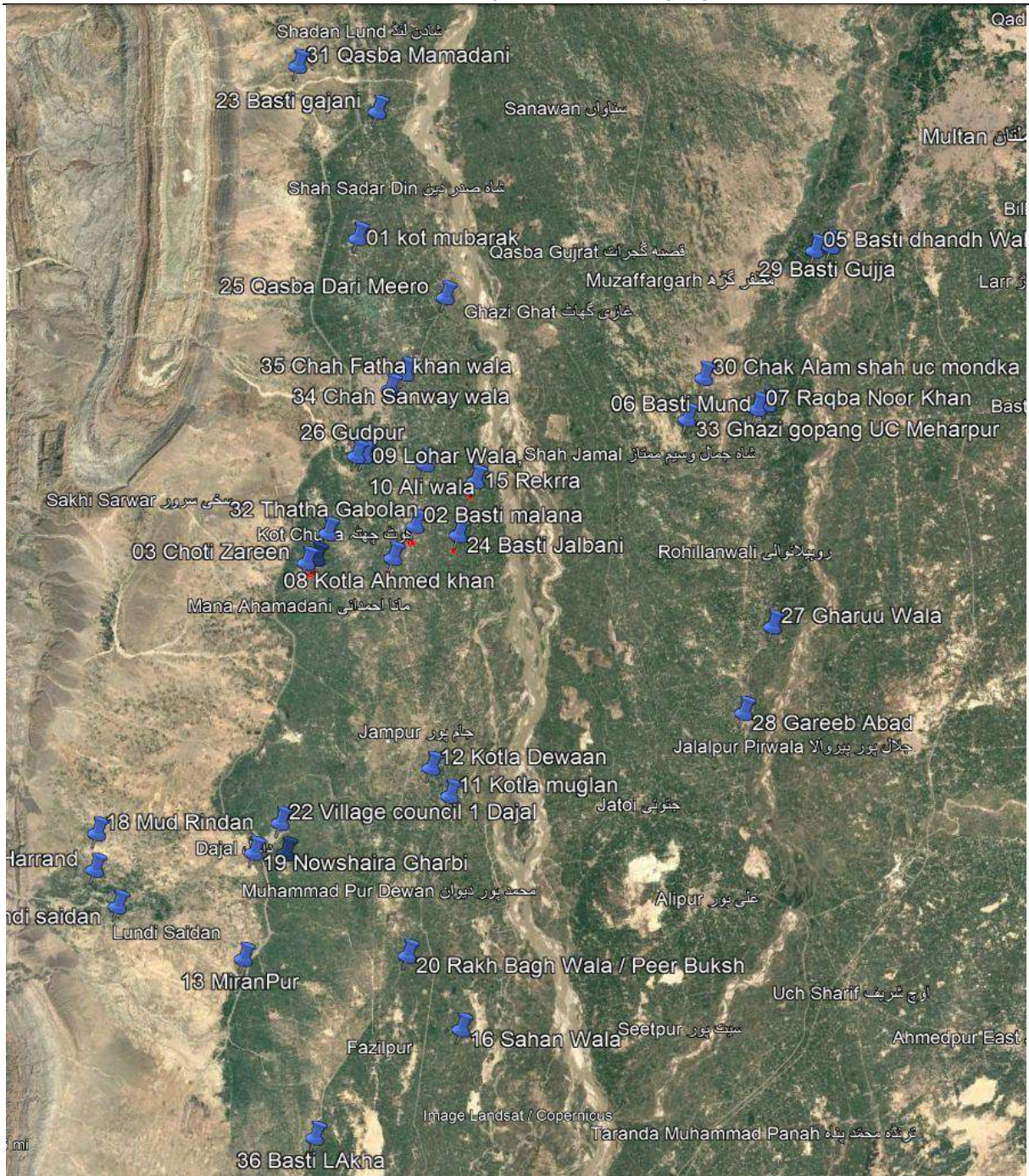


Figure 3-1, Project Map – DG Khan Division

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 DG Khan 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 DG Khan division, Punjab. Dera Ghazi Khan division, located in the southern part of Punjab, comprises four districts: DG Khan, Muzaffargarh, Taunsa, and Rajanpur. Covering an area of approximately 38,778 km², the division has a population exceeding 12 million (PBS 2023 projections), with about 10.1 million residing in rural areas. The rural populations are distributed approximately as follows: DG Khan District with around 1.6 million rural residents, Muzaffargarh with 2.8 million, Rajanpur with about 1.8 million Taunsa with 243,298 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 – DG Khan 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 DG Khan division, Punjab. Dera Ghazi Khan division, located in the southern part of Punjab, comprises four districts: DG Khan, Muzaffargarh, Taunsa, and Rajanpur. Covering an area of approximately 38,778 km², the division has a population exceeding 12 million (PBS 2023 projections), with about 10.1 million residing in rural areas. The rural populations are distributed approximately as follows: DG Khan District with around 1.6 million rural residents, Muzaffargarh with 2.8 million, Rajanpur with about 1.8 million Taunsa with 243,298 rural inhabitants. 36 villages are currently selected under this project in DG Khan division. Amongst 36 villages, 15 villages of district DG Khan, 08 villages of district Muzaffargarh, 01 village of district Taunsa and 12 villages of district Rajanpur will be developed under this project. Details of the villages is given below in Table 5-1, Details / Names of

the Villages;

Table 5-1, Details / Names of the Villages

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|--------------|--------------|--|
| 1. | DG Khan | DG Khan | DG Khan | Qasba Gajjani, UC Shero Dasti, Tehsil DG Khan |
| 2. | DG Khan | DG Khan | DG Khan | Qasba Dari Meero, DG Khan |
| 3. | DG Khan | DG Khan | Kot Chutta | Village Thatha Gabolan UC Thatha Gabolan Tehsil Kot Chutha |
| 4. | DG Khan | DG Khan | Kot Chutta | Village Kotla Ahmad Khan UC Kotla Ahmad Khan Tehsil Kot Chutta |
| 5. | DG Khan | DG Khan | D. G. Khan | Qasba kot mubark |
| 6. | DG Khan | DG Khan | Kot Chutta | Rekra |
| 7. | DG Khan | DG Khan | D. G. Khan | Ali wala |
| 8. | DG Khan | DG Khan | D. G. Khan | Chah Sanway wala |
| 9. | DG Khan | DG Khan | D. G. Khan | Chah Fatha khan wala |
| 10. | DG Khan | DG Khan | D. G. Khan | Lohar Wala, UC Mamoori, Dera Ghazi Khan |
| 11. | DG Khan | DG Khan | D. G. Khan | Basti Gud pur |
| 12. | DG Khan | DG Khan | Kot Chutta | Basti malana |
| 13. | DG Khan | DG Khan | Kot Chutta | Basti Jalbani, DG Khan |
| 14. | DG Khan | DG Khan | Kot Chutta | Choti Zareen |
| 15. | DG Khan | DG Khan | Kot Chutta | Hassan Aabad |
| 16. | DG Khan | Muzaffargarh | Muzaffargarh | Village Basti Mond, UC Gharewan Tesil Muzaffargarh |
| 17. | DG Khan | Muzaffargarh | Muzaffargarh | Village Raqba Noor Khan, UC Gharewan, Tehsil Muzaffargarh |
| 18. | DG Khan | Muzaffargarh | Muzaffargarh | Basti gujja obleigh hunjra |
| 19. | DG Khan | Muzaffargarh | Muzaffargarh | Basti dhandh Wala UC taliri |
| 20. | DG Khan | Muzaffargarh | Muzaffargarh | Basti Alam shah uc mondka |
| 21. | DG Khan | Muzaffargarh | Muzaffargarh | Ghazi gopang UC Meharpur |
| 22. | DG Khan | Muzaffargarh | Jatoi | Gharuu walla |
| 23. | DG Khan | Muzaffargarh | Jatoi | Gareeb Abad UC Lal Sha |
| 24. | DG Khan | Taunsa | Taunsa | Qasba Mamadani |
| 25. | DG Khan | Rajanpur | Jampur | Village Council #1 Dajal (Union Council Dajal) |
| 26. | DG Khan | Rajanpur | Jampur | Village Council #2 Adjoining Bastis Meo/Pat Wali (Union Council Tufki) |
| 27. | DG Khan | Rajanpur | Rajanpur | Nowshaira Gharbi U/C Nowshaira gharbi |
| 28. | DG Khan | Rajanpur | Rajanpur | Rakh Bagh Wala U/C peer Bakhsh Sharqi |

Environmental Impact Assessment (EIA)

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|----------|----------|-------------------------------------|
| 29. | DG Khan | Rajanpur | Rajanpur | Mudd Rindan |
| 30. | DG Khan | Rajanpur | Rajanpur | Harand |
| 31. | DG Khan | Rajanpur | Jampur | Kotla muglan U/C Kotla Muglaan |
| 32. | DG Khan | Rajanpur | Jampur | Kotla Dewaan U/C Kotla Dewaan |
| 33. | DG Khan | Rajanpur | Jampur | Miran pur |
| 34. | DG Khan | Rajanpur | Jampur | Lundi saidan |
| 35. | DG Khan | Rajanpur | Rajanpur | Sahan Wala, UC Sahan Wala, Rajanpur |
| 36. | DG Khan | Rajanpur | Rajanpur | Basti Lakha, UC Jahanpur Rajanpur |

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 illustrating the proposed 36 target villages within the DG Khan Division — including 15 villages in district DG Khan, 08 villages in district Muzaffargarh, 01 village in district Taunsa and 12 villages in district Rajanpur is provided below in Figure 5-1 Figure 1-1;

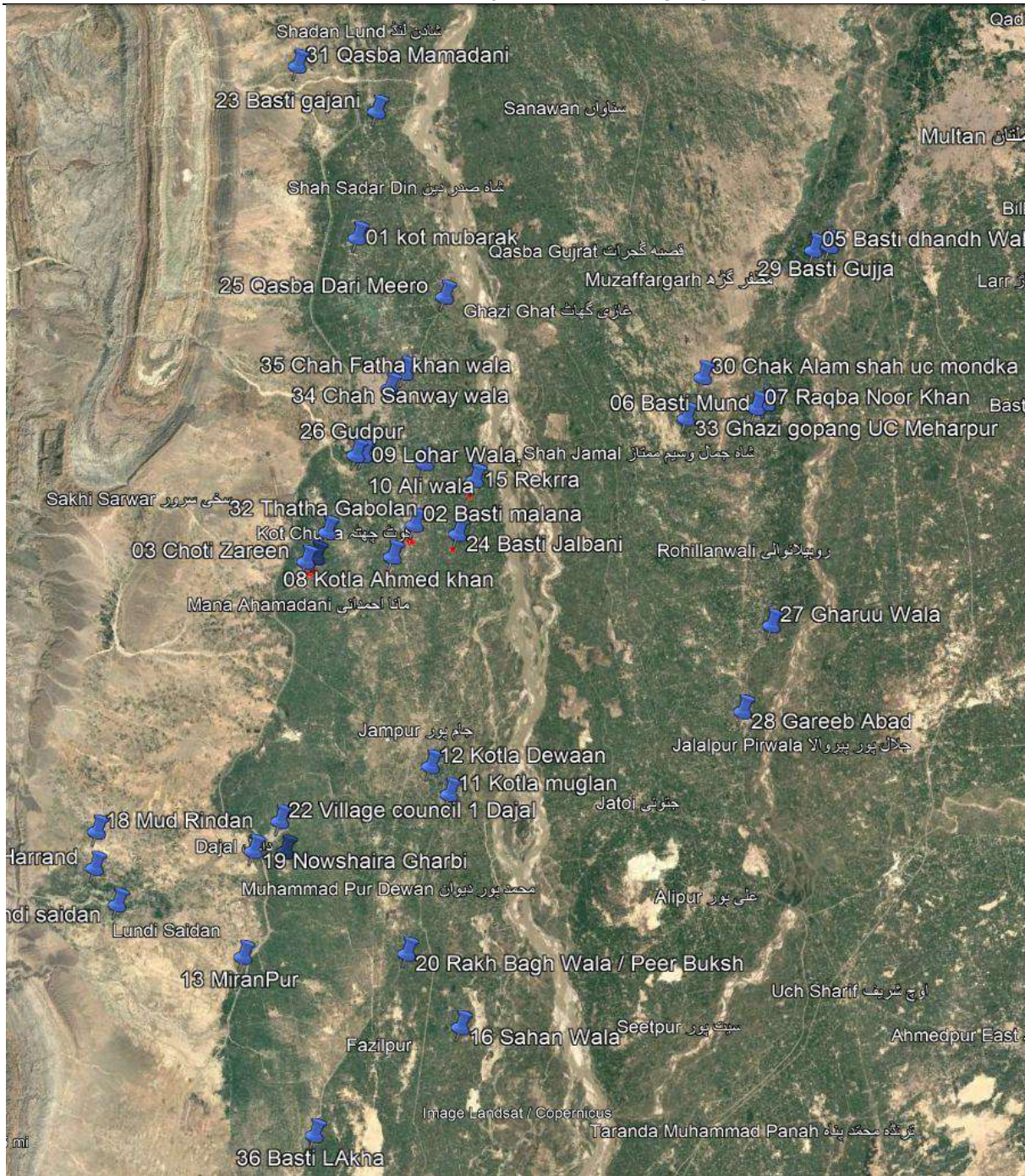


Figure 5-1, Project Location Map

5.4 Land Use

A few trees and vegetation (like small grass / shrubs) are present near the site for proposed project interventions, 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. Most of the project areas currently feature open surface drains, which will be considered for rehabilitation / reconstruction or covering as part of the project's design to improve environmental and sanitary conditions in the vicinity.



Figure 5-2, Representative Pictures of the Site

5.5 Road Access

The project consists of improvement and development of water supply & sanitation services in the villages within district DG Khan, Muzaffargarh, Taunsa and Rajanpur, in DG Khan division. The villages can be mainly accessible from National Highway – 55, National Highway – 70, Muzaffargarh – Garh Mor Road, Mianwali – Muzaffargarh Road, Mehmood Kot Road, Muzaffargarh – Alipur Road, Mangrotha Road, Thairi Road, Aqilpur Bait Sontra Road and other existing minor roads within / around the villages.

5.6 Cost & Magnitude of the Project

Total cost of the project is 3,817.680 Million PKR. The project will improve the water supply and sanitation services and related infrastructure in the selected villages within DG Khan division.

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.
- **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.

5.10 Project Description

The project is located in DG Khan division, Punjab. Dera Ghazi Khan division, located in the southern part of Punjab, comprises four districts: DG Khan, Muzaffargarh, Taunsa, and Rajanpur. Covering an area of approximately 38,778 km², the division has a population exceeding 12 million (PBS 2023 projections), with about 10.1 million residing in rural areas. The rural populations are distributed approximately as follows: DG Khan District with around 1.6 million rural residents, Muzaffargarh with 2.8 million, Rajanpur with about 1.8 million Taunsa with 243,298 rural inhabitants. 36 villages are currently selected under this project in DG Khan division. Amongst 36 villages, 15 villages of district DG Khan, 08 villages of district Muzaffargarh, 01 village of

district Taunsa and 12 villages of district Rajanpur will be developed under this project. 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. | DG Khan | DG Khan | DG Khan | Qasba Gajjani, UC Shero Dasti, Tehsil DG Khan |
| 2. | DG Khan | DG Khan | DG Khan | Qasba Dari Meero, DG Khan |
| 3. | DG Khan | DG Khan | Kot Chutta | Village Thatha Gabolan UC Thatha Gabolan Tehsil Kot Chutha |
| 4. | DG Khan | DG Khan | Kot Chutta | Village Kotla Ahmad Khan UC Kotla Ahmad Khan Tehsil Kot Chutta |
| 5. | DG Khan | DG Khan | D. G. Khan | Qasba kot mubark |
| 6. | DG Khan | DG Khan | Kot Chutta | Rekrra |
| 7. | DG Khan | DG Khan | D. G. Khan | Ali wala |
| 8. | DG Khan | DG Khan | D. G. Khan | Chah Sanway wala |
| 9. | DG Khan | DG Khan | D. G. Khan | Chah Fatha khan wala |
| 10. | DG Khan | DG Khan | D. G. Khan | Lohar Wala, UC Mamoori, Dera Ghazi Khan |
| 11. | DG Khan | DG Khan | D. G. Khan | Basti Gud pur |
| 12. | DG Khan | DG Khan | Kot Chutta | Basti malana |
| 13. | DG Khan | DG Khan | Kot Chutta | Basti Jalbani, DG Khan |
| 14. | DG Khan | DG Khan | Kot Chutta | Choti Zareen |
| 15. | DG Khan | DG Khan | Kot Chutta | Hassan Aabad |
| 16. | DG Khan | Muzaffargarh | Muzaffargarh | Village Basti Mond, UC Gharewan Tesil Muzaffargarh |
| 17. | DG Khan | Muzaffargarh | Muzaffargarh | Village Raqba Noor Khan, UC Gharewan, Tehsil Muzaffargarh |
| 18. | DG Khan | Muzaffargarh | Muzaffargarh | Basti gujja obleigh hunjra |
| 19. | DG Khan | Muzaffargarh | Muzaffargarh | Basti dhandh Wala UC taliri |
| 20. | DG Khan | Muzaffargarh | Muzaffargarh | Basti Alam shah uc mondka |
| 21. | DG Khan | Muzaffargarh | Muzaffargarh | Ghazi gopang UC Meharpur |
| 22. | DG Khan | Muzaffargarh | Jatoi | Gharuu walla |
| 23. | DG Khan | Muzaffargarh | Jatoi | Gareeb Abad UC Lal Sha |
| 24. | DG Khan | Taunsa | Taunsa | Qasba Mamadani |
| 25. | DG Khan | Rajanpur | Jampur | Village Council #1 Dajal (Union Council Dajal) |
| 26. | DG Khan | Rajanpur | Jampur | Village Council #2 Adjoining Bastis Meo/Pat Wali (Union Council Tufki) |
| 27. | DG Khan | Rajanpur | Rajanpur | Nowshaira Gharbi U/C Nowshaira gharbi |
| 28. | DG Khan | Rajanpur | Rajanpur | Rakh Bagh Wala U/C peer Bakhsh |

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|----------|----------|-------------------------------------|
| | | | | Sharqi |
| 29. | DG Khan | Rajanpur | Rajanpur | Mudd Rindan |
| 30. | DG Khan | Rajanpur | Rajanpur | Harand |
| 31. | DG Khan | Rajanpur | Jampur | Kotla muglan U/C Kotla Muglaan |
| 32. | DG Khan | Rajanpur | Jampur | Kotla Dewaan U/C Kotla Dewaan |
| 33. | DG Khan | Rajanpur | Jampur | Miran pur |
| 34. | DG Khan | Rajanpur | Jampur | Lundi saidan |
| 35. | DG Khan | Rajanpur | Rajanpur | Sahan Wala, UC Sahan Wala, Rajanpur |
| 36. | DG Khan | Rajanpur | Rajanpur | Basti Lakha, UC Jahanpur Rajanpur |

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 illustrating the proposed 36 target villages within the DG Khan Division — including 15 villages in district DG Khan, 08 villages in district Muzaffargarh, 01 village in district Taunsa and 12 villages in district Rajanpur is provided below in Figure 5-3Figure 1-1;

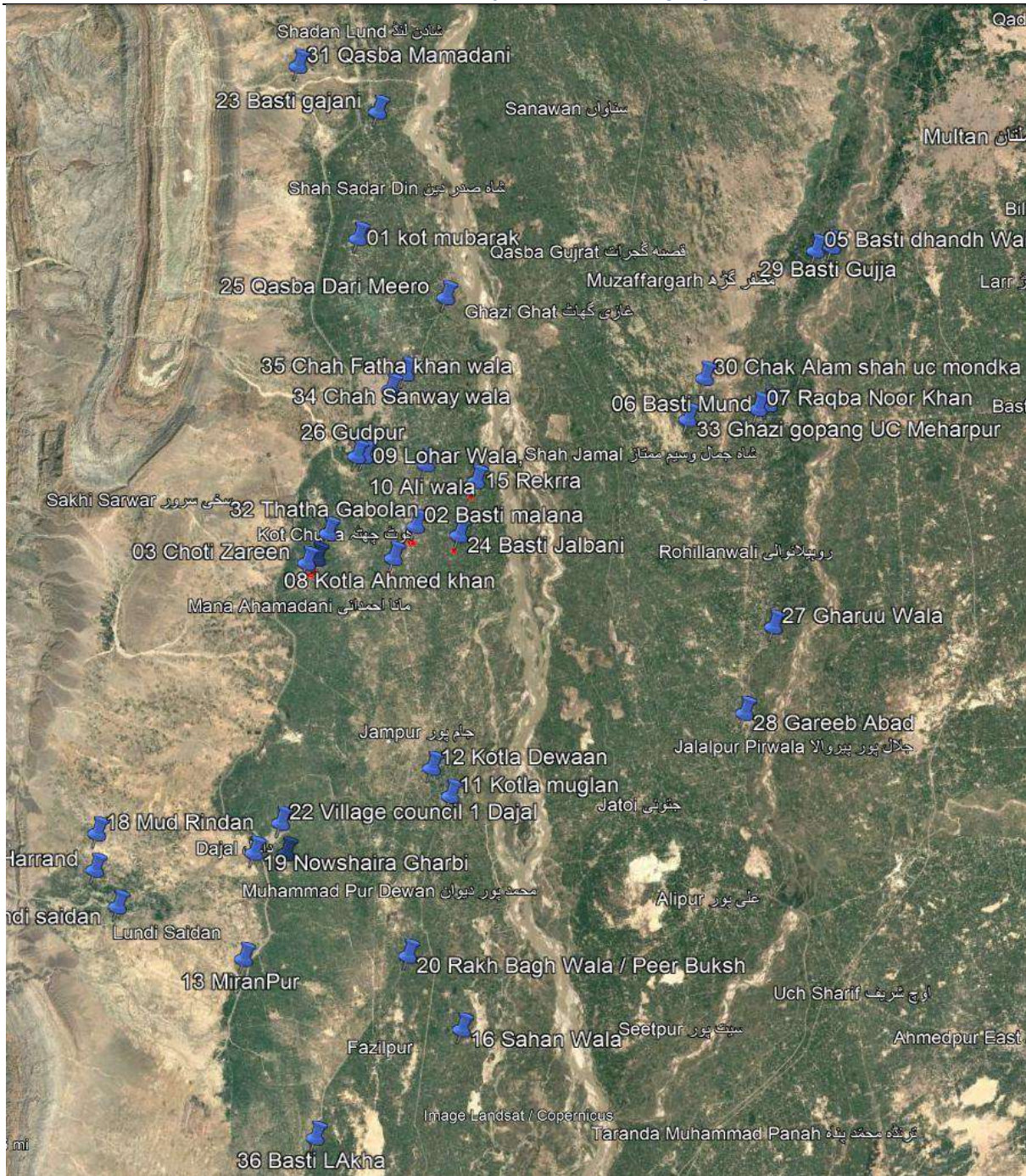


Figure 5-3, Project Location Map

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.
- 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.

5.10.1 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 |
| 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, RCC Drains Types and Dimensions

| Drain Type | Material | Internal Width (inches) | Depth (Inches) | Application |
|------------|----------|-------------------------|----------------|--|
| Type 1 | RCC | 10" | 12" | Small streets / Low-flow areas |
| Type 2 | RCC | 15" | 15" | Medium-sized streets / Moderate flow |
| Type 3 | RCC | 18" | 18" | Main streets / High-flow or collector drains |

Table 5-6, 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 |

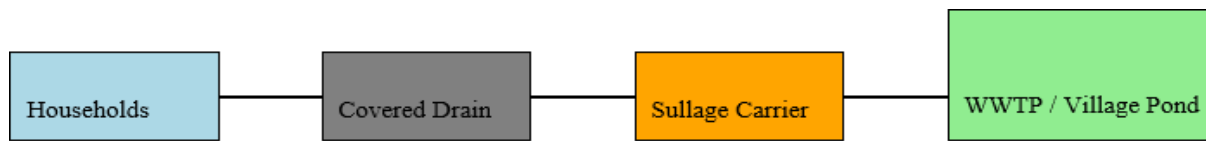


Figure 5-4, Proposed Schematic Diagram of Drainage System

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 5-7, 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 | — |

| Parameter | Recommended Value / Range | Units |
|--------------------------|----------------------------------|---------------------|
| Groundwater separation | Min. 1.0 – 1.5 m | vertical separation |
| Frost / temperature note | Not typically critical in Punjab | — |

Table 5-8, Specifications of Soakage Pit

| Parameter | Recommended Standard |
|----------------------------|---|
| Shape | Circular or square |
| 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 5-9, 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 $> 3\text{kg}/\text{m}^3$ 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 |

| Parameter | Design Value / Range |
|---------------------------------|--|
| 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 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 5-5;

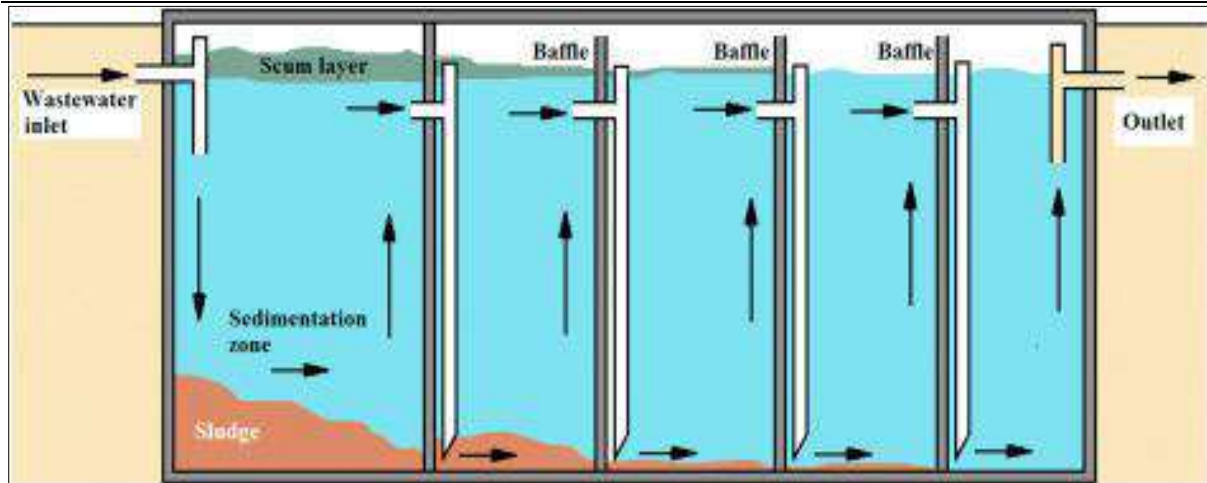


Figure 5-5, Layout Plan of ABR

5.10.3 Pavement Design

Pavement design for a 08–12 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.

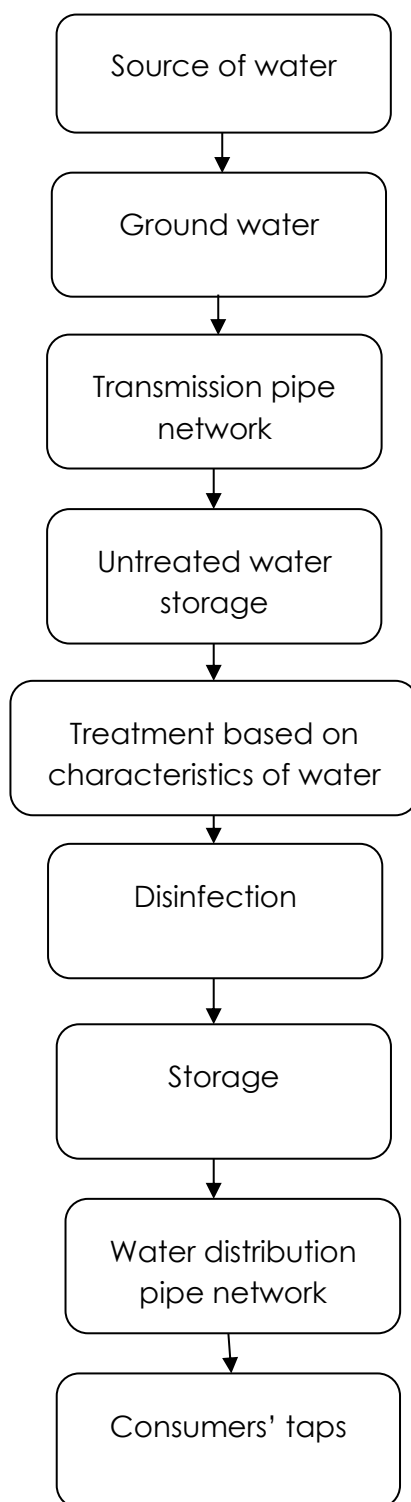


Figure 5-6, Process Flow Diagram of Water Supply

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.

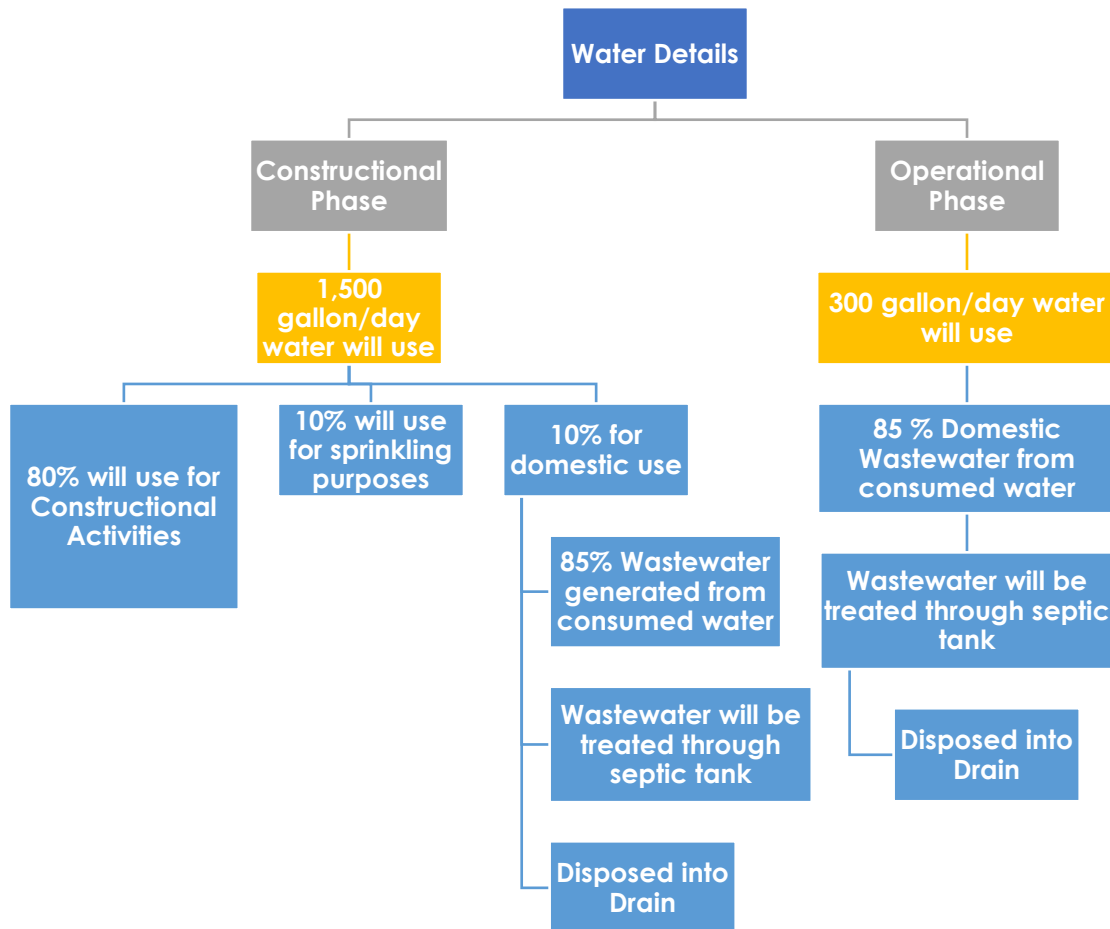


Figure 5-7, Estimated Water Balance for Each Village

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 5-10, Waste Management Collection and Disposal Techniques

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

5.13 Sources of construction material

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

5.14 Machinery & Equipment

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

Table 5-11, 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 STP and / or relevant infrastructure

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 DG Khan division. Amongst 36 villages within DG Khan division, 15 villages of district DG Khan, 08 villages of district Muzaffargarh, 01 village of district Taunsa and 12 villages of district Rajanpur will be developed under this project. Details of the villages is given below in Table 6-1;

Table 6-1, Details / Names of the Villages

Environmental Impact Assessment (EIA)

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|--------------|--------------|--|
| 1. | DG Khan | DG Khan | DG Khan | Qasba Gajjani, UC Shero Dasti, Tehsil DG Khan |
| 2. | DG Khan | DG Khan | DG Khan | Qasba Dari Meero, DG Khan |
| 3. | DG Khan | DG Khan | Kot Chutta | Village Thatha Gabolan UC Thatha Gabolan Tehsil Kot Chutta |
| 4. | DG Khan | DG Khan | Kot Chutta | Village Kotla Ahmad Khan UC Kotla Ahmad Khan Tehsil Kot Chutta |
| 5. | DG Khan | DG Khan | D. G. Khan | Qasba kot mubark |
| 6. | DG Khan | DG Khan | Kot Chutta | Rekrra |
| 7. | DG Khan | DG Khan | D. G. Khan | Ali wala |
| 8. | DG Khan | DG Khan | D. G. Khan | Chah Sanway wala |
| 9. | DG Khan | DG Khan | D. G. Khan | Chah Fatha khan wala |
| 10. | DG Khan | DG Khan | D. G. Khan | Lohar Wala, UC Mamoori, Dera Ghazi Khan |
| 11. | DG Khan | DG Khan | D. G. Khan | Basti Gud pur |
| 12. | DG Khan | DG Khan | Kot Chutta | Basti malana |
| 13. | DG Khan | DG Khan | Kot Chutta | Basti Jalbani, DG Khan |
| 14. | DG Khan | DG Khan | Kot Chutta | Choti Zareen |
| 15. | DG Khan | DG Khan | Kot Chutta | Hassan Aabad |
| 16. | DG Khan | Muzaffargarh | Muzaffargarh | Village Basti Mond, UC Gharewan Tesil Muzaffargarh |
| 17. | DG Khan | Muzaffargarh | Muzaffargarh | Village Raqba Noor Khan, UC Gharewan, Tehsil Muzaffargarh |
| 18. | DG Khan | Muzaffargarh | Muzaffargarh | Basti gujja obleigh hunjra |
| 19. | DG Khan | Muzaffargarh | Muzaffargarh | Basti dhandh Wala UC taliri |
| 20. | DG Khan | Muzaffargarh | Muzaffargarh | Basti Alam shah uc mondka |
| 21. | DG Khan | Muzaffargarh | Muzaffargarh | Ghazi gopang UC Meharpur |
| 22. | DG Khan | Muzaffargarh | Jatoi | Gharuu walla |
| 23. | DG Khan | Muzaffargarh | Jatoi | Gareeb Abad UC Lal Sha |
| 24. | DG Khan | Taunsa | Taunsa | Qasba Mamadani |
| 25. | DG Khan | Rajanpur | Jampur | Village Council #1 Dajal (Union Council Dajal) |
| 26. | DG Khan | Rajanpur | Jampur | Village Council #2 Adjoining Bastis Meo/Pat Wali (Union Council Tufki) |
| 27. | DG Khan | Rajanpur | Rajanpur | Nowshaira Gharbi U/C Nowshaira gharbi |
| 28. | DG Khan | Rajanpur | Rajanpur | Rakh Bagh Wala U/C peer Bakhsh Sharqi |
| 29. | DG Khan | Rajanpur | Rajanpur | Mudd Rindan |
| 30. | DG Khan | Rajanpur | Rajanpur | Harand |

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|----------|----------|-------------------------------------|
| 31. | DG Khan | Rajanpur | Jampur | Kotla muglan U/C Kotla Muglaan |
| 32. | DG Khan | Rajanpur | Jampur | Kotla Dewaan U/C Kotla Dewaan |
| 33. | DG Khan | Rajanpur | Jampur | Miran pur |
| 34. | DG Khan | Rajanpur | Jampur | Lundi saidan |
| 35. | DG Khan | Rajanpur | Rajanpur | Sahan Wala, UC Sahan Wala, Rajanpur |
| 36. | DG Khan | Rajanpur | Rajanpur | Basti Lakha, UC Jahanpur Rajanpur |

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. The site / project area / villages can be mainly accessible from National Highway - 55, National Highway - 70, Muzaffargarh - Garh Mor Road, Mianwali - Muzaffargarh Road, Mehmood Kot Road, Muzaffargarh - Alipur Road, Mangrotha Road, Thairi Road, Aqilpur Bait Sontra Road and other existing minor roads within / around the villages.

6.4 Physical Resources

6.4.1 Geography, Geology, and Soils

Dera Ghazi Khan (D.G. Khan) Division is situated in the southwestern part of Pakistan's Punjab province, uniquely positioned between the towering Koh-e-Suleman mountain range to the west and the expansive Indus River to the east. The topography of the division is defined by this striking contrast, featuring the mountainous foothills of the Koh-e-Suleman, a central piedmont zone of alluvial fans and gravels, and the fertile, flat alluvial plain of the Indus River. In its mountainous western parts, the division's terrain includes the hill station of Fort Munro, with peaks that can exceed 1,800 meters. The division experiences a semi-arid climate characterized by extremely hot summers, mild and dry winters, and frequent windstorms caused by the barren mountains and sandy soil.

The geology of the D.G. Khan Division is a product of its location at the eastern edge of the Sulaiman Foldbelt, an area shaped by the collision of the Indian and Asian tectonic plates. The region's geological makeup includes extensive sedimentary rock formations from the Mesozoic and Cenozoic eras, with thick sequences of Jurassic, Cretaceous, and Tertiary rocks. The foothills of the Sulaiman Range feature notable Tertiary formations, including the Baska Shale, Domanda Shale, and Drazinda Shale, some of which contain coal. The Pliocene-age Chaudhwan Formation, consisting of conglomeratic sandstone and claystone, forms the low hills in the northern parts of the division. The vast plain areas are covered by much more recent Quaternary alluvial deposits from the Indus River and its tributaries, as well as significant deposits of windblown dune sand. The division's mineral resources are tied to

these formations, with significant reserves of Fuller's earth and gypsum found in the Tertiary rock units.

The soil composition of the D.G. Khan Division is directly influenced by its geography and geology, consisting primarily of alluvial deposits from the Indus River and the seasonal torrents that flow from the mountains. Soils in the riverine and irrigated plains are typically deep, medium-textured, well-drained, and calcareous, but are often low in organic matter due to the hot climate. Salinity is a notable challenge, with a high average pH and a high soluble salt content in many areas, particularly in the Taunsa region. While the soils are generally good for agriculture, their fertility can be limited. Soil analyses have shown that while potassium levels are adequate in some parts, a majority of the land is low in organic matter and has low to medium levels of phosphorus, requiring careful nutrient management for successful crop production.

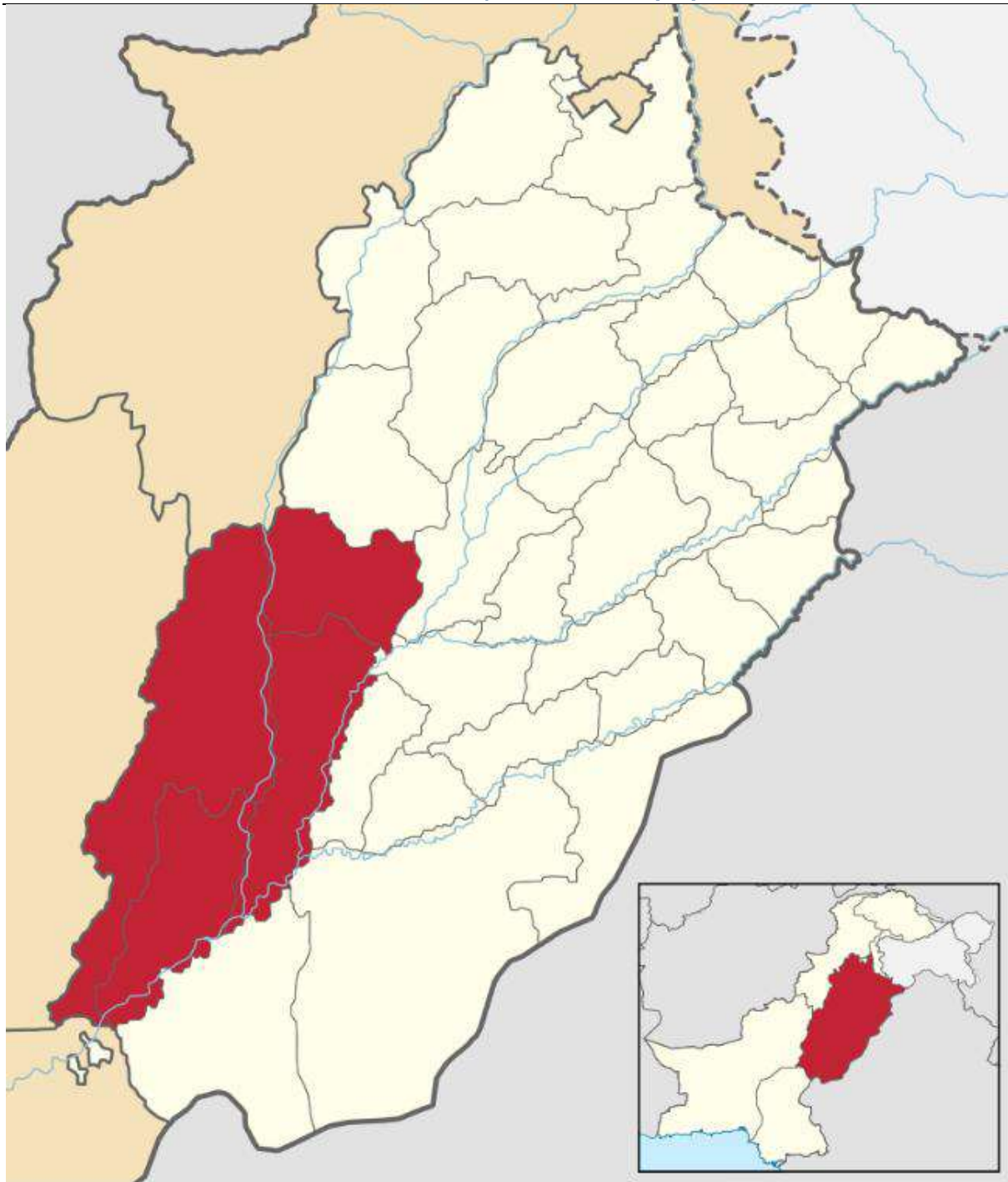


Figure 6-1, Map of DG Khan Division

6.4.2 Topography

The topography of Dera Ghazi Khan Division presents a striking contrast between its western highlands and eastern plains. The Koh-e-Suleman mountain range forms the western boundary, creating a rugged and arid terrain that extends into Balochistan. This mountainous zone includes prominent features such as Takht-e-Sulaiman and the well-known hill station of Fort Munro, which enjoys a relatively cooler climate and occasionally receives light snowfall during winter. The steep slopes and rocky outcrops are

traversed by numerous seasonal hill torrents that originate in the mountains and flow downwards during the monsoon season. While these torrents bring nutrient-rich silt that enhances soil fertility in the foothills, they also pose a considerable risk of flash flooding in downstream settlements.

Moving eastward, the landscape gradually transitions into the expansive and fertile alluvial plains of the Indus River, locally known as the Derajat region. The Indus River forms the division’s eastern boundary and serves as the lifeline for agriculture through its extensive irrigation system. The Taunsa Barrage, located along the river, plays a critical role in regulating water distribution for irrigation while also functioning as an important transportation and control structure. This interaction between the elevated terrain of the west and the riverine plains of the east creates a distinct geographical gradient that influences the region’s climate, land use, and settlement patterns. The plains experience a hot semi-arid climate with extremely high summer temperatures, in contrast to the cooler and more temperate conditions of the mountainous areas.

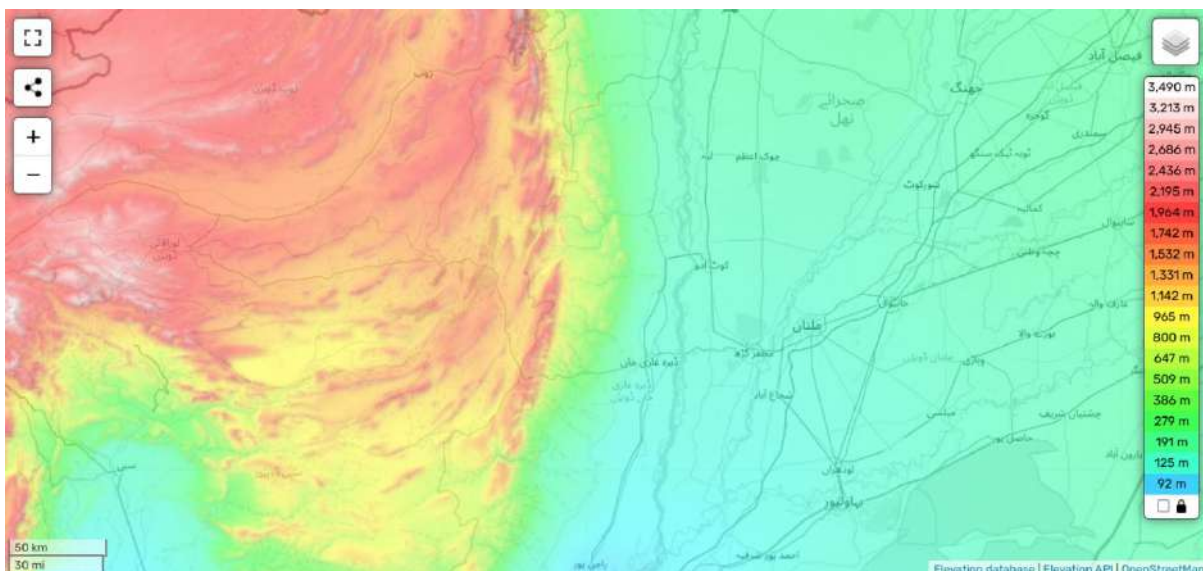


Figure 6-2, Topographical Map of DG Khan Division

6.4.3 Climate and Temperature

The Dera Ghazi Khan division experiences a semi-arid climate characterized by a stark contrast between its seasons: extremely hot, wet summers and mild, dry winters. The overall climate is largely dry, with the majority of rainfall occurring during the monsoon season. Significant temperature and weather variations exist within the division due to major differences in elevation, particularly between the flat Indus River plains and the high-altitude Sulaiman Mountain Range.

Summers in the Dera Ghazi Khan division, which run from May through September, are marked by intense and sometimes oppressive heat. The average high temperature during this season is approximately 42°C (107°F), making it one of the hottest regions in Pakistan. This season also brings

monsoon rainfall, with the heaviest precipitation typically occurring in July and August. Adding to the harsh conditions, frequent windstorms are common in the summer, caused by the heat radiating from the barren mountains of the Koh-e-Sulaiman range and the sandy soil of the plains.

In contrast, winters are mild and dry, with the coldest months occurring from November to February. Average low temperatures during this period hover around 4°C (40°F) on the plains, with a prevailing north-to-south wind. While the plains experience mild weather, temperatures can drop below freezing, and the higher elevations of the Sulaiman Mountains see much cooler weather.

The most significant climatic variation in the Dera Ghazi Khan division is tied to its diverse geography. The vast plains alongside the Indus River are flat and endure the brunt of the scorching summer heat. Conversely, the elevated tribal areas within the Koh-e-Sulaiman range, such as the hill station of Fort Munro, enjoy significantly cooler weather throughout the year. The stark difference in elevation means that while the plains are sweltering, the higher reaches of the Sulaiman Mountains can experience scattered snowfall during the winter months.

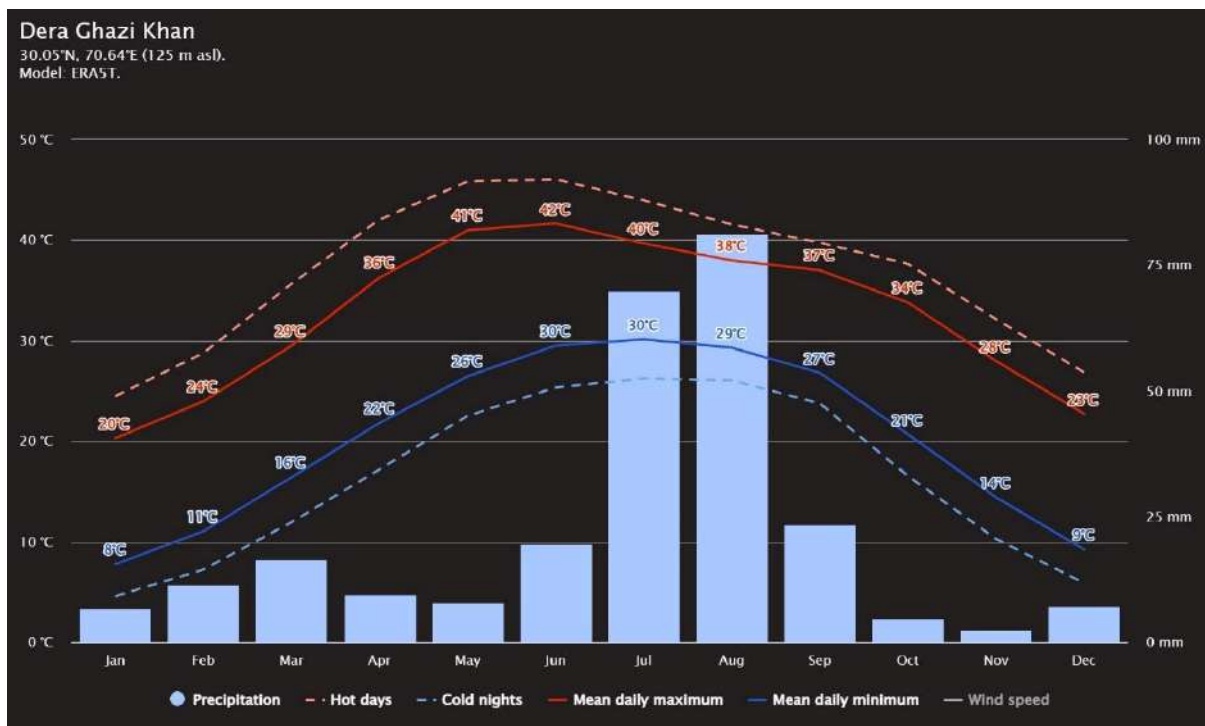


Figure 6-3, Average Annual Maximum and Minimum Temperature, and Precipitation – DG Khan

6.4.4 Rainfall

In the Dera Ghazi Khan (D.G. Khan) Division, rainfall is historically low and sporadic, with most precipitation occurring during the summer monsoon season. While the region's plains have a dry, semi-arid climate, the Sulaiman Mountain range to the west sees more rainfall. The monsoon period, from July

to September, typically brings the heaviest rain, particularly in August. The remaining months are very dry, with the least amount of rain falling between October and December. This stark contrast is a defining feature of the division's rainfall pattern.

The variability of rainfall has increased significantly in recent years due to climate change, leading to more intense and unpredictable downpours. This shift from a historically dry climate has resulted in more frequent and severe extreme weather events. As a consequence, the division, especially the districts of D.G. Khan and Rajanpur, faces a heightened risk of devastating flash floods and urban flooding.

The geography of the region, specifically the Sulaiman Mountains, plays a major role in its flooding. Heavy rainfall in the mountain range generates powerful hill torrents that rush down into the plains, causing widespread damage. For example, in 2022, D.G. Khan recorded its highest rainfall in 40 years, with 165.83 millimeters, which led to significant flash floods that impacted numerous villages. In response to this recurring threat, local authorities are now focused on monitoring the rivers and managing the floodwaters to protect residents.

The impacts of these changing weather patterns are significant for the population and economy of the D.G. Khan division. The flash floods caused by hill torrents regularly damage agricultural land, crops, and infrastructure, with notable events in 2008, 2010, and 2022 causing major losses. The unpredictability of rainfall also complicates agricultural planning. On the other hand, a cooler exception to the region's heat and aridity is the hill station of Fort Munro in the Sulaiman Mountains, where scattered snowfall can even occur during the winter.

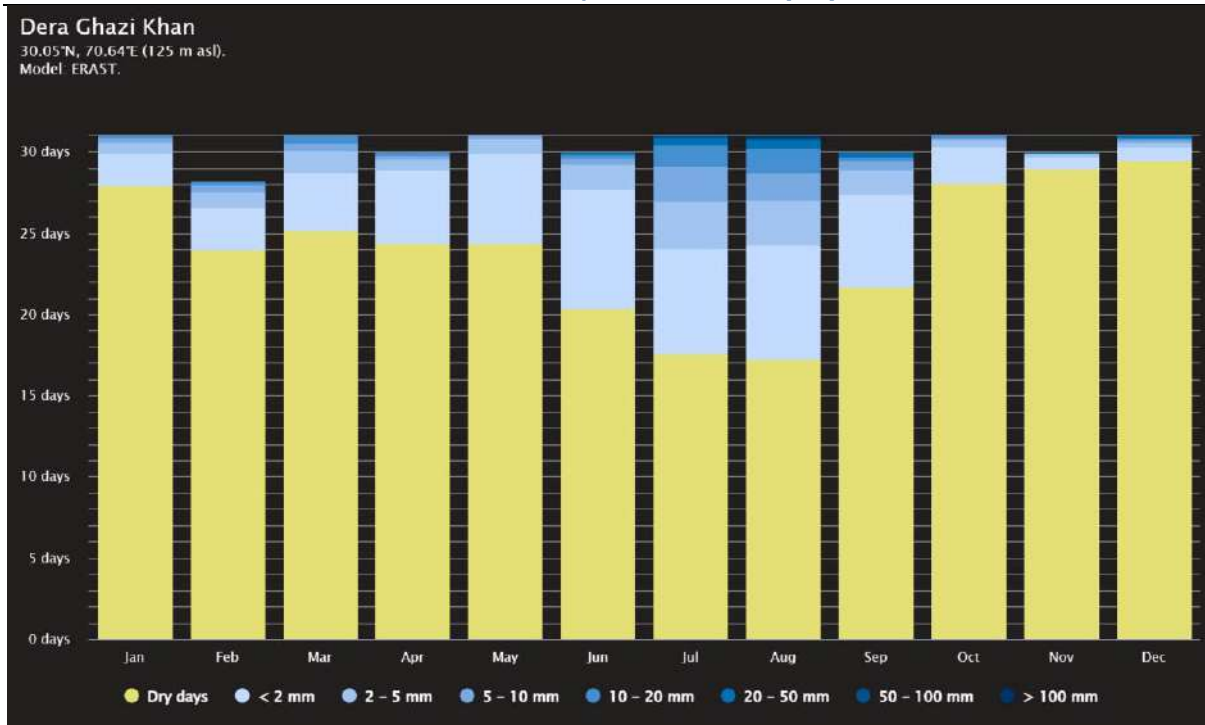


Figure 6-4, Annual Precipitation

6.4.5 Wind Speed and Direction

Wind patterns in Dera Ghazi Khan Division are generally moderate, with prevailing wind speeds ranging between 5 to 20 km/h for most of the year. The calmest conditions are observed during the winter months (December to February), where wind speeds typically remain below 10 km/h, dominated by light breezes in the 2–5 km/h and 5–10 km/h range. Wind intensity increases gradually from March onward, peaking during April to August, when speeds often fall in the 10–20 km/h category, with occasional gusts exceeding 20 km/h, particularly during dust storm events.

The prevailing wind direction is predominantly from the north and northeast, as depicted in the wind rose. Secondary wind flows originate from the north-northwest and northwest, indicating a general north-to-south wind movement across the division. Winds from the southern and western quadrants are comparatively infrequent and weaker.

This wind regime plays an important role in dispersion of air pollutants, especially during dry summer months when dust-laden gusts and occasional windstorms are common due to barren soils and open terrain. During smog and stagnant air events in late autumn, reduced wind activity may contribute to pollutant accumulation. Charts for wind speed and wind rose are given below in Figure 6-5 and Figure 6-6, respectively.

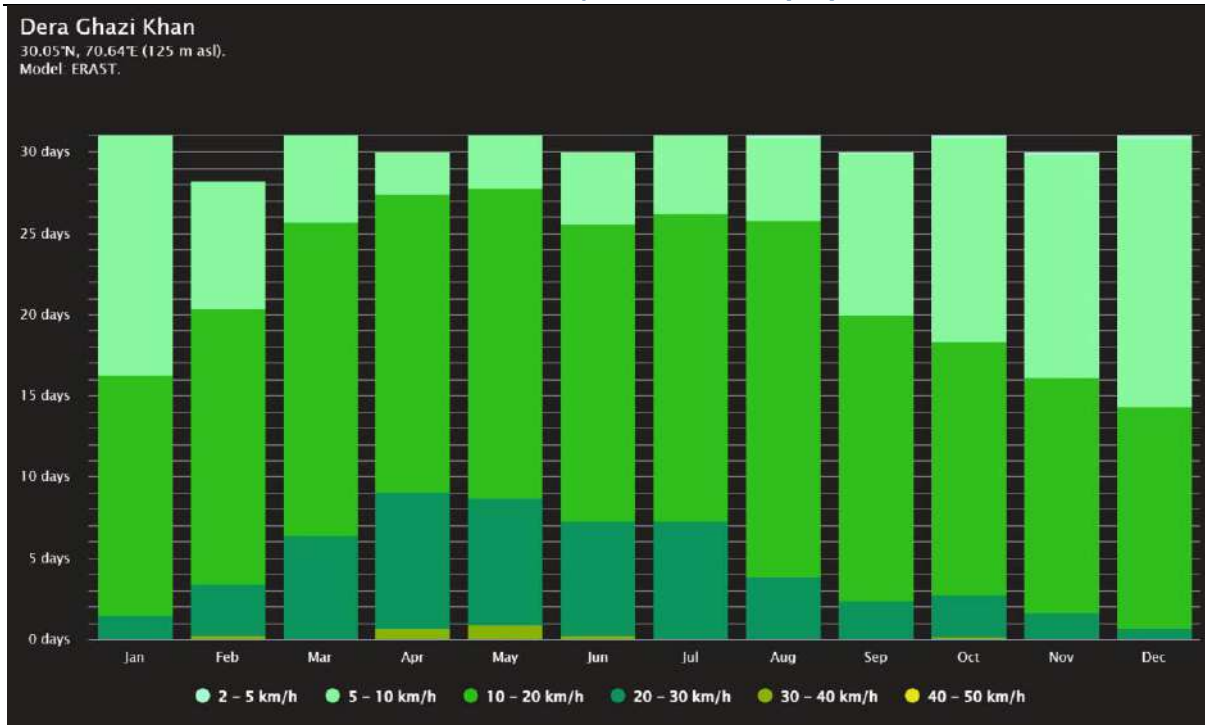


Figure 6-5, Wind Speed

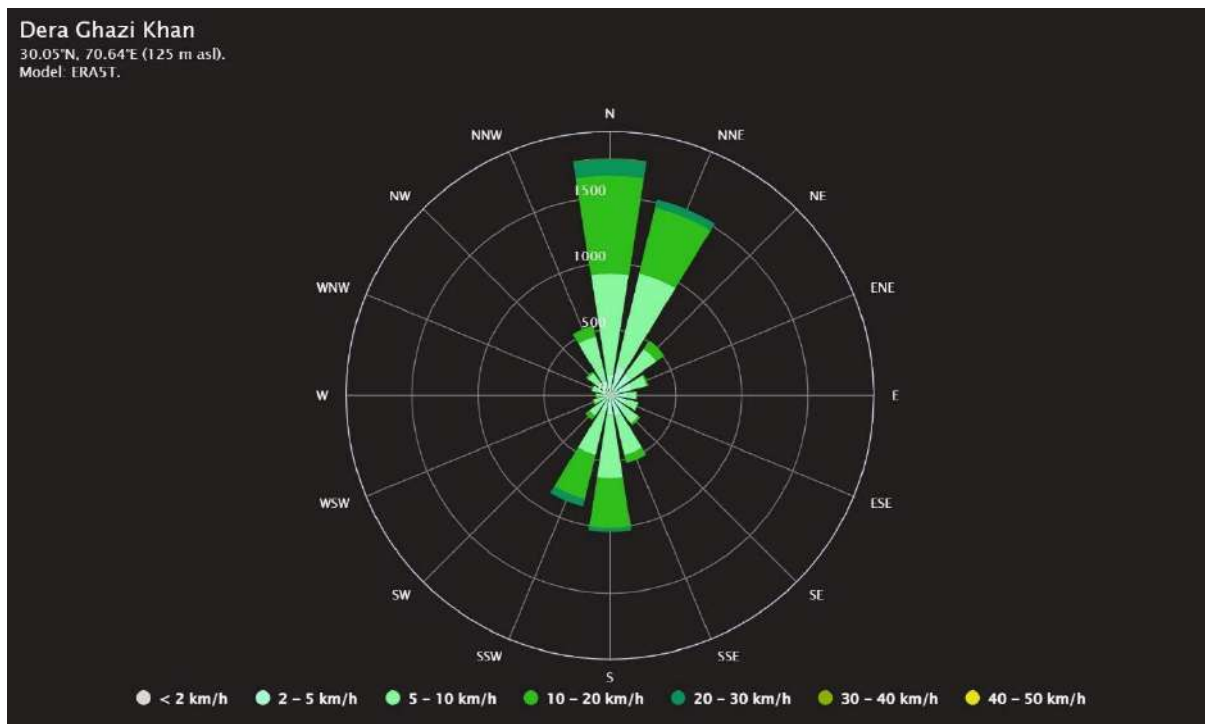


Figure 6-6, Wind Rose

6.4.6 Seismicity

Dera Ghazi Khan Division lies in a moderate seismic risk zone, as per the Seismic Zonation Map of Pakistan by the Pakistan Meteorological Department (PMD) and the Building Code of Pakistan (BCP-2007). The region falls under Zone 2B, which indicates Peak Ground Acceleration (PGA) values ranging from 0.16g to 0.24g. This classification is attributed to the proximity of

the division to the Sulaiman Fold and Thrust Belt, a geologically active zone where tectonic forces from the Indian and Eurasian plate interaction may induce seismic activity.

Although large-scale earthquakes are infrequent, mild to moderate tremors have been recorded historically, and therefore, standard earthquake-resistant construction measures are recommended for infrastructure development under the project.

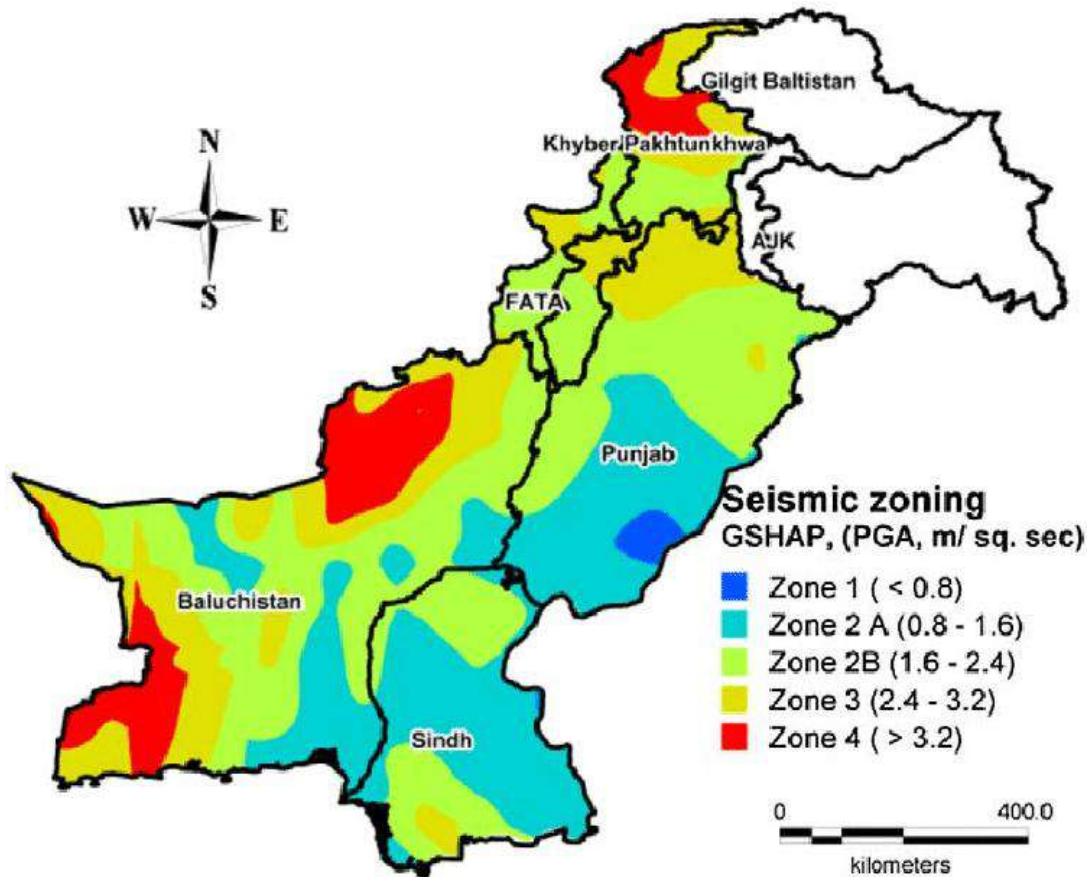


Figure 6-7, Seismic Zones of Pakistan

6.4.7 Ground Water and Water Supply

Groundwater serves as the primary source of drinking and irrigation water across most parts of the Dera Ghazi Khan Division. However, its availability and quality vary considerably due to the region's diverse hydrogeological conditions. The division lies over the extensive Indus Plain Aquifer, which comprises alluvial deposits of varying thickness and permeability. In certain southern localities, deeper aquifer zones at depths of around 200 meters yield relatively good-quality freshwater, while shallow groundwater levels are often contaminated and unsuitable for consumption. The eastern plains benefit from recharge through the Indus River and irrigation canals, whereas western settlements closer to the Koh-e-Suleman foothills rely on seasonal hill torrents and limited groundwater reserves.

Groundwater contamination is a widespread concern in both rural and

urban areas of the division. Several studies have reported elevated levels of heavy metals such as lead and cadmium in groundwater samples, largely attributed to agricultural runoff and improper disposal of industrial effluents. High total dissolved solids (TDS) and excessive salinity are common in many areas, reducing groundwater suitability for drinking. Surveys conducted in flood-affected regions of southern Punjab, including parts of DG Khan and Rajanpur, have also identified high levels of arsenic, iron, and other chemical pollutants in borewell water. The problem is further exacerbated in rural areas, where access to safe water remains significantly lower than in urban centers.

Water supply in the division relies on a combination of groundwater extraction, surface water diversions from the Indus River, and seasonal rainfall. In many villages, residents depend on hand pumps and motorized pumps to access groundwater, while in mountainous regions such as Fort Munro, communities historically relied on rainwater-fed lakes until formal water supply schemes were developed. Despite filtration plants being installed in parts of the division, many have become non-functional due to poor maintenance and lack of operational responsibility. The agricultural sector places additional pressure on groundwater resources due to continuous over-extraction for irrigation, especially where canal supplies are insufficient. Meanwhile, inefficient irrigation infrastructure, low conveyance efficiency, and inequitable water distribution further strain groundwater reserves.

Overall, the division faces a dual challenge of groundwater depletion and contamination, leading to chronic water scarcity in some areas and serious public health risks in others. Sustainable water resource management and improved treatment infrastructure are therefore critical to ensuring long-term water security for the region.

Current project is for the improvement and development of water supply & sanitation services in villages of DG Khan 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 Tehsil DG Khan

| Parameter | Method | Unit | Result | PEQS |
|------------------------------|------------------------------|-----------------|-----------|-----------|
| pH | APHA 4500-H+ B | -- | 7.68 | 6.5-8.5 |
| Total Dissolved Solids (TDS) | APHA 2540 C | mg/l | 795 | 1000 |
| Chloride | 4500- APHA Cl ⁻ B | mg/l | 56.5 | 250 |
| Fluoride | APHA 4500-F D | mg/l | 0.0 | 1.5 |
| Taste | APHA 2120 B | Object. /unobj. | Unobject. | Unobject. |

Environmental Impact Assessment (EIA)

| Parameter | Method | Unit | Result | PEQS |
|--|--|--------------------|-----------|-----------|
| Odour | APHA 2120 B | Object. /unobj. | Unobject. | Unobject. |
| Colour | APHA 2120 B | TCU | 0.14 | 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 | 125.7 | 500 |
| Turbidity | APHA 2130 B | NTU | 1.4 | 5 |
| Zinc | APHA 3500-Zn B | mg/l | 0.2 | 5 |
| Aluminum | APHA 3111 D | mg/l | 0.0 | 0.2 |
| Chromium | APHA 3500-Cr B | mg/l | 0.0 | 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 | 0.058 | 0.300 |
| Barium | APHA 3111 B | mg/l | 0.048 | 0.700 |
| Antimony | APHA 3114 C | mg/l | 0.0 | 0.020 |
| Sodium | APHA 3114 C | mg/l | 92.8 | 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 | 0.258 | 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

The surface water in DG Khan Division is sourced primarily from the Indus River, a vast network of canals, and numerous seasonal hill torrents. The Indus River forms the eastern border of the division, which encompasses the districts of Dera Ghazi Khan, Layyah, Muzaffargarh, and Rajanpur. The river and its adjacent fertile floodplains are a vital resource for the division's agriculture. The intricate canal system, managed by the Punjab Irrigation Department, draws water from the Indus River via key structures like the Taunsa and Chashma Barrages to provide irrigation to vast areas.

In addition to the river and canal networks, the division's geography includes the Sulaiman Range on its western side, from which over 200 hill torrents, locally known as Rodh Kohi, originate. These torrents flow across a piedmont plain, referred to as the "Pachad area," situated between the mountains and

the Indus flood plain. The torrents are seasonal and dependent on rainfall, often causing severe flash floods during the monsoon season. For generations, local farmers have utilized a system of spate irrigation, or Kamara irrigation, to divert this water to their fields. However, the unpredictability of these flood flows often leads to immense destruction of infrastructure and crops.

Despite the substantial surface water resources, the DG Khan Division faces significant water management challenges. The region is highly susceptible to recurring and catastrophic floods from the hill torrents, which necessitates ongoing management efforts through projects like flood embankments and river training works along the Indus. Furthermore, the aging and poorly maintained canal infrastructure results in low water conveyance efficiency, which contributes to inequitable and insufficient water delivery to farms. This unreliability of surface water supply often forces farmers to heavily rely on groundwater, which is unsustainable and leads to water scarcity during dry periods.

6.4.9 Air Quality

Air quality in the DG Khan division, a part of the Punjab province in Pakistan, is a major environmental and public health concern, especially during the winter smog season. Like much of the region, the division experiences high levels of air pollution that can exceed the safety limits recommended by the World Health Organization (WHO). This recurring issue poses significant health risks to the local population, with fine particulate matter PM_{2.5} being the most dangerous and prevalent pollutant. The concentration of these microscopic particles, which can penetrate deep into the lungs, often reaches hazardous levels, prompting authorities to issue public health advisories.

Multiple factors contribute to the poor air quality in the DG Khan division. A primary source is vehicular emissions from the rapidly growing number of cars, buses, and trucks on the roads. The transport sector is a major consumer of petroleum, and many vehicles are poorly maintained, leading to excessive and toxic exhaust fumes. Industrial activity is another significant contributor, with factories, brick kilns, and other industrial facilities releasing large amounts of particulate matter, sulfur dioxide (SO₂), and nitrogen oxides (NO_x). The practice of burning crop residue, particularly in the agricultural belt during the post-harvest season, also releases substantial amounts of aerosols and volatile organic compounds (VOCs) that add to the smog, a problem that is compounded by transboundary air currents from neighbouring regions.

The seasonal patterns of pollution have a severe impact on the health of the population in DG Khan. The air quality significantly deteriorates in winter due to temperature inversions, which trap pollutants close to the ground and create thick, toxic smog. This leads to a surge in health issues, including respiratory and cardiovascular problems, eye and throat infections, and aggravated asthma. A 2016 study on urban areas of Dera Ghazi Khan

confirmed that air pollution is hazardous for public health. Vulnerable groups, such as children, the elderly, and those with pre-existing conditions, are particularly at risk. During severe episodes, the government sometimes takes protective measures, like temporarily closing schools, to mitigate the public health emergency.

The government of Punjab has taken steps to address the pervasive air pollution issue. The provincial Environment Protection Department has established monitoring infrastructure to track air quality, identify major pollution sources, and evaluate the effectiveness of regulations. Efforts have been made to curb emissions from non-compliant industries and promote alternative, cleaner technologies. However, despite these efforts, air quality remains a challenge, and persistent action is needed. Measures such as improving public transportation, providing subsidized machinery to discourage crop burning, strengthening regulations, and promoting public awareness are necessary to achieve a significant and lasting improvement in air quality.

Given this context, the Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023 will be applicable to the project. During construction and operation phases, measures such as dust suppression, regulated machinery emissions, prohibition of open burning, and planned tree plantation will be strictly enforced in compliance with these rules to minimize the project's contribution to air pollution and smog formation.

The monitoring was carried out at designated location by the filed officers of Solution Environmental and Analytical Laboratory Pvt. Ltd. on 10th 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 Tehsil DG Khan

| Parameter | Method | Unit | Result | PEQS |
|---|---------------------------------|-------------------|--------|------|
| Particulate Matter (PM ₁₀) | 40 CFR Part 50, App J (US-EPA) | µg/m ³ | 138.7 | 150 |
| Particulate Matter (PM _{2.5}) | 40 CFR Part 50, App J (US-EPA) | µg/m ³ | 28.4 | 35 |
| Carbon monoxide (CO) | 40 CFR Part 50, App. C (US-EPA) | mg/m ³ | 3.2 | 5 |
| Oxides of Nitrogen as (NO & NO ₂) | 40 CFR Part 50, App F (US-EPA) | µg/m ³ | 86.5 | 120 |
| Sulphur dioxide (SO ₂) | EQSA-0197-114 (US-EPA) | µg/m ³ | 91.1 | 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 10th October, 2025 for the period of 24 hours at each location to determine the baseline noise levels at project site using digital sound meter and the results are presented in Table 6-4. Pictorial view of environmental monitoring / sampling is given below in Figure 6-8.

Table 6-4, Noise Level Monitoring Results in Tehsil DG Khan

| Sr. No. | Time | Noise dB(A) | Day/Night | PEQS |
|----------------------------|----------|--------------------|------------|------|
| 1 | 06:00 AM | 58.2 | Day Time | 75 |
| 2 | 07:00 AM | 57.4 | | |
| 3 | 08:00 AM | 60.1 | | |
| 4 | 09:00 AM | 61.7 | | |
| 5 | 10:00 AM | 63.2 | | |
| 6 | 11:00 AM | 62.1 | | |
| 7 | 12:00 PM | 60.2 | | |
| 8 | 01:00 PM | 68.5 | | |
| 9 | 02:00 PM | 65.4 | | |
| 10 | 03:00 PM | 63.3 | | |
| 11 | 04:00 PM | 61.1 | | |
| 12 | 05:00 PM | 63.9 | | |
| 13 | 06:00 PM | 62.5 | | |
| 14 | 07:00 PM | 61.8 | | |
| 15 | 08:00 PM | 61.1 | | |
| 16 | 09:00 PM | 63.2 | | |
| 17 | 10:00 PM | 59.3 | | |
| Average Noise Level | | 61.94 dB(A) | | |
| 18 | 11:00 PM | 55.7 | Night Time | 65 |
| 19 | 12:00 AM | 53.1 | | |
| 20 | 01:00 AM | 50.9 | | |
| 21 | 02:00 AM | 46.7 | | |
| 22 | 03:00 AM | 44.5 | | |
| 23 | 04:00 AM | 52.5 | | |
| 24 | 05:00 AM | 44.5 | | |
| Average Noise Level | | 49.7 dB(A) | | |



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

6.5 Biological Resources

6.5.1 Wildlife, Fisheries and Aquatic Biology

Dera Ghazi Khan (DG Khan) Division's wildlife and aquatic resources are shaped by its diverse geography, encompassing the mighty Indus River and the rugged Koh-e-Suleman mountain range. Conservation and management are primarily overseen by the Forest, Wildlife & Fisheries Department of South Punjab, with academic support from Ghazi University. The region's environmental health, however, is challenged by human-related factors, including over-exploitation of resources, pollution, and habitat degradation.

The diverse habitats of the DG Khan Division support a range of animal species, from those residing in the mountainous tribal areas to birdlife in urban centers. The Koh-e-Suleman range, a prominent feature of the division's

landscape, is home to a variety of flora and fauna. To protect this biodiversity, authorities in neighboring Khyber Pakhtunkhwa have advocated for a trans-boundary wildlife conservancy, highlighting the need for inter-provincial cooperation with Punjab and Balochistan. In addition to natural habitats, conservation facilities also play a role. A Wildlife Breeding Centre has been established in Tehsil Taunsa, and the DG Khan Zoo houses a variety of species, including lions, emus, and various types of peacocks.

The Indus River and its canal system form the backbone of the division's aquatic ecosystem, supporting both natural fisheries and aquaculture. The Punjab Fisheries Department actively manages these resources, promoting fish farming to enhance local economies. Commonly cultured species include Rahu, Mori, Thaila, Silver-carp, Grass-carp, and Gulfam. The department also works to combat illegal fishing activities, enforcing regulations such as a mandatory closed season during fish breeding months. Despite these efforts, the aquatic environment faces significant threats. Research indicates that freshwater habitats are severely impacted by pollution from untreated municipal and industrial effluents, as well as over-extraction of water. Common fauna found in DG Khan Zoo is given / shown below in Figure 6-9;



Grey Partridge



Chukar



Ryhsus Monkey



Emu

Figure 6-9, Fauna in DG Khan

6.5.2 Vegetation Cover and Trees

The vegetation and tree cover in Dera Ghazi Khan (DG Khan) division is highly varied, shaped by its distinct geographical zones, from the arid Koh-e-Suleman mountain range to the fertile floodplains of the Indus River. These different ecosystems host a diverse range of plant life, with species adapted to either harsh, water-scarce conditions or abundant moisture. The division's tree species are a mix of native flora and cultivated timber, playing crucial roles in both the local ecology and economy.

In the western part of the division, the Koh-e-Suleman mountains present an arid, semi-desert environment, with vegetation dominated by scrub forests. Resilient tree and plant species have adapted to these dry conditions. Common native species include *Monothea buxifolia* (Gurgura), known for its wild fruit, and *Pistacia mutica* (Khunjak). Wild olive (*Olea cuspidata*), another hardy species, is also found in the foothills of this range. The vegetation in this area is a sub-tropical thorn forest, which is critical for supporting the local ecosystem, including wildlife.

The Indus Riverine (Bela) areas, which include parts of Muzaffargarh, Layyah, and DG Khan districts, contrast sharply with the mountains. The moist, fertile floodplains support lush riverine forests and irrigated plantations. These forests are characterized by fast-growing, water-tolerant trees such as *Acacia nilotica* (Kikar), *Dalbergia sissoo* (Shisham), and various *Eucalyptus* species. These species are not only vital for their ecological functions, like protecting riverbanks from erosion, but also provide valuable timber and other products for local communities.

Between the mountains and the riverine areas lies the Pachad region, a transitional ecosystem with a mix of vegetation from both zones. This piedmont plain supports tree species capable of withstanding the intermediate climate. Trees common to this area include the drought-tolerant *Prosopis cineraria* (Jand), *Ziziphus jujuba* (Ber), and *Acacia nilotica* (Kikar). Alongside these trees, shrubs like *Carissa spinarum* (Garanda) and grasses such as *Cenchrus ciliaris* (Dhaman) are also prominent.

While vegetation and trees are integral to the division's environment, urban expansion and deforestation pose ongoing challenges. Conservation efforts are underway, with the Punjab Forest Department managing various plantations, including linear ones along roads and canals, to maintain and enhance tree cover. Large-scale projects, such as the "Ten Billion Tree Tsunami Programme," have also been implemented in the division to combat deforestation and its adverse effects, such as soil erosion. However, balancing development with environmental protection remains a crucial task for the region.

6.5.3 Wetlands

There are no wetlands nearby project site / villages.

6.5.4 Wildlife Sanctuaries

In the Dera Ghazi Khan Division, the most notable protected area for wildlife conservation is the Taunsa Barrage Wildlife Sanctuary, located in the Muzaffargarh District along the Indus River. The Taunsa Barrage Wildlife Sanctuary plays a vital role in maintaining biodiversity in southern Punjab and contributes to wetland ecosystem conservation under the Ramsar Convention on Wetlands, to which Pakistan is a signatory. But there is no wildlife sanctuary near the project site.

6.5.5 Wildlife Parks

The main wildlife park in the DG Khan division is the DG Khan Zoo, located about 4 km from Lari Adda and near the Commissioner House. It was established in 1983-1985 and offers visitors a recreational space to see animals. But it is located at specific distance from the project area.

6.5.6 Forests

The D.G. Khan Division is primarily characterized by range lands rather than dense forests, due to its semi-arid climate and sandy soil. However, the D.G. Khan Forest Division manages some scrub forests and a zoo, and the South Punjab Forest Company (SPFC) also owns a significant amount of land, including areas within this division, for forestation purposes. There are no reserved forest areas near the project site.

6.5.7 Game Reserves

The main game reserve in the Dera Ghazi Khan (DG Khan) division is the DG Khan Zoo (also known as DG Khan Wildlife Park), a 12-acre area managed by the Forest, Wildlife & Fisheries Department. The region also features the Tribal Area of Koh-e-Suleman, a mountainous range with significant wildlife populations, although it is not formally classified as a game reserve. And, this is at prominent distance from the project site.



Guava



Sago palm



Aloe vera



Madagascar periwinkle

Figure 6-10, Flora in DG Khan

6.6 Social and Cultural Resources

6.6.1 Population

The total population of DG Khan division is 12,892,465 as per census 2023.

6.6.2 Gender Status

At the time of the 2023 census, the DG Khan Division had a population of 12,892,465 of which 6,551,912 were males, 6,340,116 females and 437 were transgenders. Demographic data is provided in Table 6-5;

6.6.3 Land-use

The land use in Dera Ghazi Khan division is characterized by a mix of agricultural areas, bare soil, urban and built-up land, water bodies, and rangelands. The region's geography, which spans from the Indus River to the Koh-e-Suleman range, dictates these diverse land-use patterns across its districts. The division has experienced notable land-use changes over time, primarily driven by urban expansion and increasing demand for resources. Agriculture and bare soil are the most extensive land uses in the division. The fertile Indus plains support widespread agriculture, with the division producing significant amounts of cotton, wheat, rice, and sugarcane. This agrarian activity is crucial to both the regional and provincial economies. In contrast, large areas of bare soil exist in the division, particularly in the arid and desert-like regions away from the river. As urban and agricultural areas expand, these vast, undeveloped stretches of land are often the first to be developed. Urban and built-up areas, though smaller in overall size, are growing rapidly in the division's major cities, including Dera Ghazi Khan, Layyah, Muzaffargarh, and Rajanpur. Dera Ghazi Khan city, for example, saw its built-up area expand significantly between 1991 and 2021, a trend that converted large tracts of agricultural land and bare soil into housing and infrastructure. This rapid urbanization puts pressure on surrounding land and resources, and also contributes to issues like the urban heat island effect.

In the western, more mountainous parts of the division, rangelands and scrub forests are prevalent. These areas, particularly within the Koh-e-Suleman range, are characterized by low rainfall and are used primarily for grazing livestock. The rangelands are managed by the provincial Forest Department and are a vital resource for the local pastoral communities. Water bodies, primarily the Indus River and its associated canals, are also a crucial part of the land-use profile, supplying water for the extensive agricultural areas.

The Koh-e-Suleman range is also a significant site for mining, representing another important land use in the division. The region holds valuable deposits of industrial minerals such as gypsum, iron ore, and fuller's earth. In the Dera Ghazi Khan district specifically, uranium has been mined for many years, though this has raised significant health and environmental concerns among the local population. The Mines and Minerals Department is responsible for managing these mining activities, including the auctioning of new areas for exploration.

6.6.4 Languages

The main language spoken in the Dera Ghazi Khan (DG Khan) division is Seraiki, which is the most dominant language in the area. Other languages spoken include Balochi, Urdu, Punjabi, and Pashto.

6.6.5 Literacy Rate and Education Facilities

Based on the 2023 census, Dera Ghazi Khan (DG Khan) division recorded a literacy rate of 48.00%. This figure is considerably lower than Punjab's overall provincial literacy rate of 66.25%. The literacy rates vary significantly across the districts and tehsils within the division, with male literacy (56.48%) being substantially higher than female literacy (39.20%). For example, Layyah district has a 61.83% literacy rate, while parts of Rajanpur district, like Rojhan tehsil, show much lower rates at 20.98%. In general, urban areas report higher literacy levels compared to rural areas across the region.

Educational facilities in DG Khan division span from primary schools to higher education institutions, though efforts are continuously underway to address gaps in infrastructure and quality. Key higher education providers include Ghazi University, Dera Ghazi Khan Medical College, and Mir Chakar Khan Rind University of Technology. There are also numerous government and private degree colleges affiliated with these universities. The government of Punjab has launched targeted initiatives to improve educational access, especially in the more underdeveloped southern districts.

To address the educational challenges, particularly in underserved and rural areas, several programs are being implemented. The Missing Facilities Program aims to provide basic amenities like clean water and electricity to schools. The Punjab Daanish Schools and Centers of Excellence Authority operate residential schools, like the one in Dera Ghazi Khan, to offer free, high-quality education to underprivileged children. Non-formal education is also being promoted through adult literacy centers and non-formal basic



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education schools to help boost the overall literacy rate. These initiatives are part of a broader strategy to meet educational goals and reduce regional disparities within Punjab.

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 | | |
| DG Khan Division | 38,778 | 12,892,465 | 6,551,912 | 6,340,116 | 437 | 103.34 | 332.47 | 21.50 | 6.5 | 11,021,214 | 2.66 |

6.6.6 Health Facilities

Dera Ghazi Khan (DG Khan) Division has a varied healthcare infrastructure comprising both public and private facilities that serve the districts of Dera Ghazi Khan, Layyah, Muzaffargarh, and Rajanpur. The city of Dera Ghazi Khan is home to prominent institutions like the DHQ Headquarters and Teaching Hospital and the specialized Sardar Fateh Muhammad Khan Buzdar Institute of Cardiology, complemented by smaller Rural Health Centers (RHCs). In addition, numerous private hospitals, such as Ghazi National Hospital and Fatima Kidney Hospital, operate within the district. Other districts also maintain a mix of healthcare options, with each having its own District Head Quarter (DHQ) Hospital as a central public provider.

Beyond the division's headquarters, healthcare is provided through a network of facilities adapted to local needs. Layyah has a DHQ Hospital along with several private centers, including the Layyah Cardiac Center and Shahid Orthopaedic and Trauma Center. Muzaffargarh's public health is anchored by its DHQ Hospital, while the district also benefits from specialized private clinics and the advanced Indus Hospital - Recep Tayyip Erdogan Campus, which offers free treatment. In Rajanpur, the DHQ Hospital is the primary public option, supported by private hospitals and clinics like Athar Surgical and Doctor's Hospital in Jampur. This network ensures a breadth of healthcare services, from comprehensive inpatient care to specialized and emergency services, are available across the division.

6.6.7 Health Problems

Numerous health problems affect the DG Khan division, stemming from a combination of environmental factors, poor sanitation, and underdeveloped healthcare infrastructure. The region faces a dual burden of both communicable and non-communicable diseases, exacerbated by poverty, a lack of awareness, and limited access to quality medical services. This creates a difficult healthcare landscape, especially for rural and tribal populations.

Environmental contamination is a significant driver of severe health issues, including a rising number of cancer cases. Investigations have linked this trend to industrial waste and the use of phosphate fertilizers, which can increase levels of radioactive elements like uranium, thorium, and potassium in the soil and food supply. Exposure to these materials has been associated with various malignancies, including liver, lung, and kidney cancer, as well as bone tumors. Additionally, poor sanitary conditions contribute to the spread of diseases like typhoid, particularly among children and infants, due to unsafe drinking water and low public health awareness. Widespread ear, nose, and throat (ENT) diseases are also prevalent, with risk factors including contaminated water, poor ventilation, and tobacco use.

The DG Khan division also contends with a high burden of communicable diseases common throughout Pakistan. These include prevalent illnesses like HIV/AIDS, Hepatitis B and C, tuberculosis, and polio. A 2020 study highlighted that leprosy is still a concern, concentrated mainly in the tribal areas of Dera Ghazi Khan and Rajanpur. Compounding these physical ailments are widespread mental health issues. Many people, especially those in rural areas, experience mental stress linked to poverty, heavy workloads, and displacement caused by natural disasters such as floods.

Systemic problems within the healthcare infrastructure worsen the public health situation. The region's underdeveloped and poorly managed healthcare system is a major obstacle to providing effective care. For example, despite the high rate of cancer, the district hospital lacks a specialized cancer ward. Many rural health centers are deficient in doctors, essential medicines, and basic facilities. Furthermore, there is often a lack of coordination between health departments and specialized programs, leading to resource duplication and inefficiency. Weak enforcement of regulations and a lack of accountability mean that environmental safety guidelines are frequently ignored. For citizens, particularly low-income families, high out-of-pocket medical expenses pose a significant barrier to accessing treatment.

6.6.8 Decision-making Method and Conflict Resolutions System

In the Dera Ghazi Khan division, conflict resolution and decision-making systems are shaped by a duality of formal and informal mechanisms. While the formal state-based legal and administrative structures operate throughout the area, a powerful and deeply entrenched tribal system, known as the jirga, provides an alternative, customary method for resolving disputes, particularly in rural and tribal regions. This parallel functioning of state authority and tribal tradition is a defining feature of the governance and justice landscape in the division.

The formal system of governance is rooted in the administrative and judicial machinery of the state. At the administrative level, the Commissioner's Office oversees the division's four districts and is responsible for implementing government policies and maintaining law and order. The legal and judicial system consists of civil and criminal courts that enforce state law, as well as state-sanctioned Dispute Resolution Councils (DRCs). These DRCs offer a more accessible and less formal alternative to the official courts, helping to resolve minor disputes outside the traditional judiciary.

Alongside the formal system, the traditional tribal jirga continues to be a dominant force in decision-making and conflict resolution. This is especially true among the Baloch tribes, where a hierarchical leadership structure, headed by a Sardar or Tumandar, governs tribal affairs. The jirga, an assembly

of tribal elders, is convened to mediate and arbitrate a wide range of issues, from land and water disputes to family feuds. Its decisions are grounded in customary law and tradition, with enforcement often relying on community consensus and the threat of social or economic exclusion. However, this system has faced criticism for its disregard for modern human rights standards, particularly concerning gender equality.

The coexistence of these two systems creates a complex dynamic. For many citizens, the jirga is often favored over the formal courts due to its speed, lower cost, and greater cultural relevance. However, this preference can sometimes challenge the authority of the state's judicial process. Recognizing the need for both accessible justice and adherence to constitutional law, the state has, at times, attempted to incorporate or reform the traditional system. Efforts to formally recognize and regulate jirga proceedings or integrate them with legal experts have been proposed as ways to ensure tribal decisions align with state law. The ongoing interplay between these formal and informal mechanisms defines the landscape of justice and decision-making in the Dera Ghazi Khan division.

6.6.9 Household Information

The 2023 Census the population showed DG Khan division is predominantly Muslims i.e., 12,771,234 nos. The next higher one is Christians with 46,023, followed by other minorities like Ahmadi, Hindu (Jati), Scheduled Castes etc. are very small in number.

6.6.10 Settlement of Respondents

Based on available reports, internal migration into the division appears to be comparatively low. The Pakistan Bureau of Statistics (PBS) reported migration figures for the districts within the division around 2019–2020, revealing a small percentage of people residing in a district other than their birthplace. For example, the migrated population in DG Khan District was 6.59%, with similar percentages in Layyah (6.16%), Muzaffargarh (6.23%), and Rajanpur (6.72%). These figures reflect internal rather than international migration and indicate that the division does not attract a large number of migrants compared to more urbanized areas like Lahore.

The relatively low level of internal migration in DG Khan is likely linked to the region's socio-economic conditions. A 2014 study noted a low density of internal migrants, especially when compared to divisions like Lahore, which offers more economic opportunities. Migration within the region, particularly from tribal areas to urban centers like DG Khan city, is often driven by a lack of facilities and the need to diversify income.

6.6.11 Family System

The family system in the Dera Ghazi Khan (DG Khan) division is a complex and evolving structure, blending deep-seated tribal traditions with modernizing influences from urbanization and economic changes. Historically, the social organization of the area has been profoundly shaped by patriarchal tribal customs, with power concentrated within influential landed families. However, recent decades have seen a gradual shift, particularly in urban centers, as more modern lifestyles gain ground.

The traditional family structure is rooted in the biradari (kinship) system, a network of patrilineal relations that defines identity and social standing. Historically, this system was intertwined with the Tumandarana system, where powerful tribal chiefs (tumandars) held administrative and judicial authority. Although the Tumandarana system was formally abolished, the political and social influence of leading tribal families, such as the Leghari, Khosa, and Buzdar, remains significant. Within this hierarchical structure, patriarchal norms are strong, and major family decisions are traditionally made by the eldest male members.

As DG Khan has urbanized, the traditional joint family system has begun to shift towards a more nuclear model. Migration from rural areas to cities for better economic opportunities and education has been a key driver of this change. This move is often accompanied by a higher preference for independent, nuclear families, though the joint family system remains common, especially in rural areas. Urbanization has also contributed to a gradual decline in traditional family sizes and a rise in education levels, though a notable urban-rural divide in literacy and poverty persists.

Despite these modernizing trends, core family values and cultural traditions remain influential. Marriage, for instance, is still largely governed by family and biradari preferences, with arrangements often made to strengthen familial or tribal alliances. Traditional wedding customs and a high degree of respect for elders and family decisions are also deeply embedded in the local culture. However, as with other parts of Pakistan, contemporary influences are introducing new dynamics, including changes in gender roles and increasing individual aspirations, which sometimes lead to tensions between traditional family values and modern expectations.

6.6.12 Source of Livelihood and Income

The sources of livelihood and income in the Dera Ghazi Khan division are heavily reliant on agriculture and livestock, particularly for its large rural population. The region's economy, which features a diverse geography ranging from the fertile plains along the Indus River to the arid tribal areas of the Koh-e-Sulaiman mountains, supports various income-generating activities. While farming dominates, additional contributions come from the

division's rich mineral resources, commercial enterprises, and employment in the public and private sectors.

Agriculture and livestock serve as the primary sources of income and sustenance for many residents. Key crops grown in the region include cotton, wheat, bajra, and sorghum, with cotton ginning being a significant local industry. In the mountainous areas, especially among tribal communities, livestock farming is critical. Small ruminants like sheep are extensively reared, providing a steady income from the sale of wool, meat, milk, and skins. The traditional and nomadic methods of livestock farming, however, can be limited by poor management, lack of modern technologies, and low participation in training.

Beyond the agricultural sector, the division's economy is bolstered by its rich natural resources and a growing commercial sector. The Koh-e-Sulaiman Mountain range is abundant in minerals such as marble, gypsum, iron, and limestone, along with reserves of coal and natural gas. Industrially, the division is home to the Al-Ghazi Tractor Company, and the Dera Ghazi Khan Chamber of Commerce & Industries helps promote various local businesses. Government initiatives, such as the National Business Development Program, also seek to attract investment and foster small and medium enterprises (SMEs).

Employment provides a significant income stream for many households in the Dera Ghazi Khan division, particularly in urban areas. A socio-economic study found that more than half of the residents are employed in the private sector, with a smaller portion working in government jobs or owning shops. A substantial number of people, however, depend on daily wages for their income, reflecting a more precarious economic position. These jobs are found across various sectors and industries, contributing to the overall livelihood of the division's population.

Despite these varied sources of income, many residents of Dera Ghazi Khan, especially in the more impoverished districts, face significant vulnerabilities. The region has historically included some of Pakistan's poorest districts, with high percentages of the population living below the poverty line. Poor infrastructure, limited educational opportunities, and restricted access to modern technology and finance are persistent issues. Furthermore, recurrent natural disasters like flooding pose a major threat, capable of severely disrupting agriculture and other income-generating activities and undermining the livelihoods of the local populace.

6.6.13 Agricultural Land Status

The agricultural landscape in the DG Khan Division is characterized by a significant expanse of farmland, covering 4,507,750 acres. The region, which includes the districts of Dera Ghazi Khan, Layyah, Muzaffargarh, and

Rajanpur, holds a dual agricultural character defined by its distinct land types: the fertile, irrigated plains and the arid, rainfed (barani) areas. This diverse terrain allows for a wide range of crop production, but also presents unique challenges for different parts of the division.

The division's irrigated land is the backbone of its agricultural productivity, supporting an abundance of crops. This land is sustained by an extensive canal network, which includes the D.G. Khan Canal fed by the Taunsa Barrage and the Chashma Right Bank Canal system serving the Taunsa Sharif area. In addition to supplying water for cultivation, the irrigation infrastructure also includes systems for tube wells, drainage, and river training works along the Indus River. These systems have historically fueled the region's strong agricultural output, with cotton being a particularly well-known crop.

In contrast, the rainfed or "barani" areas of the DG Khan Division, particularly within the Koh-e-Suleman range, face harsher, water-scarce conditions. These lands rely heavily on precipitation, and farmers in these regions face challenges such as drought and limited resources. Government agencies like the Agency for Barani Areas Development (ABAD) are mandated to address these issues and promote more resilient and productive agricultural practices in these regions. Projects are focused on introducing drought-tolerant crop varieties and improving water conservation and management of hill torrents.

Despite its robust agricultural output, the division faces infrastructure and modernization challenges. Much of the irrigation infrastructure in Punjab, which serves DG Khan, is aging and suffers from suboptimal service delivery. To address this, the government has launched various programs aimed at rehabilitating and modernizing the system, including projects to enhance on-farm water management and improve watercourse efficiency. Furthermore, initiatives are in place to shift towards "climate-smart" agricultural practices and enhance farm profitability through farmer training and the introduction of new farming technologies. These efforts are essential for sustaining and improving the division's agricultural status in the long term.

6.6.14 Road and Rail Network

The division is served by 30,283 km of roads including two National Highways N-55 and N-70. Additionally, there are 28 railway stations. To support freight transport, there are 44 goods forwarding agencies (GFAs) in the division but no formal truck terminal in D.G Khan. For passenger transport, there are 9 inter-city public transport terminals in the division.

6.6.15 Energy Sources

As per the survey / consultation, almost 60 percent housing units are using wood as cooking fuel in their houses while almost 36 percent are using gas

for their purpose. About 1 percent are using kerosene oil and 3 percent are using other sources of cooking fuel in their houses.

6.6.16 Community Based Organization (CBOs) and NGOs

Numerous non-governmental and community-based organizations operate within the Dera Ghazi Khan division, addressing a wide range of developmental challenges through focused interventions. These organizations, which include both national and localized groups, play a crucial role in complementing government services, particularly in rural and underdeveloped areas. The work of these CBOs and NGOs typically spans across multiple sectors, including health, education, infrastructure development, and community empowerment initiatives.

Several national-level NGOs with a presence in the DG Khan division are significant contributors to the region's development. For example, the Pakistan Poverty Alleviation Fund (PPAF) has partnered with local organizations to implement projects that focus on improving basic infrastructure, health, and disaster resilience. The National Rural Support Programme (NRSP) is another national organization active in the region, with projects aimed at improving urban infrastructure and services for low-income communities. Organizations such as Strengthening Participatory Organization (SPO) also contribute by working with local partners to advocate for social change and development.

Beyond the national NGOs, numerous local and grassroots CBOs are actively involved in improving local communities. These groups often operate with a deep understanding of local needs and social dynamics. For instance, the Gul e Fatima Development Organization (GFDO) is active in DG Khan and neighboring Rajanpur, focusing on health initiatives, vocational training, and female literacy programs. Other local organizations, like the Al-Asar Development Organization and the Al-Fateh Development Organization, have been identified for their work in sectors such as women's and child welfare, health, and advocacy.

6.6.17 Local Government and Administration

The local government and administrative structure in Dera Ghazi Khan (DG Khan) division is organized into a three-tiered system typical of Pakistan's Punjab province: the divisional, district, and local council levels. This system has undergone frequent reforms, including the latest framework established under the Punjab Local Government Act, though the fundamental structure remains focused on hierarchical oversight. The administration is ultimately controlled by the provincial government, which delegates authority and responsibility down through the different tiers.

At the top is the divisional administration, which is headed by the Commissioner. This senior bureaucrat serves as the principal representative of the provincial government and is responsible for overall administration, maintaining law and order, and supervising development projects across the division's four districts. The Commissioner's office coordinates the work of various government departments, handles revenue collection, and ensures the implementation of provincial policies. DG Khan Division includes the districts of Dera Ghazi Khan, Layyah, Muzaffargarh, and Rajanpur.

Each of the four districts is headed by a Deputy Commissioner (DC), who is the chief administrative and land revenue officer. The DC is assisted by additional deputy commissioners and assistant commissioners and is responsible for coordinating with all government departments within the district. Law and order is separately managed by the District Police Officer (DPO), though coordination between the two roles is crucial. The District Councils, comprised of elected representatives from the union councils, constitute the highest rural tier of local government, though their exact powers are subject to the provincial local government acts.

The lowest level of government in the DG Khan division is organized into Tehsils and Union Councils. The Tehsil Municipal Administration (TMA) is responsible for municipal services, including sanitation, waste management, and local infrastructure projects, and is managed by administrative officers. Underneath the tehsils are the union councils, such as the 115 within DG Khan district, which are tasked with providing basic community services and recording vital statistics. While designed to empower citizens at the grassroots level, the effectiveness of local government bodies is often subject to changes in provincial legislation, which can shift the balance of power between elected representatives and appointed administrators.

6.6.18 Law and Order Situation

Law and order control in the Dera Ghazi Khan (DG Khan) division is managed through a comprehensive, multi-tiered framework involving various administrative and police authorities. This system operates under the direct oversight of the provincial government of Punjab. At the highest level, the Commissioner of the DG Khan Division holds overall responsibility for maintaining peace and stability. This role is complemented by the Regional Police Officer (RPO), who commands the police force across all districts within the division, including DG Khan, Muzaffargarh, Rajanpur, and Layyah. The provincial authorities in Lahore, particularly the Home Department and the Cabinet Committee on Law and Order, also play a crucial role by providing strategic direction and approving resource deployments for the region.

At the local level, law and order are enforced by district-specific authorities. Each district in the DG Khan division is headed by a District Police Officer

(DPO), who is in charge of all police stations and operations. The DPO works in tandem with the Deputy Commissioner, a key administrative figure who can implement measures like invoking Section 144 of the Criminal Procedure Code to ban public gatherings and the display of weapons. This decentralized approach allows for localized responses to specific security challenges.

To support the standard police force, specialized and auxiliary units are also utilized. These include detachments from the Counter-Terrorism Department (CTD), Elite commando units, and the intelligence-gathering Special Branch of the Punjab Police. Furthermore, the Border Military Police (BMP), an independent paramilitary force, is deployed in the tribal areas adjacent to DG Khan and reports directly to the divisional Commissioner.

6.6.19 Community Awareness about Project Works

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.

6.6.20 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 and uninterrupted supply of water

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

The Dera Ghazi Khan division is a significant and growing economic hub, primarily driven by heavy industry, agriculture, and mineral extraction. Heavy industrial operations in the region include major cement and tractor manufacturing. The D.G. Khan Cement Company is a prominent player, with large-scale factory operations and an associated coal-fired power plant. The Al-Ghazi Tractor Company also has a manufacturing presence in the division, serving the agricultural sector. Furthermore, the Pakistan Atomic Energy

Commission (PAEC) operates in the area, contributing to the region's industrial base.

Agriculture-based industries are widespread throughout the division due to its strong agricultural output, particularly cotton. The region is dotted with numerous cotton ginning factories and textile mills, including companies such as Mahmood Textile Mills. A list from the Pakistan Cotton Ginners' Association (PCGA) details many of the registered factories in the division. Beyond cotton, the area supports a variety of other agricultural processing units, including numerous flour, rice, and oil mills, as well as cold storage facilities for perishable goods.

Mineral extraction is another key economic pillar for the D.G. Khan division. The region is rich in mineral deposits, including significant reserves of gypsum, limestone, and marble, which are crucial for the local cement industry. Additionally, the area has confirmed deposits of natural gas that are being actively exploited.

To facilitate further growth, several industrial development projects are underway. These include a planned industrial park covering a 400-acre site on the Muzaffargarh-Dera Ghazi Khan Road. The city of Dera Ghazi Khan already has an established industrial estate along the Jampur and Multan roads, which hosts many of the smaller cotton, flour, and oil mills. In 2025, the government is also making provisions for the "Establishment of SIE DG Khan" (Small Industrial Estate Dera Ghazi Khan) as part of its investment plans. These initiatives aim to strengthen the division's role as a major economic driver for the region.

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

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

The impact characterization due to design, location, construction and 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 DG Khan division; 15 villages in district DG Khan, 08 in district Muzaffargarh, 01 in district Taunsa and

12 in district Rajanpur 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. | DG Khan | DG Khan | DG Khan | Qasba Gajjani, UC Shero Dasti, Tehsil DG Khan |
| 2. | DG Khan | DG Khan | DG Khan | Qasba Dari Meero, DG Khan |
| 3. | DG Khan | DG Khan | Kot Chutta | Village Thatha Gabolan UC Thatha Gabolan Tehsil Kot Chutta |
| 4. | DG Khan | DG Khan | Kot Chutta | Village Kotla Ahmad Khan UC Kotla Ahmad Khan Tehsil Kot Chutta |
| 5. | DG Khan | DG Khan | D. G. Khan | Qasba kot mubark |
| 6. | DG Khan | DG Khan | Kot Chutta | Rekrra |
| 7. | DG Khan | DG Khan | D. G. Khan | Ali wala |
| 8. | DG Khan | DG Khan | D. G. Khan | Chah Sanway wala |
| 9. | DG Khan | DG Khan | D. G. Khan | Chah Fatha khan wala |
| 10. | DG Khan | DG Khan | D. G. Khan | Lohar Wala, UC Mamoori, Dera Ghazi Khan |
| 11. | DG Khan | DG Khan | D. G. Khan | Basti Gud pur |
| 12. | DG Khan | DG Khan | Kot Chutta | Basti malana |
| 13. | DG Khan | DG Khan | Kot Chutta | Basti Jalbani, DG Khan |
| 14. | DG Khan | DG Khan | Kot Chutta | Choti Zareen |
| 15. | DG Khan | DG Khan | Kot Chutta | Hassan Aabad |
| 16. | DG Khan | Muzaffargarh | Muzaffargarh | Village Basti Mond, UC Gharewan Tesil Muzaffargarh |
| 17. | DG Khan | Muzaffargarh | Muzaffargarh | Village Raqba Noor Khan, UC Gharewan, Tehsil Muzaffargarh |
| 18. | DG Khan | Muzaffargarh | Muzaffargarh | Basti gujja obleigh hunjra |
| 19. | DG Khan | Muzaffargarh | Muzaffargarh | Basti dhandh Wala UC taliri |
| 20. | DG Khan | Muzaffargarh | Muzaffargarh | Basti Alam shah uc mondka |
| 21. | DG Khan | Muzaffargarh | Muzaffargarh | Ghazi gopang UC Meharpur |
| 22. | DG Khan | Muzaffargarh | Jatoi | Gharuu walla |
| 23. | DG Khan | Muzaffargarh | Jatoi | Gareeb Abad UC Lal Sha |
| 24. | DG Khan | Taunsa | Taunsa | Qasba Mamadani |
| 25. | DG Khan | Rajanpur | Jampur | Village Council #1 Dajal (Union Council Dajal) |
| 26. | DG Khan | Rajanpur | Jampur | Village Council #2 Adjoining Bastis Meo/Pat Wali (Union Council Tufki) |
| 27. | DG Khan | Rajanpur | Rajanpur | Nowshaira Gharbi U/C Nowshaira gharbi |

| Sr. No. | Division | District | Tehsil | Village / Darkha |
|---------|----------|----------|----------|---------------------------------------|
| 28. | DG Khan | Rajanpur | Rajanpur | Rakh Bagh Wala U/C peer Bakhsh Sharqi |
| 29. | DG Khan | Rajanpur | Rajanpur | Mudd Rindan |
| 30. | DG Khan | Rajanpur | Rajanpur | Harand |
| 31. | DG Khan | Rajanpur | Jampur | Kotla muglan U/C Kotla Muglaan |
| 32. | DG Khan | Rajanpur | Jampur | Kotla Dewaan U/C Kotla Dewaan |
| 33. | DG Khan | Rajanpur | Jampur | Miran pur |
| 34. | DG Khan | Rajanpur | Jampur | Lundi saidan |
| 35. | DG Khan | Rajanpur | Rajanpur | Sahan Wala, UC Sahan Wala, Rajanpur |
| 36. | DG Khan | Rajanpur | Rajanpur | Basti Lakha, UC Jahanpur Rajanpur |

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;

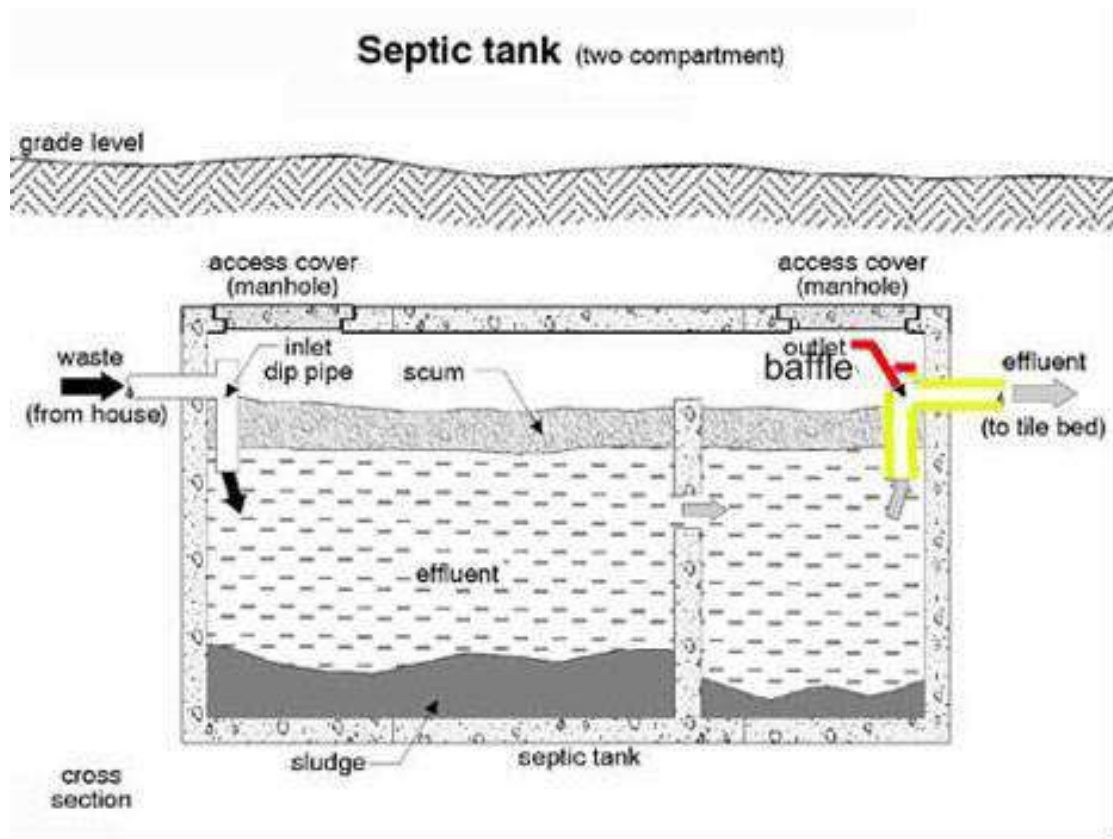


Figure 7-1, Septic Tank

- 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 NO_x, SO_x, CO and PM₁₀.
- 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.

Health & safety procedures will also be 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, 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 DG Khan Division and areas where transmission lines are to be installed, the temporal boundary can be considered as the whole selected villages.

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 DG Khan 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.

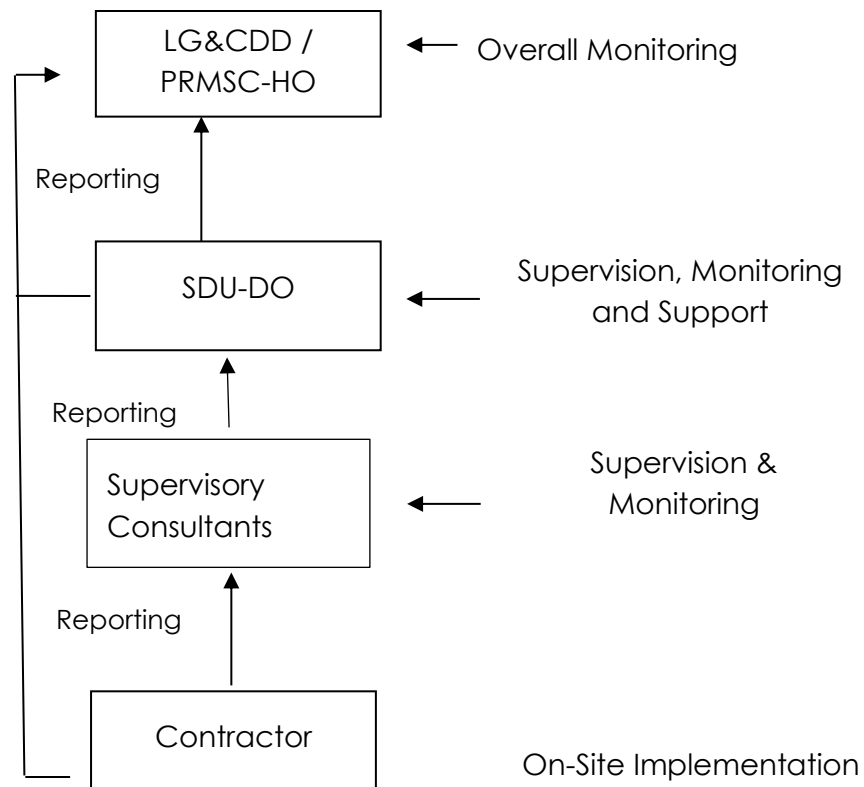


Figure 8-1, Institutional Mechanism

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 DG Khan 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 | <ul style="list-style-type: none"> • Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and 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 | | | | <ul style="list-style-type: none"> • 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). | 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 | | | | |
| | | | | | <ul style="list-style-type: none"> • Communication on hiring criteria, minimum age, and applicable laws. • 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 | <ul style="list-style-type: none"> • Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in | | | | <ul style="list-style-type: none"> • Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. | | | |

Environmental Impact Assessment (EIA)

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|---|---|----------------------|--------|-----|---|---------------------|---------------------------|---|
| | | High | Medium | Low | | | | |
| | <p>the project site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites.</p> <ul style="list-style-type: none"> 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. | | | | <ul style="list-style-type: none"> The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. Ground shall be leveled to avoid slopes. Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems. | Contractor | PRMSC / SC | |
| Contamination of Surface and Groundwater Resources | <ul style="list-style-type: none"> Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. | | | | <ul style="list-style-type: none"> Sewage from construction camp will be disposed of using septic tank Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency | Contractor | PRMSC / SC | <ul style="list-style-type: none"> Checking of septic tanks constructed for sewage. Monitoring of surface water quality |

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|-----------------------------|---|----------------------|--------|-----|--|---------------------|---------------------------|--|
| | | High | Medium | Low | | | | |
| | <ul style="list-style-type: none"> As some infrastructure to be constructed / developed on the embankment of canal / water body, therefore, 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. | | | | <p>Response Procedures in case of any spill hazard.</p> <ul style="list-style-type: none"> 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. | | | through EPA certified Lab |
| Ambient Air Quality | <ul style="list-style-type: none"> 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 | | | | <ul style="list-style-type: none"> Tuning of vehicles should be made mandatory to reduce the emissions of NO_x, SO_x, CO and PM₁₀ & 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. | 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 | | | | |
| | motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works. | High | Medium | Low | <ul style="list-style-type: none"> • 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, | | | |

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|-----------------------------|---|----------------------|--------|-----|---|---------------------|---------------------------|--|
| | | High | Medium | Low | | | | |
| | | | | | <p>particularly during peak smog season.</p> <ul style="list-style-type: none"> Tree plantation and green buffer restoration post-construction to improve long-term air quality and assist in smog reduction. | | | |
| Noise and vibration | <ul style="list-style-type: none"> During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and 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. | | | | <ul style="list-style-type: none"> During the construction phase of the project, it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary. 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 | 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 | | | | |
| | <ul style="list-style-type: none"> During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration. | | | | <ul style="list-style-type: none"> time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn. As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier. Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective / mitigation measures applied where necessary. | | | |
| Disposal of Construction Debris & Garbage | <ul style="list-style-type: none"> During construction phase of the project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the | | | | <ul style="list-style-type: none"> A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of | 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 | | | | |
| | <p>site and surrounding areas.</p> <ul style="list-style-type: none"> Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites | | | | <p>construction debris to an approved dump site.</p> <ul style="list-style-type: none"> The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. Arrangements should be made for regular garbage collection and removal of sewage from the construction site. A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals. | | | |
| Traffic annoyance | <ul style="list-style-type: none"> 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 | | | | <ul style="list-style-type: none"> During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the project area. The contractor will prepare a detailed traffic management plan (TMP) which will elaborate | 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 | | | | |
| | 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. | | | | <p>how traffic will be managed during construction, including need for diversions (if necessary).</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Project activities may result in disturbance of public utilities like roads / brick soling and others. | | | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Construction activities can result in the generation of wastewater, oil spillage from machinery, domestic waste from labour camps and | | | | <ul style="list-style-type: none"> All the wastes including liquid & solid, will not be disposed-off without treatment. Services of waste contractor should be obtained | | | Waste Management |

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|--------------------------------|---|----------------------|--------|-----|---|---------------------|---------------------------|--|
| | | High | Medium | Low | | | | |
| | construction related solid waste. | | | | | | | |
| Emergency Response Plan | <ul style="list-style-type: none"> Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment. | | | | <ul style="list-style-type: none"> Measures for fire prevention and firefighting. Indicators on site (for example, heavy rainfall) that will prompt the shutdown of specified areas of work. Procedure for shutdown of site, including transfer of plant, materials and personnel to safe areas (for example in the event of a flood). Emergency evacuation procedure for staff and members of the public likely to be impacted by an emergency event on site (for example: fire or blast). Where practicable, avoiding or minimizing the use of hazardous materials. Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to | Contractor | PRMSC / SC | |



“Model Village (Misaali Gaon) Project,
DG Khan Division”
Environmental Impact Assessment (EIA)



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

Environmental Impact Assessment (EIA)

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|--|---|----------------------|--------|-----|---|---------------------|---------------------------|--|
| | | High | Medium | Low | | | | |
| Biodiversity (Fauna and Flora) | <p>Impact on Flora A few trees and vegetation are present near the sites. However, no tree will be cut.</p> <p>Disturbance to Fauna: No negative impacts on fauna are envisaged.</p> | | | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient | | | | <ul style="list-style-type: none"> 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. | | | | <p>machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment.</p> <ul style="list-style-type: none"> Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage. | | | |
| Job opportunities | <ul style="list-style-type: none"> It will lead to an increase in economic activity and contribute to local area economic development. | | | | <ul style="list-style-type: none"> 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 | - |

Environmental Impact Assessment (EIA)

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|------------------------------------|---|----------------------|--------|-----|--|---------------------|---------------------------|--|
| | | High | Medium | Low | | | | |
| | | 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 | <ul style="list-style-type: none"> No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of 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 | | Medium | | <ul style="list-style-type: none"> The potential hazard risk from open trenches in the vicinity of populated areas should be mitigated by appropriate warnings and fencing. Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours. 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 | | | | |
| | <ul style="list-style-type: none"> Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase Community may face the noise and dust problems during the construction activities. Theft problems to the community by the Contractor's workers and vice versa. | | | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Construction activities, particularly excavation and movement of haul trucks and machinery | | | | <ul style="list-style-type: none"> 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 | | | | |
| | <p>may prove dangerous for the safety of the workers as well as for local residents.</p> <ul style="list-style-type: none"> 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 | | | | <p>with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor.</p> <ul style="list-style-type: none"> The active construction zone must be cordoned off to avoid injuries due to accidents. 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 | | | | |
| | <p>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.</p> | | | | <ul style="list-style-type: none"> • 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 | | | | |
| | | | | | <ul style="list-style-type: none"> 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 health 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 | <ul style="list-style-type: none"> Construction workers might predominantly be | | | | <ul style="list-style-type: none"> 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 | | | | |
| | <p>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</p> | | | | <p>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;</p> <ul style="list-style-type: none"> • 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; | | | |

Environmental Impact Assessment (EIA)

| Proposed Project Activities | Potential Impacts | Magnitude of Impacts | | | Mitigation Measures | Implementing Agency | Monitoring Responsibility | Actions / Monitoring Parameters / Monitoring methods |
|-----------------------------|--|----------------------|--------|-----|--|---------------------|---------------------------|--|
| | | High | Medium | Low | | | | |
| | <p>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.</p> <ul style="list-style-type: none"> • Project activities may cause hindrance to mobility especially for women during construction stage. • Privacy of the community may be disturbed. | High | Medium | Low | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> Blocking of road may hamper public mobility due to increase in number of vehicles Road Safety | | | | <ul style="list-style-type: none"> Provision of alternative routes Water sprinkling at project site at consecutive intervals Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience. Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; In case of any complaint, focal person of GRC may contact (details will be highlighted at project site). Contractor 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 | <ul style="list-style-type: none"> Economic issues may arise due to; loss of land, structures / assets productive plants livelihood shopkeepers vendors (Mobile/permanent) | | | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> PRMSC / SC | - |

Environmental Impact Assessment (EIA)

| 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 / MAINTENANCE PHASE | | | | | | | | |
| Consumption of Contaminated Water | <ul style="list-style-type: none"> 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 | | | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | | | | <ul style="list-style-type: none"> The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. The soil excavated during maintenance will be used as backfill and thereby reducing | 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 | | | | |
| | <p>repair and maintenance.</p> <ul style="list-style-type: none"> Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes. | | | | <p>the generation of soil material and related waste pollution concern.</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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. | | | | <ul style="list-style-type: none"> This impact is not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil 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 | <ul style="list-style-type: none"> Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others. | | | | <ul style="list-style-type: none"> Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment. | Contractor | PRMSC | |
| Impacts on Community Health and Safety | <ul style="list-style-type: none"> 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 | | | | <ul style="list-style-type: none"> Health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance. | Contractor | 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 | <ul style="list-style-type: none"> 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. | | | | <ul style="list-style-type: none"> The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during repair and maintenance activities including need for diversions (if necessary). The method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary. | Contractor | PRMSC | Traffic management plan |
| Impact on Air Quality | <ul style="list-style-type: none"> 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, | | | | <ul style="list-style-type: none"> It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air | Contractor | PRMSC | |

Environmental Impact Assessment (EIA)

| 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. | | | | <p>quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.</p> <ul style="list-style-type: none"> • Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. | | | |
| Noise and Vibration Emission Impacts | <ul style="list-style-type: none"> • Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used. | | | | <ul style="list-style-type: none"> • The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones. | Contractor | 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. | <ul style="list-style-type: none"> • Pre-Construction • During Construction - Quarterly | <ul style="list-style-type: none"> • Contractor • PRMSC |
| Noise level Testing | Noise level testing with Digital Noise Level Meter | <ul style="list-style-type: none"> • Pre-Construction • During Construction - Quarterly | <ul style="list-style-type: none"> • Contractor • PRMSC |
| Water Testing | Water Quality will be analyzed through EPD certified Lab. | <ul style="list-style-type: none"> • Pre-Construction • During Construction - Quarterly | <ul style="list-style-type: none"> • Contractor • PRMSC |
| Wastewater Testing | Wastewater Quality will be analyzed through EPD certified Lab | <ul style="list-style-type: none"> • Pre-Construction • During Construction - Quarterly | <ul style="list-style-type: none"> • Contractor • PRMSC |
| Vehicular Emission Testing | Dumpers, Asphalt Pavers, Road Rollers & other machinery | <ul style="list-style-type: none"> • During Construction - Quarterly | <ul style="list-style-type: none"> • 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.

Table 8-4, 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 ESMP Implementation Cost (PKR) | | | | | 1,520,575 |

This ESMP cost is average cost estimated for one village. For all villages, this ESMP Cost will be multiplied with the number of villages, i.e., for total 36 villages: $1,520,575 \times 36 = 54,740,700/-$ PKR. So total ESMP Implementation Cost for DG Khan Division is estimated to be **54,740,700**.

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 affected from noise pollution, air emissions and disturbances in their routine work.
- Usage of machinery / equipment producing negligible / low noise.
- Ensure health, safety and protective measures including safety equipment, safe drinking water, first aid boxes etc. to the workforce as per nature of their jobs.
- Water sprinkling to avoid air pollution.
- Indicate alternate routes and provide indicators on suitable places during work timings.
- Local labor should be preferred to work.
- Child labor is strictly prohibited as per labor law. All labor should be more than 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 DG Khan division. Several institutional stakeholders were engaged in the consultation process. 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 | OHRs will be constructed as a part of |

| | | |
|-----|--|--|
| | as a part of this project. | 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 VO's 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.

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

Tier 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.

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

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.

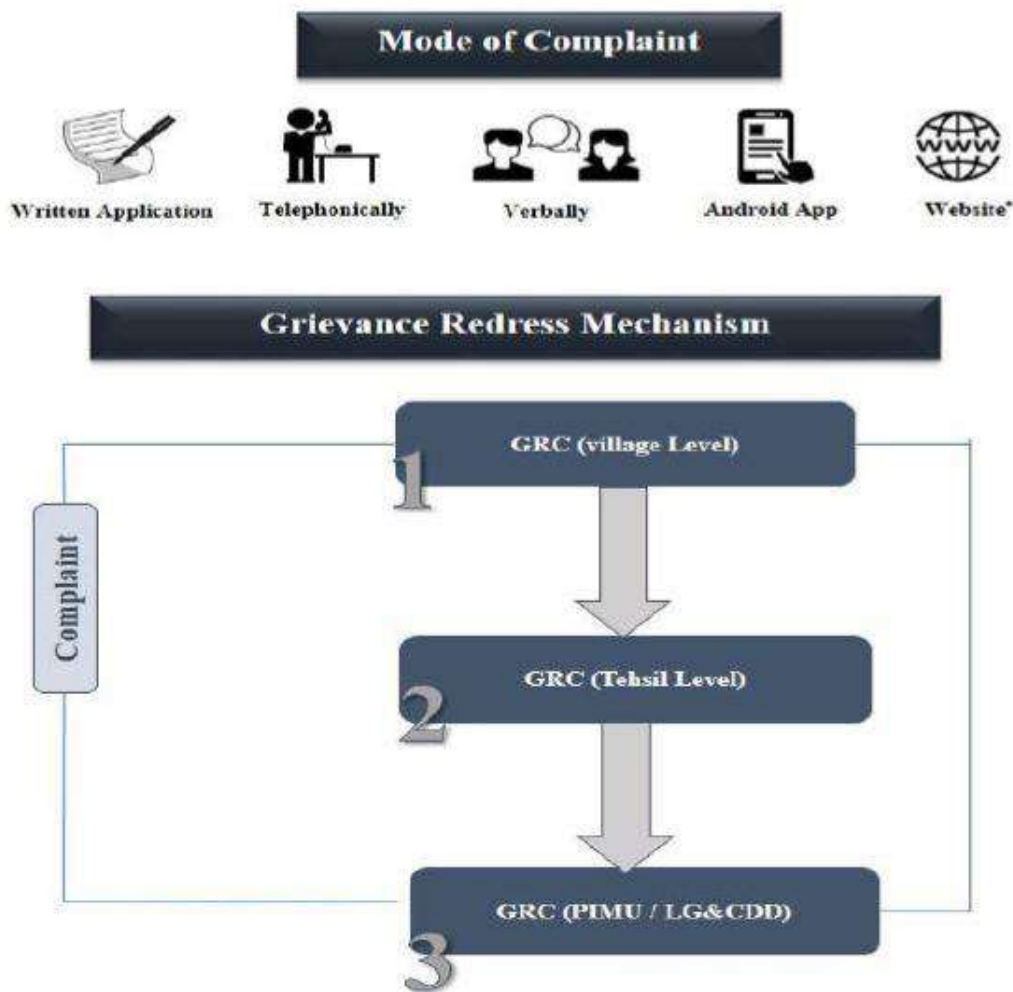


Figure 10-1, Mode of Complaint

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 |
|---|--|--|
| <ul style="list-style-type: none"> •Noise Pollution •Air Pollution •Fugitive Dust •Water Pollution •Solid Waste Management •House Keeping •Cutting of Trees •Borrow Areas Management •Protection of Wildlife •Campsite Management | <ul style="list-style-type: none"> •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 | <ul style="list-style-type: none"> •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/sites/production/files/2015-10/documents/njmc-wpp-2.pdf>
- Schedule I of Punjab Environmental Protection Act 1997 (Amended 2012)
- section 12 of Punjab Environmental Protection Act 1997 (Amended 2012)
- Pakistan Environmental Protection Act 1997
- Punjab Environmental Protection Act 1997 (Amended 2012)
- Guideline for the Environmental Assessment
- Regulations of Environmental Assessment, Regulations 2000
- National Conservation Strategy- Pakistan
- Guideline for the public consultation
- National Resettlement Policy and Ordinance
- National Environmental Quality Standards (Self-monitoring and reporting by the industry)
- Labor laws
- Canal and Drainage Act, 1873
- National Environmental Policy 2005.
- The Land Acquisition act, 1894
- The Punjab local Governmental ordinance, 2001.
- Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023
- Meteorological data from meteorological department and relevant website
- Pakistan Biosafety rules 2005
- Review of IEE / EIA Regulations, 2022
- Relevant sites of division / district / tehsils
- Punjab Portal (<http://www.punjab.gov.pk/>)
- Sectorial Guideline for environmental reports, industrial states
- Pakistan Environmental Protection ordinance (PEPO), 1983
- OSHAS 1800 for health and safety
- Census 2023

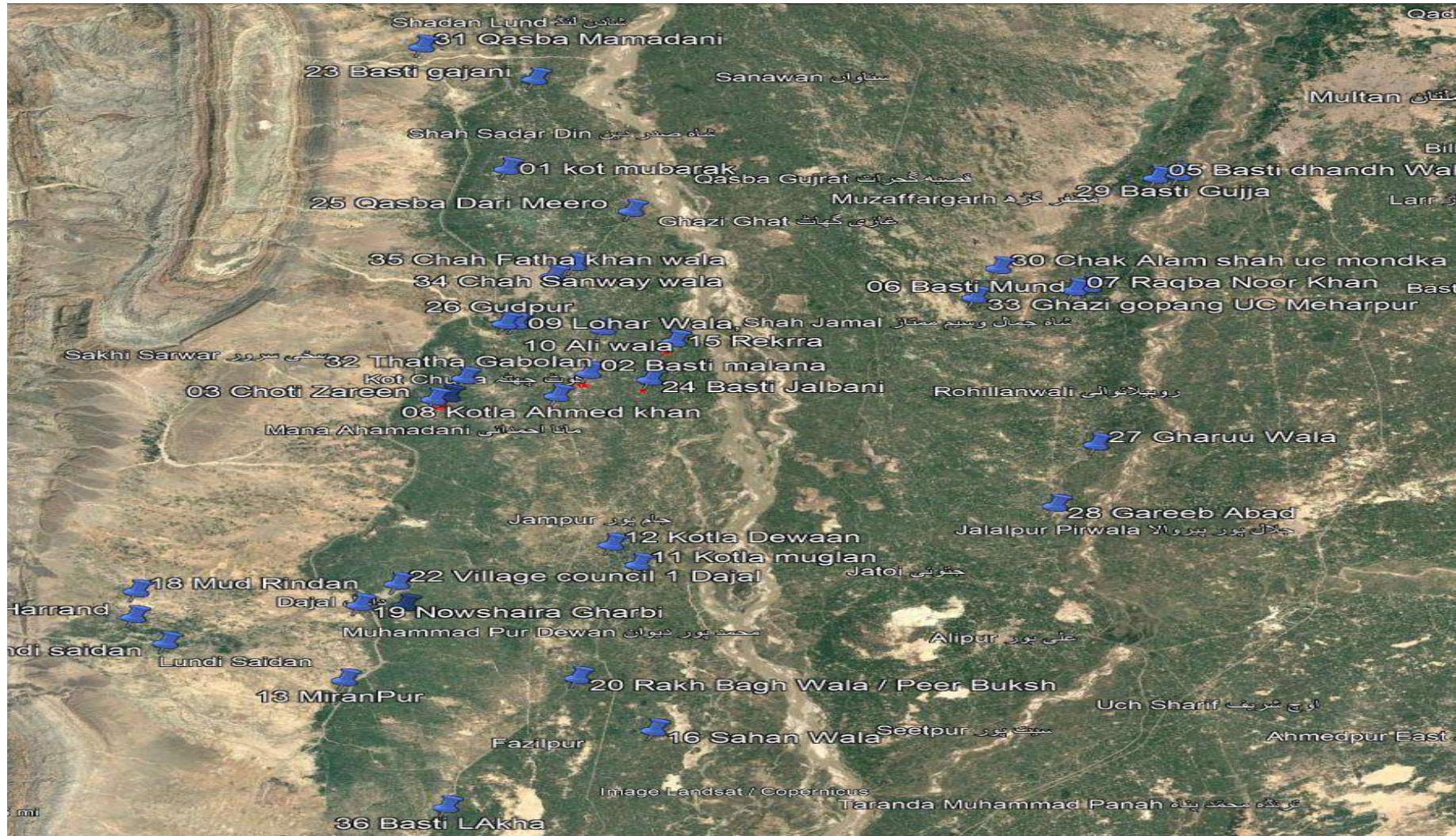
ANNEXURE - 2: GLOSSARY

| 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

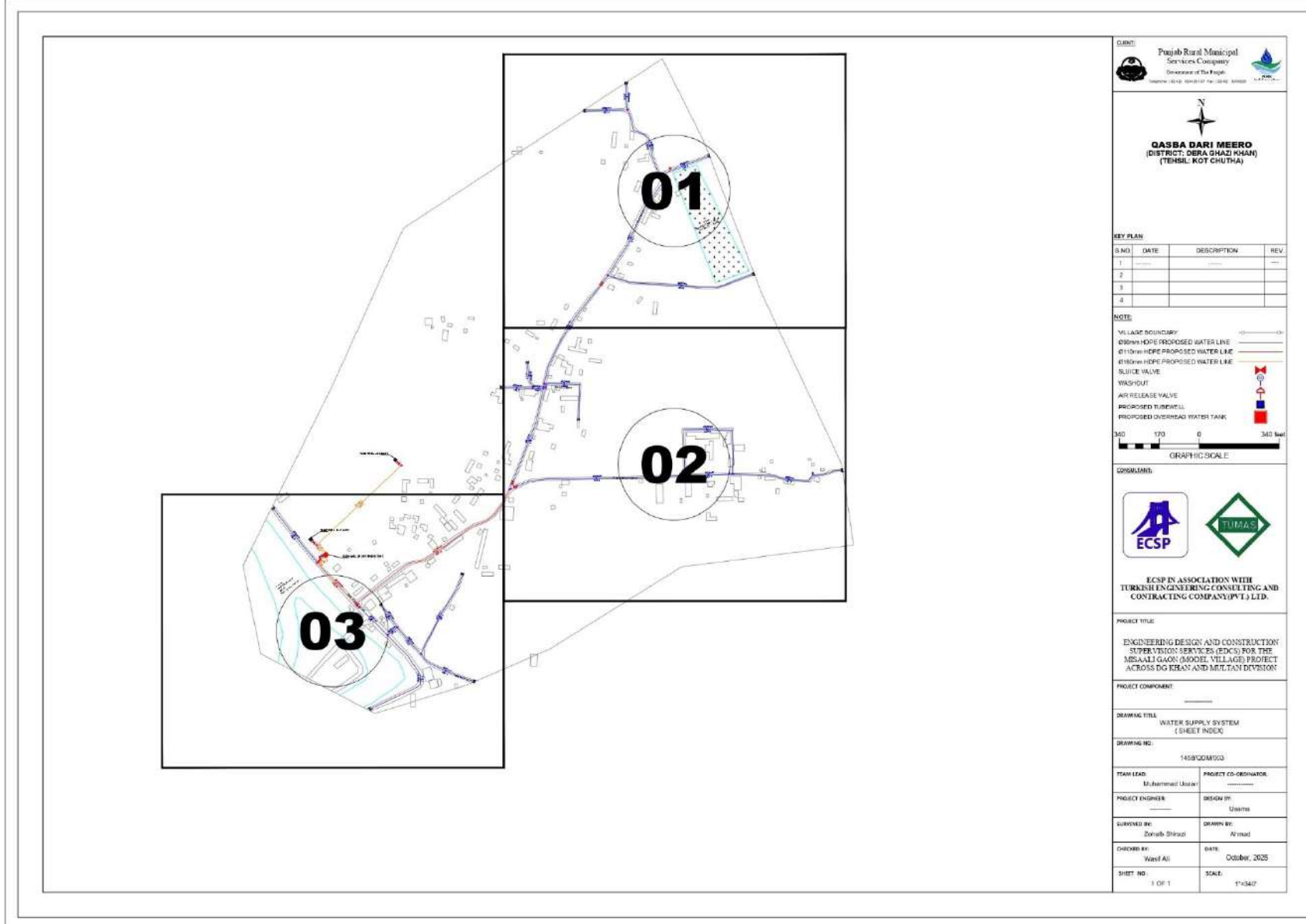


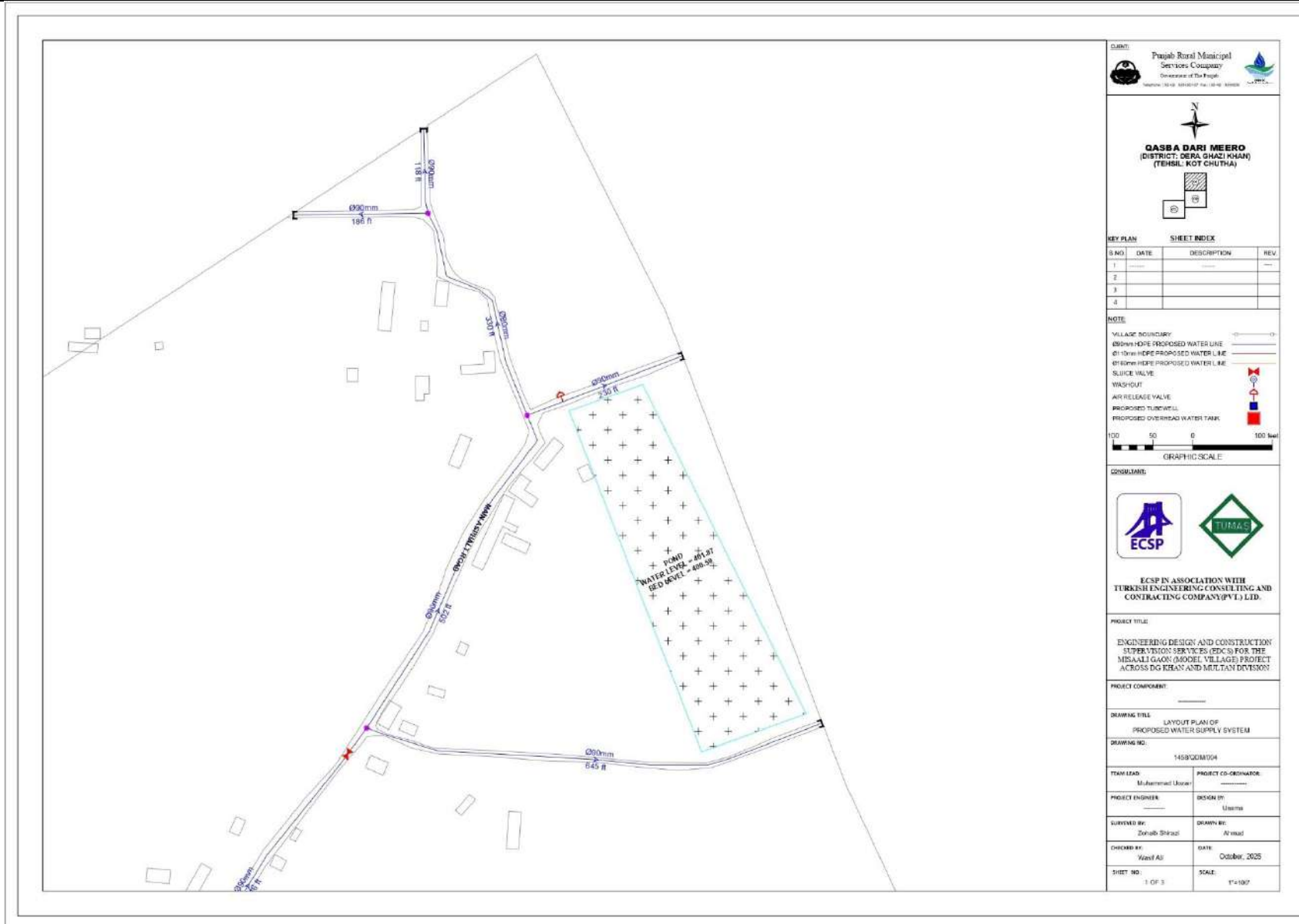


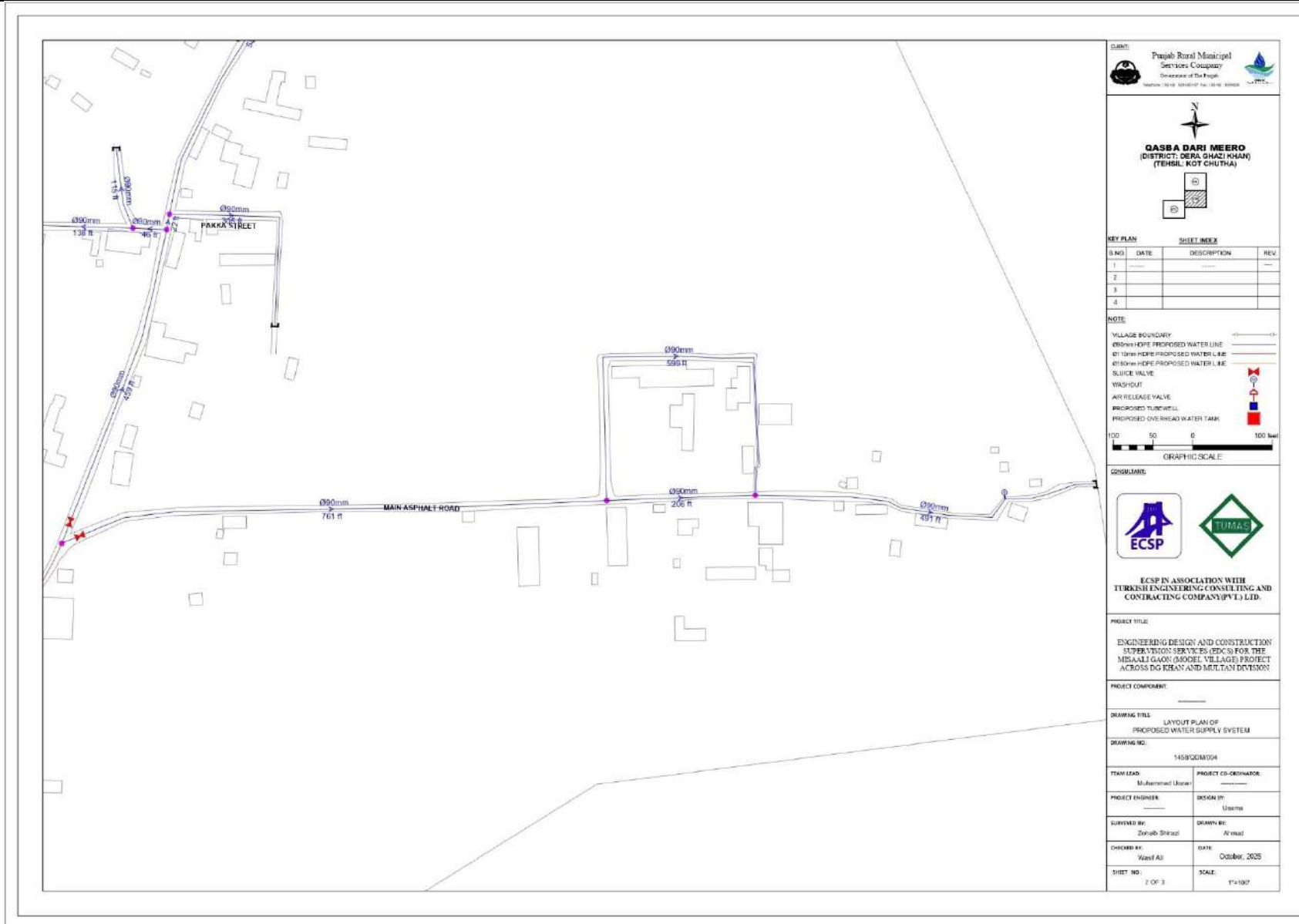
“Model Village (Misaali Gaon) Project,
DG Khan Division”
Environmental Impact Assessment (EIA)

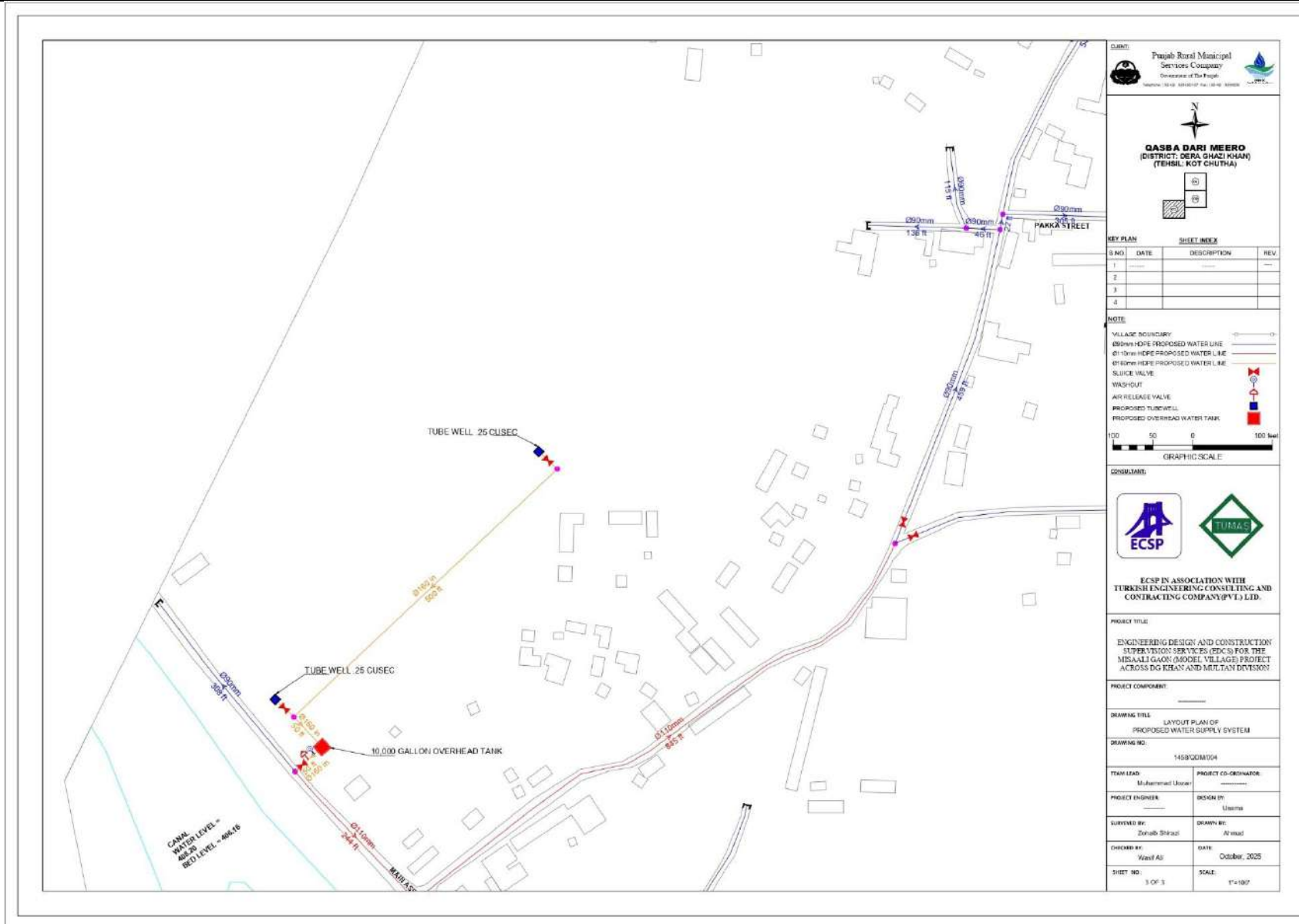


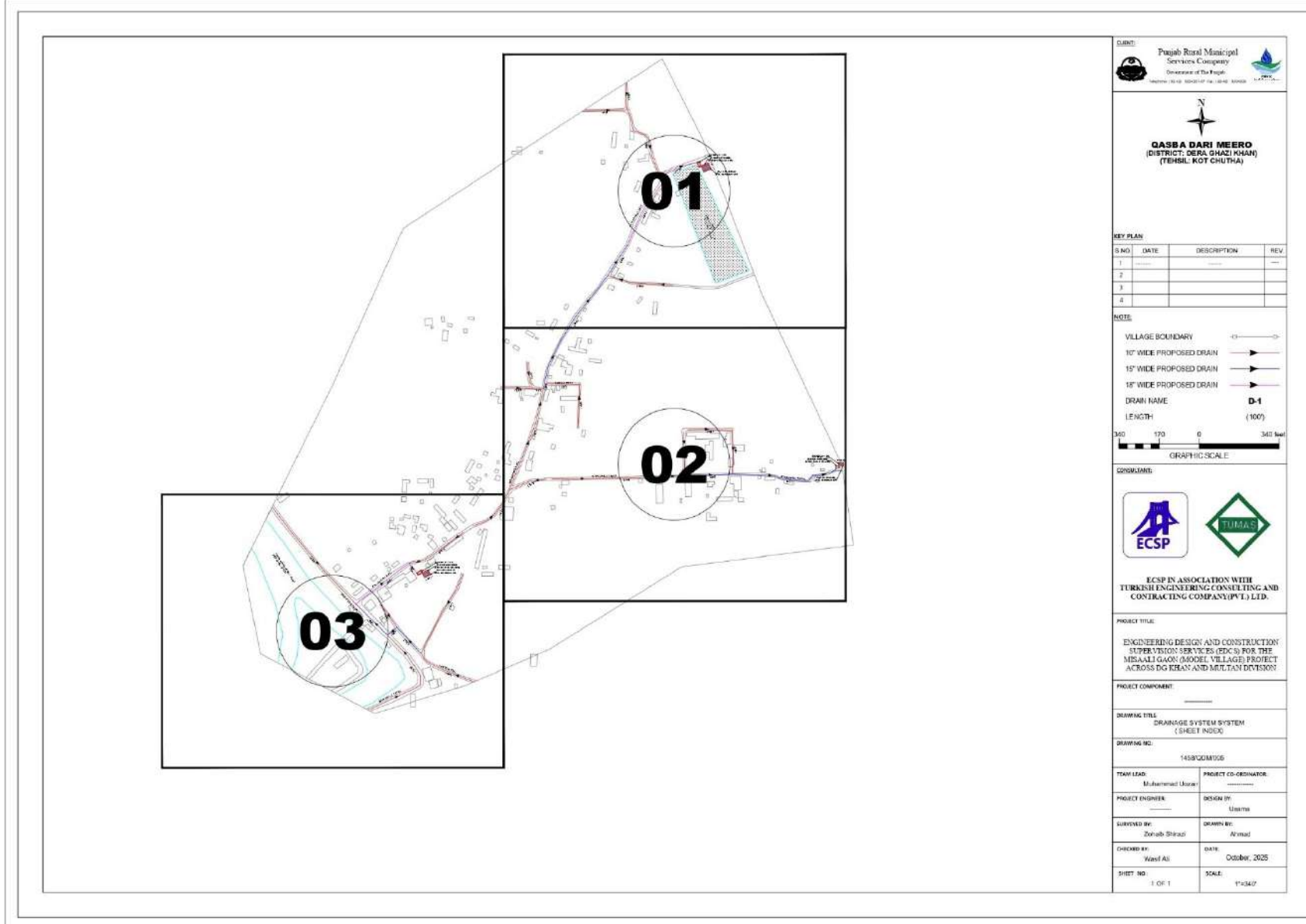
Project Map

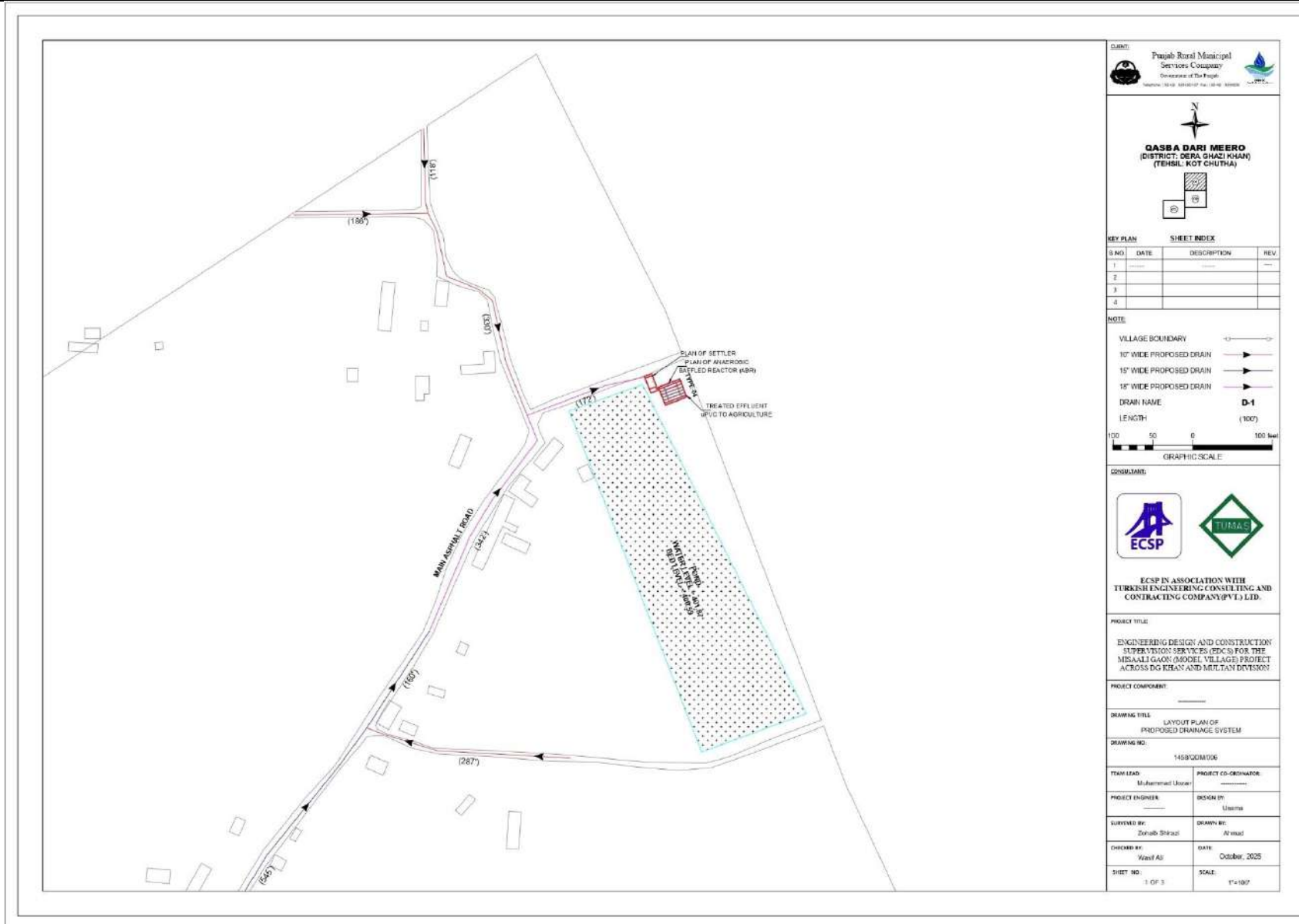


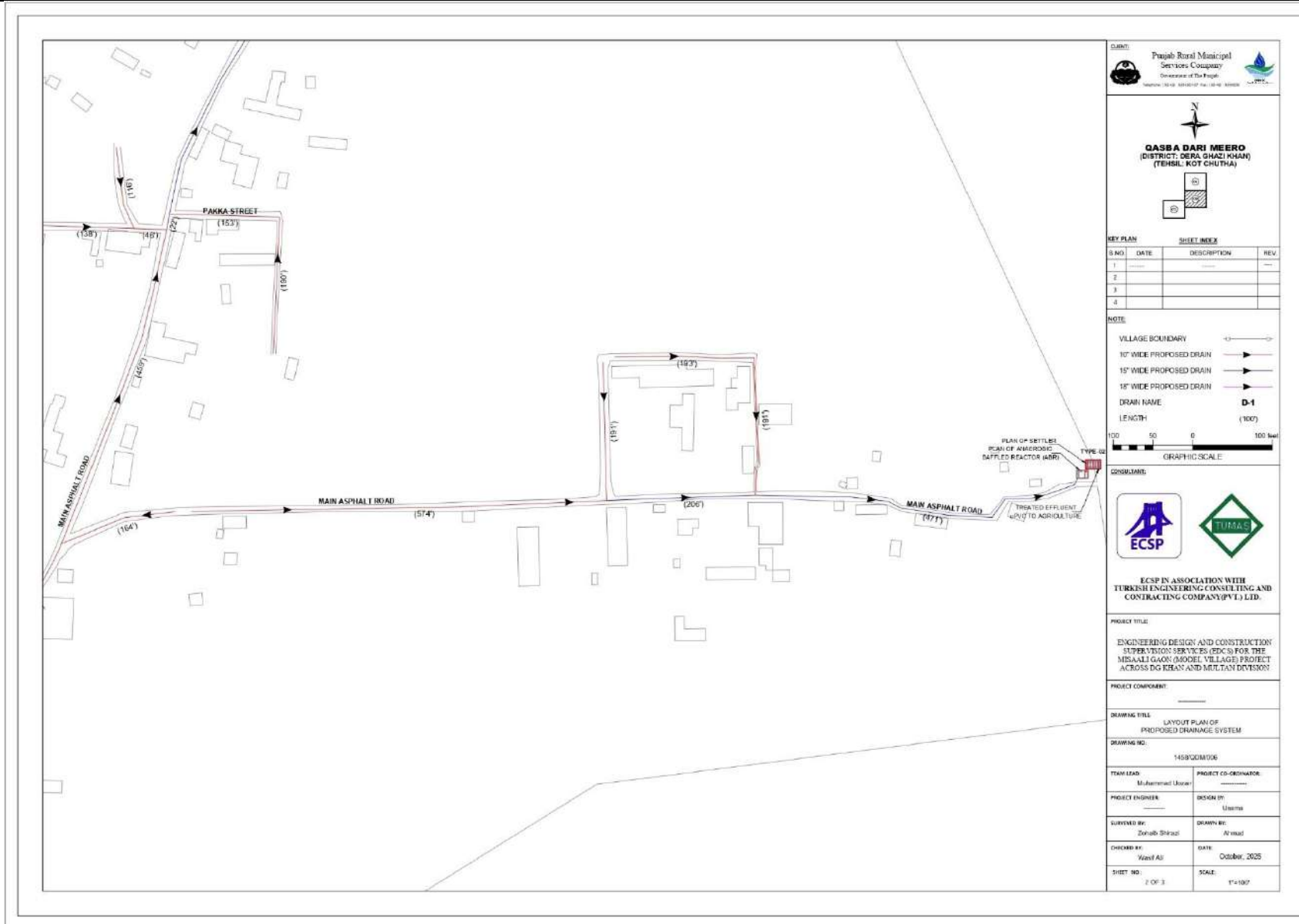


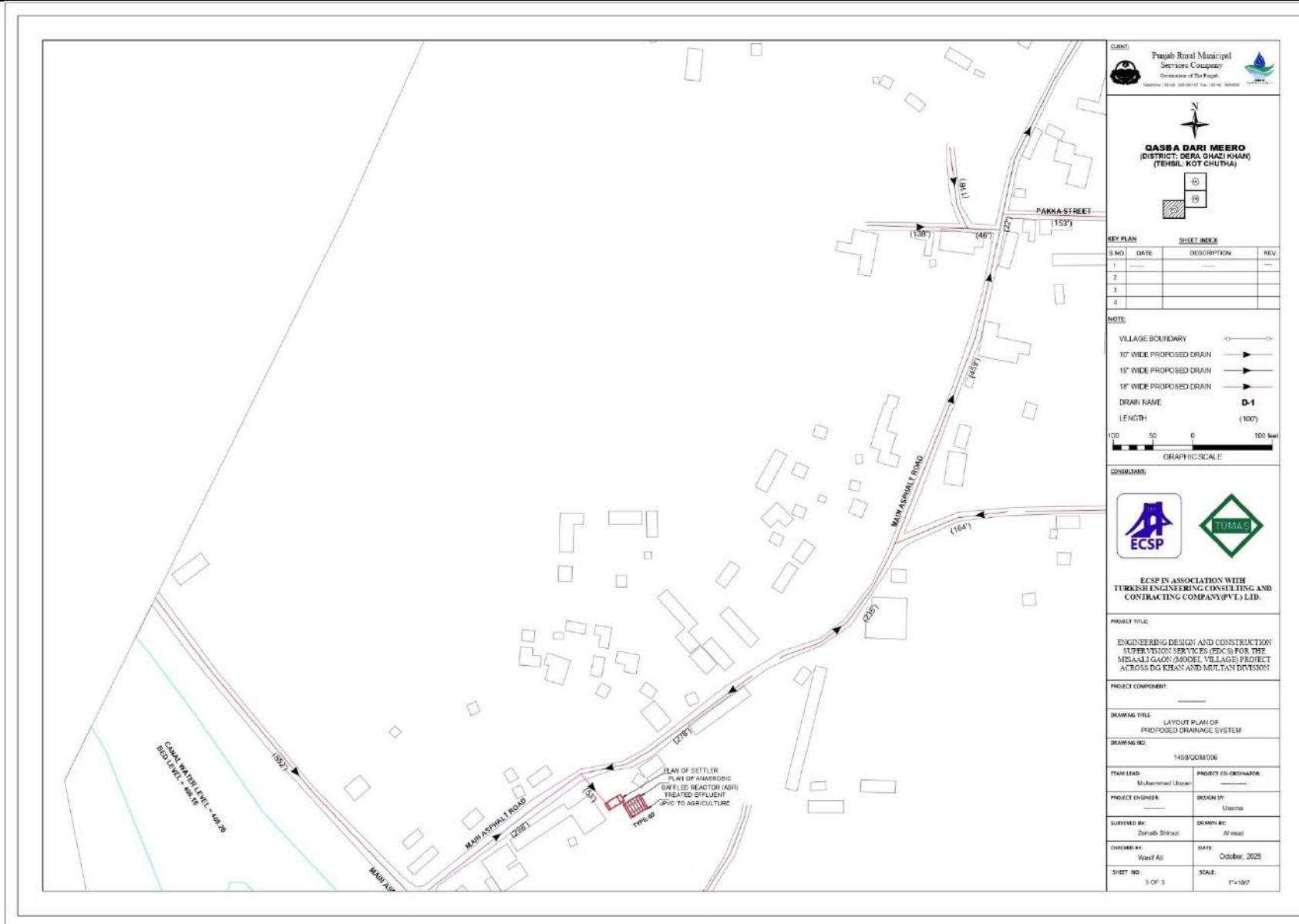


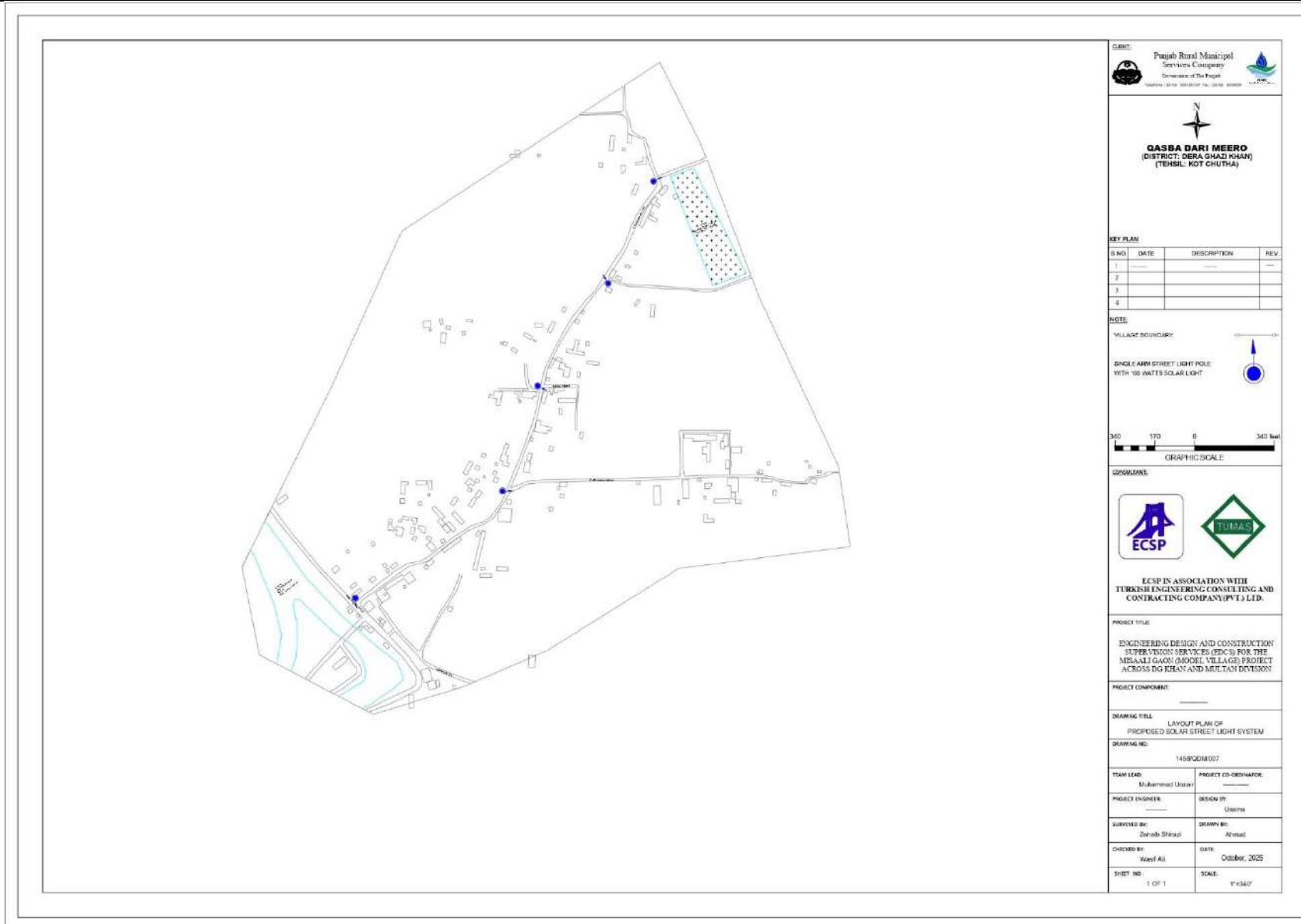












ANNEXURE - 5: EIA TEAM

| 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 | OCL |
| 8. | Huba Bint E Asla | Environmentalist | OCL |
| 9. | Sidra Rao | Environmentalist | OCL |
| 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**



AMBIENT AIR MONITORING REPORT

Client Name: ECSP - TUMAS **Address:** DG Khan Division
Monitoring Point: Tehsil DG Khan
Starting Date: 10-10-2025 **Reporting Date:** 18-10-2025
Monitoring By: SEAL **Reference No.:** SEAL/Lab/2025/AA/002
Results: -

| Sr. No. | Parameter | Method | Unit | Results | PEQS |
|---------|---|---------------------------------|-------------------|---------|------|
| 1 | Particulate Matter (PM ₁₀) | 40 CFR Part 50, App J (US-EPA) | µg/m ³ | 138.7 | 150 |
| 2 | Particulate Matter (PM _{2.5}) | 40 CFR Part 50, App J (US-EPA) | µg/m ³ | 28.4 | 35 |
| 3 | Carbon monoxide (CO) | 40 CFR Part 50, App. C (US-EPA) | mg/m ³ | 3.2 | 5 |
| 4 | Oxides of Nitrogen as (NO & NO ₂) | 40 CFR Part 50, App F (US-EPA) | µg/m ³ | 86.5 | 120 |
| 5 | Sulphur dioxide (SO ₂) | EQSA-0197-114 (US-EPA) | µg/m ³ | 91.1 | 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 |





**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**



NOISE LEVEL MONITORING REPORT

Client Name: ECSP - TUMAS **Address:** DG Khan Division
Monitoring Point: Tehsil DG Khan **Time of Monitoring:** 24 Hours
Starting Date: 10-10-2025 **Reporting Date:** 18-10-2025
Monitoring By: SEAL **Reference No.:** SEAL/Lab/2025/AN/002
Results: -

| Sr. No. | Time | Noise dB(A) | Day/Night | PEQS |
|----------------------------|----------|--------------------|-----------|------|
| 1 | 06:00 AM | 58.2 | Day Time | 75 |
| 2 | 07:00 AM | 57.4 | | |
| 3 | 08:00 AM | 60.1 | | |
| 4 | 09:00 AM | 61.7 | | |
| 5 | 10:00 AM | 63.2 | | |
| 6 | 11:00 AM | 62.1 | | |
| 7 | 12:00 PM | 60.2 | | |
| 8 | 01:00 PM | 68.5 | | |
| 9 | 02:00 PM | 65.4 | | |
| 10 | 03:00 PM | 63.3 | | |
| 11 | 04:00 PM | 61.1 | | |
| 12 | 05:00 PM | 63.9 | | |
| 13 | 06:00 PM | 62.5 | | |
| 14 | 07:00 PM | 61.8 | | |
| 15 | 08:00 PM | 61.1 | | |
| 16 | 09:00 PM | 63.2 | | |
| 17 | 10:00 PM | 59.3 | | |
| Average Noise Level | | 61.94 dB(A) | | |

Page 1 of 2



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**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**



Client Name: ECSP - TUMAS **Address:** DG Khan Division
Monitoring Point: Tehsil DG Khan **Time of Monitoring:** 24 Hours
Starting Date: 10-10-2025 **Reporting Date:** 18-10-2025
Monitoring By: SEAL **Reference No.:** SEAL/Lab/2025/AN/002
Results: -

| | | | | |
|----------------------------|----------|-------------------|------------|----|
| 18 | 11:00 PM | 55.7 | Night Time | 65 |
| 19 | 12:00 AM | 53.1 | | |
| 20 | 01:00 AM | 50.9 | | |
| 21 | 02:00 AM | 46.7 | | |
| 22 | 03:00 AM | 44.5 | | |
| 23 | 04:00 AM | 52.5 | | |
| 24 | 05:00 AM | 44.5 | | |
| Average Noise Level | | 49.7 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 |
|---|---|--|
|  |  |  |
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**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**



GROUND WATER ANALYSIS REPORT

Client Name: ECSP - TUMAS **Address:** DG Khan Division
Sampling Point: Tehsil DG Khan **Nature of Sample:** Ground Water
Sampling Date: 10-10-2025 **Reporting Date:** 18-10-2025
Sampling By: SEAL **Reference No.:** SEAL/Lab/2025/GW/002
Results: -

| Sr. No. | Parameter | Method | Unit | Result | PEQS |
|---------|--|--|-----------------|-----------|-----------|
| 1 | pH | APHA 4500-H ⁺ B | -- | 7.68 | 6.5-8.5 |
| 2 | Total Dissolved Solids (TDS) | APHA 2540 C | mg/l | 795 | 1000 |
| 3 | Chloride | 4500- APHA Cl ⁻ B | mg/l | 56.5 | 250 |
| 4 | Fluoride | APHA 4500-F ⁻ D | mg/l | 0.0 | 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 | 0.14 | 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 | 125.7 | 500 |
| 12 | Turbidity | APHA 2130 B | NTU | 1.4 | 5 |
| 13 | Zinc | APHA 3500-Zn B | mg/l | 0.2 | 5 |
| 14 | Aluminum | APHA 3111 D | mg/l | 0.0 | 0.2 |
| 15 | Chromium | APHA 3500-Cr B | mg/l | 0.0 | 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 | 0.058 | 0.300 |
| 19 | Barium | APHA 3111 B | mg/l | 0.048 | 0.700 |

Page 1 of 2



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**SOLUTION ENVIRONMENTAL
& ANALYTICAL LABORATORY**



Client Name: ECSP - TUMAS **Address:** DG Khan Division
Sampling Point: Tehsil DG Khan **Nature of Sample:** Ground Water
Sampling Date: 10-10-2025 **Reporting Date:** 18-10-2025
Sampling By: SEAL **Reference No.:** SEAL/Lab/2025/GW/002
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 | 92.8 | 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 | 0.258 | 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 |

Page 2 of 2



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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 DG Khan division.

Cost of Project:

The capital cost of the project will be about 3,817.680 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 analyzing EPA Smart Parameters. 2-3 representative samples will be collected to check the groundwater quality by using certified sampling techniques and analysis procedures.
 - Noise Level will be monitored at 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

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First published 2001
Second edition 2009

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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

ISBN 92-2-111634-4

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).

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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

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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.

¹See 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.

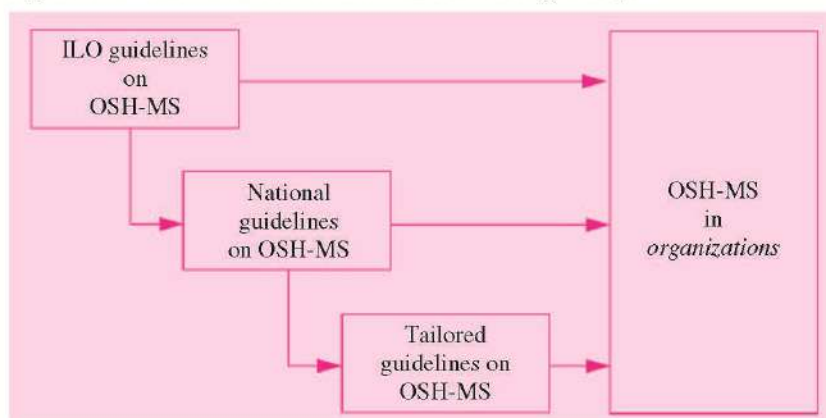
2.3. Tailored guidelines

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





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. Competence² 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:

- ensure that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite;
- provide information to, and communication with, the relevant competent authorities, and the neighbourhood and emergency response services;
- address first-aid and medical assistance, firefighting and evacuation of all people at the worksite; and
- 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:

- compliance with safety and health requirements for the *organization* is identified, evaluated and incorporated into purchasing and leasing specifications;
- national laws and regulations and the *organization's* own OSH requirements are identified prior to the procurement of goods and services; and
- 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).



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 States³ 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 edition 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 synthetic 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 edition 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 edition 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

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(Dr. D. Nelson, Occupational and Environmental Health Unit)

European Union

(Mr. D.R. Carruthers, DG Employment and Social Affairs, European Commission)

World Confederation of Labour (WCL)

(Ms. B. Fauchère, Permanent Representative)

International Confederation of Free Trade Unions (ICFTU)

(Mr. D. Cunniah, Director, ICFTU Geneva)

(Ms. A. Biondi, Assistant Director, ICFTU Geneva)

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International Social Security Association (ISSA)

(Mr. R. David, Representative)

International Commission on Occupational Health (ICOH)

(Professor Alain Cantineau, Representative)

(Ms. J. Fanchette, Representative)

International Occupational Hygiene Association (IOHA)

(Mr. H.G.E. Wilson, Representative)

International Metalworkers' Federation (IMF)

(Mr. L. Powell, Director of Occupational Health and Safety)

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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 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 | -2 | 0 | 0 | -1 | 0 | 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 | 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 |

| | | |
|---|--------|----|
| 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. |