



Punjab Municipal Development Fund Company (PMDFC)

“Improvement and Extension of Sewerage System
in Burewala City”

Environmental & Social Impact Assessment (ESIA)

December-2023



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EXECUTIVE SUMMARY

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

ES-1. Project Background

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

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

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

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

ES-2. Project Overview

The project aims at improvement of infrastructure of municipal services in MC Burewala. This project includes the improvement and / or construction of disposal stations, force main and Waste Stabilization Pond in MC Burewala.

Punjab Cities Program (PCP) aims at improvement of infrastructure of municipal services including sewerage system for improved municipal service delivery.

The project comprises of the replacement of old, outlived, damaged or worn-out components in existing infrastructure for;

- Improvement of service delivery level of the municipal services in the served areas of the city for provision of better basic urban services for improved livability of the citizen.
- Reduction in annual O&M charges of the infrastructure due to reduced repairs in the forthcoming years because of repair or replacement of infrastructure components.
- Reduction and prompt addressal of the public complaints regarding municipal service delivery.
- Reduction in surcharging and overflowing of sewers thus reducing waste water ponding in the city. The objectives of the projects are in line with Sector Objectives.
- Construction of wastewater treatment plant to avoid environmental hazards.

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

ES-3. Project Location

The project is located in Burewala City Punjab. Burewala is a Tehsil Headquarter of Vehari District in southern Punjab, Pakistan. It is located at 30°10'0 N and 72°39'0 E and has an altitude of 133 meters. Burewala is situated on the Multan-Vehari-Depalpur Road. Sutlej River crosses Burewala Tehsil near the towns of Jamlera and Sahuka. It is located at 35 km at North East of District Headquarter Vehari and is the second biggest tehsil of Punjab. *(Location map is provided in Chapter 5: Description of Project)*

ES-4. Project Proponent

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

ES-5. Brief Description of the Project

The existing sewerage system of the Burewala is designed as a combined system to cover about 60% area of the city. The system is comprised of approximately 178 km length of sewers with diameters ranging from 9 inch to 48 inch (R.C.C. pipes). There are 05 disposal stations (DS) in the city, 04 Nos. are operational while 1 DS is under Construction. The existing sewerage system is divided into three zones (Zone-1, Zone-2 & Zone 3). The wastewater from each zone is collected in DS and discharge in Sukh Bias Creek without any treatment. The Wastewater is also being used in agriculture fields without any treatment. There is no Wastewater Treatment Plant (WWTP) in Burewala City.

Existing sewerage system in Burewala City is equipped with the following

assets.

- Sewer Lines
- Force Mains
- Disposal Stations

This project includes the improvement and / or construction of waste stabilization pond, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines
- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Table 0-1, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Rehabilitation of disposal stations	04 Nos.
2.	Laying of force main	14,240 ft.
3.	Construction / rehabilitation of sewer lines	6,886 ft.
4.	Construction of Wastewater Treatment Plant	01 No.

ES-6. Need of ESIA

As per Environmental and Social Management Framework (ESMF) of Punjab Cities Program (PCP), the projects under the scope of Waste Management which involves construction of wastewater treatment plants will fall in category E1 and may require to conduct Environmental & Social Impact Assessment (ESIA) study as per scope of work and environmental impacts.

According to the Review of IEE and EIA Regulations, 2022, the project falls under Schedule II (List of projects requiring an EIA), Category F (Water supply, Sewerage System and treatment), sub-clause (Wastewater channels / Sewerage System Schemes).

This project involves construction of 01 wastewater treatment plant, construction / rehabilitation of 6,886 ft. sewer lines, desilting of particular sewer lines, rehabilitation of 04 disposal stations and laying of 14,240 ft. force main.

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

As per Environmental and Social Management Framework (ESMF) of Punjab Cities Program (PCP), all those projects having negative social impacts of significant nature on 01-40 households and / or it requires displacement / resettlement of 01-40 households due to land acquisition, a Social Management Plan (SMP) will be prepared and implemented as a part of the ESMP. An Abbreviated Resettlement Action Plan (ARAP) will also be prepared and implemented. These projects are categorized as S2.

Proposed land for the construction of WWTP (22 acres) is govt. owned but it was allotted to a family [Mr. Sarfraz Majeed (Late)(Allotted), Mr. Khalil Jibran (Hier), Mr. Arsalan Majeed (Hier), Mrs. Maleeha Zainab (Late)(Hier), and Mrs. Mubeen Fatima (Hier)] through tube well scheme in 1960s, as per consultation conducted with MC, concerned patwari and members of that family. There is a dairy farm constructed on the land, 03 rooms, a tube well installed and crops (wheat, corn, and cow food / chara) grown in 15 acres agriculture land. As resettlement / compensation of private assets is involved in this project, the project is categorized as S2 for social perspective, for which, ARAP is prepared.

ES-7. Major Impacts and Mitigation Measures

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

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

Pollutants	Construction Phase	Operational Phase
Ambient air quality	The impact on air quality is expected as a result of construction works, specifically excavation, which will generate dust with motorized equipment also generating gases. Smoke from vehicles, generator and other fuel consuming machinery and construction material.	Resources utilization i.e., fuel and energy for the operation of pumps.
Noise and vibration	- During the construction of the project, a large amount of equipment and construction machinery will be utilized for construction. - The equipment would include excavators, concrete mixer, trucks, generators and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and neighborhood residential may be disturbed by the noisy activities.	- 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	Nil	Odor issues may arise from WWTP.
Flora and fauna	Impact on Flora - No trees will be cut during execution of this project. Anyhow, in case of any mishap / misfortune, if a tree has to be cut then 10 new trees of almost 06 ft. height will be planted by the contractor against each tree cut. - Crops (wheat, corn, and cow food / chara is grown in 15 acres agriculture land, which will be cleared for the construction of WWTP. And compensation for these crops will be given to APs as per approved ARAP.	No significant impact on flora and fauna during operation phase.

Pollutants	Construction Phase	Operational Phase
	Disturbance to Fauna No impacts.	
Solid Waste	Solid waste will be generated due to construction activities and domestic sources. Also due to sludge from septic tank	- Solid wastes will mainly emanate from the operational activities related to maintenance and 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
Soil Contamination	- Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project area and in its nearby surroundings. - Spillage from the generators or from moving vehicle will cause contamination of soil at construction sites. - Solid wastes generation. - Hazardous materials.	Soil can be contaminated due to leaching of oil, fuel, from vehicles or machinery any stored oil. Storage & handling of hazardous chemicals.
Surface and Ground water contamination.	Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly.	Sewage and sanitary water generated from operational offices / domestic waste may contaminate groundwater, if not disposed of properly.
Health and safety issues	Construction activities including excavations, backfilling involve inherent occupational health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the	Health and safety issues will be arising if flue gases or noise exceeds the permissible limits of PEQS, and improper practice of work during storage, handling and transportation of fuel.

Pollutants	Construction Phase	Operational Phase
	- workforce may suffer injury or death. - Accidents may also occur.	
Socioeconomic	- Disturbance to neighbors by constructional activities. - Resettlement / compensation to the family / persons currently associated with the proposed WWTP land for their constructed structures, tube well and crops. - Employment opportunities will be generated for locals.	Employment opportunities will be enhanced as staff will be hired for operational phase.
Gender & privacy issues	- Project activities may cause hindrance to mobility especially for women in terms of privacy or harassment, during construction stage. - Privacy of the community may be disturbed. - Harassment issues.	Privacy of the community may be disturbed.
Land acquisition and resettlement	Proposed land for the construction of WWTP (22 acres) is govt. owned but it was allotted to a family [Mr. Sarfraz Majeed (Late) (Allotted), Mr. Khalil Jibran (Hier), Mr. Arsalan Majeed (Hier), Mrs. Maleeha Zainab (Late) (Hier), and Mrs. Mubeen Fatima (Hier)] through tube well scheme in 1960s, as per consultation conducted with MC, concerned patwari and members of that family. There is a dairy farm constructed on the land, 03 rooms, a tube well installed and crops (wheat, corn, and cow food / chara) grown in 15 acres agriculture land. The land is the govt. owned and therefore no acquisition required. However, the compensation will be provided for private assets along with livelihood allowance.	Nil

Pollutants	Construction Phase	Operational Phase
	- Route for laying force main is along the road which is under jurisdiction of MC / Highway Department. - Existing sewer lines will be desilted and existing disposal stations will be rehabilitated which do not require land acquisition.	
Mobility issues & Traffic management	- The roads maybe temporarily blocked at the active construction zone that may create problems of traffic for nearby community. - Blockage due to construction waste. - Blockage due to machinery and vehicles.	The roads may be temporarily blocked at the active work zone during repair / maintenance in operational phase that may create problems of traffic for nearby community.
Loss of livelihood	- A livelihood allowance typically refers to financial support or assistance provided to individuals or communities to help sustain their basic needs and maintain a decent standard of living. During the consultation, it was identified that eight Affected Persons (APs) due to construction of Wastewater Treatment Plant (WWTP) are eligible for livelihood allowance. These eight people work in dairy farm that is constructed on proposed WWTP site. These eight APs comprises of one farm manager and seven servants of the dairy farm. - On the other hand, this project is of short duration (18 months) and will not have significant impact on the livelihood of the community.	Nil
Community health and safety	- The community health and safety must be ensured during construction phase especially the hazard of falls during excavation of trenches. - Accidents and disputes can also arise.	The community health and safety must be ensured during repair / maintenance in operational phase especially the hazard of falls during excavation of trenches.
Child protection	Child labor might get involved in the construction	Child labor might get involved in the construction

Pollutants	Construction Phase	Operational Phase
	activities.	activities during repair and maintenance.

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

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
Ambient Air Quality	- Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM, when they are not in use. - Equipment and vehicles powered with diesel should be well maintained and tuned to minimize particulate emissions. - Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. - To reduce fugitive dust emissions, sprinkling of water by water-trucks will be done. - As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.	- It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible concentrations. - All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance and monitoring of vehicles, use of high-quality fuel, etc. - Further, the project will be implemented through the significant use of manual labor and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.
Noise and vibration	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.	The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	- 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. - Shutting down the noisy equipment when not needed. - Providing personal protective measures to labors working. - Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.	
Odor	Nil	Odor issues may arise during operation phase of the project. Buffer zone of minimum 500 meters will be provided between WWTP and nearby settlements. The buffer zone will be planted with trees and herbs in order to minimize the impact of odor on nearby settlements.
Impacts on flora and fauna	- For clearing of crops (15 acres) compensation to the concerned family will be given. - New trees will be planted at project site by the contractor. - For each tree cut, 10 new trees of almost 06 ft. height will be planted by the contractor.	Maintenance and monitoring of plantation around the project corridor.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
Solid Waste	- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. - The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. - Arrangements should be made for regular garbage collection and removal of sewage from construction site. - A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals.	- The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. - The soil excavated during maintenance will be used as backfill and thereby reducing the generation of waste material and related waste pollution concern. - There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. Site for hazardous waste should be constructed using concrete so infiltration of material in soil cannot take place. - All wastes will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project.
Soil Erosion / Soil Contamination	- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. - The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. - Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. - Ground shall be leveled to avoid slopes.	- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining and use of well-tuned vehicles as well as machinery & generators. - The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. - Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. - Ground shall be leveled to avoid slopes.

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.	Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.
Surface and ground water	- Sewage from construction camp will be disposed of using septic tank. - Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard. - Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. - Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.	- Wastewater from WWTP will be discharged in nearby seepage canal / nullah after treatment, so no surface and ground water will be polluted. - During operation / maintenance works, wastewater may be generated from construction / maintenance works which should be disposed-off / discharged after treatment through septic tank.
Health and safety issues	- Occupational health and safety impacts during construction phase is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained and skilled labor or personnel will be engaged in operating equipment. - 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	- 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

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	protective masks, and monitoring their proper and sustained usage. - First aid boxes should also be present on sites. - Construction safety SOPs should be followed. - Sign boards should be displayed at sites.	sites at night. - Labors should be provided with PPEs to avoid accidents. - Labors should be trained for healthy team work. - Conflicts should be settled according with law. - Sign boards should be displayed at sites.
Socioeconomic	- People will be informed in advance when work is about to start at the site. - Job opportunities should be provided to local labors. - Privacy of neighboring areas should not be disturbed. - Trainings should be provided to labors. - Compensation should be provided to APs for the loss of asset as per approved ARAP prepared for this project.	- Community wellbeing should be considered and neighbor's privacy should not be disturbed. - Local people should be preferred for the employment. - Working should be scheduled and informed to the concerned public.
Gender issue	- Workers would be trained to address privacy issues and ethically behaved. - Labors would be strictly asked to cater the privacy issues. - Staff's capacity-building / trainings.	- 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 / trainings.
Land acquisition and resettlement	- No land acquisition is required for this project. - However, there will be resettlement of APs on WWTP site. The detailed ARAP has been prepared for the resettlement issue. As per ARAP, resettlement / compensation will be given to the family / APs including compensation for structures; dairy farm, 03 rooms, 15 acres crops and a tube well. The estimated cost of resettlement is 77,213,628 PKR.	Nil

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
	For construction of force main, desilting of sewer lines and rehabilitation of disposal stations, NOCs / consent letters will be obtained from concerned authorities (e.g. Highway Department etc.).	
Traffic management	- Provision of alternative routes. - Water sprinkling at project site at consecutive intervals. - Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents. - Vehicles should be parked at designated points. - Machinery after use should be allocated to designated places. - Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience. - Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents. - In case of any complaint, focal person of GRC may contact (details will be highlighted at project site).	- 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 be stored at proper places that should not affect mobility. - Inform and coordinate the local residents regarding construction time schedule and also to display the details at sub-project site for their convenience
Loss of livelihood	- Livelihood allowance will be given to APs (08 persons; 07 servants and 01 farm manager working on the dairy farm constructed on proposed land for WWTP) as per approved ARAP. - As there will be no significant impacts on community, hence no mitigation measure is required.	Nil

Pollutants	Recommendation during Construction Phase	Recommendations during Maintenance / Operational Phase
Community health and safety	- Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. - Compliance with the safety precautions for construction workers as per International Labor Organization (ILO) Convention No. 62 will be ensured by the Contractor. - The active construction zone must be cordoned off to avoid injuries due to accidents.	The active construction zone must be cordoned off to avoid injuries due to accidents.
Child protection	Child labor must be prohibited on project site.	Child labor must be prohibited on project site.

ES-8. Proposed Environmental Monitoring

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

ES-8.1 Ambient Air

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

ES-8.2 Noise

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

ES-8.3 Water Quality

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

ES-8.4 Schedule of Proposed Monitoring

Table 0-4, Proposed Monitoring Schedule

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

ES-9. ESIA Implementation and Monitoring Arrangements

ES-9.1 MC Burewala

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

ES-9.1.1 The Contractor

The Contractor will be responsible for on-field implementation of the ESMMP and environmental protection liabilities under the Punjab Environmental Protection Act (Amendment 2012) and World Bank's Environmental and

Social Safeguard Policies. He will also be responsible for compliance of ESIA provisions keeping in view his contract with MC Burewala. The Contractor will train his crews in all aspects for implementation of the ESIA. The contractor will report the progress of ESMMP to the Environmental Specialist of the consultant.

ES-9.1.2 Supervision Consultant

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

ES-9.1.3 PMDFC ESM Wing

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

ES-10. ESIA & ARAP Implementation and Monitoring Budget

The cost for the implementation of construction stage activities given in this ESIA will be included within the civil works for this project with total cost of the project is 845.209 million PKR. The total cost of ESIA implementation is 15,009,800 PKR and cost of ARAP is 77,213,628 PKR.

ES-11. Grievance Redress Mechanism

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

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

The GRM will be accessible to diverse members of the communities including women, senior citizens, people with disabilities, laborers / workers, and other vulnerable groups. Culturally appropriate communication mechanisms will be used at all project sites both to spread awareness regarding the GRM

process as well as complaints management. *ESMF GRM will be integrated with the PCP's overall program GRM hotline to be developed by the Consultants under the scope of PCP.*

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

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

SECTION - 1: INTRODUCTION

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

1.1 Purpose of the Report

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

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

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

1.2 Project Background

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

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

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

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

1.3 Project Overview

The project aims at improvement of infrastructure of municipal services in MC Burewala. This project includes the improvement and / or construction of waste stabilization pond, sewer lines, force main, disposal stations and desilting of sewer lines in MC Burewala.

Punjab Cities Program (PCP) aims at improvement of infrastructure of municipal services including sewerage system for improved municipal service delivery.

The project comprises of the replacement of old, outlived, damaged or worn-out components in existing infrastructure for;

- Improvement of service delivery level of the municipal services in the served areas of the city for provision of better basic urban services for improved livability of the citizen.
- Reduction in annual O&M charges of the infrastructure due to reduced repairs in the forthcoming years because of repair or replacement of infrastructure components.
- Reduction and prompt addressal of the public complaints regarding municipal service delivery.
- Reduction in surcharging and overflowing of sewers thus reducing waste water ponding in the city. The objectives of the projects are in line with sector objectives.

This project includes the improvement and / or construction of waste stabilization pond, sewer lines, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines

- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

1.4 Objective of ESIA

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

The specific objectives of this ESIA are:

To assess the existing environmental and socioeconomic conditions of the project area;

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

1.5 Identification of the Project

This project includes the improvement and / or construction of waste stabilization pond, sewer lines, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines

- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Table 1-1, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Rehabilitation of disposal stations	04 Nos.
2.	Laying of force main	14,240 ft.
3.	Construction / rehabilitation of sewer lines	6,886 ft.
4.	Construction of Wastewater Treatment Plant	01 No.

According to the Review of IEE and EIA Regulations, 2022, the project falls under Schedule II (List of projects requiring an EIA), Category F (Water supply, Sewerage System and treatment), sub-clause (Wastewater channels / Sewerage System Schemes).

Hence this project falls in E-1 category for environmental perspective and S-2 for social perspective as resettlement is involved in this project, for which ARAP is prepared.

1.6 The Proponent

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

1.7 The Consultant

Asian Consulting Engineers Private Limited (AsCE) JV with Rehman Habib Consultants (Pvt.) Ltd. is providing their services to conduct environmental assessment for the project. Asian Consulting Engineers Private Limited is an independent consulting company working in the field of environment. AsCE provides consulting services and sustainable solutions for infrastructure projects, industrial projects and social development projects.

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

Asian Consulting Engineers Private Limited

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

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

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

1.8 Brief Description of Project

The existing sewerage system of the Burewala is designed as a combined system to cover about 60% area of the city. The system is comprised of approximately 178 km length of sewers with diameters ranging from 9 inch to

48 inch (R.C.C. pipes). There are 05 disposal stations (DS) in the city, 04 Nos. are operational while 1 DS is under Construction. The existing sewerage system is divided into three zones (Zone-1, Zone-2 & Zone 3). The wastewater from each zone is collected in DS and discharge in Sukh Bias Creek without any treatment. The Wastewater is also being used in agriculture fields without any treatment. There is no Wastewater Treatment Plant (WWTP) in Burewala City.

Existing sewerage system in Burewala City is equipped with the following assets.

- Sewer Lines
- Force Mains
- Disposal Stations

This project includes the improvement and / or construction of waste stabilization pond, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines
- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Table 1-2, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Rehabilitation of disposal stations	04 Nos.
2.	Laying of force main	14,240 ft.
3.	Construction / rehabilitation of sewer lines	6,886 ft.
4.	Construction of Wastewater Treatment Plant	01 No.

1.9 Location

The project is located in Burewala City Punjab. Burewala is a Tehsil Headquarter of Vehari District in southern Punjab, Pakistan. It is located at 30°10'0 N and 72°39'0 E and has an altitude of 133 meters. Burewala is situated on the Multan-Vehari-Depalpur Road. Sutlej River crosses Burewala Tehsil near the towns of Jamlera and Sahuka. It is located at 35 km at North East of District Headquarter Vehari and is the second biggest tehsil of Punjab. Location map of MC Burewala is given below in **Figure 1-1**;

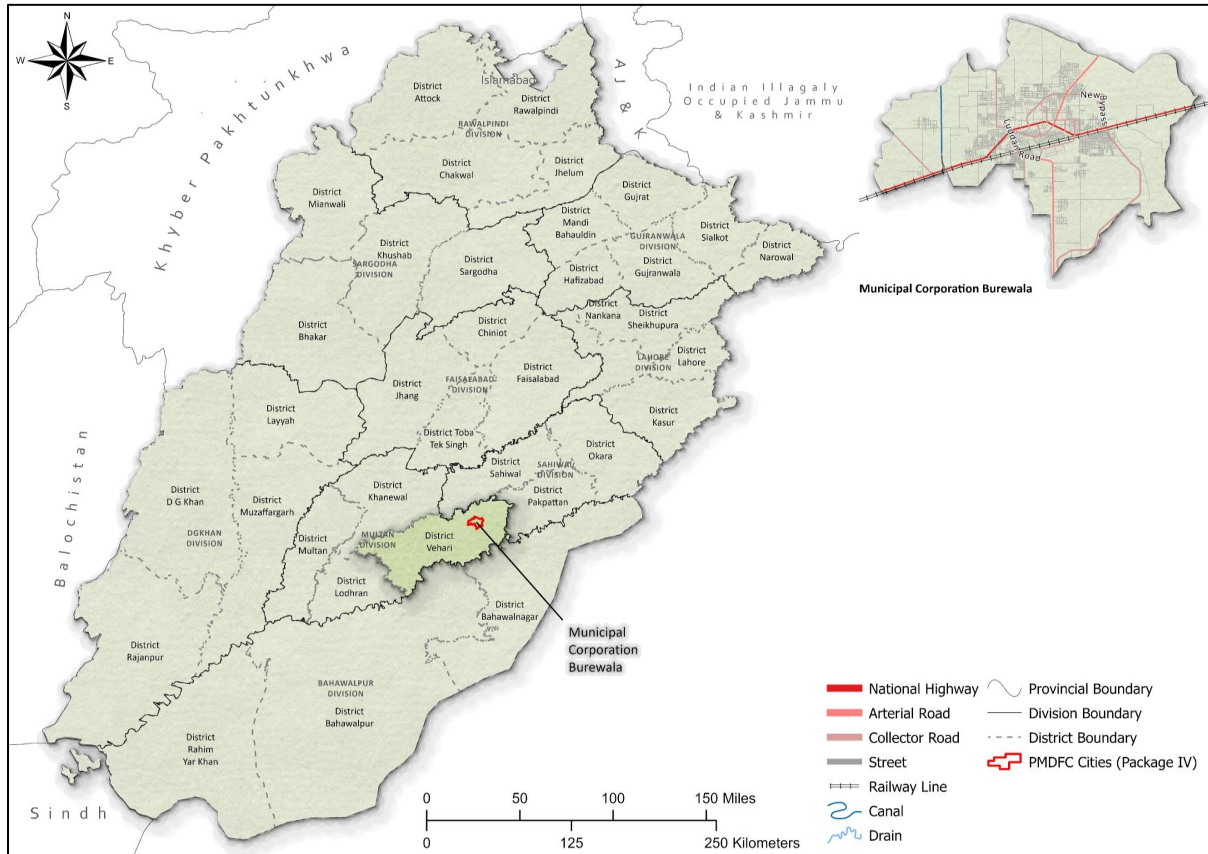


Figure 1-1, Location Map of MC Burewala

1.10 Approach & Methodology to Work

1.10.1 Approach

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

1.10.2 Methodology

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

A) Orientation

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

B) Data Collection Planning

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

C) Detailed Field Survey

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

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

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

D) Sampling & Analysis of Physical Environmental Parameters

Asian Environmental Services Private Limited, which is an EPA certified laboratory, was hired for physical environmental sampling and mobilized on October 08, 2023 for sampling and analysis of air, water and noise quality. Samples were collected from two (02) locations for analysis in the laboratory.

E) Review of Secondary Data

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

- **Physical Environment:** topography, geology, soils, surface and ground water resources and climate;
- **Biological Environment:** habitat types, flora and fauna (particularly rare or endangered species), critical habitats/zones and vegetation communities within the project area;

- **Socio-economic Environment:** settlements, socio-economic conditions, infrastructure and land use.
- **Heritage Aspects:** sites of cultural, archaeological or historical significance.

F) Corridor of Impact (COI)

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

G) Stakeholder Consultations

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

H) Environmental and Social Impact Assessment

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

- Overlay Mapping
- Screening Checklists
- Impacts matrix

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

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

An ESMMP for the proposed project activities is prepared. The ESMMP provides a plan for implementing and managing the mitigation and

monitoring measures recommended in the ESIA. The ESMMP includes the following:

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

1.11 Structure of Report

The structure of this report is listed below:

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

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

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

Section 4: Analysis of Alternatives enlists possible design, site / location alternatives for Improvement and Extension of Sewerage System in Burewala City, and their influence of environment and social situation.

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

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

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

Section 8: Environmental and Social Management and Monitoring Program outlines organizational framework, mitigation and monitoring plans training

requirements, defines roles and responsibilities, estimates budgets requirements for satisfactory implementation.

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

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

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

1.12 ESIA Team

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

The team of experts are given as under:-

Table 1-3, List of Team Members

Sr. No.	Team Member	Position Held	Qualifications
1.	Aleem Butt	Chief Environmentalist, Team Leader – ESIA	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; M.Sc. Environmental Sciences, Punjab University (PU), Lahore; NEBOSH, Lead Auditor
2.	Noman Ashraf	Environmental Specialist	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; PGD, Environmental Law, University of the Punjab, Lahore
3.	M. Umair Iqbal	Environmental	BS Environmental Science, Government College University, Faisalabad
4.	Engr. Maryam	Environmental Engineer	BE Environmental Engineering, University of Engineering and Technology (UET), Lahore
5.	Waqar Saleem	Sociologist and Resettlement Specialist	M.Phil. Sociology, University of Sargodha
6.	Asma Butt	Sociologist	M.Phil. Sociology, University of Punjab
7.	Muhammad Ibrar	Ecologist	M.Phil. Zoology, University of Punjab
8.	Sajjad Hussain	Chief Chemist	M.Phil. Chemistry, Govt. College University, Lahore

SECTION - 2: REGULATORY AND POLICY FRAMEWORK

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

2.1 National and Provincial Legislative Framework

Table 2-1, National and Provincial Legislative Framework

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
1.	National Environmental Policy 2005	In March 2005, Government of Pakistan (GoP) launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.	The core areas that are relevant in the context of the proposed project are pollution prevention during construction and conserving biodiversity and forestry.
2.	Punjab Environmental Protection Act, 1997 (Amended 2012)	The Punjab Environmental Protection Act, 1997 (Amended, 2012 & 2017) is comprehensive legislation and provides the legislative framework for protection, conservation, rehabilitation and improvement of the environment. The 'environment' has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures,	The provision of the act is applicable to proposed project for conducting an IEE / EIA according to section 12 and to obtain environmental approval from the EPA. The section 11 of the act is applicable in term of compliance with Punjab Environmental Quality Standards (PEQS). Similarly, section 13 of the act prohibits the import of hazardous waste.

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

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.	
3.	Punjab Environmental Quality Standards (PEQS), 2016	PEQS promulgated recently in 2016. Specified standards under PEQS are for: • Drinking Water; • Ambient Air; • Noise; • Industrial Gaseous Emissions; • Municipal and Liquid Industrial Effluents; • Motor vehicle exhaust and noise; and • Treatment of Liquid and Bio-Medical Waste	
4.	Punjab Environmental Protection, (Review of IEE and EIA) Regulations, 2022	These regulations set out: • Key policy and procedural requirements for filing an EIA; • The purpose of environmental assessment; • The goals of sustainable development; • The requirement that environmental assessment be integrated with feasibility studies; • The jurisdiction of the Federal and Provincial EPA's and Planning & Development (P&D) Departments; • The responsibilities of proponents; • Duties of responsible authorities; • Provides schedules of proposals that the project requires either IEE or an EIA; • The environmental screening process of the projects under schedule I, II and III; and • The procedure for the environmental approval	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 MC Burewala to follow the procedure to file an Environmental study with Punjab-EPA and to understand its review process along with timelines to be followed.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		for filing the case with the concerned EPA for the granting of the NOC.	
5.	Pakistan Penal Code, 1860	The Code deals with the offences where public or private property or human lives are affected due to intentional or accidental misconduct of an individual or organization. The Code also addresses control of noise, noxious emissions and disposal of effluents.	The provisions of the Penal Code, 1860 are applicable to the project in terms of penalties for effecting human lives and public property. It also addresses the control of noise, air emissions and effluent disposal.
6.	The Canal and Drainage Act 1873 and amendment 2016	The Canal and Drainage Act 1873 (CDA) focuses 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 wilfully damaged or obstructed the canal or "rendered it less useful."	This act will be applicable as the project is for improvement and extension of sewerage system in Burewala city.
7.	Punjab Municipal Water Act, 2014	The basic aim of the Act is to recognize, regulate and manage present and future municipal water supply and sanitation services and to establish rights of access to basic water supply and basic sanitation, and to ensure conservation of water resources in the province. This Act is in draft stage.	This Act will elicit if there is misappropriation of water supply during construction activities and also due to sanitation services.
8.	Motor Vehicle Rules 1969	It defines powers and responsibilities of Motor Vehicle Examiners (MVEs). The establishment of MVE inspection system is one of the regulatory measures	This act is applicable to the gaseous emission that will be released from project vehicles.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		that can be taken to tackle the ambient air quality problems associated with the vehicular emissions during operation phase.	
9.	Pakistan Labour Policy, 2010	The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts: • Legal Framework; • Advocacy: rights of workers and employers; • Skill development and employment; and • Manpower export	This act is applicable to protect the rights of labor involved in project implementation.
10.	The Bonded Labour System (Abolition) ACT 1992	According to this act, forced labour is any type of work or kind of service in which someone engages involuntarily and under implied coercion a manifest threat of a party or oppression measures. The bonded labour can exist in following forms under different situations: • Bonded labour in exchange of advance / an amount of money given before services are rendered, received by a person or his family. • Bonded labour as a consequence of some social or customary obligations. • Bonded labour in exchange of an economic benefit / consideration received by a person or his family, • Bonded labour of a guarantor in exchange for debtor who was unable to pay off his debt. Bonded labour is prevalent in agriculture sector, brick kilns, domestic work and begging.	This act is applicable to protect the rights of labor involved in the project implementation.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
11.	Punjab Forest Act (Amended), 2010	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. There is no protected forest situated in and around the Project area.	This act provides guidelines to protect the trees present around the project corridor.
12.	Employment of Child Act 1991	Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any construction, or any other hazardous employment. In accordance with this Article, the Employment of Child Act 1991 prohibits child labour (a child is under 14 years old).	The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.
13.	The Land Acquisition Act, 1894	The Land Acquisition Act, 1894, is a "law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition". The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements 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	This act applies to the projects which requires land acquisition. This project does not require land acquisition as the project will be constructed / developed on govt. land.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		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.	
14.	The Punjab Land Acquisition Rules, 1983,	It describes the land acquisition procedure for public purposes or for a company.	This act applies to the projects which requires land acquisition. This project does not require land acquisition as the project will be constructed / developed on govt. land.
15.	Provincial Wildlife Act, 1974	The Punjab Wildlife Act (1974) is developed for the regulation of activities relating to protection, conservation and management of wildlife in Punjab.	This act will not trigger as no wildlife will be disturbed.
16.	Pakistan Antiquities Act 1975 and Punjab Antiquities Amendment Act 2012	The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The Antiquities Act, 1975 (amended in 1990) states the following: • "Ancient" is any object that is at least 75 years old; • All accidental discoveries of artefacts must be reported to the Federal Department of Archaeology; • The Government is the owner of all buried antiquities discovered on any site, whether protected or otherwise; • All new construction within a distance of 200 feet from protected antiquities is forbidden; • No changes or repairs can be made to a	The law will be applicable to the project mainly due to its two provisions: • According to the law, any construction activity within 61 meter or 200 ft. of protected antiquities, are prohibited. • The provisions of this act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the construction of proposed project.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		protected monument, even if it is owned privately, without approval of the responsible authorities; and The cultural heritage laws of Pakistan are uniformly applicable to all categories of sites regardless of their state of preservation and classification as monuments of national or world heritage.	
17.	The Punjab Special Premises (Preservation) Ordinance, 1985	It is expedient to preserve certain premises of historical, cultural and architectural value in the Punjab and to control and regulate alterations therein and demolition and re-erection thereof and for matters 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.
18.	Katchi Abadis Act, 1987	The Katchi Abadis Act covers the urban squatter's rehabilitation rights by providing plots in public resettlement areas or cash assistance.	This act applies to the projects which requires land acquisition. This project does not require land acquisition as the project will be constructed / developed on govt. land.
19.	Land Revenue Act, 1967	Determination of disputes under section 44 of LR Act 1967 sub-section (2) If in any such dispute, the Revenue Officer is unable to satisfy himself as to which of the parties thereto is in possession of any property to which the dispute relates, he shall (a) if he be not below the rank of Assistant Collector of the first grade, ascertain, after an inquiry in which an opportunity shall be given to all the parties, to the dispute of being heard and adducing evidence in support of their claims, who is the person best entitled to the property, and shall by written order direct that the person be put in possession thereof, and that	This act applies to the projects which requires land acquisition. This project does not require land acquisition as the project will be constructed / developed on govt. land.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		entry in accordance with that order be made in the record or register; and (b) if he be below the rank of Assistant Collector of the first grade, report the matter to the Assistant Collector of the first grade, who shall thereupon proceed in the manner provided in clause (a). (3) A direction under sub-section (3) shall be subject to any decree or order which may be subsequently passed by any Court of competent jurisdiction.	
20.	Punjab Alienation of Land Act, 1900	Under section 13, sub-section 11 of Punjab Alienation of Land Act 1900: Any member of an agricultural tribe may make a lease or farm of his land for any term not exceeding twenty years, and any lease or farm made by a member of an agricultural tribe for a longer term than twenty years shall if the lessee or farmer is not a member of the same tribe or of a tribe in the same group, be deemed to be a lease or farm for the term permitted by this section. Under section 13, sub-section 12. (1) During the currency of a mortgage made under section 6 in form (a) or form (b) or of a lease or farm under this Act, the owner shall be at liberty to make a further temporary alienation of the same land for such term as together with the term of the current mortgage, lease or farm will make up a term not exceeding the full term of twenty years.	This act applies to the projects which requires land acquisition. This project does not require land acquisition as the project will be constructed / developed on govt. land.
21.	Colonization of Government Lands Act, 1912	This Act shall, unless the Provincial Government, otherwise directs, apply to land to which the provisions of the Government Tenants (Punjab) Act	This act will be triggered as WWTP and pipelines are proposed at the government lands.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		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.	
22.	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.
23.	The West Pakistan Maternity Benefit Ordinance, 1958	The West Pakistan Maternity Benefit Ordinance of 1958 was a legislation enacted in the former state of West Pakistan, which is now part of present-day Pakistan. The ordinance was established to provide maternity benefits to women in employment. The ordinance mandated that every woman employed in an establishment was entitled to maternity benefits, including paid leave before and after childbirth. The main provisions of the ordinance included:	The relevance of this act to the project will be to facilitate pregnant women worker.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		Duration of Maternity Leave: Twelve weeks (06 weeks before the expected date of childbirth and 06 weeks after the childbirth). Payment During Maternity Leave: During the maternity leave, the female employee is entitled to receive her full wages. Medical Allowance: The employer is also responsible for paying a medical bonus of a certain amount to the pregnant woman. Job Protection: A woman availing maternity leave cannot be terminated from her job during her absence due to pregnancy. Limitation on Heavy Work: Prohibits employers from assigning heavy or dangerous work to pregnant women during the pregnancy and for a specified period after childbirth. Notice Requirement: An employee intending to avail maternity leave must provide her employer with a notice stating the expected date of childbirth at least six weeks before taking leave.	
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 ESIA.
25.	Guidelines for Public Consultation, 1997	The Federal EPA provides these guidelines to deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures the incorporation of their concerns in any impact assessment study. These	This act will be applicable to this project as public consultation is an essential / mandatory part of ESIA.

Sr. No.	Act / Regulation	Description / Brief Coverage	Applicability / Relevance to the Project
		guidelines cover: • Consultation, involvement and participation of stakeholders • Effective public consultation (planning, stages of EIA where consultation is appropriate) • Facilitation involvement (including the poor, women and Non-Governmental Organizations (NGOs))	

2.2 Comparison of International and Local Environmental Legislations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 2-5, Maximum Permissible Construction Phase Vibration Levels

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

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

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

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

Sr. No.	Parameters	Units	PEQS	WHO Standards
1.	Temperature (During Sample Collection)	OC	NS	NS
2.	Colour	Pt-Co	≤15TCU	<15TCU
3.	pH	pH unit	6.5-8.5	6.5-8.5
4.	Turbidity	NTU	<5	<5
5.	Total, Hardness	mg/L	<500.00	NS
6.	Total Dissolved Solid (TDS)	mg/L	<1000.00	<1000.00
7.	Total Suspended Solid (TSS)	mg/L	NS	NS
8.	Ammonia	mg/L	NS	NS
9.	Fluoride F-	mg/L	<1.50	1.50
10.	Sulfate (SO ₄ -2)	mg/L	NS	NS
11.	Chloride (Cl-)	mg/L	<250.00	250
12.	Nitrate (NO ₃)-	mg/L	<50.00	50.00
13.	Odor	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable
14.	Taste	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable
15.	Sodium	mg/L	NS	NS
16.	Iodine	ppm	NS	NS
17.	Arsenic (As)	mg/L	< 0.05	0.01
18.	Iron (Fe 3+)	mg/L	NS	NS
19.	Zinc (Zn 2+)	mg/L	5.0	3.0
20.	Conductivity	μS/cm	NS	NS
21.	Bicarbonate	mg/L	NS	NS
22.	Nitrite	mg/L	<3	3
23.	Magnesium	mg/L	NS	NS
24.	Calcium as Ca	mg/L	NS	NS
25.	Phosphate	mg/L	NS	NS
26.	Potassium	mg/L	NS	NS
27.	Boron	mg/L	<0.3	0.3
28.	SAR Iodine (I)	mg/L	NS	NS
29.	Aluminum	mg/L	< 0.2	0.2
30.	Antimony	mg/L	<0.005	0.02
31.	Cadmium	mg/L	0.01	0.003
32.	Mercury	mg/L	<0.001	0.001
33.	Nickel	mg/L	<0.02	0.02
34.	Selenium	mg/L	0.01	0.01

Sr. No.	Parameters	Units	PEQS	WHO Standards
35.	Barium	mg/L	0.7	0.7
36.	Total Chromium	mg/L	<0.05	0.05
37.	Copper	mg/L	2	2
38.	Lead	mg/L	<0.05	0.01
39.	Cyanide (CN)	mg/L	<0.05	0.07
40.	Manganese	mg/L	<0.5	0.5
41.	Total Coliforms	cfu/100ml	0/100 ml	0/100 ml
42.	Fecal Coli forms (E.Coli)	cfu/ml	0/100 ml	0/100 ml

NS = Not Specified

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

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

Sr. No.	Parameters	Units	PEQS (Regional)	WHO Class – V (Agriculture)	FAO Standards
1.	Temperature	OC	--	--	--
2.	pH	pH unit	6-9	<5.3	6.0-8.5
3.	COD	mg/L	150	>30	--
4.	(BOD ₅)	mg/L	80	--	--
5.	Solids, Total Dissolved (TDS)	mg/L	3500	--	0-2000
6.	Solids, Total Suspended (TSS)	mg/L	200	--	--
7.	Chloride	mg/L	1000	--	0-1065
8.	Fluoride (F-)	mg/L	10	--	--
9.	Oil & grease	mg/L	10	--	--
10.	Phenols, Total (Phenolic Compounds)	mg/L	0.10	--	--
11.	Cyanide (CN-)	mg/L	01.00	--	--
12.	Anionic Detergents as MBAS	mg/L	20.00	--	--
13.	Sulfate (SO ₄ ⁻²)	mg/L	600	--	0-960
14.	Sulfide (S)	mg/L	01.00	--	--
15.	Ammonia NH ₃	mg/L	40.00	--	--
16.	Cadmium (Cd)	mg/L	0.10	>0.0039 mg/L	--
17.	Chromium (Cr) as Hexavalent & Trivalent	mg/L	1.00	>0.016 mg/L	--
18.	Copper (Cu)	mg/L	1.00	>0.018 mg/L	--
19.	Lead	mg/L	0.50	>0.082 mg/L	--

Sr. No.	Parameters	Units	PEQS (Regional)	WHO Class – V (Agriculture)	FAO Standards
20.	Nickel	mg/L	1.00	>1.4 mg/L	--
21.	Zinc	mg/L	5.00	>0.12 mg/L	--
22.	Iron	mg/L	8.00	--	--
23.	Manganese	mg/L	1.50	--	--
24.	Selenium	mg/L	0.50	--	--
25.	Silver	mg/L	1.00	--	--
26.	Arsenic	mg/L	1.00	>0.36 mg/L	--
27.	Barium	mg/L	1.50	--	--
28.	Magnesium	mg/L	--	--	0-61
29.	Nitrate	mg/L	--	--	0-10
30.	Sodium	mg/L	--	--	0-920
31.	Boron	mg/L	6.00	--	0-2
32.	Mercury	mg/L	0.01	>0.0024 mg/L	--
33.	Chlorine	mg/L	01.00	--	--
34.	Total Toxic Metals	mg/L	02.00	--	--
35.	Turbidity	NTU	NS	--	--
36.	Oxygen, Dissolved	mg/L	NS	--	--
37.	Pesticides	µg/L	NS	--	--
38.	Nutrients as Potassium	mg/L	--	--	0-2
39.	Nutrients as Nitrogen	mg/L	--	--	--
40.	Nutrients as Phosphorous	mg/L	--	--	--
41.	Total Coliform	MPN/100ml	--	--	--
42.	Fecal Coliform	MPN/100ml	--	--	--

NS = Not Specified

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

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

2.3 International Laws / Treaties

2.3.1 The World Bank's Operational Policies

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

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

Safeguard Policy	Triggered?	Explanation
Environmental Assessment OP / 4.01	Yes	This project has been categorized as 'Category E-1'. The project activities under this category may potentially cause negative environmental and social impacts. The project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.
Physical Cultural Resource OP / 4.11	No	The project does not lie in any near any cultural and heritage resource therefore OP 4.11 will not be triggered.
Involuntary Resettlement OP / 4.12	Yes	OP 4.12 is triggered, although this project does not land acquisition but resettlement / compensation for private assets is anticipated, therefore Abbreviated Resettlement Plan (ARAP) is prepared.

2.3.2 World Bank Environmental, Health and Social Guidelines

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

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

Labor's SOPs are attached as Annexure-14.

2.3.3 World Bank Policy Core Principles and Applicability on Project

Core Principles	Applicability
Core Principle 1 Environmental and social management procedures and processes are designed to; (a) avoid, minimize, or mitigate against adverse impacts; (b) promote environmental and social sustainability in program design; and (c) promote informed decision making relating to a program's environmental and social effects.	ESIA prepared under the light of this Principle in order to mitigate negative impacts envisaged in this project. ESMMP implementation and monitoring arrangements of ESIA will help in achieving environmental and social sustainability.
Core Principle 2 Environmental and social management procedures and processes are designed to avoid, minimize, and mitigate against adverse effects on natural habitats and physical cultural resources resulting from the program.	Table 8-2 prepared to mitigate all impacts anticipated during the course of the project.
Core Principle 3 Program procedures ensure adequate measures to protect public and worker safety against the potential risks associated with (a) construction and / or operations of facilities or other operational practices developed or promoted under the Program and (b) exposure to toxic chemicals, hazardous wastes, and otherwise dangerous materials	All the mitigation measures have been incorporated in the Table 8-2 to address risks associated with workers and community health and safety. Contractor will ensure compliance with these attributes.
Core Principle 4 Land acquisition and loss of access to natural resources are managed in a way that avoids or minimizes displacement, and affected people are assisted in improving, or at least restoring, their livelihoods and living standards	This core principle is triggered, although this project does not require land acquisition but resettlement / compensation for assets is anticipated in this project.
Core Principle 5 Due consideration is given to cultural appropriateness of, and equitable access to, program benefits, giving special attention to rights and interests of indigenous peoples and to the needs or concerns of vulnerable groups.	This core principle is triggered in this project as, during the survey, it was identified that Mrs. Mubeen Fatima (Hier) is a vulnerable person as the parent of a disabled child.
Core Principle 6 Avoid exacerbating social conflict,	This principle doesn't trigger in this project.

especially in fragile states, post-conflict areas, or areas subject to territorial disputes.	

2.3.4 The World Bank's Environmental Code of Practices

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

- ECP 1: Waste Management
- ECP 2: Fuels and Hazardous Substances Management
- ECP 3: Water Resources Management
- ECP 4: Drainage Management
- ECP 5: Soil Quality Management
- ECP 6: Erosion and Sediment Control
- ECP 7: Borrow Areas Development and Operation
- ECP 8: Air Quality Management
- ECP 9: Noise and Vibration Management
- ECP 10: Protection of Flora
- ECP 11: Protection of Fauna
- ECP 12: Protection of Fisheries
- ECP 13: Road Transport and Road Traffic Management
- ECP 14: Construction Camp Management
- ECP 15: Cultural and Religious Issues
- ECP 16: Workers Health and Safe

SECTION - 3: SCREENING AND SCOPING OF PROJECT

3.1 Screening of the Project

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

As per ESMF of PCP, the projects under the scope of Waste Management which involves construction of wastewater treatment plants will fall in category E1 and may require to conduct Environmental & Social Impact Assessment (ESIA) study as per scope of work and environmental impacts.

According to the Review of IEE and EIA Regulations, 2022, the project falls under Schedule II (List of projects requiring an EIA), Category F (Water supply, Sewerage System and treatment), sub-clause (Wastewater channels / Sewerage System Schemes).

This project involves construction of 01 wastewater treatment plant, construction / rehabilitation of 6,886 ft. sewer lines, desilting of particular sewer lines, rehabilitation of 04 disposal stations and laying of 14,240 ft. force main.

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

Resettlement / displacement is involved in this project as proposed land for the construction of WWTP (22 acres) is govt. owned but it was allotted to a family [Mr. Sarfraz Majeed (Late)(Allotted), Mr. Khalil Jibran (Hier), Mr. Arsalan Majeed (Hier), Mrs. Maleeha Zainab (Late)(Hier), and Mrs. Mubeen Fatima (Hier)] through tube well scheme in 1960s, as per consultation conducted with MC, concerned patwari and members of that family. There is a dairy farm constructed on the land, 03 rooms, a tube well installed and crops (wheat, corn, and cow food / chara) grown in 15 acres agriculture land. Therefore, the project is categorized as S2 for social perspective and an Abbreviated Resettlement Action Plan (ARAP) to be prepare.

3.2 Spatial and Temporal Boundaries of Environmental Assessment

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

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

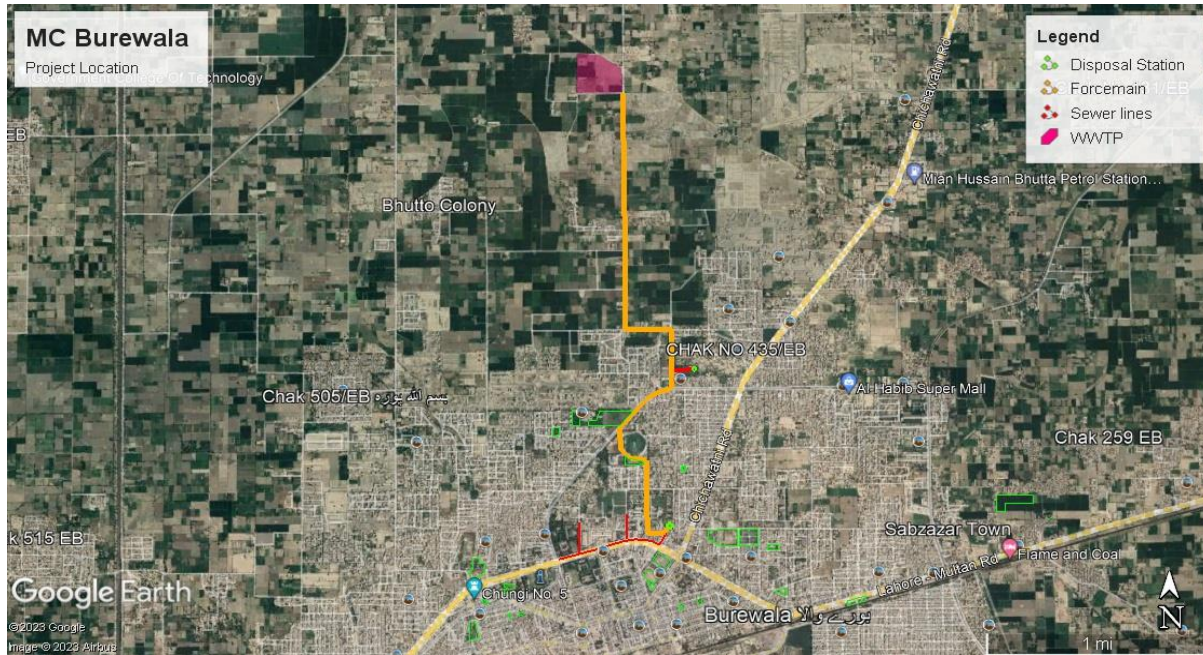


Figure 3-1, Google Map of the Project

3.3 Important Issues and Concerns Raised During Consultation

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

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

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

3.4 Significant Impacts and Factors to be Determined

- Resettlement / Compensation
- Livelihood disturbance
- Soil contamination and erosion
- Ground water contamination
- Air quality deterioration
- Noise
- Waste material

- Labor HSE issues
- Impacts on flora and fauna

SECTION - 4: ANALYSIS OF ALTERNATIVES

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

4.1 No Project Option (NPO) / No Project Alternative

This project is for the improvement / rehabilitation of existing sewerage system of MC Burewala and to construct wastewater treatment plant that will treat the wastewater before its final discharge.

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

4.1.1 Advantages of NPO

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

4.1.2 Disadvantages of NPO

Adopting NPO will generate more environmental, social and health issues in MC Burewala as untreated wastewater will be kept on discharging in open areas / agricultural field as usual, damaged / choked / blocked sewer lines will not be rehabilitated which is dire need of residents to rehabilitate them, disposal stations will not be rehabilitated / improved; adopting NPO will require much more resources to rectify the issues that can be resolved through this project.

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

4.2 Location Alternatives / Site Alternatives

Two (02) different sites were considered for construction of wastewater treatment plant for Burewala. As per design engineers of WWTP, almost 22 acres of land is required for construction of wastewater treatment plant in Burewala. Environmental & Social Experts along with WWTP Design Engineers visited the sites to check / finalize which site is more suited and feasible as per design and environmental & social perspectives. Details of these sites are given below;

4.2.1 Site-01

Site-01 is located near Chak 435-EB at the northern side of Burewala with direct distance of almost 2.5 km from the city. As per consultation and site visit, that land is private and crops are cultivated on the land. Location marked at Google Maps is given below;

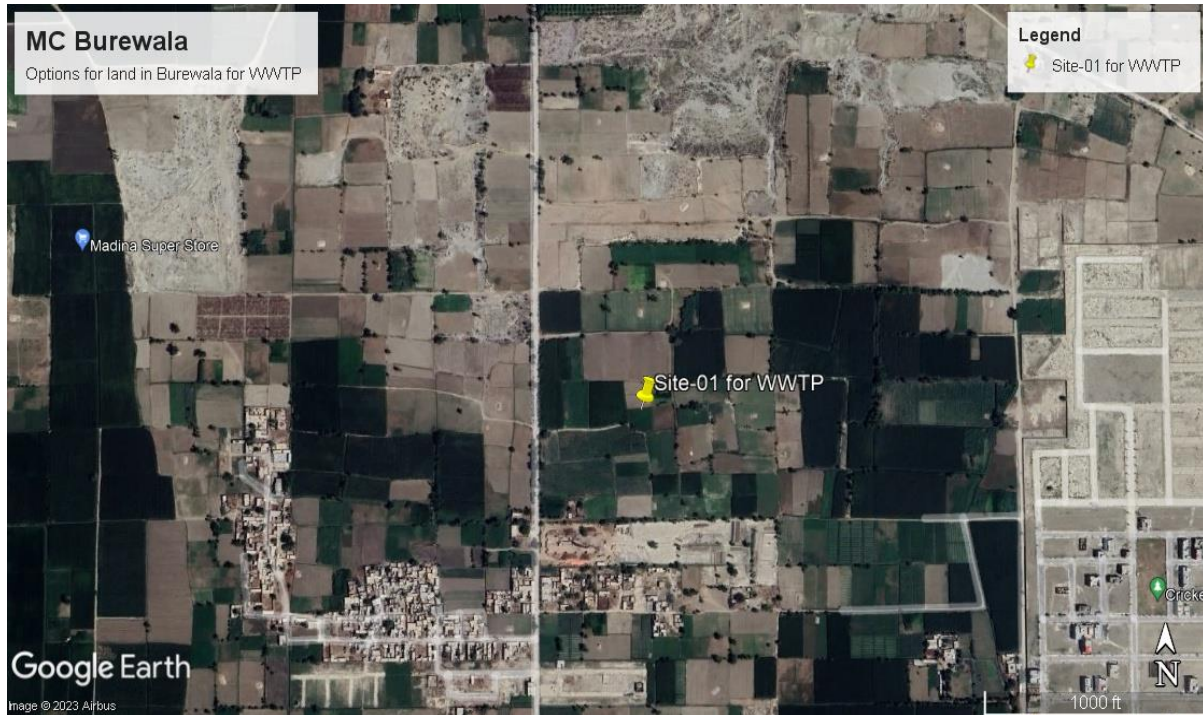


Figure 4-1, Site-01 for WWTP on Google Maps

4.2.2 Site-02

Site-02 is located near Chak 423-EB at northern side of MC Burewala with direct distance of almost 3.5 km. As per consultation conducted during site visit, that land is govt. owned but it was allotted to a family through tube well scheme in 1960s. Location marked at Google Maps and pictorial view of site are given below;

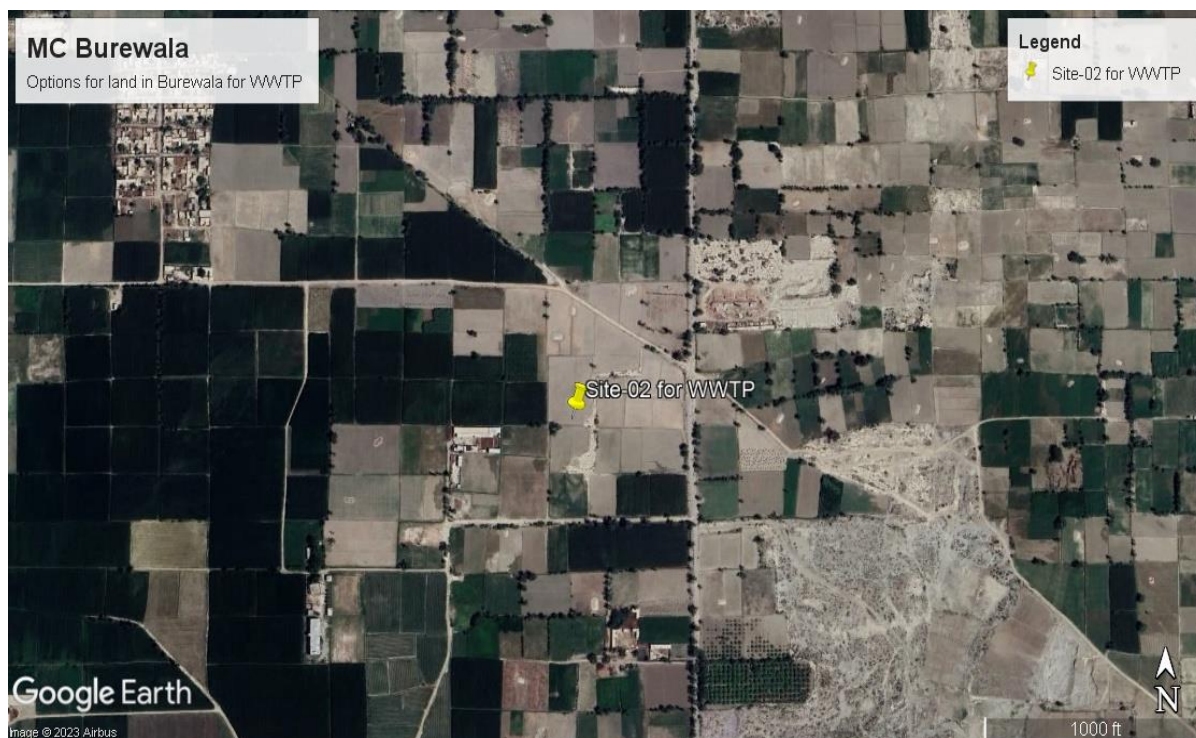


Figure 4-2, Site-02 for WWTP on Google Maps

4.2.3 Preferable Site for WWTP

Considering the design criteria, both sites are favourable for construction of WWTP but site-01 requires land acquisition and this site is surrounded by small settlements as well while site-02 is govt. land although it is allotted to a family but it will be transferred from revenue department to MC. Land acquisition for private land is an extensive and economic process, while resettlement / compensation to allottees on govt. land is not that much extensive / economic process, and construction of WWTP is a dire need of MC Burewala as per consultation conducted with local residents and MC; therefore, considering the environmental and social factors, it is determined that Site-02 is a more preferable location as compared to Site-01 for construction of wastewater treatment plant. Comparison of both sites is given under in **Table 4-1**;

Table 4-1, Comparison of WWTP Sites

Site-01	Site-02
Not Preferable	Preferable
- Entirely private land - Agricultural land - Crops are cultivated - Compensations to be provided for crops, livelihood and for land as well - Economically expensive as land acquisition for private land is required	- Entirely govt. land - Resettlement / compensation is required only for asset / structures on the land developed / built by allottees - No land acquisition is required - Not surrounded by settlements

Site-01	Site-02
Not Preferable	Preferable
and compensation has to be provided for livelihood, crops and land - Surrounded by small settlements - HSE related impacts on surrounding settlements (dust, noise, odor, accidents etc.)	

4.3 Design / Technology Alternatives

Various technological options are available in case of wastewater treatment plant. Based upon available and practically implemented alternative MBBR, Activated Sludge Process, Trickling Filters and Waste Stabilization Ponds are considered for comparison purpose. The detail of these technological options is given below;

4.3.1 Option I – Moving Bed Bioreactor (MBBR)

Moving Bed Bioreactors (MBBR) biologically treat wastewater through the use of circulating moving media in aerobic activated sludge environments. The moving media is typically a floating plastic substrate colonized by a community of bacteria called a biofilm. Increased levels of biofilm enhance the biological treatment process by introducing a more robust microbial community to break down nutrients. A high treatment capacity and low maintenance requirements make MBBR systems ideal to most industrial and sewage applications.

A) Advantages

- There are no limitations of height as long as compressors can be suitably used.
- Circular structures can be used to economize on construction costs & time.
- The structures can be easily covered for indoor air quality when needed.
- Requires lower footprints compared to conventional activated sludge.
- Easy to operate and maintain.

B) Disadvantages

- The area per unit volume of the media offered by various vendors is different and also each vendor advocates his own criteria for the relative ratio of volume of media to volume of aeration tank, which makes it difficult to bring about a common and validated standard design criteria.
- The quality of plastic of media varies.

- The verification of whether the media is moving about the entire volume of the tank or merely clumping at the top layers and if so the method of mixing it up through the tank volume without shearing of the biomass on it are issues of infirmity and which may need gentle movers of the media through the volume of the tank.
- Furthermore, the media is a patented product.
- Higher energy input if used without bio-methanation.

4.3.2 Option II – Activated Sludge Process

Activated Sludge Process is the most common suspended growth process used for municipal wastewater treatment. Activated Sludge Process involved:

- Wastewater aeration in the presence of a microbial suspension,
- Solid-liquid separation following aeration,
- Discharge of clarified effluent,
- Wasting of excess biomass, and
- Return of remaining biomass to the aeration tank.

In activated sludge process wastewater containing organic matter is aerated in an aeration basin in which micro-organisms metabolize the suspended and soluble organic matter. Part of organic matter is synthesized into new cells and part is oxidized to CO₂ and water to derive energy. In activated sludge systems the new cells formed in the reaction are removed from the liquid stream in the form of a flocculent sludge in settling tanks. A part of this settled biomass, described as activated sludge is returned to the aeration tank and the remaining forms waste or excess sludge.

The advantages and disadvantages of this technology are given below:

A) Advantages

- Retention time in reactor tank is relatively short resulting in lesser foot print.
- BOD removal rate is superior, 85-95%.
- Transparency of treated effluent is high.
- Stability in sewage temperature fluctuation is inferior in comparison with other methods.

B) Disadvantages

- Primary Sedimentation Tank is required to reduce loading.
- Sludge treatment facility is required.
- Generated sludge volume is larger than from other methods.
- The system has many maintenance and inspection points. Thus, advanced / complicated operational techniques are needed.
- Energy Consumption is more.

4.3.3 Option III – Trickling Filters

The Trickling Filter is an aerobic treatment system that utilizes microorganisms attached to a medium to remove organic matter from wastewater. These systems are known as attached-growth processes. The trickling filter consists of a cylindrical tank and is filled with a high specific surface area material, such as rocks, gravel, shredded PVC bottles, or special pre-formed plastic filter media. A high specific surface provides a large area for biofilm formation. Organisms that grow in the thin biofilm over the surface of the media oxidize the organic load in the wastewater to carbon dioxide and water, while generating new biomass. This happens mainly in the outer part of the slime layer, which is generally of 0.1 to 0.2 mm thickness.

The incoming pre-treated wastewater is 'trickled' over the filter, e.g., with the use of a rotating sprinkler. In this way, the filter media goes through cycles of being dosed and exposed to air. However, oxygen is depleted within the biomass and the inner layers may be anoxic or anaerobic.

The advantages and disadvantages of this technology are given below:

A) Advantages

- Simple & reliable process
- BOD removal rate is 80-90%
- Low energy requirement
- Less affected by sewage temperature fluctuation compared with Activated Sludge Method
- O&M is easy since no advanced / complicated operational technique is needed

B) Disadvantages

- Primary sedimentation tank must be installed to prevent clogging in the bio filter and distributor's nozzle
- A sludge treatment facility is needed as well
- Flies and odors are generated

4.3.4 Option IV – Waste Stabilization Ponds

Waste Stabilization Ponds (WSPs) are large, man-made water bodies in which blackwater, greywater or faecal sludge are treated by natural occurring processes and the influence of solar light, wind, microorganisms and algae. The ponds can be used individually, or linked in a series for improved treatment. There are three types of ponds, (1) anaerobic, (2) facultative and (3) aerobic (maturation), each with different treatment and design characteristics.

The advantages and disadvantages of this technology are given below:

A) Advantages

- Low cost for O&M
- Resistant to organic and hydraulic shock loads
- High reduction of solids, BOD and pathogens
- High nutrient removal if combined with aquaculture
- Low operating cost
- No electrical energy required
- No real problems with flies or odours if designed and maintained correctly
- Can be built and repaired with locally available materials
- Effluent can be reused in aquaculture or for irrigation in agriculture

B) Disadvantages

- Requires large land area
- High capital cost depending on the price of land
- Requires expert design and construction
- Sludge requires proper removal and treatment
- De-sludging (normally every few years)
- Mosquito control required
- If the effluent is reused, salinity needs to be monitored
- Not always appropriate for colder climates

4.3.5 Conclusion

After detailed analysis in terms of capital cost, O&M cost, site suitability, land area requirement, ease of maintenance, advantages & disadvantages and neighbourhood environment. The experts of design engineers and environmental & social experts decided to adopt Option-IV (Waste Stabilization Ponds – WSP) as a preferred technology over other technological option.

4.4 Environmental Alternatives

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

Overall, this project will lead to the improvement of environmental quality of project site as wastewater will be treated through WWTP / WSP before final discharge.

4.5 Economic Alternatives

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

SECTION - 5: DESCRIPTION OF THE PROJECT

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

5.1 Overview of the Project

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

"Improvement and Extension of Sewerage System in Burewala City"

This project includes the improvement and / or construction of waste stabilization pond, sewer lines, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines
- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Table 5-1, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Rehabilitation of disposal stations	04 Nos.
2.	Laying of force main	14,240 ft.
3.	Construction / rehabilitation of sewer lines	6,886 ft.
4.	Construction of Wastewater Treatment Plant	01 No.

5.2 Objectives of the Project

The project aims at improvement of infrastructure of municipal services including sewerage system for improved municipal service delivery.

The project comprises of the replacement of old, outlived, damaged or worn-out components in existing infrastructure for;

- Improvement of service delivery level of the municipal services in the served areas of the city for provision of better basic urban services for improved livability of the citizen.
- Reduction in annual O&M charges of the infrastructure due to reduced repairs in the forthcoming years because of repair or replacement of infrastructure components.
- Reduction and prompt addressal of the public complaints regarding municipal service delivery.
- Reduction in surcharging and overflowing of sewers thus reducing waste water ponding in the city. The objectives of the projects are in line with Sector Objectives.
- Construction of waste water treatment plant to avoid environmental hazards.

5.3 Location & Site Layout of the Project

The project is located in Burewala City Punjab. Burewala is a Tehsil Headquarter of Vehari District in southern Punjab, Pakistan. It is located at 30°10'0 N and 72°39'0 E and has an altitude of 133 meters. Burewala is situated on the Multan-Vehari-Depalpur Road. Sutlej River crosses Burewala Tehsil near the towns of Jamlera and Sahuka. It is located at 35 km at North East of District Headquarter Vehari and is the second biggest tehsil of Punjab. Project location map, site layout map and google map are given below in **Figure 5-1**, **Figure 5-2** and **Figure 5-3** respectively;

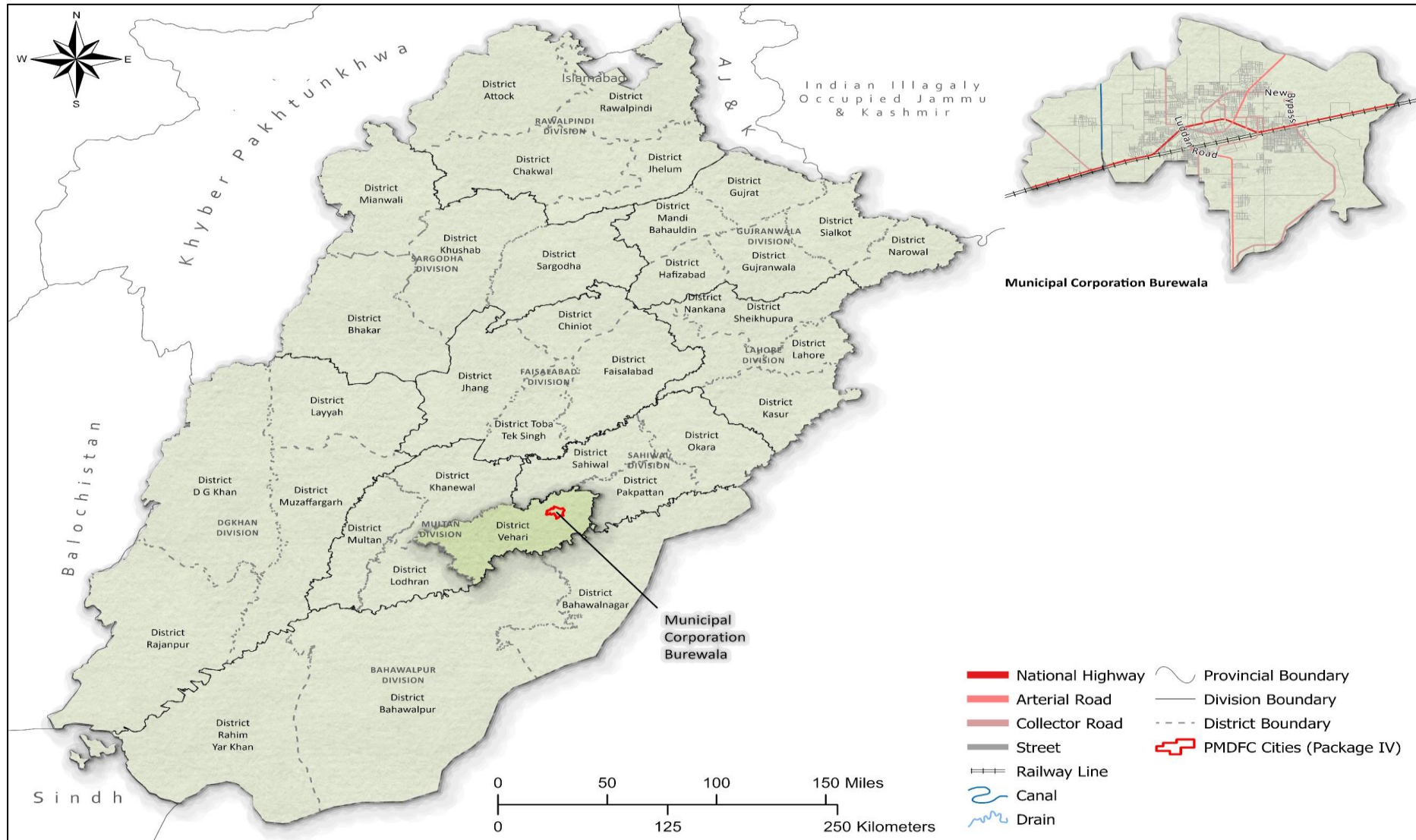


Figure 5-1, Project Location Map

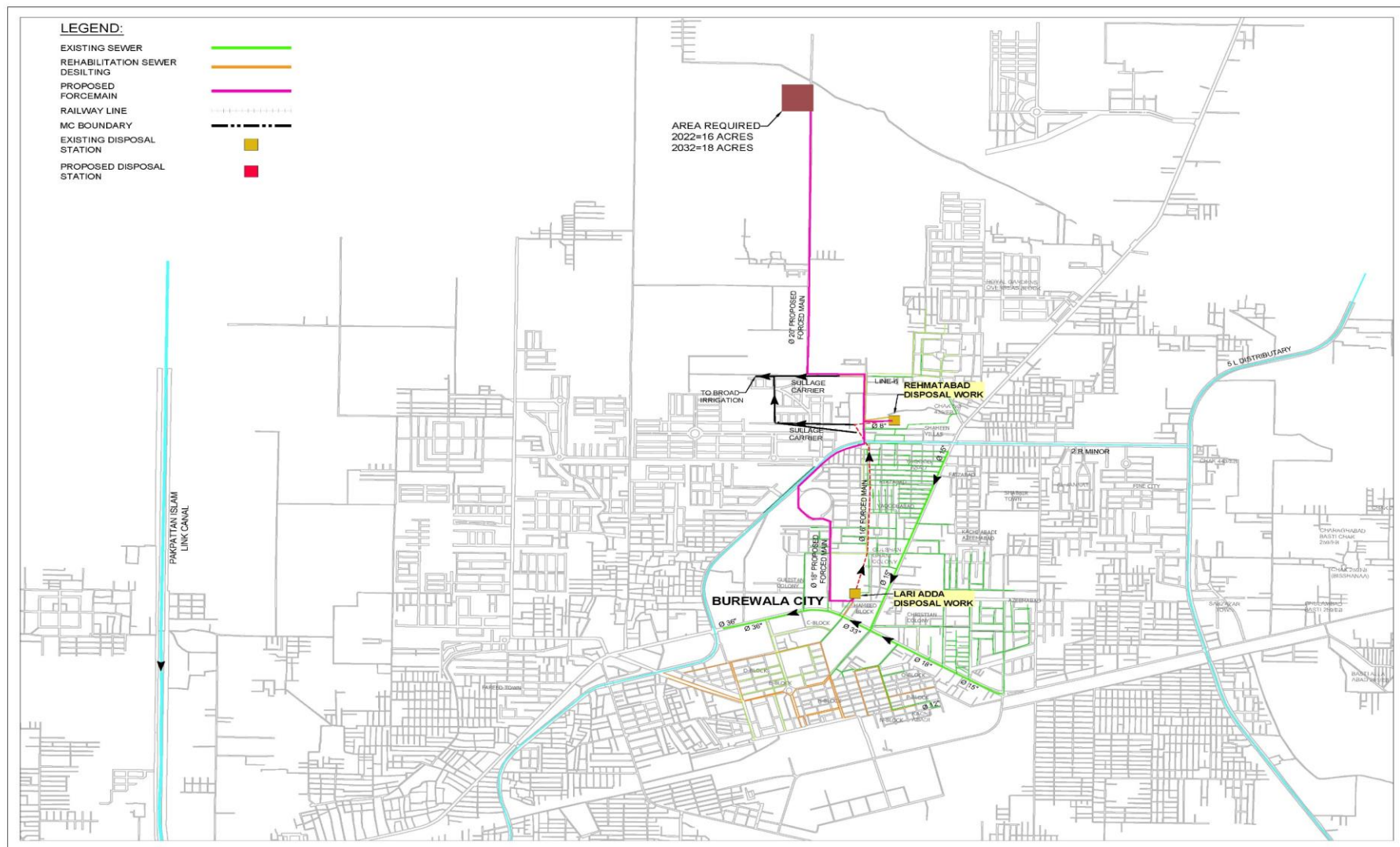


Figure 5-2, Project Layout Map

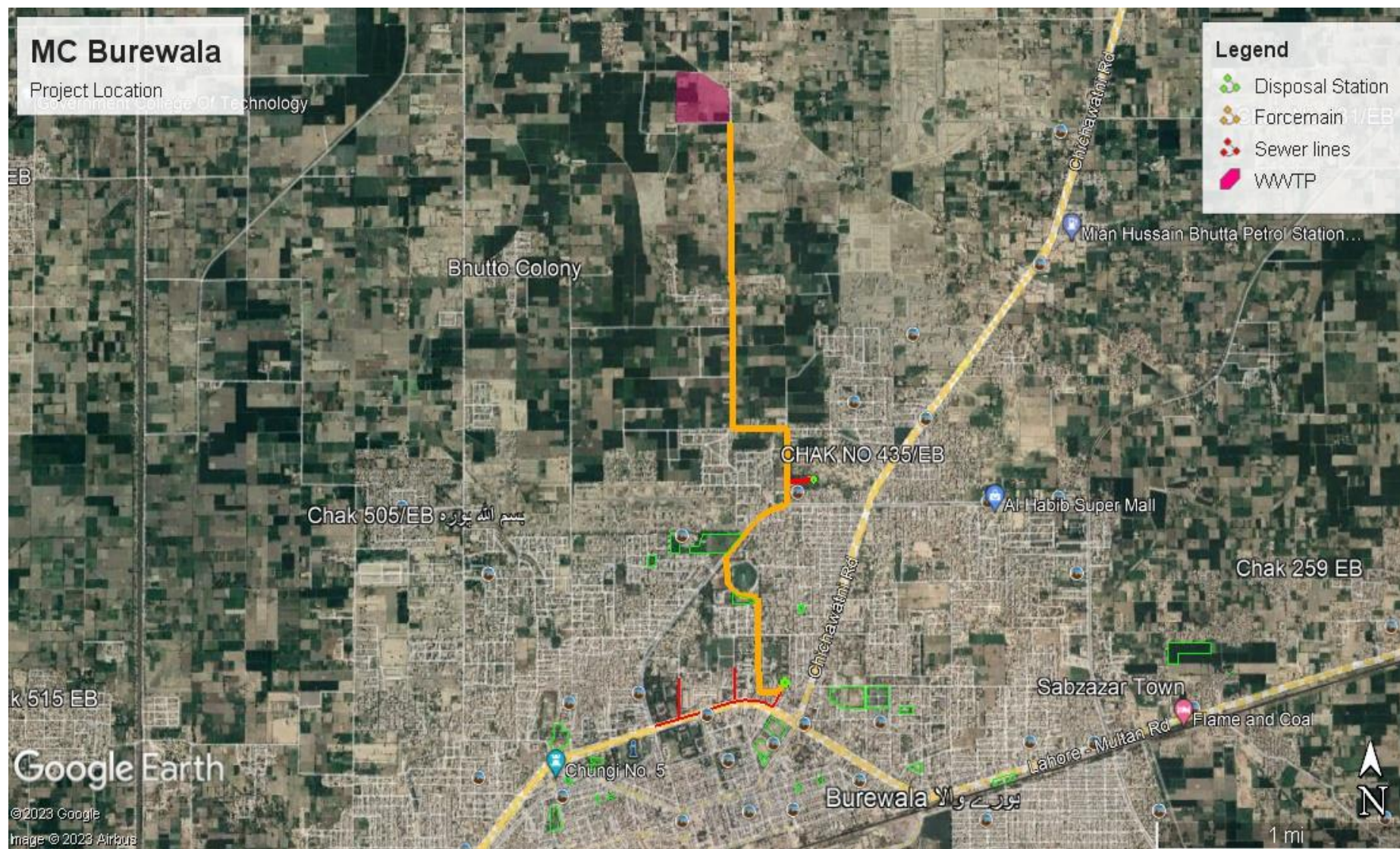


Figure 5-3, Project Google Map

The site has been selected on the recommendation of MC Burewala and PMDFC. 01 wastewater treatment plant will be constructed on govt. land near chak 423-EB at northern side of MC Burewala. Following 04 disposal stations will also be rehabilitated:

- Chak No. 451 EB Disposal Station
- Larri Adda Disposal Station
- Rehmat Abad Disposal Station
- Existing Multan Road Disposal Station

For taking the sewers to their full carrying capacity again these sewers will be desilted and cleaned. For this purpose, the total lengths of the sewers in various systems are given below. The table of de-silting lines are illustrated in **Table 5-2**.

Table 5-2, Estimated Length (Rft) of Existing Sewers in Sewerage System Burewala

Sr. No.	Disposal Station	48"	42"	36"	33"	30"	27"	24"	21"	18"	15"	12"	9"
1.	Chak No. 451/EB	14,200	6,650	2,250	1,010	1,020	6,100	13,700	2,590	8,350	2,750	61,800	107,720
2.	Multan Road Existing	—	15,200	—	12,040	12,250	1,760	3,320	1,170	19,400	19,260	42,580	206,690
3.	Larri Adda	—	—	—	—	—	—	—	—	—	—	1,800	530
4.	Rehmatabad	—	—	—	—	—	—	—	—	—	—	6,950	3,090
Total		14,200	21,850	2,250	13,050	13,270	7,860	17,020	3,760	27,750	22,010	113,130	318,030

It is assumed that 70% of these main sewers have choked and require desilting. The desilting of sewers from 15" dia to 42" dia is included in this project's PC-I. However, the sewers of 9" and 12" dia will be desilted by Municipal Unit Burewala by deployment of own labor as the winch machines for desilting of sewers are available with the Unit.

After desilting of all the sewers in all drainage areas of the sewerage system it will be assessed that if some of the sewers cannot be desilted then these will be replaced. The subsoil stratification beyond the depth of 2-3 feet in Burewala City is sandy and hence the replacement of the sewers will be very difficult and costly and should be avoided as far as possible. Only those sewers will be replaced wherein there is no other option left.

Particular sewer lines will also be constructed / rehabilitated. Detail of these sewer lines is given below **Table 5-3**;

Table 5-3, Construction / Rehabilitation of Sewer Lines

Sr. No.	Location	Length (ft.)	Proposed Work
1.	Rescue 1122 Bridge from College Hostel to Larri Adda Disposal Station	3,050	New line
2.	Janazahgah road to Multan Road	950	Old / Rehabilitation
3.	Gulistan Colony Street to Multan Road	630	Old / Rehabilitation
4.	Stadium Road to Multan Road	2,256	Old / Rehabilitation

5.4 Land-Use on the Site

This project includes construction of one wastewater treatment plant, laying of 14,240 ft. force main, construction / rehabilitation of 6,886 ft. sewer lines, rehabilitation / improvement of 04 existing disposal stations and desilting of particular sewer lines in Burewala.

Site of proposed wastewater treatment plant is located near Chak 423-EB in tehsil Burewala. As per consultation conducted with MC and concerned patwari, 22 acres of land is govt. owned which is proposed for the construction of WWTP.

Proposed land for the construction of WWTP (22 acres) is govt. owned but it was allotted to a family [Mr. Sarfraz Majeed (Late)(Allotted), Mr. Khalil Jibran (Hier), Mr. Arsalan Majeed (Hier), Mrs. Maleeha Zainab (Late)(Hier), and Mrs. Mubeen Fatima (Hier)] through tube well scheme in 1960s, as per consultation conducted with MC, concerned patwari and members of that family. There is a dairy farm constructed on the land, 03 rooms, a tube well installed and crops (wheat, corn, and cow food / chara) grown on 15 acres agriculture land. Location marked on Google Maps and pictorial view of site are given below;

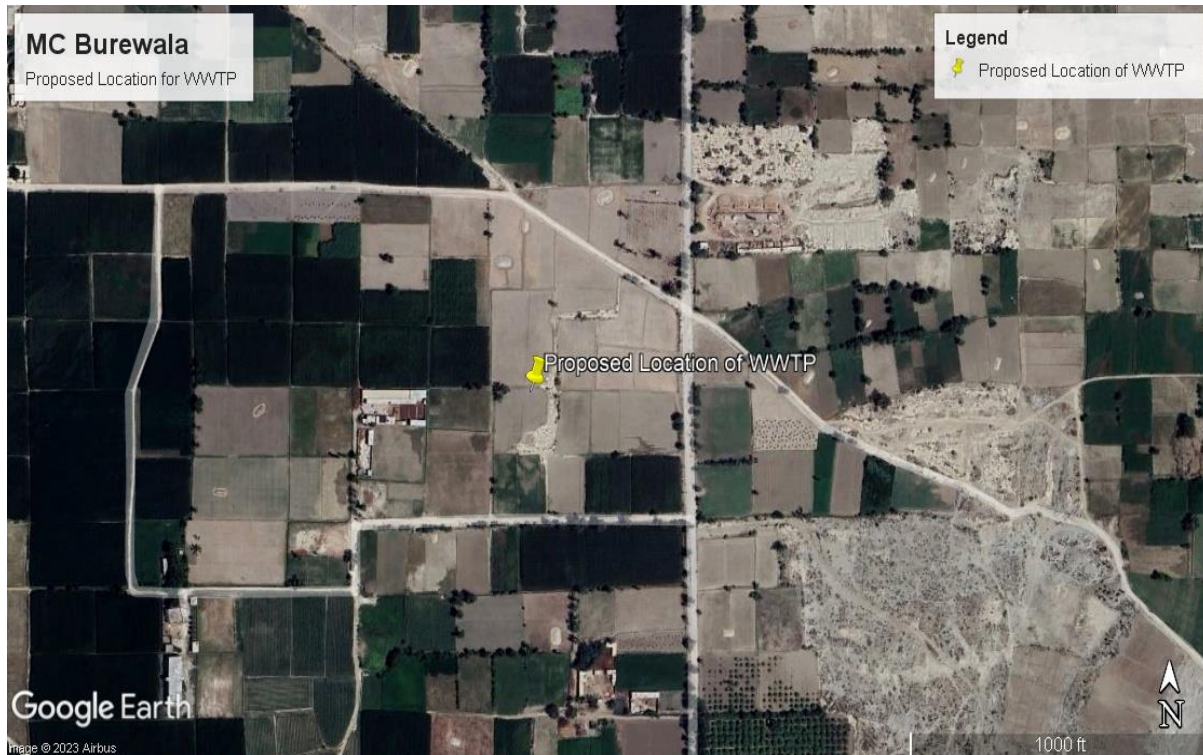


Figure 5-4, WWTP's Site on Google Maps

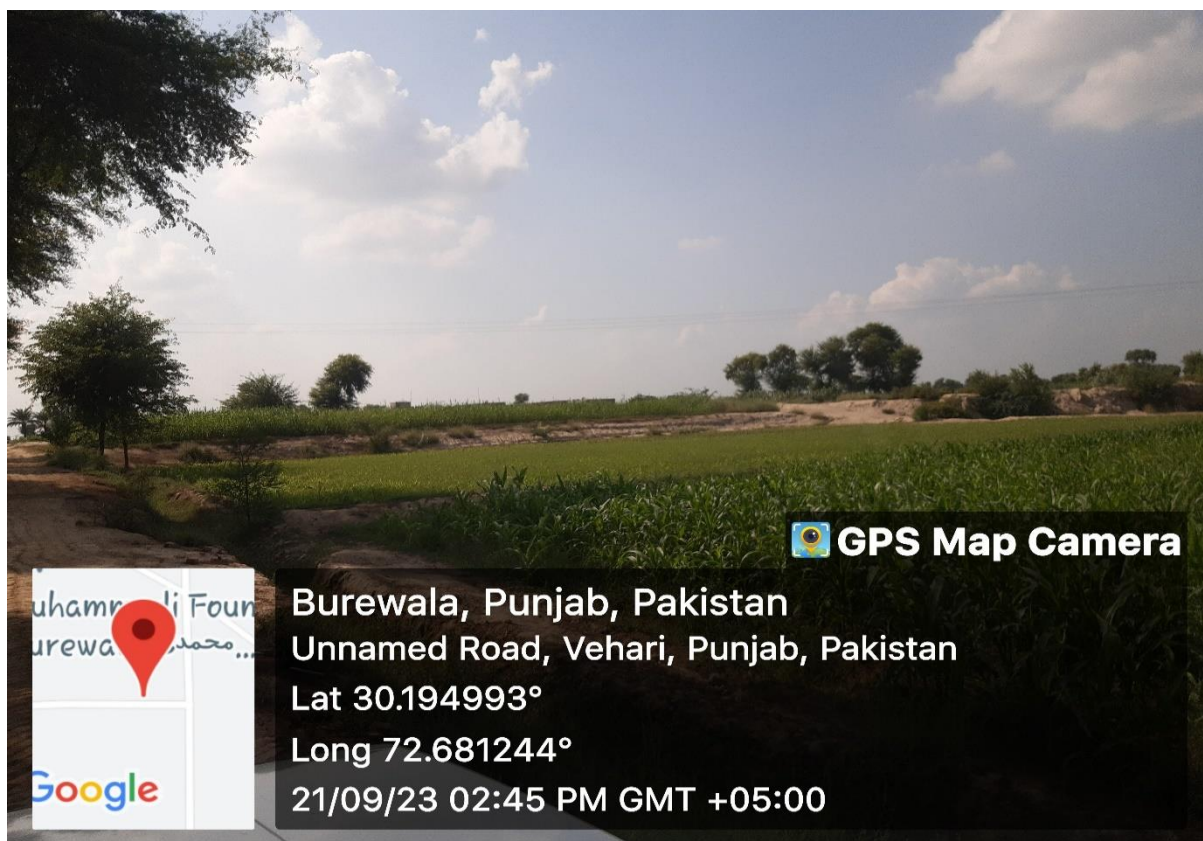


Figure 5-5, Pictorial View of WWTP's Site

Construction / rehabilitation of sewer lines (6,886 ft) are proposed in recommendation of MC / PMDFC, detail of sewer lines is as;

Sr. No.	Location	Length (ft.)	Proposed Work
1.	Rescue 1122 Bridge from College Hostel to Larri Adda Disposal Station	3,050	New line
2.	Janazahgah road to Multan Road	950	Old / Rehabilitation
3.	Gulistan Colony Street to Multan Road	630	Old / Rehabilitation
4.	Stadium Road to Multan Road	2,256	Old / Rehabilitation

Rehabilitation of following 04 existing disposal stations is also proposed in this project;

- Chak No.451 EB Disposal Station
- Larri Adda Disposal Station
- Rehmat Abad Disposal Station
- Existing Multan Road Disposal Station

Force main (5,646 ft.) from Madina Town disposal station to Rehmat Abad Disposal Station, 503 ft. from Rehmat Abad Disposal Station to Connecting Larri Adda Force Main and 8,090 ft. from Rehmat Abad Disposal Station + Larri Adda Disposal Station to WWTP will be laid along the roads.

Representative pictures of project sites are given below in **Figure 5-6**;



Figure 5-6, Representative Pictures of Project Sites

5.5 Road Access

The main roads near project site are Lahore – Multan Road, Chichawatni Road, Luddan Road, BTM Road, Vehari Bazar Road, College Road, Arif Bazar Road, Stadium Road and other minor / link roads within / along Burewala.

5.6 Cost & Magnitude of the Project

Total cost of project is estimated to be 845.209 million PKR. The magnitude of the project is to improve the sewerage system of almost whole of the MC Burewala.

5.7 Labour Requirement

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

During operation phase, 27 employees would be required which would include Laboratory Technician, Sub-Engrs., Sanitary Supervisors, Sanitary Workers, Driver and Security Guard.

5.8 Schedule of Implementation

Detailed feasibility studies and designing of the project have been completed. Necessary legal, administrative and financial formalities have been also completed. The project is expected to be completed within 18 months from the date of project execution / environmental approval. Subsequently, the construction, operational and maintenance aspects of the project will be undertaken by the proponent.

5.9 Scope of Work

This project includes the improvement and / or construction of waste stabilization pond, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines
- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Table 5-4, Scope of Work

Sr. No.	Proposed Works	Nos. / Length
1.	Rehabilitation of disposal stations	04 Nos.
2.	Laying of force main	14,240 ft.
3.	Construction / rehabilitation of sewer lines	6,886 ft.
4.	Construction of Wastewater Treatment Plant	01 No.

5.10 Project Description

The existing sewerage system of the Burewala is designed as a combined system to cover about 60% area of the city. The system is comprised of approximately 178 km length of sewers with diameters ranging from 9 inch to 48 inch (R.C.C. pipes). There are 05 disposal stations (DS) in the city, 04 Nos. are operational while 1 DS is under Construction. The existing sewerage system is divided into three zones (Zone-1, Zone-2 & Zone 3). The wastewater from each zone is collected in DS and discharge in Sukh Bias Creek without any treatment. The Wastewater is also being used in agriculture fields without any treatment. There is no Wastewater Treatment Plant (WWTP) in Burewala City.

Existing sewerage system in Burewala City is equipped with the following assets.

- Sewer Lines
- Force Mains
- Disposal Stations

This project includes the improvement and / or construction of waste stabilization pond, force main, disposal stations and desilting of sewer lines in MC Burewala. Project activities include;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines
- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

5.10.1 Sewerage Zones

In terms of wastewater drainage, the city has been separated into three zones. Below is a detail of zones and their respective coverage areas. Zones have been shown in **Figure 5-7**.

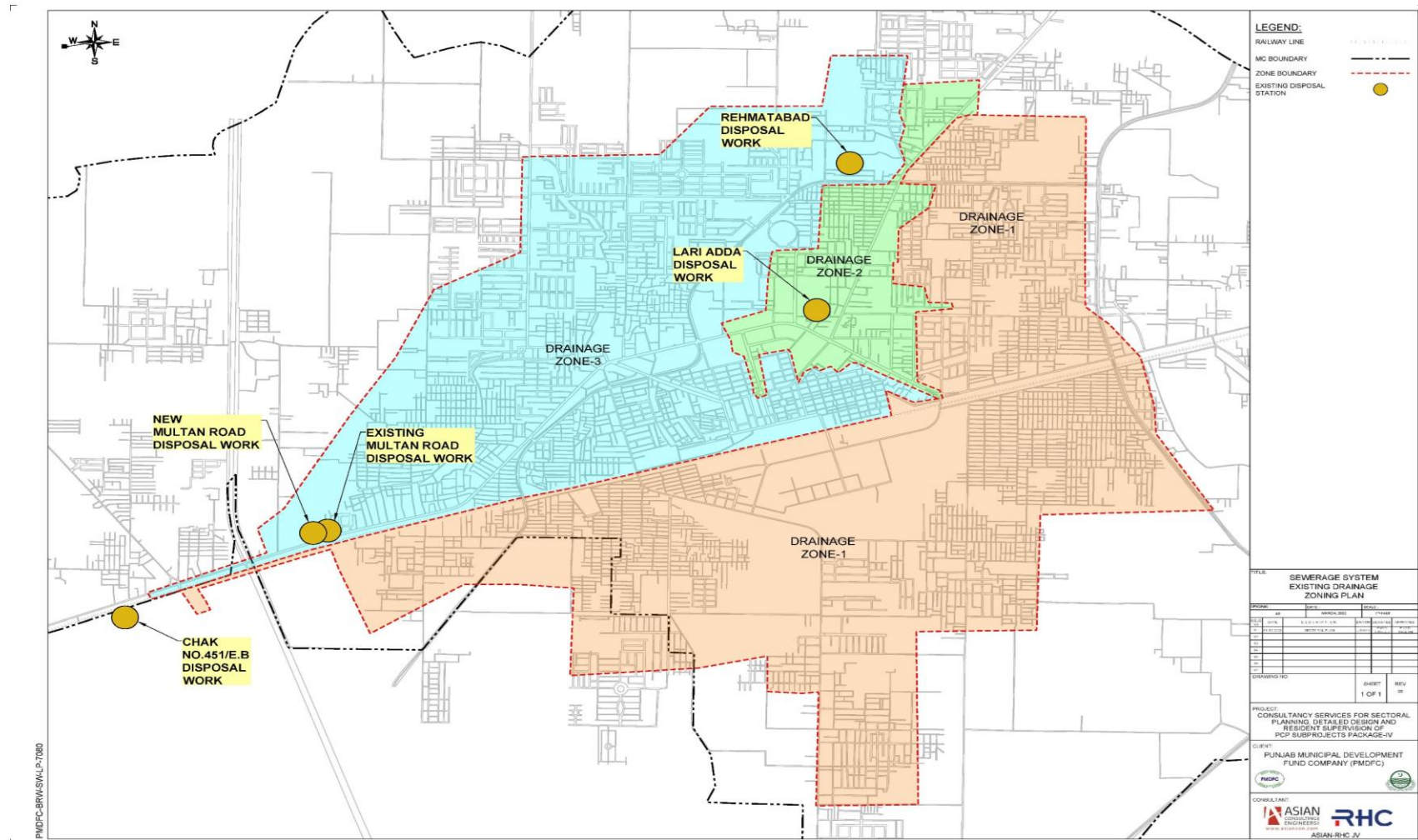


Figure 5-7, Sewer Zones in MC Burewala

A) Zone 1

This zone includes areas that are located in the south of the railway track along with some portion of the city in east side but located on north side of the railway track. A trunk sewer of 42-inch diameter collects the waste water from the city's northeast and it joins the 48 inches diameter outfall sewer discharging in Chak No. 451/EB disposal works after crossing the Pakpattan-Islam Link Canal. Some main sewers in this area were choked and Public Health Engineering Department (PHED) has replaced them.

PHED has a plan to lay new sewers in these areas and connect the collector sewer to the Proposed Multan Road Disposal Station. The work on this plan is currently in progress. PHED is also laying some lateral sewers of 9" & 12" diameter in this zone to cover the left-over areas.

Wastewater from Chak No. 451 EB disposal works is pumped into a sullage carrier which ultimately discharges into an old River Bias creek named as Sukh Bias without treatment. In the way the water is also used for broad irrigation.

B) Zone 2

This drainage zone comprises of central part of the city located in north of the railway track and is drained off into Larry Adda disposal works. The areas named as New Model Town, Gulistan Colony, Gulshan-e Ghani, Kachi Abadi Azeemabad, Yaqoobabad, Riazabad, A, B, C, D, E, N, O and P blocks and Shaheen villas were initially connected with this system. Later on, the main sewer of 36" diameter taking water to Multan Road disposal works was choked near 2-R Minor due to poor maintenance and water from this sewer was also directed to this disposal works by laying an overflow 15" diameter link sewer. It is evident that the upstream part of 36" dia sewer will also choke ultimately. This shows poor maintenance of the sewers on the part of MC Burewala.

The waste water pumped through forced main collected into a sullage carrier and being used for broad irrigation. After completion of PHED planned scheme waste water of A, B, C, D, E, N, O and P blocks would be collected in new sewers leading to newly proposed Multan Road disposal works.

C) Zone 3

This drainage zone comprises of most of the area located on the northern side of the railway track. The waste water is collected into main outfall sewers of 42" and 33" diameters discharging into Multan Road old disposal works from where it is pumped through a forced main of 24" dia GRP pipe across the Multan Road, railway track and then the Pakpattan-Islam link canal into a sullage carrier leading to a Sukh Bias creek without treatment. There is also another forced main of 16" dia RCC pipe to dispose-of the wastewater which is ultimately used for broad irrigation.

The main sewer of 36" dia has been choked as stated above and water has been diverted into Lorry Adda disposal works. However, water from the rest of the area is being taken by 42" dia sewer of this system and pumped through Multan Road disposal works. The disposal works of this zone is located at Multan Road.

Due to choking of number of main sewers, a new sewerage system has been designed by PHED and it is at the construction stage now. Wastewater from all over the zone will be diverted to the new outfall sewer of 30" dia along the railway track and 42" dia outfall sewer at the western Periphery of the city. Both sewers of this system will discharge into a new disposal works being constructed along Multan Road. The new system will relieve the problems created by the choked sewers.

A small area in the extreme east of the city was being drained through Rehmatabad disposal works. Waste water from this disposal works is pumped into a sullage carrier then it is being used for broad irrigation. A newly laid sewer will divert this water to the Proposed Multan Road disposal works and, in this way, the Rehmatabad disposal works will be eliminated

Wastewater from the new Multan Road disposal works will be pumped through a 36" dia GRP force main into a sullage carrier across the Pakpattan-Islam Link Canal which will discharge this water in the old Sukh Bias creek.

5.10.2 Proposed WWTPs of Sewer Zones

As per existing conditions of the city, there are 3 zones in Burewala. The zones are based on the topology and direction of sewerage lines.

As per planning concept, each zone should have separate wastewater treatment plant. Based on topology, 2 WWTPs has been proposed for Burewala City. Zone-1 & Zone-3 will have combined WWTP and Zone-2 will have separate WWTP. Zones with proposed WWTPs are shown in **Figure 5-8**.

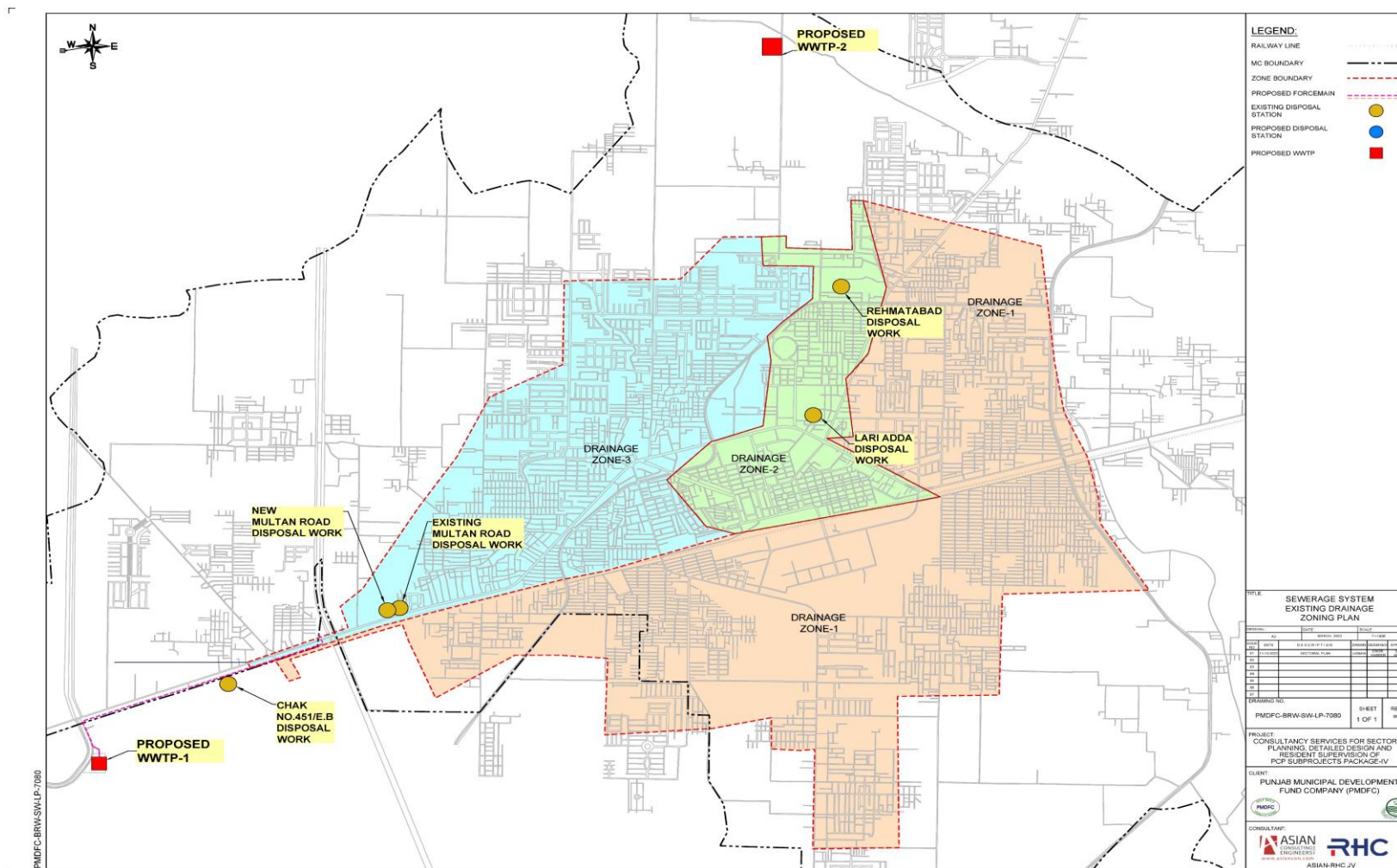


Figure 5-8, Sewer Zones with Proposed WWTPs

A) Zone – 1 & 3

A combined Stabilization Ponds has been proposed for both Zone 1 and Zone 3. WWTP has been proposed at the downstream of the city along with Old Creek River. Separate Force main from New Multan Road disposal works and Chak No. 451 will be combined and will dispose the wastewater into WWTP. Due to unavailability of land at present, this WWTP will be part of future extension.

1. Wastewater Generation of Zone 1 & 3

The wastewater flow of zone 1 & 3 has been provided in;

Year	2017	2022	2032	2040
Population	211,501	237,505	298,863	358,036
Avg. Domestic Sewage Generation (GPD)	5,393,276	6,056,373	7,621,018	9,129,917
Avg. Non. Domestic Sewage Generation (GPD)	1,078,655	1,211,275	1,524,204	1,825,983
Avg. Sewage Generation (GPD)	6,471,931	7,267,647	9,145,222	10,955,900
Avg. Sewage Generation (Cusec)	12.02	13.50	16.99	20.35
Infiltration (Cusec)	1.2	1.4	1.7	2.0
Total Avg. Flow	13.2	14.9	18.7	22.4
Peak flow @ PHED Criteria	24.0	27.0	34.0	40.7
Stormwater Allowance 50% of Peak Flow	12.0	13.5	17.0	20.4
Design flow (Cusec)	37.3	41.9	52.7	63.1

2. Design of Force Main

Data:			
Discharge	=	42.00	ft ³ /sec
Length	=	5,000	ft
Velocity in pipe	=	5.00	ft/sec
Cross sectional area	=	8.40	sq.ft
Diameter of pipe	=	39.25	inches
Adopted size	=	42.74	inches
		1200.00	mm OD HDPE
Cross sectional area of adopted pipe	=	9.96	sq.ft
Actual velocity in pipe	=	4.22	ft/sec
V ² /2g	=	0.28	
Pipe			
Hazen William Formula		$V = 1.318 \times C \times R^{0.63} \times S^{0.54}$	

Data:			
V	=	4.22	ft/sec
C	=	130	
$R=D/4$	=	0.890	ft
$R^{.63}$	=	0.9295	
$S^{.54}$	=	0.0265	
S	=	0.0012	ft/ft
L	=	5,000	ft
$hL = Ls \times \text{length of pipe}$	=	6.01	ft
20 % of head loss in fittings	=	1.20	ft
Total head loss in pipe (Fittings + Pipe)	=	7.21	ft
Level at Suction Point (Base level of Wet Well)	=	498.00	ft
Level at Delivery Point (WWTP)	=	502.00	ft
Elevation Difference (A)	=	4.00	ft
Head Loss in Pipe & Fittings (B)	=	7.21	ft
Total Head (A + B)	=	11	ft
Say	=	15	ft
Pressure of Pipe	=	0.45	Bars

The total flow comes out to be 42 cusecs means 9 (7 working+2 standby)
Pumps of 6 cusecs will be replaced with existing pumps.

Item	Flow (cfs)	Head (ft)	Status
Pump # 1	6	50	Working
Pump # 2	6	50	Working
Pump # 3	6	50	Working
Pump # 4	6	50	Working
Pump # 5	6	50	Working
Pump # 6	6	50	Working
Pump # 7	6	50	Working
Pump # 8	6	50	Stand-by
Pump # 9	6	50	Stand-by

B) Zone – 02

This zone covers the serving area of Larri Adda and Rehmatatabad disposal stations in the city. This zone is located to the northern side of Railway line. The flow of Riazabad, Yaqoobad, Hameed Block, Ghulshan-e-Ghani Town, A, C, D, E, F, G, H, M, N, O, P Blocks, Christian Colony, Kachi Abadi Azeemabad, Shaheen Villas & Chak No 435/E.B is included. The total projected population of year 2032 will be 51,859 and design flow will be 9.1 cusecs in 2032. Total area required for the treatment plant is 18 acres in 2032. Force mains are designed from these two disposal stations. Force main coming out from Larri

Adda disposal station will combine with force main coming out from Rehmarabad disposal station. These 2 force mains will then combine and dispose the sewage in WWTP-1. The layout plan of proposed force main has been shown in **Figure 5-9**. The details are given in **Table 5-5**.

Table 5-5, Design of Force Mains Option-01

From	To	Length (ft)	Outer Diameter (mm)	Diameter (Inches)
Larri Adda DS	Rahamatabad DS	5,646	500	18
Rahamatabad DS	Connecting Larri Adda Force Main	503	225	8
Rehmatabad DS + Larri Adda DS	WWTP	8,090	560	20

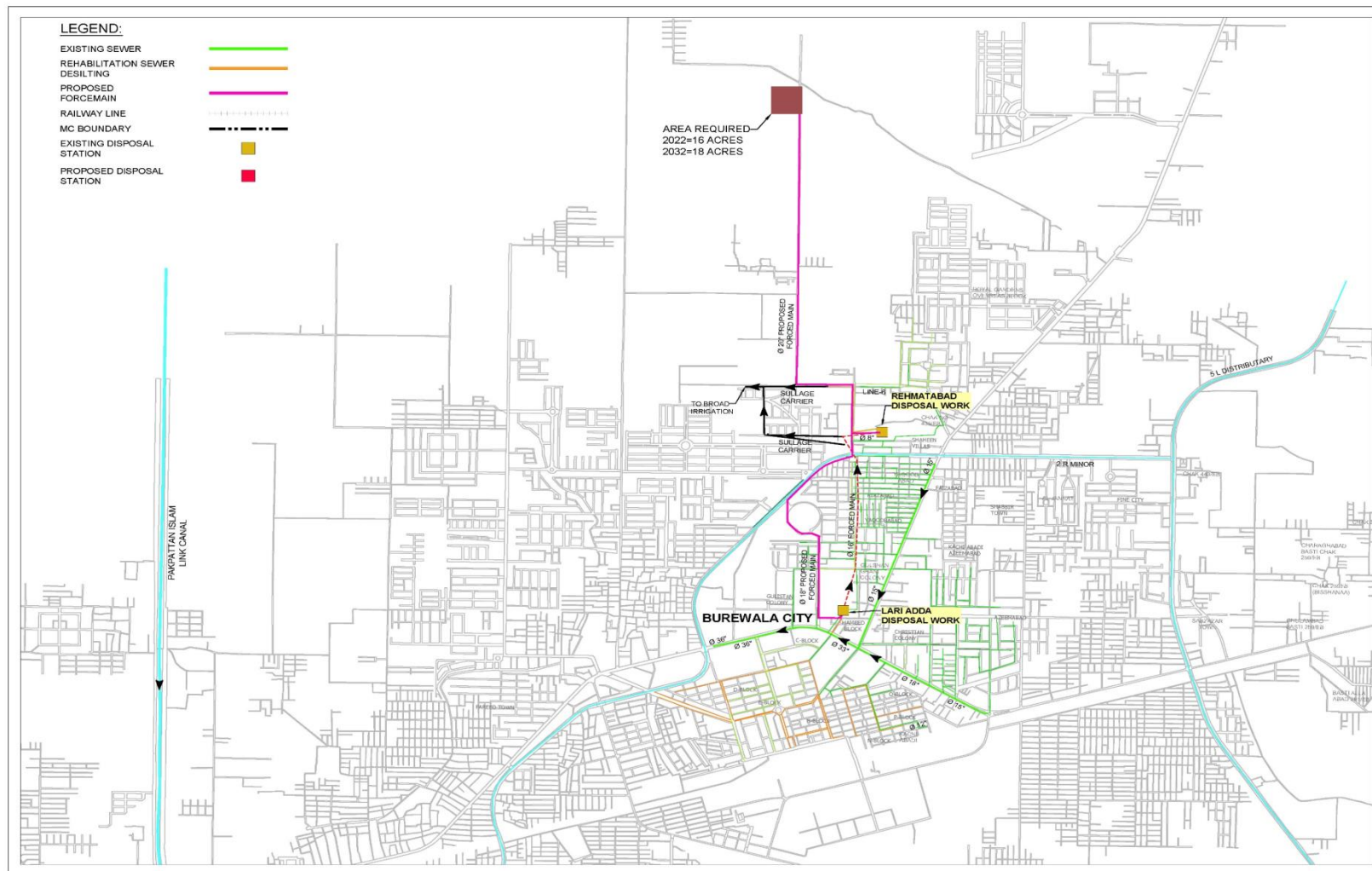


Figure 5-9, Layout Plan of Force Main

1. Wastewater Generation at Larri Adda Disposal Station

The wastewater flow generation at Larri Adda disposal station in 2032 has been provided in **Table 5-6**.

Table 5-6, Wastewater Generation at Larri Adda Disposal Station

Year	2017	2022	2032
Population	36,378	38,234	42,234
Avg Domestic Sewage Generation (GPD)	927,639	974,958	1,076,960
Avg Non. Domestic Sewage Generation (GPD)	185,528	194,992	215,392
Avg Sewage Generation (GPD)	1,113,167	1,169,949	1,292,352
Avg Sewage Generation (Cusec)	2.07	2.17	2.40
Infiltration (Cusec)	0.2	0.2	0.2
Total Avg Flow	2.3	2.4	2.6
Peak flow @ PHED Criteria	4.1	4.3	4.8
Stormwater Allowance 50% of Peak Flow	2.1	2.2	2.4
Design flow (Cusec)	6.4	6.7	7.4

2. Force Main Design for Larri Adda upto Junction Point

Data			
Discharge	=	7.44	ft ³ /sec
Length	=	5,600	ft
Velocity in pipe	=	5.00	ft/sec
Cross sectional area	=	1.49	sq.ft
Diameter of pipe	=	16.52	inches
Adopted size	=	17.80	inches
	=	500	mm OD HDPE PN-8
Cross sectional area of adopted pipe	=	1.73	sq.ft
Actual velocity in pipe	=	4.31	ft/sec
V ² /2g	=	0.29	
Pipe			
Hazen William Formula		$V = 1.318 \times C \times R^{0.63} \times S^{0.54}$	
V	=	4.31	ft/sec
C	=	130	
R=D/4	=	0.371	ft
R ^{0.63}	=	0.5353	

Data			
$S^{.54}$	=	0.0470	
S	=	0.0035	ft/ft
L	=	5,600	ft
$h_L = Ls \times \text{length of pipe}$	=	19.45	ft
20 % of head loss in fittings	=	3.89	ft
Total head loss in pipe (Fittings + Pipe)	=	23.34	ft
Level at Suction Point (Base level of Wet Well)	=	444.00	ft
Level at Junction	=	472.00	ft
Elevation Difference (A)	=	28.00	ft
Head Loss in Pipe & Fittings (B)	=	23.34	ft
Total Head (A + B)	=	51	ft
Say	=	55	ft
Pressure of Pipe	=	1.65	Bars

3. Wastewater Generation at Rehmatabad Disposal Station

The total flow for Rehmatabad Disposal Station for year 2032 has been calculated in **Table 5-7**.

Table 5-7, Sewage Generation at Rehmatabad Disposal Station

Year	2017	2022	2032	2040	2050
Description	8,291	8,714	9,626	10,633	11,745
Avg Domestic Sewage Generation (GPD)	211,421	222,205	245,453	271,132	299,499
Avg Non. Domestic Sewage Generation (GPD)	42,284	44,441	49,091	54,226	59,900
Avg Sewage Generation (GPD)	253,705	266,646	294,543	325,359	359,399
Avg Sewage Generation (Cusec)	0.47	0.50	0.55	0.60	0.67
Infiltration (Cusec)	0.0	0.0	0.1	0.1	0.1
Total Avg Flow (Cusec)	0.5	0.5	0.6	0.7	0.7
Peak flow @ PHED Criteria	0.9	1.0	1.1	1.2	1.3
Stormwater Allowance 50% of Peak Flow	0.5	0.5	0.5	0.6	0.7
Design flow (Cusec)	1.5	1.5	1.7	1.9	2.1

4. Force Main Design for Rehmatabad Disposal Station

Data			
Discharge	=	1.70	ft ³ /sec
Length	=	550	ft
Velocity in pipe	=	5.00	ft/sec
Cross sectional area	=	0.34	sq.ft
Diameter of pipe	=	7.89	inches
Adopted size	=	8.01	inches
	=	225.00	mm HDPE PN-8
Cross sectional area of adopted pipe	=	0.35	sq.ft
Actual velocity in pipe	=	4.85	ft/sec
V ² /2g	=	0.37	
Pipe			
Hazen William Formula		$V = 1.318 \times C \times R^{0.63} \times S^{0.54}$	
V	=	4.85	ft/sec
C	=	130	
R=D/4	=	0.167	ft
R ^{0.63}	=	0.3237	
S ^{0.54}	=	0.0875	
S	=	0.0110	ft/ft
L	=	550	ft
h _L = Ls x length of pipe	=	6.04	ft
20 % of head loss in fittings	=	1.21	ft
Total head loss in pipe (Fittings + Pipe)	=	7.24	ft
Level at Suction Point (Base level of Wet Well)	=	443.00	ft
Level at Junction	=	472.00	ft
Elevation Difference (A)	=	29.00	ft
Head Loss in Pipe & Fittings (B)	=	7.24	ft
Total Head (A + B)	=	36	ft
Say	=	40	ft
Pressure of Pipe	=	1.20	Bars

5. Combined Force Main

Data			
Discharge	=	9.14	ft ³ /sec
Length	=	8,090	ft
Velocity in pipe	=	5.00	ft/sec
Cross sectional area	=	1.83	sq.ft
Diameter of pipe	=	18.31	inches
Adopted size	=	19.94	inches
Cross sectional area of adopted pipe	=	2.17	sq.ft
Actual velocity in pipe	=	4.22	ft/sec
V ² /2g	=	0.28	
Pipe			
Hazen William Formula		$V = 1.318 \times C \times R^{0.63} \times S^{0.54}$	
V	=	4.22	ft/sec
C	=	130	
R=D/4	=	0.415	ft
R ^{0.63}	=	0.5750	
S ^{0.54}	=	0.0428	
S	=	0.0029	ft/ft
L	=	8,090	ft
h _L = Ls x length of pipe	=	23.64	ft
20 % of head loss in fittings	=	4.73	ft
Total head loss in pipe (Fittings + Pipe)	=	28.36	ft
Level at Suction Point	=	472.00	ft
Level at Delivery Point (WWTP)	=	466.00	ft
Elevation Difference (A)	=	(6.00)	ft
Head Loss in Pipe & Fittings (B)	=	28.36	ft
Total Head (A + B)	=	22	ft
Say	=	25	ft
Pressure of Pipe	=	0.75	Bars

6. Pumping Machinery for Larri Adda Disposal Station

The total flow comes out to be 7.4 cusecs means 4 (3 working+1 standby)
Pumps of 2.5 cusecs will be replaced with existing pumps.

Item	Flow (cfs)	Head (ft)	Status
Pump # 1	2.5	80	Working
Pump # 2	2.5	80	Working
Pump # 3	2.5	80	Working
Pump # 4	2.5	80	Stand by

7. Pumping Machinery for Rehmatabad Disposal Station

The total flow comes out to be 1.5 cusecs means 3 (2 working+1 standby)
Pumps of 1.0 cusecs will be replaced with existing pumps.

Item	Flow (cfs)	Head (ft)	Status
Pump # 1	1	65	Working
Pump # 2	1	65	Working
Pump # 3	1	65	Standby

8. Sewer Gems Results

The force main has been analysed on sewer gem and results are attached
under in **Figure 5-10** and **Table 5-8**.

Figure 5-10, Sewer Gems Results

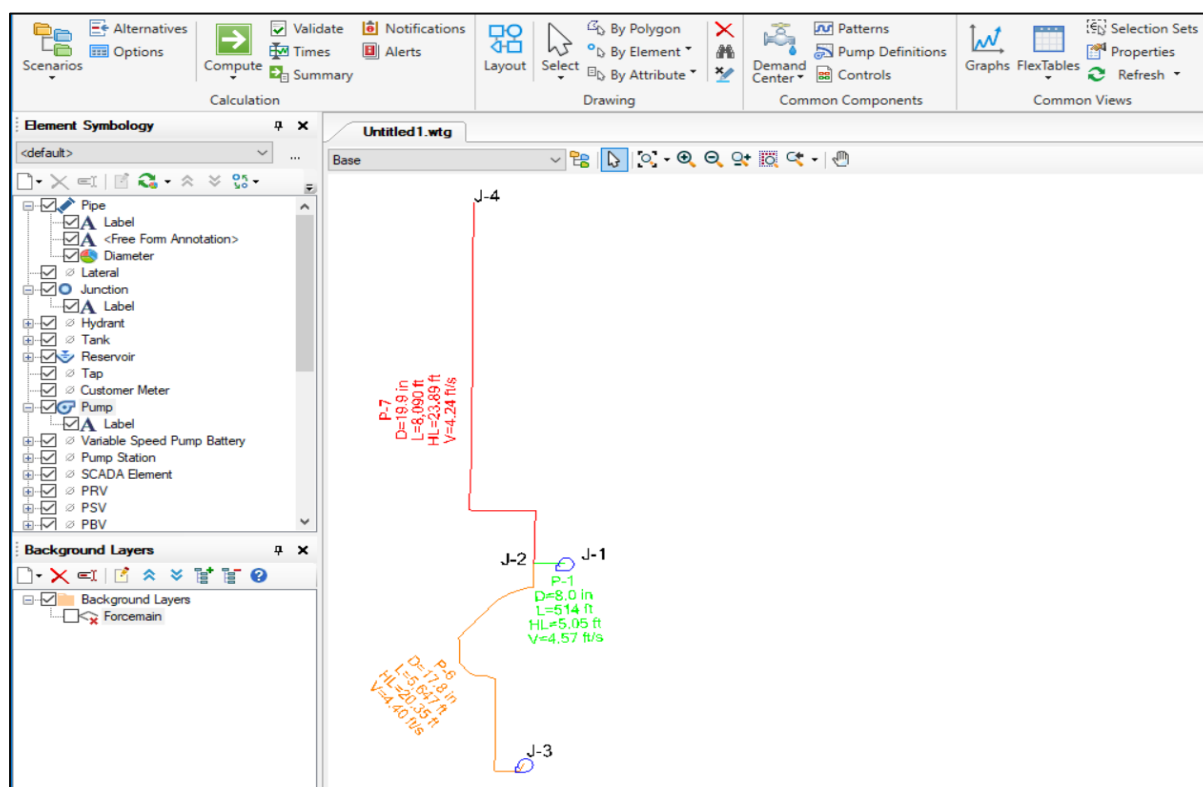


Table 5-8, Pipe Flex Table

Label	Start Node	Stop Node	Length (Scaled) (ft)	Outer Diameter (mm)	Inner Diameter (in)	Flow (ft ³ /s)	Velocity (ft/s)	Head loss (ft)	Pressure (Start) (bars)	Pressure (Stop) (bars)
P-1	J-1	J-2	514	225	8	1.6	4.57	5.05	2	1
P-2	R-2	PMP-2	11	225	8	1.6	4.57	0.11	0	0
P-3	PMP-2	J-1	9	225	8	1.6	4.57	0.09	3	2
P-4	R-1	PMP-1	9	500	17.8	7.6	4.4	0.03	0	0
P-5	PMP-1	J-3	8	500	17.8	7.6	4.4	0.03	3	2
P-6	J-3	J-2	5,647	500	17.8	7.6	4.4	20.35	2	1
P-7	J-2	J-4	8,090	560	19.9	9.2	4.24	23.89	1	1

5.10.3 Construction / Rehabilitation of Sewer Lines

Construction / rehabilitation of sewer lines (6,886 ft.) are proposed on the recommendation of MC / PMDFC in Burewala city. Detail of the work is given below in **Table 5-9**.

Table 5-9, Construction / Rehabilitation of Sewer Lines

Sr. No.	Location	Length (ft.)	Proposed Work
1.	Rescue 1122 Bridge from College Hostel to Larri Adda Disposal Station	3,050	New line
2.	Janazahgah road to Multan Road	950	Old / Rehabilitation
3.	Gulistan Colony Street to Multan Road	630	Old / Rehabilitation
4.	Stadium Road to Multan Road	2,256	Old / Rehabilitation

5.10.4 Repairs / Replacements in the Existing Disposal Stations

Four (04) out of existing five (05) disposal stations will be rehabilitated / improved by urgently required repairs and replacement of the worn out, outlived, dormant, missing, and damaged components. The detail of the works / installations included in this project's PC-I for each of the four disposal stations is given below:

A) Chak No.451 EB Disposal Station

- Replacement of damaged delivery mains by CI pipe along with bends and valves (02 non-Return & 02 Sluice Valves)
- 12" i/d = 60 Rft
- Replacement of 02 Nos MS screens of the screening chamber (4'x6')
- Replacement of 02 Nos of gate valves (4'x4')
- Replacement of 06 Nos Pumps and motors (Non-Clogging Sewage Vertical Pumps with Cordon Shaft)
- 05 cusec pump with 80 HP motor (04 Nos)

- vii. 02 cusec pump with 25 HP motor (02 Nos)
- viii. 3-core cable 7/0.64 (16mm) (200ft)
- ix. 3-core cable 7/0.52 (12mm) (200ft)
- x. 4-core cable (150mm) (200ft) Transformer
- xi. Changeover 600Amp (1Nos)
- xii. Railing of 02 Nos Wet Well dia of 30 ft
- xiii. Painting of pump house and generator room (10'x10')

B) Larri Adda Disposal Station

- i. Replacement of Pumping Machinery (Non-Clogging Sewage Vertical Pumps with Cordon Shaft)
- ii. Replacement of 04 Nos screens of screening chambers
- iii. Replacement of sluice valves
- iv. 12" i/d = 04 Nos
- v. 10" i/d = 01 Nos
- vi. 08" i/d = 02 Nos
- vii. Replacement of 02 MCUs 80 & 60 HPs motors are required
- viii. 4- core cable (150mm) 200 ft electric cable from transformer to pump house
- ix. Civil work repair of wet well (Plastering)
- x. Construction of generator room (10' x 10')
- xi. Replacement of 01 gate valve (4'x4')
- xii. Electric wiring of 02 pump houses
- xiii. Railing of 02 Nos wet well dia of 30 ft
- xiv. Painting of 02 pump houses (30' Dia & 10' x 10')

C) Rehmat Abad Disposal Station

- i. Replacement of Pumping Machinery (Non-Clogging Sewage Vertical Pumps with Cordon Shaft)
- ii. Replacement of 02 Nos screens of screening chambers (4'x6')
- iii. Replacement of 02 gate valves of 12" dia (4'x4')
- iv. Construction of generator room (10' x 10')
- v. Electric wiring of pump house
- vi. Replacement of 100KVA Transformer
- vii. 200 KVA generator is required
- viii. Railing of 02 Nos wet well dia of 35 ft
- ix. Painting of one pump house (30' Dia)

D) Existing Multan Road Disposal Station

- i. Replacement of 02 motors of 80HP with 05 cusec pumps (Non-Clogging Sewage Vertical Pumps with Cordon Shaft)
- ii. Replacement of suction and delivery piping by CI pipe.
- iii. 24" dia = 300 Rft.
- iv. 10" dia = 60 Rft.
- v. 08" dia = 30 Rft.
- vi. 06" dia = 30 Rft.
- vii. Replacement of 06 Nos screens of screening chamber (4'x6')
- viii. Replacement of 02 Nos gate valves (4'x4')
- ix. Electric wiring & Civil work (whitewash, plastering, paint, doors and windows in both pump houses) (30' dia pump houses)
- x. Construction of generator room (10'x10')
- xi. MCUs of the following HPs motor
- xii. 80HP = 01 Nos
- xiii. 75HP = 02 Nos
- xiv. 30HP = 01 Nos
- xv. Replacement of 200 KVA Transformer
- xvi. 3-core cable 7/0.64 (16mm) (500ft)
- xvii. Changeover of 600Amp (02 Nos)
- xviii. Railing of 03 wet wells of dia 30 ft.

5.10.5 Desilting of the Choked Sewer Lines

For taking the sewers to their full carrying capacity again these sewers will be desilted and cleaned. For this purpose, the total lengths of the sewers in various systems are given below. The figures of de-silting lines are illustrated in **Table 5-10**.

Table 5-10, Estimated Length (Rft) of Existing Sewers in Sewerage System Burewala

Sr. No.	Disposal Station	48"	42"	36"	33"	30"	27"	24"	21"	18"	15"	12"	9"
1.	Chak No. 451/EB	14,200	6,650	2,250	1,010	1,020	6,100	13,700	2,590	8,350	2,750	61,800	107,720
2.	Multan Road Existing	–	15,200	–	12,040	12,250	1,760	3,320	1,170	19,400	19,260	42,580	206,690
3.	Larri Adda	–	–	–	–	–	–	–	–	–	–	1,800	530
4.	Rehmatabad	–	–	–	–	–	–	–	–	–	–	6,950	3,090
Total		14,200	21,850	2,250	13,050	13,270	7,860	17,020	3,760	27,750	22,010	113,130	318,030

It is assumed that 70% of these main sewers have choked and require desilting. The desilting of sewers from 15" dia to 42" dia is included in this project's PC-I. However, the sewers of 9" and 12" dia will be desilted by Municipal Unit Burewala by deployment of own labor as the winch machines for desilting of sewers are available with the Unit.

After desilting of all the sewers in all drainage areas of the sewerage system it will be assessed that if some of the sewers cannot be desilted then these will be replaced. The subsoil stratification beyond the depth of 2-3 feet in Burewala City is sandy and hence the replacement of the sewers will be very difficult and costly and should be avoided as far as possible. Only those sewers will be replaced wherein there is no other option left.

5.10.6 Wastewater Treatment Plant

A) Objectives of Wastewater Treatment

- a) Under the existing laws, all the wastewaters, originating from any source, and being discharged to an inland water body, within Punjab, shall conform to the requirements of the applicable Punjab Environmental Quality Standards (PEQS).
- b) In raw municipal wastewaters, typically, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS) and oil & grease, exceed the PEQS limits. Therefore, STPs shall be designed, primarily, to bring these parameters within the PEQS limits, prior to their discharge to the natural water body, directly, or indirectly.
- c) Applicable PEQS limits, for the treated effluent, prior to their discharge.

B) Proposed Treatment Technology

In view of the recommendations, made by the HUD&PHED-Punjab Technical Committee, and the factors and considerations, as reiterated below, Waste Stabilization Ponds (WSPs) system is proposed, for the treatment of sewage, prior to its disposal:

- a) It is established that local municipal bodies, particularly of intermediate cities, at present or in near future, would not be in a position to afford the high recurring operation & maintenance costs (mainly owing to high electric energy requirement), associated with the treatment systems other than waste stabilization ponds. Consequently, provision of any of the mechanized systems, would, ultimately lead to non-operation of these treatment plants and mere wastage of the capital investments made on this account.
- b) Mechanized treatment systems invariably need a higher level of operational skill, responsibility, supervision and control, for their

proper functioning, which under the prevailing conditions is envisaged to be difficult to be maintained by the local municipal bodies. Under these circumstances, the treatment systems, which are relatively easy to monitor, operate and maintain need be adopted. WSPs are almost self-operating and do not need much operational intervention, for their proper functioning.

- c) Climatic conditions, of the area, in terms of high ambient temperatures and longer durations of intense solar radiation, which enhance microbial activity and photosynthetic production of algal oxygen, favour the selection of WSPs.
- d) In contrast with mechanized treatment systems, WSPs systems do not have any permanent structure, except for wastewater screening and pumping station and plant building, if any. Consequently, they offer a much higher degree of flexibility in terms of system change in future. If in future, the conditions governing the selection are changed, the land used for ponds can easily be reclaimed and put to other urban uses and a mechanized treatment system with much lesser area requirement can be installed in its place.

C) Proposed System and Facilities

- a) The facilities, required for each STP, shall comprise the following:
 - 1) Raw Wastewater Screening and Pumping Station
 - 2) Raw Wastewater Distribution Mains (Lined Channels or Pipes)
 - 3) Waste Stabilization Ponds – WSP (Earthen)
 - 4) Treated Effluent Channel (Earthen)
 - 5) Plant Building
 - 6) Roads
 - 7) Boundary Fence
 - 8) Electrical Transmission Line to Plant
 - 9) Transformer
- b) Each STP shall be provided with two or more equal-size WSP Units, of specified treatment capacity, placed in parallel.
- c) One WSP Unit shall comprise two facultative ponds, of equal surface area, placed in series, with the upstream pond provided with deepened anaerobic zone at inlet, to act as an anaerobic pond. This provision is to optimize the utilization of the available space.
- d) Deepened anaerobic zone, provided at the start of the upstream facultative pond, shall act as pre-treatment and help to significantly reduce the surface area and volume requirements of the subsequent facultative ponds, for the required degree of treatment,

by removing a significant amount of influent BOD and TSS. Anaerobic zone shall be of such depth, to exclude oxygen and encourage the growth of anaerobic bacteria, to degrade the organic matter in the influent and to produce anaerobic biomass and Methane (CH₄).

- e) In facultative ponds, biological treatment of wastewater is carried out, by symbiosis of algae and bacteria. The principal source of oxygen, required for aerobic treatment in upper pond layers, is oxygen transferred from atmosphere by diffusion and wind mixing, as well as the algal oxygen produced by photosynthetic process. In lower layers of ponds, treatment takes place under anaerobic conditions.
- f) In a typical WSP Unit, two ponds, in series, are provided, because of the established fact that ponds in series (two or more) are more efficient than one pond, with equal total detention periods.
- g) Maturation ponds, to be provided after facultative ponds, are used for the additional removal of pathogenic agents such as bacteria, fungi, protozoa and viruses. Since the objective of the treatment is merely to conform to the PEQS, which does not impose any limit on the bacteriological quality of the treated effluents; therefore, no maturation ponds would be provided. Under the local conditions, this would be an unnecessary cost, on account of additional land acquisition and construction.

D) Waste Stabilization Ponds (WSPs)

Waste Stabilization Ponds (WSPs), also termed as oxidation ponds, are large earthen basins, in which raw wastewater is treated entirely by natural processes, involving both algae and bacteria. They are the most important method of wastewater treatment in hot climates. However, since the rate of oxidation is slow so large areas are required for their construction. The area requirement is of the order of 10 times of those required for activated sludge (conventional) or trickling filter process. Their specific advantages are simple operation, low operation & maintenance costs and no sludge management problem. Quantities of sludge produced are less, due to long stabilization periods and no daily waste sludge disposal is needed. Accumulated sludge, in the ponds, need to be removed, after very long operational durations of the order of 3-5 years.

Generally, the flow-through system comprises of anaerobic, facultative and maturation (optional) ponds, in series.

Table 5-11 presents, in summarized form, the overall qualitative analysis with respect to certain key parameters.

Table 5-11, A Qualitative Analysis with Respect to Certain Key Parameters

Sr. No.	Parameters	Waste Stabilization Pond
1.	Plant Area Requirement	Very High
2.	Operation and Maintenance Cost	Minimum
3.	Process Energy Requirement	Nil
4.	Operational Supervision & Control	Minimum
5.	Construction Cost	Moderate
6.	Capital Cost	High ^[1]
7.	Process Mechanical Equipment	No
8.	Quantities of Sludge Produced	Minimum
^[1] Largely depends upon the cost of land		

E) Design Basis and Criteria

1. General

The process design of the WSPs shall, primarily, be based upon the provisions, laid down in MARA (2003), which is deemed to be the most authentic practicing literature on designs of such treatment systems, in developing countries.

2. Design Temperature

Design capacities of WSPs, for required degree of treatment, are inversely related to the ambient temperatures. Higher ambient temperatures are favourable, owing to enhanced microbial activity and photosynthetic production of algal oxygen.

Generally, minimum of the mean monthly ambient temperatures, in an area, is taken as design temperature, which would normally occur in January or December.

At the design stage, ambient temperature data, for the area, would be collected, from the meteorological department, and analysed. However, it is estimated that in the area, under consideration, mean monthly ambient temperatures would remain equal or above 20° C, for about 9 months (March to November) of the year.

Report (2018), by the HUD&PHED-Punjab Technical Committee, recommends that in order to make the system economical, and reduce the land requirements and costs, design temperature shall be taken as 20° C, for areas of central and southern Punjab. Same is adopted for the Project. This will partly compromise the efficiency of the system, only during 3 months of the year.

3. Design Criteria for Anaerobic Zone

Volumetric Capacity: Volumetric capacity of the zone shall be determined on the basis the following two criteria, and larger of the value shall be adopted:

- Volumetric BOD Loading Rates (g-BOD/m³-d), **Table 5-12**
- Detention Period (d)

Table 5-12, Permissible Volumetric BOD Loading Rates (MAR, 2003)

Design Temperature – T	Volumetric BOD Loading	BOD Removal
(°C)	(g-BOD/m ³ -d)	(%)
< 10	100	40
10 – 20	20 (T) – 100	2 (T) + 20
20 – 25	10 (T) + 100	2 (T) + 20
> 25	350	70

4. Other Criteria

Table 5-13, Anaerobic Zone: Other Criteria

Parameter	MAR (2003)	Adopted
Design Temperature (°C)		20
Volumetric BOD Loading (g-BOD/m ³ -d) – Per Table 5-12	300	300
Detention Period @ Average Day Flow (d)	> 1.0	1.0
BOD Removal Efficiency (%) – Per Table 5-12	60	50
Liquid Depth (m)	2 – 5	3.50
Free Board (m)	0.5 – 1	0.50
Side Slope		
Internal	1V:3H	1V:1½H
External	1V: 1½–2H	1V:1H

5. Design Criteria for Facultative Ponds

Surface Area of Pond: Surface area of the pond shall be determined on the basis the Surface BOD Loading Rate (L_s), in accordance with the following Equation [MAR, 2003]:

$$L_s = 350 \{1.107 - 0.002 (T)\}^{T-25}$$

Where;

L_s = Surface BOD Loading Rate (kg-BOD/ha-d)

T = Design Temperature (°C)

BOD Removal Efficiency: BOD removal efficiency of the facultative ponds shall be determined by employing the following relationships [MAR, 2003]:

$$S_E = S_i / (1 + K_T T_D)$$

$$K_T = K (1.05)^{T-20}$$

Where;

S_i = Influent BOD (mg/l)

S_E = Effluent BOD (mg/l)

T_D = Detention Time (d)

K_T = Reaction rate constant at temperature T (°C), (1/day)

K = Reaction rate constant at 20 °C, 1/day = 0.10

T = Design Temperature (°C)

5.10.7 Design of Proposed Wastewater Treatment Plant (WWTP)

Burewala is divided into three Sewerage zones and one combined wastewater treatment plant is proposed for whole city. This section presents the preliminary design of all the key component facilities for the proposed Wastewater Treatment Plants (WWTPs).

A) Design Flow and Characteristics

Wastewater treatment plant will be design on average day flow of the project area. The design flow has been calculated in **Table 5-14**.

Table 5-14, Design Flow

Sr. No.	Parameters	WWTP
1.	Ultimate Served Population – Projected (2032)	52,000
2.	Average Sewage Flow	
	Domestic Sewage Flow (GPD)	1,323,901
	Com. & Institutional Sewage Flow (GPD)	132,390
	Infiltration (GPD)	132,390
3.	Total Average Sewage Flow	
	MGD (Plant Design Flows)	1.5
	Cusecs	2.96
4.	Influent BOD @ average flow (mg/l)	250

B) Design of Key Components of WWTP

Major components for WWTP are given below;

1. Anaerobic Pond

Anaerobic pond shall be provided in parallel for primary treatment of sewage / wastewater. This will receive wastewater and reduce BOD of the sewage / wastewater through anaerobic processes. 03 ponds have been proposed for Anaerobic.

Phasing wise Design summary of Anaerobic Ponds (APs) is presented in **Table 5-15**.

Table 5-15, Design Summary of Anaerobic Zone

Description	Values
Population (persons)	52,000
No. of Anaerobic Ponds	3
Average sewage Flow rate (m ³ /day)	7,235
Average sewage Flow rate (Cusec)	2.96
Average sewage Flow rate per AT	2,412
Temperature (Degree Celsius)	20
Volumetric loading (λ_v) (g/m ³ .d)	300
Influent BOD Li (mg/l)	250
Volume of AP (V_a)	2,010
Check Detention time (d)	0.83
Detention time (d)	1
Volume (m ³)	2,412
Assume depth (m)	3.5
Mid depth area (m ²)	689
L:W	2
Mid depth Length (m)	15.8
Mid depth Width (m)	43.5
BOD removal (%)	60
BOD removal	0.6
Remaining BOD (mg/L)	100
Side slopes H:V	1.5
Width at bottom level (m)	38.3
Width at top water level (m)	48.8
Free Board (m)	0.5
Extreme top width of AP	50.3
Say in Feet	165
Length at bottom level (m)	10.6
Length at top water level (m)	21.1
Extreme Top Length (m)	22.6
Say in Feet	74
Area of Anaerobic Pond (m ²)	1,135
Total area of Anaerobic Pond (m ²)	3,406

Description	Values
Total area of Anaerobic Pond (ha)	0.3
Total area of Anaerobic Pond (acre)	0.8

Desludging of Anaerobic Ponds is normally carried out after 2 - 3 years. Drying of sludge is proposed to be carried out inside anaerobic pond on periodic basis separately for each terrain/module. During desludging period, flow to respective anaerobic pond will be closed. It is recommended that desludging shall be carried out in summer season when temperature would be more than 20°C so that remaining anaerobic pond may take increased flow without compromising treatment efficiency.

2. Facultative Ponds

For secondary treatment, Facultative Pond (FP) have been proposed. Floating wetland technology has been proposed in the Facultative Ponds. Total 3 ponds have been proposed for this zone.

Phasing wise design summary of Facultative Ponds (FP) is presented in **Table 5-16**.

Table 5-16, Design Summary of Facultative Pond

Description	Values
BOD applied to FP Lfp (mg/l)	100
Surface loading (λ_s) (kg -BOD/ha.d)	280
No of Facultative Ponds	3
Flow at each Facultative Pond	2412
Mid depth area (m ²) of FP (A_f)	8613
Assume Depth (m)	1.5
Voulme of FP (V_f)	12918.8
Check Detention time (d)	5.4
K20 (1/d)	0.1
Check effluent BOD (L_e)	65
BOD removal %	35
Extreme top width of FP (m)	50
Say in Feet	165
Width of FP at top water level (m)	49
Mid depth width of FP (m)	47
Bottom width of FP (m)	44
Mid depth length of FP (m)	185
Bottom length of FP (m)	183

Description	Values
Length at top water level (m)	187
Extreme top length of FP(m)	189
Say in Feet	619
Area of Facultative Pond (m ²)	9,495
Total Area of All Facultative Ponds	28,486
Total area of Facultative Pond (ha)	3
Total area of Facultative Pond (acre)	7

3. Maturation Ponds

For tertiary treatment, Maturation Pond (FP) have been proposed. Due to the lack of convenient disposal options or nearby drain for the treated effluent, the incorporation of maturation ponds into the waste stabilization pond system is necessary. In situations like this, establishing maturation ponds becomes essential as they play a vital role in improving effluent quality, making it appropriate for irrigation.

Phasing wise Design summary of Maturation Ponds (FP) is presented in **Table 5-17**.

Table 5-17, Design Summary of Maturation Pond

Description	Values
Assume detention time (d)	1.8
Assume depth (m)	1.5
K ₂₀ (1/d)	2.6
Assume influent Fecal coliform Ni (1/100ml)	10,000,000
Volume of MP (m ³)	4,389
Mid depth area (m ²)	2,926
Top extreme width of MP	50
Free Board (m)	0.5
Width at top water level (m)	48
Mid depth width (m)	46
Bottom width of MP (m)	44
Mid depth length (m)	64
Bottom length of MP (m)	61
Length at top water level (m)	66
Extreme top length of MP (m)	67
Area of MP(m ²)	3,385
No. of Maturation Ponds in parallel (n)	3

Description	Values
Ne (1/100ml)	988
No. of Maturation Ponds in series (n)	3
Ne (1/100ml)	988
Total no. of Maturation ponds	9
Total area of Maturation Pond (m ²)	30,462
Total area of Maturation Pond (ha)	3
Total area of Maturation Pond (acre)	8

As per the availability of area the final dimensions adopted for the design of a ponds are stated in **Table 5-18** below:

Table 5-18, Dimensions of Ponds

	Unit	Parallel - I				
		AP	FP	MP- I	MP- II	MP- III
Area	ft ²	12210.8	102151.0	36417.2	36417.2	36417.2
Volume	ft ³	140179.8	502583.0	179172.5	179172.5	179172.5
Depth	ft	11	5	5	5	5
Length	ft	40	334	119	119	149
Width	ft	306	306	306	306	244
Check Area	ft ²	12210.8	102151.0	36417.2	36417.2	36417.2
Top Length	ft	39	332	118	118	148
Mid Length	ft	27	325	110	110	140
Bottom Length	ft	16	318	103	103	133
Top Width	ft	305	305	305	305	243
Mid Width	ft	294	297	297	297	235
Bottom Width	ft	282	290	290	290	228

4. Total Area Requirement

Total Area Requirement for WWTP-2 for Year 2032 of Burewala city is;

Area required for Anaerobic Pond	=	0.8 Acres
Area Required for Facultative Pond	=	7 Acres
Area Required for Maturation Pond	=	8 Acres
Total Area required	=	15.4 Acres

After adding 25% Additional area for Embankment, Disposal Station and Other Services, Total preliminary Area requirement for WWTP is 19.3 acres.

5.10.8 Site Identification of WWTP

WWTP-2 has been proposed near Chak 423 EB at the north of Burewala city. The land was easily available to MC as it is govt. owned land. WWTP will be designed against an average day flow of 8.22 MGD (15.4 Cusec). Preliminary area requirement for WWTP is 19.3 Acres. Schematic figure of WWTP is given below in **Figure 5-11** and Plan & Section of WWTP is given below in **Figure 5-12** & **Figure 5-13**.

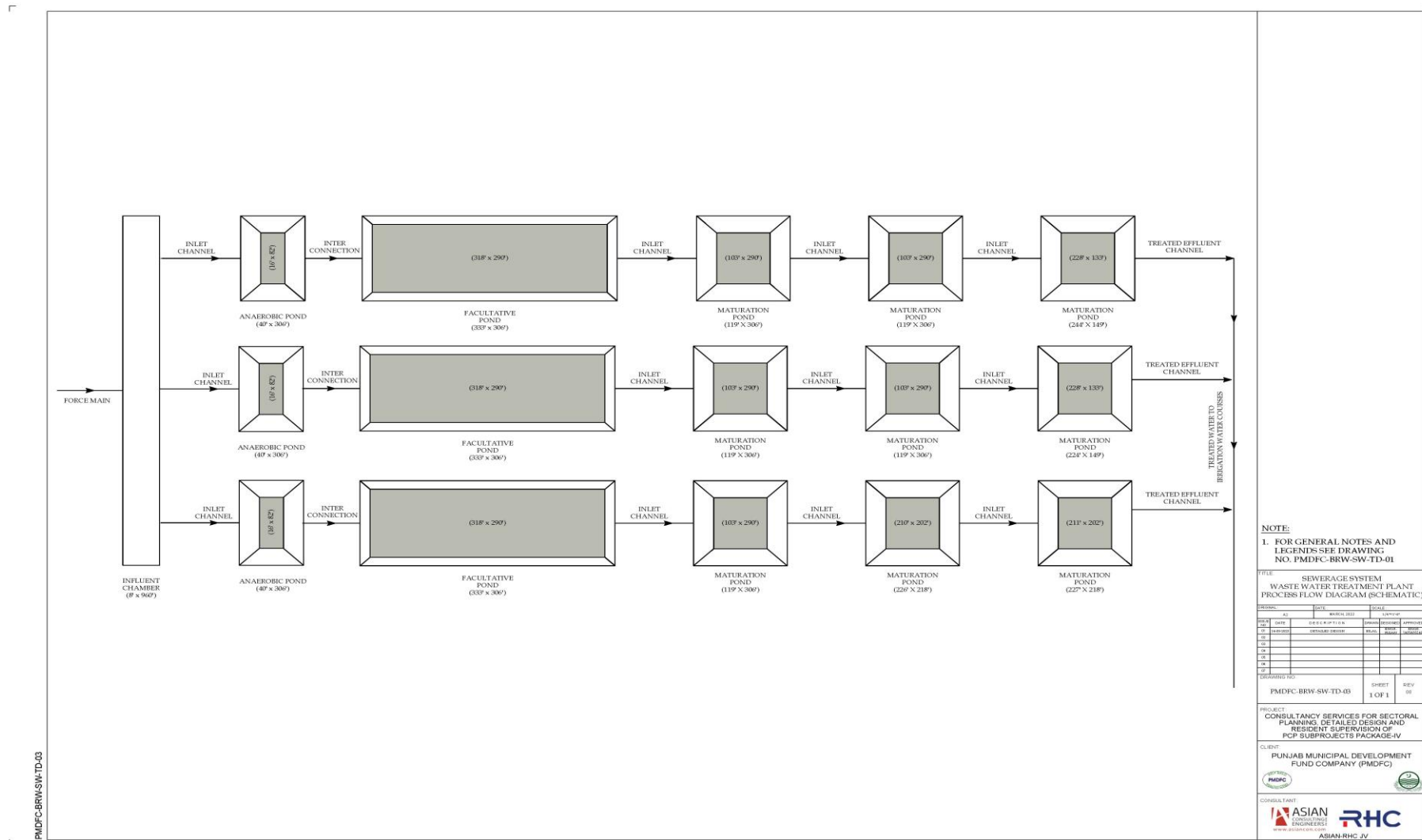


Figure 5-11, Schematic Figure of WWTP



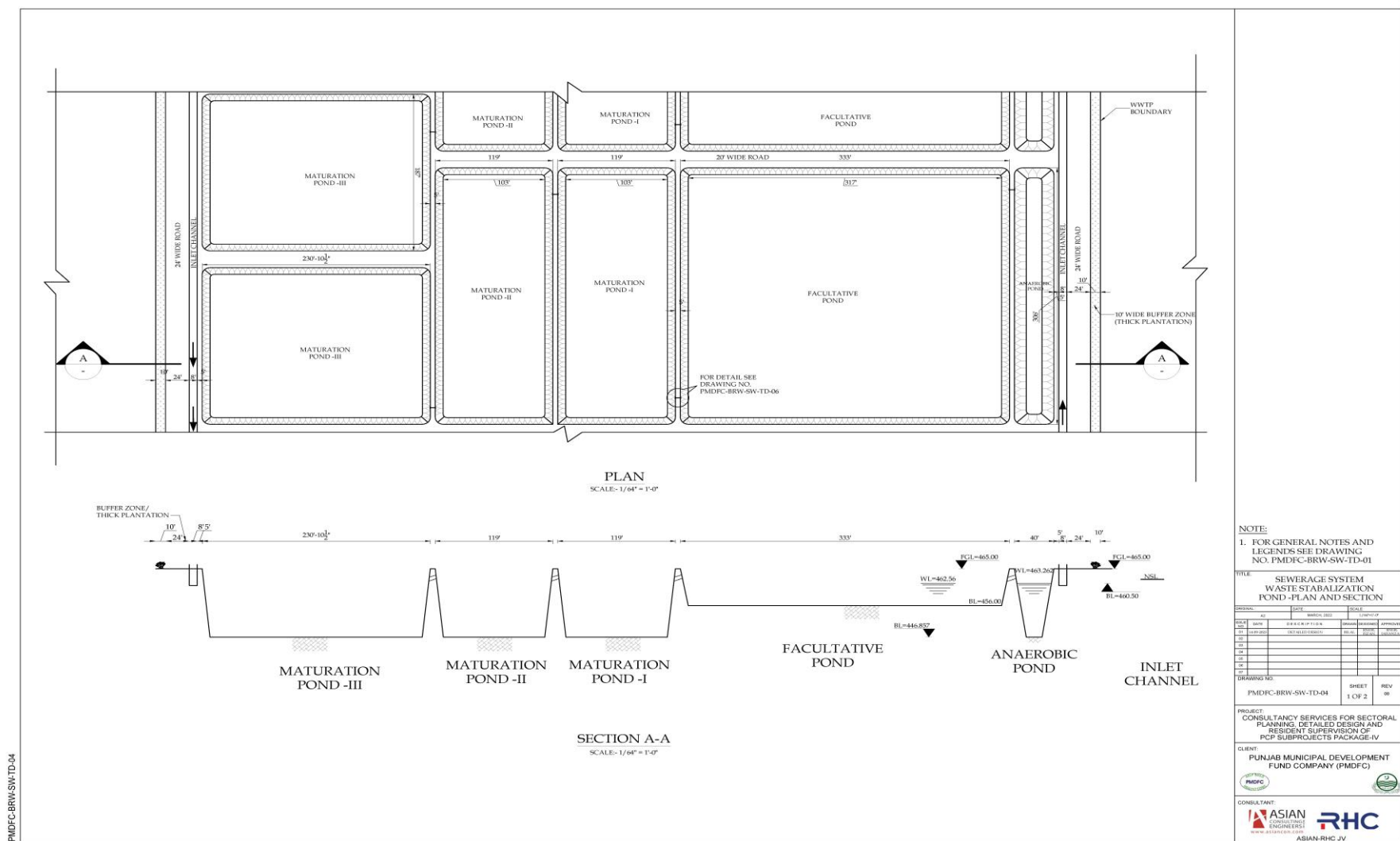


Figure 5-13, Plan & Section of WWTP (ii)

5.11 Water Consumption and Wastewater Generation

Ground water will be the main source of water during construction phase. In constructional phase, 1,500 gallons/day water will be used. During operation, 1,350 gallons/day water will be use. Wastewater produced will be domestic wastewater.

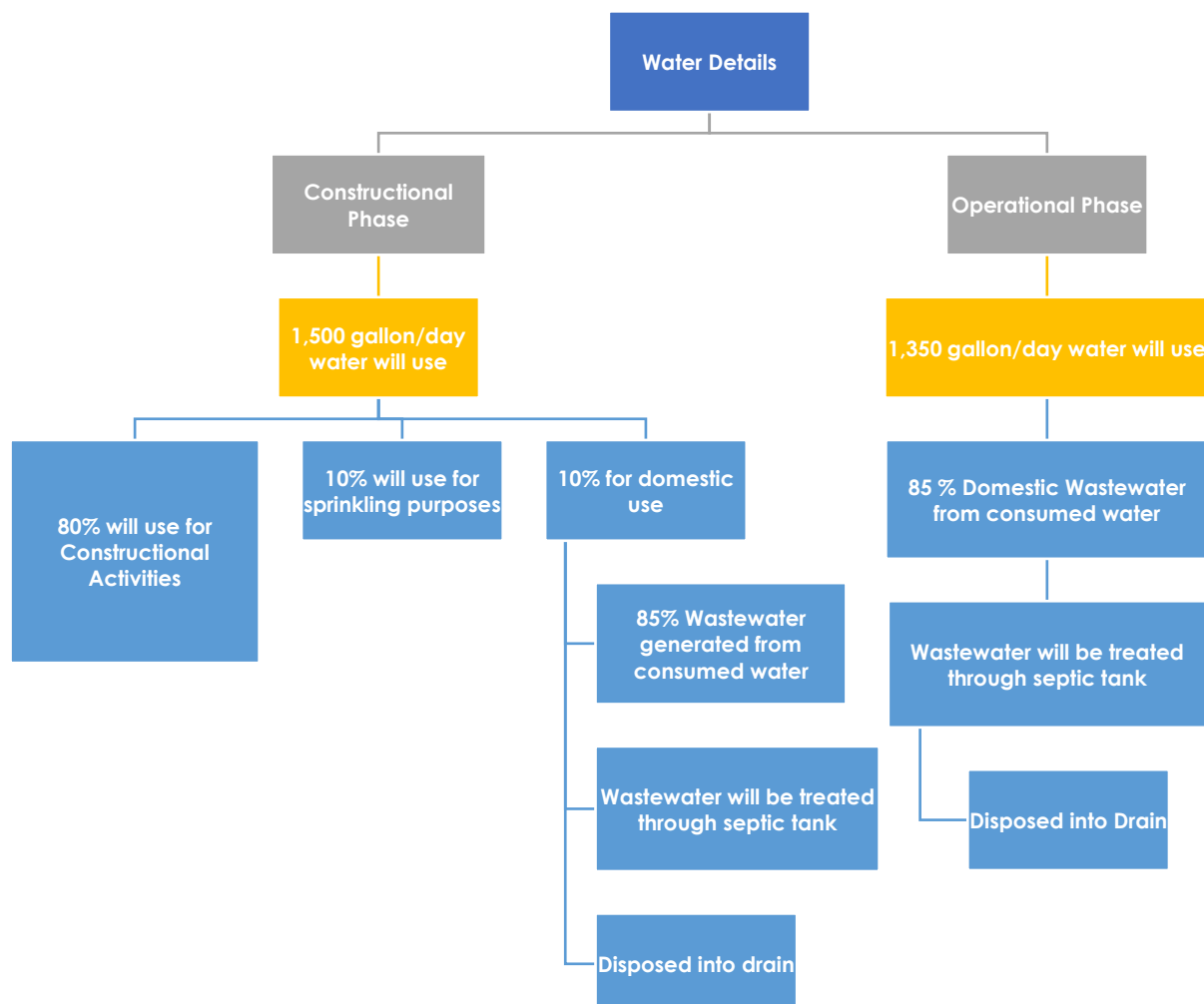


Figure 5-14, Estimated Water Balance

5.12 Solid Waste

The amount of solid waste produced during construction phase will be 13.5kg/day. 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 12.15 kg/day. Only domestic waste will be produced that will be handed over to local waste contractor.

5.12.1 Waste Management and Disposal

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

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

Table 5-19, Waste Management Collection and Disposal Techniques

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

5.13 Sources of Construction Material

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

5.14 Machinery & Equipment

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

Table 5-20, 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

Sr. No.	Equipment / Machinery	Sr. No.	Equipment / Machinery
7.	Back Hoe Excavator	8.	Water bowser
9.	Jack hammer	10.	Pipeline pressure testing equipment
11.	Compressor	12.	Butt fusion equipment
13.	Generator	14.	Water pumps

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

5.15 Storage of Materials

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

5.16 Construction / Labour Campsite

Location of the construction camps should be at areas which are acceptable from environmental, cultural or social point of view. Location of construction camps should be away from communities in order to avoid social conflict with the surrounding communities. Contractor will submit to the relevant MC for approval of a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective. The Contractor's staff quarters and labour camps shall be provided with all necessary services for drainage, lighting, roads, paths, parking places, fencing, sanitation, cook-houses, fire prevention and firefighting equipment. All labour camps, workshops and storage areas shall be built on hard compacted ground with sufficient bunding and spill kits so as to prevent the loss or infiltration of leaked or 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. *(Labour Management Plan is given in Table 01 of EHS SOPs for Labour / workers prepared for PCP's projects, attached as Annexure-14)*

5.16.1 Proposed Campsite Locations

Two locations have been suggested for contractor's campsite. Both the locations are near project site. Location 01 is near WWTP site and almost 02 km from MC while location-02 is near MC but almost 1.5 km from WWTP site, both of the locations are at the distance from sensitive receptors. Locations of proposed campsites marked on Google Maps are shown below in **Figure 5-15**.

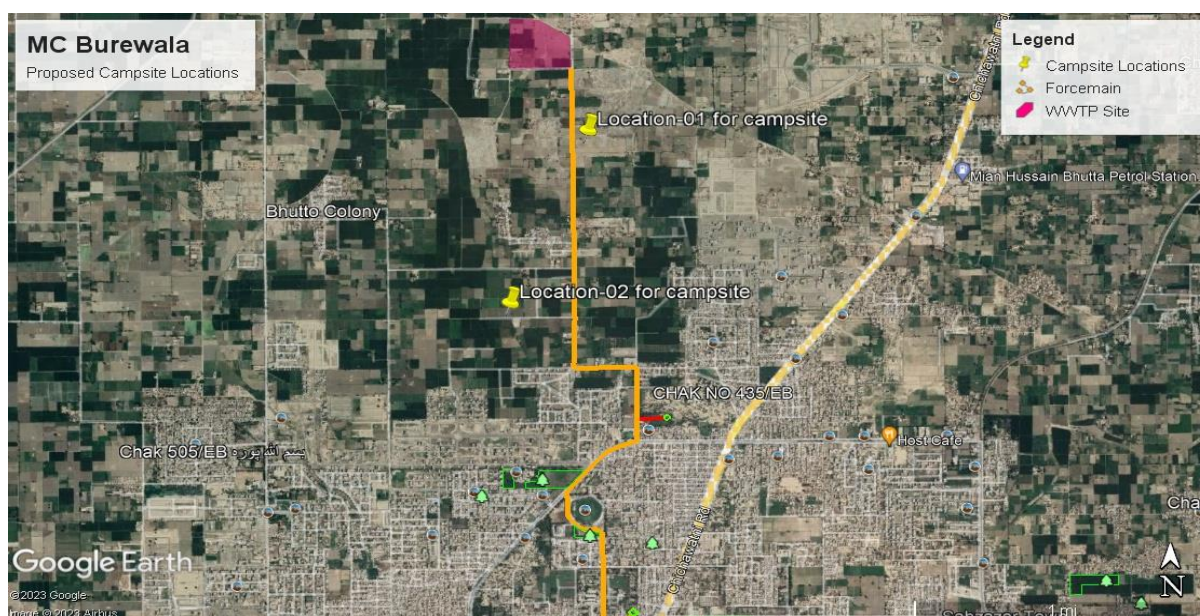


Figure 5-15, Proposed Locations for Campsite

5.17 Restoration and Rehabilitation Plans

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

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

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

5.18 Government & Local Approvals

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

SECTION - 6: DESCRIPTION OF ENVIRONMENTAL AND SOCIAL BASELINE

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

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

6.1 General Characteristics of Project Area

The project is for improvement and extension of sewerage system in Burewala city, which includes;

- Rehabilitation of 04 disposal stations including pumping machineries, plaster of wall, painting etc.
- Laying of 14,240 ft. force main including excavation, backfilling and restoration of roads
- Construction / rehabilitation of 6,886 ft. sewer lines
- Desilting of particular sewer lines
- Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office. The sites of disposal stations and sewer lines included in this project are located in urban area while location of WWTP is near Chak 423-EB. The main roads near project site are Lahore – Multan Road, Chichawatni Road, Luddan Road, BTM Road, Vehari Bazar Road, College Road, Arif Bazar Road, Stadium Road and other minor / link roads within / along Burewala.

6.2 Physical Resources

6.2.1 Geography, Geology, and Soils¹

Burewala is situated on the Dehli Multan Road. Sutlej River crosses Burewala

¹

<https://en.wikipedia.org/wiki/Burewala#:~:text=Burewala%20is%20situated%20on%20the,from%20Burewala.> and EIA of Vehari Industrial Estate

near the towns Kachi Pakki, Jamlera and Sahuka. Shrine of Haji Sher Dewan Chawli Mashaikh is also situated in Dewan Sahib at a distance of 18 km. from Burewala. Prior to its settlement, the area was a jungle which was later populated by the Dhuddi tribe of Rajput When the Pakpattan canal started operating in this area, people started to settle in villages as agriculture developed, resulting in jungles being cut to make way for cultivation fields. As this area was in 'Eastern Canal Division' so it was named village no. 118/EB (EB = Eastern Barr). In the northern side of Burewala tehsil, there are still signs of an old water canal which is now called Sukh Bias. The strata are generally fine to medium grained sand with some amount of silt at 5m depth. Coarse sand was encountered at places. The colour is generally grey to brownish grey. Strata are loose to medium dense. At top, strata are generally dry with some roots of vegetation but at depth moisture is observed.

6.2.2 Topography²

Burewala (Punjab), Pakistan elevation is 147 meters on average.



Figure 6-1, Topography of Burewala

6.2.3 Climate and Temperature³

The climate in Burewala is called a desert climate. July & August are hottest months when the temperature generally reaches to 45°C and in night the average minimum temperature drops down to 27°C. The average humidity of city in August is 72%.

Winter season starts from November and lasts till February. Mean maximum

² <https://en-nz.topographic-map.com/map-11sr/Burewala/?center=30.13206%2C72.78683&zoom=12>

³ https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/burewala_pakistan_1182092

and minimum temperatures recorded during the month of January are about 22 and 8 degrees Celsius respectively. The average annual rainfall is 194 mm.

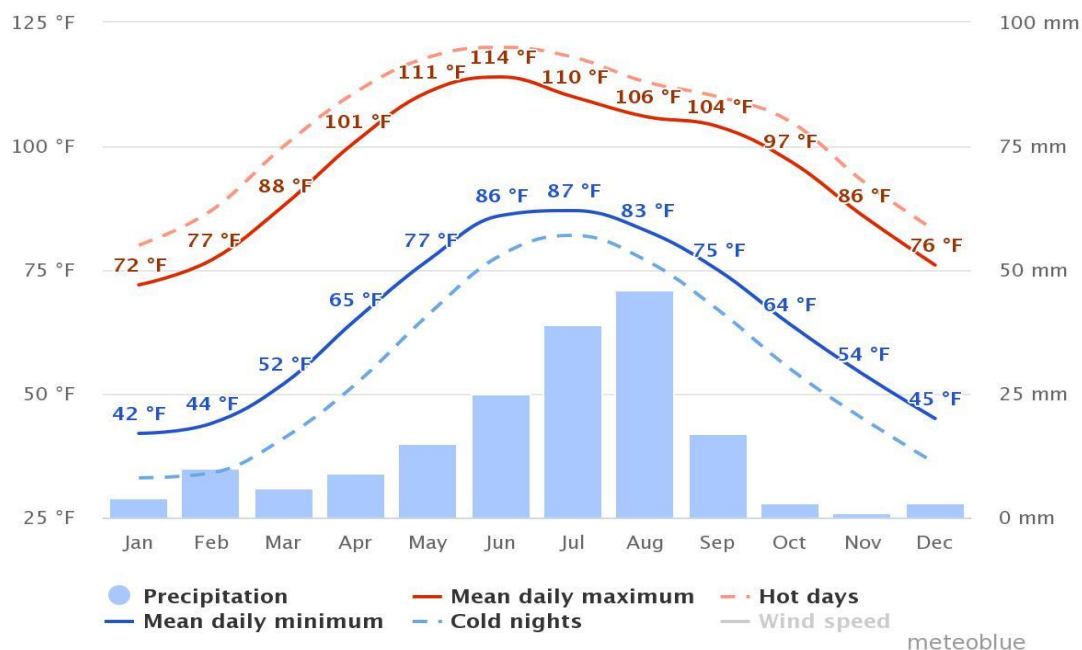


Figure 6-2, Mean Average Temperatures & Precipitation of MC Burewala

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Burewala. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

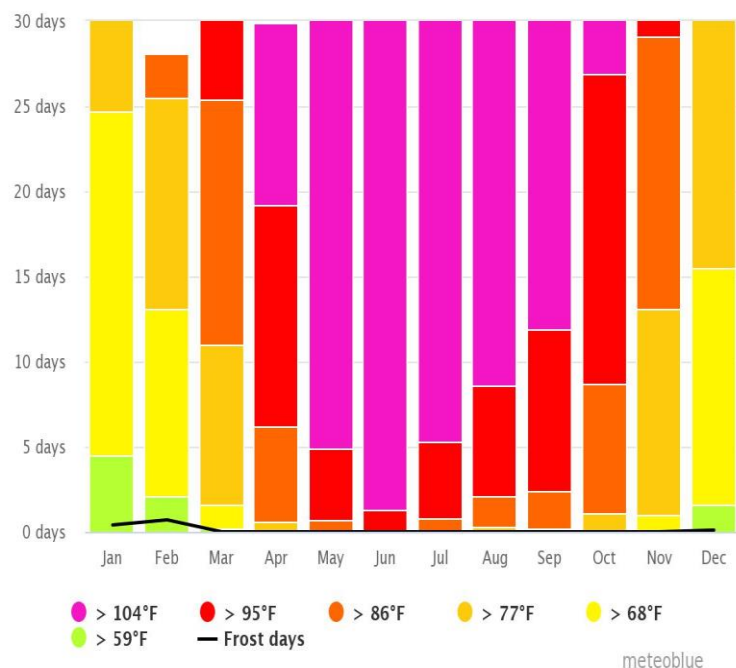


Figure 6-3, Maximum Temperature as per no. of Days

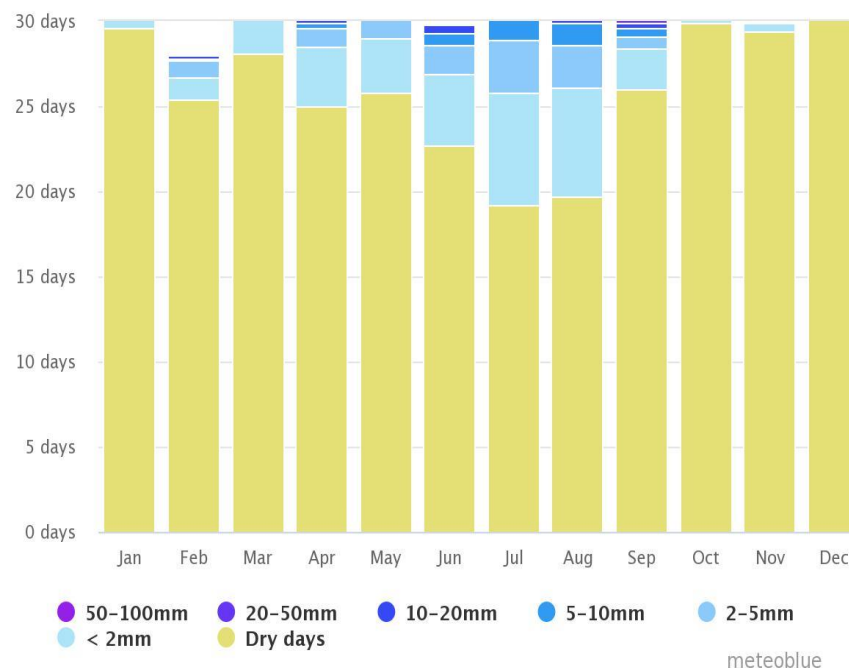


Figure 6-4, Precipitation amounts as per no. of days

The maximum temperature diagram (**Figure 6-3**) for Burewala displays how many days per month reach certain temperatures. The precipitation diagram (**Figure 6-5**) for Burewala shows on how many days per month, certain precipitation amounts are reached. In tropical and monsoon climates, the amounts may be underestimated.

6.2.4 Rainfall⁴

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Burewala experiences some seasonal variation in monthly rainfall. The rainy period of the year lasts for 7.3 months, from February 21 to September 30, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Burewala is July, with an average rainfall of 1.5 inches. The rainless period of the year lasts for 4.8 months, from September 30 to February 21. The month with the least rain in Burewala is November, with an average rainfall of 0.1 inches.

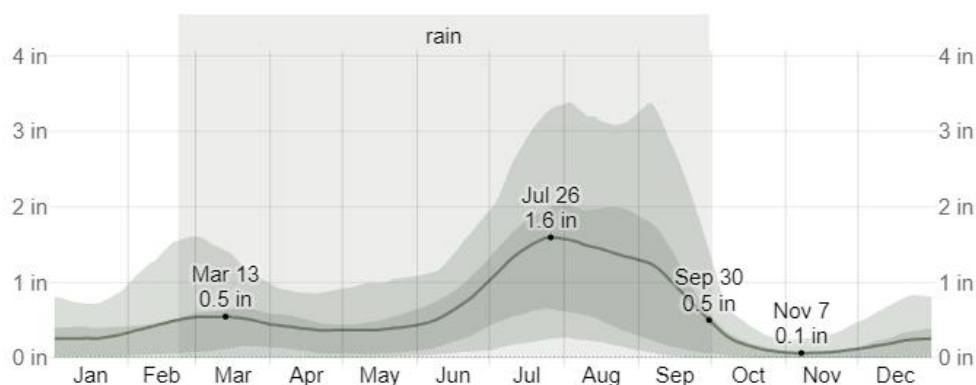


Figure 6-5, Average Rainfall

6.2.5 Wind⁵

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Burewala experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 4.0 months, from May 9 to September 8, with average wind speeds of more than 6.7 miles per hour. The windiest month of the year in Burewala is June, with an average hourly wind speed of 8.4 miles per hour. The calmer time of year lasts for 8.0 months, from September 8 to May 9. The calmest month of the year in Burewala is November, with an average hourly wind speed of 4.8 miles per hour.

⁴ <https://weatherspark.com/y/107379/Average-Weather-in-B%C5%ABrew%C4%81la-Pakistan-Year-Round>

⁵ <https://weatherspark.com/y/107379/Average-Weather-in-B%C5%ABrew%C4%81la-Pakistan-Year-Round>

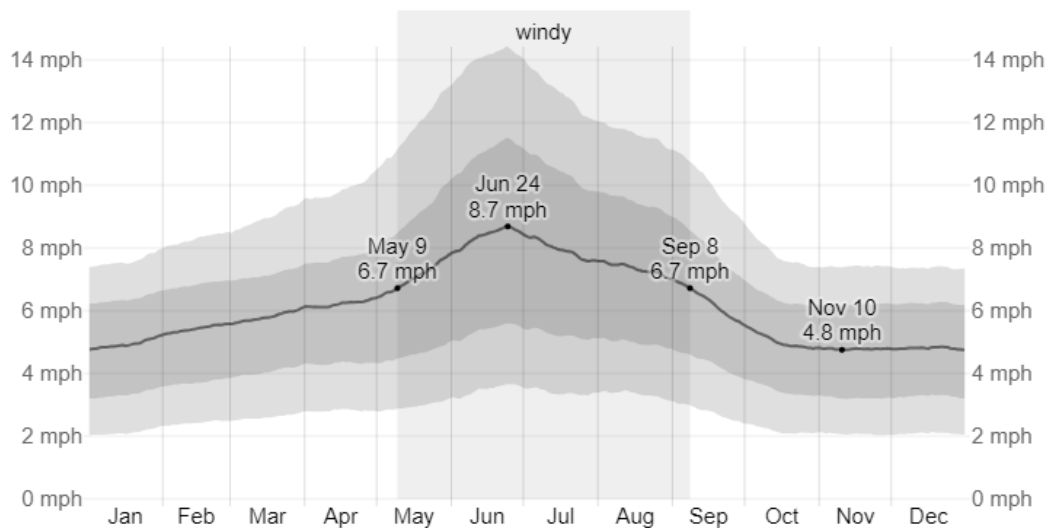


Figure 6-6, Average Wind Speed

6.2.6 Seismicity

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

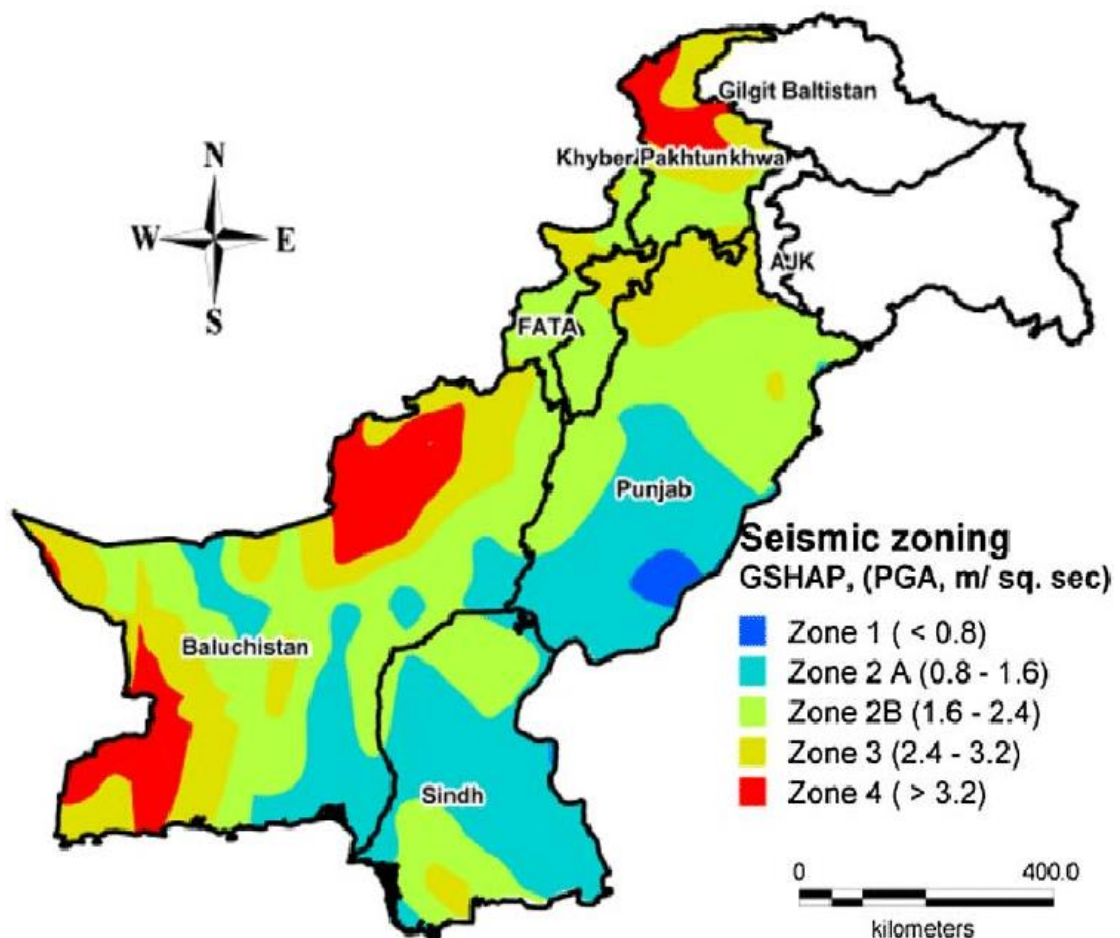


Figure 6-7, Seismic Zones of Pakistan

6.2.7 Ground Water and Water Supply

5-L distributary is flowing at the eastern periphery of the city whereas Pakpattan-Islam Link (PI Link) canal is located at the western boundary of the city. The city has contaminated shallow sub soil water which is unfit for human consumption. Tube wells have been installed at different locations of the city to harness the deep underground fresh water. 26 tube wells were working in the city prior to the installation of 21 tube wells in 2009 by PHE Department. All the 47 tube wells were taken over by defunct TMA. 15 tube wells have been abandoned due to non-availability of distribution system. Water from the operational tube wells is directly fed to the distribution system. Only one overhead reservoir is operative in the entire water supply system.

A) Water Quality

Drinking water gets polluted due to rusty / old water supply network. The city has contaminated shallow sub soil water which is unfit for human consumption.

To check the quality of the water in the area, ground water was collected by Field officers of Asian Environmental Services Private Limited – an EPA Certified Lab on October 08, 2023 and analyzed. The detail of the water quality of the project area is given below:

Table 6-1, Ground Water Analysis Results near THQ Hospital

Parameters	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Lab Analysis					
Color*	SMWW 2120 C	≤ 15 TCU	0	N.A.	Optimal
Taste*	SMWW 2160 C	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Odor*	SMWW 2150 B	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Turbidity*	SMWW 2130 B	< 5 NTU	0	N.A.	Optimal
Total Hardness (as CaCO ₃)**	SMWW 2340 C	< 500 mg/L	396	± 5.14	Optimal
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	630	± 8.02	Optimal
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	7.28	± 0.04	Optimal
Aluminum (Al)	SMWW 3111 B	≤ 0.2 mg/L	<0.005	N.A.	Optimal
Antimony (Sb)	SMWW 3114 B	≤ 0.005 mg/L	<0.005	N.A.	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Barium (Ba)	SMWW 3113 B	0.7 mg/L	<0.0035	N.A.	Optimal
Boron (B)	SMWW 3113 B	0.3 mg/L	<0.02	N.A.	Optimal
Cadmium (Cd)	SMWW 3113 B	0.01 mg/L	<0.006	N.A.	Optimal

Parameters	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Chloride (Cl ⁻) **	SMWW 4500 Cl ⁻ B	< 250 mg/L	67	± 1.73	Optimal
Chromium (Cr)	SMWW 3113 B	≤ 0.05 mg/L	<0.004	N.A.	Optimal
Copper (Cu)	SMWW 3111 B	2.0 mg/L	<0.164	N.A.	Optimal
Cyanide (CN ⁻)*	SMWW 4500 CN ⁻ F	≤ 0.05 mg/L	0	N.A.	Optimal
Fluoride (F ⁻)**	SMWW 4500 F ⁻ C	≤ 1.5 mg/L	0.16	± 0.103	Optimal
Lead (Pb)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Manganese (Mn)	SMWW 3113 B	≤ 0.5 mg/L	<0.015	N.A.	Optimal
Mercury (Hg)	SMWW 3114 B	≤ 0.001 mg/L	<0.001	N.A.	Optimal
Nickel (Ni)	SMWW 3113 B	≤ 0.02 mg/L	<0.02	N.A.	Optimal
Nitrate (NO ₃ ⁻) *	SMWW 4500 NO ₃ ⁻ D	≤ 50 mg/L	1.67	± 1.20	Optimal
Nitrite (NO ₂ ⁻) *	SMWW 4500 NO ₂ ⁻ B	≤ 3.0 mg/L	0	N.A.	Optimal
Selenium (Se)	SMWW 3114 B	0.01 mg/L	<0.01	N.A.	Optimal
Residual Chlorine (Cl ₂) *	SMWW 4500 Cl ⁻ B	0.5 mg/L	0	N.A.	Optimal
Phenolic Compounds (as Phenols) *	SMWW 5530 D	NGVS	0	N.A.	-
Zinc (Zn)	SMWW 3113 B	5.0 mg/L	0.046	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0 CFU/100 mL	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0 CFU/100 mL	0	N.A.	Optimal



Figure 6-8, Ground Water Sampling near THQ Hospital

Table 6-2, Ground Water Analysis Results near Chak 423-EB

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Lab Analysis					
Color*	SMWW 2120 C	≤ 15 TCU	0	N.A.	Optimal
Taste*	SMWW 2160 C	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Odor*	SMWW 2150 B	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Turbidity*	SMWW 2130 B	< 5 NTU	0	N.A.	Optimal
Total Hardness (as CaCO ₃) **	SMWW 2340 C	< 500 mg/L	512	± 5.14	High
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	1312	± 8.02	High
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	7.37	± 0.04	Optimal
Aluminum (Al)	SMWW 3111 B	≤ 0.2 mg/L	<0.005	N.A.	Optimal
Antimony (Sb)	SMWW 3114 B	≤ 0.005 mg/L	<0.005	N.A.	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Barium (Ba)	SMWW 3113 B	0.7 mg/L	<0.0035	N.A.	Optimal
Boron (B)	SMWW 3113 B	0.3 mg/L	<0.02	N.A.	Optimal
Cadmium (Cd)	SMWW 3113 B	0.01 mg/L	<0.006	N.A.	Optimal
Chloride (Cl-) **	SMWW 4500 Cl ⁻ B	< 250 mg/L	237	± 2.87	Optimal
Chromium (Cr)	SMWW 3113 B	≤ 0.05 mg/L	<0.004	N.A.	Optimal

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Copper (Cu)	SMWW 3111 B	2.0 mg/L	0.164	N.A.	Optimal
Cyanide (CN) ⁻ *	SMWW 4500 CN-F	≤ 0.05 mg/L	0	N.A.	Optimal
Fluoride (F) ⁻ **	SMWW 4500 F-C	≤ 1.5 mg/L	0.17	± 0.103	Optimal
Lead (Pb)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Manganese (Mn)	SMWW 3113 B	≤ 0.5 mg/L	<0.015	N.A.	Optimal
Mercury (Hg)	SMWW 3114 B	≤ 0.001 mg/L	<0.001	N.A.	Optimal
Nickel (Ni)	SMWW 3113 B	≤ 0.02 mg/L	<0.02	N.A.	Optimal
Nitrate (NO ₃ ⁻) *	SMWW 4500 NO ₃ ⁻ D	≤ 50 mg/L	3.10	± 1.21	Optimal
Nitrite (NO ₂ ⁻) *	SMWW 4500 NO ₂ ⁻ B	≤ 3.0 mg/L	0	N.A.	Optimal
Selenium (Se)	SMWW 3114 B	0.01 mg/L	<0.01	N.A.	Optimal
Residual Chlorine (Cl ₂) *	SMWW 4500 Cl ₂ B	0.5 mg/L	0	N.A.	Optimal
Phenolic Compounds (as Phenols) *	SMWW 5530 D	NGVS	0	N.A.	-
Zinc (Zn)	SMWW 3113 B	5.0 mg/L	0.050	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0 CFU/100 mL	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0 CFU/100 mL	0	N.A.	Optimal



Figure 6-9, Ground Water Sampling near Chak 423-EB

Groundwater samples were tested for 30 different selected parameters as per PEQS. Based on the laboratory test results, it was found that all the parameters of sample taken near THQ Hospital were within prescribed limits of PEQS while Total Hardness (as CaCO₃) and Total Dissolved Solids (TDS) of sample taken near Chak 423-EB were not in permissible limits of PEQS. Baseline Environmental Monitoring Reports are attached as Annexure-06.

6.2.8 Air Quality

Air quality in most of the project area appears good based on observation during the study period. Emissions should be controlled at source under the ESIA. There will be a few items of powered mechanical equipment to be used in the construction and rehabilitation works that may give rise to complaints of dust and other emissions, however, these should be minor and easily dissipated. Domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households, are minor.

The primary source of air pollution at the project sites is the vehicular emissions, industries such as rice mills and the key pollutants likely to be found near project proposed locations are Carbon Monoxide (CO), Oxides of Nitrogen (NO_x), Sulfur Dioxide (SO_x) and Particulate Matter (PM). In order to determine the air quality of the area, Asian Environmental Services Private Limited – an EPA certified Lab had the requisite air sampling device and expertise for collection of samples.

The monitored parameters included Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulphur Oxides (SO_x), Particulate Matter (PM). The monitoring was carried by the field officers of Asian Environmental Services Private Limited on October 8, 2023 to October 9, 2023 for the period of 24 hours at Madina Town and October 8, 2023 to October 10, 2023 for the period of 24 hours at near THQ Hospital and near Chak 423-EB in Burewala within project area to determine the baseline ambient air quality of the area and results are presented in **Table 6-3** and **Table 6-4**, respectively and pictorial views monitoring are shown in **Figure 6-10** and **Figure 6-11**, respectively. Baseline Environmental Monitoring Reports are attached as Annexure-06.

Table 6-3, Ambient Air Quality Results near THQ Hospital

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂)*	µg/m ³	24Hours	1.00	32.97	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	14.94	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	47.85	120.0	Optimal

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	37.31	120.0	Optimal
Carbon Monoxide (CO) *	mg/m ³	24Hours	0.01	1.80	05.0	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	100.31	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	20.56	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	138.04	500	Optimal



Figure 6-10, Ambient Air Monitoring near THQ Hospital

Table 6-4, Ambient Air Quality Results near Chak 423-EB

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	39.40	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	15.90	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	55.01	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	38.14	120.0	Optimal
Carbon Monoxide (CO) *	mg/m ³	24Hours	0.01	1.91	05.0	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	96.97	150	Optimal

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	20.03	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	126.29	500	Optimal



Figure 6-11, Ambient Air Monitoring near Chak 423-EB

6.2.9 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 project will use powered mechanical equipment. Subjective observations were made of background noise and also of individual vehicle pass by events.

Noise levels of the project area was monitored by field representative of Asian Environmental Services Private Limited on October 8, 2023 to October 9, 2023 for 24 hours near THQ Hospital and on October 9, 2023 to October 10, 2023 for 24 hours Chak 423-EB to determine the baseline noise levels at project area using digital sound meter and the results are presented in **Table 6-5** and **Table 6-6**, respectively. Baseline Environmental Monitoring Reports are attached as Annexure-06.

Table 6-5, Noise Level Monitoring Results neat THQ Hospital

Sr. No.	Time	Noise dB(A)		PEQS
1	10:30	44	Day Time	55
2	11:30	45		
3	12:30	45		
4	13:30	46		
5	14:30	47		
6	15:30	46		
7	16:30	45		
8	17:30	44		
9	18:30	45		
10	19:30	44		
11	20:30	43		
12	21:30	42		
13	22:30	41	Night Time	45
14	23:30	40		
15	00:30	40		
16	01:30	39		
17	02:30	39		
18	03:30	38		
19	04:30	39		
20	05:30	39		
21	06:30	40		
22	07:30	41	Day Time	55
23	08:30	42		
24	09:30	43		

Table 6-6, Noise Level Monitoring Results near Chak 423-EB

Sr. No.	Time	Noise dB(A)		PEQS
1	11:00	47	Day Time	55
2	12:00	46		
3	13:00	47		
4	14:00	48		
5	15:00	49		
6	16:00	49		
7	17:00	48		
8	18:00	49		
9	19:00	50		
10	20:00	49		

Sr. No.	Time	Noise dB(A)		PEQS
11	21:00	48		
12	22:00	46	Night Time	45
13	23:00	45		
14	00:00	44		
15	01:00	44		
16	02:00	43		
17	03:00	43		
18	04:00	42		
19	05:00	43		
20	06:00	44		
21	07:00	46	Day Time	55
22	08:00	47		
23	09:00	48		
24	10:00	47		

6.2.10 Solid Waste

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

6.3 Biological Resources

6.3.1 Fauna

No wild animal / endangered species are found in the area. Some of the commonly found fauna is cow, buffalo, goat, horse, donkey, peacock, sparrow, crow, owl, dog, cat, pigeon, lizard and hen etc.



Cow



Goat



Dog



Pigeon

Figure 6-12, Fauna in Burewala

6.3.2 Flora

No wild animal / endangered species are found in the area. Kikar, shisham, beri, tali, neem etc. are common species present in and surrounding areas of Burewala. No tree will be cut during execution of this project, anyhow, in case of any mishap / misfortune, if a tree has to be cut then the contractor will be bound to plant 10 new trees of almost 06 ft. height against each tree cut.

6.3.3 Wetlands

There are no wetlands nearby project site and in Burewala.

6.3.4 Wildlife Sanctuaries

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

6.3.5 Wildlife Parks

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

6.3.6 Forests

Burewala Forest Range comprises of Canal Side Plantation and Roadside Plantation along Provincial Highways of Tehsil Burewala and Rakh Jamlera Plantation situated near Satluj River.

6.3.7 Game Reserves

No game reserves found in near project area and in Burewala.

6.4 Socio-Economic and Cultural Environment

This section addresses the socio-economic and cultural aspects of the project area. The available reports and documents were thoroughly examined during the desk study. A team of experts conducted on-site visits to assess the proposed "Improvement and Extension of Sewerage System in Burewala City"

project, collecting baseline data from both directly and indirectly impacted individuals, including perspectives related to the sewerage system. The information revealed from this report assist the project planners, local authorities, and policymakers in making informed decisions to ensure the appropriateness and suitability of essential services (Construction of Wastewater Treatment Plant, Repair and Rehabilitation of existing Sewerage Infrastructure, and Maintenance of Choked Sewer Lines) for the residents, further promoting the overall well-being and sustainability of the city.

The basic objectives of the social surveys were to:

- Get the primary data from the various sources.
- Informed people about the objective and purpose of the proposed project.
- Understand the specific needs and concerns of residents regarding the sewerage system.
- Identify the potential impacts associated with the implementation of the proposed project.
- Get feedback from the community about the project related social issues.
- And address the mitigation measures about the social issues in the report.

6.4.1 Methodology

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

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

Population statistics were collected from the secondary data source which is District Census Report (DCR). According to the (DCR) 2017, the total population of Burewala Tehsil is estimated as 1,019,659 individuals.

The sample size of 69 individuals was determined using the Standard Statistical Formula with a confidence level of 90% and a confidence interval of 10%. The respondents were selected through Simple Random Sampling, which falls under the type of Probability Sampling techniques. Data from the respondents was collected using an Interview Schedule technique. A total of 69 questionnaires were designed to collect baseline data on demographic and socio-economic indicators. In addition, extensive Consultations and

Focus Group Discussions (FGDs) were conducted during the socio-economic survey in order to inform individuals about project-related activities and record their opinions.

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

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

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

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

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

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

6.4.2 Socio-economic Environment of Project Area

Burewala Tehsil is located in the Vehari District of the Punjab province in Pakistan. It is located on the bank of River Sutlej and divided administratively into 32 Union Councils. The city of Burewala serves as the administrative center for Burewala Tehsil, which is a sub-division within the larger district. It is a significant urban center within the tehsil, and it is known for its agricultural activities, trade, and economic contributions to the region.

The tehsil, like many others in the Punjab province, has a predominantly agrarian economy with a focus on crops such as cotton, wheat, rice, maize, and sugarcane. Burewala is also famous for its mangoes, which are considered among the best in the region. Burewala, a key economic center in Pakistan, relies heavily on the cotton industry, being a major producer in the country. The city boasts numerous cotton ginning factories, contributing significantly to employment opportunities. Additionally, Burewala is a prominent rice-producing region, exporting high-quality rice globally through well-established processing facilities. The city houses various agricultural-related industries, including cotton processing, rice production, and flour mills. Furthermore, Burewala hosts a range of small and medium-sized industries

such as flour mills, brick kilns, and metal workshops, fostering local employment. With robust road and rail connections, Burewala serves as a crucial transportation hub in the region.

The city, similar to many parts of Punjab, possesses a rich cultural heritage. Traditional music, dance, and local festivals are integral parts of the local culture. Society is influenced by both traditional values and modern influences, creating a blend of customs and practices. Punjabi serves as the predominant language spoken in the designated area with Urdu and Saraiki being secondary languages used.

The project area is characterized by a strong presence of Punjabi culture. Inhabitants of this area come from diverse backgrounds, with the majority belonging to low-income and middle-income socioeconomic classes, although there are also some individuals from higher income brackets. The most prevalent dress style among the people in the project area is Shalwar Kameez. Traditional attire is commonly worn by females, who often embellish their outfits with ornamental accessories as well. Additionally, various castes can be found residing within the project area. Convenient transportation options connect the region to other cities and towns through an established road network, including buses and private vehicles that are widely utilized for commuting purposes.

The city's rich food culture reflects its history, geography, and cultural diversity, with traditional dishes playing a central role in local celebrations. Popular local dishes include Sarson Ka Saag, Makai Ki Roti, Nihari, Haleem, Sajji, and Kheer, along with a variety of street foods like samosas, pakoras, and chaat. Notably, Burewala is renowned for its lassi, a popular Punjabi drink made with yogurt, milk, and sugar.

6.4.3 Political and Administrative Setup

The project area is located in the Tehsil of Burewala that serves as one of the subdivisions within the district Vehari and consists of 32 Union Councils. Burewala, like other cities in Pakistan, is likely to have a local government system. This includes municipal committees or corporations responsible for local administration, public services, and infrastructure development. The city may be divided into different administrative zones or union councils, each with its own local administration and representation.

6.4.4 Land Acquisition and Resettlement

During the survey, it was identified that project land for construction of Wastewater Treatment Plant (WWTP) is government owned and will be transferred from Revenue Department to Municipal Corporation (MC) Burewala, covering approximately 22 acres. This transfer has raised resettlement concerns, as identified through consultations with both

Municipal Corporation and relevant patwari.

6.4.5 Vulnerable Persons

A vulnerable person is someone who is more likely to face adverse impacts from a project or face challenges due to his/her particular characteristics, circumstances, or conditions. This may include individuals with disabilities, those below the poverty line, elderly women, and children. These individuals may face greater difficulties in accessing resources, fulfilling their basic needs, and exercising their rights. In the survey, it was identified that Mrs. Mubeen Fatima (Hier) is a vulnerable person as the parent of a disabled child.

6.4.6 Demographic Profile

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

A) Households Surveyed in the Residential Area

For the present study, the project area has been categorized into three zones, all situated within Burewala City. Notably, both Disposal Stations in Zone-2 will be directly linked to the Waste Water Treatment Plant (WWTP). It's important to note that the Waste Water Treatment Plant (WWTP) is specifically located in the Rural Area at Chak 435/E.B. The Table provides details on the primary areas and the corresponding number of households surveyed in the proximity of the study area.

Table 6-7, No. of Households Surveyed in the Residential Area

Sr. No.	Zone	Area Name	No. of Households
1.	Zone-1 & Zone-3	Shadman Colony, Mujahid Colony, Azizabad	21
2.	Zone-2	Model Town, Gulistan Colony, P-Block, D-Block, E-Block, Yaqoobabad, Chak 435/E. B	48
	Total		69

The table indicates that the majority of the households surveyed were present in the Zone-2 whose Disposal Stations will be connected with the Waste Water Treatment Plant (WWTP) and will provide services to the residents of Zone-2. Additionally, this Waste Water Treatment Plant (WWTP) will also cater for both Zone-1 and Zone-3 residents.

B) Gender Ratio of Respondents

The gender ratio of respondents contacted is shown in the following table.

Table 6-8, Gender Ratio of Respondents

Sr. No.	Gender	Frequency	Percentage (%)
1.	Male	47	68.1
2.	Female	22	31.9
	Total	69	100

Based on the data, the majority of survey participants, accounting for 68.1%, identified themselves as male, with 31.9% identifying as female.

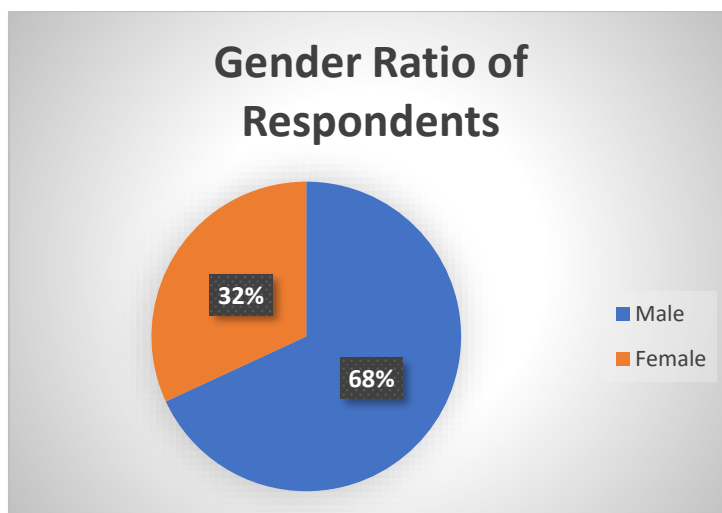


Figure 6-13, Graph: Gender Ratio of Respondents

C) Age

The demographic characteristic of age is shown in the **Table 6-9**

Table 6-9, Age Composition of the Respondents

Sr. No.	Frequency Distribution	Number	Percentage (%)
1.	16 - 30	23	33.4
2.	31 - 45	39	56.5
3.	46 - 60	07	10.1
4.	60 & above	0	0
	Total	69	100

Based on the data in this table, it can be observed that 33.4% of participants fall within the age range of 16-30 years, while 56.5% are aged between 31-45 years. Additionally, individuals ranging from 46-60 years make up 10.1% of respondents.

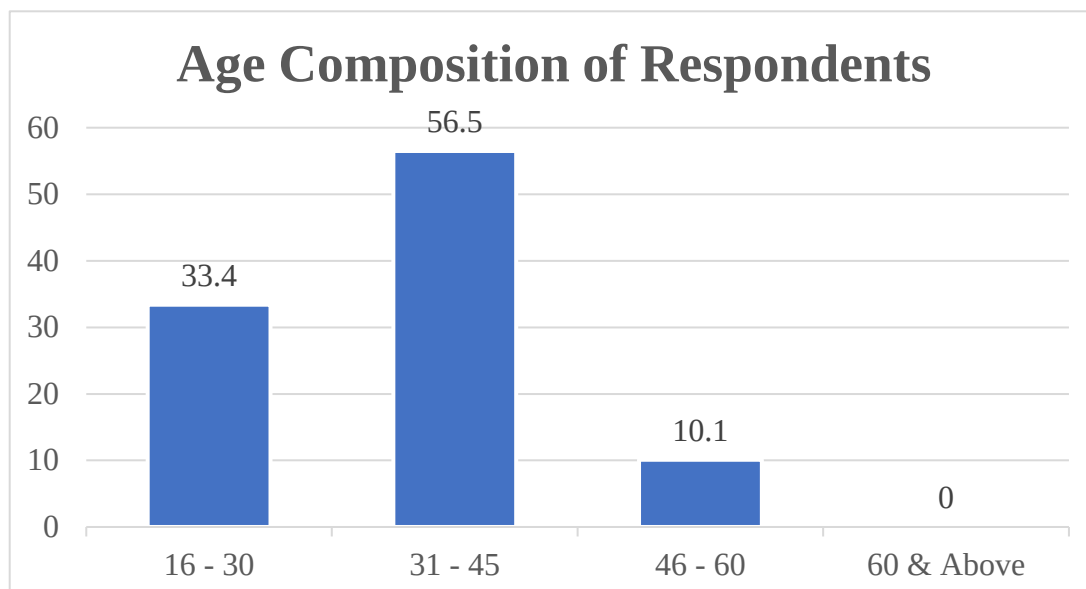


Figure 6-14, Graph: Age Composition of the Respondents

D) Caste

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

E) Language

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

F) Education

Education distribution of the survey is shown in the following **Table 6-10**.

Table 6-10, Education Level of the Respondents

Sr. No.	Education Level	Number	Percentage (%)
1.	Illiterate	07	10.1
2.	Primary	03	4.3
3.	Middle	0	0
4.	Matric	0	0
5.	Intermediate	05	7.3
6.	Bachelor's	10	14.5
7.	Master's	44	63.8

Sr. No.	Education Level	Number	Percentage (%)
	Total	69	100

Based on the data presented in this table, it is evident that a significant portion of respondents possess advanced levels of education. Specifically, 10.1% are unable to read or write, while 4.3% have received primary level education. Additionally, 7.3% hold Intermediate certificates and 14.5% have obtained bachelor's degrees; however, the majority of participants (63.8%) possess master's degrees. In conclusion, the survey results indicate that a considerable number of respondents exhibit a high educational attainment level.

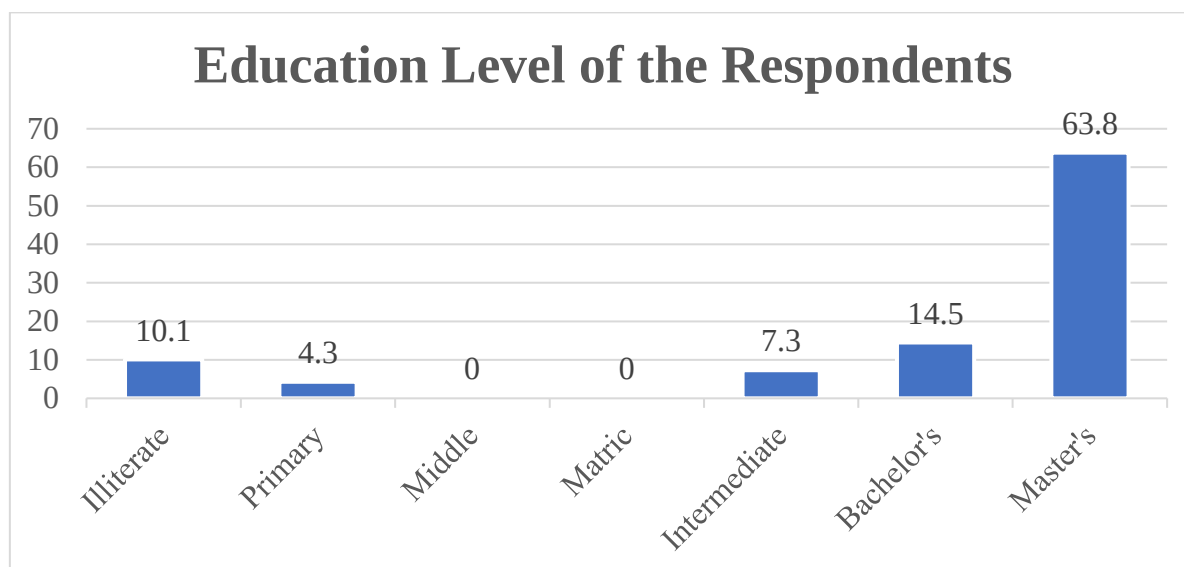


Figure 6-15, Graph: Education Level of the Respondents

G) Marital Status

Marital status distribution of the survey is shown in the **Table 6-11**.

Table 6-11, Marital Statuses of the Respondents

Sr. No.	Marital Status	Number	Percentage (%)
1.	Married	51	73.9
2.	Unmarried	18	26.1
3.	Divorced	0	0
	Total	69	100

According to the survey, 73.9% of the respondents are married and 26.1% are unmarried or single.

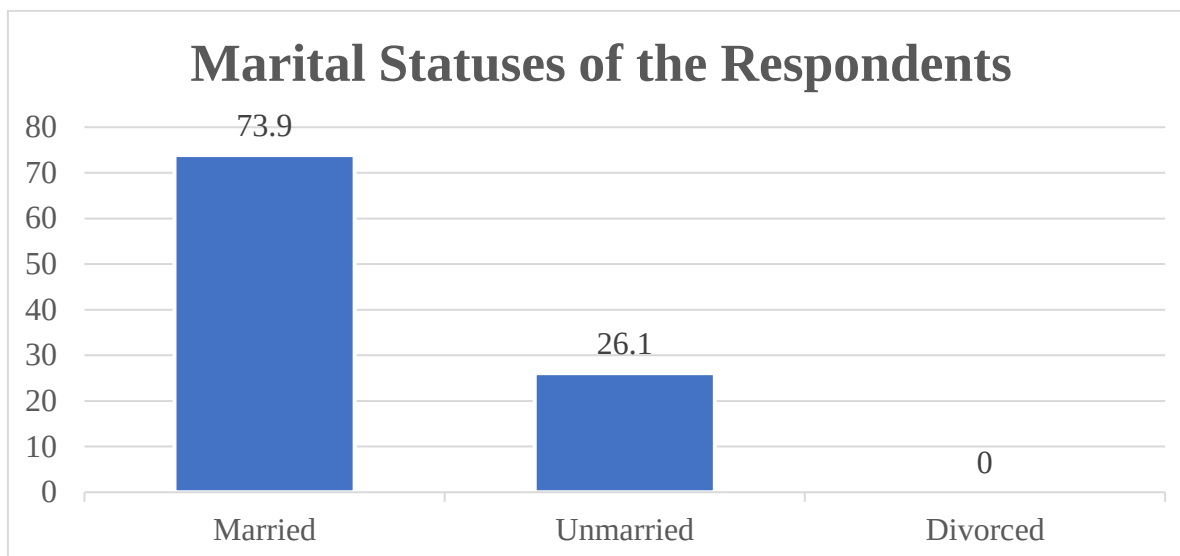


Figure 6-16, Graph: Marital Statuses of the Respondents

H) Total Dependents

The number of individuals who rely on the respondents is shown in the following **Table 6-12**.

Table 6-12, Total Dependents

Sr. No.	Total Dependents (Individuals)	Number	Percentage (%)
1.	No Dependent	13	18.8
2.	1-4	24	34.8
3.	5-8	21	30.4
4.	9-12	11	15.9
5.	More than 12	0	0
Total		69	100

The table illustrates the count of people dependent on the survey participants. Most participants, precisely 34.8%, support 1 to 4 dependents. Additionally, 30.4% are responsible for 5 to 8 individuals while 18.8% have no dependents. Moreover, 15.9% have 9 to 12 dependents.

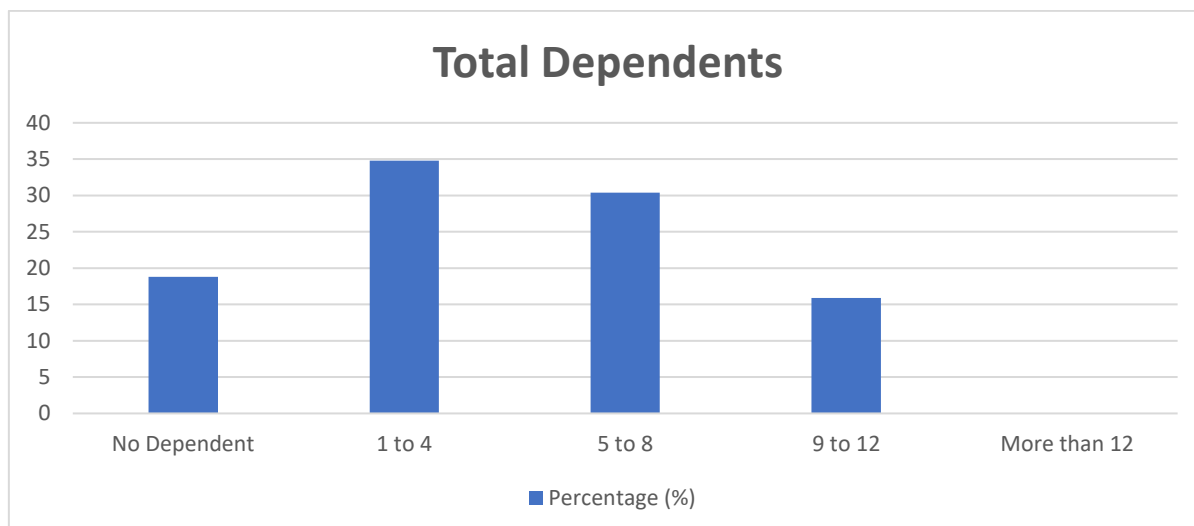


Figure 6-17, Graph: Total Dependents

6.4.7 Occupation and Sources of Income

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

A) Occupation

Occupations of the selected respondents are shown in the **Table 6-13**

Table 6-13, Occupational Status of the Respondents

Sr. No.	Occupation	Number	Percentage (%)
1.	Farmer	09	13.1
2.	Government Job	26	37.7
3.	Private Job	18	26.1
4.	Business	11	15.9
5.	Unemployed	05	7.2
	Total	69	100

The above table represents the occupational distribution of the respondents. According to the data, 7.2% of respondents are without a job. Among those considered "economically active," 13.1% are engaged in farming, 37.7% are employed in government positions, and 26.1% of respondents are working in the private sector. Additionally, 15.9% of participants are involved in business activities.

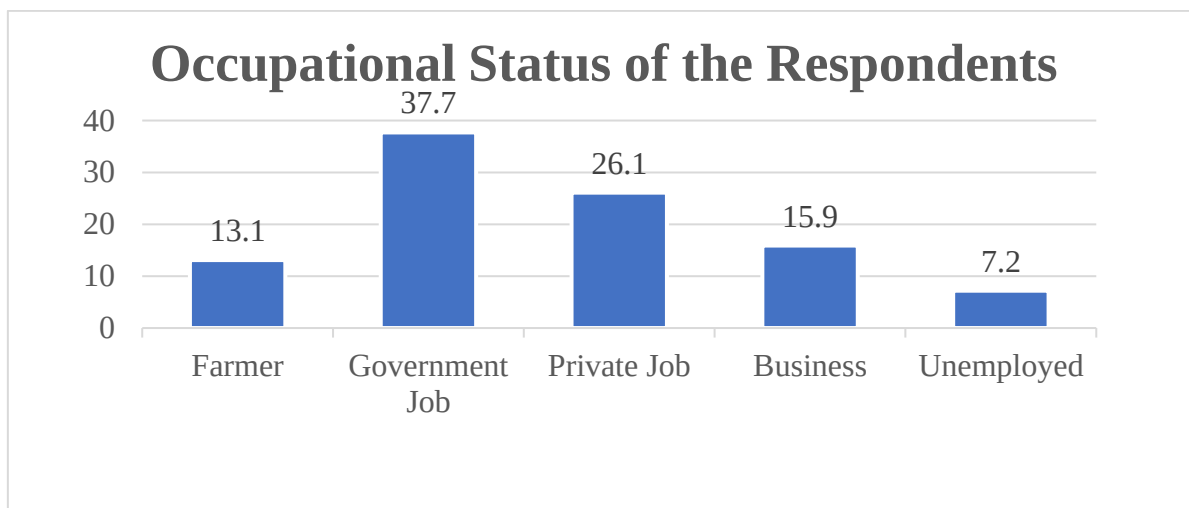


Figure 6-18, Graph: Occupational Status of the Respondents

B) Household Income Levels

During the socio-economic survey, respondents were inquired about their total family monthly income from all sources. **Table 6-14** shows the income levels of the respondents.

Table 6-14, Household Income Levels

Sr. No.	Income Level (Pak Rupees)	Number	Percentage (%)
1.	Less than Rs. 32,000	06	9.4
2.	Rs. 32,000-50,000	21	32.8
3.	Rs. 50,001-75,000	12	18.7
4.	Rs. 75,001-90,000	04	6.3
5.	More than Rs. 90,000	21	32.8
	Total	64	100

Based on the data presented in the table, it can be observed that 9.4% of the participants earn less than Rs. 32,000 monthly. Additionally, 32.8% fall within the income bracket of Rs. 32,000 to Rs. 50,000 per month, while 18.7% earn between Rs. 50,001 and Rs. 75,000 monthly. Furthermore, 6.3% have a monthly income ranging from Rs. 75,001 to Rs. 90,000, and 32.8% of respondents earn more than Rs. 90,000 monthly.

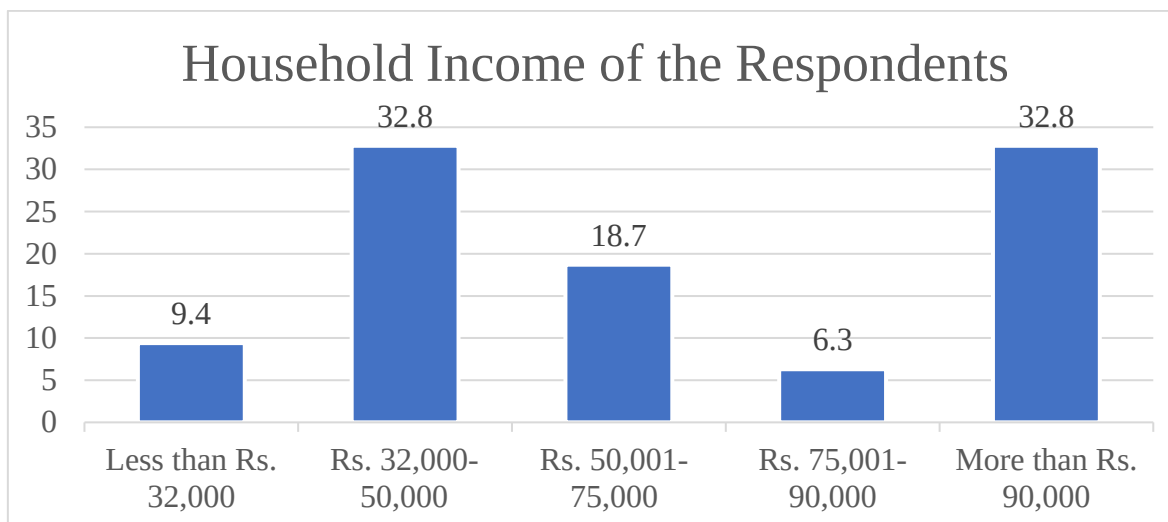


Figure 6-19, Graph: Household Income of the Respondents

C) Sources of Income

Sources of income survey findings of selected respondents are shown in the following **Table 6-15**.

Table 6-15, Sources of Income Distribution of the Respondents

Sr. No.	Source	Number	Percentage (%)
1.	Service	40	62.5
2.	Agriculture / Livestock	06	9.4
3.	Business	11	17.2
4.	Labor	07	10.9
5.	Any other	0	0
	Total	64	100

Based on the data presented in the table, it can be observed that 62.5% of participants are involved in service-related occupations, while 9.4% are engaged in agriculture and livestock activities. Another 17.2% reported being self-employed as business owners or entrepreneurs, while 10.9% work as daily wage laborer.

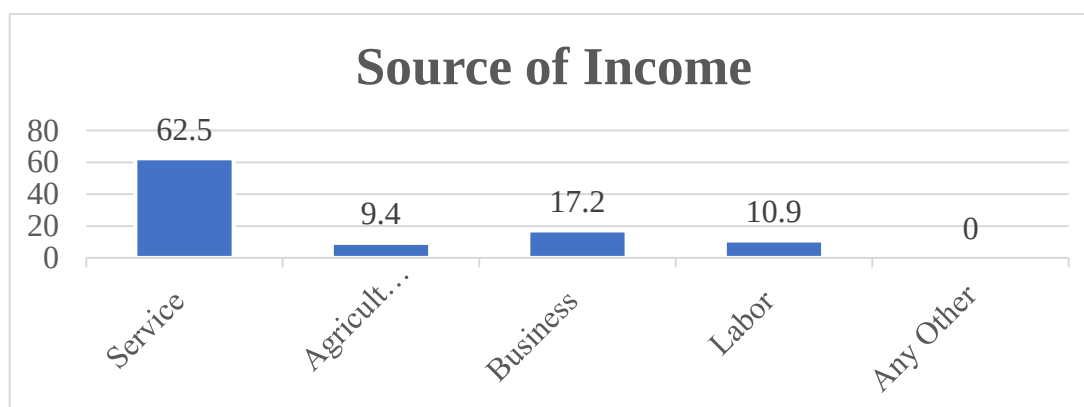


Figure 6-20, Graph: Source of Income

6.4.8 Housing Profile

The housing profile shows the housing conditions of the respondents.

A) Types of Construction

Table 6-16 shows the type of construction of the house in the Project Area.

Table 6-16, Types of Construction

Sr. No.	Construction Type	Number	Percentage (%)
1.	Pacca Houses	67	97.1
2.	Katcha Houses	0	0
3.	Semi Pacca	02	2.9
	Total	69	100

Based on the data in the table, it can be observed that majority of the respondents i.e., 97.1% reported living in pacca (concrete) houses while a small proportion of respondents i.e., 2.9% living in semi pacca houses. However, none of the participants reside in katcha (mud) houses.

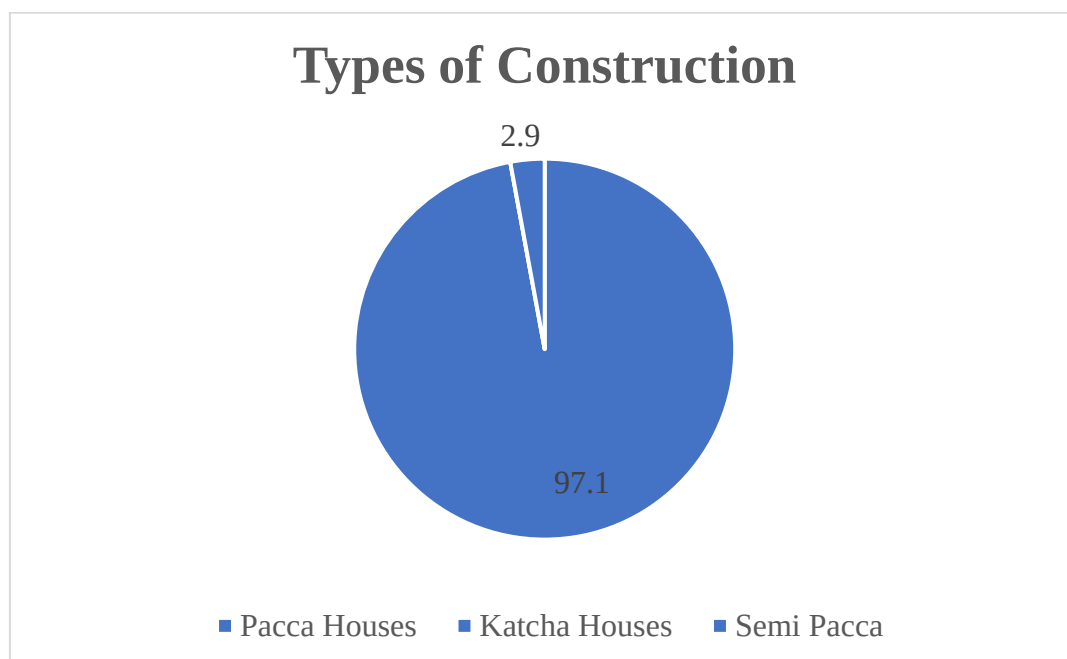


Figure 6-21, Graph: Types of Construction

B) Estimated Number of Houses in the Sub Project Area

Based on the survey findings, a large portion of participants indicated that Burewala City is home to an estimated 40,000 to 60,000 residences. The average number of houses in the city was calculated at around 50,000.

C) Estimated Household Size

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

D) Estimated Population

Estimated Population = Household Size * No. of Houses

$$50,000 * 6.5 = 325,000$$

The accurate population estimates are essential for the proper functioning and efficiency of wastewater treatment facilities in Burewala City. Therefore, proper planning based on these estimates ensures that the treatment plant can effectively manage and treat the wastewater generated by the city's residents, contributing to a cleaner and healthier environment for the community.

6.4.9 Social Amenities

In the socio-economic survey conducted to establish the social foundation of the project area, participants were asked about the utilities in their locality. All respondents reported having access to electricity and Sui Gas at their homes. PTCL services were accessible in various areas, and a majority of participants owned mobile phones. Some households used solar panels for electricity and water supply. However, a small number of respondents expressed discontent with the sewerage and drainage facilities. The **Table 6-17** illustrates the status of social amenities on a scale.

Table 6-17, Social Amenities of the Project Area

Sr. No.	Social Amenities	Scale	Number	Percentage (%)
1.	Truck / Bus Terminals	Yes	69	100
		No	0	0
		Total	69	100
2.	Railway Tracks	Yes	69	100
		No	0	0
		Total	69	100
3.	Gas Pipelines	Yes	69	100
		No	0	0
		Total	69	100
4.	Shopping Area/Markets	Yes	69	100
		No	0	0
		Total	69	100
5.	Tubewells	Yes	69	100
		No	0	0
		Total	69	100
6.	Telephone Lines	Yes	69	100
		No	0	0
		Total	69	100
7.	Water Supply Network	Yes	69	100

Sr. No.	Social Amenities	Scale	Number	Percentage (%)
		No	0	0
		Total	69	100
8.	Sewerage System	Yes	69	100
		No	0	0
		Total	69	100
9.	Drainage System	Yes	69	100
		No	0	0
		Total	69	100
10.	Electricity Transmission Lines	Yes	69	100
		No	0	0
		Total	69	100
11.	Storm Water drains	Yes	0	0
		No	69	100
		Total	69	100
12.	Disposal Stations	Yes	69	100
		No	0	0
		Total	69	100

A) Mode of Transport

The survey revealed that a significant portion of the participants opt for cars and motorcycles as their primary mode of transportation. However, there are also some respondents who rely on cycles and public transport to commute.

6.4.10 Availability of Social Services

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

A) Educational Facilities

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

Table 6-18, Educational Facilities

Sr. No.	Name of Institution	Education Level	For Boys / Girls
1.	Government High School Burewala	Secondary	Co-Education
2.	Divisional Public School Burewala	Secondary	Co-Education
3.	Government Girls High School Burewala	Secondary	Girls
4.	Unique School System Burewala	Secondary	Co-Education

Sr. No.	Name of Institution	Education Level	For Boys / Girls
5.	Madrassa Darul Quran for Women Burewala	Primary / Islamic	Girls
6.	Virtual University Burewala Campus	Higher Secondary	Co-Education
7.	Government Girls MC High School	Secondary	Girls
8.	The Alliance School	Secondary	Co-Education
9.	The Allied School Burewala	Secondary	Co-Education
10.	The City School Burewala	Secondary	Co-Education
11.	Superior College Burewala	Higher Secondary	Co-Education
12.	Punjab College Burewala	Higher Secondary	Co-Education
13.	Jinnah College Burewala	Higher Secondary	Co-Education
14.	Leads College Burewala	Higher Secondary	Co-Education
15.	Barani Institute of Sciences Burewala	Higher Secondary	Co-Education
16.	Agriculture university Faisalabad Sub Campus Burewala	Higher Secondary	Co-Education
17.	Government College of Technology Burewala	Higher Secondary	Co-Education

B) Health Facilities

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

Table 6-19, Health Facilities

Sr. No.	Health Facilities	Government / Private
1.	Tehsil Head Quarter Hospital Burewala	Government
2.	The Doctors Hospital	Private
3.	Burewala Hospital and Medical Centre	Private
4.	Din Medical Complex Hospital	Private
5.	Al-Ghafoor Hospital	Private
6.	Dhillon Surgical Complex	Private

C) Offices

In the survey, the offices which is identified within the project area is shown in the **Table 6-20**

Table 6-20, Offices

Sr. No.	Office	Government / Private
1.	Population Welfare Department	Government
2.	Forest Department	Government

Sr. No.	Office	Government / Private
3.	NADRA Office	Government
4.	FBR Office Burewala	Government
5.	Sui Gas Office Burewala	Government
6.	Agriculture Office Burewala	Government
7.	Baradarz Cooling Center	Private
8.	Khushahli Bank Limited	Private

6.4.11 Sewerage Infrastructure

Sewerage infrastructure refers to the system of pipes, drains, sewers, and other structures that are designed to collect, transport, and dispose of wastewater and sewage from homes, offices, and industries. The primary purpose of sewerage infrastructure is to prevent the contamination of water sources, protect public health, and maintain environmental sustainability. In the present project survey, various questions related to sewerage infrastructure were asked from the respondents. A detailed analysis of each question is given below.

A) Availability of Sewerage System

The survey indicated that there is a sewerage system present in all three zones of Burewala City. However, there are certain streets within the city where a sewerage system is not in place.

B) Type of Sewerage System (Open or Closed)

Most parts of Burewala City are equipped with a closed sewerage system; however, there are a few areas where an open sewerage system is in place.

C) Current Issues Related to Sewerage System

Some common issues reported by respondents are:

- Ground water mixes with sewer water through cracks and leaks.
- Waterborne diseases arise from the presence of sewage-contaminated water in public areas.
- Accumulation of debris, solid waste, or foreign objects can lead to blockages in the sewer pipes, causing backups and overflows.
- Aging sewer pipes may deteriorate, leading to cracks, leaks, or collapses.
- Overflowed sewer systems can result in foul odors, impacting the quality of life for residents in the vicinity.
- Combined sewer systems overflowed due to heavy rainfall.

D) Satisfaction of Local Community with the Current Services

The survey revealed that most respondents are dissatisfied with the existing services provided by the Municipal Corporation (MC).

E) Signs of Choked / Damaged Sewers or Ponding

Survey participants reported that the current sewage pipelines are damaged, choked and blocked.

F) Drinking Water Contaminates with Waste water

Respondents disclosed that clean drinking water becomes contaminated with wastewater specifically during heavy rainfall.

G) Repair / Maintenance / Rehabilitation Requirement of Current Sewerage System

In the survey, participants stated that the current sewerage system needs repairs, maintenance, and rehabilitation.

H) Percentage of Community Being Served by Sewerage System

According to the respondents, 90% to 95% of the local community is being served by the existing sewerage infrastructure.

I) Bill Payment

Residents are charged an annual sewerage / drainage tax of Rs. 500 per household.

This tax is imposed by Municipal Corporation (MC) to fund the maintenance, development, and operation of sewerage and drainage infrastructure within the community. The imposition of such a tax is a common practice in many areas worldwide as a means to generate revenue for the upkeep of essential public services related to sewage and drainage systems. The funds collected through this tax contribute to activities such as repairing existing sewer lines, constructing new infrastructure, managing stormwater drainage, and ensuring the overall functionality of the sewage system.

J) Current Requirements of Local Community Being Fulfilled by Current Sewerage System

The current sewerage system, despite its presence, falls short in meeting the community's needs effectively due to the requirements for repairs and rehabilitation in existing systems.

The shortfall in meeting these needs stems from the pressing demands for repairs and rehabilitation within the current sewer infrastructure. This situation has multifaceted implications for public health, environmental sustainability, and the overall quality of life for the community.

K) Government Efforts for Future Sewerage System Requirements

During the survey, all respondents shared their opinions regarding the Government's initiatives for addressing future sewerage system needs. The opinions are:

- Government should ensure that the sewerage system can meet the demands of a growing population.
- The government ought to address and fix the choked and damaged pipelines.
- Government should focus on strategic planning, infrastructure investment, and the implementation of sustainable and advanced technologies to ensure an efficient and resilient sewerage system for the future.
- Government should formulate sustainable policies to ensure a robust and resilient sewerage system.

L) Stormwater Drains

The survey revealed that there is an absence of stormwater drainage facilities in the specified project area.

The survey's revelation about the absence of stormwater drainage facilities in the specified project area holds critical implications for the local environment, infrastructure, and the well-being of the community. Stormwater drainage plays a pivotal role in managing rainwater runoff and preventing flooding, erosion, and waterlogging during periods of heavy rainfall.

M) Ultimate Disposal for Wastewater (Water Body / Irrigation / Sem Nullah)

The survey revealed that any water body like a canal or river is used for the final disposal of wastewater.

The use of water bodies for final wastewater disposal suggests a lack of proper wastewater treatment infrastructure. When untreated or inadequately treated wastewater is discharged directly into rivers or canals, it introduces a plethora of contaminants, including pathogens, chemicals, and nutrients, into the aquatic environment and poses serious threats to the ecosystems.

N) Treatment of Wastewater Before Disposal

In the survey, respondents were asked about the treatment of wastewater before its disposal. All the respondents collectively acknowledge the need for treating wastewater before its disposal. The acknowledgment of the necessity for wastewater treatment among all respondents underscores a growing awareness regarding the public health and environment.

6.4.12 Physical Cultural Resources

Sites of religious importance like mosques and graveyards have been found within 100 m of the proposed project. Around 04 no. of mosques and 03 no. of graveyards found within 100 m boundary. Sensitive receptors like educational institutions and hospitals have been found. Around 02 no. of

educational institutions (colleges) and 03 no. of Hospitals have been found within 100 meter of project boundary. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.

6.4.13 Suitability of Site

The project does not fall in any sensitive zone. The project is for the improvement and extension of sewerage system in the city which includes rehabilitation of 04 disposal stations (Chak No.451 EB Disposal Station, Larri Adda Disposal Station, Rehmat Abad Disposal Station and Existing Multan Road Disposal Station), laying of 14,240 ft. force main, construction / rehabilitation of 6,886 ft. sewer lines, desilting of particular sewer lines and construction of one (01) wastewater treatment plant / waste stabilization pond. The main roads near project site are Lahore – Multan Road, Chichawatni Road, Luddan Road, BTM Road, Vehari Bazar Road, College Road, Arif Bazar Road, Stadium Road and other minor / link roads within / along Burewala. Therefore, the sites included in this project are suitable for the project.

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

7.1 General

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

7.2 Approaches and Methodology

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

For impact identification, various ESIA methodologies are available including the checklists, interaction matrices, networks and overlays. Among these four methods, following three are used in ESIA of this project; Improvement and Extension of Sewerage System in Burewala City:

- 1) Project Interaction Matrix
- 2) Checklists
- 3) Overlays

7.2.1 Project Interaction Matrix

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

- It provides cause-effect relationship between the project actions and resulting consequences impacts.

- It provides nature (+ve or –ve) and weighting of different impacts.
- It provides cumulative impacts of a project.

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

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

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

7.2.2 Checklist

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

7.2.3 Overlays

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

7.3 Characteristics of Impacts

The predicted impacts have been characterized; various aspects of the

impact characterized include:

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

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

Table 7-1, Impact Characterization

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

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

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

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

7.4.1 Impacts Regarding Project Location

The project is for sewerage system that will be constructed / executed on the govt. owned land. Force main and sewer lines are to be constructed / laid / rehabilitated / desilted in RoW of roads. Site of WWTP is govt. land but was allotted to a family through tube well scheme in 1960s. Relocation / resettlement is required for the execution of this project as per approved ARAP before the execution of the project.

A) Impact Significance

- High

B) Mitigations

All the relevant stakeholder must be consulted before execution of the project. ARAP must be prepared and get approved from the World Bank for resettlement issues.

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

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

7.4.2 Impacts Regarding Project Design

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

A) Impact Significance

- Medium

B) Mitigations

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

C) Residual Impact:

The impact of project design will be low adverse in nature after taking the above-mentioned mitigations.

7.5 Impacts and Their Mitigations During Construction Phase

7.5.1 Physical Impacts

A) Soil Contamination

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

1. Impact Significance

- Medium

2. Mitigations

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

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

3. Residual Impact

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

B) Contamination of Surface and Groundwater Resources

Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. Although there is no canal near project site but there is a seepage drain near proposed site of WWTP which can be more polluted if wastewater generated from construction activities is disposed of in it without treatment or there can be leakage / seepage through the ground if accidental spills occur.

1. Mitigation Measures of Impacts on Water Resources

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

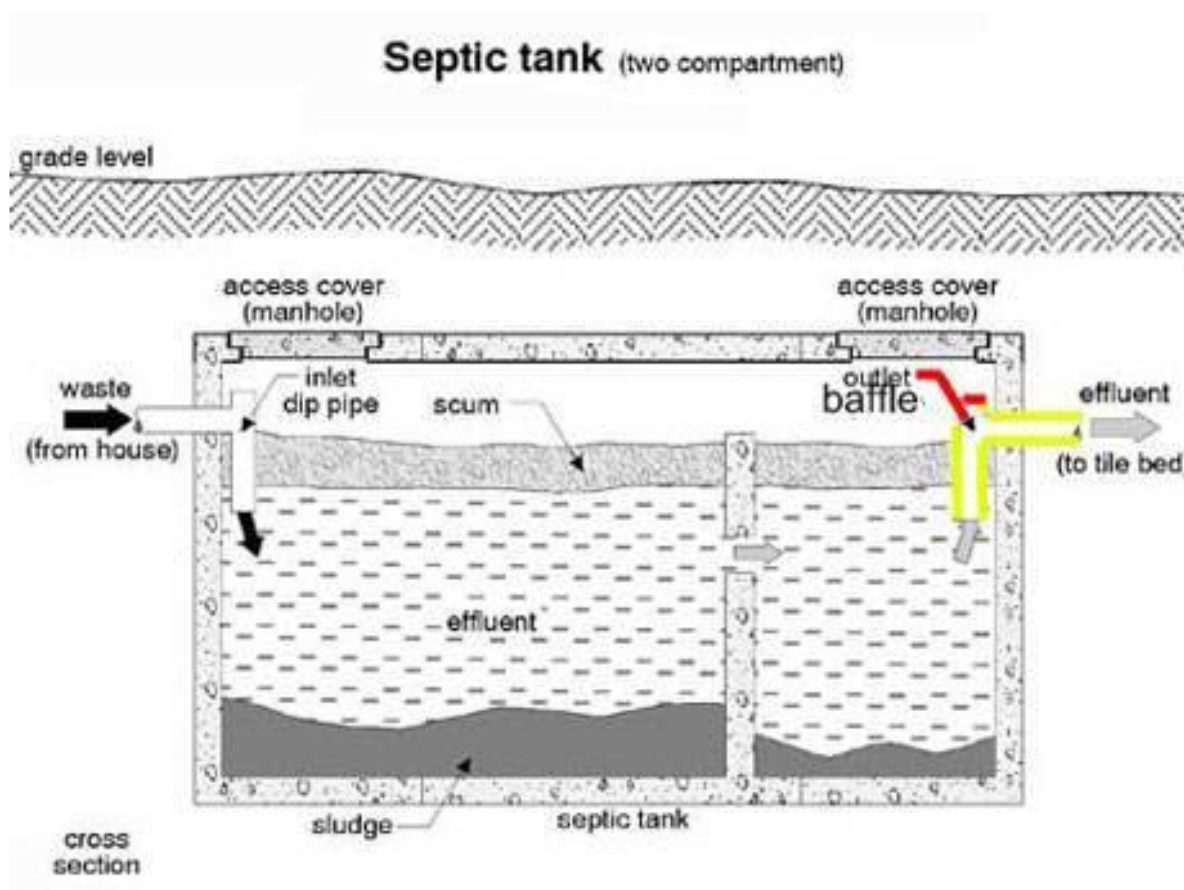


Figure 7-1, Septic Tank

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

2. Residual Impact:

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

C) Impacts on Ambient Air Quality

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

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

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

1. Impact Significance

- High

2. Mitigation Measures of Impacts on Ambient Air Quality

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

3. Residual Impact

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

D) Impacts on Ambient Noise Levels & Vibration

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

During excavation activities (trenching), noise sources will include, vehicles

used to transportation of materials and equipment to the site. The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration.

1. Impact Significance

- High

2. Mitigation Measures of Impacts on Noise & Vibration

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

3. Residual Impact

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

E) Disposal of Construction Debris & Garbage

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

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

1. Impact Significance

- High

2. Mitigations

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

3. Residual Impact:

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

F) Traffic Annoyance

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

1. Impact Significance

- Medium

2. Mitigation

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

3. Residual Impact:

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

G) Impact on Utilities

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

1. Impact Significance

- Medium

2. Mitigation

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

3. Residual Impact:

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

7.5.2 Ecological Environment

A) Impacts on Ecological Environment

1. Impact on Flora

- No trees exist at the proposed site of wastewater treatment plant. Anyhow, small grass / bushes exist at the site.

2. Disturbance to Fauna

- No impacts on fauna are envisaged.

3. Impact significance

- High

4. Mitigations

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

The clearing of project sites through excavations will not adversely affect flora

and fauna and all the impacts caused by construction work on flora and fauna are of temporary and reversible in nature and can be mitigated by appropriate good working practices that are prescribed in this ESIA. As it is suggested to plant 10 new trees of almost 06 ft. height if a tree has to be cut due to any mishap / accident.

5. Residual Impact:

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

7.5.3 Socioeconomic Environment

A) Impacts to Occupational Health and Safety

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

1. Impact Significance

- High

2. Mitigations Measures of Impacts to Occupational Health and Safety

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

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

3. Residual Impact:

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

B) Impacts on Local Population

No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project. The population residing in and the surroundings of the project area will be affected during the construction phase as follows:

- There is potential hazard risk from open trenches in the vicinity of populated areas during the construction.

- Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase.
- Community may face the noise and dust problems during the construction activities.
- Theft problems to the community by the Contractor's workers and vice versa.

1. **Impact Significance**

- Medium

2. **Mitigations Measures of Impacts on Local Population / Workforce**

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

3. **Residual Impact:**

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

C) **Impacts on Public Health and Safety Hazard**

- Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for the safety of the workers as well as for local residents.

- The storage of all solid waste shall be practiced so as to prevent the attraction, harborage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odors, unsightliness or public nuisance.

1. **Impact Significance**

- Medium

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

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

3. **Residual Impact:**

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

D) **Public Health Diseases**

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

E) **Resettlement Impacts**

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

F) **Gender Based Violence**

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

The term GBV is used to underscore systemic inequality between males and females (which exists in every society in the world) and acts as a unifying and

foundational characteristic of most forms of violence perpetrated against women and girls. The 1993 United Nations Declaration on the Elimination of Violence against Women defines violence against women as "any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women." The nine core types of GBV are;

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

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

G) Child Protection

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

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

H) Labor Influx and Recruitment

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

1. Residual Impact:

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

7.6 Environmental Impacts and Mitigation Measures During Project Operation

7.6.1 Solid Waste Generation

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

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

A) Impact Significance

- Low

B) Mitigation Measures

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

C) Residual Impact

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

7.6.2 Visual Impacts

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

A) Impact Significance

- Medium

B) Mitigation

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

C) Residual Impact:

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

7.6.3 Impacts to Occupational Health and Safety

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

A) Mitigation Measure

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

B) Impact Significance

- Medium

C) Residual Impact

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

7.6.4 Odor Issues

The processing of wastewater and sludge will cause odour which will be nuisance to the nearby settlements. This will have impact on health of inhabitants living in surroundings of the treatment plants.

A) Mitigation Measures

Buffer zones of almost 500 meters have been proposed along all the boundary walls of the treatment plants. The buffer zone will be planted with trees and herbs in order to minimize the impact of odour on nearby settlements.

B) Impact Significance

- Medium

C) Residual Impact:

The impact of odor issue will be low adverse in nature after taking the above-

mentioned mitigations.

7.6.5 Insect Breeding

The source of wastewater will provide ideal condition for breeding of mosquitoes and other insects. The nutrient-rich water found in clarifiers, sedimentation areas and treatment basins is an ideal production area for mosquitoes that will cause severe problem to the inhabitants of nearby settlements and to the staff employed at treatment plants.

A) Mitigation Measures

- Larvicide is the most effective control technique for mosquito breeding. The primary larvicide used by wastewater treatment facilities is *Bacillus thuriangiensis israelensis* (Bti). Bti is a naturally occurring bacteria that will not interfere with the existing bacterial process occurring at a WWTP.
- Mosquito repelling plants that include Citronella, Horsemint and Marigolds should be planted in buffer zones and inside treatment plants.

B) Impact Significance

- Medium

C) Residual Impact

The impact of mosquito breeding will be low adverse in nature after taking the above-mentioned mitigations.

7.6.6 Sludge Disposal

The sludge will be generated from the wastewater treatment plants if not disposed or manage properly then it can cause severe environment problem as well as risk to human health.

A) Mitigation Measures

- Sewerage sludge is organic in nature and contains useful amounts of plant nutrients such as nitrogen, phosphorus and essential trace elements and can be used as organic fertilizer or soil conditioner after treatment.
- Where the treatment of sludge is not possible then it should be incinerated at 900 °C.

B) Impact Significance

- Medium

C) Residual Impact:

The impact of sludge will be low adverse in nature after taking the above-mentioned mitigations.

7.6.7 Impacts on Community Health and Safety

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

7.6.8 Impacts on Traffic

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

A) Impact Significance:

- Medium

B) Mitigation

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

C) Residual Impact

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

7.6.9 Impact on Air Quality

The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route and WWTP site only. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works. It is not expected that

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

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

A) Residual Impact:

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

7.6.10 Noise and Vibration Emission Impacts

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

A) Mitigation Measure

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

B) Impact Significance

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

C) Residual Impact:

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

7.7 Assessing Impacts

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

information will include all aspects of construction or operation that might affect the environment.

7.7.1 Approach to Assessment

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

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

7.7.2 Negative Impacts

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

7.7.3 Positive Impacts

The positive impacts of the project are given as under:

- The project is in MC Burewala; 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.
- Sanitation features / sewerage features of the city will be enhanced as disposal stations of MC will be rehabilitated, choked / worn-out sewer lines will be rehabilitated and a wastewater treatment plant will be constructed which will treat wastewater before final disposal.

7.8 Cumulative and Induced Impacts

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

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

The project has identified the VCs as air quality, noise, water quality, socioeconomic and socio-community components, and human health. The spatial boundary of the project is the area Chak 423-EB where WWTP will be constructed, force main from Rehmatabad disposal station and Larri Adda disposal station to WWTP along the road, desilting of existing sewer lines within the MC Burewala, and rehabilitation of 04 existing disposal stations within MC Burewala. Key VCs identified included air quality, water quality and noise that can impact public health, access to livelihood opportunities. The overall perception of stakeholders in the long-term perspective was highly positive and they considered it as an important development for the local economy.

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

7.9 Potential Environmental Enhancement Measures

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5Rs Principles – Reduce, Reuse, Recycle, Refurbish and Retrofit. Good housekeeping practices will be the order of the day.

SECTION - 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PROGRAM

8.1 Objective

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

8.2 Institutional Arrangements

8.2.1 MC Burewala

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

A) The Contractor

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

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

B) Supervision Consultant

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

C) PMDFC's ESM Wing

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

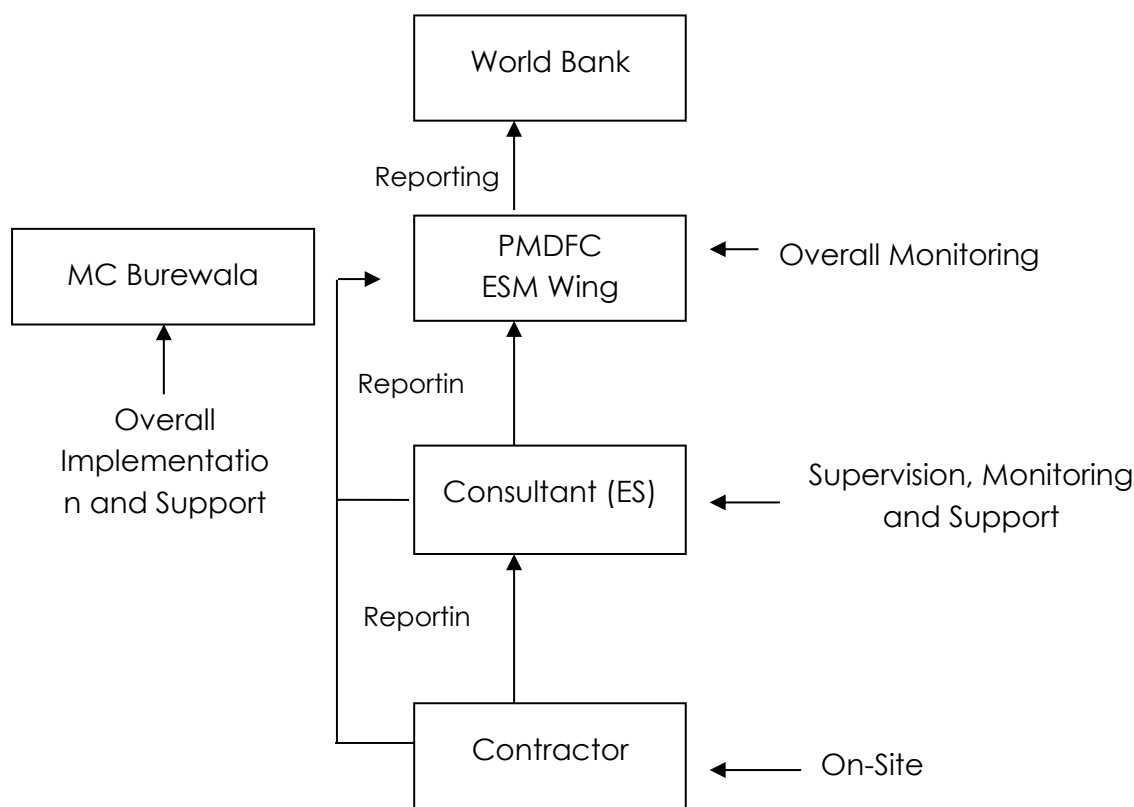


Figure 8-1, ESIA Implementation Framework

8.3 Mitigation Plan

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

8.4 Monitoring Plan

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

8.4.1 Monitoring Mechanism

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

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

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

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

8.5 Reports

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

Table 8-1, Reporting Mechanism

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

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

8.6 Inclusion of ESIA In Bidding / Contract Documents

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

8.7 Monitoring of Environmental and Social Non-Compliance

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

8.8 Environmental and Social Management and Monitoring Plan

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

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

8.8.1 Improvement and Extension of Sewerage System in Burewala City – WWTP

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
Impacts due to Project Location								
Site Selection	The project is for sewerage system that will be constructed / developed on govt. owned land. Proposed land for the construction of WWTP (22 acres) is govt. owned but it was allotted to a family [Mr. Sarfraz Majeed (Late)(Allotted), Mr. Khalil Jibran (Hier), Mr. Arsalan Majeed (Hier), Mrs. Maleeha Zainab (Late)(Hier), and Mrs. Mubeen Fatima (Hier)] through tube well scheme in 1960's, as per consultation conducted with MC, concerned patwari and members of that family. There is a dairy farm constructed				- All the relevant stakeholders must be consulted before execution of the project. - ARAP to be prepared for resettlement / compensation to the family / APs on proposed land of WWTP.	MC / PMDFC	- ESFPs - Supervisory Consultant - ESM- PMDFC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	on the land, 03 rooms, a tube well installed and crops (wheat, corn, and cow food / chara) grown in 15 acres agriculture land.							
Impacts due to Project Design								
Project Design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).				The design is made by taking in consideration that minimum impact will occur on the environment.	Design consultant	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Construction Phase / Repair / Rehabilitation								
Physical Impacts								
Labour Camp Management	- Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities. - There will be a potential for diseases to be				- Labor camps should be 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	transmitted including malaria, exacerbated by inadequate health and safety practices. Health & Safety issues				or nurse. - Ensuring that children and minors are not employed directly or indirectly on the project. - Children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). - Communication on hiring criteria, minimum age, and applicable laws. - Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. - Safety procedures include			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. EHS SOPs of Labor developed by PMDFC must be followed.			
Soil contamination	- Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project Site and in its nearby surroundings. - Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites. - Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. Although				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	- Equipment washing method and frequency to be regulated / controlled. - Vegetation to control erosion.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.				be developed by the Contractor and implemented to avoid the litter and any other waste problems.			
Contamination of Surface and Groundwater Resources	Sewage and sanitary wastewater generated from the construction site may contaminate groundwater and surface water, if not disposed of properly.				- Sewage from construction camp will be disposed of using septic tank. - Avoid accidental spills of oils and lubricants through good practice. - Prepare and implement Emergency Response Procedures in case of any spill hazard. - Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. - Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	- Checking of septic tanks constructed for sewage. - Monitoring of surface water quality through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					plans will be made to ensure that.			
Ambient Air Quality	The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				- Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM. - Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions. - Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. - The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done. - As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Ambient air quality monitoring through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					residential area.			
Noise and vibration	- During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. - The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the project area and Neighborhood residential may be disturbed by the noisy activities. - During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Noise level monitoring by an EPA certified lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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.				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	- 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				- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. - The organic waste produced during site clearing should be mechanically mulched and	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	- Placement of solid waste storage containers at camp sites. - Collection and disposal into MC's containers.

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

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	construction is on-going with little room for pedestrian access.				including need for diversions (if necessary). - The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. - The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.			
Impact on Utilities	There are estimated 03 no. of electric poles present on the proposed site of WWTP that might be disturbed / need to relocate.				Electric poles must be shifted / relocated to other places in consultation with concerned authority (WAPDA / MEPCO) or the poles may not be disturbed during the project execution. However, as a general rule, before excavation, the location and routes of all utilities must be identified and in case of the need for relocating	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					utilities that may be along the proposed location, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.			
Emergency Response Plan	Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Following EHS SOPS

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					use of hazardous materials. - Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. - The contractor will prepare emergency shutdown procedures and evacuations to cover all staffs and affected members of the public in the event of any emergency incident (such as traffic accident and fire). The contractor will ensure emergency access routes are well-known and have appropriate signage. - Identification of locations of hazardous materials and associated activities on an emergency plan. - Training should incorporate information from Material Safety Data Sheets for			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					hazardous materials being handled. MSDSs should be readily accessible to employees in their local language.			
Ecological Impacts								
Biodiversity (Fauna and Flora)	- Impact on Flora - Disturbance to Fauna: - No negative impacts on fauna are envisaged.				- The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. - In case of any mishap / accident, if a tree is disturbed or cut, 10 new trees of almost 06 ft. height will be planted by the contractor. - New trees of almost 06 ft. height must be planted at / near project site to make the project more environment friendly.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Maintenance and monitoring of tree plantation
Social Impacts								
Project will have positive outcomes for the local communities as by the provision of good state of art infrastructure.								
Health and Safety Measures	Construction activities including excavations, backfilling involve				Occupational health and safety impacts during construction is considered to	Contractor	- ESFPs - Supervisory Consultant	Following EHS labor SOPs

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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				be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment. Heath safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.		ESM-PMDFC	
Job opportunities	It will lead to an increase in economic activity and contribute to local area economic development.				Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need will be met from the project areas. The project will also	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					require skilled workers and these may be available from the community. It is anticipated that approximately 75% of the workforce will be from project area while 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive impact on social norms, culture and economy of the area.			
Impacts on Local Population	- No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project. - The population residing in and the surroundings of the project area will be affected during the construction phase as follows: - There is potential hazard risk from open trenches				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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.				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			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					localized. The contractor will prepare an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts.			
Impacts on Public Health and Safety Hazard	- 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.				- Contractor will have rented out houses for Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor. - The active construction zone must be cordoned off to avoid injuries due to accidents.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Gender issue	Project activities may cause hindrance to mobility especially for				Workers would be trained to address privacy issues and ethically behaved.	Contractor	- ESFPs - Supervisory Consultant	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	women during construction stage. Privacy of the community may be disturbed.				- Labor would be strictly asked to cater the privacy issues. - staff capacity-building		ESM-PMDFC	
Traffic Management	- Blocking of road may hamper public mobility due to increase in number of vehicles - Road Safety				- Provision of alternative routes - Water sprinkling at project site at consecutive intervals - Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents - Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience - Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; - In case of any complaint, focal person of GRC may	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					contact (details will be highlighted at project site).			
Economic Issues	- Economic issues may arise due to loss of; - land, - structures / assets - productive plants - livelihood - And, disturbance to - shopkeepers - vendors (Mobile / permanent)				- Resettlement / compensation to be provided as per approved ARAP before execution of the project. - Electric poles to be relocated / shifted of can be saved during the execution of the project in consultation with concerned authority (WAPDA / MEPCO). 10 new trees of almost 06 ft. height must be planted against each tree cut if a tree has to be cut. - Livelihood of 07 APs will be affected; 07 servants and 01 farm manager working on dairy farm constructed on the site of WWTP. Livelihood allowance for these APs will be paid as per approved ARAP. - No shops were found to be affected as located out of ROW. - No permanent vendors were	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					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.			
Operation / Maintenance Phase								
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.				- The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. - The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. - There will be limited hazardous wastes generated from this project including the cement bags, grease and oil.	Contractor	- ESFPs - ESM-PMDFC)	- Placement of solid waste storage containers at camp sites. - Collection and disposal into MC's containers

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project			
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 - 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.	Contractor	- ESFPs - ESM-PMDFC)	
Impacts to Occupational Health and Safety	Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of				Occupational health and safety impacts during operation / maintenance and repair is considered to be of moderate in significance due to the	Contractor	- ESFPs - ESM-PMDFC)	Following EHS labor SOPs

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	equipment among others				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.			
Odor Issues	The processing of wastewater and sludge will cause odor which will be nuisance to the nearby settlements. This will have impact on health of inhabitants living in surroundings of the treatment plants.				Buffer zones of 500 meters have been proposed along all the boundary walls of the treatment plants. The buffer zone will be planted with trees and herbs in order to minimize the impact of odor on nearby settlements.	Contractor	- ESFPs - ESM-PMDFC)	
Insect Breeding	The source of waste water will provide ideal condition for breeding of mosquitoes and other insects. The nutrient-rich water found in clarifiers, sedimentation areas and treatment basins is an ideal production				Larvicide is the most effective control technique for mosquito breeding. The primary larvicide used by wastewater treatment facilities is Bacillus thuriangiensis israelensis (Bti). Bti is a naturally occurring bacteria that will not	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	area for mosquitoes that will cause severe problem to the inhabitants of nearby settlements and to the staff employed at treatment plants.				interfere with the existing bacterial process occurring at a WWTP. Mosquito repelling plants that include Citronella, Horsemint and Marigolds should be planted in buffer zones and inside treatment plants.			
Sludge Disposal	The sludge will be generated from the waste water treatment plants if not disposed or managed properly then it can cause severe environmental problem as well as risk to human health.				- Sewerage sludge is organic in nature and contains useful amounts of plant nutrients such as nitrogen, phosphorus and essential trace elements and can be used as organic fertilizer or soil conditioner after treatment - Where the treatment of sludge is not possible then it should be incinerated at 900°C.	Contractor	- ESFPs - ESM-PMDFC)	
Impacts on Community Health and Safety	No specific serious adverse impacts on community health and safety are expected as a result of operation activities of sewerage system. There is potential				Health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very	Contractor	- ESFPs - ESM-PMDFC)	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	hazard risk from open trenches during the repair phases that could lead to community health and safety risks				insignificant, short term and localized during the operation phase with respect to repairs and maintenance.			
Impacts on Traffic	Repair and maintenance activities will take place within the boundary of WWTP, traffic will be disturbed only if heavy machinery / vehicles will be utilized.				- 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	- ESFPs - ESM-PMDFC)	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
Impact on Air Quality	The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route and at the site of WWTP or at disposal stations. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The 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.	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
Noise and Vibration Emission Impacts	Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.				The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.	Contractor	- ESFPs - ESM-PMDFC))	-

A) Environmental Monitoring Plan

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

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
1.	Noise and vibration	- Use of machineries and equipment having less noise. - Provision for personal protective equipment (PPE's), ear muffs / ear plugs to workers. - Noise level testing will be carried through EPA certified Lab.	Project Site	Quarterly	It will be conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
2.	Dust	- Provision for personal protective equipment (PPEs) – mask. - Avoiding construction activities during nights. - Sprinkling of water and removal of excess matter / construction debris from the site as soon as possible.	Project Site	Quarterly	It will be conducted during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
3.	Air Quality	Air quality will be analyzed in through EPA certified	Project Site	Quarterly	It will be conducted	- ESFPs - DPO-ESM

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
		Lab.			before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	SPO ID/PD
4.	Provision of first aid in case of any emergency	- First Aid will be provided immediately to save the life of affected peoples. - Ambulance will be called up to shift the affected persons to the nearest medical facility.	Project Site	Immediate as per need	First Aid Box will be provided at site.	- ESFPs - DPO-ESM - SPO ID/PD
5.	Health, Safety and Environmental needs	Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour.	Project Site	Once during construction activities	During construction of project, Health Safety attributes will be provided and environmental compliance report should be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
6.	Public Consultation	Local residents in the	Project Site	Two times	During and after	ESFPs

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
		project area will be informed about the project details, project schedule and GRM		(during and post construction) • In case of any complaint, emergency visit will be organized.	completion of project; social compliance report will be submitted.	- DPO-ESM - SPO ID/PD
7.	Vehicle Movement / Mobility issues	- Provision of alternative routes - Indicators / signboards regarding alternate routes should be provided at proper distance - In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site.	Project Site	- During construction, alternative routes will be provided. - In case of any complaint, emergency visit will be organized.	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
8.	Obstruction in public access	- Provision of alternate routes - Construction should start from either side of the road	Project Site	Once during construction activities	During and after completion of project; environmental and social monitoring report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified Environmental and Social Issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting Frequency	Responsibility
9.	Economic Losses	- loss of land, - damage to structures - damage to trees / plants - negative impacts on livelihood in form of blockage of passage for shopkeepers as well as vendors (Mobile / permanent)	Project Site	Three times (pre, during and post construction) In case of any complaint, emergency visit will be organized.	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
10.	Privacy Issues	- Contractors would be trained to address privacy issues / behave ethically. - Labor will be strictly asked to respect privacy of local residents. - Training on observing / respecting and local norms.	Scheme Site	Once during construction	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD

B) ESIA Implementation Budget – WWTP

Project: Improvement and Extension of Sewerage System in Burewala City.

Item	Quantity	Tentative Cost per Item (PKR)	Total Cost (PKR)
Labor Safety			
Face Masks (3 PLY) - box	110	400	44,000
Safety Hard Helmets	30	3,000	90,000
Safety Shoes	30	3,000	90,000
Hand Gloves - box	110	1,500	165,000
Ear Plugs	30	500	15,000
Reflective Safety Vest	30	1,000	30,000
Safety Goggles	30	500	15,000
First Aid Box Complete	03	10,000	30,000
Infrared Thermometer (Benetech GM-2200 or equivalent)	02	40,000	80,000
Sub-Total			559,000
Working Site Safety			
Safety Signs	10	15,000	150,000
Safety Cones	20	1,000	20,000
Safety Tape	30	1,500	45,000
Portable Delineator with chain	20	2,200	44,000
Emergency Portable Lights	05	3,000	15,000
Solid Waste Collection Drums with Cover	10	12,000	120,000
Fire Fighting Equipment Purchase and refilling	03	10,000	30,000
Sub-Total			424,000
Others			
Hiring of Environmental Specialist (for 06 months)	01	100,000	600,000
Hiring of HSE Expert (for 06 months)	01	100,000	600,000
Training (HSE & Environment related trainings)	Lump sum	-	100,000
Pole Hanging Waste Bins	10	12,000	120,000
Digital Sound Level Meter	02	30,000	60,000
Labor Campsite Management	Lump sum	-	200,000
Water Sprinkling	Lump sum	-	200,000
Environmental Monitoring (Ambient Air, Noise Level, Drinking Water, Surface Water & Vehicular Emission Monitoring)	02	200,000	400,000
Sub-Total (PKR)			2,280,000
Grand Total (PKR)			3,263,000
15% Contingency (PKR)			489,450
Grand Total with 15% Contingency (PKR)			3,752,450

8.8.2 Improvement and Extension of Sewerage System in Burewala City – Force main

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 sewerage system that will be constructed on govt. owned land. However, RoW of govt. departments will be utilized e.g., RoW of Highway Department will be utilized as force main will be laid along / in RoW of roads.				All the relevant stakeholders must be consulted before execution of the project. Applications will be submitted for relevant NOCs / consent will be obtained by MC and submitted to EPA upon issuance.	MC / PMDFC	- ESFPs - Supervisory Consultant - ESM- PMDFC	-
B- Impacts due to Project Design								
Project Design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).				The design is made by taking in consideration that minimum impact will occur on the environment.	Design consultant	- ESFPs - Supervisory Consultant - ESM- PMDFC	-
C- Construction Phase / Repair / Rehabilitation								
Physical Impacts								
Labour Camp Management	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.				- Labor camps should be away from the residential areas. - Provide adequate health care facilities within construction sites. - Provide first aid facility round the clock.	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. Health & Safety issues				- Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. - Ensuring that children and minors are not employed directly or indirectly on the project. - Children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). - Communication on hiring criteria, minimum age, and applicable laws. - Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. - Safety procedures include provision of information,			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					training and protective clothing to workers involved in hazardous operations and proper performance of their job. EHS SOPs of Labor developed by PMDFC must be followed.			
Soil contamination	Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project Site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites. Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	Equipment washing method and frequency to be regulated / controlled. Vegetation to control erosion.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					problems.			
Contamination of Surface and Groundwater Resources	Sewage and sanitary wastewater generated from the construction site may contaminate groundwater and surface water, if not disposed of properly.				- Sewage from construction camp will be disposed of using septic tank. - Avoid accidental spills of oils and lubricants through good practice. - Prepare and implement Emergency Response Procedures in case of any spill hazard. - Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. - Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	Checking of septic tanks constructed for sewage. Monitoring of surface water quality through EPA certified Lab
Ambient Air Quality	The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a				Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM.	Contractor	- ESFPs - Supervisory Consultant - ESM-	Ambient air quality monitoring through EPA

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	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.				- Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions. - Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. - The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done. - As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.		PMDFC	certified Lab
Noise and vibration	During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and other machinery				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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Noise level monitoring by an EPA certified lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	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. 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.				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			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					where necessary.			
Disposal of Construction Debris & Garbage	During construction phase of the project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas. Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites.				- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. - The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. - Arrangements should be made for regular garbage collection and removal of sewage from the construction site. - A barrier between surface water bodies and the active construction zone should be made to make sure that no construction debris is disposed-off intentionally or unintentionally in the canals.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Placement of solid waste storage containers at camp sites. Collection and disposal into MC's containers.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Traffic annoyance	There construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.				- During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the sub-project area. - The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary). - The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. - The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan
Impact on Utilities	Utilities can be disturbed present in RoW of proposed force main.				This impact is not expected to be significant because there is no	Contractor	- ESFPs - Supervisory Consultant	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					utilities present in the project routes. However, as a general rule, before excavation, the location and routes of all utilities have been identified and in case of the need for relocating utilities that may be along the proposed lines, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.		ESM-PMDFC	
Emergency Response Plan	Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.				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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Following EHS SOPS

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					example: fire or blast). - Where practicable, avoiding or minimizing the use of hazardous materials. - Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. - The contractor will prepare emergency shutdown procedures and evacuations to 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			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					Safety Data Sheets for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language.			
Ecological Impacts								
Biodiversity (Fauna and Flora)	Impact on Flora: No trees are anticipated to be disturbed Disturbance to Fauna: No negative impacts on fauna are envisaged.				- In this project, low impact is expected on vegetation (small grass / shrubs) since the pipeline routes are devoid of significant unique floral and faunal life. - The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. - In case of any mishap / accident, if a tree is disturbed or cut, 10 new trees of almost 06 ft. height will be planted by the contractor.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Maintenance and monitoring of tree plantation
Social Impacts								
Project will have positive outcomes for the local communities as by the provision of good state of art infrastructure.								
Health and Safety Measures	Construction activities including excavations, backfilling involve inherent				Occupational health and safety impacts during construction is considered to be of moderate in	Contractor	- ESFPs - Supervisory Consultant	Following EHS labor SOPs

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	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	Medium	Low	significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment. Heath safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.		ESM-PMDFC	
Job opportunities	It will lead to an increase in economic activity and contribute to local area economic development.	High	Medium	Low	Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need will be met from the project areas. The project will also require skilled workers and these may be available from the community. It is anticipated that approximately 75% of the workforce will be from project area while 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					impact on social norms, culture and economy of the area.			
Impacts on Local Population	No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project. The population residing in and the surroundings of the project area will be affected during the construction phase as follows: There is potential hazard risk from open trenches in the vicinity of populated areas during the construction Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase Community may face the noise and dust problems during the construction activities. Theft problems to the community by the Contractor's workers and vice versa.				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					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.			
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				Contractor will have rented out houses for Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	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.				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.			
Gender issue	Project activities may cause hindrance to mobility especially for women during construction stage. Privacy of the community may be disturbed.				- Workers would be trained to address privacy issues and ethically behaved. - Labor would be strictly asked to cater the privacy issues. - staff capacity-building	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Traffic Management	Blocking of road may hamper public mobility due to increase in number of vehicles Road Safety				- Provision of alternative routes - Water sprinkling at project site at consecutive intervals - Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents - Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience - Movement of vehicles carrying construction materials should be restricted during the	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					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).			
Economic Issues	Economic issues may arise due to loss of; land, structures / assets productive plants livelihood And, disturbance to shopkeepers vendors (Mobile / permanent)				- No land acquisition is involved - No public structures are found to be affected in the project area because they are not falling in ROW - No tree plantation is found - No livelihood will be affected by project activity - No shops were found to be affected as located out of ROW. - No permanent vendors were observed during social and environmental assessment survey - In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site.	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	-
D- Operation / Maintenance Phase								
Solid Waste	Solid wastes will mainly				The occurrence of these	Contractor	ESFPs	Placement of

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Generation	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.				wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. - The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. - There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. - All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project		ESM-PMDFC)	solid waste storage containers at camp sites. Collection and disposal into MC's containers
Visual Impacts	Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and				This impact is not considered to be significant and will be experienced for a short period of time because of the	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
	maintenance which could be an eye-sore and a health hazard.				immediate backfilling of the trenches by the excavated soil / spoil The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible.			
Impacts to Occupational Health and Safety	Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others				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	- ESFPs - ESM-PMDFC)	Following EHS labor SOPS
Odor Issues	During repair and maintenance phase of force main, minor odor issues will be anticipated along the route of force main.				Buffer zones of 500 meters have been proposed along all the boundary walls. The buffer zone will be planted with trees	Contractor	ESFPs ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					and herbs in order to minimize the impact of odor on nearby settlements.			
Insect Breeding	The source of wastewater will provide ideal condition for breeding of mosquitoes and other insects. The nutrient-rich water found in clarifiers, sedimentation areas and treatment basins is an ideal production area for mosquitoes that will cause severe problem to the inhabitants of nearby settlements and to the staff employed at treatment plants.				- Larvicide is the most effective control technique for mosquito breeding. The primary larvicide used by wastewater treatment facilities is <i>Bacillus thuriangiensis israelensis</i> (Bti). Bti is a naturally occurring bacteria that will not interfere with the existing bacterial process occurring at a WWTP. - Mosquito repelling plants that include Citronella, Horsemint and Marigolds should be planted in buffer zones and inside treatment plants.	Contractor	- ESFPs - ESM-PMDFC)	
Sludge Disposal	The sludge will be generated from the wastewater treatment plants if not disposed or manage properly then it can cause severe environment problem as well as risk to human health.				Sewerage sludge is organic in nature and contains useful amounts of plant nutrients such as nitrogen, phosphorus and essential trace elements and can be used as organic fertilizer or soil conditioner after treatment Where the treatment of sludge is not possible then it should be incinerated at 900°C.	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Impacts on Community Health and Safety	No specific serious adverse impacts on community health and safety are expected as a result of operation activities of sewerage system. There is potential hazard risk from open trenches during the repair phases that could lead to community health and safety risks	High	Medium	Low	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	- ESFPs - ESM-PMDFC)	-
Impacts on Traffic	There maintenance and repair activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.		Medium		- 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	Contractor	- ESFPs - ESM-PMDFC)	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
					walk ways as necessary.			
Impact on Air Quality	The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route and at the site of WWTP or at disposal stations. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The 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.	Contractor	- ESFPs - ESM-PMDFC)	
Noise and Vibration	Noise emission and associated impacts during repairs and				The repair and maintenance works will mainly be carried out	Contractor	- ESFPs - ESM-	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions/ Monitoring Parameters/ Monitoring Methods
		High	Medium	Low				
Emission Impacts	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.				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.		PMDFC))	

A) Environmental Monitoring Plan

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

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
1.	Noise and vibration	- Use of machineries and equipment having less noise. - Provision for personal protective equipment (PPE's), ear muffs / ear plugs to workers. - Noise level testing will be carried through EPA certified Lab.	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. in this regard, an environmental compliance report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
2.	Dust	- Provision for personal protective equipment (PPE's) Mask. - Avoiding construction activities during nights. - Sprinkling of water and removal of excess matter / construction debris from the site as soon as possible.	Scheme Site	Quarterly	It will be conducted during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
3.	Air Quality	Air quality will be analyzed in through EPA certified Lab.	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
4.	Provision of first aid in case of any emergency	- First Aid will be provided immediately to save the life of affected peoples. - Ambulance will be called up to shift the affected	Scheme Site	Immediate as per need	First Aid Box will be provided at site.	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
		persons to the nearest medical facility.				
5.	Health, Safety and Environmental needs	Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour.	Scheme Site	Once during construction activities	During construction of project, Health Safety attributes will be provided and environmental compliance report should be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
6.	Public Consultation	Local residents in the sub-project area will be informed about the sub-project details, sub-project schedule and GRM	Scheme Site	- Two times (during and post construction) - In case of any complaint, emergency visit will be organized.	During and after completion of project; social compliance report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
7.	Vehicle Movement / Mobility issues	- Provision of alternative routes - Indicators/signboards regarding alternate routes	Scheme Site	During construction, alternative routes will be provided.	During and after completion of project; environmental and	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
		should be provided at proper distance In case of any complaint, focal person of GRC may contact and his contact details will be provided at sub-project site.		In case of any complaint, emergency visit will be organized.	social monitoring report will be submitted	
8.	Obstruction in public access	- Provision of alternate routes - Construction should start from either side of the road	Scheme Site	Once during construction activities	During and after completion of project; environmental and social monitoring report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
9.	Economic Losses	- loss of land, - damage to structures - damage to trees/plants - negative impacts on livelihood in form of blockage of passage for shopkeepers as well as vendors (Mobile / permanent)	Scheme Site	- Three times (pre, during and post construction) - In case of any complaint, emergency visit will be organized.	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
10.	Privacy Issues	- Contractors would be trained to address privacy issues / behave ethically. - Labor will be strictly asked to respect privacy of local residents. - Training on observing / respecting and local norms.	Scheme Site	Once during construction	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD

B) ESIA Implementation Budget – Force Main

Project: Improvement and Extension of Sewerage System in Burewala City.

Item	Quantity	Tentative Cost per Item (PKR)	Total Cost (PKR)
Labor Safety			
Face Masks (3 PLY) - box	110	400	44,000
Safety Hard Helmets	30	3,000	90,000
Safety Shoes	30	3,000	90,000
Hand Gloves - box	110	1,500	165,000
Ear Plugs	30	500	15,000
Reflective Safety Vest	30	1,000	30,000
Safety Goggles	30	500	15,000
First Aid Box Complete	3	10,000	30,000
Infrared Thermometer (Benetech GM-2200 or equivalent)	2	40,000	80,000
Sub-Total			559,000
Working Site Safety			
Safety Signs	10	15,000	150,000
Safety Cones	20	1,000	20,000
Safety Tape	30	1,500	45,000
Portable Delineator with chain	20	2,200	44,000
Emergency Portable Lights	5	3,000	15,000
Solid Waste Collection Drums with Cover	10	12,000	120,000
Fire Fighting Equipment Purchase and refilling	3	10,000	30,000
Sub-Total			424,000
Others			
Hiring of Environmental Specialist (for 06 months)	1	100,000	600,000
Hiring of HSE Expert (for 06 months)	1	100,000	600,000
Training (HSE & Environment related trainings)	Lump sum		100,000
Pole Hanging Waste Bins	10	12,000	120,000
Digital Sound Level Meter	2	30,000	60,000
Labor Campsite Management	Lump sum		200,000
Water Sprinkling	Lump sum		200,000
Environmental Monitoring (Ambient Air, Noise Level, Drinking Water, Surface Water & Vehicular Emission Monitoring)	2	200,000	400,000
Sub-Total (PKR)			2,280,000
Grand Total (PKR)			3,263,000
15% Contingency (PKR)			489,450
Grand Total with 15% Contingency (PKR)			3,752,450

8.8.3 Improvement and Extension of Sewerage System in Burewala City – Rehabilitation Work

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
Impacts due to Project Location								
Site Selection	The project is for sewerage system that will be constructed / developed on govt. owned land. Rehabilitation work includes rehabilitation of disposal stations and desilting of sewer lines. Selected disposal station and sewer lines are proposed for rehabilitation / desilting which are under the jurisdiction of MC.				All the relevant stakeholders to be consulted before execution of the project.	MC / PMDFC	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Impacts due to Project Design								
Project Design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).				The design is made by taking in consideration that minimum impact will occur on the environment.	Design consultant	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Construction Phase / Repair / Rehabilitation								
Physical Impacts								
Labour Camp Management	Campsites for construction workers are the important locations that have significant impacts such as health				- Labor camps should be away from the residential areas. - Provide adequate health care facilities within	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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. - Health & Safety issues				construction sites. - Provide first aid facility round the clock. - Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. - Ensuring that children and minors are not employed directly or indirectly on the project. - Children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). - Communication on hiring criteria, minimum age, and applicable laws. - Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. - Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. - EHS SOPs of Labor developed by PMDFC must be followed.			
Soil contamination	- Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project Site and in its nearby surroundings. - Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites.				- Soil 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	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	- Equipment washing method and frequency to be regulated / controlled. - Vegetation to control erosion.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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.				water accumulation, which will minimize the soil contamination. - Ground shall be leveled to avoid slopes. - Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.			
Contamination of Surface and Groundwater Resources	Sewage and sanitary wastewater generated from the construction site may contaminate groundwater and surface water, if not disposed of properly.				- Sewage from construction camp will be disposed of using septic tank. - Avoid accidental spills of oils and lubricants through good practice. - Prepare and implement Emergency Response Procedures in case of any spill hazard. - Construction site effluent drainage should be established in areas with	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	- Checking of septic tanks constructed for sewage. - Monitoring of surface water quality through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					adequate natural drainage channels in order to facilitate flow of the effluents. Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.			
Ambient Air Quality	The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				- Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM. - Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions. - Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. - The fugitive dust emission will	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Ambient air quality monitoring through EPA certified Lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done. As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.			
Noise and vibration	- 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				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Noise level monitoring by an EPA certified lab

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	the project area and Neighborhood residential may be disturbed by the noisy activities. - During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. - The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration.				noise level within applicable limits (including proper tuning of vehicles and mufflers / silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn. - As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier. - Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective / mitigation measures applied where necessary.			
Disposal of Construction	During construction phase of the project, large quantity of				A site waste management plan should be made the responsibility of the	Contractor	- ESFPs - Supervisory Consultant	Placement of solid waste

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
Debris & Garbage	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.				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.		ESM- PMDFC	storage containers at camp sites. Collection and disposal into MC's containers.

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
Traffic annoyance	There construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.				- During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the sub-project area. - The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary). - The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. - The contractor will barricade all areas of work along the road to reduce accidents	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					and offer alternative pedestrian walk ways as necessary.			
Impact on Utilities	There are no utilities found on the proposed project sites for rehabilitation of disposal stations and desilting of existing sewer lines. But utilities can be disturbed / damaged if untrained staff of contractor do the work.				This impact is not expected to be significant because there is no utilities present in the project routes. However, as a general rule, before excavation, the location and routes of all utilities have been identified and in case of the need for relocating utilities that may be along the proposed lines, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	
Emergency Response Plan	Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.				- 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	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Following EHS SOPS

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					flood). - Emergency evacuation procedure for staff and members of the public likely to be impacted by an emergency event on site (for example: fire or blast). - Where practicable, avoiding or minimizing the use of hazardous materials. - Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. - The contractor will prepare emergency shutdown procedures and evacuations to 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			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					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								
Biodiversity (Fauna and Flora)	Impact on Flora: No trees exist at the proposed site of wastewater treatment plant. Anyhow, small grass / bushes exist at the site Disturbance to Fauna: No negative impacts on fauna are envisaged.				- In this project, low impact is expected on vegetation (small grass / shrubs) since the pipeline routes are devoid of significant unique floral and faunal life. - The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. - In case of any mishap /	Contractor	- ESFPs - Supervisory Consultant - ESM- PMDFC	Maintenance and monitoring of tree plantation

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					accident, if a tree is disturbed or cut, 10 new trees of almost 06 ft. height will be planted by the contractor.			
Social Impacts								
Project will have positive outcomes for the local communities as by the provision of good state of art infrastructure.								
Health and Safety Measures	Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer injury or death. Impact Significance				Occupational health and safety impacts during construction is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment. Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Following EHS labor SOPs
Job opportunities	It will lead to an increase in economic activity and				Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need	Contractor	- ESFPs - Supervisory Consultant	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	contribute to local area economic development.				will be met from the project areas. The project will also require skilled workers and these may be available from the community. It is anticipated that approximately 75% of the workforce will be from project area while 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive impact on social norms, culture and economy of the area.		ESM-PMDFC	
Impacts on Local Population	- No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project. - The population residing in and the surroundings of the project area will be affected during the construction phase as follows: - There is potential hazard risk from open trenches in the vicinity of				- 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,	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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.				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			

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					an Occupational Health and Safety Plan for minimizing occupational and community health and safety impacts.			
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.				- Contractor will have rented out houses for Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor. - The active construction zone must be cordoned off to avoid injuries due to accidents.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Gender issue	Project activities may cause hindrance to mobility especially for				Workers would be trained to address privacy issues and ethically behaved.	Contractor	- ESFPs - Supervisory Consultant	-

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	women during construction stage. Privacy of the community may be disturbed.				- Labor would be strictly asked to cater the privacy issues. - staff capacity-building		ESM-PMDFC	
Traffic Management	- Blocking of road may hamper public mobility due to increase in number of vehicles - Road Safety				- Provision of alternative routes - Water sprinkling at project site at consecutive intervals - Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents - Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience - Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; - In case of any complaint, focal person of GRC may	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
					contact (details will be highlighted at project site).			
Economic Issues	Economic issues may arise due to loss of; - land, - structures / assets - productive plants - livelihood - And, disturbance to - shopkeepers - vendors (Mobile / permanent)				- No land acquisition is involved - No public structures are found to be affected in the project area because they are not falling in ROW - No tree plantation is found - No livelihood will be affected by project activity - No shops were found to be affected as located out of ROW. - No permanent vendors were observed during social and environmental assessment survey - In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Operation / Maintenance Phase								
Solid Waste Generation	Solid wastes will mainly emanate from the operation activities related to				The occurrence of these wastes is expected to be minimal because of the	Contractor	- ESFPs - ESM-PMDFC)	Placement of solid waste

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	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.				expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. - The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. - There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. - All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project			storage containers at camp sites. Collection and disposal into MC's containers
Visual Impacts	Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and				This impact is not considered to be significant and will be experienced for a short period of time because of	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	maintenance which could be an eye-sore and a health hazard.				the immediate backfilling of the trenches by the excavated soil / spoil The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible.			
Impacts to Occupational Health and Safety	Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others				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	- ESFPs - ESM-PMDFC)	Following EHS labor SOPs
Odor Issues	The processing of wastewater and sludge will cause odor				Buffer zones of 500 meters have been proposed along	Contractor	- ESFPs - ESM-	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	which will be nuisance to the nearby settlements. This will have impact on health of inhabitants living in surroundings of the treatment plants.				all the boundary walls of the treatment plants. The buffer zone will be planted with trees and herbs in order to minimize the impact of odor on nearby settlements.		PMDFC)	
Insect Breeding	The source of waste water will provide ideal condition for breeding of mosquitoes and other insects. The nutrient-rich water found in clarifiers, sedimentation areas and treatment basins is an ideal production area for mosquitoes that will cause severe problem to the inhabitants of nearby settlements and to the staff employed at treatment plants.				- larvicide is the most effective control technique for mosquito breeding. The primary larvicide used by wastewater treatment facilities is Bacillus thuriangiensis israelensis (Bti). Bti is a naturally occurring bacteria that will not interfere with the existing bacterial process occurring at a WWTP. - Mosquito repelling plants that include Citronella, Horsemint and Marigolds should be planted in buffer zones and inside treatment plants.	Contractor	- ESFPs - ESM-PMDFC)	
Sludge Disposal	The sludge will be generated from the waste water treatment plants if not disposed or managed properly then it can cause severe				Sewerage sludge is organic in nature and contains useful amounts of plant nutrients such as nitrogen, phosphorus and essential trace elements	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	environment problem as well as risk to human health.				and can be used as organic fertilizer or soil conditioner after treatment Where the treatment of sludge is not possible then it should be incinerated at 900°C.			
Impacts on Community Health and Safety	No specific serious adverse impacts on community health and safety are expected as a result of operation activities of sewerage system. There is potential hazard risk from open trenches during the repair phases that could lead to community health and safety risks				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	- ESFPs - ESM-PMDFC)	-
Impacts on Traffic	There maintenance and repair activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents				- 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	Contractor	- ESFPs - ESM-PMDFC)	Traffic management plan

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	especially where construction is on-going with little room for pedestrian access.				which will reduce the potential for traffic blockages that would be caused when using motorized equipment like excavators. The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.			
Impact on Air Quality	The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route and at the site of WWTP or at disposal stations. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and				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	Contractor	- ESFPs - ESM-PMDFC)	

Proposed Project Activities	Potential Impacts	Magnitude of Impacts			Mitigation Measures	Implementing Agency	Monitoring Responsibility	Actions / Monitoring Parameters / Monitoring Methods
		High	Medium	Low				
	vehicles on site and excavation works.				of high-quality fuel, etc. • Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.			
Noise and Vibration Emission Impacts	Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.				• The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.	Contractor	• ESFPs • ESM-PMDFC))	-

A) Environmental Monitoring Plan

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

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
1.	Noise and vibration	- Use of machineries and equipment having less noise. - Provision for personal protective equipment (PPE's), ear muffs / ear plugs to workers. - Noise level testing will be carried through EPA certified Lab.	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
2.	Dust	- Provision for personal protective equipment (PPE's) Mask. - Avoiding construction activities during nights. - Sprinkling of water and removal of excess matter / construction debris from the site as soon as possible.	Scheme Site	Quarterly	It will be conducted during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
3.	Air Quality	Air quality will be analyzed in through EPA certified Lab.	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. In this	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
					regard, an environmental compliance report will be submitted.	
4.	Provision of first aid in case of any emergency	- First Aid will be provided immediately to save the life of affected peoples. - Ambulance will be called up to shift the affected persons to the nearest medical facility.	Scheme Site	Immediate as per need	First Aid Box will be provided at site.	- ESFPs - DPO-ESM - SPO ID/PD
5.	Health, Safety and Environmental needs	Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour.	Scheme Site	Once during construction activities	During construction of project, Health Safety attributes will be provided and environmental compliance report should be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
6.	Public Consultation	Local residents in the sub-project area will be informed about the sub-project details, sub-project schedule and GRM	Scheme Site	- Two times (during and post construction) - In case of any	During and after completion of project; social compliance report will be	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
				complaint, emergency visit will be organized.	submitted.	
7.	Vehicle Movement / Mobility issues	- Provision of alternative routes - Indicators/signboards regarding alternate routes should be provided at proper distance - In case of any complaint, focal person of GRC may contact and his contact details will be provided at sub-project site.	Scheme Site	- During construction, alternative routes will be provided. - In case of any complaint, emergency visit will be organized.	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
8.	Obstruction in public access	- Provision of alternate routes - Construction should start from either side of the road	Scheme Site	Once during construction activities	During and after completion of project; environmental and social monitoring report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
9.	Economic Losses	- loss of land, - damage to structures - damage to trees/plants - negative impacts on livelihood in form of	Scheme Site	Three times (pre, during and post construction) In case of any complaint,	During and after completion of project; environmental and social	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
		blockage of passage for shopkeepers as well as vendors (Mobile / permanent)		emergency visit will be organized.	monitoring report will be submitted	
10.	Privacy Issues	- Contractors would be trained to address privacy issues / behave ethically. - Labor will be strictly asked to respect privacy of local residents. - Training on observing / respecting and local norms.	Scheme Site	Once during construction	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD

B) ESIA Implementation Budget – Rehabilitation Work

Project: Improvement and Extension of Sewerage System in Burewala City.

Item	Quantity	Tentative Cost per Item (PKR)	Total Cost (PKR)
Labor Safety			
Face Masks (3 PLY) - box	110	400	44,000
Safety Hard Helmets	30	3,000	90,000
Safety Shoes	30	3,000	90,000
Hand Gloves - box	110	1,500	165,000
Ear Plugs	30	500	15,000
Reflective Safety Vest	30	1,000	30,000
Safety Goggles	30	500	15,000
First Aid Box Complete	3	10,000	30,000
Infrared Thermometer (Benetech GM-2200 or equivalent)	2	40,000	80,000
Sub-Total			559,000
Working Site Safety			
Safety Signs	10	15,000	150,000
Safety Cones	20	1,000	20,000
Safety Tape	30	1,500	45,000
Portable Delineator with chain	20	2,200	44,000
Emergency Portable Lights	5	3,000	15,000
Solid Waste Collection Drums with Cover	10	12,000	120,000
Fire Fighting Equipment Purchase and refilling	3	10,000	30,000
Sub-Total			424,000
Others			
Hiring of Environmental Specialist (for 06 months)	1	100,000	600,000
Hiring of HSE Expert (for 06 months)	1	100,000	600,000
Training (HSE & Environment related trainings)	Lump sum		100,000
Pole Hanging Waste Bins	10	12,000	120,000
Digital Sound Level Meter	2	30,000	60,000
Labor Campsite Management	Lump sum		200,000
Water Sprinkling	Lump sum		200,000
Environmental Monitoring (Ambient Air, Noise Level, Drinking Water, Surface Water & Vehicular Emission Monitoring)	2	200,000	400,000
Sub-Total (PKR)			2,280,000
Grand Total (PKR)			3,263,000
15% Contingency (PKR)			489,450
Grand Total with 15% Contingency (PKR)			3,752,450

8.8.4 Improvement and Extension of Sewerage System in Burewala City – Sewer lines

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 sewerage system that will be constructed / developed on govt. owned land. Construction / rehabilitation of sewer lines is to be held along the roads in MC Burewala. Roads will be damaged for this purpose.				All the relevant stakeholders to be consulted before execution of the project. Damaged infrastructure (road etc.) to be rehabilitated by the contractor after completion of the project.	MC / PMDFC	• ESFPs • Supervisory Consultant • ESM-PMDFC	-
B. Impacts due to Project Design								
Project Design	The project is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS).				The design is made by taking in consideration that minimum impact will occur on the environment.	Design consultant	• ESFPs • Supervisory Consultant • ESM-PMDFC	-
C. Construction Phase / Repair / Rehabilitation								
Physical Impacts								
Labour Camp Management	• Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.				• Labor camps should be away from the residential areas. • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock.	Contractor	• ESFPs • Supervisory Consultant • ESM-PMDFC	-

	• There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. • Health & Safety issues			• Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Ensuring that children and minors are not employed directly or indirectly on the project. • Children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labor Laws and Employment of Child Act (1977). • Communication on hiring criteria, minimum age, and applicable laws. • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. • EHS SOPs of Labor developed by PMDFC must be followed.			

Soil contamination	- Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the project Site and in its nearby surroundings. - Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites. - Construction site will generate about 0.45 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.			- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators. - The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste. - Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination. - Ground shall be leveled to avoid slopes. - Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	- Equipment washing method and frequency to be regulated / controlled. - Vegetation to control erosion.
Contamination of Surface and Groundwater Resources	Sewage and sanitary wastewater generated from the construction site may contaminate groundwater and surface water, if not disposed of properly.			- Sewage from construction camp will be disposed of using septic tank. - Avoid accidental spills of oils and lubricants through good practice. - Prepare and implement Emergency Response Procedures in case of any spill hazard. - Construction site effluent drainage should be established in areas with adequate natural drainage	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	- Checking of septic tanks constructed for sewage. - Monitoring of surface water quality through EPA certified Lab

					channels in order to facilitate flow of the effluents. • Efforts will be made to make sure that the surface water quality is not disturbed in any way during the construction activities and contingency plans will be made to ensure that.			
Ambient Air Quality	The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.				• Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM. • Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions. • Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin. • The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water-by-water trucks will be done. • As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.	Contractor	• ESFPs • Supervisory Consultant • ESM-PMDFC	Ambient air quality monitoring through EPA certified Lab
Noise and vibration	• During the implementation of the project a large				• During the construction phase of the project, it is expected that	Contractor	• ESFPs	Noise level monitoring by

	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 Neighborhood residential may be disturbed by the noisy activities. - During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. - The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration.				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.		- Supervisory Consultant - ESM-PMDFC	an EPA certified lab
Disposal of Construction Debris & Garbage	During construction phase of the project, large quantity of construction waste will produce, the				A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Placement of solid waste storage containers at camp sites.

	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.			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.			Collection and disposal into MC's containers.
Traffic annoyance	There construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.			- During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the sub-project area. - The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary).	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan

				- 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	Roads will be damaged for construction / rehabilitation of sewer lines.			As a general rule, before excavation, the location and routes of all utilities have been identified and in case of the need for relocating utilities that may be along the proposed lines, the contractor must work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	
Emergency Response Plan	Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.			- Measures for fire prevention and firefighting. - Indicators on site (for example, heavy rainfall) that will prompt the shutdown of specified areas of work. - Contractor will restore / rehabilitate all the damaged utilities / sites after completion of the project. - Procedure for shutdown of site, including transfer of plant, materials and personnel to safe	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Following EHS SOPs

				areas (for example in the event of a flood). • Emergency evacuation procedure for staff and members of the public likely to be impacted by an emergency event on site (for example: fire or blast). • Where practicable, avoiding or minimizing the use of hazardous materials. • Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation etc. • The contractor will prepare emergency shutdown procedures and evacuations to 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								
Biodiversity (Fauna and Flora)	Impact on Flora: No trees exist at the proposed site of wastewater treatment plant. Anyhow, small grass / bushes exist at the site Disturbance to Fauna: No negative impacts on fauna are envisaged.				- In this project, low impact is expected on vegetation (small grass / shrubs) since the pipeline routes are devoid of significant unique floral and faunal life. - The clearing of project sites through excavations for the pipelines (reservoir) will not affect flora and fauna. No tree will be cut. - In case of any mishap / accident, if a tree is disturbed or cut, 10 new trees of almost 06 ft. height will be planted by the contractor.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Maintenance and monitoring of tree plantation
Social Impacts								
Project will have positive outcomes for the local communities as by the provision of good state of art infrastructure.								
Health and Safety Measures	Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer injury or death. Impact Significance				Occupational health and safety impacts during construction is considered to be of moderate in significance. The construction activities will use a mix of hand-held tools and mechanized equipment and machinery in digging the trenches. Experienced and trained personnel will be engaged in operating equipment. Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Following EHS labor SOPs

Job opportunities	It will lead to an increase in economic activity and contribute to local area economic development.			Priority will be given to local area inhabitants for skilled and unskilled labour jobs. Majority of labour need will be met from the project areas. The project will also require skilled workers and these may be available from the community. It is anticipated that approximately 75% of the workforce will be from project area while 25% of labour (skilled) would be hired from outside the project area. This labour influx may have a positive impact on social norms, culture and economy of the area.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Impacts on Local Population	- No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the project. - The population residing in and the surroundings of the project area will be affected during the construction phase as follows: - There is potential hazard risk from open trenches in the vicinity of populated areas during the construction - Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase			- 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.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

	- 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.			- 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.			
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			Contractor will have rented out houses for Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-

	to public health or which create safety hazards, odors, unsightliness or public nuisance.			The active construction zone must be cordoned off to avoid injuries due to accidents.			
Gender issue	- Project activities may cause hindrance to mobility especially for women during construction stage. - Privacy of the community may be disturbed.			- Workers would be trained to address privacy issues and ethically behaved. - Labor would be strictly asked to cater the privacy issues. - staff capacity-building	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
Traffic Management	- Blocking of road may hamper public mobility due to increase in number of vehicles - Road Safety			- Provision of alternative routes - Water sprinkling at project site at consecutive intervals - Indicators / signboards regarding alternate routes should be provided at proper distance to avoid accidents - Inform and coordinate the local residents regarding construction time schedule and also to display the details at project site for their convenience - Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents; - In case of any complaint, focal person of GRC may contact (details will be highlighted at project site).	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	Traffic management plan

Economic Issues	Economic issues may arise due to loss of; - land, - structures / assets - productive plants - livelihood And, disturbance to - shopkeepers - vendors (Mobile / permanent)				- No land acquisition is involved - No public structures are found to be affected in the project area because they are not falling in ROW - No tree plantation is found - No livelihood will be affected by project activity - No shops were found to be affected as located out of ROW. - No permanent vendors were observed during social and environmental assessment survey - In case of any complaint, focal person of GRC may contact and his contact details will be provided at project site.	Contractor	- ESFPs - Supervisory Consultant - ESM-PMDFC	-
D. Operation / Maintenance Phase								
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				- The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. - The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. - There will be limited hazardous wastes generated from this project including the cement bags, grease and oil.	Contractor	- ESFPs - ESM-PMDFC)	- Placement of solid waste storage containers at camp sites. - Collection and disposal into MC's containers

	also encompass solid wastes.			All wastes including will be disposed in an approved waste disposal site. The operator will develop a Waste Management Plan (WMP) to guide the disposal of all types of wastes emanating from the project			
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 - 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.	Contractor	- ESFPs - ESM-PMDFC)	
Impacts to Occupational Health and Safety	Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others			Occupational health and safety impacts during operation/maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment.	Contractor	- ESFPs - ESM-PMDFC)	Following EHS labor SOPs
Odor Issues	The processing of wastewater and sludge will cause odor			Buffer zones of 500 meters have been proposed along all the	Contractor	ESFPs	

	which will be nuisance to the nearby settlements. This will have impact on health of inhabitants living in surroundings of the treatment plants.				boundary walls of the treatment plants. The buffer zone will be planted with trees and herbs in order to minimize the impact of odor on nearby settlements.		• ESM-PMDFC)	
Insect Breeding	The source of waste water will provide ideal condition for breeding of mosquitoes and other insects. The nutrient-rich water found in clarifiers, sedimentation areas and treatment basins is an ideal production area for mosquitoes that will cause severe problem to the inhabitants of nearby settlements and to the staff employed at treatment plants.				- larvicide is the most effective control technique for mosquito breeding. The primary larvicide used by wastewater treatment facilities is <i>Bacillus thuriangiensis israelensis</i> (Bti). Bti is a naturally occurring bacteria that will not interfere with the existing bacterial process occurring at a WWTP. - Mosquito repelling plants that include Citronella, Horsemint and Marigolds should be planted in buffer zones and inside treatment plants.	Contractor	- ESFPs - ESM-PMDFC)	
Sludge Disposal	The sludge will be generated from the waste water treatment plants if not disposed or managed properly then it can cause severe environment problem as well as risk to human health.				- Sewerage sludge is organic in nature and contains useful amounts of plant nutrients such as nitrogen, phosphorus and essential trace elements and can be used as organic fertilizer or soil conditioner after treatment - Where the treatment of sludge is not possible then it should be incinerated at 900°C.	Contractor	- ESFPs - ESM-PMDFC)	
Impacts on Community Health and Safety	No specific serious adverse impacts on community health and safety are expected as a result of operation activities of sewerage system. There is potential hazard risk from open trenches during the repair				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	Contractor	- ESFPs - ESM-PMDFC)	-

	phases that could lead to community health and safety risks				be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance.			
Impacts on Traffic	There maintenance and repair activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorized and non-motorized traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access.				- 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	- ESFPs - ESM-PMDFC)	Traffic management plan
Impact on Air Quality	The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route and at the site of WWTP or at disposal stations. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The				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	Contractor	- ESFPs - ESM-PMDFC)	

	processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.			measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc. Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.			
Noise and Vibration Emission Impacts	Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used.			The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g., pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.	Contractor	- ESFPs - ESM-PMDFC))	-

A) Environmental Monitoring Plan

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

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
1.	Noise and vibration	- Use of machineries and equipment having less noise. - Provision for personal protective equipment (PPE's), ear muffs / ear plugs to workers. - Noise level testing will be carried through EPA certified Lab.	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. In this regard, an environmental compliance report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
2.	Dust	- Provision for personal protective equipment (PPE's) Mask. - Avoiding construction activities during nights. - Sprinkling of water and removal of excess matter / construction debris from the site as soon as possible.	Scheme Site	Quarterly	It will be conducted during and after completion of civil work. In this regard, an environmental compliance report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
3.	Air Quality	Air quality will be analyzed in through EPA certified Lab.	Scheme Site	Quarterly	It will be conducted before, during and after completion of civil work. In this	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
					regard, an environmental compliance report will be submitted.	
4.	Provision of first aid in case of any emergency	- First Aid will be provided immediately to save the life of affected peoples. - Ambulance will be called up to shift the affected persons to the nearest medical facility.	Scheme Site	Immediate as per need	First Aid Box will be provided at site.	- ESFPs - DPO-ESM - SPO ID/PD
5.	Health, Safety and Environmental needs	Adequate safety precautions such helmets, safety shoes, gloves, etc. should be provided to the labour.	Scheme Site	Once during construction activities	During construction of project, Health Safety attributes will be provided and environmental compliance report should be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
6.	Public Consultation	Local residents in the sub-project area will be informed about the sub-project details, sub-project schedule and GRM	Scheme Site	- Two times (during and post construction) - In case of any	During and after completion of project; social compliance report will be	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
				complaint, emergency visit will be organized.	submitted.	
7.	Vehicle Movement / Mobility issues	- Provision of alternative routes - Indicators/signboards regarding alternate routes should be provided at proper distance - In case of any complaint, focal person of GRC may contact and his contact details will be provided at sub-project site.	Scheme Site	- During construction, alternative routes will be provided. - In case of any complaint, emergency visit will be organized.	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD
8.	Obstruction in public access	- Provision of alternate routes - Construction should start from either side of the road	Scheme Site	Once during construction activities	During and after completion of project; environmental and social monitoring report will be submitted.	- ESFPs - DPO-ESM - SPO ID/PD
9.	Economic Losses	- loss of land, - damage to structures - damage to trees/plants - negative impacts on livelihood in form of	Scheme Site	Three times (pre, during and post construction) In case of any complaint,	During and after completion of project; environmental and social	- ESFPs - DPO-ESM - SPO ID/PD

Sr. No.	Identified environmental and social issues	Monitoring Parameters	Monitoring Site	Monitoring Frequency	Reporting frequency	Responsibility
		blockage of passage for shopkeepers as well as vendors (Mobile / permanent)		emergency visit will be organized.	monitoring report will be submitted	
10.	Privacy Issues	- Contractors would be trained to address privacy issues / behave ethically. - Labor will be strictly asked to respect privacy of local residents. - Training on observing / respecting and local norms.	Scheme Site	Once during construction	During and after completion of project; environmental and social monitoring report will be submitted	- ESFPs - DPO-ESM - SPO ID/PD

B) ESIA Implementation Budget – Sewer Lines

Project: Improvement and Extension of Sewerage System in Burewala City.

Item	Quantity	Tentative Cost per Item (PKR)	Total Cost (PKR)
Labor Safety			
Face Masks (3 PLY) - box	110	400	44,000
Safety Hard Helmets	30	3,000	90,000
Safety Shoes	30	3,000	90,000
Hand Gloves - box	110	1,500	165,000
Ear Plugs	30	500	15,000
Reflective Safety Vest	30	1,000	30,000
Safety Goggles	30	500	15,000
First Aid Box Complete	3	10,000	30,000
Infrared Thermometer (Benetech GM-2200 or equivalent)	2	40,000	80,000
Sub-Total			559,000
Working Site Safety			
Safety Signs	10	15,000	150,000
Safety Cones	20	1,000	20,000
Safety Tape	30	1,500	45,000
Portable Delineator with chain	20	2,200	44,000
Emergency Portable Lights	5	3,000	15,000
Solid Waste Collection Drums with Cover	10	12,000	120,000
Fire Fighting Equipment Purchase and refilling	3	10,000	30,000
Sub-Total			424,000
Others			
Hiring of Environmental Specialist (for 06 months)	1	100,000	600,000
Hiring of HSE Expert (for 06 months)	1	100,000	600,000
Training (HSE & Environment related trainings)	Lump sum		100,000
Pole Hanging Waste Bins	10	12,000	120,000
Digital Sound Level Meter	2	30,000	60,000
Labor Campsite Management	Lump sum		200,000
Water Sprinkling	Lump sum		200,000
Environmental Monitoring (Ambient Air, Noise Level, Drinking Water, Surface Water & Vehicular Emission Monitoring)	2	200,000	400,000
Sub-Total (PKR)			2,280,000
Grand Total (PKR)			3,263,000
15% Contingency (PKR)			489,450
Grand Total with 15% Contingency (PKR)			3,752,450

8.8.5 Abbreviated Resettlement Action Plan (ARAP) Budget

Draft ARAP Implementation Cost is estimated to be 77,213,628/- PKR.

8.9 Proposed ESIA Reporting and Reviewing Procedure of EPA

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

Reporting and reviewing procedure are following:

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

8.10 Contractor's Training

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

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

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

Contractors have to comply with the following responsibilities:

- Observation of timings and make a schedule that the surrounding communities should not be affect from noise pollution, air emissions and disturbances in their routine work.
- Usage of machinery / equipment producing negligible / low noise.

- Ensure health, safety and protective measures including safety equipment, safe drinking water, first aid boxes etc. to the workforce as per nature of their jobs.
- Water sprinkling to avoid air pollution.
- Indicate alternate routes and provide indicators on suitable places during work timings.
- Local labor should be preferred to work.
- Child labor is strictly prohibited as per labor law. All labor should be more than 14 years of age individually.
- Proper disposal of wastes and garbage.
- Health, safety and protective measures for the labor.
- Notice board of emergency numbers should be placed on proper place.

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

Components	Audience	Level	Modality	Frequency	Responsibility
ESMF Site Specific requirements and E&S Management and Mitigation Plan	MO-I MO-P and MC field staff ⁶	Training	Briefing Presentations Mock Activities	Before execution of project and time to time instructions	PMDFC ESM team
ESIA Implementati on and Monitoring Plan	MO-I MO-P MC field staff	Training	Briefing Presentations Mock Activities		
	Contractor	Awareness and sensitization	Briefing	At the time of Contract signing and before execution	DPO-ESM ESFPs
	Labor	Awareness and sensitization	Briefing	Before execution and time to time during	DPO-ESM ESFPs

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

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

SECTION - 9: STAKEHOLDER AND PUBLIC CONSULTATION

9.1 Proponents Environmental Management Team

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

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

9.2 Responsible Authority

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

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

9.3 Project Stakeholders

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

Table 9-1, Project Stakeholders

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

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

Table 9-2, Framework for Consultation

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

9.3.1 Modes of Consultations

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

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

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

A) Primary Stakeholders: Affected Wider Community

The project area is of both commercial and residential in nature. Project area inhabitants are direct beneficiaries of project interventions as it will resolve their long-standing issue of sewerage system. **Table 9-3** provides public consultation record, **Error! Reference source not found.** provides suggestions / concerns given by general public and **Figure 9-2** shows representative

pictures of public consultation.

Table 9-3, Public Consultation

Sr. No.	Name	Contact No.	Profession / Designation
1.	Malik Raza	0300-6994403	ASI – Punjab Police
2.	Usama Razzaq	0300-0765164	Student of BS Env. Science
3.	Abdul Jabbar	0300-6990237	Works in FM / Radio
4.	Muhammad Ramzan	0308-6999097	Businessman
5.	Sohaib Nawaz	0346-7819155	IT Expert in THQ
6.	Musarrat Begum	-	Housewife
7.	Abyaz Anwer	0333-7799112	HSE Expert in Maheen Textiles, FSD
8.	Majid Ali	0300-6997509	Teacher
9.	Muhammad Mumtaz	0300-6992086	Doctor
10.	Abdul Salam	0334-7202600	Teacher

B) Secondary Stakeholders: Department and Agencies

The project area lies in the jurisdiction of MC Burewala and MC has an ambit of providing safe and properly working sewerage system / facilities to the citizens. Public has filed complaints about issues of current sewerage system, that's why MC Burewala has suggested the project for improvement and extension of sewerage system in the city. Several other institutional stakeholders were also engaged in the consultation process. **Table 9-4** provides institutional / departmental consultations record, summary of institutional stakeholder consultation is given in **Error! Reference source not found.** and representative pictorial view of institutional consultation is shown in **Table 9-4.**

Table 9-4, Institutional / Departmental Consultation

Sr. No.	Department	Person	Designation
1.	Municipal Corporation	Allah Ditta	Sub-Engr.
2.	Environmental Protection Agency	Sarfraz Anjum	DO – Environment
3.	Highway Department	Shahid Ghafoor	Sr. Sub-Engineer
4.	Public Health Engineering Department	Mr. Akbar Ali	SDO
5.	Forest Department	Mr. Tanvir Ahmed Khan	Range Forest Officer

9.3.2 Environmental Practitioner and Expert

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

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

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

9.3.3 Disclosure of Project Information

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

9.3.4 Future Consultation Plan

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

9.4 Summary of Issues Raised by Affected and Wider Community

A summary of the key issues raised by stakeholders and how these are being addressed by project proponent is provided in **Table 9-5** below.

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

Location	Name / Designation / Department	Concern / Suggestion	Response
MC Burewala	Malik Raza	There is a significant level of pollution resulting from the excessive discharge of wastewater into open drains that need to be managed effectively.	Efforts will be made to improve the current sewerage issues through this project.
	Usama Razzaq	Will Rehmatatabad disposal be rehabilitated?	Total 04 disposal stations including Rehmatatabad Disposal Station will be rehabilitated.
	Abdul Jabbar	Will job opportunities be generated and provided to the locals?	Employment opportunities will be generated and it will be made sure that almost 75% of the workforce should be employed from the project area.
	Muhammad Ramzan	The increased volume of wastewater on roads generated from choked /damaged pipelines is a critical problem for the residents that needs to be address.	The PMDFC project has been developed to effectively address this particular issue by rehabilitating the existing sewerage system.
	Sohaib Nawaz	Concerns about the maintenance of the sanitation system raised.	Efforts will be made to improve the current sewerage issues through this project.
	Musarrat Begum	Privacy of people should be upheld during construction phase of the project.	Contractor will provide trainings to workers regarding gender and privacy issues.
	Abyaz Anwer	As WWTP will be constructed on 22 acres of land, tree plantation should be ensured for the protection / improvement of the environment of area.	Plantation will be done to enhance the acceptability of the project and to make the project more environment friendly.
	Majid Ali	Choked or Damaged sewer	Efforts will be made to

Location	Name / Designation / Department	Concern / Suggestion	Response
		lines should be repaired.	improve the current sewerage issues through this project.
	Muhammad Mumtaz	Wastewater overflows from open drains that causes diseases and bad odor, therefore, it should be changed into underground sewerage systems.	Efforts will be made to improve the current sewerage issues through this project.
	Abdul Salam	Choked or Damaged sewer lines should be repaired.	Efforts will be made to improve the current sewerage issues through this project.

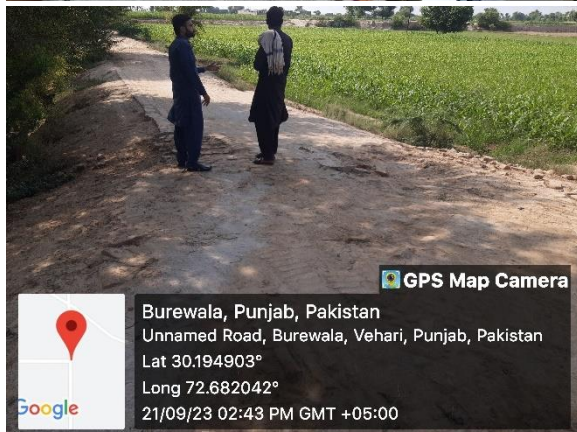


Figure 9-1, Public Consultation

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

Person	Concern / Suggestion	Response
Sarfraz Anjum, DO – EPA	EPA should be kept in loop during the project process. NOC from EPA head office should be obtained before commencement of works.	Comments are noted.
Mr. Tanvir Ahmed Khan, Range Forest Officer – Forest Department	It is a good project; however, it is essential to ensure that the selected / chosen location for the construction of wastewater treatment plant does not fall in forest area.	Comments are noted.
Mr. Akbar Ali, SDO – PHED	Construction of WWTP is very essential for the residents of Burewala, disposal stations should also be rehabilitated.	04 disposal stations of Burewala will be rehabilitated / improved through this project.
Mr. Allah Ditta, Sub-Engr. – MC Burewala	This project is a dire need of MC Burewala and should be initiated as soon as possible.	Comments are noted.
Mr. Shahid Ghafoor, Sr. Sub- Engr. – Highway Department	If force main or sewer lines are to be constructed / rehabilitated in ROW of highway department, then NOC should be obtained.	Comments are noted. MC Burewala will obtain NOC from the concerned authority before execution of the project.
Mr. Muhammad Saleem, Assistant Professor – Govt. College	The government's effort is admirable; however, it should be made sure to cordon-off excavated areas near educational institutions during execution of the project.	Suggestions are noted, as it will be made sure in ESIA of the project to cordon-off the excavated area by the contractor.



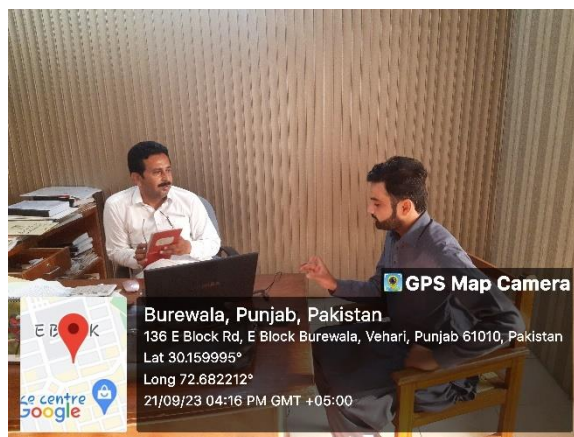
PHED



EPA



Highway Department



Sub-Engr. – MC



Forest Department



Educational Institute

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

SECTION - 10: GRIEVANCE REDRESS MECHANISM

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

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

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

10.1 GRM at Project Site

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

• Chief Officer MC Burewala	Chairperson
• Municipal Officer (Infrastructure Development)	Convener
• Municipal Officer (Planning)	Member
• Municipal Officer (Regulation)	Member

TORs of GRC – MC Burewala are as following:

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

10.2 GRM at Regional Level

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

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

TORs of GRC-Regional are as followed:

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

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

10.3 Types of Grievances

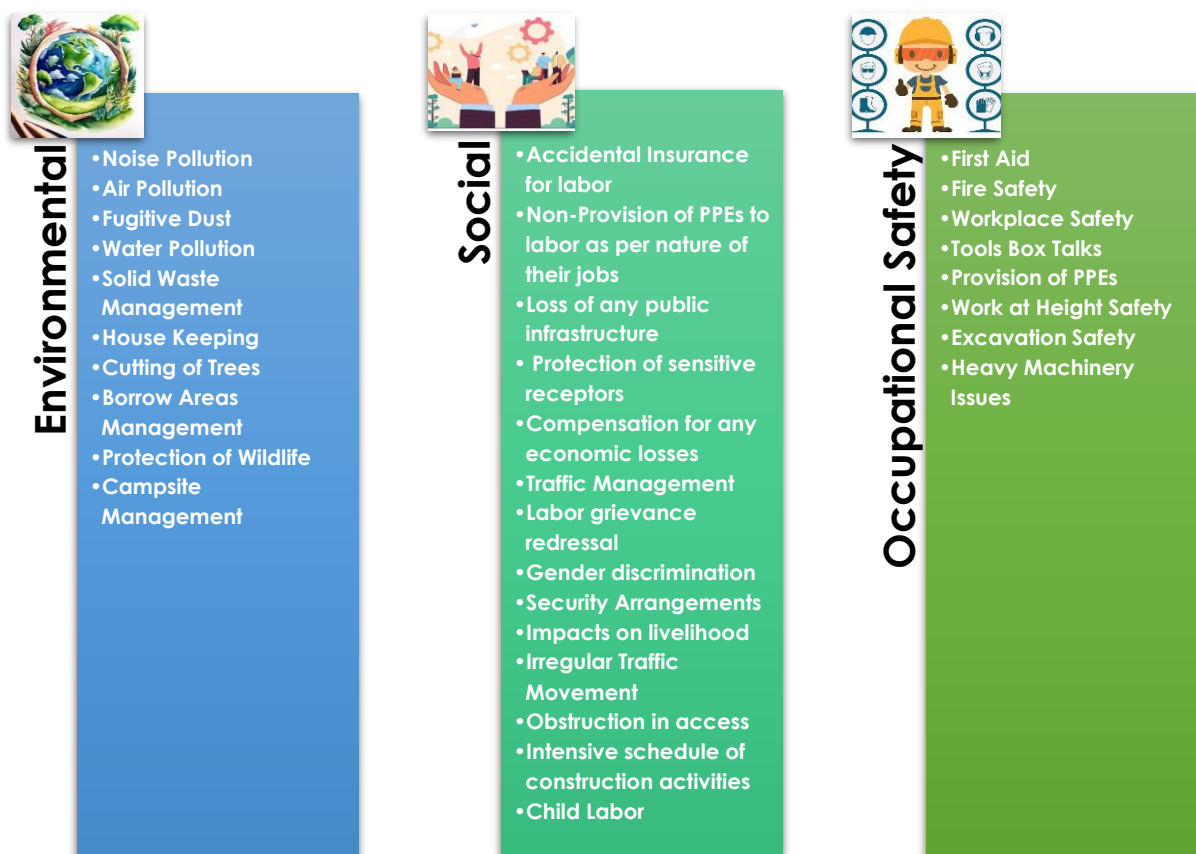


Figure 10-1, Types of Grievances

10.3.1 Procedures

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

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

Public Complaints Center (PCC) which will be responsible to receive, log, and resolve complaints in local offices. The Grievance Redress Committee at the MC level will review and identify actions to be taken to address the

complaints at its weekly meetings.

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

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

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

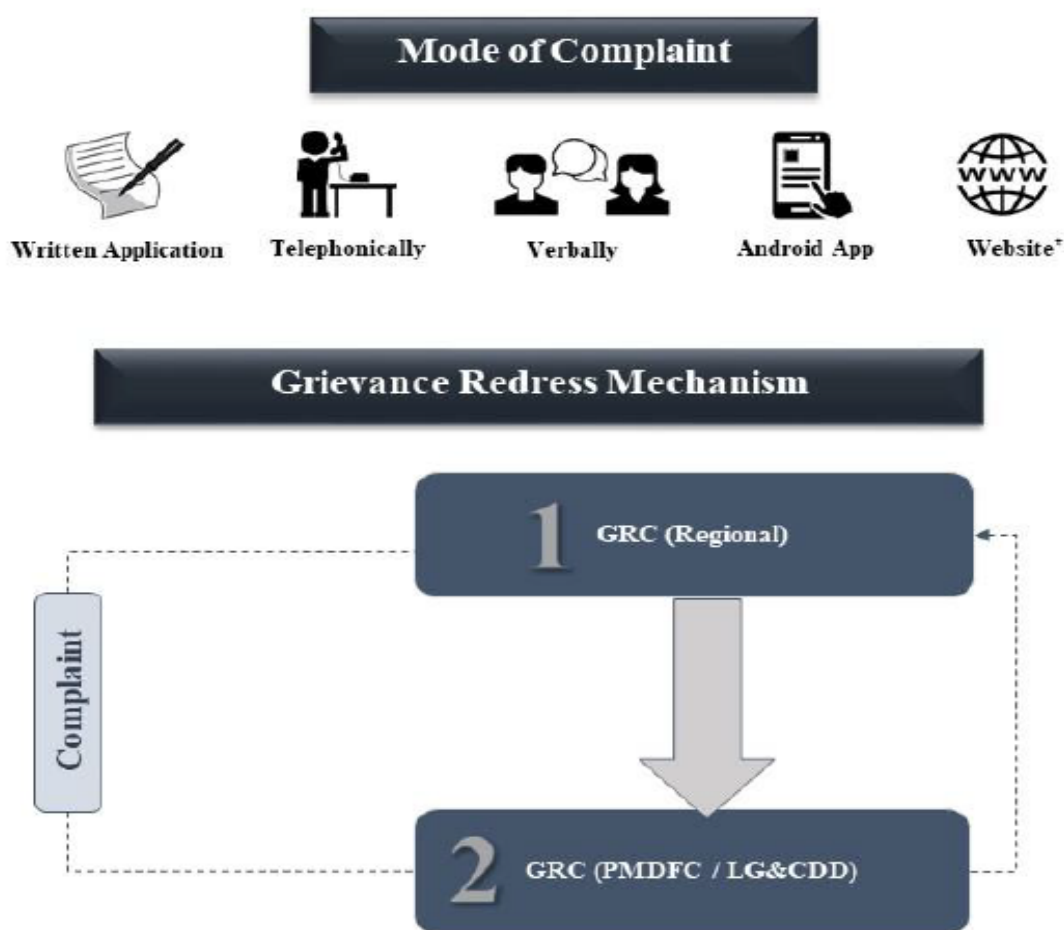


Figure 10-2, GRM

SECTION - 11: CONCLUSION AND RECOMMENDATIONS

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

11.1 Conclusion

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

11.2 Recommendations

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

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

The present ESIA report is enough to meet the administrative and legal

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

Project will be executed on government owned land. As wastewater treatment plant will be constructed on govt. owned land, but allottees will be affected, so ARAP is prepared for resettlement / compensation, force main will pass along / RoW of roads, sewer line will be constructed / rehabilitated along the road and existing disposal stations will be rehabilitated. So, NOCs / Consent Letters from concerned departments should be obtained before execution of the project.

ANNEXURES

ANNEXURE - 1: REFERENCES

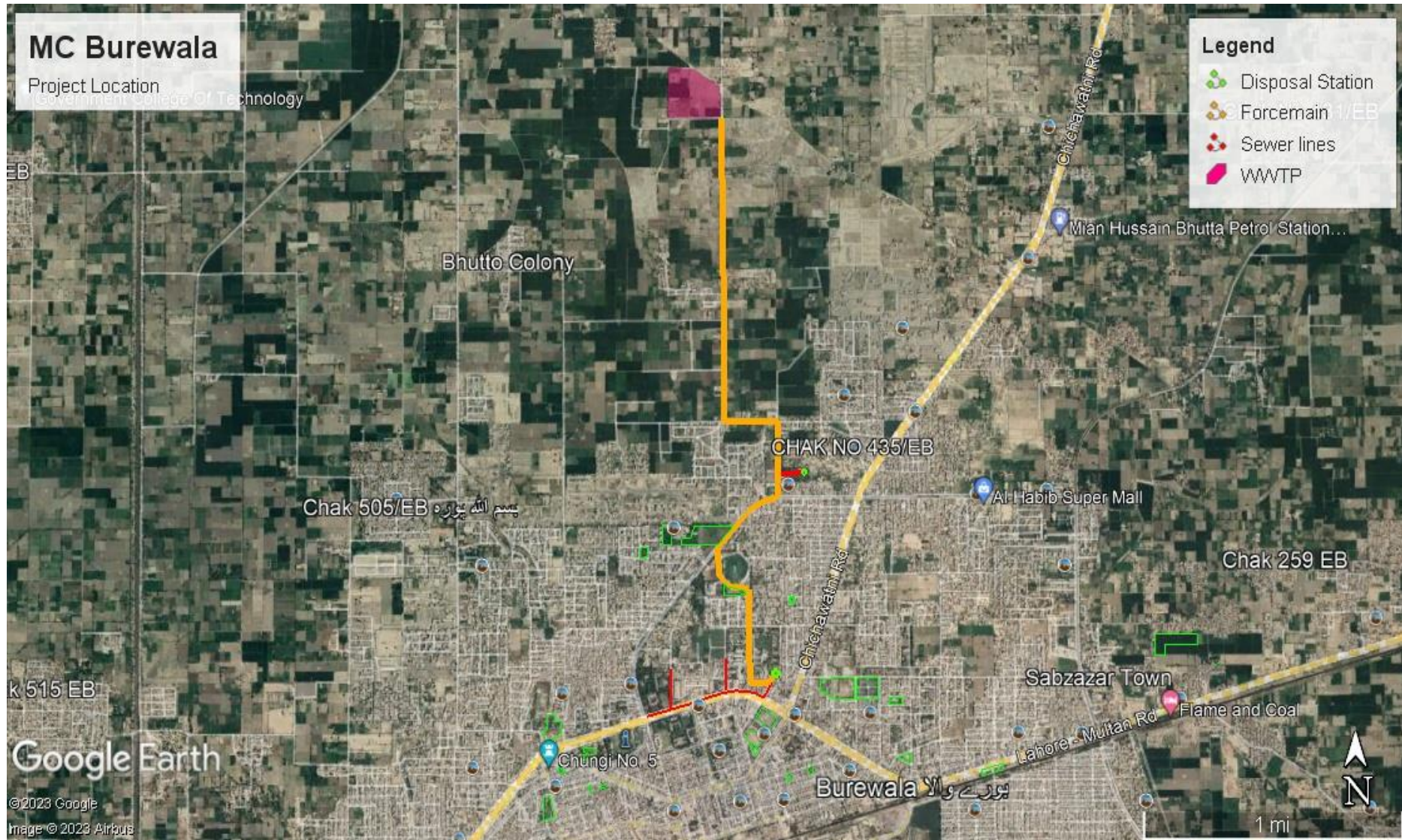
- <https://www.epa.gov/sites/production/files/2015-10/documents/njmc-wpp-2.pdf>
- Schedule I of Punjab Environmental Protection Act 1997 (Amended 2012)
- section 12 of Punjab Environmental Protection Act 1997 (Amended 2012)
- Pakistan Environmental protection act 1997
- Punjab Environmental Protection 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.
- Meteorological data from meteorological department and website
- Pakistan Biosafety rules 2005
- Pakistan Environmental agency (review of IEE/EIA) regulation 2000.
- Punjab Portal (<http://www.punjab.gov.pk/attock>)
- Attock Chamber of Commerce Industries (<http://www.acci.org.pk/Attock.html>)
- Sectorial Guideline for environmental reports, industrial states
- Pakistan Environmental Protection ordinance (PEPO), 1983
- OSHAS 1800 for health and safety
- Census 2017

ANNEXURE - 2: GLOSSARY

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

ANNEXURE - 3: LIST OF ABBREVIATION

PEPA	Punjab Environmental Protection Act
NEQS	National Environmental Quality Standards
PEQS	Punjab Environmental Quality Standards
WAPDA	Water and Power Development Authority
EMP	Environmental Management plan
ESMMP	Environmental and Social Management & Monitoring Plan
WWTP	Waste Water Treatment Plant
EPA	Environmental Protection Agency
W.H.O	World Health Organization
SWM	Solid Waste Management
CSR	Corporate Social Responsibility
MSWs	Municipal Solid Wastes
TMA	Town Municipal Authority
MC	Municipal Corporation
PPEs	Personal protective equipment's
PM	Particulate Matter
ESIA	Environmental and Social Impact Assessment
ARAP	Abbreviated Resettlement Action Plan
APs	Affected Persons
ESFPs	Environment and Social Focal Persons
DPO-ESM	Deputy Program Officer- Environment and Social Management
DPO ID	Deputy Program Officer Infrastructure Development
DPO IS	Deputy Program Officer – Infrastructure Strengthening
PD	Project Director
GRC	Grievance Redress Committee
LG and CDD	Local Government and Community Development Department
SDO	Sub Divisional Officer
PMDFC	Punjab Municipal Development Fund Company
PCP	Punjab Cities Program
AsCE	Asian Consulting Engineers Private Limited



Project Google Map

ANNEXURE - 5: ESIA TEAM

Sr. No.	Team Member	Position Held	Qualifications
1.	Aleem Butt	Chief Environmentalist, Team Leader – ESIA	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; M.Sc. Environmental Sciences, Punjab University (PU), Lahore; NEBOSH, Lead Auditor
2.	Noman Ashraf	Environmental Specialist	M.Phil. Environmental Sciences, Government College University (GCU) Lahore; PGD, Environmental Law, University of the Punjab, Lahore
3.	M. Umair Iqbal	Environmentalist	BS Environmental Science, Government College University, Faisalabad
4.	Engr. Maryam	Environmental Engineer	BE Environmental Engineering, University of Engineering and Technology (UET), Lahore
5.	Waqar Saleem	Sociologist and Resettlement Specialist	M.Phil. Sociology, University of Sargodha
6.	Asma Butt	Sociologist	M.Phil. Sociology, University of Punjab
7.	Muhammad Ibrar	Ecologist	M.Phil. Zoology, University of Punjab
8.	Sajjad Hussain	Chief Chemist	M.Phil. Chemistry, Govt. College University, Lahore

ANNEXURE - 6: LAB REPORTS OF ENVIRONMENTAL MONITORING



LAB 208
ISO 17025






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BASELINE ENVIRONMENTAL MONITORING & ANALYSIS REPORT

IMPROVEMENT & EXTENSION OF SEWERAGE SYSTEM IN BUREWALA CITY.

- Ambient Air Monitoring
- Noise Monitoring
- Ground Water Analysis

Reference No.: AES-ENV-PM-94/2023

Dated: 18 October, 2023

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Location for Ambient Air Monitoring-01 NEAR TQH HOSPITAL Burewala



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Ambient Air Monitoring Report

Monitoring Details

Reference Number AES-ENV-PM-094/2023-AA-01 Monitoring Point Near TQH Hospital, Burewala

Date of Monitoring 08-10-2023 to 09-10-2023 Monitoring Coordinates 30°9'45" N 72°40'59" E

Validation Officer Miss. Saiqa (Research officer-Punjab EPA)

Sr. No.	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1	10:30	2.18	15.68	36.41	52.03	32.14
2	11:30	1.97	17.63	37.77	55.33	33.15
3	12:30	2.00	17.67	38.17	55.77	34.38
4	13:30	1.98	18.09	38.67	56.69	34.83
5	14:30	1.90	17.37	39.19	56.48	35.12
6	15:30	1.92	16.43	39.99	56.35	35.39
7	16:30	1.94	17.14	40.95	58.01	36.51
8	17:30	1.96	16.07	40.58	56.57	37.28
9	18:30	1.98	16.10	41.10	57.13	37.39
10	19:30	1.99	15.99	41.14	57.05	37.92
11	20:30	1.97	15.64	41.48	57.05	39.81
12	21:30	1.96	15.72	38.29	53.94	40.05
13	22:30	1.96	15.70	38.67	54.30	39.81
14	23:30	1.93	15.45	38.40	53.79	39.12
15	00:30	1.94	15.34	38.17	53.44	38.34
16	01:30	1.92	15.20	37.89	53.02	37.12
17	02:30	1.91	14.99	37.68	52.60	36.06
18	03:30	1.89	14.86	37.14	51.93	34.80
19	04:30	1.85	15.19	36.62	51.74	34.49
20	05:30	1.86	16.10	35.86	51.89	33.79
21	06:30	1.84	17.06	36.13	53.12	34.43
22	07:30	1.82	17.23	35.76	52.93	34.80
23	08:30	1.79	18.57	35.40	53.90	35.63
24	09:30	1.80	19.11	0.00	54.26	37.01
Average Concentration		1.93	16.43	36.73	54.56	36.22

Monitored By

Reviewed By
(TM)

Approved By
(QM/Chief Chemist)

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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-ENV-PM-094/2023-AA-01	Monitoring Point	Near TQH Hospital, Burewala
Date of Monitoring	08-10-2023 to 09-10-2023	Monitoring Coordinates	30°9'45" N 72°40'59" E
Validation Officer	Miss. Saiqa (Research officer-Punjab EPA)		

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	36.73	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	16.43	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	54.56	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	36.22	120.0	Optimal
Carbon Monoxide (CO) *	mg/m ³	24Hours	0.01	1.93	05.0	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	96.84	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	19.33	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	139.11	500	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

Abbreviations:

LDL= Lower Detection Limit

PEQS= Punjab Environmental Quality Standards

µg/m³ = Micro Gram per Meter Cube

Remarks:

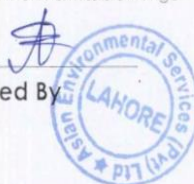
Optimal = Compliance with Permissible Range

Marginal = Close to Extreme Edge

High = Exceeds from Permissible Range

Low = Less Than Permissible Range

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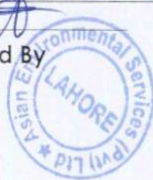
Ambient Air Monitoring Report

Monitoring Details

Reference Number AES-ENV-PM-094/2023-AA-01 Monitoring Point Near TQH Hospital, Burewala
Date of Monitoring 08-10-2023 to 09-10-2023 Monitoring Coordinates 30°9'45" N 72°40'59" E
Validation Officer Miss. Saiqa (Research officer-Punjab EPA)

Sr. No.	Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
1	10:30	36	SE	1.02	50	756.80
2	11:30	36	SE	1.02	50	756.90
3	12:30	37	SE	1.06	51	757.30
4	13:30	38	SE	1.09	51	757.90
5	14:30	39	E	1.12	50	758.40
6	15:30	39	E	1.12	51	758.90
7	16:30	40	E	1.19	52	758.60
8	17:30	41	E	1.2	52	758.10
9	18:30	40	NE	1.19	51	757.60
10	19:30	39	NE	1.14	52	757.20
11	20:30	38	NE	1.06	51	757.10
12	21:30	37	NE	1.02	52	756.20
13	22:30	37	NE	1.01	51	755.90
14	23:30	37	E	0.92	51	755.10
15	00:30	36	E	0.89	50	754.70
16	01:30	36	E	0.8	50	754.20
17	02:30	35	E	0.9	49	753.70
18	03:30	34	SE	1.02	49	753.30
19	04:30	34	SE	1.09	48	754.10
20	05:30	35	SE	1.12	48	754.90
21	06:30	36	SE	1.16	48	755.50
22	07:30	36	SE	1.19	47	755.90
23	08:30	37	E	1.23	48	756.40
24	09:30	38	E	1.25	49	756.70

Monitored By



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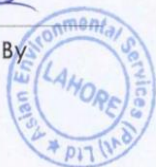
Noise Monitoring Report

Monitoring Details

Reference Number AES-ENV-PM-094/2023-AA-01 Monitoring Point Near TQH Hospital, Burewala
Date of Monitoring 08-10-2023 to 09-10-2023 Monitoring Coordinates 30°9'45" N 72°40'59" E
Validation Officer Miss. Saiqa (Research officer-Punjab EPA)

Sr. No.	Time	Noise dB(A)	PEQS
1	10:30	44	
2	11:30	45	
3	12:30	45	
4	13:30	46	
5	14:30	47	
6	15:30	46	
7	16:30	45	Day Time 55
8	17:30	44	
9	18:30	45	
10	19:30	44	
11	20:30	43	
12	21:30	42	
13	22:30	41	
14	23:30	40	
15	00:30	40	
16	01:30	39	
17	02:30	39	Night Time 45
18	03:30	38	
19	04:30	39	
20	05:30	39	
21	06:30	40	
22	07:30	41	
23	08:30	42	Day Time 55
24	09:30	43	

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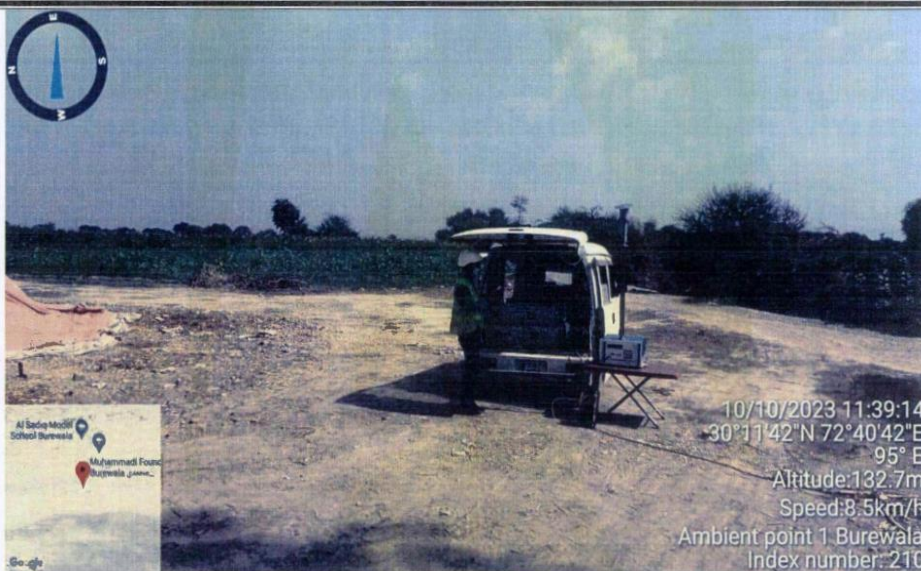
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Location for Ambient Air Monitoring-02 NEAR CHAK 423-EB Burewala



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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-ENV-PM-094/2023-AA-02	Monitoring Point	Near Chak 423-EB, Burewala
Date of Monitoring	09-10-2023 to 10-10-2023	Monitoring Coordinates	30°11'42" N 72°40'42" E
Validation Officer	Miss. Saiqa (Research officer-Punjab EPA)		

Sr. No.	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1	11:00	2.05	16.07	37.31	53.31	34.75
2	12:00	2.07	16.28	38.17	54.38	35.82
3	13:00	2.04	16.62	38.80	55.35	36.32
4	14:00	1.99	16.73	39.28	55.94	37.23
5	15:00	1.97	16.62	39.49	56.04	37.39
6	16:00	1.91	16.47	40.01	56.40	38.56
7	17:00	1.87	15.89	40.95	56.77	38.56
8	18:00	1.79	15.32	41.04	56.29	41.00
9	19:00	1.84	14.52	40.32	54.76	41.75
10	20:00	1.89	14.80	39.88	54.61	42.81
11	21:00	1.79	14.42	39.11	53.46	41.24
12	22:00	1.80	13.94	38.80	52.68	40.42
13	23:00	1.77	13.48	38.79	52.20	40.13
14	00:00	1.73	13.58	38.61	52.12	39.83
15	01:00	1.70	14.34	38.46	51.97	39.65
16	02:00	1.72	14.54	38.35	52.62	38.74
17	03:00	1.77	15.22	38.17	52.64	37.86
18	04:00	1.83	16.29	37.68	52.83	37.28
19	05:00	1.89	16.62	38.23	54.45	36.85
20	06:00	1.97	17.06	38.69	55.24	37.31
21	07:00	2.03	17.58	40.09	57.07	36.32
22	08:00	2.08	17.96	40.62	58.12	37.23
23	09:00	2.14	18.46	41.58	59.46	35.15
24	10:00	2.19	18.76	43.22	61.60	33.26
Average Concentration		1.91	15.90	39.40	55.01	38.14

Monitored By



Reviewed By

(TM)

Approved By

(QM/Chief Chemist)

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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-ENV-PM-094/2023-AA-02	Monitoring Point	Near Chak 423-EB, Burewala
Date of Monitoring	09-10-2023 to 10-10-2023	Monitoring Coordinates	30°11'42" N 72°40'42" E
Validation Officer	Miss. Saiqa (Research officer-Punjab EPA)		

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	39.40	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	15.90	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	55.01	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	38.14	120.0	Optimal
Carbon Monoxide (CO) *	mg/m ³	24Hours	0.01	1.91	05.0	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	96.97	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	20.03	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	126.29	500	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

Abbreviations:

LDL= Lower Detection Limit

PEQS= Punjab Environmental Quality Standards

µg/m³ = Micro Gram per Meter Cube

Remarks:

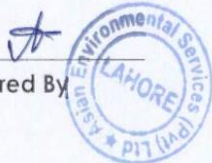
Optimal = Compliance with Permissible Range

Marginal = Close to Extreme Edge

High = Exceeds from Permissible Range

Low = Less Than Permissible Range

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Ambient Air Monitoring Report

Monitoring Details

Reference Number AES-ENV-PM-094/2023-AA-02 Monitoring Point Near Chak 423-EB, Burewala
Date of Monitoring 09-10-2023 to 10-10-2023 Monitoring Coordinates 30°11'42" N 72°40'42" E
Validation Officer Miss. Saiqa (Research officer-Punjab EPA)

Sr. No.	Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
1	11:00	36	NE	1.12	52	757.70
2	12:00	35	NE	1.16	52	757.90
3	13:00	36	NE	1.17	51	758.10
4	14:00	36	E	1.2	52	758.50
5	15:00	37	E	1.25	51	758.80
6	16:00	37	E	1.29	52	759.10
7	17:00	38	E	1.31	53	759.00
8	18:00	37	SE	1.35	52	758.60
9	19:00	36	SE	1.4	51	758.10
10	20:00	35	SE	1.36	50	757.60
11	21:00	35	SE	1.31	50	757.40
12	22:00	34	S	1.28	49	756.90
13	23:00	34	S	1.26	49	756.40
14	00:00	33	S	1.21	49	756.10
15	01:00	33	S	1.17	48	755.70
16	02:00	32	S	1.11	48	755.10
17	03:00	31	SE	1.09	47	754.30
18	04:00	30	SE	1.06	47	755.10
19	05:00	31	SE	1.01	48	755.90
20	06:00	31	SE	0.96	48	756.40
21	07:00	32	E	0.91	49	756.90
22	08:00	33	E	0.99	49	757.40
23	09:00	34	E	1.02	50	757.90
24	10:00	35	E	1.07	51	758.90

Monitored By



Reviewed By
(TM)

Approved By
(QM/Chief Chemist)

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Noise Monitoring Report

Monitoring Details

Reference Number	AES-ENV-PM-094/2023-AA-02	Monitoring Point	Near Chak 423-EB, Burewala
Date of Monitoring	09-10-2023 to 10-10-2023	Monitoring Coordinates	30°11'42" N 72°40'42" E
Validation Officer	Miss. Saiqa (Research officer-Punjab EPA)		

Sr. No.	Time	Noise dB(A)	PEQS
1	11:00	47	
2	12:00	46	
3	13:00	47	
4	14:00	48	
5	15:00	49	
6	16:00	49	Day Time 55
7	17:00	48	
8	18:00	49	
9	19:00	50	
10	20:00	49	
11	21:00	48	
12	22:00	46	
13	23:00	45	
14	00:00	44	
15	01:00	44	
16	02:00	43	Night Time 45
17	03:00	43	
18	04:00	42	
19	05:00	43	
20	06:00	44	
21	07:00	46	
22	08:00	47	
23	09:00	48	Day Time 55
24	10:00	47	

Monitored By



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(TM)

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GROUND WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-ENV-PM-094/2023-GW-65	Reporting Date	18-10-2023
Nature of Sample	Ground Water	Sampling Method	AES/LMS/QSP-014
Grab/Composite	Grab	Reference	
Sampling Date	08-10-2023	Sample Collected by	AES
Analysis		Sample Receiving Date	09-10-2023
Completion Date	16-10-2023	Lab Temp & Humidity	26.6°C & 52%
Ambient Temperature & Humidity at the Time of Sampling			33°C & 49%
Sample ID	AES-ENV-GW-65/2023	Sampling Location	Burewala Vehari
Client Details	Improvement & Extension of Sewerage System in Burewala City.	Validation Officer	Miss Saiqa (Research Officer Punjab EPA)



Ground Water Analysis Results					
Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Lab Analysis					
Color*	SMWW 2120 C	≤ 15 TCU	0	N.A.	Optimal
Taste*	SMWW 2160 C	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Odor*	SMWW 2150 B	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Turbidity*	SMWW 2130 B	< 5 NTU	0	N.A.	Optimal
Total Hardness (as CaCO ₃)**	SMWW 2340 C	< 500 mg/L	396	± 5.14	Optimal
Total Dissolved Solids [TDS]**	SMWW 2540 C	< 1000 mg/L	630	± 8.02	Optimal
pH**	SMWW 4500 H* B	6.5-8.5	7.28	± 0.04	Optimal
Aluminum (Al)	SMWW 3111 B	≤ 0.2 mg/L	<0.005	N.A.	Optimal
Antimony (Sb)	SMWW 3114 B	≤ 0.005 mg/L	<0.005	N.A.	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Barium (Ba)	SMWW 3113 B	0.7 mg/L	<0.0035	N.A.	Optimal
Boron (B)	SMWW 3113 B	0.3 mg/L	<0.02	N.A.	Optimal
Cadmium (Cd)	SMWW 3113 B	0.01 mg/L	<0.006	N.A.	Optimal
Chloride (Cl) **	SMWW 4500 Cl* B	< 250 mg/L	67	± 1.73	Optimal
Chromium (Cr)	SMWW 3113 B	≤ 0.05 mg/L	<0.004	N.A.	Optimal
Copper (Cu)	SMWW 3111 B	2.0 mg/L	<0.164	N.A.	Optimal
Cyanide (CN)*	SMWW 4500 CN* F	≤ 0.05 mg/L	0	N.A.	Optimal
Fluoride (F)**	SMWW 4500 F* C	≤ 1.5 mg/L	0.16	± 0.103	Optimal
Lead (Pb)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Manganese (Mn)	SMWW 3113 B	≤ 0.5 mg/L	<0.015	N.A.	Optimal
Mercury (Hg)	SMWW 3114 B	≤ 0.001 mg/L	<0.001	N.A.	Optimal
Nickel (Ni)	SMWW 3113 B	≤ 0.02 mg/L	<0.02	N.A.	Optimal
Nitrate (NO ₃)*	SMWW 4500 NO ₃ * D	≤ 50 mg/L	1.67	± 1.20	Optimal
Nitrite (NO ₂)*	SMWW 4500 NO ₂ * B	≤ 3.0 mg/L	0	N.A.	Optimal
Selenium (Se)	SMWW 3114 B	0.01 mg/L	<0.01	N.A.	Optimal
Residual Chlorine (Cl ₂)*	SMWW 4500 Cl* B	0.5 mg/L	0	N.A.	Optimal

18-10-2023

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GROUND WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-ENV-PM-094/2023-GW-65	Reporting Date	18-10-2023
Nature of Sample	Ground Water	Sampling Method	AES/LMS/QSP-014
Grab/Composite	Grab	Reference	AES
Sampling Date	08-10-2023	Sample Collected by	AES
Analysis	16-10-2023	Sample Receiving Date	09-10-2023
Completion Date	16-10-2023	Lab Temp & Humidity	26.6°C & 52%
Ambient Temperature & Humidity at the Time of Sampling			33°C & 49%
Sample ID	AES-ENV-GW-65/2023	Sampling Location	Burewala Vehari
Client Details	Improvement & Extension of Sewerage System in Burewala City.	Validation Officer	Miss Saiqa (Research Officer Punjab EPA)



Ground Water Analysis Results

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Phenolic Compounds (as Phenols) *	SMWW 5530 D	NGVS	0	N.A.	-
Zinc (Zn)	SMWW 3113 B	5.0 mg/L	0.046	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0 CFU/100 mL	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0 CFU/100 mL	0	N.A.	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

**Parameters are accredited from Pakistan National Accreditation Council.

The reported expanded uncertainty is based on combined standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

Abbreviations:

PEQS = Punjab Environment Quality Standards	SMWW = Standard Methods for the examination of Water and Wastewater
TCU = True Color Unit	N.A. = Not Available
NTU = Nephelometric Turbidity Unit	CFU = Colony forming Unit
	MU = Measurement Uncertainty
	NGVS = No Guideline Value Set

Remarks:

Optimal = Compliance with Permissible Range	Marginal = Close to Extreme Edge	High = Exceeds from Permissible Range
Low = Less Than Permissible Range		

Report Disclaimer

- The remaining portion of the sample (s) will be disposed off after 15 days after the issuance date of report from the laboratory unless otherwise instructed (Condition Apply).
- This report shall not be reproduced in part/parties.
- The provided results relate only to the sample provided/collected.
- Values reflect the testing results; decision for usage of report totally depends on client.

Analyzed By

Reviewed By
(TM)

Approved By
(QM/ Chief Chemist)

-----End of Report-----

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GROUND WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-ENV-PM-094/2023-GW-66	Reporting Date	18-10-2023
Nature of Sample	Ground Water	Sampling Method	AES/LMS/QSP-014
Grab/Composite	Grab	Reference	AES
Sampling Date	08-10-2023	Sample Collected by	AES
Analysis	16-10-2023	Sample Receiving Date	09-10-2023
Completion Date		Lab Temp & Humidity	26.6C & 52%
Ambient Temperature & Humidity at the Time of Sampling			33°C & 49%
Sample ID	AES-ENV-GW-66/2023	Sampling Location	Burewala Tubewell
Client Details	Improvement & Extension of Sewerage System in Burewala City.	Validation Officer	Miss Saiqa (Research Officer Punjab EPA)



Ground Water Analysis Results					
Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Lab Analysis					
Color*	SMWW 2120 C	≤ 15 TCU	0	N.A.	Optimal
Taste*	SMWW 2160 C	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Odor*	SMWW 2150 B	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Turbidity*	SMWW 2130 B	< 5 NTU	0	N.A.	Optimal
Total Hardness (as CaCO ₃)**	SMWW 2340 C	< 500 mg/L	512	± 5.14	High
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	1312	± 8.02	High
pH**	SMWW 4500 H* B	6.5-8.5	7.37	± 0.04	Optimal
Aluminum (Al)	SMWW 3111 B	≤ 0.2 mg/L	<0.005	N.A.	Optimal
Antimony (Sb)	SMWW 3114 B	≤ 0.005 mg/L	<0.005	N.A.	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Barium (Ba)	SMWW 3113 B	0.7 mg/L	<0.0035	N.A.	Optimal
Boron (B)	SMWW 3113 B	0.3 mg/L	<0.02	N.A.	Optimal
Cadmium (Cd)	SMWW 3113 B	0.01 mg/L	<0.006	N.A.	Optimal
Chloride (Cl ⁻)**	SMWW 4500 Cl ⁻ B	< 250 mg/L	237	± 2.87	Optimal
Chromium (Cr)	SMWW 3113 B	≤ 0.05 mg/L	<0.004	N.A.	Optimal
Copper (Cu)	SMWW 3111 B	2.0 mg/L	0.164	N.A.	Optimal
Cyanide (CN ⁻)*	SMWW 4500 CN ⁻ F	≤ 0.05 mg/L	0	N.A.	Optimal
Fluoride (F ⁻)**	SMWW 4500 F ⁻ C	≤ 1.5 mg/L	0.17	± 0.103	Optimal
Lead (Pb)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Manganese (Mn)	SMWW 3113 B	≤ 0.5 mg/L	<0.015	N.A.	Optimal
Mercury (Hg)	SMWW 3114 B	≤ 0.001 mg/L	<0.001	N.A.	Optimal
Nickel (Ni)	SMWW 3113 B	≤ 0.02 mg/L	<0.02	N.A.	Optimal
Nitrate (NO ₃ ⁻)*	SMWW 4500 NO ₃ ⁻ D	≤ 50 mg/L	3.10	± 1.21	Optimal
Nitrite (NO ₂ ⁻)*	SMWW 4500 NO ₂ ⁻ B	≤ 3.0 mg/L	0	N.A.	Optimal
Selenium (Se)	SMWW 3114 B	0.01 mg/L	<0.01	N.A.	Optimal
Residual Chlorine (Cl ₂)*	SMWW 4500 Cl ⁻ B	0.5 mg/L	0	N.A.	Optimal

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GROUND WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-ENV-PM-094/2023-GW-66	Reporting Date	18-10-2023
Nature of Sample	Ground Water	Sampling Method	AES/LMS/QSP-014
Grab/Composite	Grab	Reference	
Sampling Date	08-10-2023	Sample Collected by	AES
Analysis		Sample Receiving Date	09-10-2023
Completion Date	16-10-2023	Lab Temp & Humidity	26.6C & 52%
Ambient Temperature & Humidity at the Time of Sampling			33°C & 49%
Sample ID	AES-ENV-GW-66/2023	Sampling Location	Burewala Tubewell
Client Details	Improvement & Extension of Sewerage System in Burewala City.	Validation Officer	Miss Saiqa (Research Officer Punjab EPA)



Ground Water Analysis Results

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Phenolic Compounds (as Phenols) *	SMWW 5530 D	NGVS	0	N.A.	-
Zinc (Zn)	SMWW 3113 B	5.0 mg/L	0.050	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0 CFU/100 mL	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0 CFU/100 mL	0	N.A.	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

**Parameters are accredited from Pakistan National Accreditation Council.

The reported expanded uncertainty is based on combined standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

Abbreviations:

PEQS = Punjab Environment Quality Standards	SMWW = Standard Methods for the examination of Water and Wastewater
TCU = True Color Unit	N.A. = Not Available
NTU = Nephelometric Turbidity Unit	CFU = Colony forming Unit
	MU = Measurement Uncertainty
	NGVS = No Guideline Value Set

Remarks:

Optimal = Compliance with Permissible Range	Marginal = Close to Extreme Edge	High = Exceeds from Permissible Range
Low = Less Than Permissible Range		

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- The remaining portion of the sample (s) will be disposed off after 15 days after the issuance date of report from the laboratory unless otherwise instructed (Condition Apply).
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Reviewed By

Approved By

(TM)

(QM/ Chief Chemist)

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ANNEXURE - 7: TORS

Terms of References

These terms of references are being submitted for the subject ESIA study under Clause 5 (f) of policy and procedure for the filing, review and approval of environmental assessment. These TORs of ESIA have been prepared by the environmental consultants, in consultation with the sub-project proponent. Proposal and TORs for the ESIA accepted by Punjab Municipal Development Fund Company (PMDFC).

Introduction of Project

The project aims at improvement of infrastructure of municipal services such as improvement and extension of sewerage system of the Burewala city.

The project comprises of construction of wastewater treatment plant, force mains, laying of sewer lines, rehabilitation of disposal stations and other allied works.

Cost of Project:

The capital cost of the project will be about 845.209 Million PKR.

Name of Proponent

Chief Executive Officer of MC Burewala is the project proponent.

Environmental Consultant & Client

MC Burewala has appointed the Asian Consulting Engineers Private Limited, as the Consultant for the subject project to conduct the ESIA. Asian Consulting Engineers Private Limited will be called as "Consultant" and MC Burewala as the "Client".

Objective of the ESIA Study

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

Purpose of the ESIA

The key objectives of the ESIA are to:

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

- Meet the requirements or recommendations of the applicable National Environmental Laws and Guidelines

Scope of Services

ESIA for the subject project is construction and / or rehabilitation of WWTP, sewer lines, force main, sewer lines and disposal stations in MC Burewala.

Accordance with:

1. The Punjab Environmental Protection Act, 1997 (amended 2012) and the
 - Various guidelines developed by the Punjab Environmental Protection Agency
 - Pakistan Environment Protection Agency Guidelines
 - Guidelines of Labor & Human Resource Department
 - Punjab Local Government Guidelines
 - Punjab Food Authority Guidelines
2. Methodology for carrying out this study
 - Project Description
 - Site Selection
 - Project Alternatives
3. Process Description
 - Detailed review of the processes
 - Design Parameters
 - Process flow chart
 - Details related top Plant and Equipment
4. Environmental profile of the environmental study area
 - Climatology
 - Geographical features
 - Geological and Hydrological features
 - Historical review
 - Land Use
 - Ecology, i.e., Flora and Fauna etc.
5. Analysis of EPA required environmental parameters
 - Sampling for Air, Water, and Noise Level
 - Ambient Air Quality will be monitored at the existing sub-project site by using certified instruments/methods to check the concentration of pollutants in ambient air before construction.
 - Groundwater quality of the area will be checked through analysing EPA Smart Parameters. 2-3 representative samples will be collected to

- check the groundwater quality by using certified sampling techniques and analysis procedures.
- Noise Level will be monitored at 5 to 6 localities at existing project site
- 6. Investigate Socio-Economic and Socio-Environmental aspects and cultural values within and around the operating facility
 - Administrative Set up
 - Cultural and Social Values
 - Social Cohesion
 - Interviews from different groups
- 7. Development activities and Waste Management
- 8. Identify and evaluate major environmental impacts
- 9. Identify mitigation measures and develop Environmental Management and Monitoring plan
- 10. Conclusions based on the study conducted for this ESIA.

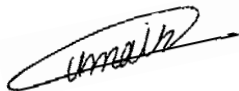
ESIA Proceedings

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

Client's Responsibility

We expect the following inputs from the clients:

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

Signature: 
 Name: Muhammad Umair Iqbal
 Designation: Environmentalist
 Date: _____

Signature: _____
 Name: _____
 Designation: _____
 Date: _____

ANNEXURE - 8: IFC'S EHS GUIDELINES FOR CONSTRUCTION AND DECOMMISSIONING

General EHS Guidelines [Complete version] at: www.ifc.org/ehsguidelines



Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING



4.0 Construction and Decommissioning

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Applicability and Approach

This section provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. Cross referencing is made to various other sections of the General EHS Guidelines.

4.1 Environment{ TC "4.1 Environment" \f C \l "2" }

Noise and Vibration

During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. Some recommended noise reduction and control strategies to consider in areas close to community areas include:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are

planned during periods of the day that will result in least disturbance

- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
- Avoiding or minimizing project transportation through community areas

Soil Erosion

Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.

Recommended soil erosion and water system management approaches include:

Sediment mobilization and transport

- Reducing or preventing erosion by:
 - Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical
 - Contouring and minimizing length and steepness of slopes
 - Mulching to stabilize exposed areas
 - Re-vegetating areas promptly
 - Designing channels and ditches for post-construction flows
 - Lining steep channel and slopes (e.g. use jute matting)
- Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.



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Clean runoff management

- Segregating or diverting clean water runoff to prevent it mixing with water containing a high solids content, to minimize the volume of water to be treated prior to release

Road design

- Limiting access road gradients to reduce runoff-induced erosion
- Providing adequate road drainage based on road width, surface material, compaction, and maintenance

Disturbance to water bodies

- Depending on the potential for adverse impacts, installing free-spanning structures (e.g., single span bridges) for road watercourse crossings
- Restricting the duration and timing of in-stream activities to lower low periods, and avoiding periods critical to biological cycles of valued flora and fauna (e.g., migration, spawning, etc.)
- For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediments to moving water
- Consider using trenchless technology for pipeline crossings (e.g., suspended crossings) or installation by directional drilling

Structural (slope) stability

- Providing effective short term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented
- Providing adequate drainage systems to minimize and control infiltration

Air Quality

Construction and decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site. Techniques to consider for the reduction and control of air emissions from construction and decommissioning sites include:

- Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone)
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- Selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition
- Managing emissions from mobile sources according to Section 1.1
- Avoiding open burning of solid (refer to solid waste management guidance in Section 1.6)

Solid Waste

Non-hazardous solid waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office, kitchen, and dormitory wastes when these types of operations are part of construction project activities. *Hazardous solid waste* includes contaminated soils, which could potentially be encountered on-site due to previous land use activities, or small



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amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills. Techniques for preventing and controlling non-hazardous and hazardous construction site solid waste include those already discussed in Section 1.6.

Hazardous Materials

Construction and decommissioning activities may pose the potential for release of petroleum based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. These materials may also be encountered during decommissioning activities in building components or industrial process equipment. Techniques for prevention, minimization, and control of these impacts include:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
- Using impervious surfaces for refueling areas and other fluid transfer areas
- Training workers on the correct transfer and handling of fuels and chemicals and the response to spills
- Providing portable spill containment and cleanup equipment on site and training in the equipment deployment
- Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal according to Sections 1.5 and 1.6 on Hazardous Materials and Hazardous Waste Management, respectively
- Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos-containing flooring or insulation) and decontaminating or properly managing contaminated building materials

Wastewater Discharges

Construction and decommissioning activities may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Sanitary wastewater in construction and other sites should be managed as described in Section 1.3.

Contaminated Land

Land contamination may be encountered in sites under construction or decommissioning due to known or unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy should include:

- Managing contaminated media with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction or post decommissioning
- Understanding the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction or decommissioning activities
- Preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment consistent with the approach for Contaminated Land in Section 1.6
- Preparation of a management plan to manage obsolete, abandoned, hazardous materials or oil consistent with the approach to hazardous waste management described in Section 1.6.



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Successful implementation of any management strategy may require identification and cooperation with whoever is responsible and liable for the contamination.

4.2 Occupational Health and Safety

TC "4.2 Occupational Health and Safety" \f C \l "2" }

Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction and decommissioning sites. Recommendations for their prevention and control include:

- Training of workers in lifting and materials handling techniques in construction and decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Planning work site layout to minimize the need for manual transfer of heavy loads
- Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
- Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks

Slips and Falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction and decommissioning sites. Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths
- Cleaning up excessive waste debris and liquid spills regularly
- Locating electrical cords and ropes in common areas and marked corridors
- Use of slip retardant footwear

Work in Heights

Falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures are among the most common cause of fatal or permanent disabling injury at construction or decommissioning sites. If fall hazards exist, a fall protection plan should be in place which includes one or more of the following aspects, depending on the nature of the fall hazard⁹⁵:

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support 5000 pounds (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. The tie in point of the fall arresting system should also be able to support 5000 pounds
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as

⁹⁵ Additional information on identification of fall hazards and design of protection systems can be found in the United States Occupational Health and Safety Administration's (US OSHA) web site: <http://www.osha.gov/SLTC/fallprotection/index.html>



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securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces

Struck By Objects

Construction and demolition activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities. Techniques for the prevention and control of these hazards include:

- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged
- Evacuating work areas during blasting operations, and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of

a turn while moving. Techniques for the prevention and control of these impacts include:

- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle
- Ensuring moving equipment is outfitted with audible back-up alarms
- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Dust

- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- PPE, such as dust masks, should be used where dust levels are excessive

Confined Spaces and Excavations

Examples of confined spaces that may be present in construction or demolition sites include: silos, vats, hoppers, utility vaults, tanks, sewers, pipes, and access shafts. Ditches and trenches may also be considered a confined space when access or egress is limited. In addition to the guidance provided in Section 2.8 the occupational hazards associated with confined spaces and excavations in construction and decommissioning sites should be prevented according to the following recommendations:



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- Controlling site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated

Other Site Hazards

Construction and decommissioning sites may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms, which should be prevented through the implementation of project-specific plans and other applicable management practices, including:

- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation, construction, dismantling or demolition
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements prior to dismantling or demolition including, for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury⁹⁶
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including

respirators, clothing/protective suits, gloves and eye protection

4.3 Community Health and Safety{ TC "4.3 Community Health and Safety" \f C \1 "2" }

General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

Disease Prevention

Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities. Recommendations for the prevention and control of communicable and vector-borne diseases also applicable to

⁹⁶ Additional information on the management and removal of asbestos containing building materials can be found in ASTM Standard E2356 and E1368



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construction phase activities are provided in Section 3.6 (Disease Prevention).

Traffic Safety

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities. The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of procedures described in Section 3.4 (Traffic Safety).

ANNEXURE - 9: COVID-19 PANDEMIC AND HEALTH SAFETY MEASURES

Given the unprecedented nature of the COVID-19 pandemic, contractors are bound to take all necessary precautions to maintain the health and safety related measures at site and to ensure suitable arrangements regarding hygiene requirements for the prevention of pandemic.

Following are the measures that should be implemented at the construction site to avoid the spread of Covid-19:

Activities	Adaptive Measures
Pre- Execution Phase	
A. Profile preparation	- Detail profile of sub-project workforce - Enlist the names, addresses and contact nos. - Breakdown of the workforce (workers from local communities and those who have on site accommodation) - Assigning the task against each person - Schedule the key activities and their duration at site
B. Initial Screening	- All enlisted workforce should go through initial screening process - Ensuring the availability of Thermogun on site - Record keeping against initial screening - Identifying all workers who are initially at more risk of contracting Covid-19
During Execution Phase	
A. Preliminary Screening	Regular Screening: - Regular screening by using Thermogun on daily basis before starting civil work at site - Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site - If a worker has symptoms of COVID-19 (e.g., fever, dry cough, fatigue) the worker should be removed immediately from work activities and isolated on designated site. - Co-workers (i.e., workers with whom the sick worker was in close contact) should be required to stop work, and to quarantine themselves for 14 days, even if they have no symptoms. Sequential Screening: Concerned THQ medical staff is requested for screening at regular intervals. List should also be shared with THQ for avoiding future inconvenience or hire health safety officer on weekly basis.

Activities	Adaptive Measures
B. Special Arrangements regarding PPEs	- Ensuring availability of handwashing facilities (sanitizers/soaps) on site - Presence of closed waste bins at key places throughout site, including at entrances/exits to work areas (toilet, canteen or food distribution, or provision of drinking water; in worker accommodation; at waste stations; at stores; and in common spaces). - Special arrangements regarding PPEs and sanitation at site - Record keeping of stock availability on daily basis
C. Restricted Movement/ Demobilization of staff	- Encourage employees to wash their hands at least for 20 seconds with soap and stay at least one meter away from people who are coughing or sneezing - Breakdown of workers who reside at home (i.e., workers from the communities), workers who lodge within the local communities and workers in on-site accommodation. Workers accommodated on site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. - Workers from local communities, who return home daily, weekly or monthly, will be more difficult to manage. They should be subject to health checks at entry to the site (as set out above) and at some point, circumstances may make it necessary to require them to either use accommodation on site or not to come to work. - All workers should be provided separate accommodation.
D. Training sessions	- Health and safety training for Contractor's Personnel (which include sub-project workers and all personnel that the Contractor uses on site, including staff and other employees of the Contractor and Subcontractors and any other personnel assisting the Contractor in carrying out sub-project activities. - Sessions related to safety procedures, use of construction PPEs, occupational health and safety issues, and code of conduct specially privacy issues including social distancing. - Arranging daily briefings with workforce, reminding workers to self-monitor for possible symptoms (fever, cough) and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell. - Placing posters and sign boards around the site in local languages. - Appointing one person on daily basis among the

Activities	Adaptive Measures
	workforce who will serve as trainer for conducting awareness session and encouraging the rest to take preventive measures.
E. Operationalization of Grievance Redress Mechanism	• Effective implementation of GRM at site • Encouraging to report any COVID-19 related health issue and concerns about the health of their co-workers and other staff as well. • In case of unavailability of the PPEs at site, grievance would be lodged directly to PMDFC.
F. Role of PMDFC	• PMDFC is required to arrange regular meetings with Contractors and workforce to monitor all procedural implementation of COVID-19 prevention related mechanism. • Arrange meeting with concerned DHQs for immediate support and guidance in case of emergency. • During inspection visit by PMDFC Staff, if a worker is found to has symptoms of COVID-19, the worker should be removed immediately from work activities and isolated on designated site.
Post Execution Phase	
A. Post Screening	• Screening should be done at the end of the day on daily basis, if a worker is found to have any symptoms of COVID-19, he should be immediately reported to concerned health department.
B. Cleaning and waste disposal	• All waste (PPEs and sanitation related) shall be disposed of properly at designated sites.

ANNEXURE - 10: ENVIRONMENTAL & SOCIAL SCREENING AND INVOLUNTARY RESETTLEMENT SCREENING CHECKLISTS

Environmental & Social Screening Checklist

Instructions:

Environmental and Social Focal Persons (ESFPs)⁷ nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.

Deputy Program Officers-Environmental and Social Management (DPO-ESM) deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist.

It is to be attached with the main document⁸ of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM.

This checklist focuses on environmental and social impacts. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used.

(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City – WWTP

Sub- Project Categorization:	E-1 ✓	S-1
	E-2	S-2 ✓
	E-3	S-3

Date of Screening: 21st September, 2023

Anticipated Project Activities:

Construction of Wastewater Treatment Plant / Waste Stabilization Pond which involves excavation of ponds, construction of inlet channel and effluent channels and construction of office building and office.

Estimated Cost of Subproject: PKR 808.30 M for whole sub project

Completion Time/Duration: 18 Months for whole sub-project

Estimated Labor for Subproject: Approx. 30

⁷ In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

⁸ It is meant as PC-I and/or engineering estimates of sub-project

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following:			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area has been reported within the project area.
Any surface water body (river, canal, stream, lake, wetland) within 250 meter of the proposed sub project?		✓	No surface water body has been reported within 250 meters of the proposed sub-project.
Estuarine		✓	No estuarine has been reported within the project area.
Special area for protecting biodiversity		✓	No special area for protecting biodiversity has been reported within the project area.
Buffer zone of protected area		✓	No buffer zone of protected area has been reported within the project area.
Mangroves Forest		✓	No mangroves forest has been reported within the project area.
Man-made forest /game reserve, orchid /crops or any other area of environmental importance	✓		Crops are cultivated on the proposed land for the construction of WWTP. Harvesting time will be given to the cultivator before execution of the project.
Socially sensitive /important areas/communities/ people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject ¹⁰	✓		Sites of religious importance like mosque and graveyard have been found within 100 m of the proposed subproject. Around 01 no. of mosque and 01 no. of graveyard have been found within 100 m boundary. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to

Screening Questions	Yes	No	Remarks
			encounter the impact near sensitive receptors.
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meter of the proposed sub project ¹¹	✓		Sensitive receptors like schools, college and hospitals have not been found. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.
Any graveyard of local community (Muslims or Christians)	✓		01 no. of graveyard has been found within 100 m of the proposed subproject.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments ¹² of the society and women or children)?	✓		A couple of settlers / encroachers are found on the proposed land for WWTP. Compensation or alternatives will be provided to them as per policy.
Already existing infrastructure ¹³ (including public amenities) which may be required to dismantle or may be affected temporarily by any means?	✓		Electric poles (estimated 03 in no.) will be required to shift. Shifting of poles will be done before execution of the subproject in coordination with MEPCO's relevant office.
B. Potential Environmental Impacts			
Will the Sub-Project cause...			
1. Disturbance to habitats / biodiversity of environmentally sensitive or protected areas?		✓	There will be no disturbance to habitats / biodiversity or protected areas.
2. Cutting of trees?	✓		Few trees exist on the proposed land for WWTP.

⁹ Ibid.

¹⁰ According to Environmental Assessment Guidelines adopted by Punjab EPA

¹¹ Ibid.

¹² due to caste, creed, religion or gender e.g., transgender

¹³ Sewerage / Drainage system, Water supply lines, tube-wells, WAPDA/Telephone transmission lines/electric poles, Railway tracks, Gas pipelines, Roads, Shops/Plazas, Banks, Industry, Disposal stations etc.

Screening Questions	Yes	No	Remarks
			These trees would be transferred to nearby available spaces. While 10 no. of trees of almost 06 ft. height would be planted against each tree cut.
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	There will not be any disruption to habitats/biodiversity of surrounding ecosystem/environment.
4. Generation of wastewater during construction or operation?	✓		The wastewater will be generated from the contractor camp site during construction phase which will be treated through wastewater treatment plant or septic tank before final disposal to the nearest drain. However, no wastewater generation is anticipated during project operation.
5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?		✓	The wastewater discharge from construction camps will be properly treated before the final disposal. No ground water contamination is anticipated, the septic tank develop will be properly lined in order to avoid percolation and contamination of ground water.
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	Not reported as there is no surface water body present near sub-project area.
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	Surface water quality will not be deteriorated, no surface water body is present near sub-project area. Storing all material and chemicals required for construction in well secured and managed sites, installing silt traps construction material sites prior to construction activities, disposing all waste soil and

Screening Questions	Yes	No	Remarks
			other debris to approved locations, locating labor camps at approved locations, providing proper sanitary facilities and solid waste management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping will be done. The turbine installed for the extraction will be operated within its capacity.
9. Serious contamination of soil due to construction works?	✓		Soil may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The contractor is required to adopt the proper mitigation that include good housekeeping, training of his staff, disposal of waste on approved landfill and implementation of waste management plans.
10. Aggravation of solid waste problems in the area?		✓	The solid waste problem during construction activities will be mitigated by adopting the proper solid waste management plan.
11. Generation of hazardous waste?	✓		Oil, fuel, batteries and other hazardous chemicals that will be used during construction activities will be stored at the site, if required, in well closed containers at designated locations. The hazardous waste will be disposed of

Screening Questions	Yes	No	Remarks
			through EPA approved contractor.
12. Increased air pollution due to sub-project construction and operation?	✓		Adaptation of speed limits for construction vehicles and timely servicing and maintaining them up to the given standards will reduce the volume of air emissions to the surrounding. Frequent monitoring of air quality will support to review the effectiveness of the mitigation measures. The scrubber will be installed on asphalt and batching plant in order to limit the air emissions within PEQS limits.
13. Noise and vibration due to sub-project construction or operation?	✓		Blasting is not involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level. Further regular monitoring of noise levels will be adopted based on baseline data gathered during the pre-construction stage and continuous monitoring is

Screening Questions	Yes	No	Remarks
			proposed during construction stage as a mitigatory measure.
14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?	✓		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Mitigation will be proposed like filled top-soil which will naturally restrict mosquito breeding. The tyres should remain dry in order to avoid the mosquito breeding.
15. Use of chemicals during construction?	✓		All chemicals will be stored in proper containers in order to avoid the leakages. The storage facility of chemicals should be properly ventilated and have emergency measures of firefighting and emergency exists. The workers using the chemicals should have training and should wear the PPEs.
C: Potential Social Impacts			
Will the Sub-Project cause...			
1. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	There will be no impairment of historical/cultural areas and there will be no disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs).
2. Displacement or involuntary resettlement of people? (Physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Proposed Land is owned by Government as per consultation conducted with Patwari and MC's representative. On site visit, a couple of settlers / encroachers are found on the proposed land for WWTP. Compensation or alternatives will be provided to them as per policy.

Screening Questions	Yes	No	Remarks
3. Disproportionate impacts on the poor, women and children and or other vulnerable groups ¹⁴ (mentioned above)?		✓	There is no impact on the poor, women and children or other vulnerable group.
4. Temporary impediments in movements of people/transport and animals?	✓		The movement will be restricted for few hours only which the resident/people will be informed prior to the construction activities.
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	There will be no large population influx on the locals. However, during construction activities, separate sanitary facilities and water will be adequately supplied to the labor force by the contractor to avoid and conflict with the local community on the use of their water resources.
6. Social conflicts if workers from other areas are hired?		✓	Contractor will be bound to hire the locals for unskilled work during construction and hence such conflict is not anticipated, however, awareness programs will be conducted for both labor force and local community in order to minimize possible conflicts.
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Also, it is proposed to prepare a separate health and safety plan to be implemented during construction and operation phases, and a regular monitoring schedule to be

¹⁴ Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

Screening Questions	Yes	No	Remarks
			proposed under close supervision and coordination of a professional Occupational Health & Safety Officer of the Project Implementation Consultant.
8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS. The regular monitoring schedule to be proposed under close supervision of the consultant.
9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS and a regular monitoring schedule to be proposed under close management of a professional Occupational Health & Safety officer.
10. Any impact on sensitive receptors (mentioned above)	✓		The sensitive receptors may be subject to the impact like vibration, noise and emission which will be mitigated by installing acoustic equipment, silencers, maintenance of machinery, limiting the time specific construction activity near the receptors and with regular monitoring of construction activities near the sensitive receptors.
11. Any impact of negative nature on already existing infrastructure including public amenities?	✓		Electric poles (estimated 03 in no.) will be required to shift. Shifting of poles will be done before execution of the subproject in coordination with MEPCO's relevant office.

Prepared By:

Name: Aleem Butt
(Environmental Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Appendix A-Environmental and Social Categorization of Sub-Projects

Using the Environmental and Social Screening Checklist, E & S Categorization of sub-projects of PCP is and will be carried out as following:

For Environmental Category:

E-1 = All those sub-projects having adverse environmental impacts and or those sub-projects that come under Schedule I and II of Pakistan Environment Protection Agency Review of IEE and EIA Regulations 2000 will need to submit **Initial Environmental Examination (IEE)** or **Environmental Impact Assessment (EIA)**¹⁵ report

E-2 = All those sub-projects which will have moderate negative environmental impacts will need to submit **Environmental and Social Management Plans (ESMP)**¹⁶

E-3 = All those sub-projects which will have no negative environmental impacts will be categorized as E3 and for those, no further process will be required¹⁷ after E &S Screening

For Social Category:

S-1= All those sub-projects having negative social impacts of significant nature on > 40 households and or it require displacement/resettlement of > 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Resettlement Action Plan (RAP)

S-2= All those sub-projects having negative social impacts of significant nature on 1 – 40 households and or it require displacement/resettlement of 1- 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Abbreviated Resettlement Action Plan (ARAP)

S-3= All those sub-projects having no negative social impacts and or they are not involved in displacement/resettlement of any nature, will be categorized as S3 and No further process will be required after E &S Screening

Appendix B-Important Definitions

1. Environmentally sensitive areas ¹⁸

Environmentally sensitive areas are landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context.

¹⁵ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E1 Category sub-projects will be covered in IEE/EIA report

¹⁶ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E2 Category sub-projects will be covered in the ESMP

¹⁷ .For all those sub-projects which will have no negative environmental impacts and are categorized as E3 but they require construction labor/workers for the execution ,will follow the Environment, Health and Safety SOPs prepared for PCP and they will follow the instructions given by ESM team of PCP

¹⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0169204694020169>

2. Cultural heritage¹⁹

- Tangible cultural heritage:
 - movable cultural heritage (paintings, sculptures, coins, manuscripts)
 - immovable cultural heritage (monuments, archaeological sites, and so on)
 - underwater cultural heritage (shipwrecks, underwater ruins and cities)
- Intangible cultural heritage: oral traditions, performing arts, rituals

3. Wetlands

- Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.²⁰
- areas of marsh, fen, peat and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".²¹

4. Buffer zone of protected area

Areas peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area.²²

5. Special area for protecting biodiversity/ Key Biodiversity Areas (KBA)

Sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems²³

6. Estuarine

Area of the mouth of a river where it broadens into the sea, and where fresh and seawater intermingle to produce brackish water. The estuarine environment is very rich in wildlife, particularly aquatic, but it is very vulnerable to damage as a result of human activities.²⁴

7. Hazardous substance means-

(a) A substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and

(b) Any substance which may be prescribed as a hazardous substance;

Hazardous waste means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;²⁵

8. Waste

¹⁹ <http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/>

²⁰ <https://www.epa.gov/wetlands/what-wetland>

²¹ <https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf>

²² <https://www.biodiversitya-z.org/content/buffer-zones.pdf>

²³ <https://biodiversitya-z.org/content/key-biodiversity-areas-kba>

²⁴ <https://biodiversitya-z.org/content/estuary>

²⁵ Punjab Environmental Protection Act 2012

Waste means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste. ²⁶

²⁶ *ibid*

Pictures of Project Siting

 GPS Map Camera Burewala, Punjab, Pakistan Unnamed Road, Vehari, Punjab, Pakistan Lat 30.194964° Long 72.679447° 21/09/23 02:52 PM GMT +05:00	 GPS Map Camera Burewala, Punjab, Pakistan Unnamed Road, Vehari, Punjab, Pakistan Lat 30.195273° Long 72.678443° 21/09/23 02:48 PM GMT +05:00
WWTP Land	Settlers / Encroachers at WWTP Land

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City – WWTP

Sub- Project Categorization:

S-1

S-2 ✓

S-3

Date of Screening: 21st September & 20th November, 2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		The proposed project requires 22 acres land fall in Chak 435-E.B / near Chak 423-EB Tehsil Burewala district Vehari. Proposed land is government owned and will be transfer from Revenue department to MC Burewala
If yes, then describe the type of land being acquired from the categories below:				
Land (Quantify and describe types of land being acquired in "remarks column".		✓		
Government and LG owned land free of occupation (agriculture or settlement)				
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)	✓			Land is government owned however one Dairy Farm, 03 rooms and 01Tubewell exist along with agriculture at proposed site by Encroachers

Private land				
Residential				
Commercial				
Agricultural	✓			
Communal				
Others (specify in "remarks").				
Name of owner/owners and type of ownership document if available.		✓		1. Mr. Sarfraz Majeed (Late)[Allotted] 2. Mr. Khalil Jibran (Hier) 3. Mr. Arsalan Majeed (Hier) 4. Mrs. Maleeha Zainab (Late)(Hier) 5. Mrs. Mubeen Fatima (Hier)
If land is being acquired, describe any structures constructed on it				
Land-based assets:				
Residential structures				
Commercial structures (specify in "remarks")				
Community structures (specify in "remarks")				
Agriculture structures (specify in "remarks")	✓			Dairy Farm, 03 rooms and 01Tubewell
Public utilities (specify in "remarks")	✓			03 poles of 11kV Transmission Line
Others (specify in "remarks")				
If agricultural land is being acquired, specify the following:				
Agriculture related impacts	✓			• Temporary disruption in operations of dairy farm. • Loss of 01 Tubewell • Loss of Crops. • Loss of Livelihood of the DPs.

Crops and vegetables (specify types and cropping area in "remarks").	✓			Wheat, Corn, and Cow Feeder (Chara) grown in 15 Acres Agriculture land.
Trees (specify number and types in "remarks").	✓			Tali (Shisham Tree) - 15 Keekar (Acacia Tree) - 12
Others (specify in "remarks").				
Affected Persons (APs)	✓			
Will any people be displaced from the land when acquired? Yes/No	✓			
Number of APs	✓			12 (4 Hiers, 1 Farm Manager, 7 servants)
Males	✓			10
Females	✓			02
Titled land owners	✓			4
Tenants and sharecroppers		✓		
Leaseholders		✓		
Agriculture wage laborers		✓		
Encroachers and squatters (specify in remarks column)		✓		
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		
Others (specify in "remarks")				
How will people be affected?	✓			There will be loss of livelihood, and agricultural activities, financial loss, infrastructure challenges, water access issues, adaptation to new environment, psychological impact and seeking alternative livelihoods

				of the affected employees.

Prepared By:

Name: Muhammad Waqar Saleem

Signature: Social Expert

Date: 21-11-2023

Endorsed By:

Name:

Signature:

Date:

Environmental & Social Screening Checklist

Instructions:

Environmental and Social Focal Persons (ESFPs)²⁷ nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.

Deputy Program Officers-Environmental and Social Management (DPO-ESM) deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist.

It is to be attached with the main document²⁸ of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM.

This checklist focuses on environmental and social impacts. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used.

(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City

Sub- Project Categorization:	E-1 ✓	S-1
	E-2	S-2 ✓
	E-3	S-3

Date of Screening: 21st September, 2023

Anticipated Project Activities:

Laying of force main including excavation, backfilling and restoration of roads.

Estimated Cost of Subproject: PKR 808.30 M

Completion Time/Duration: 18 Months for whole sub-project

Estimated Labor for Subproject: Approx.30

²⁷ In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

²⁸ It is meant as PC-I and/or engineering estimates of sub-project

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following:			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area has been reported within the project area.
Any surface water body (river, canal, stream, lake, wetland) within 250 meters of the proposed sub project ²⁹		✓	No surface water body has been reported within 250 meters of the proposed sub-project.
Estuarine		✓	No estuarine has been reported within the project area.
Special area for protecting biodiversity		✓	No special area for protecting biodiversity has been reported within the project area.
Buffer zone of protected area		✓	No buffer zone of protected area has been reported within the project area.
Mangroves Forest		✓	No mangroves forest has been reported within the project area.
Man-made forest /game reserve, orchid /crops or any other area of environmental importance	✓		Crops are cultivated on the proposed land for the construction of force main. Harvesting time will be given to the cultivator before execution of the project.
Socially sensitive /important areas/communities/ people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject ³⁰	✓		Sites of religious importance like mosque and graveyard have been found within 100 m of the proposed subproject. Around 01 no. of mosque and 01 no. of graveyard have been found within 100 m boundary. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to

Screening Questions	Yes	No	Remarks
			encounter the impact near sensitive receptors.
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meter of the proposed sub project ³¹	✓		Sensitive receptors like schools, college and hospitals have not been found. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.
Any graveyard of local community (Muslims or Christians)	✓		01 no. of graveyard has been found within 100 m of the proposed subproject.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments ³² of the society and women or children)?	✓		A couple of settlers / encroachers are found on the proposed land for force main. Compensation or alternatives will be provided to them as per policy.
Already existing infrastructure ³³ (including public amenities) which may be required to dismantle or may be affected temporarily by any means?	✓		Electric poles (estimated 03 in no.) will be required to shift. Shifting of poles will be done before execution of the subproject in coordination with MEPCO's relevant office.
B. Potential Environmental Impacts			
Will the Sub-Project cause...			
1. Disturbance to habitats / biodiversity of environmentally sensitive or protected areas?		✓	There will be no disturbance to habitats / biodiversity or protected areas.
2. Cutting of trees?	✓		No trees cutting is involved in this subproject.

²⁹ Ibid.

³⁰ According to Environmental Assessment Guidelines adopted by Punjab EPA

³¹ Ibid.

³² due to caste, creed, religion or gender e.g., transgender

³³ Sewerage / Drainage system, Water supply lines, tube-wells, WAPDA/Telephone transmission lines/electric poles, Railway tracks, Gas pipelines, Roads, Shops/Plazas, Banks, Industry, Disposal stations etc.

Screening Questions	Yes	No	Remarks
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	There will not be any disruption to habitats/biodiversity of surrounding ecosystem/environment.
4. Generation of wastewater during construction or operation?	✓		The wastewater will be generated from the contractor camp site during construction phase which will be treated through wastewater treatment plant or septic tank before final disposal to the nearest drain. However, no wastewater generation is anticipated during project operation.
5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?		✓	The wastewater discharge from construction camps will be properly treated before the final disposal. No ground water contamination is anticipated, the septic tank develop will be properly lined in order to avoid percolation and contamination of ground water.
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	Not reported as there is no surface water body present near sub-project area.
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	Surface water quality will not be deteriorated, no surface water body is present near sub-project area. Storing all material and chemicals required for construction in well secured and managed sites, installing silt traps construction material sites prior to construction activities, disposing all waste soil and other debris to approved locations, locating labor camps at approved locations, providing proper sanitary facilities and solid waste

Screening Questions	Yes	No	Remarks
			management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping will be done. The turbine installed for the extraction will be operated within its capacity.
9. Serious contamination of soil due to construction works?	✓		Soil may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The contractor is required to adopt the proper mitigation that include good housekeeping, training of his staff, disposal of waste on approved landfill and implementation of waste management plans.
10. Aggravation of solid waste problems in the area?		✓	The solid waste problem during construction activities will be mitigated by adopting the proper solid waste management plan.
11. Generation of hazardous waste?	✓		Oil, fuel, batteries and other hazardous chemicals that will be used during construction activities will be stored at the site, if required, in well closed containers at designated locations. The hazardous waste will be disposed of through EPA approved contractor.
12. Increased air pollution due to sub-project construction and operation?	✓		Adaptation of speed limits for construction vehicles and timely servicing and

Screening Questions	Yes	No	Remarks
			maintaining them up to the given standards will reduce the volume of air emissions to the surrounding. Frequent monitoring of air quality will support to review the effectiveness of the mitigation measures. The scrubber will be installed on asphalt and batching plant in order to limit the air emissions within PEQS limits.
13. Noise and vibration due to sub-project construction or operation?	✓		Blasting is not involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level. Further regular monitoring of noise levels will be adopted based on baseline data gathered during the pre-construction stage and continuous monitoring is proposed during construction stage as a mitigatory measure.

Screening Questions	Yes	No	Remarks
14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?	✓		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Mitigation will be proposed like filled top-soil which will naturally restrict mosquito breeding. The tyres should remain dry in order to avoid the mosquito breeding.
15. Use of chemicals during construction?	✓		All chemicals will be stored in proper containers in order to avoid the leakages. The storage facility of chemicals should be properly ventilated and have emergency measures of firefighting and emergency exists. The workers using the chemicals should have training and should wear the PPEs.
C: Potential Social Impacts			
Will the Sub-Project cause...			
12. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	There will be no impairment of historical/cultural areas and there will be no disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs).
13. Displacement or involuntary resettlement of people? (Physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Proposed Land is owned by Government as per consultation conducted with Patwari and MC's representative.
14. Disproportionate impacts on the poor, women and children and or other vulnerable groups ³⁴ (mentioned above)?		✓	There is no impact on the poor, women and children or other vulnerable group.
15. Temporary impediments in movements of people/transport and animals?	✓		The movement will be restricted for few hours only which the resident/people will

³⁴ Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

Screening Questions	Yes	No	Remarks
			be informed prior to the construction activities.
16. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	There will be no large population influx on the locals. However, during construction activities, separate sanitary facilities and water will be adequately supplied to the labor force by the contractor to avoid and conflict with the local community on the use of their water resources.
17. Social conflicts if workers from other areas are hired?		✓	Contractor will be bound to hire the locals for unskilled work during construction and hence such conflict is not anticipated, however, awareness programs will be conducted for both labor force and local community in order to minimize possible conflicts.
18. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Also, it is proposed to prepare a separate health and safety plan to be implemented during construction and operation phases, and a regular monitoring schedule to be proposed under close supervision and coordination of a professional Occupational Health & Safety Officer of the Project Implementation Consultant.
19. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS. The regular monitoring schedule to be proposed

Screening Questions	Yes	No	Remarks
			under close supervision of the consultant.
20. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS and a regular monitoring schedule to be proposed under close management of a professional Occupational Health & Safety officer.
21. Any impact on sensitive receptors (mentioned above)	✓		The sensitive receptors may be subject to the impact like vibration, noise and emission which will be mitigated by installing acoustic equipment, silencers, maintenance of machinery, limiting the time specific construction activity near the receptors and with regular monitoring of construction activities near the sensitive receptors.
22. Any impact of negative nature on already existing infrastructure including public amenities?	✓		Electric poles (estimated 03 in no.) will be required to shift. Shifting of poles will be done before execution of the subproject in coordination with MEPCO's relevant office.

Prepared By:

Name: Aleem Butt
(Environmental Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

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and EIA Regulations 2000 will need to submit **Initial Environmental Examination (IEE)** or **Environmental Impact Assessment (EIA)**³⁵ report

E-2 = All those sub-projects which will have moderate negative environmental impacts will need to submit **Environmental and Social Management Plans (ESMP)**³⁶

E-3 = All those sub-projects which will have no negative environmental impacts will be categorized as E3 and for those, no further process will be required³⁷ after E & S Screening

For Social Category:

S-1= All those sub-projects having negative social impacts of significant nature on > 40 households and or it require displacement/resettlement of > 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Resettlement Action Plan (RAP)

S-2= All those sub-projects having negative social impacts of significant nature on 1 – 40 households and or it require displacement/resettlement of 1- 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Abbreviated Resettlement Action Plan (ARAP)

S-3= All those sub-projects having no negative social impacts and or they are not involved in displacement/resettlement of any nature, will be categorized as S3 and No further process will be required after E & S Screening

Appendix B-Important Definitions

9. Environmentally sensitive areas ³⁸

Environmentally sensitive areas are landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context.

10. Cultural heritage³⁹

- Tangible cultural heritage:
 - movable cultural heritage (paintings, sculptures, coins, manuscripts)
 - immovable cultural heritage (monuments, archaeological sites, and so on)
 - underwater cultural heritage (shipwrecks, underwater ruins and cities)
- Intangible cultural heritage: oral traditions, performing arts, rituals

11. Wetlands

- Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.⁴⁰

³⁵ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E1 Category sub-projects will be covered in IEE/EIA report

³⁶ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E2 Category sub-projects will be covered in the ESMP

³⁷ .For all those sub-projects which will have no negative environmental impacts and are categorized as E3 but they require construction labor/workers for the execution ,will follow the Environment, Health and Safety SOPs prepared for PCP and they will follow the instructions given by ESM team of PCP

³⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0169204694020169>

³⁹ <http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/>

⁴⁰ <https://www.epa.gov/wetlands/what-wetland>

- areas of marsh, fen, peat and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".⁴¹

12. Buffer zone of protected area

Area's peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area.⁴²

13. Special area for protecting biodiversity/ Key Biodiversity Areas (KBA)

Sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems⁴³

14. Estuarine

Area of the mouth of a river where it broadens into the sea, and where fresh and seawater intermingle to produce brackish water. The estuarine environment is very rich in wildlife, particularly aquatic, but it is very vulnerable to damage as a result of human activities.⁴⁴

15. Hazardous substance means-

- A substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and
- Any substance which may be prescribed as a hazardous substance;

Hazardous waste means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;⁴⁵

16. Waste

Waste means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.⁴⁶

⁴¹ <https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf>

⁴² <https://www.biodiversitya-z.org/content/buffer-zones.pdf>

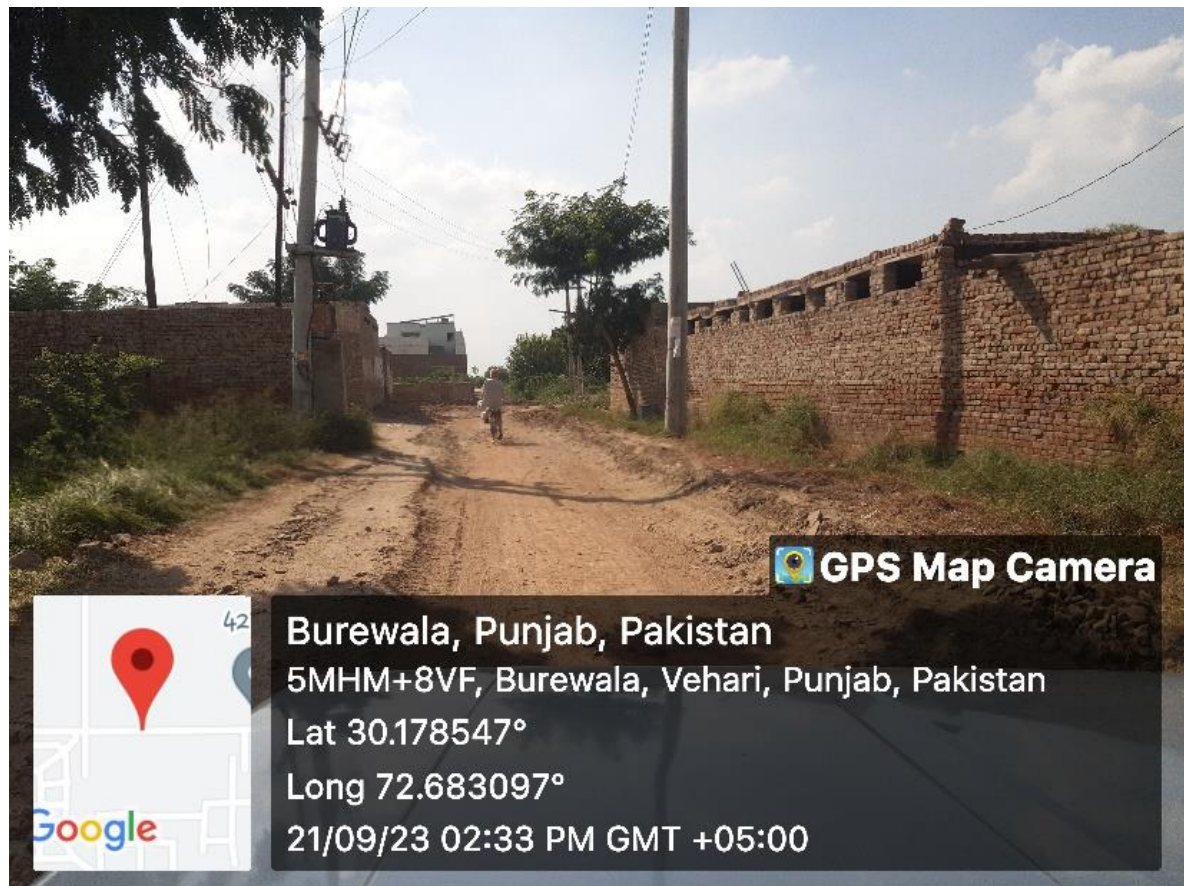
⁴³ <https://biodiversitya-z.org/content/key-biodiversity-areas-kba>

⁴⁴ <https://biodiversitya-z.org/content/estuary>

⁴⁵ Punjab Environmental Protection Act 2012

⁴⁶ *ibid*

Pictures of Project Siting



Pipeline route

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City
– Force main

Sub- Project Categorization:

S-1

S-2 ✓

S-3

Date of Screening: 21st September & 20th November, 2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Project does not require land acquisition.
If yes, then describe the type of land being acquired from the categories below:		✓		
Land (Quantify and describe types of land being acquired in "remarks column".				
Government and LG owned land free of occupation (agriculture or settlement)	✓			Force main will be laid in along railway track and road.
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)				
Private land		✓		No private land will be acquired.
Residential		✓		No residential land will be acquired.
Commercial		✓		No commercial land will be acquired.

Agricultural		✓		No agricultural land will be acquired.
Communal		✓		No communal land will be acquired.
Others (specify in "remarks").				
Name of owner/owners and type of ownership document if available.				NA
If land is being acquired, describe any structures constructed on it		✓		NA
Land-based assets:		✓		NA
Residential structures		✓		NA
Commercial structures (specify in "remarks")		✓		NA
Community structures (specify in "remarks")		✓		NA
Agriculture structures (specify in "remarks")		✓		NA
Public utilities (specify in "remarks")	✓			Road will be disturbed which be rehabilitated / restored by the contractor after completion of the project.
Others (specify in "remarks")		✓		
If agricultural land is being acquired, specify the following:				
Agriculture related impacts		✓		NA
Crops and vegetables (specify types and cropping area in "remarks").		✓		NA
Trees (specify number and types in "remarks").		✓		No tree will be cut.
Others (specify in "remarks").				
Affected Persons (APs)		✓		
Will any people be displaced from the land when acquired? Yes/No		✓		Land acquisition is not required.

Number of APs		✓		NA
Males		✓		NA
Females		✓		NA
Titled land owners		✓		NA
Tenants and sharecroppers		✓		NA
Leaseholders		✓		NA
Agriculture wage laborers		✓		NA
Encroachers and squatters (specify in remarks column)		✓		Nil
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		Nil
Others (specify in "remarks")				
How will people be affected?		✓		NA

Prepared By:

Name: Muhammad Waqar
Saleem (Social Expert)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Environmental & Social Screening Checklist

Instructions:

Environmental and Social Focal Persons (ESFPs)⁴⁷ nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.

Deputy Program Officers-Environmental and Social Management (DPO-ESM) deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist.

It is to be attached with the main document⁴⁸ of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM.

This checklist focuses on environmental and social impacts. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used.

(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City – Rehabilitation Work / Disposal Station

Sub- Project Categorization:	E-1 ✓	S-1
	E-2	S-2 ✓
	E-3	S-3

Date of Screening: 21st September & 20th November, 2023

Anticipated Project Activities:

Rehabilitation of disposal stations including pumping machineries, plaster of wall, painting etc.,

Estimated Cost of Subproject: PKR 808.30 M

Completion Time/Duration: 18 Months for whole sub-project

Estimated Labor for Subproject: Approx. 30

⁴⁷ In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

⁴⁸ It is meant as PC-I and/or engineering estimates of sub-project

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following:			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area has been reported within the project area.
Any surface water body (river, canal, stream, lake, wetland) within 250 meter of the proposed sub project ⁴⁹		✓	No surface water body has been reported within 250 meters of the proposed sub-project.
Estuarine		✓	No estuarine has been reported within the project area.
Special area for protecting biodiversity		✓	No special area for protecting biodiversity has been reported within the project area.
Buffer zone of protected area		✓	No buffer zone of protected area has been reported within the project area.
Mangroves Forest		✓	No mangroves forest has been reported within the project area.
Man-made forest /game reserve, orchid /crops or any other area of environmental importance	✓		There is no need of crop cultivation on the proposed land for the construction of disposal station.
Socially sensitive /important areas/communities/ people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject ⁵⁰	✓		No graveyard, shrine, mosque or church have been found within 100 meters of the proposed sub-project.
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meter of the proposed sub project ⁵¹	✓		No sensitive receptors like schools, college and hospitals have been found.
Any graveyard of local community (Muslims or Christians)	✓		No graveyard has been found within 100 meters of the proposed sub-project.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities,	✓		No settlers / encroachers are found on the proposed sub-project.

Screening Questions	Yes	No	Remarks
people with disabilities, people in old age, socially isolated segments ⁵² of the society and women or children)?			
Already existing infrastructure ⁵³ (including public amenities) which may be required to dismantle or may be affected temporarily by any means?	✓		No infrastructure (including public amenities) are found on the proposed sub-project.
B. Potential Environmental Impacts			
Will the Sub-Project cause...			
16. Disturbance to habitats / biodiversity of environmentally sensitive or protected areas?		✓	There will be no disturbance to habitats / biodiversity or protected areas.
17. Cutting of trees?		✓	No tree cutting is anticipated.
18. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	There will not be any disruption to habitats/biodiversity of surrounding ecosystem/environment.
19. Generation of wastewater during construction or operation?	✓		The wastewater will be generated from the contractor camp site during construction phase which will be treated through wastewater treatment plant or septic tank before final disposal to the nearest drain. However, no wastewater generation is anticipated during project operation.
20. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?		✓	The wastewater discharge from construction camps will be properly treated before the final disposal. No ground water contamination is anticipated, the septic tank develop will be properly lined in order to avoid percolation and contamination of ground water.

⁴⁹ Ibid.

⁵⁰ According to Environmental Assessment Guidelines adopted by Punjab EPA

⁵¹ Ibid.

⁵² due to caste, creed, religion or gender e.g., transgender

⁵³ Sewerage /Drainage system, Water supply lines, tube-wells, WAPDA/Telephone transmission lines/electric poles, Railway tracks, Gas pipelines, Roads, Shops/Plazas, Banks, Industry, Disposal stations etc.

Screening Questions	Yes	No	Remarks
21. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/ rivers or due to increased soil erosion at construction site?		✓	Not reported as there is no surface water body present near sub-project area.
22. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	Surface water quality will not be deteriorated, no surface water body is present near sub-project area. Storing all material and chemicals required for construction in well secured and managed sites, installing silt traps construction material sites prior to construction activities, disposing all waste soil and other debris to approved locations, locating labor camps at approved locations, providing proper sanitary facilities and solid waste management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.
23. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping will be done. The turbine installed for the extraction will be operated within its capacity.
24. Serious contamination of soil due to construction works?	✓		Soil may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The contractor is required to adopt the proper mitigation that include good housekeeping, training of his staff, disposal of waste on approved landfill and implementation of waste management plans.

Screening Questions	Yes	No	Remarks
25. Aggravation of solid waste problems in the area?		✓	The solid waste problem during construction activities will be mitigated by adopting the proper solid waste management plan.
26. Generation of hazardous waste?	✓		Oil, fuel, batteries and other hazardous chemicals that will be used during construction activities will be stored at the site, if required, in well closed containers at designated locations. The hazardous waste will be disposed of through EPA approved contractor.
27. Increased air pollution due to sub-project construction and operation?	✓		Adaptation of speed limits for construction vehicles and timely servicing and maintaining them up to the given standards will reduce the volume of air emissions to the surrounding. Frequent monitoring of air quality will support to review the effectiveness of the mitigation measures. The scrubber will be installed on asphalt and batching plant in order to limit the air emissions within PEQS limits.
28. Noise and vibration due to sub-project construction or operation?	✓		Blasting is not involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be

Screening Questions	Yes	No	Remarks
			proposed along the road which acts as a barrier to reduce the noise level. Further regular monitoring of noise levels will be adopted based on baseline data gathered during the pre-construction stage and continuous monitoring is proposed during construction stage as a mitigatory measure.
29. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?	✓		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Mitigation will be proposed like filled top-soil which will naturally restrict mosquito breeding. The tyres should remain dry in order to avoid the mosquito breeding.
30. Use of chemicals during construction?	✓		All chemicals will be stored in proper containers in order to avoid the leakages. The storage facility of chemicals should be properly ventilated and have emergency measures of firefighting and emergency exists. The workers using the chemicals should have training and should wear the PPEs.
C: Potential Social Impacts			
Will the Sub-Project cause...			
23. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	There will be no impairment of historical/cultural areas and there will be no disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs).
24. Displacement or involuntary resettlement of people? (Physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Proposed Land is owned by Government as per consultation conducted with Patwari and MC's representative.

Screening Questions	Yes	No	Remarks
25. Disproportionate impacts on the poor, women and children and or other vulnerable groups ⁵⁴ (mentioned above)?		✓	There is no impact on the poor, women and children or other vulnerable group.
26. Temporary impediments in movements of people/transport and animals?	✓		The movement will be restricted for few hours only which the resident/people will be informed prior to the construction activities.
27. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	There will be no large population influx on the locals. However, during construction activities, separate sanitary facilities and water will be adequately supplied to the labor force by the contractor to avoid and conflict with the local community on the use of their water resources.
28. Social conflicts if workers from other areas are hired?		✓	Contractor will be bound to hire the locals for unskilled work during construction and hence such conflict is not anticipated, however, awareness programs will be conducted for both labor force and local community in order to minimize possible conflicts.
29. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Also, it is proposed to prepare a separate health and safety plan to be implemented during construction and operation phases, and a regular monitoring schedule to be proposed under close supervision and coordination of

⁵⁴ Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

Screening Questions	Yes	No	Remarks
			a professional Occupational Health & Safety Officer of the Project Implementation Consultant.
30. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS. The regular monitoring schedule to be proposed under close supervision of the consultant.
31. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS and a regular monitoring schedule to be proposed under close management of a professional Occupational Health & Safety officer.
32. Any impact on sensitive receptors (mentioned above)	✓		The sensitive receptors may be subject to the impact like vibration, noise and emission which will be mitigated by installing acoustic equipment, silencers, maintenance of machinery, limiting the time specific construction activity near the receptors and with regular monitoring of construction activities near the sensitive receptors.
33. Any impact of negative nature on already existing infrastructure including public amenities?	✓		There will be no impact on already existing infrastructure including public amenities.

Prepared By:

Name: Aleem Butt (Environmental Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Appendix A-Environmental and Social Categorization of Sub-Projects

Using the Environmental and Social Screening Checklist, E & S Categorization of sub-projects of PCP is and will be carried out as following:

For Environmental Category:

E-1 = All those sub-projects having adverse environmental impacts and or those sub-projects that come under Schedule I and II of Pakistan Environment Protection Agency Review of IEE and EIA Regulations 2000 will need to submit **Initial Environmental Examination (IEE)** or **Environmental Impact Assessment (EIA)**⁵⁵ report

E-2 = All those sub-projects which will have moderate negative environmental impacts will need to submit **Environmental and Social Management Plans (ESMP)**⁵⁶

E-3 = All those sub-projects which will have no negative environmental impacts will be categorized as E3 and for those, no further process will be required⁵⁷ after E &S Screening

For Social Category:

S-1= All those sub-projects having negative social impacts of significant nature on > 40 households and or it require displacement/resettlement of > 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Resettlement Action Plan (RAP)

S-2= All those sub-projects having negative social impacts of significant nature on 1 – 40 households and or it require displacement/resettlement of 1- 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Abbreviated Resettlement Action Plan (ARAP)

S-3= All those sub-projects having no negative social impacts and or they are not involved in displacement/resettlement of any nature, will be categorized as S3 and No further process will be required after E &S Screening

Appendix B-Important Definitions

17. Environmentally sensitive areas ⁵⁸

Environmentally sensitive areas are landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context.

⁵⁵ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E1 Category sub-projects will be covered in IEE/EIA report

⁵⁶ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E2 Category sub-projects will be covered in the ESMP

⁵⁷ .For all those sub-projects which will have no negative environmental impacts and are categorized as E3 but they require construction labor/workers for the execution ,will follow the Environment, Health and Safety SOPs prepared for PCP and they will follow the instructions given by ESM team of PCP

⁵⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0169204694020169>

18. Cultural heritage⁵⁹

- Tangible cultural heritage:
 - movable cultural heritage (paintings, sculptures, coins, manuscripts)
 - immovable cultural heritage (monuments, archaeological sites, and so on)
 - underwater cultural heritage (shipwrecks, underwater ruins and cities)
- Intangible cultural heritage: oral traditions, performing arts, rituals

19. Wetlands

- Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.⁶⁰
- areas of marsh, fen, peat and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".⁶¹

20. Buffer zone of protected area

Areas peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area.⁶²

21. Special area for protecting biodiversity/ Key Biodiversity Areas (KBA)

Sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems⁶³

22. Estuarine

Area of the mouth of a river where it broadens into the sea, and where fresh and seawater intermingle to produce brackish water. The estuarine environment is very rich in wildlife, particularly aquatic, but it is very vulnerable to damage as a result of human activities.⁶⁴

23. Hazardous substance means-

(a) A substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and

(b) Any substance which may be prescribed as a hazardous substance;

Hazardous waste means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;⁶⁵

24. Waste

⁵⁹ <http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/>

⁶⁰ <https://www.epa.gov/wetlands/what-wetland>

⁶¹ <https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf>

⁶² <https://www.biodiversitya-z.org/content/buffer-zones.pdf>

⁶³ <https://biodiversitya-z.org/content/key-biodiversity-areas-kba>

⁶⁴ <https://biodiversitya-z.org/content/estuary>

⁶⁵ Punjab Environmental Protection Act 2012

Waste means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste. ⁶⁶

⁶⁶ *ibid*

Pictures of Project Siting



Rehmatabad Disposal Station

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City
– Rehabilitation Work / Disposal Station

Sub- Project Categorization:

S-1

S-2 ✓

S-3

Date of Screening: 21st September & 20th November, 2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Project does not require land acquisition.
If yes, then describe the type of land being acquired from the categories below:		✓		
Land (Quantify and describe types of land being acquired in "remarks column".				
Government and LG owned land free of occupation (agriculture or settlement)	✓			Rehabilitation work will be done on existing infrastructure: disposal stations & sewer lines.
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)				
Private land		✓		No private land will be acquired.
Residential		✓		No residential land will be acquired.

Commercial		✓		No commercial land will be acquired.
Agricultural		✓		No agricultural land will be acquired.
Communal		✓		No communal land will be acquired.
Others (specify in "remarks").				
Name of owner/owners and type of ownership document if available.				NA
If land is being acquired, describe any structures constructed on it		✓		NA
Land-based assets:		✓		NA
Residential structures		✓		NA
Commercial structures (specify in "remarks")		✓		NA
Community structures (specify in "remarks")		✓		NA
Agriculture structures (specify in "remarks")		✓		NA
Public utilities (specify in "remarks")	✓			Road will be disturbed which be rehabilitated / restored by the contractor after completion of the project.
Others (specify in "remarks")		✓		
If agricultural land is being acquired, specify the following:				
Agriculture related impacts		✓		NA
Crops and vegetables (specify types and cropping area in "remarks").		✓		NA
Trees (specify number and types in "remarks").		✓		No tree will be cut.
Others (specify in "remarks").				
Affected Persons (APs)		✓		

Will any people be displaced from the land when acquired? Yes/No		✓		Land acquisition is not required.
Number of APs		✓		NA
Males		✓		NA
Females		✓		NA
Titled land owners		✓		NA
Tenants and sharecroppers		✓		NA
Leaseholders		✓		NA
Agriculture wage laborers		✓		NA
Encroachers and squatters (specify in remarks column)		✓		Nil
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		Nil
Others (specify in "remarks")				
How will people be affected?		✓		NA

Prepared By:

Name: Muhammad Waqar Saleem (Social Expert)

Signature:

Date:

Endorsed By: Reviewed By:

Name:

Name:

Signature:

Signature:

Date:

Date:

Environmental & Social Screening Checklist

Instructions:

Environmental and Social Focal Persons (ESFPs)⁶⁷ nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.

Deputy Program Officers-Environmental and Social Management (DPO-ESM) deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist.

It is to be attached with the main document⁶⁸ of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM.

This checklist focuses on environmental and social impacts. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used.

(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City – Sewer lines

Sub- Project Categorization:	E-1 ✓	S-1
	E-2	S-2 ✓
	E-3	S-3

Date of Screening: 21st September & 20th November 2023

Anticipated Project Activities:

Construction / rehabilitation of sewer lines including excavation, backfilling and restoration of roads.

Estimated Cost of Subproject: PKR 808.30 M

Completion Time/Duration: 18 Months for whole sub-project

Estimated Labor for Subproject: Approx.30

⁶⁷ In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

⁶⁸ It is meant as PC-I and/or engineering estimates of sub-project

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following:			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area has been reported within the project area.
Any surface water body (river, canal, stream, lake, wetland) within 250 meter of the proposed sub project ⁶⁹	✓		A minor / distributary exists within 250 m boundary of proposed sub-project.
Estuarine		✓	No estuarine has been reported within the project area.
Special area for protecting biodiversity		✓	No special area for protecting biodiversity has been reported within the project area.
Buffer zone of protected area		✓	No buffer zone of protected area has been reported within the project area.
Mangroves Forest		✓	No mangroves forest has been reported within the project area.
Man-made forest /game reserve, orchid /crops or any other area of environmental importance		✓	No man-made forest /game reserve, orchid /crops or any other area of environmental importance.
Socially sensitive /important areas/communities/ people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject ⁷⁰	✓		Sites of religious importance like mosques and graveyard have been found within 100 m of the proposed subproject. Around 02 no. of mosques and 01 no. of graveyard have been found within 100 m boundary. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.

⁶⁹ Ibid.

⁷⁰ According to Environmental Assessment Guidelines adopted by Punjab EPA

Screening Questions	Yes	No	Remarks
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meter of the proposed sub project ⁷¹	✓		Sensitive receptors like colleges and hospitals have not been found. Around 03 no. of hospitals and 02 colleges are found. The mitigation measures like operating the equipment with muffling devices, use localized noise barriers, regular maintenance of machinery equipment's and regular monitoring and reporting will be adopted to encounter the impact near sensitive receptors.
Any graveyard of local community (Muslims or Christians)	✓		01 no. of graveyard has been found within 100 m of the proposed subproject.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments ⁷² of the society and women or children)?		✓	No demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments of the society and women or children).
Already existing infrastructure ⁷³ (including public amenities) which may be required to dismantle or may be affected temporarily by any means?		✓	No already existing infrastructure (including public amenities) which may be required to dismantle or may be affected temporarily by any means
B. Potential Environmental Impacts			
Will the Sub-Project cause...			
1. Disturbance to habitats / biodiversity of environmentally sensitive or protected areas?		✓	There will be no disturbance to habitats / biodiversity or protected areas.
2. Cutting of trees?		✓	No trees cutting is involved in this subproject.

⁷¹ Ibid.

⁷² due to caste, creed, religion or gender e.g., transgender

⁷³ Sewerage / Drainage system, Water supply lines, tube-wells, WAPDA/Telephone transmission lines/electric poles, Railway tracks, Gas pipelines, Roads, Shops/Plazas, Banks, Industry, Disposal stations etc.

Screening Questions	Yes	No	Remarks
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	There will not be any disruption to habitats / biodiversity of surrounding ecosystem / environment.
4. Generation of wastewater during construction or operation?	✓		The wastewater will be generated from the contractor camp site during construction phase which will be treated through wastewater treatment plant or septic tank before final disposal to the nearest drain. However, no wastewater generation is anticipated during project operation.
5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?		✓	The wastewater discharge from construction camps will be properly treated before the final disposal. No ground water contamination is anticipated, the septic tank develop will be properly lined in order to avoid percolation and contamination of ground water.
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	Surface water body exists near sub-project site, contractor will be bound not to pollute / contaminate that water body, wastewater from construction site will be disposed of after treatment.
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓		Storing all material and chemicals required for construction in well secured and managed sites, installing silt traps construction material sites prior to construction activities, disposing all waste soil and other debris to approved locations, locating labor camps at approved locations, providing proper sanitary facilities and solid waste management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.

Screening Questions	Yes	No	Remarks
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping will be done. The turbine installed for the extraction will be operated within its capacity.
9. Serious contamination of soil due to construction works?	✓		Soil may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The contractor is required to adopt the proper mitigation that include good housekeeping, training of his staff, disposal of waste on approved landfill and implementation of waste management plans.
10. Aggravation of solid waste problems in the area?		✓	The solid waste problem during construction activities will be mitigated by adopting the proper solid waste management plan.
11. Generation of hazardous waste?	✓		Oil, fuel, batteries and other hazardous chemicals that will be used during construction activities will be stored at the site, if required, in well closed containers at designated locations. The hazardous waste will be disposed of through EPA approved contractor.
12. Increased air pollution due to sub-project construction and operation?	✓		Adaptation of speed limits for construction vehicles and timely servicing and maintaining them up to the given standards will reduce the volume of air emissions to the surrounding. Frequent monitoring of air quality will support to review the effectiveness of the mitigation measures. The scrubber will be installed on asphalt and

Screening Questions	Yes	No	Remarks
			batching plant in order to limit the air emissions within PEQS limits.
13. Noise and vibration due to sub-project construction or operation?	✓		Blasting is not involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level. Further regular monitoring of noise levels will be adopted based on baseline data gathered during the pre-construction stage and continuous monitoring is proposed during construction stage as a mitigatory measure.
14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?	✓		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Mitigation will be proposed like filled top-soil which will naturally restrict mosquito breeding. The tyres should remain dry in order to avoid the mosquito breeding.

Screening Questions	Yes	No	Remarks
15. Use of chemicals during construction?	✓		All chemicals will be stored in proper containers in order to avoid the leakages. The storage facility of chemicals should be properly ventilated and have emergency measures of firefighting and emergency exists. The workers using the chemicals should have training and should wear the PPEs.
C: Potential Social Impacts			
Will the Sub-Project cause...			
16. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	There will be no impairment of historical/cultural areas and there will be no disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs).
17. Displacement or involuntary resettlement of people? (Physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Proposed Land is owned by Government as per consultation conducted with Patwari and MC's representative.
18. Disproportionate impacts on the poor, women and children and or other vulnerable groups ⁷⁴ (mentioned above)?		✓	There is no impact on the poor, women and children or other vulnerable group.
19. Temporary impediments in movements of people/transport and animals?	✓		The movement will be restricted for few hours only which the resident/people will be informed prior to the construction activities.
20. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	There will be no large population influx on the locals. However, during construction activities, separate sanitary facilities and water will be adequately supplied to the labor force by the contractor to avoid and conflict with the local community on the use of their water resources.

⁷⁴ Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

Screening Questions	Yes	No	Remarks
21. Social conflicts if workers from other areas are hired?		✓	Contractor will be bound to hire the locals for unskilled work during construction and hence such conflict is not anticipated, however, awareness programs will be conducted for both labor force and local community in order to minimize possible conflicts.
22. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects. Also, it is proposed to prepare a separate health and safety plan to be implemented during construction and operation phases, and a regular monitoring schedule to be proposed under close supervision and coordination of a professional Occupational Health & Safety Officer of the Project Implementation Consultant.
23. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS. The regular monitoring schedule to be proposed under close supervision of the consultant.
24. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		EHS SOPs will be followed to mitigate any impacts related to EHS and a regular monitoring schedule to be proposed under close management of a professional Occupational Health & Safety officer.
25. Any impact on sensitive receptors (mentioned above)	✓		The sensitive receptors may be subject to the impact like vibration, noise and emission

Screening Questions	Yes	No	Remarks
			which will be mitigated by installing acoustic equipment, silencers, maintenance of machinery, limiting the time specific construction activity near the receptors and with regular monitoring of construction activities near the sensitive receptors.
26. Any impact of negative nature on already existing infrastructure including public amenities?		✓	No impact of negative nature on already existing infrastructure including public amenities.

Prepared By:

Name: Aleem Butt
(Environmental Specialist)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

Appendix A-Environmental and Social Categorization of Sub-Projects

Using the Environmental and Social Screening Checklist, E & S Categorization of sub-projects of PCP is and will be carried out as following:

For Environmental Category:

E-1 = All those sub-projects having adverse environmental impacts and or those sub-projects that come under Schedule I and II of Pakistan Environment Protection Agency Review of IEE and EIA Regulations 2000 will need to submit **Initial Environmental Examination (IEE)** or **Environmental Impact Assessment (EIA)**⁷⁵ report

E-2 = All those sub-projects which will have moderate negative environmental impacts will need to submit **Environmental and Social Management Plans (ESMP)**⁷⁶

E-3 = All those sub-projects which will have no negative environmental impacts will be categorized as E3 and for those, no further process will be required⁷⁷ after E & S Screening

For Social Category:

⁷⁵ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E1 Category sub-projects will be covered in IEE/EIA report

⁷⁶ .All the social impacts (except those that come under S1 and S2 Category of land acquisition) of E2 Category sub-projects will be covered in the ESMP

⁷⁷ .For all those sub-projects which will have no negative environmental impacts and are categorized as E3 but they require construction labor/workers for the execution ,will follow the Environment, Health and Safety SOPs prepared for PCP and they will follow the instructions given by ESM team of PCP

S-1= All those sub-projects having negative social impacts of significant nature on > 40 households and or it require displacement/resettlement of > 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Resettlement Action Plan (RAP)

S-2= All those sub-projects having negative social impacts of significant nature on 1 – 40 households and or it require displacement/resettlement of 1- 40 households for land acquisition, will need to submit Social Assessment (SAR), Social Management Plan (SMP) and Abbreviated Resettlement Action Plan (ARAP)

S-3= All those sub-projects having no negative social impacts and or they are not involved in displacement/resettlement of any nature, will be categorized as S3 and No further process will be required after E & S Screening

Appendix B-Important Definitions

25. Environmentally sensitive areas ⁷⁸

Environmentally sensitive areas are landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context.

26. Cultural heritage⁷⁹

- Tangible cultural heritage:
 - movable cultural heritage (paintings, sculptures, coins, manuscripts)
 - immovable cultural heritage (monuments, archaeological sites, and so on)
 - underwater cultural heritage (shipwrecks, underwater ruins and cities)
- Intangible cultural heritage: oral traditions, performing arts, rituals

27. Wetlands

- Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.⁸⁰
- areas of marsh, fen, peat and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".⁸¹

28. Buffer zone of protected area

Areas peripheral to a specific protected area, where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area.⁸²

29. Special area for protecting biodiversity/ Key Biodiversity Areas (KBA)

⁷⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0169204694020169>

⁷⁹ <http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/>

⁸⁰ <https://www.epa.gov/wetlands/what-wetland>

⁸¹ <https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf>

⁸² <https://www.biodiversitya-z.org/content/buffer-zones.pdf>

Sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems ⁸³

30. Estuarine

Area of the mouth of a river where it broadens into the sea, and where fresh and seawater intermingle to produce brackish water. The estuarine environment is very rich in wildlife, particularly aquatic, but it is very vulnerable to damage as a result of human activities.⁸⁴

31. Hazardous substance means-

(a) A substance or mixture of substance, other than a pesticide as defined in the Agricultural Pesticide Ordinance, 1971 (II of 1971), which, by reason of its chemical activity is toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and

(b) Any substance which may be prescribed as a hazardous substance;

Hazardous waste means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste; ⁸⁵

32. Waste

Waste means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste. ⁸⁶

⁸³ <https://biodiversitya-z.org/content/key-biodiversity-areas-kba>

⁸⁴ <https://biodiversitya-z.org/content/estuary>

⁸⁵ Punjab Environmental Protection Act 2012

⁸⁶ *ibid*

Picture of Project Siting



Pipeline route

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of ESFP: Mr. Allah Ditta

Name of MC: Burewala

Sub-Project Sector: Sewerage System

Sub-Project Title: Improvement and Extension of Sewerage System in Burewala City
– Sewer lines

Sub- Project Categorization:

S-1

S-2 ✓

S-3

Date of Screening: 21st September & 20th November 2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Project does not require land acquisition.
If yes, then describe the type of land being acquired from the categories below:		✓		
Land (Quantify and describe types of land being acquired in "remarks column".				
Government and LG owned land free of occupation (agriculture or settlement)	✓			Force main will be laid along road.
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)				
Private land		✓		No private land will be acquired.
Residential		✓		No residential land will be acquired.
Commercial		✓		No commercial land will be acquired.

Agricultural		✓		No agricultural land will be acquired.
Communal		✓		No communal land will be acquired.
Others (specify in "remarks").				
Name of owner/owners and type of ownership document if available.				NA
If land is being acquired, describe any structures constructed on it		✓		NA
Land-based assets:		✓		NA
Residential structures		✓		NA
Commercial structures (specify in "remarks")		✓		NA
Community structures (specify in "remarks")		✓		NA
Agriculture structures (specify in "remarks")		✓		NA
Public utilities (specify in "remarks")	✓			Road will be disturbed which will be rehabilitated / restored by the contractor after completion of the project.
Others (specify in "remarks")		✓		
If agricultural land is being acquired, specify the following:				
Agriculture related impacts		✓		NA
Crops and vegetables (specify types and cropping area in "remarks").		✓		NA
Trees (specify number and types in "remarks").		✓		No tree will be cut.
Others (specify in "remarks").				
Affected Persons (APs)		✓		
Will any people be displaced from the land when acquired? Yes/No		✓		Land acquisition is not required.

Number of APs		✓		NA
Males		✓		NA
Females		✓		NA
Titled land owners		✓		NA
Tenants and sharecroppers		✓		NA
Leaseholders		✓		NA
Agriculture wage laborers		✓		NA
Encroachers and squatters (specify in remarks column)		✓		Nil
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		Nil
Others (specify in "remarks")				
How will people be affected?		✓		NA

Prepared By:

Name: Muhammad Waqar Saleem (Social Expert)

Signature:

Date:

Endorsed By:

Name:

Signature:

Date:

Reviewed By:

Name:

Signature:

Date:

ANNEXURE - 11: IMPACT MATRIX

Project Impact Matrix																																
Environmental Component → Project Component	Physical, Ecological and Social Environment																															
	Land Acquisition	Downstream Water Users	Air Quality	Noise	Soil Contamination	Aesthetic	Liquid and Solid Waste	Material Quarries and Borrow Pits	Surface Water	Irrigation Water	Wastewater	Soil degradation	Flora	Fauna	Livestock Grazing	Fishery	Mobility of Locals	Cultural Issues	Water Ponds	Gender Issues	Health & Safety of Workers	Archeological/Historic al and Religious Sites	Security Situation	Human Health	Ground Water	Agriculture	Drinking Water	Livelihood	Employment Opportunities	Economic Uplift		
A. Planning & Design Phase	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Site Selection	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Topography survey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Geological investigation	0	0	-1	0	-1	-1	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-1	0	0	-1	0	0	0	0	0	0	0	
Seismic Investigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B. Construction Phase	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Clearing of land, Digging and excavation	0	0	-2	-2	-1	-3	-1	-3	0	0	-1	-1	-1	-1	0	0	-2	0	0	-1	-1	0	0	-1	0	0	0	0	1	3		
Storage of material	0	0	0	0	-1	0	-1	0	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	
Loading and hauling	0	0	-1	-1	-2	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	0	0	-1	0	0	0	0	0	0	0	0	0	0	
Construction Camps	0	0	0	-1	-1	-2	-2	-1	0	0	-1	-1	0	0	0	0	0	-1	0	-1	-1	0	0	0	0	0	0	0	0	0	0	
Use of Heavy Machinery	0	0	-1	-3	-1	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	
Wastewater Disposal	0	0	0	0	-1	-1	-1	0	0	0	-1	-1	0	0	0	0	0	-1	0	0	0	0	0	0	0	-1	0	0	0	0	0	

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ANNEXURE - 12: SCREENING CHECKLIST

Adverse Impact -, Significant Adverse --, Beneficial Impact +, Highly Beneficial ++,
No Impact 0

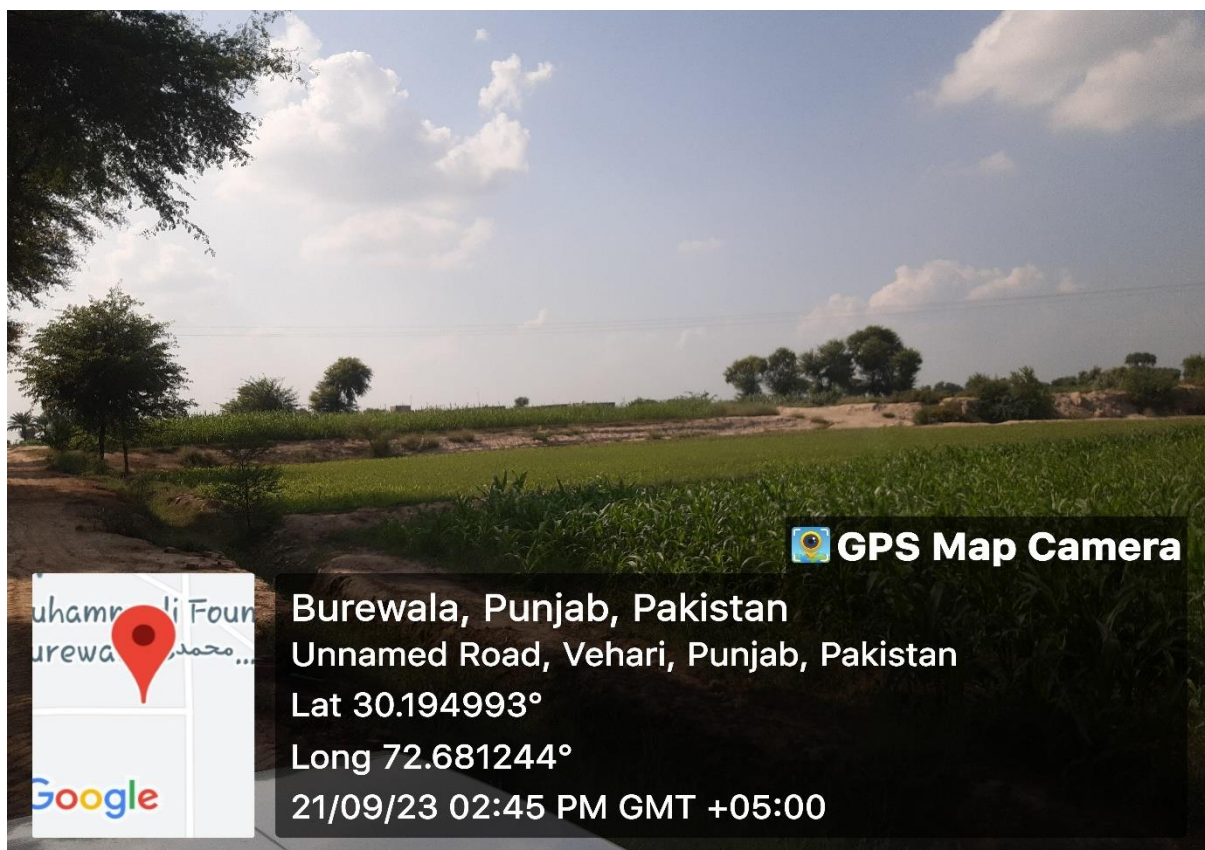
Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
1	Atmosphere					
a	Ambient Air	0	--	0	-	0
b	Primary Pollutants	0	--	0	-	0
c	Secondary Pollutants	0	-	0	0	0
d	Noise	0	--	0	-	0
e	Vibration	0	-	0	-	0
2	Climate					
a	Temperature	0	0	-	0	-
b	Precipitation	0	0	0	0	0
c	Relative Humidity	0	0	0	0	0
e	Evaporation	0	0	0	0	0
3	Water Resources					
a	Surface Water	0	0	0	0	0
	Rivers	0	0	0	0	0
	Streams	0	0	0	0	0
	Springs	0	0	0	0	0
	Wetland	0	0	0	0	0
	Flow	0	0	0	0	0
	Quality	0	0	0	0	0
	Usage	0	0	0	0	0
	Sediments	0	0	0	0	0
	Chemicals	0	0	0	0	0
	Pollution	0	0	0	0	0
	Erosion	0	0	0	0	0
b	Ground Water					
	Sources	0	0	++	+	++

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
	Depth	0	0	++	+	++
	Quantity	0	0	++	+	++
	Potential Extraction	0	0	++	+	++
	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	+

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
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
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	++	++

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
	Other Cash Income	0	+	+	+	++
7	Transport, Infrastructure & Communication					
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 - 13: SITE PICTURES





ANNEXURE - 14: LABOR'S SOPS

PUNJAB CITIES PROGRAM

ENVIRONMENT, HEALTH AND SAFETY SOPs FOR LABOR/WORKERS

Labor /workers play key role in the infrastructure development and construction activities. The objective of preparation of the EHS SOPs for Labor/Workers is to address environment, health and safety issues related to the proposed sub-project implementation. These SOPs will provide guidelines to be followed by the contractors for effective management of EHS issues related to labor/workers/daily wagers (including women). These SOPs will be annexed in the general conditions of all the contracts carried out under the PCP. These SOPs are designed for Punjab Cities Program and will be applicable to all types of labor/workers/daily wagers (including women), hired for the construction activities under PCP. Following are the anticipated Environment, Health and Safety issues and their recommended mitigation measures.

Table 1: Construction Camp Management

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Camp sites for construction workers are the important locations that have significant impacts such as health and safety hazards on labor/workers Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	The Contractor shall: Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view. Consider the location of construction camps away from communities in order to avoid social conflict with the surrounding communities. Submit to the relevant MC for approval of a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will generate social issues and impacts on health and environment.	Contractor shall provide the following facilities in the campsites: Adequate ventilation facilities Safe and reliable drinking water supply for personal hygiene (washing or bathing) Adequate housing for all workers Safe and reliable drinking water supply. Water supply from tube wells that meets the Punjab Environment Quality Standards Hygienic sanitary facilities, hand washing facilities and sewerage system. The toilets and domestic waste water will be collected

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. Female toilets should be clearly marked in language or signage clearly understood by the persons using them to avoid miscommunication. The minimum number of toilet facilities required is one toilet for every ten persons. Storm water drainage facilities. Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the silt retention pond to natural drainage via a grassed swale at least 20 meters in length with suitable longitudinal gradient. Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon. Provide child crèches for women working on the construction site. The crèche should have facilities for dormitory, kitchen, indoor/outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by construction camps to be discouraged/prohibited to the extent possible.
Disposal of Labor Camp waste	Management of wastes is crucial to minimize impacts on the environment as well as on the health of the workers/labor	The Contractor shall: Ensure proper collection and disposal of solid wastes within the construction camps Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level. Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems at their own. Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition. Cover the bed of the pit with impervious layer of materials (clayey, thin concrete) to protect groundwater from

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		contamination. Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play with. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall: Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. Make available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. Conduct awareness campaigns to educate workers on preserving the protecting of biodiversity in the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including COVID-19, malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall: Provide adequate health care facilities within construction sites. Provide first aid box facility at the construction site round the clock. Maintain stock of medicines in the first aid facility in camp sites facility and appoint fulltime designated first aider or nurse. Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals and telephone/mobile facility to call for Emergency Services 1122. Initial health screening of the laborers coming from outside areas Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis Provide adequate drainage facilities throughout camps to ensure that disease vectors habitats (stagnant water bodies, puddles) do not form. Regular mosquito repellent sprays in monsoon. Carryout short training sessions on best hygiene practices to

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices Place display boards of contact information of nearest dispensary/health clinic/hospital
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	The Contractor shall: Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry in to the camp area. Maintain register to keep track on a head count of persons present in the camp at any given time. Encourage use of flame proof material for the construction of labor housing/site office. Ensure that these houses/rooms are of sound construction and capable of withstanding storms/cyclones. Provide appropriate type of firefighting equipment suitable for the construction camps Display emergency contact numbers clearly and prominently at strategic places in camps. Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractor.
Food Safety	There is potential for exposure to poisonous substances by ingestion	Suitable arrangements are to be made for provision of clean eating areas where workers are not exposed to the hazardous or noxious substances
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	The Contractor shall: Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. Dismantle camps in phases as the work decreases (do not wait for completion of the entire work). Give prior notice to the laborers before demolishing their camps/units Maintain the noise levels within the national standards during demolition activities Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site by MCs/ESFPs. Handover the construction camps with all built facilities as it is if agreement between both parties (contractor and land-owner) has been made so.

Activity/ Impact Source	EHS Concerns/issues	Mitigation Measures/ Management Guidelines
		Restore the site to its original condition or to an agreed condition with the landowner defined prior to the commencement of the works (in writing). Not make false promises to the laborers for future employment in O&M of the project.

Table 2: Cultural and Religious Issues

Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	Disturbance in performance of religious activities	The Contractor shall: Provide separate prayer facilities (men and women) to the construction workers. Show appropriate and non-biased behavior with all construction workers irrespective of their religious or cultural affinities Allow the workers to participate in praying during construction time Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters In case of working during COVID-19 pandemic, SOPs for prayers in Mosque issued by the Government of Punjab, will be applicable and it will be responsibility of contractor to sensitize the labor/workers about it

Table 3: Workers/Labor Health and Safety at Construction Site

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
Construction Activities	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise,	The Contractor shall: Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with the national acts and rules of the Government of Pakistan Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
	dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc) and (iii) road accidents from construction traffic.	hazards in the work areas, Provide Personal Protection Equipment (PPEs)¹ for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job Appoint an environment, health and safety manager to look after the health and safety of the workers Inform the local authorities responsible for health, religious and security before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters
	Child and pregnant labor	The Contractor shall: not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Employment of Children Act (2015)² and Pakistani Labor Laws and policies respectively .

¹ Table 4 presents general examples of occupational hazards and types of PPE available for different purposes.

² The ECA 2015 defines a child as a person who has not completed his/her 14th year of age. The ECA states that no child shall be employed or permitted to work in any of the occupations set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the Act is carried out

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work Document and report occupational accidents, diseases, and incidents. Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice. Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. Provide awareness to the construction drivers to strictly follow the driving rules Provide adequate lighting in the construction area and along the roads
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	The contractor shall provide separate portable toilets and hand washing facilities at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities should be at least six m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment. Contractor should provide bottled drinking water facilities to the construction workers at all the construction sites.
Other issues	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following management measures to reduce health risks to the construction workers and nearby community: Drainage Management Air Quality Management Noise and Vibration Management Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall: Train all construction workers in basic sanitation and health care issues (e.g., how to avoid COVID-193, malaria and transmission of sexually transmitted infections (STI) HIV/AIDS. Train all construction workers in general health and safety matters, and on the specific hazards of their work Training should consist of basic hazard awareness, site specific

3 .SOPs issued by the GoPunjab during COVID-19 Pandemic will be implemented

Activity/ Impact Source	Impacts	Mitigation Measures/ Management Guidelines
		hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Commence the COVID-19, malaria, HIV/AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counseling and testing. Implement COVID-19, malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.

Table 4: Summary of Recommended Personal Protective Equipment According to Hazard4

Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic Helmets with top and side impact protection.
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).
Foot protection	Falling or rolling objects, pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available.
	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.
Body/leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.

4 Source: IFC Environmental, Health, and Safety (EHS) Guidelines

ANNEXURE - 15: TORS FOR ENVIRONMENT AND HSE SPECIALISTS

A qualified Environment Specialist, HSE Specialist, and environmental inspectors will be hired by the contractor to implement ESIA during the construction activities. The contractor will be responsible for implementing the impact mitigation measures of the ESIA during the construction phase of the project. The key responsibilities with qualifications for safeguard staff of contract are given as under;

Environment Specialist (ES)

The main responsibilities of the C-ES include, but are not necessarily limited to the following;

- Responsible for all Environment Safeguard related matters at the site.
- Screen all construction activities for construction environment impacts and implement its mitigations.
- Prepare the Site-Specific Environmental Management Plan (SSEMP) and ensure its effective implementation.
- Ensure that all facilities (establishment of camp, asphalt and batching plants, borrow areas) will be selected in light of the EMP requirements.
- Maintain close liaison with Environment Specialist – Supervisory Consultant with respect to the implementation of ESMMP requirements and compliance to Punjab Environmental Protection Agency (PEPA) Environmental Approval;
- Monitor all the construction work and ensure that work has been undertaken in accordance with the ESMMP.
- Carry out site visits of construction camp, construction site(s), quarries, and borrow pits to review environmental status and rectify the non-compliances.
- Ensure that all waste generated from the construction site, camps, asphalt plants, etc. has been properly disposed of.
- Prepare the corrective action plan for the major non-compliances
- Supervise the environmental monitoring is being carried out as pre-defined frequencies mentioned in EMP.
- Implementation of the mitigation measures at the construction site;
- Responsible for the compliance of EMP recommendations and will also be responsible for effective liaison with local people
- Provision of proper Personal Protective Equipment (PPEs) to the workers and train them for their proper use;

Qualification Requirement

- Post Graduate degree in environmental engineering, environmental management, environmental sciences, Civil Engineering, or relevant areas

- 05 years of professional experience in implementing environment safeguard preferably on donor-funded projects or large-scale development projects
- Excellent written and spoken communication skills in English;

HSE Specialist

The main responsibilities of the HSE specialist include, but are not necessarily limited to the following:-

- Responsible for all HSE related matters at the site.
- Prepare the Health, Safety and Environment (HSE) Management Plan; Emergency Preparedness and Response Plan; Restoration and Rehabilitation Plan; Waste Management Plan; Disaster Management Plan; Drinking Water Supply and Sanitation Plan, Traffic Management Plan, Dust Control / Water Sprinkling Plan etc.
- Responsible for the Implementation of the HSE Plan, waste management plan, emergency response plan, disaster management plan etc.
- Screen all construction activities for construction HSE impacts and implement its mitigations
- Responsible for performing regular risk assessments during the construction activities and enforcing preventive measures.
- Perform the accident investigation, data analysis, and recurrence prevention programs and procedures
- Responsible for appropriateness of all safety equipment used at the site
- Perform periodic HSE-related and risk assessments at site and implement its mitigations.
- Impart training programs and workshops for the contractor's staff;
- Strong coordination with the Supervision Consultant.

Qualification Requirement

- Post Graduate degree in Health and Safety, Environmental Science / Management, Environmental Engineering, Civil Engineering, or other relevant discipline.
- 05 years of professional experience in managing health & safety on major roads & infrastructure projects.
- Must have NEBOSH International General Certificate in Occupational Health & Safety and certification in ISO 45001:2018 Occupational health and safety management systems.

ANNEXURE - 16: WASTE MANAGEMENT PLAN

As the project will generate significant volume of wastes of various types, the contractor will therefore implement its Waste Management Plan. The following objectives form the basis for the waste management plan of the Campsite:

- Progressive reduction of wastes with the target to minimize overall emissions / discharges, which have adverse impact on the environment,
- Establishment, Implementation and maintenance of waste segregation aimed at enhancing recycling,
- Ensure effective waste handling and disposal processes.

Type of Waste

The major categories of wastes envisaged from the sub-project are outlined as follows:

- Solid wastes: These include felled vegetation, woods from crates, metals, papers and other scraps which are due to be removed during site clean-up, domestic waste (waste generated from camp kitchens, packing materials, boxes and plastics).
- Liquid wastes: These include non-hazardous operational waste generated from work construction sites e.g., sanitary water etc.
- Gaseous wastes: These include combustion products from construction engines, natural gas leaks etc.

Waste Minimization / Reduction

Waste minimization implies reduction to the greatest extent possible of the volume or toxicity of waste materials. The four principles of waste minimization (reduce, reuse, recycle and recover) shall be adopted as applicable.

Waste Segregation

Waste segregation and characterization shall be carried out on wastes that are similar and shall be combined to simplify storage, treatment, recycling and effective implementation of appropriate waste disposal methods. Wastes shall be segregated at source into clearly designated bins at strategic locations. Particular attention shall be given to the work area where a variety of wastes shall be generated.

Waste Disposal

All debris, spoilt materials, and other wastes shall be cleared regularly from the site and disposed at approved dump sites operated by designated waste disposal authorities. Instructions on material safety handling sheet shall be strictly adhered to and shall form the basis for the disposal of wastes related to such products. Wastes in transits shall be accompanied and tracked by

waste disposal notes. The note shall contain such information as date of dispatch, description of wastes, waste quantity, container type, designated disposal site and method, consignee name, means of transport and confirmation of actual disposal time and date. Special attention will be accorded to wastes removed from the sites and also drums of waste oil that might contain dangerous substances; these are to be transported to a site designated by MC for safe storage and subsequent testing prior to disposal.

Waste management audit of facilities shall be carried out in consultation with the key stakeholders, and findings shall be properly documented and followed up. Accommodation, catering services areas and work site shall maintain acceptable standard of hygiene and good house-keeping.

Contractor should be committed to effectively manage all their activities, including:

- Approved storage and use of raw materials and substances.
- Waste Management Plan - Waste minimization (promoting reduce, reuse, recycling, recovery including energy recovery and safe disposal).
- Monitoring and review of environmental performance.

Waste Management

The construction waste from the project site consists of asphalt waste, batteries, containers / drums, excavated natural material, oil filters, motor oil, scrap material and concrete waste. The waste from labour camp consists of the municipal waste of both solid and liquid effluent. The liquid waste from campsite will be disposed of by using the septic tank. Each type of solid waste has been managed separately and is discussed in the following table:

Sr. No	Type of Waste	Mode of Disposal / Use
1.	Asphalt Waste	Reuse in applications such as base, and sub-base and some will be blended for use in new asphalt
2.	Batteries	Sell to the scrap metal recyclers
3.	Empty containers / drums	Sell to the scrap metal recyclers
4.	Excavated natural material	Reuse offsites
5.	Oil filters	Sell to recyclers
6.	Motor oil	Sell to oil recycler for reprocessing and recovery
7.	Scrap material	Sell to the scrap metal recyclers
8.	Concrete Waste	Reuse in pavement base and sub-base
9.	Municipal Solid Waste	Dispose in landfill site