

EIA REPORT

APRIL-2022



WATER AND SANITATION AGENCY, FAISALABAD

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT OF CHIEF MINISTER'S DEVELOPMENT PACKAGE FOR FAISALABAD WATER SUPPLY, SEWERAGE AND DRAINAGE FACILITIES

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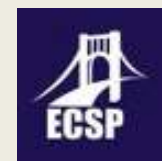
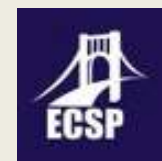


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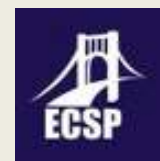
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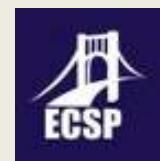
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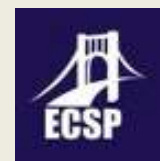
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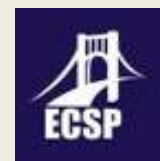


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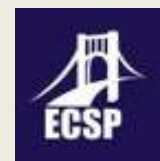
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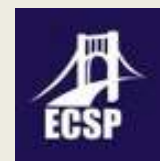


List of Abbreviations

AC	Asbestos Cement
DI	Ductile Iron
EIA	Environmental Impact Assessment
ECSP	Engineering Consultancy Services Punjab (Pvt.) Limited
EMMP	Environment Management and Monitoring Plan
EPA	Environment Protection Agency
EPD	Environmental Protection Department
EMC	Environment Management Committee
FDA	Faisalabad Development Authority
FGDs	Focused Group Discussions
GRP	Glass Reinforced Plastics
GoPb	Government of Punjab
HDPE	High-density polyethylene
HSE	Health, Safety and Environment
HUD & PHED	Housing Urban Development & Public Health Engineering Department
IEE	Initial Environment Examination
JICA	Japan International Cooperation Agency
KIIs	Key Informant Interviews
MS	Mild Steel
NA	National Assembly
NEQS	National Environmental Quality Standards
NGO	Non-Government Organizations
NOC	No Objection Certificate



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NRW	Non-Revenue Water
O&M	Opeartion and Maintenance
PEPA	Pakistan Environment Protection Act
PEPO	Pakistan Environmental Protection Ordinance
PEPC	Pakistan Environmental Protection Council
PEQs	Pakistan Environmental Quality Standards
PMD	Pakistan Meteorological Department
PP	Punjab Assembly
RE	Resident Engineer
RCC	Reinforced Cement Concrete
SC	Supervision Consultants
ToR	Terms of Reference
T&P	Tools and Plants
UK	United Kingdom
WASA-F	Water and Sanitation Agency, Faisalabad
WASH	Water Sanitation and Hygiene



Executive Summary

1) Introduction

Faisalabad is the third-largest city of Pakistan with an estimated population of 3.4 million with a growth rate of 3.70% and is a hub of industrial activities in the country. As the population and industrial growth is flourishing, the demand for water supply, sewerage and drainage system has also increased but the infrastructure is lagging to match the contemporary demand. Presently, the total service area of WASA Faisalabad is 225 sq. km with total registered consumers for water & sewerage being 2,60,000. It is estimated that WASA provides about 72% of the city with sewerage services and about 70% with water services.

In 2015, Pakistan, along with the rest of the international community, committed to achieving the Sustainable Development Goals (SDGs) by 2030. The SDG 6, Clean water and sanitation for all, aims to ensure the provision of clean drinking water to 95% of the population by 2030. WASA-F has implemented many projects to meet the gap between supply and demand in Faisalabad; the requirement of water has increased beyond the supply capacity in 2021. Similarly, the existing sewerage system was laid many decades back. During this period, there has been immense population growth increasing sewage flow, making the system deficient for the present population as well as an increase in flooding in the monsoon due to a poor drainage system. Further, the laid system has outlived its operational life and there are frequent maintenance problems in the sewerage and drainage system.

A summary of the bailout package was forwarded to Chief Minister Punjab with a request for assistance from the Government of Punjab. Chief Minister of Punjab approved a development package for Faisalabad on his visit to the city on 25/08/2020 for extension/rehabilitation of water supply, sewerage and drainage system in the areas falling under NA-105, NA-107, NA-108, NA-109, and NA-110. Consequently, different schemes have been proposed by WASA-F for improvement of the existing system in different areas of the city including urban flood mitigation and the provision of machinery for the disposal stations to overcome the existing water supply and sewerage/drainage issues of the city.



2) Environmental Legislative Requirements

The National Conservative Strategy (NCS) is the principle document which addresses the environmental issues of the country. The Pakistan Environmental Protection Act (PEPA), 1997 is the key regulation authorizing the government to frame regulations for the protection and safeguard of the environment. This Environmental Impact Assessment (EIA) Study has been conducted for "Chief Minister Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities", as a mandatory requirement of Punjab Environmental Protection Act (PEPA), 2012 as an amendment of Pakistan Environmental Protection Act, 1997. Section 12 (1) of this Act states that:

"No proponent of a Project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or, where the Project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."

Engineering Consultancy Services Punjab, (Pvt.) Ltd (ECSP) has been engaged to carry out the Environmental Impact Assessment (EIA) process of the proposed project.

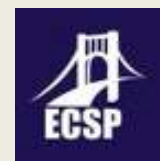
3) Project Description

The Project area spreads around the of whole Faisalabad City. Sewerage and Drainage facilities will be improved in the areas of Eastern and Western areas of Faisalabad including but not limited to Barkat Pura, Waris Pura, Raza Abad, Islam Nagar, Gulistan Colony, D Type Colony, Allama Iqbal Colony, Nishatabad, etc. Chak no. 215 Islam Pura, Nethry, Usman Town, Satellite Town, Awais Town, Samanabad, Sekhan Wala, Nisar Colony, Manan Town, Gulshan-E-Iqbal, Sitara Colony, Habib Town, Peoples colony, Madina Town, Shamsabad Division & Adjoining Areas, to mention a few. Presently, disposal stations pumping out the wastewater of these areas lack capacity which causes unhygienic environmental conditions, especially during the rainy season.

The project has been divided into 17 PC-1s (sub projects) and the total cost of the project is estimated about 3669.9 million which will be provided by the Government of Punjab during



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



the three years of the project construction.

The main objective is the rehabilitation and extension of water supply, sewer and drainage facilities, and upgrading the disposal stations based on meeting daily increasing demand for households and managing the existing system more efficiently. It also includes the provision of machinery to WASA for operation and maintenance and to cater to urban flooding.

The Disposal stations were constructed in the early 1980s and expired their useful life. Accordingly, pumping machinery is also old and less efficient. Resultantly, WASA-F has to bear the additional burden of electricity bills, wear and tear of machinery. Hence, improvement/rehabilitation is essential to improve the efficiency of the sewerage system and the public will enjoy good sanitation and environmental conditions. Wastewater is creating unhygienic, and environmental problems in the areas putting human health at risk.

This project is part of the master plan for WASA Faisalabad (2018-2038) and is aligned with Punjab Spatial Strategy (2017-2047). To achieve the sewerage related Sustainable Development Goal 6, the objective of providing 100% sanitation facility till 2030, this mega project has been prepared, considering:

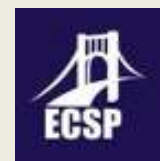
- Improvement in existing water supply, sewerage, and drainage network to cover the supply-demand gap of clean water, to avoid unhygienic environmental problems in the city, and to cater inundation in low-lying areas.
- Provision of O&M machinery for improvement in the services

The salient features of the project is given below:

Sr#	Salient Features	
1	Project Title	Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities
2	Project Location	Faisalabad City (NA-105, NA-107, NA-108, NA-109, NA-110)
3	Proponent	Water & Sanitation Agency (WASA), Faisalabad, Government of Punjab



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4	Consultants	Engineering Consultancy Services Punjab Pvt. Ltd. (ECSP)
5	Cost of Project	PKR 3669.9 million (Based on PC-1's)
6	Water Source during construction phase	Ground water
7	Status of Project	Construction Phase
8	Nature of Area	Residential, Commercial, Agricultural and Industrial
9	Source of Power	WAPDA (FESCO)
10	Environmental Budget	PKR 62.9 million

4) Socio-Environmental Baseline Conditions

The baseline conditions were studied with respect to physical, biological and socio-economic environment. The physical environment includes topography, geology and soils, climate, hydrology and drainage, land use, surface water quality, ground water quality, ambient air quality, noise levels, and seismicity.

The climate of the project area is hot in summer and moderate in winter. The coldest month is December and the hottest is June. According to the Seismic Zoning Map (prepared by Pakistan Meteorological Department), the proposed Project area falls in Zone-2.

M/s ASIAN Environmental Services (AES), is an EPA certified laboratory, has been engaged, after competitive bidding, to carry out environmental monitoring of ambient air quality, ground water quality, noise level and soil quality in the project area. Preliminary findings of air quality revealed that the conventional pollutants like CO, SO_x and NO_x are within the prescribe limits of PEQS. Similarly, the noise levels are found higher during most of the day time due to the traffic. The tap water quality results indicate that the total hardness and chloride levels are well above the permissible limits of relevant PEQS.

The biological environment of the Project Area includes flora and fauna. The floral species found in the Project Area include some trees, bushes and shrubs. Some of the project area is surrounded by the agricultural land as well. The faunal species noticed/reported in the Project Area include mammals (dogs, cats etc.), mongoose, squirrel, amphibians (frog, toad,

turtle etc.), reptiles (small and medium sized lizards, snakes etc.), house sparrows, house crow, etc. However, no endangered species are found in the Project Area.

The aspects covered under socio-economic environment of the Project Area include population and communities, mother tongue, occupation, health care facilities, educational facilities, physical and cultural heritage (shrine, mosque, graveyard), respondent's age group, marital status, willingness to pay for improved WASA services, common diseases found in the area etc. Overall the public generally supports the project and visualize it as a good project.

5) Environmental Impacts and Mitigation Measures

The proposed project will have both positive and negative impacts during the construction and operational phases, for which proper mitigation measures are necessary.

Sr.No	Parameters		Pre-Construction Phase	Construction Phase	Post-Construction/ Execution Phase
1	<i>Ecological Environment</i>				
1.1	Avifauna (Birds)		N/A	0T	N/A
1.2	Trees		N/A	-1P	+1P
1.3	Endangered Species		N/A	N/A	N/A
1.4	Fauna		N/A	N/A	N/A
1.5	Aquatic life		N/A	N/A	N/A
1.6	Crop Cutting		N/A	N/A	N/A
2	<i>Physical Environment</i>				
2.1	Land Use		N/A	-1T	N/A
2.2	Climate Change		N/A	0T	0P
2.3	Ground depletion	Water	N/A	0T	+1P
2.4	Ground Quality	Water	N/A	0T	0P
2.5	Surface Quality	Water	N/A	0T	N/A
2.6	Air Quality		0T	-1T	0P
2.7	Noise		0T	-1T	0P
2.8	Solid Waste Management		0T	-1T	N/A
3	<i>Socio-Economic Environment</i>				
3.1	Loss of Electricity/Sui-gas Transmission lines		N/A	N/A	N/A

3.2	Loss of water and sewerage distribution pipelines	N/A	-1T	+1P
3.3	Loss of telephone lines	N/A	N/A	N/A
3.4	Accessibility infrastructure Roads/Railways	N/A	-1T	N/A
3.5	Loss of Assets	N/A	N/A	N/A
3.6	Aesthetic	0T	-1T	+1P
3.7	Quality of Life	N/A	-1T	+2P
3.8	Mosques	N/A	N/A	N/A
3.9	Monuments	N/A	N/A	N/A
3.10	Employment Opportunities	0T	+1T	N/A
3.11	Public Health	N/A	-1T	+1P

During the field survey, significant efforts were made to identify the main social, cultural and environmental issues related to the project. Various government departments and agencies were also contacted for obtaining salient information along with area resident/ stakeholders. Most of the perceived impacts are during construction phase. Following is the list of main concerns identified in the study:

- Disturbance to the public movement during construction;
- Excavation and Vibrations due to construction machinery may affect the nearby structures during construction.
- Air and noise pollution due to the operating of construction machinery during construction phase of the project;
- Solid waste generation during construction and operational phase;
- Accidental leaks/spills of hazardous chemicals from construction activities and machinery;
- Health and safety issues of the workers;
- Contamination of water body by construction activities; and
- Temporarily relocation of public utilities.



6) Land Acquisition Framework

The project includes the replacement/extension of the public water supply, sewerage, and drainage. The already laid piping system along the roads and streets will be replaced or extended. The new distribution system will also be laid below the roads and streets with proper earth covering. The private land will not be disturbed in any case, unless fulfilling all the legal requirements. As per reconnaissance meeting, no land acquisition involved in this project.

7) Environmental Monitoring and Management Plan (EMMP)

EMMP is a sort of the master plan which supervises all stages of the Project to safeguard the environmental aspects of the project during pre-construction, construction and operational phase of the proposed project. It addresses the main components like environmental mitigation and monitoring programs, institutional arrangements and budgeting. Management plans including air, dust, wastewater generated noise quality, health and safety, capacity building, site management, emergency management are recommended in this report.

A total of Rs. 62.9 million EMMP budget is calculated, which has covered direct cost of environmental operations like monitoring of air, water, noise, training, internal audit, tree plantation cost etc.

8) Conclusion and Recommendations

The development of the Faisalabad Water Supply and Drainage Facilities will bring about some significant positive Impacts while moderate to minor adverse impacts on the physical, ecological, and socio-economic environment of the project area. The execution of the project will surely reduce the outbreak of waterborne diseases and consequently will improve the health condition of the area people especially the children of the Faisalabad city.

- Environmentally sustainable engineering practices should be followed to control soil erosion, solid waste management, water contamination, air pollution, noise levels, etc.
- If any tree is uprooted, the contractor should plant at least five folds of tree lost.



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



- Minimum nuisance to the local community should be ensured.
- The proponent must apply for Environmental Approval (NOC) to Punjab-EPD before proceeding further into project implementation.



1 INTRODUCTION

The Faisalabad district is surrounded from North and West by Hafizabad, Jhang, and Toba Tek Singh districts respectively. In the East, it touches Sheikhupura and in the South, it is bounded by river Ravi, across which lies Okara. The district spreads over an area of 58.56 Square kilometers comprising of six tehsils. Faisalabad is the third-largest city of Pakistan with an estimated population of 3.4 million with a growth rate of 3.70% and is a hub of industrial activities in the country.¹ The city is located almost on flat terrain (0.05% slope of alluvial plain). The city has grown rapidly to the present population of about 3.4 million residents, but the environmental infrastructure development, including the capacity of existing water supply, sewerage network, and machinery is lagging due to which the city needs an extensive up-gradation in the water supply as well as the sewerage & drainage system.

The human body consists of 75 percent of water, it is clear that it is one of the prime elements responsible for life on Earth. Water circulates through the human body, transporting, dissolving, and refilling nutrients and organic matter while carrying away waste material. Water might be everywhere, but one must never take it for granted. According to the report by WaterAid, an average of 84-89% of water in Punjab is unsafe. Similarly, Faisalabad has brackish groundwater. Women in rural Punjab still have to collect unsafe water from unsafe resources. An adequate supply of safe drinking water is one of the major prerequisites for a healthy life, but waterborne diseases may be a major cause of death in many parts of Punjab and also all over Pakistan. It is also a significant control to the subsistence of the economy and water-borne diseases are causing Pakistan's economy 1.3 billion dollars of a burden every year. An estimated 250,000 children in Pakistan under the age of 5 years die every year due to water-borne diseases.

Sewers & Drainage systems are also extremely important components of urban infrastructure that help keep the urban environment safe from flooding and prevent the spread of water-borne diseases by safely transporting wastewater to the wastewater

¹ <https://www.punjab.gov.pk/faisalabad>



treatment works and through the transport of rainwater from urban surfaces. Over the years, the understanding of sewer function has expanded, so that expectations of the urban drainage systems are now to help minimize the impact of urban activities on the natural environment and to prevent odor from wastewater in the urban environment.

1.1 Background

Faisalabad has grown to become a major industrial and distribution center because of its central location in the region and connecting roads, rails, and air transportation. Faisalabad is also called Manchester of Pakistan because it's the biggest textile city of Pakistan and all the industries here are related to textiles, the same as Manchester in the UK.² As the industrial growth is flourishing, the demand for water supply and sewerage systems has also increased but the infrastructure is lagging to match the contemporary demand.

Under such a situation, the Chief Minister of Punjab approved a development package for Faisalabad on his visit to the city on 25/08/2020 for extension/rehabilitation of water supply, sewerage, and drainage system. Consequently, different schemes have been proposed by WASA-F for improvement of the existing system in different areas of the city including urban flood mitigation and provision of machinery for the disposal stations to overcome the existing sewerage/drainage issues of the city.

Water and Sanitation Agency, commonly known as WASA, subsidiary of Faisalabad Development Authority, (FDA) was established on April 23, 1978, under the Development of Cities Act 1976 to provide and cater for the services about Water Supply, Sewerage, and Drainage. The WASA Faisalabad (WASA-F) is administratively aligned to Housing Urban Development and Public Health Engineering Department (HUD & PHED) of the Government of Punjab. Presently, the total service area of WASA Faisalabad is 225 sq. km with total registered consumers for water & sewerage being 2,60,000. It is estimated that WASA provides about 72% of the city with sewerage services and about 70% with water services.

² <https://faisalabadinfo.com/manchester-of-pakistan/>

1.2 Screening of Project

This project includes the sub-projects of rehabilitation/extension of water, sewerage, and drainage-related projects. According to Schedule II of IEE/ EIA regulations states that Water supply schemes and treatment plants with a higher cost of Rs.25 million and above, Waste Disposal facilities for domestic waste with an annual capacity of more than 10,000 cubic meters, will require an EIA. Therefore, this project falls in schedule II and thus an EIA is triggered on this Project. The National/Punjab Laws require EIA of projects proposed for its effective implementation to help and ensure that they are environmentally sound and sustainable.

1.3 Project proponent

The Water & Sanitation Agency (WASA), Faisalabad, Government of Punjab under Chief Minister's instructions launched the program of extension/rehabilitation of water supply, sewerage and drainage system in Faisalabad city to meet the need for sustainable clean drinking water as well as the development of Sewerage & Drainage system.

Table 1-1: Responsible Authorities

Sr. No.	Authorities Responsible for	Name of Authority
1.	Sponsoring	Housing, Urban Development and Public Health Engineering Department, Government of Punjab
2.	Execution	Water and Sanitation Agency, FDA, Faisalabad
3.	Operation and Maintenance	Water and Sanitation Agency, FDA, Faisalabad

1.4 Project Consultants

Water & Sanitation Agency (WASA), Faisalabad, Government of Punjab, has engaged M/s Engineering Consultancy Services Punjab (Pvt.) Limited (ECSP) for the preparation of the Environmental Impact Assessment (EIA) report for this project.



The primary contact of the focal person from ECSP is:

Amjad Ghafoor

Chief Engineer (Environment and Social Division),
Engineering Consultancy Services Punjab (Pvt.) Limited
83-A, E/1, Main Boulevard, Gulberg III, Lahore
Phone: +92-42-35717681-84
Email: amjad.ghafoor@ecsp.com.pk

1.5 Objectives of the EIA study

The main objective of the EIA study is to assess the environmental impacts likely to occur due to the construction and operation and to suggest mitigation measures to minimize the likely negative impacts. For achieving the above objectives, the study was mainly divided into the following sections:

- Identification of all requirements as set forth by the Pakistan Environmental Protection Act. 1997 and the Guidelines for preparation of EIA reports, etc.
- Study of the existing regulatory framework in Pakistan concerning the developmental projects;
- Study of Guidelines for the preparation of EIA reports;
- Collection and scrutinizing data related to physical, ecological and socio-economic, and physical resources of the project area;
- Evaluation of data and identification of significant environmental impacts;
- Identification of necessary mitigation measures to minimize the negative impacts; and preparation of an Environmental Management Plan.

1.6 Approach and methodology

In preparing the EIA Report, overall baseline conditions like physical environmental components like Topography, Climate, Groundwater, Rainfall, Water quality, Temperature, Geology, Seismology, etc. are studied whereas the biological environment is also taken into consideration like fauna and flora of the project area. In addition to the baseline conditions, alternative discussions are also sought in detail as well as the environmental impact



description and mitigation measures, and an overall Environment Management Plan describing the measures taken to minimize the significant adverse impacts of the project. During the study, surveys regarding the data collection were carried out to gather accurate information about the environmental and socio-economic conditions.

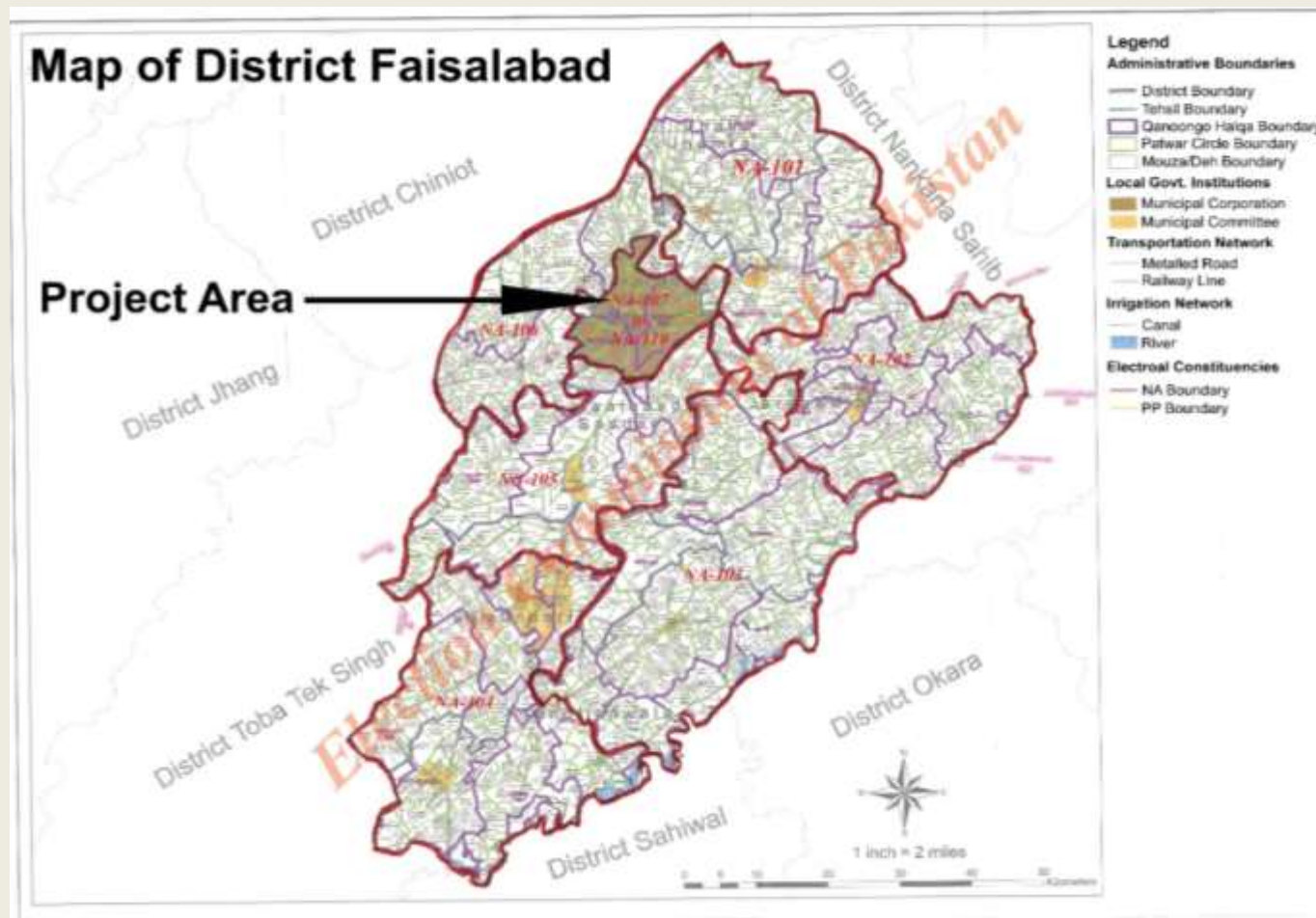
This Environmental Impact Assessment (EIA) is a statutory requirement of the Government of Punjab (previously the Government of Pakistan's Environment Protection Act of 1997, now taken as a provincial subject after the eighteenth amendment in the constitution). The process of assessment also includes stakeholder consultations during the process and after the completion of the report is called public disclosure.

1.7 Nature, size, and location of the project

The main objective of this project includes improvement in existing water supply, sewerage and drainage network to cover the supply-demand gap of clean water, to avoid unhygienic environmental problems in the city, and to cater to inundation in low lying areas. And the Provision of O&M machinery to increase the institutional capacity for improvement in the services.

In Faisalabad, major supply (90%) is derived from the tube wells installed in Chenab Well-field and Jhang Branch Canal Well Field to supply the water. WASA-F has implemented many projects to meet the gap between supply and demand in Faisalabad; the requirement of water has increased beyond the supply capacity in 2021. Similarly, the existing sewerage system was laid many decades back. During this period, there has been immense population growth increasing sewage flow, making the system deficient for the present population as well as an increase in flooding in the monsoon due to a poor drainage system. Further, the laid system has outlived its operational life and there are frequent maintenance problems in the sewerage and drainage system.

This project includes the 17 sub-projects of water supply, sewerage, and drainage sub-projects that lie within the Faisalabad city under the CM Package. The project mainly includes the five National Assembly's constituencies (NA-105, NA-107, NA-108, NA-109, NA-110) of Faisalabad city:



3

Figure 1-1: Project Location

The details of each sub-project will be discussed under the heading 3.11.

1.8 Scoping

The scoping identifies the key issues and impacts that should be further investigated. The scoping defines the spatial and temporal boundaries of Environmental Assessment, important issues and concerns raised, and significant impact factors to be determined.

1.8.1 Spatial Boundaries of the Project

The project will cover the different areas falling into the following 5 National

³ Election Commission of Pakistan (Faisalabad City Boundary)

Assembly's Constituencies of Faisalabad that are highlighted in the map given below. No land acquisition is required for the project as all the land required for all the sub-projects is state-owned. The spatial boundaries are given in below map as **Figure 1.2:**

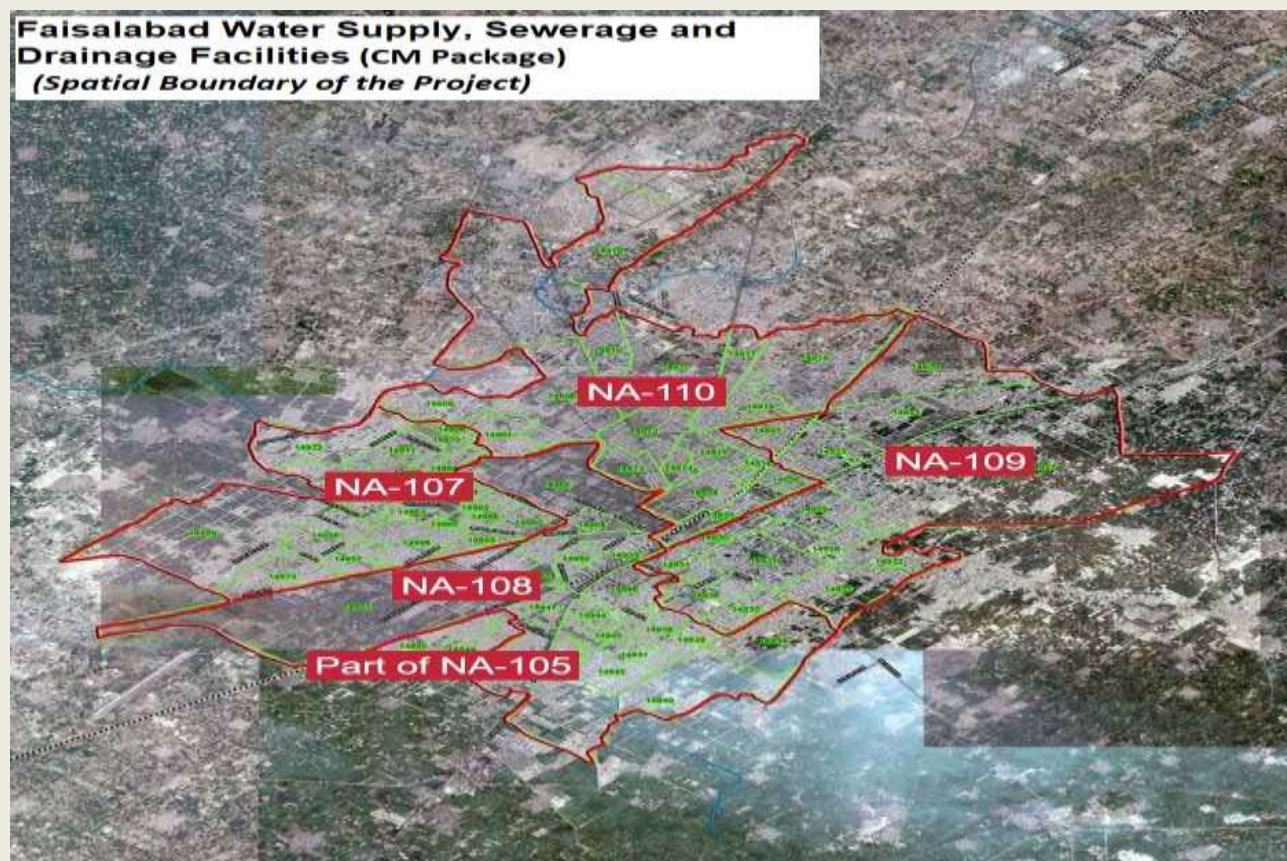


Figure 1-2: Spatial Boundaries of the Project

1.8.2 Important Issues and Concerns raised during the consultation

The consultation, scoping meetings were carried out in the project area to disseminate information about the project and its expected impact on the primary and secondary stakeholders. Several relevant stakeholders were consulted regarding the proposed project activities during different KIIs (Key Informant Interviews), FGDs (Focused Group Discussions), and meetings. The positive and negative impacts and mitigation measures were discussed with the stakeholders. All meetings and discussions are documented in Chapter-4 and Chapter-7, of this EIA report.

1.8.3 Significant Issues and factors to be considered during EIA study

It was unanimously agreed by almost all the consultation participants that the project is necessary for the provision of potable water supply, sewerage and drainage facilities considering the needs of the growing population. However, most of the participants are of the view that compliance with the mitigations should be ensured in the project. And the roads, streets should be reconstructed on a priority basis.

1.9 Environmental impact assessment (EIA) team

A team of experienced professionals drawn from various disciplines and having relevant experience in conducting Environmental Assessments participated in the preparation of the Environmental Impact Assessment (EIA) Report. The study team collaborated during a comprehensive survey of the project site, discussions with the proponents and collection and analysis of data collected from stakeholders, conducting surveys and spot analysis, and preparation of the report in consultation with specialists. This Environmental Impact Assessment (EIA) has been prepared by the core team of experts given in **Table 1-2** below:

Table 1-2: List of EIA Team

Sr. No.	Name	Position
1.	Sheikh Amjad Ghafoor	Chief Engineer, Environment
2.	Muhammad Talha Ikram	Environmental Engineer
3.	Ahsan Rasheed	Junior Environmentalist
4.	Asad Naveed	Junior Environmentalist
5.	Hamza Shahid	Junior Water Treatment Engineer
6.	Jawad Mubeen	Site/Survey Environmental Inspector



1.10 Structure of the report

The draft EIA report is divided into nine chapters. **Chapter-1** covers an introduction to the proposed Project, **Chapter-2** provides the country's environmental legislative requirements and framework applicable to the proposed Project together with the guidelines, **Chapter-3** presents the description of the Project including project components and activities, design parameters, detail of infrastructure facilities, alternatives, etc., **Chapter-4** describes in detail the existing environmental baseline conditions of the Study Area related to the physical, ecological and social domains of environment, **Chapter-5** exhibits the assessment of the impact at construction and operational phases of the proposed project along with their mitigation measures, **Chapter-6** outlines EMP along with proposed institutional framework required for effective implementation and monitoring, **Chapter-7** explains the public consultation mechanism and findings, **Chapter-8** gives the conclusions and recommendations.



2 LEGISLATIVE AND REGULATORY OVERVIEW

2.1 Introduction

The objective of the project is to prepare a Comprehensive Rehabilitative Plan for the provision of safe drinking water to the residents of Faisalabad and solve the problems of sewerage and drainage in line with the Vision 2025, National Water Policy 2018, Punjab Water Policy 2018, Punjab Growth Strategy and Sustainable Development Goals.

Several environmental laws exist in Pakistan, containing several clauses concerning the protection of the environment however its history began over three decades ago. The Pakistan Environmental Protection Ordinance (PEPO) 1983 was the first legislation promulgated for the protection of the environment. Pakistan Environment Protection Agency (Pak-EPA), however, was established in 1984. No significant environmental policy, guidelines, and regulations were enacted until the early 1990s. The National Conservation Strategy (NCS) was developed and approved by the federal cabinet in 1992. Provincial Environmental Protection Agencies were also established in 1992-1993 including Punjab-EPA. National Environmental Quality Standards (NEQS) were established in 1993. Detailed environmental guidelines started in 1996. The National Assembly and the Senate conferred Pakistan Environmental Protection Act (PEPA) in 1997. National Environment Policy was passed by the parliament in 2005 which received World Bank approval in 2011. Water and Sanitation Authority, Faisalabad (WASA-F) has been assessed in compliance with the existing legal framework on the environment in Pakistan as described henceforth.

2.2 National Laws and Regulations

The enactment of the Pakistan Environmental Protection Act (PEPA) 1997 conferred broad-base enforcement powers to the environmental protection agencies. The publication of the Pakistan Environmental Protection Agency Review of IEE and EIA Regulations (IEE-EIA Regulations), 2000, provided the necessary details on the preparation, submission, and review of initial environmental examinations (IEE) and environmental impact assessments (EIA). In addition to the PEPA, 1997, Pakistan's statute books contain several other laws that have clauses concerning the regulation and protection of the environment.



The Environmental Protection Agency (EPA), Punjab is a Regulatory body under provisions of the Punjab Environmental Protection Act, 1997 (Amendment 2012) in the Province of Punjab. Most of the existing laws on environmental and social issues have been enforced over an extended period, and are context-specific. The laws relevant to the developmental projects are briefly reviewed below:

2.2.1 National Water Policy 2018

The objective of the National Water Policy is to take cognizance of the emerging water crisis and provide an overall policy framework and guidelines for a comprehensive plan of action. Pakistan has a federal system of government and the provinces enjoy a considerable degree of 2 autonomy under the 18th Amendment to the Constitution. Thus, this policy is a national framework within which the provinces can develop their master plans for sustainable development and management of water resources. The water resource is a national responsibility but irrigation and agriculture, as well as rural and urban water supply, environment, and other water-related sub-sectors, are provincial subjects.

2.2.2 Punjab Water Policy 2018

This Punjab Water Policy is a sectoral policy document at the provincial level. The overall objective of Punjab's Water Policy is to provide clear policy directions to the Government of Punjab on the sustainable management and development of water from all sources of water (surface water, groundwater, and rainwater), for all sub-sectors of water use (domestic, stock water, agriculture, industry, commercial and environment) and all regions (Indus basin canal commands and outside the canal commands) at the basin level through equitable water allocations, management, and development.

The Policy contributes to helping eliminate hunger, food insecurity, and malnutrition. The first 3 priorities for the consumptive and non-consumptive uses of water are set as:

- Drinking and Sanitation (WASH);
- Irrigation;
- Livestock, fisheries, and wildlife.

The specific objectives of the Policy include:

- Rigorously pursue Demand Management through water conservation, improving irrigation efficiency, increasing water productivity, adjusting cropping patterns, developing water-food-energy nexus and population control;
- Enforce Drinking Water and Sanitation Standards in urban and rural areas through the construction of water treatment plants, sewage disposal, solid waste management, proper landfills siting, and management;
- Increase Water Availability through advocacy of construction of large dams at the Federal level, construction of small and medium dams, beneficial use of floodwaters, reallocation between sectors, and recycling and reuse of wastewater

2.2.3 Pakistan Environmental Protection Act, 1997

The Act applies to a broad range of issues and extends to air, water, soil, marine, and noise pollution, as well as the handling of hazardous waste. Some portions of the Act are reproduced below for reference purposes.

- Section-11 (1) (Prohibition of Certain Discharges or Emissions): "Subject to the provisions of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollution or noise in an amount, concentration or level which is more than the National Environmental Quality Standards."
- Section-12 (1) (IEE and EIA): "No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination (IEE) or, where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained from the Federal/ Provincial Agency approval in respect thereof".
- Section 12-2b (Review of IEE and EIA): The Federal/ Provincial Agency shall review

the EIA report and accord its approval subject to such conditions as it may deem fit to impose, or require that the EIA be re-submitted after such modifications as may be stipulated or rejected, the project as being contrary to environmental objectives.

- Section-14 (Handling of Hazardous Substances): "Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except (a) under a license issued by the Federal Agency and in such manner as may be prescribed; or (b) by the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or another instrument to which Pakistan is a party"
- Section 15 (Regulation of Motor Vehicles): Subject to the provision of this clause of the Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration, or level which is more than the NEQS, or where the applicable standards established under clause (g) of subsection (1) of Section-6 of the Act.
- Section 17 (Penalties): Whoever contravenes or fails to comply with the provisions of section 11, 12, 13, or section 16 or any order issued there thereunder under shall be punishable with a fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues: Provided that in contravention of the provisions of section 11 also constitutes a contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

2.2.4 Review of IEE/ EIA Regulations (2000)

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000, prepared by the Pak-EPA under the powers conferred upon it by the PEPA, 1997 provide the necessary details on the preparation, submission, and review of the initial environmental examination (IEE) and the environmental impact assessment (EIA).

Categorization of projects for IEE and EIA is one of the main components of the IEE/EIA Regulations, 2000. Projects have been classified based on the expected degree of adverse environmental impact. Project types listed in Schedule II of the regulations are designated as potentially seriously damaging to the environment, and those listed in Schedule I as having potentially less adverse effects.

Schedule-I projects require an IEE to be conducted, rather than a full-fledged EIA, provided that the project is not located in an environmentally sensitive area. The projects listed in Schedule-II are generally major projects and have the potential to affect a large number of people in addition to significant adverse environmental impacts. For the Schedule II projects, conducting an EIA is necessary. According to Schedule-II; List of Projects requiring EIA of the IEE/ EIA regulations, 2000, the following is the exact version of the Clause F and Clause G (2):

2.2.2.1 Water Supply and Treatment

“Water supply schemes and treatment plants with a total cost of Rs.25 million and above”

2.2.2.2 Waste Disposal

“Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters” (**Source: IEE/ EIA Regulations 2000**)

2.2.5 Punjab Environmental Protection Act 1997

After the 18th Constitutional Amendment in the Constitution of Pakistan, the Federal Ministry of Environment has been dissolved and the subject of the environment has been handed over to provinces, thus Punjab-EPA has formulated its act. The major content of the act is the same as of PEPA, 1997 but minor amendments/changes have been made viz.:

- The Name of the Act has been changed into “Punjab Environmental Protection (Amendment) Act, 2012”.
- For the words “Federal Government”, wherever occurring, the word “Government” Shall besubstituted;



- For the words “Federal Agency”, wherever occurring, the words “Provincial Agency” shall be substituted; and for the word “National”, wherever occurs, the word “Punjab” shall be substituted.

All the other clauses, sub-clauses, sections, and sub-sections are almost the same.

2.3 OTHER RELEVANT LAWS

2.3.1 Pakistan Penal Code, 1860

The Act deals with the offenses where public or private properties and human lives are affected due to intentional or accidental misconduct of an individual or a mass of people. It also addresses violations of any law of the country.

2.3.2 Land Acquisition Act, 1894

Land Acquisition Act 1894 provides the acquisition of private properties for public purposes including development projects in Pakistan. It comprises fifty-five sections dealing with area notifications, survey, acquisition, compensation, apportionment awards, disputes resolutions, penalties, and exemptions. The latest revision/amendments including land acquisition rule 1983 and general regulation called standing order No. 28 shall be applicable.

2.3.3 Code of Criminal Procedure, 1898 (Act V of 1898)

This act provides details of the procedures to be adopted in handling legal cases. Various sections such as section 494 have been renumbered as sub-section (1) thereof and after sub-section (1) renumbered as aforesaid, the following sub-section (2) and (3) have been added.

2.3.4 Forest Act, 1927

Forest Act of 1927 establishes the right of the Government to designate areas for the reserved forest, village forest, and protected forest, and they may acquire such areas to prohibit or restrict the public use of such resources or other activities within them.

2.3.5 Punjab Wild Life Protection Act 1974

This act was enacted on 1st February 1974. The purpose of this act is to provide for



the Protection, preservation, conservation, and management of wildlife in the Province of Punjab. The act may be called Punjab Wildlife Act 1974 and it extends to the whole province of Punjab. This legislation creates a wildlife department and protects the wildlife.

2.3.6 Punjab Irrigation and Drainage Authority Act, 1997

This Act aims to implement the strategy of the Government of Punjab for streamlining the Irrigation and Drainage System; to replace the existing administrative set up and procedures with more responsive, efficient, and transparent arrangements; to achieve economical and effective operation and maintenance of the irrigation, drainage and flood control system in the Province; and to make the irrigation and drainage network sustainable on a long-term basis and introduce participation of beneficiaries in the operation and management.

2.3.7 Punjab Local Government Act 2013

It is expedient to establish an elected local government system to devolve political, administrative, and financial responsibility and authority to the elected representatives of the local governments; to promote good governance, effective delivery of services, and transparent decision making through institutionalized participation of the people at the local level; and, to deal with ancillary matters; It is enacted as follow: This Act may be cited as the Punjab Local Government Act 2013.

- It extends to the whole of Punjab except the Cantonment areas or any other area excluded by the Government by notification in the Official Gazette.
- It shall come into force on such date as the Government may, by notification, appoint and Different dates may be appointed for coming into force of different provisions of this Act.

2.3.8 Factories Act, 1934 (as amended to 1997)

The pertinent clauses of the Act are those that deal with the health, safety, and welfare of the workers, disposal of solid waste and effluent, and damage to private and public property. It also deals with the regulations for handling and disposing of toxic and



hazardous materials. As the construction activity has also been classified as an 'industry', the regulations will apply to the Contractors.

2.3.9 Protection of Trees Act, 1949

This Act prohibits cutting or lopping of trees along roads and canals planted by the Forest Department, without permission of the Forest Department. This Act prohibits the cutting of trees in the Water and Sanitation Authority, Faisalabad (WASA-F) project area.

2.3.10 Motor Vehicle Ordinance, 1965 and Rules, 1969

The Motor Vehicles Ordinance, 1965, has been extended with effect from March 05, 1978, to the whole of Pakistan. It deals with the licensing requirement for driving; powers of licensing authority, Regional Transport Authority and those of Court vis-à-vis disqualification for license and registration requirements to control road transport; compensations for the death of or injury to a passenger of the public carrier; powers of Road Transport Corporation; traffic rules, power to limit speed, weight, use of vehicles; power to erect traffic signs; specific duties of drivers in case of accident and powers of police officers to check and penalize traffic offenders.

2.3.11 Antiquity Act, 1975

The Antiquities Act of 1975 ensures the protection of cultural resources in Pakistan. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The law prohibits new construction in the proximity of protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the project proponents are obligated to: Ensure that no activity is undertaken in the proximity of protected antiquity, and if during the Project an archaeological discovery is made, it should be reported to the Department of Archaeology, Government of Pakistan.

2.3.12 Labor Laws

Labor laws in Pakistan are governed by several legislative tools. However, the



principal labor rights are provided by the constitution of Pakistan. In addition to constitutional rights, Acts and Ordinances have been enforced for limiting working hours, minimum working age, and conditions of employment. The laws will apply to the Water and Sanitation Authority, Faisalabad (WASA-F) construction contractors.

2.3.13 Employment of Child Act, 1977

Article 11(3) of the Constitution of Pakistan prohibits the employment of children below the age of 14 years in any, factory, mines, or any other hazardous employment. By this Article, the Employment of Child Act (ECA) 1991 disallows child labor in the country. The ECA defines a child to mean a person who has not completed his/her the fourteenth year of age. The ECA states that no child shall be employed or permitted to work in any of the occupations outlined in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes are defined in the Act is carried out. The processes defined in the Act include carpet weaving, beerri (kind of a cigarette) making, cement manufacturing, textile, construction, and others). Water and Sanitation Authority, Faisalabad (WASA-F) project will go through construction and operation phase; hence employment of Child Act 1977 will apply to WASA-F construction activities.

2.3.14 Local Government Ordinance, 2001

This Act empowers the Government of Pakistan and provincial governments to enforce laws for land use; conservation of natural vegetation; air, water, and land pollution; disposal of solid waste and wastewater effluents; and public health and safety, including some provisions for environmental protection. Section 93 of this Ordinance pertains to environmental pollution, under which the local councils are authorized to restrict causing pollution to air, water, or land. Water and Sanitation Authority, Faisalabad (WASA-F) will have to follow the Local Government Ordinance 2001 with regards to pollution of air, water, and land.

2.3.15 Eighteenth Amendment to Constitution of Pakistan Act 2010

The constitution of Pakistan has been amended by Eighteenth Amendment by Act 2010 by due process of Law on 19th April 2010. "Environmental pollution and ecology" used

to be listed at number 24 of the Concurrent Legislative List of Schedule IV of the Constitution of Pakistan. Under the 18th amendment to the constitution of Pakistan, the entire Concurrent List has been omitted.

The 18th amendment to Pakistan's constitution does away with all the entries in the Concurrent List. Now, under the constitution, the parliament in Islamabad is competent to legislate only on matters in the Federal Concurrent List and the provinces have the power to legislate on anything that isn't on the Federal Concurrent List. The regulatory arrangement sat at odds with the needs and demands of enforcement. First, not all of the federal EPA's powers and functions were delegated to provincial Punjab-EPA.

2.4 Policy Framework

2.4.1 National Conservation Strategy (NCS), 1992

The Pakistan National Conservation Strategy (NCS) is the principal policy document for environmental issues in the country and was developed and approved by the Government of Pakistan on March 1, 1992. The NCS works on a ten-year planning and implementation cycle. The NCS deals with 14 core areas which are;

- Maintaining soils in cropland; Increasing irrigation efficiency; Protecting watersheds; Supporting forestry and plantations;
- Restoring rangelands and improving livestock; Protecting water bodies and sustaining fisheries; Conserving biodiversity;
- Increasing energy efficiency;
- Developing and deploying material for renewable energy; Preventing/abating pollution;
- Managing urban wastes;
- Supporting institutions for common resources; Integrating population and environmental programs and Preserving the cultural heritage.

2.4.2 National Environmental Policy

This policy was implemented in 2005 to provide an overarching framework for



addressing the environmental issues facing Pakistan. It gives directions for addressing Sectorial issues and provides means for promoting conservation and environmental protection in water, air and waste management, forestry, and transport. The policy aims to promote the protection of the environment, the honoring of international obligations, sustainable management of resources, and economic growth. Water and Sanitation Authority, Faisalabad (WASA-F) will be required to promote, conserve and protect the environment.

2.4.3 Guidelines for Preparation and Review of Environmental Reports

These guidelines on the preparation of environmental reports address project proponents, and specify the:

- Nature of the information to be included in environmental reports;
- Need to incorporate suitable mitigation measures into every stage of project implementation;
- Need to specify monitoring procedures; and the Terms of reference for the reports are to be prepared by the project proponents themselves.

2.4.4 Policy and Procedures for Filling, Review, and Approval of Environmental Assessments 2000

These policies and procedures define the policy context and the administrative procedures that govern the environmental assessment process, from the project pre-feasibility stage to the approval of the environmental report.

2.4.5 Guidelines for Public Consultations, 1997

The guidelines deal with 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 impact assessment.

2.4.6 Guidelines for Sensitive and Critical Areas, 1997

The guidelines identify officially notified protected areas in Pakistan, including critical ecosystems, archaeological sites, etc., and present checklists for environmental assessment



procedures to be carried out within or near such sites. Environmentally sensitive areas include, among others, archaeological sites, biosphere reserves and natural parks, and wildlife sanctuaries and preserves, none of which are relevant to the Project area.

2.5 National Environmental Quality Standards (NEQS 2000; Amended In 2010)

NEQS was first promulgated in 1993 and was amended in 2000, 2009, and 2010. The NEQS 2000 includes Environmental Quality Standards for Municipal and Liquid Industrial Effluents (32 parameters) and Industrial Gaseous Emissions (18 parameters). NEQS 2009 provides standards for motor vehicle exhaust and noise (in used vehicles and new vehicles). NEQS 2010 provides the standards for ambient air quality (9 parameters), drinking water quality (32 parameters), and noise (four zones during day and night).

2.6 Environmental Regulatory Authorities

The development of statutory and other instruments for environmental protection has steadily gained priority in Pakistan since the late 1970s. The Pakistan Environmental Protection Ordinance (PEPO) 1983 was the first legislation in Pakistan designed specifically for the protection of the environment. The promulgation of this Ordinance was followed in 1984 by the creation of the Pakistan Environmental Protection Council (PEPC) Pakistan Environmental Protection Council

The PEPC is the highest inter-ministerial statutory body in the country headed by the Chief Executive and is responsible for:

- Formulating national environmental policy; Enforcing PEPA 1997;
- Approval of the NEQS;
- Provision of guidelines for the protection and conservation of biodiversity in general as well as conservation of renewable and non-renewable resources; and in the amendment of the PEPA 1997 for the word Pakistan is substituted by Punjab.

2.6.1 Pakistan Environment Protection Agency (Pak-EPA)

The PAK-EPA is headed by a Director-General and has wide-ranging functions as set out in PEPA 1997. These include preparation and coordination of national environmental



policy for approval by PEPC, administering and implementing PEPA 1997, and preparation, revision, or establishment of NEQS. The PAK-EPA has issued regulations regarding the environmental assessment procedures known as Review of Initial Environmental Examination (IEE) and EIA Regulations, 2000; these provide a firm legal status to the IEEs and EIAs. The jurisdiction of the EPA applies to the following projects:

- On federal land; Military projects;
- Involving trans-country impacts, and Bearing trans-province impacts.

2.6.2 Environmental Protection Department (EPD), Punjab

Punjab, along with other provinces, has its own Environmental Protection Department (EPD) as a provincial level counterpart of the PAK-EPA. It is headed by a Director-General who exercises powers delegated to him by the provincial government. The IEE and EIA report about projects falling within Punjab are to be submitted to Punjab EPA for approval. Water and Sanitation Authority, Faisalabad (WASA-F) is responsible for providing the complete environmental documentation required by the Punjab-EPA and remains committed to the approved project design.

No deviation is permitted in design and scope of work during Project implementation without the prior and explicit permission of the Punjab-EPA.

3 PROJECT DESCRIPTION

3.1 Introduction

Faisalabad is the third-largest city of Pakistan with a present estimated population of 3.4 million, located in the central part of the Punjab Province, and has developed as an Industrial City. The city is situated on flat topography which does not allow the disposal of sewage and stormwater from the city through gravity flow. For this purpose, multistage pumping is frequently performed by the WASA Faisalabad (WASA-F) for eventual disposal of the wastewater which is quite expensive and challenging. The city of Faisalabad is divided into two zones (Western and Eastern). The North-Western area is drained towards Paharang Drain which eventually discharges into River Chenab. The east area of the canal slopes towards the South-East and drains into the Madhuana Drain which discharges into the Ravi River.

The WASA Faisalabad revealed, during the reconnaissance session, that around 72% population of the city Faisalabad is served through 34 functional disposal stations located across the city. The length of the sewerage network of WASA Faisalabad is around 1711 km which is connected with the abovementioned 34 disposal stations which are further linked with the four main channels for the final disposal of wastewater. The length of these main channels is 62KM. There are so many pockets of thickly populated areas in an outskirts of the city, where a proper sewerage system is lacking. The wastewater is being disposed of through sullage drain/ private laid defective sewer lines creating miserable sanitary living conditions. Most of the existing sewer lines has been laid 40 years ago which are required to be replaced and laid new sewer lines to provide better sanitation facilities.

WASA-F has implemented many projects to meet the gap between supply and demand in Faisalabad; the requirement of water has still increased beyond the supply capacity in 2021. The Japanese Consultant under WASA F Master Plan proposed to replace the water supply lines which are undersized, outlived, rusted, and damaged water supply lines in the city for pressure balancing and provision of contamination-free water to residents. These lines are causing waste of water which increases in Non-Revenue Water. Furthermore, it damages the road and gives inconvenience to the public.

During this period, there has been immense population growth increasing sewage flow, making the system deficient for the present population as well as an increase in flooding in the monsoon due to a poor drainage system. Further, the laid system has outlived its operational life and there are frequent maintenance problems in the sewerage and drainage system. Moreover, some mobile machinery was provided by JICA in 2014 which is very helpful to WASA but it could not fulfill the present requirement given the expansion of the sewerage system.

A summary of the bailout package was forwarded to Chief Minister Punjab with a request for assistance from the Government of Punjab. Chief Minister of Punjab approved a development package for Faisalabad on his visit to the city on 25/08/2020 for extension/rehabilitation of water supply, sewerage and drainage system in the areas falling under NA-105, NA-107, NA-108, NA-109, and NA-110. Consequently, different schemes have been proposed by WASA-F for improvement of the existing system in different areas of the city including urban flood mitigation and the provision of machinery for the disposal stations to overcome the existing water supply and sewerage/drainage issues of the city.

3.2 Type and Category of Project

According to the PAK-EPA Regulations, 2000 for Review of IEE and EIA, this project of extension/rehabilitation of water supply, sewerage, and drainage system falls under category 'F' (Water Supply Schemes and treatment plants with a total cost of Rs. 25 million and above) and 'G' (Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters) of Schedule-II Projects, which requires an EIA.

3.3 Objectives of Project

The main objective is the rehabilitation and extension of water supply, sewer and drainage facilities, and upgrading the disposal stations based on meeting daily increasing demand for households and managing the existing system more efficiently. It also includes the provision of machinery to WASA for operation and maintenance and to cater to urban flooding. The intervention proposed in PC-I, by WASA, is for areas without proper sewer facilities or with an outlived water supply and sewer lines. At present, 70% population is being

served with a water supply and 72% with a sewerage facility. Almost 40% of the city area will be benefitted from the forthcoming improvement of the water supply network.

The Disposal stations were constructed in the early 1980s and expired their useful life. Accordingly, pumping machinery is also old and less efficient. Resultantly, WASA-F has to bear the additional burden of electricity bills, wear and tear of machinery. Disposal station is the heart of the sewerage system upon which the efficiency of the whole sewerage system depends. Hence, improvement/rehabilitation is essential to improve the efficiency of the sewerage system and the public will enjoy good sanitation and environmental conditions. Wastewater is creating unhygienic, and environmental problems in the areas putting human health at risk.

This project is part of the master plan for WASA Faialsbad (2018-2038) and is aligned with Punjab Spatial Strategy (2017-2047). To achieve the sewerage related Sustainable Development Goal 6, the objective of providing 100% sanitation facility till 2030, this mega project has been prepared, considering:

1. Improvement in existing water supply, sewerage, and drainage network to cover the supply-demand gap of clean water, to avoid unhygienic environmental problems in the city, and to cater inundation in low-lying areas.
2. Provision of O&M machinery for improvement in the services.

3.4 Project Location

The Project area spreads in the whole Faisalabad City. Sewerage and Drainage facilities will be improved in the areas of Eastern and Western areas of Faisalabad including but not limited to Barkat Pura, Waris Pura, Raza Abad, Islam Nagar, Gulistan Colony, D Type Colony, Allama Iqbal Colony, Nishatabad, etc. Chak no. 215 Islam Pura, Nethry, Usman Town, Satellite Town, Awais Town, Samanabad, Sekhan Wala, Nisar Colony, Manan Town, Gulshan-E-Iqbal, Sitara Colony, Habib Town, Peoples colony, Madina Town, Shamsabad Division & Adjoining Areas, to mention a few. Presently, disposal stations pumping out the wastewater of these areas lack capacity which causes unhygienic environmental conditions, especially during the rainy season.

The project will cover the areas falling into the following 5 National Assembly Constituencies of Faisalabad that are highlighted in the map given below as **Figure 3-1**:

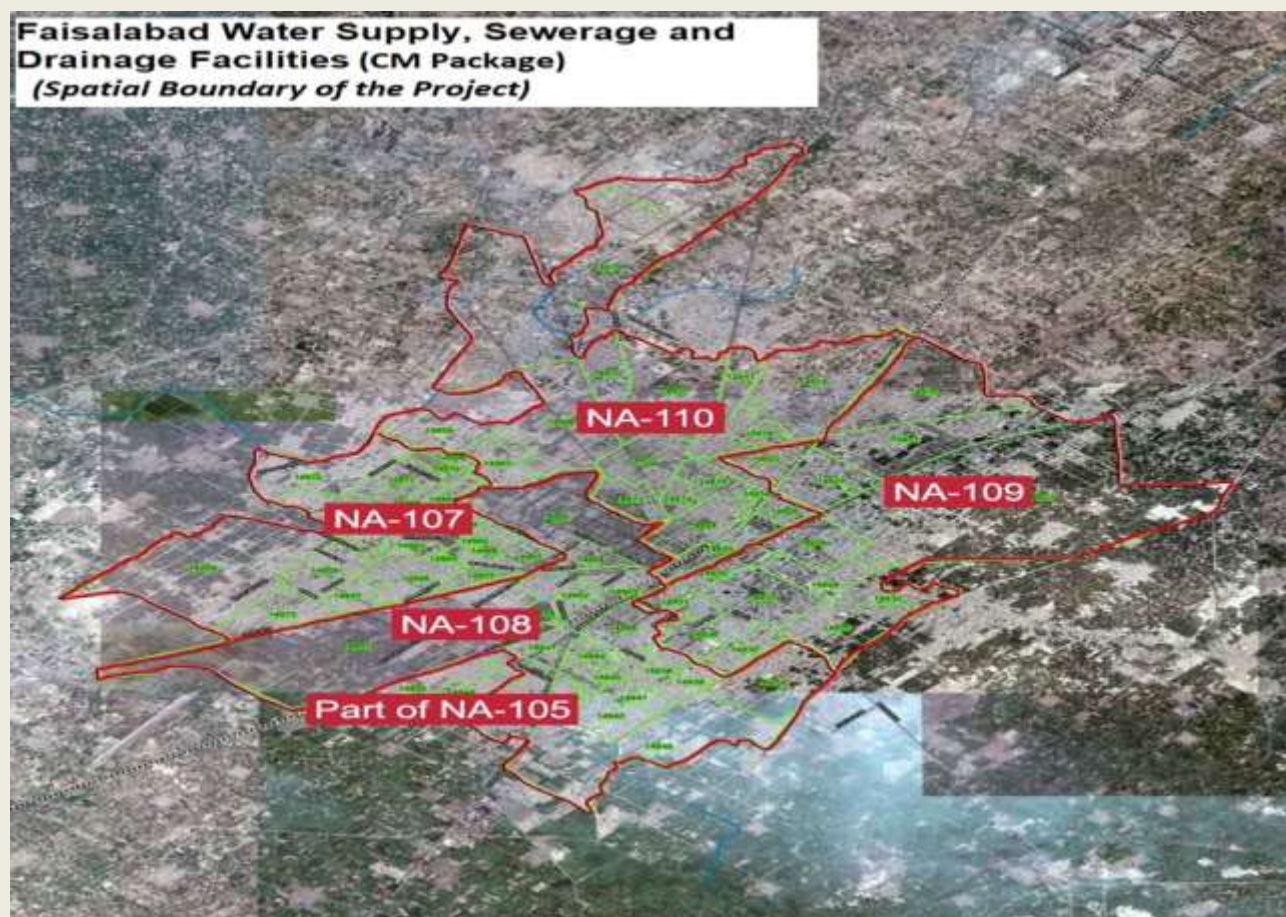


Figure 3-1: Boundary of the Project Area

The Project is being proposed to provide relief during a disaster and better management of water supply and reduce sewerage complaints. The details of the proposed sub-projects, to strengthen the water and wastewater facilities of the city, are mentioned below:

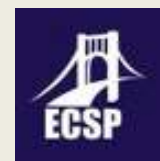
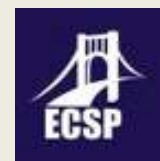


Table 3-1: Details of Proposed Sub-Project Schemes

Serial No.	Proposed Sub-Project
1.	Improvement of Sewerage & Drainage System in NA-105/PP-113
2.	Rehabilitation/ Replacement of Damaged and Outlived Trunk, Secondary and Tertiary Sewerage Network of Faisalabad City
3.	Extension of sewerage network in Un-served & Partially served areas in the outskirts of Faisalabad city
4.	Improvement and Replacement of Outlived, Damaged Water Supply Lines in Faisalabad City
5.	Procurement of Machinery for Operation & Maintenance and Urban Flood Mitigation WASA F
6.	Rehabilitation of Sewerage System from General BUS Stand to Trunk Sewer Bolay Di-Jhugi, Sargodha Road Faisalabad.
7.	Improvement of Sewerage and Drainage System in PP-97, Faisalabad
8.	Rehabilitation/ Replacement/ Improvement of Sewerage & Drainage system, NA -107 (PP-109,110, 111 & 112), Faisalabad.
9.	Augmentation of Disposal Stations, Machinery, Equipment And T&P for O&M of Sewerage System in NA -107 (PP-109,110, 111 & 112), Faisalabad.
10.	Rehabilitation/ Replacement/ Extension of Sewerage and Drainage System in NA-108 (PP-111, 113 & 114), Faisalabad
11.	Augmentation of Disposal Stations, Machinery, Equipment, and T&P for O&M of Sewerage System in NA-108 (PP-111, 113 & 114), Faisalabad.



12.	Rehabilitation/ Replacement of Sludge Carrier Risalewala Road to Dijkot Seepage Drain
13.	Improvement/ Extension of Sewerage & Drainage System in NA-109 (PP-111, 113, 114)
14.	Augmentation of Disposal Stations, Machinery, Equipment, and T&P for O&M of Sewerage System in NA-109 (PP-111, 113 & 114), Faisalabad.
15.	Rehabilitation / Replacement / Extension of Sewerage and Drainage System in NA-110 / PP-111, 114, 115, 116 & 117, Faisalabad
16.	Augmentation of Disposal Stations, Machinery, Equipment's & T&P for O&M of Sewerage System in NA-110 / PP-111, 114, 115, 116 & 117, Faisalabad
17.	Provision of Sewerage System and other developments at Shamsabad & Allied Areas Shamsabad Sub Division

3.5 Project Site features: Land Use, Road Access, and Vegetation

The project area lies in Faisalabad city. At each project site, mixed land use pattern is observed which is residential, commercial, agricultural as well as industrial. But the area falling under the jurisdiction of this project is mostly residential cum commercial mainly having settlements in the form of colonies and villages.

As the scope of work of this project is restricted to Faisalabad city, therefore it is observed that provision of basic municipal services is available and needed to upgrade due to the immense population growth. The access roads to transfer construction material through machinery into the project sites are available whereas some metaled roads are in poor condition.

The city has a network of roads which links it with other areas of the city as well as the other country. Road infrastructure is mainly divided into two types metaled roads and

unmetalled roads. Generally, the metaled road network is found in the city area, major towns are linked through them.

As the project will pass through the street and road network, there exists little vegetation.

3.6 Cost and magnitude of operation:

The Project will cover the whole Faisalabad City under the special CM Package for Faisalabad. The deteriorated Asbestos Cement (AC) Pipe distribution network for water will be replaced by High Polyethylene Pipes (HDPE). New waterproof Underground tanks will be built. New Pumping Machinery in the Pump House will be installed to ensure the Punjab EPA standards for potable water. This will directly benefit around 40% of the city's population.

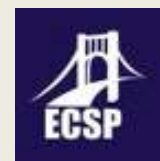
The outlived Sewerage and Drainage facility will be improved in the areas of Eastern and Western areas of Faisalabad including but not limited to Barkat Pura, Waris Pura, Raza Abad, Islam Nagar, Gulistan Colony, D Type Colony, Allama Iqbal Colony, Nishatabad, etc. Chak no. 215 Islam Pura, Nethry, Usman Town, Satellite Town, Awais Town, Samanabad, Sekhan Wala, Nisar Colony, Manan Town, Gulshan-E-Iqbal, Sitara Colony, Habib Town, Peoples colony, Madina Town, Shamsabad Division & Adjoining Areas, to mention a few. The areas identified by the WASA-F where the conditions are miserable. The total capital cost breakup division-wise is given below which will be covered in 3 years by the Government of Punjab. The cost estimates are given below as per PC-1:

Table 3-2: Sub Project wise Capital-Cost Breakup

Sr. No.	General abstract of cost	Amount (Rs. in Million)
1.	Improvement of Sewerage & Drainage System in NA-105/PP-113	150
2.	Rehabilitation/ Replacement of Damaged and Outlived Trunk, Secondary and Tertiary Sewerage Network of Faisalabad City	300
3.	Extension of sewerage network in Un-served & Patiallytion served areas in the outskirt of Faisalabad city	60
4.	Improvement and Replacement of Outlived, Damaged Water Supply Lines in Faislabad City	300



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5.	Procurement of Machinery for Operation & Maintenance and Urban Flood Mitigation WASA F	400
6.	Rehabilitation of Sewerage System from General BUS Stand to Trunk Sewer Bolay Di-Jhugi, Sargodha Road Faisalabad.	51.9
7.	Improvement of Sewerage and Drainage System in PP-97, Faisalabad	100
8.	Rehabilitation/ Replacement/ Improvement of Sewerage & Drainage system, NA -107 (PP-109,110, 111 & 112), Faisalabad.	200
9.	Augmentation of Disposal Stations, Machinery, Equipment And T&P for O&M of Sewerage System in NA -107 (PP-109,110, 111 & 112), Faisalabad.	258
10.	Rehabilitation/ Replacement/ Extension of Sewerage and Drainage System in NA-108 (PP-111, 113 & 114), Faisalabad	247
11.	Augmentation of Disposal Stations, Machinery, Equipment, and T&P for O&M of Sewerage System in NA-108 (PP-111, 113 & 114), Faisalabad.	223
12.	Rehabilitation/ Replacement of Sludge Carrier Risalewala Road to Dijkot Seepage Drain	300
13.	Improvement/ Extension of Sewerage & Drainage System in NA-109 (PP-111, 113, 114)	280
14.	Augmentation of Disposal Stations, Machinery, Equipment, and T&P for O&M of Sewerage System in NA-109 (PP-111, 113 & 114), Faisalabad.	100
15.	Rehabilitation / Replacement / Extension of Sewerage and Drainage System in NA-110 / PP-111, 114, 115, 116 & 117, Faisalabad	300
16.	Augmentation of Disposal Stations, Machinery, Equipment's & T&P for O&M of Sewerage System in NA-110 / PP-111, 114, 115, 116 & 117, Faisalabad	200
17.	Provision of Sewerage System and other developments at Shamsabad & Allied Areas Shamsabad Sub Division	200
Total cost of all the sub-projects (in Millions)		3669.9

The above capital cost also includes the contingencies charges (2%), Plantation Charges (1%), Third Party Validation Charges (2%), awareness campaign (0.25%), and PRA Tax (5%). O&M charges for 5 years will be borne by WASA from its sources @ 8-10%

increase/year to make sure it's sustainable.

3.7 Schedule of Implementation:

The project is in the Planning & Design phase while the work on some sub-projects has already been started and will be implemented as per **Annexure-II** to meet the deadline of April 2024. The work on the sub-projects will be done parallel by different contractors. The detailed Gantt chart of the sub-projects is annexed as **Annexure-II**.

3.8 General Design Criteria

The subproject of the water supply system has many components such as replacement of pipe network, construction of underground water storage tank, and pump house. Similarly, rehabilitation/replacement and extension of damaged and outlived Trunk, Secondary and Tertiary sewerage network of Faisalabad city consists of sewer and drainage pipelines, disposal stations along appurtenances. The selection of an appropriate design period for a particular facility/component of the system is very important and dependent upon the following factors:

- The rate of population growth.
- The useful life of the structures and equipment.
- The ease or difficulty of expansion. This factor affects the design period of the whole Water Supply System depending upon the easiness with which its components can be enlarged i.e., the effort with which the capacity of the components can be increased.
- Performance in early years of life under minimum hydraulic load.

As per WASA approved design criteria, the design period of different components of the water supply system is presented in the following table:

Table 3-3: Design period of different components of the water supply system

Serial No.	Components	Design Period (years)	Design Life (years)
1	Tube wells	20	20
2	Pumps	15	15
3	Distribution system	20	50
4	Water reservoirs	20	50
5	Buildings	20	50

3.8.1 Design Horizon

Design Horizon is 2042 (20 years)

3.9 Design Criteria

3.9.1 Pipe

Pipe sections or links are the most abundant elements in the water distribution network. These sections are constant in diameter and may contain fittings and other appurtenances, such as joints, valves, etc. **Table 3-4** shows the comparison of the piping material.

Table 3-4: Summary of pipe material comparison

Sr.#	Description	HDPE	GRP	DI	MS
1	Technical Viability	Yes	Yes	Yes	Yes
2	Initial Capital Cost	Low	Med	High	Med
3	Local Manufacturing	Yes	No	No	Yes
4	Lining & Coating Cost	No	No	Med	High
5	Installation / Fixing Cost	Low	Med	High	High



6	Corrosion Protection Cost	No	No	Med	High
7	Leak-free joint	Yes	No	No	No
8	Site Fabrication & Fittings	No	No	No	Yes
9	Flexibility and deflection	High, can be bent to aradius 25 times the nominal pipe diameter	Low	Low	Med

Keeping in view the above comparison, HDPE pipes are considered ideally suited for the project as it has both technical and commercial advantages compared to other piping systems. Hence, HDPE pipe has been proposed for underground use in the water supply system.

Similarly, for the sewerage and drainage network, Gravity sewers (R.C.C) have been proposed considering their advantages.

3.9.2 MINIMUM PIPE SIZE AND DEPTH OF COVER

a) Minimum Pipe Size

As per the standards, "The minimum size of the water main in the distribution system where fire protection is not to be provided should be a minimum of three (3) inch diameter".

The minimum size of the water pipe is normally taken as 3 inches. Concerning the international standard and local practices of government departments, a minimum pipe size of 3-inches has been suggested.

The minimum acceptable gravity pipe diameter for sewer pipelines shall be 9-inches as per design criteria and therefore, shall be followed.

3.9.2.1.1 Depth of Cover

For the water supply system, 1 meter of earth cover for all sizes of pipes is suggested. However, all road cuts are to be filled in with pit sand/river sand.

A 3.0 ft. earth cover should be provided above the crown of the sewer. However, in

the case of sewer laid under road crossings, sand will be filled to provide cover instead of earth.

3.9.2.1.2 Velocity of Flow in Pipes

As per WASA criteria, the velocity range is given below:

- Distribution mains: 1 to 5 feet/ second
- Sewer Mains: Self-cleansing velocity (2.5 feet/ second)

3.9.3 Groundwater Reservoir

As per the design criteria;

“When the length of the rising main is such that the loss of head is very high, intermediate pumping stations comprising a storage tank and pumping machinery installed in a pump house will be used. The capacity of groundwater storage tank @ $\frac{1}{4}$ th average daily demand will be provided”

3.10 Selection of Best Suitable Option Based on Project Alternatives

3.10.1 Site Alternatives

The project includes the replacement/extension of the public water supply, sewerage, and drainage. The already laid piping system along the roads and streets will be replaced or extended. The new distribution system will also be laid below the roads and streets with proper earth covering. The private land will not be disturbed in any case, unless fulfilling all the legal requirements. It was also ensured that no financial liability is created in case of land acquisition or resettlement/ compensation. While opting to accept land donations all procedures/laws/rules/ regulations were adhered to. The transfer deed documentation will be completed before acquiring the land so that financial liability /dispute may not arise in the future.

No site alternatives for the water supply, sewerage and drainage pipelines are possible as they will pass along the roads and streets. For disposal stations upgradation, they will be upgraded within the already existing boundary of the disposal station.



3.10.2 Design/Technology alternatives

Water can be "produced" from different sources by various technical means. In Faisalabad, the major supply (90%) is derived from the tube wells installed in Chenab Well-field and Jhang Branch Canal Well Field to supply the water. The supplies, then are "delivered" to consumers through pipelines, underground water tanks, and water pumps. Whatever the technical solution adopted, the aim is to make adequate quantities of water, which is safe for human consumption, and reasonably accessible to all. In this project, to address the problem, the water supply, sewerage, and drainage network will be laid down keeping in view the problems incurred to the public and minimizing the impact. The deteriorated Asbestos Cement (AC) Pipe distribution network for water will be replaced by High-Density Polyethylene Pipes (HDPE). New waterproof Underground tanks will be built. New Pumping Machinery in the Pump House will be installed to ensure the Punjab EPA standards for potable water. The best available technology pipes, soundproof generators at disposal stations, keeping in view their benefits and EPA compliance, will be installed to make the system sustainable.

3.10.3 Environmental Alternatives, their selection and rejection criteria

According to the WWF report, Pakistan is below the threshold of a water-stressed country and is a water-scarce with per capita water availability at only 930 cubic meters per annum. In Punjab, there is high dependence on groundwater, whereas indicators show improvement in accessibility to water, the quality of water remains problematic, particularly in Faisalabad where the groundwater is brackish. It has also been observed that the commercial water tankers supply water in the city for drinking and cooking mostly without any treatment, resulting in water-borne diseases. Therefore, this project will ensure the provision of safe and clean drinking water as a top priority in such areas.

3.10.4 Economical Alternatives, their selection and rejection criteria

In 2015, Pakistan, along with the rest of the international community, committed to achieving the Sustainable Development Goals (SDGs) by 2030. The SDG 6, Clean water and sanitation for all, aims to ensure the provision of clean drinking water to 95% of the



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population by 2030. However, the success of any Government intervention depends upon partnerships with all stakeholders, including the private sector and community. The capital cost of this project will be provided by Punjab Government. However, socio-economic considerations, community attitude, practices, willingness to pay will have an impact on the sustainability of this project.

Effective tariff setting and collection mechanisms will be extremely important in ensuring the sustainability of the project. It has been observed that the schemes where no tariff is involved find difficulties in proper O&M. On the other end, political and public pressures do not let collect the required tariff so that the department can run on its own. Most tariff plans are either designed to collect both investment and O&M costs or only the O&M cost. WASA-F will only collect the O&M cost through a flexible payment plan. The tariff plan will be devised keeping into consideration the public and political acceptability. For better results, it will be easily understandable for the community.

3.11 Sub-Project Details

3.11.1 Improvement of Sewerage & Drainage System in NA-105/PP-113

Objective	Areas proposed in PC-1 lack proper sewerage facility due to damaged/outlived sewer lines in the locality. Wastewater is creating unhygienic conditions and environmental problems in the area, thereby putting human health at risk. To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features (as per PC-1)	• Providing and Laying of Sewer Lines 9 to 27" Dia (4.46 km) • Replacement of Sewer Lines 9 to 18" Dia (2.10 km) • Manhole Slabs/ Covers (1515 No.) • Upgradation of Disposal station PS-42 • Machinery for NA-105 • Tools and Plants for NA-105
Estimated Cost (as per PC-1)	150 million Rupees
Population to be benefitted (as per PC-1)	200,000 persons
Schedule of Implementation (as per PC-1)	1-4-21 to 31-3-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved, instead more trees will be planted • Detailed Impacts will be discussed in Chapter-6

The drawing of the upgradation plan of the PS-42 Disposal is shown in **Figure 3-2** below:

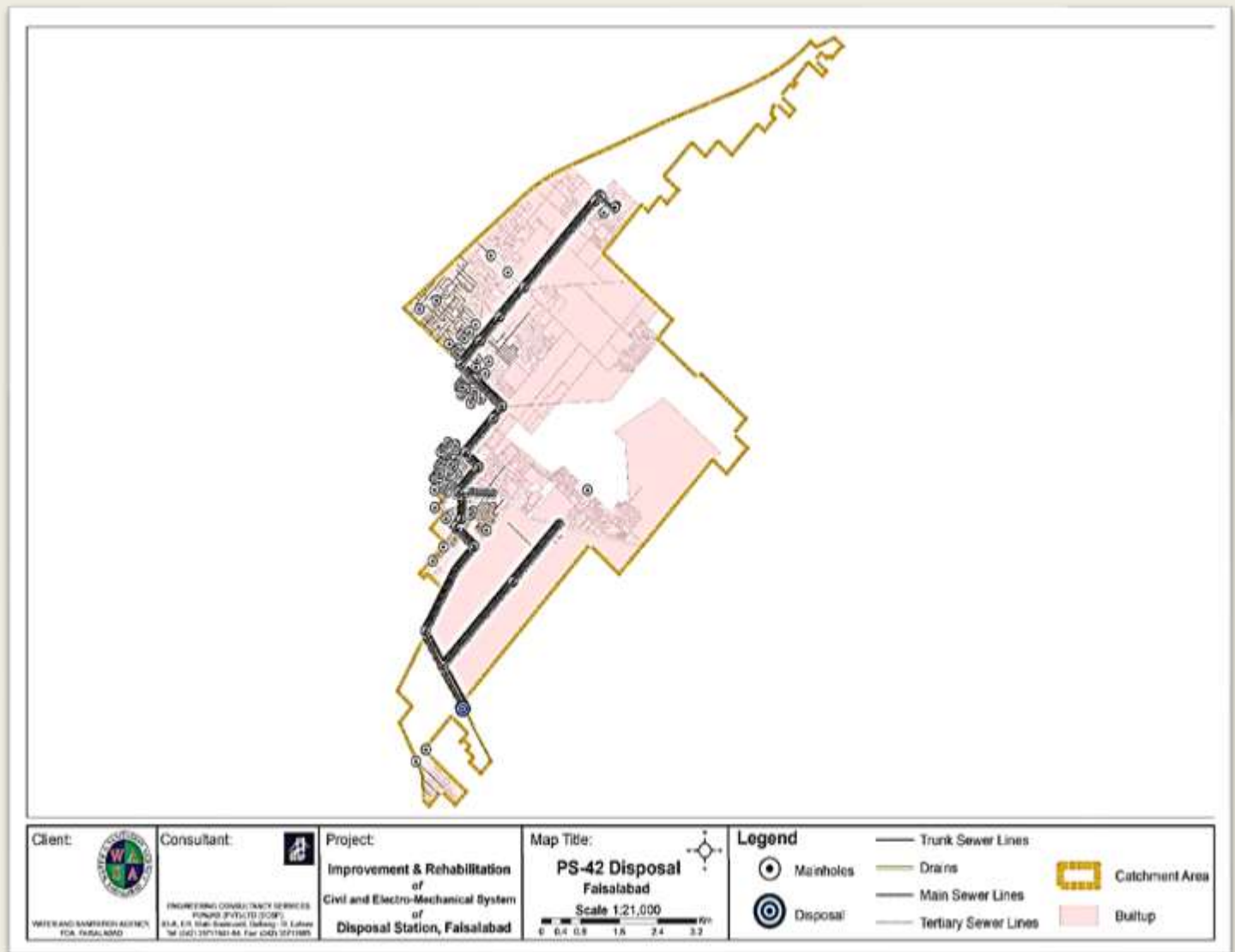


Figure 3-2: PS-42 Disposal Faisalabad

3.11.2 Rehabilitation/ Replacement of Damaged and Outlived Trunk, Secondary and Tertiary Sewerage Network of Faisalabad City

Objective	Areas proposed in PC-1 lack proper sewerage facility due to damaged/outlived sewer lines in the locality. Wastewater is creating unhygienic conditions and environmental problems in the area, thereby putting human health at risk. To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features (as per PC-1)	Replacement of sewerage Network 112,255 ft (9" to 72" dia). Gravity Sewers (R.C.C.) have been proposed at a velocity of 2.5 ft/sec.
Areas Served (as per PC-1)	Sewerage Facility will be improved in different Eastern & Western areas of Faisalabad including but not limited to Barkat Pura, Waris Pura, Raza Abad, Islam Nagar, Gulistan Colony, D Type Colony, Allama Iqbal Colony, Nishatabad, etc.
Estimated Cost (as per PC-1)	300 Million Rupees
Population to be benefitted (as per PC-1)	104,889 persons benefitted
Schedule of Implementation (as per PC-1)	01-04-21 to 31-03-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved

3.11.3 Extension of sewerage network in Un-served & Partially served areas in the outskirt of Faisalabad city

Objective	Areas proposed in PC-1 are without any proper sewer facility. Human health is on risk. To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features	Sewer line 9" to 15" dia (9.1 km)
Areas served	Sewerage Facilities will be extended to the un-served and served areas of CC-128-131 (Babuwala, Rustam Park, Rashidabad Ishaq Basti, Faisal Town, Raziq Colony, Pathan Wala Amin Town among other areas
Estimated Cost	60 million Rupees
Population to be benefitted	800,000
Schedule of Implementation	15-06-21 to 14-06-23
Major Impacts	• No Land acquisition • No Tree Cutting Involved
Existing Conditions	Existing Conditions are the open drains and some parts are covered by the people on their own. A proper sewerage system will be laid down in these areas.



3.11.4 Improvement and Replacement of Outlived, Damaged Water Supply Lines in Faisalabad City

Objective	The objective of the sub-sector is to provide water facilities based on meeting daily increasing demand for households and managing existing systems more efficiently, ensuring the provision of the water systems to poor households. The proposed areas are without any proper water facility or need up-gradation in water supply/ Replacement of old water supply lines. To achieve the water-related objective, this project has been prepared.
Main Features	• Replacement of 45.43 km outlived, damaged water supply lines (3 inches to 12 inches dia), • Rehabilitation of Underground Tanks (4 No.), • Construction of Pump Houses (5 No.), • Replacement of Machinery (20 no.) • International Standard High-Density Polyethylene Pipes (HDPE) will be used to replace Asbestos Cement (AC) Pipe.
Areas Served	40% of the city area.
Estimated Cost	300 Million Rupees
Population to be benefitted	0.5 million benefitted people (40% of city area). Existing Consumers will be beneficiaries
Schedule of Implementation	15-04-21 to 16-04-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved
Existing Conditions	During the survey, it has been observed that the Faisalabad city lacks serious public water supply connections and people use local canned water (15 to 25 rupees per can) for drinking water. In some areas, a public supply network has been laid under this project but is not

operational yet.

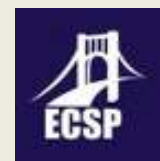


3.11.5 Machinery for Operation & Maintenance and Urban Flood Mitigation WASA Faisalabad

Objective	The project plan has been prepared for the arrangement of heavy machinery for disaster management and improved management of
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	water supply and sewerage complaints in the city. As the machinery currently available with WASA is not sufficient for desilting operations, therefore, it is proposed to procure heavy machinery to give relief to the public by providing quick response and redressal of complaints.
Main Features	• Supply of fully automated self-priming dewatering sets 2/3 & 4.5 cusecs (14 No.) • Supply of hydraulic dumper having capacity of 8 ton mounted on Truck Chassis (2 No.) • Supply of water bowser 3000-gallon capacity mounted on the truck (1 No.) • Supply of mobile engineering workshop mounted on truck chassis along with tools & equipment (1 No.) • Excavator Wheel Mounted 158 hp or above (1 No.) • Dragaline/Lattice boom wheel excavator with calm shell (1 No.) • Sewer Suction Machine (3 No.) • Sewer Jetter Machine (2 No.) • Tractor 4000 cc or more with a backhoe (1 No.) • Tractor 4000 cc or more with trolley (having jack system) with front-end blade (1 No.) • Truck mounted crane 3 ton (1 No.)
Areas Served	Whole City
Estimated Cost	400 million
Population to be benefitted	3.40 million
Schedule of Implementation	1-4-21 to 31-3-24
Major Impacts	The procurement of state-of-the-art machinery will not have any direct negative impacts.

3.11.6 Rehabilitation of Sewerage System from General BUS Stand to Trunk Sewer Bolay Di-Jhugi, Sargodha Road Faisalabad

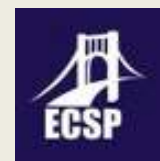
Objective	Under this project, expired/ damaged sewerage pipelines will be replaced by newlines which were laid in 1192, as the system has already used its useful life. The said project will be helpful in the reduction of sewer problems in the affected area. Trunk sewer and main lines are already laid and in working condition so it is feasible to lay this lateral trunk sewer along with secondary sewers.
Main Features	R.C.C. Gravity Sewers 9" to 36" dia (2.39 km) has been proposed at the velocity of 2.00 to 2.10 ft/sec
Areas Served	General Bus Stand to Trunk Sewer Bolay Di-Jhugi, Sargodha Road
Estimated Cost	51.90 million
Schedule of Implementation	01-07-21 to 30-03-2022
Major Impacts	- No Land acquisition - No Tree Cutting Involved

3.11.7 Improvement of Sewerage and Drainage System in PP-97, Faisalabad

Objective	To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features	8.53 km sewer 9" to 36" dia - Construction of Missing Manhole Covers and Broken Slabs (500)
Areas Served	Sewerage facility will be extended to the un-served and served areas of Ghana Sharqi, Bhaiwal Road, Millat Town, Gokhowal, and Adjoining Areas in PP-97 Faisalabad.
Estimated Cost	100 million



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Population to be benefitted	800,000 persons benefitted
Schedule of Implementation	15-06-21 to 14-06-23
Major Impacts	• No Land acquisition • No Tree Cutting Involved

3.11.8 Rehabilitation/ Replacement/ Improvement of Sewerage & Drainage system, NA -107 (PP-109, 110, 111 & 112), Faisalabad

Objective	Wastewater of these proposed areas is collected and carried through previously laid old pipes which often overflow & create unhygienic environmental conditions. Trunk sewers and main lines are already laid and in working condition so it is feasible to lay the secondary and branch sewers for this unserved area. To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features	• Sewers ranging 9" to 36" dia (7.98 km) • Construction of Missing Manhole Covers & Broken Slabs (3718 No.) • Construction of RCC Slabs for Covering of Channel (2500 ft.)
Areas Served	Saifabad, Shadab Colony, Babu Wala, G.M. Abad, Gulberg, Ali Housing, Rustam Park, Sahianwala, A Block Bagdadi Park Gulberg, Afghana Abad, Darul Ehsan, Naranwala to Pharang Drain, Metro Pole Road and Adjoining Areas in NA-107 (PP-109, 110, 111 & 112), Faisalabad.
Estimated Cost	200 Million
Population to be benefitted	1200,000 persons
Schedule of	15-04-21 to 14-04-24

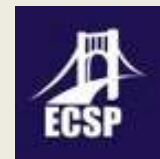
Implementation	
Major Impacts	• No Land acquisition • No Tree Cutting Involved
Existing Conditions	The existing carrying channel is open and solid waste is being dumped by the people, further exaggerating the environmental problems. It is proposed to cover it with RCC Slabs. 

3.11.9 Augmentation of Disposal Stations, Machinery, Equipment And T&P for O&M of Sewerage System in NA -107 (PP-109,110, 111 & 112), Faisalabad

Objective	To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features	• Forced Main HDPE Pipe 18" Dia (2000 Rft.) • Civil works at Disposal Stations (Screening Chamber, Wet Well & Pump House) • Electromechanical works at Disposal Stations (5 No. Pumps, 4



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	No. Transformer, 3 No. Generator) • Field Machinery (Jetting Machine, Suction Machine, Submersible Pumps, Auto Prime Dewatering Set) • Desilting Equipment (Gas Masks Delivery Pipe etc.)
Areas Served	Saifabad, Shadab Colony, Babu Wala, G.M. Abad, Gulberg, Ali Housing, Rustam Park, Sahianwala, A Block Bagdadi Park Gulberg, Afghana Abad, Darul Ehsan, Naranwala to Pharang Drain, Metro Pole Road and Adjoining Areas in NA-107 (PP-109, 110, 111 & 112), Faisalabad
Estimated Cost	258 million
Population to be benefitted	200,000
Schedule of Implementation	15-04-21 to 14-04-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved

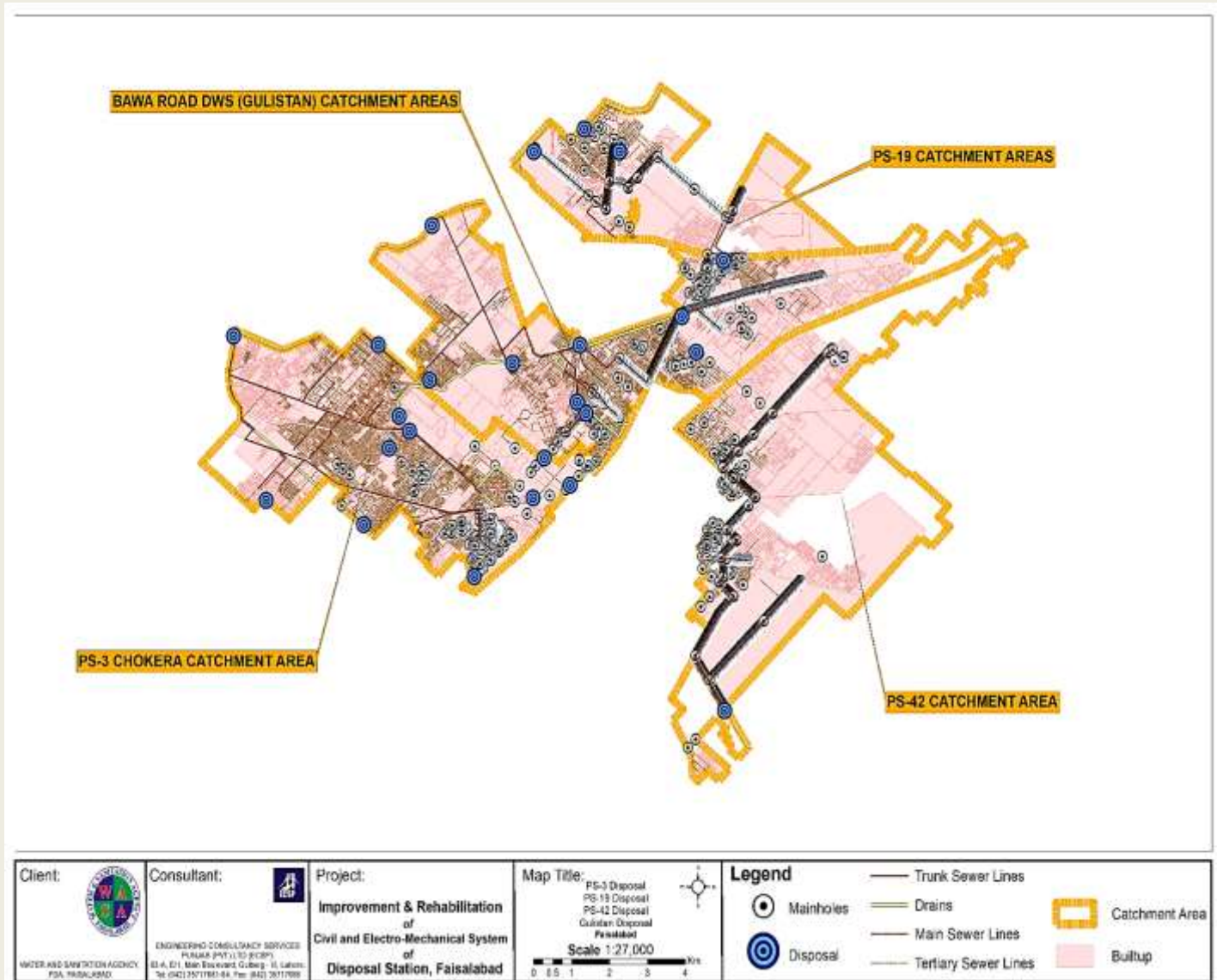


Figure 3-3: Plan of 4 disposal Stations

3.11.10 Rehabilitation/ Replacement/ Extension of Sewerage and Drainage System in NA-108 (PP-111, 113 & 114), Faisalabad

Objective	Wastewater of these proposed areas is collected and carried through previously laid old pipes which often overflow & create unhygienic environmental conditions. Trunk sewers and main lines are already laid and in working condition so it is feasible to lay the secondary and branch sewers for this unserved area. To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features	• Sewers lines to be laid 9" to 30" dia (50155 Rft) • Manhole Covers & Broken Slabs (3612 No.)
Areas Served	Samnabad, Allama Iqbal Colony, D type, Nazimabad and adjoining areas in NA-108 (PP-111, 113 & 114), Faisalabad
Estimated Cost	247 Million
Population to be benefitted	800,000 persons benefitted
Schedule of Implementation	01-4-21 to 31-03-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved

3.11.11 Augmentation of Disposal Stations, Machinery, Equipment, and T&P for O&M of Sewerage System in NA-108 (PP-111, 113 & 114), Faisalabad

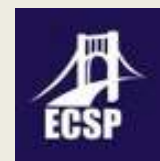
Objective	Wastewater of these proposed areas is collected and carried through previously laid old pipes which often overflow & create unhygienic environmental conditions. Trunk sewers and main lines are already laid and in working condition so it is feasible to lay the secondary and branch sewers for this unserved area. To achieve the sewerage-related SDG 6 objective of providing 100% sanitation facility by 2030, this project has been prepared.
Main Features	• Forced Main HDPE Pipe 16" & 24" dia (4900 Rft) • Civil works at Disposal Stations (Screening Chamber & Wet Well) • Electromechanical works at Disposal Stations (5 No. Pumps, 3 No. Transformer, 2 No. Generator) • Field Machinery (Jetting Machine, Suction Machine, Submersible Pumps, Auto Prime Dewatering Set)
Areas served	Samnabad, Allama Iqbal Colony, D type, Nazimabad and adjoining areas in NA-108 (PP-111, 113 & 114), Faisalabad
Estimated Cost	223 million
Population to be benefitted	800,000 persons
Schedule of Implementation	15-03-21 to 14-03-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved

3.11.12 Rehabilitation/ Replacement of Sludge Carrier Risalewala Road to Dijkot Seepage Drain (NA-108)

Objective	The existing drain is disposing of sewage from 3 disposal stations of WASA, Faisalabad comprising 30 cusec discharge. But due to less
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	capacity of the drain, seepage and overflow issues are seen every year. Under this project, the capacity of the sludge carrier will be increased up to 84 cusecs. The drain proposed in PC-1 will provide an effecting solution to dispose of sewage and will allow future growth of the sector in coming years.
Main Features	Gravity Drain (Sludge Carrier, 18420 Rft) has been proposed at the velocity of 2.5 ft/sec
Areas Served	Samanabad, Sitara Colony, Muzafar Colony etc.
Estimated Cost	300 Million
Population to be benefitted	800000 persons
Schedule of Implementation	15-03-21 to 14-03-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved

**3.11.13 Improvement/ Extension of Sewerage & Drainage System in NA-109
(PP-111, 113, 114)**

Objective	The objective is to provide sewerage facilities based on meeting
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	rapidly increasing demand for ensuring the provision of sewerage systems to poor households. And managing the existing system more efficiently.
Main Features	• Replacement Sewer 9" to 24" dia (3.82 km) • Providing and Laying Sewer 9" to 30" dia (19.79 km) • Construction of Missing Manhole Covers and Broken Slabs (4100)
Areas Served	Peoples Colony, Madina Town, Shamsabad subdivisions and adjoining abadies in NA-109 (PP-111, 113 & 114), Faisalabad
Estimated Cost	280 million
Population to be benefitted	300,000 persons
Schedule of Implementation	01-04-21 to 31-03-24
Major Impacts	• No Land acquisition • No Tree Cutting Involved

3.11.14 Augmentation of Disposal Stations, Machinery, Equipment, and T&P for O&M of Sewerage System in NA-109 (PP-111, 113 & 114), Faisalabad.

Objective	The objective of the subproject is to provide a sewer facility based on meeting daily increasing demand for households and managing the existing system more efficiently, ensuring the provision of sewerage system to poor households by improvement of Electro-Mechanical System at Disposal Station Shamsabad, WASA FDA, Faisalabad.
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	Lack in the capacity of the disposals especially in the rainy season causes unhygienic conditions and environmental problems in the city, thereby putting human health at risk.
Main Features	• Improvement of Electro-Mechanical System at Disposal stations NA-109, Faisalabad. • Procurement of Machinery • Tools & Plants (T&P) for Operation and Maintenance for NA-109
Areas Served	Fatehabad, Peoples Colony No. 1 & 2, Muhammad Abad, Alnajaf Colony, Noorpura, Dhudiwala, Niamat Colony, Hassanpura, Madina town, Shamsabad, Azhar Town, Sufyan Town, Manwala, Gati, National Colony, Malik Pur and Adjoining Abadies. Rasool Pura, Madian abad, Yousaf abad, Dawood naga & Adjoining areas of People Colony, Madina Town, and Shamasabad Subdivisions.
Estimated Cost	100 million
Population to be benefitted	200,000
Schedule of Implementation	01-04-21 to 31-03-23
Major Impacts	• No Land acquisition, as land is available within the disposal station • No Tree Cutting Involved
Existing Conditions	The existing disposal station machinery is too old and consumption is fuel is very high. A new disposal station with the latest machinery will be installed to cater to the existing problems.



**3.11.15 Rehabilitation / Replacement / Extension of Sewerage and Drainage
System in NA-110 / PP-111, 114, 115, 116 & 117, Faisalabad**

Objective	The sewer lines which need to be replaced are expired their useful life. Crown failures are occurred frequently at different places, thereby, damaging public and private property as well as roads. Similarly, the areas proposed for the provision of a new sewerage system are without any proper sewer facility. Furthermore, the stormwater drain is also proposed as it was constructed in 1978 and need to rehabilitate according to present requirement.
Main Features	• Replacement Sewers 9" to 24" dia (5.68 km) • Providing and laying of sewers 9" to 36" dia (9.81 km) • Drains 11.5 x 9" (1.67 km)
Areas Covered	Islam Nagar, NeghenPura, Johar Colony, Gulistan Colony, Hajveri Town, Professor Colony, Akbarabad, Rajewala, Sidhupure, 7 Chak, Bilal Nagar, Rehmanabad, Green Town, Ghaziabad, etc areas to be benefitted.

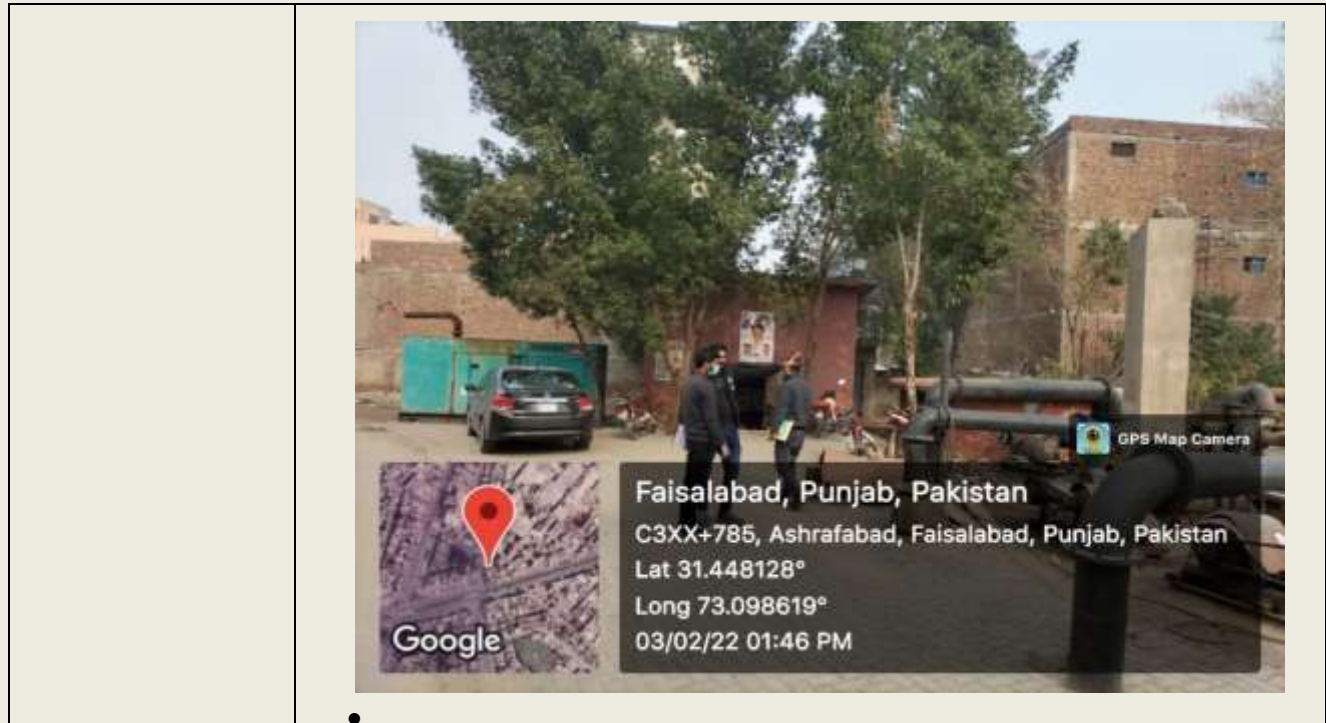
Estimated Cost	300 Million
Population to be benefitted	200,000 persons
Schedule of Implementation	05-04-2021 to 04-04-2024
Major Impacts	• No Land acquisition • No Tree Cutting Involved

3.11.16 Augmentation of Disposal Stations, Machinery, Equipment's & T&P for O&M of Sewerage System in NA-110 / PP-111, 114, 115, 116 & 117, Faisalabad

Objective	The disposal stations were constructed earlier in 1980 and expired their useful life. Accordingly, pumping machinery is very old and does not give the required efficiency. Resultantly, WASA-F has to bear the additional burden of electricity bills, wear and tear of machinery. Disposal station is the heart of the sewerage system. The efficiency of the sewerage system depends upon the efficient working of the disposal station. Hence, improvement/ rehabilitation is essential to improve the efficiency of the sewerage system and the public will enjoy good sanitation and environmental conditions.
Main Features	• Rehabilitation of civil/electromechanical system of 3 disposal stations • Civil works at Disposal Stations (Screening Chamber, Wet Well & Pump House) • Supply and Installation of valves and delivery pipes • Construction of Discharge Chamber • Construction of 229 Rft Boundary wall and 03 main gate • Electromechanical works at Disposal stations • Procurement of Machinery for Operation & Maintenance
Areas served	Islam Nagar, Neghen Pura, Johar Colony, Gulistan Colony, Hijveri Town, Professors Colony, Akbarabad, Rajewala, Sidhepure, 7 Chak,

	Bilal Nagar, Rehmanabad, Green Town, Ghaziabad, etc. areas to be benefitted.
Estimated Cost	200 million
Population to be benefitted	200,000
Schedule of Implementation	01-04-2021 to 31-03-2024
Major Impacts	• No Land acquisition is required as Akbarabad disposal station and Gulistan disposal station will be upgraded within the already existing WASA area • Two old trees exist very close to the wet well at Akbarabad disposal station, but it has been saved and more trees will be planted as per the plan. • At Gulistan Disposal station, 3 trees may need to be cut down for the new wet well construction, but more trees will be planted at the site for aesthetics and to minimize the nuisance.
Pictorial view of Akbarabad Disposal Station	 The photograph shows a construction site for the Akbarabad Disposal Station. In the foreground, two men are standing and talking. Behind them, there are large trees, some of which appear to be old. In the background, there are several multi-story buildings. A GPS overlay in the bottom right corner of the photo provides the following information: Faisalabad, Punjab, Pakistan; Umar Rd, Mustaffabad, Faisalabad, Punjab, Pakistan; Lat 31.444339°; Long 73.082516°; 03/02/22 01:06 PM. A Google Maps inset is visible in the bottom left corner of the photo.

	
Pictorial view of Gulistan Disposal Station	



The drawing of the map of Gulistan Disposal Station is given in **Figure 3-4** below:

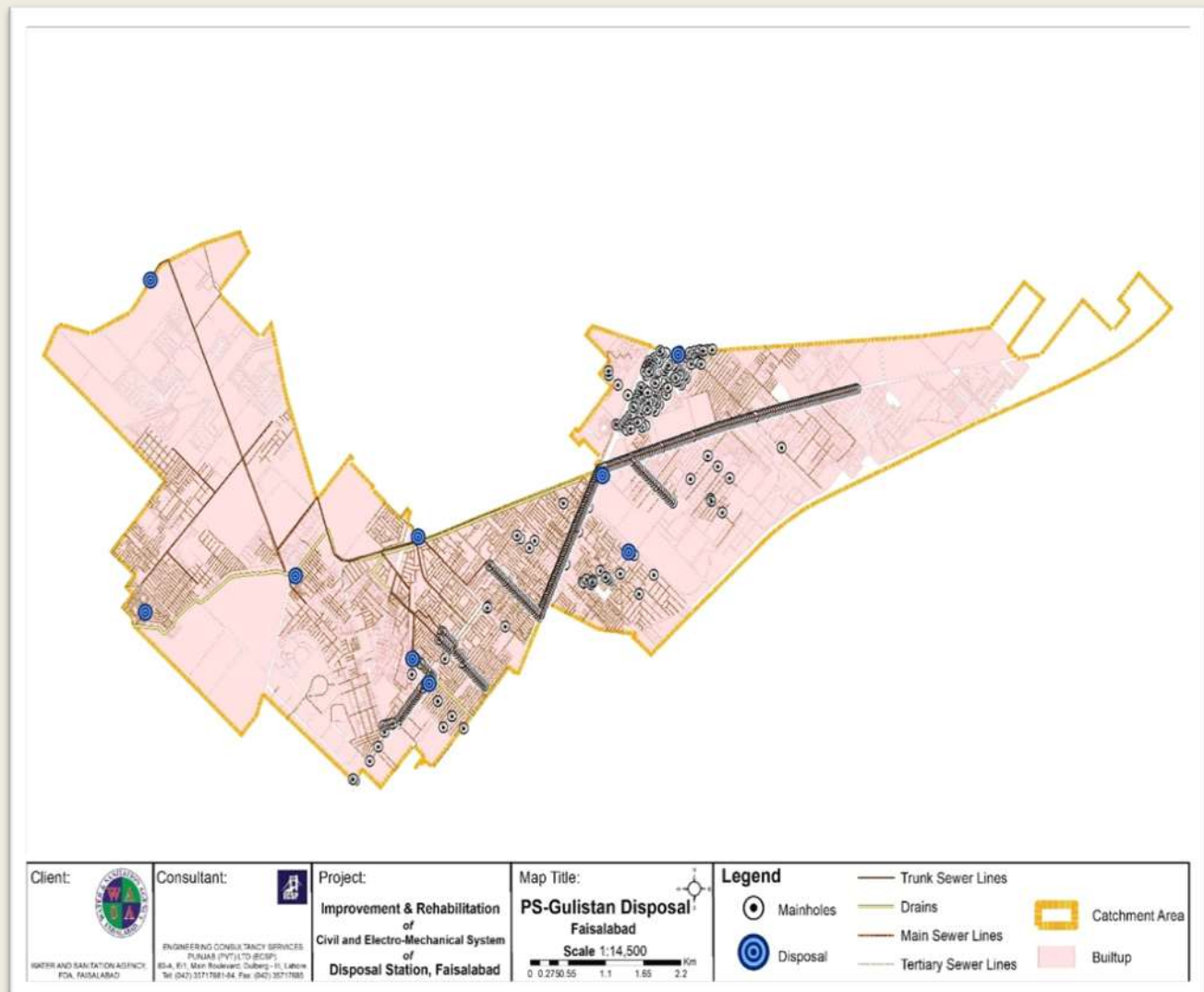


Figure 3-4: Gulistan Disposal Station Drawing

3.11.17 Provision of Sewerage System and other developments at Shamsabad & Allied Areas Shamsabad Sub Division

Objective	The objective of the subproject is to provide a sewer facility based on meeting daily increasing demand for households and managing the existing system more efficiently, ensuring the provision of sewerage system to poor households by improvement of Electro-Mechanical System at Disposal Station Shamsabad, WASA FDA, Faisalabad. Lack in the capacity of the disposals especially in the rainy season causes unhygienic conditions and environmental problems in the city, thereby putting human health at risk.
Main Features	• Replacement of Sewer Lines 9" to 15" (0.47 km) • Providing and laying of sewer lines 9" to 30" dia (6.87 km) • Manhole Slabs/Covers (2200 No.) • Machinery for Shamsabad Sub Division (1 jetter machine, 1 suction machine, 2 dewatering set, 2 loaders 200 CC) • Upgradation of Disposal Station Capacity (15 cfs cordon shaft pump, 10 cfs cordon shaft pump)
Areas Served	Shamsabad, Ali Irfanabad, Azhar Town, Sufyan Town, National Colony, Baghy wala road, Munir Park, Javed Town, Gatti, Bhai Wala, and Adjoining areas of Shamasabad subdivision.
Estimated Cost	200 Million
Population to be benefitted	200000
Schedule of Implementation	01-04-2021 to 31-03-2024
Major Impacts	• No Land acquisition • No Tree Cutting Involved

The map of the Shamsabad division works is shown in **Figure 3-5** below:

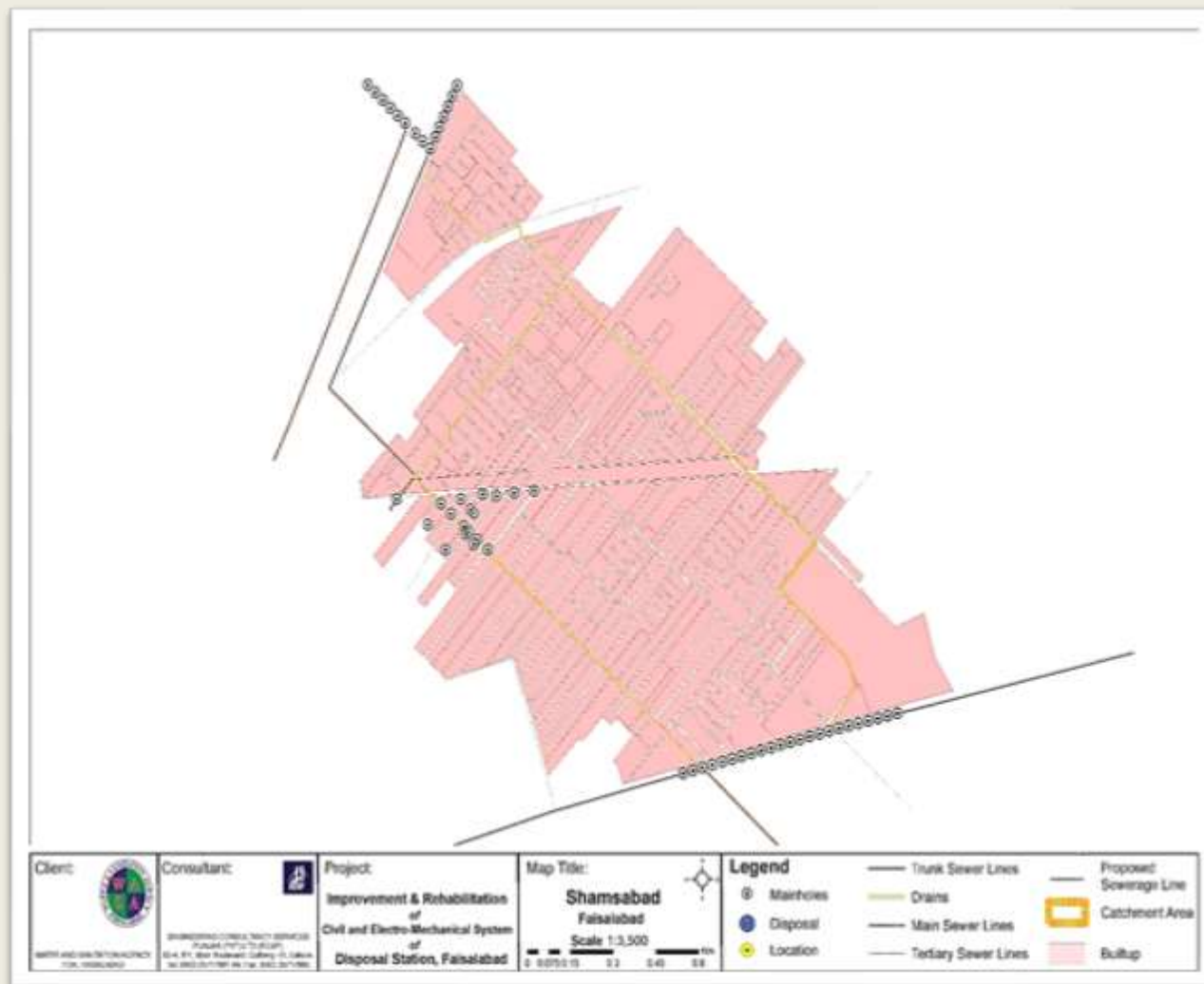


Figure 3-5: Rehabilitation of Sewerage Lines in Shamsabad



4 SOCIO-ENVIRONMENTAL BASELINE CONDITIONS

4.1 General

The baseline information is required for noting down the present environmental and social status of the project area because usually after the implementation of a new project, lots of current environmental features/social features are altered due to the implementation of a new project. Based on baseline information, the project interventions are assessed and mitigation measures are proposed. The baseline information also helps to indicate the specific issues to be discussed to some extent and being monitored after scheduled intervals during the construction and operational phase of the project. Therefore, the baseline data (i.e., physical, biological, and socio-economic parameters) related to the project area is described underneath. Information provided is based on primary and secondary data collected by site visits and desk studies respectively.

4.2 Physical Environment

The physical environment includes topography, geology, seismology, climate, soil, land use, and water resources. The existing information/conditions in the project area are briefly presented as under:

4.2.1 Topography

District Faisalabad lies between longitude 73° and 74° East, latitude 30° and 31.5° North having an elevation of 605 feet from sea level. The total area of the District is 58.56 square kilometers. It is sharing its boundaries with Hafizabad and Sheikhupura at North and Northeast while with Okara and Sahiwal towards east and southeast, and by Jhang and Toba Tek Singh towards West and Southwest. Although, there is no natural boundary between Faisalabad and adjoining districts. River Chenab flows about 30 km in the North West while River Ravi meanders about 40 km off the city in the South East. Lower Chenab canal is the main source of irrigation water, which meets the requirements of 80% of cultivated land. The topography is marked by valleys, local depression, and high ground.

4.2.2 Climate

The climate of the district touches two extremes. The maximum temperature in summer reaches up to 50 °C (122°F). In winter, it may, at times fall below freezing point. The mean maximum and minimum temperature in summer are 39 and 27 °C respectively and in winter, 21 and 6 °C respectively. The summer season starts in April and continues till October. May, June, and July are the hottest months. The winter season, on the other hand, starts from November and continues till March. December, January, and February are the coldest months. The climate of Faisalabad is taking an impact of seasonal rainfall which is intense during the rainy season called the monsoon. Therefore, urban flooding occurs in the low-lying areas of the Faisalabad city creating massive problems for the citizens.

4.2.3 Rainfall

Rainfall is of Monsoonal origin. Most of the rain falls during April and March as well as during the monsoon season from Jun to September. Normal monthly rainfall data obtained from the Punjab Development Statistics 2021 document having a data of the year 2020 is given in **Table 4-1**:

Table 4-1: Normal monthly rainfall (mm/ month) of District Faisalabad (year-2020)⁴

Location	Jan	Feb	Mar	Apr	May	Jun
Faisalabad	54.8	26.0	144.1	24.4	25.8	72.5
	Jul	Aug	Sep	Oct	Nov	Dec
	170.6	159.0	33.9	0.0	0.0	7.0

4.2.4 Soil

Faisalabad is situated in gentle sloping plains of the Upper Indus Basin. Most of the Indus Basin has been formed as a result of alluvium deposits derived by rivers from the mountain ranges in the north. These alluvial deposits consist principally of fine and medium-grained sands and silts, although there are discontinuous lenses of silt and clay. Their depth ranges from 450 meters in upper Punjab to about 60 meters in lower Sindh, where it is layered with silty and heavy deltaic sediment. The texture, morphology, and moisture-holding

⁴ Punjab Development Statistics, 2021

capacities of the soils in the study area vary from region to region and district to district. The surface crust soils are composed of alluvial deposits consisting of silt, clay, sand, and loam. Clay and silt formations occur in discontinuous layers with limited lateral extent. Their thickness is generally less than five meters due to rich surface irrigation in central Punjab, the fertile soils of the floodplains give a good per unit yield.

4.2.5 Geology

Faisalabad falls in lower Rachna Bari Doab because of its existence between River Ravi and Chenab. There is a mild slope from the northeast to the southwest with an average fall of 0.2–0.3 meters per kilometer (1.1–1.6 feet per mile). It is falling in upper Indus basin plains which are covered by Quaternary Unconsolidated deposits of enormous thickness and bedrock belonging to Indian Basement exists at a greater depth. The Quaternary deposits are comprised of silty clay and sand in varying proportions which are accumulated by braided tributaries of the Indus river system, originating from the northwest Himalayas.

The alluvium of the Punjab Plains, derived from the mountain ranges to the north, has been deposited by the present and ancestral tributaries of the Indus River. The alluvial complex of Pleistocene and Recent age represents the latest phase of sedimentation in an environment that had its beginnings in mid-Tertiary time: the deposition of predominantly fluvial sediments in a subsiding trough a foredeep adjacent to the rising Himalayan ranges. Although there are local concentrations of fine-grained sediments of considerable thickness, individual strata are generally lenticular and have little horizontal or vertical continuity. The random distribution of coarse and fine-grained sediment within the alluvial complex is entirely consonant with its mode of deposition by large constantly shifting streams.

4.2.6 Seismology

The Punjab Plain, in which the Faisalabad city is located, shows a low moderate level of seismicity which is associated with the faulting in the basement rocks covered by the deep alluvial deposits. The basement high, depicted by outcrops of basement rocks near Sargodha, Chiniot, Shahkot and extending from Sargodha to Faisalabad and further southeast towards the Indian border, shows a concentration of earthquakes with a magnitude

up to 5.5 on the Richter scale.

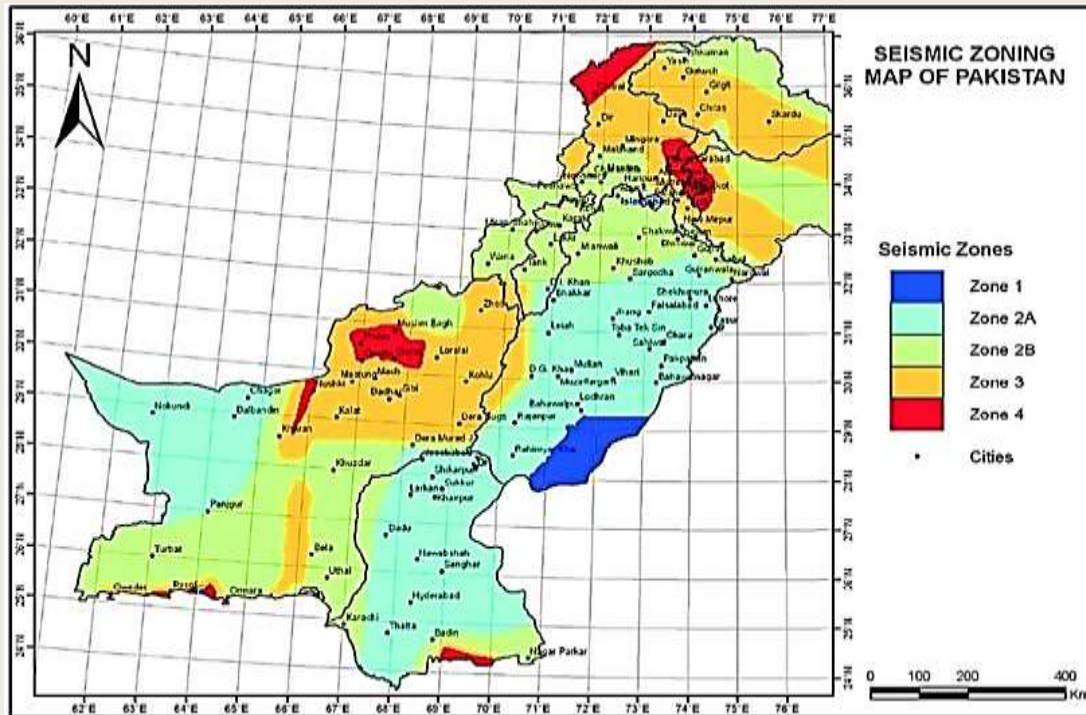


Figure 4-1: Seismic Map Pakistan

A moderate earthquake originating from the basement high in the Punjab plain could produce appreciable ground shaking at sites due to the thick alluvial deposits. According to the Seismic Zoning Map of Pakistan, the project area falls in Zone 2A, consequently, the structures should be designed by the requirement of seismic design after due consideration to other structural design parameters.

4.2.7 Water Resources

Both types of water i.e. ground and surface are present in the overall district.

4.2.7.1 Surface Water

The main surface water sources available in the district are in the form of rivers, canals, and ponds while river Chenab is considered as a primary source of surface water. An extensive canal system, off-taking from Khanki Barrage, irrigates agricultural lands of the district. The name of the main canal irrigating the area is Lower Chenab Canal. A small part of the district is also irrigated by Upper Chenab Canal off taking from Marala Barrage. The

major part of the district is irrigated by rivers Indus and its tributaries (Jhelum, Chenab, Ravi, Sutlej, and Bias). However, to meet the irrigation needs of the command areas of the rivers, waters from the western rivers have been diverted into the eastern rivers through the link canals. The link canals are conduits for water transfer only and are not used for irrigation. However, they help in groundwater recharge. There are 12 such link canals irrigating the central and southern Punjab. Structurally, the surface irrigation system comprises major canals, minor canals, branch canals, distributaries, and watercourses up to farm-gate. In Faisalabad, major supply is derived from the tube wells installed in Chenab Well-field and Jhang Branch Canal Well Field to supply the water. Below figure shows the locations of existing water supply facilities of Faisalabad.

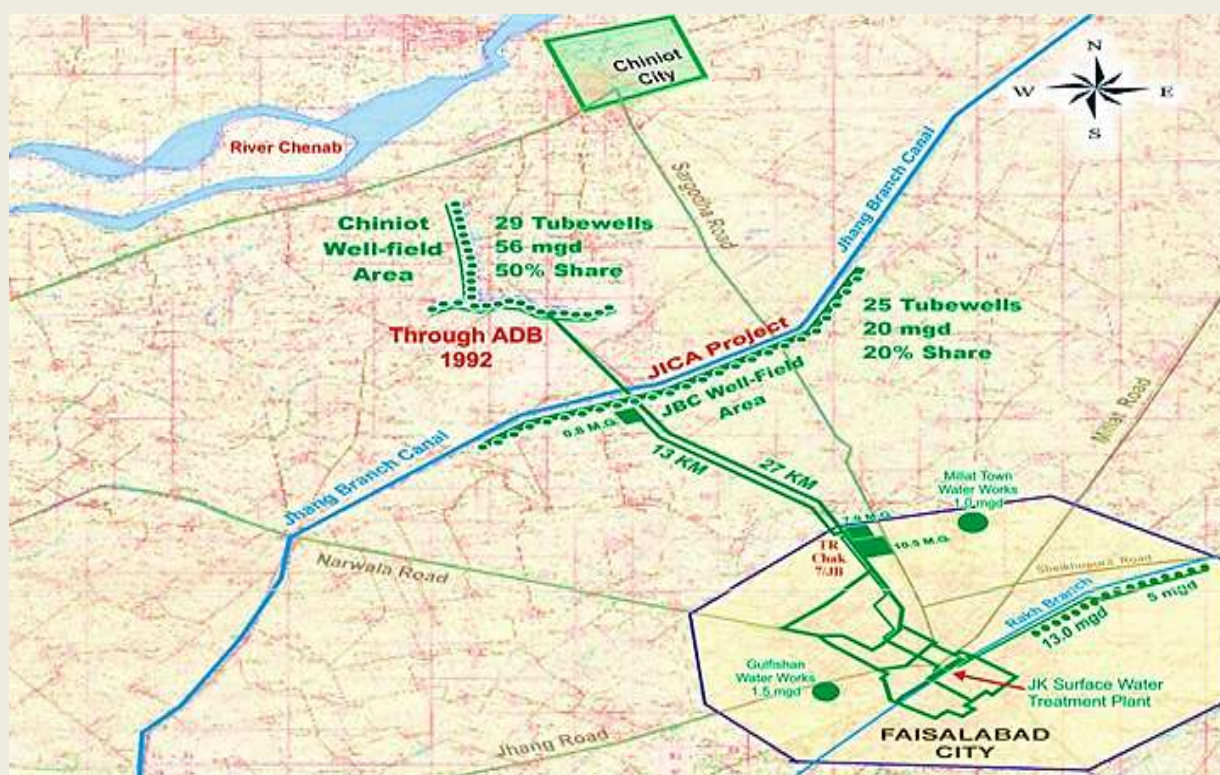


Figure 4-2: Existing water supply of Faisalabad

4.2.7.2 Ground Water

The Project Area falls in Faisalabad city. A major part of the groundwater abstraction for irrigation is within the canal commands or in the flood plains of the rivers. However, the amount of abstraction varies throughout the area, reflecting the inadequacy/unreliability of

surface water supplies and groundwater quality distribution. The quality of groundwater ranges from fresh (salinity less than 1000 mg/l TDS) near the canal to highly saline farther away, with salinity more than 3000 mg/l TDS. In the project area, most people depend on local canned water and welfare trust filtration points for drinking and cooking purposes. While for other uses, they use bore water. It is noted during the baseline survey that a very limited area of the area has a WASA water supply network. WASA is currently working on the surface water treatment plant project Phase II to meet the needs of the city.

4.3 Biological Environment

The biological component of the area includes the flora and fauna of the project area. Detail information of the project area is provided as under:

4.3.1 Flora

4.3.1.1 Forest Trees

The project area falls in the Faisalabad which is under scrub dry thorn forest region which is often called Rakh forest. Faisalabad has a specified forest area and it is reported to be native vegetation of the Indus basin system. There is no potential threat to the flora of the project area, as only 5 to 6 trees (majorly Sufayda) need to be removed for land clearance on the disposal stations. The major forest trees of the project area are presented in **Table 4-2**:

Table 4-2: Common Trees of the Project Area

Sr.No.	Common Name	Scientific Name
1	Kikar	Acacia Nilotica
2	Sheesham	Dilbergia Sisso
3	Amaltas	Cassia fistula
4	Neem	Azadirachia Indica
5	Bur	Solanum rostratum
6	Peepal	Ficus religiosa
7	Sumbul	Bombax Ceiba
8	Sufayda	Eucalyptus
9	Jhand	Prosopis Cineraria

4.3.1.2 Fruit Trees

Fruit trees are often planted by the farmers of native land by themselves as well as the concerned government departments. The major fruit trees of the project area are presented in **Table 4-3**.

Table 4-3: Major Fruit Trees of the Project Area

Sr. No	Common Name	Scientific Name
1	Mango	Mangifera indica
2	Jammun (BlackBerry)	Syzygium cumini
3	Bairyee	Ziziphus mauritiana
4	Guava	Psidium Guajava
5	Kinoo	Kinnow (Malta)

4.3.2 Fauna

In the project area due to urbanization and intensification of agricultural crop production activities, loss of forest spots, and hunting the wildlife has been decreased considerably. However, various types of animals are found surrounding the project area according to existing environmental conditions suitable for their survival. In the project area, which is away from urban centers, some of the common animals found are rabbits jackals, foxes, and caracal cats. The other species found in the area are different types of snakes, tortoises, frogs, toads, etc.

In the area, different species of birds like peacock, storks, purple, Morhen (Jal-kukar), crows, sparrows, grey partridge, black partridge, dove, etc. are commonly found. Generally, some species are vanishing with time in the area. But there is no potential threat to the fauna due to the project activities.



4.4 Environmental Analysis

M/s ASIAN Environmental Services (AES), is an EPA certified laboratory, was engaged to carry out environmental monitoring of ambient air quality, ground water quality, noise level and soil quality in the project area. Laboratory analysis reports of ambient air quality, ambient noise and drinking water analysis results are annexed at **Annex-III** of this EIA Report and the detail information related to the testing results is given below

4.4.1 Noise Quality

In the project area, no major source of noise pollution was observed except the noise created by vehicular movement in the towns and agricultural activities, equipment used for the construction of the project. The local people were asked about the noise problems in the area and almost all were of the view that there is no such problem in the area other than vehicular movement.

Noise Level monitoring was carried out in a detailed field survey at various location points in Faisalabad. Day hourtime monitoring 6 am to 10 pm was carried out and all the values were found within the PEQS which is 55 dBA. Field noise level monitoring results of all four locations are being attached in **Annex-III**.

4.4.2 Drinking Water Quality

The drinking water quality analysis was conducted for the 4 selected points falling in the project vicinity. A total of 18 parameters has been tested to illustrate the overall drinking water quality at specified locations in Faisalabad city. Results of all fifteen tested parameters are specified in Annex-III and almost all the parameters are within the limits of Pakistan drinking water quality standards (**PDWQS**). It can be seen from the table that the total hardness and chlorides level are found high in the sample taken from the tap water.



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities

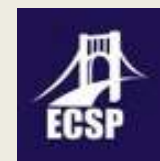


Table 4-4: Drinking Water Quality Results

Sr. #	Water Quality Parameters	PEQS	Sample collection locations			
			Tap Water Lal Mill Chowk, Faisalabad	Tap Water Sandhu Town, Faisalabad	Tap Water Akbarabad, Faisalabad	Tap Water Faisalabad-Jaranwala Road Chak 229RB
1.	Color	≤ 15 TCU	0	0	0	0
2.	Taste	Non-objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable
3.	Odor	Non-objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Turbidity	< 5 NTU	0	0	0	0
5.	Total Hardness (as CaCO ₃)	< 500 mg/L	208	1200	260	604
6.	TDS (mg/l)	< 1000 mg/L	362	562	226	345
7.	pH	6.5- 8.5	7.54	7.35	7.52	7.19
8.	Arsenic (As)	≤ 0.05 mg/L	<0.005	<0.005	<0.005	<0.005
9.	Chloride (mg/l)	< 250 mg/L	36	1425	505	800
10.	Fluoride (mg/l)	≤ 1.5 mg/L	0.18	0.55	0.58	0.44
11.	Nitrate as NO ₃ (mg/l)	≤ 50 mg/L	2.2	3.2	1.12	1.24
12.	Calcium Hardness	NGVS mg/L	120	248	44	36
13.	Magnesium Hardness	NGVS mg/L	88	952	216	568
14.	Total Alkalinity (mg/l)	NGVS mg/L	155	244	96	146
15.	Sodium (mg/l)	NGVS mg/L)	32	48	18	32
16.	Total Coliform	0/ 100 mL CFU	0	0	0	0
17.	Fecal Coliform	0/ 100 mL CFU	0	0	0	0
18.	E. Coli	0/ 100 mL CFU	0	0	0	0
Abbreviations: PEQS = Punjab Environment Quality Standards TCU = True Color Unit N.A. = Not Available CFU = Colony forming Unit NTU = Nephelometric Turbidity Unit NGVS = No Guideline Value Set						

4.4.3 Ambient Air Quality Results

Ambient air quality is a key to measure the concentration of the various chemicals in atmosphere; especially of the chemicals which pose detrimental effects on health, safety and environment, to have a comparison with their safe concentrations, as established in WHO Standards and PEQS.

Petrol and Diesel operated vehicles are emitting smoke and exhaust gasses in excessive quantity which are the leading sources of environmental pollution and are responsible for the air quality worsening. In fact, exhaust emissions (including dangerous gases such as carbon monoxide, oxides of nitrogen, hydrocarbons and particulates) and Evaporative emissions (including vapors of fuel which is released into the atmosphere, without being burnt) are the prime reasons of deterioration of air quality.

The results of the samples are within the **PEQS** and the detailed results of each parameter are being attached in **Annexes-III**.

Table 4-5: Ambient Air Quality Results

Location	PEQS	Lal Mill Chowk, Faisalabad	Sandhu Town, Faisalabad	Akbarabad, Faisalabad	Faisalabad- Jaranwala Road Chak 229RB
NO ₂ (µg/m ³)	80 µg/m ³	23.97	23.96	22.32	22.99
NO (µg/m ³)	40 µg/m ³	16.29	16.17	14.38	16.32
NO _x (µg/m ³)	120 µg/m ³	40.21	40.08	36.66	39.26
SO ₂ (µg/m ³)	120 mg/m ³	27.41	25.34	24.26	27.64
CO (mg/m ³)	5 mg/m ³	0.95	0.90	0.93	1.03
O ₃ (mg/m ³)	130 mg/m ³	20.8	18.6	19.12	22.3
Lead (mg/m ³)	1.5 mg/m ³	0.2	0.4	0.2	0.4
PM 10 (µg/m ³)	150 µg/m ³	142.32	139.63	140.25	145.10

PM 2.5 ($\mu\text{g}/\text{m}^3$)	35 $\mu\text{g}/\text{m}^3$	33.62	34.10	34.68	33.25
TSP ($\mu\text{g}/\text{m}^3$)	500 $\mu\text{g}/\text{m}^3$	263.8	259.14	248.52	258.23

The pictures taken during the environmental monitoring are given below:



Figure 4-3: Environmental Monitoring and Sampling



4.5 Socio-Economic Environment

4.5.1 Administrative Division

District Faisalabad is administratively divided into six tehsils which are enlisted below:

- Chak Jhumra
- Faisalabad City
- Faisalabad Saddar
- Jaranwala
- Samundri
- Tandlianwala

All tehsils have rural and urban union councils. There are 289 union councils in the Faisalabad district which are comprised of 123 urban union and 166 rural union councils.

4.5.2 Population

According to the 2017 census of Pakistan (bureau of statistics Punjab) Faisalabad district population is 7873910 and concerning this calculation, it is the second biggest population of Punjab Province. Faisalabad city estimated population is 3.4 million with a growth rate of 3.70%.

4.5.3 Educational Institutes

Faisalabad has the distinction of being a seat of world-famous Agricultural University and equally renowned Agricultural Ayub Research Institute besides the Punjab Medical College there are several other colleges like Commerce College, Textile College, Superior Science College, Poly-Technical College, and others. The population of Faisalabad has a literacy rate of approximately 51.9%. The extreme burden on the educational infrastructure results in gross inequality in educational development across the district. The literacy rate falls significantly when we look at the rural populations of the district—the rural literacy rate is 16% lower than the urban rate. There is also significant gender disparity: the female literacy



rate is 46% while the male literacy rate stands at 59%.

4.5.4 Health Facilities

The health care includes Basic Health Units (BHU) and Secondary Health Care Includes Tehsil Head Quarter Hospitals (THQ, Hospital). All Four Tehsils of Faisalabad District have Tehsil Head Quarter Hospital in place. But in the Tehsil & District Faisalabad, there is a District Headquarter Hospital that provides health facilities to the people of the area. The numbers of hospitals having major equipment were lacking due to poor management, lack of education, and resources.

4.5.5 Quality of Life Value

The concept of quality-of-life value can provide ways of explaining and understanding human behavior, belief system, values, and ideologies, as well as particular culturally specific personality types. The combination of the new and old culture is found in the Project area, although the young generation is fond of modern culture. The majority of the population follows the Islamic tradition, which is well-practiced in the rural areas has high moral values in the society. Moreover, the influence of the textile business is quite strong. The industry located in the city and surrounding areas is a major part of employment for labor.

The food of the citizens is very simple. Wheat, maize, and rice are the staple food grains. Meat and vegetables like Spinach, Peas, Carrot, Potatoes, Lady Finger are also consumed by well-to-do families. Tea is popular all over the Study Area. Bread (Roti) is generally backed in Tandoor or on simple Tawa. The use of Desi Ghee, milk, and Lassi is very popular in rural areas, which is available abundantly.

The culture of the Faisalabad District is mainly of rural type and overall Punjabi culture prevails in the district. Faisalabad District residents both men and women 99.5% are Muslims and wear according to the old subcontinent traditions i.e. Shalwar Qameez. Both genders like to wear Shalwar Qameez. Some people of nomadic origin may be in the villages using Tehmat (Dhoti) & Kurta instead of Shalwar Qameez, the same case is with both men and women. The use of ornaments among females is also common. The females decorate themselves with ear-ring, necklaces, and Cherries (bangle), especially on festive occasions

or marriages.

Marriage is a special happy occasion in the family, which is performed with all its charms by singing and dancing. The persons of the family and adjacent locality are invited by the bridegroom's family and are entertained with delicious meals. The bride's parents donate the dowry to the girl for equipping her new house. The joint family system is predominant in the Project Area and gradually shifting to the nuclear family system.

4.5.6 Socio-Economic Profile of Project Area

The field survey (including interviews, focus group discussions, census, and area profile) was carried out to collect the socioeconomic data from the various stakeholders which include; general public, residents, and government departments to accomplish the baseline information, which will provide the basis for subsequent monitoring and evaluation studies. The demographic features include; the information on the household's profile, occupation and literacy status of the population, and civic facilities availability residing in the project area. The information relating to the demographic profile of the people in the project area is described below.

4.5.6.1 Age Groups

During the field survey, the ages of the consulted population were recorded. The people interviewed for the socio-economic assessment belong to different age groups i.e., 18-30 years, 31-40 years, 40-50 years, and 50-60+ years.

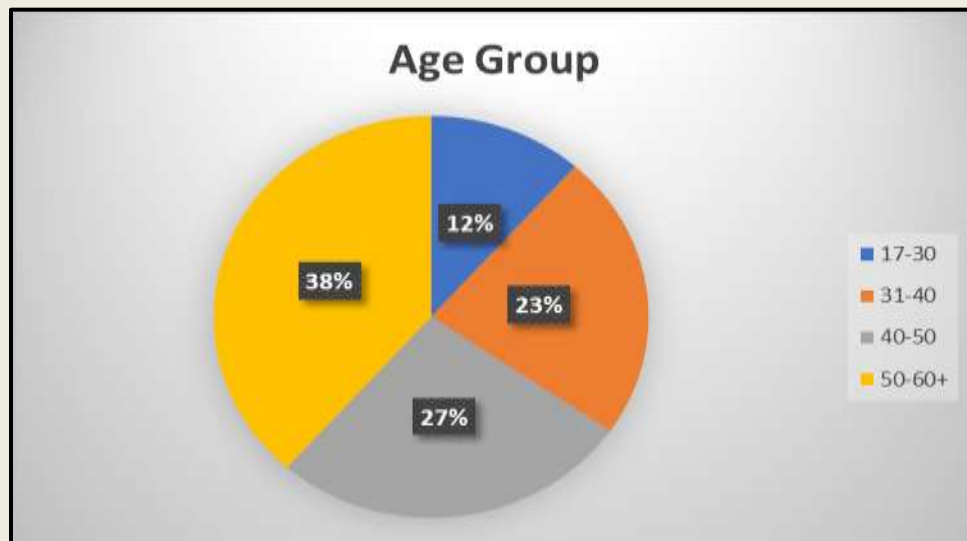


Figure 4-4: Graph Showing the Percentages of Age Groups

4.5.6.2 Language

Faisalabad District has a very rich culture. Language is one of the primary components of the social aspects. Presently the Faisalabad District inhabitants speak several languages like Urdu and Punjabi. The socio-economic data analysis shows that two-thirds of the people speak Punjabi.

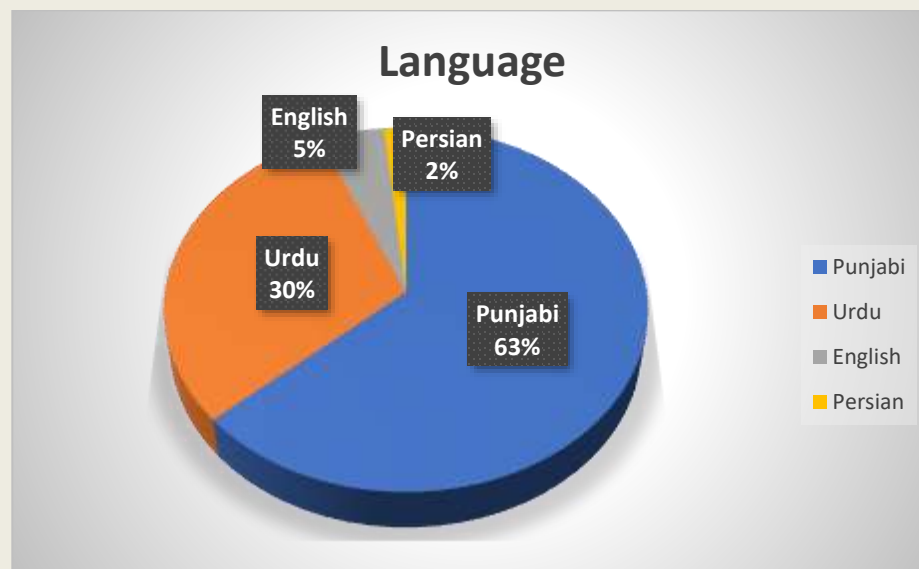


Figure 4-5: Graph Showing the Language of the People can speak

4.5.6.3 Religion

Almost 99% of the Project Area people are Muslims. A bigger residency of Christians can mainly be found in the cities area. The field survey shows that mainly the people follow the Islam religion. No non-muslims were found in the area.

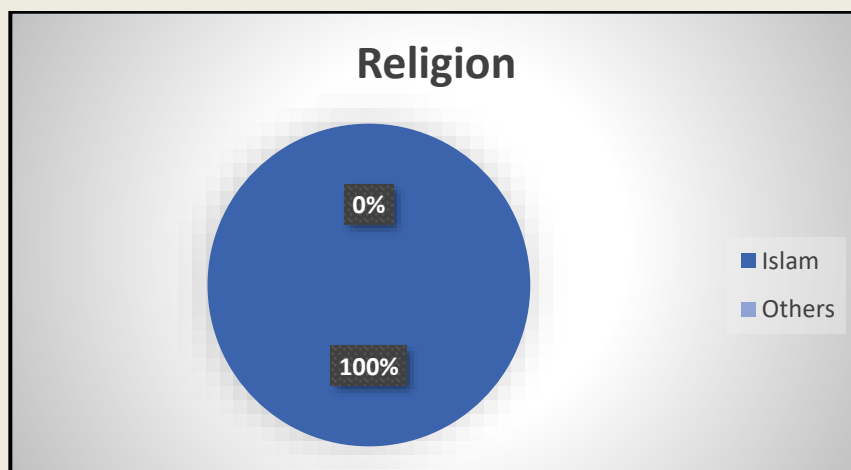


Figure 4-6: Graph Showing the Religion of the People

4.5.6.4 Occupation

During the field survey, it has noted that 26% of the project area population is associated with some kind of business/shops while 37% of the population is involved in labor jobs and 26% of the population are employees and 11% are unemployed.

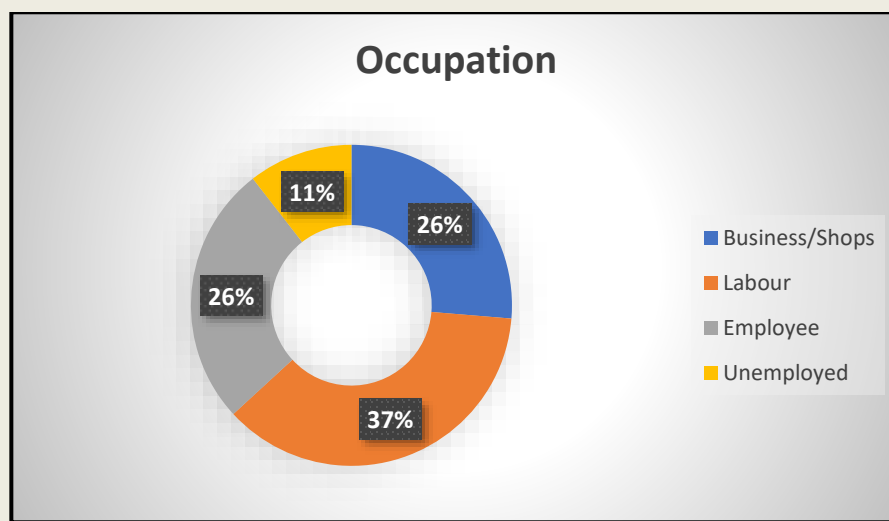


Figure 4-7: Graph Showing the Employment status of the People

4.5.6.5 Status of Education

The field survey analysis shows that one-third of respondents never go to school, while only 18% go for higher education than matric. Among respondents, the percentage of educational status was:

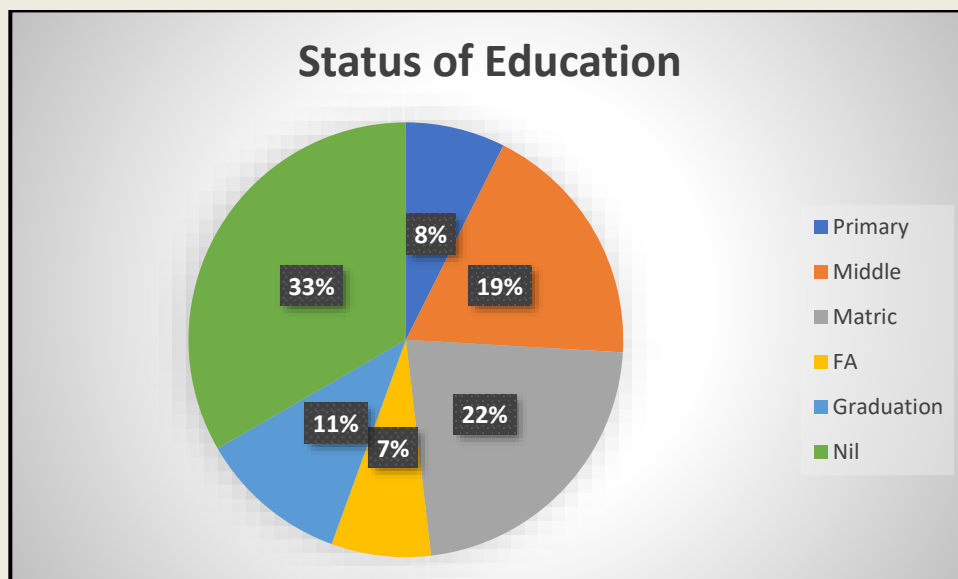


Figure 4-8: Graph Showing Educational Condition among respondents

4.5.6.6 Civic Facilities Available

Civic facilities include the availability of water supply, drainage system, solid waste management system, Electricity, Sui Gas, telephone system, and any emergency response system. The field survey results show that the project areas have the access to Sui gas, a Telephonic system, commercial areas having small shops, lined drainage as well as emergency response system when needed, but seriously lacks a public water supply system.

4.5.6.7 Public Water Supply

The Faisalabad groundwater has high TDS and hardness that makes it hard water. During the field survey, it is noted that the city lacks seriously in terms of Public water supply network. Instead, each household has its bore and uses this water for their daily use. For drinking purposes, local vendors sell the water at the rate of Rs. 15 to Rs. 25 per gallon. Almost a gallon is used in a day by a typical household. Only the drinking water costs Rs.

450 to Rs. 750 per month to a family. Other than that, it has been claimed by a resident of Sandhu Town that he has been paying the WASA bills regularly for years, which include water supply and sewerage charges but the water supply network is yet to be operational.

Some areas have water filtration plants installed by the Selani Trust (welfare organization), but very few people use the facility. Instead, canned water is equally popular among the houses and shops/business centers as well.

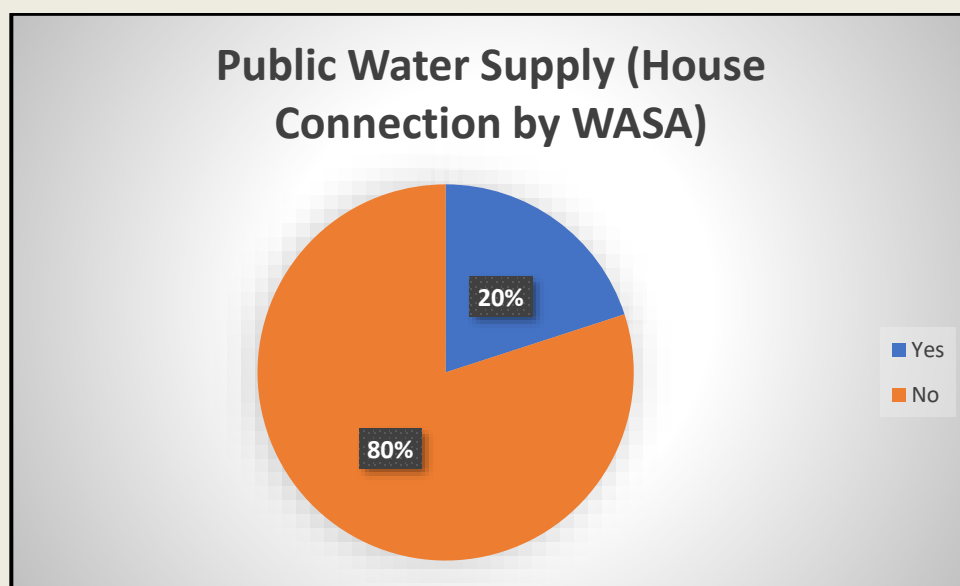


Figure 4-9: Graph Showing Public water supply availability

4.5.6.8 Willingness to Pay

During the field survey, it has been asked if the people are willing to pay the bill to WASA for the improved services of water supply, sewerage, and drainage. All the respondents agreed to pay the bill for better services.

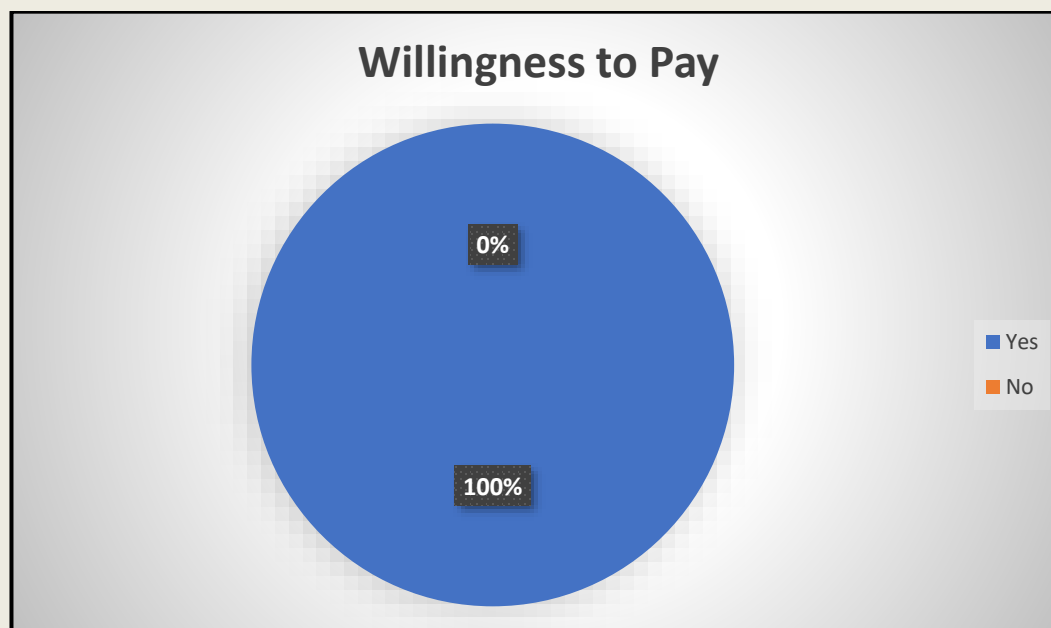


Figure 4-10: Graph Showing Willingness to Pay for improved WASA services

4.5.6.9 Solid Waste Management System

Most of the project area people are satisfied by the solid waste management system as the solid waste generated is domestic solid waste. It is also analyzed from the field survey results that there is no segregation system and a waste collection system is available in the project area. While some of the residents segregate their organic and inorganic waste to feed live stocks like hens, cows, buffaloes, etc. as well to sell their segregated inorganic waste like plastic bottles, metals to Ragmans to generate money.

4.5.6.10 Project Response

Approximately 100% of the respondents thought that this project should be implemented. In their opinion, the development of the project will create new job opportunities for locals residing near the project area and it will help to improve the economic, social, and living conditions of the area. The respondents also provided the mitigation measures like certified contractors must be hired for the selected site development, a proper landscape management plan must be implemented and the management of the generated wastewater & solid waste should be done. The respondents said if mitigation measures will be implemented efficiently, they would have no objection.

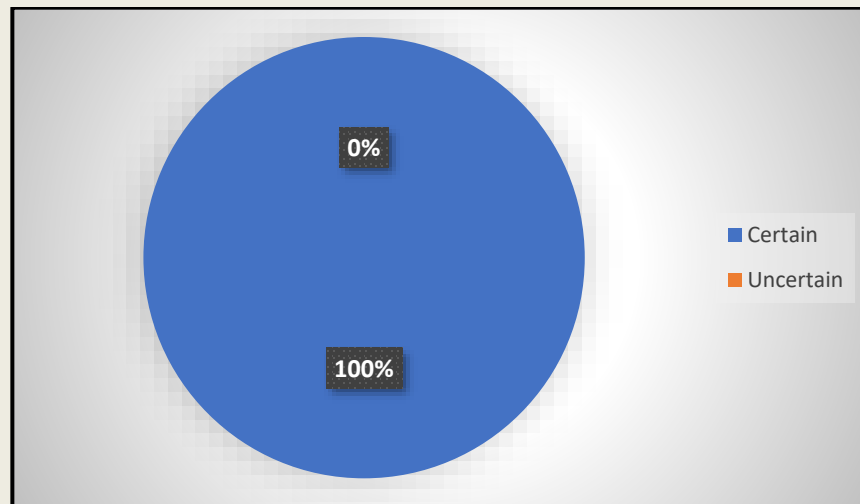


Figure 4-11: Percentage of People in Favor or Against the project

4.5.6.11 Archaeological or Historical Sites

Field Survey results verified that there is no archaeological or historical site falling in the area of influence (AOI) of the Project which is 500ms both ways.

The photolog of the socio-environmental baseline survey is given below:





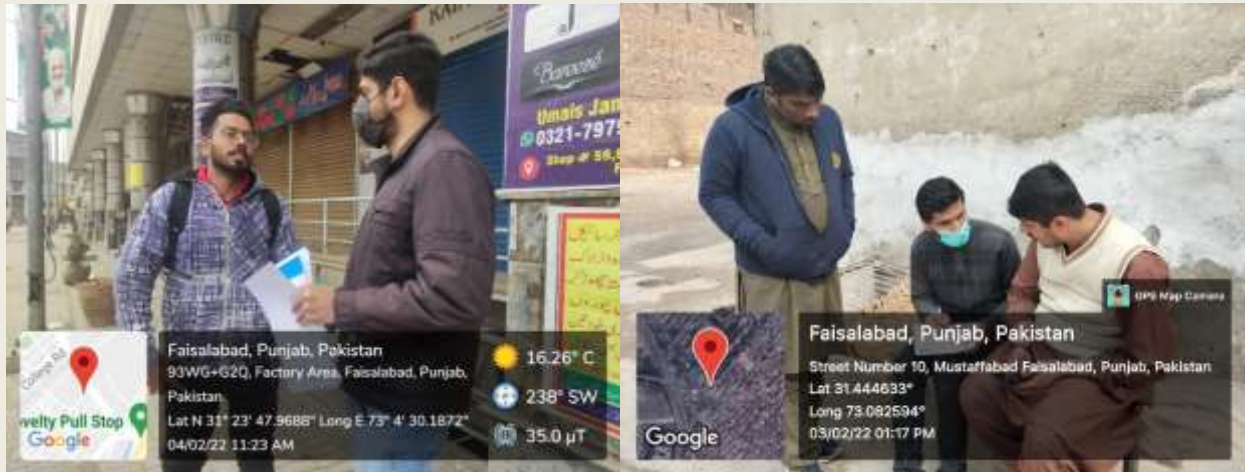


Figure 4-12: Photolog of Socioenvironmental Survey with public

5 IMPACT ASSESSMENT AND MITIGATION MEASURES

This section identifies the potential impacts anticipated relating to the location and design during the construction and operation phases of the project on physical, ecological, and socio-economic domains of the environment. EPA Punjab Guidelines require that an Environmental Assessment should evaluate impacts due to the location, design, construction, and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes, therefore, all potential impacts of the project are identified, and mitigation is devised for any negative impacts. A project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed project. Since the proposed project falls under 'Schedule II' which describes that such projects are likely to cause medium-level severity adverse environmental impacts however all adverse impacts can be mitigated by applying engineering techniques with best management practices.

5.1 Environmental Impact Characterization

During the EIA Study of the Project, the predicated environmental impacts were carefully characterized. There are different categories of impact characterization including the following:

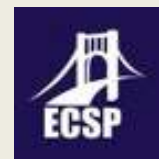
- Nature (direct/indirect)
- Duration of impact (short term, medium term, long term)
- Geographical extent (local, regional)
- Timing (project phase)
- Reversibility of impact (reversible/irreversible)
- Likelihood of the impact (certain, likely, unlikely)
- Impact consequence severity (severe, moderate, mild)

- Signification of impact (High, medium, low)

The above aspects of environmental impacts characterization are defined in **Table 5-1**. After the characterization, appropriate mitigation measures were identified, to minimize, if not eliminate, the adverse impacts associated with Project activities. Finally, residual impacts were also identified.

Table 5-1: Impact Characterization

Sr. No.	Categories	Characteristics
1	Nature	Direct: The environmental parameters are directly affected by the project construction or operation. Indirect: The environmental parameter changes as a result of alteration in another parameter.
2	Duration	Short-term: The impacts that last only during the construction of the proposed Project e.g., noise from the construction activities. Medium-term: lasting for a period of a few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to clearing of the 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 erosion.
3	Geographical Extent	The geographical extent may be local or regional (spatial dimension).
4	Timings	Pre-construction (designing), Construction and Operational
5	Reversibility	Temporary: The impacts that don't cross the ecosystem threshold value of resilience. Permanent: The impacts that exceed the ecosystem threshold value of resilience i.e., a community that cannot come back to its original stage without external aid.



6	Likelihood	Certain: Impact anticipated occurring under extreme circumstances. Likely: Impact will probably occur under less extreme circumstances. Possibly: Impact may occur during different stages of the project. Unlikely: Impact could occur during many stages of the project. Rare: Impact may occur but only under exceptional circumstances.
7	Consequence of 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 or fauna; has long-term effects (period of years) on socio-economic activities of significance or 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; has short-term effects (period of months) on socio-economic activities of significance on a regional level. Minor: When an activity causes short-term (period of few months) reversible damage to an 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 socio-economic activities of local significance. Negligible: When no measurable damage to the physical, socio-economic, or biological environment above the existing level of public concern; and conformance with legislative or statutory requirements.
8	Impacts based on Significance	The impact may be categorized as high, medium, or low. Based on the consequence, likelihood, reversibility, geographical extent, duration, level of public concern; and conformance with legislative or statutory requirements.



5.2 Impact Assessment Procedure

To identify the significance of an impact, it is important to distinguish between two concepts: **sensitivity and magnitude**. As far as possible, the sensitivity and magnitude of the impacts are described concerning legal requirements, accepted scientific standards or accepted impact assessment practice, and/or social acceptability. Where no known or published “standard” criteria exist for determining the magnitude of effects, already established professional criteria and best practices or techniques used and clearly described.

5.3 Project Area of Influence

The parts of the five halqas, where major project activities are proposed, are considered within the project jurisdiction. Environmental impacts have been identified within the Project Area of Influence; which lies within 500 m on both ways from the boundary of the proposed facilities. Therefore, the identification of Project impacts and recommendations of mitigation measures will be limited within this area.

5.4 Impact Evaluation

The Impact screening checklist and Project impact evaluation matrix have been developed (**Table 5-2**) to evaluate the potential impacts of the proposed Project based on set procedures of environmental guidelines of the EPA-Punjab. The impact screening checklist is developed to screen out the potentially insignificant environmental and social impacts from the potentially significant adverse environmental and social impacts during the Pre-construction (planning and design), construction, and operational phase of the proposed Project. The objective of the impact screening process is to assess the significance of the issues related to the air, water, noise, soil, transportation, infrastructure, communication, hazards, and external limits of the proposed project. The impact assessment has been evaluated in support of an environmental-socio-economic questionnaire developed and enclosed as **Annex IV**. For the assessment of impacts, the project impact evaluation matrix is used by dividing the project action into different phases

(planning, design, construction, and operations). A Project impact evaluation matrix is shown in **Table 5-2**.

Table 5-2: Impact Matrix

Sr.No	Parameters		Pre-Construction Phase	Construction Phase	Post-Construction/ Execution Phase
1	<i>Ecological Environment</i>				
1.1	Avifauna (Birds)		N/A	0T	N/A
1.2	Trees		N/A	-1P	+1P
1.3	Endangered Species		N/A	N/A	N/A
1.4	Fauna		N/A	N/A	N/A
1.5	Aquatic life		N/A	N/A	N/A
1.6	Crop Cutting		N/A	N/A	N/A
2	<i>Physical Environment</i>				
2.1	Land Use		N/A	-1T	N/A
2.2	Climate Change		N/A	0T	0P
2.3	Ground depletion	Water	N/A	0T	+1P
2.4	Ground Quality	Water	N/A	0T	0P
2.5	Surface Quality	Water	N/A	0T	N/A
2.6	Air Quality		0T	-1T	0P
2.7	Noise		0T	-1T	0P
2.8	Solid Waste Management		0T	-1T	N/A
3	<i>Socio-Economic Environment</i>				
3.1	Loss of Electricity/Sui-gas Transmission lines		N/A	N/A	N/A
3.2	Loss of water and sewerage distribution pipelines		N/A	-1T	+1P
3.3	Loss of telephone lines		N/A	N/A	N/A
3.4	Accessibility infrastructure Roads/Railways		N/A	-1T	N/A
3.5	Loss of Assets		N/A	N/A	N/A
3.6	Aesthetic		0T	-1T	+1P
3.7	Quality of Life		N/A	-1T	+2P
3.8	Mosques		N/A	N/A	N/A
3.9	Monuments		N/A	N/A	N/A



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3.10	Employment Opportunities	0T	+1T	N/A
3.11	Public Health	N/A	-1T	+1P

5.5 Positive Environmental Impacts

Mostly in developing countries, residents are deprived of proper WASH (Water, Sanitation, and Hygiene) facilities. In Pakistan, residents are also underprivileged due to the isolation of these basic municipal services. This Project is one of the milestones to improve the health of the people as well as accessibility by the provision of potable clean water in the Faisalabad city as per provincial, national, and international goals to provide better sanitation facilities.

The environmental and social impacts of this proposed project are low to moderate, not of high intensity. Therefore, execution of this proposed project seems beneficial for the residents of the city if proper mitigation actions will be taken at different stages of the project execution which are proposed in the mitigation plan. Enlisted below are a few of the positive impacts of the project:

- The countable benefits from the project are the employment opportunities that will be created. People will be employed at the site in all the phases of the project. The project has employed the people right from the planning through to the assessment. Others to be employed are the contractor, the supervisors, and the construction workers during the construction phase and the management staff during the operation phase.
- Employment will improve the living standards of the employees and their families as they will be able to acquire basic needs from the income that they will earn from the employment.
- The development will enhance water security in the area and ensure the potable supply is reliable due to the up-gradation of the distribution network.
- It is helpful for the provision of safe and clean potable water to the residents



of the project area because the survey shows that currently, available drinking water is not fulfilling the needs as well as water quality standards.

- It is beneficial to improve the public health as well as to save the life of this project area by reducing the induction probability of waterborne diseases such as hepatitis, diarrhea, dysentery, cholera, Guinea worm disease, typhoid etc
- It will improve the quality of life of the citizens because of many factors like ease of accessibility, good quality water provision, safe disposal of wastewater and less ponding in low-lying areas during monsoon, and many more.
- The landscape of the area will be improved after completion of the project as new roads will be constructed by the relevant department (Highways department, Local Government).
- The air quality of the area will become better through the plantation of new trees.
- People will be served with clean and hygienic potable water at their home, and safe disposal of wastewater which is the actual objective of this project.

5.6 Adverse Environmental Impacts

Besides positive environmental impacts, several adverse environmental could also be assessed when the proposed project is implemented. Almost all adverse environmental impacts will be temporary, thus short-term mitigations are required. Following is a brief account of the impacts.

Physical Impacts: like excavation, inducing loss of land for cultivation, noise, and dust emission temporarily during construction. The range of impacts normally is in the area where plants and other infrastructures are going to be constructed.

Biological Impacts: such as degradation of habitats by excavation & dumping of earth



material, construction of a road or other corridors. Often like in such Project, will only have local impacts in the project area.

Economic and Social Impacts: such as disturbance to traffic flow, free movement, business, affecting the social cohesion of a community. Although the scope of impacts is limited, but sometimes an area might be affected from an aspect even far away.

5.7 Pre-Construction Impacts

The impacts associated with the Project siting (before construction begins) are those which relate to its location along with the future extension and distribution network. These impacts are different from those which are associated with the Project's construction and operation phases, in the sense that the construction and operation impacts are associated with the activities such as land clearing, waste disposal, whereas the project siting impacts relate to the mere presence of a facility at the given location. For the proposed project, the following two aspects of the Project site will be considered:

- Project site, land use, and design
- Visual Impacts (aesthetic value)

a) Land Use and Design

The impact area is that territory, where effects will occur, the Project impact area is defined as the area where the infrastructure will be replaced/ extended/ installed. The scope of impact and its characteristics depend upon the final area selected after the detailed design stage. However, as confirmed in the reconnaissance meeting with the client, all of the project area lands are government-owned and no land acquisition is required. Therefore, the impact is of low insignificance. The nature of this impact is direct, irreversible and the duration will be long term.

Mitigation Measures

This impact can be mitigated by taking the following measures:



- All project components will be provided as per respective design standards.
- Proper Landscaping after collection of relevant data to identify the sensitivity of the area to erosion, instability, and contamination.
- Appropriate measures will be taken to ensure the stability of design structures. Consideration of the inclined slopes, drainage in the distribution network should be made about stability and future maintenance programs should be planned to maintain and repair sensitive soil areas, slope retaining areas, and provision of soil protective planting.

5.7.1.1.1 Visual Impacts

Visual impacts can have a long-lasting impact on the aesthetics of the area. It is essential to maintain the existing natural landscape and vegetation, if present, of the Project area. As this natural landscape has an aesthetic value although not of very significant importance, without any doubt, is a valuable asset of the area. The development of the Project can potentially damage the natural landscape and thus it will result in visual impact. The nature of this impact is direct and irreversible, the duration will be short term and the extent will be localized.

Mitigation Measures

The following measures should be taken to reduce the visual impacts of the current project:

- Prepare and follow an appropriate plantation plan in the project area including planting methods, maintenance, and schedule.
- Adopt manners that minimize the changes in the topography, landscaping, and damage to vegetation.

5.7.1.1.2 Socio-Economic Environment

There are no adverse impacts on the socio-economic conditions of the residents of



the project area. As there will be no impact on public infrastructure or livelihoods on a long-term basis, however, a few minor temporary impacts might occur during the construction phase.

5.8 Construction Phase Impacts

The construction phase will be the most significant part of the Project concerning environmental disturbances since most of the impacts are likely to take place during this period. Various construction activities will invariably intervene in the existing environmental conditions, which may have impacts on the physical, biological and social environment of the area and nearby communities. Such impacts include the following:

5.8.1 Physical Environment

a) Soil Erosion and Contamination

Significant excavation is expected for the project to rehabilitate the water, sewer, and drainage pipelines. While every effort should be made to minimize the excavation by optimizing the cutting and filling operations. This may lead to erosion due to the loosening of topsoil. Excavation of soil may alter the topography and may also lead to topsoil erosion. This impact would be of moderate significance.

Mitigation Measures

By adopting the following measures, the impact would be finally of low significance:

- Erosion control measures such as ramming of topsoil immediately after excavation and silt controls will be provided to minimize erosion;
- Construction work will not be carried out during heavy monsoon rains;
- It will be ensured that no soil is left unconsolidated after completion of work;
- Photographic record will be maintained for pre-project, during-construction, and post-construction condition of the sites;



- Monitoring during the project execution will ensure compliance with the above mitigation measures and their adequacy;
- Prepare material borrowing and disposal plan;
- Keep a photographic record (before, during, after) for borrow and disposal areas;
- Ditches or borrow pits that cannot be fully rehabilitated will be landscaped; and
- Roads and streets should be constructed again on an urgent basis by the relevant department (Municipal Corporation, Local Government).

5.8.1.1.1 Air Quality Degradation

The movement of motor vehicles/ large machinery for earthmoving activities produces toxic dust emissions. Furthermore, the project traffic flows may cause dust and gaseous emissions off non-metalled/ unpaved road tracks directly affecting the ambient air quality of residential villages (within +/-100m COI). Local settlements near the location of the construction site may come under direct air quality impacts of activities such as excavation of trunk sewers or disposal station site (Stockpiles associated emissions), development of concrete working platform (Dust emissions) by heavy bulldozers; and Project Traffic transporting raw materials along with manpower to construction camps or construction site.

Construction machinery and Project vehicles will release exhaust emissions, containing Carbon Monoxide (CO), Oxides of Sulfur (SO_x), Oxides of Nitrogen (NO_x), and Particulate Matter (PM_{2.5}). These emissions can deteriorate the ambient air quality near the Project site. Furthermore, construction activities such as excavation, land leveling, filling, and vehicular movement on unpaved tracks may also cause fugitive dust emissions. The nature of this impact will be direct but short-term. The geographical extent of the impact will be locally-based and reversible.



Mitigation Measures

- All temporary services and access roads to be water sprinkled on regular basis (twice a day) to minimize dust generation.
- All vehicles, equipment, and machinery used in construction to be regularly maintained to ensure the pollution emission levels as per Punjab Environmental Quality standards (PEQs) Air quality standards.
- Control of vehicular speed and strictly follow the specified speed limit.

Residual impacts

The above measures will reduce the magnitude of the adverse impacts on the ambient air quality. The significance of the residual impacts on the air quality is expected to be below.

5.8.1.1.2 Water Pollution

The Project Activities that can contaminate soil can also contaminate the nearby water bodies (canal, nullah, drain). During the survey, only wastewater carrying channels (nullahs) are found to be in the Area of Influence. During the construction activities, any potential contamination of these surface water bodies such as nullahs or drains due to improper disposal of sewage, inappropriate solid waste disposal, sludge wastes generated from contractor's camp and site offices may prove to be highly threatening for the local population which inhibits the project area in terms of the spread of disease. Material Safety Data Sheets (MSDS) data, when available, will bind the Contractor to target the key chemicals, disposal solid waste, and liquid wastewater to implement their mitigation measures in detail. This impact may be exaggerated if construction activities are carried out during the wet season. The nature of this impact is direct, reversible with a long-term effect. The geological extent is local.

Mitigation Measures

- Prepare and implement Waste Management Plan for solid/ liquid wastes.



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- Removal of suspension materials from wastewater before discharge into a surface water body such as canal or nullah.
- Construction materials will be stored away from the canals, nullahs, or drain bank in a bunded area with an impermeable base to be developed by the contractor;
- An efficient communication system and a downstream warning system are essential in case a spill occurs in the canal distribution network;
- Cover the storage area so that the surface water or rainwater will not carry the pollution into the nullah or drain;
- Vehicle or contaminated tools will not be washed in or near the canals, nullah or drain;
- Camps should be provided with soakage pits along with septic tanks for final disposal of effluents (refer EMMP);
- Contractor should arrange a clean water source for meeting the construction as well as domestic usage water demands of labor workers (cooking, cloth washing, kitchen washing);
- All routine maintenance of construction machinery and vehicles, if carried out on-site, will be carried out in a designated workshop/maintenance area with concrete hard standing surface and drainage to an oil interceptor grease trap device;
- Implementation of monitoring activities as per location for surface water quality as given in the EMMP; and
- Construction activities to be minimized during the rainy season.

Residual Impacts

If the recommended mitigation measures are effectively employed, the residual



impacts of the WASA-F construction activities on the water resources of the Faisalabad project area will be negligible.

5.8.1.1.3 Noise and Vibration

The construction activities at the work site may generate noise nuisance as high as 85 decibels (A distance of 350 m to 400 m is needed to reach the PEQS daytime guideline level of 55 dBA for residential receptors). Noise and vibration will be generated by the construction machinery and vehicles during construction activities. Noise emissions will also be generated from other on-site mechanical equipment (vibrations, drilling, etc.). It is likely to affect the Project area, particularly the nearby settlements and agricultural areas. The nature of impact is direct and the duration is short-term. The geographical extent of the impact is local and reversible.

Mitigation Measures

- Vehicles, equipment, and other machinery to strictly follow the noise standards as specified in PEQs. The noise levels should be monitored regularly and levels should be maintained within the PEQS level i.e. >80 dB;
- Vehicles and equipment used will be fitted as applicable with silencers or mufflers and properly tuned and maintained to minimize noise pollution;
- Noise measurement to be carried out at locations and schedules specified as per EMMP to ensure the effectiveness of mitigation measures; and
- Construction activities will not be carried out at night.

Residual Impacts

If the recommended mitigation measures are effectively employed, the residual noise impact will be low to medium.

5.8.1.1.4 Health and Safety of Workers

The Project is located very close to the residential communities may pose safety



hazards to the local population living nearby. The Project components or construction activities impose a varying degree of safety hazards, which may be attributed to different factors, e.g., road accidents, fire incidents, failure of heavy machinery or equipment, etc.

The public health issues related to the Project location are the possibility of contamination of local drinking water resources, facilitation of transmission of disease, and dust emissions during the construction phase. The anticipated health impacts are classified into the following categories:

- **Disease Transmission:** The labor work crew may bring with them a multitude of communicable diseases including coronavirus, malaria, tuberculosis, influenza, hepatitis, HIV, etc. The standing water and poor waste management near the campsites may provide a breeding ground for vectors of diseases to multiply and infect the local population
- **Dust Allergy:** One of the main problems, people might face is dust allergy, which is a form of air pollution and may lead to the problem of difficulty breathing among the laborers and nearby residents.
- **Eye and Respiratory Diseases:** Construction workers and people in close vicinity of project sites may become susceptible to eye infections, redness, itchiness, and respiratory diseases due to their routine exposure to dust and exhaust emissions on site. Various respiratory diseases such as Pneumonia, Bronchitis may also occur due to prolonged exposure times.
- **Physical Injuries:** Injuries or loss of life could occur primarily by occupational-related accidents or natural disasters. Activities such as land clearing, earthworks, handling of electric generators and equipment, construction of facilities, installation of machinery may pose threat to various occupational hazards e.g., falling, tripping, slipping, electrocution, burns, cuts, etc. to the workers on-site as well as road users.



- **Psychological Disorders:** Some workers may suffer from depression and anxiety disorders due to bad working and accommodation conditions or their relationships with fellow workers. The psychological well-being of some members of the communities may be affected due to disturbances created by the Project activities.

Excessive illumination at the construction site may potentially cause light pollution, creating a public nuisance. The nature of this impact will be direct and indirect at the same time. The duration will be spread across short to medium term and geological extent will be local, with a reversible potential.

Mitigation Measures

- Contractor will ensure the provision of medicines, First Aid Kits, and Emergency vehicles at workplaces;
- The work site should be kept clean and provided with adequate facilities like potable water and sanitation;
- The local community will be educated regarding the safety hazards at the site via awareness campaigns;
- The mitigation measures discussed under air quality deterioration, soil and water contamination will address the public health concerns as well. Inter-alia, routine health screening and training of the contractor's employees should be ensured;
- Provision of training and education of workers at the site of emergency response procedures is also important to enable them to encounter the risks associated with physical injuries. Mitigation measures for workers' psychological disorders include devotion to best management standards regarding working conditions. Also, the laborers should be vaccinated for immunization against communicable diseases including coronavirus;



- Protective fencing will be fixed around the construction site.
- Unauthorized access within the construction area will not be allowed;
- Vehicle speed limits of 30 km/hr. around the Project site will be enforced;
- Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance of glare;
- Elaboration of contingency planning in case of major accidents;
- Appropriate Personal Protective Equipment (PPE) will be provided to the workers to reduce health hazards;
- Warning signboards, sign markings, access restrictions will be displayed on the construction site to avoid risks of accidents. A separate Traffic management plan should be developed and implemented by the Contractor to reduce the likelihood of major accidents or injuries to personnel; and
- The traffic movement would be strictly managed by posting an appropriate number of wardens to avoid accidents and on-road hazards, especially in rainy and fog weather.

Residual Impacts

There will be a moderate level of the residual impact of safety hazards associated with vehicular traffic and construction activities. The residual public health and nuisance issues will be quite negligible after the effective implementation of the mitigation measures.

5.8.2 Biological Environment

During the construction phase, trees/ shrubs would be partially removed from the project site at the locations of disposal stations. Only 5 to 6 trees will be removed from the project area (the prominent species is Sufaeda). Trees act as a binding force as their roots are spread in the soil, which helps to keep the soil intact and erosion-free.



On account of the movement of heavy construction machinery, bulldozers, dump trucks, cranes, trucks, and tractors in the Project Area or the periphery of the Project sites, dust-laden polluted air will form a dust film on the leaves of trees in the area, thus blocking the sunshine and hindering photosynthesis process to the deterioration of the plant health.

During the construction activities, the Contractor's workers may damage the vegetation and trees for use as firewood for cooking requirements. The nature of the impact will be direct; duration will be from medium to long term. The geological extent will be local and reversible.

Mitigation Measures

The mitigation measures will further minimize any adverse impacts on the floral resources of the area:

- Cutting of trees and other natural vegetation will be minimized as far as possible through astute planning;
- If cutting of trees is unavoidable, tree plantation of local species such as Shisham, (Dalbergiasissoo), Kikar (Acacia nilotica), Poplar (Populusalba), Toot (Morusalba), Jamin (Syzigiumcumini), Sukh Chain (Pongmiapinnata), etc. will be undertaken at appropriate locations. The number of trees thus planted will be at least five times the ones that are cut;
- A record will be maintained for any tree cutting;
- A plantation cover of appropriate trees/ bushes will be raised within the open available spaces, distributaries, and along canals. Ornamental trees bushes and climbers have been included to improve the scenic and aesthetic value. A mixture of shady trees with heavy foliage will be required to counter the air and noise pollution.
- Small green areas in and around various structures as local landscape plans, should be set aside, where ornamental shrubs will be grown;



- Use of firewood and shrubs for cooking and execution of work to be prohibited;
- During construction, the sprinkling of water in the project site and on the stockpiles of sand and earth should be made a regular practice and preferably be carried out 2 times a day;
- Chain saws should be used for cutting trees instead of bulldozers to control clearance of vegetation; and
- The removed vegetation cover will be vigorously reinstated and re-vegetated to the original conditions.

Residual Impact

The proposed tree plantation will take some time to grow and mature, there will therefore be some reduction of trees and natural vegetation in the area. However, no vegetation will be possible in the built-up area. This impact cannot be fully mitigated, and the residual impact would be medium; at least in the medium term. In the longer run, however, the planted trees and vegetation will more than compensate for any vegetation loss.

5.8.3 Social Environment

a) Impact on Local Population

During the construction phase, the local population will be affected by the construction of activities in several ways. Some of these are mentioned below:

- The general mobility of the public using the tracks may be hindered.
- Inhabitants will have to bear the noise and dust problems.
- Construction activities may inhibit the agricultural or business facilities in the adjoining areas.
- Insecurity may occur for the local population due to the contractor's labor at



the site.

- Public health may also get affected by fugitive dust, noise, and smoke.
- The nature of these impacts is both direct and indirect simultaneously. They will be ranging from short-term to medium-term with a local geological extent and both reversible and sometimes irreversible types.

Mitigation Measures

The mitigation measures for the social impacts on the local community are enlisted below:

- If possible, alternate tracks may be constructed temporarily, where utmost necessary, or appropriate signage boards would be displayed for alternate routes during the construction phase.
- Temporarily, the Contractor should select specific timings for heavy machinery operation to cause the 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 construction materials being transported to the site.
- The Contractor should warn the workers not to involve in any theft activities or to cause disturbance/ harassment of women at the project area and if anyone would be involved in such types of activities, he will have to pay the heavy penalty and would be handed over to police.
- Similarly, at the time of hiring laborers/ workers, the Contractor has to take care that the workers should be of good repute and should be familiar with



specific requirements for working.

After the implementation of the above-mentioned mitigation measures, there will be a negligible level of residual impact.

5.8.3.1.1 Gender Issues

Conflicts may occur due to the intrusion of men in the nearby settlements. The nature of these impacts will be indirect and short-term based. The geological extent will be local and in a reversible manner.

Mitigation Measures

- Location of Contractor's camp should be carefully selected to avoid conflicts with the local people of aforementioned residential areas.
- Contractor will warn the staff strictly not to involve in any unethical activities and to respect the social norms and restrictions, particularly concerning local women.

5.8.3.1.2 Indigenous People and Vulnerable Social Groups

No indigenous people have been identified in the Project Area and hence no impact is envisaged on such groups.

5.8.3.1.3 Religious, Cultural and Historical Sites

All project-related activities must be carried out at a reasonable distance from religious, cultural, and historical sites if any. During the survey, there is no such site found near the project site.

If the project activities are needed to be done in front or close vicinity of sensitive receptors like masjid school, college, or hospital, then the utmost care should be taken to avoid any negative social impacts and proper mitigation measures, as described above, must be followed.



5.9 Operational Phase Impacts

5.9.1 Physical Environment

During the operational phase, project activities will interact with different components of the environment. This interaction may result in the following adverse impacts:

- Water contamination
- Water overuse
- Safety hazards, public health, and nuisance

However, the magnitude of the above impacts is likely to be lower as compared to the construction phase.

- To ensure harmony of the Project with the environment, the management will implement sound environmental management practices to effectively handle the basic environmental issues, including any accidental oil/ fuel spillage to be cleared and its disposal ensured;
- The operational phase problems of sewerage lines like choking, desilting must be carried out as early as possible after the sewerage complaint is received.
- Maximum tree plantation as applicable and feasible, by selecting suitable species to absorb emissions. Plantation of suitable species will help the overall aesthetics of the area as well as nurture the oxygen needed for a clean environment;
- Continuous monitoring of water table at source and water quality;
- Maintenance of water distribution network to avoid any leakage; and
- Noise, and other public nuisance abatement, particularly at disposal stations



5.9.2 Socioeconomic Environment

Project operation will have the following positive impacts on the socio-economic environment of the Project area:

- Water-borne diseases in the project area will decrease.
- People will be more productive and avail more business opportunities.
- Overall benefits of better health and access to clean drinking water will get a boost.

The nature of these impacts will be both direct and indirect with a long-term irreversible effect. The geological extent will remain locally limited to the surrounding areas.

Mitigation Measures

- Since most of the socioeconomic impacts are positive, therefore no mitigation measures are required.
- Improved facilities will outweigh the negative factors as it would help to maintain reduced health-related problems and a more healthy productive environment.

5.10 Potential Environment Enhancement Measures

The project is an environmental enhancement measure in itself as part of providing clean drinking water and provision of sewerage and drainage facilities. The project will enhance the quality of the project area.

5.11 Equipment Maintenance Details

All mobile heavy equipment being used as construction machinery have been categorized here as vehicles which also include general vehicles used for transportation during the construction process. As per motor vehicle regulation 15 of PEPA 2000, a maintenance schedule will be chalked out by the contractor immediately after mobilization.



6 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

6.1 Introduction

The EMMP is a strategic approach towards the effective implementation of the mitigation measures and environmental protection of the Project Area and its surroundings. It not only mitigates and offsets the potential adverse environmental & social impacts of the project identified in the detailed socio-economic survey but also enhances the positive impacts. According to this plan, all the activities related to various phases of the project are controlled and monitored.

Based on the environmental baseline conditions, planned project activities and impacts assessed earlier, this section enumerates the set of measures to be adopted to minimize the adverse impacts. The process of implementing mitigation and compensatory measures, execution, and agencies responsible for their implementation and indicative costs is discussed in this chapter. The key stakeholders in the environmental management activities are Proponent, Contractor, Local Government Authorities and General Public. The EMMP for the management of the identified environmental impacts associated with this project consists of three main components:

1. Implementing the Impact Mitigation Plan
2. Monitoring the implementation of the EMMP
3. Institutional Framework for Monitoring, Reporting, and Supervision of EMMP.

It should be amended in consultation with the concerned regulatory authority, in this case, EPA Punjab, if any issue has been overlooked or if any need would arise as the project continues.



6.2 Purpose & Need of the EMMP

Primarily, the purpose of this EMMP is to serve as a quick reference for the consultants, contractors as well as the Proponent to implement the proposed mitigation measures effectively and to monitor the overall environmental performance of the project. Furthermore, to house the procedure, which the proponent follows to implement and maintain this EMMP. The need for the EMMP is mentioned as follows:

- Ensure that attention is paid to the actual environmental effects arising from construction, and operation of the proposed project;
- Ensure that anticipated impacts are maintained within the levels predicted;
- Ensure that unanticipated impacts are managed or mitigated before they become a problem; and
- Ensure that environmental management brings about real environmental benefits and achieves environmental sustainability, rather than the Environmental Approval Process being a mere paper chase to secure a development approval.

6.3 Objectives of the EMMP

The EMMP ensures to implement mitigation measures during different phases of the project and evaluate the effectiveness of mitigation measures as proposed in the EIA and recommend improvement if any need would arise. The key objectives can be summarized as:

- Minimizing any adverse environmental, social, and health impacts resulting from the project related activities
- Implementation of ongoing environmental monitoring programs
- Periodic review of the Environmental Management Plan to allow for improvement



- Ensure that all stakeholder concerns are addressed if any
- Overall, this EMMP aims at ensuring the application of the mitigation and monitoring measures needed to reduce and control the various environmental and social impacts associated with the implementation of the proposed project
- Provide the mechanism for taking timely action in the face of unanticipated environmental or social situations
- Identify environmental as well as social training requirements at various levels

6.4 Scope of the EMMP

The scope of the EMMP includes the following phases of the project:

- Planning and Design Phase;
- Implementation and Construction Phase; and
- Operation Phase.

All the activities performed during these phases will be controlled and monitored according to this EMMP.

6.5 Components of EMMP

These are the relative components of the Environmental Management & Monitoring Program (EMMP).

- Environmental Mitigation Plan
- Environmental Monitoring Plan
- Institutional Framework and Administrative Requirements
- Environmental and social training to raise awareness and



- EMMP Cost

6.6 Environmental Management & Monitoring Plan

The EMMP is a document setting out environmental impact mitigation actions, monitoring actions, responsibility, and schedule. Environmental impact monitoring is undertaken during the pre-construction, construction, and operational phases to ensure the effectiveness of the proposed mitigation measures. Responsibilities for the collection and analysis of data as well as the reporting requirements have been outlined in **Table 6-1**. Implementation of environmental impact mitigation measures during construction is to avoid and reduce short-term and long-term potential environmental impacts. Incorporation of environmental impact mitigation considerations into the tender and contract documents is a fundamental prerequisite for effective implementation of the EMMP.

Most of the proposed EMMP mitigation activities will be assured under supervision of engineering design, provisions in the construction contracts, engineering supervision contract, and as necessary by agreement with relevant communities. **Table 6-1** emphasizes the institutions which are responsible for proper implementation and effective supervision. The proposed environmental management and monitoring program for the construction and operational phase of the project is provided in **Table 6-2**.

During the construction phase of the project, all the checks which are enlisted in EMMP as daily, fortnightly, and on monthly basis are visual checks and reports should be maintained in the form of checklists as well as in the form of monitoring reports as mentioned in EMMP.



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Table 6-1: Roles and Responsibilities

Organization	Duties
Designing & Planning Phase	
Proponent/ WASA-F	• Implementation and monitoring of the EMMP • Provide all supervisory and management staff with the awareness and understanding of their responsibilities under this EMMP • Provide appropriate and adequate resources to allow for the effective implementation and maintenance of the EMMP • Conduct periodic reviews of environmental performance • Report any major environmental incidents that may have a significant impact on the surrounding environment • Provide employees with the relevant environmental instructions, awareness, and understanding of their obligations and duties regarding the environment
Development Phase	
EPA Punjab	Ensure EMMP is sufficient to control impacts and ensure compliance with the statutory requirements of EPA
Contractor / Project Manager	Following are the responsibilities of the Contractor: • Ensure compliance with the EMMP at all times during development • Ensure the health and safety of the labor by adopting best practices • Maintain an environmental register which keeps a record of all incidents which occur on the site during construction • Be aware of and understand the contents of and the reason for implementing the elements of the EMP and ensure all personnel including sub-contractors adhere to these requirements. • Provide adequate training in the elements of the EMP to all personnel, including contractors. • Provide personnel involved in the project, including subcontractors and visitors, with the appropriate environmental



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	training required to provide them with awareness and understanding of their responsibilities under the EMP as well as an understanding of the environmental approvals that adhere to the strategies outlined in the EMMP • Carry out all work as per the procedures outlined in the EMMP • Make sure that all environmental safeguards and precautions are in place and adhered to at all times at the site and activity • Regularly inspect and monitoring of all activities for adherence to environmental safeguards • Report all environmental incidents to the Superintendent's Representative as soon as practicable, but within 24 hours of them occurring • Ensure that all equipment used is properly serviced and that all precautions are in place to prevent the likelihood of an environmental incident occurring
HSE Officer	Following will be the responsibilities of the HSE Officer: • Supervise and monitor environmental management actions and parameters • Commence daily observations of EMMP activities • Confirm that every activity on the site is within the limits mentioned in PEQS • Specific review of residual hazards to be undertaken at the prescribed intervals • Develop the emergency plan in conjunction with all the employees • Provide adequate and relevant training to ensure that all employees understand the authority's approach to HSE and are aware of their responsibilities • Ensure that any innovation or positive input made by any staff member is acknowledged through praise and feedback from actions
Operational Phase	



WASA-F	WASA-F will serve as the ultimate authority to approve the project-specific designs and will regulate the safe disposal of the wastewater and the provision of safe drinking water to the residents. Regular maintenance schedules and desilting operations should be done.
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6.7 Management Approach:

The contractor should appoint a Health and Safety Officer, Assistant Health and Safety Officer, and Environmental Inspector during the development and commencement phase within the organization, to handle the environmental, social, occupational health and safety aspects during the development and commencement phases. Other essential features proposed for the project are:

- The incumbent will be responsible for overseeing and monitoring the entire implementation of the EMMP with true spirit.
- The contractor(s) will be required to appoint a dedicated field HSE Officer at the project site.



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Table 6-2: Environmental Management and Monitoring Plan (EMMP)

Activity	Potential Impact	Mitigation Measures	Monitoring Indicators	Monitoring and Reporting Frequency	Party(ies) Responsible for Implementation & Monitoring
CHIEF MINISTER'S DEVELOPMENT PACKAGE FOR FAISALABAD WATER SUPPLY, SEWERAGE, AND DRAINAGE FACILITIES					
A. Design & Planning Phase					
Public disclosure of the final design. Although it is not a mandatory requirement for EIA but necessary to inform all stakeholders.	Social issues	Continued stakeholder engagement and timely public disclosure.	Minutes of meetings of stakeholder's consultation	Once before initiation of construction works	• Consultants • WASA-F
Coordination with all relevant departments for NOCs will be required	May delay in project implementation & cost overruns	Continued stakeholder engagement and proper coordination with relevant departments for timely approvals.	NOCs from relevant departments	Once before initiation of construction works	• Consultants • WASA-F



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Disruption to Public Life	• Social issues • At the individual scale there is a negligible impact but at a cumulative scale, the impact is of moderate intensity.	• The project does not require the relocation of the community. • Immaculate Project planning and extensive inter-departmental coordination will be ensured to minimize the disruption to public life during the period of construction. • While finalizing construction schedules, special consideration will be given to the calendar of social and religious events. It will be ensured that the construction work does not cause undue impediments to the general public life close to, and during, such events.	• Monitoring and details profile study of the project area	• Before initiation of construction works	• WASA-F • Contractor(s)
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B. Construction Phase					
Continued stakeholder engagement	Social issues	Establishment of Grievance redressal mechanism (GRM) at the campsite as well as at WASA-F PMU office which is responsible to deal with all environmental & social concerns of stakeholders/workers/public and ensure dissemination of information.	- Timely management and proper record keeping of every case/concern - Dissemination material	- Quarterly monitoring - Biannually reporting	Contractor/R E/ WASA-F/ EMC
Construction Works, Construction material storage, Staff mobilization, Establishment of Campsite and equipment Yard	- Changes in the land-use pattern due to construction of houses, and campsite construction. - Influx of external workforce create social conflicts	- Select campsite in view of the cultural norms of the area to avoid undue interference of the Construction contractor's staff with local residents. - Give priority employment to local residents	- Development & implementation of policy on local employments - Employment record	- Strict compliance monitoring on fortnightly basis - Monthly Reporting	- Execution by Construction Contractor - Monitoring by SC and Reporting to EMC



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	• Workshop facilities may spread oils & chemicals • Generation of solid and liquid waste	• Disposal of used oil and chemical waste in accordance with Material Safety Data Sheets (MSDS) although it may be in small quantity. • Efficient Use of Chemicals. • Good housekeeping practices at workshop areas. • Mixing waste into freshwater sources shall not be allowed. • Proper waste management plan should be formulated for the disposal of solid waste and liquid waste i.e., septic tank construction, etc.	• Visual inspection	• Daily monitoring report • Quarterly Reporting	• Construction Contractor • Monitoring by SC and Reporting to EMC
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Construction Works, Construction material storage, Staff mobilization, Establishment of Campsite and equipment Yard	Deterioration of air quality due to construction works, transportation machinery & equipment (Lower impact intensity at individual scale but major at cumulative scale)	- Proper standards will be followed during construction works - Proper engine tuning of machinery/ equipment to meet Punjab Environmental Quality Standards of Punjab limits for air quality - Water should be sprinkled where needed and appropriate, particularly if the campsite is near the communities. - Proper Transportation Plan should be prepared to avoid congestion and environmental pollution	Monitoring shall be done on a stack of machinery that will be used for transportation and at the projectsite. The parameters required to be monitored visually are Smoke, SO_x, CO, VOCs and NO_x.	- Monthly reporting - Follow up of transportation Plan	- Construction Contractor - Monitoring by SC and Reporting to EMC
	Noise	- Noise reduction devices on high noise equipment - Regular inspection, maintenance, and lubrication of the construction vehicle and equipment - Use of PPEs by the workers - Avoid nighttime activity	Monitoring compliance to PEQS for noise shall be ensured	Monthly Reporting	- Construction Contractor - HSE officer - Monitoring by SC and Reporting to EMC



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	Land degradation due to solid waste disposal of the campsite	- Ensure proper disposal of campsite waste at designated disposal sites according to the wastemanagement plan. - An impervious liner shall be laid to waste sites before the dumping of solid waste. The approval for impervious liner shall be granted by SC. - Good housekeeping practices within the campsite. - Disposal of campsite waste near residential colonies or in agricultural fields shall not be allowed	Visual inspection	- Fortnightly monitoring - Monthly Reporting	- Execution by Construction Contractor - Monitoring by SC and EMMP implementation on reporting to EMC
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Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



Construction Works, Construction material storage, Staff mobilization, Establishment of Campsite and equipment Yard	Water contamination	Proper sewerage disposal arrangements to be provided such as septic tank and soaking pits for camps	- Monitoring compliance to PEQS of sanitary wastewater generated from the campsite. - Waste management plan in place - Photographic record	- Fortnightly monitoring - Monthly reporting	- Construction Contractor - Monitoring by SC and EMMP implementation on reporting to EMC
	Health and Safety issues	- Protective fencing around the camps. - Firefighting equipment at the camps. - First aid facility should be in place. - Safety precautions shall be taken to transport, handle and store hazardous substances. - Contractor to prepare OHS plan and get it approved by SC.	- Use of personal protective equipment - Health & safety plan in place	- Fortnightly monitoring - Monthly reporting	- Construction Contractor - HSE Officer - Monitoring by SC and reporting to EMC.

Transportation of construction material	• Soil erosion and contamination	• Avoid vehicular traffic on unpaved roads as far as possible. • Vehicles and equipment shall not be repaired in the field and all the repairing work will be done at designated workshop facilities.	• Log of vehicle and equipment repairs • Visual inspection of vehicles	• Fortnightly monitoring • Monthly reporting	• Construction Contractor • Monitoring by SC and reporting to EMC.
	• Air pollution	• Minimize operation of vehicles and machinery close to the water channels, water reservoir. • Vehicles shall be kept in good working condition and properly tuned, to minimize the exhaust emissions	• Route maps of vehicle movement • Log of vehicle maintenance • Visual inspection	• Fortnightly monitoring • Monthly reporting	• Construction Contractor • Monitoring by SC and reporting to EMC.
	• Noise pollution	• Vehicles to have exhaust mufflers (silencers) • Night time traffic shall be avoided near the communities. • Inform the local population beforehand if nighttime traffic is unavoidable.	• Log of vehicle movement time • Visual inspections of the vehicles	• Fortnightly monitoring • Monthly reporting	• Construction Contractor • Monitoring by SC and reporting to EMC.



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



	Health and Safety issues	- Road signage fixed at appropriate locations - Train all drivers on defensive driving - Low vehicle speeds 15 km/hr. near/within the communities.	- Visual inspections - Training record	- Fortnightly monitoring - Monthly reporting	- Construction Contractor - HSE Officer - Monitoring by SC and reporting to EMC.
C. Operation Phase					
Biological Resources	- Water Table reduction - Damage to re-planted trees and shrubs	- Rainwater Harvesting systems can be developed to avoid groundwater drawdown and encourage water reuse - Awareness of controlled use of water during cleaning activities - Operation and	- Monitoring of underground water table - Record keeping and plantation inventory	- Continuous - Quarterly	WASA-F/ PHED/ Local Government Departments/ PHA



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



		maintenance activities - Record-Keeping and plantation inventory. - Implementation of seasonal tree plantation campaigns and continuous maintenance of social forestry			
Wastewater overflow during choking of sewers	- Ground Water contamination - Public Nuisance - Source of communicable diseases	- Proper disposal system must be operational at all times - Operation & Maintenance machinery and staff must be present and in the active state at all times - Sensitize and educate the beneficiaries on the need to promote best practices. - Immediate and proper response to sewerage related complaints - Periodic desilting of all sewers and wastewater carrying channels (nullahs)	Maintenance of the photographic record.	Continuous	WASA-F



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



	Air/ Noise Emissions	During O&M activities the vehicular movement and noise of generators may result in air emissions and noise in the area.	Monitoring shall be carried out for SO_x, NO_x, and particulate matter (PM) keeping in view the guidelines of PEQS. No operation of heavy equipment like generators etc. shall be allowed before sunrise and after sunset.	Continuous	WASA-F
Solid Waste Generation from Sewer Cleaning activities	- Source of Nuisance - Eruption of various diseases (if not properly disposed of)	The responsible department or the private contractor must be informed/hired who is responsible to collect the solid waste generated from cleaning activities and desilting operations from each site and for disposing of it safely	- Visual monitoring - Maintain Photographic record	Weekly monitoring mechanism	WASA-F/Private Contractor/FWM C/Municipal Corporation

6.8 Institutional Arrangement

6.8.1 Institutional Framework and Administrative Requirements

Having well-defined implementation arrangements, with specific assigned responsibilities, and adequate monitoring of the implementation and performance of mitigation measures, are critical to environmental management. The presence of a good and functional institutional framework and monitoring entities ensure that mitigation measures are an important and integral part of these arrangements. Monitoring becomes part of the development process because mitigation measures are suggested, and their performance is monitored. Feedback in the event of poor performance of a mitigation measure will allow appropriate corrective actions to be taken. There are certain institutions belonging to the government and private sectors that are taking part in the construction of this project. These institutions will take care of the engineering, design, ecology, socio-economic and other impacts. The list of these institutions is given below along with their duties:

- Proponent of the project (WASA-F) and the Consultants (ECSP). The main responsibility to implement EMP lies on them.
- Supervision Consultants (SC), as deputed by the Project Proponent; Project Manager (PM) will be appointed by Proponent.
- Project Contractor, as the executors of the Environmental Management and Monitoring Plan during the construction phase.
- Environmental Protection Agency Punjab (EPA-Punjab), as an observer and top monitoring agency during construction and operational stages.

6.9 Roles and Responsibilities

As the institutional strengthening activities are necessary to facilitate the implementation of EMMP, thus roles and responsibilities of various institutions are discussed below:



A. Project Proponent/ Client

The Proponent of the Proposed project is WASA-F, thus implementation and monitoring requirements of environmental impact mitigation and monitoring measures will be met by them. The Environment Management Committee (EMC) of this project will take overall responsibility for undertaking and coordinating the mitigation and monitoring measures identified during the preconstruction and construction phases. The Proponent in consultation with the consultants and concerned government agencies will ensure that the mitigation and monitoring measures for the operation and maintenance phases are adequately transferred. The specific duties of Assistant Manager/ Environment Specialist will include:

- Coordination as required with regulatory agencies including EPA-Punjab, as well as with the local community, as and when required.
- Ensuring that the terms of reference of the Contractor(s) adequately cover environmental and social issues to comply with the local laws.
- Ensuring that the Contractor develops and adopts environmental implementation plans that are consistent with the EIA requirements.
- Supervising the Project's Contractor and ensuring that all the contractual obligations related to the design and construction, as well as environmental and social compliance, are met.
- Ensuring that day-to-day construction activities are carried out in an environmentally sound and sustainable manner.
- Undertake critically important routine visual monitoring of the construction, waste disposal, and overall environmental management practices by the Contractor.
- Devise solutions to the environmental issues as they arise. Particularly those related to dust, noise levels, and other impacts that are in some instances unavoidable.



- Good construction supervision requires that every effort be made to minimize these impacts.

B. Supervisory Consultant

The civil works contractor will be required to ensure the implementation of EMMP activities in the construction stage under the monitoring and supervision of the Site Engineer and EMC. The site Engineer will deliver day-to-day supervision and reporting of the Environmental Management Plan.

The major role of SC will be supervising the project activities in general and the environment-related issues in particular as discussed below:

- Coordinating with regulatory agencies like EPA-Punjab as well as regional agencies.
- Ensuring that the terms of reference of the contractor(s) adequately cover the environmental and social issues to comply with the EMMP.
- Supervising the project Contractor (including HSE team) and ensuring that all the contractual obligations related to design and construction, as well as environmental and social components, are met.
- Ensure that day-to-day construction activities are carried out in an environmentally sound and sustainable manner.
- Determine the timing and exact location of air, water, and noise monitoring.
- Monitoring of waste disposal practices by Contractor.
- Devise solutions to environmental issues like dust, noise, and air quality; make efforts to minimize the impacts.
- After commissioning of the proposed project, during the operational phase the environmental monitoring plan will be designed and implemented.
- Consultants with the assistance of the Contractor will monitor the environment of

the project area.

- The project manager hired by the proponent will be the supervisory agency and will be responsible for the timely and sound execution of works and activities in sequence under the project.
- The project manager will include the summary of activities related to EMMP in his routine.

C. Project Contractor

The contractor is responsible for the execution of construction activities as well as for environmental protection through their environmental field staff. The contractor is subjected to environmental protection liabilities under environmental laws of Pakistan, project EIA, and under their contract with project Proponent. The contractor is also responsible for communicating with the crew and training them in all aspects of environmental management. The contractor must also fulfill the following contractual obligations as per the contract agreement.

- Proper disposal of construction waste;
- Location of labor camps, approach roads, machinery, and other materials;
- Rehabilitation of construction site;
- Respect for social, religious, and cultural values at the site;
- Control of dust and other pollutants from machinery and stored materials;
- Provision of proper machinery and avoiding using out of order equipment or machinery that can cause any adverse health impact or nuisance;
- Public health safety at construction site especially for the labor and nearby community;
- Employment of locals; and
- Storage of fuel must meet the safety requirements.



D. Environmental Protection Agency Punjab (EPA-Punjab)

EPA-Punjab is involved in the project to award NOC for the project implementations as well as to respond to public complaints. The Pakistan Environmental Protection Act (1997/2000) defines the environmental protection standards for national development projects. EPA-Punjab guidelines have been followed to prepare the EIA of this project. EPA-Punjab can independently consult the Proponent if there are any concerns about this project.

6.10 Restoration and Rehabilitation Plans

After completion of the construction work, all the disturbed sites will be restored to conditions as they were before the commencement of the project or in a better condition. All the concrete and other material will be cleared and disposed of according to the waste management plan. The contractors for roads and streets construction will be hired by the relevant department (Local Government, Municipal Corporation). The Deputy Commissioner of the Faisalabad is also overseeing the whole project to ensure coordination between the different departments. The funds have been allocated in PC-I for roads as well and will be utilized efficiently.

6.11 Training Schedules

To enhance the capacity of the Proponent/EA as well as the Contractor, training will be imparted related to the environmental and social issues of the project implementation of mitigation measures, the monitoring protocols, and reporting mechanism. The project will ensure in-house training for the project staff, contractor, and the supervisory staff of the Proponent/EA and the consultants through the provision of one-day basic training and one-day advanced training, covering environmental and social aspects of the development projects in general and implementation requirements will emphasize on the development projects in general, implementation requirements with an emphasis on the roles and responsibilities of the Proponent/EA and the Contractor staff while executing the environmental monitoring plan in particular. The training protocols will include the following aspects:

- Procedures to monitor the air quality parameters and measures to be adopted for

avoiding or minimizing air pollution, particularly from the concrete batching plant, haul trucks, etc.

- Procedures to monitor the water quality parameters and measures to be adopted for avoiding or minimizing water pollution, particularly from the wastewater or effluent generated from the workshops, machinery washing yards, and other hazardous chemicals;
- Practices for safe disposal of solid waste;
- Safe noise level from the construction/installation equipment etc.;

Safety measures against hazards for the workforce and the local communities arising from the construction activities by the use of safety gadgets by the workforce.

6.12 Site Waste Management Plan

The site waste management plan for the proposed project emphasizes the procedure of how to dispose of construction waste. The project Contractor should not start construction work until they have an approved Solid Waste Management Plan (SWMP) in place. The SWMP corresponds to the following topics:

- Type of waste produced at the construction site;
- Procedure for waste disposal i.e. reuse, recycle, landfill, etc.; and
- Address and issue permits to where waste is transported for disposal or further treatment

6.13 Impact and their Mitigation Measures

The impacts and their mitigation measures are a key component of the EMMP. It enlists all the potential effects of each activity of the project and their associated mitigation measures identified during impact assessment. For each project related activity, the following information is presented in the plan:

- A listing of the potential impact associated with that project activity

- A comprehensive listing of mitigation measures (actions) taken to prevent an unfortunate incident
- The person(s) responsible for ensuring the full implementation of the action and carrying out the drills on the regular basis
- The person(s) responsible for monitoring the action will be designated
- Timely implementation of the environment plan to ensure that the objectives of mitigation are fully met

It should be emphasized that the mitigation measures will have to be translated into environmental as well as social requirements and specifications to be made part of the contracts for the construction activities, with legal binding.

6.14 Communication and Documentation

Communication and documentation are an essential part of the EMMP. The key features of such mechanism are discussed as under:

6.14.1 Data Recording and Maintenance

The standard format of all forms used for data recording should be followed. It should correspond to the database into which all the gathered information will be placed. Checkboxes are used as much as possible to facilitate data entry.

6.14.2 Meetings

To have first-hand information following meetings will take place during the execution of the project, such as the kick-off meeting, weekly, quarterly and monthly meetings. The purpose of these meetings will be to discuss the conduct of the operation, non-compliances noted by the environment and social supervisor and recorded in the form of a daily environmental and social checklist and incorporated them in the report.

6.14.3 Reports

The SC staff will prepare weekly monthly and final reports on environmental and social issues. The list of distribution of these reports is provided in **Table 6-5**.

Table 6-3: Report Preparation

Sr.No	Report	Prepared by	Reviewed by	Distributed by
1	Monthly	Environmental Inspector of Prospect Consultants	RE/Environmental Specialist of Supervision Consultants (SC)	EMC
2	Final	Environmental Inspector of Prospect Consultants	RE/ Environmental Specialist of Supervision Consultants (SC)	EMC

6.15 Social Complaint Register

The Social Complaint Register will be maintained by the supervision consultant environmental inspector at the campsite to document all complaints received from the project area. In the social complaint register, the measures taken to mitigate the complaints will also be recorded. The final report will be communicated to EMC.

6.16 Grievance Redress Mechanism (GRM)

A GRM is proposed to address any complaints or grievances arising during the implementation period of the projects undertaken by the Project Authority. Members of the public may perceive risks to themselves or their property or their legal rights or have concerns about the possible adverse environmental and social impact that a project may have. Any concerns or grievances should be addressed quickly and transparently, and without retribution to the Complainant. The complainant can register the complaint directly in the office timing, in the PMU WASA-F office located at the given address below:

Samundri Rd Dar-ul-Ehsan Colony, Darul Ehsan Town, Faisalabad, Punjab 38000

The registration of complaints through online means (email, website) or telephone calls is also proposed, for ease and facilitation.



www.ecsp.com.pk

(042)35717681-84

The primary principle is that any complaints or grievances are resolved as quickly as possible fairly and transparently.

6.17 Environmental Management and Monitoring Cost

Implementation of the commendations of the EIA at the construction stage is the sole responsibility of the contractor and the monitoring activities will be carried out by the SC. The environmental budget will consist of the cost of tree plantation, monitoring and reporting, solid waste management, and disposal of the wastewater treatment (construction of septic tank). During the development phase, a few trees and shrubs species will be removed from the site and after completion of the development phase, the area will be re-vegetated with local trees. The cost for environmental monitoring will be a part of the contract document with the Contractor. It must be noted that environmental costs will not be a separate entity because all of its components will be addressed in the bidding document under various heads of account. For instance, tree plantation will be a part of landscaping; infrastructure repair will be covered under rehabilitation work, and so forth.

The tentative cost for these components and various others has been estimated in the breakup of implementation of EMMP. The total estimated cost of EMMP for this project is PKRs 62.9 million (Approximately) during the pre-construction, construction stage, and operation Stage. The breakdown cost of the project phase-wise is calculated and is presented in **Table 6-6**:



Environmental Impact Assessment (EIA) Report of Chief Minister's Development Package for Faisalabad Water Supply, Sewerage and Drainage Facilities



Table 6-4: Total Estimated Cost of Implementation of EMMP

Sr. No.	EMP Parameters	Unit Cost	Before Construction		During Construction (3 Years)		After Construction		Total (PKR in Million)
			Times	Cost	Times	Cost	Times	Cost	
1	Environmental Testing (Air, water & noise quality)	0.5	1	0.5	6	3	1	0.5	4.0
2	Transportation	0.05	1	0.05	6	0.3	1	0.05	0.4
3	Internal Environmental Auditing	0.5	0	0	3	1.5	1	0.5	2.0
4	Environmental Training	0.5	1	0.5	3	1.5	1	0.5	2.5
5	Tree Plantation	2	0	0	0	0	10	20	20
6	Rehabilitation Cost	5	0	0	3	15	1	5	20
7	Environmental Reporting and Review	3	0	0	3	9	1	3	12
8	Contingency	2							2
Total:									62.9 (approx.)

7 STAKEHOLDERS CONSULTATION

7.1 General

In the process of planning, design, and execution of any project, the proper consultation with the project area people does work and plays a significant role in achieving the cooperation of the area people. The involvement of the people at the early stage of the project is a key factor in the Environmental Impact Assessment (EIA) process. The public consultations, conducted as part of Environmental and Social Assessment have reshaped certain projects by identifying some adverse/negative environmental and social impacts.

7.2 Consultation Objectives

The broad objective of project people consultations and participation is to take the project area people in confidence about the impacts of the project, addressing their concerns, if any, about the project during different stages and activities of the project. The main/specific objectives of public participation and consultations are:

- Ensure public and community active participation.
- Ensure public confidence in the administration of the project.
- Provide the community access to environmental information to the area's people.
- Increase transparency, people's understanding, and their involvement in decision-making.
- Promote sustainability for Government-funded projects.
- Ensure broad-based participation of people in development projects/ activities.

7.3 Identification and Consultations With Stakeholders

The project stakeholders are the project affected/project area people, who reside or own businesses or land subject to expropriation due to project activities. The other important stakeholders identified include the local Government representatives and Government officials of the relevant departments like the Environmental Protection Department, Faisalabad Waste Management Company, Faisalabad Development Authority, Public Health Engineering Department, Highway Division, Municipal Corporation, Irrigation Department, interested NGO/ CBO and general people.

7.4 Participants of Consultations

The main stakeholders include the general public falling in the jurisdiction of project activity and local Government representatives. The invitation letter written by WASA-F to different departments for stakeholder meetings is annexed as **Annex-V**. But due to Covid and office commitments, the meeting has been done by going in-person in their respective offices.

7.5 Points Discussed

During the process of consultation, the important points explained and discussed with the participants were as under: -

- Objectives of the project.
- Existing water quality of the area.
- Plan of the CM package Project execution.
- Possible / expected impacts of the projection area.
- Suggestions for improvement in the project.

During this process, the objectives and scope of the work, expected benefits of the adverse impacts, if any, were clearly explained. The potential affectees/ beneficiaries contacted are as under:

7.5.1 Local/District Government officials

The main points of consultations with secondary stakeholders are provided below:

Mr. Muhammad Rafi Gujjar (Deputy Director) and Mr. Faizan (Assistant Director), Planning & Design Division, WASA Faisalabad

- The majority of infrastructure laid in the city is almost 40 years old and its design life is over.
- There have been some developments with JICA but there are not enough considering the exponential growth of the city. Therefore, this project is vital for the city.
- WASA-F is working on the state-of-the-art wastewater treatment plants along with foreign donors so that the surface water bodies can be saved.
- WASA-F is ensuring the rapid work done so that the minimum nuisance will be created for the people.
- Proper allocation of funds to respective departments (Municipal Corporation, Local Government) will be done for the restoration of the sites.
- Tree Plantation Drive Funds will be given to the Parks and Horticulture Authority to enhance the green areas.

Mr. Shaukat Hayat Virk, Executive Engineer, Samundri Drainage Division, Irrigation Department Faisalabad

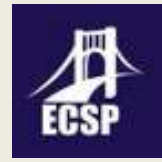
- The outfall structures (carry channels) must be concreted.
- Proper desilting operation must be ensured as wastewater falls in surface water bodies.
- Wastewater treatment should be done before disposing of wastewater into the surface water bodies.
- Waste generated during construction and operational activities should be

disposed of properly as early as possible.

- The NOC must be secured, before initiating any work that falls within the jurisdiction of the irrigation department.
- Clean water is a basic need of people it should be on the priority in decisions.
- He was overall in the favor of the project implementation.



**Figure 7-1: Stakeholder Consultation in Process with the WASA and Irrigation
Department**



**Mr. Farhat Abbass Kamoka, Deputy Director, Environmental Protection
Department, Faisalabad**

- There should be no sewerage connection for industries, except those who treat their wastewater.
- There should not be any open drainage.
- The disposal stations must be away from the community as they create a nuisance.
- Future expansion of projects and population explosion must be considered.
- The slope of the sewers must be ensured to achieve self-cleansing velocity.
- Wastewater can be harmful but it should be drained properly.
- In Faisalabad mostly diseases are directly or indirectly linked with the water.
- The overflow and choke sewer complaints must be addressed timely.
- Proper Sludge Disposal system must be ensured.
- Plantation of trees must be done, wherever it is possible to curb the pollution.

Mr. Saeed Anwar, Assistant Director, Local Government Faisalabad

- In Faisalabad most of the quality of water is contaminated and not good for health. This project is the need of the hour.
- The temporary problem of roads is faced by the people but the WASA-F has allocated the funds after consultation with us for the road network, and the tenders will be issued soon after WASA-F completed their work.
- Deputy Commissioner Faisalabad has been in touch with Highway Department, Municipal Corporation, and Local government over the CM Package road rehabilitation.

- WASA-F coordinates with our department before any project but the SNGPL, PTCL, and other local cable operators usually do their work without informing the department or taking any NOC, which creates problems.
- The mechanism of restoration of roads has not been followed by SNGPL, PTCL, Cable Operators.
- We have to face political interference if we stop the SNGPL, PTCL to do their work, which leaves the road network vulnerable.

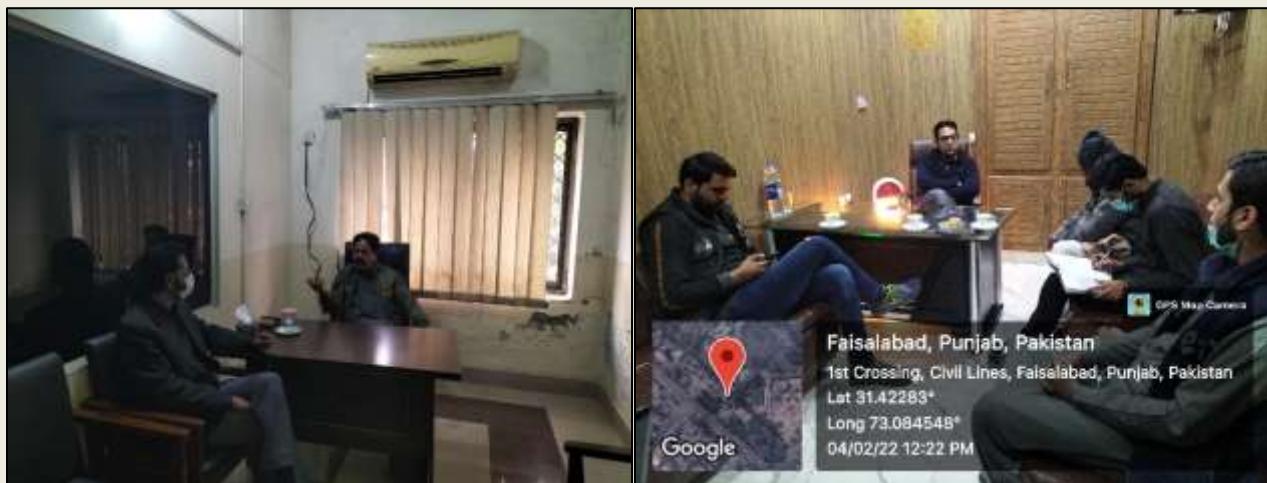


Figure 7-2: Stakeholder Consultation in Process with the Environmental Protection Department and Local Government

7.5.2 Stakeholder Consultation with the general public

The Key Informant Interviews (KII) and socio-environmental baseline survey of the project area were held in **February 2022** along with the Site Inspector of ECSP. The observations made during the survey are discussed in Chapter 4 (Socio-Environmental Baseline Conditions).

7.5.3 Key Informant Interviews (KIIs)

A number of residents have been interviewed through structured questionnaire to have their opinion about the project. Similarly, some Key Informant Interviews have also been done to note their views. Two of the KIIs are mentioned below with which detailed interviews were conducted.



Muhammad Afzal - (President of Fish Market)



Mr. Nisar (Previous Councillor)

Figure 7-3: Key Infromant Interviews (KIIs)

7.6 General Concerns of Stakeholders

During the consultation majority of the stakeholders appreciated the efforts of the Government of Punjab for starting this comprehensive project. However, some of the concerns shown by the project people are enlisted as under:

- There is no water supply in the majority of the survey area so people are forced to buy drinking water (15 to 25 rupees per can) from local vendors resulting in waterborne diseases like diarrhea, dysentery, hepatitis, etc.
- In some areas the water is contaminated due to high arsenic, fluoride, nitrate, and high salinity/sodality.
- Majority of the participants demanded a water filtration plant and water

supply network in the area.

- One of the interviewees told that he pay the WASA bill regularly, yet there is no public water supply exists in the area, only sewerage and drainage system exists. He was forced to buy drinking water at Rs. 20 per can per day for his family.
- In the existing water supply schemes water filtration plant should also be established, so people can drink safe water as it is a basic human right.
- The filtration plants should be easily accessible by the area people.
- The construction activities should be on the fast track as they restrict the mobility of people and hamper their business as no parking is available.
- Privacy of people should be respected during construction activities.
- Available skilled and unskilled labor should be hired from the project area by the contractor.
- Construction waste material should be dumped properly by the contractor at a designated place.

8 CONCLUSION & RECOMMENDATIONS

8.1 Conclusion

The development of the Faisalabad Water Supply and Drainage Facilities will bring about some significant positive Impacts while moderate to minor adverse impacts on the physical, ecological, and socio-economic environment of the project area. These Impacts have been identified and possible mitigation measures for the adverse impacts have been provided. Generally speaking, the project will have short-term reversible impacts with minor to moderate magnitude. The execution of the project will surely reduce the outbreak of waterborne diseases and consequently will improve the health condition of the area people especially the children of the Faisalabad city. Some Important Impacts of the project area are provided as under:

- In the project area where the facilities will be extended or rehabilitated, no protected areas, wildlife sanctuary, or any environmentally sensitive areas are present.
- Not a single place was found in the project area which is archaeologically preserved or declared/ possessing a cultural heritage Site.
- The impacts like Soil Erosion, Dust Problem, Soil Disposal, Waste Generation, Higher Noise levels during Construction, Enhanced Traffic problems, and health problems are temporary and can be controlled and mitigated by taking necessary action by the proper implementation of the EMMP.
- The Environmental Management and Monitoring Plan (EMMP) has been prepared to identify the impacts of the project activities, mitigation measures required for adverse impacts, and different agencies responsible for the implementation.

8.2 Recommendations

In the EIA Report, some comprehensive mitigation measures have been identified to minimize/ nullify the adverse impacts and enhance the positive impacts of the project. The major recommended measures are summarized as below:

- The contractor's construction and labor camps should be established at least 500m away from the settlements. The camps should be having a boundary wall and proper drainage system and an effective waste management system.
- Environmentally sustainable engineering practices should be followed to control soil erosion, solid waste management, water contamination, air pollution, noise levels, etc.
- Proper Plantation plans must be ensured and they must be planted, particularly, at the disposal stations
- The affected utility services due to construction activities should be rehabilitated by the contractor.
- Water quality should be monitored regularly keeping in view the PEQS. The EMMP should be followed strictly by the contractor.
- Educate the beneficiaries of the project to not dump the solid waste into the sewers and during the operational phase, sewerage complaints must be addressed at the earliest.
- In case of heavy rains, an emergency plan using all the available machinery and manpower must be there to avoid ponding.
- The Proponent should submit this EIA report immediately to EPA-Punjab for issuance of necessary Environmental Approval (NOC); before proceeding further into the construction activities.

9 References

- Pakistan, The Constitution of the Islamic Republic of Pakistan (2012)
- <https://www.punjab.gov.pk/faisalabad>
- <https://faisalabadinfo.com/manchester-of-pakistan/>
- Election Commission of Pakistan (Faisalabad City Boundary)
- Punjab Development Statistics, 2021
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Annexure - I
(Layout Plans/Drawing/Google Maps)

Map of District Faisalabad

Project Area



Legend

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- Qanoongo Halqa Boundary
- Patwar Circle Boundary
- Mouza/Deh Boundary

Local Govt. Institutions

- Municipal Corporation
- Municipal Committee

Transportation Network

- Metalled Road
- Railway Line

Irrigation Network

- Canal
- River

Electoral Constituencies

- NA Boundary
- PP Boundary

Electoral



1 inch = 2 miles

0 5 10 20 30 40 50 Kilometers

Faisalabad Water Supply, Sewerage and Drainage Facilities (CM Package)
(Spatial Boundary of the Project)

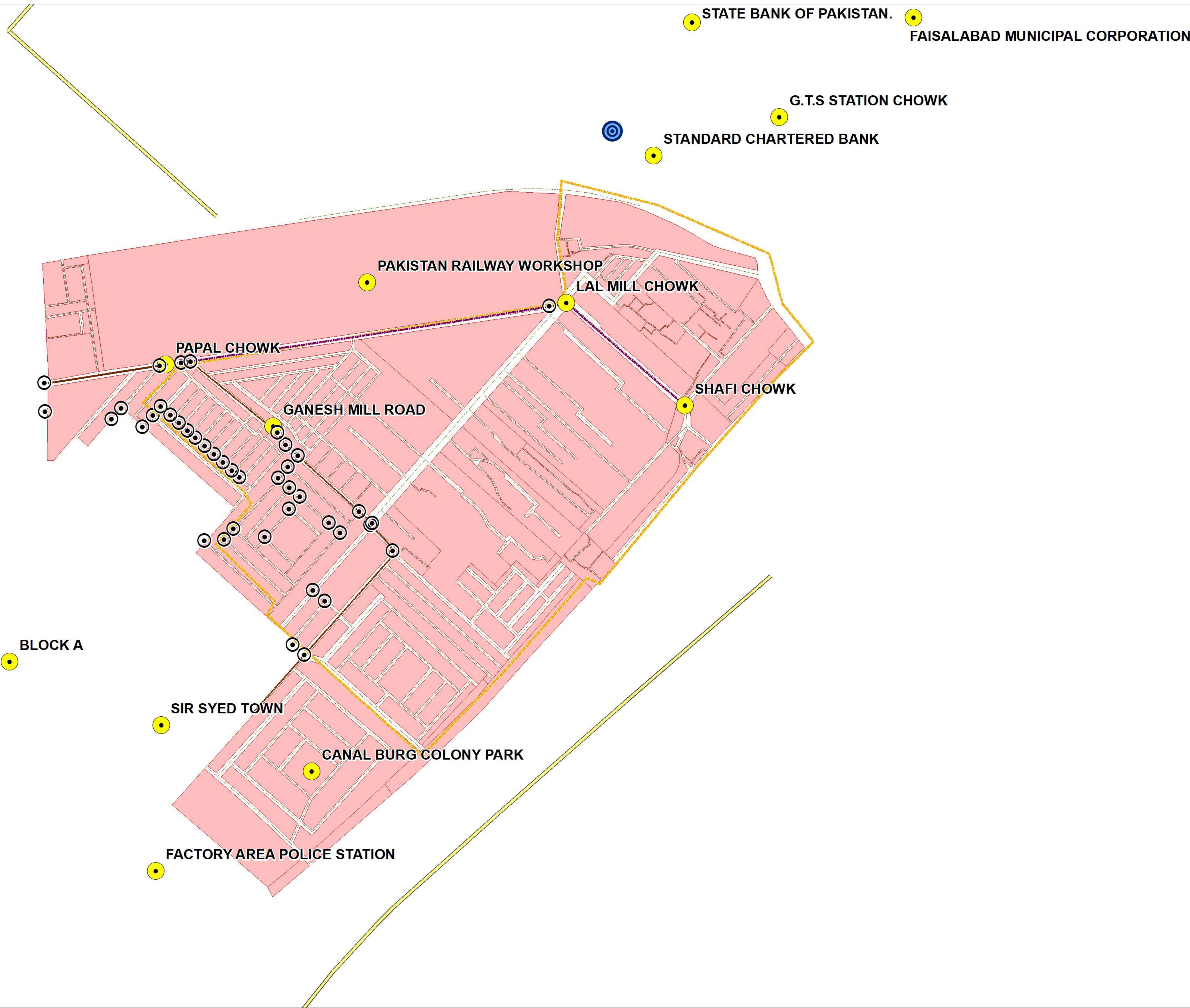
NA-107

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NA-109



Client:



WATER AND SANITATION AGENCY,
FDA, FAISALABAD

Consultant:



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83-A, E/1, Main Boulevard, Gulberg - III, Lahore.
Tel: (042) 35717681-84, Fax: (042) 35717685

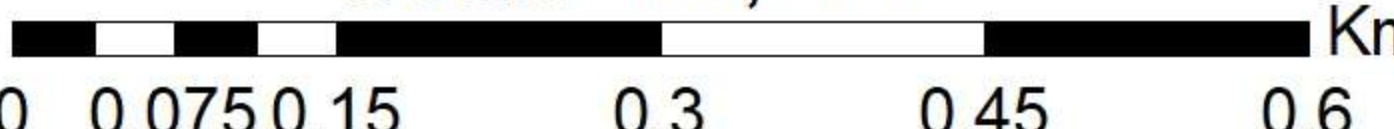
Project:

**Improvement & Rehabilitation
of
Civil and Electro-Mechanical System
of
Disposal Station, Faisalabad**

Map Title:

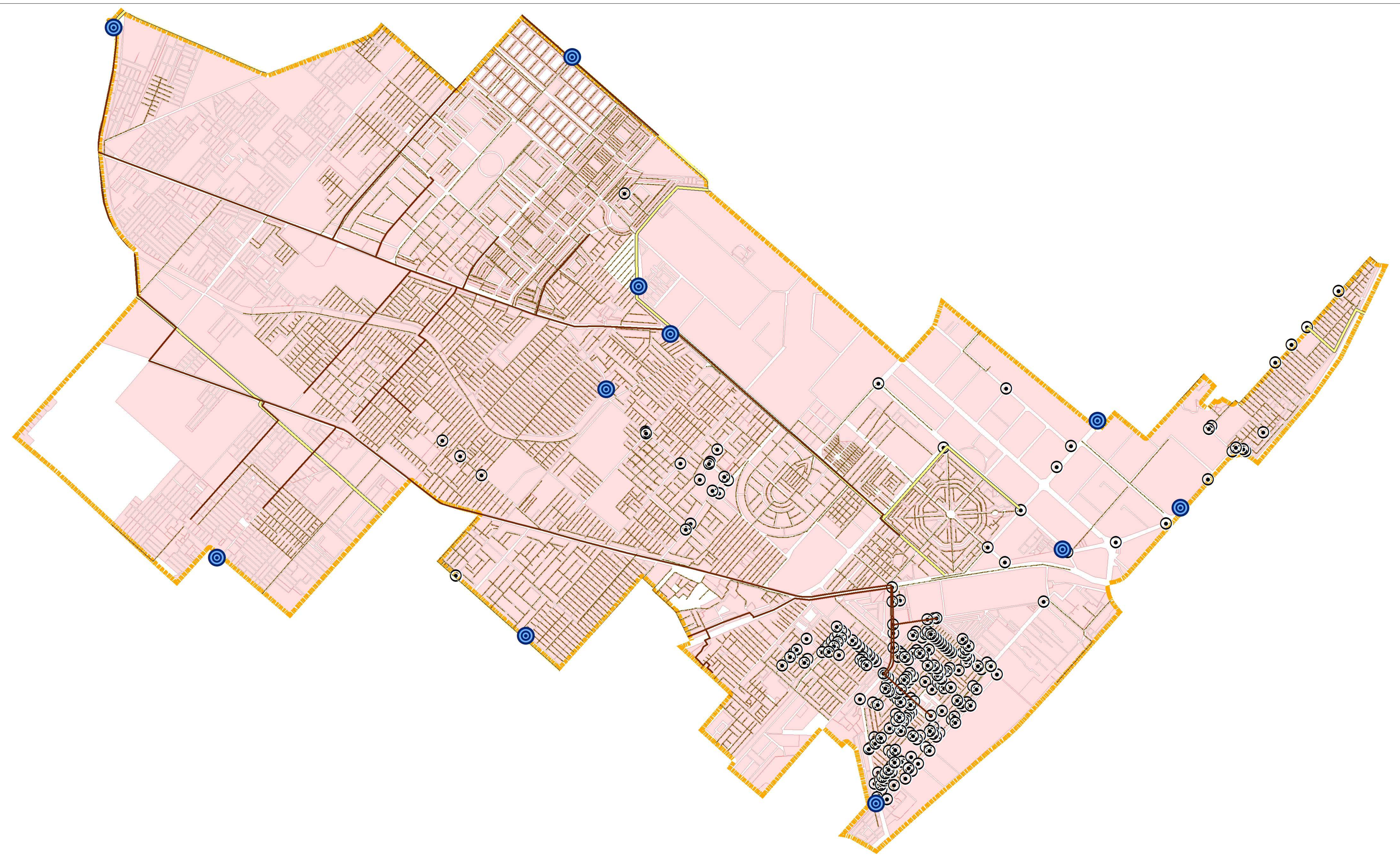
**Ganesh Mill
Faisalabad**

Scale 1:3,500



Legend

 Mainholes	 Trunk Sewer Lines	 Proposed Sewerage Line
 Disposal	 Drains	 Catchment Area
 Location	 Main Sewer Lines	 Builtup
	 Tertiary Sewer Lines	



Client:



WATER AND SANITATION AGENCY,
FDA, FAISALABAD

Consultant:



ENGINEERING CONSULTANCY SERVICES
PUNJAB (PVT) LTD (ECSP).
83-A, E/1, Main Boulevard, Gulberg - III, Lahore.
Tel: (042) 35717681-84, Fax: (042) 35717685

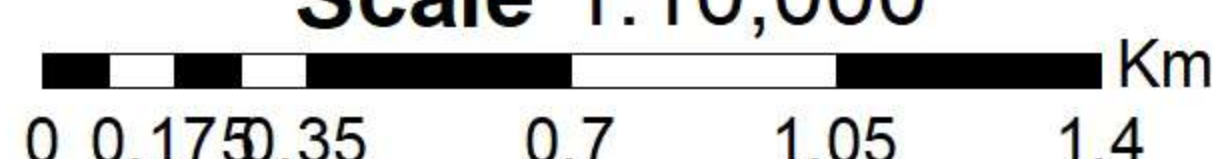
Project:

**Improvement & Rehabilitation
of
Civil and Electro-Mechanical System
of
Disposal Station, Faisalabad**

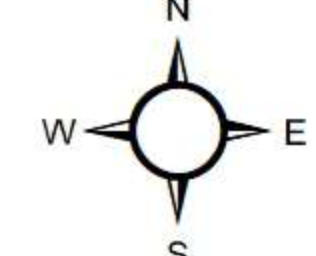
Map Title:

**PS-3 Disposal
Faisalabad**

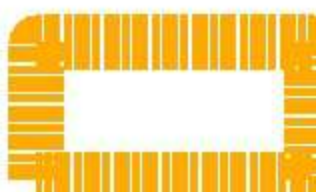
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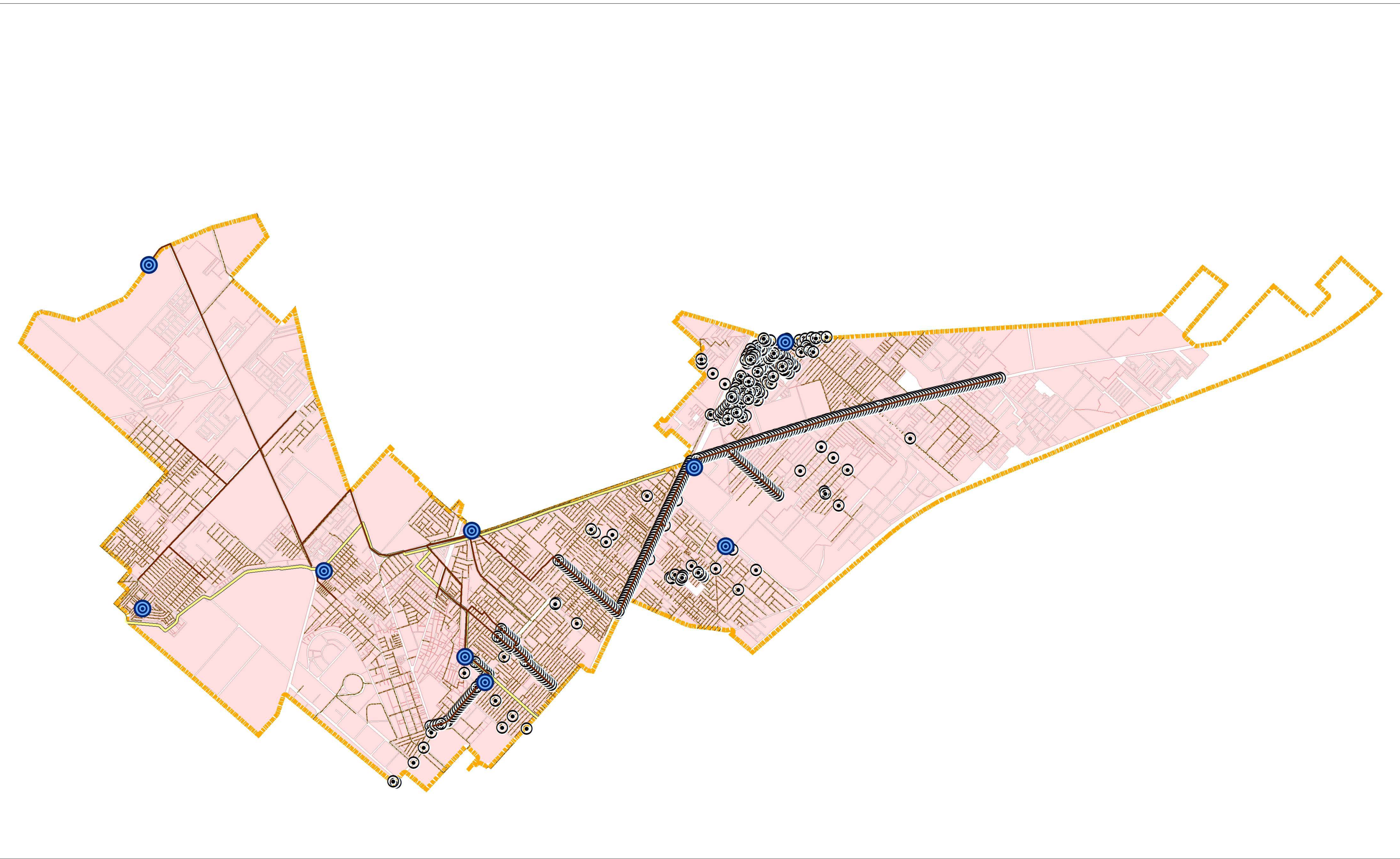


0 0.175 0.35 0.7 1.05 1.4 Km



Legend

	Mainholes		Trunk Sewer Lines		Catchment Area
	Disposal		Drains		Builtup
			Main Sewer Lines		
			Tertiary Sewer Lines		



Client:



WATER AND SANITATION AGENCY,
FDA, FAISALABAD

Consultant:



ENGINEERING CONSULTANCY SERVICES
PUNJAB (PVT) LTD (ECSP).
83-A, E/1, Main Boulevard, Gulberg - III, Lahore.
Tel: (042) 35717681-84, Fax: (042) 35717685

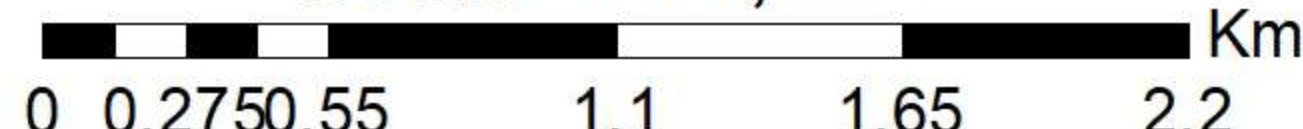
Project:

**Improvement & Rehabilitation
of
Civil and Electro-Mechanical System
of
Disposal Station, Faisalabad**

Map Title:

**PS-Gulistan Disposal
Faisalabad**

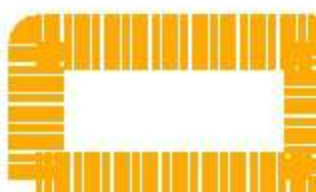
Scale 1:14,500



0 0.2750.55 1.1 1.65 2.2 Km



Legend

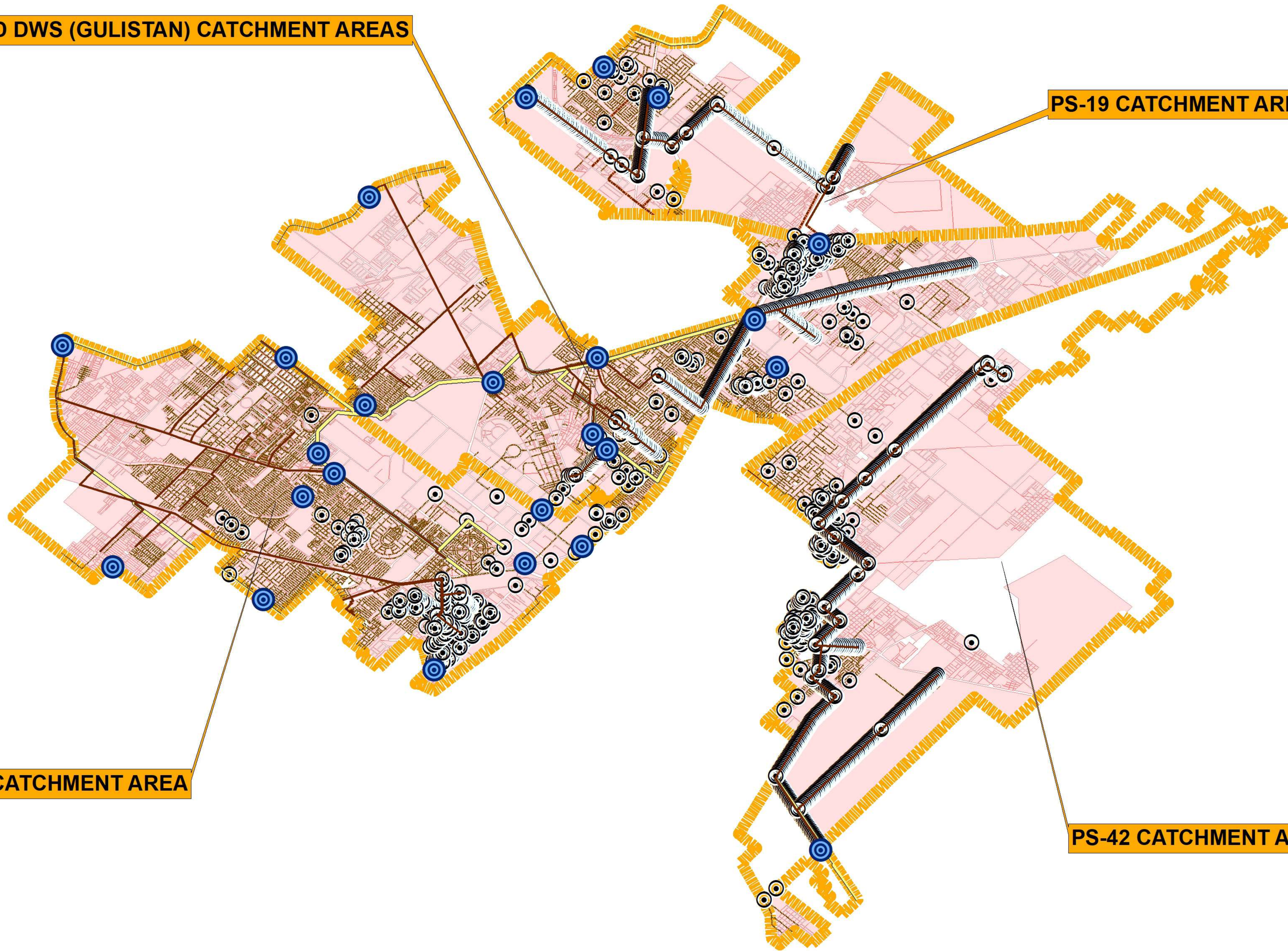
 Mainholes	 Trunk Sewer Lines	 Catchment Area
 Disposal	 Drains	 Builtup
	 Main Sewer Lines	
	 Tertiary Sewer Lines	

BAWA ROAD DWS (GULISTAN) CATCHMENT AREAS

PS-19 CATCHMENT AREAS

PS-3 CHOKERA CATCHMENT AREA

PS-42 CATCHMENT AREA



Client:



WATER AND SANITATION AGENCY,
FDA, FAISALABAD

Consultant:



ENGINEERING CONSULTANCY SERVICES
PUNJAB (PVT) LTD (ECSP).
83-A, E/1, Main Boulevard, Gulberg - III, Lahore.
Tel: (042) 35717681-84, Fax: (042) 35717685

Project:

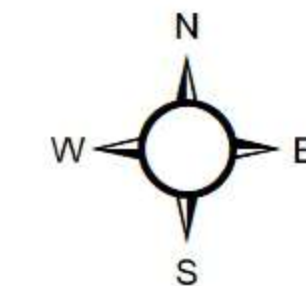
**Improvement & Rehabilitation
of
Civil and Electro-Mechanical System
of
Disposal Station, Faisalabad**

Map Title:

PS-3 Disposal
PS-19 Disposal
PS-42 Disposal
Gulistan Disposal
Faisalabad

Scale 1:27,000

0 0.5 1 2 3 4 Km



Legend



Mainholes



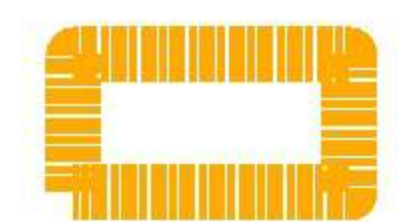
Disposal

Trunk Sewer Lines

Drains

Main Sewer Lines

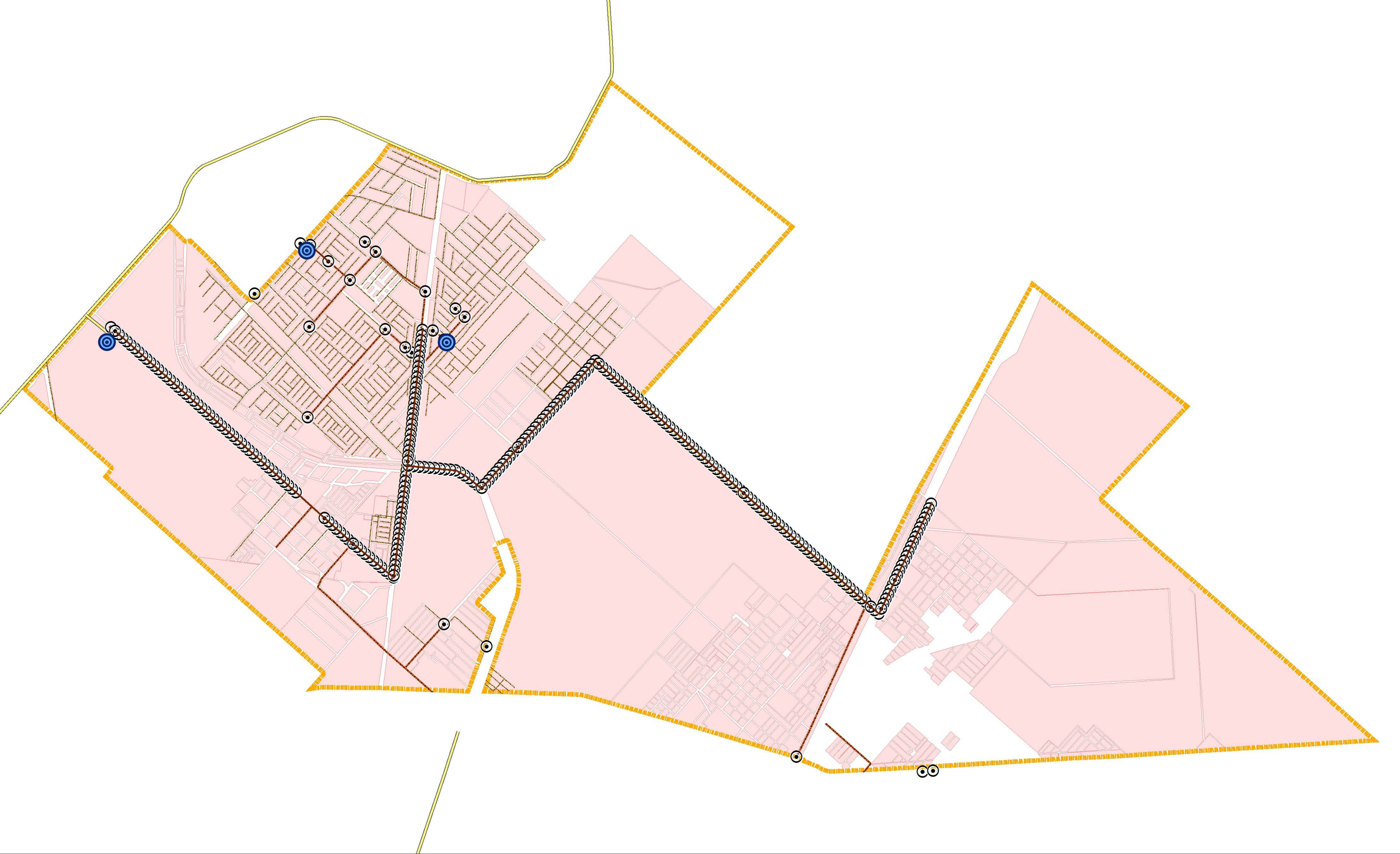
Tertiary Sewer Lines



Catchment Area



Builtup



Client:



WATER AND SANITATION AGENCY,
FDA, FAISALABAD

Consultant:



ENGINEERING CONSULTANCY SERVICES
PUNJAB (PVT) LTD (ECSP).
83-A, E/1, Main Boulevard, Gulberg - III, Lahore.
Tel: (042) 35717681-84, Fax: (042) 35717685

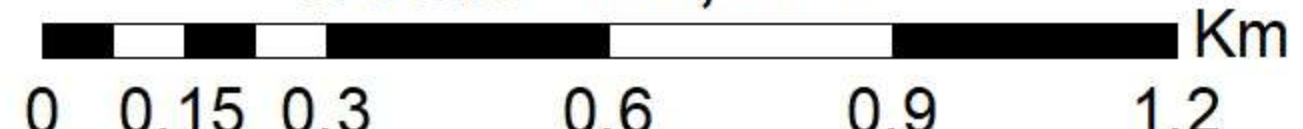
Project:

**Improvement & Rehabilitation
of
Civil and Electro-Mechanical System
of
Disposal Station, Faisalabad**

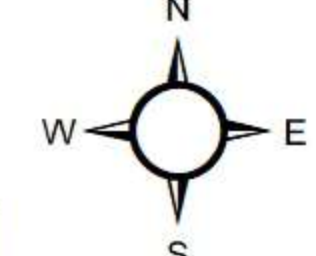
Map Title:

**PS-19 Disposal
Faisalabad**

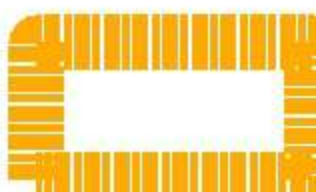
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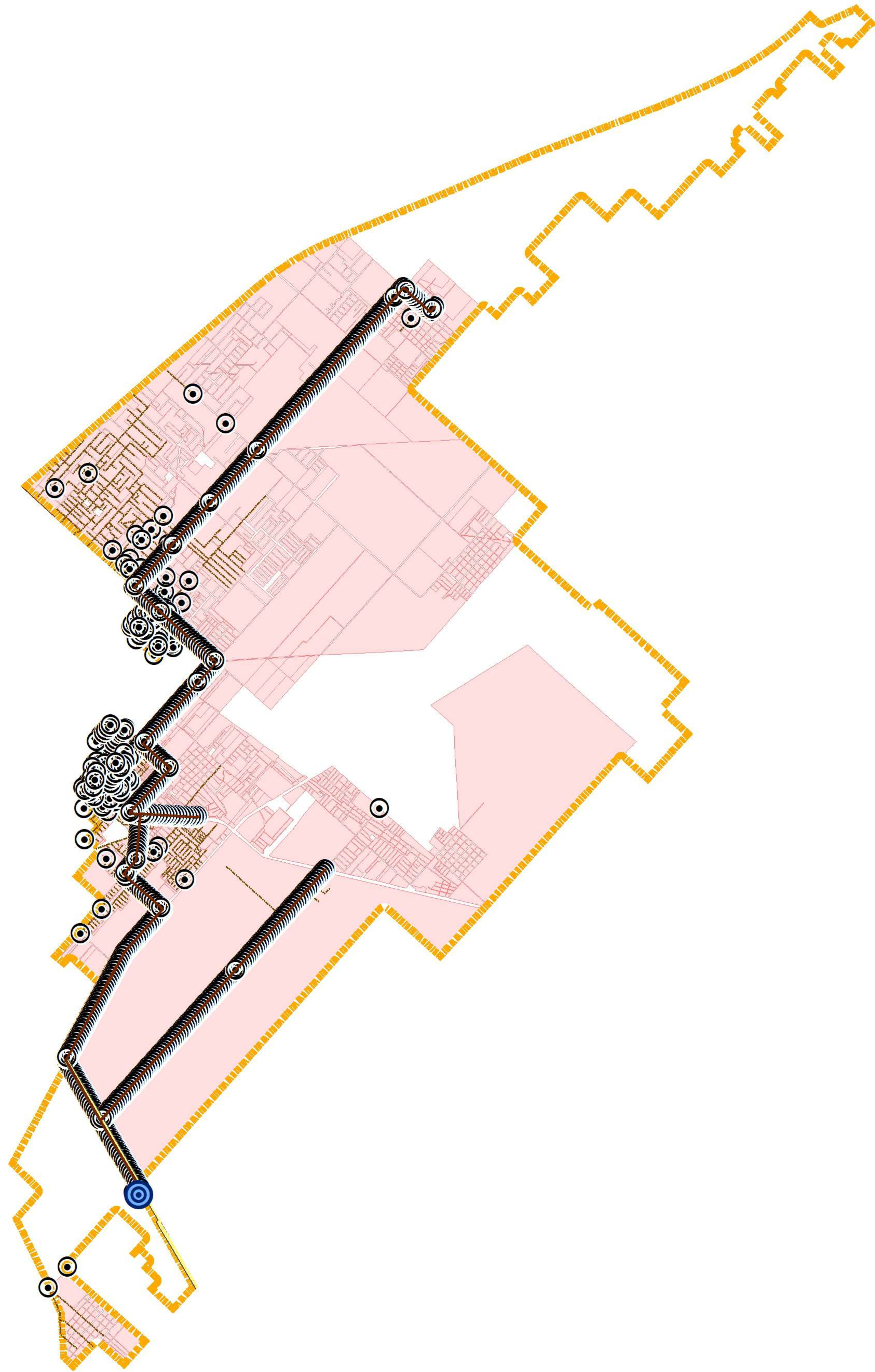


0 0.15 0.3 0.6 0.9 1.2 Km



Legend

 Mainholes	 Trunk Sewer Lines	 Catchment Area
 Disposal	 Drains	 Builtup
	 Main Sewer Lines	
	 Tertiary Sewer Lines	



Client:



WATER AND SANITATION AGENCY,
FDA, FAISALABAD

Consultant:



ENGINEERING CONSULTANCY SERVICES
PUNJAB (PVT) LTD (ECSP).
83-A, E/1, Main Boulevard, Gulberg - III, Lahore.
Tel: (042) 35717681-84, Fax: (042) 35717685

Project:

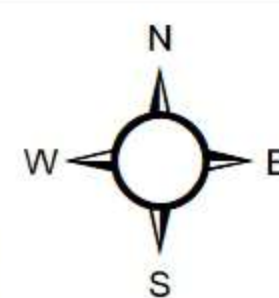
**Improvement & Rehabilitation
of
Civil and Electro-Mechanical System
of
Disposal Station, Faisalabad**

Map Title:

**PS-42 Disposal
Faisalabad**

Scale 1:21,000

0 0.4 0.8 1.6 2.4 3.2 Km



Legend



Mainholes



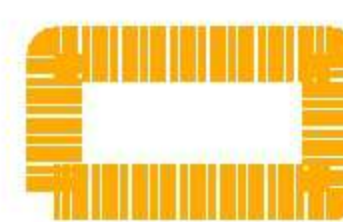
Disposal

Trunk Sewer Lines

Drains

Main Sewer Lines

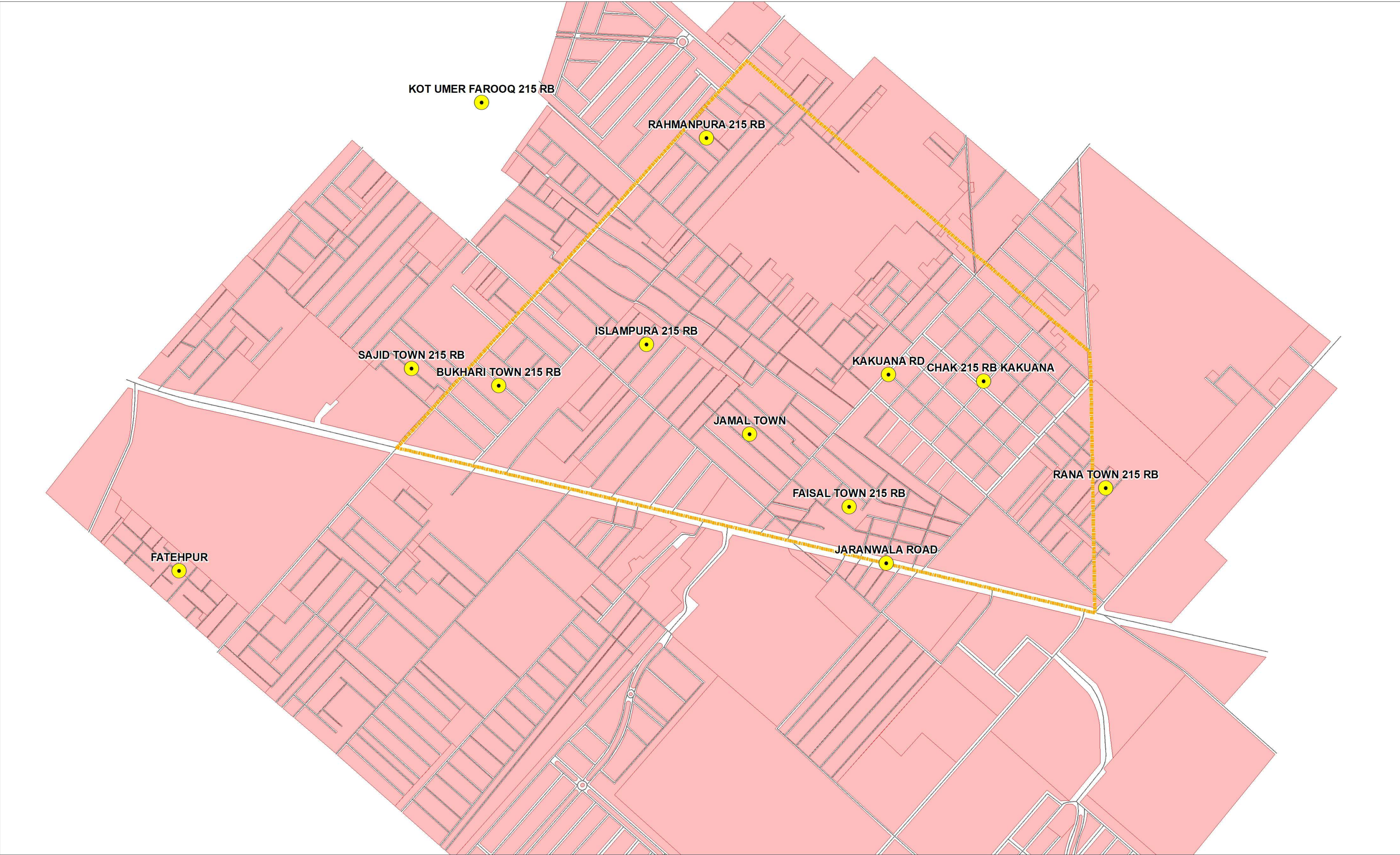
Tertiary Sewer Lines

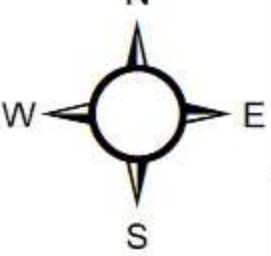
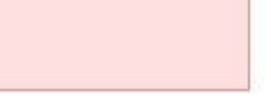


Catchment Area

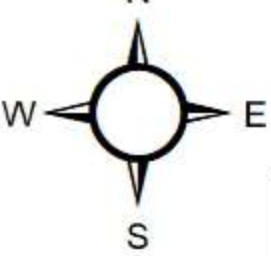
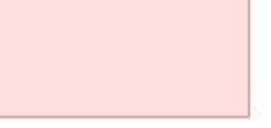


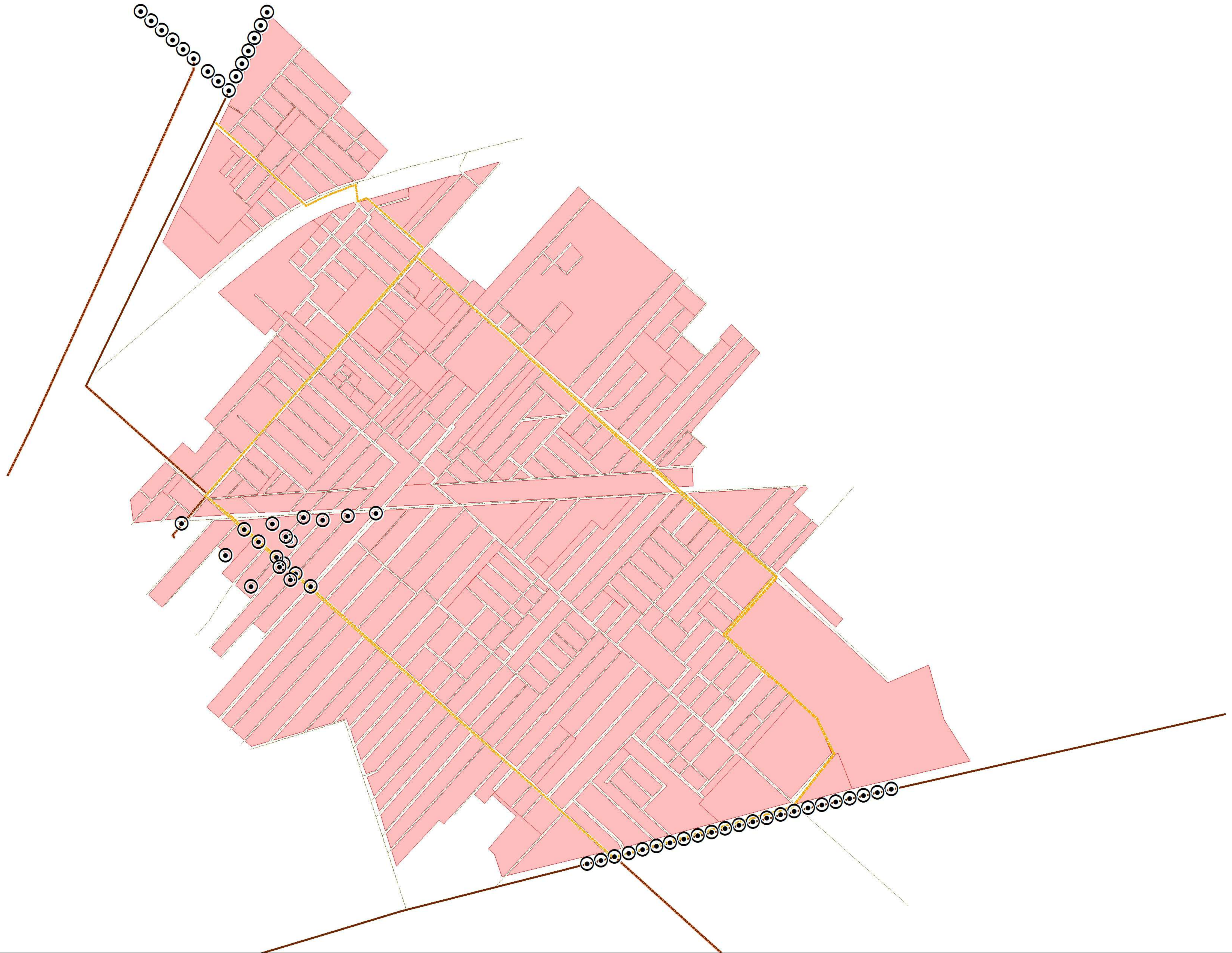
Builtup

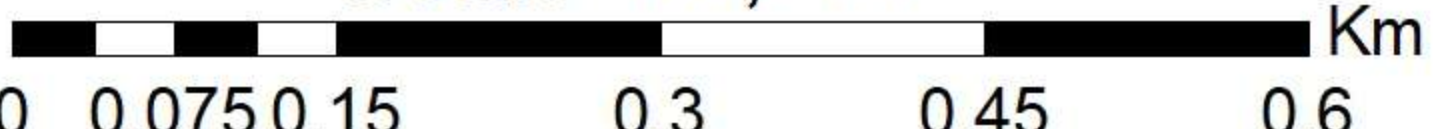
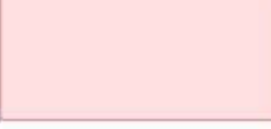


Client:  WATER AND SANITATION AGENCY, FDA, FAISALABAD	Consultant:  ENGINEERING CONSULTANCY SERVICES PUNJAB (PVT) LTD (ECSP). 83-A, E/1, Main Boulevard, Gulberg - III, Lahore. Tel: (042) 35717681-84, Fax: (042) 35717685	Project: Improvement & Rehabilitation of Civil and Electro-Mechanical System of Disposal Station, Faisalabad	Map Title: Kakuana Faisalabad Scale 1:3,000  	Legend  Mainholes  Disposal  Location  Trunk Sewer Lines  Drains  Main Sewer Lines  Tertiary Sewer Lines  Proposed Sewerage Line  Road  Catchment Area  Builtup
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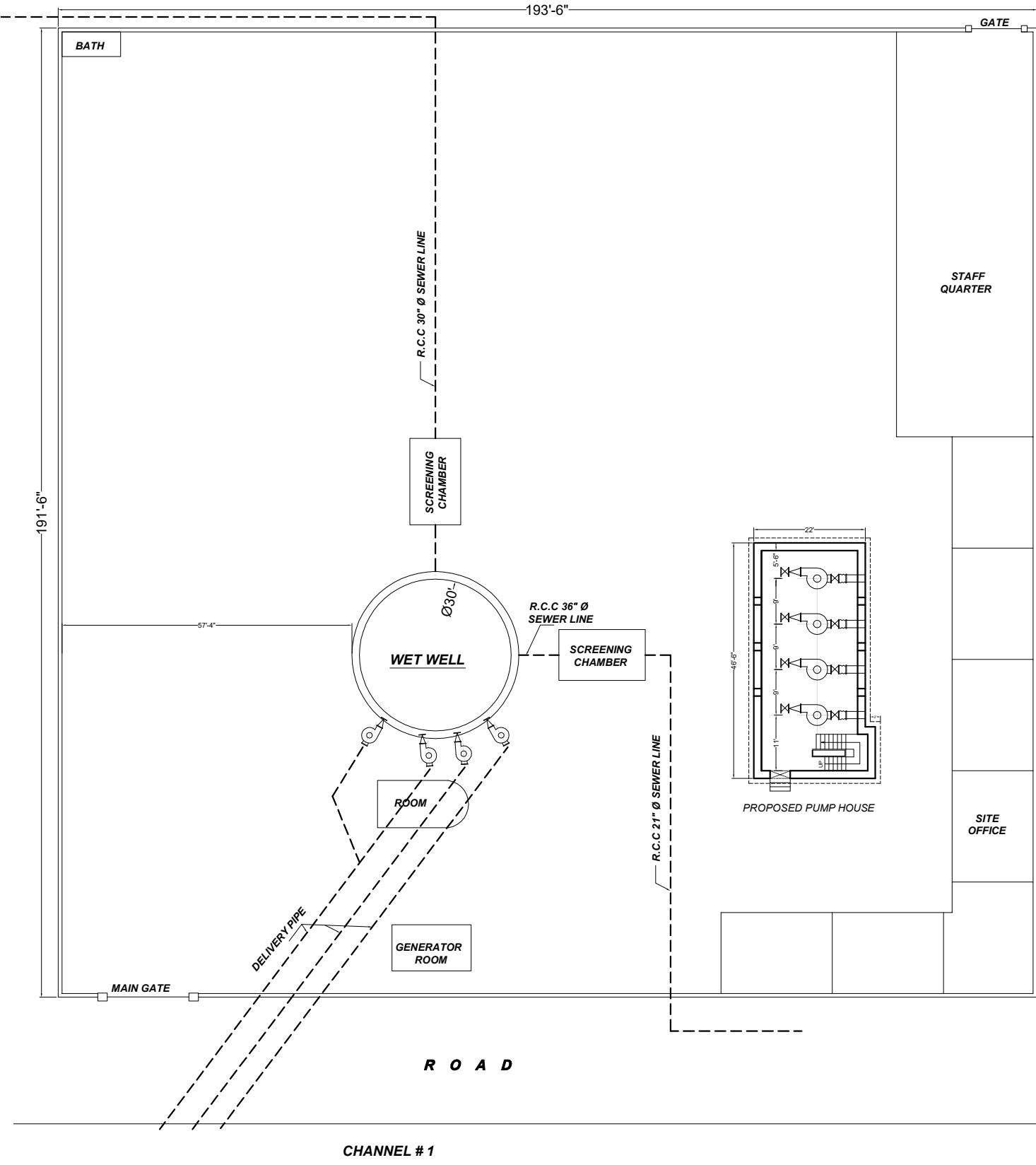


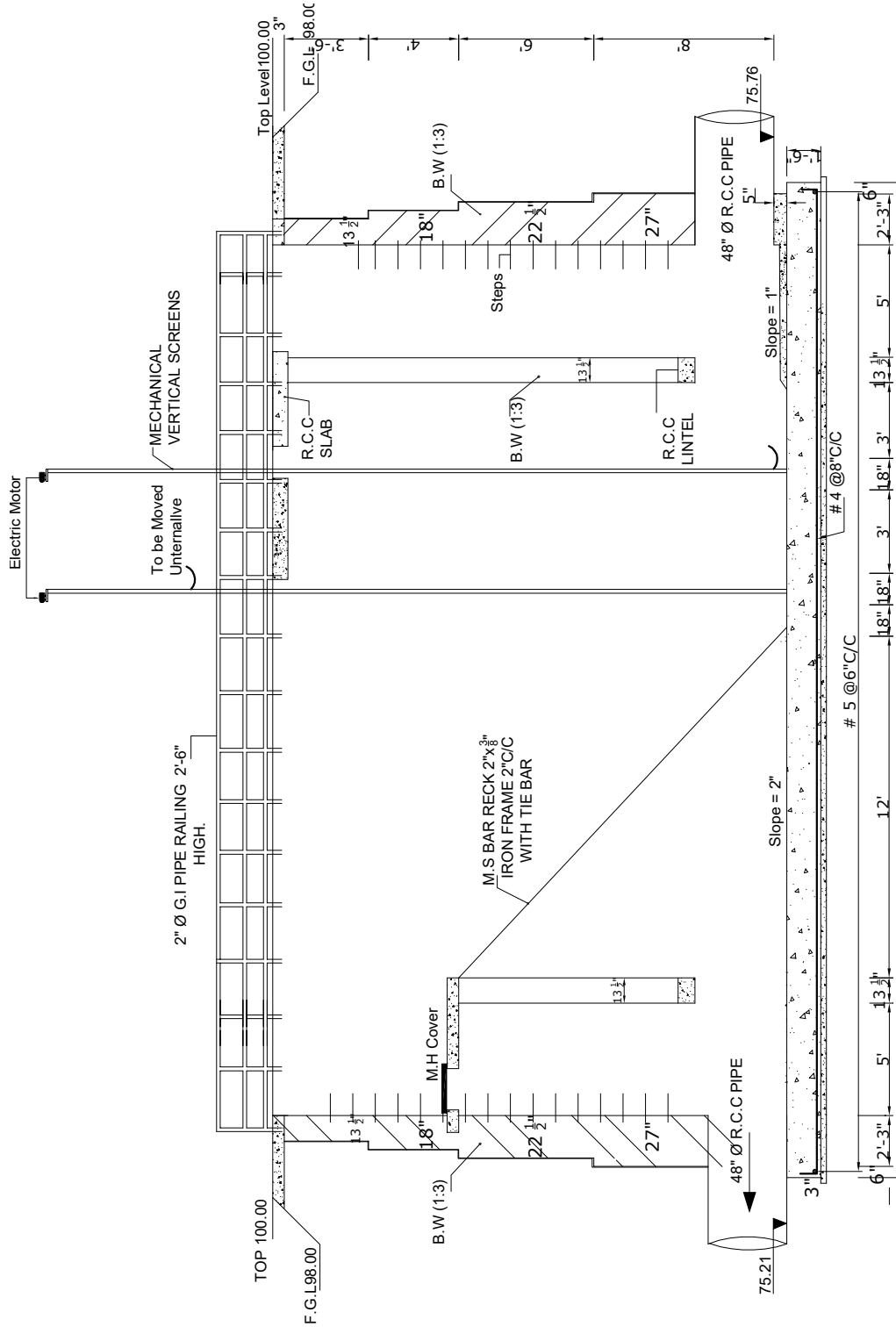
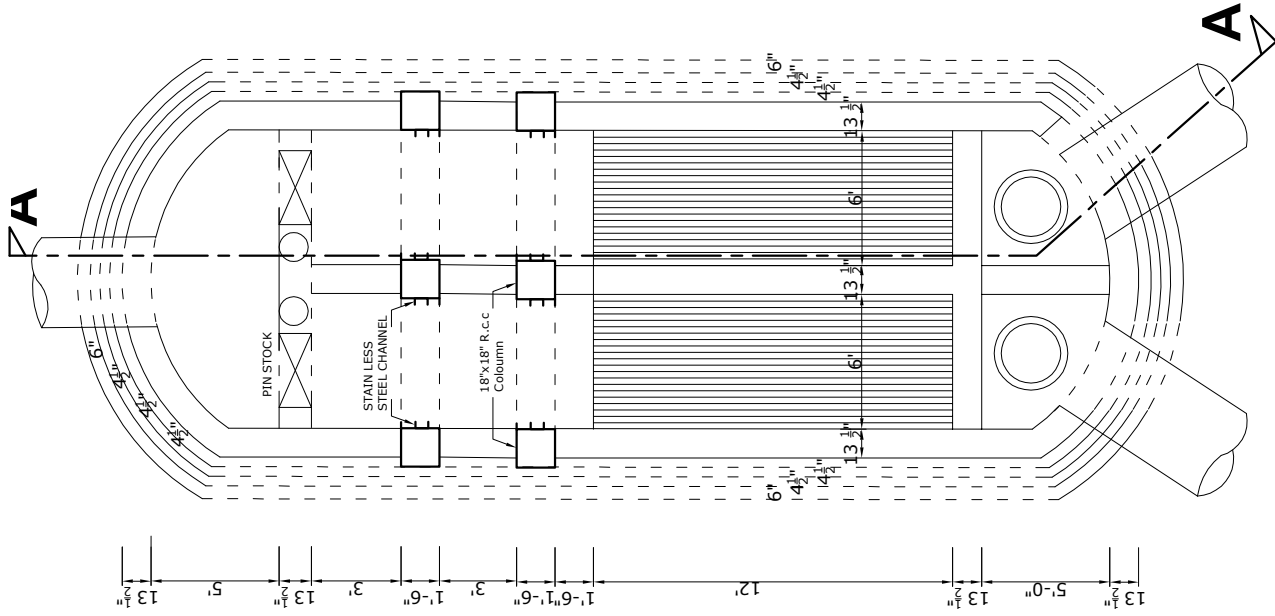
Client:  WATER AND SANITATION AGENCY, FDA, FAISALABAD	Consultant:  ENGINEERING CONSULTANCY SERVICES PUNJAB (PVT) LTD (ECSP). 83-A, E/1, Main Boulevard, Gulberg - III, Lahore. Tel: (042) 35717681-84, Fax: (042) 35717685	Project: Improvement & Rehabilitation <i>of</i> Civil and Electro-Mechanical System <i>of</i> Disposal Station, Faisalabad	Map Title: Nisar Colony Faisalabad Scale 1:4,000  	Legend  Mainholes  Disposal  Location  Trunk Sewer Lines  Drains  Main Sewer Lines  Tertiary Sewer Lines  Branch	 Proposed Sewerage Line  Road  Catchment Area  Builtup
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Client:  WATER AND SANITATION AGENCY, FDA, FAISALABAD	Consultant:  ENGINEERING CONSULTANCY SERVICES PUNJAB (PVT) LTD (ECSP). 83-A, E/1, Main Boulevard, Gulberg - III, Lahore. Tel: (042) 35717681-84, Fax: (042) 35717685	Project: Improvement & Rehabilitation of Civil and Electro-Mechanical System of Disposal Station, Faisalabad	Map Title: Shamsabad Faisalabad Scale 1:3,500  0 0.075 0.15 0.3 0.45 0.6 Km 	Legend  Mainholes  Disposal  Location  Trunk Sewer Lines  Drains  Main Sewer Lines  Tertiary Sewer Lines  Proposed Sewerage Line  Catchment Area  Builtup
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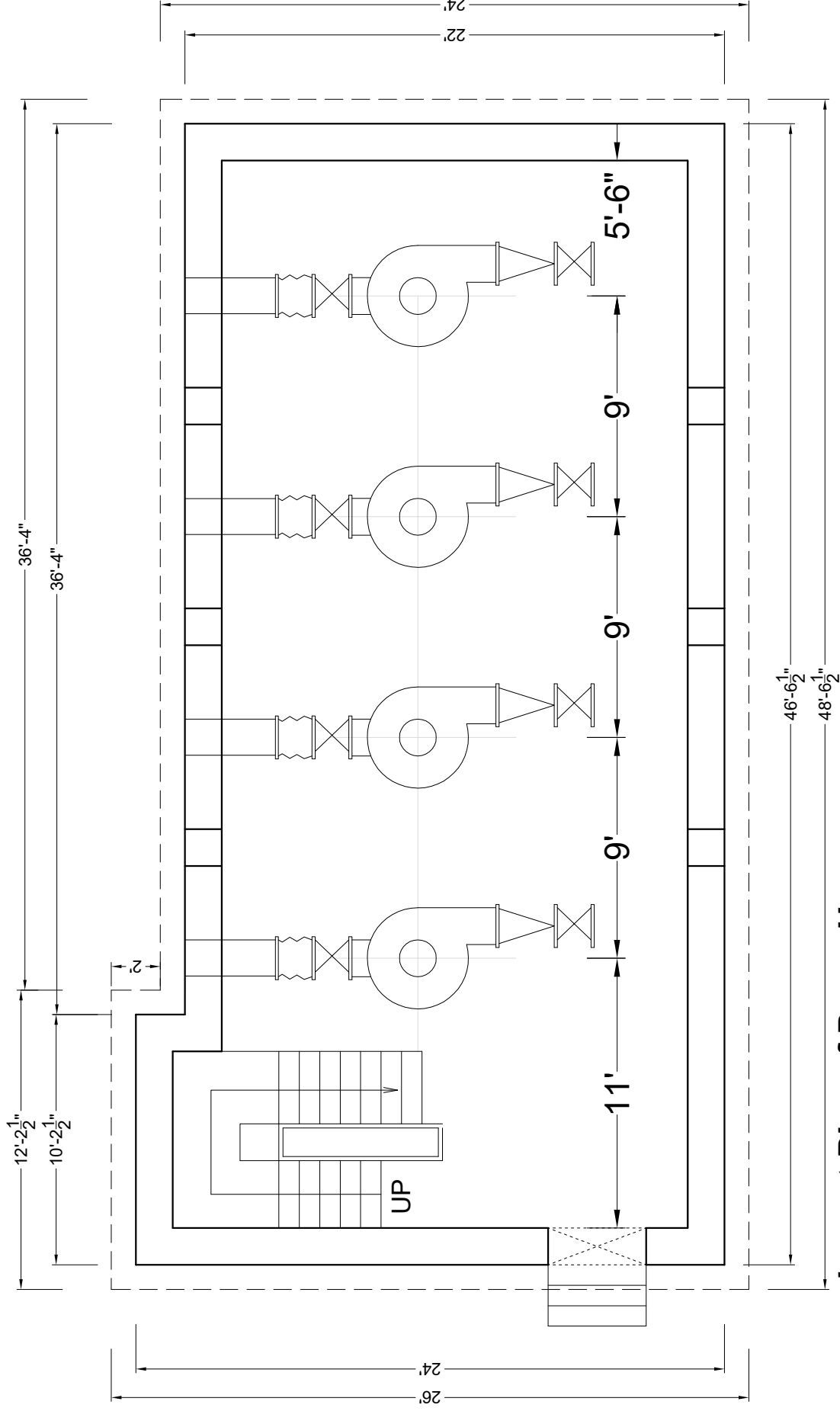
LAY OUT PLAN OF AKBRABAD DISPOSAL STATION



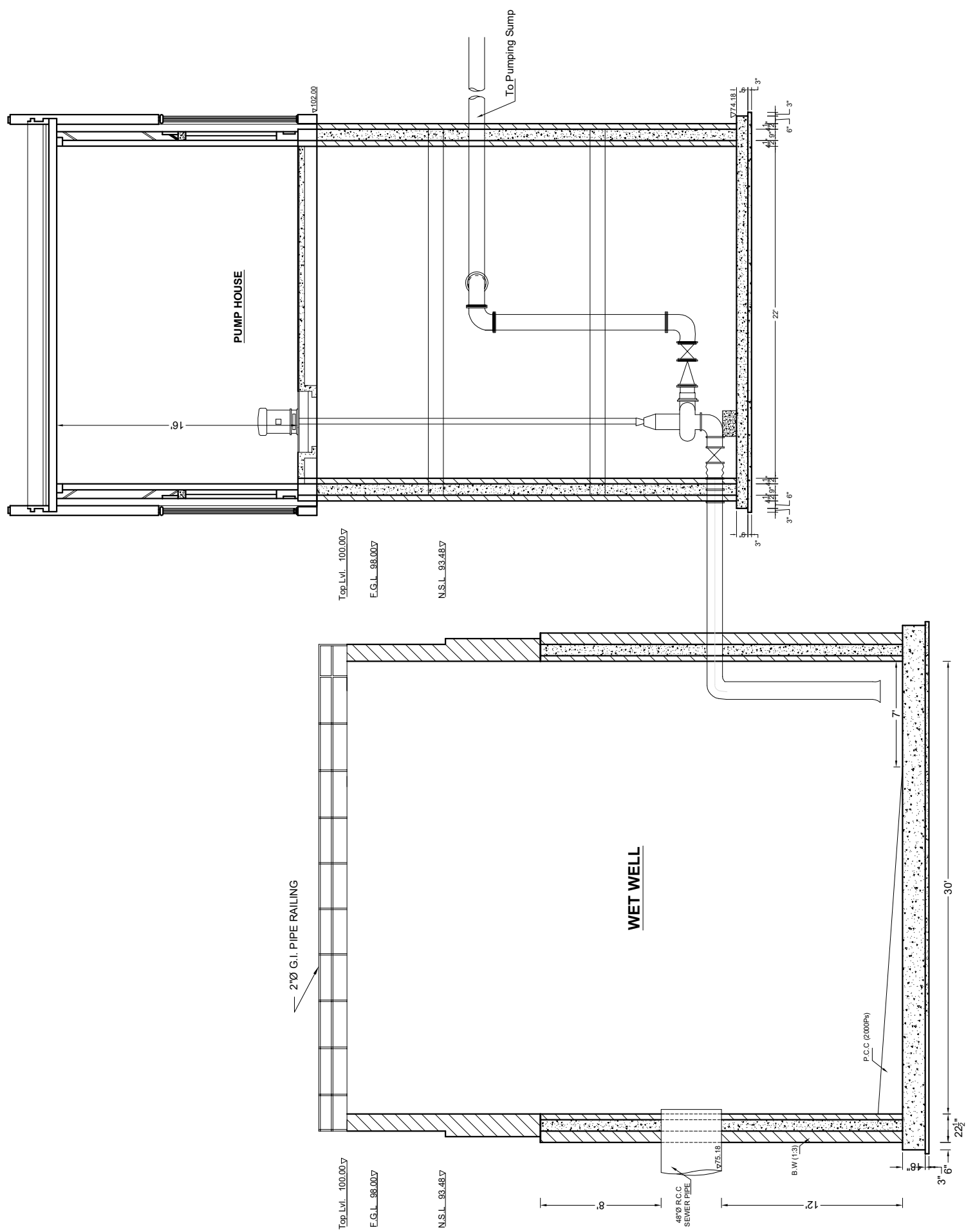


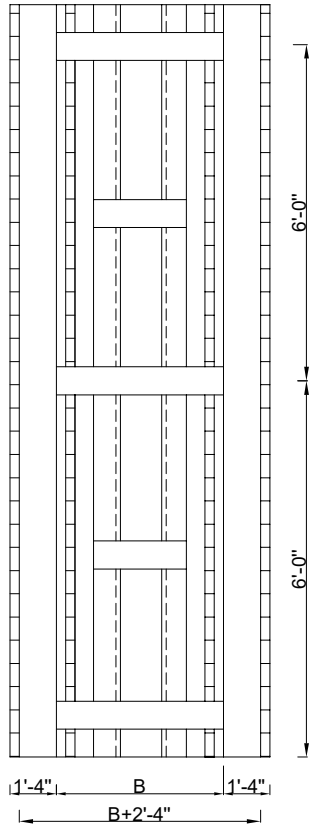
SECTION OF SCREENING CHAMBER

PLAN SCREENING CHAMBER



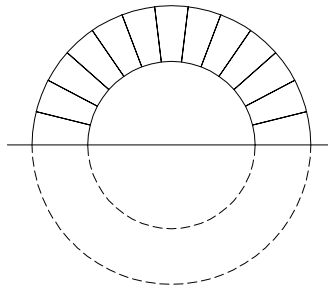
Layout Plan of Pump House



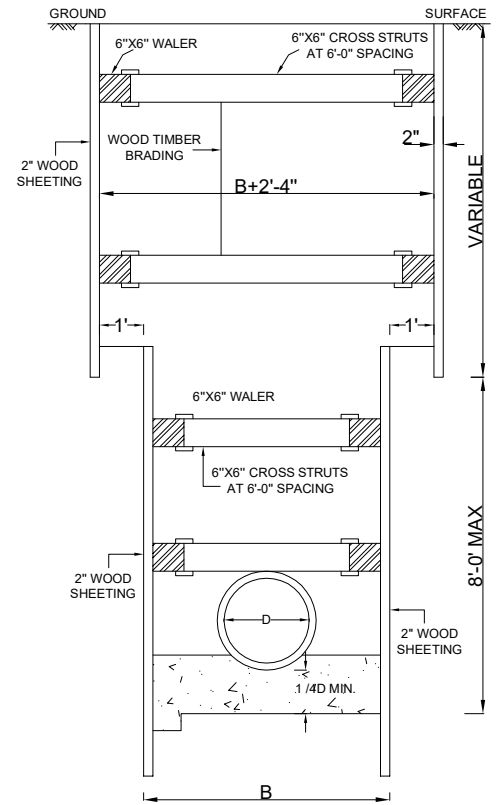


PLAN

TRENCH EXCAVATION WITH TIMBERING AND BRACING



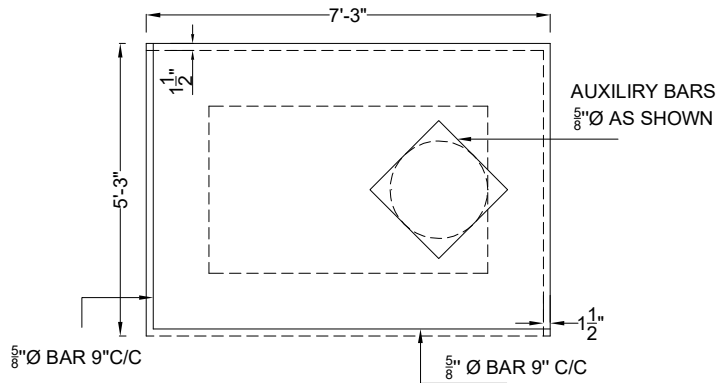
ARCHING IN MANHOLE FOR PIPE



SECTION

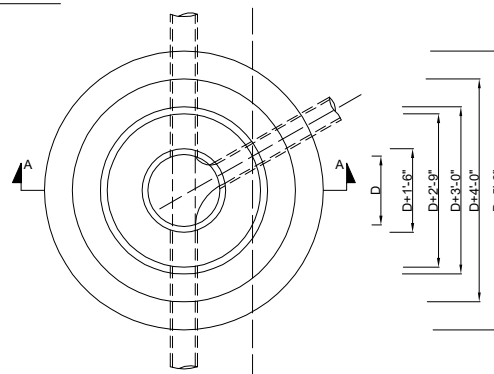
VARIABLE DIMENSIONS FOR SEWER MANHOLE

PIPE DIAMETER	D	H
9" TO 15"	4' - 0"	3' - 0"
18" TO 30"	5' - 0"	4' - 0"
36" TO 42"	6' - 0"	4' - 6"
48" TO 54"	7' - 6"	5' - 0"
60"	8' - 0"	5' - 6"
66"	8' - 8"	6' - 0"
72"	9' - 0"	6' - 6"
78"	9' - 6"	7' - 0"
84"	10' - 0"	7' - 6"
90"	10' - 8"	8' - 0"
96"	11' - 0"	8' - 6"



RCC SLAB

REINFORCEMENT DETAIL



PLAN

TYPICAL SEWER MANHOLE

Annexure - II
(Schedule of Implementation)

REHABILITATION / REPLACEMENT / IMPROVEMENT OF SEWERAGE & DRAINAGE SYSTEM, NA -107 (PP-109,110, 111 & 112), FAISALABAD.

PROCUREMENT / IMPLEMENTATION PLAN

S. No.	Activity	2021												2022												2023		
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	1st	2nd	3rd
1	Preparation & Submission of PC-I																											
2	Clearance of PC-I																											
3	Issuance of Administrative Approval																											
4	Consultant Selection																											
5	Submission of Tender Documents to client																											
6	Selection of Contractor																											
7	Execution of the Project																											
8	Third Party Validation																											

AUGMENTATION OF DISPOSAL STATIONS, MACHINERY, EQUIPEMENTS & T&P FOR O&M OF SEWERAGE SYSTEM IN NA-110 / PP-111, 114, 115, 116 & 117, FAISALABAD

PROCUREMENT / IMPLEMENTATION PLAN

S. No.	Activity	2021												2022												2023		
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	1st	2nd	3rd
1	Preparation & Submission of PC-I																											
2	Clearance of PC-I																											
3	Issuance of Administrative Approval																											
4	Consultant Selection																											
5	Submission of Tender Documents to client																											
6	Selection of Contractor																											
7	Execution of the Project																											
8	Third Party Validation																											

AUGMENTATION OF DISPOSAL STATIONS, MACHINERY, EQUIPMENT AND T&P FOR O&M OF SEWERAGE SYSTEM IN NA-109 (PP-111, 113 & 114), FAISALABAD.

PROCUREMENT / IMPLEMENTATION PLAN

[illegible]

Annexure - III
(Environmental Monitoring Reports)

ENVIRONMENTAL MONITORING & ANALYSIS REPORT

ENGINEERING CONSULTANCY SERVICES PUNJAB PVT LTD

- Ambient Air Monitoring
- Noise Level Monitoring
- Soil Testing
- Drinking Water Analysis

Reference No: AES-090-EC/2022

Dated: 01 April, 2022

Asian Environmental Services Pvt. Ltd.

has prepared this report as per prerequisites of client.

Any other individual using the content of this document shall do so at their own liability.

The client is responsible for lawful usage of this reported data.



Document No. AES/LMS/FRM-110, Date of Issue 22 June, 2020, Revision No. 00

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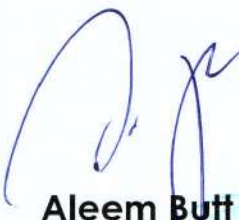


Client Details

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AES Details

AES Director	Mr. Aleem Butt
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Aleem Butt

Director Asian Environmental Services

Document No. AES/LMS/FRM-110, Date of Issue 22 June, 2020, Revision No. 00



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Location For Ambient Air Monitoring 01

LAAL MILL CHOWK

Faisalabad



Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-01	Sampling Point	Laal Mill Chowk, Faisalabad.
Date of Monitoring	24-Mar-2022 to 25-Mar-2022	Sampling Coordinates	31°24'40" N 73°05'21" E

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	12:00	0.99	15.64	24.63	40.22	26.88
2	13:00	1.02	16.96	24.50	41.41	26.88
3	14:00	0.97	16.98	24.56	41.49	27.73
4	15:00	0.91	16.89	24.50	41.33	27.81
5	16:00	0.91	16.96	24.58	41.49	28.10
6	17:00	0.91	16.98	24.56	41.49	26.88
7	18:00	0.87	16.87	24.59	41.41	28.34
8	19:00	0.98	16.98	24.15	41.08	26.88
9	20:00	1.01	16.96	24.56	41.47	27.43
10	21:00	0.98	15.64	24.50	40.09	26.88
11	22:00	0.95	15.51	24.02	39.48	26.93
12	23:00	0.97	15.43	24.06	39.44	27.01
13	00:00	0.95	15.84	24.37	40.15	26.98
14	01:00	0.92	15.63	24.38	39.96	26.88
15	02:00	0.90	15.64	15.54	31.14	28.79
16	03:00	0.87	16.98	24.06	40.99	26.89
17	04:00	0.87	16.79	24.61	41.35	28.29
18	05:00	0.98	16.66	24.58	41.18	27.83
19	06:00	0.97	16.85	24.19	40.99	27.19
20	07:00	1.02	16.96	23.68	40.59	26.93
21	08:00	0.98	16.79	24.02	40.76	28.34
22	09:00	0.85	16.98	24.44	41.37	26.90
23	10:00	0.98	15.85	23.93	39.73	26.88
24	11:00	1.04	12.22	24.31	36.48	28.31
Average Concentration		0.95	16.29	23.97	40.21	27.41

Monitored By

Reviewed By
(TM)

Approved By
(QM)

Page 2 of 20

Document No. AES/LMS/FRM-110, Date of Issue 22 June, 2020, Revision No. 00



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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-01	Sampling Point	Laal Mill Chowk, Faisalabad.
Date of Monitoring	24-Mar-2022 to 25-Mar-2022	Sampling Coordinates	31°24'40" N 73°05'21" E

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	23.97	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	16.29	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	40.21	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	27.41	120.0	Optimal
Carbon Monoxide (CO)*	mg/m ³	24Hours	0.01	0.95	05.0	Optimal
Ozone (O ₃)	mg/m ³	01Hours	1.00	20.8	130	Optimal
Lead (Pb)	mg/m ³	24Hours	0.07	0.2	1.5	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	142.32	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	33.62	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	263.8	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-090-EC/2022-AA-01 Sampling Point Laal Mill Chowk,
Faisalabad.
Date of Monitoring 24-Mar-2022 to 25-Mar-2022 Sampling Coordinates 31°24'40" N 73°05'21" E

Sr. No.	Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
1	12:00	36	NW	3.8	17	761
2	13:00	37	NW	4.2	14	761
3	14:00	38	NW	4	10	761
4	15:00	39	NW	3.9	12	761
5	16:00	40	NW	3.7	14	761
6	17:00	39	NW	3.5	16	761
7	18:00	38	W	3.2	22	761
8	19:00	37	W	2.8	24	761
9	20:00	36	NW	2.7	27	761
10	21:00	35	NW	2.5	30	762
11	22:00	32	NW	2.8	32	762
12	23:00	30	NW	2.9	34	761
13	00:00	28	NW	2.9	37	761
14	01:00	25	N	3.2	40	761
15	02:00	20	N	3.6	42	761
16	03:00	18	NE	3.5	48	761
17	04:00	20	NE	3.2	51	761
18	05:00	24	NE	2.5	50	760
19	06:00	26	E	2.6	46	760
20	07:00	29	E	2.7	40	760
21	08:00	30	E	2.9	37	760
22	09:00	33	E	3.1	32	760
23	10:00	34	E	3.4	28	760
24	11:00	35	E	3.8	22	760

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Noise Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-01	Sampling Point	Laal Mill Chowk, Faisalabad.
Date of Monitoring	24-Mar-2022 to 25-Mar-2022	Sampling Coordinates	31°24'40" N 73°05'21" E

Sr. No.	Time	Noise dB(A)*	PEQS
1	12:00	65	
2	13:00	64	
3	14:00	68	
4	15:00	62	
5	16:00	58	Day Time
6	17:00	60	
7	18:00	59	
8	19:00	55	
9	20:00	52	
10	21:00	50	
11	22:00	48	Night Time
12	23:00	45	
13	00:00	42	
14	01:00	40	
15	02:00	39	
16	03:00	38	
17	04:00	39	
18	05:00	42	
19	06:00	40	
20	07:00	45	Day Time
21	08:00	49	
22	09:00	52	
23	10:00	58	
24	11:00	64	

*Parameters are approved from Punjab Environment Protection Agency.

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Location For Ambient Air Monitoring 02

SANDHU TOWN

Faisalabad



3/25/22
31°22'20"N 73°4'48"E
Bilal Nagar
Faisalabad
Punjab
Sandhu Town

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Ambient Air Monitoring Report

Monitoring Details

Reference Number AES-090-EC/2022-AA-02 **Sampling Point** Sandhu Town, Faisalabad.

Date of Monitoring 25-Mar-2022 to 26-Mar-2022 **Sampling Coordinates** 31°22'20" N 73°04'48" E

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	13:00	0.95	15.74	24.06	39.75	25.44
2	14:00	0.94	16.31	24.21	40.47	25.33
3	15:00	0.98	15.59	23.60	39.14	24.80
4	16:00	0.99	15.76	24.38	40.09	25.04
5	17:00	0.95	16.41	23.49	39.84	25.60
6	18:00	0.93	16.89	24.21	41.05	25.15
7	19:00	0.92	15.66	24.06	39.67	24.48
8	20:00	0.87	16.01	23.89	39.84	25.94
9	21:00	0.88	16.41	24.00	40.36	25.92
10	22:00	0.86	16.22	23.39	39.56	25.62
11	23:00	0.84	16.85	23.87	40.66	24.61
12	00:00	0.81	16.29	24.12	40.36	26.24
13	01:00	0.85	16.05	24.42	40.42	25.07
14	02:00	0.83	16.22	24.79	40.95	24.35
15	03:00	0.84	16.85	23.94	40.74	24.80
16	04:00	0.85	16.16	23.83	39.94	24.27
17	05:00	0.83	16.98	23.43	40.36	24.61
18	06:00	0.86	16.14	23.62	39.71	26.00
19	07:00	0.87	15.59	23.83	39.37	25.94
20	08:00	0.91	15.66	23.62	39.23	25.68
21	09:00	0.94	15.64	23.75	39.35	25.62
22	10:00	0.97	16.01	23.58	39.54	25.94
23	11:00	0.99	15.84	24.65	40.43	25.94
24	12:00	0.97	16.85	24.25	41.05	25.68
Average Concentration		0.90	16.17	23.96	40.08	25.34

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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-02	Sampling Point	Sandhu Town, Faisalabad.
Date of Monitoring	25-Mar-2022 to 26-Mar-2022	Sampling Coordinates	31°22'20" N 73°04'48" E

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	23.96	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	16.17	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	40.08	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	25.34	120.0	Optimal
Carbon Monoxide (CO)*	mg/m ³	24Hours	0.01	0.90	05.0	Optimal
Ozone (O ₃)	mg/m ³	01Hours	1.00	18.6	130	Optimal
Lead (Pb)	mg/m ³	24Hours	0.07	0.4	1.5	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	139.63	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	34.10	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	259.14	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-090-EC/2022-AA-02 **Sampling Point** Sandhu Town, Faisalabad.
Date of Monitoring 25-Mar-2022 to 26-Mar-2022 **Sampling Coordinates** 31°22'20" N 73°04'48" E

Sr. No.	Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
1	13:00	37	SE	4.2	19	760
2	14:00	38	SE	4.0	17	760
3	15:00	39	SE	3.9	16	760
4	16:00	39	SE	4.1	15	760
5	17:00	37	SE	4.2	18	760
6	18:00	36	SE	3.8	21	760
7	19:00	34	SE	3.2	23	760
8	20:00	32	E	3.0	27	759
9	21:00	31	E	2.8	28	759
10	22:00	30	NE	2.7	32	759
11	23:00	28	NE	2.5	37	760
12	00:00	26	NE	2.2	40	760
13	01:00	24	NE	2.0	42	760
14	02:00	23	NE	2.4	45	760
15	03:00	20	NE	2.8	47	760
16	04:00	21	NE	3.2	43	760
17	05:00	22	N	3.4	40	760
18	06:00	25	NE	3.6	37	760
19	07:00	26	NE	3.7	35	760
20	08:00	29	NE	3.9	30	760
21	09:00	31	NE	4.0	26	761
22	10:00	33	NE	4.4	22	761
23	11:00	34	NE	4.2	20	761
24	12:00	35	NE	4.1	18	760

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Noise Monitoring Report

Monitoring Details

Reference Number AES-090-EC/2022-AA-02 **Sampling Point** Sandhu Town, Faisalabad.

Date of Monitoring 25-Mar-2022 to 26-Mar-2022 **Sampling Coordinates** 31°22'20" N 73°04'48" E

Sr. No.	Time	Noise dB(A)*	PEQS
1	13:00	61	
2	14:00	58	
3	15:00	55	
4	16:00	57	
5	17:00	59	Day Time
6	18:00	62	
7	19:00	52	
8	20:00	51	
9	21:00	50	
10	22:00	45	
11	23:00	47	
12	00:00	42	
13	01:00	40	
14	02:00	36	Night Time
15	03:00	37	
16	04:00	35	
17	05:00	38	
18	06:00	40	
19	07:00	42	
20	08:00	48	
21	09:00	49	
22	10:00	55	Day Time
23	11:00	53	
24	12:00	59	

*Parameters are approved from Punjab Environment Protection Agency.

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Location For Ambient Air Monitoring 03

AKBARABAD

Faisalabad



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Ambient Air Monitoring Report

Monitoring Details

Reference Number AES-090-EC/2022-AA-03 **Sampling Point** Akbarabad, Faisalabad.

Date of Monitoring 26-Mar-2022 to 27-Mar-2022 **Sampling Coordinates** 31°26'44" N 73°05'7" E

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	14:00	0.92	14.82	24.46	39.23	24.27
2	15:00	0.95	14.19	24.69	38.83	24.80
3	16:00	0.94	14.50	17.65	32.11	25.15
4	17:00	0.98	14.10	24.27	38.31	23.97
5	18:00	0.99	14.82	24.08	38.85	24.88
6	19:00	0.95	15.07	23.83	38.85	25.60
7	20:00	0.92	14.78	18.07	32.81	26.02
8	21:00	0.88	15.13	24.52	39.59	25.76
9	22:00	0.84	14.25	24.29	38.49	22.51
10	23:00	0.86	13.81	24.73	38.49	22.17
11	00:00	0.81	14.06	18.97	32.99	21.61
12	01:00	0.83	13.41	18.02	31.38	22.75
13	02:00	0.88	13.67	24.25	37.88	22.03
14	03:00	0.87	13.85	17.44	31.25	23.31
15	04:00	0.91	13.98	18.07	32.01	22.91
16	05:00	0.93	13.58	18.51	32.05	24.27
17	06:00	0.97	13.81	24.44	38.20	24.85
18	07:00	0.99	14.44	24.25	38.64	25.36
19	08:00	1.01	14.80	24.44	39.19	24.35
20	09:00	1.04	14.88	24.63	39.46	26.02
21	10:00	0.99	14.76	18.47	33.20	25.15
22	11:00	0.97	15.05	24.40	39.40	24.53
23	12:00	0.95	15.26	24.75	39.96	24.27
24	13:00	0.93	14.19	24.44	38.58	25.68

Average Concentration **0.93** **14.38** **22.32** **36.66** **24.26**

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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-03	Sampling Point	Akbarabad, Faisalabad.
Date of Monitoring	26-Mar-2022 to 27-Mar-2022	Sampling Coordinates	31°26'44" N 73°05'7" E

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	22.32	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	14.38	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	36.66	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	24.26	120.0	Optimal
Carbon Monoxide (CO)*	mg/m ³	24Hours	0.01	0.93	05.0	Optimal
Ozone (O ₃)	mg/m ³	01Hours	1.00	19.12	130	Optimal
Lead (Pb)	mg/m ³	24Hours	0.07	0.2	1.5	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	140.25	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	34.68	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	248.52	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-090-EC/2022-AA-03 **Sampling Point** Akbarabad, Faisalabad.
Date of Monitoring 26-Mar-2022 to 27-Mar-2022 **Sampling Coordinates** 31°26'44" N 73°05'7" E

Sr. No.	Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
1	14:00	38	W	4.2	13	760
2	15:00	39	W	4.0	12	760
3	16:00	37	W	4.1	14	760
4	17:00	36	W	4.0	16	760
5	18:00	35	NW	3.7	18	759
6	19:00	33	NW	3.2	22	759
7	20:00	30	NW	3.4	24	759
8	21:00	29	W	3.0	27	758
9	22:00	27	NW	2.8	30	758
10	23:00	26	NW	2.7	32	759
11	00:00	24	N	2.9	37	759
12	01:00	22	N	3.3	40	759
13	02:00	20	NW	3.2	48	758
14	03:00	19	NW	3.0	49	758
15	04:00	20	NW	2.7	52	758
16	05:00	21	NW	2.8	50	759
17	06:00	22	NW	2.9	45	759
18	07:00	24	NW	3.2	41	759
19	08:00	27	NW	3.4	36	760
20	09:00	28	NW	3.7	30	760
21	10:00	30	NW	3.6	28	760
22	11:00	31	W	3.9	25	760
23	12:00	33	W	4.1	22	760
24	13:00	34	W	4.2	20	760

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Noise Monitoring Report

Monitoring Details

Reference Number AES-090-EC/2022-AA-03 **Sampling Point** Akbarabad, Faisalabad.
Date of Monitoring 26-Mar-2022 to 27-Mar-2022 **Sampling Coordinates** 31°26'44" N 73°05'7" E

Sr. No.	Time	Noise dB(A)*	PEQS
1	14:00	68	Day Time
2	15:00	71	
3	16:00	69	
4	17:00	70	
5	18:00	66	
6	19:00	62	
7	20:00	66	
8	21:00	64	
9	22:00	58	Night Time
10	23:00	55	
11	00:00	52	
12	01:00	50	
13	02:00	47	
14	03:00	42	
15	04:00	40	
16	05:00	45	
17	06:00	49	
18	07:00	52	Day Time
19	08:00	55	
20	09:00	60	
21	10:00	68	
22	11:00	65	
23	12:00	66	
24	13:00	68	

*Parameters are approved from Punjab Environment Protection Agency.

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Location For Ambient Air Monitoring 04

JARANWALA ROAD CHAK 229RB

Faisalabad



3/27/22
31°23'18"N 73°11'48"E
Faisalabad
Punjab
Chak 229 RB

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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-04	Sampling Point	Faisalabad-Jaranwala Road Chak 229RB
Date of Monitoring	27-Mar-2022 to 28-Mar-2022	Sampling Coordinates	31°23'18" N 73°11'48" E

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	15:00	1.15	16.93	23.16	40.03	27.06
2	16:00	0.95	16.10	23.29	39.35	27.57
3	17:00	0.94	16.41	21.57	37.93	27.89
4	18:00	0.98	16.03	23.73	39.71	26.88
5	19:00	0.99	16.73	23.77	40.45	27.49
6	20:00	0.95	16.98	22.97	39.90	28.26
7	21:00	1.15	16.70	21.90	38.54	28.50
8	22:00	1.12	17.04	23.73	40.72	28.42
9	23:00	1.07	16.16	23.91	40.01	27.67
10	00:00	1.09	15.72	23.17	38.84	27.49
11	01:00	1.05	15.97	21.61	37.53	27.01
12	02:00	1.06	15.32	21.84	37.11	28.07
13	03:00	1.12	15.59	24.25	39.79	27.35
14	04:00	1.11	15.76	21.27	36.98	28.63
15	05:00	1.14	15.89	22.03	37.88	28.37
16	06:00	0.93	15.49	22.19	37.63	26.93
17	07:00	0.97	15.72	23.43	39.10	27.19
18	08:00	0.99	16.35	24.25	40.55	26.93
19	09:00	1.04	16.91	24.44	41.29	27.11
20	10:00	1.04	16.98	23.18	40.11	28.68
21	11:00	0.99	16.68	21.42	38.05	27.81
22	12:00	0.97	16.98	24.40	41.33	27.19
23	13:00	0.95	17.17	23.08	40.21	26.93
24	14:00	0.93	16.10	23.12	39.17	27.99
Average Concentration		1.03	16.32	22.99	39.26	27.64

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Ambient Air Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-04	Sampling Point	Faisalabad-Jaranwala Road Chak 229RB
Date of Monitoring	27-Mar-2022 to 28-Mar-2022	Sampling Coordinates	31°23'18" N 73°11'48" E

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	PEQS	Remarks
Nitrogen Dioxide (NO ₂) *	µg/m ³	24Hours	1.00	22.99	80.0	Optimal
Nitrogen Oxide (NO)*	µg/m ³	24Hours	1.00	16.32	40.0	Optimal
NO _x *	µg/m ³	24Hours	1.00	39.26	120.0	Optimal
Sulphur Dioxide (SO ₂) *	µg/m ³	24Hours	1.00	27.64	120.0	Optimal
Carbon Monoxide (CO)*	mg/m ³	24Hours	0.01	1.03	05.0	Optimal
Ozone (O ₃)	mg/m ³	01Hours	1.00	22.3	130	Optimal
Lead (Pb)	mg/m ³	24Hours	0.07	0.4	1.5	Optimal
Particulate Matter (PM ₁₀) *	µg/m ³	24Hours	1.00	145.10	150	Optimal
Particulate Matter (PM _{2.5}) *	µg/m ³	24Hours	1.00	33.25	35	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	258.23	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-090-EC/2022-AA-04 **Sampling Point** Faisalabad-Jaranwala Road Chak 229RB
Date of Monitoring 27-Mar-2022 to 28-Mar-2022 **Sampling Coordinates** 31°23'18" N 73°11'48" E

Sr. No.	Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
1	15:00	37	NW	4.4	16	760
2	16:00	38	NW	4.0	18	760
3	17:00	37	NW	4.2	21	760
4	18:00	36	S	3.7	123	760
5	19:00	35	S	3.5	27	760
6	20:00	32	S	3.2	29	760
7	21:00	30	S	3	33	760
8	22:00	28	S	3.4	37	760
9	23:00	27	SE	3.7	39	760
10	00:00	25	SE	3.8	42	760
11	01:00	24	SE	3.5	48	760
12	02:00	23	SE	2	50	760
13	03:00	21	NE	2.4	47	760
14	04:00	20	NE	2.8	45	760
15	05:00	22	E	2.9	40	760
16	06:00	24	E	3	38	760
17	07:00	27	E	3.3	35	760
18	08:00	28	NE	3.2	30	760
19	09:00	30	NE	3.4	28	760
20	10:00	33	NE	3.7	25	760
21	11:00	34	NE	3.8	23	760
22	12:00	35	NE	4	20	760
23	13:00	36	NE	4.1	18	760
24	14:00	37	NE	4.2	15	760

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Noise Monitoring Report

Monitoring Details

Reference Number	AES-090-EC/2022-AA-04	Sampling Point	Faisalabad-Jaranwala Road Chak 229RB
Date of Monitoring	27-Mar-2022 to 28-Mar-2022	Sampling Coordinates	31°23'18" N 73°11'48" E

Sr. No.	Time	Noise dB(A)*	PEQS
1	15:00	66	Day Time
2	16:00	68	
3	17:00	67	
4	18:00	66	
5	19:00	60	
6	20:00	59	
7	21:00	55	
8	22:00	50	Night Time
9	23:00	48	
10	00:00	42	
11	01:00	40	
12	02:00	40	
13	03:00	37	
14	04:00	39	
15	05:00	42	
16	06:00	48	
17	07:00	50	Day Time
18	08:00	52	
19	09:00	54	
20	10:00	58	
21	11:00	59	
22	12:00	62	
23	13:00	61	
24	14:00	64	

*Parameters are approved from Punjab Environment Protection Agency.

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SOIL ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-SL-01	Reporting Date	01-04-2022
Nature of Sample	Soil	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis Completion Date	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Ambient Temperature & Humidity at the Time of Sampling			29 °C & 44 %
Sample ID	AES-Soil-50/2022	Sampling Location	Laal Mill Chowk, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		

Soil Analysis Results

Parameter	Unit	Result
Lab Analysis		
pH	-	8.48
Electrical Conductivity	mg/kg	297
Mercury	mg/kg	0.01
Cadmium	mg/kg	N.D.
Lead	mg/kg	2.5
Chromium	mg/kg	N.D.
Nickel	mg/kg	12.6
Cyanide	mg/kg	0.0
Arsenic	mg/kg	0.05
Manganese	mg/kg	23.6
Selenium	mg/kg	0.05

Abbreviations:

mg/kg= Milligram Per Kilogram

N.D. = Not Detected

Report Disclaimer

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SOIL ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-SL-02	Reporting Date	01-04-2022
Nature of Sample	Soil	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis Completion Date	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Ambient Temperature & Humidity at the Time of Sampling			29 °C & 44 %
Sample ID	AES-Soil-51/2022	Sampling Location	Sandhu Town, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		

Soil Analysis Results

Parameter	Unit	Result
Lab Analysis		
pH	-	8.23
Electrical Conductivity	mg/kg	305
Mercury	mg/kg	0.014
Cadmium	mg/kg	N.D.
Lead	mg/kg	3.3
Chromium	mg/kg	N.D.
Nickel	mg/kg	15
Cyanide	mg/kg	0.0
Arsenic	mg/kg	0.018
Manganese	mg/kg	33
Selenium	mg/kg	0.07

Abbreviations:

mg/kg= Milligram Per Kilogram

N.D. = Not Detected

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SOIL ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-SL-03	Reporting Date	01-04-2022
Nature of Sample	Soil	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis Completion Date	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Ambient Temperature & Humidity at the Time of Sampling			29 °C & 44 %
Sample ID	AES-Soil-52/2022	Sampling Location	Akbarabad, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		

Soil Analysis Results

Parameter	Unit	Result
Lab Analysis		
pH	-	8.18
Electrical Conductivity	mg/kg	176
Mercury	mg/kg	0.01
Cadmium	mg/kg	N.D.
Lead	mg/kg	2.1
Chromium	mg/kg	N.D.
Nickel	mg/kg	9.66
Cyanide	mg/kg	0.0
Arsenic	mg/kg	0.02
Manganese	mg/kg	22
Selenium	mg/kg	0.05

Abbreviations:

mg/kg= Milligram Per Kilogram

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SOIL ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-SL-04	Reporting Date	01-04-2022
Nature of Sample	Soil	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis Completion Date	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Ambient Temperature & Humidity at the Time of Sampling			29 °C & 44 %
Sample ID	AES-Soil-53/2022	Sampling Location	Faisalabad- Jaranwala Road
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		

Soil Analysis Results

Parameter	Unit	Result
Lab Analysis		
pH	-	8.36
Electrical Conductivity	mg/kg	233
Mercury	mg/kg	0.012
Cadmium	mg/kg	N.D.
Lead	mg/kg	2.53
Chromium	mg/kg	N.D.
Nickel	mg/kg	15.2
Cyanide	mg/kg	0.0
Arsenic	mg/kg	0.03
Manganese	mg/kg	15.1
Selenium	mg/kg	0.06

Abbreviations:

mg/kg= Milligram Per Kilogram

N.D. = Not Detected

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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-01	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			29 °C & 44 %
Ambient Temperature & Humidity at the Time of Sampling			Tap Water Laal
Sample ID	AES-DW-254/2022	Sampling Location	Mill Chowk, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		



Drinking 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	208	± 0.87	Optimal
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	362	± 0.81	Optimal
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	7.54	± 0.70	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Chloride (Cl ⁻) **	SMWW 4500 Cl ⁻ B	< 250 mg/L	36	± 1.23	Optimal
Fluoride (F ⁻)*	SMWW 4500 F ⁻ D	≤ 1.5 mg/L	0.18	± 0.71	Optimal
Nitrate (NO ₃ ⁻) *	SMWW 4500 NO ₃ ⁻ B	≤ 50 mg/L	2.2	N.A.	Optimal
Calcium Hardness	SMWW 2340 C	NGVS mg/L	120	N.A.	Optimal
Magnesium Hardness	SMWW 2340 C	NGVS mg/L	88	N.A.	Optimal
T. Alkalinity	SMWW 2320 B	NGVS mg/L	155	N.A.	Optimal

Signature
21/04/2022



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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-01	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			
Ambient Temperature & Humidity at the Time of Sampling			29 °C & 44 %
Sample ID	AES-DW-254/2022	Sampling Location	Tap Water Laal Mill Chowk, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		



Drinking Water Analysis Results

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Sodium	USEPA 3050 B	NGVS mg/L	32	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0/ 100 mL CFU	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal
E.Coli	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

**Parameters are accredited from Pakistan National Accreditation Council.

Abbreviations:

PEQS = Punjab Environment Quality Standards

TCU = True Color Unit

NTU = Nephelometric Turbidity Unit

SMWW = Standard Methods for the examination of Water and Wastewater

N.A. = Not Available

MU = Measurement Uncertainty

CFU = Colony forming Unit

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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Analyzed By *M. Ashraf* 04-2022

Reviewed By *A. Khan*
(TM) 04-2022

Approved By *A. Khan*
(QM) 04-22

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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-02	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			29 °C & 44 %
Ambient Temperature & Humidity at the Time of Sampling			Tap Water
Sample ID	AES-DW-255/2022	Sampling Location	Sandhu Town, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		



Drinking 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	1200	± 0.87	High
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	562	± 0.81	Optimal
pH**	SMWW 4500 H+ B	6.5- 8.5	7.35	± 0.70	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Chloride (Cl-) **	SMWW 4500 Cl- B	< 250 mg/L	1425	± 1.22	High
Fluoride (F)*	SMWW 4500 F- D	≤ 1.5 mg/L	0.55	± 0.71	Optimal
Nitrate (NO ₃ ⁻) *	SMWW 4500 NO ₃ ⁻ B	≤ 50 mg/L	3.2	N.A.	Optimal
Calcium Hardness	SMWW 2340 C	NGVS mg/L	248	N.A.	Optimal
Magnesium Hardness	SMWW 2340 C	NGVS mg/L	952	N.A.	Optimal
T. Alkalinity	SMWW 2320 B	NGVS mg/L	244	N.A.	Optimal

Signature
21/04/2022



Document No. AES/LMS/FRM-110, Date of Issue 22 June, 2020, Revision No. 01

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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No. AES-090-EC/2022-DW-02 **Reporting Date** 01-04-2022
Nature of Sample Drinking Water **Sampling Method Reference** AES/LMS/QSP-014
Grab/Composite Grab **Sample Collected by/Sent By** AES
Sampling Date 24-03-2022 **Sample Receiving Date** 25-03-2022
Analysis **Lab Temp & Humidity** 23°C & 53 %
Completion Date 01-04-2022
Ambient Temperature & Humidity at the Time of Sampling 29 °C & 44 %
Sample ID AES-DW-255/2022 **Sampling Location** Tap Water
Sandhu Town,
Faisalabad.
Client Detail Engineering Consultancy Services Punjab Pvt Ltd.



Drinking Water Analysis Results

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Sodium	USEPA 3050 B	NGVS mg/L	48	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0/ 100 mL CFU	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal
E.Coli	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

**Parameters are accredited from Pakistan National Accreditation Council.

Abbreviations:

PEQS = Punjab Environment Quality Standards

TCU = True Color Unit

NTU = Nephelometric Turbidity Unit

Remarks:

Optimal = Compliance with Permissible Range

Low = Less Than Permissible Range

SMWW = Standard Methods for the examination of Water and Wastewater

N.A. = Not Available

MU = Measurement Uncertainty

CFU = Colony forming Unit

NGVS = No Guideline Value Set

Marginal = Close to Extreme Edge

High = Exceeds from Permissible Range

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Analyzed By

Reviewed By
(TM)

Approved By
(QM)

-----End of Report-----

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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-03	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			29 °C & 44 %
Ambient Temperature & Humidity at the Time of Sampling			Tap Water
Sample ID	AES-DW-256/2022	Sampling Location	Akbarabad, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		



Drinking 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	260	± 0.87	Optimal
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	226	± 0.81	Optimal
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	7.52	± 0.70	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Chloride (Cl ⁻) **	SMWW 4500 Cl ⁻ B	< 250 mg/L	505	± 1.22	High
Fluoride (F ⁻)*	SMWW 4500 F ⁻ D	≤ 1.5 mg/L	0.58	± 0.71	Optimal
Nitrate (NO ₃ ⁻) *	SMWW 4500 NO ₃ ⁻ B	≤ 50 mg/L	1.12	N.A.	Optimal
Calcium Hardness	SMWW 2340 C	NGVS mg/L	44	N.A.	Optimal
Magnesium Hardness	SMWW 2340 C	NGVS mg/L	216	N.A.	Optimal
T. Alkalinity	SMWW 2320 B	NGVS mg/L	96	N.A.	Optimal

Signature
01/04/2022



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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-03	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			29 °C & 44 %
Ambient Temperature & Humidity at the Time of Sampling			Tap Water
Sample ID	AES-DW-256/2022	Sampling Location	Akbarabad, Faisalabad.
Client Detail	Engineering Consultancy Services Punjab Pvt Ltd.		



Drinking Water Analysis Results

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Sodium	USEPA 3050 B	NGVS mg/L	18	N.A.	Optimal
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0/ 100 mL CFU	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal
E.Coli	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

**Parameters are accredited from Pakistan National Accreditation Council.

Abbreviations:

PEQS = Punjab Environment Quality Standards

TCU = True Color Unit

NTU = Nephelometric Turbidity Unit

Remarks:

Optimal = Compliance with Permissible Range

Low = Less Than Permissible Range

SMWW = Standard Methods for the examination of Water and Wastewater

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MU = Measurement Uncertainty

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Marginal = Close to Extreme Edge

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Analyzed By

Reviewed By
(TM)

Approved By
(QM)

-----End of Report-----



DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-04	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			29 °C & 44 %
Ambient Temperature & Humidity at the Time of Sampling			Tap Water
Sample ID	AES-DW-257/2022	Sampling Location	Faisalabad- Jaranwala Road Chak 229RB



Client Detail Engineering Consultancy Services Punjab Pvt Ltd.

Drinking 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	604	± 0.87	High
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	345	± 0.81	Optimal
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	7.19	± 0.70	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Chloride (Cl ⁻)**	SMWW 4500 Cl ⁻ B	< 250 mg/L	800	± 1.22	High
Fluoride (F ⁻)*	SMWW 4500 F ⁻ D	≤ 1.5 mg/L	0.44	± 0.71	Optimal
Nitrate (NO ₃ ⁻) *	SMWW 4500 NO ₃ ⁻ B	≤ 50 mg/L	1.24	N.A.	Optimal
Calcium Hardness	SMWW 2340 C	NGVS mg/L	36	N.A.	Optimal
Magnesium Hardness	SMWW 2340 C	NGVS mg/L	568	N.A.	Optimal
T. Alkalinity	SMWW 2320 B	NGVS mg/L	146	N.A.	Optimal
Sodium	USEPA 3050 B	NGVS mg/L	32	N.A.	Optimal

Signature
01/04/2022



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DRINKING WATER ANALYSIS REPORT

Sample Detail

Reference No.	AES-090-EC/2022-DW-04	Reporting Date	01-04-2022
Nature of Sample	Drinking Water	Sampling Method Reference	AES/LMS/QSP-014
Grab/Composite	Grab	Sample Collected by/Sent By	AES
Sampling Date	24-03-2022	Sample Receiving Date	25-03-2022
Analysis	01-04-2022	Lab Temp & Humidity	23°C & 53 %
Completion Date			29 °C & 44 %
Ambient Temperature & Humidity at the Time of Sampling			Tap Water
Sample ID	AES-DW-257/2022	Sampling Location	Faisalabad- Jaranwala Road Chak 229RB



Client Detail Engineering Consultancy Services Punjab Pvt Ltd.

Drinking Water Analysis Results

Parameter	Analysis Method	PEQS	Result	MU (CL95%)	Remarks
Microbiological Analysis					
Total Coliforms*	SMWW 9222 B	0/ 100 mL CFU	0	N.A.	Optimal
Fecal Coliforms *	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal
E.Coli	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal

*Parameters are approved from Punjab Environment Protection Agency.

**Parameters are accredited from Pakistan National Accreditation Council.

Abbreviations:

PEQS = Punjab Environment Quality Standards

TCU = True Color Unit

NTU = Nephelometric Turbidity Unit

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(TM)

Approved By
(QM)

-----End of Report-----



Annexure - IV
(Socio-Economic Questionnaire)



Socio-Environmental Baseline Survey for Faisalabad Water Supply, Sewerage and Drainage Facilities

a. RESPONDENT PERSONAL INFORMATION

1. Respondent Name: _____ 2. Contact No./CNIC: _____
3. Residential Address: _____
4. Age _____ 5. Education: _____ 6. Marital Status: (Single/Married)
7. Religion: _____ 8. Income/Source/Occupation: _____
9. Languages Spoken: _____

b. SOCIO-ECONOMIC STATUS OF STUDY AREA

Civic Facilities Availability	Electricity	Gas	Public Water Supply	Sewer Mains	Road Access	School	College	Madrassah	Health units/Hospital	Cellular Coverage
(Yes/No)										

c. PROJECT BASED

10. Is there any water supply scheme in the area?		Yes	No
Do you think drinking water is appropriate for cooking purpose?		Yes	No
11. How is the wastewater management of the area?	Poor	Nominal	Good
12. What is the condition of Drainage system of the area?		Open	Covered
13. Is urban flooding happening regular after rain?	Yes	Sometimes	No
14. Are you willing to pay for improved services of water supply, sewerage and drainage?		Yes	No
15. How is the solid waste management of the area?	Poor	Nominal	Good
16. Is the area visually pollution free?		Yes	No
17. Common Diseases in the area:			
Common Cold	Diarrhea	Typhoid	Malaria
TB	Cough	Dengue	Hepatitis
If others, specify			
18. Does the area have any archaeological or historical monuments?		Yes	No
If yes, specify:			
19. Are there any Potential threats to flora and fauna?		Yes	No
20. Types & number of Trees (to be uprooted) (if any)			
21. What are the most pressing needs/major problems of the area?			
22. Are you in favor of the Project?		Yes	No

Annexure - V
(Stakeholder's Consultation Invitation Letter)



WATER AND SANITATION AGENCY, FAISALABAD
OFFICE OF THE DIRECTOR (P&D)

Phone: 041-9210058

Email: wasa_fsd@yahoo.com

No 626-31/D(P&D)/WASA/2021

Dated: 28 / 12 /2021

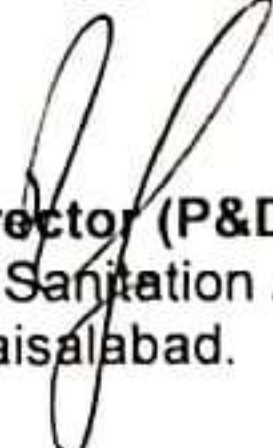
To

- ✓ i. **The Chief Executive Officer,**
Faisalabad Waste Management Company, Faisalabad.
- ii. **The Chief Engineer**
Faisalabad Development Authority, Faisalabad.
- iii. **The Superintending Engineer,**
Public Health Engineering, Faisalabad Circle.
- iv. **The Superintending Engineer,**
Highway Division, Faisalabad.
- v. **The Chief Officer,**
Municipal Corporation Faisalabad.
- vi. **The Executive Engineer**
Irrigation Department, Faisalabad.

Subject: - **STAKEHOLDER'S CONSULTATION MEETING FOR CHIEF MINISTER'S DEVELOPMENT PACKAGE FOR FAISALABAD WATER SUPPLY, SEWERAGE AND DRAINAGE FACILITIES.**

WASA Faisalabad is planning to execute the extension / rehabilitation / replacement of water supply, sewerage and drainage projects for the Faisalabad city under Chief Minister's Development Package for WASA Faisalabad. In this regard, the stakeholders consultation meeting is scheduled to be held on 04.01.2022 at 12:00 P.M in committee room of WASA Faisalabad Main Office, Opposite Allied Hospital, Jail Road, Faisalabad.

You are therefore requested to attend / depute your representative for the meeting on the said date and time and record your valuable comments / suggestions.


Director (P&D)
Water and Sanitation Agency
Faisalabad.

CC to the:-

- Managing Director WASA, Faisalabad.
- Deputy Managing Director (East/West), WASA, Faisalabad.
- All Executing Directorates, WASA Faisalabad, to attend the meeting as per above schedule.
- Director (Dev. & Finance), Commissioner Office, Faisalabad.
- Deputy Director (Development), Deputy Commissioner Office, Faisalabad.
- Consultant (ECSP Pvt., Ltd.).

Annexure VI
(Proponent CNIC)

Annexure VII

(ToR)

SECTION 5: TERMS OF REFERENCE (TORs)

FOR CM'S DEVELOPMENT PACKAGE FOR FAISALABAD WATER SUPPLY, SEWERAGE AND DRAINAGE FACILITIES

1. BACKGROUND.

Faisalabad is the third largest city of Punjab with an estimated population of 3.4 million with growth rate of 3.70% and is a hub of industrial activities in the country. The city is located almost on a flat terrain (0.05% slope of alluvial plain). The city has grown rapidly to the present population of about 3.4 million persons, but the environmental infrastructure development, including capacity of existing water supply, sewerage network and machinery is lagging. Rakh Branch Canal passing through the middle of the city, divides it into two distinct zones; eastern and western. Water and Sanitation Agency, commonly known as WASA, subsidiary of Faisalabad Development Authority, (FDA) was established on April 23, 1978 under the Development of Cities Act 1976 with a view to providing and catering for the services with regard to Water Supply, Sewerage and Drainage. The WASA Faisalabad is administratively aligned to HUD & PHED of the Government of Punjab. Presently, total service area of WASA Faisalabad is 225 sq.km with total registered consumers for water & sewerage being 2,60,000. It is estimated that WASA provides about 72% of the city with sewerage services and about 70% with water services.

A very limited quantity of potable water is available as seepage from the canal. Surface Water Treatment Plants have been used to provide treated canal water to the city for a limited quantity. Major supply (90%) is derived from the tube wells installed in Chenab Well-field and Jhang Branch Canal Well Field. WASA-F has implemented many projects to meet the gap between supply and demand in Faisalabad; the requirement of water has still increased beyond the supply capacity in 2021. Similarly, the existing sewerage system was laid many decades back. During this period, there has been immense population growth resulting in an increase in sewage flow, making the system deficient for the present population as well as increase in flooding in monsoon due to poor drainage system. Further, the laid system has outlived its operational life and there are frequent maintenance problems in the sewerage and drainage system.

Currently, WASA Faisalabad is facing financial crunch due to its frozen tariff since 2005 and a huge increase in rates of electricity, POL etc. during this

period. In this regard a summary for bailout package was forwarded to Chief Minister Punjab with request for assistance from Government of the Punjab.

Under such situation, Chief Minister of Punjab approved a development package for Faisalabad on his visit to the city on 25/08/2020 for extension/rehabilitation of water supply, sewerage and drainage system. Consequently, different schemes have been proposed by WASA-F for improvement of the existing system in different areas of the city including urban flood mitigation and provision of machinery for the disposal stations to overcome the existing sewerage/drainage issues of the city.

WASA, Faisalabad intends to hire services of suitable consulting firm on Quality and Cost Based Selection Method for preparation of Engineering design, design vetting, proposing innovative methodology for execution of work for least public inconvenience, suggestions for use of improved construction materials/construction techniques and resident supervision, etc. *(weightage of quality and cost will be eighty percent & twenty percent respectively).*

2. OBJECTIVES.

The objectives of the consultancy are:

- ❖ Improvement in existing water supply, sewerage and drainage network to cover supply-demand gap of clean water, to avoid unhygienic environmental problems in the city and to cater inundation in low lying areas.
- ❖ Provision of O&M machinery for improvement in the services.

3. SCOPE OF WORK/DUTIES AND RESPONSIBILITIES OF THE CONSULTANT.

The scope of work covering the required services to be rendered by the consultant shall include, but not limited to the following: -

- 1) The survey work shall comprise necessary surveying, leveling and establishing benchmarks with respect to Geodetic Traversing Survey (GTS) bench mark, drawing cross-sections where required, and other related works required for preparation of design and construction of the water supply, sewerage and drainage system of the city.
- 2) Preparation of Topographic maps and Hydrogeological study of WASA service area and submit a detailed report.
- 3) Soil investigations required for the construction of the water supply, sewerage system and drains with all related laboratory testing.
- 4) Examine existing system/data, reconcile with Master Plan (2018) and discuss each component of projects with the client to recommend

remedies, alterations, omissions and corrections with supporting documents before or during implementation/execution.

- 5) Study existing sewerage system of WASA and propose replacements where needed.
- 6) Prepare Engineering Design, vet the available design and submit GIS based maps for rehabilitation/new construction of sewer, water supply lines and drains (where required as per nature of job).
- 7) Prepare cost estimates (where required) of the project & bidding documents of contractors.
- 8) Responsible for design, cost estimation, construction and all related works of the buildings including in the project.
- 9) Prepare EIA/IEE report and arrange its approval from concerned Department.
- 10) Develop android/web based IT application for all official correspondence relating to estimates, procurement, supervision, billing to contractors etc. The consultant will hand over this application (including server) to WASA after completion of the project.
- 11) Prepare the detailed schedule for entire implementation program and construction schedule of works to be communicated to the bidders. He shall also define main constraints to be taken into consideration by the Contractor during the works (traffic management issues, continuity of supply, etc.).
- 12) Assist WASA in Land related matters, such as its acquisition and resettlement of communities where it cannot be avoided.
- 13) Responsible for Resident Supervision of all works through qualified graduate engineers and other supervisory staff having sufficient experience in the relevant field. The consultant's team shall perform its duties with due diligence and efficiency in accordance with the best Engineering practices, standards and through technical/ professional approach.
- 14) Supervise contractor's job and all work-related matters and shall ensure that measures taken by the contractor for safety of public, properties and staff working at site are adequate and in accordance to international standards/practices. If found any deficiency, the consultant shall advise to the contractor for remedial measures informing concerned officer of WASA.
- 15) Certify that the executed works are as per approved design, drawings, standard specifications, technically sanctioned estimates and within

provision of contract agreement.

- 16) Examine the work schedule prepared by the contractor; recommend any change/ modification, if required. Consultant shall also certify that the work executed at site is strictly according to the work schedule approved by the client. The consultant shall submit monthly inspection and progress reports to the concerned Engineer in charge. In case if the contractor lags behind the schedule, the consultant will point out and propose remedial measures to meet the target.
- 17) Certify that construction material brought by the contractor at site to be used in execution of work is strictly in accordance with standards & specifications laid down in the contract and laboratory test reports meet the standards.
- 18) Ensure regulatory compliance with occupational health and safety laws and regulation at site by preparing HSE Plan for both construction and O&M phase.
- 19) Visit the factories where material including pipes, machinery, tools, plants etc. is being manufactured and arrange testing of all materials before procurement and ensure that they are meeting the standard specifications.
- 20) Supervise all field/laboratory tests of materials and works as per methods described in the specifications and will submit a copy of all field/laboratory test reports to the concerned officer of WASA. The field equipment required will be provided by the contractor whereas the consultant will arrange technician/supervisory staff to supervise the tests. For laboratory tests, sampling will be carried out by the consultant and laboratory fee will be paid by the contractor.
- 21) Certify under his seal, the contractor's bills/payments, clearly indicating that the quality of work executed at site is in accordance to the specifications, design, drawings, technically sanctioned estimate and contract agreement within due time of submission of bill to the consultant. The consultant shall also certify the quantity of work executed at site and make recommendations regarding payment to the contractor along with Test Reports.
- 22) Evaluate Operation & Maintenance plan of schemes submitted by the contractor.
- 23) Keep record of daily inspection & tests reports and will hand over the same to the client on monthly basis.
- 24) Assist the client for interpretation of Contract Documents particularly

with respect to disputes with the contractor or other affected parties. Moreover, he shall evaluate and make recommendations to the client for actions to be taken against contractor's claims, disputes and time extensions.

- 25) Take and submit photographs during execution of work.
- 26) Scrutinize all specification of equipment/machinery and their procurement process.
- 27) Prepare and submit as built drawings of schemes to WASA. Design an electronic database for supervision of facilities (through SCADA) with consultation of client.
- 28) Work out the number of connections and estimated revenue to be generated as a result of this project.
- 29) Carry out detailed final inspection of the work along with Client's staff.
- 30) Recommend to the Engineer in charge for issuance of completion certificate stating that the work has been completed as per specifications, drawings, estimates and contract agreement.
- 31) Submit monthly and quarterly reports as required by the client/Engineer in-charge
- 32) Submit completion report and PC-IV of the Projects after completion of work.

4. ADDITIONAL REQUIREMENTS FROM CONSULTANT.

- i) **Delayed Submission:** - If project cost increases due to delays in supply of design, drawings by the consultant, the consultant shall be responsible for that and a penalty equal to 5% of contract value will be imposed @ 0.36% for each day delay up to max two weeks. Client shall have right to terminate the contract in case of delays more than two weeks.
- ii) **Repeated Design:**-In case there is any repetition in the design of some components of the work which has already been designed for any of the project of the client carried out by consultant, no payment will be made for that component of design work.
- iii) **Design/Drawings:** - The consultant will provide soft and hard copies of design and drawings to WASA, where required. Department has the right to get the design vetted from a third party and in case there is a variation of $\pm 5\%$, the consultant will be penalized by the same %age from the fee besides making required changes in design & drawings.

iv) **Best Effort:** - The consultant shall furnish a certificate to the effect that design carried out by him is most efficient and economical.

v) **Consultant's work is expected to result in:**

- Good quality of construction in accordance with stipulated specifications.
- Timely completion of work.

5. **TIME DURATION**

Time duration of the consultancy is 36 months (06 months for design and 30 months for resident supervision).

6. **MAN-MONTHS OF THE STAFF**

MAN MONTHS OF THE STAFF		
a) Design Phase		
Key Staff	No.	Man-Months
Team Leader	1	Estimated staff ratio/man-months for Key & Non-Key staff for Design Phase are 25 & 15 respectively.
Dy. Team Leader	1	
Sewerage Expert	1	
Water Supply Expert	1	
Drainage Expert	1	
Senior Electro-Mechanical Engineer	1	
Procurement Specialist	1	
Non-Key Staff		
Design Engineer (Structure)	1	
EIA Expert	1	
Survey Expert	1	
IT Expert	1	
Auto CAD Operator	1	
b) Supervision Part		
Key Staff	No.	Individual Man-Months
Team Leader	1	10
Deputy Team Leader/Resident Engineer	1	30
Procurement Specialist	1	3
Non-Key Staff	No.	Individual Man-Months
Assistant Resident Engineer (Civil)	2	30
Assistant Resident Engineer (Electrical/Mechanical/Mechatronics)	1	19
Site Inspectors	3	30
Material Inspector	1	30
Quantity Surveyor	1	15

- Design component will be paid on lump sum based on cost of project. Supervision phase will be paid on man-months and deliverable basis and it will be finalized during contract negotiation.

- Additional staff will be arranged by the consultant at his own expense.
- No expert/staff should be more than 60 years old.
- The staff/team given in the technical proposal for construction supervision shall not be changed after the award of work without prior approval of DMD (Engg.), WASA.
- Team Leader, Deputy Team Leader and Procurement Specialist will be same for design and supervision period.

7. **QUALIFICATION & EXPERIENCE REQUIREMENT OF TEAM**

a) Design Phase			
Specialists	Qualification	Experience	Area of work
KEY STAFF			
Team Leader	B.Sc. (Civil/Environmental Engineering) or equivalent degree	20 Years	To Co-ordinate and monitor the project and liaison with WASA. Must have experience of conducting preferably 5 projects of similar nature.
Dy. Team Leader	B.Sc.(Civil/Environmental Engineering) or equivalent degree	12 Years	To conduct site surveys, prepare design and cost estimate, billing, site issue etc. Having experience of completing preferably 2 similar design and 3 similar supervision assignments
Sewerage Expert	B.Sc. Civil/Environmental Engineering or equivalent degree	5 Years	Having experience of completing preferably 3 similar assignments.
Senior Electro-Mechanical Engineer	B.Sc. Mechanical/ Mechatronics/Electrical Engineering or equivalent Degree	5 Years	Having experience of completing preferably 3 similar assignments.
Procurement Specialist	B.Sc.(Business/Finance/or equivalent) or background of B.Sc. (Engineering) preferably	8 Years	Having experience of completing preferably 5 similar assignments.
Water Supply Expert	B.Sc. in Civil Engineering or equivalent degree	5 Years	Having experience of completing preferably 3 similar assignments.
Drainage Expert	B.Sc. in Civil/Environmental/ Water Resources Engineering or equivalent degree	5 Years	Having experience of completing preferably 3 similar assignments.
NON-KEY STAFF			
Design Engineer (Structure)	MSc.(Structural Engg.)	5 Years	Having experience of completing preferably 3 similar assignments.
EIA Expert	MSc. Environmental Science / B.Sc. Environmental Engineering	10 years	Having experience of completing preferably 5 similar assignments
Survey Expert	B.Sc. GIS/Social Sciences/ Survey diploma or	5 Years	Having experience of completing preferably 3 similar assignments.

	equivalent		
IT Expert	BSc(CS)/MS (IT) or Equivalent	5 Years	Having experience of completing preferably 3 similar assignments.
AutoCAD Operator	DAE (Civil)/Intermediate with AutoCAD diploma or equivalent	5 Years	Having experience of completing similar assignments.
b) Supervision Part			
Specialists	Qualification	Experience	Area of work
KEY STAFF			
Team Leader	B.Sc. (Civil/Environmental Engineering) or equivalent degree	20 Years	To Co-ordinate and monitor the project and liaison with WASA. Must have experience of conducting preferably 5 projects of similar nature
Deputy Team Leader/Resident Engineer	B.Sc. Civil/Environmental Engineering or equivalent degree	12 Years	To conduct site surveys, prepare design and cost estimate, billing, site issue etc. Having experience of completing preferably 2 similar design and 3 similar supervision assignments
Procurement specialist	B.Sc. (Business/Finance or equivalent) or background of B.Sc. (Engineering) preferably	8 Years	Having experience of completing preferably 5 similar assignments.

NON-KEY STAFF			
Assistant Resident Engineer(Civil)	B.Sc. Civil Engineering	5 Years	Having experience of completing similar assignments.
Assistant Resident Engineer (Electrical /Mechanical/Mechatronics)	B.Sc. Mechanical/Electrical/ Mechatronics Engineering	5 Years	Having experience of completing similar assignments.
Site Inspectors	DAE (Civil) or equivalent	5 Years	Having experience of completing similar assignments.
Material Inspector	DAE (Civil) or equivalent	5 Years	Having experience of completing similar assignments.
Quantity Surveyor	DAE (Civil) or equivalent	5 Years	Having experience of completing similar assignments.
Auto CAD Operator	DAE (Civil)/Intermediate With AutoCAD diploma or equivalent	5 Years	Having experience of completing similar assignments.

8. DELIVERABLES/ REPORTING WITH TIMELINES

Sr. No.	Report / Document	Period	No. of Copies
1.	Site Survey Report and Geotechnical Investigations Report	15 days	10
2	Submission of preliminary design report (where required as per nature of job)	15 days	10
3.	Submission of detailed Engineering Design, vetting of available design, specifications, drawings, cost estimation and GIS maps (where required as per nature of job)	2 months	10
4.	Review of design/cost/other related works as per amendments required at supervision stage.	Within 07 days	05
5	Submission of EIA/IEE report of all projects	03 months	05
6	Submission of bidding documents of the contractors, QA&QC manuals and HSE plan (where required as Per nature of job)	15 days	10
7	NOC from EPD , Lahore	03 months(from submission of draft EIA/IEE report)	05

Resident Supervision of Work(30-Months)			
6.	Progress Report including presentation on multimedia	Monthly	10
7.	Progress Report including presentation on multimedia	Quarterly	10
8.	As-built drawings hard and softcopy with co-ordinates.	On completion of project.	15
9.	Completion Report/PC-IV supported by requisite surveys and reports	On completion of work	10
	Total	36-Months	-

8. **WORKING LANGUAGE**

The working language of the assignments, all reports and works prepared by the consultants will be in “English or Urdu as required”.

9. **ROLE OF CLIENT AGENCY**

The client shall:

- Provide all necessary documents prepared by the Client or other consulting engineers appointed by the Client at no cost as needed to enable the consultants to perform their specified scope of work.
- Approve project plans, request changes, raise issues and risks, release payments, and accept (or decline) the deliverables of the project

10. **PROFESSIONAL LIABILITY OF THE CONSULTANT**

The consultant shall comply with the PPRA Rule-54 which states:

- (1) The consultant selected and awarded a contract shall be liable for consequence of errors or omissions on the part of the consultant.
- (2) The extent of liability of the consultant shall form part of the contract and such liability shall not be less than remunerations nor it shall be more than twice the remunerations.
- (3) The procuring agency may demand insurance on part of the consultant to cover the liability of the consultant and necessary costs shall be borne by the consultant.
- (4) The consultant shall be held liable for all losses or damages suffered by the procuring agency on account of any misconduct by the consultant in performing the consulting services.

11. **MISCELLANEOUS**

- i) The presentations, as and when required during the whole period of the assignment will be made by the consultant on multimedia to the satisfaction of WASA and Govt. of Punjab.
- ii) One month prior to the expiry of the Maintenance Period of the work, the consultant shall carry out a Detailed Final Inspection of the work and submit a report to the Client pointing out the defects, if any, in the work.
- iii) Order, if required, to uncover the completed work for removal of the defective work and substitution with proper work.
- iv) Coordinate between contractors of different groups for levels, grades and alignment etc. of different infrastructure and services.
- v) The Client can increase or decrease the quantum of work without assigning any reason.
- vi) The consultant will adjust & depute staff as per pace of work during execution.

Annexure VIII
(List of EIA Team)

Table 0-1: List of EIA Team

Sr. No.	Name	Position
1.	Sheikh Amjad Ghafoor	Chief Engineer, Environment
2.	Muhammad Talha Ikram	Environmental Engineer
3.	Ahsan Rasheed	Junior Environmentalist
4.	Asad Naveed	Junior Environmentalist
5.	Hamza Shahid	Junior Water Treatment Engineer
6.	Jawad Mubeen	Site/Survey Environmental Inspector

Annexure IX

(Glossary)

Glossary

Air pollutant: air pollutant means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electromagnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances.

Archeological: the scientific study of humans, past and present. To understand the full sweep and complexity of cultures across all of human history, anthropology draws and builds upon knowledge from the social and biological sciences as well as the humanities and physical sciences.

Adverse Environmental Impacts: means impairment of, or damage to, the environment and includes:

- impairment of, or damage to, human health and safety or to biodiversity or property
- Pollution.
- Any adverse environmental effect as may be specified in the regulation.

Biodiversity: means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; including diversity within species, between species and of eco-systems.

Biological Environment: the natural biological factors (such as wild animals and plants or bacteria) that affect human life (as in a particular place or period).

Contaminate: to make impure, pollute.

Environment: means

- Air, water and land;
- All layers of the atmosphere;
- All organic and inorganic matter and living organisms;
- The ecosystem and ecological relationships;
- Buildings, structures, roads, facilities and works; Pakistan Environmental Protection Act, 1997
- All social and economic conditions affecting community life; and
- The inter-relationships between any of the factors specified in sub-clauses (a) to (f),¹

Flora: the word “Flora” is used to describe the plant species of a specific area.

Fauna: the word “Fauna” is used to describe the animal species of a specific area.

Geology: the science which deals with the physical structure and substance of the earth, their history, and the processes which act on them.

Impact: have a strong effect on someone or something.

IEE (Initial Environmental Examination): means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed

¹ PEPA, Pakistan Environmental Protection act, 1997

project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment.

Livestock: the term livestock includes cattle, sheep, horse's goats, and other domestic animals ordinarily raised or used on the farm.

Mitigation: the action of reducing the severity, seriousness or painfulness of something.

Mitigation Measures: include engineering works, technological improvements, management measures and other ways and means of preventing, ameliorating or compensating for adverse environmental impacts and losses suffered by individuals and communities and for enhancing benefits.

Natural Resources: materials or substances occurring in nature which can be exploited for economic gain such as: a) Soil; b) Water; c) Plant life and vegetation, including mammals, birds, reptiles, fish, insects and natural products derived from them; and, d) Any other thing, which the Minister of Tourism, Environment and Natural Resources may, by Statutory Order declare to be Natural Resources.

Noise: means the intensity, duration and character of sounds from all sources, and includes vibration.

Objectives: a thing aimed at or sought; a goal

Proponent: means the person who proposes or intends to undertake a project.

Physical: indicates connected with, pertaining to, the animal or human body as a material

Project: project means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes

- Construction or use of buildings or other works
- Construction or use of roads or other transport systems
- Construction or operation of factories or other installations
- Mineral prospecting, mining, quarrying, stone-crushing, drilling and the like
- Any change of land use or water use; and
- Alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations.

Personal protective equipment (PPE): PPEs Refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection.

Restoration plan: a strategy/ schedule to rebuild the pre-existing conditions present before any operation.

Regulations: "regulations" means regulations made under this Act.

Rules: "rules" means rules made under this Act;

Scope: The extent of the area or subject matter that something deals with or to which it is relevant

Social environment: It includes the culture that the individual was educated or lives in, and the people and institutions with whom they interact.

Seismology: The branch of science concerned with earthquakes and related phenomenon.

Surface water: the top layer of a body of water.” The surface water of a pond or lake.

Seepage: The slow escape of a liquid or gas through porous material or small holes.

Topography: is a detailed map of the surface features of land. It includes the mountains, hills, creeks, and other bumps and lumps on a particular hunk of Earth.

Visual impact is defined as a change in the appearance of the landscape as a result of development which can be positive (improvement) or negative (detraction)

Waste material: any residual material after use in any form like solid or liquid.

Water Pollutant: means any substance or energy which if it enters or is discharged into water may cause discomfort to, or endanger the health, safety and welfare of persons, or may cause injury or damage to plant or animal life or property, or which may interfere unreasonably with the normal enjoyment of life or property or use of property or conduct of business and those objects or substances as may inadvertently obstruct or divert the natural flow of a water course when discharged or dumped into it.

Wastewater: means water which has been used for domestic, or commercial purposes and as a result of such uses may cause water pollution when discharged into the aquatic environment.