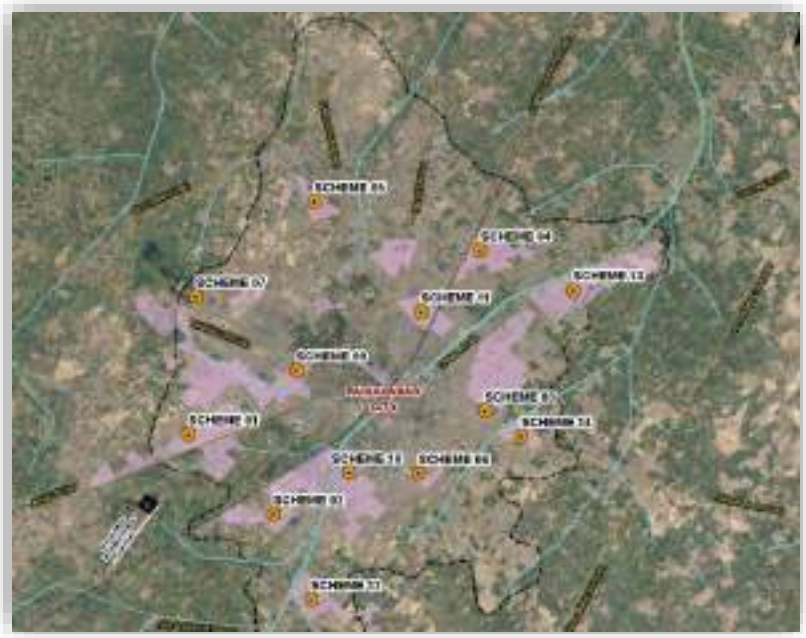
Water and Sanitation Agency Faisalabad

DESIGN AND RESIDENT SUPERVISION OF THE DEVELOPMENT SCHEMES (ADP 2024-25) TO CATER SEWERAGE ISSUES OF FAISALABAD CITY



Environmental Impact Assessment (EIA)

Draft Report

July 2025

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LIST OF ABBREVIATION

AC	Assistant Commissioner
AFD	Agence Francaise Development/ French Development Agency
AIDS	Acquired Immunodeficiency Syndrome
AoI	Area of Influence
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
BOQs	Bill of Quantities
BRBD	Bambanwala Ravi Badian Depalpur
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CC	Construction Contractor
COD	Chemical Oxygen Demand
COVID-19	Coronavirus Disease 2019
DC	Design Consultant
DG	Directorate General
ECNEC	Executive Committee of National Economic Council
EIA	Environmental Impact Assessment
EPA	Environment Protection Agency
EP&CCD	Environment Protection and Climate Change Department
ESMMP	Environmental and Social Management and Monitoring Plan
FDA	Faisalabad Development Authority
FESCO	Faisalabad Electric Supply Company
FWMC	Faisalabad Waste Management Company
GBV	Gender-Based Violence
GDP	Gross Domestic Production
GPD	Gallon Per Day
HDPE	High Density Polyethylene
HIV	Human Immunodeficiency Virus
HSE	Health, Safety and Environment
IEE	Initial Environment Examination
IUCN	International Union for Conservation of Nature
LCC	Lower Chenab Canal
MDGs	Millennium Development Goals
MGD	Million Gallons per Day
ND	Not Detected
NESPAK	National Engineering Services Pakistan Pvt. Limited
NGO	Non-Governmental Organization
NOC	No Objection Certificate
NTU	Nephelometric Turbidity Unit
O&M	Operational and Maintenance
OHS	Occupational Health & Safety

P&D	Planning and Development
PDWP	Provincial Development Working Party
PEQS	Punjab Environmental Quality Standards
PGA	Peak Ground Acceleration
PID	Punjab Irrigation Department
PKR	Pakistani Rupee
PPE	Personal Protective Equipment
PTCL	Pakistan Telecommunication Company Limited
SBC	Seismic Building Code
SC	Supervision Consultant
SDO	Sub Divisional Officer
SMP	Safety Management Plan
SNGPL	Sui Northern Gas Pipeline Limited
SOPs	Standard Operating Procedures
SPM	Suspended Particulate Matter
SPSS	Statistical Package for Social Sciences
SRP	Site Rehabilitation Plan
STDS	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
SWM	Solid Waste Management
TCU	True Color Unit
TDS	Total Dissolved Solids
UCC	Upper Chenab Canal
UGWT	Underground Water Tank
UHI	Urban Heat Island
UNESCO	United Nations Education Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNO	United Nation Organization
WASA-F	Water And Sanitation Agency Faisalabad

Executive Summary

1. Introduction

Faisalabad, also known as “Manchester of Pakistan”, is one of Punjab’s major industrial cities and has a significant contribution to the textile sector. The city has evolved as a key industrial and distribution hub more than 20% contribution to Pakistan’s annual Gross Domestic Product (GDP). The population explosion, driven by rapid industrialization, urban sprawl, and agricultural expansion, has placed immense pressure on existing municipal services, and the city’s sewerage system is not an exception. The old sewerage infrastructure is unable to cope with the increased load, leaving several areas underserved and contributing to environmental degradation and public health hazards.

To address the issue, the Government of Punjab (GoP) has launched “Chief Minister (CM) Development Package to Combat Sewerage Issues of Faisalabad City,” comprising 14 schemes focused on system rehabilitation and modernization. This project includes the replacement of outdated trunk sewers, the introduction of new sewerage systems in unserved areas, upgrading pumping stations, and the installation of forcemain to ensure the smooth collection and disposal of wastewater.

The Water and Sanitation Agency Faisalabad (WASA-F), under the Faisalabad Development Authority (FDA), has engaged National Engineering Services Pakistan (NESPAK) to provide consultancy services for the assignment.

The current Environmental Impact Assessment report is prepared to list all the associated environmental and social impacts of the proposed interventions and provides adequate mitigation measures to curtail those impacts. The document is intended to obtain environmental clearance from the Environmental Protection and Climate Change Department (EP&CCD) in compliance with the ‘Punjab Environmental Protection Act, 2012’ and is prepared in the light of ‘Review of Initial Environmental Examinations / Environmental Impact Assessment Regulation 2022’.

2. Policy, Legal, and Administrative Framework

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

The Key National Strategies/Policies, Legislation/Acts, Laws and Regulations for this project are:

- Fatal Accidents Act 1855
- Protection of Trees, and Brushwood Act, 1949
- Pakistan Labor Laws 2004
- National Environment Policy, 2005
- Seismic Building Code of Pakistan, 2007
- Canal and Drainage Act 1873 and Amendment Act, 2016
- National Climate Change Policy, 2021
- Pakistan Penal Code 1860
- National Sanitation Policy, 2006

Key Provincial Strategies/Policies, Legislation / Acts, Laws, and Regulation for this project are:

- Punjab Plantation & Maintenance of Trees Act, 1974
- The Punjab Wildlife (Protection, Reservation, Conservation & Management) Act, 1974
- Punjab Environment Protection Act 1997 (Amended 2012)
- The Motor Vehicles Rules, 2000
- Punjab Forest Act (Amended), 2010
- Punjab Drinking Water Policy 2011
- Punjab Environmental Tribunal Rules, 2012
- Punjab Antiquities Amendments Act, 2012
- Punjab Restriction on Employment of Children Act, 2016
- Punjab Environmental Quality Standards (PEQS), 2016
- Punjab Policy on Controlling Smog, 2017
- Punjab Labor Policy, 2018
- Punjab Occupational Safety and Health Act, 2025 (Draft)
- Punjab Water Act 2019
- The Punjab Irrigation, Drainage and Rivers Act 2023
- Punjab Local Government Act 2022
- Punjab Urban Water and Sanitation Policy (Draft)

Furthermore, Pakistan is a member of several international organizations such as the United Nations Organization (UNO), Organization of the Islamic Conference (OIC), South Asian Association for Regional Cooperation (SAARC), Economic Cooperation Organization (ECO), etc. so it has to follow the international protocol and obligations related to the environment.

3. Project Description

The existing sewerage system in most areas is inadequate and fails to serve the entire population. Many pipelines are old or damaged, and disposal points are inadequate, leading to sewage being

dumped into open areas or stormwater drains. Open drains are misused for garbage disposal, reducing their capacity and causing overflow during rains, which inundates streets and spreads diseases.

This package includes a total of fourteen (14) schemes aimed at modernizing and improving the city's sewerage infrastructure. The description of schemes under the project is given below in the **Table ES 1**.

Table ES 1: Description of Schemes

Sr. No	Description
1	Providing and Laying Trunk Sewer from Model Bazar Jhang Road to Dijkot Drain Disposal & Improvement of Sewerage System in Saifabad, Faisalabad
2	Upgradation and Rehabilitation of Pumping Station No. 34 and Installation of 36" HDPE Forcemain in Samanabad, Faisalabad
3	Providing and laying of HDPE Forcemain from Dawood Chowk Disposal Station to Fish Farm Satayana Road, Faisalabad
4	Providing and Laying Forcemain and Development of the Sewerage System in adjacent areas of Gatti, Aslam Park, Farooq Town, Adnan Town, Bagewala Road, Azhar Town, Sufyan Town and Adjoining Areas
5	Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Millat Town, Civil Lines, Ghulam Muhammad Abad, Gulberg, Usman Town and Adjoining Areas (Western Side)
6	Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Madina Town, Shamsabad, Samnabad, Masoodabad, Nawaban Wala, Sakhi Sarwar Abad and Adjoining Areas (Eastern Side)
7	Providing and Laying Trunk Sewer from Jawad Club Chowk to Chokera Disposal Station, Faisalabad
8	Procurement of Machinery for Improvement in Drainage System of Faisalabad City
9	Improvement of Sewerage System of Shadab Colony, Muhammad Pura, Badar Colony, Darulihsan Town, Talianwala and adjacent areas of Jhang Road and Narwala Road
10	Upgradation of Drainage System in Faisalabad
11	Improvement of lift stations to reduce un-necessary pumping & reduction of electricity consumption
12	Development of Sewerage Network in Chak No. 235 R.B Niamuana and adjoining Areas Faisalabad
13	Providing and laying of RCC Trunk Sewer Line & Branch Lines for Chak No. 119 R.B Fakharabad and adjoining areas Faisalabad
14	Development of Sewerage Network in Naithari and adjoining areas Faisalabad

The project is scheduled to be completed in 18 months with a cost of **PKR 10,810 million.** The cost is tentative and may vary subject to the finalization of the design. The total manpower required for the construction of the entire project is 210 persons including skilled, semi-skilled, and unskilled staff.

4. Baseline Profile

The baseline covers the physical, biological as well as socioeconomic features of the project area.

A. Physical Environment

The project area is spread across various locations within Faisalabad, with a particular focus on the eastern and western areas of the city. The topography is predominantly flat, characterized by urban areas, peri-urban settlements, agricultural fields, industrial areas, and commercial centers. The terrain is generally even, with slight variations in elevation. Irrigation canals, minors, and watercourses traverse through the project area.

Faisalabad is located between the alluvial plains of Chenab and Ravi rivers, primarily composed of sedimentary deposits. The area's geology is dominated by layers of river-borne sediments, including clay, silt, and sand, deposited by the nearby rivers. Beneath these sediments lie layers of limestone and shale formations, remnants of ancient marine environments. The region is relatively stable tectonically, with no significant seismic activity recorded.

The project area has a moderate climate. It has hot summer and cold winters. The summer starts from May and lasts till September. June is the hottest month. The summer starts from May and lasts till September. June is the hottest month. The mean maximum and minimum temperature are 40 ºC and 28 ºC respectively for month of June. The winter seasons lasts from December to February. January is the coldest month. The mean maximum and mean minimum temperature are 19 ºC and 7 ºC in January. Maximum precipitation days are observed during June to August ranging between 2-5 mm. Wind speeds between 12-19 km/h dominate throughout the year.

Faisalabad region is surrounded by the two main rivers of Punjab; Chenab River towards the north which is a branch of the larger Indus River system and Ravi River towards the south. The entire district lies in the Rachna Doab (the area between Ravi River and Chenab).

Wastewater of Faisalabad is discharged through two major drains i.e., Paharang drain, Madhuana drain and other domestic drains into Chenab River and Ravi River. More than 70 percent of industrial wastewater discharges through Madhuana drain that ends up in River Ravi. Madhuana drain joins Samundri drain and converts into Main Samundri drain. It carries effluents from industrial and residential areas of Samundri and Faisalabad city and discharges into Ravi River at Mamoon Kanjan, within Faisalabad district.[1]

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

[1] https://urbanunit.gov.pk/Download/publications/Files/17/2023/Faisalabad%20Regional%20Development%20Plan%20-%20Enviroment%20Sector_compressed.pdf

B. Biological Environment

The project site is rich in biodiversity because of its diverse landscape and geographical location. The variety of ecosystems is evident as this area is home to various species.

The major floral species of the project area include Chinaberry (Dharek), Arabic Tree (Kikar), Gum trees/Eucalyptus (Sufaida), Black plum, Indian Rosewood (Shisham), Sirris, Indian lilac (Neem), Cottonwood, Mulberry, Indian plum, Willow, Frash, Silk cotton (Simal), and Palm trees.

Natural shrubs and herbs found in the project area include Karir and Aak. Major crops that are cultivated in the project area are cotton, sugarcane, wheat, maize, citrus fruits, and rice. Additionally, Faisalabad is also known for its production of vegetables, particularly potatoes and onions. Common animals found in the project area are dogs, cats, house rats etc., and domestic livestock.

C. Social Environment

The current socioeconomic baseline profile covers various aspects, including demographics, socioeconomic factors, educational status, health conditions, and availability of amenities, etc. The socioeconomic baseline profile was developed using both primary and secondary data.

Primary data was collected during 14th May through 21st May 2025, by a dedicated team of environmentalists and sociologists who utilized a structured socio-economic survey tool to gather the requisite information about the social settings of the project area. A sample size of 150 respondents was adopted by using a simple random sampling technique. The collected data was analyzed using software named Statistical Package for Social Sciences (SPSS), a statistical information handling tool, to analyze various socioeconomic features.

The findings of the socioeconomic survey indicate that the residents of the project area are mostly low to average communities and have attained low levels of education from local educational institutes. The people mostly refer to the health facilities present in the city center. The absence of an adequate sanitation system is a major concern, as sewer lines are frequently clogged, leading to sewage stagnation in the streets. This makes it extremely difficult for residents to access schools, markets, and places of worship. Furthermore, the unavailability of safe and clean drinking water severely affects the health and overall quality of life of the community.

People have major concerns about the sewerage system in this area due to its poor condition and lack of proper maintenance. In locations where open ponding exists, residents are often forced to manage the situation on their own. They hire local cleaners at their own expense to remove garbage and clear blockages from open drain lines. In areas where sewer lines are present but under capacity, frequent sewage overflow onto roads creates serious issues. Residents usually call sanitation workers (Jamadars) to clean manholes, yet the problem often persists. Stagnant sewage

remains in the streets, posing health hazards and worsening living conditions. The situation leads to foul odors and unhygienic surroundings. Streets become flooded, particularly after rainfall, making daily movement extremely difficult. People struggle to reach schools, markets, and religious sites. This lack of an effective drainage system continues to impact their quality of life. Urgent attention and proper infrastructure upgrades are needed to resolve this crisis.

5. Public Consultation

Public consultation is mandatory as part of the EIA process for development projects. Public consultation and information disclosure adequacy is one of the basic criteria used to determine the project's compliance with the national/international safeguard policies.

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Individual/community stakeholders and institutional stakeholders were identified during the field survey: The project stakeholders include residents of the project area, local business owners, shopkeepers, Pakistan Telecommunication Company Limited (PTCL), Environmental Protection and Climate Change Department (EP&CCD), Faisalabad Electric Supply Company (FESCO), and Punjab Irrigation Department etc.

The concerns and suggestions of the community recorded during the informal consultation meetings are summarized hereunder:

- The construction of the proposed project should be completed within the stipulated time;
- Arrangements should be made to suppress dust, curtail high-noise activities, and control the vibrations caused due to machinery, to protect the community's health;
- Residents of the local community should be given priority for jobs both in the construction and operation phases;
- Tree cutting should be avoided as far as possible;
- Any damage to the existing utilities should be repaired immediately;
- The accessibility issues will arise during the construction phase; therefore, alternative access routes should be provided;
- A traffic management plan should be devised and communicated to the local community to avoid traffic congestion issues;
- The construction waste as well as the domestic waste should be frequently collected and disposed of to the designated dumping sites;
- The restriction in access due to excavation works will cause temporary economic losses to the local business persons.

6. Anticipated Environmental Impacts and Mitigation Measures

The impacts of the project activities are considered concerning the area of influence which is the project boundary in the current case owing to the limited impacts of the project.

The construction activities would cause changes in topography (by physical activities including digging and excavation areas, storing or dumping sites for excessive material, storing areas and movement of heavy construction machinery), soil contamination, construction camps issues, surface & groundwater pollution, air pollution, noise pollution, solid waste generation, disturbance to flora and fauna, overburdening of resources, health & safety issues, traffic disruption, accessibility issues, and social issues.

Anticipated impacts during the operational stage will include air pollution due to the operation of a diesel generator for pumping, waste from Manholes and community health hazards.

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

7. Environmental & Social Management & Monitoring Plan (ESMMP)

The proponent WASA-F will be responsible for compliance with the environmental and social safeguard requirements of the proposed project. The whole Environmental and Social Management and Monitoring Plan (ESMMP) will be included as a clause in the contract documents.

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

Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at three levels. At the WASA-F level, the WASA-F representative will do ESMMP monitoring to ensure that the mitigation plans are being effectively implemented. The Environmental Engineer (EE) of the Supervision Consultant will regularly monitor the ESMMP implementation by the contractor. At the contractor's level, the environmental monitoring checklist will be filled on regular basis by their environmental manager and countersigned by the EE of the Supervision Consultant. Implementation of environmental mitigation measures during construction is a key to avoiding and reducing short- and long-term potential environmental impacts. Environmental cost has also been given in the EMMP.

Environmental Budget

The total estimated cost for the implementation of ESMMP is worked out as **7,050,750/- PKR.**

1 INTRODUCTION

1.1 Project Background

Faisalabad, a major city in the Punjab province. It is located about 120 km from Lahore (the Provincial Capital of Punjab), and covers a total area of 5856 km^2. It has grown to become a major industrial and distribution centre because of its central location in the region. It is also known as the Manchester of Pakistan as it reproduces cotton products and contributes of over 20% to Pakistan's annual GDP. Like many metropolitan cities in Pakistan, Faisalabad is also facing a rapid growing population due to an increase in industrialization, urbanization and agricultural development in the last decade.

The sewerage system in Faisalabad has faced significant challenges due to rapid population growth, industrial development, and urbanization, emerging as a serious environmental issue. The system is outdated and overloaded, with many areas still lacking proper sewerage infrastructure. In unserved localities, wastewater is commonly discharged into open drains or wells. Additionally, the existing infrastructure is incapable of handling the increased sewage load resulting from urban expansion. Consequently, the current sewerage network fails to mitigate environmental pollution and poses serious health risks to the public.

In view of above, the Government of Punjab has launched a comprehensive development package for the provision/rehabilitation/improvement of the sewerage system in different areas namely “Chief Minister (CM) Development Package to Combat Sewerage Issues of Faisalabad City” to safeguard damage to infrastructure and other environmental and public health conditions of the communities. The aim is to improve the sewerage system in different parts of Faisalabad through new construction, rehabilitation of old systems, and connecting unserved areas to the main sewerage network. This package includes a total of fourteen (14) schemes aimed at modernizing and improving the city's sewerage infrastructure.

The Water and Sanitation Agency Faisalabad (WASA-F) is the main organization responsible for water supply, sewerage, and drainage in the city. It works under the Faisalabad Development Authority (FDA) and was established in 1978 under the Development of Cities Act, 1976. WASA-F job is to plan, operate, and maintain the systems that supply water and remove wastewater. WASA-F currently manages an area of about 225 square kilometers. This includes 113 union councils across four towns. The agency provides services to over 260,000 registered consumers. It is estimated that WASA-F provides about 72% of the city with sewerage services and about 60% with water services.

WASA-F has engaged NESPAK for the design and supervision of the sewerage schemes under the project “CM Development Package to Combat Sewerage Issues of Faisalabad City." The current Environmental Impact Assessment report is prepared to list all the associated environmental and social impacts of the proposed interventions and provides adequate mitigation measures to curtail those impacts. The document is intended to obtain environmental clearance from the Environmental Protection and Climate Change Department (EP&CCD) in compliance with the ‘Punjab Environmental Protection Act, 2012’ and is

prepared in the light of 'Review of Initial Environmental Examinations / Environmental Impact Assessment Regulation 2022'.

1.2 Need for EIA Study of the Proposed Project

Environmental clearance from the Environmental Protection and Climate Change Department (EP&CCD), Punjab is mandatory according to the Punjab Environmental Protection Act, 2012. Section 12 (1) of the 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."*

1.3 Category of the Project

According to the EP&CCD, Review of IEE/EIA Regulations 2022, the proposed project falls under the following category**.**

Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations 2022	
Category F	Sewerage System Scheme

1.4 Schemes under the Project

A detailed description of the project is given in **Section 3** of the current report. However, a list of the proposed project schemes is given hereunder:

Sr. No	Description
1	Providing and Laying Trunk Sewer from Model Bazar Jhang Road to Dijkot Drain Disposal & Improvement of Sewerage System in Saifabad, Faisalabad
2	Upgradation and Rehabilitation of Pumping Station No. 34 and Installation of 36" HDPE Forcemain in Samanabad, Faisalabad
3	Providing and laying of HDPE Forcemain from Dawood Chowk Disposal Station to Fish Farm Satayana Road, Faisalabad
4	Providing and Laying Forcemain and Development of the Sewerage System in adjacent areas of Gatti, Aslam Park, Farooq Town, Adnan Town, Bagewala Road, Azhar Town, Sufyan Town and Adjoining Areas
5	Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Millat Town, Civil Lines, Ghulam Muhammad Abad, Gulberg, Usman Town and Adjoining Areas (Western Side)

Sr. No	Description
6	Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Madina Town, Shamsabad, Samnabad, Masoodabad, Nawaban Wala, Sakhi Sarwar Abad and Adjoining Areas (Eastern Side)
7	Providing and Laying Trunk Sewer from Jawad Club Chowk to Chokera Disposal Station, Faisalabad
8	Procurement of Machinery for Improvement in Drainage System of Faisalabad City
9	Improvement of Sewerage System of Shadab Colony, Muhammad Pura, Badar Colony, Darulihsan Town, Talianwala and adjacent areas of Jhang Road and Narwala Road
10	Upgradation of Drainage System in Faisalabad
11	Improvement of lift stations to reduce un-necessary pumping & reduction of electricity consumption
12	Development of Sewerage Network in Chak No. 235 R.B Niamuana and adjoining Areas Faisalabad
13	Providing and laying of RCC Trunk Sewer Line & Branch Lines for Chak No. 119 R.B Fakhar Abad and adjoining areas Faisalabad
14	Development of Sewerage Network in Naithari and adjoining areas Faisalabad

1.1 Purpose of EIA Report

The purpose of this EIA Report is to assess significant adverse environmental and social impacts and to suggest mitigation and remedial measures to make the project environmentally friendly and sustainable during the construction and operational stages of the project and to initiate the process of Environmental Clearance from EP&CCD, Punjab.

1.2 Scope of Study

The scope of this EIA Study aims at the collection and scrutiny of data related to the physical, biological, and socio-economic environment of the project area and to prepare the baseline environmental profile. It also aims at the identification, prediction & evaluation of the possible environmental and social impacts of the proposed project in immediate surroundings on short and long-term bases. Based on the nature and levels of those impacts, appropriate mitigation measures are proposed in this EIA Report.

1.3 The Proponent and Consultant

The proponent of the project is WASA-F, Faisalabad while the Consultant is M/s NESPAK. The contact details are given as under:

PROPONENT

- Mr. Saqib Raza
  Deputy Managing Director (Engg)
  Water and Sanitation Agency FDA Faisalabad
  Block W, Madina Town, East Canal Road, Faisalabad
  Telephone: 041-5488088
- Email: pmuewrfwasa@gmail.com

CONSULTANT

- National Engineering Services Pakistan Private Limited (NESPAK)
- EPHE Division, NESPAK House, 1-C, Block – N, Model Town Extension, Lahore
- Tel: 042-99090000

1.4 Study Team

A multidisciplinary team was formed to conduct the study. The team comprises the following professionals.

Mr. M. Ali Hamid	Principal Engineer/Environmental Expert
Mr. Syed Zeeshan Abbas	Senior Environmental Engineer
Mr. Abdul Manan	Senior Environmental Engineer
Mr. Ali Iqbal	Environmental Engineer
Mr. Anns Ali	Environmental Engineer

1.5 Study Approach & Methodology

1.5.1 Study Approach

The study is based on both primary and secondary data / information. Discussions were held with stakeholders including government officials, community representatives, and a wide range of residents. The main purpose of this approach was to obtain a fair impression of the people's perceptions of the project and its environmental impacts.

1.5.2 Methodology

The following methodology was adopted for carrying out the EIA study of the proposed Project:

a) Orientation

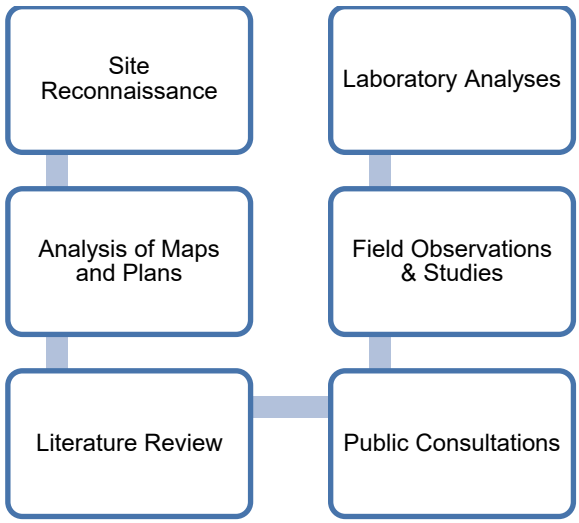
Meetings and discussions were held among the members of the EIA Consulting Team as well as with the Client. This activity was aimed at achieving a common ground of understanding of the project and various issues of the study.

b) Planning for Data Collection

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

c) Data Collection

In this step, primary and secondary data was collected through field observations, environmental monitoring in the field, concerned departments, and published materials to establish a baseline profile for physical, biological, and socio-economic conditions. These activities were as under:



Baseline	***Physical Environment:*** Information was gathered on the existing physical environment, particularly as related to geology, topography, soils, hydrology and drainage, water quality, air quality, and noise in the project area.
	Biological Environment The status of flora and fauna of the study area was determined by an ecological survey, a review of literature relevant to the study area, and an assessment of terrestrial environments.
	Socio-Cultural Environment The consultants utilized a combination of desk research, field investigations, census data, structured interviews, and reports to generate the data required for a description of the existing social environment.

d) Identification and Evaluation of Environmental Impacts

The impacts of the proposed project on the physical, biological, and socio-economic environment prevalent in the project area were assessed at the design, construction, and operational phases with the help of baseline data.

e) Mitigation Measures and Implementation Arrangements

Adequate mitigation measures and implementation mechanisms were proposed so that the proponent could incorporate them beforehand in the design phase.

1.6 Structure of the Report

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

Section 2: Policy, Legal, and Administrative Framework comprise policy guidelines, statutory obligations, and roles of institutions concerning the EIA study of the proposed Project.

Section 3: Project Description furnishes information about the location of the proposed Project, cost and size of the project, and its major components.

Section 4: Baseline Profile describes baseline conditions for physical, biological, and socio-economic conditions prevalent in the project area.

Section 5: Public Consultation identifies the main stakeholders and their concerns raised through scoping sessions and deals with the measures to mitigate the social impacts.

Section 6: Anticipated Environmental Impacts and Mitigation Measures identifies, predicts, and evaluates impacts of the project activities during the construction and operation stages and deals with the measures proposed to mitigate potential environmental impacts of the proposed project.

Section 7: Environmental & Social Management & Monitoring Plan (ESMMP) outlines institutional arrangements for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements, and monitoring cost.

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This section deals with the prevalent environmental policies and regulations as well as the legal and administrative framework required to ensure environmentally safe implementation of the project. The policies are comprehensive and ensure complete protection of environmental and social settings.

2.1 Relevant Legislation

Table 2.1, provides a summary of all national strategies, policies, acts, and legislation from an environmental perspective below:

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

Sr. No	Policy/Strategy	Brief Coverage	Relevance to Project
1.	Fatal Accidents Act 1855	This act ensures compensation is provided to the family of the person injured or deceased at the workplace due to any fatal accident.	The provision of this act would be applicable if any fatal accident occurs during the execution of the project.
2.	Protection of Trees, and Brushwood Act, 1949	This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department.	No tree cutting is involved in the said project. However, provisions of this act will ensure that no trees are cut or damaged without the approval of the concerned authority. If tree cutting is necessary, compensatory plantation will be done to offset the impact of tree cutting.
3.	Pakistan Labor Laws 2004	The labor laws are a comprehensive set of laws in Pakistan dealing with the following aspects: • Contract of Employment; • Termination of Contract; • Working Time and Rest Time; • Working hours; • Paid Leave; • Maternity Leave and Maternity Protection; • Other Leave Entitlements; • Minimum Age and Protection of Young Workers; • Equality; • Pay Issues; • Workers' Representation in the Enterprise; • Trade Union and Employers Association Regulation	The labor laws will be relevant as the labor will be hired for the execution of the Project.
4.	National Environment Policy, 2005	The objective of the Policy is to provide an overarching framework for addressing the environmental issue and provide broad guidelines to the federal and provincial governments to	Environmental protection will be given prime importance during the execution of the project under the provision of these policies.

Sr. No	Policy/Strategy	Brief Coverage	Relevance to Project
		address environmental concerns accordingly and ensure the effective management of environmental resources.	
5.	Seismic Building Code of Pakistan, 2007	This code stipulates the minimum requirements for the seismic safety of buildings and structures and the provisions of the code apply to the engineering design of buildings, like structures and related components.	The provision of this code will ensure the safety of all the structures proposed under the project.
6.	Canal and Drainage Act 1873 and Amendment Act, 2016	This Act prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs, and watercourses), or obstruction of drainage.	This act applies to the project for the efficient management of wastewater disposal during the construction or operation phase of the project
7.	National Climate Change Policy, 2021	The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in the future due to the changing climate. Given Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. The policy covers measures to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity, and other vulnerable ecosystems.	The project will take stewardship towards climate change and will ensure no contribution towards the climate by adopting the best engineering and management practices as prescribed in Section 7 of the current report.
8.	Pakistan Penal Code 1860	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.	The provisions of the Penal Code, 1860 are applicable to the project in terms of penalties for effecting human lives and public property. It also addresses the control of noise, air emissions, and effluent disposal.

Sr. No	Policy/Strategy	Brief Coverage	Relevance to Project
9.	National Sanitation Policy, 2006	The National Sanitation Policy of Pakistan, 2006, stresses on the safe disposal of excreta away from the dwellings, creation of an open defecation-free environment and, promotion of health and hygienic practices in the country.	This policy applies to the project for the efficient management of wastewater during the construction or operation phase of the project. This project primarily focused on the provision of improve sanitation services in Faisalabad.

2.2 Key Provincial Strategies/ Policies, Legislations/ Acts, Laws and Regulations

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

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

Table 2.2: Key Provincial strategies/policies, legislation / Acts, Laws, and Regulation and their relevance to the Project

Sr. No	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to Project
1.	Punjab Plantation & Maintenance of Trees Act, 1974	The Punjab Plantation and Maintenance of Trees Act, (1974) regulates tree plantations and enforces measures for their protection. The requirements of this act are applicable in terms of planting new trees and their maintenance by the occupier of the proposed Project land who would have the physical possession.	This act will be implemented if any tree-cutting activity is involved during the construction and operation phase.
2.	The Punjab Wildlife (Protection, Reservation, Conservation & Management) Act, 1974	This act provides for the protection, preservation, conservation, and management of wildlife in the Province of Punjab. This act defines the wildlife sanctuary, game reserves, protected areas, and national parks. It also defines the rules and responsibilities of the relevant authorities and the relevant personnel to protect ecological resources. It also describes the penalties and punishments for offenses against the sections given in the act.	The provisions of the Act will ensure that none of the wildlife components are affected during the execution of the project.
3.	Punjab Environment Protection Act 1997 (Amended 2022)	The Punjab Environmental Protection Act, 1997 (as Amended up to 2022) is a comprehensive legislation and provides the legislative framework for the protection, conservation, rehabilitation, and improvement of the environment. The „environment" has been defined in the Act as (a) air, water, and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities, and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses „a" to „f".	Environmental clearance will be required from the Punjab Environmental Protection Department before the commencement of construction.
4.	The Motor Vehicles Rules, 2000	Subject to the provisions of this Act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration, or level that is more than the National Environmental Quality Standards, or where applicable the	All the construction machinery will be kept in good working condition to avoid the emission of air pollutants and to keep the noise levels within prescribed limits.

Sr. No	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to Project
		standards customary under clause (g) of sub-section (I) of section 6.	
5.	Punjab Forest Act (Amended), 2010	The act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping, and topping of trees, and branches in reserved and protected forests. The proposed project is semi-urban and no protected forest is situated in and around the Project area.	No trees will be cut under the provision of this Act. If tree cutting is mandatory, prior approval will be sought from the concerned office of the Forest Department.
6.	Punjab Drinking Water Policy 2011	The overall objective of Punjab's Water Policy is to provide clear policy directions to the Government of Punjab on the sustainable management and development of water from all sources of water (surface water, groundwater, and rainwater), for all sub-sectors of water use (domestic, stock water, agriculture, industry).	The policy will ensure the provision of safe drinking water to the workers during the construction phase through a sustainable system.
7.	Punjab Environmental Tribunal Rules, 2012	The Punjab Environmental Tribunal Rules, 2012, provide a legal framework for the functioning and procedures of the Punjab Environmental Tribunal in Punjab, Pakistan. These rules outline various aspects related to the jurisdiction, powers, procedures, and functions of the tribunal in dealing with environmental matters and disputes.	The rules will ensure that the proposed project undergoes environmental impact assessments and adheres to pollution control measures, promoting sustainability and compliance with environmental regulations.
8.	Punjab Antiquities Amendments Act, 2012	This Act defines the roles and responsibilities of a supply chain in case of chance finds. It ensures the protection of antiquities and avoids their illegal trafficking.	If during excavation operations, any antiquities are found, they will be reported and preserved.
9.	Punjab Restriction on Employment of Children Act, 2016	According to sub-section 11(a) of this act, an occupier who employs or permits a child (person under the age of 15 years) to work in an establishment shall be liable to punishment with imprisonment for a term which may extend to six months, but	The Act will ensure that no children under the age of 15 are hired by the contractor.

Sr. No	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to Project
		which shall not be less than seven days, and a mandatory fine between 10,000 and 50,000 rupees.	
10.	Punjab Environmental Quality Standards (PEQS), 2016	PEQS endows information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions to regulate environmental pollution.	Good engineering practices will be adopted to ensure that all the important parameters of air, drinking water, and surface water as well as noise are kept within the prescribed limits.
11.	Punjab Policy on Controlling Smog, 2017	The Punjab Environmental Protection Department issued this policy on controlling smog in 2017. It imposed a complete ban on the open burning of rice stubble, solid waste, and other hazardous materials. It focuses on the reasons behind the formation of dense smog in the Punjab.	No waste or any other material will be burnt by the contractor during the execution of the project.
12.	Punjab Labor Policy, 2018	The Punjab Labor Policy, 2018 intends to guide and support the Government and the stakeholders in developing strategies, plans, and programs for the protection and promotion of the rights and benefits of the working community without jeopardizing the genuine concerns of the employers.	The labor policy, of 2018 will be followed during the construction phase of the project as it focuses on the protection of the working staff of the project.
13.	Punjab Occupational Safety and Health Act, 2025 (Draft)	This law was enacted to ensure the occupational safety and health of the persons at the workplace. It aims to protect workers against risks arising out of occupational hazards and to promote a safe and healthy working environment catering to the physiological and psychological needs of the employees at the workplace. Its further expands its scope to cover more workplaces, strengthening enforcement mechanisms, and promoting a proactive safety culture aligned with international best practices, aiming for comprehensive protection across all sectors.	This act will apply to the proposed project in terms of health and safety during the construction and operational phases of the project.
14.	Punjab Water Act 2019	An Act to comprehensively manage and regulate water resources in the Punjab in the interest of conservation and sustainability. It is expedient to provide for comprehensive	The project will comply with the provisions of the Punjab Water Act 2019, ensuring responsible

Sr. No	Strategies / Policies / Legislations / Acts / Laws & Regulations	Brief Coverage	Relevance to Project
		management of all water resources in Punjab and to regulate their use in the interest of conservation and sustainability and matters connected with and ancillary thereto.	discharge of wastewater to protect surface and groundwater resources. All effluent management will align with the water quality protection and permitting requirements stipulated under the Act
15.	The Punjab Irrigation, Drainage and Rivers Act 2023	The act ensures sustainable irrigation, drainage, control, and management of rivers, streams, lakes, groundwater, and navigation in the Punjab.	The Punjab Irrigation, Drainage, and River Act will be the primary legal framework for this project, most of the project area's drainage system connects to the Chenab River. All wastewater generated within the project area is currently discharged into nearby drains that ultimately discharge into the Chenab.
16	Punjab Local Government Act 2022	It is expedient to reconstitute the local governments and consolidate laws relating to powers and functions of local governments for establishing an effective elected local government system for meaningful devolution of political, administrative and financial responsibility and authority to the directly elected representatives of the local governments as envisaged under Article 140A of the Constitution to promote good governance, effective delivery of services and transparent decision making through institutionalized participation of the people at local level; and to deal with ancillary matters.	All project activities to be implemented must comply with Punjab Local Government Act during all the phases i.e., construction and operation.

2.3 International Protocol/Conventions

Pakistan is a member of several international organizations so it has to follow the international protocols and obligations related to the environment. The major protocols, ratification dates by Pakistan, and obligations related to the proposed project are provided in **Table 2.3** below:

Table 2.3: International Agreements/Conventions Relevant to the Project

Sr. No	Agreement/ Convention	Ratification	Description/Relevance
1.	UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972 Web Link: UNESCO World Heritage Centre	Pakistan ratified this convention on 23 July 1976.	Convention concerning the Protection of the World Cultural and Natural Heritage - requires parties to adopt a general policy on the protection of the natural and cultural heritage, to set up services for such protection, to develop scientific and technical studies, to take appropriate legal, technical, scientific and administrative measures and to foster training and education for such protection. The proposed project design and ESS team paid due attention to archaeological sites and local norms. Both of these factors will also be considered during project implementation.
2.	The Rio Declaration, 1992 Web Link: http://www.unesco.org/education/pdf/RIO E.PDF	Pakistan signed the treaty on 13 June 1992 and ratified it on 1 June 1994.	The Rio Declaration comprises 27 principles that address important issues such as; sustainable development to integrate environmental protection into the development process; common but differentiated responsibilities to conserve, protect, and restore the earth's ecosystems; public participation and information access at the national level, reduce and eliminate unsustainable patterns of production and consumption.
3.	Convention on Biological Diversity, 1994 Web Link: https://www.cbd.int/	Pakistan signed this treaty in 1992 and it was ratified by cabinet in 1994.	The Convention on Biological Diversity (CBD) has three main goals: Conservation of biological diversity (or biodiversity); sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources.
3(1).	International Union for Conservation of Nature and Natural Resources Red List, 2000. Web Link: https://www.iucnredlist.otg/	Pakistan ratified this convention in 2000	The objective of the policy development aims to promote biodiversity conservation, address environmental challenges, and foster a harmonious relationship between humans and world natural resources by setting appropriate and effective solutions. IUCN enlists wildlife species experiencing various level

Sr. No	Agreement/ Convention	Ratification	Description/Relevance
			threads at the global level by including them in the Red list. The 2022-2 IUCN Red List update includes 1,104 new tree species assessments. However, no wildlife species experiencing any kind of fatal threats are present in and around the projected area.
4.	United Nations Framework on Climate Change (UNFCCC) Amended, 2015 Web Link: https://unfccc.int/resource/docs/convkp/coveng.pdf	Pakistan ratified this convention on June 1, 1994	The objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic interference with the climate system". Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed sustainably. Conference of the Parties (COP), 28 in Dubai, UAE December 2023, held to address the climate crises simply, includes reducing global temperature helping vulnerable communities to adopt effective mitigation in response to climate change, and achieving net-zero emissions by 2050.
5.	United Nations Millennium Development Goals (MDGs), September 2000 Web Link: https://www.un.org/millenniumgoals/	Pakistan ratified with MDGs in June 2005.	The MDG target comes from the Millennium Declaration signed by 189 developing countries, including 147 heads of state and government. Pakistan adopted 16 targets and 41 indicators against which progress towards achieving eight goals of MDGs is measured. MDG 7: **Ensure Environmental Sustainability** has been associated with the current project. MDG 7 targets to ensure the sustainable development of the nation and also reverse the depletion of environmental resources.

Sr. No	Agreement/ Convention	Ratification	Description/Relevance
			Reducing the loss of biodiversity and achieving substantial reduction. Halving the proportion of population without sustainable access to basic sanitation.
6.	Paris Agreement, 2015	Pakistan ratified Paris Agreement, in 2016	The Paris Agreement's central goal is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below two degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to one and a half degrees Celsius. Additionally, the agreement aims to increase the ability of countries to deal with the impacts of climate change, and to make finance flows consistent with low GHG emissions and climate-resilient pathways.

2.4 Administrative Framework

2.4.1 Water and Sanitation Agency (WASA), Faisalabad

WASA-F is the executing agency of the project and will control all the administrative matters of the project. The agency will ensure compliance with all the environmental legislation and will seek necessary approvals where applicable.

2.4.2 Environmental Protection & Climate Change Department (EP&CCD), Punjab

EP&CCD Punjab is the responsible authority to ensure environmental protection and compliance with environmental legislation within the province. As regards the current project, EP&CCD will be responsible for reviewing the report, issuing environmental clearance (NOC), and overall/broad-based monitoring of the proposed project activities.

3 PROJECT DESCRIPTION

This chapter presents a comprehensive technical review of the proposed project, through proper analysis and evaluation, it aims to provide a clear understanding of the project's technical aspects and potential implementation strategies.

3.1 Overview of Project

The rapid population growth, industrial expansion, and urbanization of Faisalabad has severely stressed its outdated and overburdened sewerage system, leading to widespread environmental pollution, and health hazards with unserved areas where wastewater is openly discharged.

Government of Punjab has launched a comprehensive development package for the provision/rehabilitation/improvement of the sewerage system in different areas namely “CM Development Package to Combat Sewerage Issues of Faisalabad City”. a comprehensive initiative comprising of fourteen (14) schemes aimed at modernizing and improving the city's sewerage infrastructure to safeguard public health and protect the environment.

The list of the project’s schemes is given below in **Table 3.1**.

Table 3.1: List of Schemes

Sr. No	Description	Cost (Rs. in Million)
1	Providing and Laying Trunk Sewer from Model Bazar Jhang Road to Dijkot Drain Disposal & Improvement of Sewerage System in Saifabad, Faisalabad	1200
2	Upgradation and Rehabilitation of Pumping Station No. 34 and Installation of 36” HDPE Forcemain in Samanabad, Faisalabad	1150
3	Providing and laying of HDPE Forcemain from Dawood Chowk Disposal Station to Fish Farm Satayana Road, Faisalabad	1300
4	Providing and Laying Forcemain and Development of the Sewerage System in adjacent areas of Gatti, Aslam Park, Farooq Town, Adnan Town, Bagewala Road, Azhar Town, Sufyan Town and Adjoining Areas	1250
5	Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Millat Town, Civil Lines, Ghulam Muhammad Abad, Gulberg, Usman Town and Adjoining Areas (Western Side)	755
6	Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Madina Town, Shamsabad, Samnabad, Masoodabad, Nawaban Wala, Sakhi Sarwar Abad and Adjoining Areas (Eastern Side)	800
7	Providing and Laying Trunk Sewer from Jawad Club Chowk to Chokera Disposal Station, Faisalabad	950
8	Procurement of Machinery for Improvement in Drainage System of Faisalabad City	600
9	Improvement of Sewerage System of Shadab Colony, Muhammad Pura, Badar Colony, Darulihsan Town, Talianwala and adjacent areas of Jhang Road and Narwala Road	335
10	Upgradation of Drainage System in Faisalabad	380
11	Improvement of lift stations to reduce un-necessary pumping & reduction of electricity consumption	390
12	Development of Sewerage Network in Chak No. 235 R.B Niamuana and adjoining Areas Faisalabad	600
13	Providing and laying of RCC Trunk Sewer Line & Branch Lines for Chak No. 119 R.B Fakharabad and adjoining areas Faisalabad	600

Sr. No	Description	Cost (Rs. in Million)
14	Development of Sewerage Network in Naithari and adjoining areas Faisalabad	500
	Total	**10,810**

Existing Issues:

- Existing system does not serve entire population;
- Many sewer lines are old and damaged.
- Some schemes do not have a proper sewage disposal point. They are either disposed of in open spaces or in nearby stormwater drains.
- Most of the houses near the drains directly dispose of sewage/wastewater into these drains. During heavy rains, these drains reach their capacity, thus flooding the streets and the houses
- Open drains are used as a garbage/solid waste disposal point, thus resulting in a decrease of water carrying capacity of these drains. During rain, storm water and sewage overflow from the drains and spread solid waste through the area thus causing nuisance, environmental issues and the spread of diseases
- Manholes are open thus liable to cause danger to passersby
- There is a drain in Scheme -10 that is flowing through this area. Many houses close to this drain dispose their sewage into this drain. During rainy season, this drain gets flooded and sewage flows into the houses. Further, the drain is accumulated with Solid Waste due to non-cleaning and absence of screens which is creating a severe environmental nuisance.
- Lack of urban water infrastructure significantly lowers quality of life and causing health issues.

3.2 Project Location

The project area is located in the Faisalabad city. The project area includes fourteen (14) schemes to improve the city's sewerage infrastructure. The primary areas that include are Shadab Colony, Saifabad No.1, Saifabad No. 2, Naimatabad, Bhatta Stop Road, Rasheedabad, Samanabad, Dawood Chowk Disposal Station to Fish Farm Satayana Road, Gatti, Aslam Park, Farooq Town, Adnan Town, Bagewala Road, Azhar Town, Sufyan Town, Millat Town, Civil Lines, Ghulam Muhammad Abad, Gulberg, Usman Town, Madina Town, Shamsabad, Samnabad, Masoodabad, Nawaban Wala, Sakhi Sarwar Abad, Jawad Club Chowk to Chokera Disposal Station, Shadab Colony, Muhammad Pura, Badar Colony, Darulihsan Town, Talianwala, Chak No. 235 R.B Niamuana, Chak No. 119 R.B Fakharabad, Naithari and adjoining areas etc. The location map of the project area is shown in **Figure 3.1**.

3.3 Objectives of the Project

- To enhance the quality of life for residents by improving sanitation facilities.
- To address current sewerage issues in the project area.
- To provide a reliable and sustainable sewerage system for the currently unserved areas.
- To eliminate sewage ponding and associated public health hazards in the region.
- To provide new disposal station for a reliable and sustainable sewerage system.

- To enhance the operational efficiency of the existing disposal station by installing new pumps, ensuring effective conveyance of wastewater to the final disposal point.
- To optimize the wastewater conveyance system to minimize energy consumption and operational expenses associated with double pumping.
- To reduce environmental contamination and support the sustainable urban development goals of Faisalabad.

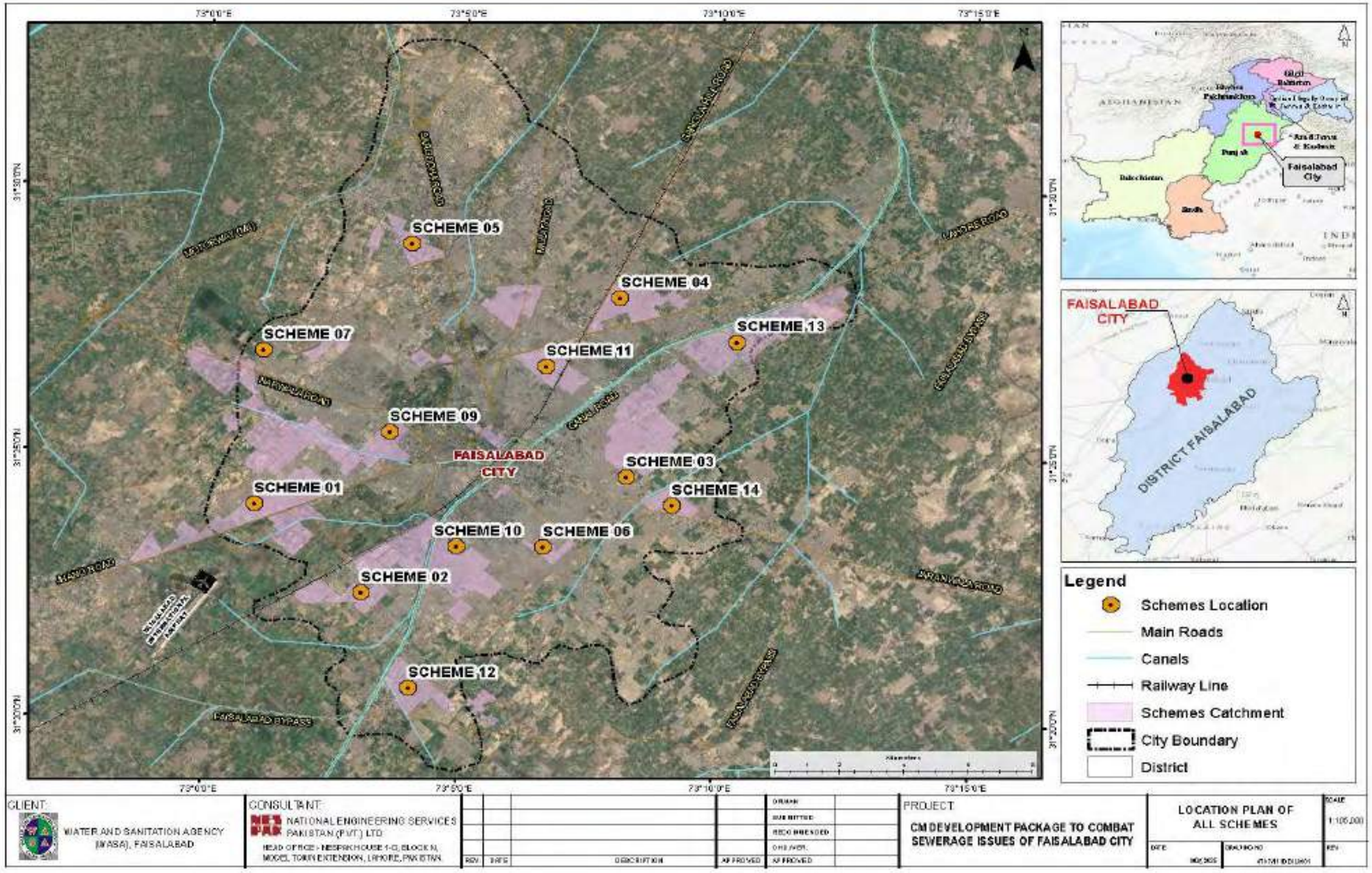


Figure 3.1 : Location Map of Project Area

3.4 Project Description

3.4.1 Existing System

EXISTING SEWERAGE SYSTEM

A site visit was conducted by consultants' public health and environmental experts along with WASA-F officials to evaluate the existing sewerage system in the areas. The photo log of existing situation and the layout of the existing system is attached as **Annex-I** and **Annex-II** respectively.

Scheme No. 1

The visit revealed that a main sewer line already runs along the proposed route, with varying diameters of 24-inch, 27-inch, 30-inch, 42-inch, and 48-inch pipes. These sewer lines are mainly located along the service road of Jhang Road, while the 48-inch line extends from the katcha track along Jhang Road, connecting to the Dijkot Disposal Station.

The current sewer system along Jhang Road, with pipe diameter ranges from 12" to 48", has become inadequate, causing sewage problems in the surrounding areas. Additionally, the existing sewer infrastructure in Saifabad is insufficient to meet present demands, with frequent complaints about sewer overflows.

The current sewer system is unable to handle the increasing volume of wastewater due to the growing population and urban development in the area. The existing pipes, with varying diameters, are unable to manage the high flow, leading to blockages, overflows, and system failures. The main trunk line is almost 30 years old, outlived and has also experienced crown failure.

Scheme No. 2

It was observed that Pumping Station No. 34 (PS-34) is facing operational inefficiencies due to a significant gap between the available and required pumping capacity. This shortfall has resulted in sewer overflows and complaints in the designated service areas.

The site visit revealed that PS-34 currently operates with three lines approaching the disposal station: two 24-inch lines and one 27-inch line. The existing GRP forcemain is of 20 inches in diameter having a capacity of 11 cusecs, and it discharges wastewater into a sullage carrier.

Currently, sewage is being disposed-off into a sullage carrier which is under capacity and causes the overflows in the nearby area, as the sewage flow from Sitara colony (12 cusecs) and Gulshan colony (04 cusecs) are also disposed-off in this sullage carrier.

Scheme No. 3

It was observed that a sewerage network is operational in the area, collecting wastewater and conveying it to the Dawood Disposal Station. From there, the wastewater is pumped into an existing 48-inch gravity sewer and transported to another disposal station (PS-42). After double pumping, the wastewater is ultimately discharged into a receiving water body.

Scheme No. 4

It was observed that there is no proper sewerage system in the adjacent area of Gatti Disposal Station. Trunk lines carrying the sewage to Gatti Disposal Station are as under.

An existing 30-inch diameter line coming beyond the gas pipeline, collecting wastewater from the branch lines of nearby areas. After crossing the gas pipeline, this main line transitions to a 36-inch diameter. This 36-inch trunk line passes through the Gatti area, which lacks a sewerage network. As it traverses the Gatti area, an existing 27-inch diameter line from Shamashabad, carrying wastewater, connects to the 36-inch main line, causing the diameter of the main line to increase to 42-inch. The main line (42-inch) subsequently conveys the wastewater to Gatti Disposal Station.

Gatti Disposal Station is located on Faisalabad Sangla Road. It has a total discharge capacity of 25 cusecs, with 02 pumps, having capacities of 10 & 15 cusecs. An existing forcemain pumps wastewater from Gatti Disposal Station into an existing 21-inch diameter line adjacent to the disposal station, running along Faisalabad Sangla Road. The 21-inch diameter line connects to an existing 42-inch diameter line originating from the northeast of the Gatti Disposal Station. This line then transports the wastewater after additional pumping into Paharang Drain as final disposal, located to the north of the Gatti Disposal Station.

Scheme No. 5

It was observed that trunk Sewer (18 inch) that carries the flow from Green Town area and transports to the trunk sewer (36 inch) present on the Millat Road is under sized and not able to carry all the flow from its catchment area.

The wastewater from the areas of Mehboob Town and Shahbaz Town is being discharged directly into nearby agricultural fields. As a result, untreated sewage is being used for irrigation. The existing trunk line (21 inch) is under capacity and not carrying all the sewage from the Chak No. 7 JB and creating unsanitary conditions into the village.

A trunk sewer line (21 inch) was previously laid to carry wastewater from the Muradabad area along Muradabad Road, adjacent to the Paharang Drain. Over time, this trunk sewer line is settled, primarily due to water seepage into its bedding and the excessive overburden load on the pipe.

Scheme No. 6

It was observed that trunk sewer that carrying the sewage from lateral to the trunk sewer going to the PS-36, is outlived and settled. It is not able to carry all the flow from its catchment area.

In Nawaban Wala, due to the topographical disadvantage, the trunk sewer experiences operational challenges during peak sewage generation hours. The combination of heavy inflow and reduced flow velocity in the downstream section prevents the trunk line from achieving the desired self-cleansing velocity. As a result, the system becomes hydraulically inefficient, leading to frequent surcharging of manholes and subsequent sewage overflows.

In Rachna Town, trunk Sewer that carrying the sewage from lateral to the trunk sewer present on the Satyana Road that is going to the PS-31, is under sized and not able to carry all the flow from its catchment area.

Trunk Sewer that carrying the sewage from lateral to the trunk sewer present on the Hilal Road that is going to the Ilahiabad Disposal Station, is under sized and not able to carry all the flow from its catchment area.

Trunk Sewer that carrying the sewage from lateral to the trunk sewer present on the Satyana Road that is going to the PS-31, is under sized and not able to carry all the flow from its catchment area.

The forcemains serving the Gulshan-e-Iqbal and Sitara Colony Disposal Stations are made of asbestos cement (AC) pipes that are disposing the sewage to the final disposal point. These AC forcemains have suffered damage at multiple locations, resulting in partial or complete leakage of the pumped sewage. As a result, not all of the sewage reaches the final disposal point, leading to overflows, ponding in the streets, and unsanitary conditions in the surrounding areas.

Scheme No. 7

It was noted that there is no proper sewerage system in Chokera Village and adjacent areas. Existing trunk lines carrying the sewage to Chokera Disposal Station are as under.

At Jawad Club Chowk, two 72-inch sewer lines merge, originating from different directions. The first line runs along Narwala Road, on the eastern side of Jawad Club Chowk, while the second line comes along Jawad Club Road. When these two lines meet at the chowk, causing the diameter of the main line to increase to 90-inch, which ultimately leads to the Chokera Disposal Station.

Scheme No. 9

It was noted that in Gulberg Block B & C Near Jinnah Colony (Contributing Flow to Chokera DS) due to the topographical disadvantage, the trunk sewer experiences operational challenges. The combination of heavy inflow and reduced flow velocity in the downstream

section prevents the trunk line from achieving the desired self-cleansing velocity. As a result, the system becomes hydraulically inefficient, leading to frequent surcharging of manholes and subsequent sewage overflows in the catchment area.

Ship Town & Khokhar Town, some streets are unserved and have no sewerage network. Houses from these streets are disposing their sewage directly into the agricultural fields. Sewage from remaining area is being collected in the existing trunk sewer present on the Kokianwala Main Road. This trunk line is disposing sewage into the existing lift station on the Kokianwala Main Road.

Talianwala, some streets are unserved and have no sewerage network. Houses from these streets are disposing their sewage directly into the agricultural fields. Existing trunk line carrying the sewage from Talianwala to the existing trunk line of Chokera Disposal Station is under sized and during the rainy season, this trunk line is unable to accommodate the increased flow, resulting in frequent overflows.

Scheme No. 10

The structure of the Channel-4 D is damaged. The walls are broken at various locations due to encroachments and locals also punctured the channel's walls to connect their house connection pipe with the channel. Top slabs are also damaged due to encroachments and 1.5 ft to 3 ft thick pavement of road are contributing more load on slabs.

The structure of the Mattupura Channel is damaged. The walls are broken at various locations due to encroachments and locals also punctured the channel's walls to connect their house connection pipe with the channel.

Scheme No. 11

The Weaver Colony DS, Liaqat Town DS, General Bus Stand DS, Sharifpura DS, Allama Iqbal LS, Boota Chowk LS, Bismillah Chowk LS and D-Type DS are currently operational, which is resulting in continuous and unnecessary pumping activity, thereby causing avoidable electricity consumption. Additionally, its operation is contributing to unpleasant odors in the surrounding area.

Near Mansoorabad DS the trunk sewer experiences operational challenges during peak sewage generation hours. The combination of heavy inflow and reduced flow velocity in the downstream section prevents the trunk line from achieving the desired self-cleansing velocity. As a result, the system becomes hydraulically inefficient, leading to frequent surcharging of manholes and subsequent sewage overflows.

Scheme No. 12

Chak No. 235 R.B Niamuana is a completely unserved area with no existing sewerage system. The absence of a sewerage system has led to sewage ponding and unhygienic conditions in

the area. This has resulted in significant wastewater management challenges, creating health hazards and environmental issues for the residents.

Scheme No. 13

There is currently no sewerage (pipe) network within Chak No. 199 RB and Fakharabad. Wastewater in these areas is discharged into open area/ fields through existing open RCC drains, which serve as the primary means of wastewater conveyance.

An existing 15-inch diameter sewer line connects to a 36-inch diameter trunk sewer near Abdullah Garden. This line subsequently transitions to a 42-inch diameter main as it intercepts additional flows along its route, ultimately conveying wastewater to the Dawood Colony Disposal Station. Furthermore, a 30-inch diameter sewer line from the southeast also joins the 36-inch line near Abdullah Garden. Fakharabad is located about 6 kilometers from Abdullah Garden, currently has no existing sewerage network, leaving the area without adequate wastewater collection system.

Scheme No. 14

It was noted that in Naithri Village some streets are unserved and have no sewerage network. Houses from these streets are disposing their sewage directly into the agricultural fields or ponds present inside the village. Existing trunk line carrying the sewage from laterals to the existing trunk line of PS-42 is under sized and unable to accommodate the increased flow, resulting in frequent overflows.

3.4.2 Proposed System

The project involves provision/rehabilitation/improvement of the sewerage system in different areas including forcemain, sewerage network, procurement of machinery, disposal station upgradation and construction. The layout of the proposed system is attached as **Annex-III**.

3.5 Proposed Sewerage System

3.5.1 Scheme No. 1

Scheme No. 1 contains the Improvement/Rehabilitation of sewerage network in the areas along the Jhang Road from Model Barar to Dijkot Drain Disposal Station that includes Shadab Colony, Saifabad No.1, Saifabad No. 2, Naimatabad, Bhatta Stop Road and Rasheedabad Areas of Faisalabad. To resolve sewage problems in the surrounding areas, a new sewer system (lateral and trunk) is planned, starting with a 12" diameter, expanding to 54", and ultimately reaching 60" before discharging into the Dijkot Drain Disposal. Additionally, the existing sewer infrastructure in Saifabad is insufficient to meet present demands, with frequent complaints about sewer overflows.

The maximum and minimum diameters are 12” & 72” respectively. The details of diameters and lengths are given below:

Table 3.2: Lengths and Diameters of Sewerage Network in Scheme No. 1

Diameter (inches)	Length (ft)
12	9,175
18	664
24	663
27	1,603
30	2,644
36	1,040
42	618
48	1,376
54	1,087
60	2,551
66	8,468
72	2,440
Total	32,329

3.5.2 Scheme No. 2

Scheme No. 02 includes the “Upgradation and Rehabilitation of Pumping Station No. 34 and Installation of 36" HDPE Forcemain in Samanabad”. This Scheme is currently facing limitations in terms of disposal station and forcemain capacity. This can lead to system overloads, environmental contamination, and potential health risks. Upgrading the scheme by expanding disposal station and enhancing the forcemain infrastructure is essential to meet growing demand.

This scheme includes the following major components;

- New Disposal Station
- Forcemain from Disposal Station to Outfall Drain/ Channel
- Remodeling of sullage carrier

3.5.3 Scheme No. 3

Scheme No. 03 contains the providing and laying of HDPE forcemain from Dawood Chowk Disposal Station to fish farm Satyana Road, Faisalabad. The existing system in this scheme involves double pumping, to optimize the system, a new 40-inch forcemain is proposed to directly convey wastewater from the Dawood Disposal Station to the Satyana Sludge Carrier, eliminating the need for double pumping. This scheme includes the following major components;

- Upgradation of Disposal Station.
- Forcemain from Disposal Station to Outfall Drain/ Channel.

3.5.4 Scheme No. 4

Scheme No. 4 contains the development of sewerage network in the Gatti and its adjoining areas. It also includes the laying of forcemain to avoid the double pumping indisposing the sewage from Gatti Disposal station. Currently, there is not proper sewage system in this area. This scheme includes the following major components;

- Sewer Network to transport the sewage from household level to Gatti Disposal Station through existing trunk lines.
- Upgradation of Pumps at Disposal Station
- Forcemain from Disposal Station to Outfall Drain/ Channel

3.5.5 Scheme No. 5

Scheme No. 5 includes the “Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Millat Town, Civil Lines, Ghulam Muhammad Abad, Gulberg, Usman Town, and Adjoining Areas (Western Side)”.

This scheme includes the following major components;

- Providing and Laying / Replacement of sewer: 09” – 54” diameter
- Sewerage system in Millat town, Civil line & Adjoining areas: 28,329 Rft
- Sewerage system in G.M Abad, Gulberg, Saifabad and adjoining areas: 16,330 Rft
- Provision for 6 Cusec Pumps: 2 Nos.
- Provision for 25 Cusec Pumps: 4 Nos.

3.5.6 Scheme No. 6

Scheme No. 6 includes the “Enhancement of Pumping Capacity of Disposal Stations and Improvement of Sewerage System in Madina Town, Shamsabad, Samanabad, Masoodabad, Nawaban Wala, Sakhi Sarwar Abad and Adjoining Areas (Eastern Side)". The pumping capacity of PS-31 Satiana Road Disposal Station, PS-36 Ahmad Nagar Disposal Station, and Gulshan Iqbal Disposal will be significantly enhanced through the installation and replacement of pumps.

This scheme includes the following major components;

- Providing and Laying / Replacement of sewer: 09” – 54” diameter
- Sewerage system in Samanabad, Masoodabad, Nawaban Wala, Allama Iqbal Colony and Adjoining areas: 22,281 Rft
- Sewerage system in Madina Town, Shamsabad, Sakhi Sarwar Abad and Adjoining areas: 21,846 Rft
- Provision for 6 Cusec Pumps: 1 No.
- Provision for 25 Cusec Pumps: 1 No.
- Provision for 40 Cusec Pumps: 1 No.

3.5.7 Scheme No. 7

Scheme No. 7 includes the “Providing and Laying Trunk Sewer from Jawad Club Chowk to Chokera Disposal Station, Faisalabad”. Furthermore, this scheme will establish a new sewerage infrastructure for Chokera Village and adjoining areas, which currently lacks sewerage infrastructure.

This scheme includes the following major components;

- Laying of new trunk sewer from Jawad Club Chowk to Chokera Disposal Station
- Laying of Trunk Sewer from Narwala Road Bypass Chowk, connecting with newly proposed Trunk sewer
- Development of Sewerage Network in Chokera Village

3.5.8 Scheme No. 8

Scheme No. 8 includes the “Procurement of Machinery for Improvement in Drainage System of Faisalabad City”. There are very limited facilities available in WASA-F. To achieve the objectives, the following machinery will be procured:

- Telescopic Clamshell Excavators: 2 Nos.
- Backhoe Loaders: 2 Nos.
- Dump Trucks: 2 Nos.
- Dewatering Sets: 2 Nos.
- Desilting Machines for Manholes: 4 Nos.
- Combined Suction – Jetting Unit: 2 Nos.

3.5.9 Scheme No. 9

Scheme No. 9 includes the “Improvement of Sewerage System of Shadab Colony, Muhammad Pura, Badar Colony, Darulihsan Town, Talianwala and Adjacent Areas of Jhang Road and Narwala Road”. It involves replacing the deteriorated sewer & laying of new sewer to provide a reliable and efficient sewerage system that can handle the current and future wastewater needs of the area. The project consists of the sewer having diameter 9” – 30.

3.5.10 Scheme No. 10

Scheme No. 10 includes the “Upgradation of Drainage System in Faisalabad City”. The remodeling, construction, and rehabilitation of Matoopura Channel and Channel 4D are proposed to address critical environmental and safety concerns.

This scheme includes the following major components;

- Matoopura Channel: 4950 Rft
- Channel No. 4d: 7080 Rft

3.5.11 Scheme No. 11

Scheme No. 11 includes the “Elimination of lift station to reduce un-necessary pumping and reduction of electricity consumption”. This project represents a pivotal initiative aimed at optimizing the wastewater management infrastructure in Faisalabad by reducing the number of existing lift stations. This reduction will significantly contribute to lowering the operational and maintenance (O&M) costs, which currently constitute a major expenditure for WASA-F. In this scheme, lift stations such as Chenab Club, Weaver Colony, Liaqat Town, Noorpur, Allama Iqbal Colony, Tower disposal, Shareef Pura etc. will be phased out through the construction of new sewer with diameters ranging from 18” to 48”.

3.5.12 Scheme No. 12

Scheme No. 12 includes the “Development of Sewerage Network in Chak No. 235 R.B Niamuana and adjoining areas Faisalabad”. The project aims are to establish a dedicated disposal station equipped with high-capacity pumps to handle the area’s wastewater efficiently and laying of trunk & branch sewer of varying diameters 9” to 48” for an efficient sewerage system in Chak No. 235 R.B Niamuana and its adjoining areas. This would facilitate approximately 6,000 new sewerage connections.

This scheme includes the following major components;

- Providing and laying of trunk sewer and branch lines having 9” to 48” diameter a total length of 35085 Rft
- Provision for 6 Cusec Pumps: 3 Nos.
- Construction of Disposal Station

3.5.13 Scheme No. 13

Scheme No. 13 includes the “Providing and laying of RCC Trunk Sewer Line & Branch Lines for Chak No. 119 R.B Fakharabad and adjoining areas Faisalabad”. A detailed topographic and alignment survey was conducted for the proposed sewerage scheme, including the 6-kilometer route leading to the existing sewerage network near Abdullah Garden. Based on these measurements, it was observed that even when designing the proposed sewer line at the minimum slope allowed for self-cleansing flow, the invert level of the new line at the endpoint would still be approximately 9 feet below the invert level of the existing manhole. This indicates that the proposed sewer line would not be able to discharge into the existing trunk line by gravity. Instead, it would require pumping i.e. either through intermediate lift stations or a full pumping station to overcome this elevation difference. However, the current scheme does not include any provision for pumping infrastructure. In conclusion, due to the significant elevation difference, the proposed gravity-based sewerage scheme is technically not feasible. Therefore, the proposed design must be reconsidered, possibly involving a pump solution or an alternative outfall point/ with appropriate hydraulic connectivity.

3.5.14 Scheme No. 14

Scheme No. 14 includes the “Development of Sewerage Network in Naithari and Adjoining Areas Faisalabad”. The project aim is to establish an effective sewerage network to handle

the wastewater of Netheri and its adjoining areas and laying of trunk & branch sewer of varying diameters (9" to 36") with a total length of 50,410 Rft. This would facilitate approximately 56,000 new sewer connections.

Table 3.3: Lengths and Diameters of Sewerage Network in Scheme No. 14

Diameter (inches)	Length (ft)
9	10200
12	20550
15	5600
18	2840
24	2480
27	3320
30	4620
36	800
Total	**50410**

3.6 Project Cost

The estimated total cost for the construction of the proposed project is **PKR 10,810 million**. This cost is tentative and will be finalized with the detailed technical design of the proposed project.

3.7 Land Acquisition

The proposed sewerage will be laid within existing streets and/or roads, thus eliminating the need for any land acquisition. Furthermore, the proposed location for the Disposal Station is already owned by WASA-F.

3.8 Project Administrative Jurisdiction

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

3.9 Project Implementation Schedule

The project is scheduled to be completed in 18 months.

3.10 Construction Activities and Required Machinery

Construction activities involve the following:

- Site Clearance
- Earthwork (Excavation for upgradation and construction of disposal station, and pipe laying)
- Structure/ Concrete works (Upgradation and construction of disposal station)

- Pipe laying (Force Main and Distribution System)
- Earthwork (Backfill)

Table 3.4 presents the list of expected machinery required for construction:

Table 3.4: List of expected Machinery/Equipment

Sr. No.	Description	Sr. No.	Description
1	Mobile Crane	15	Transit Mixer
2	Dumpers	16	Plate Compactor
3	Mini/ Hand Roller	17	Jack Hammer
4	Road/Power Roller	18	Motor graders
5	Road Cutter	19	Concrete Mixer Machine
6	Pneumatic Tyred Roller (PTR)	20	Light Transport
7	Light Weight Compactor	21	Generators
8	Tandem Roller	22	Welding Plant
9	Excavator	23	Water Sprinkler and Water Tanker
10	Tractor with Front Blade and Trolley	24	Wood Shuttering
11	Loader	25	Scaffolding
12	Ramming Machine	26	Formwork
13	Vibrators	27	Steel Cage Shuttering Unit
14	Tower Crane	28	Barricades

3.11 Construction Camps

Campsites will be selected based on the following considerations:

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

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

3.12 Construction Materials

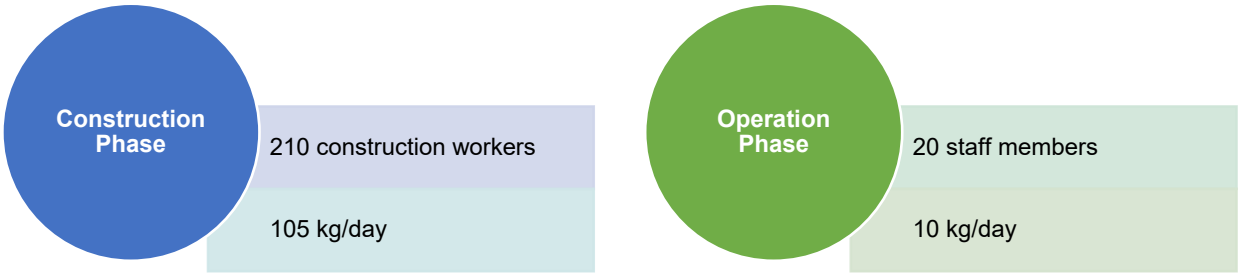
The materials used in the construction of the sewerage system, and disposal station would include coarse aggregates (crush), fine aggregates (sand), bricks, soil, sewerage pipes (RCC), cement, reinforcement, etc.

3.13 Workforce Requirement

The manpower required during the construction phase is 210 workers while 20 workers will be required during the operational phase of the project.

3.14 Solid Waste Generation

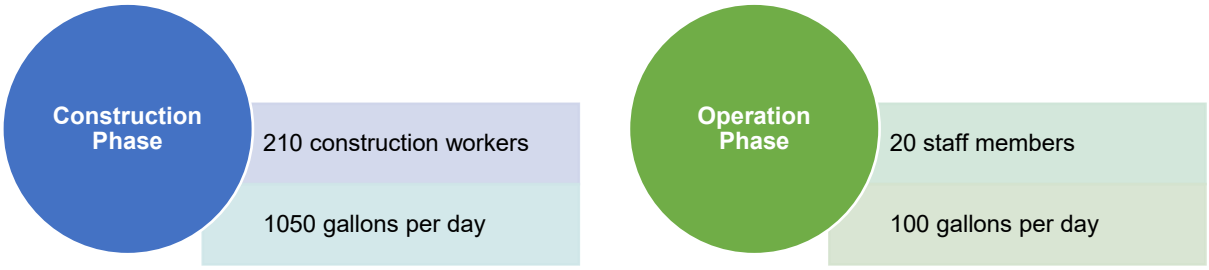
Due to construction activities waste will be generated at construction and contractor's campsite. The construction waste will include wastewater, oil spillage from machinery, domestic waste, and waste construction materials. Solid waste generated during construction and campsites will be safely disposed of in demarcated waste disposal sites.



Waste Generation Rate 0.5 kg/capita/day

3.15 Water requirement

The water requirement for the proposed project activities is summarized hereunder:



3.16 Power Requirement During Construction Phase

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

3.17 Wastewater Generation during Construction Phase

The wastewater generation is estimated to be 840[1] gallons/day for 210 construction workers during the construction phase of the proposed project. It is important to note that due to the dispersed nature of the workforce across various sites i.e., forcemain, sewerage network,

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

disposal stations in different schemes. This wastewater is not generated collectively. Each construction site contributes a relatively small amount of sewage. However, the wastewater generated on each site will be directed into existing sewerage systems, where it is subsequently managed.

4 Baseline Profile

4.1 General

This section presents the current environmental conditions in and around the project area, which has been considered with respect to physical, ecological and socio-economic resources. The current environmental baseline study is intended to establish a database against which potential project impacts can be predicted and managed later.

Reconnaissance and detailed surveys of the project area were conducted for baseline data collection during field visits in different days of the months of May 14 2025 to May 21 2025. The prime objective of the field visits was to collect the baseline data on physical, eco-biological, and environmental & social aspects. The secondary data was collected from published sources/reports and relevant departments, which were also verified through visual observations during reconnaissance and detailed surveys.

4.2 Objective of the Baseline Study

The baseline description is intended to accomplish the following objectives:

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

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

The impacts of the project activities are limited and within the catchment area of the proposed sewerage schemes. Therefore, the individual catchment areas have been considered as the Area of Influence (AoI). **Figure 4.1**, represents the AoI of the project area.

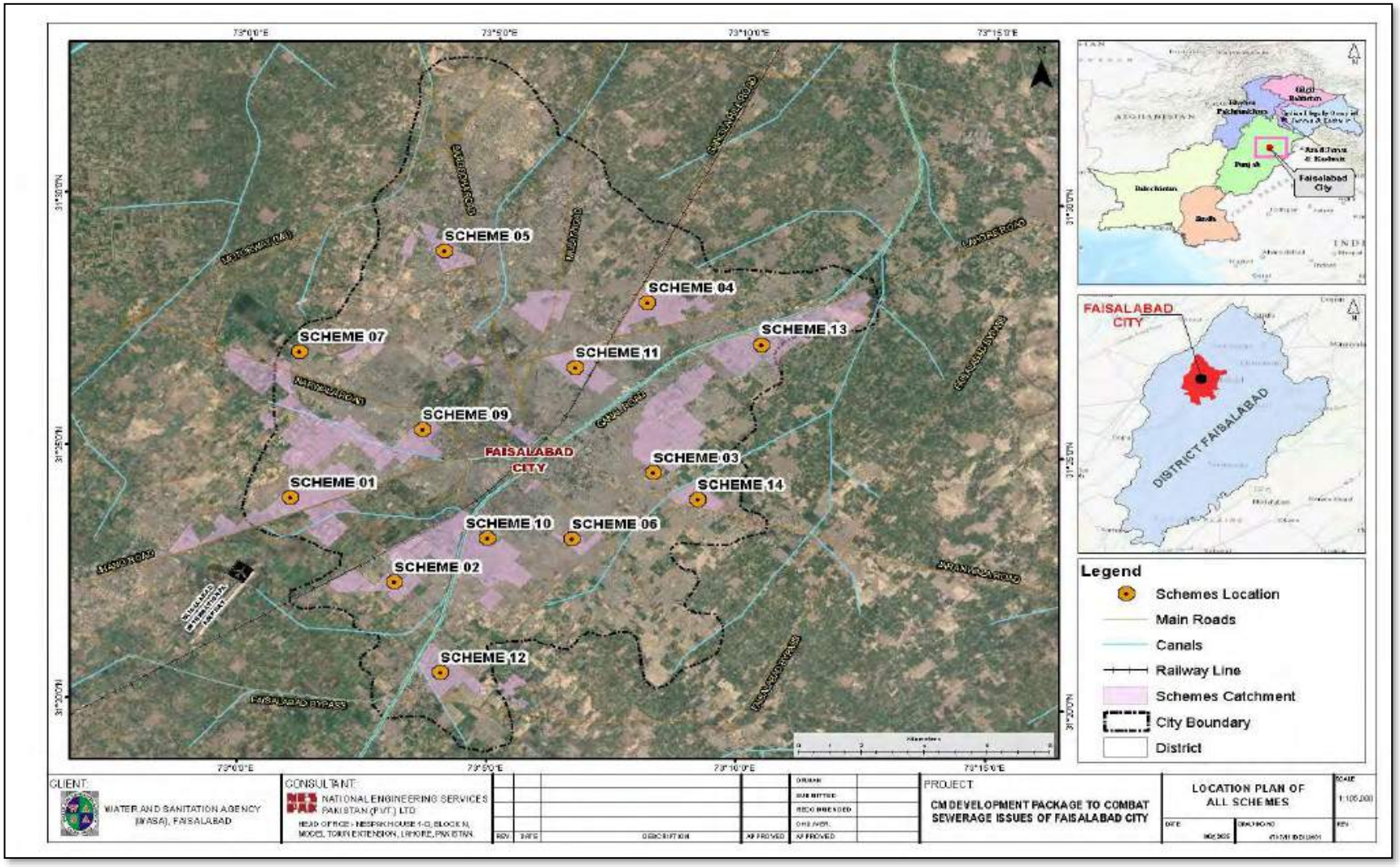


Figure 4.1: Study Area Map / AoI of all Sewerage Schemes

As per the national and provincial regulations, impacts and risks have been analyzed within the project AoI. Environmental and social impacts and risks will also be analyzed for all relevant stages of the project cycle, including pre-construction, construction and operation phases of the project.

4.4 Physical Environment

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

4.4.1 Topography

The project area is located across different part of Faisalabad City. The geographical coordinates of the city are [31°25'0" N, 73°5'0" E]. Faisalabad City is bounded by Sheikhupura District in the east, Jhang District in the Northwest, Hafizabad District on the North side, Toba Tek Singh and Sahiwal Districts are on the South side.

The ground elevations within the project area range from 560.24 ft (170.80 m) to 634.72 ft (193.51 m). This variation is due to the wide geographical spread of the sewerage scheme across different parts of Faisalabad, where natural topography changes with distance. The topography is predominantly flat, characterized by peri-urban settlements, agricultural fields, industrial areas and commercial centers. The terrain is generally even, with slight variation in elevation. Irrigation canals, minors, and watercourses traverse through the project area. The topographic map of the project area is shown in **Figure 4.2** below;

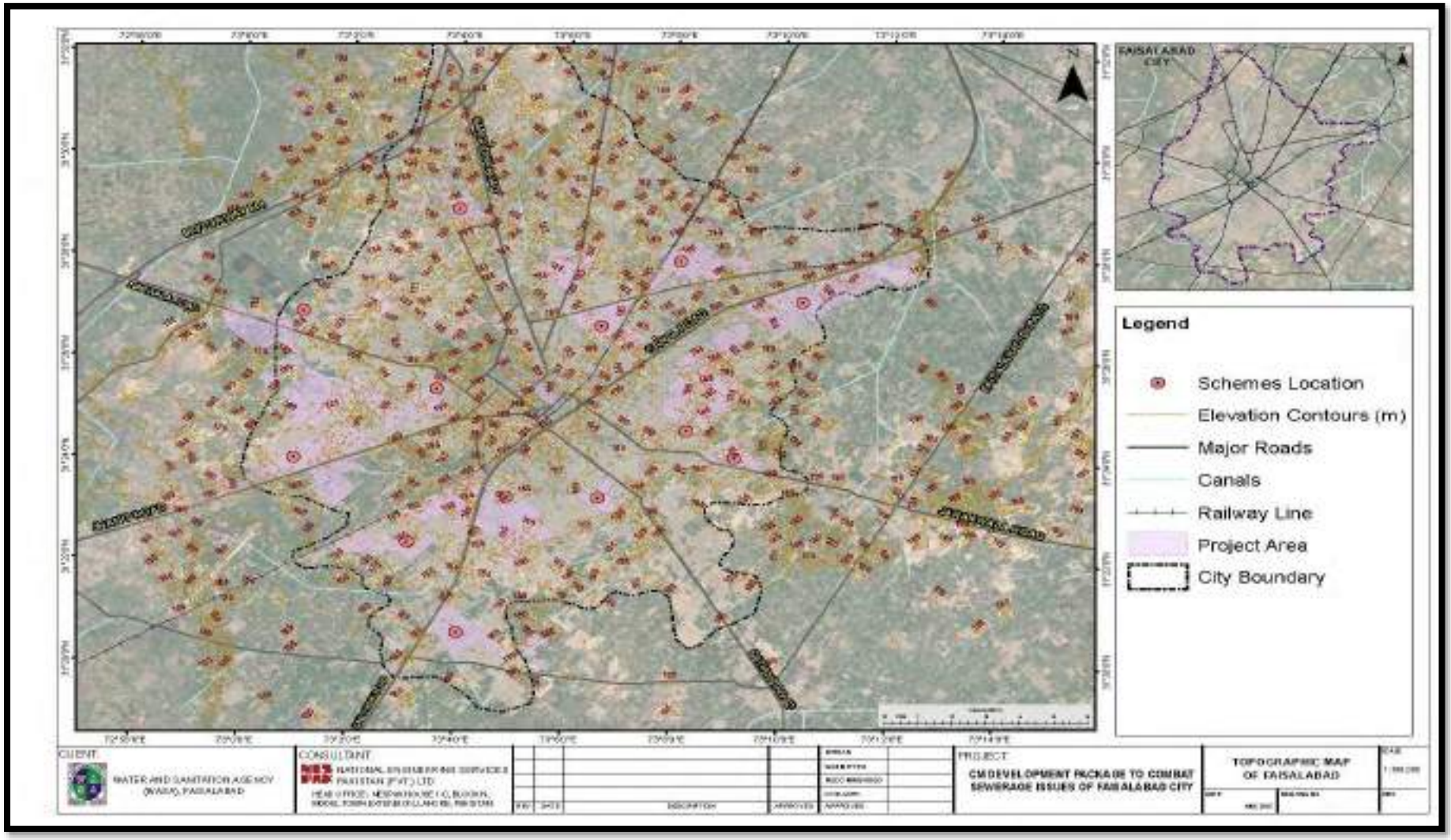


Figure 4.2: Topography Map of Project Area

4.4.2 Geology

Faisalabad is located between the alluvial plains of Chenab and Ravi rivers, primarily composed of sedimentary deposits. The area's geology is dominated by layers of river-borne sediments, including clay, silt, and sand, deposited by the nearby rivers. Beneath these sediments lie layers of limestone and shale formations, remnants of ancient marine environments. The region is relatively stable tectonically, with no significant seismic activity recorded.

4.4.3 Climate and Meteorology

i. Average Temperatures

Figure 4.3 represents mean monthly maximum and minimum temperatures for different months of the last 30 years. The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Faisalabad. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.[1]

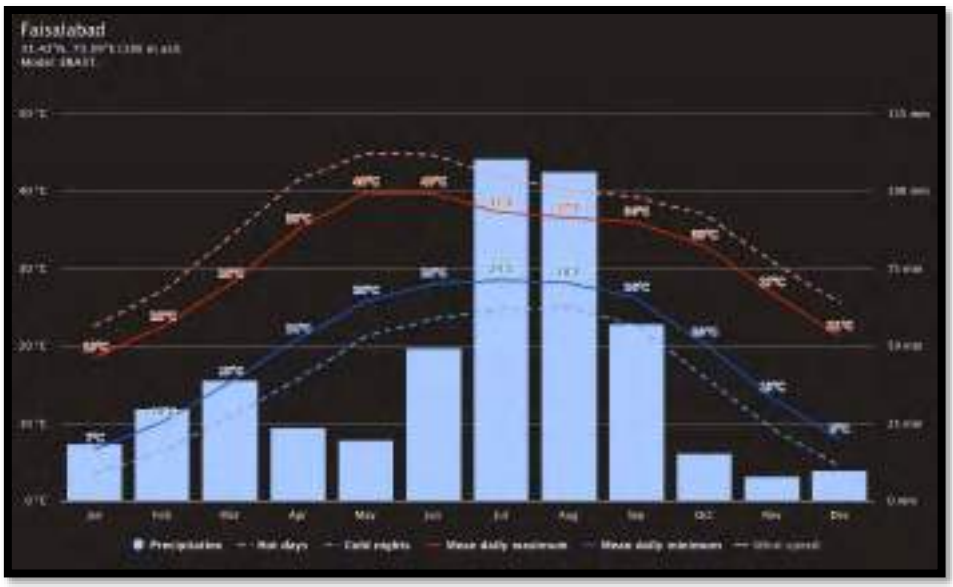


Figure 4.3: Average Temperatures

It is evident from the **Figure 4.3** that the project area has a moderate climate with relatively hot summer and cold winters. The summer starts from May and lasts till September. June is the hottest month. The mean maximum and minimum temperature are 40 ºC and 28 ºC respectively for month of June. The winter seasons lasts from December to February. January is the coldest month. The mean maximum and mean minimum temperature are 19 ºC and 7 ºC in January. The maximum temperatures days are presented in **Figure 4.4**.

[1] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/faisalabad_pakistan_1179400

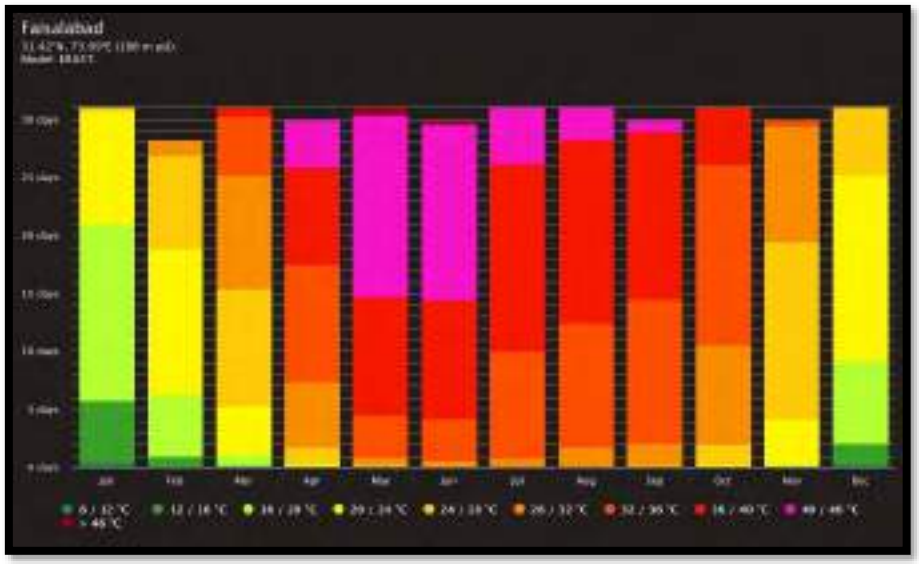


Figure 4.4: Maximum Temperature Days

ii. Climate Change

As per the **Global Climate Risk Index 2021**, Pakistan is ranked in the top ten countries that suffered the most from extreme weather events[2]. Punjab's urban areas are particularly vulnerable to climate change. Some of them are heat stress (Urban Heat Island, or UHI), extreme precipitation, inland flooding, drought and a lack of water. As shown in **Table 4.1**, the Climate Change Profile of Pakistan ranks districts of Faisalabad according to the climate risks and hazards classification.[3]

Table 4.1: Climate Change Risks and Vulnerability ranking of Faisalabad

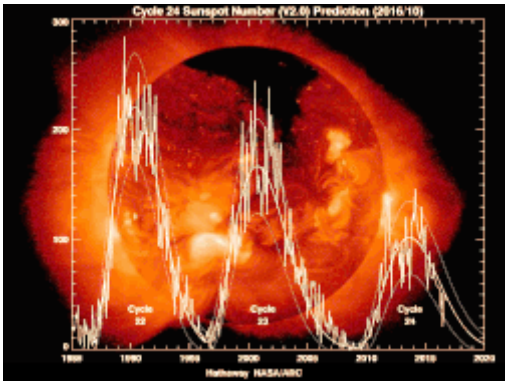
Rank	Districts	Flood Risk	Earthquake Risk	Cyclone Risk	Drought Risk
70	Faisalabad	3	4	2	4
Scoring key					
Very High	High	Medium	Low	Very Low	
5	4	3	2	1	

According to the climate risks ranking, the risk of earthquakes and droughts seems to be high in the area of Faisalabad districts. Additionally, wind and dust storms area also common in the Faisalabad division. Sand and dust clouds are carried away by the strong wind throughout the year.

[2] https://www.germanwatch.org/en/cri
[3] *Chaudhry, Q. 2017. Climate Change Profile of Pakistan. Asian Development Bank, Philippines. doi.org/10.22617/TCS178761*

iii. Solar Maximum

Solar Maximum is a significant phase within the Sun's approximately 11-year solar cycle, characterized by heightened solar activity, including increased numbers of sunspots, solar flares, and coronal mass ejections. The current solar cycle, Solar Cycle 25, commenced in December 2019. Based on projections by NASA and the National Oceanic and Atmospheric Administration (NOAA), the peak of Solar Maximum is anticipated to occur between mid and late 2025.



During this period, the frequency and intensity of space weather events notably rise, influencing both terrestrial and atmospheric conditions. Enhanced geomagnetic activity during this phase can also result in more frequent auroras visible at lower latitudes than usual. These trends must be considered due to its influence on atmospheric conditions and potential indirect effects on infrastructure.[4]

iv. Cloudy, Sunny and Precipitation Days

Figure 4.5 shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

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

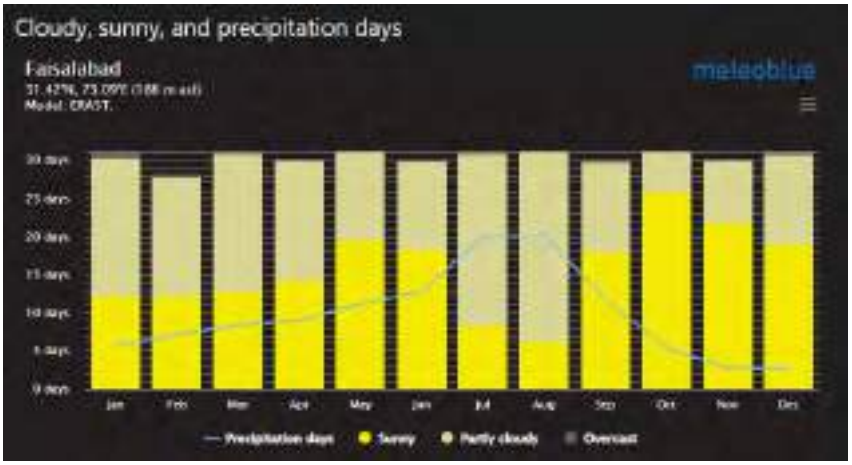


Figure 4.5: Cloudy, Sunny and Precipitation Days

[4] *https://www.swpc.noaa.gov/news/joint-solar-maximum-announcement-nasa-and-oaa?utm_source=chatgpt.com*

Figure 4.6 shows on how many days per month, certain precipitation amounts are reached. It can be seen from the chart that the precipitation in June, July and August is maximum and ranges between 2-5 mm. Highest intensity of precipitation is also observed in the months of June, July and August ranges between 5-10mm or 10-20 mm as Shown in **Figure 4.6**.

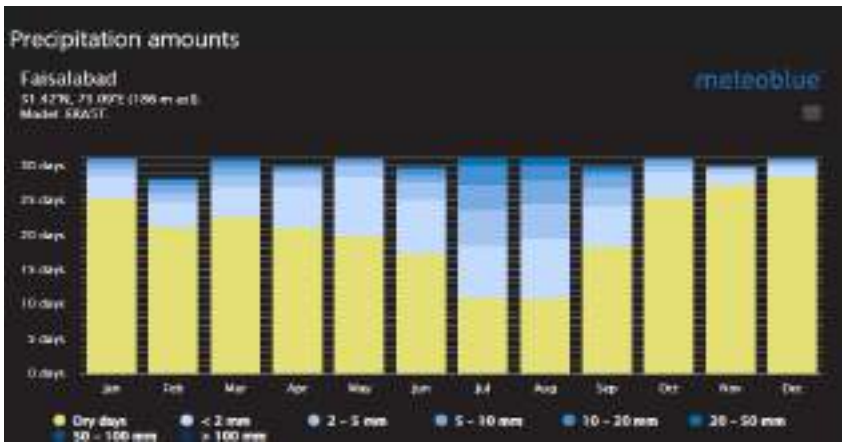


Figure 4.6: Precipitation Amounts

v. Wind

Figure 4.7 shows the days per month, during which the wind reaches a certain speed. Maximum wind speeds can be observed in the months of April to July which is 20-30 km/h. Wind speed 10-20 km/h dominates throughout the year.

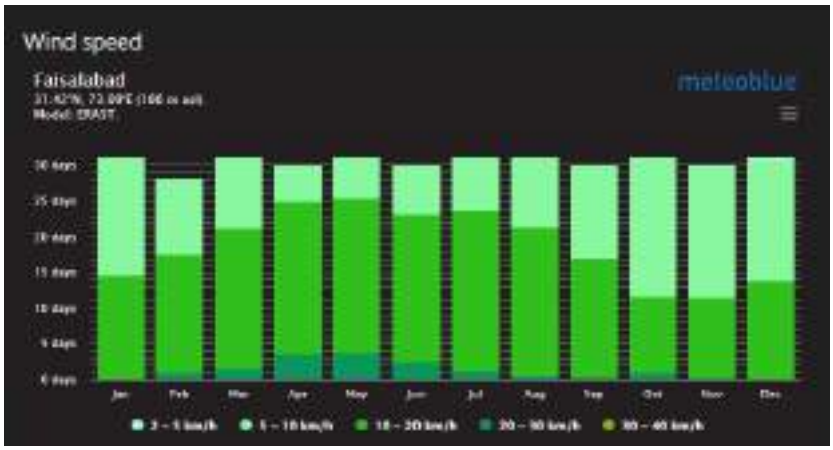


Figure 4.7: Wind Speed

The wind rose for Faisalabad shows how many hours per year the wind blows from the indicated direction. Wind rose is shown in **Figure 4.8**. It can be seen from the wind rose that dominant wind direction is towards NE to SW and Eastern side to Western side.

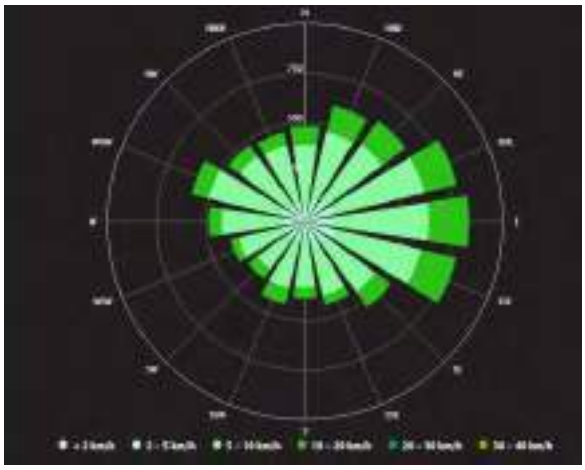


Figure 4.8: Wind Rose

4.4.4 Water Resources

The description of the water resources of Faisalabad is as under. Hydrology map of Faisalabad is shown in **Figure 4.9**.

A. Groundwater

Groundwater also plays a significant role in providing water supply to Faisalabad, alongside surface water sources. The primary groundwater source for the city is the aquifer system underlying this region. Faisalabad consists of the Upper and Lower Bari Doab Aquifers, which are part of the larger Indus Basin aquifer system.

The groundwater in Faisalabad is accessed through a network of tube wells and hand pumps, particularly in areas where municipal water supply may be inadequate or unreliable. This groundwater is used for various purposes, including domestic consumption and industrial activities.

The groundwater is brackish making it unfit for human consumption. Therefore, to meet the city's water demand, WASA-F draws water from different handpumps along main canal of Faisalabad city, different well-fields (Chiniot well-field: 120 m to 140m, Jhang Branch Canal: 133 m to 165m) along with other small water works in the city which together produce around 110 MGD of water supplied to consumers by WASA-F.

B. Surface water

Faisalabad region is surrounded by the two main rivers of Punjab; Chenab River towards the north which is a branch of the larger Indus River system and Ravi River towards the south. The entire district lies in the Rachna Doab (the area between Ravi River and Chenab). The Rachna irrigation system comprises of Upper Chenab Canal (UCC), Lower Chenab Canal (LCC), Marala-Ravi Link canal, Bambanwala Ravi Badian Depalpur (BRBD) Canal and Trimu-Sidhnai Link canal as shown in hydrology map in **Figure 4.9**.

C. Sewage Drain/Wastewater

Wastewater of Faisalabad is discharged through two major drains i.e., Paharang drain and Madhuana drains and other domestic drains into Chenab River and Ravi River. More than 70 percent of industrial wastewater discharges through Madhuana drain that ends up in River Ravi. Madhuana drain joins Samundri drain and converts into Main Samundri drain. It carries effluents from industrial and residential areas of Samundri and Faisalabad city and discharges into Ravi River at Mamoon Kanjan, within Faisalabad district.[5]

[5] https://urbanunit.gov.pk/Download/publications/Files/17/2023/Faisalabad%20Regional%20Development%20Plan%20-%20Enviroment%20Sector_compressed.pdf

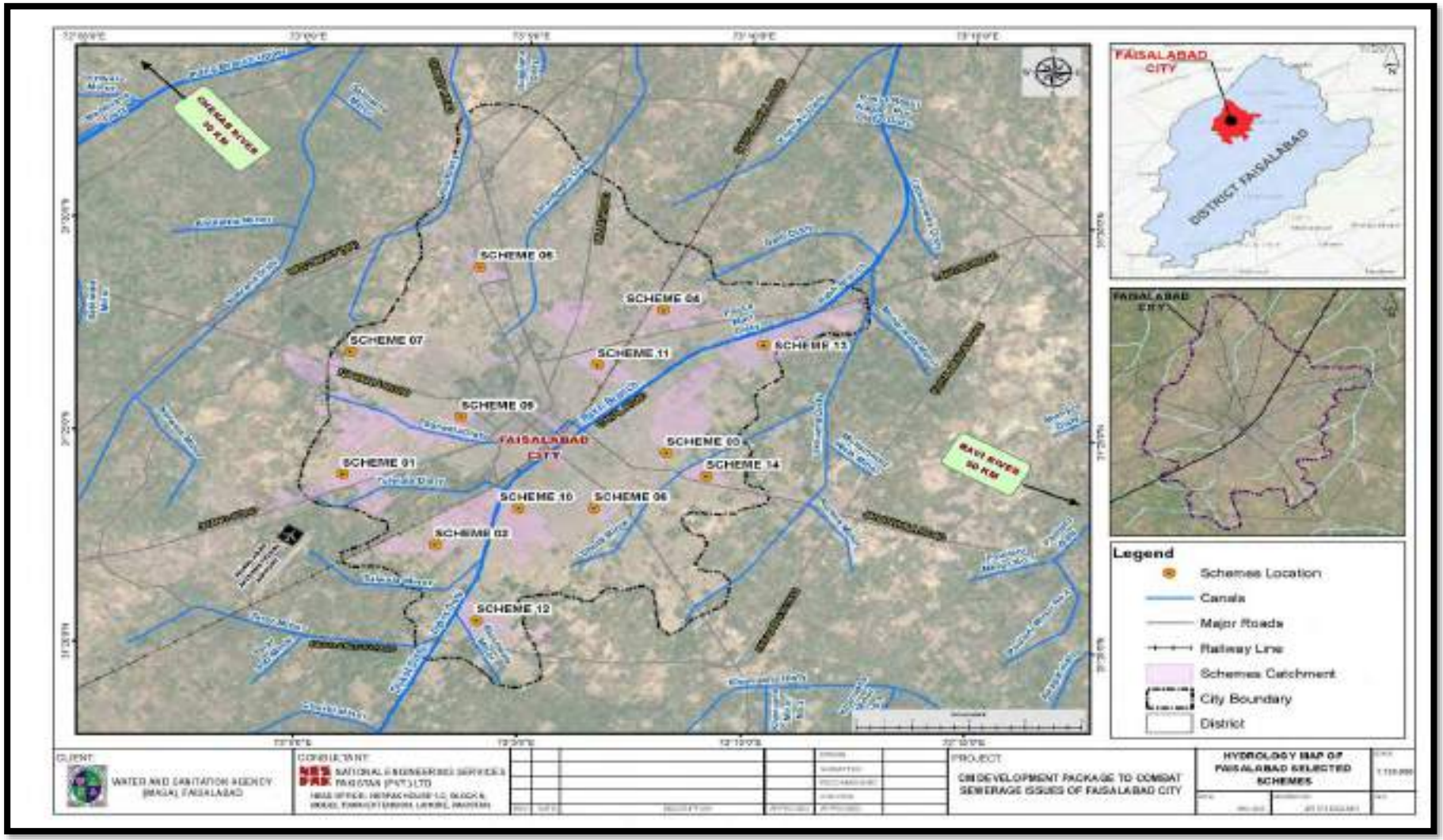


Figure 4.9: Hydrology Map of Project Area

4.4.5 Environmental Monitoring, Sampling and Testing for Proposed Project

In order to determine the ambient air, noise levels, groundwater/ drinking water and wastewater/Surface water quality of the study area environmental monitoring is being conducted. Five (05) samples of surface water/wastewater, four (04) samples of Groundwater, and four (04) sample each of ambient air & noise were conducted for the laboratory analysis. The Proposed sampling locations are shown in **Figure 4.10.**

The task of environmental monitoring and testing was awarded to EPA approved environmental laboratory i.e., M/s Pakgreen Laboratories. The sampling pictures are given in **Plate 4.1** and Lab reports are provided in **Annex-IV**.

Monitoring locations were strategically selected following a detailed reconnaissance survey conducted by the engineers, ensuring coverage of the entire project area. The sampling points were identified to comprehensively reflect site-wide environmental conditions.

A. Ambient Air Quality

The ambient air quality for priority pollutants such as NO, NO_2, SO_2, CO, O_3, PM_{10}, and $PM_{2.5}$ was carried out from July 03, 2025 to July 07, 2025 by Pakgreen Laboratory. The monitoring period was 24 hours. The results of ambient air quality monitoring are given in **Table 4.2** and Lab reports are attached as **Annex-I.**

Table 4.2: Ambient Air Quality Results

Sr. No.	Parameters	Avg. sampling time	Unit	Locations				
				S1 (Sch 5 & 7)	S2 (Near Sch 02)	S3 (Sch-03&14)	S4 (Scheme -04)	PEQS
1	Carbon monoxide		mg/m^3 (8 Hour)	2.70	1.56	2.78	2.27	5
2	Sulphur dioxide		µg/m^3	49.51	49.90	42.50	39.41	120
3	Ozone		µg/m^3 (1 Hour)	75.5	70.2	67.8	72.8	130
4	Nitric oxide		µg/m^3	7.56	12.10	15.22	17.02	40
5	Nitrogen Dioxide		µg/m^3	29.05	41.54	26.44	35.06	80
6	PM (2.5)		µg/m^3	56.9	60.4	56.3	48.7	35
7	PM (10)		µg/m^3	162.3	169.7	165.7	159.2	150
8	Suspended particulate Matter (SPM)		µg/m^3	544.9	572.9	582.8	540.4	500

The values of $PM_{2.5,}$ PM_{10} and SPM exceed the permissible limits of PEQS which indicates the presence of dust particles due to lose soil in the project area as well as traffic and commercial activities.

B. Noise Level

Noise level monitoring was carried out at the same locations where ambient air quality was monitored. Noise levels were monitored with the help of a potable digital sound meter at the project site for 24 (twenty-four) hours at an interval of 1-hour. The results of noise monitoring are given in **Table 4.3** and Lab reports are attached as **Annex-I.**

Table 4.3: Noise Monitoring Results

Sr. No.	Location	Equivalent Noise Level (L_{eq}) dB(A)		PEQS Limit dB(A)	
		Day Time	Night Time	Day Time	Night Time
1	S1 (Sch 5 & 7)	63.1	51.9	65	55
2	S2 (Near Sch 02)	62.4	47.4	65	55
3	S3 (Sch-03&14)	60.9	48.5	65	55
4	S4 (Scheme -04)	58.0	47.3	65	55

The values of noise levels are beyond the PEQS limits which is due to presence of traffic in the project area, commercial activities and hustle & bustle in the city.

C. Groundwater/ Drinking Water Quality

Groundwater/ tap water samples were collected from selected locations on June 15, 2025 and were analyzed for Physical, chemical and microbiological parameters. The analysis results of groundwater samples are compared with PEQS. The detailed monitored results for drinking water quality are given in **Table 4.4** and attached as **Annex-**I respectively.

Plate 4.1: Sampling At Different Project Locations

Table 4.4: Results of Ground water

Sr. No.	Measuring Parameter	Units	PEQS Limits	Faisalabad (Scheme-5-7) GW	Faisalabad (Scheme-2-6 Motor Pump) GW	Faisalabad (Scheme-4 Motor Pump) GW	Faisalabad (scheme-3-14 hand pump) GW
1	Total Coliform	TC (count/100ml)	0/100ml	NIL	NIL	NIL	NIL
2	Feacal Coliform	F.Coli (count/100ml)	0/100ml	NIL	NIL	NIL	NIL
3	Escherichia Coli	E.Coli (count/100ml)	0/100ml	NIL	NIL	NIL	NIL
4	Taste	…..	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable
5	Odour	…..	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable
6	PH @25˚C		6.5-8.5	7.641 at 25.0	7.805 at 25.0	7.732 at 25.0	7.676 at 25.0
7	Turbidity	NTU	5	0.49	0.40	0.35	0.30
8	Colour	TCU	<15TCU	0.000	0.000	0.000	0.000
9	Total Dissolved Solids	TDS (mg/L)	<1000	2660*	1780*	980	2330*
10	Total Hardness as CaCO3	(mg/L)	<500	700*	290	380	310
11	Residual Chlorine	Cl_2 (mg/L)	0.2-0.5	BDL	BDL	BDL	BDL
12	Chloride	Cl1- (mg/L)	<250	715*	270*	125	360*
13	Flouride	F^- (mg/L)	≤1.5	0.156	0.838	0.760	0.064
14	Cyanide	mg/l	≤ 0.05	BDL	BDL	BDL	BDL
15	Nitrate	NO_3^- (mg/L)	≤50	6.152	6.055	6.056	6.080
16	Nitrite	NO_2^- (mg/L)	≤3	BDL	BDL	BDL	BDL
17	Phenolic compound	Phol (mg/L)	-	BDL	BDL	BDL	BDL
18	Aluminium	Al +3 (mg/L)	≤0.2	BDL	BDL	BDL	BDL

19	Antimony	Sb (mg/L)	≤0.005	BDL	BDL	BDL	BDL
20	Arsenic	As (mg/L)	≤50	BDL	BDL	BDL	BDL
21	Barium	Ba (mg/L)	0.7	BDL	BDL	BDL	BDL
22	Boron	B(mg/L)	0.3	BDL	BDL	BDL	BDL
23	Cadmium	Cd.² (mg/L)	0.003	BDL	BDL	BDL	BDL
24	Chromium	Cr (mg/L)	≤0.05	BDL	BDL	BDL	BDL
25	Copper	Cu2+ (mg/L)	2.0	BDL	BDL	BDL	BDL
26	Lead	Pb.² (mg/L)	≤0.005	BDL	BDL	BDL	BDL
27	Manganese	Mn2+ (mg/L)	≤0.5	BDL	BDL	BDL	BDL
28	Mercury	Hg.² (mg/L)	≤0.001	BDL	BDL	BDL	BDL
29	Nickel	Ni.² (mg/L)	≤0.02	BDL	BDL	BDL	BDL
30	Selenium	Se.² (mg/L)	0.01	BDL	BDL	BDL	BDL
31	Zinc	Zn.² (mg/L)	5	0.0052*	0.0029	BDL	2.7180
32	Pesticides	(mg/L)	0.15	BDL	BDL	BDL	BDL

BDL = Below detected Limit

The groundwater quality analysis across all Faisalabad schemes shows compliance with microbiological standards, as Total Coliform, Fecal Coliform, and E. coli were not detected. Physicochemical parameters such as pH, turbidity, color, nitrate, and fluoride remained within PEQS limits, indicating acceptable water quality in most aspects. However, elevated levels of Total Dissolved Solids (TDS), Total Hardness, and Chloride were observed at multiple sites, particularly in Scheme 5-7 and Scheme 3-14, exceeding the allowable limits. Trace metals and pesticide residues were below detection limits, suggesting no significant contamination from heavy metals or agricultural runoff.

D. Surface Water/ Wastewater Quality

Surface water/ wastewater Samples were collected on June 15, 2025 from five locations and were analyzed in the laboratory The analysis of results of wastewater samples are compared with PEQS. The results are summarized in **Table 4.5** and lab report is attached as **Annex-I**.

Table 4.5: Results of Surface Water/Wastewater

Sr. No.	Measuring Parameter	Units	PEQS Limits	Faisalabad (canal) SW results	(Near Scheme-7-Drain) WW 1 results	(Near Scheme-4-Drain) WW 2 results	(Near Scheme 3-14 Interceptor Drain) WW 3 results	(Near Scheme-1-Drain) WW 4 results
1	PH @ 25˚C	PH	6.5 to 8.5	7.828 at 25.0	7.908 at 25.0	9.750* at 25.0	8.091 at 25.0	7.704 at 25.0
2	Total Suspended Solids	TSS (mg/L)	200	50	100	80	210*	250*
3	Total Dissolved Solids (TDS)	TDS (mg/L)	3500	100	3230	4210*	2840	3770*
4	Chlorine	mg/L	1.0	BDL	--	--	--	--
5	Chloride	Cl1- (mg/L)	<250	10	1140*	1380*	680	1355*
6	Fluoride	F^{-} (mg/L)	≤1.5	BDL	BDL	BDL	BDL	BDL
7	Cyanide	CN^{-} (mg/L)	1.0	BDL	BDL	BDL	BDL	BDL
8	Ammonia	NH3 (mg/L)	40	--	39.6	29.1	48.6*	50.4*
9	Sulphide	S^{-2} mg/L)	1.0	--	1.0	1.2*	3.0*	3.4*
10	Sulphate	SO_4-2(mg/L)	600	--	188	320	190	320
11	Chemical Oxygen Demand	COD (mg/L)	150	08	200*	160*	312*	400*
12	Biological Oxygen Demand	BOD5 (mg/L)	80	BDL	126*	99.2*	198*	248*
13	Oil & Grease	O.Gr(mg/L)	10	--	BDL	BDL	BDL	BDL

14	Phenolic Compound	Phol (mg/L)	--	BDL	BDL	BDL	BDL	BDL
15	Anionic Detergent	Det (mg/L)	20	--	25.550*	24.150*	27.950*	24.430*
16	Arsenic	As (mg/L)	≤50	BDL	BDL	BDL	BDL	BDL
17	Barium	Ba (mg/L)	0.7	BDL	--	--	--	--
18	Boron	B(mg/L)	6.0	BDL	--	--	--	--
19	Cadmium	Cd^{+2} (mg/L)	0.01	BDL	BDL	BDL	BDL	BDL
20	Chromium	Cr (mg/L)	≤0.05	BDL	BDL	BDL	BDL	BDL
21	Copper	Cu2+ (mg/L)	2.0	0.0186	0.0387	0.0527	0.471	0.0279
22	Total Iron	Fe2+ (mg/L)	8.0	--	1.2877	0.6053	1.7171	1.9523
23	Lead	Pb2+ (mg/L)	≤0.005	BDL	BDL	BDL	BDL	BDL
24	Manganese	Mn^{+2}(mg/L)	≤0.5	0.1565	0.0729	0.0846	0.0794	0.1526
25	Mercury	(Hg) (mg/L)	≤0.001	BDL	--	--	--	--
26	Nickel	Ni^{+2} (mg/L)	≤0.02	BDL	BDL	BDL	BDL	BDL
27	Selenium	Se^{+2} (mg/L)	0.01	BDL	BDL	BDL	BDL	BDL
28	Silver	Ag (mg/L)	1.0	--	0.0226	0.0269	0.0189	0.0808
29	Zinc	Zn^{+2} (mg/L)	5.0	0.0424	0.0732	0.0398	0.0884	0.0790
30	Total Toxic Metals	(mg/L)	2.0	--	--	--	--	--
31	Temperature	NGVS	32.00 C	22.4-24.0°C	25.0	25.0	25.0	25.0
32	Pesticides	(mg/L)	0.15	BDL	--	--	--	--

BDL = Below detected Limit

Surface water and wastewater samples indicate elevated pollution levels near drain discharge points. TSS, TDS, BOD, COD, ammonia, sulphide, and chloride concentrations exceeded PEQS at several locations, within acceptable limits, suggesting localized pollutant input rather than widespread toxic contamination.

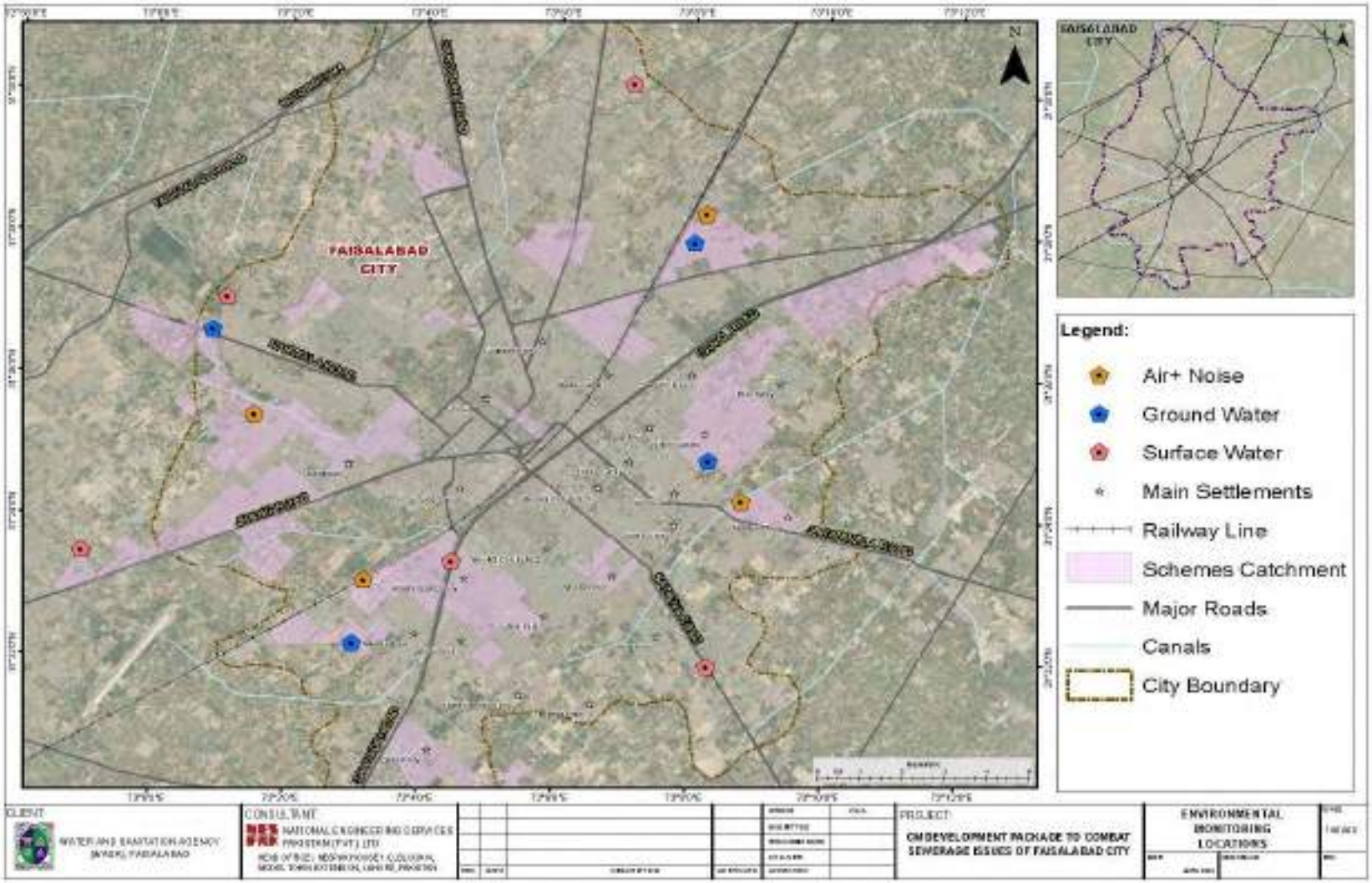


Figure 4.10: Environmental Monitoring Location Map

4.4.6 Seismology

Faisalabad is located in a low hazard earthquake zone**. Figure 4.11** shows the seismic zoning map of project site with the project area falling under Seismic Zone-2A. The Zone 2A has Peak Ground Acceleration (PGA) in the range of 0.08 g to 0.16 g.

The seismic zoning on the basis of Peak Ground Acceleration (PGA) is summarized in **Table 4.2**.

Table 4.6: Seismic Zones

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

Source: Building Code of Pakistan, Seismic Provisions – 2007

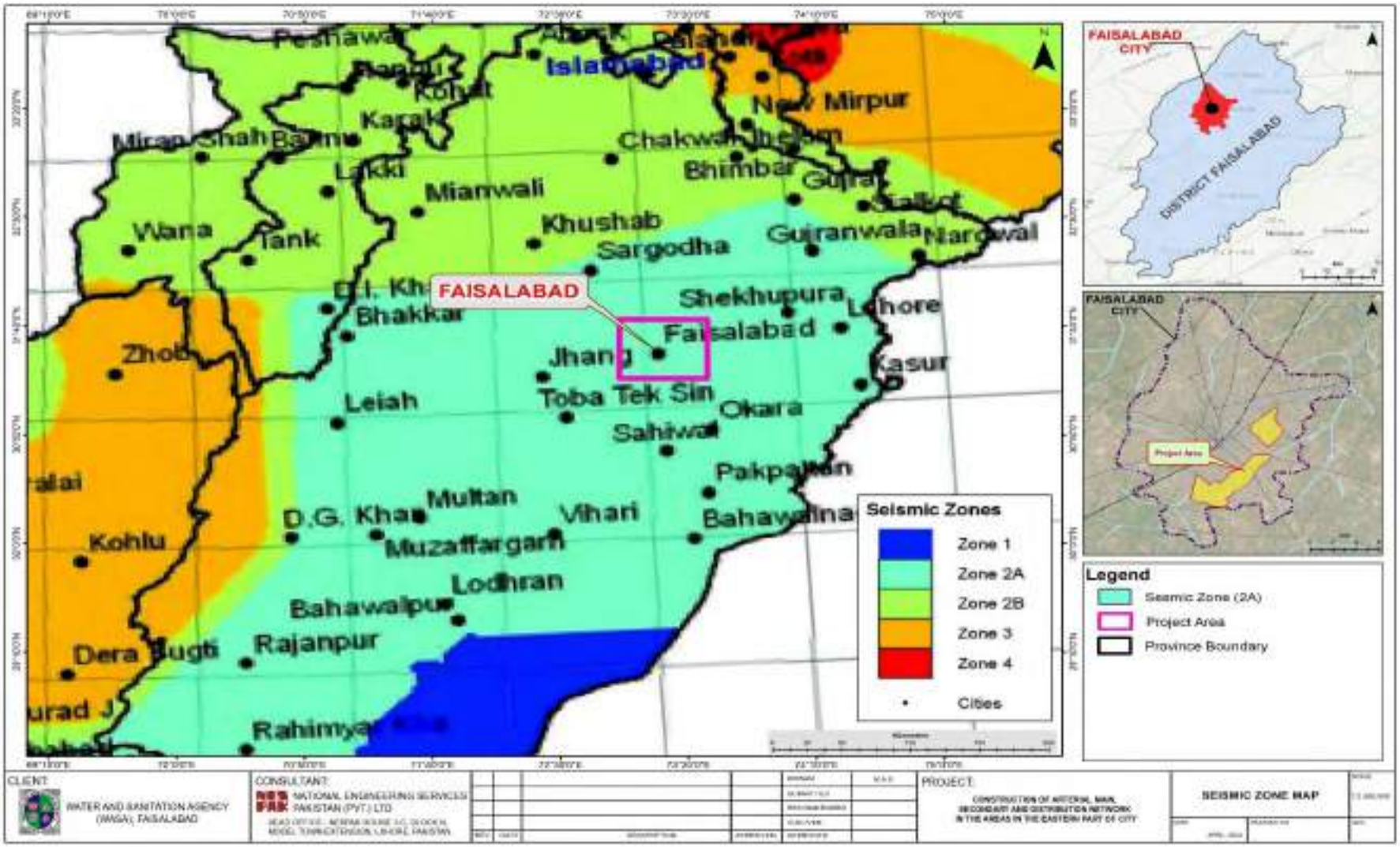


Figure 4.11: Seismic Zone Map of Project Area

4.4.7 Land use of Project Area

The project area has a diverse landscape comprising both residential, commercial and agricultural. Essential amenities such as schools, mosques, roads, medical facilities, shops, parks and graveyards are also present, catering the needs of the locals. **Plate 4.1** depicts the present land use of the project area. Overall project area Land use map is shown in **Figure 4.12** and land use maps of each scheme are provided in **Annex-V.**

Plate 4.2: Land Use of Project Area

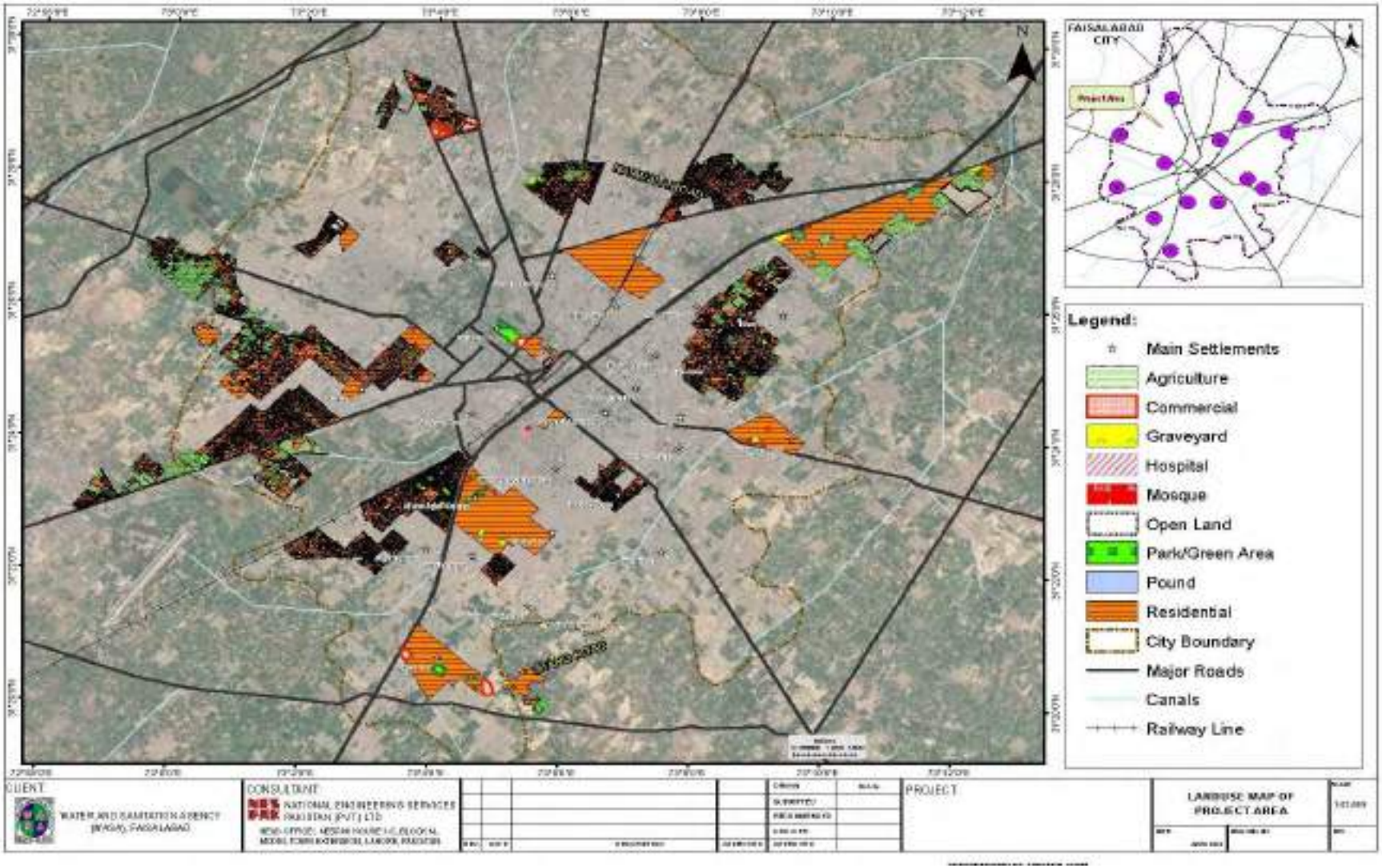


Figure 4.12: Land Use Map of Project Area

4.4.8 Environmental Sensitive Receptors

The physical and cultural resources are of immense importance for any community and hence need to be protected and preserved. However, no sites of archeological or historical importance are found in the project area, but some important resources including religious places, medical facilities, educational facilities etc. are found in abundance. An inventory of such sites was prepared for the record to take precautionary measures in the future. Maps of sensitive receptors is shown in **Figure 4.13** and Scheme wise sensitive receptors maps area attached as **Annex-VI.**

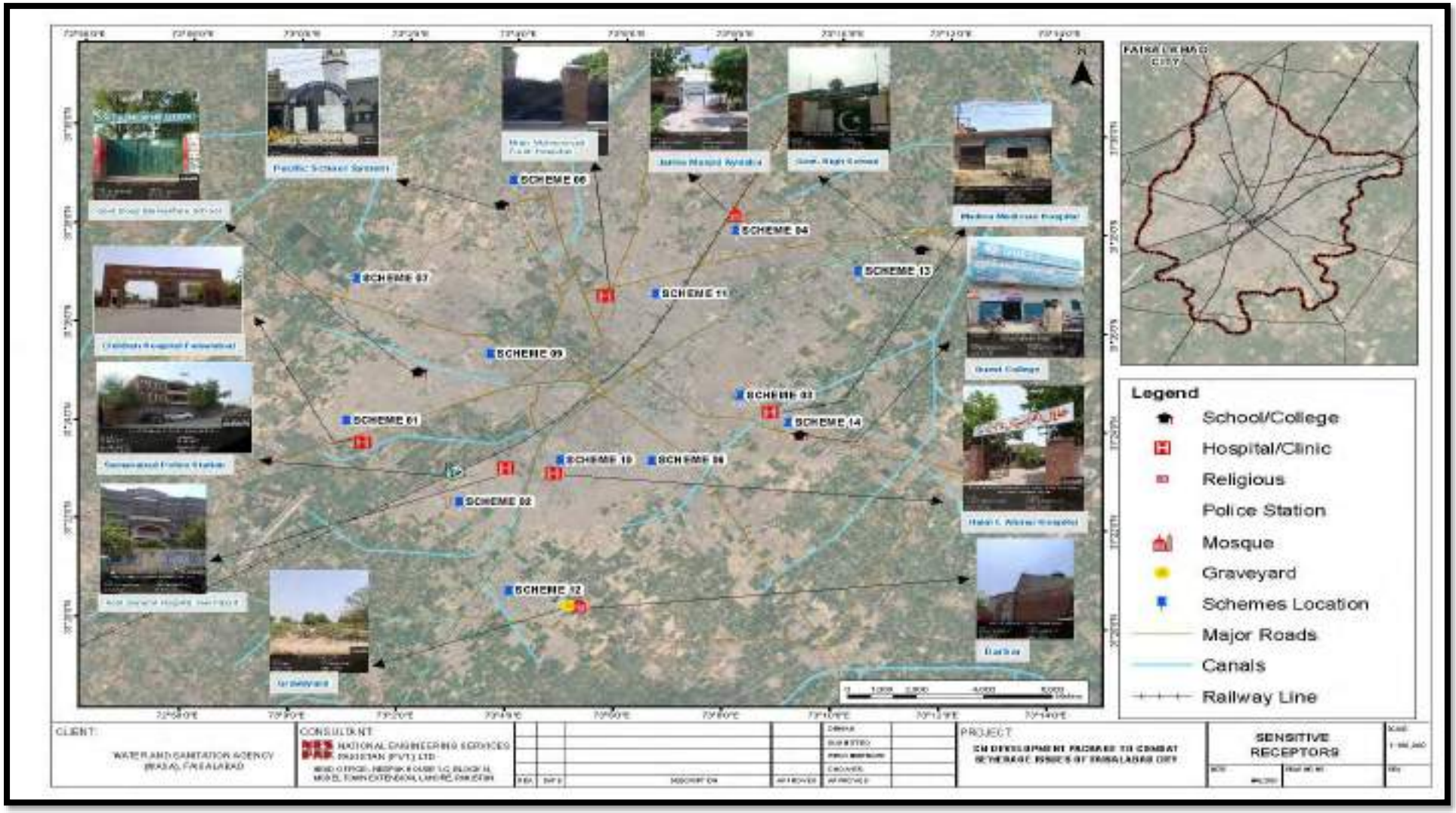


Figure 4.13: Sensitive Receptor Map of Project Area

4.5 Biological Environment

Project site is rich in biodiversity because of its diverse landscape and geographical location. The variety of ecosystem is evident as this area is home to various species. The following section describes the biological environment of the project area. **Plate 4.2** shows few existing tree species in project area.

4.5.1 Flora

The major floral species of the project area include:

Sr. No.	Common Name	Scientific Name
1	Chinaberry (Dharek)	Melia azedarach
2	Arabic Tree (Kikar)	*Acacia nilotica*
3	Gum trees (Sufaida)	*Eucalyptus camaldulensis*
4	Black plum	*Syzygium cumini*
5	Rosewood (Shisham)	*Dalbergia sissoo*
6	Sirris	*Albizzia lebbek*
7	Indian lilac (Neem)	*Azadiraccta indica*
8	Cottonwood	*Salicaceae*
9	Mulberry	*Morus alba*
10	Indian plum	*Heterophragma adenophyllum*
11	Willow	*Salix babylonica*
12	Frash	*Tamarlx aphylia*
13	Silk cotton (Simal)	*Bombax cieba*
14	Palm	*Phoenix dactiliferia*

Plate 4.3: Visual of few Flora of Project Area

A. Natural Shrubs and Herb

Few Natural shrubs and herbs found in the project site shown below. **Plate 4.3** below shows few shrubs in project area.

Plate 4.4: Visual of few Shrubs of Project Area

B. Major Crops

Major crops that are cultivated in project area are Sugarcane, wheat, maize, citrus fruits and Rice. Cotton is also cultivated, textile industry in region heavily relies on cotton. Additionally, Faisalabad is also known for its production of vegetables, particularly potatoes and onions, along with various fodder crops to support livestock farming.

4.5.2 Fauna

In the area common animals found are dogs, cats, ducks, house rats and bats. Domestic livestock that was observed during field visit include buffalo, cattle, goats, sheep, hens and donkeys that are used by the local residents for their living. **Plate 4.4** shows few existing Fauna of project area. Some other fauna at project area is as followed;

Sr. No.	Common Name
1	House Sparrow
2	Rose-ringed Parakeet
3	Common Myna
4	Indian Palm Squirrel
5	Waterfowl
6	Jungle Cat (Felis chaus)
7	Common Grey Mongoose (Herpestes edwardsi)
8	Long-earedHedgehog (Hemiechinus collaris)
9	Desert Jird (Meriones hurrianae)

Plate 4.5: Visual of few Fauna of Project Area

A. Amphibians

According to Pakistan Wildlife Department, Bullfrog (Hoplobatrachus tigernius), Pahari tidda maindak (Fejervarya limnocharis) and Indus valley toad (Buffo stomaticus) are also present in the nearby ponds and canals during rainy season.

B. Reptiles

Common tree lizard (*Calotes versicolor*), Monitor lizard (*Varnus bengalensis*), fat tailed lizard (*Uromastix hardwickii*) and fringed toed lizard (*Acanthodactylus cantoris*) are observed in and around the proposed site. Indian soft-shell turtle (*Aspideretes gangeticus*) and Indian falpshell (*Lisseyms punctate andersoni*) are also reported by the local residents.

C. Endangered Species

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

4.6 Socio-Economic Environment

This sub-section presents the socioeconomic baseline profile of the project area. The current socioeconomic baseline profile covers various aspects including demographics, socioeconomic factors, educational status, health conditions and availability of amenities, etc. The socioeconomic baseline profile was developed using both primary and secondary data. The sources of data and methodology of data collection are discussed below in **Figure 4.14**:

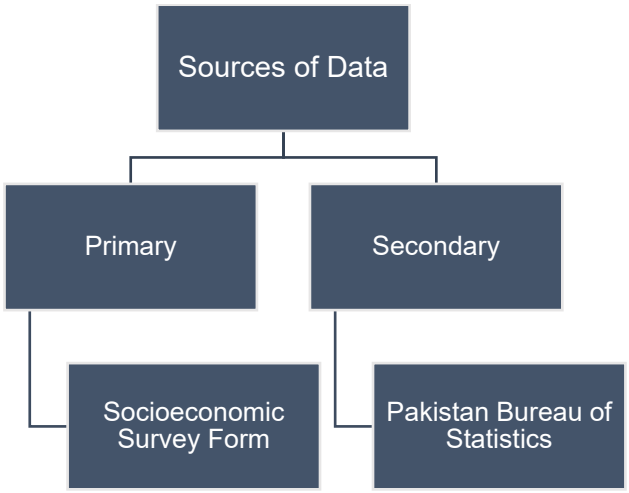


Figure 4.14: Source of Data

4.6.1 Secondary Data

Faisalabad is the second most populous agriculture industrial district in Punjab with a population of 7.87 million people and is also known as the Manchester of Pakistan due to its textile importance. The district contributes approximately $5 billion to the national GDP through textile exports. The literacy rate of the district is close to 60%.

Faisalabad comprises 06 Tehsils, 01 Municipal Corporation, 07 Municipal Committees, and 842 Villages. Whereas, the total area of the district is 5,856 Sq/Km. Parameter-wise details are given hereunder:

1. Population of Faisalabad

As per the latest census data i.e., the year 2023, the population of district Faisalabad is 9,075,819 which has been increased at a growth rate of 2.38% since 2017. The figures are summarized in **Table 4.3** below:

Table 4.7: Population of Faisalabad

Admin Unit (District)	Number of Household	Population (2023)	Average Household (HH) Size	Growth Rate
Faisalabad	1,384,668	9,075,819	6.55	2.38

Source: Census Report 2023, Punjab Bureau of Statistics

4.6.2 Primary Data

Primary data was collected during May 14 and May 21 2025, by a dedicated team of sociologists who utilized a questionnaire (see **Annex-VII**) to gather the requisite information about the social settings of the project area. The sample size of 150 respondents was adopted by using a Cochran's technique.

The collected data was analyzed using software named Statistical Package for Social Sciences (SPSS), a statistical information handling tool, to analyze various socioeconomic features. The findings of the study are presented hereunder:

A. Demographic Characteristics of the Respondents

i. Age Composition

The graph shows that the majority of respondents fall within the 18–28 age group (29%), followed by the 29–38 category (24%). Participation declines in older age brackets, with the 39–48 and 49–58 groups making up 15% and 14% respectively. The 59–68 age group accounts for 19%, indicating moderate involvement from these participants. Overall, younger individuals were more actively engaged in the survey. The age composition of the respondents is shown hereunder in **Figure 4.15**.

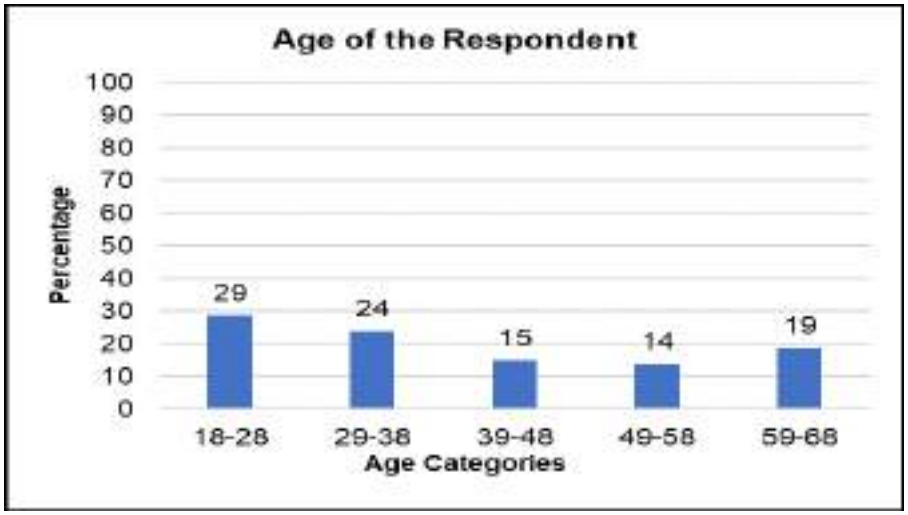


Figure 4.15: Age Composition

ii. Level of Education

The graph indicates that the highest proportion of respondents are illiterate (25.33%), closely followed by those educated up to the matric level (23.33%). Education levels taper off beyond intermediate, with only 6% having completed graduation and just 0.67% pursuing education above that. This shows a predominantly low to mid-level educational background among the surveyed population. Whereas, the statistical analysis of the qualification of the respondents is reflected in Figure **4.16.**

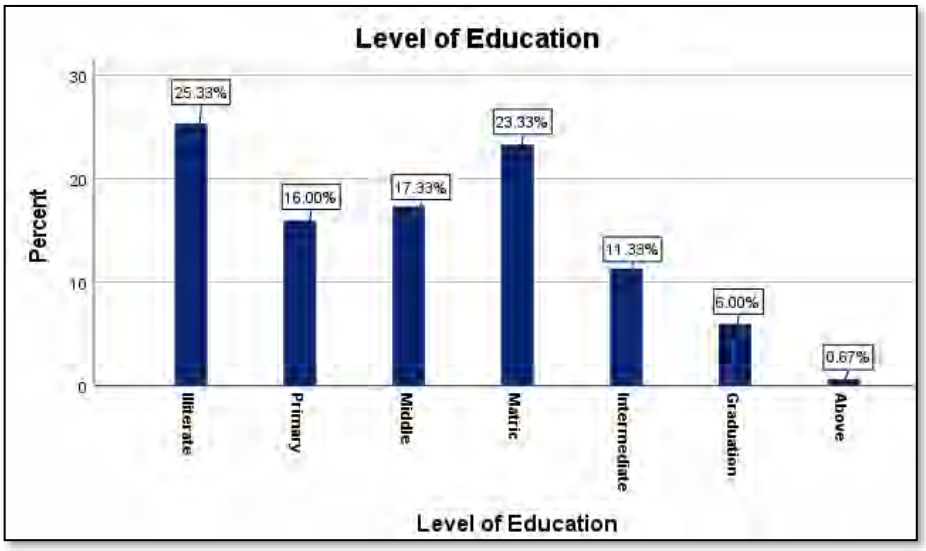


Figure 4.16: Level of Education

iii. Source of Income

The graph shows that shopkeepers constitute the largest professional group among respondents at 38%, followed by laborers/daily wagers (22.7%) and business owners (20.7%). Government and private employees represent a small portion, each below 5%. The presence of students/unemployed (2%) and others (0.7%) is minimal, indicating that most participants are self-employed or engaged in informal labor. **Figure 4.17** shows the occupation of the respondents.

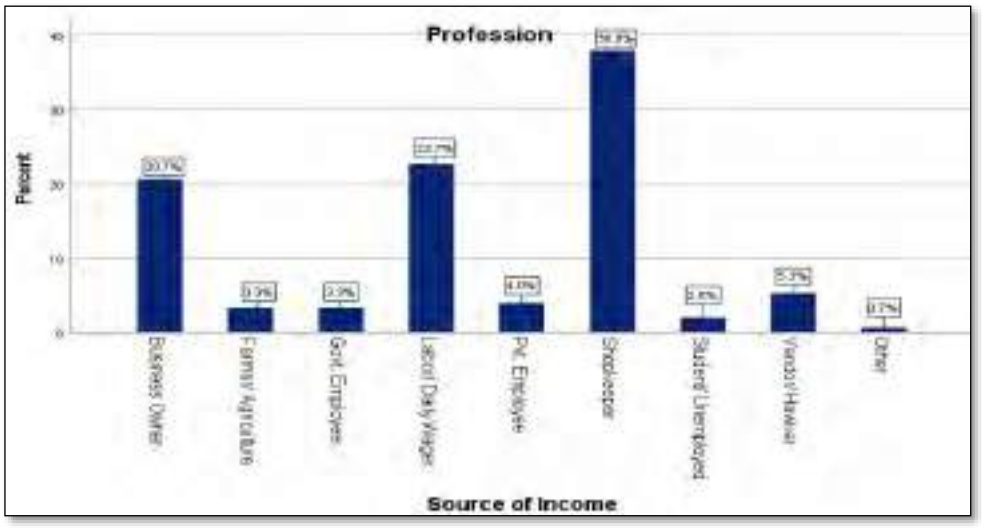


Figure 4.17: Profession

iv. Marital Status

Survey findings reveal that the majority of respondents were married. **Figure 4.18**, describes the marital status of the respondents.

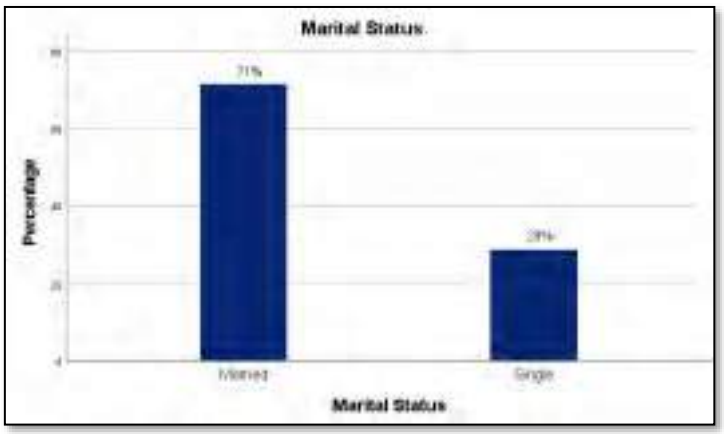


Figure 4.18: Marital Status

v. Family System

The family system in the project area is observed mix. Joint families were observed 54%; however, a 46% of the nuclear family system was also reported. **Figure 4.19**, describes the statistics of the family structure of the project area.

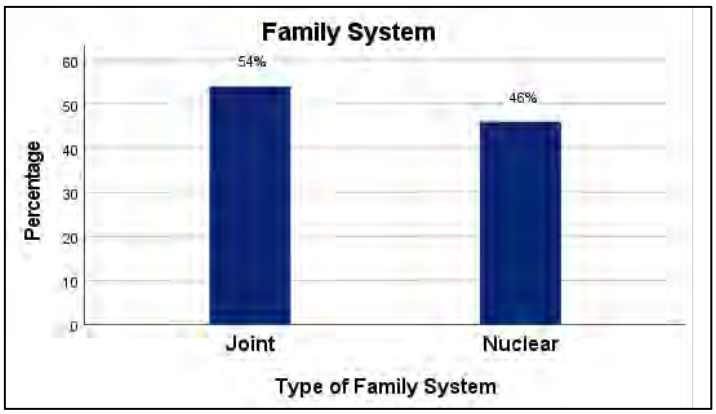


Figure 4.19: Family Structure

vi. Religion

The survey area is predominantly made up of Muslims who account for 95% of the respondents, while a few numbers of respondents from the Christian community were also reported.

vii. Caste / Ethnic Group

The major castes reported in the project area include Ansari, Arain, Bhatti, Jutt, Malik, Rajpoot, Kharal, Khokhar, Shiekh, Rajpoot, Syed, Dogar and Ansari. Details are given below in **Figure 4.20**

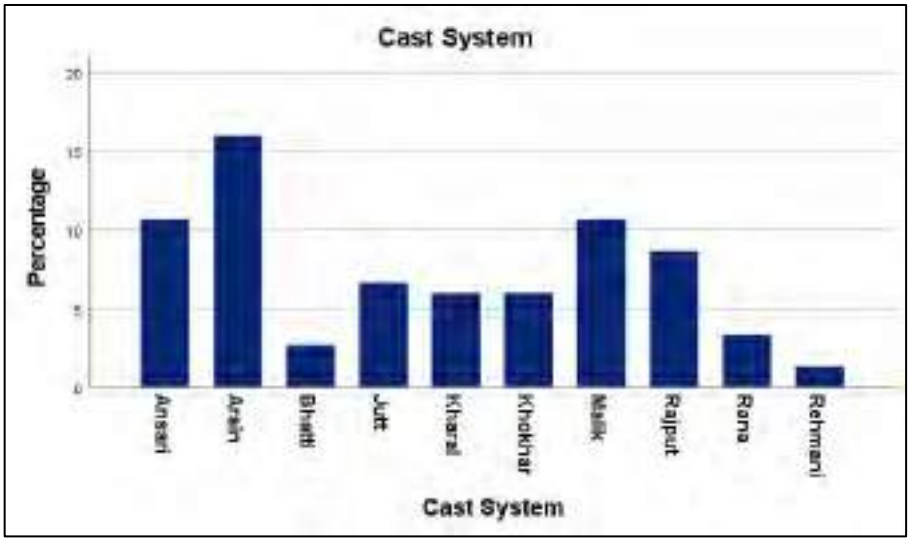


Figure 4.20: Caste System

viii. Language Spoken

The majority of our survey participants belong to two main castes. Punjabi is the predominant language spoken in the project area, though a small number of respondents identified Pashto as their primary language. Details are given in **Figure 4.21**, hereunder.

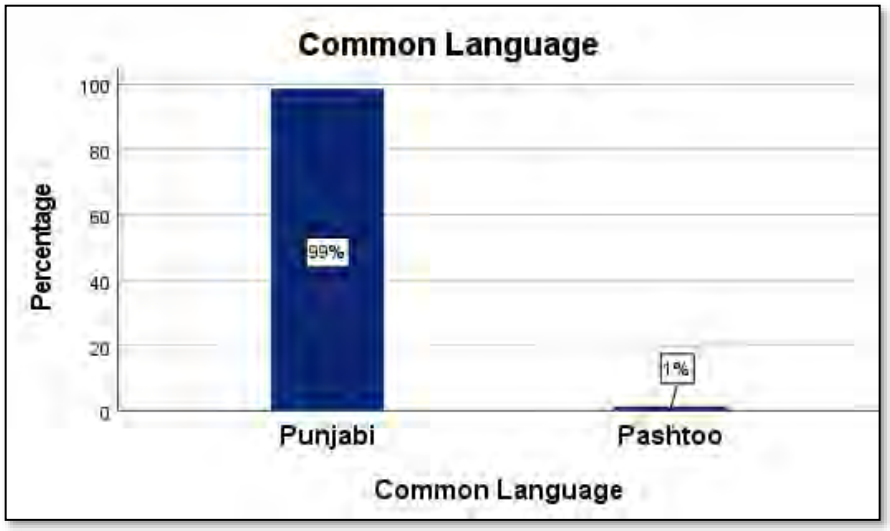


Figure 4.21: Common Language

B. Socio-Economic Characteristics

i. Monthly Income of the Respondents

The income distribution observed in the survey is primarily due to the respondent profile, which consisted mostly of shopkeepers operating on a small to medium scale. These individuals typically earn stable but moderate incomes. As a result, the highest percentage (25%) earn between 40,001 and 50,000 monthly, about 23% fall in the 30,001 to 40,000 income brackets, while 21% earn between 20,001 and 30,000. A smaller proportion, 17%, have incomes between 50,001 and 60,000. The minimal unemployment rate (1%) also suggests that most respondents are engaged in some form of economic activity. The data is summarized hereunder in **Figure 4.22:**

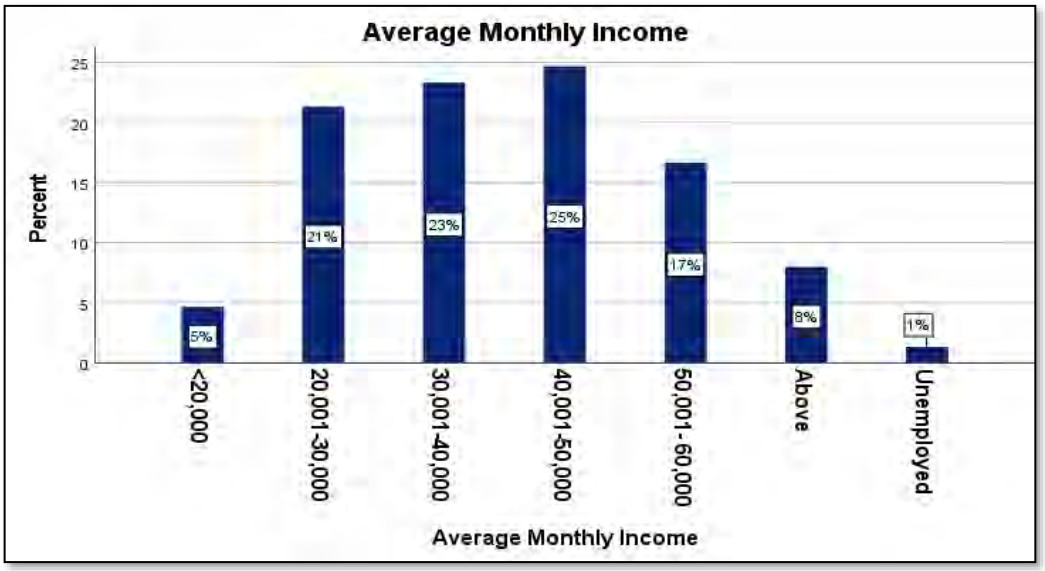


Figure 4.22: Average Monthly Income

ii. Household Expenses of the Respondents

The analysis reflects that most respondents have modest monthly expenses, primarily because the survey was conducted among shopkeepers mostly, who generally belong to a middle-income group. The survey results indicate that the majority of respondents (50%) have monthly expenses ranging from 30,001 to 50,000. A significant portion, 21%, spends between 20,001 and 30,000, while only 5% report expenses below 20,000. Additionally, 15% of individuals fall within the 50,001 to 60,000 bracket, and a smaller group (9%) spends above 60,000 monthly. Data regarding the household expenses of respondents is summarized below in **Figure 4.23**.

Figure 4.23: Average Monthly Expenses

iii. Ownership of House

Most of the respondents reported owning their houses and a considerable percentage of the respondents were renters. A lesser percentage of the rented properties in the project area was observed in the project area. Statistical data of ownership status is summarized in **Figure 4.24**.

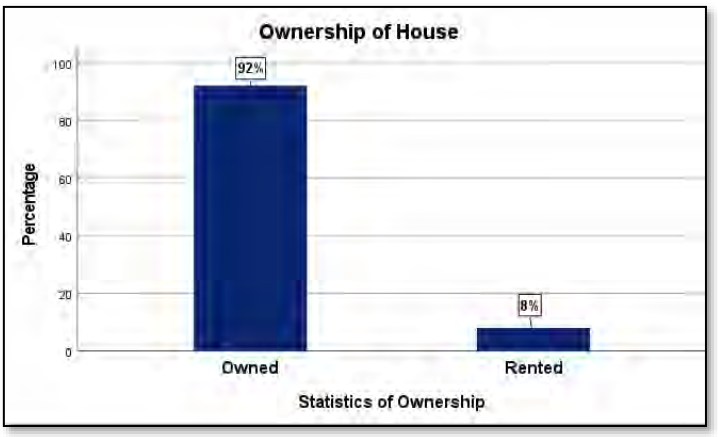


Figure 4.24: Ownership Status of Houses

iv. Mode of Transport

In the project area, respondents utilized both public and private transportation options. However, the majority relied on their own means of transport, such as motorcycles, rickshaws, while a smaller portion depended on public transport for limited travel needs as summarized in **Figure 4.25**.

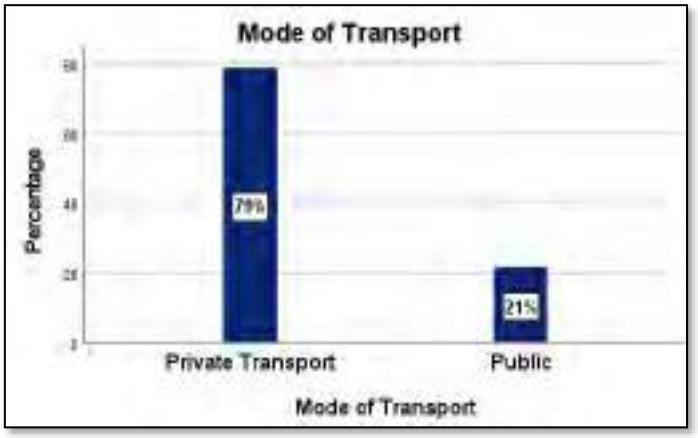


Figure 4.25: Mode of Transport

v. Common Diseases

The respondents were enquired about the common diseases in their families and the project area to assess the health situation. It was assessed that the common diseases in the project area include, but are not limited to, hepatitis, gastrointestinal diseases, skin diseases, allergies and malaria. etc.

vi. Health Facilities

The nearby health facilities include the following:

- General Hospital
- Al-shifa Hospital
- Allied Hospital
- Faisalabad Civil Hospital
- Social Security Hospital
- Al-Rehman Hospital
- District Health Quarter (DHQ)

Furthermore, several private clinics and dispensaries are also present in the project area. However, people mostly prefer government medical facilities for the treatment of various ailments.

vii. Educational Facilities

There are several public and private schools in the project area. A brief list of such facilities especially in the area of influence of the proposed interventions is given hereunder:

- Allied School System.
- Govt. High School.
- Govt. Primary School.
- Govt. Boys Primary School.
- Govt. Girls Primary School.
- Islamic Foundation School.
- Prime Public School.
- Dar-e-Arkam School.
- Educational University
- Government College University

C. Basic Civic Amenities in the Project Area

The basic civic amenities including electricity, gas supply, sewerage system, solid waste management system, health facilities, telecommunication, roads, parks, mosques, etc. are present in the project area. In addition to these facilities, the area is accessible by ambulance.

i. Source of Water

The groundwater in Faisalabad brackish which is unfit for human consumption and the city administration has made different arrangements through multiple sources to meet the needs of the community. Some of the areas have access to the piped water supply network, but in most of the places this water is not clean according to respondents. The people in the project

area rely on brackish groundwater to meet their domestic needs and have installed boreholes, few depend on handpumps at various depths summarized in **Figure 4.26.**

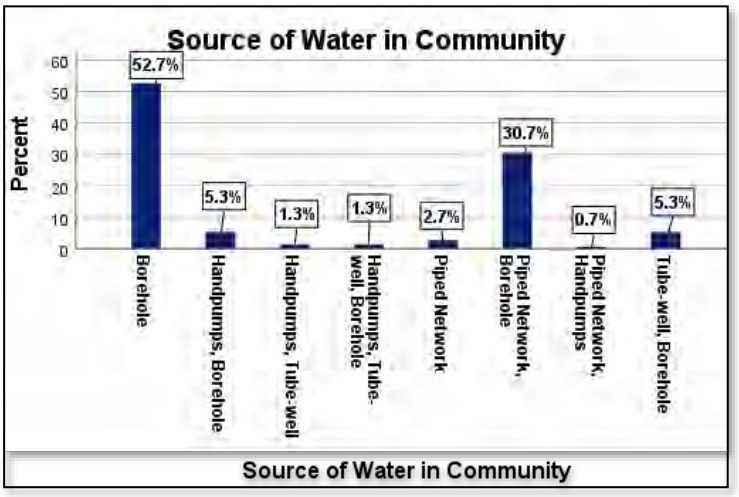


Figure 4.26: Mode of Transport

For drinking purposes, the water is bought from commercial vendors, Filter plants and some people also make efforts to fetch water from the sweet water tube wells installed along the canal. Gathered information regarding the potable water sources is summarized hereunder in **Figure 4.27.**

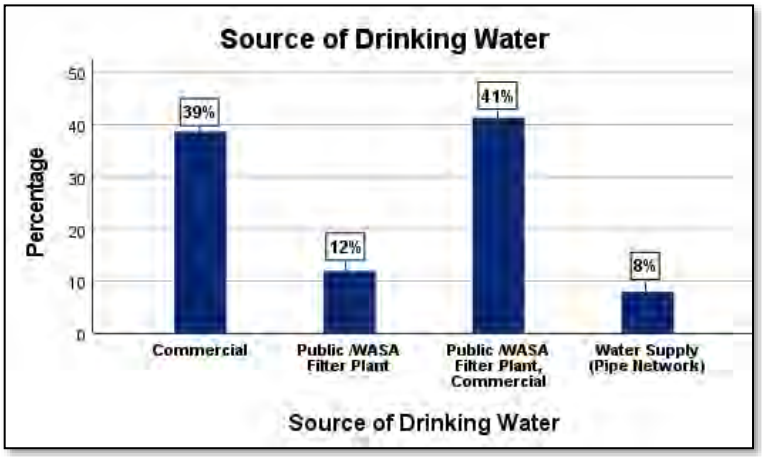


Figure 4.27: Source of Potable Water

ii. Sewerage System

The majority of respondents expressed dissatisfaction with existing infrastructure performance. Approximately 38% of the area lacks proper sewer lines and relies on open drains. In the remaining schemes where sewerage infrastructure exists, the system is under-capacity and unable to accommodate the full sewage load, leading to frequent stagnation and ponding issues as summarized in **Figure 4.28**.

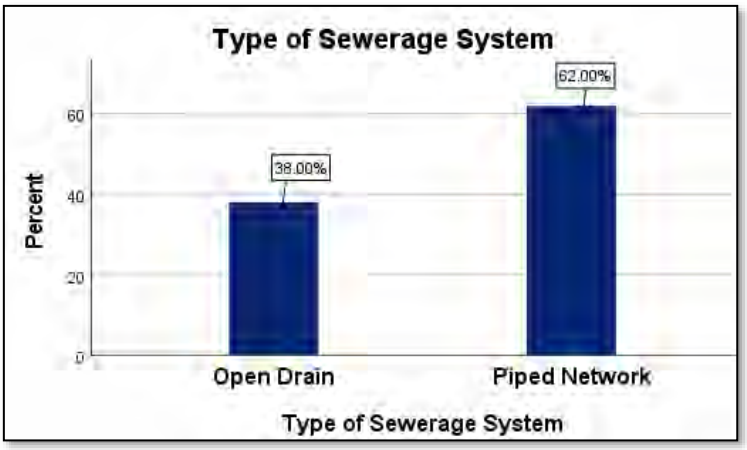


Figure 4.28: Type of Sewerage System

iii. Solid Waste Management System

Faisalabad Waste Management Company (FWMC) is the responsible authority for the collection and disposal of solid waste in the project area. The company mostly provided a door-to-door collection facility. In few schemes it is responded by the locals that they are dumping the waste on their own in the community bins near their homes. The data is summarized below in **Figure 4.29.**

Figure 4.29: Solid Waste Management System

D. Major Concerns of Locals

People have major concerns about the sewerage system in the project area due to its poor condition and lack of proper maintenance. In locations where open ponding exists, residents are often forced to manage the situation on their own. They hire local cleaners at their own expense to remove garbage and clear blockages from open drain lines. In areas where sewer lines are present but under capacity, frequent sewage overflow onto roads creates serious issues. Residents usually call sanitation workers (Jamadars) to clean manholes, yet the problem often persists. Stagnant sewage remains in the streets, posing health hazards and worsening living conditions. The situation leads to foul odors and unhygienic surroundings. Streets become flooded, particularly after rainfall, making daily movement extremely difficult.

People struggle to reach schools, markets, and religious sites. This lack of an effective drainage system continues to impact their quality of life. Urgent attention and proper infrastructure upgrades are needed to resolve this crisis.

E. Mechanism of Conflict Resolution

During the field survey, discussions were held with the locals about the disputes prevailing and their resolution system in their communities. It was revealed that most of the issues are resolved through local mediation and the police are only involved in severe cases.

F. Presence of NGOs/CBOs

Non-Governmental Organizations (NGOs) were not identified in the project area.

G. Willingness for the Implementation of the Project

Improving the sewerage system is critically needed in the project area. Residents are making considerable efforts to cope with the current situation, as sewage ponding on roads poses serious health risks by contributing to the spread of diseases. The community has expressed strong support for the proposed project and has committed to fully cooperating during its implementation.

5 PUBLIC CONSULTATION

This section describes the outcome of the public consultation sessions held with different stakeholders that may be affected by the proposed project. Public consultation is mandatory as part of the EIA process for development projects. Public consultation and information disclosure adequacy is one of the basic criteria used to determine the project's compliance with the national/international safeguard policies.

5.1 Objectives and Principles Guidelines for Consultation

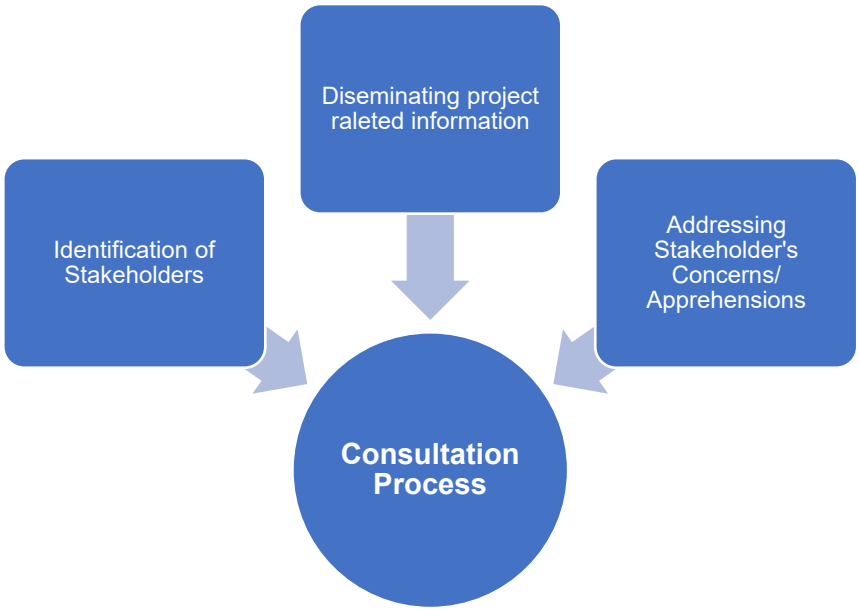
The consultation provides a forum where relevant information to the project is disseminated to and from the stakeholders. This participation is necessary because it paves a pathway between the investor and the public and enables the provision of much-needed local knowledge and indigenous know-how which can be integrated into the project design. This fosters goodwill and success in the project and leads the project to be conflict-free throughout the execution exercise.

The objectives of public consultation were to:

- Inform the public about the proposed project.
- Identify and involve all stakeholders, in the consultation and participation process;
- Share information with stakeholders on the design and implementation of the proposed project and expected impacts on the physical, biological, and socio-economic environment of the proposed project area;
- Understand stakeholders' concerns regarding various aspects of the project, including the existing available facilities and problems, the erection of the proposed project, and the likely impacts of construction and operation-related activities of the proposed project;
- Understanding the perceptions, assessment of social impacts, and concerns of the communities in the vicinity of the proposed project;
- Provide an opportunity to the public in the public consultation session to provide valuable suggestions for the project design optimistically.
- Reduce the chances of conflicts through the early identification of controversial issues, and consult them to find acceptable solutions.

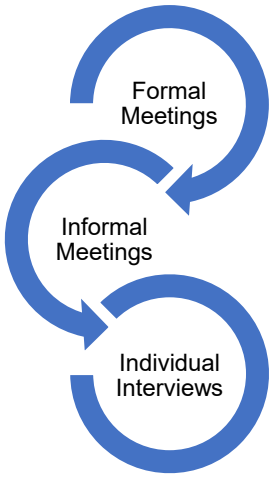
5.2 Consultation and Participation Process

Stakeholder consultations are the key to ascertaining the perception of different stakeholders about the project. Therefore, the identification and involvement of various stakeholders is a crucial part of the EIA process. The consultation and participation process adopted for the study is summarized hereunder:



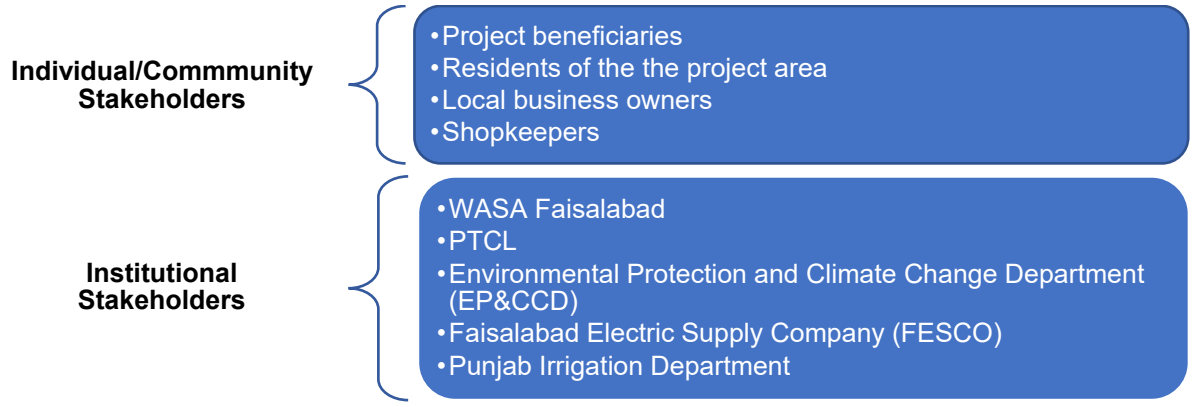
5.3 Method of Consultation

Consultations were carried out to establish stakeholder's opinions regarding project implementation. The following methods were used for the consultations:



5.4 Identification of Stakeholders

Stakeholders are those who have a direct or indirect interest in the project development and will be involved in the consultation process. During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. The following stakeholders were identified during the field survey:



5.5 Consultation Meetings (Formal and Informal Group Discussions)

5.5.1 Informal Meetings and Individual Interviews

Informal meetings and individual interviews were conducted with the local residents of all the communities of all the schemes. The project-related information was disseminated and their concerns/ apprehensions were recorded. These meetings were carried out in the project area.

Generally, it was found that almost all respondents including residents and other stakeholders showed their willingness for the proposed project. This project will provide sewerage facility to residents.

The photographic evidence of informal consultations is given in **Plate 5.1**.

i. Concerns / Suggestions the Stakeholders

The concerns and suggestions of the community recorded during the informal consultation meetings are summarized hereunder:

- The construction of the proposed project should be completed within the stipulated time;
- Arrangements should be made to suppress dust, curtail high-noise activities, and control the vibrations caused due to machinery, to protect the community's health;
- Residents of the local community should be given priority for jobs both in the construction and operation phases;
- Tree cutting should be avoided as far as possible;
- Any damage to the existing utilities should be repaired immediately;
- The accessibility issues will arise during the construction phase; therefore, alternative access routes should be provided;
- A traffic management plan should be devised and communicated to the local community to avoid traffic congestion issues;
- The construction waste as well as the domestic waste should be frequently collected and disposed of to the designated dumping sites;
- The restriction in access due to excavation works will cause temporary economic losses to the local business persons.

ii. Responses to the Concerns of the Community

The concerns of the community were adequately addressed by the consultants during the consultation meetings. Following is the summary of the responses of consultants:

- The construction contractor will be advised to complete the construction within the agreed timelines;
- Regular sprinkling of water will be carried out over the loose soil to suppress the dust, the noisy activities will not be planned at night and the community will be informed before the execution of any activity that would generate vibrations;
- The contractor will be advised to hire local labor, wherever feasible;
- Tree cutting will be avoided, if necessary, compensatory plantation will be done to offset the impact of tree cutting;
- The excavation works will be executed in the presence of the representatives of line departments including PTCL, SNGPL, etc. and any accidental damage will be swiftly addressed;
- The excavation works will be executed in pockets to curb the accessibility issues and in case complete access is blocked, alternate routes will be kept operational;
- The traffic management plan has already been devised and is part of the contractor's work plan;
- A solid waste management plan has been devised to avoid any nuisance due to solid waste;
- The excavated patches of land will be backfilled daily to ensure accessibility to the marketplaces and thus reduce any economic burden.


Public Consultation with the Stakeholders in Scheme No.1


Public Consultation with the Stakeholders in Scheme No.1


Public Consultation with the Stakeholders in Scheme No.1


Public Consultation with the Stakeholders in Scheme No.2


Public Consultation with the Locals in Scheme No.2


Public Consultation with the Stakeholders in Scheme No.2


Public Consultation with the Stakeholders in Scheme No.3


Public Consultation with the Stakeholders in Scheme No.3


Public Consultation with the Locals in Scheme No.4


Public Consultation with the Locals in Scheme No.4


Public Consultation with the Locals in Scheme No.5


Public Consultation with the Local in Scheme No.6


Public Consultation with the Local in Scheme No.6


Public Consultation with the Local in Scheme No.7


Public Consultation with the Local in Scheme No.7


Public Consultation with the Local in Scheme No.9


Public Consultation with the Local in Scheme No.9


Public Consultation with the Local in Scheme No.10

Public Consultation with the Local in Scheme No.10

Consultation with the D/S Operator in Scheme No.11


Public Consultation with the Stakeholders in Scheme No.11


Public Consultation with the Stakeholders in Scheme No.11


Public Consultation with the Stakeholders in Scheme No.12


Public Consultation with the Stakeholders in Scheme No.12


Public Consultation with the Stakeholders in Scheme No.12


Public Consultation with the Stakeholders in Scheme No.13


Public Consultation with the Stakeholders in Scheme No.14


Public Consultation with the Stakeholders in Scheme No.14


Public Consultation with the Stakeholders in Scheme No.14

Plate 5.1: Photolog of informal consultations

5.5.2 Detailed Meeting with the Institutional Stakeholders

The line government departments are the primary stakeholders of the project and hence needs to be taken on board during the planning stage of the project. Furthermore, EP&CCD is the regulatory authority to ensure environmental compliance and hence need to be made aware of the project beforehand. The consultations with these stakeholders were conducted and a summary of these consultations is given in **Table 5.3.** The photo log of formal consultations is given in **Plate 5.2**.

Table 5.1: Schedule of Meetings with Institutional Stakeholders and their Concerns / Apprehensions

Sr. No	Departments	Date of Meeting	Participants	Points of Discussion	Responses
1.	Water and Sanitation Agency Faisalabad (WASA-F)	14-05-2025	Mr. Furqan (Deputy Director WASA-F) Mr. Muhammad Ali (Env. Engineer, NESPAK) Mr. Muhammad Anns Ali (Env. Engineer, NESPAK)	• The consultant discussed the proposed project to understand their apprehensions and gather suggestions regarding the project. • The consultants enquired about the status of land ownership for the proposed Disposal Station location. • The consultants further requested to provide facilitation in lining up meetings with other government departments.	• The client indicated that the project area currently lacks basic facilities. The community will be supportive of the execution of the proposed project. • The WASA-F arranged the meeting with different government departments. • The representative of WASA-F comprehensively described the status of land ownership. • It was informed that the Disposal Station locations are under the ownership of WASA-F.

Sr. No	Departments	Date of Meeting	Participants	Points of Discussion	Responses
2.	Pakistan Telecommunication Limited (PTCL)	15-05-2025	Mr. Sajjad Sarwar (Senior Business Manager, PTCL) Mr. Arslan Khaliq (Manager Transport Optical fiber, PTCL) Mr. Muhammad Ali (Env. Engineer, NESPAK) Mr. Muhammad Anns Ali (Env. Engineer, NESPAK)	The consultant's team described the need, objective, location and proposed activities to PTCL representatives and inquired about their apprehensions/ suggestions regarding the project. The representatives of PTCL welcomed the project, owing to its community benefits. However, a few suggestions were made regarding the technical aspects of the project., which are summarized hereunder: • There is a network of sensitive optic fibre cables in the project area which are vulnerable to damage due to proposed excavation works. • Extreme caution will be required during the execution of the project. • A representative from PTCL will be present at the site during the excavation works. • The cost of any damage to the cables will be bear by WASA-F. • WASA-F should share the complete design details with PTCL before the execution of works.	• WASA-F will share the complete design with PTCL once it gets finalized. • PTCL was requested to share the BOQs of the repair works to be incorporated in the project cost as part of the contingency plan. • PTCL will be kept informed and onboard at all the stages of the project.

Sr. No	Departments	Date of Meeting	Participants	Points of Discussion	Responses
3.	Environmental Protection and Climate Change Department (EP&CCD), Punjab	15-05-2025	Mr. Usman Azhar (Deputy Director EP&CCD) Mr. Azhar Fareed (Inspector EP&CCD) Mr. Muhammad Ali (Env. Engineer, NESPAK) Mr. Muhammad Anns Ali (Env. Engineer, NESPAK)	The consultant's team described the need, objective, location and proposed activities to EP&CCD representatives and inquired about their apprehensions/ suggestions regarding the project. • When conducting an EIA, it's important to hold sessions involving all stakeholders and project beneficiaries. • During public consultation and interviews with stakeholders, effective communication should be maintained excluding all the communication gaps. • All critical points and aspects regarding the social aspects of the community should be clearly explained and noted that will come from the community concerns. • There should be a designated and centralized point for the public hearing.	• All the suggestions will be incorporated. Public consultations are already underway and efforts will be made to take all the stakeholders on board.

Sr. No	Departments	Date of Meeting	Participants	Points of Discussion	Responses
4.	Faisalabad Electric Supply Company (FESCO)	15-05-2025	Mr. Saeed Sahib (Chief Engineer, FESCO) SDO, FESCO Mr. Sami Ullah (Revenue Officer, FESCO) Mr. Muhammad Ali (Env. Engineer, NESPAK) Mr. Muhammad Anns Ali (Env. Engineer, NESPAK)	The consultant's team described the need, objective, location, and proposed activities to the representatives of FESCO and inquired about their apprehensions/ suggestions regarding the project. • There are underground installations (sensitive electrical cable) of FESCO in the project area which are vulnerable to damage due to proposed excavation works. • The electric poles may also get affected and need to be taken care of; • WASA-F should share the complete design details with FESCO before the execution of works. • If the electric poles need to be relocated, a joint survey will be conducted with the representatives of WASA-F and FESCO to make necessary arrangements; • WASA-F will bear all the expenses of relocation of poles and/or any damage to the installations of FESCO.	• WASA-F will conduct joint visits with the representatives of FESCO as well as consultants, to identify and relocate electrical utilities. • The cost of relocation will be decided in a joint meeting among the officials.

Sr. No	Departments	Date of Meeting	Participants	Points of Discussion	Responses
5.	Punjab Irrigation Department (PID), Faisalabad	15-05-2025	Mr. Khuram (XEN., Irrigation Department) Mr. Muhammad Ali (Env. Engineer, NESPAK) Mr. Muhammad Anns Ali (Env. Engineer, NESPAK)	The consultant's team described the need, objective, location, and proposed activities to the representatives of XEN., PID. Further, they were informed regarding the possible crossing of sewerage across the canals and usage of ROW of PID and inquired about their apprehensions/ suggestions in this regard. • WASA-F will require NOC from PID before the execution of the project; • A detailed design will be required to assess the situation and formulate further plans with WASA-F.	• The design will be shared and the locations for the construction of siphons, aqueducts and level crossing will be marked for further clarification and acquisition of NOC.

Plate 5. 2: Photolog of formal consultations

Meeting with Mr. Furqan
(Deputy Director WASA-F)

Meeting with
Mr. Usman Azhar
(Deputy Director EP&CCD)
Mr. Azhar Fareed
(Inspector EP&CCD)

Consultation Meeting with
Mr. Sajjad Sarwar
(Senior Business Manager, PTCL)
Mr. Arslan Khaliq
(Manager Transport Optical fiber, PTCL)

Meeting with SDO FESCO

Meeting with Mr. Sami Ullah
(Revenue Officer, FESCO)

Meeting with Mr. Khuram
(XEN. Irrigation Department)

6 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 General

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

6.2 Scoping of Impacts

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

- Selection of the Area of Influence (AOI) marked with the help of Google Earth;
- Desk study of engineering investigations, studies and designs;
- Environmental quality baseline monitoring of air, noise, surface water, wastewater and groundwater;
- Detailed review and analysis of primary and secondary data available for all environmental parameters in the project area such as physical, ecological and social resources;
- Socio-economic survey to assess the livelihood conditions and vulnerability of the households;
- Consultations with executing and implementing agencies, local government, affected community and traditional and religious leaders of community;
- Stakeholder consultations with relevant departments, government agencies and locals; and
- Knowledge assimilation of international best practices on environmental assessment of infrastructure projects.

6.3 Methodology

The selection of an appropriate and customized methodology for the impact assessment is critical for the EIA study. The impacts have been assessed based on proposed project life cycle i.e., Pre-Construction, Construction and Operational and Maintenance (O&M) stages. Each phase is assessed based on the area of impact categorized on domain wise i.e., physical, ecological and socio-economic. For the identification of the potentially significant and non-significant environmental and social impacts, different tools were utilized as detailed below:

6.4 Screening Checklist

Based on the findings of desk studies, processed satellite imageries, potentially significant adverse environmental and social impacts were screened out. The objective of the impact

screening is to assess the significance of the issues related to the atmosphere, climate, water resources, land resources, ecological environment, socio-economic environment, transport, infrastructure and communication, natural risks, hazards and external constraints of the Project for the proposed development. After the compilation of baseline information and processing of acquired satellite imagery, the screening checklist was filled to screen out the adverse impact of the proposed Project during the pre-construction, construction and operational phases.

6.4.1 Notion of Significance

The "notion of significance" is based on the following criteria:

Extent: The scale of impact, i.e., limited to the immediate areas of development activity (the site); limited to within a distance reach of the development or affecting the region as a whole; or occurring at a national or international scale;
Duration and Frequency: A prediction/forecasting of the lifetime of the impact: i.e., short-term; medium term; long term with the impact ceasing after the operational life of the development; or considered permanent and how many times the event will occur during that period;
Intensity: A description of the intensity (magnitude/size) of the impact: i.e., high, medium, low, or negligible (no impact). The specialist studies must attempt to quantify the magnitude of impacts and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact;
Reversible/Irreversible: Changes considered irreversible, for example, the loss of biodiversity due to a change in water quality;
Probability: The likelihood that the event will occur; and
Legal Restriction: If the action is likely to affect or be affected by a legal restriction.

Considering these criteria, potential significance was classified as either:

Low: an impact for which no mitigation is necessary;
Medium: an impact that requires effective mitigation; and
High: an impact, which, if not mitigated, could stop the Project from proceeding.

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

6.4.2 Study Area/ Area of Influence

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

6.5 Anticipated Impacts during Pre-Construction/Design Phase

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

6.5.1 Environmentally Responsive Design Considerations

Potential Impact

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

Mitigation Measures

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

6.5.2 Groundwater

Potential Impact

Groundwater contamination may occur during construction by the improper handling of construction material (fuel, lubricant, bitumen, asphalt, etc.) or wastewater from construction camps and domestic sewage. However, the impact will be low adverse in nature.

Mitigation Measures

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

6.5.3 Surface Water

Potential Impact

The major surface water resources of the city are the Chenab and Ravi rivers. There is a network of canals within the city to support the irrigation system. The proposed interventions will be within the city and hence the rivers are not under threat of receiving any pollution from the project activities. The distributaries and the branch canal are however exposed and may get polluted due to malpractices by the contractor.

Mitigation Measures

- In case, the ROW of canals is to be used or canal crossing is required, prior approval will be sought from the Punjab Irrigation Department. Consultation meeting has also been conducted with this department. Please Refer Section 05.

6.5.4 Seismic Hazard

Potential Impact

According to the seismic zoning map of Pakistan, the project area is in Seismic Zone 2A, where 2A (low damage) represents peak horizontal ground acceleration from 0.08 to 0.16 g. Although the sewerage line rehabilitation and disposal station construction involve underground and surface infrastructure, they may still be vulnerable to seismic activity. Earthquakes can cause pipe joint dislocations, line ruptures, or structural damage to disposal station components. Therefore, seismic resilience must be considered during design and construction.

Mitigation Measures

- Adopt the Seismic Building Code of Pakistan (SBC-2007) in structural designs; use flexible pipe joints to accommodate ground movement; and perform soil stability assessments before construction.

6.5.5 Public Utilities

Potential Impact

Due to the proposed project, public utilities including telephone lines, optic fiber cables, electric poles & wires, and gas pipelines may be affected which may cause inconvenience to the general public. This impact is however temporary and medium negative in nature.

Mitigation Measures

- Careful selection of the alignment has been adopted to minimize disturbance to public utilities;
- The project cost will have a separate provision for the repair/ relocation of utilities.

6.5.6 Physical Cultural Resources

Potential Impact

No historical/ archeological sites are present in the project area. However, some cultural resources including mosques, churches, shrines and graveyards are present. Physical and cultural resources identified in the project area are in **Annex-VI**. People visit the mosques five

times a day. Shrines and graveyards are visited occasionally by the surrounding community and devotees. These will not be directly affected but people may face access issues in visiting these facilities.

Mitigation Measures

- The access to physical and cultural resources will not be affected and an alternate access route will be provided in case the access has to be restricted during the execution period.

6.5.7 Ecology

A. Flora

Potential Impact

No trees are envisaged to be disturbed due to proposed project activities since the sewer lines are mostly laid along the roads/streets and Disposal station Rehabilitation work has been proposed on existing disposal stations mostly. However, setting up of the construction camps and movement of heavy vehicles will require significant space due to which available vegetation is expected to be removed. This impact is site-specific, temporary, reversible, possible and low significant and needs to be encountered before the start of the construction stage.

Mitigation Measures

- The location of construction camps will be carefully selected to avoid any damage to existing flora;
- The alternate routes for the movement of people and machinery are recommended where no loss of vegetation is expected.

B. Fauna

Potential Impact

The impact on fauna of the project area will be insignificant, except few insects that will be disturbed/ killed during excavation operations. The impact on fauna is temporary and moderately negative in nature. However, movement and installation of machinery and vehicles and setting up of camp will take place producing noise and habitat loss is expected which will affect the habitat of locally available fauna. This impact is site-specific, temporary, reversible, possible, and low significant.

Mitigation Measures

- The design specifications will include the use of tuned machinery to limit noise;

- Provision of gates in the design of construction camps to check the entry of animals in search of eatable goods.

6.5.8 Socio-Economic Environment

Potential Impacts

During the planning and design phase of the project, it is anticipated that there will be no potentially significant adverse impact on the socio-economic environment. Locals may be temporarily disturbed due to the field investigation activities. This impact can be categorized as indirect, low, site-specific, short-term, temporary, low probable and reversible.

Mitigation Measures

- Stakeholder engagement, involvement and awareness to take all the community groups on board.

6.6 Anticipated Impacts during Construction Phase

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

6.6.1 Topography

Potential Impact

The construction activities are not expected to impact the topography of the area significantly except for those areas where physical activities including digging and excavation areas, storing or dumping sites for excessive material, storing areas and movement of heavy construction machinery will be carried out. The excavated material is to be mostly backfilled. This impact is site-specific, temporary, reversible, possible and low significant.

Mitigation Measures

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

6.6.2 Soil Erosion

Potential Impact

The soil would be exposed to erosion due to excavations for laying of sewer pipes. Construction activities such as clearing, excavation, filling, grading and setting up construction camps will affect the existing soil condition in the study area/ AOI. The clearing of vegetation can also loosen the soil and make it more susceptible to erosion due to wind and rain. There is also a possibility of silt runoff during the rainy season causing soil erosion. During the rain, the eroded soil mixes with stagnant water to transform into slush, which can affect the movement of vehicles and machinery and construction work as well as limit the movements of local people. This impact can be categorized as low adverse, site-specific, long-term, permanent, highly probable and reversible.

Mitigation Measures

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

6.6.3 Soil Contamination

Potential Impact

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

Mitigation Measures

- Store chemicals/ hazardous products and waste on impermeable surfaces in secure, covered areas with clear labelling of containers and with a tray or bund to contain leaks;
- Regularly remove all construction wastes from the site to approved waste disposal sites;
- Awareness of emergency spill response procedures will be conducted;
- Oil leakages, chemicals and other liquids spills will be avoided/ minimized by providing appropriate storage places depending on the type of material for storage.

6.6.4 Trench Failure

Potential Impact

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

Mitigation Measures

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

6.6.5 Construction Camps/Camp Sites

Potential Impact

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

Mitigation Measures

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

6.6.6 Water Quality

Potential Impact

The major surface water resources of the city are Chenab and Ravi rivers. There is a network of canals within the city to support the irrigation system. The proposed interventions will be within the city and hence the rivers are not under threat of receiving any pollution from the project activities. The distributaries and the branch canal are however exposed and may get polluted due to malpractices by the contractor. The potential sources of pollution from the site include:

- Runoff and erosion from exposed soil surfaces, earthwork areas and stockpiles e.g., grouting and cement material with the rain;
- Wash water from dust suppression sprays;
- Fuel and lubricants from maintenance of construction vehicles and mechanical equipment;
- Spillage of liquids stored on-site such as oil, diesel and solvents, etc. are likely to result in water pollution; and
- Uncontrolled discharge of debris and garbage such as packaging, construction material and refuse.

Mitigation Measures

- Stockpiles of cement and other construction materials will be kept covered when not being used;
- Maintenance of vehicles will be carried out only in impermeable areas where any oil spillages can be contained;
- No activity may be undertaken in monsoon and careful attention must be paid to weather forecast before excavation operations and removal of old pipes;
- All kinds of waste will be stored in covered containers and disposed off safely as soon as possible; and
- The contractor will ensure that construction debris does not find their way into the drainage which may get clogged.

6.6.7 Air Quality

Potential Impact

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

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

The air emissions may cause health impacts such as dryness and roughness of the throat, eyes, nose, etc. to the workers, staff of the contractor and the residents of the area. These emissions may also affect the biophysical environment. The list of air-sensitive receptors is given in **Annex-VI.** The impact is major negative and temporary in nature.

All earthworks construction, site clearing, stockpiling, operation of batching plants and hauling of materials will generate dust and affect the local air shed. Local people and the workers may be exposed to high dust levels during landscaping, access road and site preparation. This impact is site-specific, temporary, reversible, likely and high significant.

Mitigation Measures

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

6.6.8 Noise

Potential Impact

Noise level is expected to increase during construction activities. The main sources of noise and vibration will be heavy machinery such as excavators and other equipment. Noise generated by construction machinery is likely to affect sensitive receptors located within 250 meters of the project area. Health risks associated with exposure to continuous noise levels include high blood pressure, hypertension, annoyance and sleep disturbance, temporary threshold shift, etc. The impacts of noise would be temporary and highly adverse in nature.

Mitigation Measures

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

6.6.9 Municipal and Construction Waste/ Wastewater

Potential Impact

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

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

Mitigation Measures

- Solid Waste generated during construction and campsites will be safely disposed of in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Burning of waste will be prohibited;
- Proper labelling of containers, including the identification and quantity of the contents, hazard contact information, etc;
- An Emergency Response plan will be prepared to address the accidental spillage of fuels and hazardous goods;
- Containers with covers will be provided on-site to store waste; and

- Training of work force involved in the storage, handling and transportation of hazardous material regarding emergency procedures.

6.6.10 Chance of Finding Artifacts

Potential Impact

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

Mitigation Measures

- The chance find procedures will be followed in case of finding artifacts.
- The works will be temporarily halted and the area will be bifurcated.

6.6.11 Resource Conservation

Potential Impact

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

Excessive water consumption for drinking and washing purposes by the construction staff may pressurize water resources in the project area and in certain cases may disturb the existing water supplies in the project area. The use of water is of major concern while developing resource conservation strategies.

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

Mitigation Measures

- Wastage of water will be reduced by training the workers involved in water use;
- Wastage of water will be controlled by providing proper valves and controlling the pressure of the water;
- Water jets and sprays will be used for watering surfaces rather than using an overflow system;

- The source of water will be carefully selected. Water use will not disturb the existing community water supplies;
- Reuse of construction waste materials will be considered;
- Unnecessary equipment washings will be avoided;
- The efficient and well-maintained equipment and machinery will be used;
- The equipment and machinery will be turned off when not in use;
- Regular maintenance of machinery to avoid fuel leakages; and
- Resource conservation plan (attached as **Annex-IX**) will be followed.

6.6.12 Biodiversity Conservation

Flora

Potential Impact

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

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

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

Mitigation Measures

- The Contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands;
- The contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/ bushes for fuel will not be allowed.

Fauna

Potential Impact

The local animals mostly cats and dogs get disturbed due to construction activities. However, there will be no damage to their health and life. Some reptiles and insects may get killed/ injured during excavation operations.

Mitigation Measures

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

6.6.13 Health and Safety

A. Occupational Health and Safety

Potential Impact

Health risks and workers' safety problems may result at the workplace if the working conditions provide an unsafe and/or unfavorable working environment. Health and safety issues are also associated with the operation of construction machinery and equipment, which may cause minor and severe injuries to workers. Accidental contact of workers with underground electrical cables during excavation will also be a major concern. It will be a long-term and severe negative impact.

Mitigation Measures

- Obligatory insurance against accidents for labourers/workers and implementation of the provisions of Fatal Accidents Act;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Layout plan for campsite, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing and contingency measures in case of accidents;
- Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for laborers, including use of;
- Protection devices (earmuffs) will be provided to the workers doing job in the vicinity of high noise-generating machines i.e., excavators;
- Elaboration of contingency planning in case of major accidents; and
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads.
- A no-alone-worker policy will be enforced to ensure that no worker is assigned to excavation tasks without supervision or support.
- Implementation of Health and Safety Management Plan (**Annex - X**).
- Use of safety signs at the construction site, as shown below.

B. Community Health and Safety

Potential Impact

The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with the presence of heavy equipment. This is a temporary and moderate negative impact. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents etc. The labors with different transmittable diseases (e.g., COVID-19) may cause spread out of those diseases in the local residents. Open trenches and deep manhole may cause accidents for the local residents. The piling of excavated material and sludge on the site may cause health issues to the locals and passerby.

Mitigation Measures

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

at site.

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

Potential Impact

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

Mitigation Measures

- An Emergency Response Plan (**Annex - XI**) for earthquakes and manmade disasters will be developed by the proponent and will be implemented in close consultation with the Fire Fighting Department, bomb disposal squad and paramedics;
- Training of the staff/employees regarding the emergency procedures/plans will be regularly conducted;
- Emergency numbers will be clearly posted.

6.6.14 Climate Change

- Unpredictable rainfall and intense weather events due to climate change may lead to site flooding, hindering excavation, pipe-laying, and access to construction zones.
- Higher ambient temperatures can lead to heat exhaustion among workers, reduce productivity, and increase health risks, especially in open trench and concrete works.
- Dry and hot conditions may increase dust emissions from construction activities, contributing to local air pollution and respiratory issues for nearby communities and workers.
- Reduced water availability in some regions may affect activities like concrete mixing, dust suppression, and equipment cleaning, leading to project delays.
- High temperatures and UV radiation during extended exposure can degrade construction materials e.g., pipes impacting quality and durability.

Mitigation Measures

- Schedule excavation during dry seasons where feasible and keep standby pumps to remove accumulated water.
- Reschedule work shifts to early mornings or evenings to avoid peak heat hours.
- Provide shaded rest areas, frequent hydration breaks, and heat stress awareness training.
- Use breathable and UV-resistant PPE to minimize exposure.
- Implement regular water spraying on dry surfaces and unpaved roads.
- Employ water-efficient construction methods such as pre-mixed concrete and controlled spraying.

- Store water in advance during high-demand periods and avoid wastage through staff awareness.
- Store pipes and materials under shade or use UV-resistant covers to protect from sunlight.
- Select climate-resilient materials tested for performance under high-temperature conditions.

6.6.15 Traffic Management

Potential Impact

The project area is an urban and peri-urban zone with significant movement of traffic during laying of sewer pipes. The movement of vehicles will be disturbed due to the excavation and construction works. People may suffer inconvenience during the morning and evening peak hours. This impact is temporary and major negative in nature.

Mitigation Measures

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

6.6.16 Nuisance/ Disturbance to Social Sensitive Areas (educational, health and religious places)

Potential Impact

Since the work is being conducted in urban sensitive areas like schools, hospitals and religious center, the excavation of trenches and sewer pipe laying activity will create nuisance and health hazard to children and people with ailments. This impact is temporary and major negative in nature.

Mitigation Measures

- No material will be stocked in this area; material will be brought to the site as and when required;
- No work will be conducted near the religious places during religious congregations;
- Material transport to the site will be scheduled considering school timings;
- Schools, hospitals etc., will be notified 2 weeks before the work; the awareness programs on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don’ts will be arranged.

6.6.17 Accessibility

Potential Impact

Excavation of trenches and sewer laying work in the project area will obstruct access to residences, commercial buildings and businesses adjacent to the proposed project alignment. Disruption of access to commercial establishments may affect livelihood. Since few of the roads are narrow, construction activities may also obstruct traffic and pedestrian movement. The potential impacts are negative and moderate but short-term and temporary.

Mitigation Measures

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

6.6.18 Liquid and Solid Waste from Construction Camps

Potential Impact

Development of construction camps will generate significant quantities of liquid and solid waste. Construction camps will be established in project area accommodating approximately 210 skilled and unskilled staff.

As a general rule, the water consumption will be about 5 gallon/capita/day and will subsequently generate about 70 to 80% of this water as sewage. Disposal of wastewater without treatment will pollute the soil and surface water/ groundwater resources of the area.
Hence water demand will be 1050 gallons/day for each construction camp during the construction stage and estimated generated wastewater will be about 840 gallons/day for each construction camp.

Construction Camps will generate about 0.5 kg/capita/day domestic solid waste comprising kitchen waste, garbage, putrescible waste, rubbish and small portions of ashes and residues. Estimated quantity of solid waste will be about 105 kg/day. Improper waste management activities can increase disease transmission, contaminate ground and surface water and ultimate damage to the ecosystem. **Table 6.1** below shows the estimated wastewater and solid waste generation during the Construction Phase. This impact is medium term, reversible, possible and low adverse.

Table 6.1: Estimated Wastewater and Solid Waste Generation during the Construction Phase

Sr. No.	Description	
(a)	**Wastewater Generation**	
1	No. of person in camp (During construction)	210
2	Per capita water demand	5 gallons/capita/day
3	Average water demand	1050 gallons/day
4	Wastewater generation (70-80 % of total water demand)	840 gallons/day
(b)	**Solid Waste Generation**	
1	No. of Person in camp (During Construction)	210
2	Per capita solid waste generation	0.5 kg/capita/day
3	Total solid waste generation	105 kg/day

Mitigation Measures

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

- The waste generated from the camp site will be disposed of at approved sites by Contractor;
- Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste;
- All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper SWM system. Toxic waste will be handled, stored, transported and disposed separately;
- Sewage will be disposed of in a nearby drain or the existing sewage system, but disposal in canals will be avoided;
- The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and
- Solid waste will be segregated at source so that it can be re-used or recycled.

6.6.19 Gender Based Violence (GBV)

Potential Impacts

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

Mitigation Measures

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

- Awareness will be created among the females at individual and community levels about the construction sites;
- Workers will not be allowed to crowd in the residential communities within the site;
- Alternative routes for pedestrians will be provided to avoid mixing of women with workers;
- The Contractor will make sure that no discrimination is made based on gender while hiring workers.

6.6.20 Influx of Labor

Potential Impacts

For the implementation of project activities, skilled and unskilled labor is required by the contractor. Mostly, skilled and unskilled workers have been associated with the contractor since long which they utilize, where they are required for the projects and while other workers are hired from the different areas that belong to different cultural backgrounds. Social problems and conflicts that are associated with labor Influx are as follows:

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

Mitigation Measures

- Labour camp(s) will be established away from the residential population;
- Preference will be given to the local people to work with a contractor and the contractor will hire the maximum labor force from the project area because this will reduce the labour influx;
- Awareness will be created among the work force to ensure respect for local customs;
- Construction work will be completed within the stipulated time to move workers to next location;
- Labor force will be shuffled with the time;
- Sensitize workers and surrounding communities on awareness and prevention of human immunodeficiency virus (HIV)/ acquired immunodeficiency syndrome (AIDS) and sexually transmitted infections (STI) through training, awareness campaigns and workshops during community meetings;
- Provide proper and free HIV/AIDS and STI health screening and counseling for site workers and community members;
- Develop and enforce a strict code of conduct for workers to regulate behaviour in the local communities;
- Prohibiting drugs, alcohol, weapons, and ammunition on the worksite among personnel;
- Site security preparations must be contained within the Bills of Quantities (BOQs) to avoid any delays which might be caused due to insecurity;
- The Contractor must guarantee that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft.

6.6.21 Social/Cultural Conflicts

Potential Impact

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

Mitigation Measures

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

6.6.22 Economic Activity

Potential Impact

Due to the construction of the proposed Project, economic activity will be generated in the project area as the laborers and semi-skilled staff will have an opportunity to work in the project area. This will provide them an opportunity to develop their skills and capacities. It will also benefit the local vendors of the project area. This is a positive impact. However, the project activities may cause temporary restriction in access to the local businesses i.e., shops/ kiosks etc., which will cause temporary loss of business.

Mitigation Measures

- The work will be executed in pockets to avoid complete blockage of passage;
- All the excavated sites will be immediately backfilled.

6.7 Anticipated Impacts during Operational Phase

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

6.7.1 Air Quality

Impact of Sewerage System

The operation of sewerage scheme will result in generation of gases including H_2S and CH_4. H_2S is a foul-smelling poisonous gas which might be harmful for the sewer-men and could be fatal sometimes. CH_4 is natural gas also referred to as a greenhouse gas. Pakistan is signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and adopted Kyoto Protocol in 1997. Under the Kyoto Protocol, Pakistan is committed to reduce GHG emissions into the environment to prevent interference with climate change. The GHG emissions for the proposed project are a concern due to the anaerobic conditions in the sewer lines and wet wells of the disposal station. The generators installed at the disposal station have the potential to contribute to environmental pollution through the release of various pollutants, particularly sulfur compounds and carbon emissions.

Mitigation Measures

- Provision of exhaust gas vents at appropriate locations in the design;
- Sewer-men will cover their faces with gas mask while entering the sewer for cleaning or maintenance purposes;
- It's better to use sucking machinery for cleaning of sewers;
- Use gas detector before inspection;

- Use low-sulfur fuel and conduct regular maintenance and consider transitioning to cleaner energy sources such as solar or hybrid systems.

6.7.2 Climate Change and Solar Maximum

- Climate change-induced heavy rains may exceed the design capacity of sewer lines, causing frequent overflows and system backups.
- Rising groundwater due to changing rainfall patterns may infiltrate sewer lines through cracks, reducing system efficiency and causing contamination.
- Hotter temperatures can accelerate sewer gas production (H_2S, CH_4), increasing odor issues and corrosion inside pipelines and at disposal stations.
- Reduced water flow during prolonged dry periods may lead to sediment and sludge buildup in sewers, requiring more frequent cleaning.
- Increased solar activity (solar flares, electromagnetic interference) can affect sensors, or control units used for monitoring sewer operations and pumping stations.

Mitigation Measures

- Upgrade sewer design to accommodate peak flow based on updated rainfall data.
- Regularly clean inlets and ensure free flow in manholes during monsoon.
- Use sealed, corrosion-resistant piping to prevent groundwater intrusion.
- Schedule periodic flushing of low-flow zones in sewer lines.
- Maintain backup power and control systems with offline/manual override.

6.7.3 Water Quality.

- Cracked or damaged pipelines may leak untreated sewage into surrounding soil, contaminating groundwater resources.
- Blocked or poorly maintained sewers can cause overflows, discharging raw sewage into surface water bodies such as canals or drains.
- Illegal Connections or Discharges: Unauthorized or improperly connected drains may introduce industrial or domestic waste directly into the sewer system, overwhelming treatment capacity and degrading water quality.

Mitigation Measures

- Conduct regular inspections and pressure tests, repair damaged sections promptly using trenchless technologies where feasible.
- Implement routine cleaning and maintenance schedules.
- Conduct periodic audits and awareness campaigns to prevent unauthorized sewer connections.

6.7.4 Community Health Hazards

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

Mitigation Measures

- Sludge should be promptly removed and transported to designated disposal sites to prevent accumulation near manholes.
- Use barricades and warning signs to restrict public access around sludge piles.
- Ensure timely cleanup and apply disinfectants to minimize health and safety risks.

Occupational Health and Safety Hazards

Potential Impact

- Workers entering manholes or pipelines may be exposed to hazardous gases such as methane or hydrogen sulfide, posing risks of asphyxiation, poisoning, or unconsciousness if proper ventilation and monitoring are not ensured.
- Workers handling untreated sewage or sludge are at risk of infections from pathogens such as bacteria, viruses, and parasites, potentially causing gastrointestinal or skin diseases.
- Wet surfaces, biofilm buildup, and leakage around manholes, screens, and pump rooms can lead to slip and fall injuries during routine inspection and maintenance.
- Prolonged exposure to noise from mechanical equipment (e.g., pumps) and vibrations from rotating systems can lead to hearing loss or long-term ergonomic stress.

Mitigation Measures

- Ensure proper ventilation, and enforce permit-to-work systems.
- Provide SCBA (self-contained breathing apparatus) where needed and train staff in emergency response.
- Provide appropriate PPE (gloves, face shields, boots, and coveralls) for handling sewage and sludge.
- Implement strict hygiene protocols, including handwashing stations and vaccination programs.
- Conduct routine cleaning of biofilm and spilled waste.
- A no-alone-worker policy will be applied to manhole operations, ensuring that no worker enters or works inside a manhole without the presence of a standby person for safety and emergency response.
- Ensure proper lighting and install safety railings and warning signs near wet zones.
- Store chemicals in labeled, ventilated, and segregated storage areas.

- Provide ear protection to workers in high-noise areas.
- Install noise barriers and maintain equipment to reduce operational vibration.

6.7.5 Solid Waste

Potential Impact of Sewerage System

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

Protentional Impact of Solid Waste Management

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

Mitigation Measures

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

6.8 Positive Impacts

Improved Sewerage System

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

Improvement in Public Health, Hygiene and Sanitation

With the improvement in sewerage system, improvement in health, hygiene and sanitation will also be observed. Foul odor will be eliminated and there would be no breeding grounds for

diseases vectors. Thus, the project will improve public health, hygiene and sanitation conditions in the project area.

Landscape Improvement

1. Removal of Ponds & Use of Open Drains for Stormwater

Eliminating open wastewater ponds will remove foul odors, stagnant water, and overflow points. Existing open drains will be repurposed for stormwater flow, improving overall cleanliness and enhancing the visual appearance of streets and neighborhoods.

2. Restoration of Roads and Footpaths

After pipe laying and backfilling, damaged roads, sidewalks, and streets will be restored—often in better condition. This enhances the physical layout and uniformity of urban streetscapes.

3. Greening Opportunities

No trees cutting is involved in project. However, where possible, landscaping along rehabilitated corridors or at disposal station sites could be include tree planting. This offsets dust and noise impacts and adds aesthetic value.

4. Community Beautification

Once sewerage is managed underground, households and communities are more likely to invest in cleanliness and front-yard improvements, reducing littering and illegal wastewater disposal, thus uplifting the overall neighbourhood appearance.

Other Positive Impacts

Some other positive impacts include the following:

- Economic development
- Employment generation
- Development of deprived areas

Operational Sustainability

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

Mitigation Measures

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

7 ENVIRONMENTAL & SOCIAL MANAGEMENT & MONITORING PLAN

7.1 General

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

7.2 Objectives of ESMMP

The main objectives of ESMMP are to:

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

7.3 Implementation of Environmental & Social Management & Monitoring Plan (ESMMP)

The institutional arrangement for the implementation of ESMMP is presented in **Figure 7.1**. The proponent WASA-F will be responsible for compliance of environmental and social safeguard requirements of the proposed project. The whole ESMMP will be included as a clause of the contract documents.

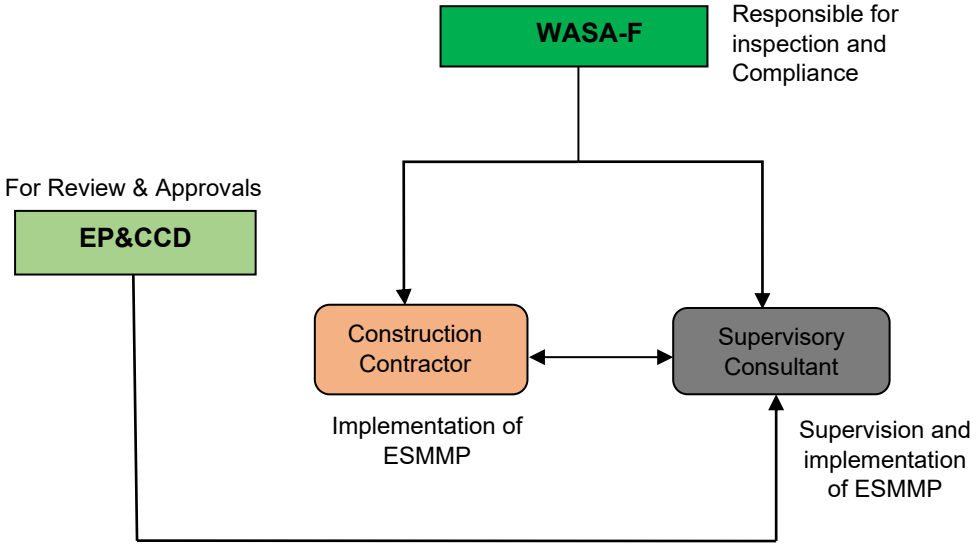


Figure 7.1: Organizational Setup for implementation of ESMMP

7.3.1 Roles and Responsibilities of the Functionaries Involved in ESMMP Implementation

A. WASA-F

WASA-F will review the Environmental Monitoring Reports and will seek necessary information to ensure efficient monitoring of the ESMMP.

B. Supervisory Consultant (SC)

The roles and responsibilities of SC will be:

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

C. Construction Contractor (CC)

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

- Implementation of the mitigation measures at the construction site;
- Contractor will be bound through the contract to take actions against all the special and general provisions of the contract document;
- Contractor will make sure the compliance of ESMMP recommendations related to construction and will also be responsible for effective liaison with local heads of the community;
- Provision of proper Personal Protective Equipment (PPE) to the workers and train them for their proper use;
- Compliance with international best SOPs for COVID-19;
- To conduct the environmental and health & safety training to the workers/labour; and
- Coordinate with the WASA-F.

D. Environmental Protection and Climate Change Department

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

7.4 Reporting

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

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

Table 7.1: Distribution of Periodic Reports

Report	Prepared by	Reviewed by	Distribution
Biannual	Contractor	Reviewed by WASA-F	EP&CCD
Annual	Contractor	Reviewed by WASA-F	EP&CCD
Final	Contractor	Reviewed by WASA-F	EP&CCD

7.5 Non-Compliance with the EIA

The implementation of the current EIA involves inputs from various functionaries as discussed earlier. The contractor will be primarily responsible for ensuring the implementation of the mitigation measures proposed in the EIA, which will be part of the contract documents. The

provision of the environmental mitigation cost will be made in the total cost of the project. However, if the contractor fails to comply with the implementation of EIA and submission of the monthly compliance reports, deductions will be made from the payments to the Contractor claimed under the heads of environmental components.

7.6 Inclusion of EIA in Bidding/ Contract Documents

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

7.7 Environmental and Social Monitoring Plan

Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at three levels. At the WASA-F level, the WASA-F representative will do ESMMP monitoring to ensure that the mitigation plans are being effectively implemented. The environmental engineer of the Supervision Consultant will regularly monitor the ESMMP implementation by the contractor. At the contractor's level, the environmental monitoring checklist will be filled on monthly basis by their environmental engineer and countersigned by the environmental engineer of the Supervision Consultant. Implementation of environmental mitigation measures during construction is a key to avoiding and reducing short- and long-term potential environmental impacts. Environmental cost has also been given in the ESMMP.

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

Table 7.2: Environmental & Social Management & Monitoring Plan (ESMMP)

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Pre-Construction / Design Phase						
Environmentally Responsive Design Considerations	To ensure provision of environmentally safe facility	• All structural, layout and engineering designs of the project are in strict accordance with the applicable national and international guidelines/ codes/ standards and engineering practices; • The layouts of sewerage networks have been adjusted to cover the whole project area. The sewerage system is based on gravity where the slopes have been provided to ensure gravity flow with adequate velocity.	DC	No harm to environmental features No harm to social settings	Once (after completion of Detailed Design)	WASA-F
Groundwater	To avoid contamination of groundwater	• Efficient seepage control measures have been considered in selection of pipe materials during the planning stage; • Procedure for efficient jointing of selected sewer pipes will be applied to avoid leakage from pipes; • Alternate sewage disposal arrangements have been suggested in design to cater the sewage flow, generated from the project area, during construction phase.	DC	Design provisions	Once (after completion of Detailed Design)	WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Surface Water	To avoid contamination of surface water	• In case, the ROW of canals is to be used or canal crossing is required, prior approval will be sought from the Punjab Irrigation Department. Consultation meeting has also been conducted with this department. Please Refer Section 05.	DC	Design provisions NOC obtained from PID	Once (after completion of Detailed Design)	WASA-F
Seismic Hazard	To keep the structures safe and intact in case of earthquakes.	• Seismic Building Code of Pakistan 2007 (SBC-07) has been adopted.	DC	Design provisions	Once (after completion of Detailed Design)	WASA-F
Public Utilities	To avoid disturbance/ damage to existing public utilities.	• Careful selection of the alignment has been adopted to minimize disturbance to public utilities; • The project cost will have a separate provision for the repair/relocation of utilities.	DC	Design provisions	Once (after completion of Detailed Design)	WASA-F
Physical Cultural Resources	To conserve physical and cultural resources in the project area.	• The access to physical and cultural resources will not be affected and an alternate access route will be provided in case the access has to be restricted during the execution period.	DC	Design provisions	Once (after completion of Detailed Design)	WASA-F
Ecology	**Flora** To minimize the impact on flora due to project activities	• The location of construction camps will be carefully selected to avoid any damage to existing flora; • The alternate routes for the movement of people and machinery are recommended where no loss of vegetation is expected.	DC	Design provisions	Once (after completion of Detailed Design)	WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
	Fauna To minimize the impact on fauna due to project activities	• The design specifications will include the use of tuned machinery to limit noise; • Provision of gates in the design of construction camps to check the entry of animals in search of eatable goods.	DC	Design provisions	Once (after completion of Detailed Design)	WASA-F
Socio-Economic Environment	To minimize the impact on social settings of the project area	• Stakeholder engagement, involvement and awareness to take all the community groups on board.	DC	Adequate consultations conducted	During the project planning	WASA-F
Anticipated Impacts during the Construction Phase						
Topography	To avoid, minimize, or rectify any changes in the topography	• Material stockpiles will be removed as soon as work is completed and the area will be re-landscaped; • Temporary storage sites will be allocated for the storage of excavated material; • Temporary storage sites will be lined and must not allow infiltration; • The stockpiles will be covered with tarpaulin sheets or other adequate material; • Pilling of material at large extent will not be allowed and the contractor will timely remove excavated material from the site.	CC	Stockpiles and heaps of waste visible at the site. Photographic evidence	Weekly	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Soil Erosion	To avoid degradation of soil.	• Good engineering practices will help to control or minimize the soil erosion both at the construction sites and in peripheral areas. Special slope protection measures will be adopted during the construction stage; • Use of heavy machinery will be restricted as far as possible to avoid the destruction of soil structure; • Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations will be avoided; • Stored excavated material will be covered and preferably reused, e.g., in construction as backfill etc.	CC	Photographic record	Monthly	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Soil Contamination	To avoid contamination of soil.	• Store chemicals/ hazardous products and waste on impermeable surfaces in secure, covered areas with clear labeling of containers and with a tray or bund to contain leaks; • Regularly remove all construction wastes from the site to approved waste disposal sites; • Awareness of emergency spill response procedures will be conducted; • Oil leakages, chemicals and other liquids spills will be avoided/ minimized by providing appropriate storage places depending on the type of material for storage.	CC	Photographic record	Monthly	SC, WASA-F
Trench Failure	To avoid trench failure	• Provision of adequate shuttering in the trenches; • Leftover shuttering may also be used in case of loose soil strata.	CC	Visual Inspection	Weekly	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Construction Camps/ Camp Sites	To avoid construction camp related issues	• Working hours of noisy activities will be limited to normal daytime working hours when near identified sensitive receptors; • Waste Management Plan will be implemented to include procedures for the classification, storage and disposal of all construction wastes and the training of employees who handle hazardous materials; and • Construction camps will be established away from populated areas. • Regular training of workers will be carried out regarding local cultural norms, human behaviour, gender issues by the contractor during construction activities at site. • Grievance Redress Mechanism will be fully implemented and active so that locals may lodge complaint and are addressed on time.	CC	Field Observations	Weekly	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Water Quality	To protect surface and groundwater resources	• Runoff and erosion from exposed soil surfaces, earthwork areas and stockpiles e.g., grouting and cement material with the rain; • Wash water from dust suppression sprays; • Fuel and lubricants from maintenance of construction vehicles and mechanical equipment; • Spillage of liquids stored on-site such as oil, diesel and solvents, etc. are likely to result in water pollution; and • Uncontrolled discharge of debris and garbage such as packaging, construction material and refuse.	CC	Water quality testing.	Biannually	SC, WASA-F

Air Quality	To avoid air pollution	• All vehicles, machinery, equipment and generators used during construction activities will be kept in good working condition, properly tuned and maintained to minimize the exhaust emissions; • Open burning of solid waste from the contractor's camps will be strictly banned; • PEQS applicable to gaseous emissions generated by construction vehicles, equipment, and machinery will be enforced during construction works. • Regular water sprinkling on the site and access roads will be carried out to suppress excessive dust emission(s); • Excavated trenches will be restored immediately to their original level and paved after laying of pipes; • Blowing of dust and particulate matter from stockpiled loose materials (e.g., sand, soil) will be avoided either by sheeting them with tarpaulin or plastic sheets or by sprinkling them with a light shower of water; • Vehicle speed in the project area will be prescribed not more than 20 km/hr and controlled accordingly; • Detour will be provided for local traffic movement; and • The vehicles carrying construction materials and the construction material	CC	24-hour continuous air sampling	Biannually	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
		storage areas will be covered with tarpaulin.				
Noise	To avoid noise pollution	• Construction workers will be provided suitable hearing protection like ear caps, or earmuffs and training them in their use; • Selection of up-to-date and well-maintained equipment with reduced noise levels will be ensured by suitable in-built damping techniques or appropriate muffling devices; and • Residents will be notified earlier before the commencement of excavation operations.	CC	Noise level monitoring	Biannually	SC, WASA-F

Municipal and Construction Waste/ Wastewater	To avoid/ minimize nuisance and environmental pollution in the project area due to liquid and solid waste	• Solid Waste generated during construction and campsites will be safely disposed of in demarcated waste disposal sites and the contractor will provide a proper waste management plan; • Burning of waste will be prohibited; • Proper labeling of containers, including the identification and quantity of the contents, hazard contact information, etc; • An Emergency Response plan will be prepared to address the accidental spillage of fuels and hazardous goods; • Containers with covers will be provided on-site to store waste; and • Training of work force involved in the storage, handling and transportation of hazardous material regarding emergency procedures. • Solid Waste generated during construction and campsites will be safely disposed of in demarcated waste disposal sites and the contractor will provide a proper waste management plan; • Burning of waste will be prohibited; • Proper labeling of containers, including the identification and quantity of the contents, hazard contact information, etc;	CC	Monitoring compliance;	Weekly	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
		• An Emergency Response plan will be prepared to address the accidental spillage of fuels and hazardous goods; • Containers with covers will be provided on-site to store waste; and • Training of work force involved in the storage, handling and transportation of hazardous material regarding emergency procedures.				
Chance of Finding Artifacts	To protect and preserve the artifacts	• The chance find procedures will be followed in case of finding artifacts. • The works will be temporarily halted and the area will be bifurcated.	CC	Finding of artifacts	Occasionally	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Resource Conservation	To conserve the natural resources	• Wastage of water will be reduced by training the workers involved in water use; • Wastage of water will be controlled by providing proper valves and controlling the pressure of the water; • Water jets and sprays will be used for watering surfaces rather than using an overflow system; • The source of water will be carefully selected. Water use will not disturb the existing community water supplies; • Reuse of construction waste materials will be considered; • Unnecessary equipment washings will be avoided; • The efficient and well-maintained equipment and machinery will be used; • The equipment and machinery will be turned off when not in use; • Regular maintenance of machinery to avoid fuel leakages; and • Resource conservation plan (attached as **Annex-IX**) will be followed.	CC	Visual Inspection	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Biodiversity Conservation	**Flora** To minimize the impact on flora due to project activities	• The Contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes. They will use the paths and tracks for movement and will not be allowed to trespass through farmlands; • The contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/ bushes for fuel will not be allowed.	CC	Visual inspections; Photographic records.	Daily	SC, WASA-F
	Fauna To minimize the impact on fauna due to project activities	• Excavations will be limited to the approved engineering drawings; • Harassing of animals will be prohibited.	CC	Visual inspections; Photographic records.	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Health and Safety Occupational Health and Safety	To minimize health risks to workers due to project activities	• Obligatory insurance against accidents for laborer and implementation of the provisions of Fatal Accidents Act; • Providing basic medical training to specified work staff and basic medical service and supplies to workers; • Layout plan for campsite, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; • A no-alone-worker policy will be enforced to ensure that no worker is assigned to excavation tasks without supervision or support. • Implementation of Health and Safety Management Plan (**Annex-X**).	CC	Visual inspection	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Community Health and Safety	To minimize health risks to public due to project activities.	• Efforts will be made to create awareness about road safety among the drivers operating construction vehicles; • Timely public notification on planned construction works; • Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots; • Setting up speed limits in close consultation with the traffic police; and • COVID-19 SOPs must be followed at work site and construction camps; and • Open trenches and deep excavated manholes will be protected by fence/barricade to avoid any accident; • Provision of adequate lighting at night near open trenches and availability of security guards at site.	CC	Incident reported	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Climate Change	To Minimize Climate Change Impacts	• Schedule excavation during dry seasons where feasible and keep standby pumps to remove accumulated water. • Reschedule work shifts to early mornings or evenings to avoid peak heat hours. • Provide shaded rest areas, frequent hydration breaks, and heat stress awareness training. • Use breathable and UV-resistant PPE to minimize exposure. • Implement regular water spraying on dry surfaces and unpaved roads. • Employ water-efficient construction methods such as pre-mixed concrete and controlled spraying. • Store water in advance during high-demand periods and avoid wastage through staff awareness. • Store pipes and materials under shade or use UV-resistant covers to protect from sunlight. • Select climate-resilient materials tested for performance under high-temperature conditions.	CC	Extreme Weather Events	Occasionally	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Emergency Response (Natural and Man-Made Disasters)	To eliminate/ minimize natural and man-made hazards	• An Emergency Response Plan (**Annex - XI**) for earthquakes and manmade disasters will be developed by the proponent and will be implemented in close consultation with the Fire Fighting Department, bomb disposal squad and paramedics; • Training of the staff/employees regarding the emergency procedures/plans will be regularly conducted; • Emergency numbers will be clearly posted.	CC	Incident reported	Daily	SC, WASA-F
Traffic Management	To avoid traffic congestion issues	• Prior information to the public through announcements in local mosques, churches, etc. • The construction activities will be carried out in pockets/reaches, once a patch has been completed (i.e., pipes are laid and covered) then excavation on new patch will be started; • Local community will be taken on board to plan alternate access routes in connecting streets to ensure mobility of local traffic.	CC	Visual inspection	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Nuisance/ Disturbance to Social Sensitive Areas	To protect the sensitive areas from the adverse effects of construction activities	• No material will be stocked in this area; material will be brought to the site as and when required; • No work will be conducted near the religious places during religious congregations; • Material transport to the site will be scheduled considering school timings; • Schools, hospitals etc., will be notified 2 weeks before the work;	CC	Visual Inspection	Daily	SC, WASA-F
Accessibility	To avoid any inconvenience in accessibility	• Leave space for access between mounds of excavated soil; • Consult affected business people to inform them in advance when work will occur; • If there are any holidays (i.e., Eid or Muharram, etc.), the Contractor will complete the backfilling work of the trenches and will not leave any trench open before holidays; • Rehabilitate the site after completion of work following the Site Rehabilitation Plan (attached as **Annex-XII**)	CC	Visual inspection	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Liquid and Solid Waste from Construction Camps	To avoid nuisance due to liquid and solid construction waste	• The waste generated from the camp site will be disposed of at approved sites by Contractor; • Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste; • All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper SWM system. Toxic waste will be handled, stored, transported and disposed separately; • Sewage will be disposed of in a nearby drain or the existing sewage system, but disposal in canals will be avoided; • The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and • Solid waste will be segregated at source so that it can be re-used or recycled.	CC	Visual inspection	Daily	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Gender Based Violence (GBV)	To avoid GBV related issues	• Awareness will be created among the females at individual and community levels about the construction sites; • Alternative routes for pedestrians will be provided to avoid mixing of women with workers; • The Contractor will make sure that no discrimination is made based on gender while hiring workers.	CC	GBV incident reported	Occasionally	SC, WASA-F
Influx of Labor	To avoid impacts due to influx of labor	• Labour camp(s) will be established away from the residential population; • Preference will be given to the local people to work with a contractor and the contractor should hire the maximum labor force from the project area because this will reduce the labour influx; • Construction work should be completed within the stipulated time to move workers to next location; • Prohibiting drugs, alcohol, weapons, and ammunition on the worksite among personnel; • Site security preparations must be contained within the Bills of Quantities (BOQs) to avoid any delays which might be caused due to insecurity;	CC	As per approved site	Once	SC, WASA-F

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Social/ Cultural Conflicts	To reduce social Issues	• Public notification through social media during the entire construction phase to avoid any inconvenience in accessibility to the locals; • Establishment of formal links with affected communities; • Local labor will preferably be employed for construction works; • Careful planning and training of the workforce to minimize disturbance to the local people; and • Contractor will preferably arrange their own sources of water.	CC	Social conflict reported	Occasionally	SC, WASA-F
Economic Activity	To ensure economic sustainability of the people of project area	• The work will be executed in pockets to avoid complete blockage of passage; • All the excavated sites will be immediately backfilled.	CC	Visual inspection	Daily	SC, WASA-F
Anticipated Impacts during Operational Phase						

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Air Quality	To avoid air pollution	• Provision of exhaust gas vents at appropriate locations in the design; • Sewer-men will cover their faces with gas mask while entering the sewer for cleaning or maintenance purposes; • It's better to use sucking machinery for cleaning of sewers; • Use gas detector before inspection; • Use low-sulfur fuel and conduct regular maintenance and consider transitioning to cleaner energy sources such as solar or hybrid systems.	WASA-F	Air quality monitoring	Annually	EP&CCD
Climate Change and Solar Maximum	To avoid any climate change impacts	• Upgrade sewer design to accommodate peak flow based on updated rainfall data. • Regularly clean inlets and ensure free flow in manholes during monsoon. • Use sealed, corrosion-resistant piping to prevent groundwater intrusion. • Schedule periodic flushing of low-flow zones in sewer lines. • Maintain backup power and control systems with offline/manual override.	WASA-F	Extreme Weather Events	Occasionally	EP&CCD

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Water Quality.	To protect surface and groundwater resources	• Conduct regular inspections and pressure tests, repair damaged sections promptly using trench-less technologies where feasible. • Implement routine cleaning and maintenance schedules. • Conduct periodic audits and awareness campaigns to prevent unauthorized sewer connections.	WASA-F	Ground water testing	Annually	EP&CCD
Solid Waste	To avoid/ minimize nuisance and environmental pollution in the project area due to liquid and solid waste	• Waste shall be collected, stored and disposed of according to relevant standards in approved facilities; • An organized collection system and its implementation through a licensed contractor; • The containers will be timely removed and the fine will be imposed on contractor in case of violations; • Closed containers will be used for transportation of waste to the dumping site; • Schedule inspection of the sewer lines to keep it clean and to identify any hazardous material; and • Solid waste bins shall be placed at appropriate locations to avoid its mixing in wastewater.	WASA-F	Visual Inspection	Monthly	EP&CCD

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Community Health Hazards	To minimize health risks to public	• Sludge should be promptly removed and transported to designated disposal sites to prevent accumulation near manholes. • Use barricades and warning signs to restrict public access around sludge piles. • Ensure timely cleanup and apply disinfectants to minimize health and safety risks.	WASA-F	Incident reported	Occasionally	EP&CCD

Parameters	Target	Mitigation Measures	Implementation Responsibility	Monitoring Indicators	Monitoring Frequency	Monitoring Responsibility
Occupational Health and Safety Hazards	To minimize occupational Health hazard to public	• Ensure proper ventilation, and enforce permit-to-work systems. • Provide SCBA (self-contained breathing apparatus) where needed and train staff in emergency response. • Provide appropriate PPE (gloves, face shields, boots, and coveralls) for handling sewage and sludge. • Implement strict hygiene protocols, including handwashing stations and vaccination programs. • Conduct routine cleaning of biofilm and spilled waste. • A no-alone-worker policy will be applied to manhole operations, ensuring that no worker enters or works inside a manhole without the presence of a standby person for safety and emergency response. • Ensure proper lighting and install safety railings and warning signs near wet zones. • Store chemicals in labeled, ventilated, and segregated storage areas. • Provide ear protection to workers in high-noise areas. • Install noise barriers and maintain equipment to reduce operational vibration.	WASA-F	Incident reported	Occasionally	EP&CCD

KEY

CC	Construction Contractor
DC	Design Consultant
SC	Supervision Consultant
WASA-F	Water and Sanitation Agency Faisalabad

7.8 Cost for testing of Ambient Air, Noise and Water

Testing and analysis for ambient air, noise, ground water and surface water will be undertaken during the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters will be selected and quantitative analysis will be carried out. The results of the analysis will be compared with the guidelines; standards and pre-project conditions to investigate whether the ESMP and its implementation are effective for the mitigation of impacts or not. The cost of environmental monitoring for the parameters to be analyzed during construction and operation phase of the project is given in **Table 7.3**.

Table 7.3: Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

Environmental Monitoring									
Components	**Parameters**	**No. of Samples**				**Rate (PKR)**	**Responsibility**	**Duration**	**Cost (PKR)**
		No. of Samples	**Frequency X Years**	**Location**	**Total Samples**				
Construction Phase (3 year)									
Air Quality	All PEQS parameters	1	2 x 3	4	24	50000	Contractor/ WASA-F	24 hours	1,200,000
Ground Water Quality	All PEQS parameters	1	2 x 3	4	24	25000	Contractor/ WASA-F	-	600,000
Surface Water/ Wastewater Quality	All PEQS parameters	1	2 x 3	5	30	25000	Contractor/ WASA-F	-	750,000
Noise Level	-	1	2 x 3	4	24	4000	Contractor/ WASA-F	24 hours	96,000
								Sub-Total	**2,646,000**
Operation Phase (1st year)									
Air Quality	All PEQS parameters	1	1	4	4	50000	WASA-F/ EP&CCD Punjab	24 hours	200,000
Drinking Water Quality	All PEQS parameters	1	1	4	4	25000	WASA-F/EP&CCD Punjab	-	100,000
Wastewater Quality	All PEQS parameters	1	1	4	4	25000	WASA-F/EP&CCD Punjab	-	100,000
								Sub-Total	**400,000**
								GRAND TOTAL	**3,046,000**

7.9 Environmental Technical Assistance and Training Plan

In order to raise the level of professional and managerial staff of contractor, there is a need to upgrade their knowledge in the related areas. The CC and WASA-F should play a key role in this respect and arrange the trainings.

An environmental and social training program is to be carried out before the implementation of the project. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the ESMMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the contractor(s) workforce to implement effective environmental protection measures. A suitable training program is proposed to train the contractor(s) staff who will be involved in the construction phase and the professional staff from the client involved at the operational stage of the project.

WASA-F will engage Technical Assistance (TA) consultant to manage the environmental training program. The objective of the TA will be to help in establishment of appropriate systems and to train senior WASA-F staff responsible for managing environment, operations and planning, who can then impart training at a broader level within and outside the WASA-F (i.e., the training of trainers). The TA consultant will organize training courses for WASA-F and contractor staff to train them in specialized areas such as air and noise pollution monitoring; develop environmental operation manuals in consultation with the EP&CCD. The details of this training program are presented in **Table 7.4** and budget estimate for Training of Workers presented in **Table 7.5**.

Table 7.4: Personnel Training Program/ TA Services

Provided by	Contents	Trainees/Events	Duration
TA consultants/ organizations Specializing in environmental management and monitoring	Short seminars and courses on: Environmental laws and regulations, daily monitoring and supervision	Three seminars for WASA-F and Contractor project staff	3 days
TA consultants/ organizations specializing in social management and monitoring	Short seminars and courses Social awareness	Three seminars for project staff dealing in Social/lands matters	3 days
TA consultants/ organizations specializing in Occupational, health and safety issues	Short lectures relating to Occupational Safety and Health	Two seminars for contractor's staff	4 days

Table 7.5: Budget Estimate for Training of Workers

Sr. No.	Training	Participants	Description	Quantity	Amount (PKR)
Training Cost of Workers					
1	Awareness workshop regarding Covid 19 and other vector borne diseases	Contractor Staff	Risk, Prevention and available treatment	Once	100,000
2	Waste Management	Contractor Staff	Awareness associated with waste Storage, collection and safe disposal	Once	100,000
3	Workshop on Emergency Response	Contractor Staff	Potential natural and other hazard/emergencies and dealing with emergency to minimize damage	Once	300,000
4	Workshop on Community/ occupational health and safety	Contractor Staff	Awareness on EHS Guidelines	Once	350,000
				TOTAL	850,000

7.10 Cost for Health and Safety

The cost to ensure occupational health and safety is summarized below in **Table 7.6** and cost breakup of PPE is given in **Table 7.7**.

Table 7.6: Budget Estimate for HSE (Construction Phase)

Sr. No.	Description	Quantity	Unit	Rate (PKR)	Amount (PKR)
1	Medical screening for workers	210	Persons	1500	315000
2	Tarpaulins	30	L.S.	10,000	300000
3	Handling of hazardous material	20	L.S.	10,000	200000
4	Handling of solid waste	20	L.S.	2,000	40000
5	DCP Fire extinguishers in case of fire	14	Each	3,500	49000
	CO2 Fire extinguishers in case of fire	14	Each	10,000	140000
6	Cost of Personal Protective Equipment (PPE)*		L.S.		1,561,000
				Sub total for all schemes	**2,605,000**
(Operation Phase)					
Sr. No.	**Description**	**Quantity**	**Unit**	**Rate (PKR)**	**Amount (PKR)**
1	Medical screening for workers	20	Persons	1500	30000
2	Handling of solid waste	15	L.S.	2,000	30000
3	Cost of Personal Protective Equipment (PPE)		L.S.		154,000
				Sub total for all schemes	**214,000**

Table 7.7: Break-up Cost of Personal Protective Equipment (PPE)

Construction					
Item No.	**Description**	**Quantity**	**Unit**	**Rate (PKR)**	**Amount**
					PKR
1	Ear plugs	210	Each	100	21,000
2	Helmets	210	Each	1500	315,000
3	Safety shoes	210	Each	3000	630,000
4	Protective goggles	210	Each	2000	420,000
5	Gloves	210	Each	300	63,000
6	Dust Mask	420	Each	100	42,000
7	First Aid Kit	14	Each	5000	70,000
				Sub total for one zone	**1,561,000**
Operation					
Item No.	**Description**	**Quantity**	**Unit**	**Rate (PKR)**	**Amount**
					PKR
1	Safety shoes	20	Each	3000	60,000
2	Gloves	60	Each	300	18,000
3	Dust Mask	60	Each	100	6,000
4	First Aid Kit	14	Each	5000	70,000
				Sub total for one zone	**154,000**

7.11 ESMMP Cost

The total cost for implementation of ESMMP has been worked out as **PKR 7,050,750 /-**. The cost in the construction phase shall be the responsibility of the Contractor while WASA-F shall bear the cost in the operational phase. Breakup given in below **Table 7.8.**

Table 7.8: ESMMP Cost

Sr. No.	***Description***	**Amount (Rs)**	
		Construction	***Operation***
1	Health & Safety	2,605,000	214,000
2	Environmental Monitoring	2,646,000	400,000
3	Training Cost	850,000	
	Sub-Total	**6,101,000**	**614,000**
	Contingencies @ 5%	305,050	30,700
	Total	**6,406,050**	**644,700**
		Grand Total	**7,050,750**

ANNEX-I

PHOTO LOG OF EXISTING CONDITIONS

PICTORIAL VIEW OF THE EXISTING CONDITION

EXISTING CONDITION SCHEME NO 1

EXISTING CONDITION SCHEME NO 2

EXISTING CONDITION SCHEME NO 3


GPS Map
Latitude
Longitude
73.132585°
Local 11:42:56 AM
GMT 06:42:56 AM
Friday, 16.06.2023


GPS Map
Latitude
31.471455°
Longitude
73.132561°
Local 11:43:25 AM
GMT 06:43:25 AM
Friday, 16.06.2023


Jhumra Road
Bhai Wala
Faisalabad
Punjab
Dec 12, 2024 4:10:56 PM

EXISTING CONDITION SCHEME NO 4

EXISTING CONDITION SCHEME NO 5

EXISTING CONDITION SCHEME NO 6

EXISTING CONDITION SCHEME NO 7

EXISTING CONDITION SCHEME NO 9

EXISTING CONDITION SCHEME NO 10

EXISTING CONDITION SCHEME NO 11

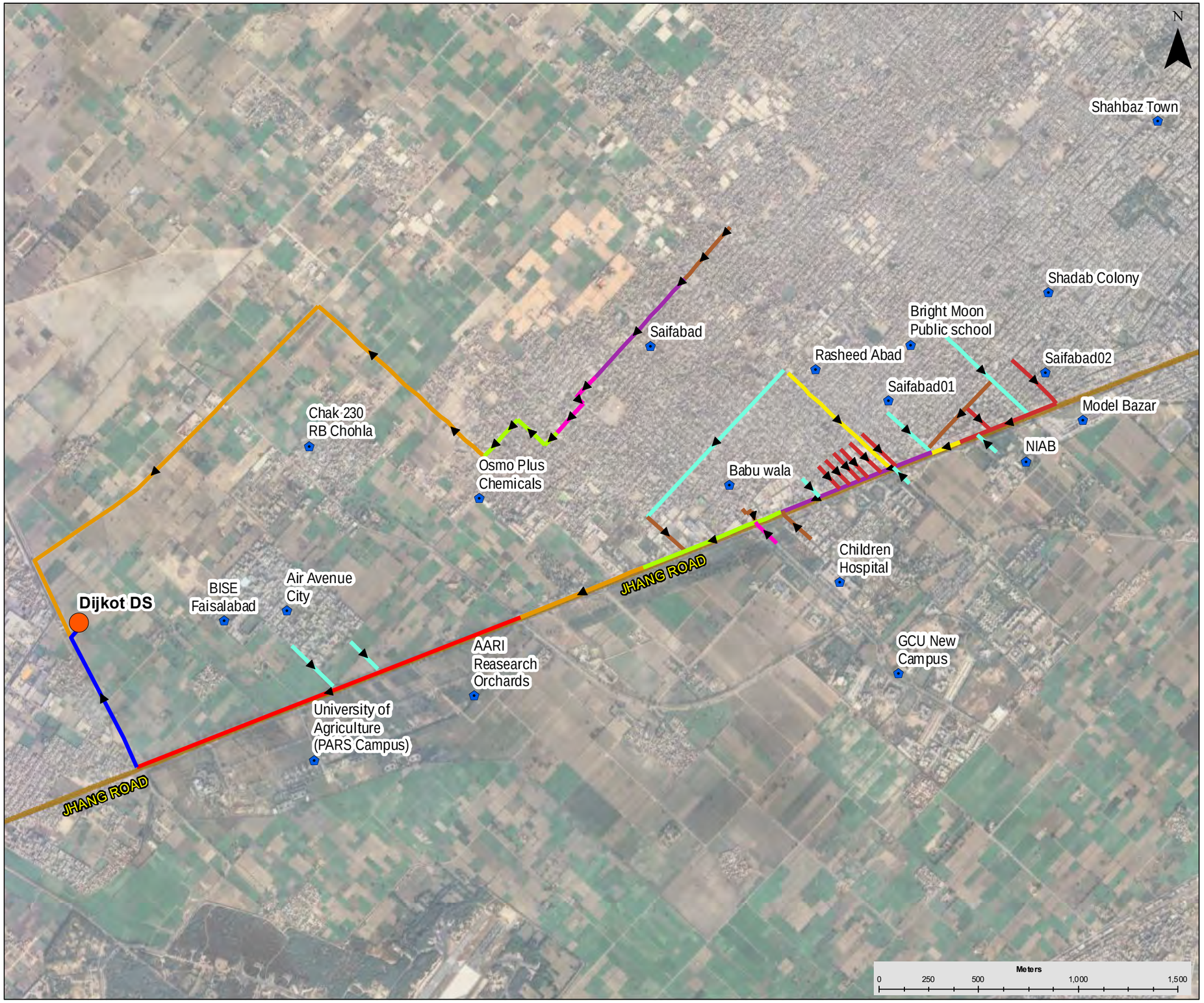
EXISTING CONDITION SCHEME NO 12

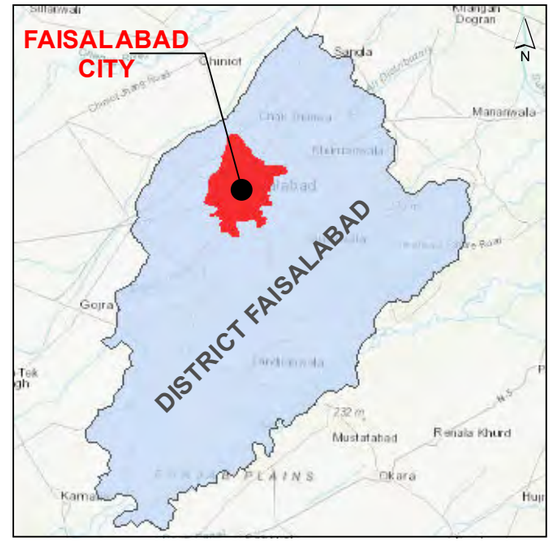
EXISTING CONDITION SCHEME NO 13

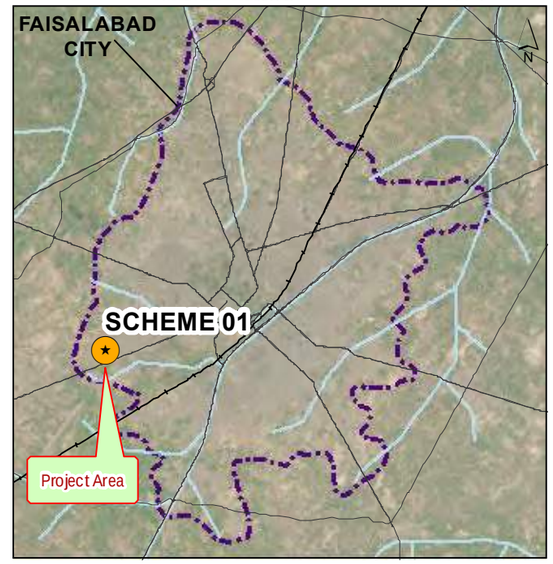
EXISTING CONDITION SCHEME NO 14

ANNEX-II

LAYOUT OF EXISTING SYSTEM







Legend

- Landmarks
- Disposal Station
- Main Roads
- 12"
- 15"
- 18"
- 21"
- 24"
- 27"
- 30"
- 36"
- 42"
- 48"

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
			DRWAN
			SUBMITTED
			RECOMMENDED
			CHD./VER.
			APPROVED

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

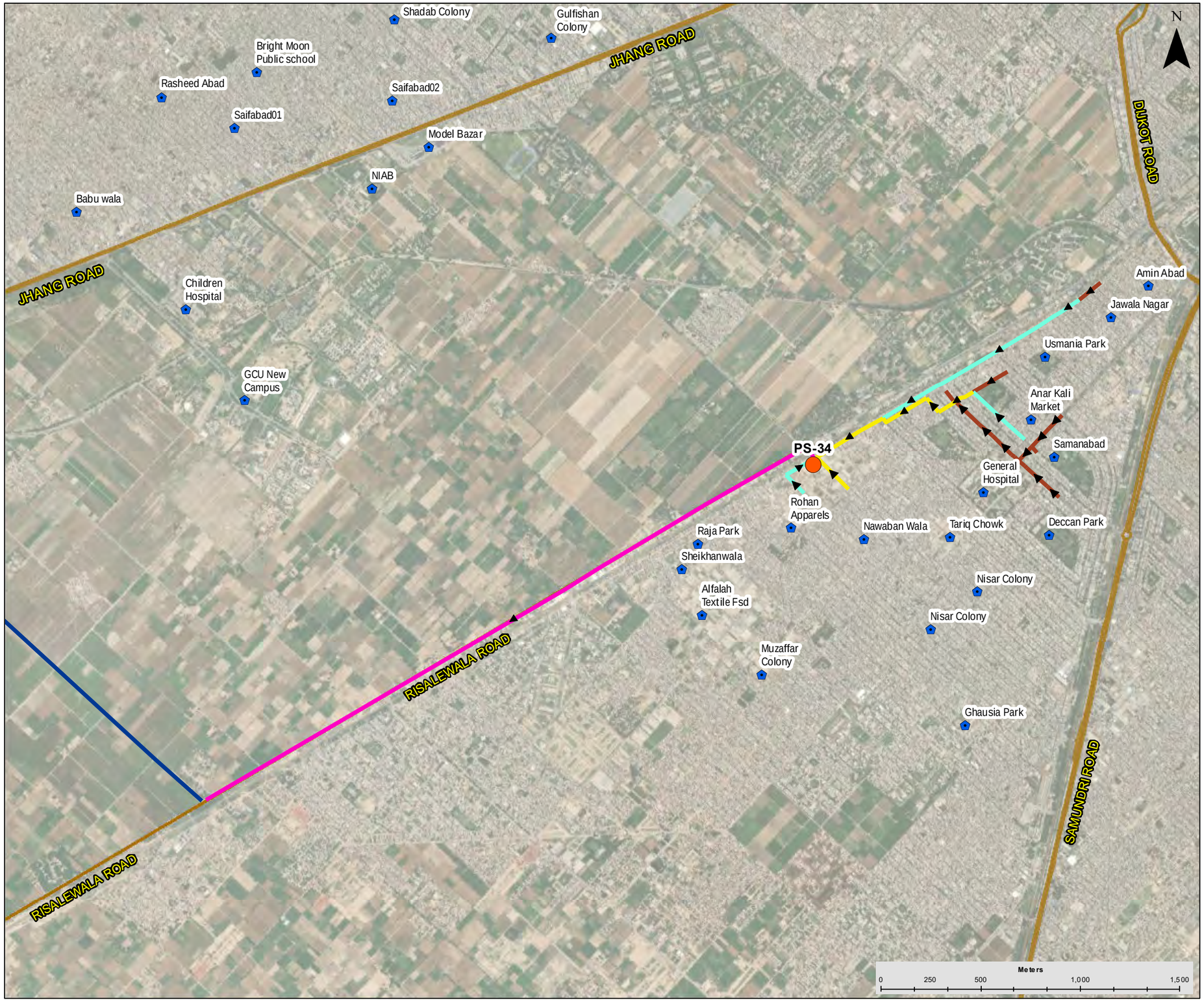
EXISTING SEWERAGE SYSTEM SCHEME # 01

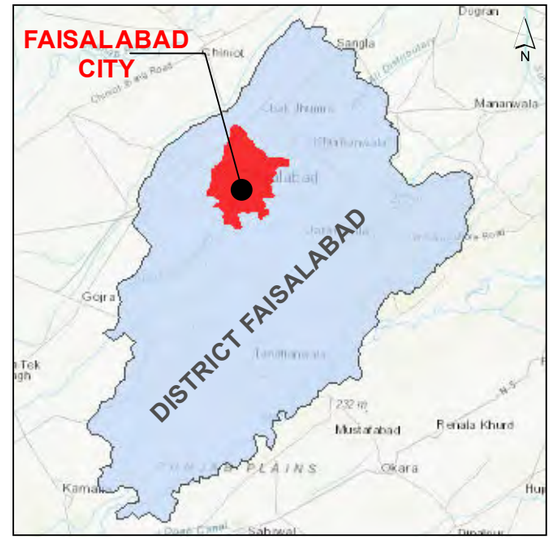
SCALE: 1:20,000

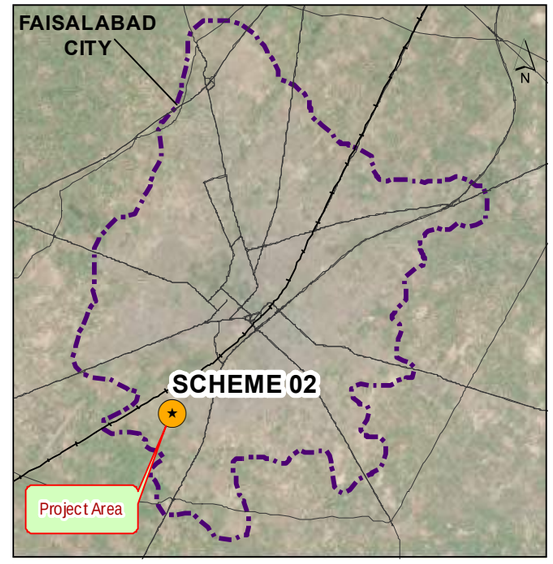
DATE: FEBRUARY, 2025

DRAWING NO: 4707/11/M/2J101

REV.







Legend

- Landmarks
- Disposal Station
- Main Roads
- 18"
- 20" GRP Force Main
- 24"
- 27"
- Irrigation Channel

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWN	O.S.A
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

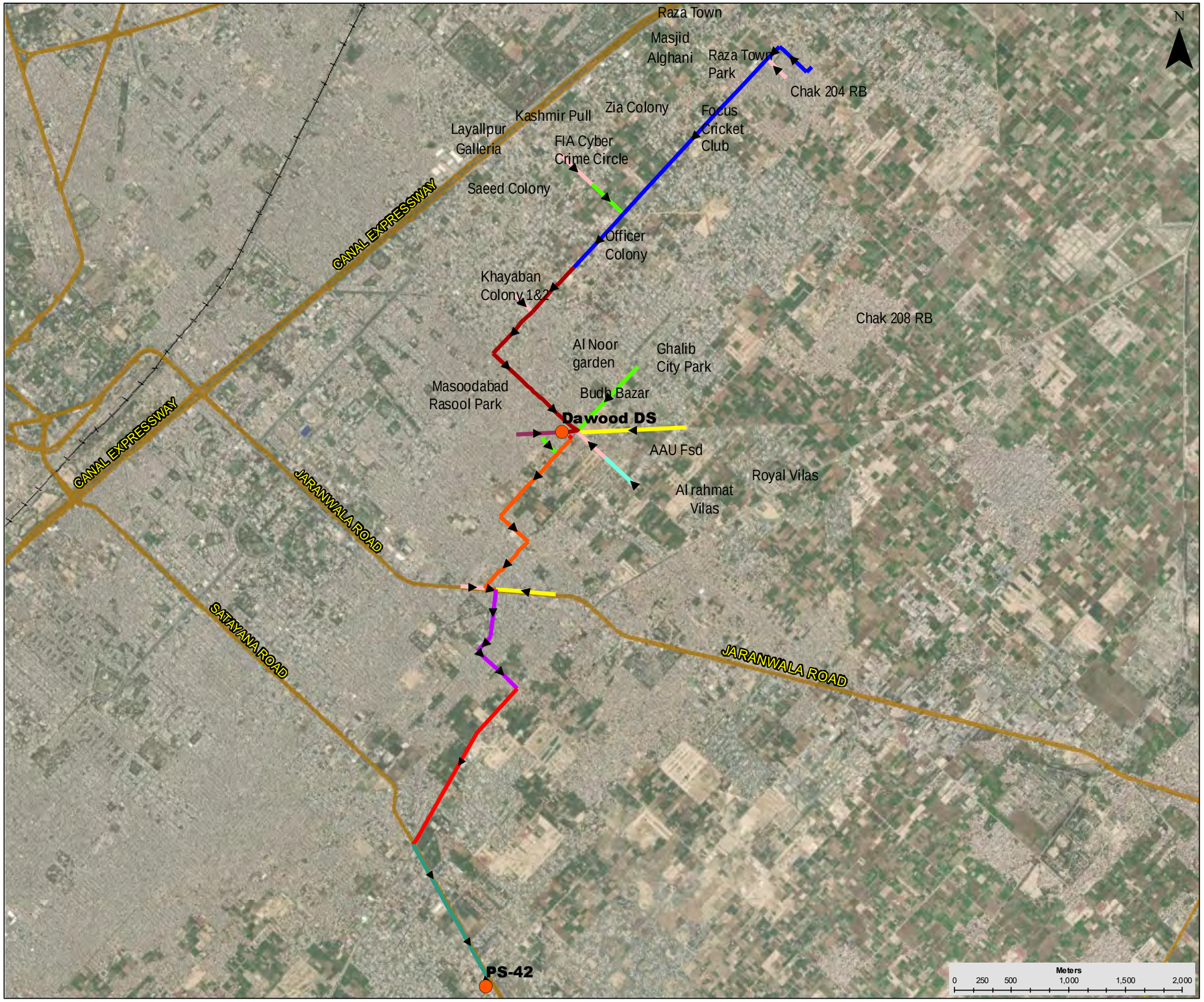
EXISTING SEWERAGE SYSTEM SCHEME # 02

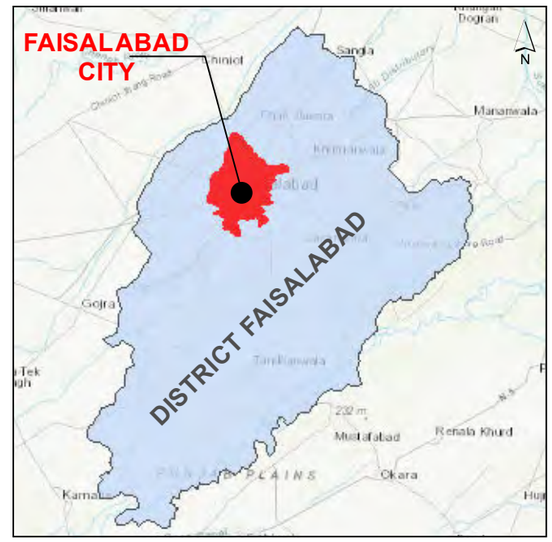
SCALE 1:20,000

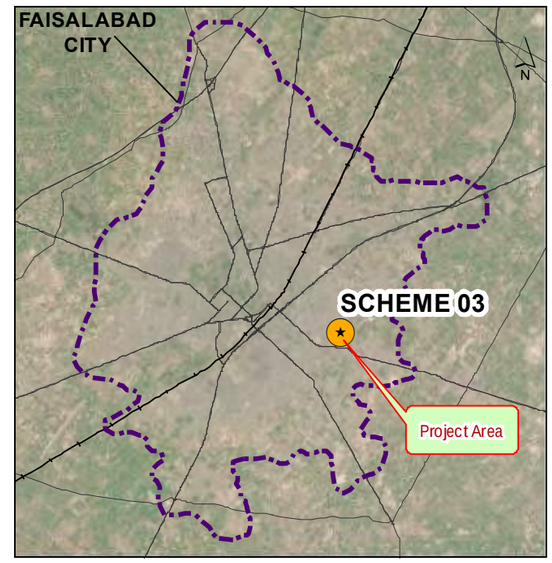
DATE FEBRUARY, 2025

DRAWING NO 4707/11/M/2J101

REV.







Legend

- Disposal Station
- Main Roads
- Railway Line
- 15"
- 18"
- 24"
- 27"
- 30"
- 36"
- 42"
- 54"
- 60"
- 66"
- 72"
- 48" Forcemain

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

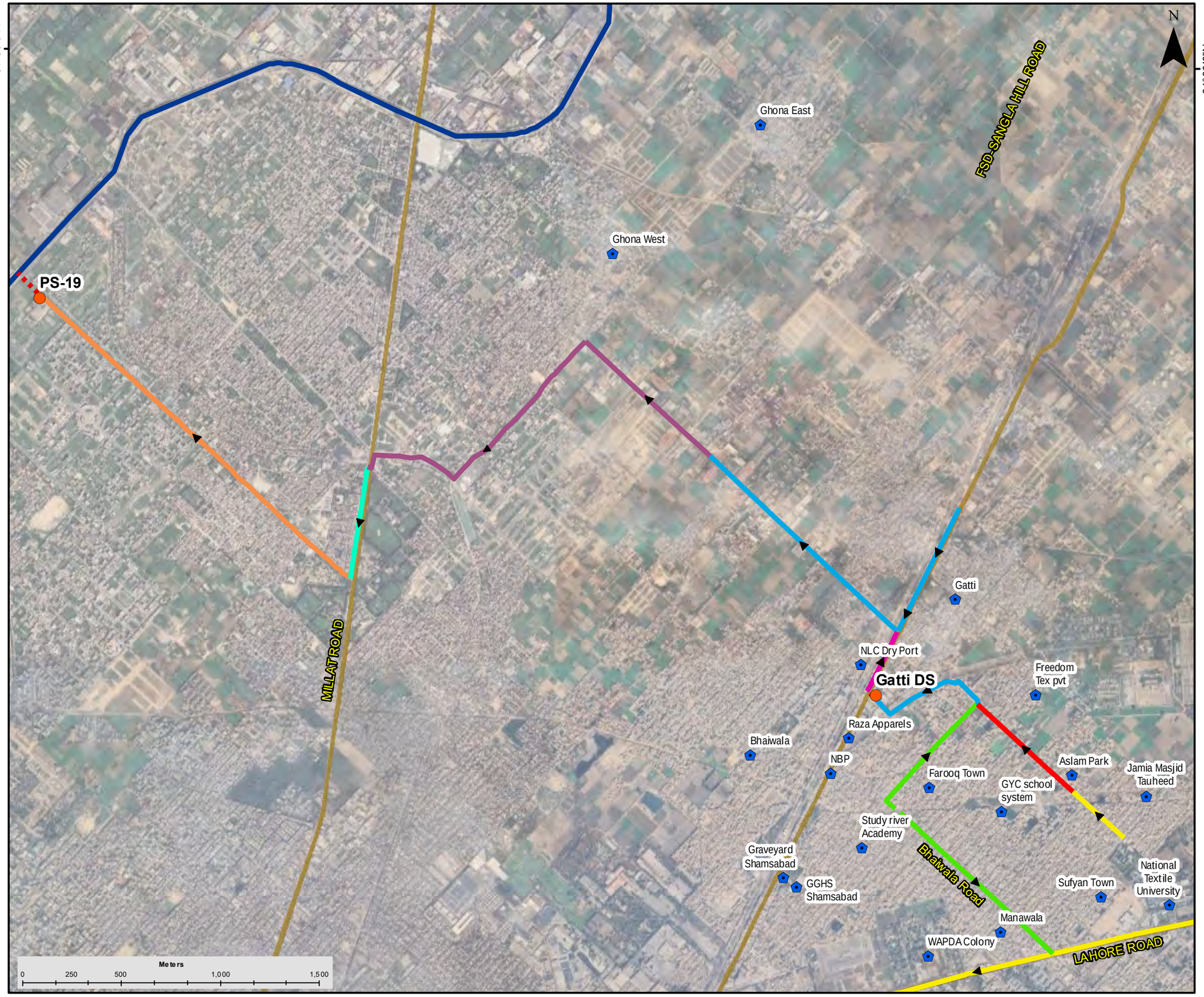
DRWN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

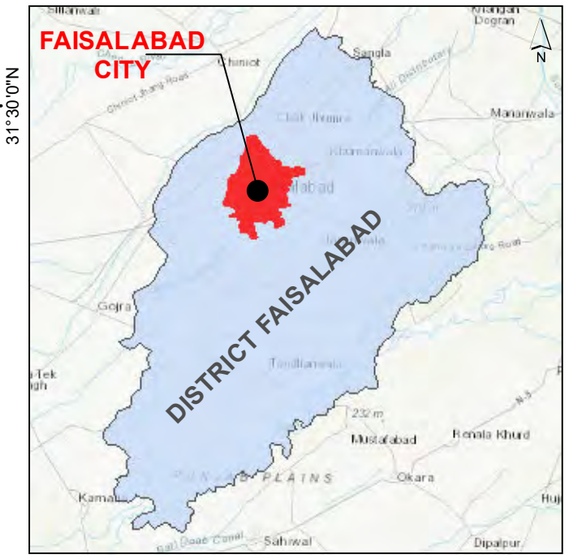
PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

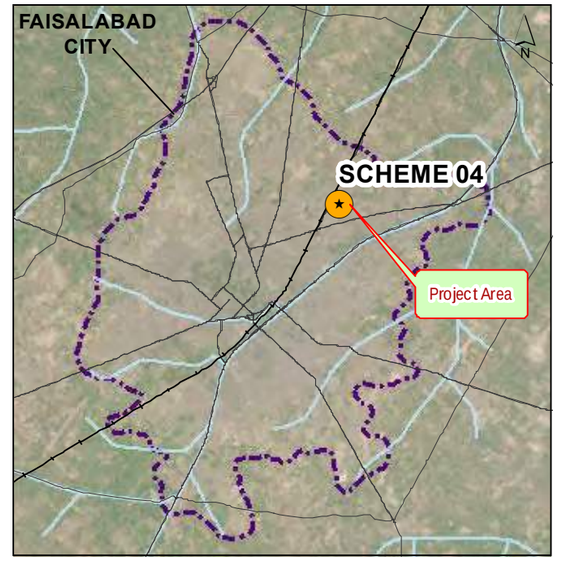
EXISTING SEWERAGE SYSTEM SCHEME # 03

SCALE: 1:35,000

DATE	DRAWING NO	REV.
FEBRUARY,2025	4707/11/M/2J101	



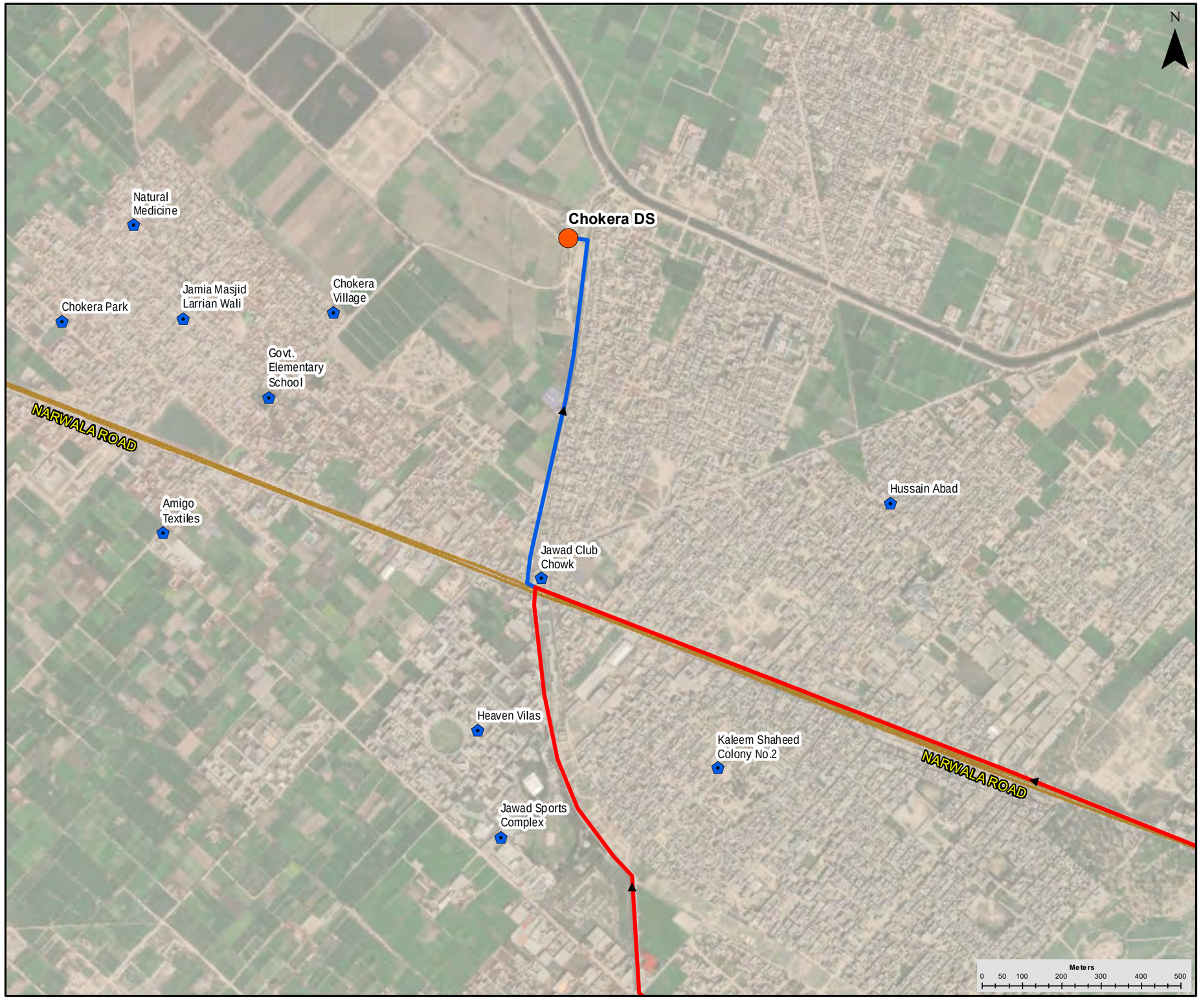


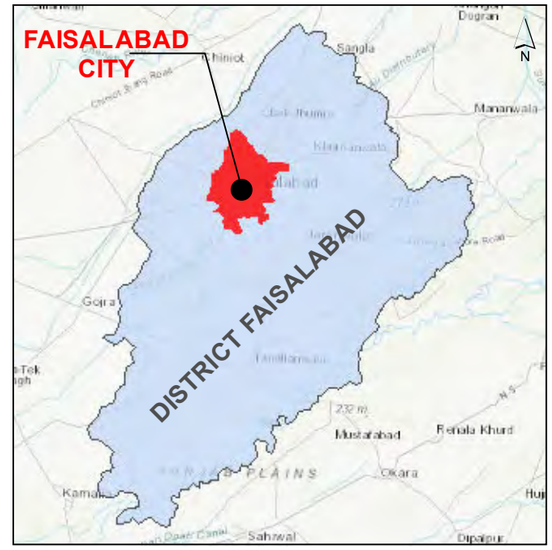


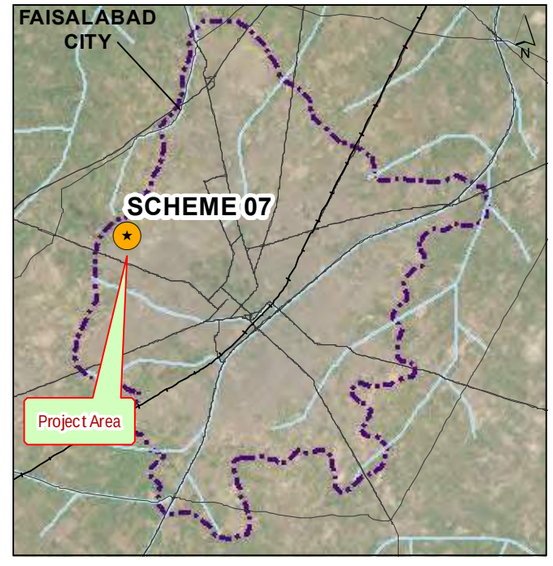
Legend

- Landmarks
- Disposal Station
- Main Roads
- 21"
- 27"
- 30"
- 36"
- 42"
- 54"
- 60"
- 66"
- Forcemain
- Paharing Drain

CLIENT: WATER AND SANITATION AGENCY (WASA), FAISALABAD	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	REV. / DATE / DESCRIPTION / APPROVED	DRWN / SUBMITTED / RECOMMENDED / CHD./VER. / APPROVED	PROJECT: CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY	EXISTING SEWERAGE SYSTEM SCHEME # 04 — SCALE 1:20,000 — DATE FEBURARY, 2025 — DRAWING NO 4707/11/M/2J101 — REV.







Legend

- Landmarks
- Disposal Station
- 72"
- 90"
- Main Roads
- Railway Line

CLIENT: WATER AND SANITATION AGENCY (WASA), FAISALABAD	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.					PROJECT: CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY
		REV.	DATE	DESCRIPTION	APPROVED	DRWN / SUBMITTED / RECOMMENDED / CHD./VER. / APPROVED

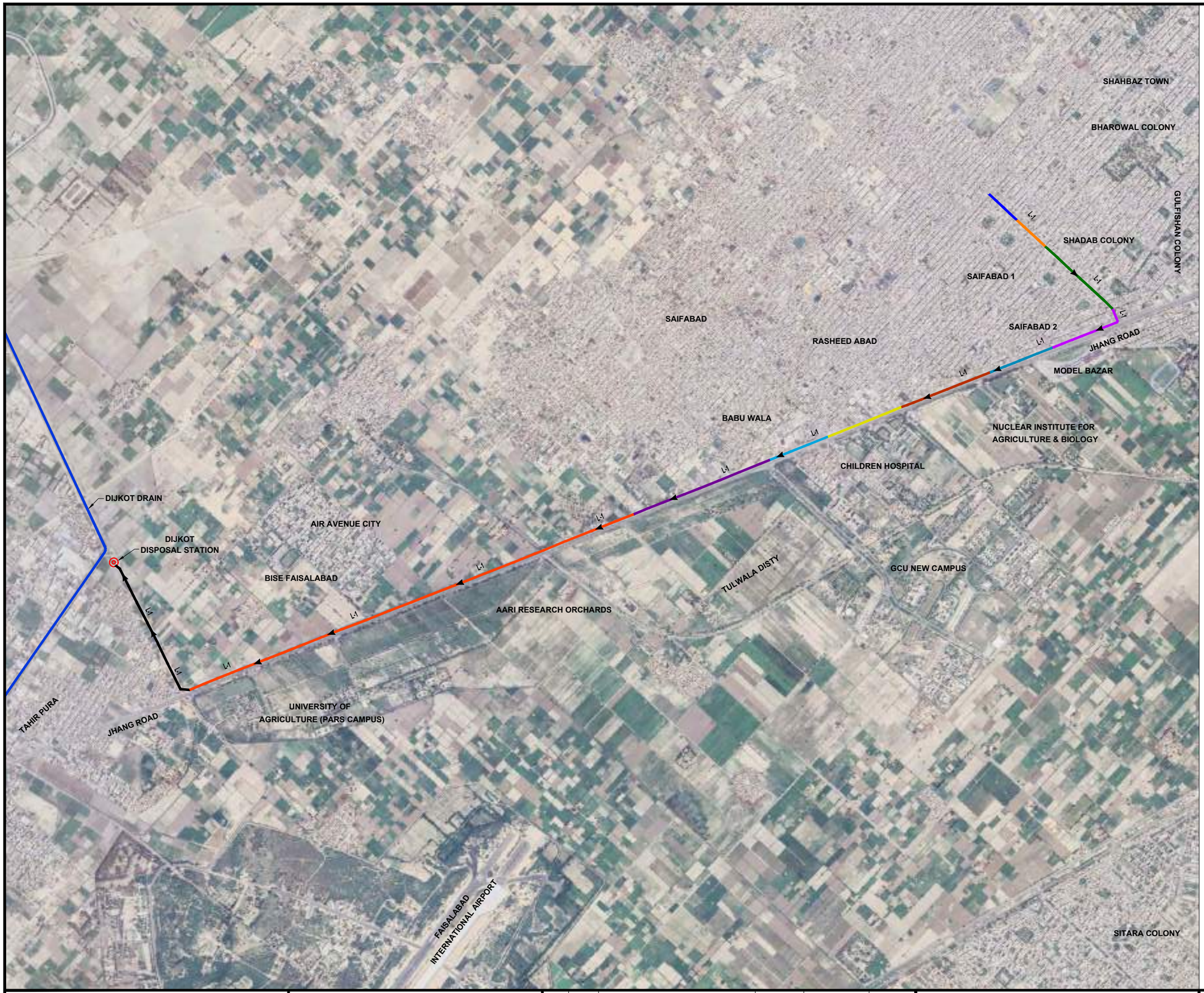
EXISTING SEWER SYSTEM SCHEME # 07

SCALE: 1:10,000

DATE: FEBRUARY,2025 | DRAWING NO: 4707/11/M/2J101 | REV.

ANNEX-III

LAYOUT OF PROPOSED SYSTEM



CLIENT

WATER AND SANITATION AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	MUTI
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 1

PROPOSED SEWERAGE SYSTEM GENERAL LAYOUT PLAN (SCHEME NO. 01)

SCALE: 1"=1650'

DATE: MAY, 2025

DRAWING No.: 4707/11/DD/2J103

REV.: 0

N

LEGEND:

- PROPOSED FORCEMAIN
- SULLAGE CARRIER
- FLOW DIRECTION
- EXISTING DISPOSAL STATION

CLIENT

WATER AND SANITATION AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	NASEEM
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

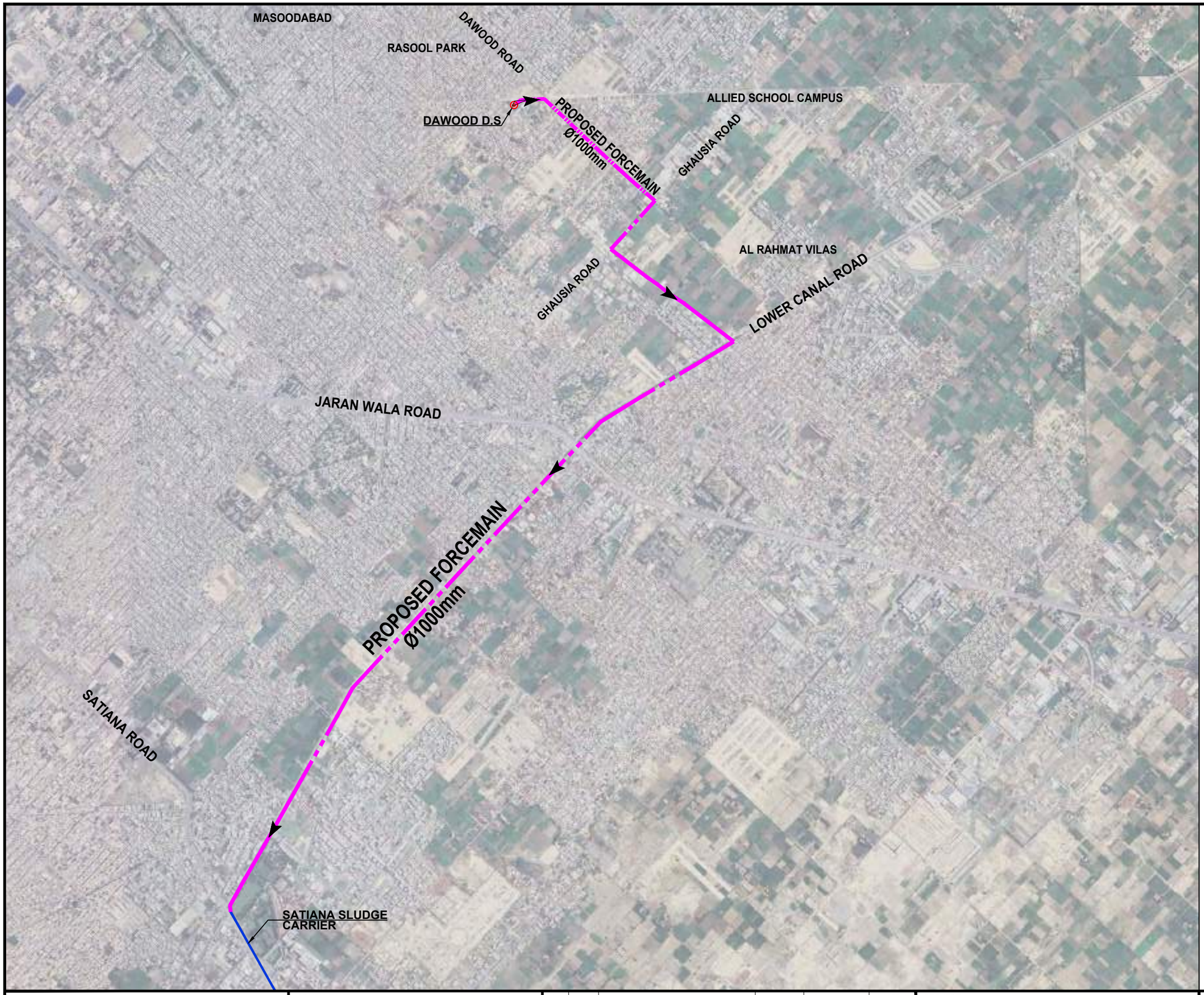
PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 2

PROPOSED FORCEMAIN LAYOUT PLAN (SCHEME NO. 02)

DATE	DRAWING No.	REV.
May, 2025	4707/11/DD/2J103	0

SCALE 1"=1100'



N

LEGEND:

PROPOSED FORCEMAIN	
LENGTH OF FORCEMAIN	L=(100')
SLUDGE CARRIER	
FLOW DIRECTION	
DISPOSAL STATION	

CLIENT

WATER AND SANITATION AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	NASEEM
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

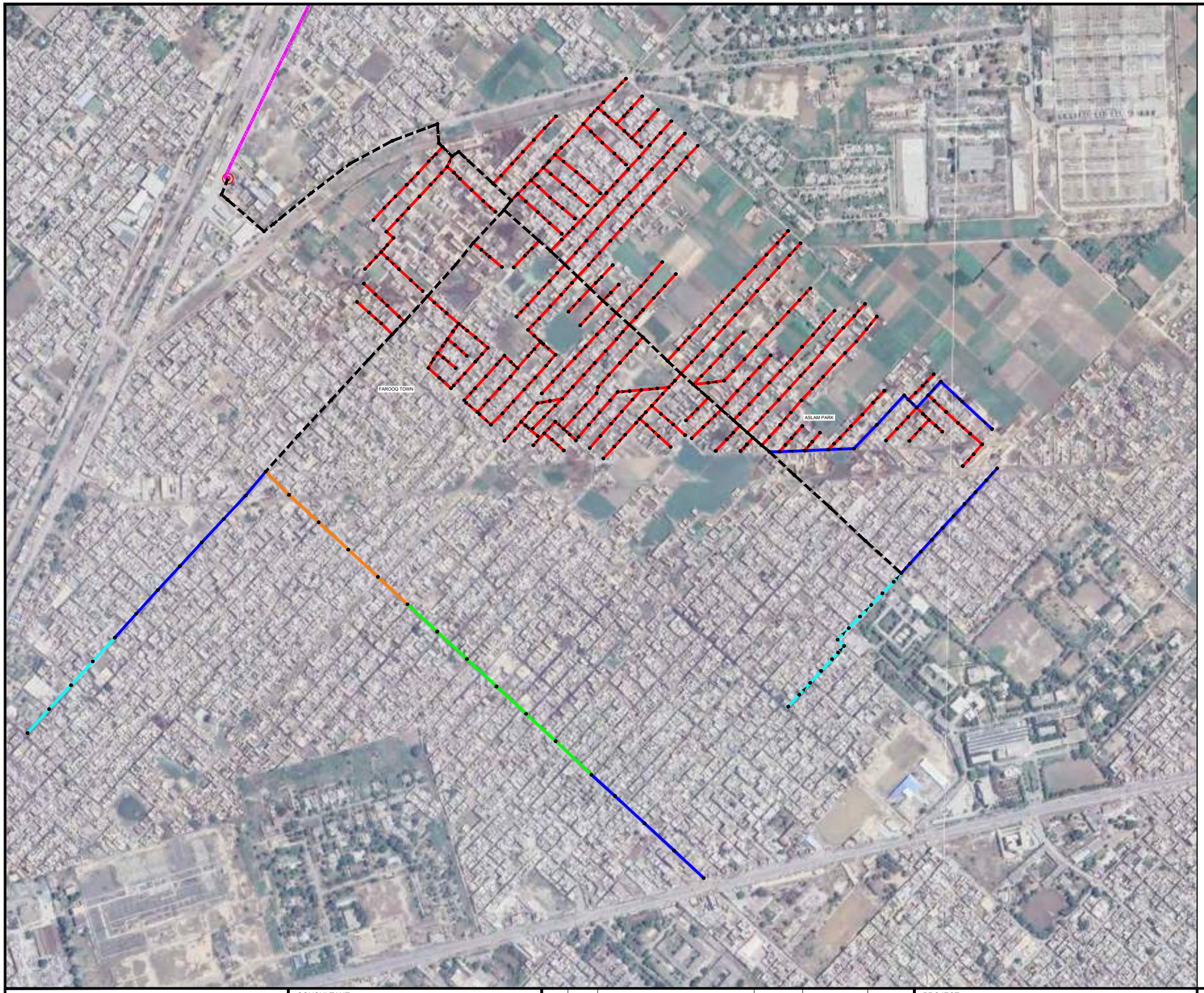
PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 3

PROPOSED FORCEMAIN LAYOUT PLAN (SCHEME NO. 03)

DATE	DRAWING No.	REV.
May, 2025	4707/11/DD/2J103	0

SCALE 1"=1400'



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LEGEND:

- Ø12" SEWER PIPE
- Ø15" SEWER PIPE
- Ø18" SEWER PIPE
- Ø21" SEWER PIPE
- Ø24" SEWER PIPE
- EXISTING SEWER
- FLOW DIRECTION
- MANHOLE
- SEWER LENGTH (100')
- DRAIN
- DISPOSAL STATION

CLIENT

WATER AND SANITARY AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	MUTI
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 4

PROPOSED SEWERAGE SYSTEM GENERAL LAYOUT PLAN (SCHEME NO. 04)

SCALE: 1"=100'

DATE: MAY, 2025

DRAWING No.: 4707/11/DD/2J105

REV.: 0

N

LEGEND:

PROPOSED FORCEMAIN

DRAIN

DISPOSAL STATION

(SHEET 1 OF 18)

CLIENT

WATER AND SANITARY AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	MUTI
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 4

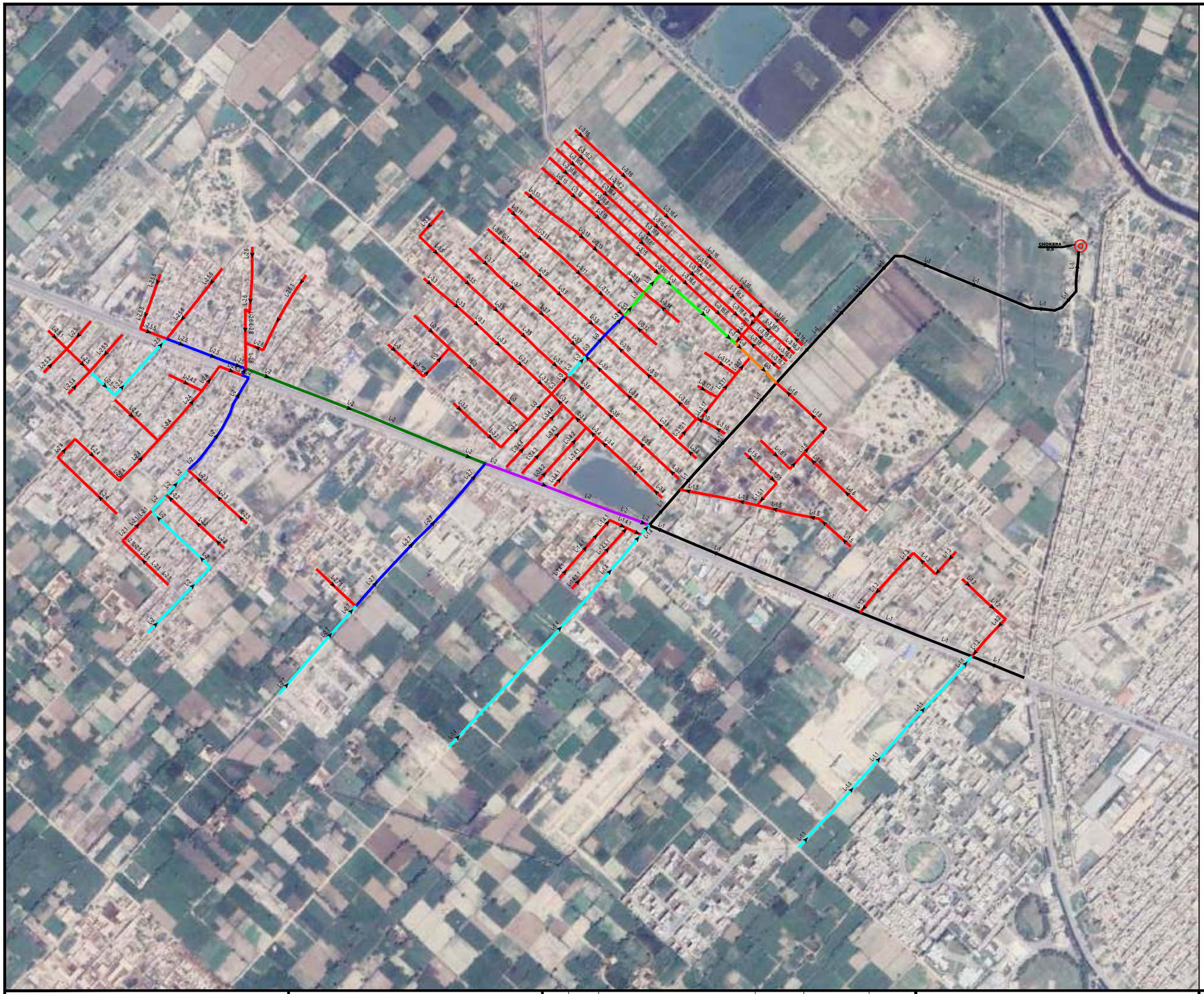
PROPOSED LAYOUT PLAN (SCHEME NO. 04)

SCALE: 1"=100'

DATE: MAY, 2025

DRAWING No.: 4707/11/DD/2J105

REV.: 0



N

LEGEND:

- EXISTING SEWER
- Ø12" SEWER
- Ø15" SEWER
- Ø18" SEWER
- Ø21" SEWER
- Ø24" SEWER
- Ø27" SEWER
- Ø30" SEWER
- Ø72" SEWER
- FLOW DIRECTION
- MANHOLE
- SEWER LENGTH — L-1 (100')
- DISPOSAL STATION

CLIENT

WATER AND SANITATION AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	NASEEM
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 07

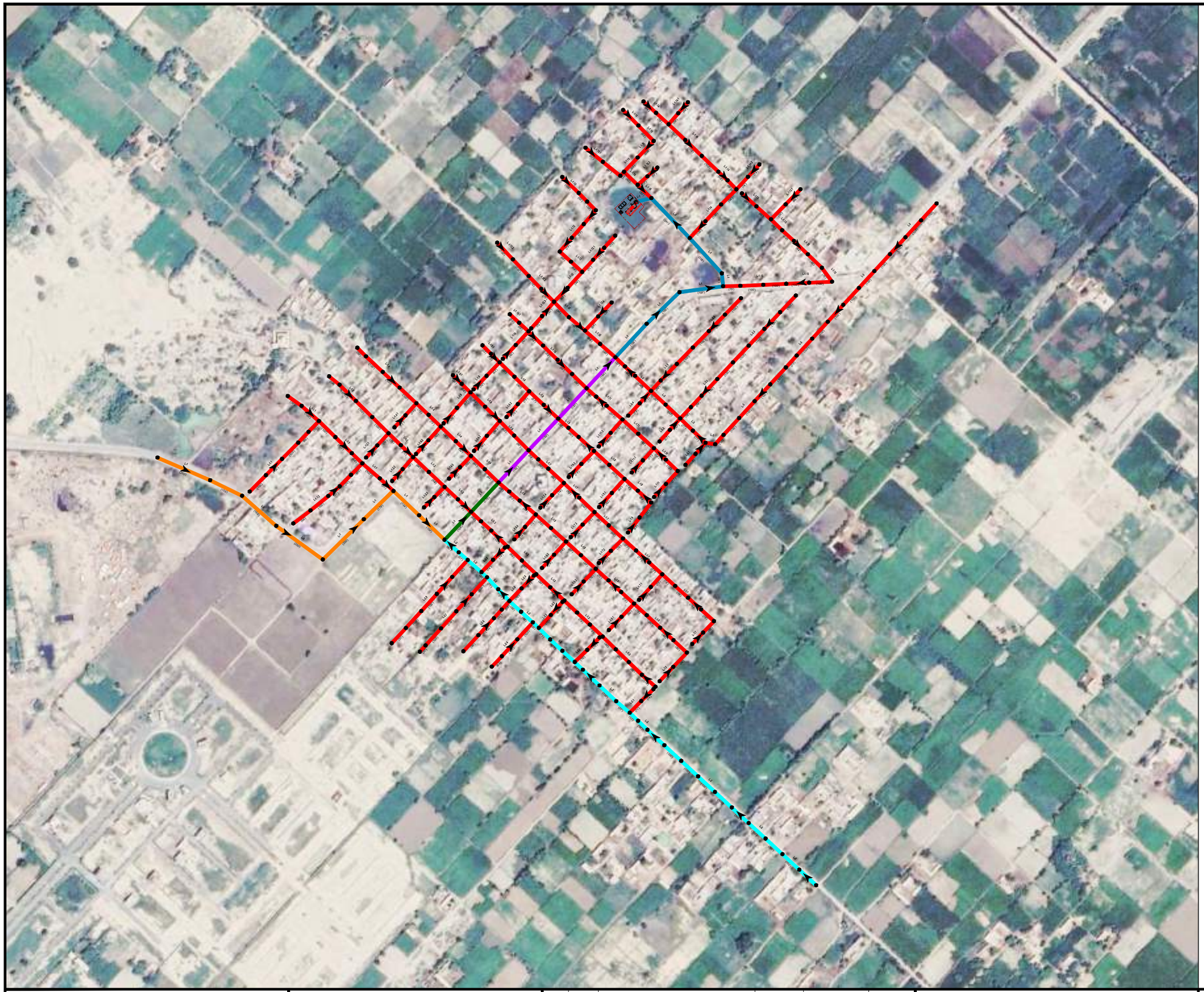
PROPOSED SEWERAGE SYSTEM GENERAL LAYOUT PLAN (SCHEME NO. 07)

SCALE: 1"=650'

DATE: MAY, 2025

DRAWING No.: 4707/11/DD/2J105

REV.: 0



N

LEGEND:

- Ø12" PROPOSED SEWER
- Ø15" PROPOSED SEWER
- Ø24" PROPOSED SEWER
- Ø27" PROPOSED SEWER
- Ø30" PROPOSED SEWER
- Ø36" PROPOSED SEWER
- FLOW DIRECTION
- LENGTH (400')
- FORCEMAIN
- DRAIN
- MANHOLE
- DISPOSAL STATION

CLIENT

WATER AND SANITARY AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	NASEEM
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 12

PROPOSED SEWERAGE SYSTEM GENERAL LAYOUT PLAN (SCHEME NO. 12)

DATE	DRAWING No.	SCALE	REV.
MAY, 2025	4707/11/DD/2J102	1"=400'	0

N

LEGEND:

FORCEMAIN

DRAIN

DISPOSAL STATION

CLIENT

WATER AND SANITARY AGENCY, FAISALABAD

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

HEAD OFFICE:- NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	NASEEM
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY SCHEME # 12

PROPOSED SEWERAGE SYSTEM GENERAL LAYOUT PLAN (SCHEME NO. 12)

SCALE: 1"=400'

DATE: MAY, 2025

DRAWING No.: 4707/11/DD/2J102

REV.: 0

ANNEX-IV

ENVIRONMENT MONITORING REPORT

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)

ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +92-42-35441444 Cell: 0303-4442334

EPA Certified

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref. #: PGG/LAB/2025-4869/AA

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Location:	S1 (Sch 5 & 7)
Monitoring Coordinates:	31°23'7.39"N 73° 3'13.09"E
Name of Sampling Person:	Mr. Arsalan
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	03-Jul-25 to 04-Jul-25

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	PM10	PM2.5	SPM	O_3
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
1.	9:00 AM	2.27	6.77	34.43	37.44				
2.	10:00 AM	2.31	9.31	41.88	50.55				
3.	11:00 AM	2.62	8.32	45.01	54.90				
4.	12:00 PM	2.34	5.62	37.96	53.76				
5.	1:00 PM	2.19	5.13	33.45	51.80				
6.	2:00 PM	2.39	7.00	25.02	51.13				
7.	3:00 PM	2.22	10.83	30.31	50.52				
8.	4:00 PM	2.28	6.74	25.22	49.20				
9.	5:00 PM	2.51	5.62	28.47	47.98				
10.	6:00 PM	2.54	4.77	24.36	46.71				
11.	7:00 PM	3.23	3.40	22.20	46.87				
12.	8:00 PM	3.31	10.68	27.10	47.24				
13.	9:00 PM	3.52	8.86	26.51	48.51	162.3*	56.9*	544.9*	75.5
14.	10:00 PM	3.34	8.13	24.95	49.57				
15.	11:00 M	3.16	6.40	23.18	50.55				
16.	12:00 AM	3.04	6.77	36.32	50.96				
17.	1:00 AM	2.89	12.92	29.26	51.16				
18.	2:00 AM	3.11	8.37	24.95	49.07				
19.	3:00 AM	3.34	6.53	29.23	49.25				
20.	4:00 AM	2.42	6.40	23.77	48.27				
21.	5:00 AM	2.62	8.49	22.28	48.93				
22.	6:00 AM	2.43	8.86	23.85	50.15				
23.	7:00 AM	2.28	8.00	25.41	51.03				
24.	8:00 AM	2.54	7.48	32.08	52.80				
Average (24 Hours)		2.70	7.56	29.05	49.51				
PEQS		5 8hours	40 24hours	80 24hours	120 24hours	150 24hours	35 24hours	500 24hours	130 1 hour

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4869/AA

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards
Remarks: Parameters with * are not in compliance with PEQS Limits.
Terms & Conditions:

- Analysis was conducted on the request of proponent for his own use or PEQS compliance.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- This report should be reproduced pas a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
  The report is not valid for any negotiations

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt.) Ltd. 46-M, Gulberg-III, Lahore Pakistan

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +92-42-35441444 Cell: 0303-4442334

EPA Certified

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref. #: PGG/LAB/2025-4870/AA

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Location:	S2 (Near Sch 02)
Monitoring Coordinates:	31°26'30.03"N 73° 0'54.48"E
Name of Sampling Person:	Mr. Arsalan
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	04-Jul-25 to 05-Jul-25

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	PM10	PM2.5	SPM	O_3
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
1.	9:00 AM	1.61	11.29	36.05	43.56				
2.	10:00 AM	1.64	7.83	40.27	45.33				
3.	11:00 AM	1.66	14.63	41.07	46.32				
4.	12:00 PM	1.69	8.52	34.06	49.28				
5.	1:00 PM	1.71	8.42	36.17	49.70				
6.	2:00 PM	1.81	14.59	41.04	43.56				
7.	3:00 PM	1.83	11.13	39.24	41.64				
8.	4:00 PM	1.77	16.01	31.83	40.48				
9.	5:00 PM	2.00	10.29	42.52	51.34				
10.	6:00 PM	1.41	8.65	44.23	52.58				
11.	7:00 PM	1.34	7.64	46.29	53.14				
12.	8:00 PM	1.33	10.67	44.73	54.38				
13.	9:00 PM	1.29	12.09	46.76	52.23	169.7*	60.4*		70.2
14.	10:00 PM	1.45	15.14	45.33	57.77			572.9*	
15.	11:00 M	1.05	14.40	41.32	53.13				
16.	12:00 AM	1.50	13.56	61.19	53.30				
17.	1:00 AM	1.57	12.95	44.97	55.06				
18.	2:00 AM	1.79	10.72	44.26	55.23				
19.	3:00 AM	2.02	13.87	49.25	55.71				
20.	4:00 AM	1.75	14.06	43.29	56.75				
21.	5:00 AM	2.02	14.50	41.37	46.32				
22.	6:00 AM	1.20	16.45	34.83	44.99				
23.	7:00 AM	1.31	14.97	34.72	53.06				
24.	8:00 AM	0.71	8.08	32.08	42.80				
Average (24 Hours)		1.56	12.10	41.54	49.90				
PEQS		5 8hours	40 24hours	80 24hours	120 24hours	150 24hours	35 24hours	500 24hours	130 1 hour

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4870/AA

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards
Remarks: Parameters with * are not in compliance with PEQS Limits.
Terms & Conditions:

- Analysis was conducted on the request of proponent for his own use or PEQS compliance.
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  The report is not valid for any negotiations

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Gulberg-III, Lahore Pakistan

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref. #: PGG/LAB/2025-4871/AA

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Location:	S3 (Sch-03&14)
Monitoring Coordinates:	31°24'16.24"N 73° 8'41.55"E
Name of Sampling Person:	Mr. Arsalan
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	05-Jul-25 to 06-Jul-25

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	PM_{10}	$PM_{2.5}$	SPM	O_3
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
1.	9:00 AM	2.23	15.75	24.88	38.78				
2.	10:00 AM	2.75	21.10	23.10	40.55				
3.	11:00 AM	2.90	15.28	23.90	41.54				
4.	12:00 PM	2.24	16.69	22.89	44.50				
5.	1:00 PM	3.54	17.59	25.00	44.92				
6.	2:00 PM	3.64	13.18	23.87	38.78				
7.	3:00 PM	3.15	16.52	22.07	36.86				
8.	4:00 PM	2.35	13.64	22.66	43.10				
9.	5:00 PM	3.31	16.26	25.29	49.96				
10.	6:00 PM	2.50	15.82	27.00	51.20				
11.	7:00 PM	2.43	16.81	28.06	51.76				
12.	8:00 PM	2.41	17.84	28.50	49.60				
13.	9:00 PM	2.38	16.40	30.53	50.85	165.7*	56.3*	582.8*	67.8
14.	10:00 PM	2.54	19.45	32.20	43.23				
15.	11:00 M	2.12	14.51	24.19	38.59				
16.	12:00 AM	2.77	13.67	24.06	38.31				
17.	1:00 AM	2.85	13.06	27.84	41.01				
18.	2:00 AM	2.98	15.83	27.13	36.18				
19.	3:00 AM	3.08	13.98	26.66	36.66				
20.	4:00 AM	3.11	11.61	26.16	37.70				
21.	5:00 AM	3.32	12.05	30.24	36.58				
22.	6:00 AM	2.95	10.88	29.60	46.21				
23.	7:00 AM	3.06	13.59	26.47	43.28				
24.	8:00 AM	2.23	13.70	32.24	39.91				
Average (24 Hours)		2.78	15.22	26.44	42.50				
PEQS		5 8hours	40 24hours	80 24hours	120 24hours	150 24hours	35 24hours	500 24hours	130 1 hour

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4871/AA

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards
Remarks: Parameters with * are not in compliance with PEQS Limits.
Terms & Conditions:

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  The report is not valid for any negotiations

Field Analyst	Chief Analyst	Laboratory Incharge

EPA Certified

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref. #: PGG/LAB/2025-4872/AA

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Location:	S4 (Scheme -04)
Monitoring Coordinates:	31°28'19.88"N 73° 8'11.73"E
Name of Sampling Person:	Mr. Arsalan
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	06-Jul-25 to 07-Jul-25

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	PM10	$PM_{2.5}$	SPM	O_3
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m3	µg/m3	µg/m3	µg/m³
1.	9:00 AM	1.93	17.51	33.29	37.86				
2.	10:00 AM	2.45	22.88	26.39	39.63				
3.	11:00 AM	2.59	17.06	28.40	40.62				
4.	12:00 PM	1.94	18.47	27.93	43.58				
5.	1:00 PM	3.24	19.37	32.71	44.00				
6.	2:00 PM	3.34	14.96	29.00	37.86				
7.	3:00 PM	2.85	21.06	28.53	35.94				
8.	4:00 PM	2.05	17.58	28.16	41.88				
9.	5:00 PM	2.19	15.90	42.46	35.88				
10.	6:00 PM	2.80	17.46	40.64	37.12				
11.	7:00 PM	2.93	16.45	39.70	38.48				
12.	8:00 PM	2.70	17.48	40.14	38.92				
13.	9:00 PM	2.39	16.04	35.80	36.77	159.2*	48.7*	540.4*	72.8
14.	10:00 PM	2.55	19.07	40.22	42.31				
15.	11:00 M	2.15	12.97	38.67	37.67				
16.	12:00 AM	1.27	15.99	37.43	37.39				
17.	1:00 AM	1.35	18.40	33.51	40.09				
18.	2:00 AM	1.48	21.17	35.05	45.12				
19.	3:00 AM	2.20	19.32	37.30	35.74				
20.	4:00 AM	2.53	16.39	35.41	36.78				
21.	5:00 AM	2.26	12.83	30.14	35.66				
22.	6:00 AM	2.23	12.66	41.92	45.29				
23.	7:00 AM	1.97	12.05	34.06	42.36				
24.	8:00 AM	1.14	15.48	44.54	38.99				
Average (24 Hours)		2.27	17.02	35.06	39.41				
PEQS		5 8hours	40 24hours	80 24hours	120 24hours	150 24hours	35 24hours	500 24hours	130 1 hour

Ref. #: PGG/LAB/2025-4872/AA

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards
Remarks: Parameters with * are not in compliance with PEQS Limits.
Terms & Conditions:

- Analysis was conducted on the request of proponent for his own use or PEQS compliance.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
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  The report is not valid for any negotiations

Field Analyst	Chief Analyst	Laboratory Incharge

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023. etc."

TEST REPORT

Ref. #: PGG/LAB/2025-4873/NL

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Noise Level
Monitoring Location:	S1 (Sch 5 & 7)
Monitoring Coordinates:	31°23'7.39"N 73° 3'13.09"E
Name of Sampling Person:	Mr. Arsalan
Monitoring By:	Pak Green Laboratory
Monitoring Time:	Real Time
Monitoring Instrument:	Noise Meter Landtek SL-5868P
Monitoring Date:	03-Jul-25 to 04-Jul-25

Results:

Sr. No.	Day Time	Equivalent Noise
		dB (A)
1.	6:00 AM	59.8
2.	7:00 AM	68.2
3.	8:00 AM	67.3
4.	9:00 AM	62.4
5.	10:00 AM	64.5
6.	11:00 AM	66.1
7.	12:00 PM	67.7
8.	1:00 PM	63.9
9.	2:00 PM	65.4
10.	3:00 PM	68.9
11.	4:00 PM	59.3
12.	5:00 PM	64.1
13.	6:00 PM	65.2
14.	7:00 PM	58.4
15.	8:00 PM	56.5
16.	9:00 PM	55.7
17.	10:00 PM	59.6
Average		63.1
Sr. No.	Night Time	Equivalent Noise
		dB (A)
18.	11:00 PM	52.8
19.	12:00 AM	51.3
20.	1:00 AM	51.9
21.	2:00 AM	50.4
22.	3:00 AM	52.7
23.	4:00 AM	53.7
24.	5:00 AM	50.3
Average		51.9

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4873/NL

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Commercial Area	dB (A) Leq	65	55

dB (A) Leq: Time weighted average of the level of sound in decibel on scale A, which is relatable to human hearing.

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M, Gulberg-III, Lahore Pakistan

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref. #: PGG/LAB/2025-4874/NL

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Noise Level
Monitoring Location:	S2 (Near Sch 02)
Monitoring Coordinates:	31°26'30.03"N 73° 0'54.48"E
Name of Sampling Person:	Mr. Arsalan
Monitoring By:	Pak Green Laboratory
Monitoring Time:	Real Time
Monitoring Instrument:	Noise Meter Landtek SL-5868P
Monitoring Date:	04-Jul-25 to 05-Jul-25

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 AM	58.2
2.	7:00 AM	63.3
3.	8:00 AM	67.8
4.	9:00 AM	64.4
5.	10:00 AM	66.5
6.	11:00 AM	73.0
7.	12:00 PM	65.7
8.	1:00 PM	66.2
9.	2:00 PM	67.4
10.	3:00 PM	62.3
11.	4:00 PM	65.9
12.	5:00 PM	56.3
13.	6:00 PM	54.6
14.	7:00 PM	53.8
15.	8:00 PM	54.4
16.	9:00 PM	57.0
17.	10:00 PM	63.2
Average		**62.4**

Sr. No.	Night Time	Equivalent Noise dB (A)
18.	11:00 PM	45
19.	12:00 AM	46.2
20.	1:00 AM	48.9
21.	2:00 AM	43.7
22.	3:00 AM	47.1
23.	4:00 AM	48.5
24.	5:00 AM	52.4
Average		**47.4**

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M, Gulberg-III, Lahore. Lab Unit Pakistan.

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4874/NL

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Commercial Area	dB (A) Leq	65	55

dB (A) Leq: Time weighted average of the level of sound in decibel on scale A, which is relatable to human hearing.

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M, Gulberg-III, Lahore Pakistan

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

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TEST REPORT

Ref. #: PGG/LAB/2025-4875/NL

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Noise Level
Monitoring Location:	S3 (Sch-03&14)
Monitoring Coordinates:	31°24'16.24"N 73° 8'41.55"E
Name of Sampling Person:	Mr. Arsalan
Monitoring By:	Pak Green Laboratory
Monitoring Time:	Real Time
Monitoring Instrument:	Noise Meter Landtek SL-5868P
Monitoring Date:	05-Jul-25 to 06-Jul-25

Results:

Sr. No.	Day Time	Equivalent Noise
		dB (A)
1.	6:00 AM	53.9
2.	7:00 AM	57.1
3.	8:00 AM	62.0
4.	9:00 AM	64.7
5.	10:00 AM	62.6
6.	11:00 AM	62.4
7.	12:00 PM	63.1
8.	1:00 PM	66.0
9.	2:00 PM	63.9
10.	3:00 PM	64.5
11.	4:00 PM	63.4
12.	5:00 PM	62.2
13.	6:00 PM	53.7
14.	7:00 PM	58.1
15.	8:00 PM	59.0
16.	9:00 PM	60.3
17.	10:00 PM	58.7
	Average	**60.9**

Sr. No.	Night Time	Equivalent Noise
		dB (A)
18.	11:00 PM	46.7
19.	12:00 AM	44.4
20.	1:00 AM	51.6
21.	2:00 AM	47.1
22.	3:00 AM	48.5
23.	4:00 AM	49.3
24.	5:00 AM	52.2
	Average	**48.5**

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4875/NL

Issue date: 09-Jul-25

PEQS: Punjab Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Commercial Area	dB (A) Leq	65	55

dB (A) Leq: Time weighted average of the level of sound in decibel on scale A, which is relatable to human hearing.

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Field Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

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TEST REPORT

Ref. #: PGG/LAB/2025-4876/NL

Issue date: 09-Jul-25

Name of Client:	NESPAK
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City
Site Location:	Faisalabad
Nature of Monitoring:	Noise Level
Monitoring Location:	S4 (Scheme -04)
Monitoring Coordinates:	31°28'19.88"N 73° 8'11.73"E
Name of Sampling Person:	Mr. Arsalan
Monitoring By:	Pak Green Laboratory
Monitoring Time:	Real Time
Monitoring Instrument:	Noise Meter Landtek SL-5868P
Monitoring Date:	06-Jul-25 to 07-Jul-25

Results:

Sr. No.	Day Time	Equivalent Noise
		dB (A)
1.	6:00 AM	51.0
2.	7:00 AM	54.2
3.	8:00 AM	59.1
4.	9:00 AM	61.8
5.	10:00 AM	59.7
6.	11:00 AM	59.5
7.	12:00 PM	60.2
8.	1:00 PM	63.1
9.	2:00 PM	61.0
10.	3:00 PM	61.6
11.	4:00 PM	60.5
12.	5:00 PM	59.3
13.	6:00 PM	50.8
14.	7:00 PM	55.2
15.	8:00 PM	56.1
16.	9:00 PM	57.4
17.	10:00 PM	55.8
Average		58.0

Sr. No.	Night Time	Equivalent Noise
		dB (A)
18.	11:00 PM	45.5
19.	12:00 AM	43.2
20.	1:00 AM	50.4
21.	2:00 AM	45.9
22.	3:00 AM	47.3
23.	4:00 AM	48.1
24.	5:00 AM	51
Average		47.3

Pak Green Enviro-Engineering (Pvt.) Ltd. Gulberg-III, Lahore

PGG/IMS/FF/063	Rev.#03	Rev date: 16-06-25

Ref. #: PGG/LAB/2025-4876/NL **Issue date:** 09-Jul-25

PEQS: Punjab Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Commercial Area	dB (A) Leq	65	55

dB (A) Leq: Time weighted average of the level of sound in decibel on scale A, which is relatable to human hearing.

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Field Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PAK Green Enviro-Engineering (Pvt.) Ltd. Gulberg-III Lahore Pakistan

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TEST REPORT

Ref #: PGG/LAB/2025-4865/GW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°26'31.92"N 73° 0'51.83"E	
Sample source:	Scheme-5-7	
Sample Code:	GW-1281	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	Temperature: 22.4-24.0°C	Humidity: 42.8-54.8%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the PEQS Limit.

Terms & Conditions:

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- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
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PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4865/GW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.641 at 25.0	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.49	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	2660*	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	700*	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	715*	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.156	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	6.152	APHA-4500-NO_3^--E

Pak Green Enviro-Engineering (PVT) Ltd. 46-M, Gulberg-III, Lahore Pakistan

Ref #: PGG/LAB/2025-4865/GW

Issue date: 30-Jun-25

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.0052*	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Cyanide (CN)	mg/L	-	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	-	0.01	BDL	APHA-6630 B

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

Pak Green Enviro-Engineering (Pvt.) Ltd. Gulberg-III, Lahore Pakistan

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TEST REPORT

Ref #: PGG/LAB/2025-4866/GW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°23'8.56"N 73° 3'12.83"E	
Sample source:	Scheme-2-6 Motor Pump	
Sample Code:	GW-1282	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	**Temperature:** 22.4-24.0°C	**Humidity:** 42.8-54.8%

Summary of Test Result:

Remarks:
Parameters with * are not in compliance with the PEQS Limit.

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M Gulberg-III Lahore Faisalabad

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
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EPA Certified

Ref #: PGG/LAB/2025-4866/GW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.805 at 25.0	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.40	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	1780*	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	290	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	270*	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.838	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	6.055	APHA-4500-NO_3^--E

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M, Gulberg-III, Lahore Pakistan

Ref #: PGG/LAB/2025-4866/GW

Issue date: 30-Jun-25

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.0029	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Cyanide (CN)	mg/L	-	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	-	0.01	BDL	APHA-6630 B

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023. etc."

TEST REPORT

Ref #: PGG/LAB/2025-4867/GW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°28'17.90"N 73° 7'57.59"E	
Sample source:	Scheme-4 Motor Pump	
Sample Code:	GW-1283	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	Temperature: 22.4-24.0°C	Humidity: 42.8-54.8%

Summary of Test Result:

Remarks: All Parameters are in compliance with the PEQS Limit.

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- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)

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PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4867/GW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.732 at 25.0	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.35	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	980	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	380	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	125	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.760	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	6.056	APHA-4500-NO_3^--E

Pak Green Enviro-Engineering (Pvt) Ltd. Gulberg-III, Lahore Pakistan

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)

ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +92-42-35441444 Cell: 0303-4442334

EPA Certified

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4867/GW

Issue date: 30-Jun-25

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Cyanide (CN)	mg/L	-	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	-	0.01	BDL	APHA-6630 B

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref #: PGG/LAB/2025-4868/GW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°24'14.81"N 73° 8'39.13"E	
Sample source:	Scheme-3-14 Hand Pump	
Sample Code:	GW-1284	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	Temperature: 22.4-24.0°C	Humidity: 42.8-54.8%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the PEQS Limit.

Terms & Conditions:

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- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4868/GW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.676 at 25.0	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.30	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	2330*	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	310	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	360*	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.064	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	6.080	APHA-4500-NO_3^--E

Ref #: PGG/LAB/2025-4868/GW

Issue date: 30-Jun-25

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	2.7180	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Cyanide (CN)	mg/L	-	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	-	0.01	BDL	APHA-6630 B

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023. etc."

TEST REPORT

Ref #: PGG/LAB/2025-4861/WW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°27'4.29"N 73° 1'2.95"E	
Sample source:	Near Scheme-7-Drain	
Sample Code:	WW-1277	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	Temperature: 22.4-24.0°C	Humidity: 42.8-54.8%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the PEQS Limit

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4861/WW

Issue date: 30-Jun-25

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	25.0	APHA-2550 B
2.	pH^	-	6-9	0.001	7.908 at 25.0	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	126*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	200*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	100	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	3230	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	1140*	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	BDL	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	25.550*	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	188	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	1.0	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	39.6	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0387	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
20.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
21.	Silver (Ag)	mg/L	1.0	0.0100	0.0226	APHA-3111 B
22.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0732	APHA-3111 B
23.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
24.	Iron (Fe)^	mg/L	8.0	0.0010	1.2877	APHA-3111 B
25.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0729	APHA-3111 B
26.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4861/WW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
27.	*E. coli*	MPN/ 100ml	-	-	286.2	APHA-9221 F
28.	*Total Coli-form*	MPN/ 100ml	-	-	1286.5	APHA-9221 D
29.	*Fecal Coliform Bacteria*	MPN/ 100ml	-	-	559.7	APHA-9221 E

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

PGG/IMS/FF/163	Rev.#05	Rev date: 16-06-25

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref #: PGG/LAB/2025-4862/WW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°30'8.87"N 73° 7'4.52"E	
Sample source:	Near Scheme-4-Drain	
Sample Code:	WW-1278	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-24 to 26-Jun-25	
Env. Conditions during Analysis:	Temperature: 22.4-24.0°C	Humidity: : 42.8-54.8%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the PEQS Limit

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

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PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4862/WW

Issue date: 30-Jun-25

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	25.0	APHA-2550 B
2.	pH^	-	6-9	0.001	9.750* at 25.0	APHA-4500-H^+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	99.2*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	160*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	80	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	4210*	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	1380*	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	BDL	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	24.150*	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	320	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	1.2*	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	29.1	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0527	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
20.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
21.	Silver (Ag)	mg/L	1.0	0.0100	0.0269	APHA-3111 B
22.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0398	APHA-3111 B
23.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
24.	Iron (Fe)^	mg/L	8.0	0.0010	0.6053	APHA-3111 B
25.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0846	APHA-3111 B
26.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E

Pak Green Enviro Eng. (Pvt.) Ltd. 46-M, Gulberg-III, Lahore Pakistan

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4862/WW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
27.	*E. coli*	MPN/ 100ml	-	-	105.6	APHA-9221 F
28.	*Total Coli-form*	MPN/ 100ml	-	-	559.7	APHA-9221 D
29.	*Fecal Coliform Bacteria*	MPN/ 100ml	-	-	383.5	APHA-9221 E

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M, Gulberg-III, Lahore Pakistan

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

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TEST REPORT

Ref #: PGG/LAB/2025-4863/WW

Issue date: 30-Jun-25

Name of Client:	NESPAK (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely 'CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°21'56.53"N 73° 8'17.11"E	
Sample source:	Near Scheme 3-14 Interceptor Drain	
Sample Code:	WW-1279	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	Temperature: 22.4-24.0°C	Humidity: 42.8-54.8%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the PEQS Limit

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4863/WW

Issue date: 30-Jun-25

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	25.0	APHA-2550 B
2.	pH^	-	6-9	0.001	8.091 at 25.0	APHA-4500-H^+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	198*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	312*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	210*	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	2840	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	680	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	BDL	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	27.950*	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	190	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	3.0*	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	48.6*	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0471	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
20.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
21.	Silver (Ag)	mg/L	1.0	0.0100	0.0189	APHA-3111 B
22.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0884	APHA-3111 B
23.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
24.	Iron (Fe)^	mg/L	8.0	0.0010	1.7171	APHA-3111 B
25.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0794	APHA-3111 B
26.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E

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PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4863/WW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
27.	*E. coli*	MPN/ 100ml	-	-	346.6	APHA-9221 F
28.	*Total Coli-form*	MPN/ 100ml	-	-	10441.0	APHA-9221 D
29.	*Fecal Coliform Bacteria*	MPN/ 100ml	-	-	4864.0	APHA-9221 E

End of Report

PEQS: Punjab Environmental Quality Standard
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With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: PGG/LAB/2025-4864/WW

Issue date: 30-Jun-25

Name of Client:	**NESPAK** (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°23'28.45"N 72°58'56.18"E	
Sample source:	Near Scheme-1-Drain	
Sample Code:	WW-1280	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	**Temperature:** 22.4-24.0°C	**Humidity:** 42.8-54.8%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the PEQS Limit

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmad

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4864/WW

Issue date: 30-Jun-25

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	25.0	APHA-2550 B
2.	pH^	-	6-9	0.001	7.704 at 25.0	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	248*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	400*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	250*	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	3770*	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	1355*	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	BDL	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	24.430*	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	320	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	3.4*	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	50.4*	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0279	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
20.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
21.	Silver (Ag)	mg/L	1.0	0.0100	0.0808	APHA-3111 B
22.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0790	APHA-3111 B
23.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
24.	Iron (Fe)^	mg/L	8.0	0.0010	1.9523	APHA-3111 B
25.	Manganese (Mn)^	mg/L	1.5	0.0010	0.1526	APHA-3111 B
26.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E

Pak Green Enviro-Engineering (Pvt.) Ltd. 46-M, Gulberg-III, Lahore Pakistan

Ref #: PGG/LAB/2025-4864/WW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	PEQS	LDL	Results	Method / Technique
27.	*E. coli*	MPN/ 100ml	-	-	486.4	APHA-9221 F
28.	*Total Coli-form*	MPN/ 100ml	-	-	18193.0	APHA-9221 D
29.	*Fecal Coliform Bacteria*	MPN/ 100ml	-	-	12826.0	APHA-9221 E

End of Report

PEQS: Punjab Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

Report Limitation: "This report is not valid for any Court Cases, Environmental Protection Orders, Compliance Reports for Operational Phase Approvals, or any regulatory action under Punjab Environmental Protection (Smog Prevention and Control) Rules, 2023, etc."

TEST REPORT

Ref #: PGG/LAB/2025-4860/SW

Issue date: 30-Jun-25

Name of Client:	**NESPAK** (Environmental & Public Health Engineering Division)
Project Name:	Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City

Sample Description:

Nature of sample:	Surface water	
Sampling By:	Pak Green Laboratories	
Sampling Location & Coordinates:	Faisalabad 31°23'22.45"N 73° 4'28.13"E	
Sample source:	Rakh Branch	
Sample Code:	SW-1276	
Date of sampling:	15-Jun-25	
Sample Receiving Date:	15-Jun-25	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	15-Jun-25 to 26-Jun-25	
Env. Conditions during Analysis:	**Temperature:** 22.4-24.0°C	**Humidity:** 42.8-54.8%

Terms & Conditions:

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- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4860/SW

Issue date: 30-Jun-25

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	LDL	Results	Method / Technique
1.	*E. coli*	-	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Nil	95.0	APHA-9221 D
3.	*Fecal Coliform*	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	LDL	Results	Method / Technique
4.	pH ^	-	0.001	7.828 at 25.0	APHA-4500-H^+ B
5.	Taste	-	-	Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.000	APHA-2120 C
7.	Odor	-	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	0.01	6.80	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	10	100	APHA-2540 C
10.	Total Suspended Solids (TSS) ^ (Settled)	mg/L	200	50	APHA-2540 D
11.	Total Suspended Solids (TSS) ^(Raw)	mg/L	200	70	APHA-2540 D

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	LDL	Results	Method / Technique
12.	Total Hardness ^	mg/L	0.1	70	APHA-2340 C
13.	Aluminum (Al)	mg/L	0.0010	BDL	APHA-3111 D
14.	Antimony (Sb)	mg/L	0.0010	BDL	APHA-3111 B
15.	Arsenic (As)	mg/L	0.0001	BDL	APHA-3114 B
16.	Barium (Ba)	mg/L	0.0500	BDL	APHA-3111 D
17.	Boron (B)	mg/L	0.0100	BDL	APHA-3111 D
18.	Cadmium (Cd) ^	mg/L	0.0010	BDL	APHA-3111 B
19.	Chloride (Cl^-) ^	mg/L	0.1	10	APHA-4500-Cl^- B
20.	Chromium (Cr) ^	mg/L	0.0010	BDL	APHA-3111-Cr B
21.	Copper (Cu) ^	mg/L	0.0001	0.0186	APHA-3111 B
22.	Fluoride (F)	mg/L	0.1	BDL	APHA-4500-F D
23.	Lead (Pb) ^	mg/L	0.0010	BDL	APHA-3111 B
24.	Manganese (Mn^{2+}) ^	mg/L	0.0010	0.1565	APHA-3111 B
25.	Mercury (Hg)	mg/L	0.0001	BDL	APHA-3112 B

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +92-42-35441444 Cell: 0303-4442334

EPA Certified

PGG/IMS/FF/163	Rev.#03	Rev date: 16-06-25

Ref #: PGG/LAB/2025-4860/SW

Issue date: 30-Jun-25

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	LDL	Results	Method / Technique
26.	Nickle	mg/L	0.0010	BDL	APHA-3111 B
27.	Nitrate^	mg/L	0.001	0.255	APHA-4500-NO_3^--E
28.	Nitrite^	mg/L	0.001	0.036	APHA-4500-NO_2^--B
29.	Selenium	mg/L	0.0001	BDL	APHA-3114 C
30.	Residual Chlorine	mg/L	0.01	BDL	APHA-4500-Cl B
31.	Zinc (Zn^{+2}) ^	mg/L	0.0001	0.0424	APHA-3111 B
32.	Phenolic Compound (As Phenol)	mg/L	0.0005	BDL	APHA-5530 D
33.	Cyanide (as CN^{1-}) Total	mg/L	1.0	BDL	APHA-4500-CN E
34.	Pesticide	mg/L	0.01	BDL	APHA-6630 B
35.	Biological Oxygen Demand (BOD_5 at 20 °C)	mg/L	1	BDL	APHA-5210 D
36.	Chemical Oxygen Demand (COD) ^	mg/L	0.4	08	APHA-5220 B
37.	PAH	mg/L		BDL	APHA-6440-C
38.	Alpha Emitters	mg/L		BDL	APHA-7110
39.	Beta Emitters	mg/L		BDL	APHA-7110

End of Report

BDL: Below Detection Limits MPN: Most Probable Number ^PNAC Accredited

ANNEX-V
LAND USE MAPS

73°0'0"E

73°2'0"E

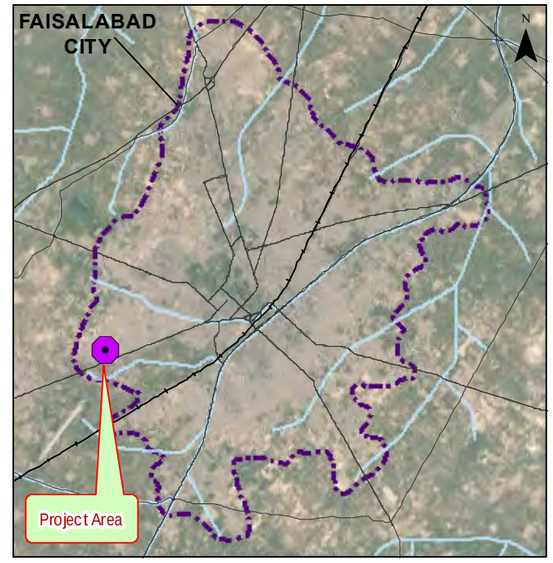
31°24'0"N

N

JHANG ROAD

JHANG ROAD

Meters
0 250 500 1,000 1,500



Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential City
- Boundary

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 01

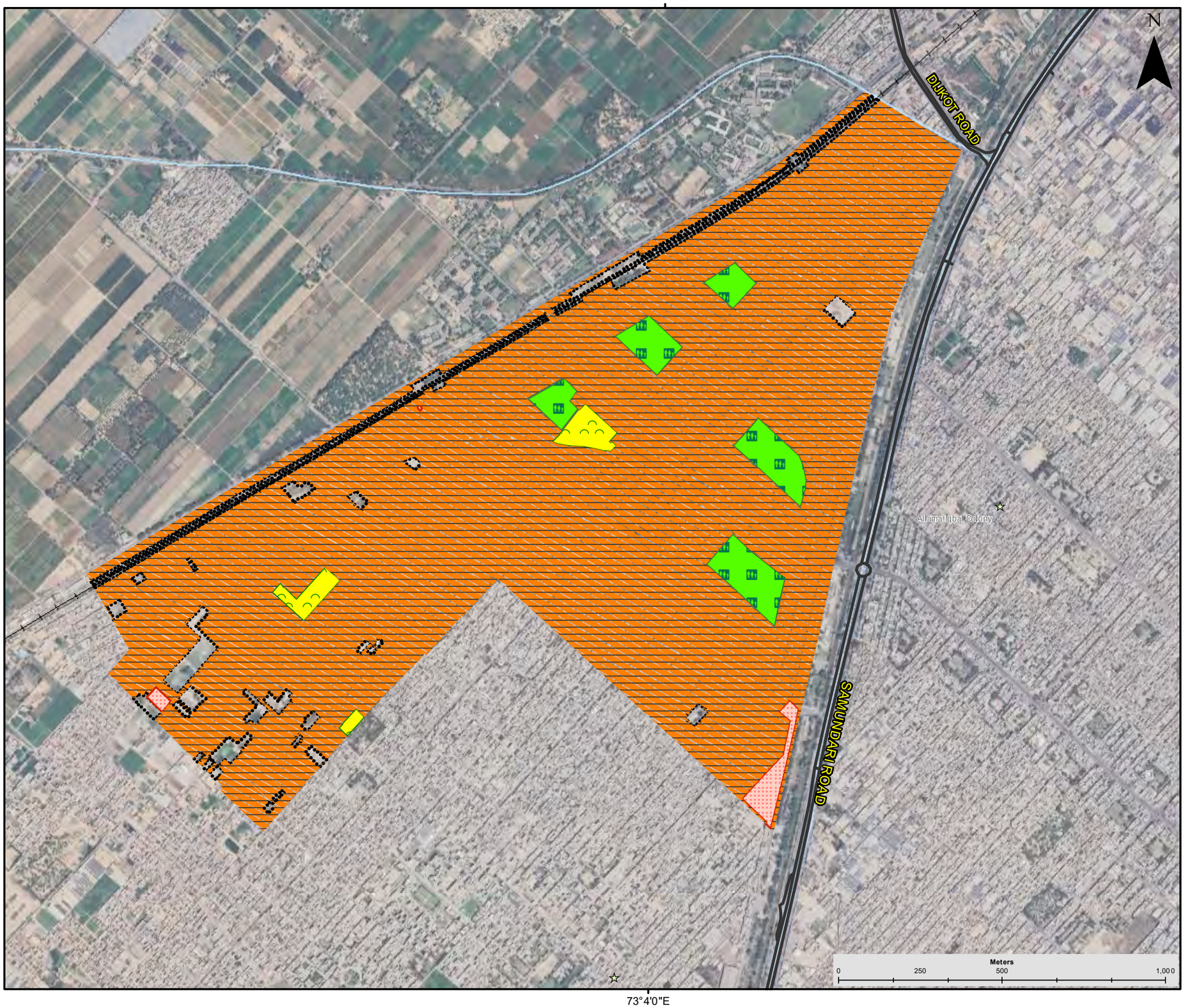
SCALE 1:24,055

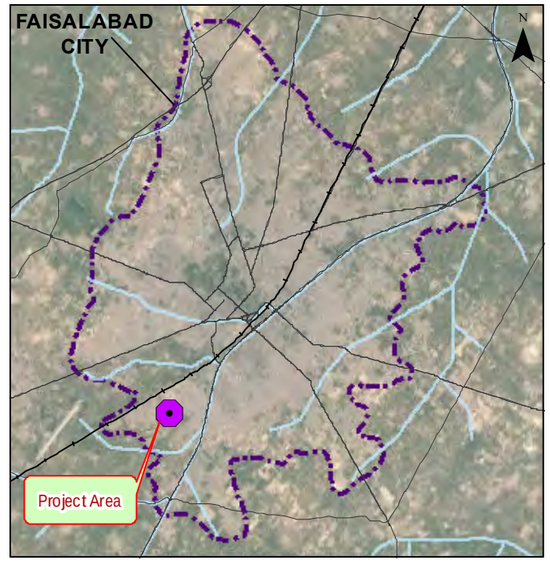
DATE MAY,2025

DRAWING NO

REV.

73°4'0"E





Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential
- City Boundary

73°4'0"E

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

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SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 02

SCALE 1:12,000

DATE MAY,2025

DRAWING NO

REV.

73°8'0"E

73°10'0"E

31°26'0"N

CANAL ROAD

Saeed Colony

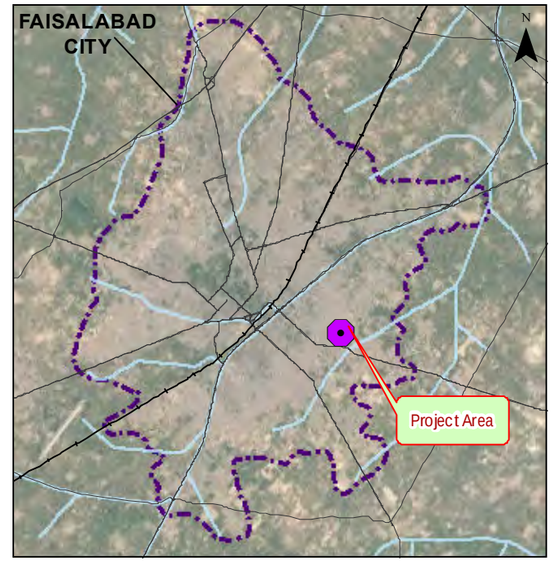
Eden Valley

Madina Town

Al-Noor Gardan

N

Meters
0 250 500 1,000 1,500



Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential City
- Boundary

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 03

SCALE 1:19,000

DATE MAY,2025

DRAWING NO

REV.

73°8'0"E

31°28'0"N

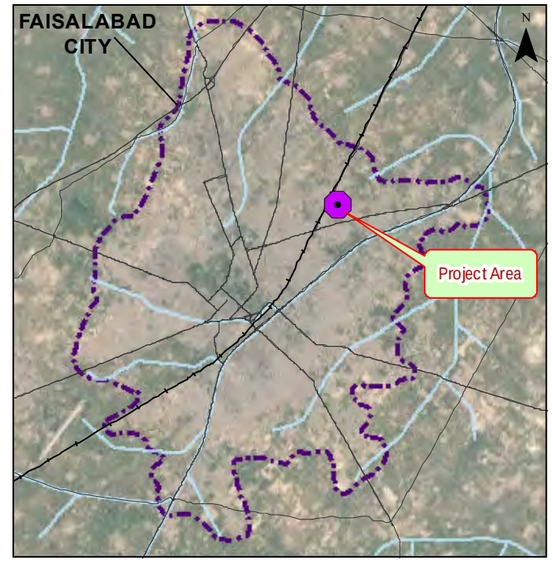
SANGLA HILL ROAD

LAHORE ROAD

CANAL ROAD

N

Meters
0 250 500 1,000



Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
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- Hospital
- Mosque
- Open Land
- Park/Green Area
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- Boundary

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
			DRWAN
			SUBMITTED
			RECOMMENDED
			CHD./VER.
			APPROVED

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 04

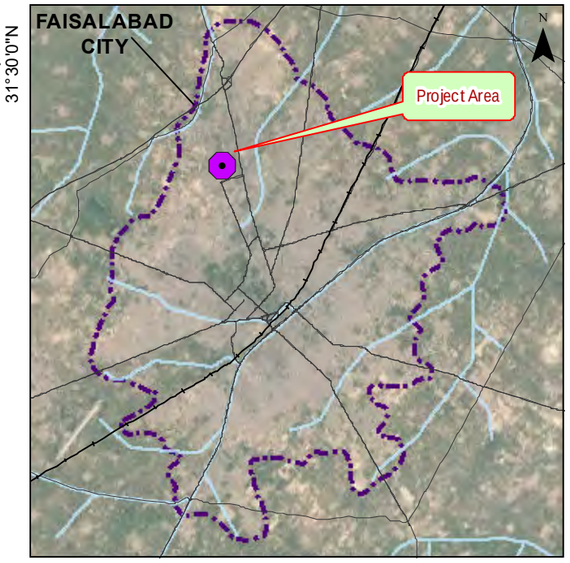
SCALE 1:13,000

DATE MAY,2025

DRAWING NO

REV.

73°2'0"E
73°4'0"E
73°6'0"E
31°30'0"N
31°28'0"N
N
FAISALABAD BYPASS
MILLAT ROAD
PUNJ PULLIAN ROAD
LAHORE ROAD
NARWALA ROAD
Gulistan Colony
Meters
0 250 500 1,000 1,500 2,000



Legend:

- Main Settlements
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- Canals
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- Agriculture
- Commercial
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- Hospital
- Mosque
- Open Land
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- Pond
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- Boundary

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

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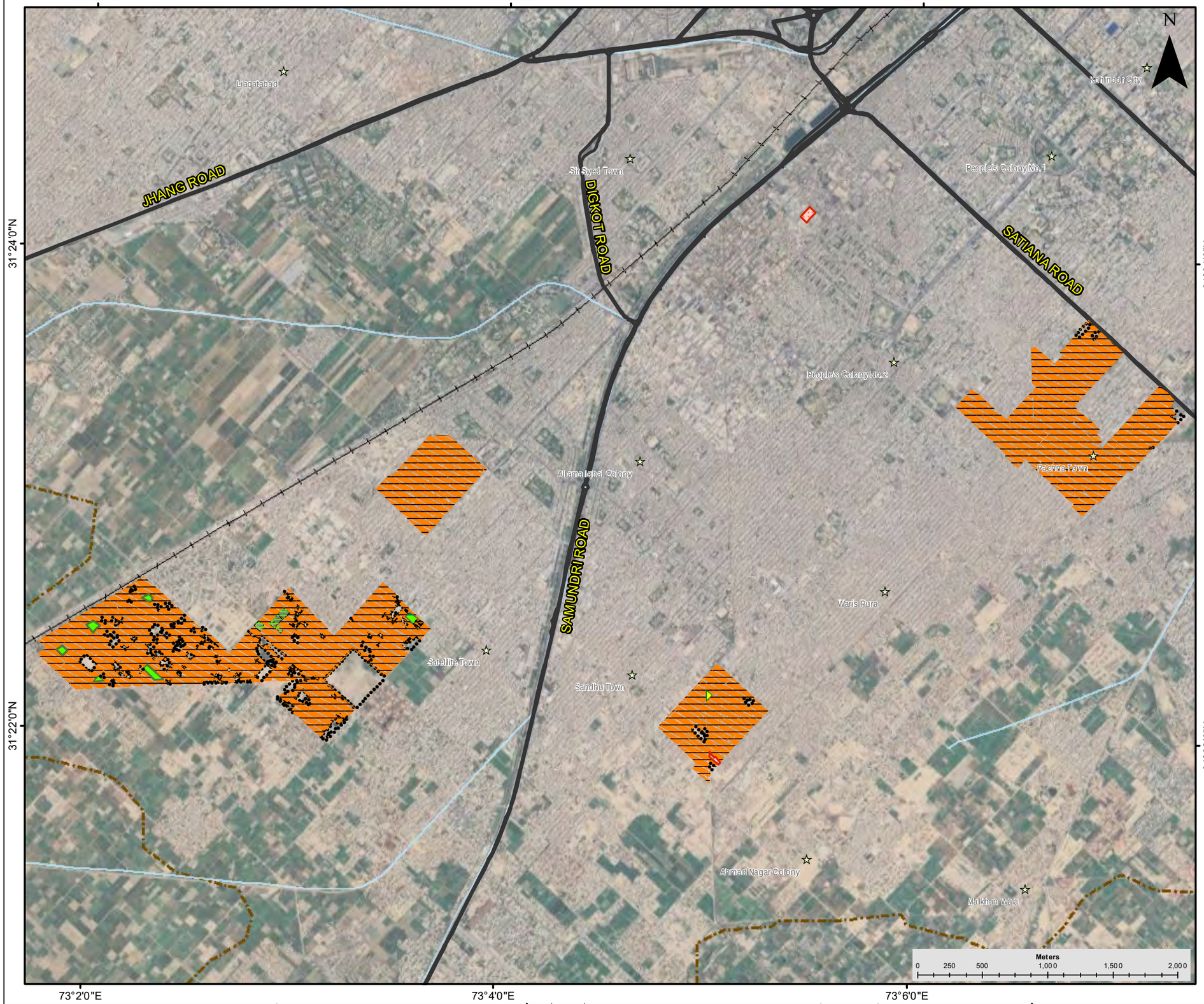
RECOMMENDED	
CHD./VER.	
APPROVED	

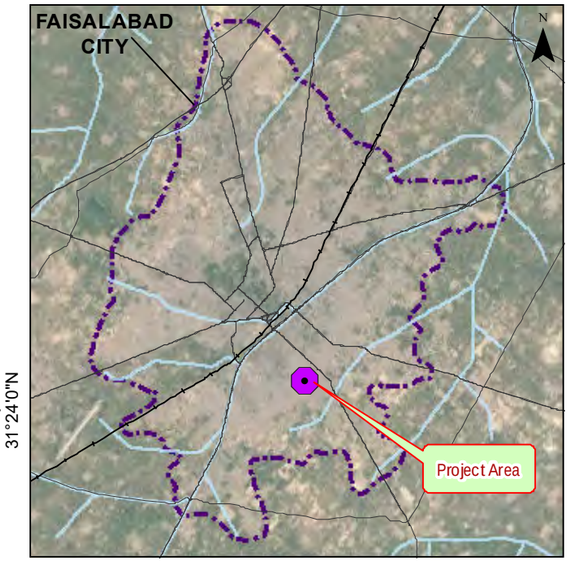
PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 05

SCALE 1:30,000

DATE MAY,2025 | DRAWING NO | REV.





Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
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- Hospital
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- Boundary

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
			DRWN
			SUBMITTED
			RECOMMENDED
			CHD./VER.
			APPROVED

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 06

SCALE: 1:30,000
DATE: MAY,2025
DRAWING NO:
REV.

73°0'0"E 73°2'0"E 73°4'0"E

31°26'0"N

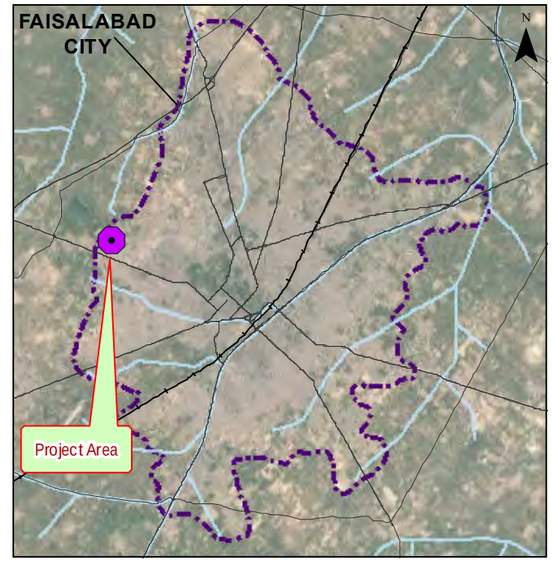
N

NARWALA ROAD

Liaqatabad

JHANG ROAD

Meters
0 250 500 1,000 1,500



Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
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- Boundary

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
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HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 07

SCALE 1:25,000

DATE MAY,2025 | DRAWING NO | REV.

73°2'0"E

73°4'0"E

31°26'0"N

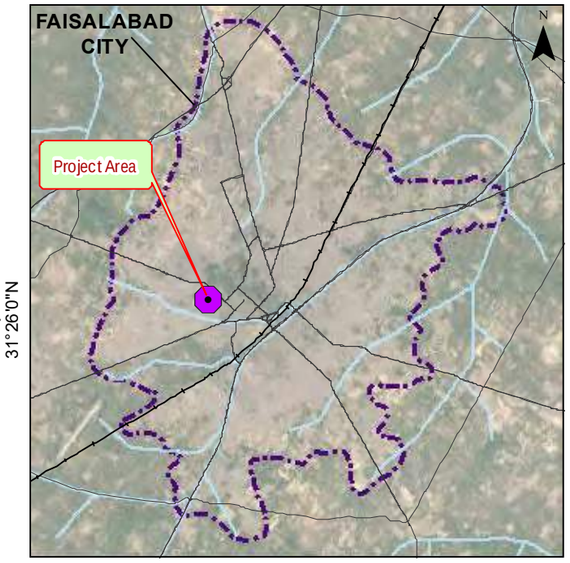
31°24'0"N

NARWALA ROAD

JHANG ROAD

Liagatabad

Meters
0 250 500 1,000 1,500



Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential
- City Boundary

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	M.A.S.
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

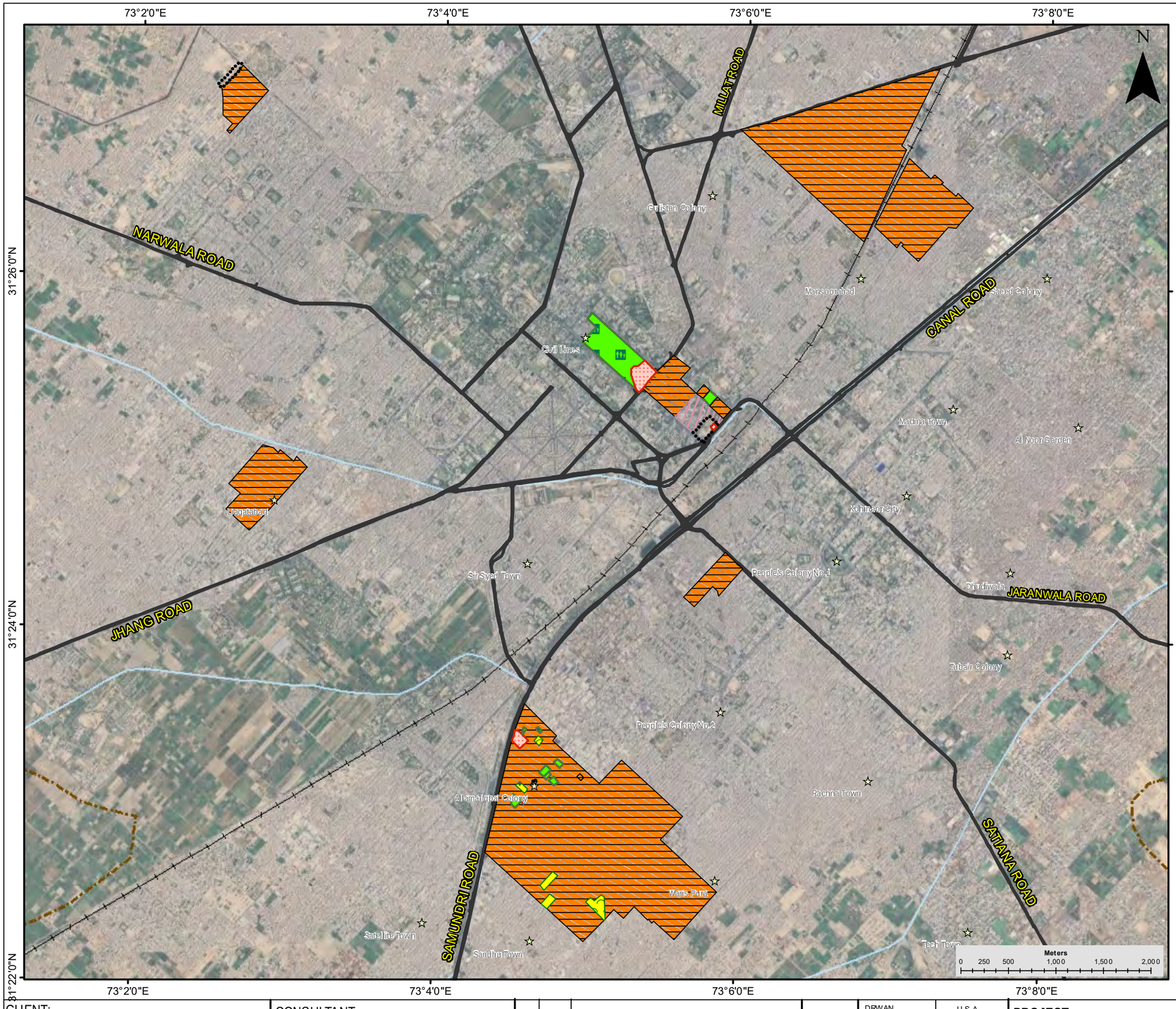
LANDUSE MAP OF SCHEME 09

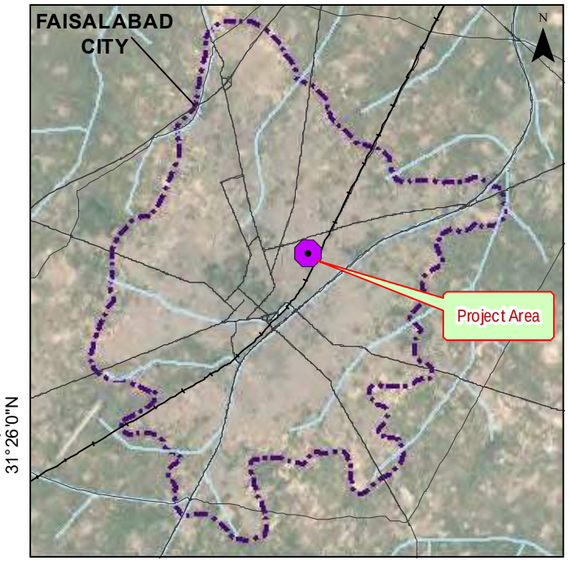
SCALE 1:20,000

DATE MAY,2025

DRAWING NO

REV.





Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential
- City Boundary

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWN	U.S.A
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 11

SCALE 1:40,000

DATE MAY,2025

DRAWING NO

REV.

73°4'0"E

73°6'0"E

31°20'0"N

SAMUNDARI ROAD

Samundari Road

Samundari Road

Ahmad Nagar Colony

Sangal City

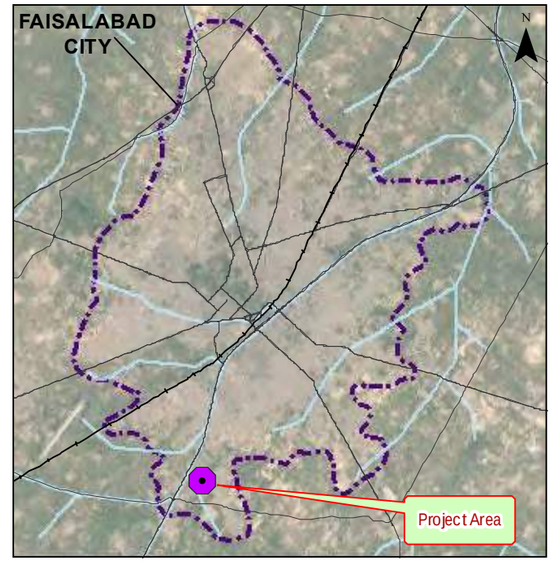
Faisalabad bypass

Faisalabad bypass

FAISALABAD BYPASS

Meters
0 250 500 1,000

N



Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential
- City Boundary

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWN	U.S.A
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

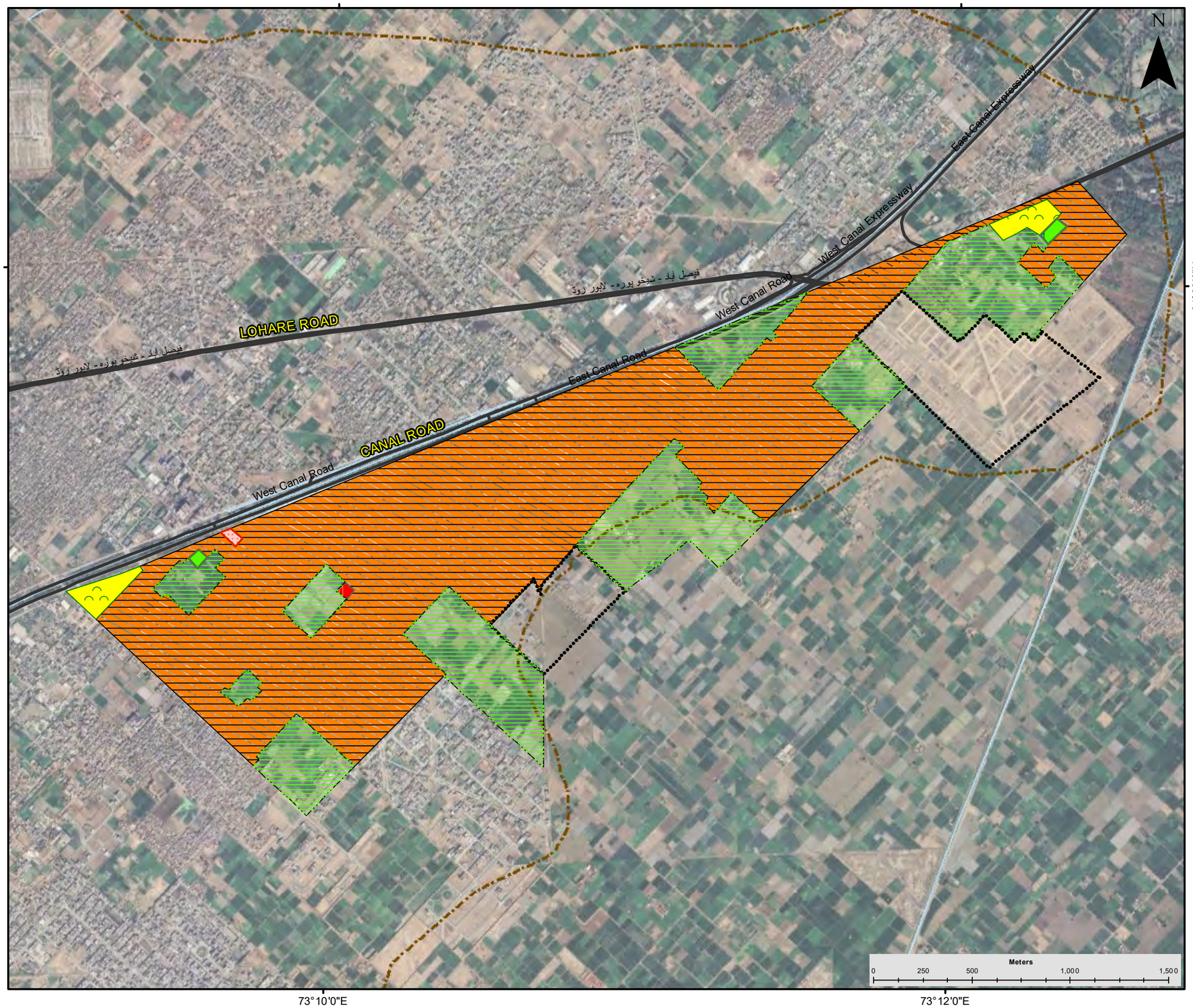
LANDUSE MAP OF SCHEME 12

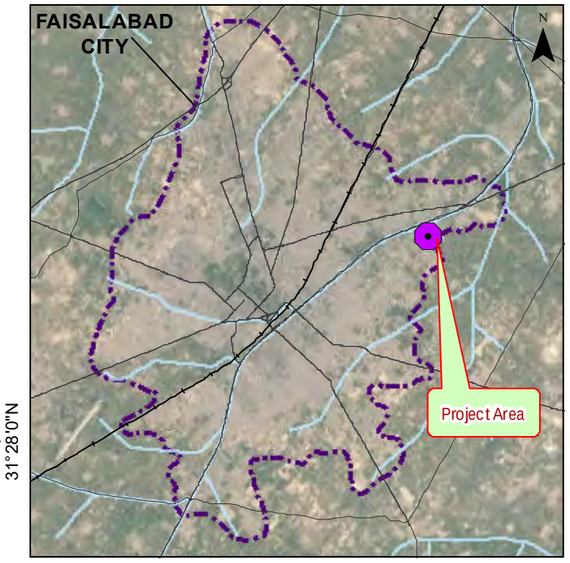
SCALE 1:15,000

DATE MAY,2025

DRAWING NO

REV.





Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pound
- Residential
- City Boundary

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

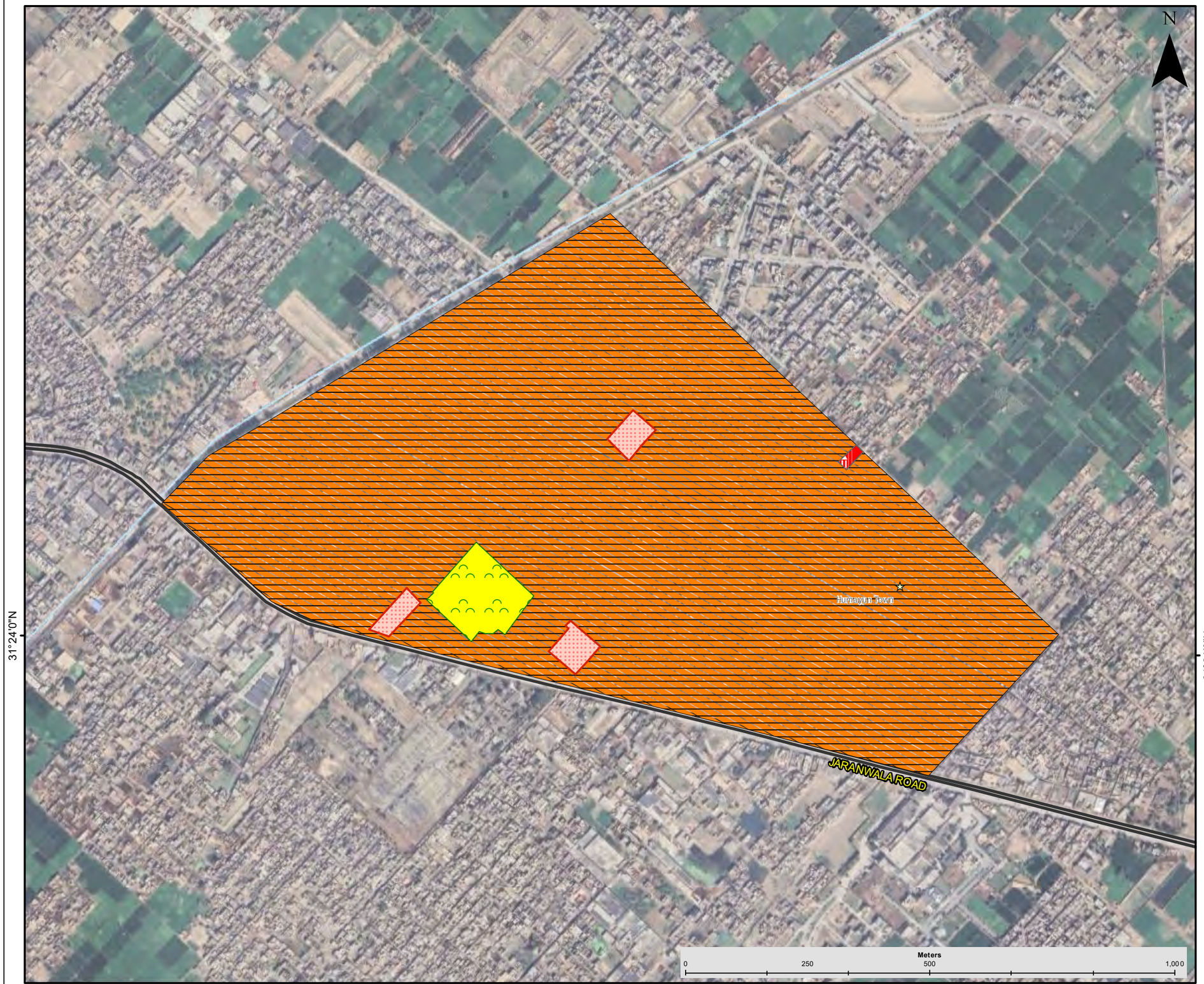
LANDUSE MAP OF SCHEME 13

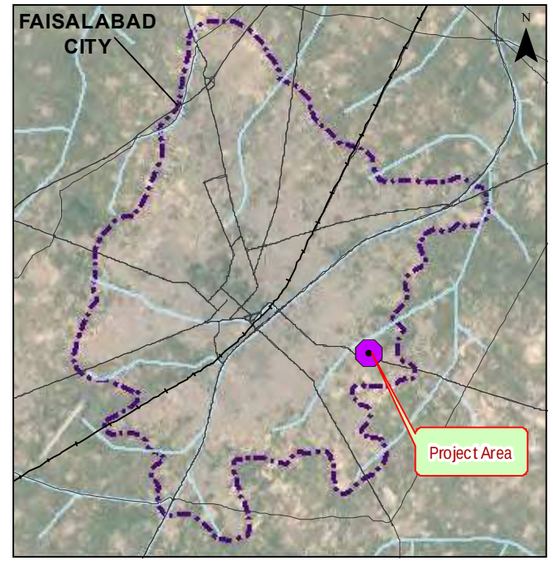
SCALE: 1:20,000

DATE: MAY,2025

DRAWING NO:

REV.





Legend:

- Main Settlements
- Major Roads
- Canals
- Railway Line
- Agriculture
- Commercial
- Graveyard
- Hospital
- Mosque
- Open Land
- Park/Green Area
- Pond
- Residential
- City Boundary

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

LANDUSE MAP OF SCHEME 14

SCALE 1:8,000

DATE MAY,2025

DRAWING NO

REV.

ANNEX-VI
ENVIRONMENTAL SENSITIVE RECEPTORS

73°0'0"E

73°2'0"E

31°24'0"N

31°22'0"N

N

Education Board Faisalabad

Jamia Masjid Milade-E-Mohammadi

Punjab College

Saif Dental Clinic

Fun Dunya

A.B.A Group of School

Shadab Clinic

Agriculture Research Station

Al Madina Laboratory

Madina College

Children Hospital

Allied School

Jamia Masjid Ghousia Hanfia

PAEC Foundation School

Jinnah High School

Jamia Masjid Norani

Markazi Jamia Masjid Madni

Laboratery College

Faisalabad International Airport

Community College University of Agriculture

Jamia Masjid Auliya

GCU Faisalabad

0 250 500 1,000 1,500 Meters

FAISALABAD CITY

Legend

- Airport
- School/College
- Hospital/Clinic
- Mosque
- Recreational
- Major Roads
- Canals
- Railway Line

CLIENT: WATER AND SANITATION AGENCY (WASA), FAISALABAD	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	REV. / DATE / DESCRIPTION / APPROVED	DRWN / SUBMITTED / RECOMMENDED / CHD./VER. / APPROVED	PROJECT: CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY	SENSITIVE RECEPTORS SCHEME-01 — DATE: MAY, 2025 — DRAWING NO — SCALE: 1:24,000 — REV.

73°2'0"E

73°3'0"E

31°23'0"N

Graveyard

Samanabad Police Station

Gohar Dawakhana

Jamia Masjid Madina Rizvia

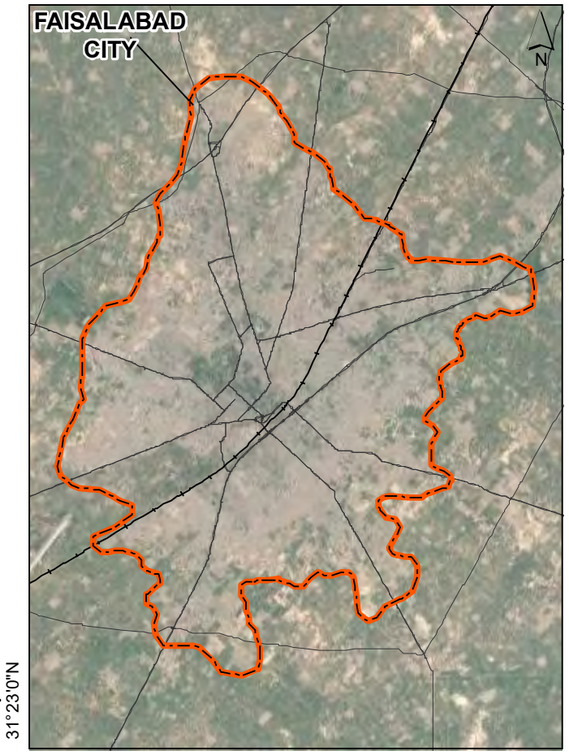
Al Shafa Veterinary Clinic

The Inspire School System

Mosque

Meters

0 80 160 320 480 640



Legend

- School/College
- Hospital/Clinic
- Mosque
- Graveyard
- Police Station
- Major Roads
- Canals
- Railway Line

CLIENT: WATER AND SANITATION AGENCY (WASA), FAISALABAD	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	REV. / DATE / DESCRIPTION / APPROVED	DRWAN / SUBMITTED / RECOMMENDED / CHD./VER. / APPROVED	PROJECT: CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY	SENSITIVE RECEPTORS SCHEME-02 — DATE: MAY, 2025 — DRAWING NO — REV. — SCALE: 1:10,000

73°8'0"E

73°9'0"E

31°25'0"N

31°24'0"N

New Convenent School System

Hassan Welfair School System

Jamia Masjid Ali Ul Murtaza

Astana Alia Ameeria Sardaria

Bilal Garden Masjad

Jamia Islamia Muhammdia

Faisal Masjad

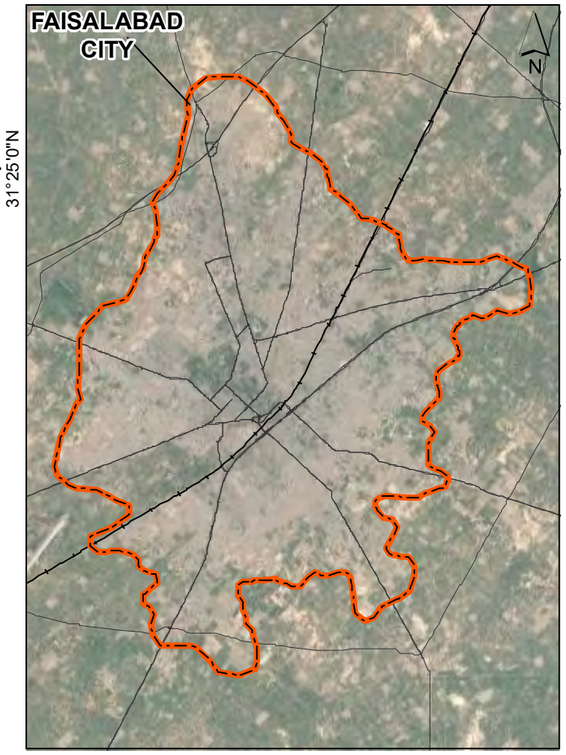
New Talent School System

Medhub Clinic

Madina Medicare Hospital

Talent Home Graimer School

Meters
0 115 230 460 690 920



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Recreational
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
			DRWN
			SUBMITTED
			RECOMMENDED
			CHD./VER.
			APPROVED

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-03

SCALE 1:14,000

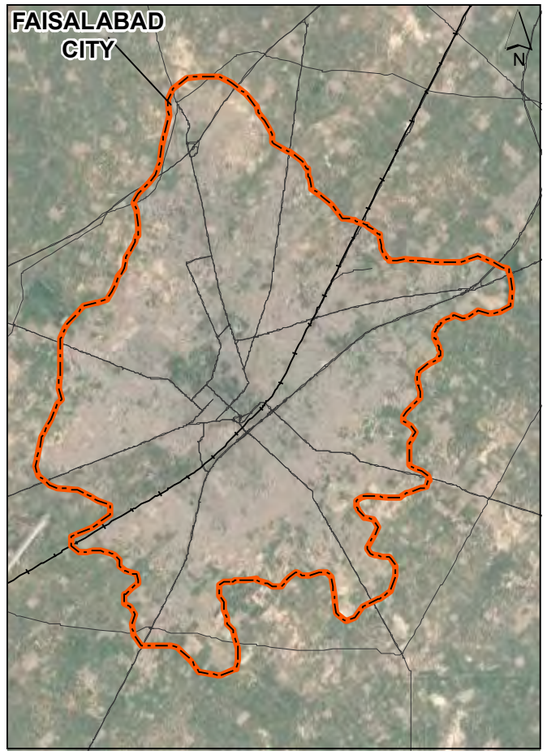
DATE MAY, 2025

DRAWING NO

REV.

73°8'0"E

73°8'0"E



Legend

- Hospital/Clinic
- School/College
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY
(WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N,
MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
			DRWAN
			SUBMITTED
			RECOMMENDED
			CHD./VER.
			APPROVED

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-04

SCALE 1:2,000

DATE MAY, 2025

DRAWING NO

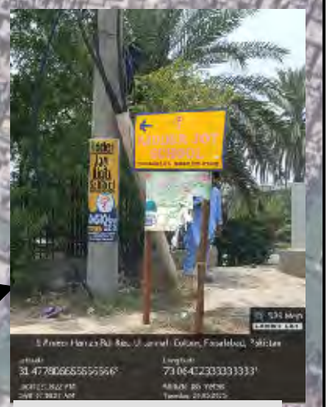
REV.

73°4'0"E

31°29'0"N

Saich School System

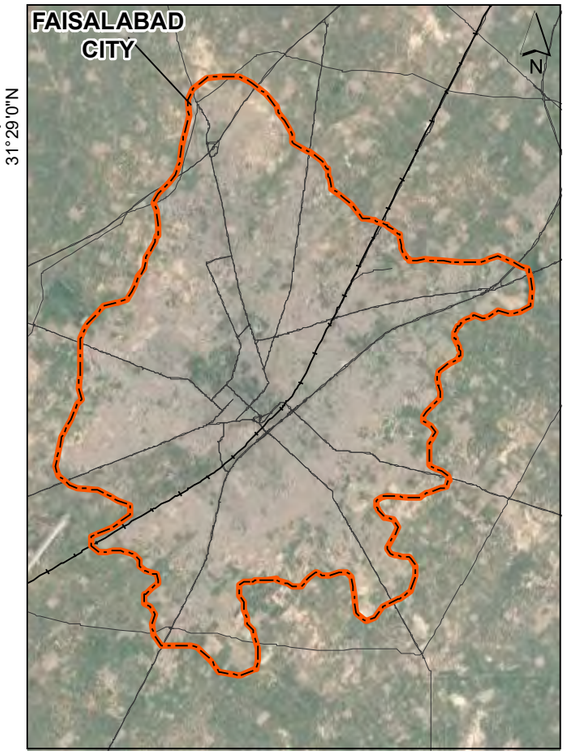
Pacific School System



Kidder Joy School

Pacific Academy of Excellence

Meters
0 25 50 100 150 200 250



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED
			DRWN
			SUBMITTED
			RECOMMENDED
			CHD./VER.
			APPROVED

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-05

SCALE 1:4,000

DATE MAY, 2025

DRAWING NO

REV.

73°3'0"E
73°4'0"E
73°5'0"E
31°24'0"N
31°23'0"N

Govt.General Hospital Samnabad

Govt. MC High School

Basharat Eye Center

Khidmat E Khalq Laboratory

Rehman Physiotherapy

Smile Dental Care

Al Saddique Foundation School

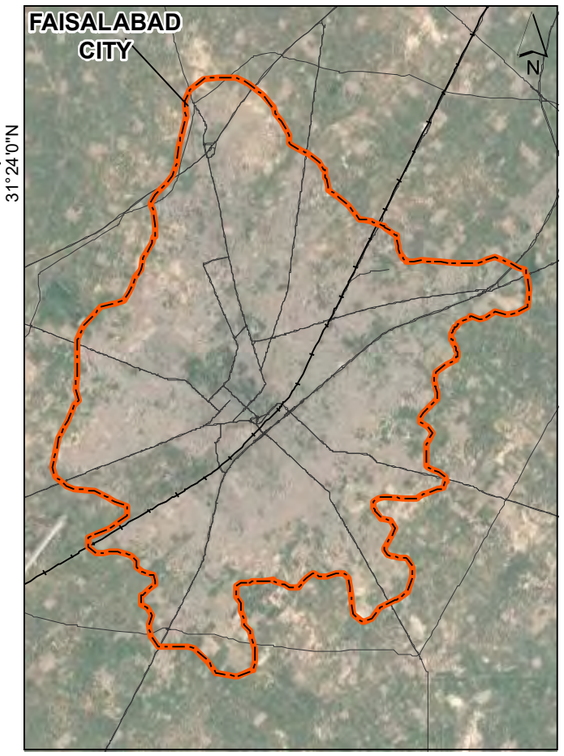
Pirit School System

Jamia Masjad Ali Murtaza

Specialist Polyclinic

Rapid Care Laboratory

ARK Health Center



N

Meters
0 95 190 380 570 760 950

Legend

- Educational
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-06

SCALE 1:15,000

DATE MAY, 2025 | DRAWING NO | REV.

73°1'0"E

73°2'0"E

31°25'0"N

Jamia Masjad Talianwala

The Scholar School

Rasheed Medical Store

Sabri Public School

Rehan Ahmad Academy

Govt Boys Elementary School

Jamia Masjad Ghulam Fatima

Govt ID Hospital

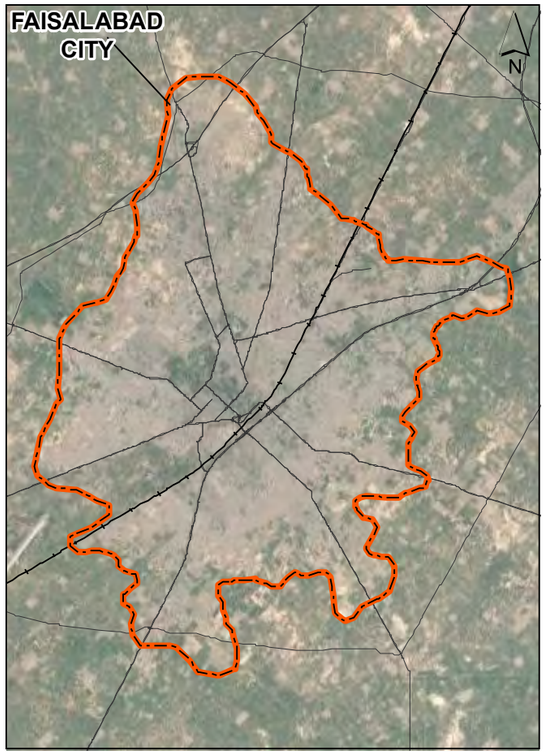
Markar Daud Islami

Jamia Masjad Abdullah

Meters

0 65 130 260 390 520 650

N



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-09

DATE	DRAWING NO	REV.
MAY, 2025		

SCALE 1:10,268

73°4'0"E

73°5'0"E

73°6'0"E

31°24'0"N

31°23'0"N

31°22'0"N

N

Ahmad Foundation School

Halal E Ahmar Hospital

Aleena Jawad Clinic

Imam Bargah Qasr E Batool

Bismillah Academy

Liaqat Family Clinic

Babar Allied Clinic

Khidmat E Khalq Laboratory

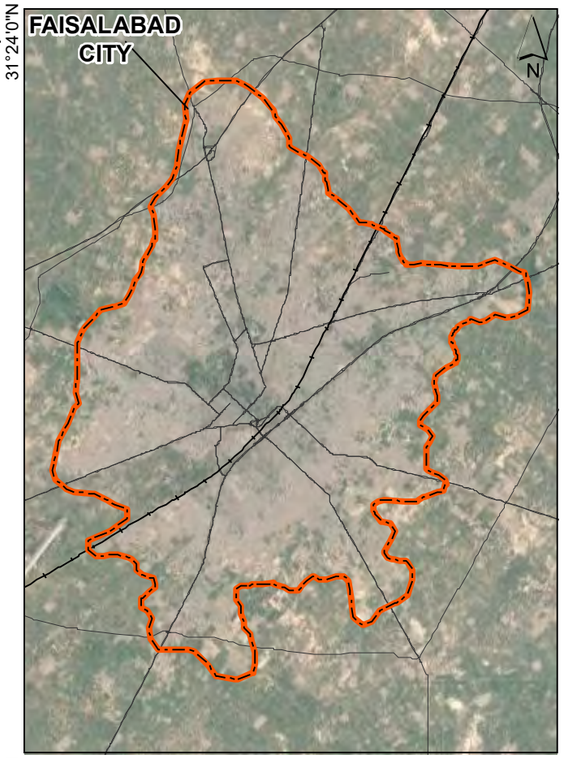
Waheed Medicare

Shah Sabooti Clinic

Nawaz Mumtaz Dispensary

Meters

0 95 190 380 570 760 950



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-10

SCALE 1:15,000

DATE MAY, 2025

DRAWING NO

REV.

73°5'0"E

73°6'0"E

31°23'0"N

31°22'0"N

Darbaar Taali Shah

Qadri Clinic

Muhammad Saddique Clinic

Masjid Waris Pura

Muhammad Jamshed Clinic

Al Habib Clinic

Rehmat Laboratory

Allied School

Dar E Arqam School

Meters

0 85 170 340 510 680 850

N

FAISALABAD CITY

N

Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED	
				DRWAN
				SUBMITTED
				RECOMMENDED
				CHD./VER.
				APPROVED

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-10_SHEET NO.02

SCALE 1:13,000

DATE MAY, 2025

DRAWING NO

REV.

73°5'0"E 73°6'0"E 73°7'0"E 73°8'0"E 73°9'0"E

31°28'0"N 31°27'0"N 31°26'0"N 31°25'0"N

N

Ashaab E Suffa School

Khaleel Ahmad Clinic

Samia Clinic

Life School And College

Jinnah Medical Institute

Hafiz Clinic

Zainab General Hospital

Yaseen Academy

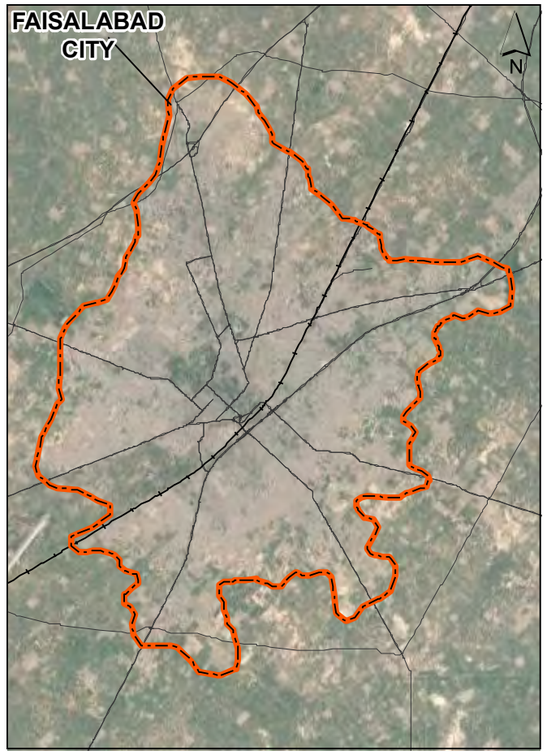
Mian Muhammad Trust Hospital

Chenab Club

Khidmat Center

General Bus Stand

Meters
0 155 310 620 930 1,240 1,550



Legend

- Educational
- Official Service
- Religious
- Hospital/Clinic
- Mosque
- Canals
- Railway Line

CLIENT: WATER AND SANITATION AGENCY (WASA), FAISALABAD	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	REV. / DATE / DESCRIPTION / APPROVED	DRWN / SUBMITTED / RECOMMENDED / CHD./VER. / APPROVED	PROJECT: CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY	SENSITIVE RECEPTORS SCHEME-11 — DATE: MAY, 2025 — DRAWING NO — REV. — SCALE: 1:24,000

73°4'0"E
73°5'0"E
73°6'0"E
31°23'0"N
31°22'0"N


Rashida Muhammad Ali Laser Eye


Noor Memorial Medical Center


Jamia Masjad Sadiqia Mill Colony


Govt High School

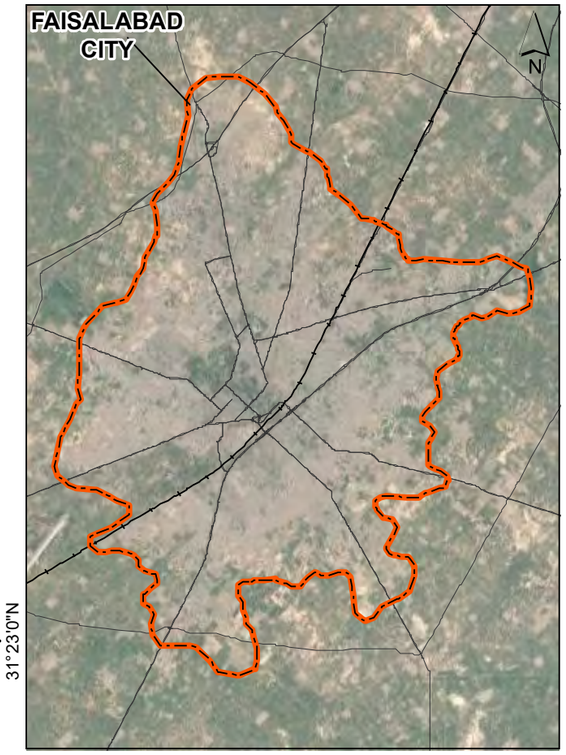

Ilahi Jamia Masjad


Govy Girls High School


Health Care Laboratory


Bilal Nagar Graveyard

Meters
0 95 190 380 570 760 950



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:
WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:
CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-11_SHEET NO.02

SCALE 1:15,000

DATE MAY, 2025

DRAWING NO

REV.

73°5'0"E

73°6'0"E

31°21'0"N

31°20'0"N

N

Jamia Masjad

Govt. Boys PS

Govt Girls Elementary School

Masjid

Graveyard

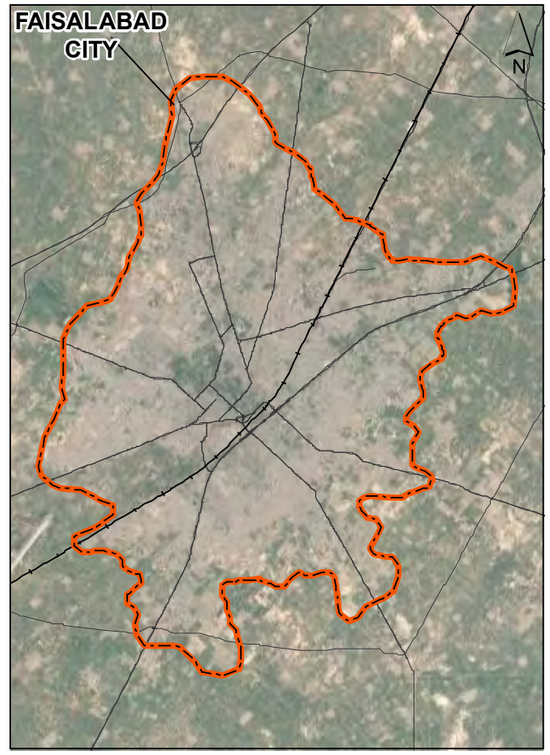
Masjid

Kids Heaven School

Darbar

Meters

0 65 130 260 390 520 650



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Graveyard
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-12

SCALE 1:10,000

DATE MAY, 2025

DRAWING NO

REV.

73°11'0"E

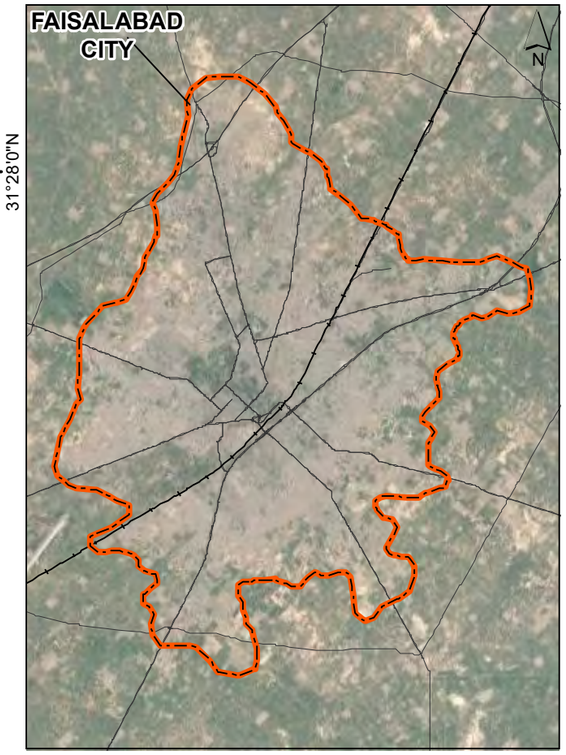
31°28'0"N

Learner School System

Darbar

Govt. High School

N



Legend

- School/College
- Religious
- Major Roads
- Canals
- Railway Line

0 37.5 75 150 225 300 Meters

CLIENT: WATER AND SANITATION AGENCY (WASA), FAISALABAD	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	REV. / DATE / DESCRIPTION / APPROVED	DRWN / SUBMITTED / RECOMMENDED / CHD./VER. / APPROVED	PROJECT: CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY	SENSITIVE RECEPTORS SCHEME-13 — DATE: MAY, 2025 — DRAWING NO — REV. — SCALE: 1:5,000

73°8'0"E

73°9'0"E

73°10'0"E

31°24'0"N

Jamia Masjad Darbar Wali

Family Care Pharmacy

Hauza Tul Saliheen

Dars E Al E Muhammad

Govt Boys Special Education School

Jamia Masjad Bilal

Toppers Law College

Quest College

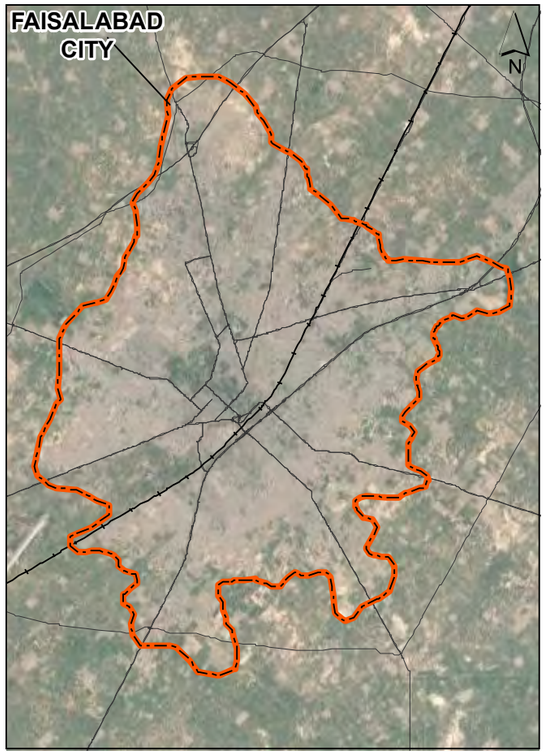
The Illuminators Academy

Rules Secondary School

N

Meters

0 80 160 320 480 640 800



Legend

- Educational
- Religious
- Hospital/Clinic
- Mosque
- Major Roads
- Canals
- Railway Line

CLIENT:

WATER AND SANITATION AGENCY (WASA), FAISALABAD

CONSULTANT:

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE 1-C, BLOCK N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.

REV.	DATE	DESCRIPTION	APPROVED

DRWAN	
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT:

CM DEVELOPMENT PACKAGE TO COMBAT SEWERAGE ISSUES OF FAISALABAD CITY

SENSITIVE RECEPTORS SCHEME-14

SCALE 1:12,500

DATE MAY, 2025

DRAWING NO

REV.

ANNEX-VII

SOCIOECONOMIC SURVEY TOOL

Provision / Rehabilitation / Improvement of Sewerage system in different areas namely "CM Development Package to Combat Sewerage Issues of Faisalabad City"

SOCIO-ECONOMIC SURVEY FORM

Name of Interviewer _____ Date _____

Tehsil/District _____ UC/ Settlement _____

Zone _____

Respondent Name _____ Contact No. _____ Age _____

Gender _____ Marital Status _____ Caste _____

Language _____ Religion _____

Level of Education

Illiterate (0)	Primary (1)	Middle (2)	Matric (3)	Intermediate (4)	Graduation (5)	Above (6)

Profession/Source of Income

Farmer/ Agriculture (0)	Labor/ Daily Wager (1)	Govt. Employee (2)	Pvt. Employee (3)	Vendor/ Hawker (4)	Business Owner (5)	Student/ Unemployed (6)	Housewife (7)

Monthly Income of Respondent

<20,000 (1)	20,001-30,000 (2)	30,001-40,000 (3)	40,001-50,000(4)	50,001-60,000(5)	Unemployed (6)

Average Monthly Household Expenses

<20,000 (1)	20,001-30,000 (2)	30,001-40,000 (3)	40,001-50,000(4)	50,001-60,000(5)

Family System	Joint (1)		Nuclear (2)		No. of Family Members	
Ownership	Owned (1)		Rented (2)		**If rented,**	Monthly Rent_____ Pkr

Construction	Pacca (1)		Semi-Pacca (2)		Katcha (3)	

Area of House _____ Marla

Available Facilities

Electricity (1)	Water supply (2)	Sewerage System (3)	Solid Waste Management (4)	Gas (5)	Telecommunication (6)	Hospital(s) (7)	Roads (8)
Public Transport (9)	Ambulance (10)	School(s) (11)	College(s) (12)	Madrassa (13)	Graveyard(s) (14)	Mosque(s) (15)	Park (16)

Expenditures on Civic Facilities

Electricity (1)	Water Supply (2)	Sui Gas (3)	Solid Waste (4)	Telephone (5)

Mode of Transport Public (1) / Private Transport (2)

Source of water in Local community

Piped Network (1)	Handpumps (2)	Tube-well (3)	Other (4)

Source of Drinking water

Public / WASA Filter Plant (1)	Water Supply (2)	Commercial (3)	Handpumps (4)	Other (5)

Satisfaction with the quality of water Supply Yes/No
If no, Reason _____

Type of Sewerage System

Piped Network (1)	Open Drainage (2)	Septic Tanks (3)	Soakage pits (4)

Solid waste management system

Door-door collection (1)	Community bin system (2)	Open dumping (3)

Major Disease

_____

Health Facility _____ **Expenditure** _____

Mechanism for Conflict Resolution: Police Involvement/Local Mediation
Any NGO/CBO working in the area? Yes/No
If yes, Name _____ **Scope** _____

Willingness of the respondent for the implementation of this project: Yes/No
Willingness to pay tariff for the improvement and maintenance of services: Yes/No
How much tariff can the respondent pay? _____

Pressing needs of the community?

_____

_____

General Observation of Interviewer:

_____

_____

_____

_____

_____
Interviewer Signature

ANNEX-VIII

CHANCES FINDING PROCEDURES

CHANCE FIND PROCEDURES

Project may involve deep excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate General (DG) of Antiquities & Archaeology, Government of Punjab to take further suitable action to preserve those antique or sensitive remains. Representative of the “Director Archaeology and Museum (DAM)” will visit the site and observed the significance of the antique, artifact and Cultural (religious) properties and significance of the project. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

In case any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department
- The suggestion of the local communities and the concerned authorities will be suitably incorporated during taking the preventive measures to conserve the antique, artifact and cultural (religious) properties
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Directorate General of Antiquities & Archaeology is given below:

1st Floor Aiwan-e-Auqaf Building Near
Lahore High Court, Lahore, Pakistan

Tel: 042-99210870

ANNEX-IX

RESOURCE CONSERVATION PLAN

Resource Conservation Plan

1. Introduction:

The resources in this world are not infinite. We are completely dependent on the resources of the earth to fulfill all our day-to-day requirements. Sustainable development calls for the need to conserve resources, especially the non-renewable resources.

2. Objective of the plan:

The Resource Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resource conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate/ prevent pollution contaminating the natural resources.

3. Planning:

Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

The estimations include the following:

1. Estimation of construction material required for the project
2. Estimation of fuel consumption for construction machinery, construction vehicles and generators etc.
3. Estimations of the energy requirements during all the stages of the project
4. Estimations of water consumption for construction activities and construction camp sites.

The pollution prevention strategies include the following

1. Strategies shall be planned to reduce loads on the identified resources to be consumed;
2. Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
3. An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

4. Execution of the plan:

The planned strategies shall be implemented to conserve the natural resources including but not limited to the following:

Material

- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed of safely to the designated disposal sites through approved contractors; and
- Reuse of the materials shall be appreciated.

Fuel/Energy

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;
- Switch off/plug off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary heating/cooling systems during extreme weathers;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light; and
- Alternate energy sources shall be considered for electricity generations during construction to conserve fossil fuel as it is nonrenewable resource.

Water

- Avoid using potable water for sprinkling, curing and washing of equipment/ vehicles. Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;
- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected; and

Pollution:

- Emissions shall be reduced/controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in ESMMP report;
- Waste water shall not be discharged directly into the water body and must be managed as per the recommendations presented in ESMMP; and

- Construction & demolition waste and municipal solid waste shall not be dumped/ burnt openly and shall be handled according to the preventative measure given in ESMMP study.

5. Checking and Corrective Actions

The proponent shall bind the construction contractor through contract agreement to comply the strategies outlined in Resources Conservation Plan. The proponent shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues/ concerns raised in relation to Resource Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.

ANNEX-X

HEALTH & SAFETY MANAGEMENT PLAN

Health & Safety Management Plan (HSMP)

1.0 Introduction

This health and safety management plan has been prepared to identify and outline the manner in which construction site health and safety aspects will be managed to ensure the safe and efficient performance of the construction phase activities and to minimize adverse effects on the existing community and workers arising from construction activities.

This plan is designed to identify, evaluate, and control health and safety hazards for the purpose of protecting employees. The plan provides for emergency response activities at the job site as well as covering site hazard analysis, training requirements, engineering controls, materials handling, and safe construction operations. This plan is intended to provide guidance and information in dealing with the hazards that may be faced on the construction site by the contractor and its workers.

The consultant as a third-party validator will monitor the compliance of the plan by the contractor and its workers on each construction site.

The purpose of this plan is to illustrate safety issues specific to the WASA-F. This plan is intended to maintain a safe work environment and effectively reduce the number of accidents resulting in personal injury, property damage, and damage to construction equipment.

2.0 Scope of Project

2.1 Scope of Work

The rapid population growth, industrial expansion, and urbanization of Faisalabad has severely stressed its outdated and overburdened sewerage system, leading to widespread environmental pollution, and health hazards with unserved areas where wastewater is openly discharged.

Government of Punjab has launched a comprehensive development package for the provision/rehabilitation/improvement of the sewerage system in different areas namely “CM Development Package to Combat Sewerage Issues of Faisalabad City”. a comprehensive initiative comprising of fourteen (14) schemes aimed at modernizing and improving the city's sewerage infrastructure to safeguard public health and protect the environment.

The project involves provision/rehabilitation/improvement of the sewerage system in different areas including forcemain, sewerage network, procurement of machinery, disposal station upgradation and construction

2.2 Site Location

The proposed project sites are located in the Faisalabad City.

3.0 Health and Safety Responsibilities

The effectiveness and success of the safety plan implementation depend upon the active participation and cooperation of all employees. The duties and responsibilities of all employees under this policy are the following:

3.1 Project Engineer

- Prepare the Site-Specific Safety Plan.
- Direct and coordinate health and safety regulations related to the construction site.
- Participate in post-accident investigations.
- Assist in formulating policy matters.
- Implement contractor Safety Program and Policy

3.2 Foremen/Supervisors

- Be familiar with, explain, and enforce health and safety plan under his jurisdiction.
- Direct and coordinate health and safety activities within the area or responsibility
- Ensure safety devices and proper PPE are used by employees under supervision.
- Instruct and train all employees within the area of responsibility in job health and safety requirements, including (but, not limited to) hazard recognition and avoidance. Also, foreman/front-line supervisors must require compliance by employees with the established safety rules.
- Direct the correction of unsafe conditions.
- Ensure safety equipment is available, maintained, used, and stored correctly.
- Ensure injuries are treated promptly and reported properly.
- Participate in post-accident investigations.
- Coordinate daily job site inspection.
- Implement health and safety plan at each site as per required.

3.3 Construction Workers

The main responsibility of every worker at the construction site will be to follow the health and safety instructions and procedures.

- Be familiar with and comply with proper health and safety practices.
- Use the required safety devices and proper PPE.
- Notify the supervisor immediately of unsafe conditions/- acts, accidents, and injuries.
- Implement the health and safety plan

3.4 Subcontractors

By the contract, the subcontractors will have to comply with and ensure the compliance of their employees with the provisions of health and safety policy as well as their own safety program. Failure to fulfill this requirement is a failure to meet the conditions of the subcontract.

3.5 Supervision Consultant (SC)

SC will validate the effective implementation of the health and safety plan at the site. WASA-F will be overall responsible for the safe construction work at each site.

4.0 General Health and Safety Procedures

4.1 Personal Protective Equipment (PPE)

The contractor provides Personal Protective Equipment (PPE) to all employees. Hard hats, safety glasses, and safety work boots are required to be worn at all times when on the job site. Reflective vests are required when working outside around equipment or traffic. Exceptions may be made to this PPE requirement only under an approved contractor work plan. Employees learn where to get PPE during their new-hire orientation and are responsible for wearing and maintaining the required PPE. Additional PPE may be required depending on the task and if there is a potential for exposure to hazardous conditions. PPE requirements are reviewed by the foreman. Employees are expected to use reasonable judgment regarding whether additional PPE (beyond the required) is necessary for certain tasks. If employees are unsure of the type of PPE required for a specific task or job, they should ask the supervisor.

4.2 Equipment Use and Operation

Equipment is used only for its intended use and as recommended by the manufacturer. Using equipment for purposes other than what it is designed for is prohibited. Employees are prohibited from operating a vehicle in a reckless manner or at a speed greater than is reasonable and proper, with due regard for weather, traffic, the character of roadway, load, type of vehicle, and any other conditions which may affect the safe operation of the vehicle. The vehicle must be kept under control at all times and special care is exercised when transporting personnel.

Employees may only ride equipment if there are seats or equal protection available for each person. Seatbelts are worn at all times while operating equipment with seats. No cell phone or earbud is used while operating equipment.

4.3 Repair

Employees are prohibited from making repairs, alterations, or attachments to equipment in the field except with the permission of the superintendent, foreman, or equipment mechanic. Only

qualified personnel will perform repairs on equipment. Such repairs, alterations, or attachments are documented on the appropriate shop forms.

Employees are prohibited from removing a guard, safety device, or appliance from equipment or machinery except to make repairs. While making repairs, employees use appropriate lockout/tag-out procedures. When repairs are complete, the guard, safety device, or appliance is replaced immediately.

4.4 Conduct

The following conduct is prohibited and may result in discipline up to and including termination:

- Horseplay and scuffling on the job.
- Making a false report or misrepresentation.
- Fighting.
- Use of alcohol or any other drugs
- Dishonesty and theft of the property.
- Deliberate misuse of the equipment.
- Unnecessary risk-taking.
- Violating or disobeying any instruction given by a supervisor

5.0 General Jobsite Procedures

5.1 New Hire Orientation

New-hire orientation may consist of, but is not limited to, the following:

- Have the employee read the health and safety plan and other safety requirements, guidelines etc. Answer any questions the new hire may have about these policies and request a signature on the Statement of Understanding.
- Orient the employee to the job site indicating the location of the emergency facilities, portable fire extinguishers, first-aid station, emergency phone numbers, public notices, and any job site-specific information.
- Explain the injury and accident policy.
- Review the written hazard communication program. Discuss hazards, container labeling, and the use of protective equipment.
- Explain the emergency response plan for catastrophic events such as fire, explosion, etc.
- Issue PPE as required for the job

5.2 Training

Training and education are necessary for the success of this policy. Employees are trained to recognize job site hazards and the procedures to follow to minimize these hazards. Training may consist of (but is not limited to) the following:

- Weekly job site safety meetings.
- Orientation training for new hires.
- Individual job/task training, including the applicable regulations/standards for the specific job/task.

Supervisors and management receive ongoing safety training throughout the year.

5.3 Safety Meetings

Weekly safety meetings are held on the job site. All employees and subcontractors are required to attend. The meetings may cover a range of safety-related topics. The format and content of the meetings are up to the discretion of the superintendent. Monthly safety meetings are held for all foremen, superintendents, project managers, project engineers, contractors, and other management personnel. These meetings are for the purpose of discussing companywide safety issues and providing continued safety training and education.

5.4 Safety Inspections

The superintendent and foreman conduct an initial safety inspection at the beginning of each project. In addition, a daily safety inspection of the job site is conducted by the contractor employees, employees of a subcontractor, or some combination thereof. The inspection is rotated between all workers on the job site. Any safety concern found during the inspection is reported. If a worker is unclear about any safety aspect, the foreman or project Engineer helps. If the area being inspected requires a *competent person*, the employee conducts the inspection with the competent person. Also, if time allows, the foreman for the worker conducting the inspection is encouraged to walk through it with them.

5.5 Hazard Communication

The contractor needs to develop a written hazard communication plan. It will be explained to each employee during the new-hire orientation. The purpose of the hazard communication plan is to provide employees with information on the chemical and physical hazards that may be present at the job site. Safety Data Sheets for all chemicals will be kept on site.

5.6 Job Hazard Analysis

A job hazard analysis may be developed covering the major activities of construction, the hazards associated with these activities, and ways to mitigate these hazards.

5.7 Housekeeping

Housekeeping is one of the most important factors for a safe job site. Form material should be scraped and all protruding nails pounded down. All other debris is cleared from work areas,

passageways, and stairs. Excess materials are stacked neatly out of the way. Tools should be stored in the toolbox so these are available for all employees to use.

Combustible scrap and debris are removed at regular intervals during the course of construction. Containers with covers are provided for the collection and separation of waste, trash, oily and used rags, and other such refuse, which is removed safely and on a regular basis.

Foreign object and debris (FOD) is a significant concern in nearby occupied spaces and construction areas. It is extremely important to keep all trash and debris contained at this site. Housekeeping will be strictly enforced

5.8 Fall Protection

The contractor provides fall protection when employees are exposed to fall hazards.

Fall protection may consist of, but is not limited to, the following:

- A stairway or ladder is provided at any point of access where there is a break in elevation of 19 inches or more.
- Guardrails are installed for all leading-edge work. For loading bay locations fall-arrest systems or fall-restraint systems are used.
- Safety harnesses with approved lanyards and tie-off points are used for all other fall protection unless an appropriate procedure or device was approved in advance by a competent person.
- Stilts may be used on job sites but work area floors must be clean/clear of all debris, materials, and equipment.

5.9 Electrical Safety

Electrical safety may consist of, but is not limited to, the following:

- Live electrical parts are guarded against accidental contact by cabinets, enclosure, location, or guarding.
- Extension cords are kept in safe, working condition.
- All lamps for general illumination have the bulbs protected against breakage. All light sockets are filled with a working bulb.
- Employees will not work in such close (able to contact) proximity to any part of an electric power circuit unless the circuit is de-energized, grounded, or guarded by insulation.
- De-energized equipment or circuits are locked out and tagged out. The tags identify the equipment or circuits being worked on.
- All generators used for temporary power shall be grounded according to manufacturers' specifications.
- Equipment shall not be operated closer than 10 feet from power lines less than 50kV. Safe distance will increase near higher voltage power lines, (over 50kV)

5.10 Tools

The contractor provides tools for employees to use. Only trained employees are allowed to use such tools. The safe use of tools may consist of, but is not limited to the following:

- Unsafe or defective tools are removed from service and tagged out.
- Power tools are turned off and motion stopped before setting down.
- Tools are disconnected from the power source before changing drills, blades, or bits and before any repair or adjustment is made. Running tools are not left unattended.
- Portable abrasive grinders have guards installed covering the upper and back portions of the abrasive wheel.

5.11 Scaffolds

Scaffolds are erected, moved, dismantled, or altered under the supervision of a competent person for scaffolding. Scaffold use consists of, but is not limited to, the following procedures:

- Standard guardrails are installed on all open sides and ends of scaffold platforms and/or work levels more than ten feet below the ground.
- Scaffolds four to ten feet in height with a minimum horizontal dimension in any direction less than 45 inches have standard railings installed on all open sides/ends.
- Platforms at all working levels are fully planked. Planking is laid tight with no more than one inch space between them, overlap at least 12 inches, and extends over end supports 6-12 inches unless cleats are used.
- The front edge of all platforms is no more than 14 inches from the face of the work, except plastering/lathing may be 18 inches.
- Mobile scaffolds are erected no more than a maximum height of four times their minimum base dimension.
- Scaffold casters/wheels are locked whenever the platform is occupied.
- Scaffolds are not overloaded beyond their design loadings.
- Scaffold components are not used as tie-off/anchor points for fall-protection devices.
- Portable ladders, hook-on ladders, attachable ladders, integral prefabricated scaffold frames, walkways, or direct access from another scaffold or structure are used for access when platforms are more than two feet above or below a point of access.
- Cross braces are not used as a means of access to scaffolds.
- Scaffolds are not erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come close to exposed and energized power lines than the following:
    - Three feet from insulated lines of less than 300 volts;
    - Ten feet plus for any other insulated or uninsulated Lines

5.12 Excavation and Trenches

Excavation and trenching are done in the presence of a competent person and in compliance with, but not limited to, the following procedures:

- Any excavation or trench five feet or more in-depth is provided cave-in protection through shoring, sloping, benching, or the use of hydraulic shoring, trench shields, or trench boxes. Trenches less than five feet in depth and showing potential of cave-in are also provided cave-in protection. Specific requirements of each system are dependent upon the soil classification as determined by a competent person.
- A competent person inspects each excavation/trench daily prior to the start of work, after every rainstorm or other hazard-increasing occurrence, and as needed throughout the shift.
- Any material and equipment are kept at least two feet from the edge of the trench or excavation.

5.13 Ladders

Ladders are inspected during the weekly inspections to identify any unsafe conditions. Any ladders found to be unsafe are taken out of service. Extension ladders extend three feet above the work surface and are 100 percent tied off. Step ladders are only used in the open position. Ladders are stored lying down. No standing on the top step or first rung below the top of a step ladder.

5.14 Illumination

Construction areas and storage areas where work is in progress are lighted with either natural or artificial illumination.

5.15 Motor Vehicles and Mechanized Equipment

Vehicles and equipment are only operated by qualified persons (training or experience). All equipment operators are responsible for checking, on a daily basis, all fluid levels, drive components, and hydraulics. In addition, operators visually inspect the engine and look for structural breaks and cracks on the machine. Any and all deficiencies must be reported to a supervisor immediately.

When equipment is stopped or parked, parking brakes are set and other safety precautions are taken as required for the type of equipment such as placing the forks flat on the ground. Keys shall be removed from equipment at the end of each shift.

5.16 Severe Weather

Outside construction operations including, but not limited to site work, and concrete work are suspended if severe wind or rain conditions present safety hazards at the worksite. Rain and wind storm hazards are evaluated and appropriate measures are taken to abate potential hazards.

5.17 Accident

All accidents and near misses must be reported immediately to the foreman or superintendent. An accident report is then filled out by the employee and the supervisor. Filling out an accident report does not require the delay of medical attention. Any injury is treated first. Employees file such reports without fear of reprisal by management. The accident or incident may be discussed at weekly safety meetings to avoid that sort of accident in the future.

5.18 First Aid

First-aid kits are available in the project office, at the appropriate and accessible locations as indicated during orientation. In addition, foremen and superintendents maintain current first aid boxes at the site.

5.19 Fire Protection

The contractor maintains appropriate fire extinguishers at the fire-prone areas of the construction site. All equipment is fitted with portable fire extinguishers. Employees are instructed on the location and usage of these fire extinguishers. Emergency telephone numbers for fire protection and emergency medical services are posted on the field office bulletin board.

5.20 Emergency Action Plan

Each job site develops an emergency action plan that is reviewed with each employee during orientation. The emergency action plan covers emergency escape procedures, procedures followed by employees remaining to operate critical operations before they evacuate, procedures to account for all employees, rescue and medical duties, and how to report emergencies.

5.21 Environmental Protection Plan

This health and safety plan also contains an Environmental Protection Plan for the control, prevention, management, containment, cleanup, and disposal of petroleum products or other hazardous substances which may be generated on each project site. The Project Engineer directs measures to control and prevent accidental discharge of petroleum products or other hazardous substances during storage and transfer on all job sites. Any onsite storage is in approved containers. Absorbent pads and other recovery equipment shall available to contain and recover any fuel accidentally spilled. Any spills and contaminated soils are cleaned and disposed of in accordance with applicable requirements.

5.22 Traffic and Pedestrian Control

A traffic control plan will be developed and put in place prior to beginning work on the project for the protection of workers and the general public. Barricades and signage must place around job site areas to reroute vehicle traffic and keep pedestrians out of the job site.

Project Engineers and Superintendents will evaluate the site before work starts to plan site control. Fencing, signage, and barricades shall be erected and secured as to keep pedestrians out.

Any time while performing work near or on a roadway and a worker has a sense of traffic patterns not being controlled properly or speeds too extreme for conditions, the worker should remove himself from the area and notify Supervisor. The Project Engineer shall stress and discuss, at weekly meetings, for all workers to be aware of traffic hazards and pedestrians.

5.24 Concrete Work

The project involves concrete work. There are many hazards associated with this work including but not limited to; Slips Trips, Falls, Strains and Sprains, Eye Injuries, Chemical Burns, and Silica Exposure. The risk assessment shall be performed for all concrete work to minimize the associated hazards

6.0 Monitoring and Reporting

Monitoring the implementation of the health and safety plan and progress reporting will be very important for the effective enforcement of the plan. WASA-F project team along with the supervision consultant will validate effective reinforcement of HSMP. The supervision consultant will frequently visit the construction sites and monitor the effectiveness of the plan implementation. The status of implementation will be reported to the WASA-F fortnightly.

ANNEX-XI

EMERGENCY RESPONSE PLAN

Emergency Response Plan

1. Introduction

Emergency management can be defined as the organization, coordination and implementation of a range of measures to prevent, mitigate, respond to, overcome and recover from the consequences of emergency events affecting the community, its assets and the environment.

2. Purpose of Plan

This plan intends to provide a framework for safety and security to infrastructure, people and vehicles. It assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency situation that exceeds the capability or routine responsibility of any one agency.

The emergency response plan provides guidance to;

- Prevent any potential sources causing hazard to the resources during all stages of the project;
- Coordinate between various organizations to take actions in case of emergencies;
- Protect people and property in emergencies and disasters;
- Develop procedures to respond to the emergencies efficiently;
- Identify and ensure availability of personnel, equipment, facilities, supplies, and other resources for use in order to provide timely and efficient response and recovery operations; and
- Confirm that measures taken in an incident are adequate to recover the affected resources or further improvements are needed.

3. Planning

i. Emergency Response Team

A group/ team shall be dedicated to identify and control potential emergencies during the construction and operation of the project. The roles and responsibilities of the group members shall be clearly defined.

The primary responsibilities of the group are described below:

- Identify the potential hazard or risk sources that can lead to emergency situations; Ensure availability of adequate resources, procedures and communication system to deal with the identified emergency situations;
- Ensure awareness and training of the staff to facilitate implementation of the emergency response plan;
- Maintaining the records of any previous incidents; and
- Post-event analysis to bridge the gaps of the existing risk prevention procedures.

The emergency response team shall include but not limited to the following;

A. Site Incharge

- Approve/ modify devised measures to prevent or mitigate the risks associated with the identified risk sources;
- Arrange resources for dealing with potential emergencies including, financial, equipment and personnel required to deal with emergencies;
- Assure that the Emergency Response Plan is adequate, effective and implementable.

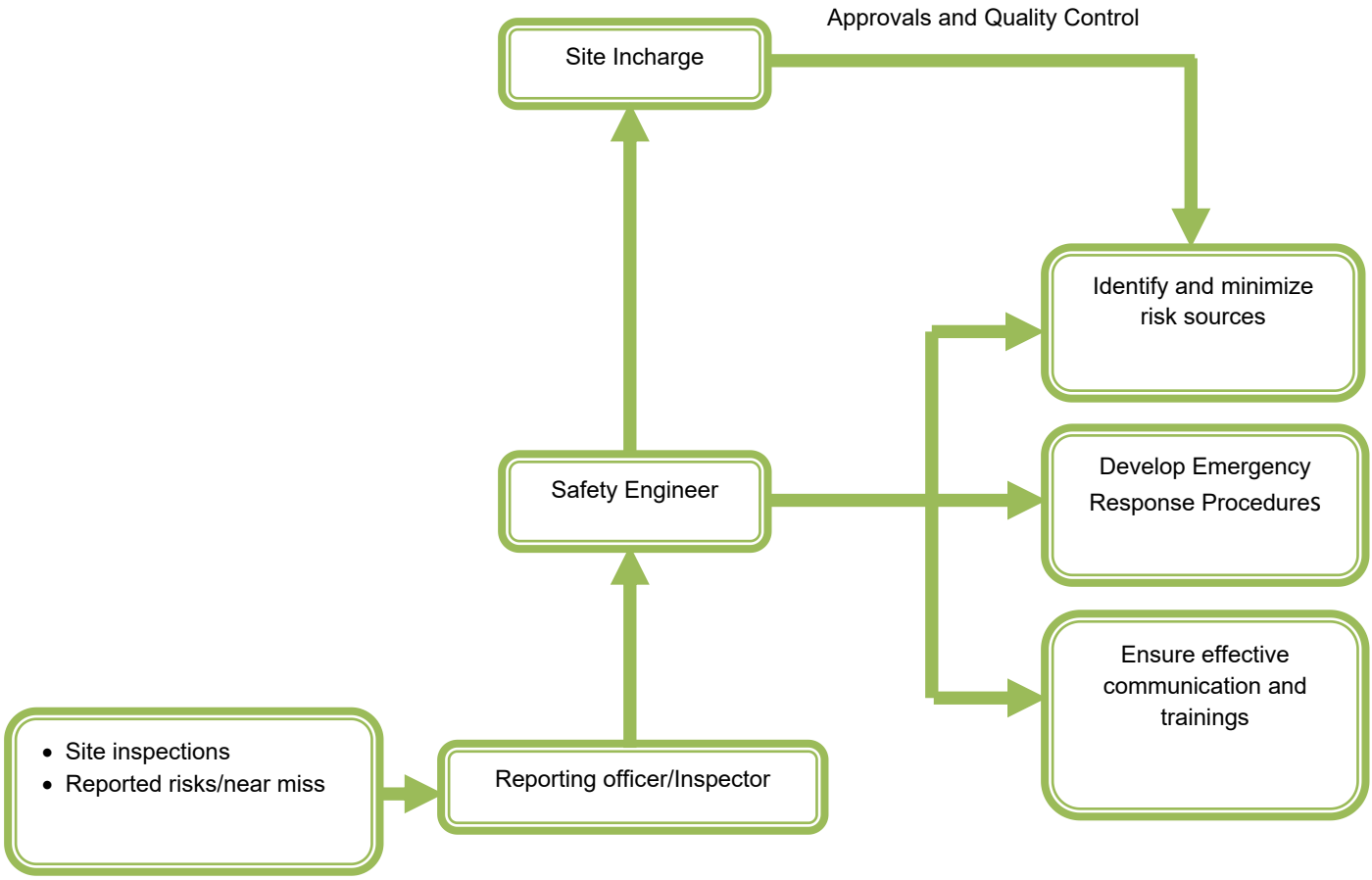
B. Safety Engineer

- Analyze the Identified risk sources and devise measures to prevent or mitigate the risks in close consultation with the Team Leader;
- Develop and implement the Emergency Response Procedures, in case of the possible emergencies arise;
- Ensure effective internal and external communication; and
- Provide regular trainings and arrange drills to make people aware of dealing with emergencies.

C. Reporting officer/Inspector

- Regular inspections of the site, to identify potential risks associated with equipment, materials and work practices;
- Anybody from the site can notify the reporting officer about potential risk and/ or near-misses on the site;
- Record any identified risks and mitigation measures to control the identified risk; and
- Notify the issue and control measures taken thereby to the safety engineer.

The designation, roles and responsibilities of each member shall be clearly defined and communicated to the employees. An outline of the framework of responsibilities is presented in the following organizational chart:



ii. Hazard Identification

A comprehensive identification and evaluation of the hazards/ risks likely to cause an emergency shall be done by Emergency Response Team (ERT). Major potential emergencies identified in projects are as follows:

- Fire
- Earthquake
- Terrorism (including bombing)
- Disease Outbreak
- Structural failure
- Disruption of Utilities (Power, Water, Telecommunications, Gas, etc.)
- Accidents (falls, slips, electric shocks etc.)
- Vehicular accident
- Failure of trenches
- Power/ equipment failure
- Vandalism

iii. Prevention and Mitigation

The ERT shall work to eliminate or reduce the impact of identified emergencies and increasing the resilience of an affected community to recover from the consequences of such events. These activities include:

- Design considerations to control flooding, earthquakes and adequate lightening for fog etc.;
- Regular inspection and maintenance of construction machinery and the structural integrity;
- Review of work schedules based on weather updates; and
- Security controls based on political situations.

4. Emergency Preparedness

The ERT shall be prepared with all necessary resources and the personnel shall be trained regularly.

i. Resources

Finance and administration

The financial resources shall be reserved for dealing with any emergencies arising on site during construction. Responsibilities of the person managing the resources in case of emergencies shall be clearly defined and the required resources shall be adequate and updated regularly.

Equipment

All the necessary equipment needed in an event of emergencies shall be made available, as a minimum, the equipment needed include;

- Personal Protective Equipment
- Alarms/ Warnings
- Fire extinguishers
- Crowd control, flashlights, signs, barricades
- First Aid Facility
- Detection instruments, e.g., personal alarm kits; smoke detection instruments
- Tools to fix minor vandalism

Communication

All external and internal communication systems shall be made available. Local emergency numbers shall be clearly posted and communicated to the personnel involved in construction.

The local emergency numbers are given below, which shall be regularly updated.

Emergency Numbers

	Service	Faisalabad (041)
1	Edhi Ambulance	115
2	Emergency Police	15
3	Police Station	Civil Lines 041-9200262-3 Factory Area 041-9200255 Sargodha Road 041-9210213 D-Type Colony 041-2404205 041-9330613 Madina Town 041-9330449
4	Rescue Service	1122
5	Rescue Fire Brigade Station	041-9200777 041-9201111
6	DHQ Hospital Faisalabad	041- 9200140

Trainings

Personnel shall be made aware of the importance of safety, potential emergencies and how to respond in case of emergencies. One day training and mock exercise shall be done to prepare, the personnel to deal with emergencies.

5. Emergency Response

Response includes actions taken to reduce the impacts of an emergency event, and to limit the threat to life, property and the environment.

The emergencies can be dealt with:

- On-site Management of the situation
- Off-site coordination to arrange necessary resources to support the on-site management
- Providing advice and reports of the situation to stakeholders

i. Emergency Response Procedure:

Any person can report about an emergency, an on-site worker, an outside agency, or the public. Circumstances change during the course of an emergency in different events; thus, the procedure will vary as per the specific situation on ground. However, a basic action plan to be followed in an emergency is discussed below. This order of response is applicable to almost any emergency and should be followed in sequence.

Assess the situation:

The most important thing to do in case of emergency is to stay calm and avoid panic. Assess the situation, the cause and most immediate requirement to control, limit and/ or manage the immediate, ongoing, or further damage.

Immediate control:

The most senior person on the scene should take control and contact, or delegate someone to contact emergency services as posted and communicated by ERT and inform the reporting officer of ERT and explain the situation. The area of emergency shall be restricted by barricades, tapes and adequate signage, if and as required.

Protection from further losses:

- Once the site is restricted, to provide protection and reduce further losses, the source causing the emergency shall be controlled including equipment, materials, environment and accident scene from continuing damage or further hazards to the area and people. e.g.: suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures as required depending upon the type of emergency
- Provide first aid if required or in doing so.
- Designate people to emergency duties. e.g.: assign personnel to guide emergency services on arrival.
- Headcount People/ personnel to identify any missing persons.
- People/ personnel shall be directed to safe location.
- Arrange diversions for the traffic to reduce disturbance to the flow of traffic, if and as far as possible.
- Preserve the accident scene until experts mark it safe; only disturb what is essential to maintain life or relieve human suffering and prevent immediate or further losses.

ii. Communication:

Emergency service providers:

The emergency service providers' needs to be kept informed of the situation. On site, personnel from the emergency services shall be guided towards the emergency scene, brief about the event, ongoing and potential hazards and cause(s), if known.

Emergency Response Team and Management:

Members of ERT shall be immediately informed and the management shall also be kept informed.

Public:

Timely notifications to public shall be disseminated through electronic and print media depending upon the requirement and urgency of the emergency so that they can adopt alternate routes and avoid the hazards associated with the emergency encountered.

Utilities:

In case of disruption of utilities, the utility control authorities shall be immediately contacted to control the situation.

6. Recovery:

Emergency affected individuals, communities and infrastructure shall be restored in terms of emotional, economic, and physical wellbeing including the following as a minimum:

- A detailed analysis and assessment of causes of emergency, extent of damage and gaps if any, in managing the emergency;
- Recovery/ replacement of the assets and infrastructure;
- Reinstatement of disrupted services;
- Updating of safety arrangements and Emergency response procedures to ensure better safety and security in any other arising emergencies.

ANNEX-XII

SITE REHABILITATION PLAN

SITE REHABILITATION PLAN

The project site should be rehabilitated after the completion of construction work. The rehabilitation will include following:

- Rehabilitation of construction camp site
- Removal of construction waste and debris
- Rehabilitation of road after laying of water/ sewer pipes

1. Rehabilitation of construction camp site

The construction camps will damage the camp site/area by following:

- Generation of solid waste;
- Generation of wastewater;
- Damage to soil due to compaction by the camps/containers;
- Damage to air quality by the operation of generators or burning of fuels;
- Hunting and poaching of animals; and
- Damage to resources.

Following measures should be adopted to rehabilitate the campsite:

- The removed/damaged flora should be replanted;
- The solid waste should be removed from the site and disposed of to the dumping area;
- Wastewater generated from the site should be either directed to the sewerage system or removed through the suction trucks;
- Soil should be reclaimed and rehabilitated; and
- Buildings may be used for any other purpose

2. Removal of construction waste and debris from site

The construction waste and debris generated at the site should be segregated and removed from the site by a licensed contractor.