

WATER SUPPLY & SANITATION

Sahiwal Regional Development Plan
MAIN REPORT



The Urban Unit

Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



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Executive Summary

Sahiwal Division is an important division in Central Punjab and constitutes the districts of Sahiwal, Okara and Pakpattan. The division ranks eleventh in Punjab province in terms of population size, with a population of approximately 7 million people and a covered area of 10,302 km². Despite its strategic location, the districts of Sahiwal division face significant challenges concerning water supply and sanitation. According to UNICEF's assessment of Water, Sanitation, and Hygiene (WASH) services at the district level, the combined scores for access to WASH services ranks as #19 for Sahiwal district, #25 for Okara district and #26 for Pakpattan district, indicating lower ranking in comparison to other districts of Punjab.

Sahiwal City

Sahiwal is situated at a distance of about 18 miles from the left bank of the river Ravi, 187 Km west of Lahore and 200 km east of Multan. The Municipal Corporation (MC) Sahiwal is responsible for providing potable water, sewerage, and drainage services to the inhabitants of the city. The water supply and sewage systems have been under strain for years due to aging water supply infrastructure, outdated and inefficient sewer systems, and profligate water consumption on the part of consumers. The PICIIP program, funded by the Asian Development Bank (ADB), is presently in progress to upgrade the Water and Sanitation (WATSAN) infrastructure to enhance the delivery of municipal services within the city. Despite these efforts, specific areas within the city still require immediate attention to address existing deficiencies and further elevate the quality of water supply and sanitation services available to residents.

Pakpattan City

Pakpattan is the 48th largest city of Pakistan by population as per Census 2017. The water supply of Pakpattan City is based on groundwater-based schemes, operated and managed by the Municipal Committee (MC) Pakpattan. These schemes rely on 29 tube wells spread across the city, with an approximate spatial coverage of water supply being over 90% in the city. The overall water supply scenario in the city is satisfactory, with a need for minor augmentation for replacement of some old and problematic lines. Existing sewerage infrastructure of Pakpattan city constitute of sewers in most of the city and drains on high elevation area (locally known as Dhakki). This sewage is then carried to five disposal stations which then further dispose it to irrigation canals and/or agriculture fields without any treatment. Issues like trunk failure and non-existent wastewater treatment remains key sanitation issues which are addressed in this proposed plan.

Okara City

Okara City is the 25th largest city of Pakistan by population as per Census 2017. The water supply system of Okara City is based on seepage tube well battery with 24 tube wells, primarily serving the southern part of the city. The majority of the distribution systems are assessed in fair to poor conditions with spatial coverage of 60% in the city. This highlights the need for immediate attention to improve water quality and water supply infrastructure reliability in Okara City. The sewerage system of Okara City comprises gravity-based sewerage systems, with an existing network of sewers covering approximately 85% of the city. There are currently two operational disposal stations in the city and wastewater from the Northern side is disposed of in the agriculture field after pumping through two Disposal Stations. Conversely, wastewater from the southern side is disposed of through gravity into a seepage drain.

Scope of Study & Methodology

The following sections discuss the area of concern for the project, the agreed scope of the study, planning years as well as the adopted methodology for the project.

1.1. Area of Concern

The Sahiwal Regional Development Plan will be focused on urban centers of all three districts of the division; Sahiwal, Okara and Pakpattan districts. Moreover, the rural areas in the aforementioned districts will also be the area of concern for this planning exercise.

1.2. Scope of the Study

The scope of the planning exercise includes but is not limited to the following.

- ▶ Rehabilitation of WSS Infrastructure
- ▶ Replacement of Poorly Served WSS Piped Network
- ▶ Planning for WSS in Rural Communities
- ▶ Extension to the Unserved Areas for WSS Services
- ▶ Proposals for Machinery
- ▶ Drawing and Design of Wet Utilities

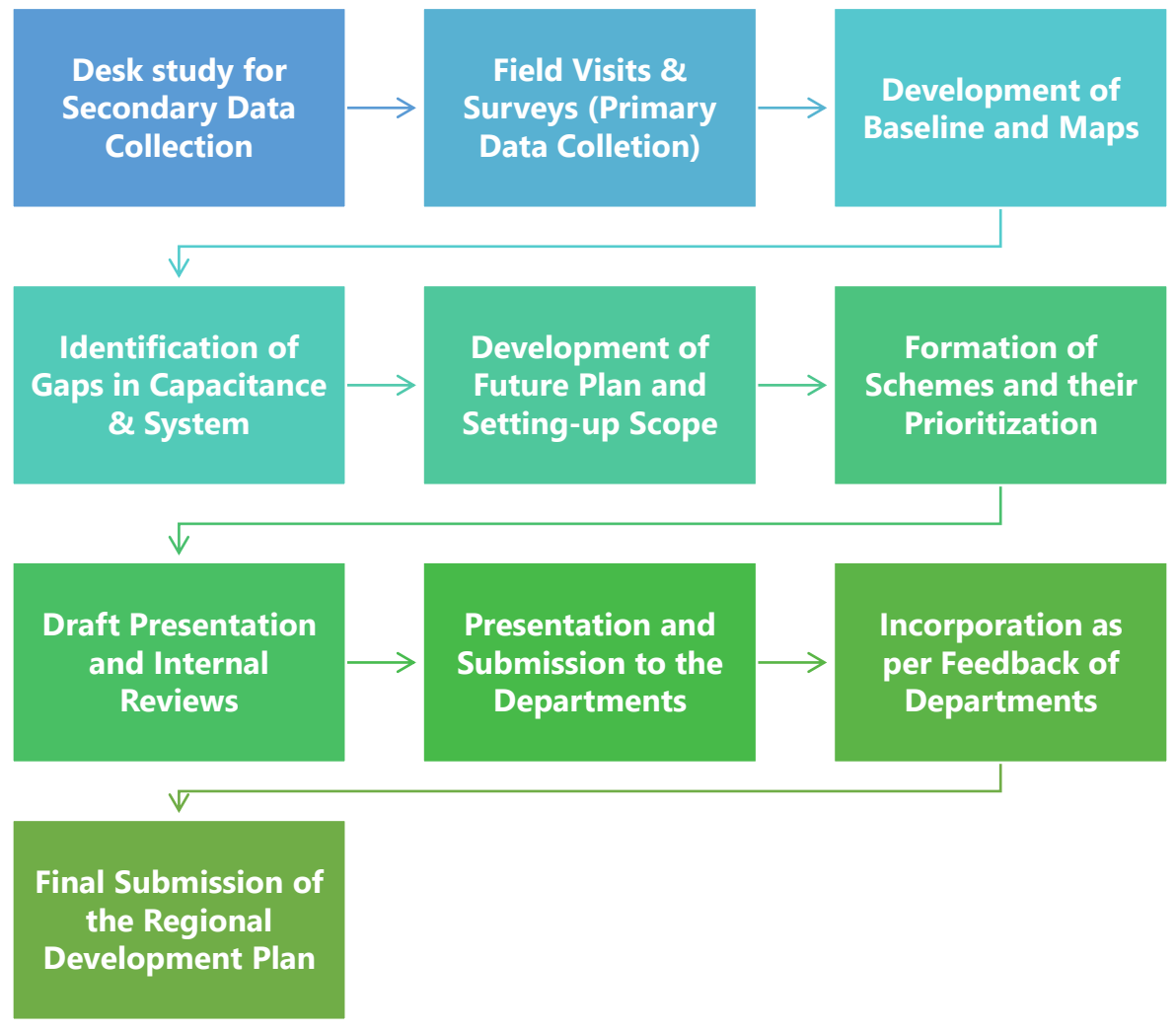
1.3. Planning Year

The following planning horizon has been adopted for this planning exercise with phasing opted for short, medium and long term. Details of the phasing is as follows.

Term	Years	Planning Year
Short Term	2	2026
Medium Term	5	2029
Long Term	10	2034

1.4. Methodology

Following methodology discusses the steps involved in the planning exercise of the Sahiwal Regional Development Plan.



1.5. Field Visits

A detailed field visit for assessment of water and sanitation infrastructure of Sahiwal division was conducted in January of 2024. The assessment included but was not limited to assessing the condition of WATSAN assets, GIS tagging of WSS assets and service lines with attributes, Rapid water quality testing, Need assessment for rehabilitation and Stakeholder meeting for their insights on the related issues etc.

1.6. Framework for Asset Mapping

Following framework was adopted for the purpose of asset mapping of the existing WSS infrastructure (Civil, Electrical, & Mechanical). All of the existing WSS utilities and assets were rated using the internationally accepted framework for condition assessment as follows.

Rating	Condition	Description
A	Excellent	No noticeable defects. Some aging or wear may be visible
B	Good	Only minor deterioration or defects are evident
C	Fair	Some deterioration or defects are evident, but function is not significantly affected
D	Poor	Serious deterioration in at least some portion of the structure. Function is inadequate
F	Failing	No longer functional. General failure or complete failure of a major structural component

1.7. Design Parameters & Considerations

The design criteria of Public Health & Engineering Department (PHED) have been broadly opted for this exercise. However, any different factors, wherever used, are rationalized, and referred to in relevant sections of the report.

1.7.1. Population Projection

Population projection is based on assumption that the past trends (growth rate of census) will continue to operate in the future. The reliability and usefulness of projections depend on the assumptions and their closeness to reality. In general, population projections are treated as predictions and should never be termed as final and fully accurate population. Following equation of Arithmetic Increase Method has been used in order to project population.

$$P_n = P_0 (1+R)^n$$

Where,

P_n = Population in the required year

P_0 = Population in the base year (known year)

R = Annual rate of growth in percentage

N = No. of years counted from base year (Census 2017 Population)

1.7.2. Water Demand

For Water Demand Calculation, 30 Gallons Per Capita Per Day may be considered as an appropriate figure to fulfill the demand. However, in case of Okara, 22 gallons per capita per day (GPCD) has been assumed due to unavailability of water in this region. These figures are inclusive of unaccounted for water and is aligned with the United Nations media brief report "Human Right to Water and Sanitation" which quote "According to the World Health Organization (WHO), between 50 and 100 liters of water per person per day are needed to ensure that most basic needs are met and few health concerns arise." Moreover, this value of 50-100 LPCD or 11-22 GPCD have been practiced in other water scare areas of Punjab such as Chakwal.

1.7.3. Variations in Water Demand

The following have been used for computation of variations in water demands.

- A. Maximum Day Demand is to be taken as 1.5 times the Average Day Demand
- B. Peak Hour Demand to be taken as 1.5 times the Maximum Day Demand

1.7.4. Operational Hours

Working or operational hours for water supply sources is proposed to be 16 hours. However, in case of high or low demand, working hours can be adjusted accordingly.

1.7.5. Velocity Flow in Pipes

The following standards shall be adopted for the maintaining velocity of water in pipes in the detail design phase, prior to installation of any water supply scheme.

- A. Distribution mains 0.5 to 2 m/sec
- B. Rising mains 0.3 to 1.5 m/sec

1.7.6. Sewage Generation

Design Flow will be the summation of Peak Sewerage Flow, Industrial / Non-domestic flow, Infiltration, and Storm Water allowances.

- A. The sewage contribution of the water consumed will be as follows: 80%-85%
- B. Infiltration Rate: 5% is assumed
- C. Peak Factor: 2.00 as projected population is greater 100 thousand
- D. Allowance for industrial waste as per actual assessment on treated industrial waste as per National Environmental Quality Standards (NEQS) is also to be allowed. 5% is taken as industrial / non-domestic sewerage flow
- E. Storm water allowance: 50% of Peak Sewage Flow (Northern Punjab)

1.7.7. Sewage Conveying Medium

Sewers of Reinforced Concrete (RC) are proposed as sewage conveying medium as they are cost effective and have following benefits:

- A. Cement pipes are corrosion resistant
- B. Asbestos cement pipes have smooth internal face and offers less hindrance to flow of wastewater
- C. They can provide working pressures up to 1.25 MPa (12.5 kgf/cm²)
- D. Conduits i.e., open drains and sullage carriers are also have been opted for sewage conveying purpose where it is not possible to lay sewers.

1.7.8. Sullage Carrier Sizing

For sizing and opting the right size of sewers and of sullage carriers, Manning's equation is used to calculate the Maximum carrying discharge and flow velocity against a slope which is assumed. This has been done for main sewers and where possible. Detail Hydraulic Statement must be made part of detail design for proper sizing of the sewers of the schemes prior to their execution.

$$Q = A V = \left(\frac{1.49}{n} \right) A R^{\frac{2}{3}} \sqrt{S} \text{ (SI Units)}$$

Where:

R= Hydraulic Radius in meters

P= Wetted Perimeter in meters

S= Slope in m/m

n= Manning's coefficient of roughness of flow carrying material (here it is assumed as 0.013 for brickwork with rough plaster)

Q= Maximum Flow Carrying capacity in m³/sec

V= Velocity of flow in m/s against assumed slope



WATER SUPPLY & SANITATION

Sahiwal Regional Development Plan
SAHIWAL (2034)

SAHIWAL CITY

Sahiwal is situated at a distance of about 18 miles from the left bank of the river Ravi, 187 Km west of Lahore and 200 km east of Multan. The Grand Trunk Road and the main railway line connecting Peshawar-Lahore with Karachi pass through the town. The Lower Bari Doab Canal separates the town into two parts. Its approximate height above sea level is 500 feet. In 2024, the city holds a population of 488,665 people according to the 2017 Pakistan Census, making it the 14th largest city in Punjab and the 22nd largest in Pakistan. The study area of the Regional Development Plan (RDP) comprises Municipal Corporation (MC) Sahiwal, which includes twelve (12) Union Councils (UCs). Due to a vast migration activity from rural to urban areas, the rapid growth of the city has overburdened the natural resources and made it difficult for service providers to provide an adequate quantity of necessities to residents of the city.

The Asian Development Bank (ADB) has collaborated with the Government of Punjab Province (GoPb) to undertake the Punjab Intermediate Cities Improvement Program (PICIIP). The program aims to turn selected urban areas into smart cities that are green, inclusive, and competitive, enhancing livability and economic growth through improved governance, urban planning, service delivery, mobility, climate resilience, and IT integration. The list of projects related to Water Supply and Sanitation (WSS) for Sahiwal City under PICIIP is listed as follows and are attached as annexure to this report.

Table 1: PICIIP Sahiwal - WSS Projects

Sr.	Sector	Name of Scheme (Source: PICIIP Sahiwal)	Completion Status (As of Jan, 2024)
1	Water Supply	LOT 1: New Tube Wells (28 Nos) New Overhead Tanks (4 Nos) Distribution Network (543 Km) Filtration Plants (10 Nos) Tube Wells Rehab (45 Nos)	63.70%
2	Sewerage System	LOT 2: Trunk Sewer North (43 Km) LOT 3: Conduit (4.6 Km) & Disposal Station (N) LOT 4: Trunk Sewer (27 Km) & Disposal Station (S) & Waste Water Treatment Plant	59% 30% 37%

The Municipal Corporation (MC) Sahiwal is responsible for providing potable water, sewerage, and drainage services to the inhabitants of the city. The water supply and sewage systems have been under strain for years due to aging water supply infrastructure, outdated and inefficient sewer systems, and profligate water consumption on the part of consumers. The PICIIP program, funded by the Asian Development Bank (ADB), is presently in progress to upgrade the Water and Sanitation (WATSAN) infrastructure to enhance the delivery of municipal services within the city. Despite these efforts, specific areas within the city still require immediate attention to address existing deficiencies and further elevate the quality of water supply and sanitation services available to residents.

In response to the current challenges, a Water Supply and Sanitation plan has been proposed for the next decade, aiming at addressing the needs of an estimated projected population of approximately 677,416 by the year 2034.

2.1. Existing Water Supply Infrastructure

The current water supply infrastructure in Sahiwal City relies on groundwater, supported by 56 tube wells distributed throughout the city. These tube wells have the capacities of 1 cusec and 1.5 cusecs that are connected to the distribution network of the city. The water distribution system mostly adopts a direct supply method, where water is pumped directly from the tube wells to the consumers, however, there are 13 overhead reservoirs in the city out of which eight (8) are functional for the service. The operational hours of these tube wells vary, ranging from 08 to 14 hours per day, depending on the demand of the areas.

A comprehensive assessment was conducted to evaluate the condition of the tube wells in Sahiwal City. The findings indicated that 55% of the tube wells are in fair to excellent condition, primarily due to their relatively recent installation and availability of appropriate electromechanical components. These wells are efficiently functioning and contributing significantly to the city's water supply. Furthermore, 12% of the tube wells were assessed to be in Fair condition whereas the remaining tube wells were either found in poor condition or completely failed. All the overhead reservoirs in the city are more than 40 years old and they have expired their designed life. Therefore, eight (08) of them are rated as Poor whereas the remaining five (05) are in failed condition. There are 04 new overhead reservoirs being constructed in the city under the ADB PICIIP project. The MC Sahiwal is managing 31 filtration plants (Both RO and UF) out of which 22% were found in good condition, 54% in fair condition and the remaining were rated in poor condition.

The water supply distribution infrastructure has an estimated spatial coverage of over 85% in the city. The distribution network of 543 Km including rising mains in the city is replaced under the ADB PICIIP project. However, the network of 22.6 Km (failed condition) present in UC-01 has never been operationalized due to handing over issues

between the executing agency and MC Sahiwal. Moreover, there is no water supply infrastructure present in the areas of UC-02 and UC-03. It is important to mention that these areas are not included in the ADB PICIIP project.

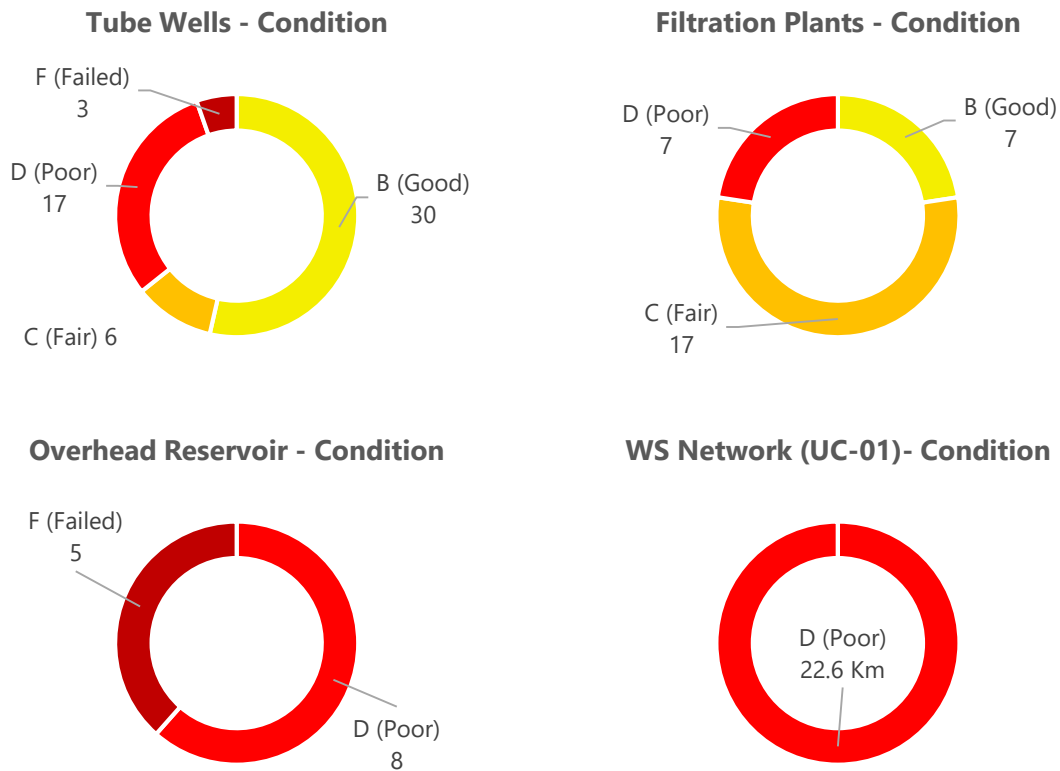


Figure 1: Condition Assessment of Water Supply Infrastructure in Sahiwal

The overall condition of water quality was also assessed through Rapid Water Quality Testing across MC Sahiwal. Handheld water quality testing equipment was utilized for this exercise and different water quality parameters like Total Dissolved Solids (TDS), PH, and Electrical Conductivity were measured. It was noted that up to the depth of 300 feet, the TDS values are high (greater than 1000 ppm) whereas above 400 feet the TDS values are below 500 ppm. It is pertinent to mention here that Sahiwal district falls in the high arsenic regions and representatives of PCRWR reported that Sahiwal city is also being affected over time. There is a need to conduct a thorough assessment of the water quality of the city and appropriate measures should be taken to overcome the challenges before time.

The condition of the water supply infrastructure as encountered during the field visit performed by the Urban Unit team is indicated in the pictures below.



Tube well located in MC Sahiwal operated and maintained by MC



Tube well (Bahar-e-Madina Road) rehabilitated under ADB PICIIP Project



Rapid Water Quality Testing at the source (TDS: 259 ppm)



Filtration Plant located in Press Club Sahiwal needs immediate rehabilitation

Figure 2: Water Supply Infrastructure of MC Sahiwal

Existing Water Supply Infrastructure Map of MC Sahiwal

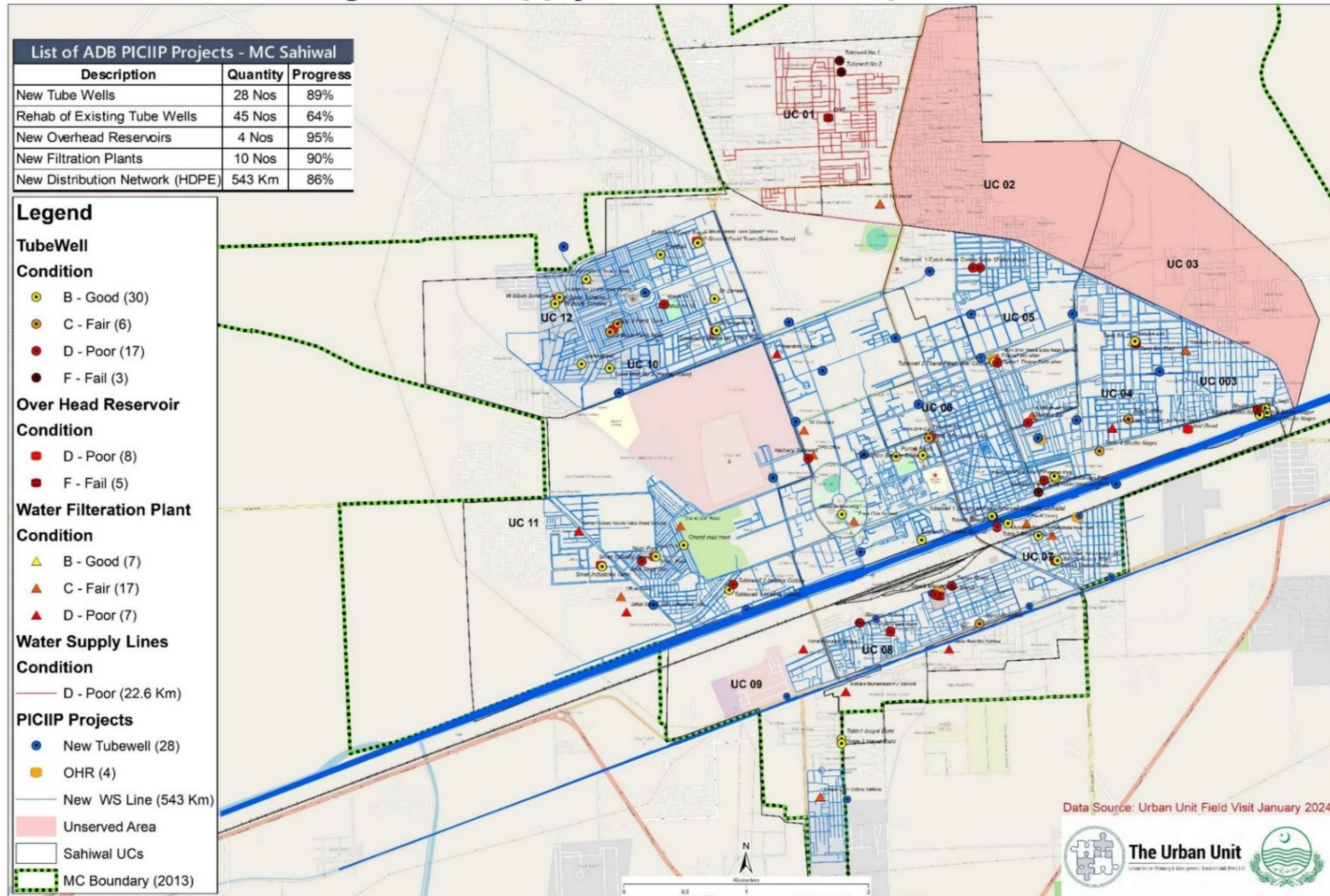


Figure 3: Existing Water Supply Infrastructure Map of MC Sahiwal

2.2. Water Demand and Supply Analysis

The water supply demand comparisons have been made corresponding to a water demand of 65 GPCD (PHED Design Criteria) and 30 GPCD keeping in consideration the global best practices. Additionally, demand augmentation for commercial, industrial, and institutional have been included as 15% each in the total water demand. It must be noted that 30 GPCD water demand is considered adequate and is aligned with the United Nations 'Human Right to Water and Sanitation Guidelines' which recommends a minimum of 11 – 22 GPCD of water to ensure full realization of the individual right to water. Moreover, this figure is also aligned with the 'National Drinking Water Policy of Pakistan (2009)' which ensures a minimum amount of 26 GPCD (120 LPCD) for equitable access to water in urban areas.

The current (2024) and future (2026, 2029, 2034) water demand are tabulated below. A comparison of estimated water demands, water supply (After PICIIP Projects), and water supply (BAU) graph are represented in the figure below.

Table 2: Water Supply Demand Estimations (30 GPCD) for Sahiwal

Year	2024	2026	2029	2034
Population	488,665	521,651	575,352	677,416
Average Day Demand (MGD)	16.86	18.00	19.85	23.37
Max Day Demand (MGD)	25.29	27.00	29.77	35.06
Peak Hour Demand (MGD)	37.93	40.49	44.66	52.58

WATER DEMAND AND SUPPLY (MGD)

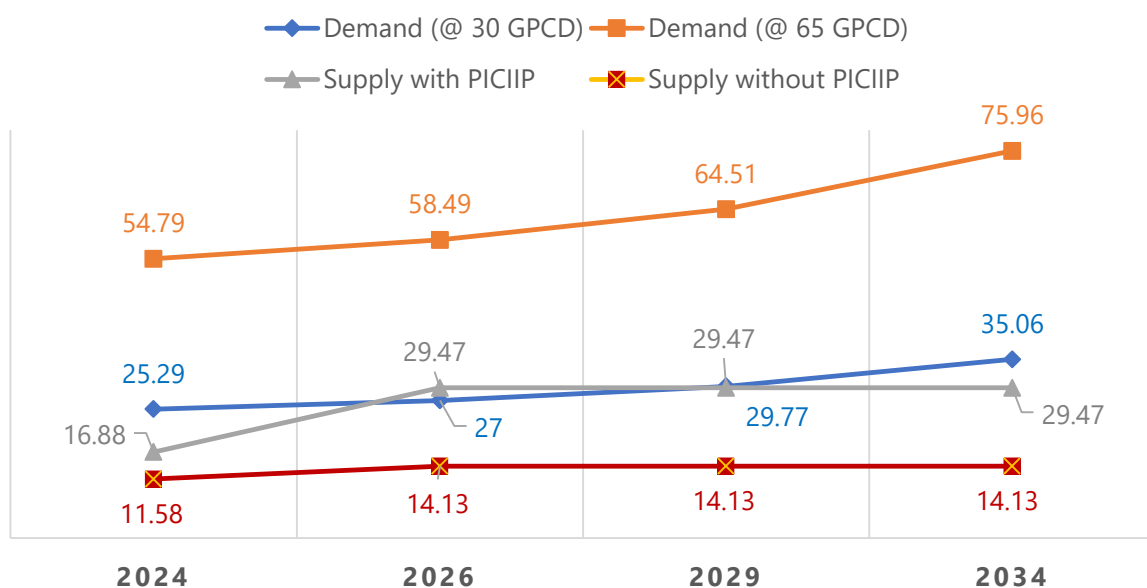


Figure 4: Water Demand versus Supply Analysis for Sahiwal

2.3. Interventions for Water Supply System

The conditional assessment of existing water supply infrastructure and its comparison with present and future projected demand and needs has resulted in the identification of service delivery gaps that exists within the system. The planning exercise aims to fulfill the afore-described gaps to water supply. Prioritization of these gaps is also done and schemes are proposed based on various factors such as essence of intervention, duration required to execute them, cost required, and their impact on public. Total cost required to uplift the current water supply situation is 2,404 Million. For Rough Cost Estimation, MRS 1st BI-ANNUAL-2024 (01.01.2024 to 30.06.2024) District Sahiwal has been applied. This is further subject to the detailed design of the proposed schemes upon PC-1 formation.

2.3.1. Short Term Plan

The short-term plan of Sahiwal is focused on fulfilling the existing service delivery gaps and capacitating the existing infrastructure in the areas that are not included in ADB PICIIP projects. It focuses on the rehabilitation of an abandoned water supply scheme in UC-01 consisting of tube wells, overhead reservoirs, and the distribution network. Furthermore, rehabilitation and solarization of existing filtration plants along with the addition of arsenic removal filters are also included in the short-term plan. The short-term plan of Sahiwal is expected to cost 412.6 Million.

2.3.2. Medium Term Plan

The medium-term plan involves the installation of five (05) new tube wells of 1.5 cusecs each, the construction of seven (07) new overhead reservoirs (dismantling and reconstruction where applicable), and the laying of the distribution network of approximately 69 Km to cater to the unserved areas in the city. Furthermore, the establishment of district metered areas (DMAs) for 24-hour metered water supply service and Asset Management & GIS cell is proposed in this plan. The medium-term plan for Sahiwal is estimated to cost around 1,349 Million.

2.3.3. Long Term Plan

The long-term plan discusses the further extension of water supply services in the city with the proposed installation of four (04) new tube wells of 1.5 cusecs each, along with nine (09) overhead reservoirs and extension of the distribution network of approximately 48 Km for the future population of the city. The long-term plan for Sahiwal is estimated to cost 642 Million.

The following schemes are proposed for uplifting the water supply system of MC Sahiwal as per the performed assessments and analysis.

Table 3: Proposed Interventions for Water Supply in Sahiwal

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Rehabilitation of Water Supply System in UC-01 Sahiwal City (252.6 M) Scope of Project:</p> <ul style="list-style-type: none"> ▶ Repairs of 02 Tube Wells (1.5 cusecs each) including civil works (pump house repairs as per requirement), electro-mechanical (machinery and panel as per requirement) & Repairs for 01 existing Overhead Tank (50,000 gallons) in Sahiwal. ▶ Replacement of outlived/damaged existing distribution network (22.6 Km) and extension of the network (18 Km) to unserved areas of UC-01. <p>Rehabilitation and Solarization of drinking water infrastructure in Sahiwal City (160 M) Scope of Project:</p> <ul style="list-style-type: none"> ▶ Rehabilitation and repair program of filtration plants (24 Nos) in the city along with the addition of an Arsenic removal cartridge vessel and installation of a dedicated rooftop solar system of 3kW on filtration plants (31 Nos)
2	Medium Term (2029)	<p>Extension of Water Supply System in Sahiwal City (700 M) Scope of Project:</p> <ul style="list-style-type: none"> ▶ Construction of 05 Nos Tube wells @1.5 cusecs along with filtration plants and 07 No Overhead Reservoirs (OHRs) (Total 600,000 gallons) ▶ Laying of the water distribution network (3", 4", 6", 8") of approximately 69 Km in the areas of UC-01, UC-02 and UC-03. <p>Establishment of District Metered Area (DMA) and GIS cell in Sahiwal City (649 M) Scope of Project:</p> <ul style="list-style-type: none"> ▶ Establishment of DMA as a pilot project in the area of Farid Town in Sahiwal City by installation of water meters at each connection, valves at nodes and junctions, and water monitoring components as required. ▶ Establishment of Asset Management and GIS cell in MC Sahiwal: Provision of computers, workstations, a dedicated server system, and related IT equipment & and resources.
3	Long Term (2034)	<p>Extension of Water Supply System in Sahiwal City (642 M) Scope of Project:</p> <ul style="list-style-type: none"> ▶ Construction of 04 Nos Tube wells @1.5 cusecs along with filtration plants and 09 No Overhead Reservoirs (OHRs) (Total 700,000 gallons) ▶ Extension of the water distribution network (3", 4", 6", 8") of approximately 48 Km in the areas of Industrial Area, Ganj Shakar, Shalimar Colony, Baba Farid Housing Society and adjoining localities.
Total Cost for Water Supply System = 2,404 Million PKR		

Proposed Water Supply Infrastructure Map of MC Sahiwal

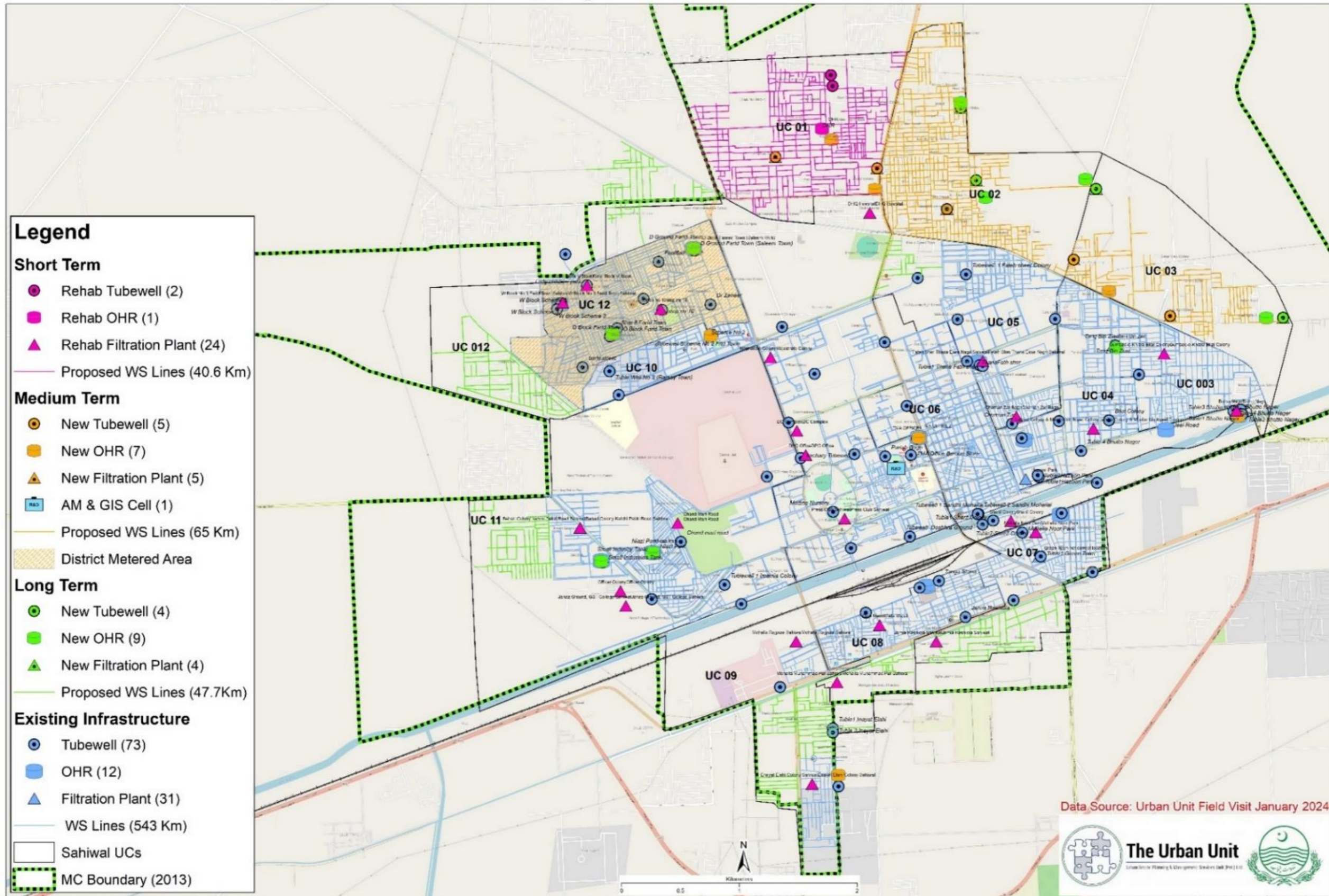


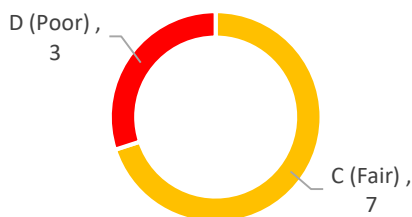
Figure 5: Proposed Water Supply Infrastructure Map of MC Sahiwal

2.4. Existing Sewerage Infrastructure

The current sewerage infrastructure of Sahiwal City includes trunk and lateral sewers (240 Km) that transport wastewater to disposal stations. The collected sewage is then transferred to ten (10) disposal stations, which discharge it into irrigation canals and agricultural fields without any treatment. Approximately 85% of the city is covered by the sewerage system, but areas in UC-01, UC-02, and UC-03 are not served. New trunk sewers (70 Km), RCC Conduits (4.60 Km), Elimination of existing disposal stations, and construction of two mega disposal stations along with a wastewater treatment plant are being executed under the ADB PICIIP program. The proposed plan aims to address the major sanitation issues of outdated lateral sewerage infrastructure and plan for a new sewerage network in the unserved areas.

The condition of disposal stations in the city was assessed and it was noted that 70% of the disposals were in fair condition whereas the remaining 30% of disposals were assessed to be in poor condition. All of these disposals have an average operational time of 18 hours per day. Whereas, the lateral sewerage infrastructure (240 Km) has an estimated spatial coverage of over 85% in the city. All of the lateral sewerage network is 40 to 50 years old and rated in poor condition.

Condition - Disposal Stations



Condition - Lateral Sewers

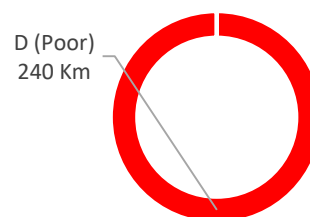


Figure 6: Condition Assessment of Sewerage Infrastructure in Sahiwal



Existing Disposal Station (Katcha Noor) planned to be eliminated



Existing Sucker & Jetting Machines



Under Construction Disposal Station (North)

Figure 7: Existing Sewerage Infrastructure of MC Sahiwal

Existing Sewerage Infrastructure Map of MC Sahiwal

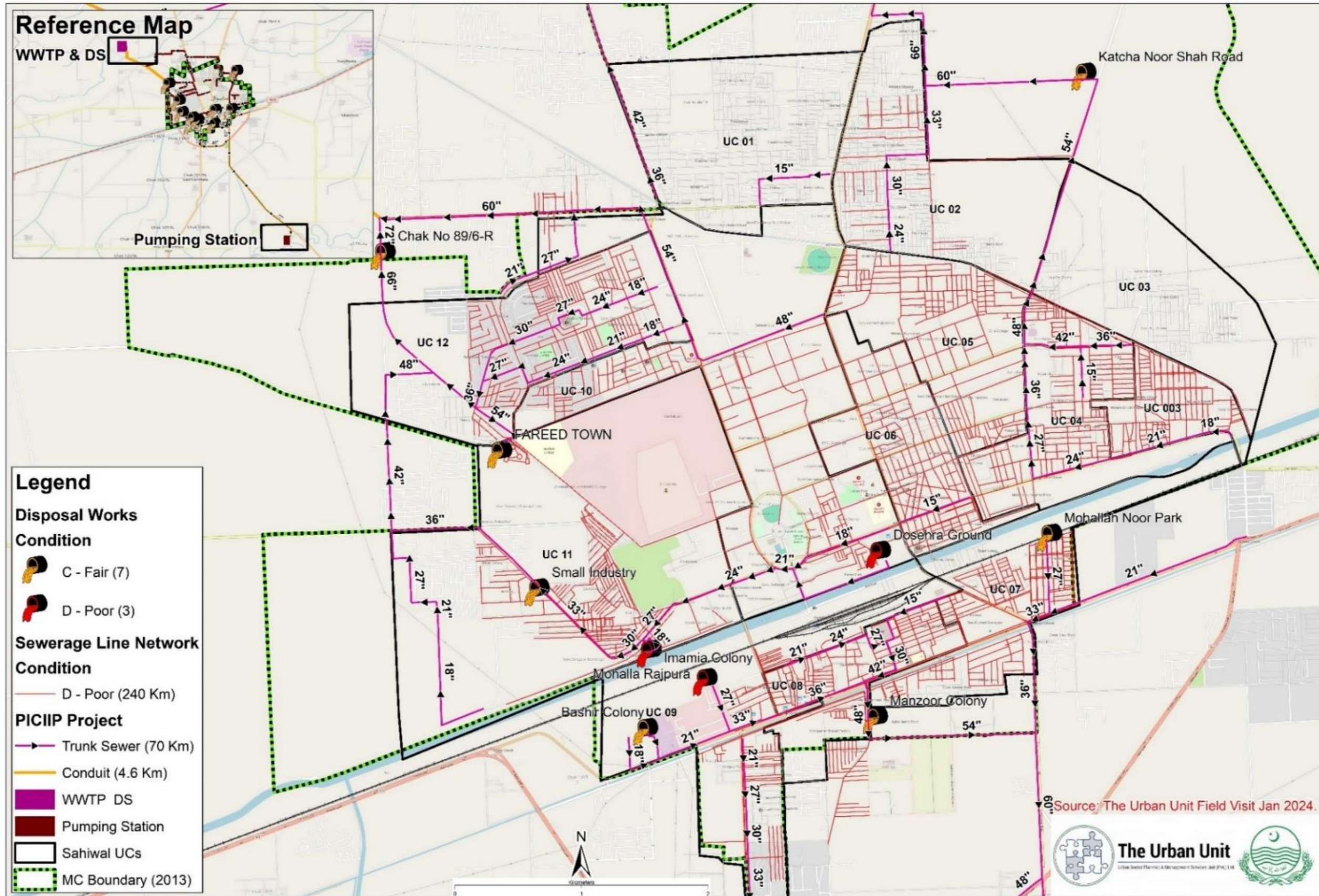


Figure 8: Existing Sewerage Infrastructure Map of MC Sahiwal

2.5. Sewage Flow Estimations

The sewage generation has been made corresponding to the 30 gallons per capita per day water demand. A contribution of 50% for storm-water flow, 5% infiltration & 5% non-domestic flows have been included during the calculation of the total sewerage flow. The current (2024) and future (2026, 2029, 2034) sewage flows are tabulated below.

Table 4: Sewage Flow Estimation for Sahiwal City

Year	2024	2026	2029	2034
Population	488,665	521,651	575,352	677,416
Avg. Sewage Generated (MGD-I)	12.46	13.30	14.67	17.27
Peak Sewage Flow (MGD-I)	24.92	26.60	29.34	34.55
Storm Water Flow (MGD-I)	7.48	7.98	8.80	10.36
Infiltration Flow (MGD-I)	0.62	0.67	0.73	0.86
Non-Domestic Flow (MGD-I)	0.62	0.67	0.73	0.86
Total Sewage Flow (MGD-I)	33.64	35.92	39.61	46.64

The current estimated wastewater generation of Sahiwal City is approximately 33.64 MGD-I. It should be noted that this flow is expected to increase up to 46.64 MGD by the end of 2034. The estimated wastewater flows for Sahiwal are graphically represented below.

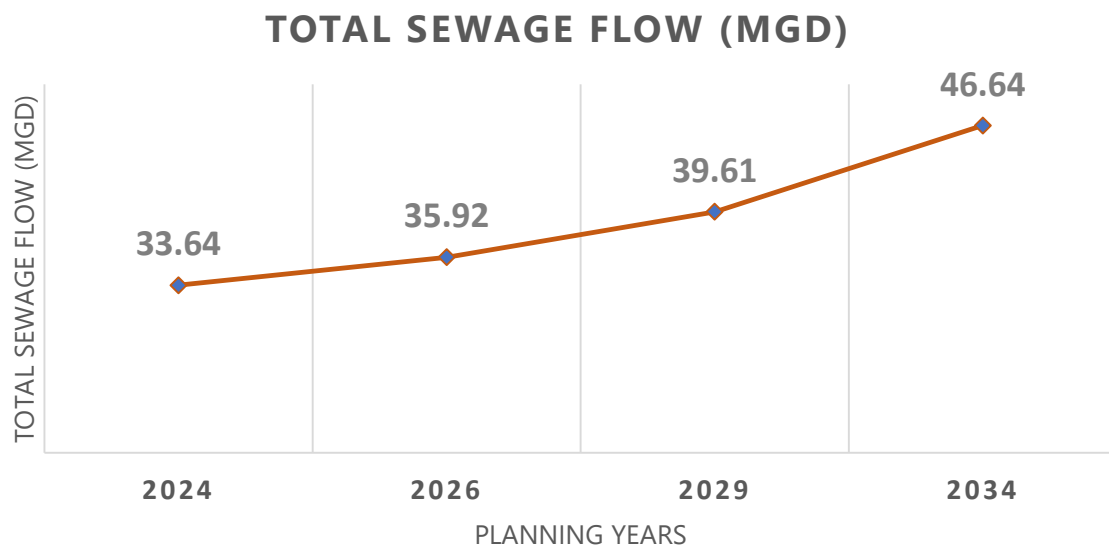


Figure 9: Estimated Total Sewage Flow (MGD-I)

2.6. Interventions for Sewerage System

The conditional assessment of existing sanitation infrastructure and its comparison with present and future projected demand and needs has resulted in the identification of service delivery gaps that exist within the system. The planning exercise aims to fulfill the afore-described gaps in sewerage. Prioritization of these gaps is also done and schemes are proposed based on various factors such as the essence of intervention, the duration required to execute them, the cost required, and their impact on the public. The total cost required to uplift the current sewerage situation is around 4,073 Million.

For Rough Cost Estimation, MRS 1st BI-ANNUAL-2024 (01.01.2024 to 30.06.2024) District Sahiwal has been applied. This is further subject to the detailed design of the proposed schemes upon PC-1 formation.

2.6.1. Short Term Plan

The Short-term plan for sewerage focuses on laying of main sewerage network of 25.8 Km in the existing unserved areas (or not included in ADB PICIIP) of UC-01, UC-02, UC-03, UC-04, and UC-06. The total expected cost for the Short Term is around 206 Million.

2.6.2. Medium Term Plan

In the medium-term plan, in continuation of the previous project new tertiary infrastructure (93 Km) is proposed along with the replacement of existing outdated tertiary infrastructure (68 Km) in the priority areas. Moreover, the plan also includes the procurement of allied machinery i.e. Sucker Machines, Jetting Machines, Dewatering Units, and Mobile Workshop Units. The total expected cost for the medium term is around 1,426 Million.

2.6.3. Long Term Plan

The long-term plan deals with the replacement of tertiary sewerage infrastructure (183 Km) in the areas of UC-04, UC-07, UC-08, UC-09, UC-10, UC-11, and UC-12. This includes the construction of WSP having a capacity of 22 MGD for primary and secondary treatment of wastewater on the outfall of under execution disposal station (South). The total expected cost of the Long term is around 2,441 Million.

The following schemes are proposed for uplifting the sewerage system of MC Sahiwal as per the performed assessments and analysis.

Table 5: Proposed Interventions for Sewerage Infrastructure

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Rehabilitation & Extension of Sewerage Infrastructure in Sahiwal City – Phase I (206 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Laying of existing sewer lines of total length 25.8 KM having diameters (12" to 18") in areas of UC-01, UC-02, UC-03, UC-05 and UC-06
2	Medium Term (2029)	<p>Rehabilitation & Extension of Sewerage Infrastructure in Sahiwal City – Phase II (1426.2 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Replacement of existing outdated branch sewer lines (9" to 12") of total length 68 KM in areas of UC-05 and UC-06. ▶ Laying of new branch sewer infrastructure (9" to 12") of total length 93 Km in the areas of UC-01, UC-02, and UC-03. ▶ Procurement of 02 Nos sucker machines, 02 Nos jetting machines, 05 portable dewatering units, and 02 mobile workshop units.
3	Long Term (2034)	<p>Rehabilitation & Extension of Sewerage Infrastructure in Sahiwal City – Phase III (2441 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Replacement of outdated branch sewers (9" to 12") having a total length of 183 KM in areas of UC-04, UC-07, UC-08, UC-09, UC-10, UC-11, and UC-12. ▶ New WWTP (South) – Waste Stabilization type with auxiliary facilities and an estimated area of 150 Acres (site marked tentatively and subject to availability of land as per MC)
Total Cost for Sewerage System = 4,073 Million PKR		

Proposed Sewerage Infrastructure Map of MC Sahiwal

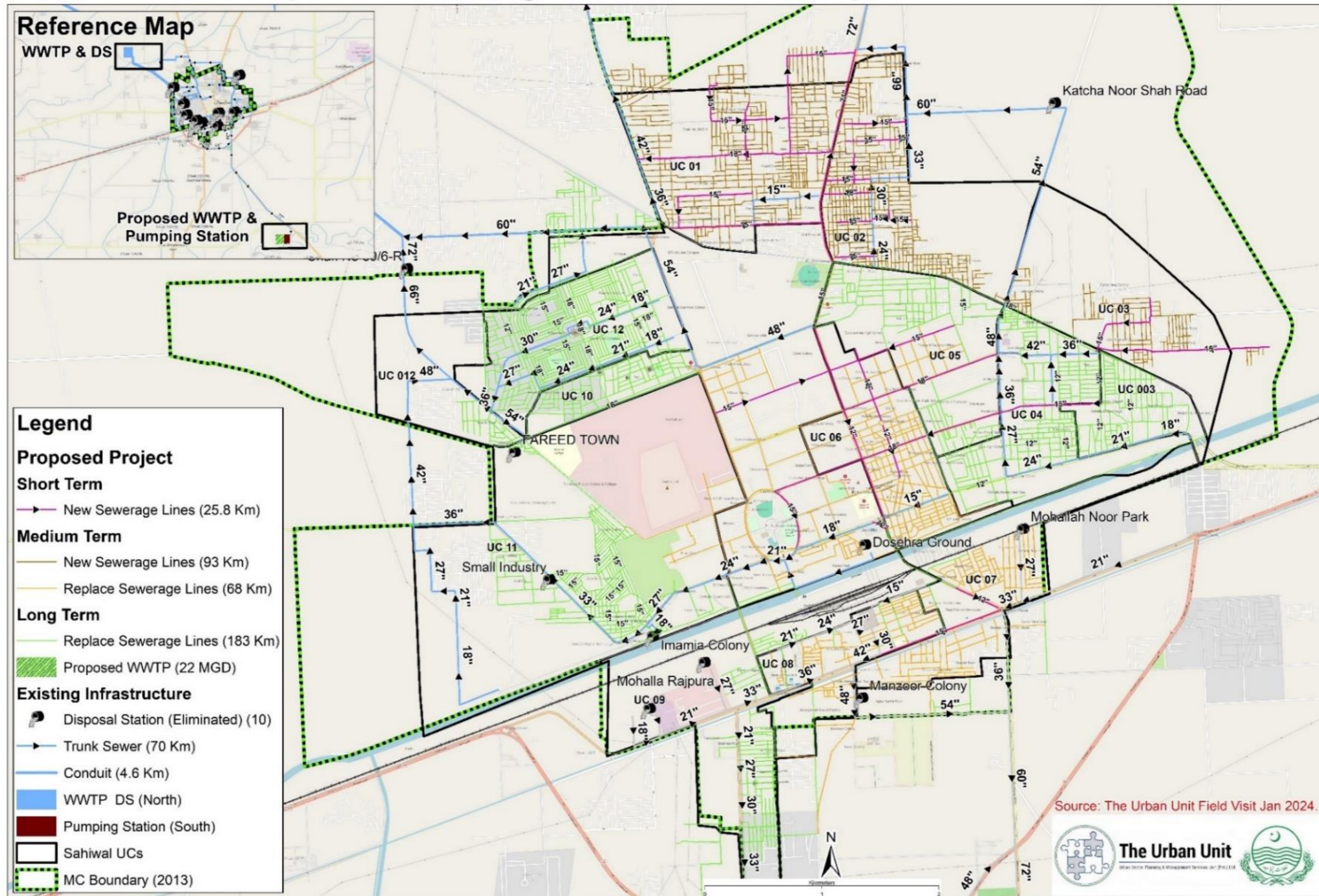


Figure 10: Proposed Sewerage Infrastructure Map of MC Sahiwal

Rural Areas of Sahiwal District

Sahiwal District houses a staggering population of around 2,196,925 (2024) in its rural areas which is estimated to reach 2,517,154 in 2034. Despite such a large rural populace, merely 23% of the population is served by public water supply schemes. The primary reason for fewer public water supply schemes is the availability of potable groundwater in most of the Sahiwal district. It was told by the Public Health Engineering Department (PHED) that there are 28 sanitation schemes operating in Sahiwal District. It is important to discuss that according to the UNICEF Wash Index (2019), Sahiwal has 17th rank in access to water and 22nd in access to sanitation facilities out of 36 districts.

3.1. Rural Water Supply and Sanitation Infrastructure

As per the data collected from PHED, a total of 64 rural water supply schemes exist in the district out of which 20 (31%) are functional, 38 (59%) are dysfunctional and 6 (9%) are under construction. Most of these schemes are dysfunctional and/or abandoned due to a lack of public interest as potable water is available at a depth of 80 – 100 ft. However, it is important to highlight that at shallow depths, high TDS values are observed and in some areas, arsenic is present in groundwater. As per the PCRWR publication "National Threat of Arsenic in Groundwater", Sahiwal falls in the list of highly contaminated areas with Arsenic in Punjab.

For drinking water, PHED has installed 160 filtration plants in villages out of which 98 are operational, 58 are not in operation and 04 are under construction. Similarly, District Council Sahiwal and Punjab Aab-e-Pak Authority (PAPA) have also installed 04 and 37 filtration plants in the district respectively.

Sahiwal district has around 28 sewerage and drainage schemes operations in different villages/towns operated by town committees and community-based organizations (CBOs). The collected wastewater is generally consumed for agriculture purposes where required otherwise it is dumped into irrigation channels without any treatment.

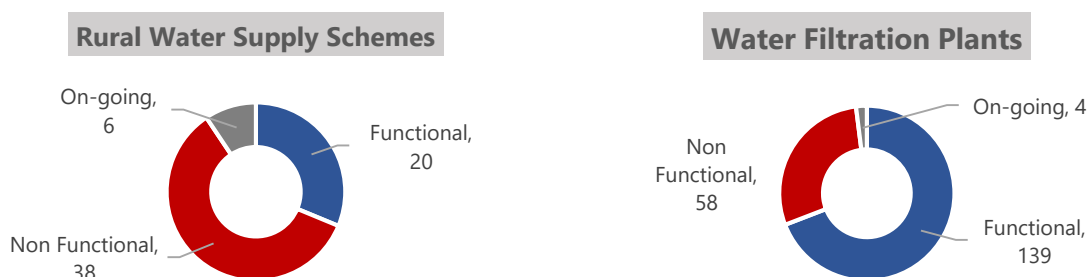


Figure 11: Status of Rural Water Supply Infrastructure in Sahiwal

Rural Water Supply and Sanitation (WSS) Schemes - District Sahiwal

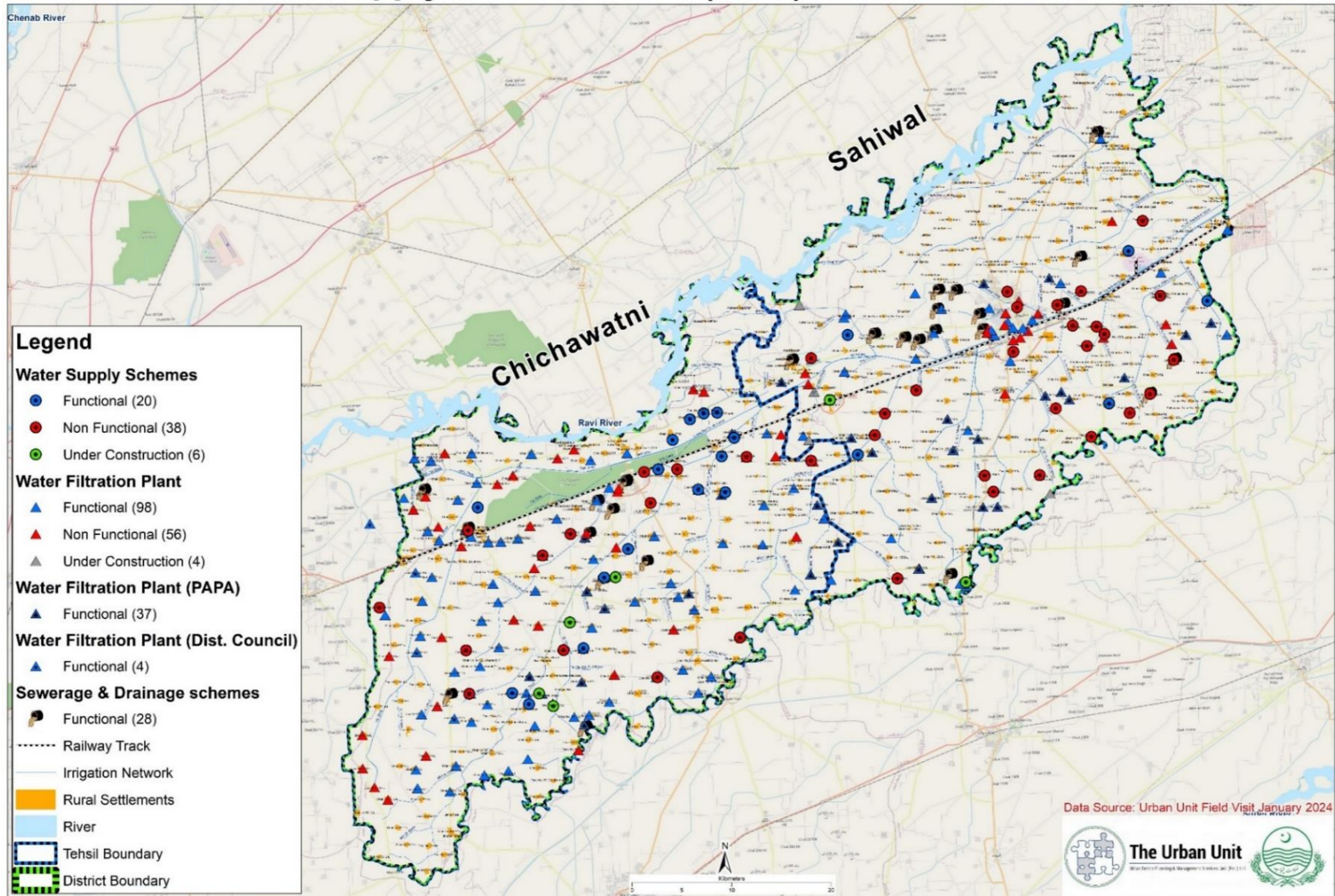


Figure 12: Baseline Map of Rural Water Supply and Sanitation Infrastructure in Sahiwal district

3.2. Interventions for Rural Water Supply and Sanitation

Following evidence-backed interventions have been proposed to address the issues in the operationalization and maintenance of water supply infrastructure in the Sahiwal district.

- ▶ Provision of Solar-based Interventions for financial sustainability of schemes
- ▶ Technical Capacity Building of the community for effective operation and maintenance of rural schemes
- ▶ Operationalization of dysfunctional schemes for immediate relief to communities in need-based areas

The following schemes are proposed for uplifting the rural water supply of Sahiwal district as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Sahiwal Rural Water Supply and Sanitation Uplift Program – Phase I (317.6 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Rehabilitation of 19 Nos Rural Water Supply Schemes in Sahiwal District (273.6 M) ▶ Rehabilitation and solarization (3 kW) of 11 Nos Rural Filtration Plants in Sahiwal District (44 M)
2	Medium Term (2029)	<p>Sahiwal Rural Water Supply and Sanitation Uplift Program – Phase II (2,050 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ 30 Nos New Rural Water Supply Schemes with distribution infrastructure in Sahiwal District ▶ 20 Nos New Rural Sewerage and Drainage Schemes along with disposal mechanism in Sahiwal District for a population of more than 5000. (10 for each Tehsils)
3	Long Term (2034)	<p>Sahiwal Rural Water Supply and Sanitation Uplift Program - Phase III (1,154 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Rooftop Solar system for 102 Nos Rural Filtration Plants in Sahiwal ▶ 20 Nos New Rural Sewerage and Drainage Schemes along with disposal mechanism in Sahiwal District for a population of more than 5000. (10 for each Tehsils) <p>Model Village Program in District Sahiwal – Pilot Project (46 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Provision of 100% coverage of water, sewerage and drainage services, wastewater treatment plant, and paved streets network in Harrappa (Tehsil Sahiwal) and Ghaziabad (Tehsil Chichawatni)
Total Cost for Rural Areas = 3,568 M		

Proposed Water Supply and Sanitation (WSS) Schemes - District Sahiwal

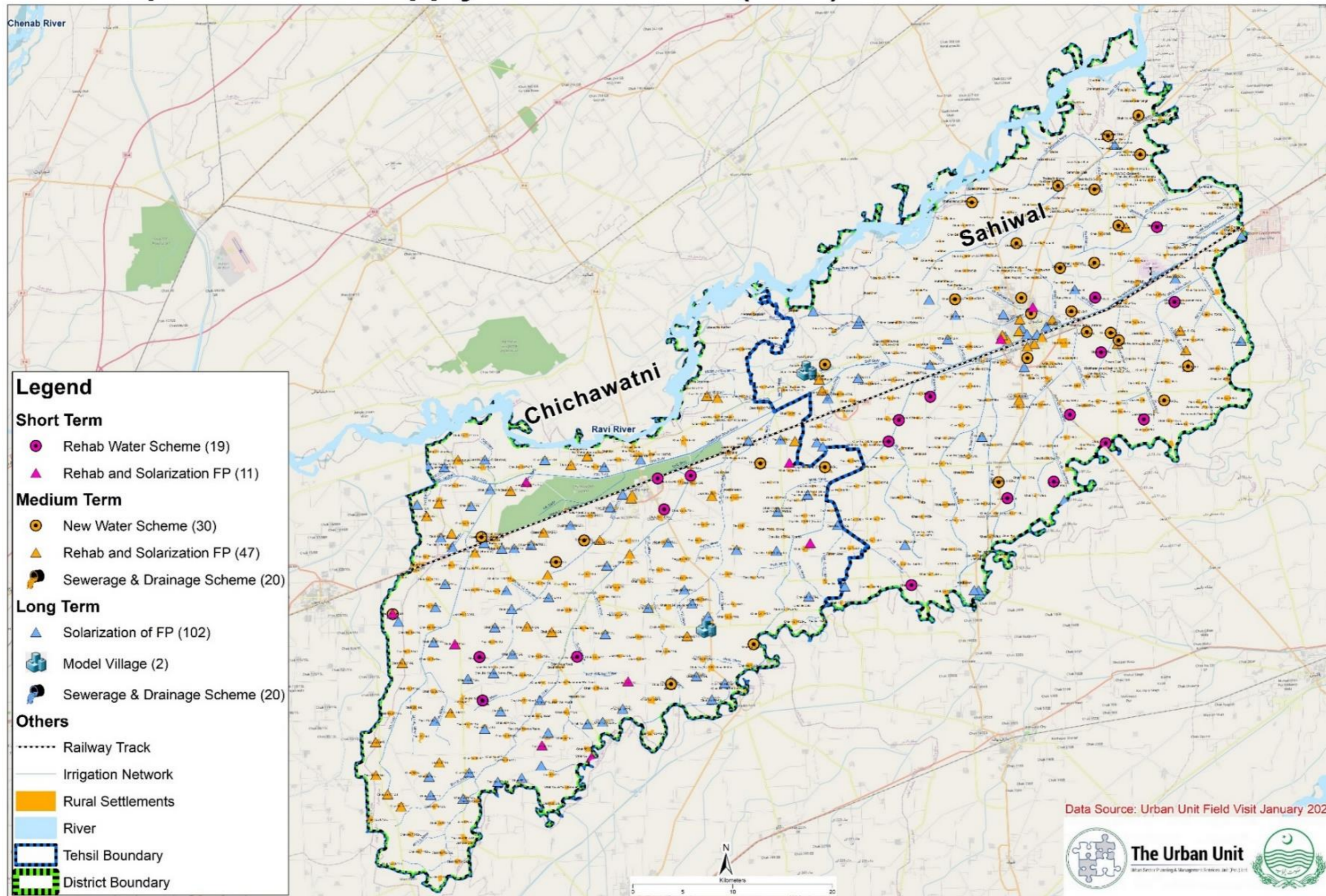


Figure 13: Proposed Rural Water Supply & Sanitation Infrastructure in Sahiwal district



WATER SUPPLY & SANITATION

Sahiwal Regional Development Plan
PAKPATTAN (2034)

PAKPATTAN CITY

Pakpattan City is the 48th largest city of Pakistan by population as per Census 2017. The current estimated population (year 2024) for the city is 205,743 which is further projected to increase to 271,987 in 2034, which is planning year for this regional development plan.

The water supply of Pakpattan City is based on groundwater-based schemes, operated and managed by the Municipal Committee (MC) Pakpattan. These schemes rely on 29 tube wells spread across the city, with an approximate spatial coverage of water supply being over 90% in the city. The city hosts good connection coverage as well with reported 9,282 domestic and 76 commercial connections. Proximity to river has blessed the city with an excellent water quality, with rapid water testing across city yielding values of 286 ppm for TDS, 7.9 for pH and 579 for EC on average. The overall water supply scenario in the city is satisfactory, with a need for minor augmentation for replacement of some old and problematic lines.

The sewerage system of Pakpattan City is gravity based owing to its plain terrain in most of the city. Existing sewerage infrastructure of Pakpattan city constitute of sewers in most of the city and drains on high elevation area (locally known as Dhakki). This sewage is then carried to five disposal stations which then further dispose it to irrigation canals and/or agriculture fields without any treatment. Spatially speaking, city is almost fully covered with sewerage system however most of the trunks are in Poor or Failing condition causing disruption and hindrance in smooth sewerage flow affecting preceding areas. These very issue of the trunk failure and non-existent wastewater treatment remains key sanitation issues which are addressed in this proposed plan. Other than these, long path of sewerage network was found to be a design flaw causing hindrance in the system and has been addressed by shortening the route for ultimate disposal utilizing closer disposal station.

4.1. Existing Water Supply Infrastructure

The existing water supply infrastructure for Pakpattan city consists of groundwater-based schemes with 29 tube wells spread across the city having capacity of 1-cusec each. Direct supply system is adopted with tube well operational times varying from 6 to 16 hours/day. 27 out of these 29 tube wells were found to be currently functional, whereas two tube wells were non-functional due to damaged distribution system. Moreover, Proper chlorination mechanism was observed at all tube wells in the city and most of the tube well had working bulk meters.

The condition of tube wells in the city was assessed and it was noted that 59% tube wells in the city were in Good condition being only 10-12 years old. 24% tube wells were assessed to be in Fair condition whereas 17% were assessed to be in Poor condition. Two overhead reservoirs also exist in the city with have been abandoned due to preference of direct supply in the city. The details of tube wells in the city has been provided in the table below and are attached as annexure to this report.

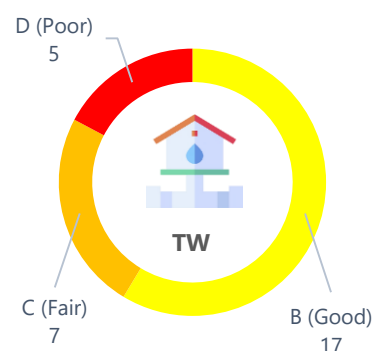
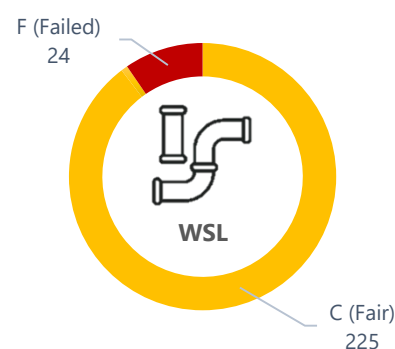


Table 6: Details of Tube Wells in Pakpattan City

Tube Well Name/Area	Functional Status	Year of Installation	Capacity (cusecs)	Installed Motor Rating (HP or kW)	Overall Condition
TW #1	Functional	1992	1-cusec	40 HP	D
TW #3	Functional	1992	1-cusec	40 HP	D
TW #4	Functional	1992	1-cusec	40 HP	D
TW #5	Functional	2005	1-cusec	40 HP	C
TW #6	Functional	2012	1-cusec	40 HP	C
TW #7	Functional	1992	1-cusec	40 HP	D
TW #8	Functional	1992	1-cusec	40 HP	D
TW #10	Functional	2005	1-cusec	40 HP	C
TW #11	Functional	2012	1-cusec	40 HP	B
TW #12	Functional	2008	1-cusec	40 HP	C
TW #13	Functional	2012	1-cusec	50 HP	B
TW #14	Functional	2012	1-cusec	40 HP	B
TW #15	Functional	2012	1-cusec	40 HP	C
TW #16	Functional	2012	1-cusec	40 HP	C
TW #17	Functional	2012	1-cusec	40 HP	B
TW #18	Functional	2012	1-cusec	50 HP	B
TW #19	Functional	2012	1-cusec	50 HP	B
TW #20	Functional	2012	1-cusec	40 HP	B

TW #21	Functional	2012	1-cusec	40 HP	B
TW #22	Functional	2012	1-cusec	40 HP	B
TW #23	Functional	2012	1-cusec	50 HP	C
TW #24	Functional	2012	1-cusec	50 HP	B
TW #25	Functional	2012	1-cusec	50 HP	B
TW #26	Non-Functional	2012	1-cusec	50 HP	B
TW #27	Functional	2012	1-cusec	50 HP	B
TW #28	Functional	2012	1-cusec	50 HP	B
TW #29	Functional	2012	1-cusec	50 HP	B
TW #30	Non-Functional	2012	1-cusec	50 HP	B
TW #31	Functional	2012	1-cusec	40 HP	B

The water supply lines (252 KM) have an estimated spatial coverage of over 90% in the city. The diameter of the lines varies from 3" to 8" in the city and 90% lines in the city were found to be Functional. Condition assessment was performed and it was noted that 64% rising mains in the city are in Fair condition, 7% in Poor condition whereas 29% rising mains in the city have Failed. When assessed, the 93% distribution system was found to be in Fair condition whereas 7% was Failed.



The details of condition assessment of water lines have been provided below.

Table 7: Details of Water Supply Lines in Pakpattan City

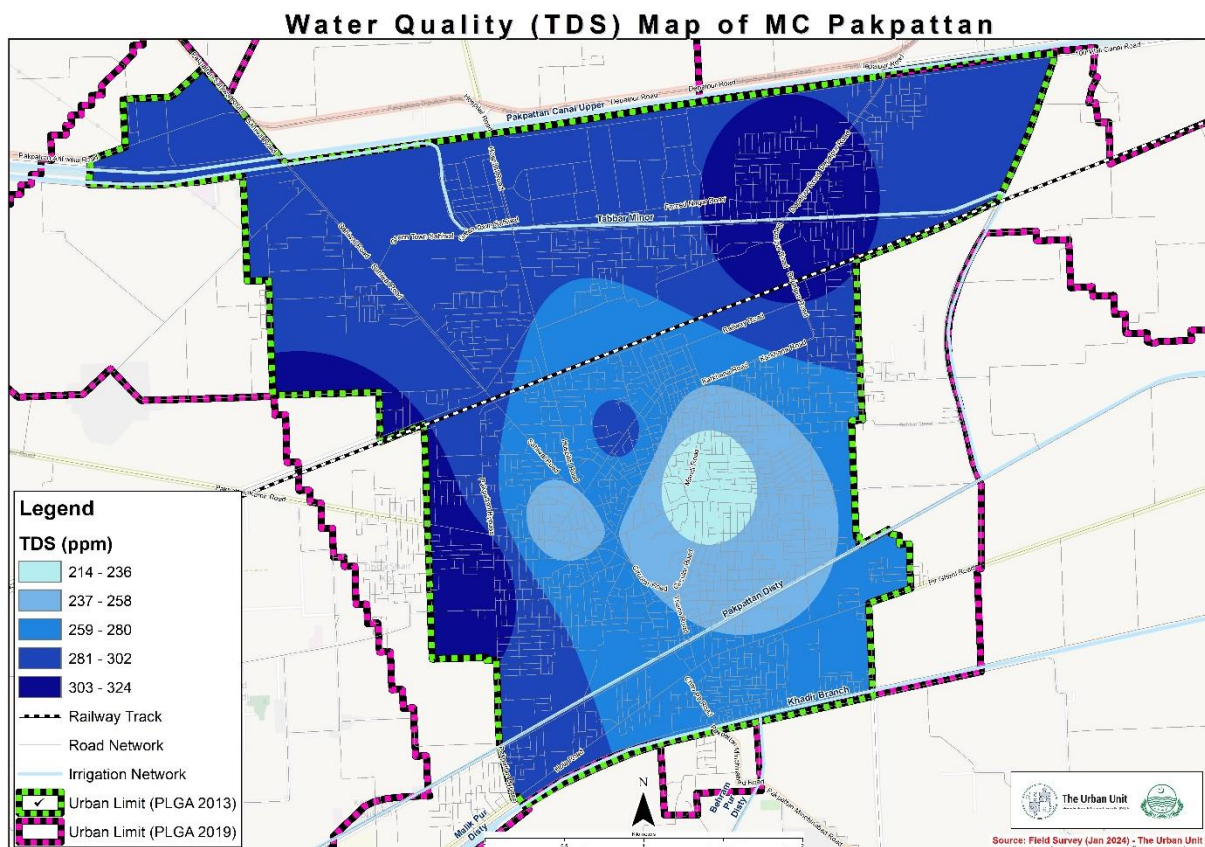
Asset Type	Type	Status	Diameter	Material	Condition	Overall Condition
Water Supply Lines (252 KM)	Rising Mains (28 KM)	F = 20 KM NF = 8 KM	Varies 6" – 8"	Varies (CI, PVC, AC)	C = 18 KM D = 2 KM F = 8 KM	C
	Distribution Lines (223 KM)	F = 207 KM NF = 16 KM	Varies 3" – 4"	Varies (CI, PVC, AC)	C = 207 KM F = 16 KM	C

The overall conditional assessment of water supply infrastructure has been evaluated in order to gauge the condition of the system as a whole, based on the most recurring conditions for the individual components of the system. The overall assessment is provided in the table below.

Table 8: Overall Asset Condition for Water Supply Infrastructure in Pakpattan City

Overall Asset Condition	Rating
Civil Structures	B (62% in Good Condition)
Distribution Network	C (90% in Fair Condition)
Electro-Mechanical	B (59% in Good Condition)

The overall condition of water quality was also assessed through Rapid Water Quality Testing across MC Pakpattan. Handheld water quality testing equipment was utilized for this exercise and different water quality parameters like Total Dissolved Solids (TDS), PH and Electrical Conductivity were measured. It was found that sweet groundwater is available in MC Pakpattan with parameters well within the national and international water quality limits, indicating excellent condition. The map below represents the variation of water quality across MC Pakpattan.



The condition of the water supply infrastructure as encountered during the field visit performed by Urban Unit is indicated in the pictures below.



TDS of 316 ppm observed during Rapid Water Quality Testing in MC Pakpattan. Pakpattan is blessed with sweet groundwater (average TDS values 286 ppm) with water table on average being 70-80 ft.



Electrical assessment being performed at a tube well in MC Pakpattan. A power factor of 97.2% on average across 3 phases was observed. 83% Electrical Panels were found to be in Satisfactory Condition.



Good Condition of pumping machinery at a tube well in MC Pakpattan. It should be noted that all TWs in the city are equipped with proper chlorination mechanism and most have working bulk meters.



A tube well installed in 1992. The Poor Condition of the asset is evident from the over-lived pumping machinery & moisture damage on walls. 17% TWs in the city are in a similar state.

Figure 14: Water Supply Infrastructure in MC Pakpattan

Existing Water Supply Infrastructure Condition Map of MC Pakpattan

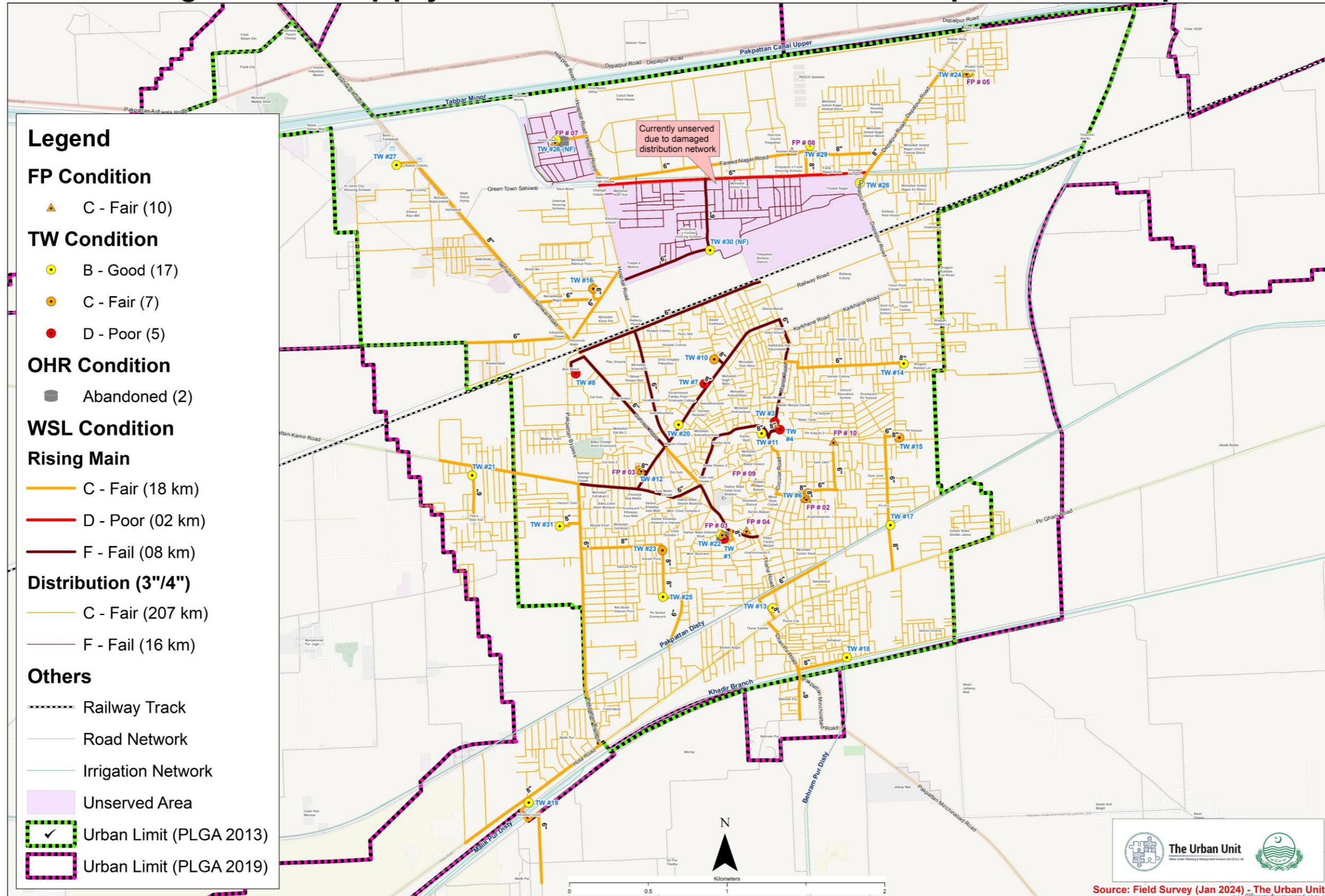


Figure 15: Existing Water Supply Infrastructure Condition Map of MC Pakpattan

4.2. Water Supply versus Demand Analysis

The water supply demand calculations have been made corresponding to a water demand of 30 GPCD. Additionally, demand augmentation for commercial, industrial and institutional have been included as 10% each in the total water demand. It must be noted that this figure for water demand is considered adequate and is aligned with the United Nations 'Human Right to Water and Sanitation Guidelines' which recommends a minimum of 11 – 22 GPCD of water to ensure full realization of the individual right to water. Moreover, this figure is also aligned with 'National Drinking Water Policy of Pakistan (2009)' that ensures a minimum amount of 26 GPCD (120 LPCD) for equitable access to water in urban areas.

The current (2024) and future (2026, 2029, 2034) water demand are tabulated as below.

Table 9: Water Supply versus Demand Calculations for Pakpattan City

Year	2024	2026	2029	2034
Population	211,030	222,017	239,578	271,987
Average Day Demand (MGD)	8.23	8.66	9.34	10.61
Max Day Demand (MGD)	12.35	12.99	14.02	15.91
Peak Hour Demand (MGD)	18.52	19.48	21.02	23.87

Capacitance analysis for existing infrastructure has yielded a current supply capacity of 5.45 MGD against 27 operational tube wells in the city. This indicates a current water supply gap of 2.78 MGD against Average Day Demand. It should be noted that this demand is expected to increase up to 5.16 MGD by the end of 2034 and additional water supply infrastructure is required to cater for this demand-supply nexus. The water demand versus the water supply capacity is graphically represented below.

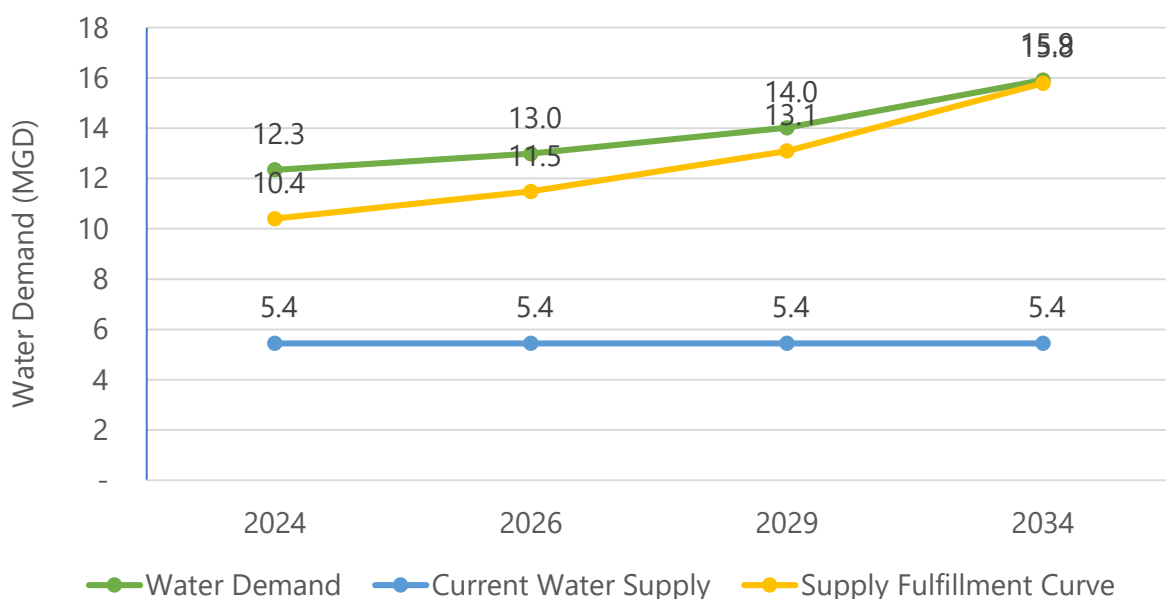


Figure 16: Water Supply versus Demand (MGD-I)

4.3. Interventions for Water Supply System

The conditional assessment of existing water supply infrastructure and its comparison with present and future projected demand and needs has resulted in the identification of service delivery gaps that exists within the system. The planning exercise aims to fulfill the afore-described gaps to water supply. Prioritization of these gaps is also done and schemes are proposed based on various factors such as essence of intervention, duration required to execute them, cost required, and their impact on general public. Total cost required to uplift the current water supply situation is 243 Million.

4.3.1. Short Term Plan

The short term plan of Pakpattan is focused on fulfilling the existing service delivery gaps and capacitating the existing infrastructure. 2 new tube wells of 1.5 cusecs each have been proposed in this phase. This is followed by servicing/repair of 5 existing tube wells that are in poor condition, for efficient working of the water supply in the city. Replacement of problematic lines is also proposed during this phase, which will further capacitate the system by operationalization of currently non-functioning tube wells of the city. The short term plan of Pakpattan is expected to cost 136 Million.

4.3.2. Medium Term Plan

The medium term plan involves installation of 3 new tube wells of 1.5 cusecs each to cater for the increased water supply demand in the city as result of the population augmentation. Furthermore, 7 existing tube wells in the city are proposed to be repaired/serviced for efficient service delivery of water supply in the city. The medium term plan for Pakpattan is estimated to cost around 32 Million.

4.3.3. Long Term Plan

The long term plan discusses the further extension of water supply services in the city with proposed installation of 5 new tube wells of 1.5 cusecs each. Furthermore, 5 existing tube wells in the city are proposed to be serviced/repared for effective and efficient delivery of water supply services in the city. The long term plan for Pakpattan is estimated to cost 75 Million.

The following schemes are proposed for uplifting the water supply system of MC Pakpattan as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Pakpattan Water Supply Improvement Project - Phase I (136 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Provision of 02 new TWs having capacity of 1.5 cusecs each (21 M) ▶ Replacement of Problematic Line/ Mains of 24 KM length (114 M) ▶ Service/Repair of 5 existing TWs including (0.7 M) <ul style="list-style-type: none"> ○ Service of Machinery ○ Electrical Panels ○ Repair/Repaint of Civil Work as needed
2	Medium Term (2029)	<p>Pakpattan Water Supply Improvement Project - Phase II (32 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Provision of 03 new TWs having capacity of 1.5 cusecs each (31 M) ▶ Service/Repairs of 7 existing TWs including: (1 M) <ul style="list-style-type: none"> ○ Service of Machinery ○ Electrical Panels ○ Repair of Civil Work as needed
3	Long Term (2034)	<p>Pakpattan Water Supply Improvement Project - Phase III (75 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Provision of 05 new TWs having capacity of 1.5 cusecs each (52 M) ▶ Rehabilitation of 5 existing TWs including (23 M) <ul style="list-style-type: none"> ○ Replacement of Machinery ○ Electrical Panels ○ Repair of Civil Work as needed
Total Cost for Water Supply System = 243 M		

For Rough Cost Estimation, MRS 1st BI-ANNUAL-2024 (01.01.2024 to 30.06.2024) District Pakpattan has been applied. This is further subject to the Detail Design of the proposed schemes upon PC-1 formation.

Water Supply Intervention Map of MC Pakpattan

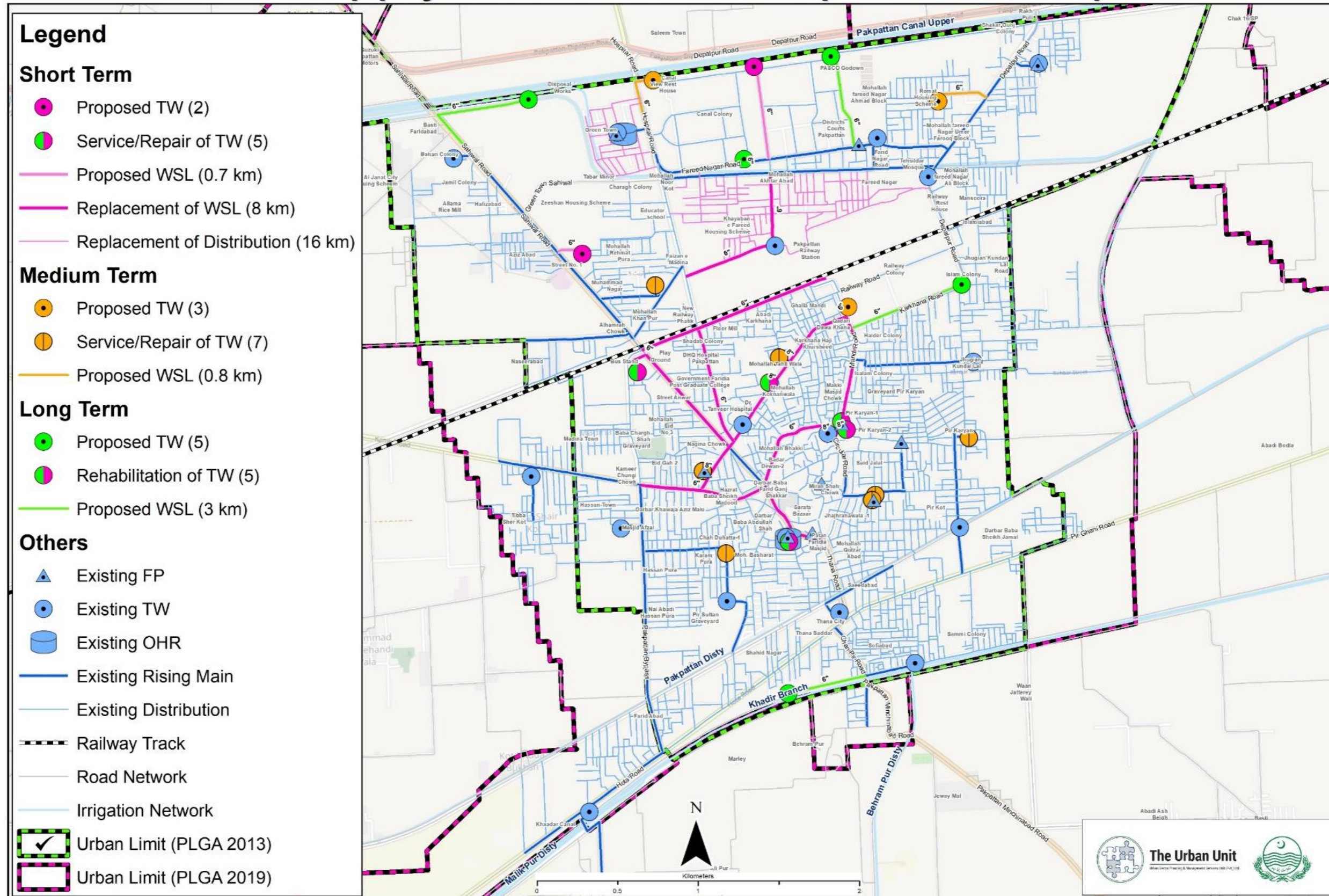


Figure 17: Proposed Water Supply Infrastructure Map of MC Pakpattan

4.4. Existing Sewerage Infrastructure

The sewerage system of Pakpattan City is gravity based owing to its plain terrain. Existing sewerage infrastructure constitutes of sewers in most of the city and drains on high elevation area (locally known as 'Dhakki'). This sewage is then carried to five disposal stations which then further dispose it to irrigation canals and/or agriculture fields without any treatment. Spatially speaking, city is almost fully covered with sewerage system, however, most of the trunks are in Poor or Failing condition causing disruption and hindrance in smooth sewerage flow affecting preceding areas. These very issues of the trunk failure and non-existent waste water treatment remains key sanitation issues which are addressed in this proposed plan. Other than these, long path of sewerage network, which is a design issue, also causes hindrance in the system and has been addressed by shortening of its route for ultimate disposal by utilizing closer disposal station.

The condition of disposal stations in the city was assessed and it was noted that 80% of the disposals were in Fair condition. 20% disposals were assessed to be in Good condition. All of these disposals have an average operational time of 18 hours per day. The water from these disposals is being used for broad irrigation. The details of the disposal stations in the city has been provided in the table below and attached as annexure.

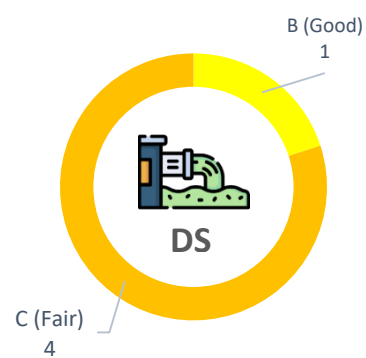
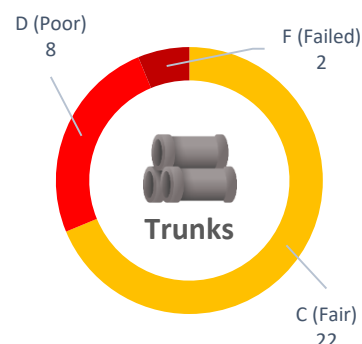


Table 10: Details of Disposals in Pakpattan City

Name/Area	Functional Status	Hours of Operation	Capacity (cusecs)	Installed Motor Rating (HP or kW)	Overall Condition
Disposal Works – Tiba Sherkot	Functional	18	8+8+5+5+5	80+80+60+60+60	C
Disposal Works – A-Zone Harsa Khamba	Functional	18	5+5+5	60+75+75	C
Disposal Works – Jhugian Kundan Lal	Functional	18	2+2+5+5	75+60 60+60	C
Disposal Works – B-Zone 16/SP	Functional	18	5+5+5	60+60+75	C
Disposal Works – C-Zone Jamal Chowk	Functional	18	5+5	60+75	B

The sewers (247 KM) have an estimated spatial coverage of over 90% in the city. The diameter of the trunk sewers varies from 15" to 48" in the city and 69% were found to be in Fair condition, whereas 25% trunk sewers were found to be in Poor condition. All of the lateral sewerage network and drainage network is assessed to be in Fair condition as well.



The details of condition assessment of sewer lines have been provided below and also attached as annexure to this report.

Table 11: Details of Sewer & Drains in Pakpattan City

Asset Type	Type	Status	Diameter	Material	Condition	Overall Condition
Sewerage System (253 KM)	Trunk Sewers (32 KM)	F = 30 KM NF = 2 KM	Varies 15" – 48"	RCC	C = 22 KM D = 8 KM F = 2 KM	C
	Lateral Sewers (216 KM)	F = 216 KM NF = 0 KM	12"	RCC	C = 216 KM	C
	Open Drains (5 KM)	F = 5 KM NF = 0 KM	9" x 9"	Masonry & RCC	C = 5 KM	C

The overall conditional assessment of sewerage infrastructure has been evaluated in order to gauge the condition of the system as a whole, based on the most recurring conditions for the individual components of the system. The overall assessment is provided in the table below.

Table 12: Overall Asset Condition for Sewerage Infrastructure in Pakpattan City

Overall Asset Condition	Rating
Civil Structures	C (75% in Fair & 25% in Good Condition)
Distribution Network	C (96% in Fair & 3% in Poor Condition)
Electro-Mechanical	C (75% in Fair & 25% in Good Condition)

The condition of the water supply infrastructure as encountered during the field visit performed by Urban Unit is indicated in the pictures below.



Direct disposal of wastewater in irrigation channel in MC Pakpattan.

Disposal of untreated wastewater in water bodies is a violation of the NEQS and a very serious environmental concern.



Pumping machinery at the main Disposal Works Tiba Sherkot in MC Pakpattan.

The Disposal Works has five pumping units and cumulative pumping capacity of 31 cusecs.



Condition of Wet Wells at Disposal Works Tiba Sherkot in MC Pakpattan.

The condition of this particular wet well is assessed to be Fair as per the developed conditional assessment practices.



Condition of electrical panels at Disposal Works Jamal Town in MC Pakpattan.

This particular disposal station was assessed to be in Good condition as evident from the condition of panels in the picture.

Figure 18: Sewerage Infrastructure in MC Pakpattan

4.5. Sewage Flow Estimation

The sewage generation has been made corresponding to the 30 gallons per capita per day water demand. A contribution of 50% for storm-water flow, 5% infiltration & 5% non-domestic flows have been included during the calculation of the total sewerage flow. The current (2024) and future (2026, 2029, 2034) sewage flows are tabulated as below.

Table 13: Sewage Flow Estimation for Pakpattan City

Year	2024	2026	2029	2034
Population	211,030	222,017	239,578	271,987
Avg. Sewage Generated (MGD-I)	7.00	7.36	7.94	9.02
Peak Sewage Flow (MGD-I)	13.99	14.72	15.88	18.03
Storm Water Flow (MGD-I)	7.00	7.36	7.94	9.02
Infiltration Flow (MGD-I)	0.35	0.37	0.40	0.45
Non-Domestic Flow (MGD-I)	0.35	0.37	0.17	0.19
Total Sewage Flow (MGD-I)	21.70	22.80	24.60	28.00

The current estimated wastewater generation of Pakpattan city is approximately 21.7 MGD-I. It should be noted that this flow is expected to increase up to 28 MGD by the end of 2034. The estimated wastewater flows for Pakpattan is graphically represented below.

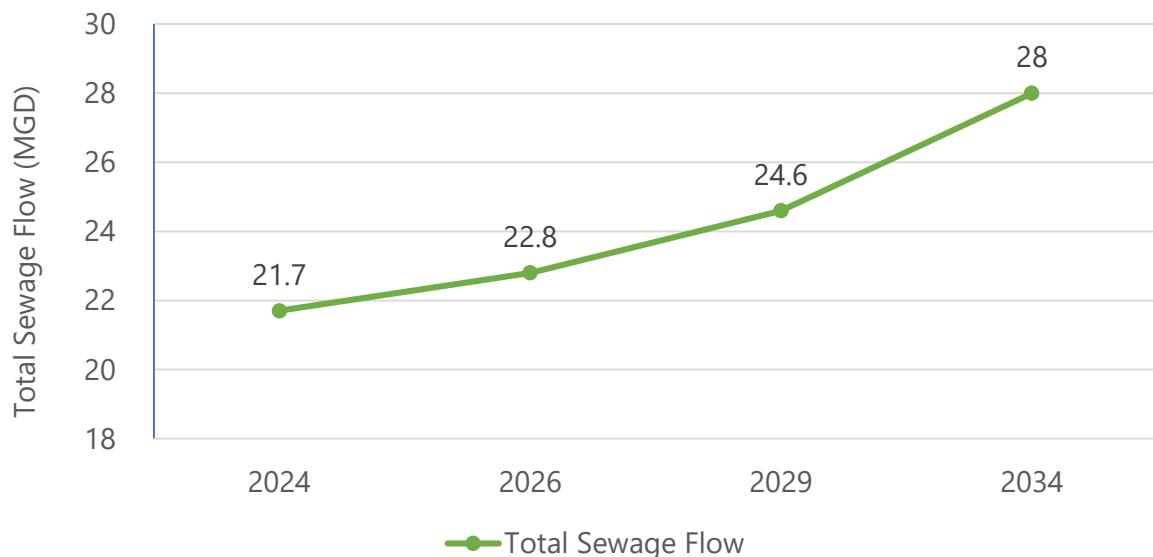
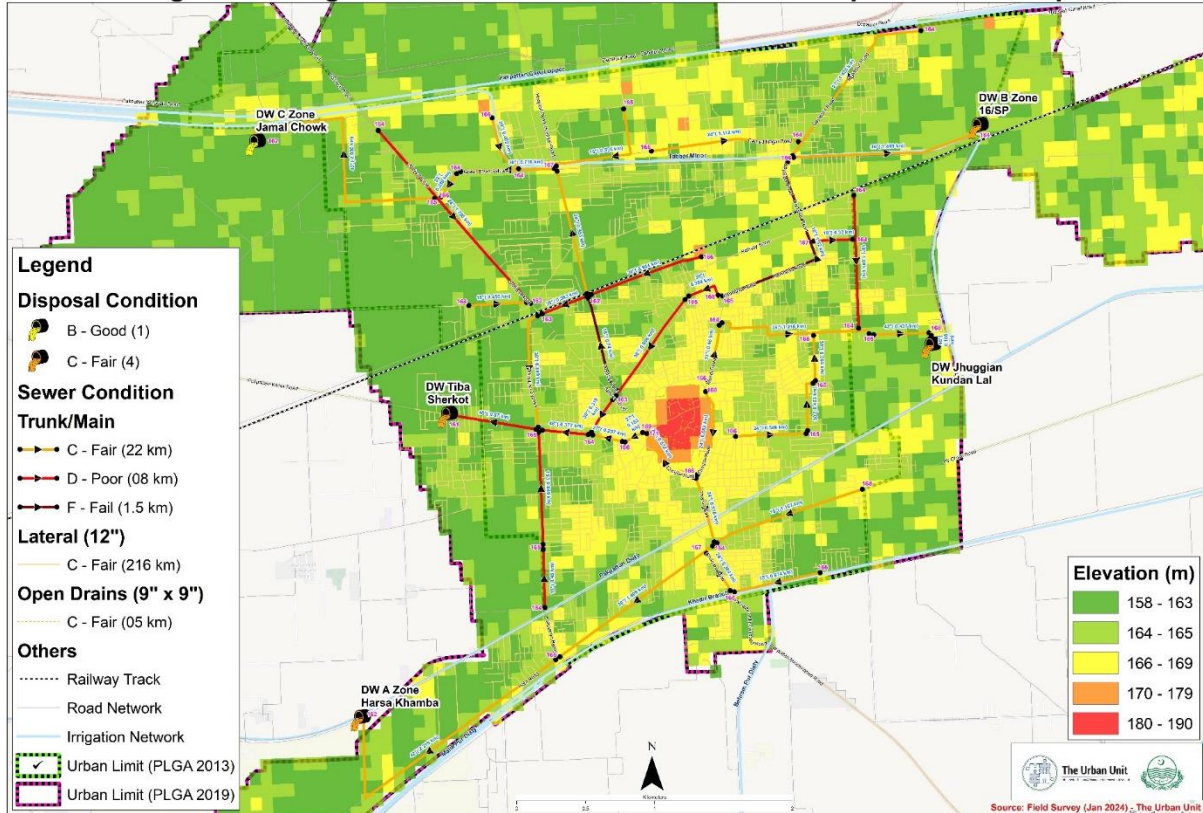


Figure 20: Estimated Total Sewage Flow (MGD-I) for Pakpattan City

A DEM-based elevation map has been developed (@ 20m) for planning purposes which shows very less terrain difference of the city i.e., 11m or 35ft other than Dhakki area (Man-made Hill) which have elevation difference of around 21m or 70ft from surrounding areas.

Existing Sewerage Infrastructure Elevation Map of MC Pakpattan



4.6. Interventions for Sewerage System

The conditional assessment of existing sanitation infrastructure and its comparison with present and future projected demand and needs has resulted in the identification of service delivery gaps that exists within the system. The planning exercise aims to fulfill the afore-described gaps to sewerage. Prioritization of these gaps is also done and schemes are proposed based on various factors such as essence of intervention, duration required to execute them, cost required, and their impact on general public. Total cost required to uplift the current sewerage situation is around 3,500 Million or 3.5 Billion.

4.6.1. Short Term Plan

The Short term plan for sewerage discusses the improvement of existing sewerage system through procurement of Sucker Machine. The total expected cost for Short Term is around 56 Million.

4.6.2. Medium Term Plan

The Medium term plan for the sewerage system involves the 'Comprehensive Sewerage System Rehabilitation Scheme for Pakpattan City'. This umbrella sewerage system scheme involves but is not limited to the following.

- ▶ Replacement and Re-routing of existing outdated and problematic trunks
- ▶ Provision for lateral sewer replacement (12" @10 km and 15" @ 10 km)
- ▶ New Trunk Sewer (54" @ 2 km)
- ▶ Relocation and Re-construction of outdated main DS Tiba Sherkot
- ▶ Rehabilitation of three existing Disposal Stations; DS Harsa Khamba, DS Jhuggian Kundan Lal & DS 16/SP

The total expected cost for Medium term is around 1,213 Million.

4.6.3. Long Term Plan

The Long term project for sewerage system involves the project 'Construction of three WSPs in Pakpattan City at five Disposal Stations', and discusses the treatment of wastewater from the disposal works in the city. This includes construction of 3 WSPs having capacity of 10 MGD or 35 Acres Land (each) for primary and secondary treatment of wastewater at:

- ▶ DS Jhuggian Kundan Lal and DS 16/SP
- ▶ DS Tiba Sherkot and DS Harsa Khamba
- ▶ DS Jamal Chowk

The total expected cost of Long term is around 2,223 Million.

The following schemes are proposed for uplifting the sewerage system of MC Pakpattan as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Sewerage System Machinery Procurement for Pakpattan City (56 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Procurement of Sucker Machine for maintenance of sewerage system in MC Pakpattan
2	Medium Term (2029)	<p>Comprehensive Sewerage System Rehabilitation Scheme for Pakpattan City (1,213 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Replacement and Re-routing of existing outdated and problematic trunks – 417 M ▶ Provision for lateral sewer replacement (12" @10 km and 15" @ 10 km) – 304 M ▶ New Trunk Sewer (54" @ 2 km) – 143 M ▶ Relocation and Re-construction of outdated main DS Tiba Sherkot – 234 M ▶ Rehabilitation of three existing Disposal Stations (DS Harsa Khamba, DS Jhuggian Kundan Lal and DS 16/SP) – 130 M
3	Long Term (2034)	<p>Construction of three WSPs in Pakpattan City (2,223 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Construction of WSPs of 3 @ 10 MGD or 35 Acres Land (each) for primary and secondary treatment of Waste Water at <ul style="list-style-type: none"> ○ DS Jhuggian Kundan Lal and DS 16/SP ○ DS Tiba Sherkot and DS Harsa Khamba ○ DS Jamal Chowk
Total Cost for Sewerage System = 3,500 M		

For Rough Cost Estimation, MRS 1st BI-ANNUAL-2024 (01.01.2024 to 30.06.2024) District Pakpattan has been applied. This is further subject to the Detail Design of the proposed schemes upon PC-1 formation.

Sewerage Intervention Map of MC Pakpattan

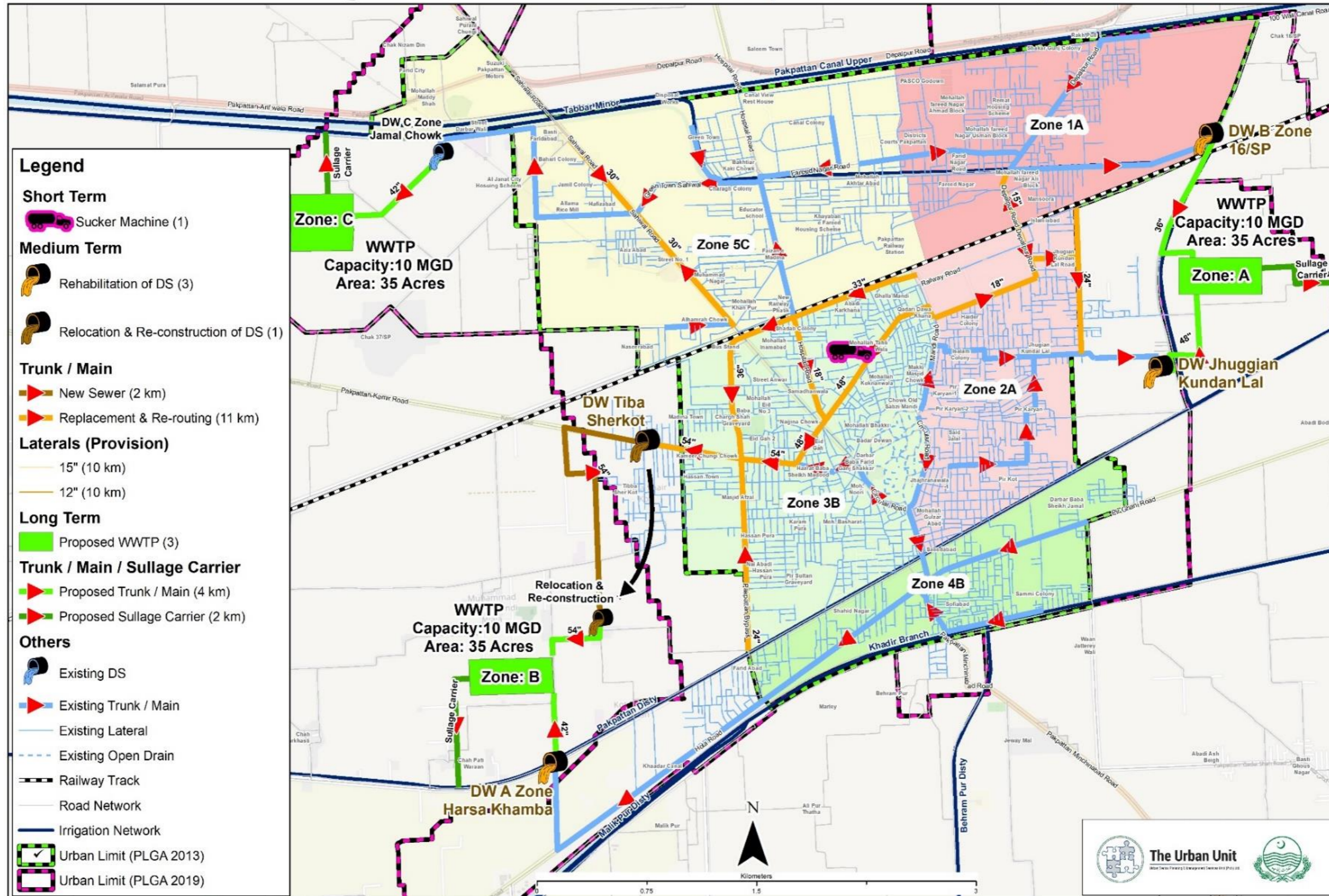


Figure 21: Proposed Sewerage Infrastructure Map for MC Pakpattan

Rural Areas of Pakpattan District

Pakpattan District houses a staggering population of around 1,733,469 in its rural areas. Despite such a large rural populace, mere 13% is served with public water supply schemes. Primary reason for less public water supply schemes is the sweet and potable groundwater in most of Pakpattan district. Total water supply in rural areas of Pakpattan is gauged at 2 MGD through these schemes, however, this may be augmented to 3 MGD if the dysfunctional infrastructure is rehabilitated. It must be mentioned here that no public sewerage scheme exists in Pakpattan district.

5.1. Rural Water Supply Schemes

As per the data collected by PHED, a total of 67 rural water supply schemes exists in the district out of which 51 (76%) are functional, 11 (16%) are dysfunctional and 5 (7%) are abandoned. Most of these schemes are dysfunctional and/or abandoned due to lack of public interest as Pakpattan district is mostly sweet water zone. Another reason is the non-payment of WAPDA dues as all of the rural water supply schemes have on-grid mechanism.

As per the data collected from PHED, the rural water supply schemes have been installed in various phases from 1984 to 2020. Aging analysis indicate that 21 (31%) are less than 10 years old whereas 41 (61%) are 10 to 25 years old. 5 (8%) are more than 25-year old and have completed their design life.

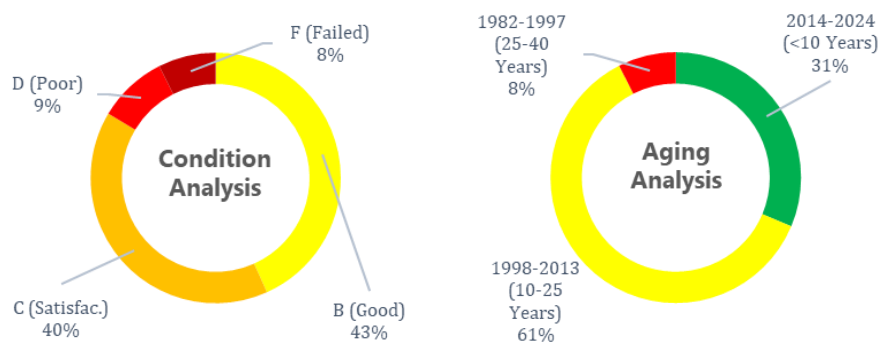


Figure 22: Condition and Aging Analysis of Rural Water Supply Schemes

5.2. Rural Filtration Plant Schemes

A total of 35 number of Water Filtration plants are installed in the region by the Public Health Engineering Department. 18 (51%) of these filters are currently reported to be dysfunctional. As per the data collected from PHED, 15 (43%) of the rural filtration plant schemes have been installed in the last ten years. Similarly, 20 (57%) of filtration plants are 10 – 25 years old.

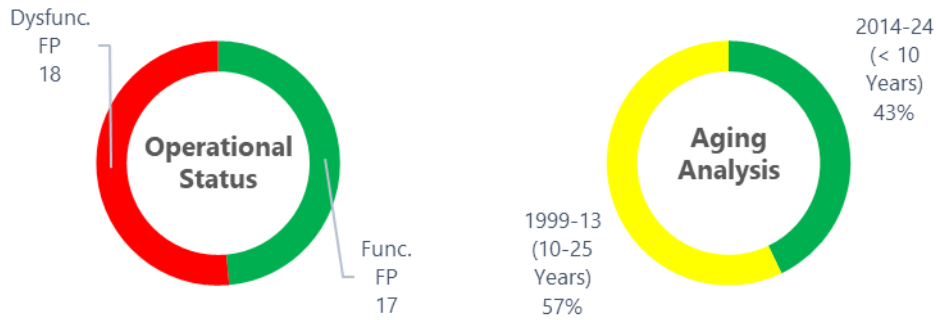


Figure 23: Status and Aging Analysis of Rural Filtration Plant Schemes

The map below represents the existing rural water supply infrastructure in Pakpattan district. The water quality variation across Pakpattan district has also been indicated in the map.

Rural Water Supply Scheme Map of Pakpattan District

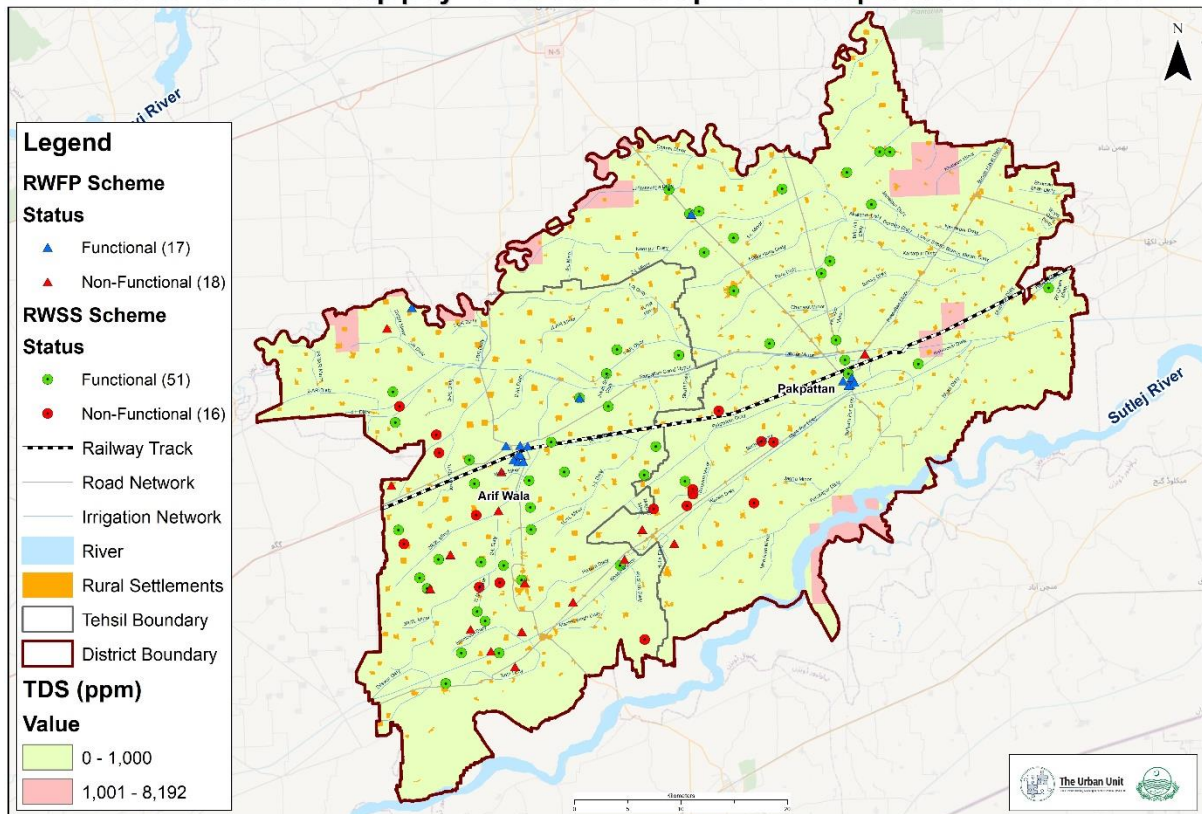


Figure 24: Baseline Map of Rural Water Supply Infrastructure of Pakpattan district

5.3. Field Assessment of Rural Water Infrastructure

Rural water infrastructure in Pakpattan district was visited by the field team of The Urban Unit in order to get insights regarding the functionality and present condition of the schemes. A total of four schemes were visited during this field assessment exercise; two schemes in each tehsil of the district. The images below are representative of the aforementioned field assessment.



A tube well in Chak 19/SP of Pakpattan. Installed in 2000, the TW in Chak 19/SP is still functional but at the verge of its design life as evident from the picture above



Community Consultation Session. Community consultation session in Chak Shafee indicated lack of technical person for the repair/maintenance of machinery



Inside view of a Rural FP Scheme. A Filtration Plant installed by Punjab Ab e Pak Authority in Chak Shafee of Pakpattan Tehsil



Rural Filtration Plant in Pakpattan. An abandoned Rural Water Supply Scheme and Filtration Plant in Chak 59/EB of Arifwala Tehsil

Figure 25: Rural water supply infrastructure in Pakpattan district

5.3.1. Issues Identified

The field assessment of rural water supply infrastructure yielded critical insights towards the gaps in operationalization and maintenance of these critical assets. Following major issues were observed during the field assessment.

- ▶ Major observed issue was the late/non-payment of WAPDA dues due to Low Bill Collection as most rural communities are unable to pay for hefty bills charged under Commercial Tariff for TWs by WAPDA
- ▶ Lack of experienced/technical persons for Repairing/ Maintenance in case of faults has led to damaged machinery & electrical systems in most schemes.

5.3.2. Interventions for Rural Water Supply Infrastructure

Following evidence-backed interventions have been proposed in order to address the above mentioned issues in operationalization and maintenance of water supply infrastructure in Pakpattan district.

- ▶ Provision of Solar-based Interventions for financial sustainability of schemes
- ▶ Technical Capacity Building of community for effective operation and maintenance of rural schemes
- ▶ Operationalization of dysfunctional schemes for immediate relief to communities in need-based areas

The following schemes are proposed for uplifting the rural water supply of Pakpattan district as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	Pakpattan Rural Water Supply Uplift Project - Phase I (49 M) Scope of Project: <ul style="list-style-type: none"> ▶ Technical Capacity Building of Community for effective Operation & Maintenance of Schemes (2 M) ▶ Rehabilitation of 18 Nos Rural Filtration Plants in Pakpattan District (47 M)
2	Medium Term (2029)	Pakpattan Rural Water Supply Uplift Project - Phase II (64 M) Scope of Project: <ul style="list-style-type: none"> ▶ Rehabilitation of 11 Nos Rural Water Supply Schemes in Pakpattan District (64 M)
3	Long Term (2034)	Pakpattan Rural Water Supply Uplift Project - Phase III (619 M) Scope of Project: <ul style="list-style-type: none"> ▶ Solarization of 35 Nos Rural Filtration Plants in Pakpattan (21 M) ▶ Solarization of 62 Nos Rural Water Supply Schemes in Pakpattan District (598 M)
Total Cost for Rural Areas = 732 M		

Rural Water Supply Scheme Intervention Map of Pakpattan District

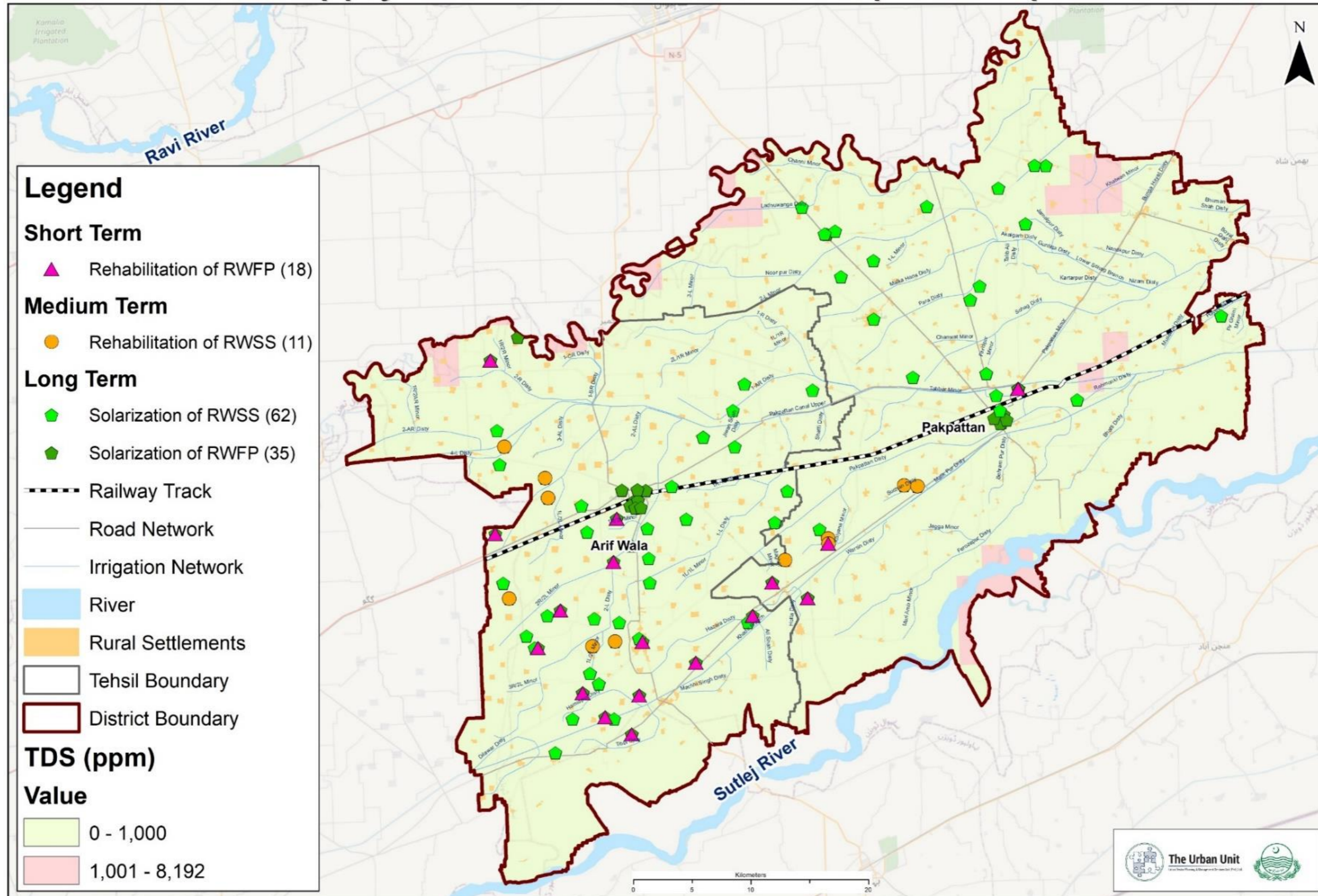


Figure 26: Rural Water Supply Schemes Interventions Map of Pakpattan district



WATER SUPPLY & SANITATION

Sahiwal Regional Development Plan
OKARA (2034)

OKARA CITY

Okara City is the 25th largest city of Pakistan by population as per Census 2017. The current estimated population (year 2024) for the city is 442,274 which is further projected to increase to 597,850 in 2034, which is the planning year for this regional development plan.

The water supply system of Okara City is based on seepage tube well battery with 24 tube wells, primarily serving the southern part of the city. However, 13 out of 24 tube wells are non-functional due to damaged delivery main, bore failures and transformer unavailability. The majority of the distribution systems are assessed in fair to poor conditions with spatial coverage of 60% in the city. Rapid water quality testing indicated an acceptable pH level but higher Total Dissolved Solids (TDS) values exceeding 1000ppm, indicating the unsuitability of water for drinking purposes. This highlights the need for immediate attention to improve water quality and water supply infrastructure reliability in Okara City.

The sewerage system of Okara City comprises gravity-based system sewerage systems, with an existing network of sewers covering approximately 85% of the city. The city is geographically divided into northern and southern parts by railway track. There are currently two operational disposal stations in the city and wastewater from the Northern side is disposed of in the agriculture field through two disposal stations. after pumping through two Disposal Stations. Conversely, wastewater from the southern side is disposed of through gravity into a seepage drain. The sewerage network of the city comprises sewers with 50% of the lines in poor condition. Additionally, a significant percentage of sewers have passed their design life.

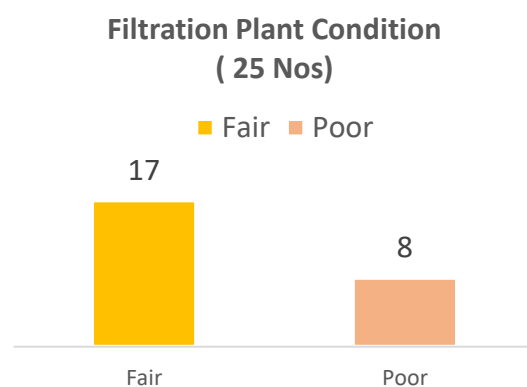
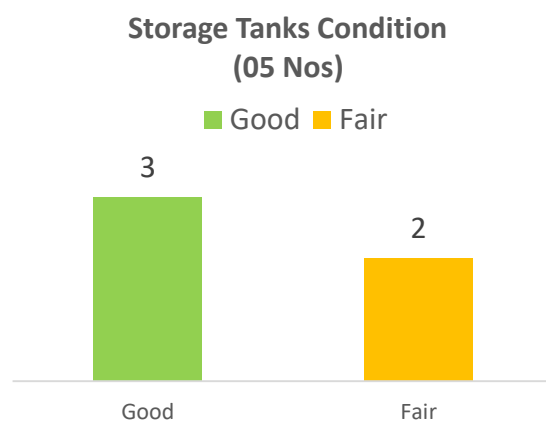
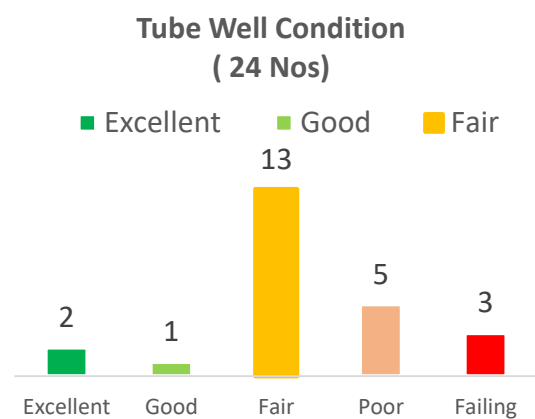
6.1. Existing Water Supply Infrastructure

The existing water supply infrastructure for Okara City comprises a seepage tube well-based scheme with 24 tube wells installed on the Lower Bari Doab Canal. This scheme supplies water to the southern part of the city through storage structures, with tube well operational time ranging from 6 to 8 hours per day. Out of the total 24 tube wells, 11 are currently functional, while 13 are non-functional, primarily due to deteriorating and outlived delivery mains. Additionally, non-availability of transformers in some non-functional tube wells has been observed.

The condition of tube wells in the city was assessed and it was noted that the majority of the tube wells in the city were in Fair condition. Five tube wells were assessed to be in Poor condition whereas three were assessed to be in Failing condition. The water supply lines, having a total length of 129 Km, have an estimated spatial coverage of over 60% in the city. The diameter of the lines varies from 3” to 12” in the city and it was assessed that 85% of the WS pipeline was in fair condition, while 15% was in failing condition.

Similarly, the storage structures were mostly assessed to be in satisfactory condition, with three in Good Condition and two in Fair Condition. The details of tube wells and Storage Structures in the city have been provided in the table below and attached as annexure to this report.

There are ten UF and fifteen RO filtration plants installed in brackish areas of the city. The condition assessment was carried out, revealing that seventeen were in fair condition and eight were in poor condition. The poorly conditioned FPs require media change and filter replacement to ensure their effective working.



WATER SUPPLY & SANITATION

Regional Development Plan of Sahiwal

Table 14: Details of Water Supply Infrastructure in Okara City

Asset Type	Asset Name	Functional Status	Year of Installation	Capacity	Installed Motor Rating	Overall Condition
Tube Well	TW #01	Functional	2003	1-cusec	40 HP	C
	TW#02	Functional	2003	1-cusec	40 HP	B
	TW#03	Non-functional	1995	1-cusec	40 HP	F
	Tw#04	Functional	2003	1-cusec	40 HP	C
	TW#05	Functional	2003	1-cusec	40 HP	D
	TW#06	Functional	2003	1-cusec	40 HP	C
	TW#07	Non-functional	2003	1-cusec	40 HP	D
	TW#08	Non-functional	2003	1-cusec	40 HP	C
	TW#09	Functional	2003	1-cusec	40 HP	C
	TW#10	Non-functional	2003	1-cusec	40 HP	C
	TW#11	Functional	2003	1-cusec	40 HP	C
	TW#12	Functional	2003	1-cusec	40 HP	C
	TW#13 New	Non-functional	2021	1-cusec	40 HP	A
	TW#13 Old	Non-functional	1995	1-cusec	40 HP	F
	TW#14	Non-functional	2003	1-cusec	40 HP	D
	TW#15	Functional	2003	1-cusec	40 HP	C
	TW# 16	Non-functional	2003	1-cusec	40 HP	C
	TW#17	Non-functional	2003	1-cusec	40 HP	C
	TW#18	Functional	2003	1-cusec	40 HP	C
	TW#19	Non-functional	2021	0.5-cusec	20 HP	A
	TW#20	Non-functional	1995	0.5-cusec	20 HP	D
	TW#21	Non-functional	1995	0.5-cusec	20 HP	D
	TW#22	Functional	2003	0.5-cusec	20 HP	C
TW#23	Non-functional	1995	0.5-cusec	20 HP	F	
Overhead Reservoirs	Old Water Works OHR	Functional	1935	50,000 G	N/A	C
Ground Storage Tank	Chamra Mandi Water Works GST	Functional	2003	80,000 G	N/A	C
	Gaziabad Water Works GST	Non-functional	2021	100,000 G	N/A	B
	Shamsia Colony Akbar Tank GST	Functional	1990	80,000 G	N/A	B
	Old Water Works GST	Functional	1935	80,000 G	N/A	B

There is a water supply scheme executed by PHED consisting of 26 seepage tube wells installed along the Lower Bari Doab Canal, with a distribution network covering the northern part of the city. The scheme also includes storage reservoirs, comprising five Overhead Reservoirs and four Ground Storage Tanks. However, the scheme remains non-operational due to issues related to handing over and finances.

The overall conditional assessment of water supply infrastructure has been evaluated to gauge the condition of the system as a whole, based on the most recurring conditions for the individual components of the system. The overall assessment is provided in the table below.

Table 15: Overall Asset Condition for Water Supply Infrastructure in Okara City

Overall Asset Condition	Rating
Civil Structures	C – Fair
Distribution Network	C – Fair
Electro-Mechanical	C – Fair

The overall condition of water quality was assessed through Rapid Water Quality Testing across MC Okara. Handheld water quality testing equipment was utilized for this exercise, measuring different parameters such as Total Dissolved Solids (TDS), PH and Electrical Conductivity. It was found that all the samples had pH levels within the acceptable range (6.5-8.5), as per Pakistan Standards & Quality Control Authority (PSQCA) and World Health Organization (WHO) (1996, 2004) guidelines. However, the average value of Total Dissolved Solids exceeded the permissible range (> 1000 ppm) stated in these standards, indicating that the water is not suitable for drinking purposes.

The condition of the water supply infrastructure as encountered during the field visit performed by the Urban Unit is indicated in the pictures below.



Condition of Pump House of TW#05 constructed in 2003



Overhead Reservoir at Old Waterworks constructed in 1935



Non Functional Tubewell TW#03 due to bore failure



Allama Iqbal Road RO Filtration Unit Installed in 2020. Satisfactory condition of the FP was observed

Figure 27: Water Supply Assets Condition in Okara city

Existing Water Supply Infrastructure-MC Okara

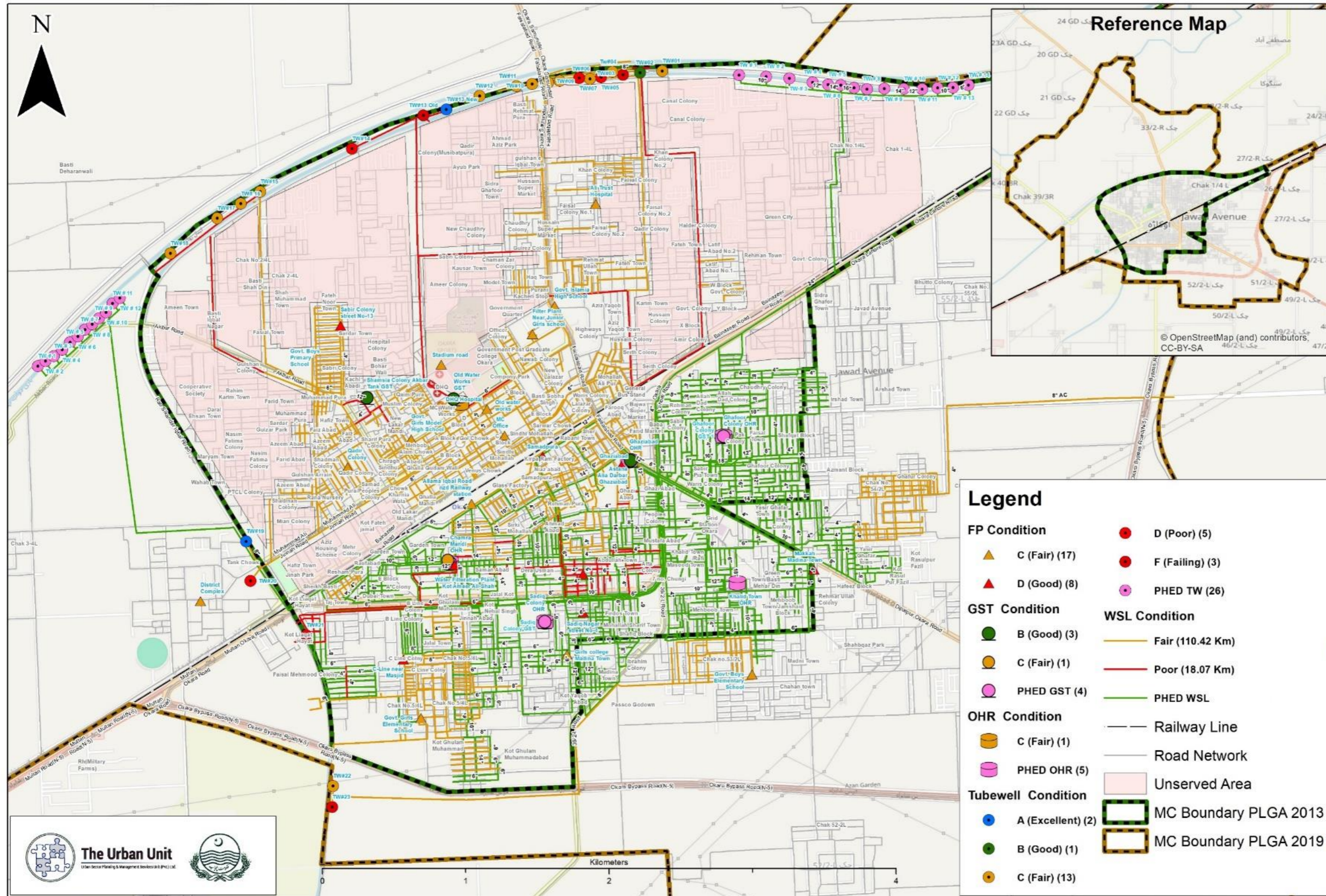


Figure 28: Existing Water Supply Infrastructure Map of MC Okara

6.2. Water Supply versus Demand Analysis

The water supply demand calculations have been made corresponding to a water demand of 22 GPCD inclusive of unaccounted-for water (NRW). It must be noted that this figure for water demand is considered adequate and is aligned with the United Nations 'Human Right to Water and Sanitation Guidelines' which recommends a minimum of 11 – 22 GPCD of water to ensure full realization of the individual right to water.

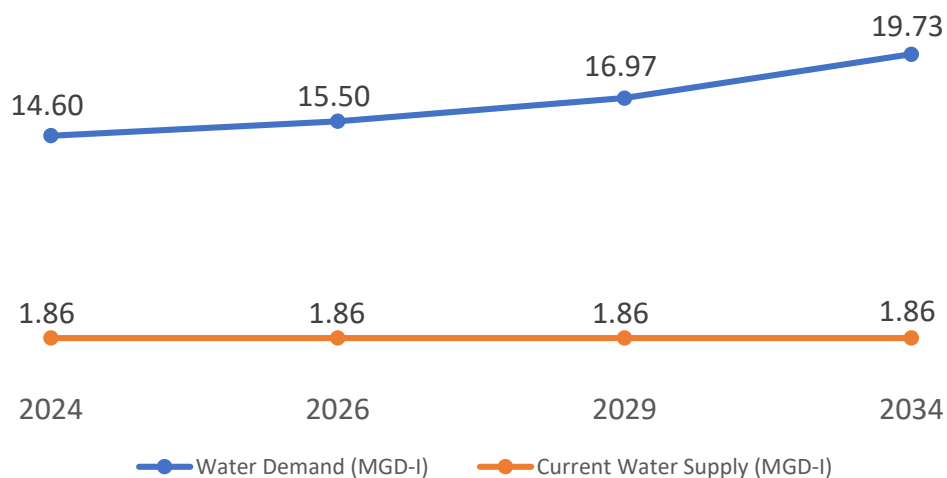
The current (2024) and future (2026, 2029, 2034) water demand are tabulated below.

Table 16: Water Supply versus Demand Calculations for Okara City

Year	2024	2026	2029	2034
Population	442,274	469,755	514,211	597,850
Average Day Demand (MGD)	9.73	10.33	11.31	13.15
Max Day Demand (MGD)	14.60	15.50	16.97	19.73
Peak Hour Demand (MGD)	21.89	23.25	25.45	29.59

Capacitance analysis for existing infrastructure has yielded a current supply capacity of 1.86 MGD against 11 operational tube wells in the city. This indicates a current water supply deficit of 12.74 MGD against Maximum Day Demand. It is important to note this demand is projected to increase up to 17.87 MGD by the end of 2034. Therefore, additional water supply infrastructure is imperative to address this water supply disparity. The water demand versus the water supply capacity is graphically represented below.

Water Supply Versus Demand



6.3. Interventions for Water Supply System

The conditional assessment of existing water supply infrastructure and its comparison with present and future projected demand and needs has resulted in the identification of service delivery gaps that exist within the system. The planning exercise aims to fulfil the aforementioned gaps in water supply. Prioritization of these gaps is also done and schemes are proposed based on various factors such as the essence of intervention, the duration required to execute them, the cost required, and their impact on the general public. The total cost required to uplift the current water supply situation is 2,501 Million.

6.3.1. Short Term Plan

The Short-Term plan for Okara prioritizes the rehabilitation of both above and below-ground water supply assets to restore the system to its full capacity. This involves improving the existing water supply scheme maintained by the Municipal Committee Okara, which involves rehabilitating twelve tubewells, eight filtration plants and problematic water supply pipelines to operationalize the currently non-functional tube wells in the city. Additionally, the plan includes the rehabilitation of PHED Scheme Tubewells (L1 - 12 Nos) through minor repairs to civil structure and electromechanical equipment as needed for their re-operation. The short-term plan of Okara is expected to cost 268 Million.

6.3.2. Medium Term Plan

In this term, the proposal includes the provision of water supply systems in unserved areas by installation of 14 new tube wells, each with a capacity of 1 cusec, along with construction of storage structures to enhance service delivery efficiency. Furthermore, this term proposes the rehabilitation of the remaining tubewells of PHED Scheme (L2-12 Nos). The medium-term plan for Okara is estimated to cost around 1,185 Million.

6.3.3. Long Term Plan

The long-term plan discusses the further extension of water supply services in the city with proposed installation of 13 new tube wells of 1 cusec each, along with the construction of storage structures. The long-term plan for Okara is estimated to cost 1,048 Million.

The following schemes are proposed for uplifting the water supply system of MC Okara as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Rehabilitation of Existing Water Supply System in Okara City Phase-I (@268 M)</p> <p>Scope of Project</p> <ul style="list-style-type: none"> ▶ Rehabilitation of existing tubewells in Okara City <ul style="list-style-type: none"> ○ Rehabilitation of 05 Non-Functional Tube Wells (TW#07, 08, 10, 13 New & 17) through the provision of transformers and electrical cables ○ New Borehole drilling, along with rehabilitation of civil structure and electrical panels (as required) in TW# 3, TW#13 Old & TW# 20 ○ Minor Repairs to the civil structure and transformer repair of TW # 05 and TW # 16 ○ Rehabilitation of Tube Well # 14 and Tube Well # 19 by replacing delivery main with a diameter of 8 inches ▶ Rehabilitation of 08 Nos Filtration Plants (People Colony Street No-4, Makkah Madina Town, Ghaziabad, Chmra Mandi, Samadpura, Sadiq Nagar Street No-4, C-Line near Masjid & Sabir Colony Street No-13) through Media Change and Filter Replacement as required ▶ Rehabilitation of 18 Km poor condition of WS Rising and Distribution Mains Main having Diameter of 12", 10", 8", 6", and 4" ▶ Rehabilitation of Line L1 PHED Tubewells 12 Nos through Minor Repairs to the Civil Structure and Electromechanical Equipment, if required
2	Medium Term (2029)	<p>Extension of Water Supply System in Northern City Okara – Phase I (@1,180 M)</p> <p>Scope of Project</p> <ul style="list-style-type: none"> ▶ Construction of 14 Tube Wells (1 Cusec each) including well bores, pump houses, machinery and allied components ▶ Construction of 02 GSTs having a capacity of 200,000 Gallons each and 04 OHRs having capacities of 100,000 Gallons each with laying of rising main and distribution network of total length of 72 KM having varying diameters (3", 4", 6", 8", 10", 12", 14", 16" & 24") in unserved areas of Green City, Rehman Town, Chak 1/4 L and Canal Colony <p>Rehabilitation of Existing Water Supply System in Okara City Phase-II (@5 M)</p> <p>Scope of Project</p> <ul style="list-style-type: none"> ▶ Rehabilitation of Line L2 PHED Tubewells 14 Nos through Minor Repairs to the Civil Structure and Electromechanical Equipment, if required

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
3	Long Term (2034)	<p>Extension of Water Supply System in Northern City Okara – Phase II (@1,048 M)</p> <p>Scope of Project</p> <ul style="list-style-type: none"> ▶ Construction of 13 Tube Wells (1 Cusec each) including well bores, pump houses, machinery and allied components ▶ Construction of 01 GST having a capacity of 200,000 Gallons, 01 OHR having 150,000 Gallons Capacity, 01 OHR having 100,000 Gallons and 03 OHRs having capacities of 50,000 Gallons each with laying of rising main and distribution network of total length of 94 KM having varying diameters (8", 10", 12", 14", 20" & 24") in unserved areas of Chak 2/4 L, Shah Muhammad Town, Hospital Colony, Basti Bohar Wali, Cooperative Society, Rahim Karim Town, Darul Ehsan Town, Faridabad, Muhammad Pura, Hafiz Town and Kot Fateh Jamal
Total Cost for Water Supply System = 2,501 M		

For Rough Cost Estimation, MRS 1st BI-ANNUAL-2024 (01.01.2024 to 30.06.2024) District Okara has been applied. This is further subject to the detailed design of the proposed schemes upon PC-1 formation.

Water Supply Intervention - MC Okara

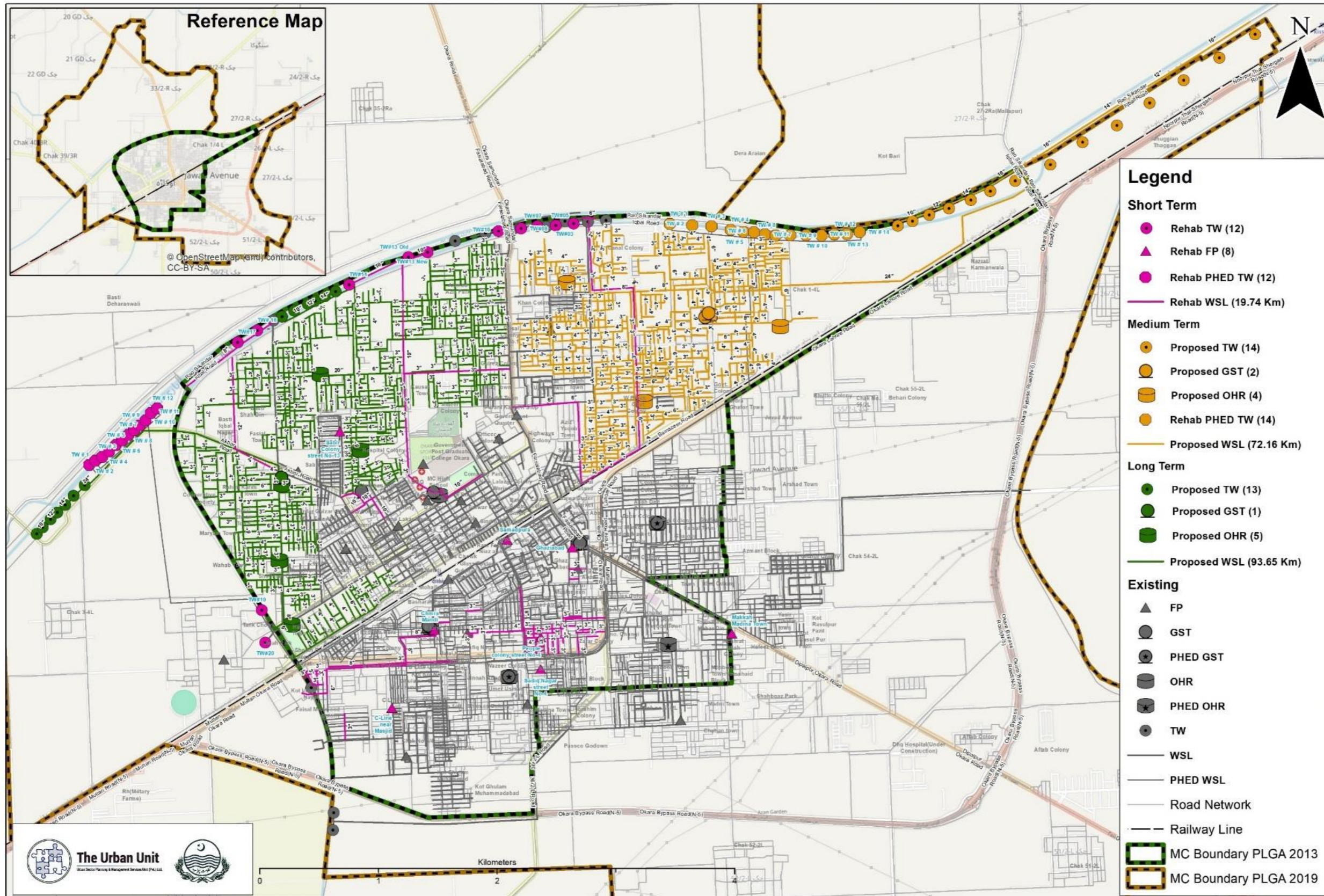


Figure 29: Water Supply Interventions Map for MC Okara

6.4. Existing Sewerage Infrastructure

The sewerage system of Okara City comprises gravity-based system sewerage systems, with an existing network of sewers covering approximately 85% of the city. The city is geographically divided into northern and southern parts by railway track. There are currently two operational disposal stations in the city and wastewater from the Northern side is disposed of in the agriculture field through two disposal stations. after pumping through two Disposal Stations. Conversely, wastewater from the southern side is disposed of through gravity into a seepage drain. The sewerage network of the city comprises sewers with 50% of the lines in poor condition. Additionally, a significant percentage of sewers have passed their design life.

The condition of disposal stations in the city was assessed and it was noted that one disposal station was in Fair condition and the other in poor condition. All of these disposals have an average operational time of 20 hours per day. The details of the disposal stations in the city have been provided in the table below.

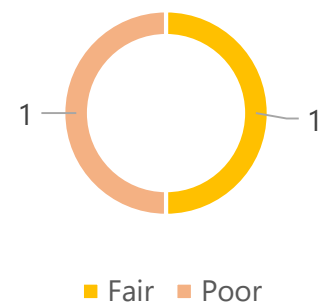
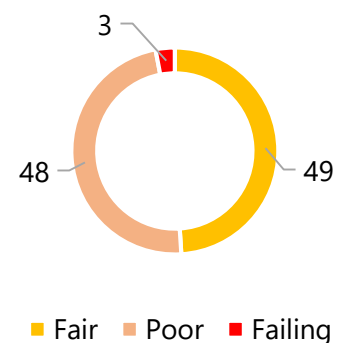


Table 17: Details of Disposal Stations in Okara City

Disposal Name/Area	Functional Status	Hours of Operation	Capacity (cusecs)	Overall Condition
2/4 L Disposal Station	Functional	20	42	C
1/4 L Disposal Station	Functional	20	25	D

The sewers (253 KM), cover an estimated spatial area of 85% in the city. The diameter of the sewers ranges from 9" to 66" and 49% were found to be in Fair condition, whereas 48% of trunk sewers were found to be in Poor condition with almost 3% being assessed in failing condition.



The overall conditional assessment of sewerage infrastructure has been evaluated to gauge the condition of the system as a whole, based on the most recurring conditions for the individual components of the system. The overall assessment is provided in the table below.

Table 18: Overall Asset Condition for Sewerage Infrastructure in Okara City

Overall Asset Condition	Rating
Civil Structures	C - Fair
Distribution Network	D - Poor
Electro-Mechanical	C - Fair

The condition of the water supply infrastructure as encountered during the field visit performed by the Urban Unit is indicated in the pictures below.

*Condition of Dry Well of 1/4 L Disposal Station**Wet Well of 2/4 L Disposal Station**Ponding issues and poor sewage lines in Wazir colony & Aladaad Colony*

Existing Sewerage Infrastructure Condition Map of MC Okara

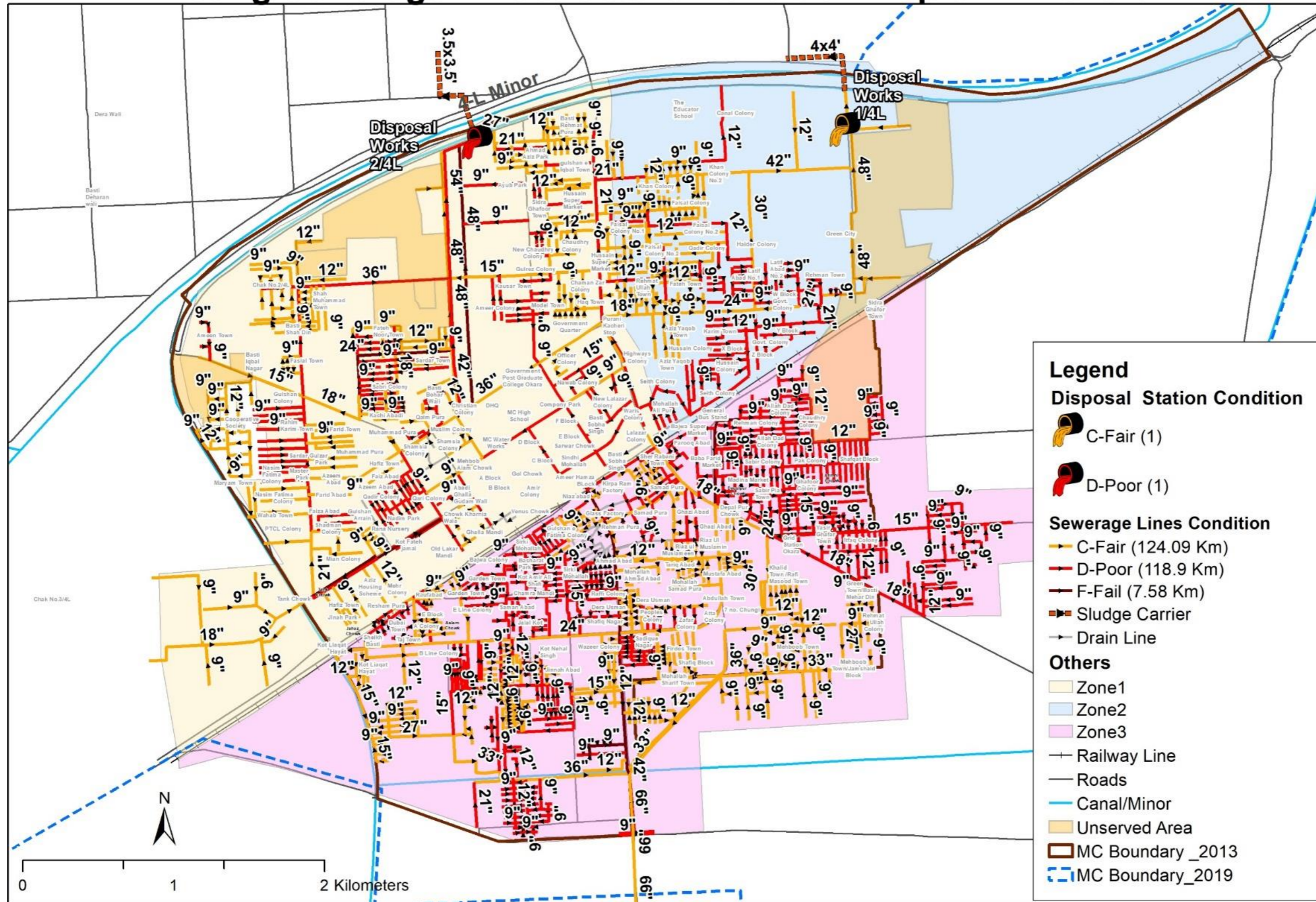


Figure 31: Existing Sewerage Infrastructure Condition Map of MC Okara

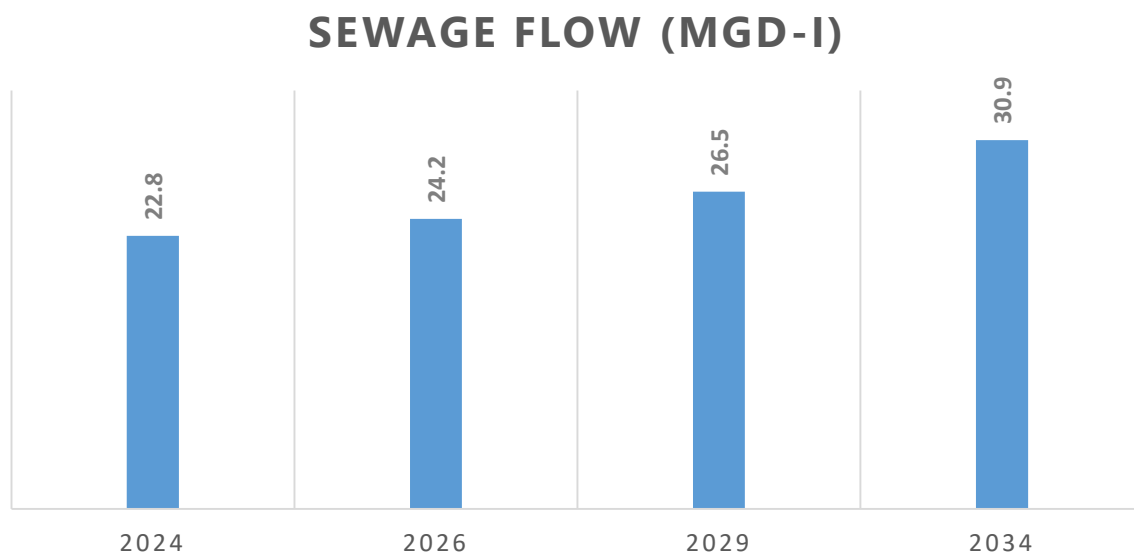
6.5. Sewage Flow Estimation

The sewage generation has been made corresponding to the 22 gallons per capita per day water demand. A contribution of 33% for storm-water flow, 5% infiltration & 5% non-domestic flows have been included during the calculation of the total sewerage flow. The current (2024) and future (2026, 2029, 2034) sewage flows are tabulated below.

Table 19: Sewage Flow Estimation for Okara City

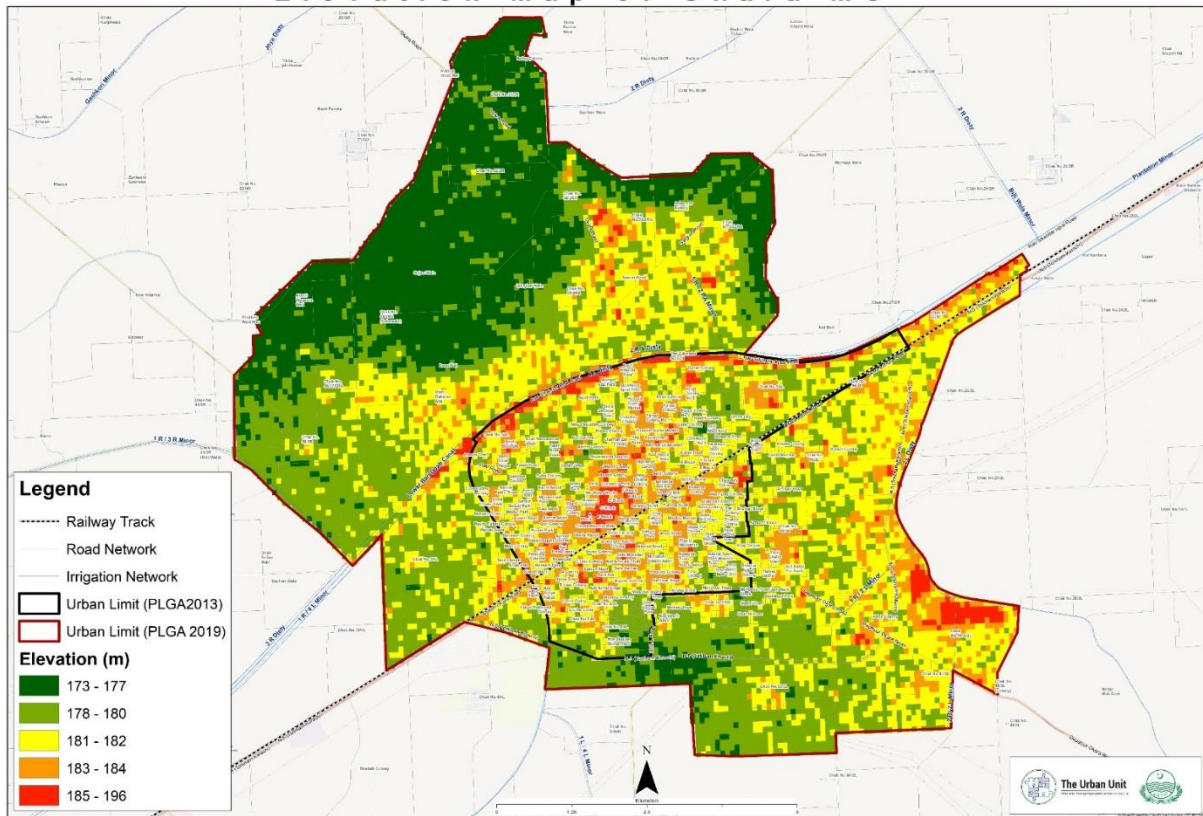
Year	2024	2026	2029	2034
Population	442,274	469,755	514,211	597,850
Avg. Sewage Generated (MGD-I)	8.27	8.78	9.62	11.18
Peak Sewage Flow (MGD-I)	16.54	17.57	19.23	22.36
Storm Water Flow (MGD-I)	5.46	5.80	6.35	7.38
Infiltration Flow (MGD-I)	0.41	0.44	0.48	0.56
Non-Domestic Flow (MGD-I)	0.41	0.44	0.48	0.56
Total Sewage Flow (MGD-I)	22.83	24.24	26.54	30.85

The current estimated wastewater generation of Okara City is approximately 22.83 MGD-I. It should be noted that this flow is expected to increase up to 30.85 MGD by the end of 2034. The estimated wastewater flows for Okara are graphically represented below.



An elevation Map has been developed for planning purposes which indicates the elevation level of the terrain and appropriate natural flow for the drainage system and sewage pipelines. The highest and lowest levels of Okara City are approximately 196 meters and 173 meters respectively from Mean Sea Level (MSL). The maximum difference in city elevation is around 23 meters.

Elevation Map of Okara MC



6.6. Interventions for Sewerage System

The conditional assessment of existing sanitation infrastructure and its comparison with present and future projected demand and needs has resulted in the identification of service delivery gaps that exist within the system. The planning exercise aims to fill the afore-described gaps in sewerage. Prioritization of these gaps is also done and schemes are proposed based on various factors such as the essence of intervention, the duration required to execute them, the cost required, and their impact on the general public. The total cost required to uplift the current sewerage situation is around 5,798 Million.

6.6.1. Short Term Plan

The Short-term plan for sewerage involves the replacement and upgradation of poor-condition sewerage lines of approximately 50 km in Zone 1 and 2 of MC Okara. The total expected cost for the Short Term is around 1,603 Million.

6.6.2. Medium Term Plan

The Medium-term plan for the sewerage system involves the replacement and upgrading of sewerage lines in Zone 3 and 4 of MC Okara. This includes replacing poor and outlived sewerage lines and upgrading poor-conditioned branch lines. The plan also involves extending sewerage lines into unserved areas and acquiring land for wastewater treatment plants for Zones 1 and 3. Additionally, the development of constructed wetlands is proposed for Zone 3.

The total expected cost for the medium term is around 2,649 Million.

6.6.3. Long Term Plan

The Long-term project for the sewerage system involves an extension of sewerage lines in the outskirts of MC Okara towards North East and South East. Also, the construction of a Waste Stabilization Pond WSP for Zone 1 & Zone 2 is proposed for safe disposal of wastewater.

The total expected cost of the Long term is around 1,546 Million.

The following schemes are proposed for uplifting the sewerage system of MC Okara as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	<p>Replacement & Upgradation of Poor Condition Sewerage Lines of Approx. 50 Km in Zone 1 &2 of MC Okara (1,603 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Replacement of 1.76 Km Fail Condition crown failure Sewerage Main Lines in Zone 1 of varying dia 15"-24" dia ▶ Replacement of Poor Condition 27.5 Km Main & Branch Sewer Lines in Zone 1 & 14 Km poor condition Main and Branch Lines in Zone 2 ▶ Upgradation of 7 Km Main Sewer Lines in Zone 1 with varying dia of 15"- 66" to cope with the increasing flow <p>Areas Covered: Latifabad, Hussain Colony, Karim Town, Seith Colony, Muhallah Alipur, Ameer Colony, Nawab Colony, Lalazar Colony, Qadir Colony, Nasim Fatima Colony, Sabri Colony etc</p>
2	Medium Term (2029)	<p>Replacement & Upgradation of 68 Km Sewerage Lines in Zone 3 & 4 of MC Okara (@ 1360 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Replacement of 66 Km Poor & outlived sewerage Lines in Zone 3 & 4 having varying dias (12"-54") ▶ Upgradation of 2 km Poor Condition Main & Branch Line with dia of 12", 15" & 18" <p>Areas covered: Samadpura, Gulshan e Fatima Colony, Garden Town, Jalal Kot, Siddiqe Nagar, Shamas Colony, Kot Nehal Singh, B line Colony, Kot Ghulam Muhammad, Chak 5/4 L, Dubai Town, Samanabad, Raffi Colony, People Colony, Wazir Colony, Chaudhary Colony, Ghafoor Colony, Chak 54/2L, and Yasir Ghaffar Town etc</p> <p>Extension of 13 km Sewerage lines in Unserved Area within MC Limits (@ 215 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Laying of new sewerage lines of 13.5 Km having dia of 9, 12, 15, 18, 21 & 24" in the unserved area say beside the area of Ayub Park, basti Iqbal Nagar Z1, near Chak 1/4L Z2, Sidra Ghafoor Town Z4, and Siddique Nagar Z3 <p>Land Acquisition for WWTP Zone 1 & 2 (@ 800 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Acquire land for Waste Stabilization Pond WSP for Wastewater Treatment for WW generated from Zone 1 51 Acres and 37 Acres for Zone 2 for installation in Long Term and avoid canal water pollution

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
		<p>Wastewater Treatment Zone 3 through Constructed Wetlands (@ 274 M)</p> <p>Scope of Project:</p> <ul style="list-style-type: none"> ▶ Construction of Constructed Wetlands for Zone 3 Wastewater treatment in Seepage Drain 8.5 Km passing downstream side of Okara City -Provision of Nature-based solution for Nullah (2000*15 m) for wastewater treatment with Constructed Wetland (4 pockets of 5*5 m at 4 different patches)
3	Long Term (2034)	<p>Extension of Sewerage lines in the Outskirts of MC Okara towards North East & South East (@ 646 M)</p> <ul style="list-style-type: none"> ▶ Laying of 30 Km new sewerage lines having varying dia of 12-36" in the outskirts of MC Okara towards the east side covering area of Behari Colony, Chak No 54/2L, Arshad Town, Chak 51/2L and Aftab Colony allied areas <p>Construction of Waste Stabilization Pond WSP for Zone 1 (51 Acres) & Zone 2 (37 Acres) (@ 900 M)</p> <ul style="list-style-type: none"> ▶ Construction of WSP of 11.4 MGD with 51 Acres of Land for primary and secondary treatment of Waste Water for Zone 1 ▶ Construction of WSP of 8 MGD with 37 Acres of Land for primary and secondary treatment of Waste Water for Zone 2
Total Cost for Sewerage System = 5,798 M		

For Rough Cost Estimation, MRS 1st BI-ANNUAL-2024 (01.01.2024 to 30.06.2024) District Okara has been applied. This is further subject to the detailed design of the proposed schemes upon PC-1 formation.

Proposed Intervention of Sewerage Infrastructure - MC Okara

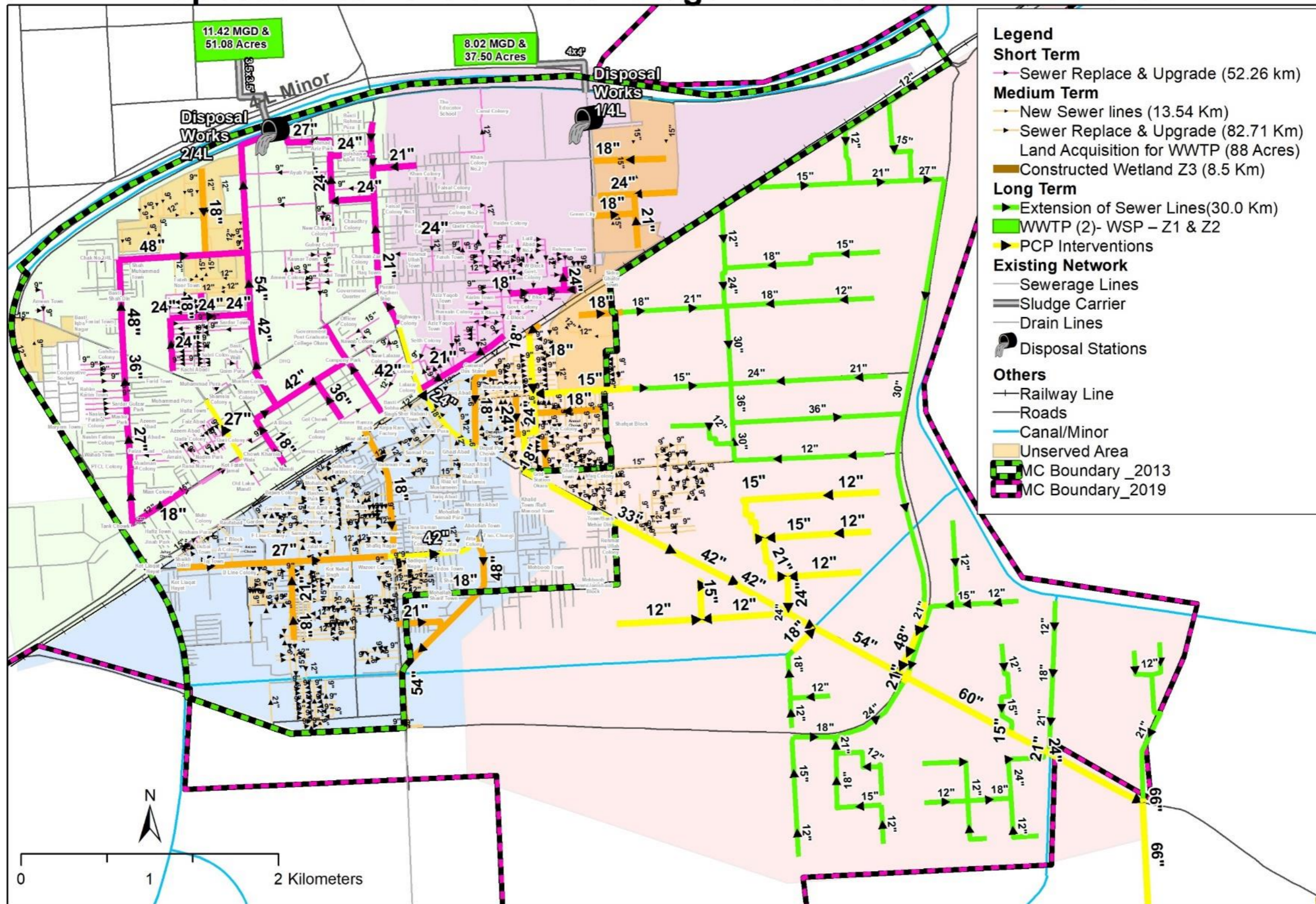


Figure 32: Proposed Interventions for Sewerage Infrastructure in MC Okara

Rural Areas of Okara District

Okara District currently has a rural population of around 2,406,277, only 12 % of this population is served by water supply schemes. The existing water supply is 1.5 MGD, leaving a current gap of 34.5 MGD, which is expected to rise to 39.6 MGD by 2034, the planning year.

7.1. Rural Water Supply Schemes

As per the data collected by PHED, a total of 91 rural water supply schemes exist in the district, out of which 62 (68%) are functional and 29 (32%) are non-functional. The majority of the non-functional schemes are in Okara with 72% of non-functional schemes. The major issues affecting these schemes are the poor condition of electromechanical equipment and sewage contamination due to poor and outdated distribution networks.

The rural water supply schemes have been installed in various phases from 1985 to 2022. Ageing analysis reveals that 43% of the assets are 10 years old whereas 24% are 10 to 25 years old, and 32% are more than 25 years old and have completed their design life.

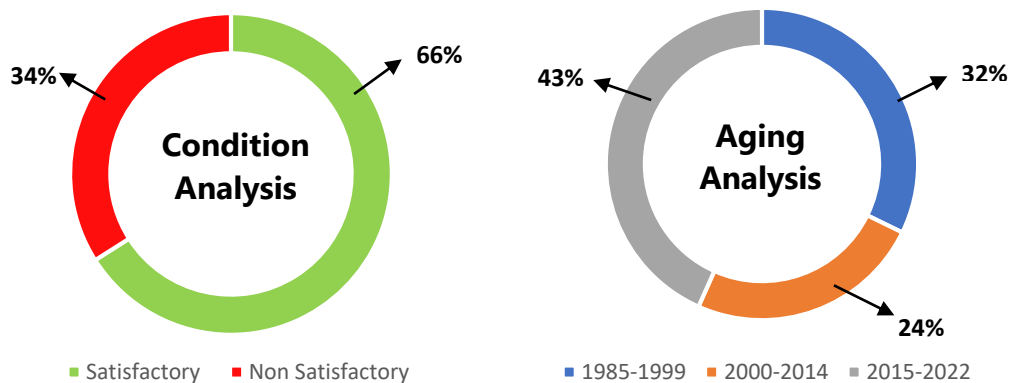


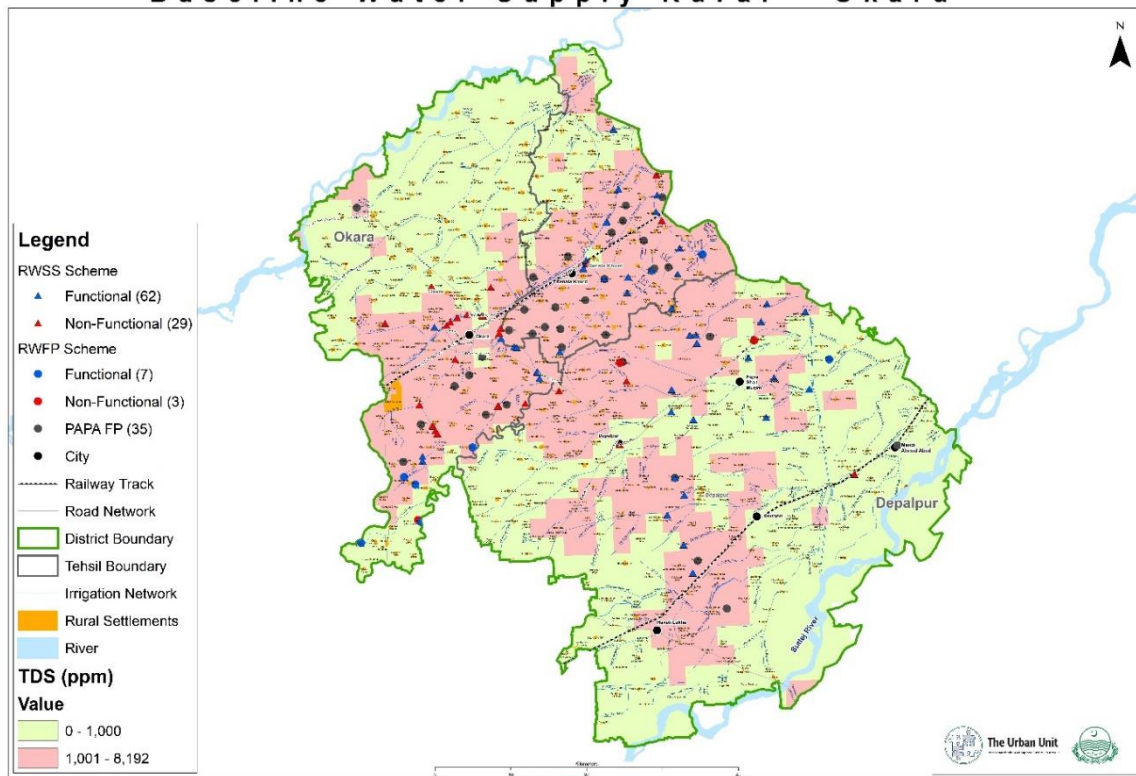
Figure 33: Condition and Aging Analysis of Rural Water Supply Schemes

7.2. Rural Filtration Plant Schemes

A total of 10 Water Filtration plants are installed in the region by the Public Health Engineering Department, 7 of these filters are currently reported to be functional while 3 of them are reported to be non-functional.

The map below represents the existing rural water supply infrastructure in the Okara district. The water quality variation across the Okara district has also been indicated in the map.

Baseline Water Supply Rural - Okara



7.3. Field Assessment of Rural Water Infrastructure

Rural water infrastructure in Okara district was visited by the field team of The Urban Unit to get insights regarding the functionality and present condition of the schemes. A total of four schemes were visited during this field assessment exercise; two schemes of Okara tehsil and one in each tehsil of the district. The images below are representative of the aforementioned field assessment.



Chak 18 1/L – Renala Khurd Scheme laid in Year 1988. Rural Scheme in Brackish Zone. Sewage contamination is occurring due to poor and outlived distribution network. Scheme Supplies Water to 694 Nos House Connections and 01 Filtration Plant

WS Scheme Dharmay Wala – Depalpur Rural Scheme in Brackish Zone/ House Connections: 550 Nos. Poor Condition of TW Pump House Observed. Rehabilitation of Civil Structure of TW Pump House and Electromechanical Machinery required

Figure 34: Condition Assessment of Rural Water Supply Schemes in Okara district

7.3.1. Issues Identified

The field assessment of rural water supply infrastructure yielded critical insights towards the gaps in the operationalization and maintenance of these critical assets. The following major issues were observed during the field assessment.

- ▶ The major issues affecting these schemes are the poor condition of electromechanical equipment and sewage contamination due to poor and outdated distribution networks
- ▶ Another issue observed is the late or non-payment of WAPDA dues due to Low Bill Collection as most rural communities are unable to pay for hefty bills charged under Commercial Tariff for TWs by WAPDA
- ▶ Lack of experienced/technical persons for Repairing/ Maintenance in case of faults has led to damaged machinery & electrical systems in most schemes.

7.3.2. Interventions for Rural Water Supply Infrastructure

Following evidence-backed interventions have been proposed to address the above-mentioned issues in the operationalization and maintenance of water supply infrastructure in Okara district.

- ▶ Rehabilitation of existing water supply schemes and filtration plants
- ▶ Provision of Solar-based Interventions for financial sustainability of schemes

The following schemes are proposed for uplifting the rural water supply of Okara district as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	Rehabilitation of Existing Water Supply Schemes and Filtration Plant in Rural Okara (@707 M) Scope of Project <ul style="list-style-type: none"> ▶ Rehabilitation of 33 Rural Water Schemes in Rural Okara (23 in Okara, 5 in Depalpur and 5 in Renala Khurd) ▶ Rehabilitation of 3 Rural Water Filtration Plants in Rural Okara (1 in Okara & 2 in Depalpur)
2	Medium Term (2029)	Solarization of Filtration Plant in Rural Okara (@33 M) Scope of Project <ul style="list-style-type: none"> ▶ Solarization of 07 Rural Water Filter Plants in Rural Okara (5 in Okara & 2 in Depalpur)
3	Long Term (2034)	Solarization of Water Supply Schemes in Rural Okara (@560 M) Scope of Project <ul style="list-style-type: none"> ▶ Solarization of 58 Rural Water Schemes in Rural Okara (Each of 0.25 Cusecs)
Total Cost for Rural Areas = 1,300 M		

Intervention Water Supply Rural - Okara

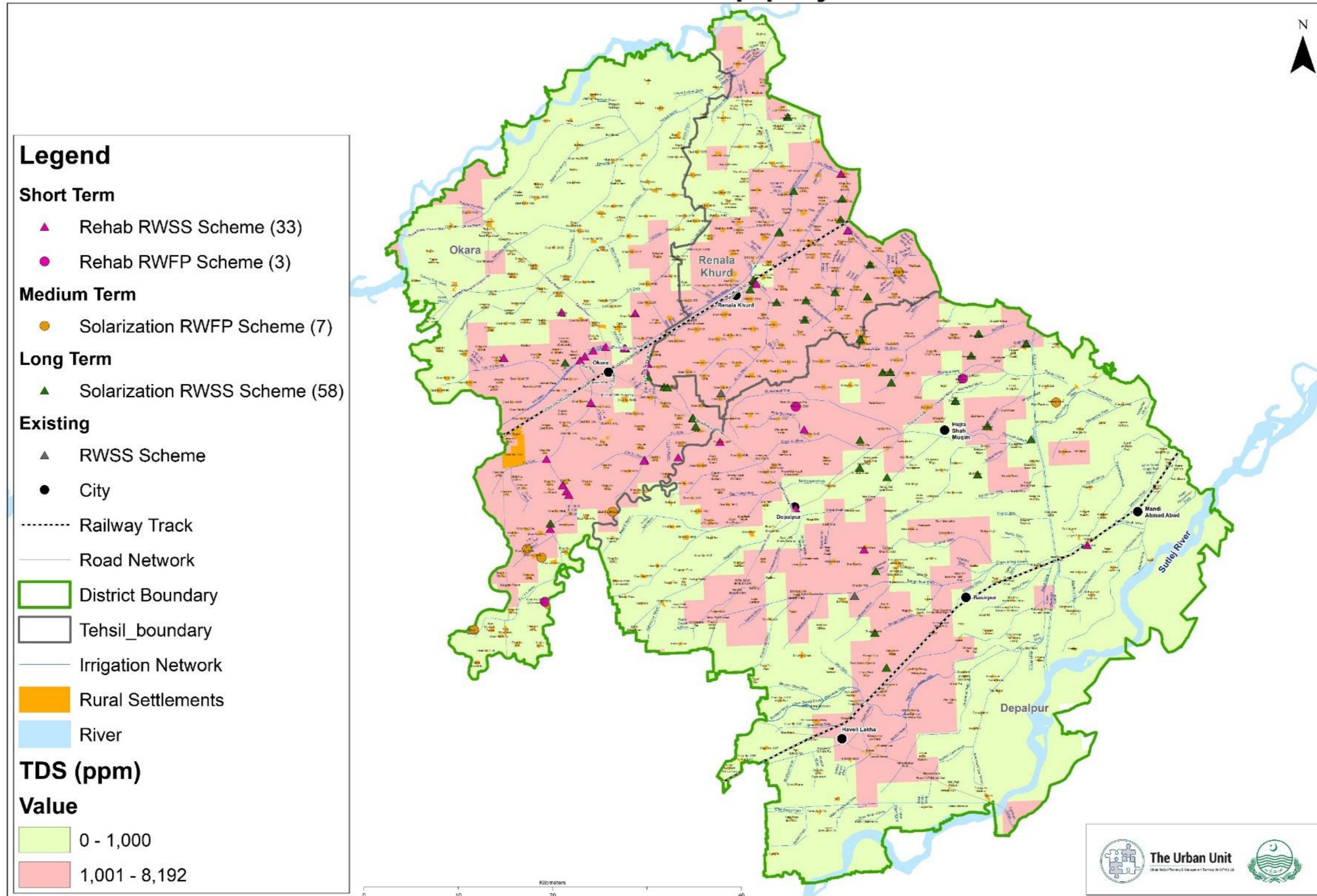


Figure 35: Interventions for Rural Water Supply in Okara district

7.3.3. Interventions for Rural Sewerage and Drainage Infrastructure

Following evidence-backed interventions have been proposed for sewerage and drainage infrastructure in the Okara district.

- ▶ Provision of Public Toilets in Rural Okara
- ▶ Proposal of rural sewerage and drainage schemes
- ▶ Model village program in Rural Okara

The following interventions are proposed for uplifting the rural sewerage system of the Okara district as per the performed assessments and analysis.

Sr.	Phase	Proposed Schemes, Estimated Costs & Scope
1	Short Term (2026)	Provision of Public Toilets in Rural Okara (@6.4 M) Scope of Project ▶ Provision of Public Toilets (total 15), 5 in each tehsil of Okara district
2	Medium Term (2029)	Okara Rural Sewerage and Drainage Scheme (@549 M) Scope of Project ▶ Provision of 60 Open Drains based Sewerage/Drainage/Tuff tile/Soling Schemes (10 in Okara), (20 in Depalpur), and (30 in Renala Khurd)
3	Long Term (2034)	Model Village Program in District Okara (@279 M) Scope of Project ▶ Proposal of 3 Model Villages (1 Village in each tehsil with 300 Households) in Okara District covered sewerage system, paved streets, and decentralized wastewater treatment plant
Total Cost for Rural Areas = 835 M		



WATER SUPPLY & SANITATION

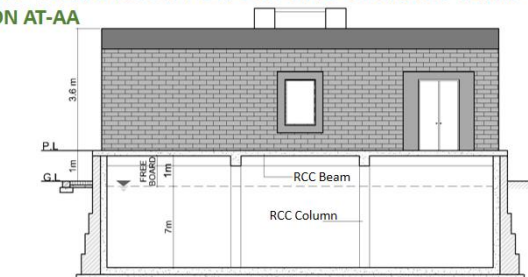
Sahiwal Regional Development Plan
CONCEPT DESIGNS

Concept Designs & Drawings

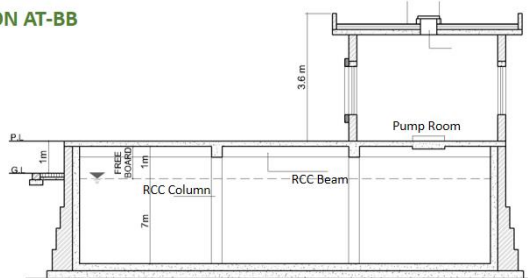
Conceptual designs are developed to explore and communicate design ideas and concepts to help stakeholders in visualization of proposed interventions. It is pertinent to mention here that actual designs vary in the physical sense as there are several considerations such as availability of land, on-ground technical challenges and financial constraints. The conceptual designs of water and sanitation infrastructure can be seen in the sections below.

Sahiwal Regional Development Plan Conceptual Design for Ground Storage Tank

SECTION AT-AA



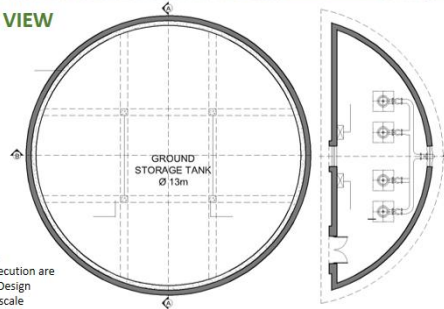
SECTION AT-BB



CONCEPTUAL 3D PERSPECTIVE VIEW



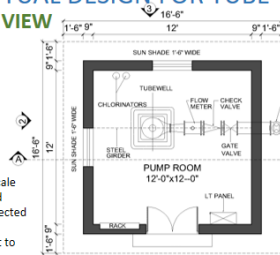
2D-PLAN VIEW



Note:
1-Sample Not to scale
2-Construction and Execution are subjected to Detailed Design
3-Drawings are not to scale

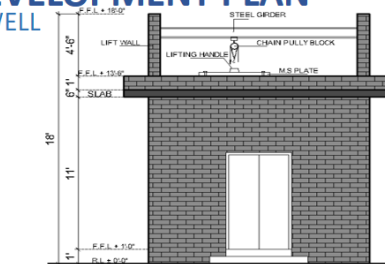
Sahiwal Regional Development Plan Conceptual Design for Tube Well

2D-PLAN VIEW

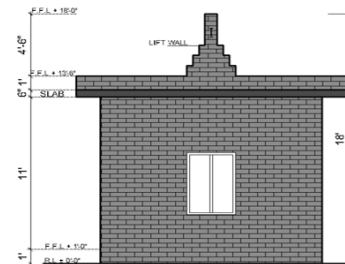


Note:
1-Sample Not to scale
2-Construction and Execution are subjected to Detailed Design
3-Drawings are not to scale

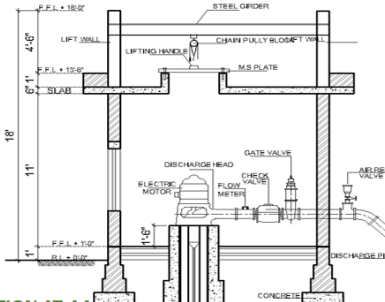
CONCEPTUAL 3D DESIGN



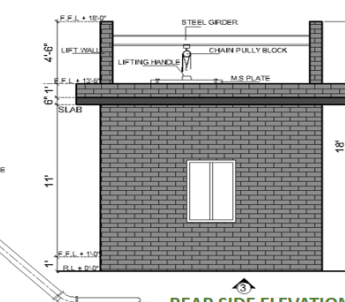
FRONT ELEVATION



LEFT SIDE ELEVATION



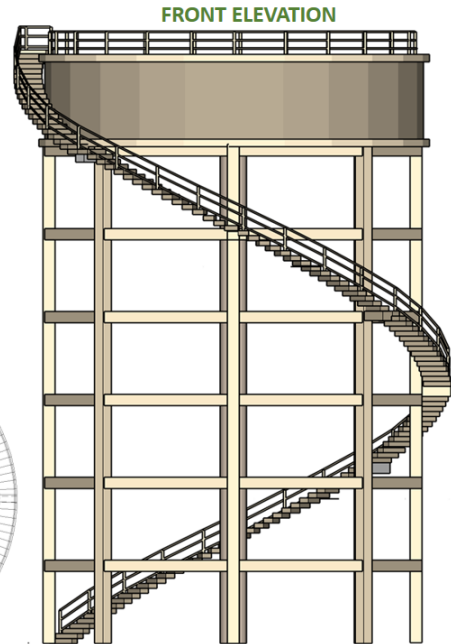
SECTION AT-AA



REAR SIDE ELEVATION

SAHIWAL REGIONAL DEVELOPMENT PLAN
CONCEPTUAL DESIGN FOR OVER HEAD WATER RESERVOIR

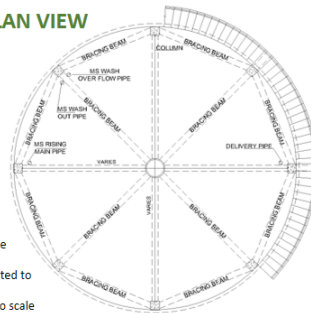
OVER HEAD WATER RESERVOIR					
Sr. No	Capacity (Gallons)	Height (m)	Diameter (m)	Height(m) from Base to ground	Number of stories
1	50,000	3.65	10	20	6
2	100,000	3.65	13.5	20	6
3	150,000	3.65	16.6	22	6



CONCEPTUAL 3D DESIGN



2D-PLAN VIEW



Note:
1-Sample Not to scale
2-Construction and Execution are subjected to Detailed Design
3-Drawings are not to scale

WATER SUPPLY AND SANITATION SECTOR

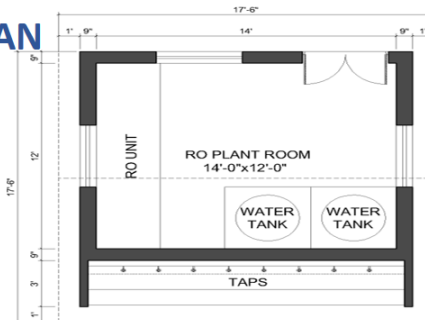
The Urban Unit, Planning, and Management Services Unit

SAHIWAL REGIONAL DEVELOPMENT PLAN
CONCEPTUAL DESIGN FOR FILTER PLANT

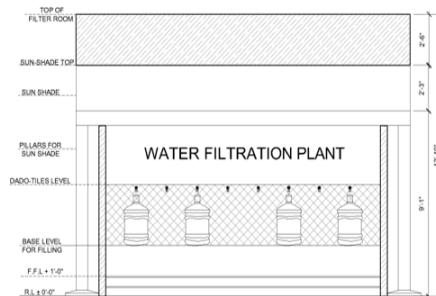
CONCEPTUAL 3D PERSPECTIVE VIEW



2D-PLAN VIEW



FRONT ELEVATION

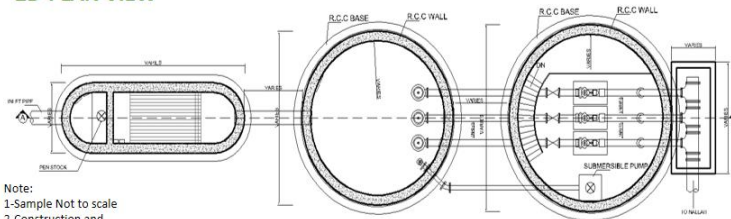


WATER SUPPLY AND SANITATION SECTOR

The Urban Unit, Planning, and Management Services Unit

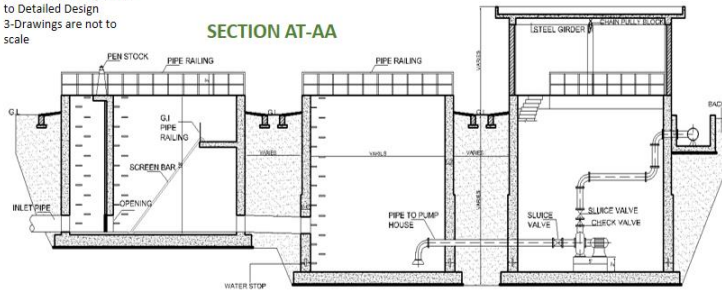
SAHIWAL REGIONAL DEVELOPMENT PLAN
CONCEPTUAL DESIGN FOR DISPOSAL STATION

2D-PLAN VIEW



Note:
1-Sample Not to scale
2-Construction and Execution are subjected to Detailed Design
3-Drawings are not to scale

SECTION AT-AA



CONCEPTUAL 3D DESIGN

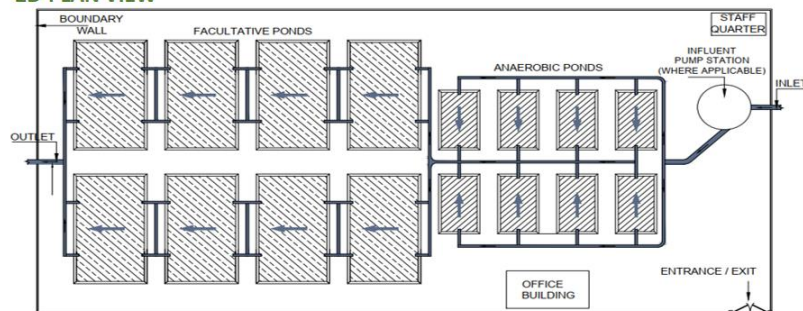


WATER SUPPLY AND SANITATION SECTOR

The Urban Unit, Planning, and Management Services Unit

SAHIWAL REGIONAL DEVELOPMENT PLAN
CONCEPTUAL DESIGN FOR WASTE WATER TREATMENT PLANT

2D-PLAN VIEW



CONCEPTUAL 3D DESIGN



DETAILS OF CAPACITY AND AREA

Waste Water Treatment Plant			
Sr	City	Capacity	Area
1	Pakpattan	10 MGD	35 Acres
		10 MGD	35 Acres
		10 MGD	35 Acres
2	Okara	12 MGD	51 Acres
		8 MGD	37 Acres
3	Sahiwal	22 MGD	150 Acres

- FACULTATIVE PONDS
- ANAEROBIC PONDS
- OFFICE BUILDING
- STAFF QUARTER

WATER SUPPLY AND SANITATION SECTOR

The Urban Unit, Planning, and Management Services Unit

WATER SUPPLY & SANITATION

Sahiwal Regional Development Plan
ANNEXURES



The Urban Unit

Urban Sector Planning & Management Services (Pvt) Ltd.



Annexures

Condition Rating Criteria for Water & Sanitation Assets

Rating	Condition	Description
A	Excellent	No noticeable defects. Some aging or wear may be visible
B	Good	Only minor deterioration or defects are evident
C	Fair	Some deterioration or defects are evident, but function is not significantly affected
D	Poor	Serious deterioration in at least some portion of the structure. Function is inadequate
F	Failing	No longer functional. General failure or complete failure of a major structural component

PICIIP Sahiwal – WSS Projects

Sr.	Sector	Name of Scheme (Source: PICIIP Sahiwal)	Completion Status (As of Jan, 2024)
1	Water Supply	LOT 1: New Tube Wells (28 Nos) New Overhead Tanks (4 Nos) Distribution Network (543 Km) Filtration Plants (10 Nos) Tube Wells Rehab (45 Nos)	63.70%
2	Sewerage System	LOT 2: Trunk Sewer North (43 Km) LOT 3: Conduit (4.6 Km) & Disposal Station (N) LOT 4: Trunk Sewer (27 Km) & Disposal Station (S) & Waste Water Treatment Plant	59% 30% 37%

Water Supply Infrastructure of Sahiwal City – Tube Wells

Sr. No	Town	Capacity	Installation Year	Motor Size	Update Status
1	Scheme No 3	1.5 Cusec	2000	40HP	Functional
2	Scheme No 3	1Cusec	2015	30 HR	Functional
3	Frid Town	1.5Cusec	2005	40HP	Functional
4	Frid Town	1Cusec	1984	30HP	Functional
5	Ramay Town	1.5Cusec	2007	40HP	Functional
6	Frid Town	1.5Cusec	1990	40HP	Functional
7	Scheme No 2 Frid Town	1.5Cusec	2003	40 HP	Functional
8	Fateh sheer Colony	1.5Cusec	2005	40 HP	Non Functional Due to Bore

WATER SUPPLY & SANITATION

Regional Development Plan of Sahiwal

9	Fateh sheer Colony	1.5Cusec	2000	40 HP	Non Functional Due to Bore
10	Sahiwal City	1Cusec	2005	30HP	Functional
11	Sahiwal City	1Cusec	2009	30HP	Functional
12	Statium Sahiwal	1Cusec	2013	25HP	Functional
13	Muhallal Farid Gung	1Cusec	1999	25HP	Non Functional Due to Bore
14	Doshhra Ground	1Cusec	2012	30HP	Functional
15	Ghala Mandi	1.5Cusec	2003	40HP	Non Functional Due to Bore
16	Peoples Colony	1.5Cusec	1996	40HP	Non Functional Due to Bore
17	Muhalla Noor Park	1Cusec	2001	30HP	Functional
18	Bhutto Nager	1Cusec	1995	30HP	Non Functional
22	Tariq Bin Ziad	1.5Cusec	2000	40HP	Functional
23	Imamia Colony	1Cusec	1999	30HP	Functional
24	Jahaz Ground	1.5Cusec	1980	40 HP	Functional
25	Jahaz Ground	1.5Cusec	1985	40 HP	Non Functional Due to Bore
26	Frid Town	1Cusec	2011	30HP	Functional
27	Frid Town	1Cusec	2008	30 HP	Non Functional Due to Bore
28	Frid Town	1Cusec	1995	25HP	Functional
29	Frid Town	1.5Cusec	1990	40HP	Functional
30	Frid Town	1.5Cusec	1990	40HP	Functional
31	Small Indistry	1Cusec	1995	30HP	Functional
32	Jahaz Ground	1Cusec	2005	30HP	Functional
33	kachary Road	1.5Cusec	2005	40HP	Non Functional
35	Partab Bagh	1Cusec	2014	30HP	Functional
36	Sandhi Mohallal	1.5Cusec	1985	40HP	Non Functional
37	Sarif Colony	1Cusec	1980	30HP	Non Functional
38	Sandhi Mohallal	2Cusec	2007	60HP	Functional
39	Hazoori Park	1Cusec	2014	30HP	Functional
40	Hazoori Park	1Cusec	1995	30HP	Functional
41	Bilal Colony	1.5Cusec	2000	40HP	Functional
42	Chaman Zar	1Cusec	2005	30HP	Functional
43	Fateh sheer Colony	1.5Cusec	2005	40HP	Functional
44	Fateh sheer Colony	1.5Cusec	2000	40HP	Functional
45	Green Town	1Cusec	1980	30HP	Non Functional Due to Bore
46	Green Town	1Cusec	2000	30HP	Functional
47	Sarif Colony	1Cusec	2003	30HP	Functional
48	out Side Ghala Mandi	1.5Cusec	2005	40HP	Non Functional Due to Bore
49	Ghousia Colony	1Cusec		30Hp	Non Functional Due to Bore
50	GT Road	1Cusec	2011	30HP	Functional
51	Inayat Elahi Colony	1.5Cusec	2002	40HP	Non Functional Due to Line
52	Inayat Elahi Colony	1Cusec	2004	30HP	Non Functional Due to Line
53	Bhutto Nager	1.5Cusec	2000	40HP	Functional
54	Bhutto Nager	1.5Cusec	2000	40HP	Functional
55	Bhutto Nager	1Cusec	1995	30HP	Functional
56	Bhutto Nager	1Cusec	1995	30HP	Non Functional
57	Imamia Colony	1Cusec	1980	30HP	Non Functional Due to Bore
58	Unnamed	1Cusec		30HP	Non Functional Due to Bore
59	Unnamed	1Cusec		30HP	Abandoned
60	Unnamed	1Cusec		30HP	Abandoned

WATER SUPPLY & SANITATION

Regional Development Plan of Sahiwal

Water Supply Infrastructure of Sahiwal City – Overhead Reservoirs

Sr. No	Name	Installation	Condition	Status
1	Water Tanki near fire Brigade TMA Office	1936	C	Functional
2	Small Industry Tanki	1980	C	Functional
3	Niazi Park	1984	B	Functional
6	Jaal Road	1980	C	Functional
7	ThanaFath sher	1982	F	Non Functional
8	Tariq Bin Ziad	1990	B	Non Functional
9	Ghala Mandi	1980	F	Non Functional
10	D Ground Farid Town	1980	C	Functional
11	Stop 8 Farid Town	1980	C	Functional
12	W Block Scheme 3	1990	D	Functional
13	Scheme No 2	1980	F	Non Functional
14	Bhutto Nager	1986	F	Functional
15	OHR		D	Non Functional

Water Supply Infrastructure of Pakpattan City – Tube Wells

Tube Well Name/Area	Functional Status	Year of Installation	Capacity (cusecs)	Installed Motor Rating (HP or kW)	Overall Condition
TW #1	Functional	1992	1-cusec	40 HP	D
TW #3	Functional	1992	1-cusec	40 HP	D
TW #4	Functional	1992	1-cusec	40 HP	D
TW #5	Functional	2005	1-cusec	40 HP	C
TW #6	Functional	2012	1-cusec	40 HP	C
TW #7	Functional	1992	1-cusec	40 HP	D
TW #8	Functional	1992	1-cusec	40 HP	D
TW #10	Functional	2005	1-cusec	40 HP	C
TW #11	Functional	2012	1-cusec	40 HP	B
TW #12	Functional	2008	1-cusec	40 HP	C
TW #13	Functional	2012	1-cusec	50 HP	B
TW #14	Functional	2012	1-cusec	40 HP	B
TW #15	Functional	2012	1-cusec	40 HP	C
TW #16	Functional	2012	1-cusec	40 HP	C
TW #17	Functional	2012	1-cusec	40 HP	B
TW #18	Functional	2012	1-cusec	50 HP	B
TW #19	Functional	2012	1-cusec	50 HP	B
TW #20	Functional	2012	1-cusec	40 HP	B
TW #21	Functional	2012	1-cusec	40 HP	B
TW #22	Functional	2012	1-cusec	40 HP	B
TW #23	Functional	2012	1-cusec	50 HP	C
TW #24	Functional	2012	1-cusec	50 HP	B
TW #25	Functional	2012	1-cusec	50 HP	B
TW #26	Non-Functional	2012	1-cusec	50 HP	B
TW #27	Functional	2012	1-cusec	50 HP	B
TW #28	Functional	2012	1-cusec	50 HP	B
TW #29	Functional	2012	1-cusec	50 HP	B
TW #30	Non-Functional	2012	1-cusec	50 HP	B
TW #31	Functional	2012	1-cusec	40 HP	B

Water Supply Infrastructure of Pakpattan City – Water Lines & Distribution Network

Asset Type	Type	Status	Diameter	Material	Condition	Overall Condition
Water Supply Lines (252 KM)	Rising Mains (28 KM)	F = 20 KM NF = 8 KM	Varies 6" – 8"	Varies (CI, PVC, AC)	C = 18 KM D = 2 KM F = 8 KM	C
	Distribution Lines (223 KM)	F = 207 KM NF = 16 KM	Varies 3" – 4"	Varies (CI, PVC, AC)	C = 207 KM F = 16 KM	C

Sewerage Infrastructure of Pakpattan City – Disposal Stations

Name/Area	Functional Status	Hours of Operation	Capacity (cusecs)	Installed Motor Rating (HP or kW)	Overall Condition
Disposal Works – Tiba Sherkot	Functional	18	8+8+5+5+5	80+80+60+60+60	C
Disposal Works – A-Zone Harsa Khamba	Functional	18	5+5+5	60+75+75	C
Disposal Works – Jhugian Kundan Lal	Functional	18	2+2+5+5	75+60 60+60	C
Disposal Works – B-Zone 16/SP	Functional	18	5+5+5	60+60+75	C
Disposal Works – C-Zone Jamal Chowk	Functional	18	5+5	60+75	B

Sewerage Infrastructure of Pakpattan City – Sewer Lines & Drains

Asset Type	Type	Status	Diameter	Material	Condition	Overall Condition
Sewerage System (253 KM)	Trunk Sewers (32 KM)	F = 30 KM NF = 2 KM	Varies 15" – 48"	RCC	C = 22 KM D = 8 KM F = 2 KM	C
	Lateral Sewers (216 KM)	F = 216 KM NF = 0 KM	12"	RCC	C = 216 KM	C
	Open Drains (5 KM)	F = 5 KM NF = 0 KM	9" x 9"	Masonry & RCC	C = 5 KM	C

WATER SUPPLY & SANITATION

Regional Development Plan of Sahiwal

Water Supply Infrastructure of Okara City – Tube Wells

Asset Name	Functional Status	Year of Installation	Capacity	Installed Motor Rating	Overall Condition
TW #01	Functional	2003	1-cusec	40 HP	C
TW#02	Functional	2003	1-cusec	40 HP	B
TW#03	Non-functional	1995	1-cusec	40 HP	F
Tw#04	Functional	2003	1-cusec	40 HP	C
TW#05	Functional	2003	1-cusec	40 HP	D
TW#06	Functional	2003	1-cusec	40 HP	C
TW#07	Non-functional	2003	1-cusec	40 HP	D
TW#08	Non-functional	2003	1-cusec	40 HP	C
TW#09	Functional	2003	1-cusec	40 HP	C
TW#10	Non-functional	2003	1-cusec	40 HP	C
TW#11	Functional	2003	1-cusec	40 HP	C
TW#12	Functional	2003	1-cusec	40 HP	C
TW#13 New	Non-functional	2021	1-cusec	40 HP	A
TW#13 Old	Non-functional	1995	1-cusec	40 HP	F
TW#14	Non-functional	2003	1-cusec	40 HP	D
TW#15	Functional	2003	1-cusec	40 HP	C
TW# 16	Non-functional	2003	1-cusec	40 HP	C
TW#17	Non-functional	2003	1-cusec	40 HP	C
TW#18	Functional	2003	1-cusec	40 HP	C
TW#19	Non-functional	2021	0.5-cusec	20 HP	A
TW#20	Non-functional	1995	0.5-cusec	20 HP	D
TW#21	Non-functional	1995	0.5-cusec	20 HP	D
TW#22	Functional	2003	0.5-cusec	20 HP	C
TW#23	Non-functional	1995	0.5-cusec	20 HP	F

Water Supply Infrastructure of Okara City – Overhead Tanks

Asset Name	Functional Status	Year of Installation	Capacity	Installed Motor Rating	Overall Condition
Old Water Works OHR	Functional	1935	50,000 G	N/A	C

Water Supply Infrastructure of Okara City – Ground Storage Tanks

Asset Name	Functional Status	Year of Installation	Capacity	Installed Motor Rating	Overall Condition
Chamra Mandi Water Works GST	Functional	2003	80,000 G	N/A	C
Gaziabad Water Works GST	Non-functional	2021	100,000 G	N/A	B
Shamsia Colony Akbar Tank GST	Functional	1990	80,000 G	N/A	B
Old Water Works GST	Functional	1935	80,000 G	N/A	B

