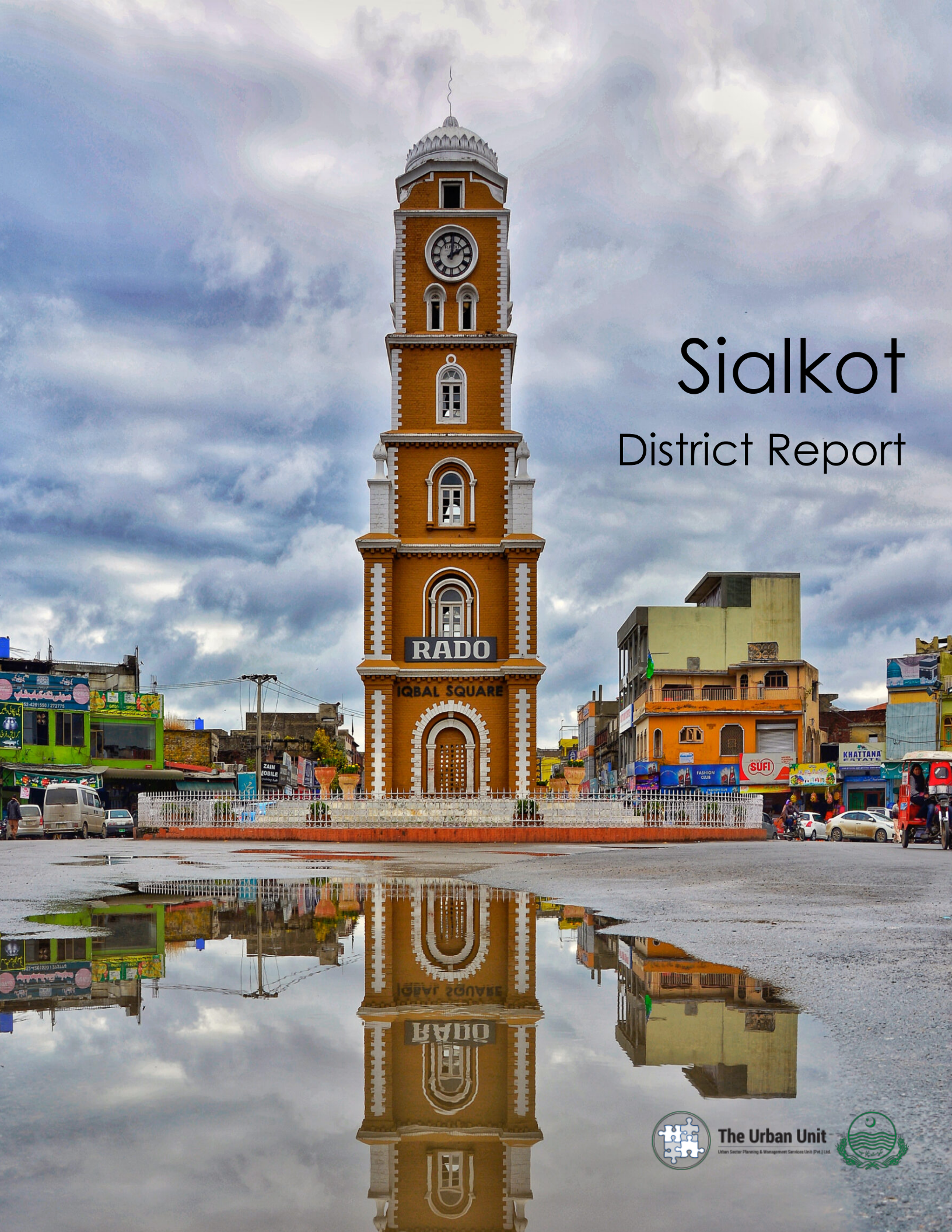

Sialkot

District Report

The Urban Unit

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

The Urban Sector Planning & Management Services Unit Pvt. Ltd.

(The Urban Unit)

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Contents

Acronyms & Abbreviations

District Profile

1.1. Location / Boundary

District Sialkot is the 9th largest district of Pakistan and encompasses over an area of 745,269 Acres (3,016 km2)[1] with population of about 3.9 million.[2] Whereas, Sialkot city is the 13th largest city in the Punjab. Presently, about 0.7 million are in Municipal Corporation Sialkot. By addition of new UCs, the present population will become 0.72 million.

Sialkot District is bounded on the north-east by the Jammu & Kashmir state, on the north-west by rivers of Ravi and Chenab, which separate it from the Gujrat District, on the west and southeast by Gujranwala and Narowal District respectively. It is an irregular tract occupying the sub-mountainous portion of Rachna. It is divided in four sub-divisions i.e. Sialkot, Daska, Pasrur and Sambrial.

The district is a plain, sloping down from the uplands at the base of the Himalayas to the level country in the south. It is one of the few cities of Pakistan where dry port was established in 1984 and export processing zone (EPZ) was developed in 1995. Sialkot has 8,100 industrial units which make it 4th largest manufacturing hub. Sialkot is the 2nd largest surgical instrument manufacturing city in the world. It is 3rd largest sports manufacturer in the world and ranks 1st in Asia. Sialkot is the sole city in Pakistan in which private airport was developed having the longest runway.

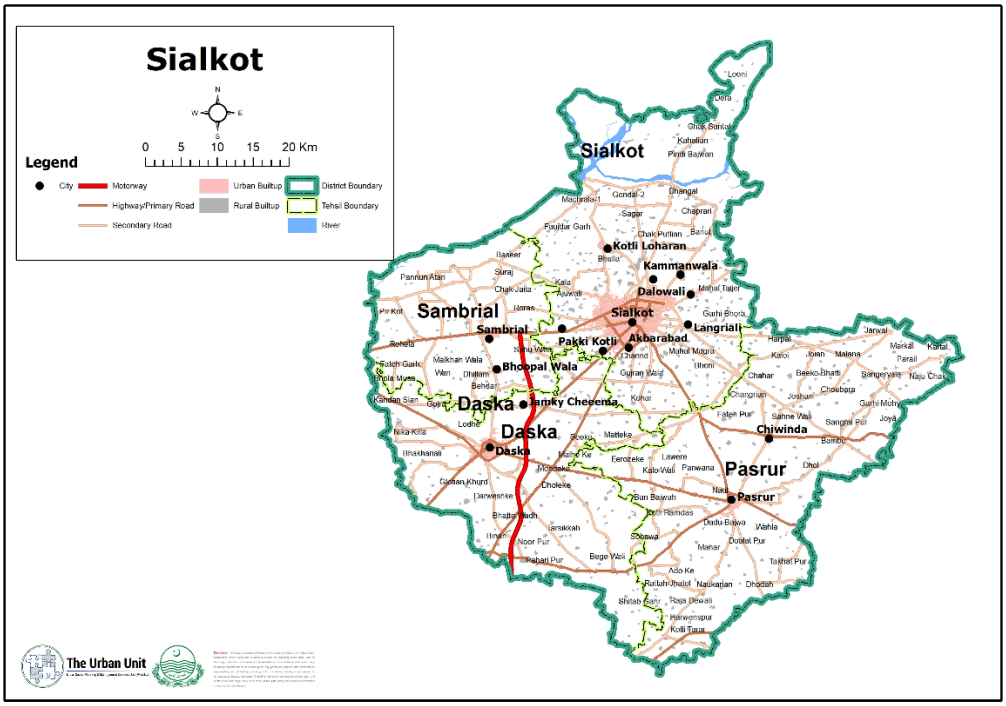


Figure 1: Location / Boundary Map of Sialkot District

[1] Master Plan Sialkot. 2020. Punjab Intermediate Cities Improvement Investment Program. Final Master Plan report, Vol-I.

[2] Population Census, 2017

The district Sialkot is bounded on the North by Indian held Jammu & Kashmir, on the North West by District Gujrat, on the South West by the District Gujranwala, on the West East by District Sheikhupura and Narowal. In the south east "Nullah Daik" separates District Narowal from District Sialkot and enters Lahore. In west there is a vast plane area which is very fertile. The soil at the surroundings of "Nullah Daik" and river "Chenab" is very fertile. There are two canals in the district namely; Upper Chenab and Marala Ravi Link. These canals were derived from River Chenab and Marala Head Works in years 1937 and 1955.

1.2. Demographic and Socio Economic Trends

The population as per the latest census data (2017) of MC Sialkot residing in 24 UC's is 591,668 persons[1], whereas an additional 121,5422 persons currently reside in the additional five (05) UCs, making a total of 713,210 persons in 29 UCs.

Similarly, Sialkot's urban population is expanding rapidly. Its share has raised from 32% of the population in 1998 to 25% today; if current trends of rural to urban migration continue, this share will exceed 50 per cent in 2025. This trend will have additional complexity, as the inability of the city to absorb, comfortably accommodate, and meaningfully employ rural-to-urban migrants exacerbates social/ethnic tensions between 'native' and migrant populations.

Table 1: Urban and Rural Population Growth Rate of Sialkot District from 1998 to 2017

Area	Household	Population 1998	Population 2017	Average Annual Growth rate 1998 - 2017
Rural	400,653	1,938,758	2,750,310	1.85
Urban	173,490	784,723	1,143,362	2.00

Table 2: Existing Administrative Units and Population (2020)

Administrative Units in Gujranwala District	Population
Tehsil Council, Sialkot	762,923
Tehsil Council, Daska	622,746
Tehsil Council, Sambrial	290,463
Tehsil Council, Pasrur	731,468
Municipal Corporation, Sialkot	733,422
Municipal Committee, Daska	195,584
Municipal Committee, Sambrial	102,063
Municipal Committee, Pasrur	82,485
Town Committee, Kamanwala	24,275
Town Committee, Uggoki	36,115
Town Committee, Kotli Loharan	32,680
Town Committee, Jamke Cheema	28,603
Town Committee, Bhopalwala	20,190
Town Committee, Chawinda	26,928
Town Committee, Pakki Kotli	27,458
Town Committee, Langrali	23,294
Town Committee, Akhbrabad	21,712
Town Committee, Dalowali	20,018
Town Committee, Bherth	48,559

Sialkot MC now consists of 29 UCs. The total projected population outside MC Boundary is 316,364. The total projected population for 2044 including MC, additional UCs and outside MC area is 1,878,243.

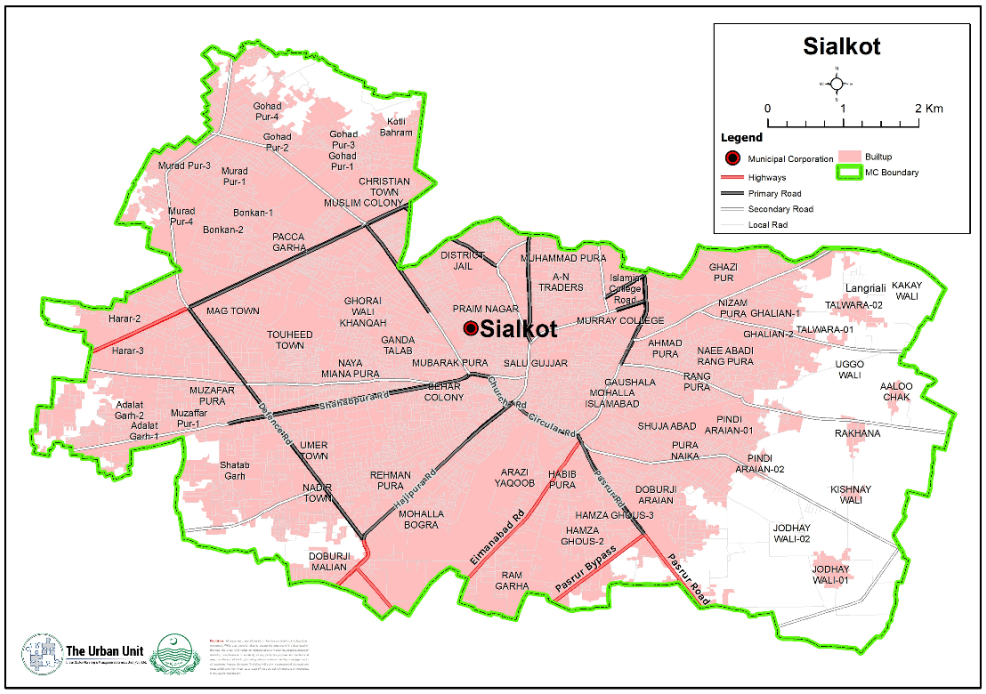


Figure 2: Location / Boundary Map of Sialkot MC

Table 3: Total Population of MC Boundary

Description	No. of Persons
Population inside MC boundary	1,295,710
Population in additional 5 UCs	266,169
Population outside MC boundary	316,364
Total Population	1,878,243

Sialkot is one of the important economic centers of Pakistan and famous all over the world for its leather garments, surgical instruments and sports goods export. During last three decades this city made a tremendous progress in the development of small and medium industry, which created a lot of income generating activities and job opportunities in the city which improved the living standard of local people. This situation is favorable to some extent for the urban growth but as trend indicates, this higher population growth rate put the existing municipal system under stress and worsens day by day.

Moreover, Sialkot plays an important regional role as an agricultural processing and shipping center, supplier of goods and services to surrounding smaller urbanizing and rural areas, and generates significant employment in surrounding settlements as a result of the contracted work system favored by many of the manufacturers.

Sialkot has a very pro-active and entrepreneurial private sector interested in the city, leading its industrial economic base, and ready for more PPP participation to move the city forward. The city has Pakistan's only privately developed and operated international airport which is a strong attraction for its international customers. Road and rail transport connections exist and are in the process of being improved. International competition is increasing as technology slowly replaces the hand labor skills that built Sialkot's position. The city needs to work hard to establish a more competitive environment.

1.3. Land-Use

Sialkot city consists of wide road network and various land-use features which include residential/urban area, commercial area, educational institutes, industrial areas government offices, hospitals, fuel filling stations, parks & play grounds, sports and recreational facilities etc.

Total land area of Sialkot city is 47.84 km^2 (11,822 acres) in which 18.20 km^2 (38%) is urban/residential followed by agriculture (13.53 km^2, 28%), open area (5.3 km^2, 11.5%) and roads (4.4 km^2, 9.3%).

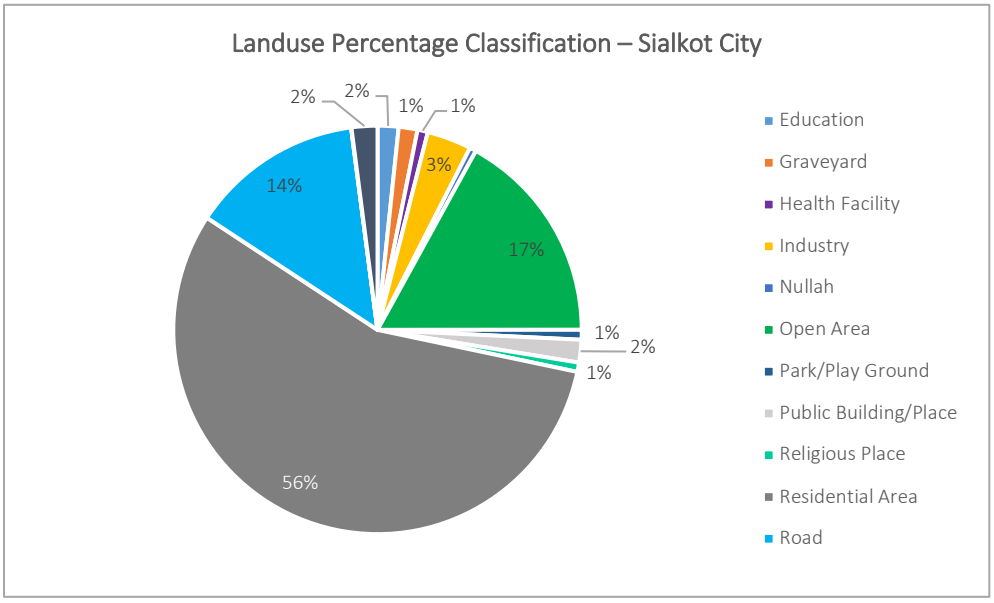


Figure 3: Land-use Percentage Classification of Sialkot City

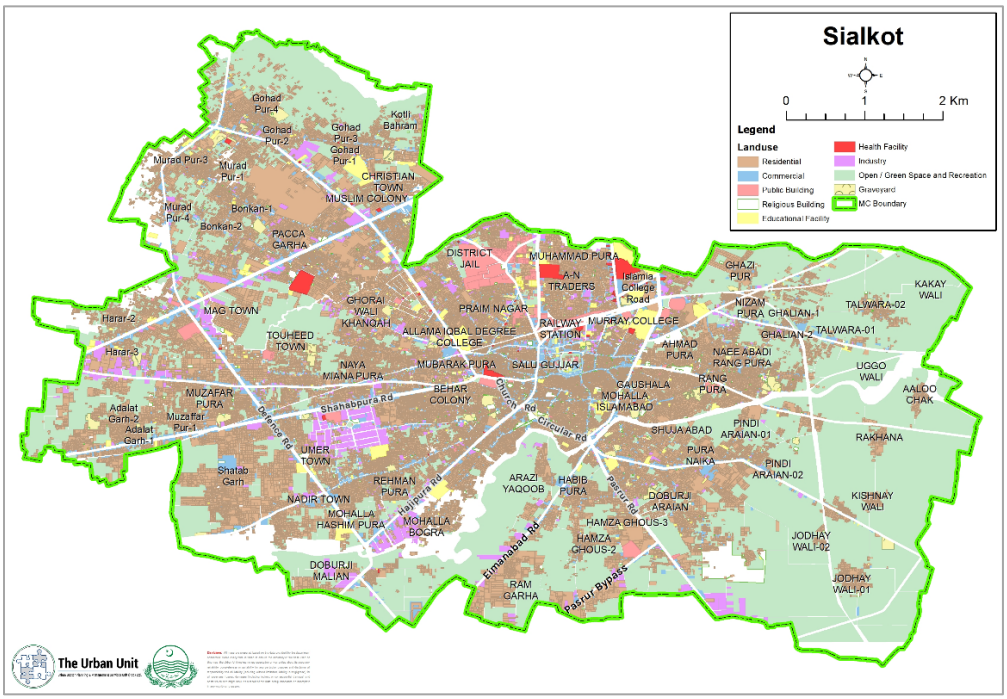


Figure 4: Land-use Map of Sialkot City

Land uses in Sialkot City are mixed, and in many cases incompatible due to a lack of development control. Sialkot would benefit from stronger land use controls to prevent potentially harmful activities from being located near residential areas and vice versa. Of particular concern is the proliferation - 400 to 500 - of tanneries located within the more central urban area. At the same time, Sialkot has very few green areas or parks, with the most prominent being Gulshan-e-Iqbal Park off Narowal Road, a park in the Cantonment and the Stadium. There is need for more open spaces, more defined spaces for industrial activities and a better-defined road network in both the core city and contiguous areas.[3]

The overall desire is to maximize the potential of inner city lands and infrastructure while improving the living environment and quality of life. Sialkot has one low layer of development spreading across the city with many land parcels undeveloped, underdeveloped or in derelict condition. There is significant development potential here if the environment is in place to encourage that mobilization of capital. At present there is little incentive and numerous disincentives to private sector investment in many of these areas. Low taxation creates no need to develop. The congested streets, lack of public transport and poor condition of other infrastructure and services do not invite investment.

1.4. Climate

Climate has humid, subtropical climate with four seasons. The highest day temperature is recorded in the months of May and June. The post-monsoon season from Mid-September to End-October remains hot during the daytime, but nights are cooler with low humidity. In the winter from mid-November to March, days are mild to warm, with occasionally heavy rainfalls occurring. Most precipitation falls in July, August and September with an accumulative average annual rainfall of 772mm.

Table 4: Climate Data Sialkot

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Avg Temperature (°C)	12.1	14.8	20.1	25.8	31	33.6	30.9	29.5	29	25.1	18.5	13.3
Min Temperature (°C)	5.7	8.1	13.3	18.4	23.1	26.6	26.2	25.3	23.6	17.8	10.5	6.1
Max Temperature (°C)	18.5	21.6	26.9	33.2	38.9	40.7	35.6	33.8	34.4	32.4	26.5	20.5
Precipitation/Rainfall (mm)	46	40	41	20	16	61	134	252	114	18	8	22

The monsoon seasonal flooding in Sialkot occurs when the rivers running through the city and surrounding areas overflow due to extreme and unusual volumes of rain in the upstream, mountainous regions of Kashmir. 160. The impact of this flooding in Sialkot is probably exacerbated by the fact that an increasing proportion of the city area in recent years has been covered by impenetrable surface materials such as asphalt and concrete, thus reducing the absorption capacity of the city soil compared with earlier. More importantly, flooding events are exacerbated by drains and natural water courses and ponds being blocked by irregularly dumped solid waste. Sialkot has no separate storm water system. The drains along main roads are designed for storm water but actually carry both storm and waste water, and are also used for irregular disposal of solid waste.

The Chenab River traverses near to Sialkot, and several canals extend from it. Upper Chenab Canal takes-off from the River Chenab at Marala Barrage with full discharge capacity of 16,500 cusecs and passes the

3

Sialkot City near its RD: 81+000 (Sialkot-Wazirabad Road). Sialkot District has experience notable flood events (exceptionally high flood) in the past few decades. The 1992 flood was the ever highest in the history of Marala Barrage with magnitude of 845,092 cusecs. The classification of Flood Limits in cusecs at U/S of Marala Barrage is as follows;

Table 5: Historical Peak Discharges of the Barrage (2003-13)

Date	Discharge U/S Barrage (cusecs)	Flood Type
19-02-2003	316,924	High
17-08-2004	93,150	Normal
07-07-2005	345,479	High
04-08-2006	247,123	High
13-03-2007	257,409	High
08-08-2008	174,977	Medium
28-07-2009	129,963	Low
06-08-2010	314,378	High
16-09-2011	169,055	Medium
04-08-2012	205,914	High
15-08-2013	377,290	High

The potential vulnerability threat to existing assets is clear, especially to water supply as a considerable numbers of tube wells and filtration plants are located in the flood prone areas. Much of the local flooding is caused by a vicious circle of poor drainage and solid waste management leading to even worse drainage and solid waste management issues. A key starting point for introducing strategic resilience building measures is therefore to reduce those human induced factors that add to the flooding, e.g. covering with impenetrable surface materials and drain blocking. In addition, the basic urban service systems that do exist should not be allowed to further deteriorate and lag behind the rapid urban development, which characterizes Sialkot.[4]

Urban flood happens because of inadequate storm and sewer system within Sialkot. Fluvid flood from Aik Nullah, Bhed Nullah and Phalku Nullah is a major calamite for Sialkot (DDMA, 2008). Sialkot has uneven land gradient, which results in small catchments and localized ponding when flood occurs. Figure IV-4 shows the flood-prone area and the main corresponding floodwater source around the Sialkot urban area. Most central city is under the threat from the heavy storm. Palkhu Nullah causes flood in the northeast, while Bhaid Nullah causes flood in the northwest of the city. The Aik Nullah caused flood in the south and southwest of the city.

1.5. Environmental Landscape

Unchecked disposal of untreated municipal and industrial wastewater and excessive use of fertilizers and insecticides are the major causes for deteriorating ground water quality in the region. Sialkot, known as a hub of industries is facing severe challenges in maintaining surface and groundwater quality due to rapid industrialization along with urbanization and unsustainable agricultural activities. All the industrial units consume large amount of water which, together with dissolved toxic substances (acids, base or toxic chemical compounds and heavy metals) after processing is discharged into nearby agricultural lands, ponds, open ditches, rivers, streams and open land. Toxic effluents percolate down into the soil resulting in aquifer contamination, polluting potable water supplies. Open unlined drains and dumping sites of urban

[4] Medium Term Integrated Climate Resilient Urban Infrastructure Investment Program and Pre-Feasibility Study. 2016. Asian Development Bank

and industrial waste, agricultural runoff and flooding during monsoon season are other most hazardous polluting source of groundwater contamination.

Majority of the urban population relies on dug wells, boreholes, hand pumps and tube wells for drinking water and other purposes. Pollution in the shallow groundwater has critically impact the health of the citizens. Environment and Climate Change Vulnerability Assessment (CRVA) report[5] of Sialkot indicates to drill about 180 meters (600 ft.) to extract clean water.

Sialkot district experiencing significant seasonal variation in temperature with mean average temperature is 30.27 ^{o}C, it is expected to increase up to 32.06% by 2030 under different climate change scenarios.[6] Similarly, it is expected that annual rain fall may increase upto 9.4% by 2030 in Sialkot. The district has already experienced four major flooding events in the last decade which is exacerbated by the inadequate storm and wastewater infrastructure in the city.

There is lack of green spaces in Sialkot and the existing parks are not well maintained. The two major parks i.e. Gulshan-e-Iqbal Park and Qila Park requires massive rehabilitation.

[5] Sialkot PFS Environment and Climate Change Detailed Report and Recommendations. 2016. Pre-Feasibility Study for Sialkot and Sahiwal Cities. Asian Development Bank
[6] Ibid

Current State of Water Supply

2.1. Water Resources

River Chenab is the main nearest source of surface water for Sialkot City. Marala Barrage is the nearest structure to Sialkot on River Chenab. The Barrage is located 23 km towards North East from Sialkot city. It is 16 km from the foothills of Pir Punjab Range where it enters the plain lands near Ahknoor. Upper Chanab Canal (UCC) and Marala Ravi (MR) Link Canal take-off from Marala Barrage and cross the Sialkot City from the north-west. Similarly, some natural nullahs are also passing through the Sialkot.

The Chenab receives its supply of water from the snow-covered central range of Himalayas as well as from numerous smaller streams from the lower hills. The force of the river throughout its curse is considerable. In its left bank upper Marginal Bound and lower marginal bound have been constructed near Head Marala saving vast area of Sialkot Tehsil from flood devastation.

The two Tawis, namely Jammu Tawi and Munawar Tawi are small rivers, which originate from Jammu & Kashmir State Territory and enter District Sialkot at its northern tip. These two merges with river Chenab near Marala Barrage. Jummu Tawi is of particulate mention, because it cuts off Bajwat area completely from the rest of the Tehsil during the flood season.

The surface water facilities (river & canal) appears to be the main source of groundwater recharge in the area. The aquifer underlying Sialkot area is unconfined and comprises sand with clay lenses of varying thicknesses and extension at places, and is the continuity of the aquifer of the Punjab plain. The reported thickness of aquifer around 1300 ft. The aquifer mainly comprises sand with clay lenses of varying thickness and extension at places.

Due to un-certainty of flows and huge financial requirement for water storage and treatment, Nullahs are not feasible for water supply. Flows of MR Link are only available in flood season and therefore water requirement can only be fulfilled in flood season. Water from Chenab River can be used directly for Sialkot city from Marala Barrage, in this scenario the carriage cost will be too high. The most feasible source of water may be through Upper Chenab Canal but It may be noted that during canal closure period i.e. in January and sometimes in February, there is no water available from UCC. Similarly, in some months of year the flows in the canal receded to zero which may be due to none availability of waters at head or otherwise shortage in the system. Therefore, it is proposed to rely on ground water.

2.2. Water Coverage

As per data obtained from MC Sialkot, there are about 43,469 connections (39,658 domestic), which serve about 39% of the households within the Municipal Corporation limits. As per census 2017 there are 110,788 households in MC Sialkot (29 UCs). 51% population is served with 37% population connected in MC area. Rest of the population has installed shallow wells to meet their water demands. Mostly water supply schemes have been installed by the Public Health Engineering Department and operation and maintenance of the schemes is being managed by MC Sialkot through revenue generated by a pre-defined tariff.

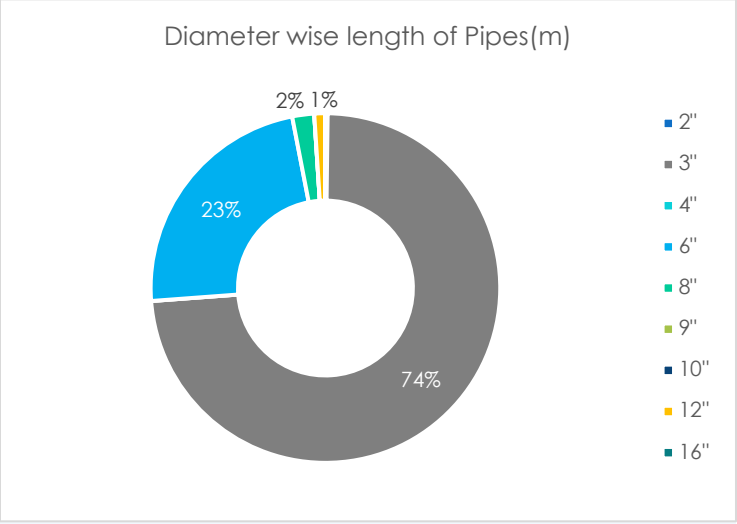
Figure 5: Comparison of Water Coverage of MC Sialkot and MC Pasrur of Sialkot District

Among all four MCs, MC Sialkot has the highest water coverage i.e. 39% (which is already very low in terms of population size). Where, 0.75 km^2 of MC Pasrur has water supply coverage. Similar disparities is observed between other districts of Gujranwala region.

2.3. Water Distribution Network

No comprehensive water supply scheme has been proposed and implemented in last many years. One of the major problems of water supply is outlived lines and mixing of sewage into water. At many locations, existing water supply lines were damaged during laying of sewer lines which resulted in mixing of sewage with water supply. Also, some areas are experiencing very low pressures due to bore choking, leakages or less operational hours.

Moreover, the valves are buried underground throughout the city and their locations are untraceable. At present, MC is carrying out O&M of water supply lines of about 357 Km varying from diameter (400mm) laid in various phases and sub projects and connected with tube wells. Different material water supply pipes exist including Asbestos Cement (AC), Galvanized Iron (GI), Cast Iron (CI), Mild Steel (MS) and Polyvinyl Chloride (PVC). Diameter wise length of existing pipe is exhibited below:



Pipe Diameter (Inch)	Length (m)
2"	716
3"	257,869
4"	58,40
6"	81,024
8"	7,107
9"	7,70
10"	7,94
12"	35,11
16"	77

Figure 6: Diameter Wise Length of Existing Water Pipes (m)

2.4. Water Depth

Water depth in the district is varied and ranges between 5m to 30m. The below table provides water depth (m) in different areas of Sialkot;

Table 6: Water Depth (m)

Area	Depth (m)
Sialkot City Area	City area ranges between 5 m to 32.5 m About 32 % of the water points ranges between 5 to 10 m 17 % ranges between 10 to 20 m 49 % ranges between 20 to 30 m and 3 % is above 30 m (Sialkot Fort).
Airport Road	Depth to water table ranges from 4.49 m to 12.69 m
Sialkot-Daska Road	Depth to water ranges from 6.39 m to 14 m
Fatehgarh Road	Depth to water ranges from 4.79 m to 13.7 m

2.5. Water Demand

Despite the significant population increase, there has been no definite plan for increasing the capacity of water sources to meet the increasing water demand. Current and Future water demand of kot District (Urban is exhibited below.

Table 7: Water Demand – Projection till 2030

Parameters	2017	2025	2030
Population	586,166	684,822	800,082
Domestic (MGD)	20,515,826	23,968,766	28,002,857
Commercial (MGD) (15%)	3,077,374	3,595,315	4,200,429
Institutional (MGD) (10%)	2,051,583	2,396,877	2,800,286
Industrial (MGD) (10%)	2,051,583	2,396,877	2,800,286
Losses (30%) (MGD)	8,308,910	9,707,350	11,341,157
Total	36,005,275	42,065,185	49,145,015

Year	Average Daily Demand		Maximum Daily Demand		Daily Supply	Deficit (Max)
	MGD	cusec	MGD	cusec	MGD	MGD
2020	36	55.69	54	83.54	38.75	15.25
2025	42	64.97	63	97.46	38.75	24.25
2030	49	75.80	73.5	113.70	38.75	34.75

2.6. Water Quality

The groundwater quality results were examined that is being used for drinking purpose and for insight into the elevated concentrations of specific elements in the water samples. Any groundwater contamination in the area, being the aquifer as a single homogeneous water body, may create serious environmental and health problems.

Analytical results for the unlimited Total coliform values presented in the last column of Table 4.3 indicate that coliform was substantially high and groundwater quality has been significantly impacted. The presence

of coliform in groundwater has revealed contamination of aquifer that has been evidenced from all the tube wells. The reason for presence of coliform was not understandable which requires further monitoring. The predominant level of coliform in most of the tube wells is of major concern.

The coliform presence can be associated with a leaking mechanism of some sewage water from pipelines into the aquifer that should further be verified, if these values decrease appreciably over time. Site background concentrations need to be included in a study for comparison to assess the corresponding increase or decrease in coliform in the groundwater or persisting trend is found across throughout the area.

Existing water supply Infrastructure

2.6.1. Main Sources of Water supply in Sialkot District

Motorized pumping is the main source of drinking water in both Urban and Rural areas of Sialkot district as per the figures available in PSLM 2014-15 (Fig. 7). The stats shows grave picture in rural areas where 87% of rural population relies on motor pumps, hand pumps, dug wells and other sources.

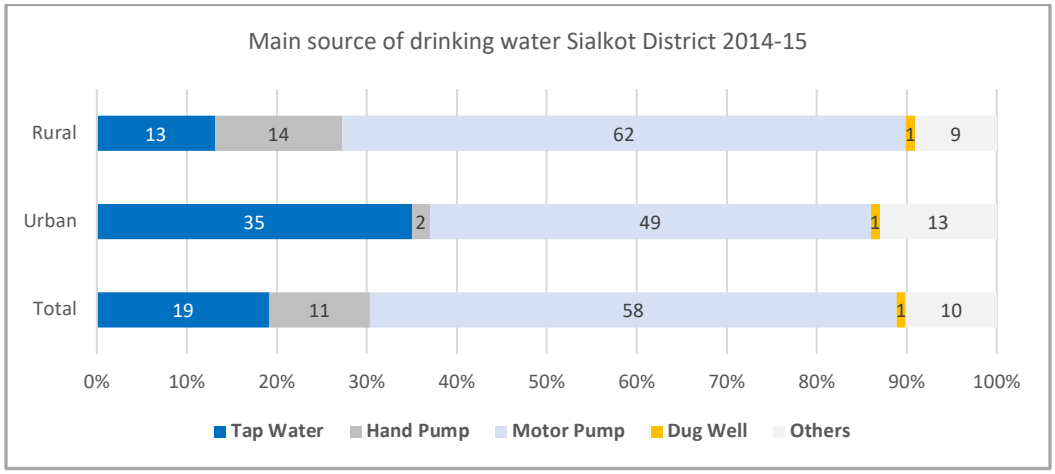


Figure 7: Main Sources of Drinking water in Sialkot district

Current water supply system in Sialkot City is a combination of the following components:

Table 8: Existing Water Supply System in Sialkot City [7]

Sr. No	Component	Qty	Capacity/Size	Remarks
1	Power Operated Tube wells	113 Nos.	- 1.5 Cusec	103 Nos. Operational
2	Overhead Tanks/ Reservoirs	11 Nos.	10,000 – 100,000 Gallons	Not Operational
3	Distribution Network	357 Km	2" – 16"	Mostly Operational
4	Filtration Plants	39 Nos.	1000 – 2000 L/hr	34 Nos. Operational

2.6.2. Tube Wells

[7] WSS and Environmental Baseline Data Collection Performa, 2020

Presently there are 113 Nos. tube wells installed in the city having designed capacity ranging from 1.0 cusecs to 1.5 cusecs installed capacity but the actual discharge varies with the condition of the pump. The functional tube wells are working on average 12 hrs. a day in different shifts. The bore depth of tube wells varies between 400 to 600 ft. Average bore depth is 528.49 ft. There is no integrated control system such as SCADA for the tube well installations or pressure gauges.

Tube wells have been installed in different span of time, therefore, in different period of time the tube wells have been segregated. Maximum no. of tube wells were installed in period of 2005-2010 i.e. 43 Nos. and minimum No. of tube wells were installed in period of 1990-1995 and 2015- 2018 i.e. 05 Nos. tube well in each tenure.

Total pumping capacity installed in MC Sialkot is 160.5 cusecs whereas actual pumping capacity is 122.3 cusecs. Tube wells have been installed of different pumping capacities, therefore, the tube wells are segregated. Maximum no. of tubewells are installed having pumping capacity of 1.5 cusecs i.e. 89% of total No. of tubewells installed.

2.6.3. Overhead reservoirs

There are eleven (11) Nos. existing overhead reservoirs (OHR) in Sialkot City. Total storage capacity of OHRs is 430,000 gallons but these are currently not in service.

2.6.4. Water Filtration Plant

There are total thirty-nine (39) water filtration plants installed in Sialkot city which are under operation of MC Sialkot. Filtration plant is installed in the tube well room; free space is not enough or proper installation and maintenance of water filtration plants. Present condition of water filtration plant is deteriorated, unclean, contaminated, and unhygienic. Filter media is not replaced since installation UV was malfunctioned and detached from the treatment process which means biological contamination is not being removed. Mostly, local steel media filter vessels are used which are obsolete now. There is no storage tanks, thus water is only available in tube well operational hours.

2.6.5. ASSET CONDITION ASSESSMENT

The team performed condition assessment of the infrastructure by physically visiting each facility. Ten tube wells, five filtration plants and three OHRs were examined in this regard on the basis of criteria mentioned in the below table:

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

Observations:

Tube Wells

- Non-functional chlorinators and unavailability of bulk meters (F)
- Improper layout of electric cables on control panels (D)
- Motor fan covers are not present (C)
- Non-existent pump houses (F)

Filtration Plants

- Condition of civil structure is acceptable but work is required in the interior (B)
- Water taps require replacement (C)
- Inadequate cleanliness around water filling area (C)

OHRS

- Earth wiring mechanism and hazard lights for air traffic missing (F)
- Civil structures have expired their life (Non-fuctional) (F)
- Pipes and valves have leakages (F)

Water Works – Sialkot

Karimpura Road - Sialkot

Water Works – Sialkot

Mohallah Pak Pura - Sialkot

Project Digest - WS

3.1. Proposed Projects

Based on the consultation meetings, planning exercise, WSS statistics, gaps in service delivery and future opportunities, on-going ADP schemes and the goals & objectives of regional plan, a phase wise plan is developed for the Sialkot district in two categories i.e. Rehabilitation of existing assets of water supply and Extension of WSS services in underserved areas. These phases are;

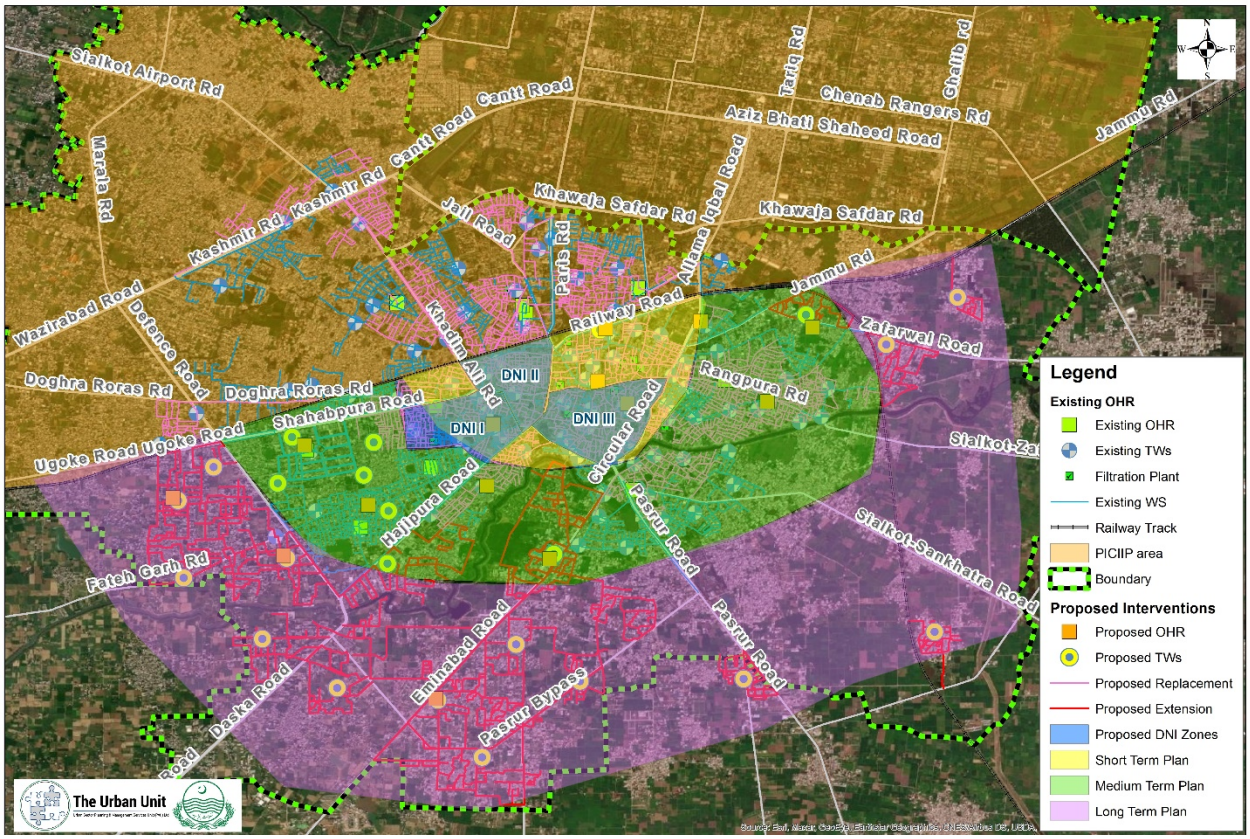
Table 9: Proposed Project Phases

Short Term (up to 3 years)	Replacement / Rehabilitation
Medium Term (3 to 5 years)	
Long Term (5 to 10 years)	
Short Term (up to 3 years)	Unserved Areas
Medium Term (3 to 5 years)	New WASA Areas

In this context, following projects are proposed in all three zones;

3.1.1. Short Term

Proposed Interventions - Water Supply Sytem



Zone	Proposed Schemes	Scope	Cost	Mode
	(i)			
	(ii)			
	(iii)			
	(iv)			
	(v)			

3.1.2. Medium Term

Zone	Proposed Schemes	Scope	Cost	Mode
	(i)			
	(ii)			
	(iii)			
	(iv)			
	(v)			

3.1.3. Long Term

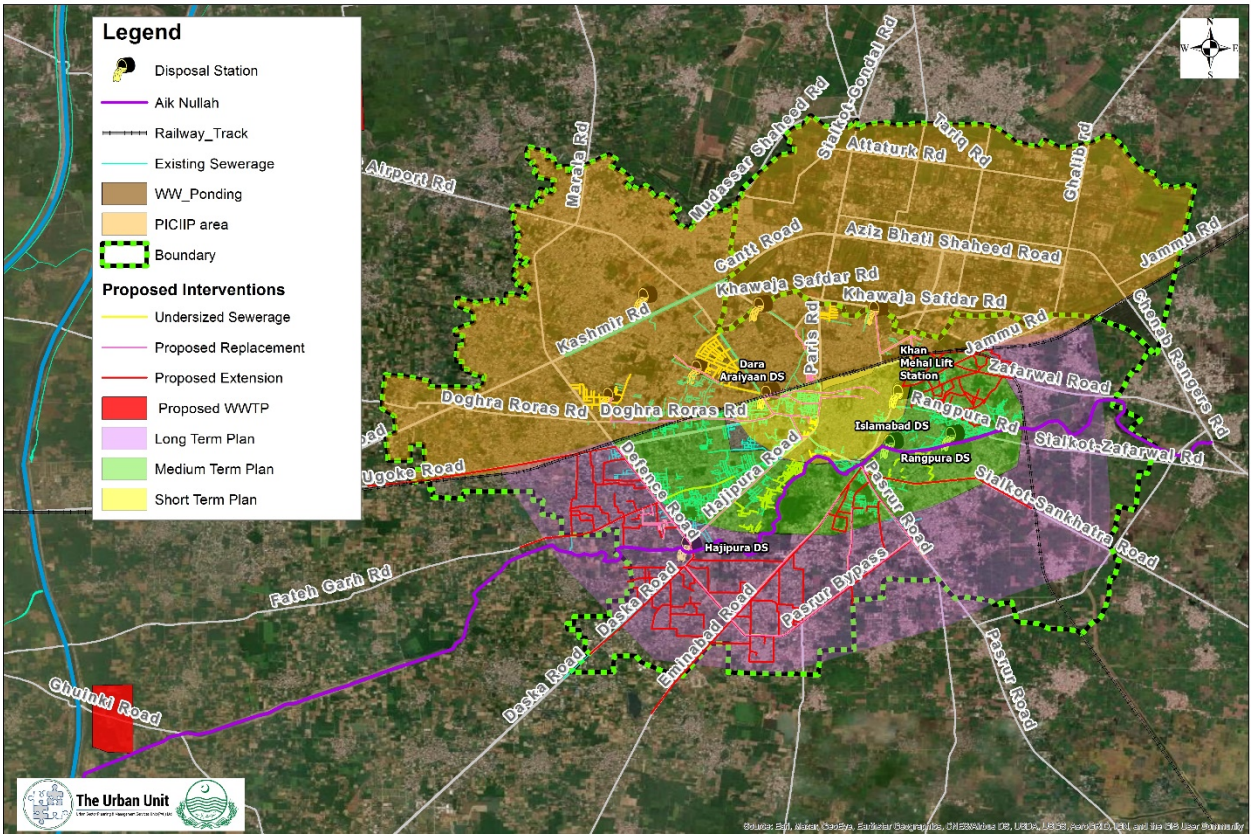
Zone	Proposed Schemes	Scope	Cost	Mode
	(i)			
	(ii)			
	(iii)			
	(iv)			
	(v)			

Sewerage System Project Digest – S

Sewage Generation (UU Project Area)

Year	**Population**	**Per Capita** (gpcd)	**Average Flow**	**Peak Flow** (PF 2) (MGD)	**Storm Water** (33% of Peak flow)	**Non-Domestic Flow** (5% avg flow)	**Infiltration (5% avg flow)**	**Total Flow** (Peak + storm + non-domestic + infiltration)
			MGD		**MGD**	**MGD**	**MGD**	**MGD**
2020	586,166	28	16.4	32.2	10.6	0.82	0.82	44.44
2025	684,822	28	19.1	38..2	12.6	0.95	0.95	52.7
2030	800,082	28	22.4	44.8	14.7	1.12	1.12	61.74

Proposed Interventions - Sewerage and Drainage



Environment and Public Parks