PROVINCIAL LAND USE PLAN OF KHYBER PAKHTUNKHWA

DISTRICT BANNU

Deliverable 04

DRAFT LANDUSE REPORT

The Urban Unit

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

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EXECUTIVE SUMMARY

The District Bannu Draft Land-Use Plan outlines a strategic, evidence-based framework for the sustainable, equitable, and efficient use of land resources. Developed under the Provincial Land Use Plan Project (PLUP) by the Urban Policy and Planning Unit (UPPU), the plan aims to address critical land management challenges and guide the district's long-term growth.

The core objectives of the plan are to enhance environmental quality by improving air and water standards and expanding green cover; to strengthen infrastructure by upgrading roads and public transport; and to stimulate economic growth through the development of industrial estates, expanding commercial hubs, and creating employment opportunities. Additionally, the plan introduces a structured settlement hierarchy comprising satellite towns, secondary centers, and industrial hubs to improve spatial organization, service delivery, and economic efficiency.

The planning process highlighted several pressing challenges facing District Bannu. Key findings include unregulated urban sprawl, illegal housing schemes, and the rapid conversion of agricultural land, all of which contribute to environmental degradation and undermine food security. Core infrastructure, particularly in transportation, healthcare, education, water supply, and sanitation, is inadequate and overstressed. Environmental concerns such as deforestation, poor waste management, and rising pollution levels further threaten ecological balance and public health. Despite these constraints, the district possesses considerable potential due to its strategic location along major trade routes and promising opportunities in the agro-based and hydrocarbon industries. Community consultations conducted throughout the planning process revealed strong public demand for improved urban management, inclusive growth, and better service delivery.

Based on these findings, the plan recommends strengthening institutional and legal frameworks, establishing planned industrial estates, expanding the housing supply, improving transportation networks, and upgrading public services. It also calls for investments in modern waste management, water conservation, afforestation, pollution monitoring, and urban greening to enhance environmental resilience. The economic strategy includes incentivizing investment in agro-processing, renewable energy, and the hydrocarbon sectors to diversify the economy and promote job creation. These measures are aligned with the overarching vision of transforming Bannu into *"a livable environment and gateway for international trade,"* a district that is resilient, green, and well-positioned for both domestic and cross-border economic integration. The implementation of these strategies is grounded in the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, which provides a comprehensive legal and institutional structure for effective planning, enforcement, and coordination through bodies such as the Provincial Council, the Authority, and District Committees.

The future development plans focus on addressing housing needs, upgrading infrastructure, expanding access to social services, and strengthening the agriculture and livestock sectors. The establishment of industrial and commercial zones is expected to stimulate economic growth, while improvements in environmental management and water systems will help meet rising demand and enhance sustainability.

To accommodate current and future development needs, the proposed land-use framework covers a total area of 181,644 hectares. A major portion, 94,189 hectares (51.8%), is designated as range, barren, or forest land to protect ecological functions, while 67,814 hectares (37.3%) are allocated to agriculture to reinforce the district's agrarian economy. For economic development, the plan reserves 89 hectares for Central Business Districts (CBDs), 271 hectares for Mixed-Use Zones, and 256 hectares for Industrial Zones. It also earmarks 175 hectares for a Model Environmental Village aimed at fostering regenerative, community-led living where people thrive in harmony with nature. Additional designations include 13,871 hectares for Riverine Forests, 1,682 hectares for Urban Farmland, and 157 hectares for Recreational Zones. To meet growing housing demands, residential zones are projected to cover 2,271 hectares by 2045. Public service areas include allocations of 142 hectares for Educational Zones, 127 hectares for Institutional Uses, 142 hectares for an IT Neighborhood, and 94 hectares for Health Services. For environmental infrastructure, 45 hectares are assigned to Waste Water Treatment Plants (WWTPs), along with 30 hectares for Buffer Zones.

In conclusion, the District Bannu Draft Land-Use Plan provides a well-rounded and actionable roadmap for sustainable and balanced development. Its phased implementation approach, strong institutional oversight, and commitment to inclusive stakeholder engagement ensure that the district is well-positioned to evolve into a resilient, environmentally secure, and economically integrated region, true to its vision as "a livable environment and gateway for international trade." The plan establishes a robust foundation for managing growth, safeguarding natural resources, and promoting socio-economic development, aligning local priorities with national goals and global sustainability commitments

1. PROLOGUE

1.1 Introduction

1.1.1 Background

Khyber Pakhtunkhwa's population is growing at an annual rate of 2.89%[1], and at this pace, it is projected to double by 2042. This rapid growth will place significant pressure on the province's natural resources and public infrastructure, leading to challenges such as inefficient land use, the conversion of agricultural land for commercial and residential purposes, water scarcity, deforestation, and environmental degradation. To address these issues, comprehensive district-level land use planning is essential to ensure the sustainable and efficient management of resources for present and future generations.

Land use planning plays a pivotal role in shaping settlements' social and economic landscape by assessing future population size, structure, and distribution. It also serves as a strategic tool for guiding agricultural and industrial development. Recognizing its importance, the Government of Khyber Pakhtunkhwa has initiated the preparation of District Land Use Plans (DLUPs) for all districts of the province. To implement this initiative, the Provincial Land Use Plan Project (PLUP) and the Urban Policy and Planning Unit (UPPU) have awarded a consultancy contract through a competitive bidding process to the Urban Unit (Urban Sector Planning & Management Services Unit Pvt. Ltd. Lahore) for the preparation of land use plans of 22 districts.

The Land Use Plan for District Bannu is a comprehensive and evidence-based planning document. This plan is a strategic framework to guide future growth by developing a comprehensive approach to land use and spatial planning in response to rapid population growth, urban expansion, and unregulated land conversion. Utilizing both primary and secondary data sources, the planning process involved household surveys, transportation and land use surveys, and stakeholder consultations. The plan proposes land use zoning, new urban areas to optimize land use, and minimize conflicts between residential, commercial, agricultural, and industrial land use. It emphasizes protecting ecologically sensitive areas through evidence-based planning. The plan incorporates legal mechanisms, institutional roles, and regulatory guidelines to support its execution at the district level.

Furthermore, The Land Use Plan will help to induce a sustainable development, optimize exploitation of land and physical resources, enhancing provincial income, increase overall activity and balanced distribution of infrastructure and services. The Land Use Plan will be a tool to provide guidance to Provincial Government, Urban Policy Unit and TMAs for undertaking integrated and coherent development programs.

Based on many studies, District Land Use Plan deals with efficient placement of broad, District-level Land Use and zoning for the sustainable growth of a District as a whole. It differs from the urban structure plans in many ways. A District can have more than one urban area and hundreds of villages and the District Plan have to consider these all. Besides, the nature of Land Uses at District level is not commonly found in an urban area, such as large-scale agriculture, rangeland, forestry, livestock, fishery etc. As against District Plan, the focus in urban plans is identification of issues and solutions for Central Business District, neighborhood planning, urban municipal services etc.

[1] *6th Population Census & Housing Census 2017, Pakistan Bureau of Statistics, Government of Pakistan.*

1.1.2 Objectives

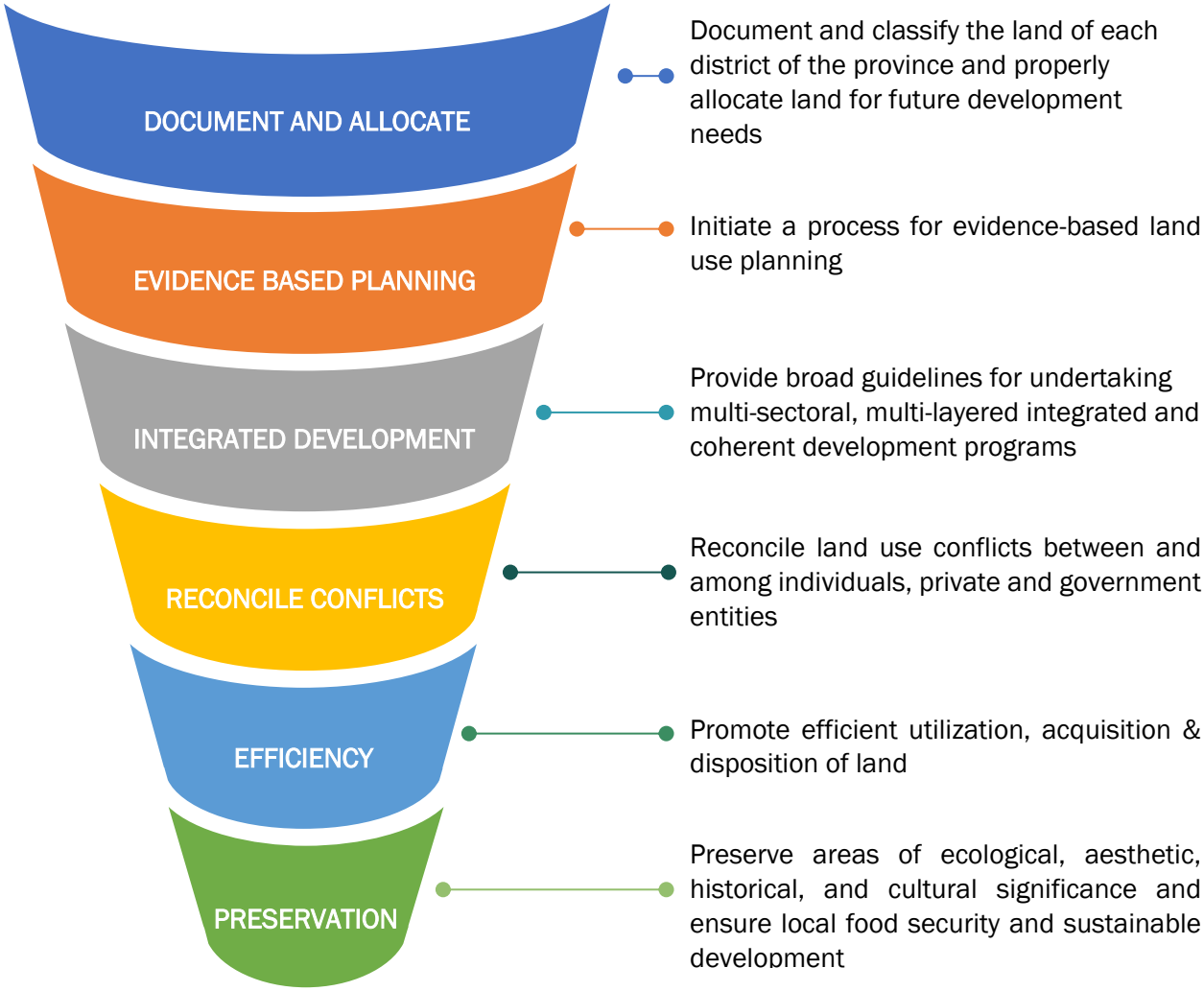


Figure 1-1: Objectives of the Study

1.1.3 Land Use Planning Process

Land use planning is believed to be holistic and relies on a detailed study of the project area and a thorough and critical analysis of data, as well as being responsive to the growing needs of the diversifying population. The consultant maintains that effective land use planning promotes sustainable development by simultaneously transforming the physical landscape and strengthening economic foundations. The balance between economic growth and environmental protection may not be achieved solely through the land use plans prepared by Technical expertise of consultants, only rather requires participation of Government entities and all relevant stakeholders in the process. The preparation process of the District Land Use Plan is classified into 09 steps presented in Figure 1-2 below:

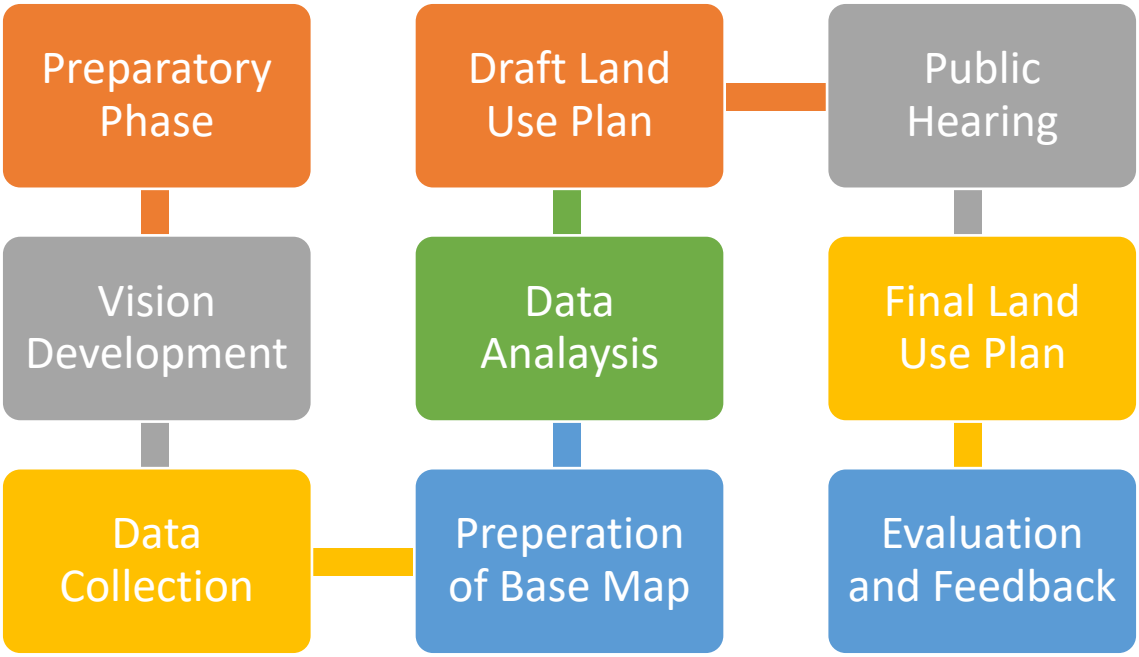


Figure 1-2: Stepwise Project Process

1.1.4 Project Methodology

The planning process for the District Land Use Plan follows a structured and phased approach. It begins with the Preparatory Phase, where the consultant reviews the Terms of Reference (TORs), finalizes the methodology, and Key stakeholders were identified, and reviews their involvement at different stages of the project. This was followed by Vision Development, in which a collective vision for the district was formulated through focus group discussions and (FG), stakeholder workshops.

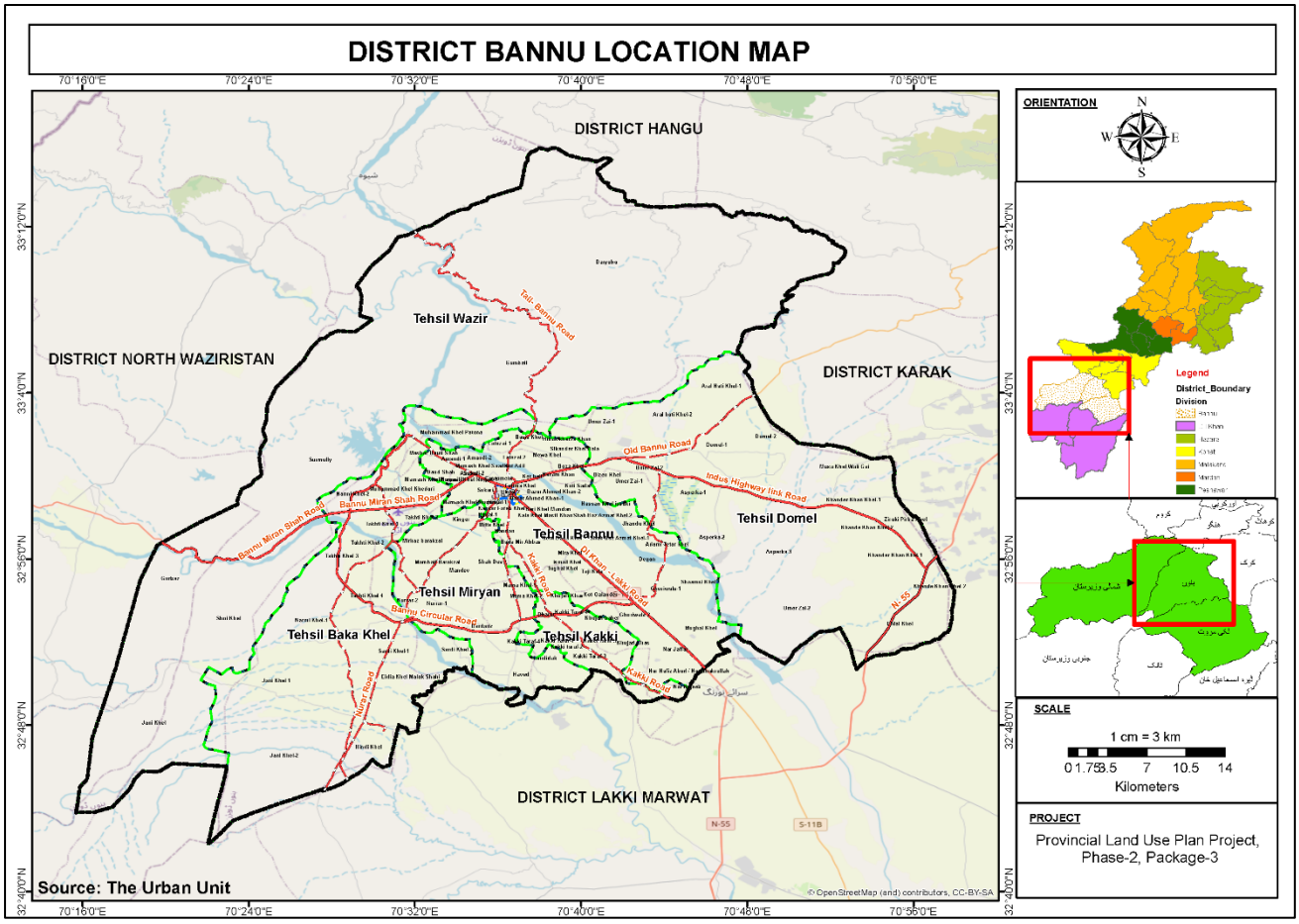
The next step, Data Collection, involved gathering both primary and secondary data across multiple sectors, including housing, transport, environment, and Land use surveys. Using this data, the team proceeded with the Preparation of Base Maps and GIS-based spatial classification to visualize existing land use patterns. These components fed into a comprehensive Data Analysis phase, where socio-economic trends, land utilization patterns, and urbanization dynamics were evaluated.

Based on these insights, the Draft Land Use Plan was prepared, outlining zoning proposals, infrastructure distribution, and regulatory frameworks. The consultant will conduct a public hearing immediately after the draft land use plan is prepared to solicit feedback from stakeholders and the general public. The input gathered during the hearing will be carefully reviewed and incorporated where necessary to refine the final land use plan. The final land use plan will be approved by the Land Use and Building Control Council and will be handed over to the district administration for implementation and execution.

1.1.5 Project Area

District Bannu is located in the Southern part of Khyber Pakhtunkhwa with its geometric centroid at 32.992°N, 70.605°E. The district is bordered by the Hangu district in the North. Towards its East, it is bordered by District Karak and in the South, by District Lakki Marwat. North Waziristan lies to the West of District Bannu.

The total area of the district is 2104 sq. km, including 917 Sq. Km of merged area (Wazir Sub-Division). The district is divided into 06 Tehsils, which are further divided into 06 Neighborhood Councils and 111 Village councils. The locational map of the District Bannu concerning Khyber Pakhtunkhwa and the Southern region is represented in Map 1-1.



Map 1-1: Location Map of the District Bannu

1.2 Vision Development

Vision development is crucial in land use planning as it provides a clear, long-term direction for sustainable growth and development. The Vision Development activity aimed to identify the concerns and suggestions of the public and all stakeholders to create a collective vision for achieving sustainable development through improved allocation and use of land in the district. Vision development for the project area was contingent upon the results of the reconnaissance survey, particularly on the feedback provided by the local community. The vision described how the project area would look physically, socially, and environmentally. It helps communities, stakeholders, and policymakers establish shared goals, ensuring that land is utilized efficiently to balance economic, social, and environmental needs.

1.2.1 Key Findings

The vision development exercise for District Bannu revealed several critical insights. The district had significant potential for hydrocarbons and agro-based industries, yet its road infrastructure has deteriorated, and essential facilities such as healthcare, education, electricity, waste disposal, sanitation, transportation, parks, and playgrounds were lacking. Unplanned urban sprawl and illegal housing schemes were rapidly diminishing agricultural land, while uncontrolled encroachment led to the destruction of heritage sites. Additionally, environmental conditions were substandard, further exacerbating the district's challenges.

Due to the absence of development regulations, Bannu was moving towards chaotic growth. The weak security situation continued to deter investments in the industrial and business sectors, and environmental degradation was worsening. If left unaddressed, these issues would hinder the district's progress and economic potential.

The people of Bannu aspired to transform the district into a thriving economic hub by leveraging its hydrocarbon resources, developing agro-based industries, and expanding commercial centers. They sought improved healthcare, education, electricity, sanitation, and a cleaner, greener environment.

Sustainable development was a priority, ensuring the preservation of natural resources while fostering economic and social growth.

To achieve this vision, business expansion needed to be supported through government-backed loans and incentives. The district had strong prospects for industrial investment, which could be realized by providing essential infrastructure and creating a favorable environment for industrial activities. Additionally, upgrading road infrastructure was identified as a key step in improving connectivity and stimulating business growth. By addressing these critical areas, Bannu could transition into a well-planned and economically prosperous district.

1.2.2 Vision Statement

Visions created from focus group discussions with the general public and the consultative workshop with the district administration and stakeholders were blended into a single vision statement for Bannu, which is written below:

"Bannu - a livable environment and gateway for international trade"

1.2.2.1 Goals

Based on the Vision statement, the goals derived for the Bannu Land Use Plan were:

1. *To preserve the environment and increase the green cover*
2. *To augment transport infrastructure for increasing intercity and intracity accessibility*
3. *To enhance the economy of the district Bannu*

1.2.2.2 Objectives

Based on the goals derived in the above section, the following objectives were formulated:

1. Improve the quality of water and air
2. Preserve the existing green cover and promote afforestation
3. Improve primary road network
4. Improve existing road network within cities and access to public facilities
5. Provide affordable public transport
6. Establishing an industrial estate to boost the economy
7. Expanding the existing commercial facilities into a commercial hub
8. Reduce unemployment by creating new opportunities for economic development

1.3 Physical Characteristics of the District

1.3.1 Climate

District Bannu experiences a semi-arid climate marked by hot summers, mild winters, and distinct seasonal variations in temperature, rainfall, wind, and humidity. From 1979 to 2024, climate data shows peak temperatures in May–June, with rainfall concentrated in July–August due to the monsoon. Wind speeds remain moderate year-round, while humidity varies seasonally, peaking in August. The detail analysis of climate for District Bannu is as follows.

1.3.1.1 Temperature Pattern

From 1979 to 2024, District Bannu's climate data shows a steady rise in temperatures from January, peaking in June with a mean daily maximum of 40°C and a minimum of 28°C, reflecting intense summer heat. May and June are the hottest months, while January and December are the coldest, with minimums dropping to 5°C and 7°C. After June, temperatures gradually decline, displaying a seasonal pattern typical of semi-arid regions, with significant day-night temperature contrasts. This profile is vital for understanding the region's agriculture, water management, and human comfort.

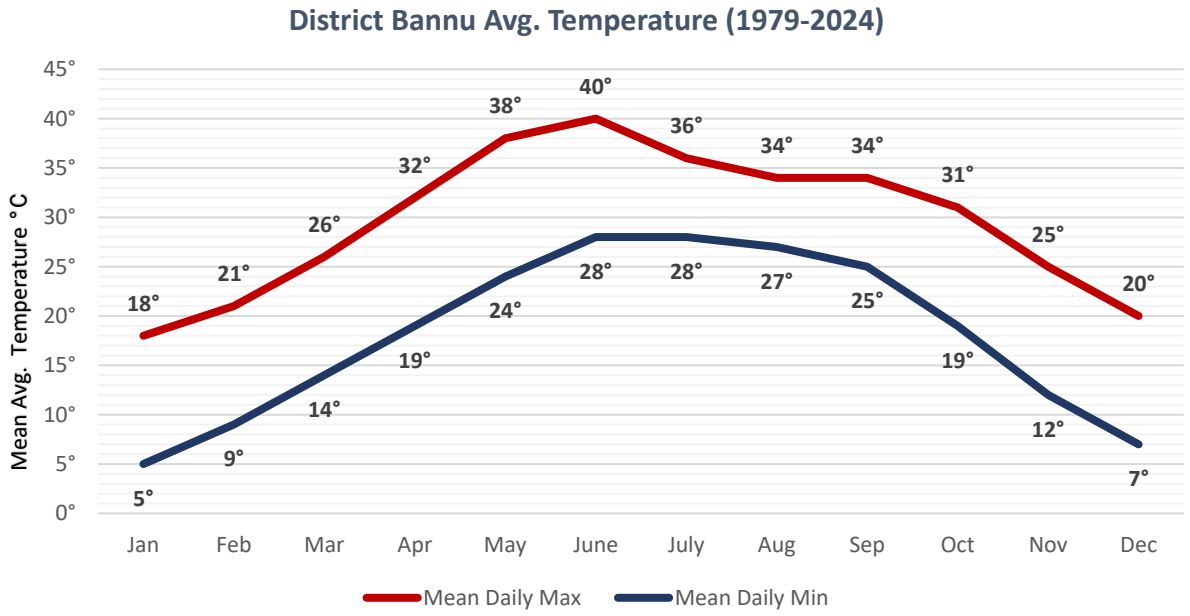


Figure 1-3: Annual Mean Average Temperature[2]

1.3.1.2 Rainfall

From 1979 to 2024, District Bannu exhibited a highly seasonal rainfall pattern, with most precipitation concentrated in July and August (158 mm and 135 mm), driven by the South Asian monsoon. Spring months receive moderate rain, while winter and late autumn see minimal rainfall, dropping to 9 mm in December. This uneven distribution impacts agriculture, water planning, and drought resilience in the region.

[2] *https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bannu_pakistan_1183460*

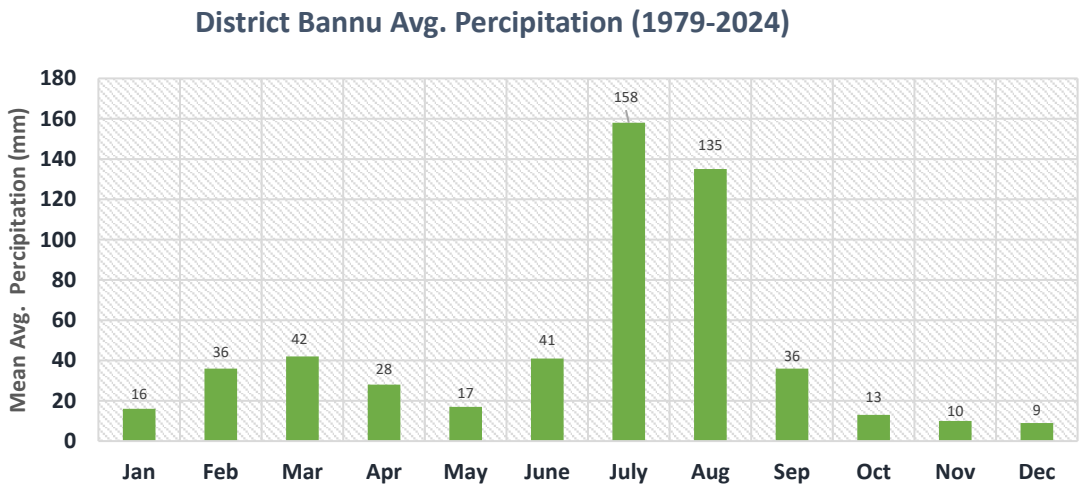


Figure 1-4: District Bannu Mean Average Precipitation[3]

1.3.1.3 Wind-Speed

The stacked bar chart shows monthly wind speeds in District Bannu from 1979 to 2024, with most days recording speeds between 5–10 km/h. Wind speeds of 20–30 km/h are rare, while August and September see a slight increase in days with 10–20 km/h winds.

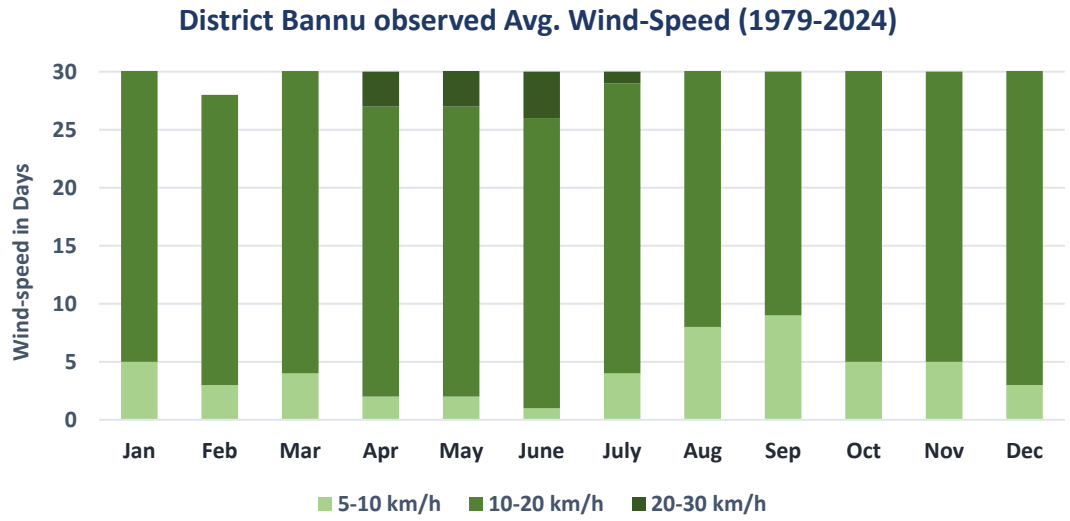


Figure 1-5: District Bannu Mean Average Wind Speed[4]

1.3.1.4 Wind-Direction

In District Bannu, prevailing winds mainly blow toward the N, NNW, S, and SSE, with the weakest winds from the NE and W. Wind speeds are generally light to moderate, ranging from 4–13 km/h, with highs of 10–20 km/h and lows below 2 km/h across all directions.

[3] *https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bannu_pakistan_1183460*

[4] *https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bannu_pakistan_1183460*

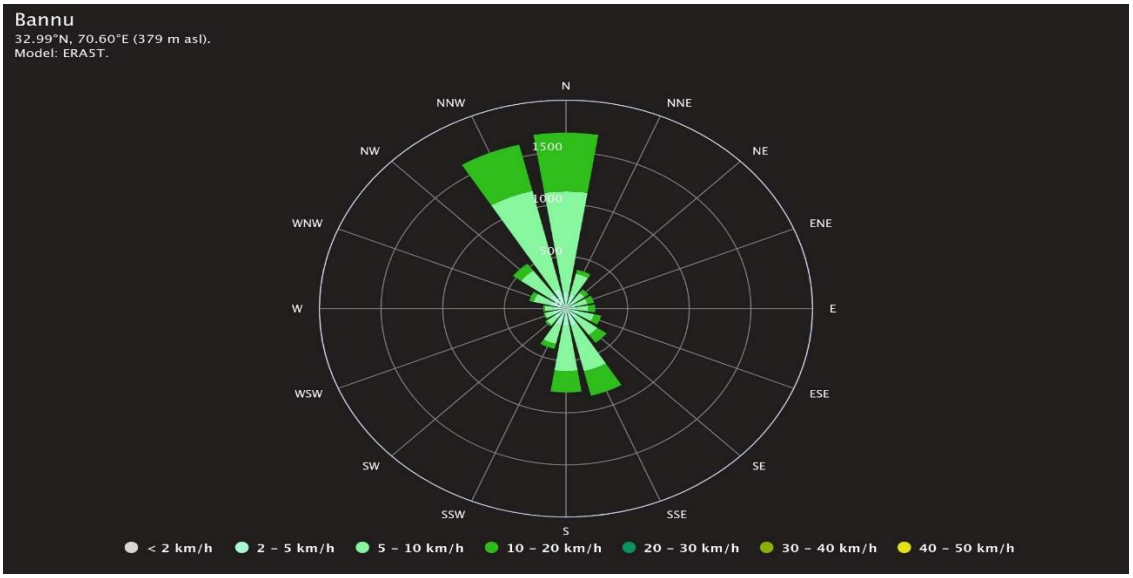


Figure 1-6: District Bannu Wind Rose[5]

1.3.1.5 Monthly Distribution of Humidity

Bannu shows strong seasonal humidity variation. August records the highest humidity at 67.55%, while June and December at 26.36% and 24.81%. Heatwaves are common in May–June and September, with May's humidity at 37.45%. Winter months are cooler with higher humidity, peaking at 48.16% in February.

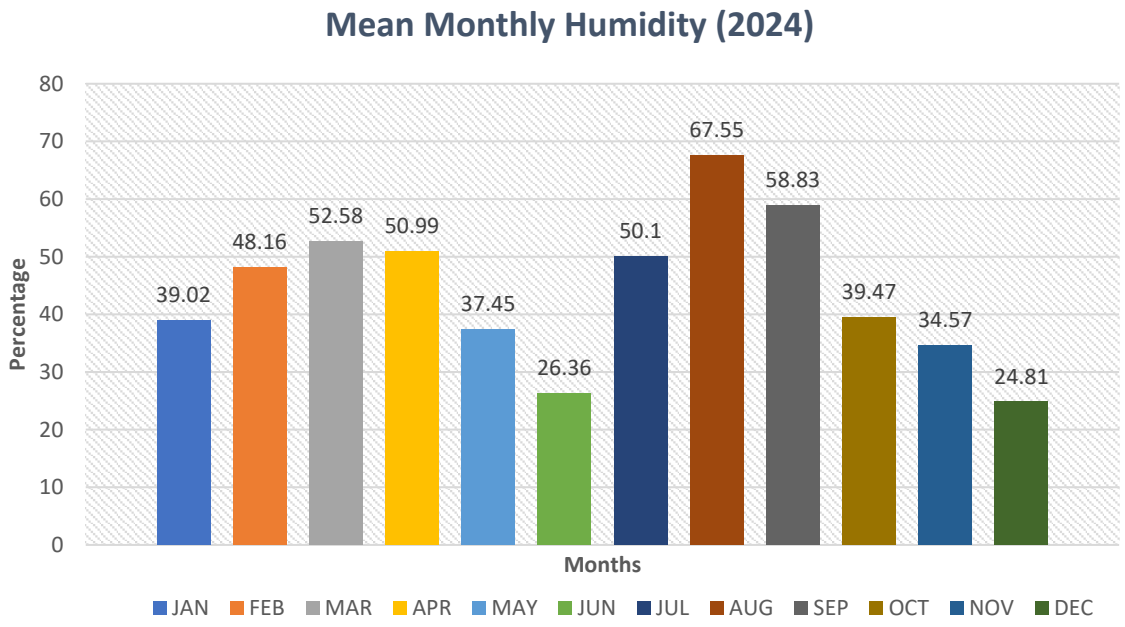
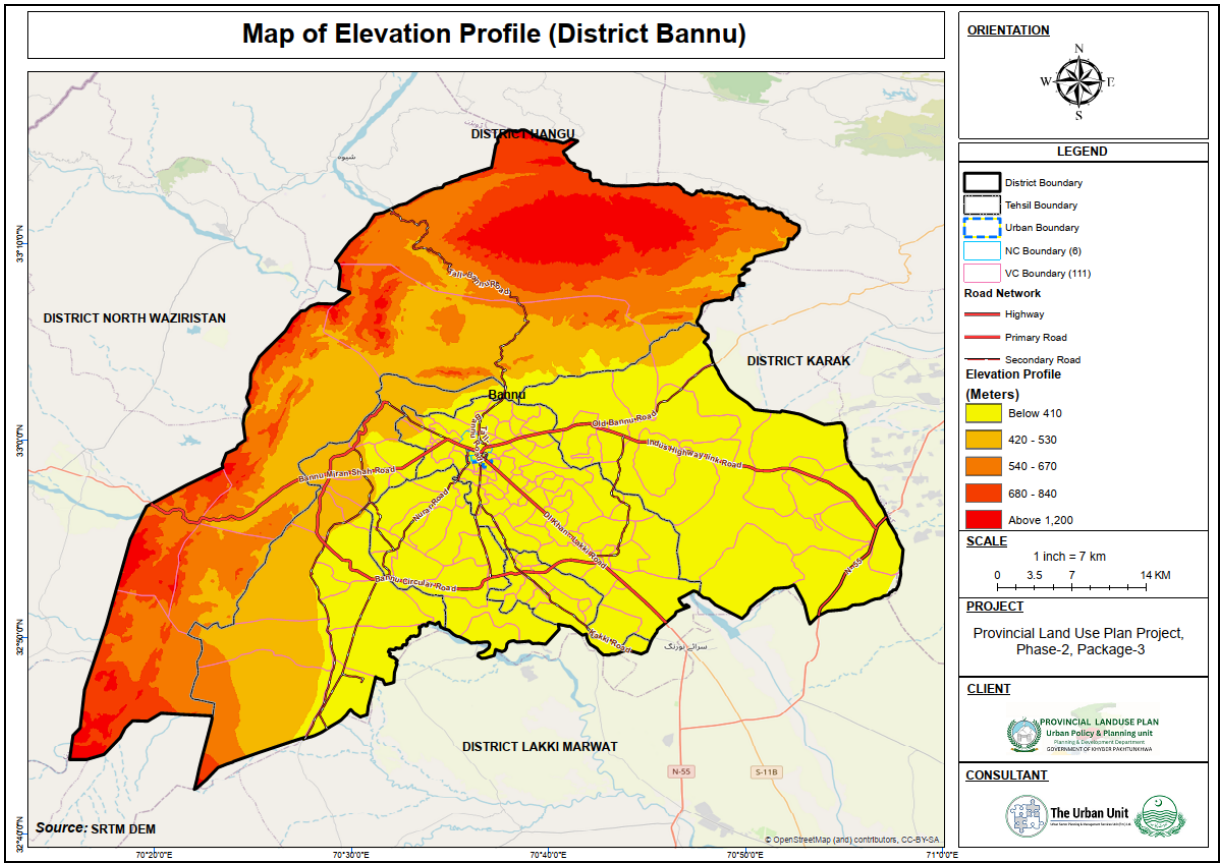


Figure 1-7: Mean Monthly Humidity (2024)

1.3.2 Elevation

The elevation map of District Bannu uses color gradients to show height variations, with yellow for areas below 410 meters and dark red for elevations above 1,200 meters, mainly in the north and west. Lower elevations dominate the central and eastern parts.

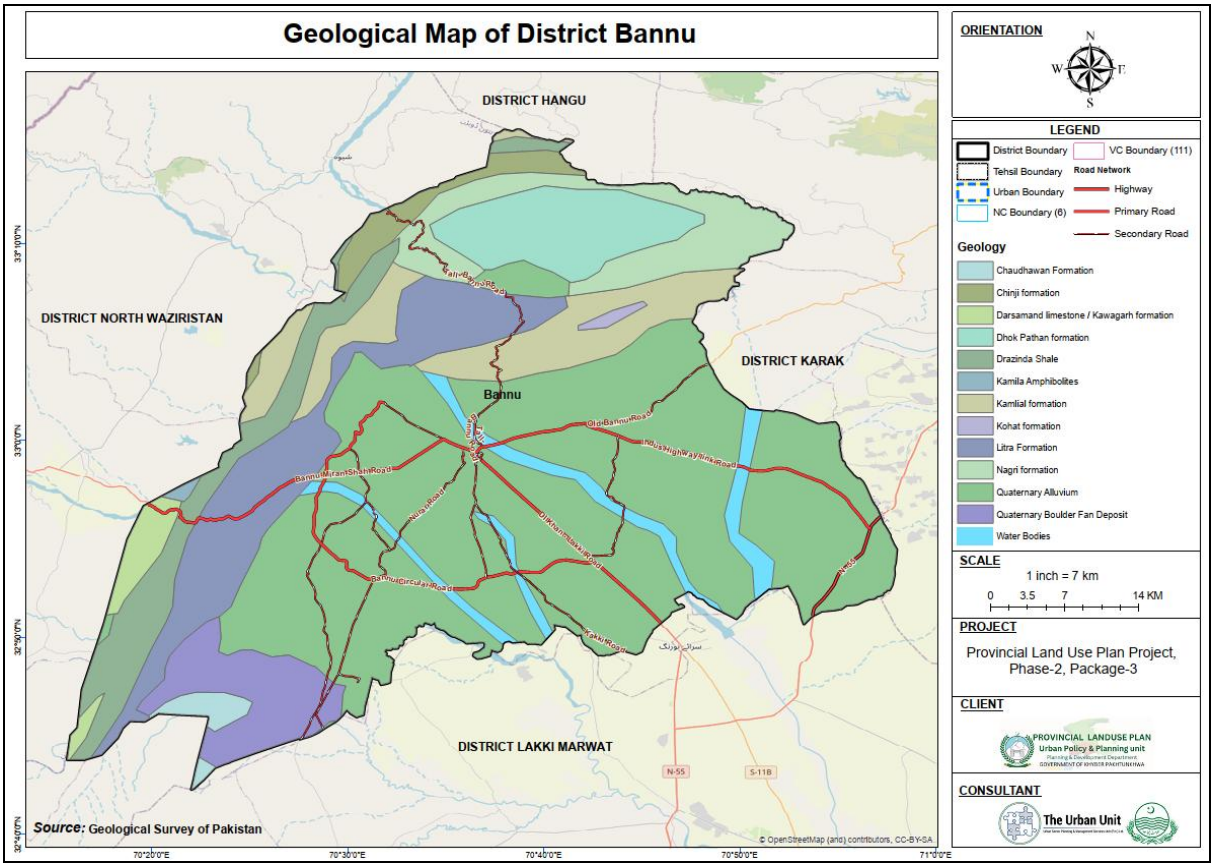
[5] *https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bannu_pakistan_1183460*



Map 1-2: Elevation of the District Bannu

1.3.3 Geology

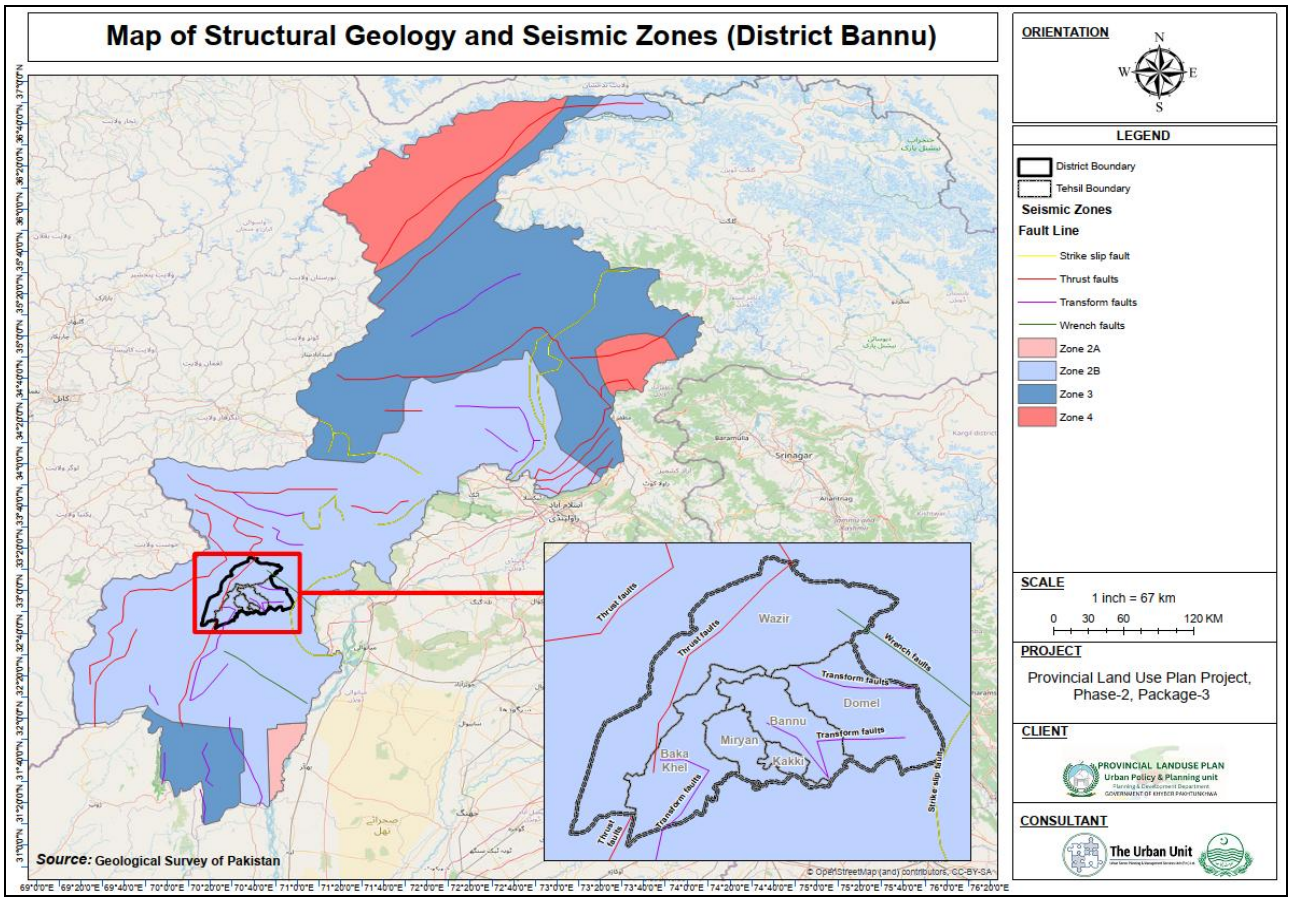
The geological profile of District Bannu includes fertile Quaternary Alluvium, ideal for agriculture and groundwater recharge. Notable formations like Darwaza Limestone and Kamlai Amphibolites provide quality construction materials. Other units such as the Boulder Fan, Litra, and Chirinji formations influence land stability and topography.



Map 1-3: Geological Pattern of District Bannu

1.3.4 Seismic Condition

District Bannu falls in Seismic Zone 2B, indicating moderate earthquake risk. The presence of nearby thrust and strike-slip faults, especially near Domel and Ghoriwala, highlights regional tectonic activity. Though not in a high-risk zone, the area requires earthquake-resilient planning due to its complex fault network.



Map 1-4: Geology and Seismic Structure of District Bannu

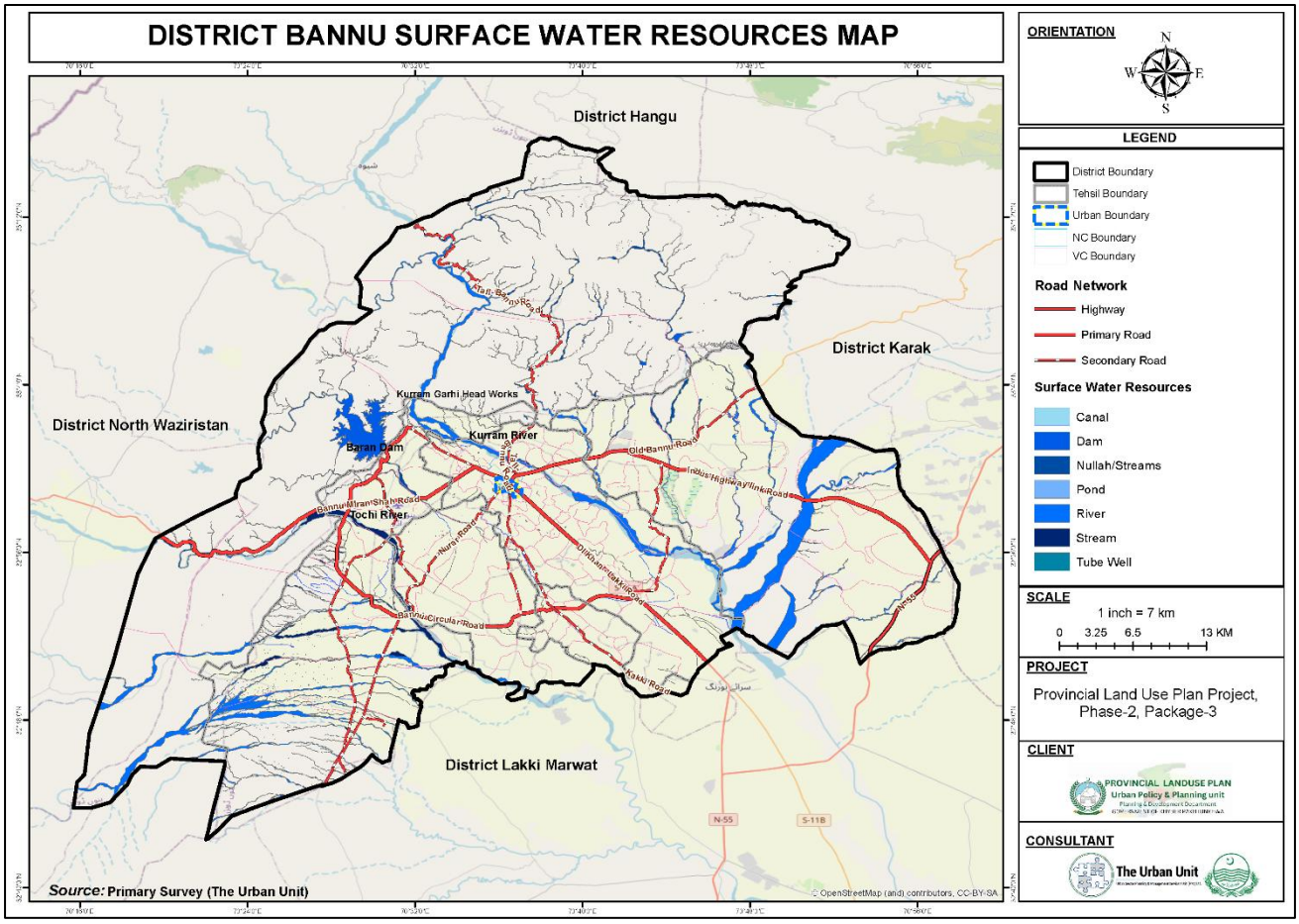
1.3.5 Hydrology

Bannu District, situated in the province Khyber Pakhtunkhwa, Pakistan, benefits significantly from its irrigation and canal systems, primarily supported by the Kurram and Tochi Rivers. These rivers and their tributaries have transformed Bannu into a fertile region suitable for diverse crops and fruits, contributing substantially to the district's agricultural productivity.

1.3.6 Surface Water Resources

Groundwater is the primary source of drinking water in the Bannu district extracted through tube wells in the form of small schemes spread throughout the district. The initiative is public sector with most of these tube wells installed by the Public Health Engineering Department (PHED) in rural areas in Bannu. Similarly, WSSC Bannu and BDA are the major stakeholders supplying water in urban areas of the district. The discharge capacity of these tube well-based schemes is dependent on the groundwater potential of the area which varies across the district.

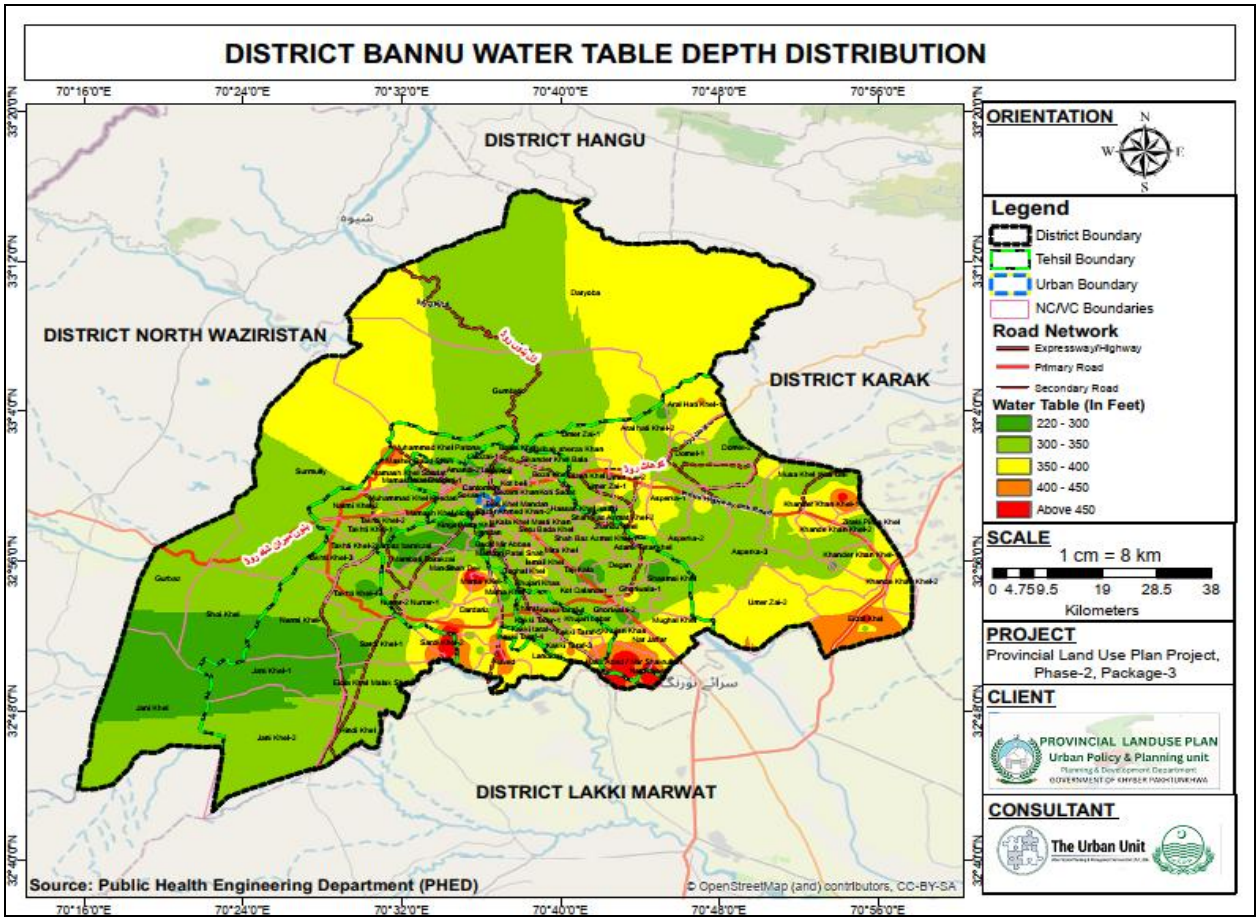
The surface water sources of Bannu include major water bodies, most notably the Kurram River, which is the mainstream passing through the region. The second major stream is the Gambila River, which enters the basin southwest of Bannu, runs southeast and eventually merges with the Kurram River west of Lakki. In addition to these main streams, several ephemeral streams carry surface runoff toward the Gambila and Kurram Rivers, but only during rainstorms. Several small dams also exist in Bannu district, the details of which are given below.



Map 1-5: Surface Water Resources of District Bannu

1.3.7 Water Table

The Water depth in District Bannu has been assessed using PHED data, illustrating groundwater levels for each settlement through a color-gradient map. The minimum water depths range between 220 and 300 feet, predominantly in central areas such as parts of Miryan and Baka Khel tehsils. In contrast, the maximum water levels—exceeding 450 feet—are observed in the southern regions, particularly within Kaki and Baka Khel tehsils.



Map 1-6: District Bannu Water Depth Distribution

1.4 Socio Economic Profile

1.4.1 Population Distribution

According to the 2017 Census, District Bannu has a population of 1,210,183, including 49,948 in urban areas (Bannu Municipal Committee: 41,632; Bannu Cantt: 8,316) and 1,160,235 in rural areas. The district is divided into Bannu Urban, Bannu Settled (Rural), and Bannu Merged (FR Bannu) areas. The settled area had 1,117,123 people, while the merged area had 43,112.

The population distribution of District Bannu is given in Table below.

Table 1-1: District Bannu Population Distribution[6]

Administrative Area	1951	1961	1972	1981	1998	2017
District Urban	27199	31623	43757	43210	47676	49948
District Rural	185148	243312	348711	442030	647584	1,160,235
District Overall	212347	274935	392468	485240	695260	1210183
Urban Proportion	13%	12%	11%	9%	7%	4%
Urban Areas						
Bannu Cantt	7007	7764	7113	8040	9482	8316
Bannu MC	20192	23859	36644	35170	38194	41632
Rural Areas						
Bannu Settled Area	158235	190550	297933	378817	627,991	1,117,123
Bannu Merged Area	26,913	52,762	50,778	63,213	19,593	43,112

[6] *Pakistan Bureau of Statistics, Government of Pakistan*

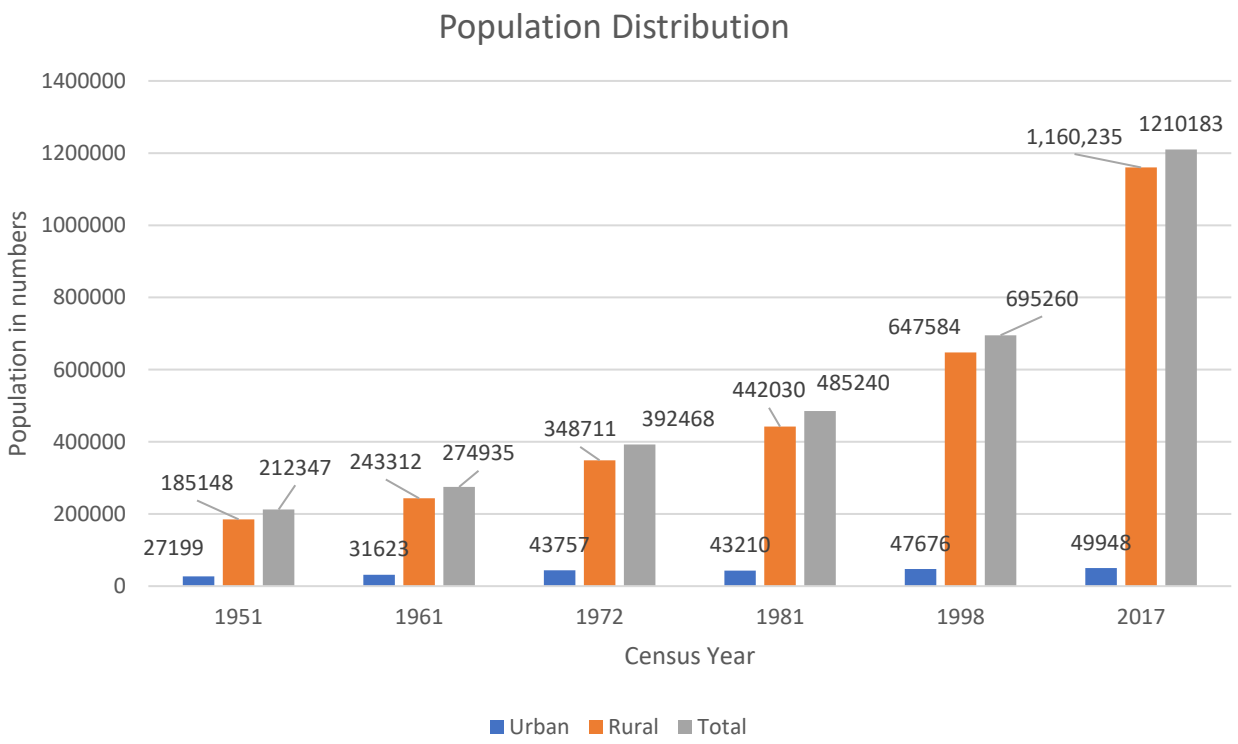


Figure 1-8: Population Distribution over the years

1.4.1.1 Age and Sex-Wise Population Distribution

District Bannu is classified as a "youthful population district," with 46.68% of its population under 15 and 65.45% under 25. This trend indicates rapid population growth, especially in rural areas, and highlights upcoming challenges in employment and service delivery. Age-wise, 48.19% of males and 45.43% of females are under 15, while over 66% of males and nearly 65% of females are under 25[7].

The details of District Bannu's age and sex-wise population distribution are given in the Table and graphically represented in Figure below.

Table 1-2: District Bannu Age and Sex-Wise Population Distribution[8]

Age (Years)	Male	Female	Transgender	Total
04 and below	102334	96547	-	198,881
05-09	110932	97275	-	208,207
10-14	83056	72782	-	155,838
15-19	64209	59288	1	123,498
20-24	49011	55355	1	104,367
25-29	43272	50126	4	93,402
30-34	33424	35822	1	69,247
35-39	25074	27076	3	52,153
40-44	22620	25291	4	47,915
45-49	17832	19189	2	37,023
50-54	16882	17411	3	34,296
55-59	14180	12200	2	26,382
60-64	13184	10790	-	23,974

[7] *Multi-Donor Support Unit (MSU). 2000. District Population Profile: Operationalizing and Interpreting Population Census Data for Planning (NWFP). Islamabad: Government of Pakistan*

[8] *Pakistan Bureau of Statistics. (April, 2021). District Bannu-Final Results of Sixth Population and Housing Census-2017. Table-4: Population by Single Year Age, Sex and Rural/Urban*

65-69	8102	6114	1	14,217
70-74	5296	4117	2	9,415
75 & above	5503	5865	-	11,368
All Ages	614,911	595,248	24	1,210,183

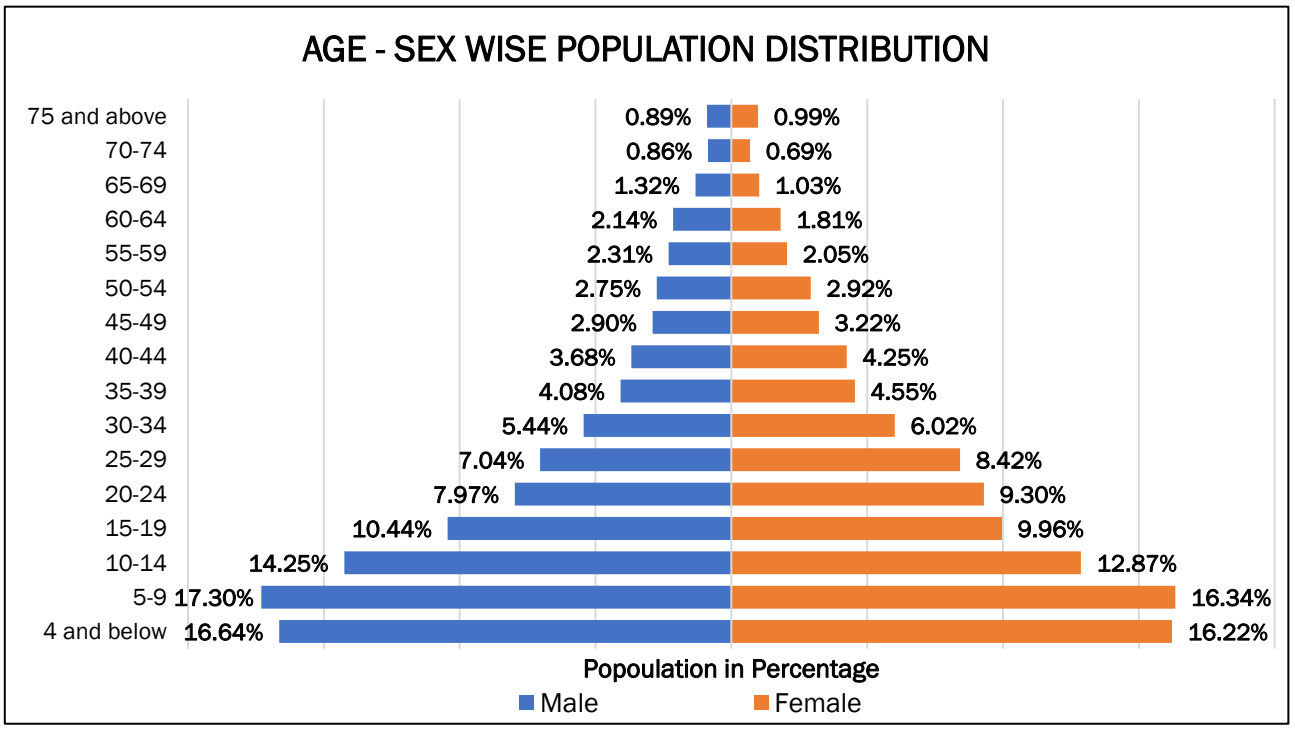


Figure 1-9: District Bannu Age and Sex-Wise Population Distribution

1.4.2 Population Density

Population density, the number of people per unit area, is vital in urban planning. It guides resource allocation, infrastructure development, and land use design. High density can lead to congestion and pressure on services, while balanced density supports sustainable, livable cities.

The consultant has calculated the population density by dividing the total population by its land area. The formula for calculating population density is:

$$\textbf{Population Density} = \frac{\textbf{Total Population}}{\textbf{Land Area in sq.km.}}$$

Since 1951, the population density of District Bannu has increased at a similar pace to that of Khyber Pakhtunkhwa. In 2017, Bannu's density was 614 persons/Sqkm compared to the province's 349, including the population and area of the merged FATA regions. The population density comparison for over the years have been given in Table and graphically shown in Figure below.

Table 1-3: Population Density Comparison of District and Province

Administrative Area	District Bannu		Khyber Pakhtunkhwa	
	Population	Density	Population	Density
1951	212347	108	4556545	61
1961	274935	139	5730991	77
1972	392468	199	8388551	113
1981	485240	246	11061328	148
1998	695260	353	17743645	238
2017	1210183	614	35501964	349

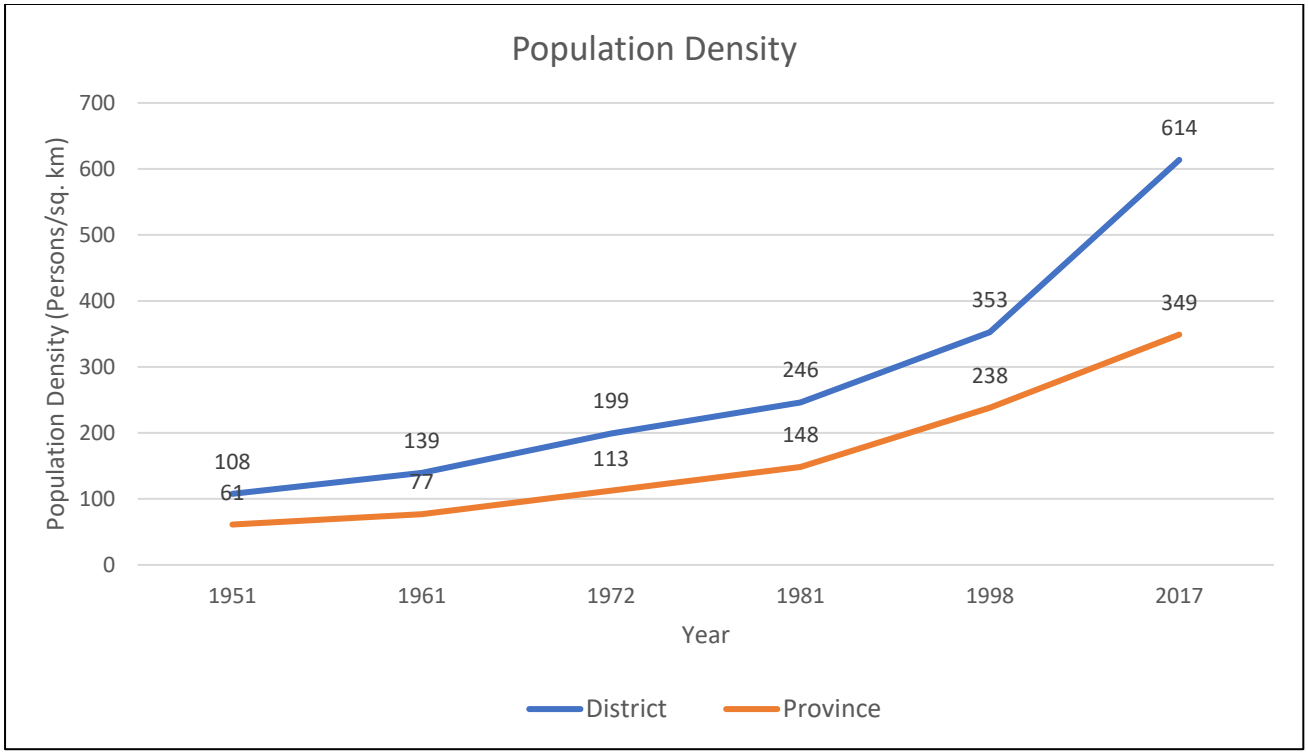


Figure 1-10: Population Density Comparison

1.4.3 Population Projection

The population is projected using the block-wise 2017 population data, due to the unavailability of NC/VC population in the 2017 population census. The population is also projected for the areas to be urbanized, as mentioned in Background Studies Task B these areas include Bannu City, Domel Urban, Kakki Urban, Nurar Urban, and Ghoriwala Urban. The population of District Bannu has been projected for 20 years using the exponential population growth model, which is a robust technique for population forecasting. The formula for the projected population is given as under:

$$\boldsymbol{Pn = P0 * (1 + r/100)\text{^}t}$$

Where;

P_n =Population of desired year

P_0 = Population of base year

r = Population growth rate

t = Number of years

It is important to note that, according to the 2017 census, there were two tehsils: Bannu Tehsil and Domel Tehsil. The merged area was counted separately. Based on these statistics, the consultant calculated the projected population and growth rate. The growth rates for three tehsils—Bannu, Domel, and Wazir—were mentioned in the census. For the remaining three tehsils—Miryan, Kakki, and Baka Khel, the Consultant has used the growth rate of Bannu Tehsil since these tehsils were formed from the Bannu Tehsil. The reason for this approach was to calculate the projected population of all the tehsils as notified by the government later.

1.4.3.1 Population Calculation for new urban areas

To calculate the population within the proposed urban area, firstly, two sets of data were extracted from the Geographic Information System (GIS) landuse dataset which are following:

- Residential land use area of the relevant administrative units such as Neighborhood Council (NC) or Village Council (VC)
- Residential land use area within the proposed urban boundary

To derive the growth rates for District Urban, District Rural, and District Overall, a weighted average method was used based on the 2017 population of each area. Furthermore, all future population projections presented below have been calculated using the respective tehsil growth rates, which were derived from Census 2017, and applied uniformly to all village councils (VCs) falling within each tehsil.

Subsequently, the residential land use area within the proposed urban boundary was divided by the overall residential land use area of the respective NC or VC to obtain the ratio. This ratio was then multiplied by the total population of that NC or VC, allowing to estimate the current population residing within the proposed urban boundary in present year i.e. 2025. This population of 2025 was then projected exponentially to obtain the population residing within the urban boundary in 2045 too. The equation below shows the formula to obtain the current population 2025 residing within the urban boundary:

$$\text{Current Urban Population} = \frac{\text{Residential area within urban boundary}}{\text{Residential area of NC/VC}} \times \text{Projected Population of NC/VC}$$

The details of projected population of District Bannu are given in Table and graphically shown in Figure.

Table 1-4: District Bannu Population Projection for Plan Period

Administrative Area	Growth Rate	2017	2025	2030	2035	2040	2045
District Urban	2.71	464652	578361	664511	765170	882089	1018205
District Rural	3.2	746353	958695	1121759	1313192	1538041	1802289
District Overall	3.02	1211005	1537056	1786270	2078362	2420130	2820494
Urban Areas							
Bannu Urban	2.7	401390	498004	571169	656722	756062	871717
Domel Urban	3.8	8073	10879	13109	15797	19035	22937
Kakki Urban	2.92	25883	32585	37629	43453	50178	57944
Nurar Urban	2.92	12562	15814	18263	21090	24354	28123
Ghoriwala Urban	2.92	16743	21079	24341	28108	32460	37484
Rural Areas							
Bannu Tehsil	2.92	243,246	306,227	353,622	408,361	471,565	544,550
Domel Tehsil	3.8	150,033	202,192	243,642	293,589	353,773	426,297
Meryan Tehsil	2.92	131,627	165,709	191,357	220,974	255,177	294,671
Kakki Tehsil	2.92	56,249	70,813	81,772	94,429	109,046	125,924
Baka Khel	2.92	122,085	153,696	177,486	204,955	236,678	273,311
Wazir Tehsil	4.23	43,114	60,058	73,880	90,884	111,802	137,536

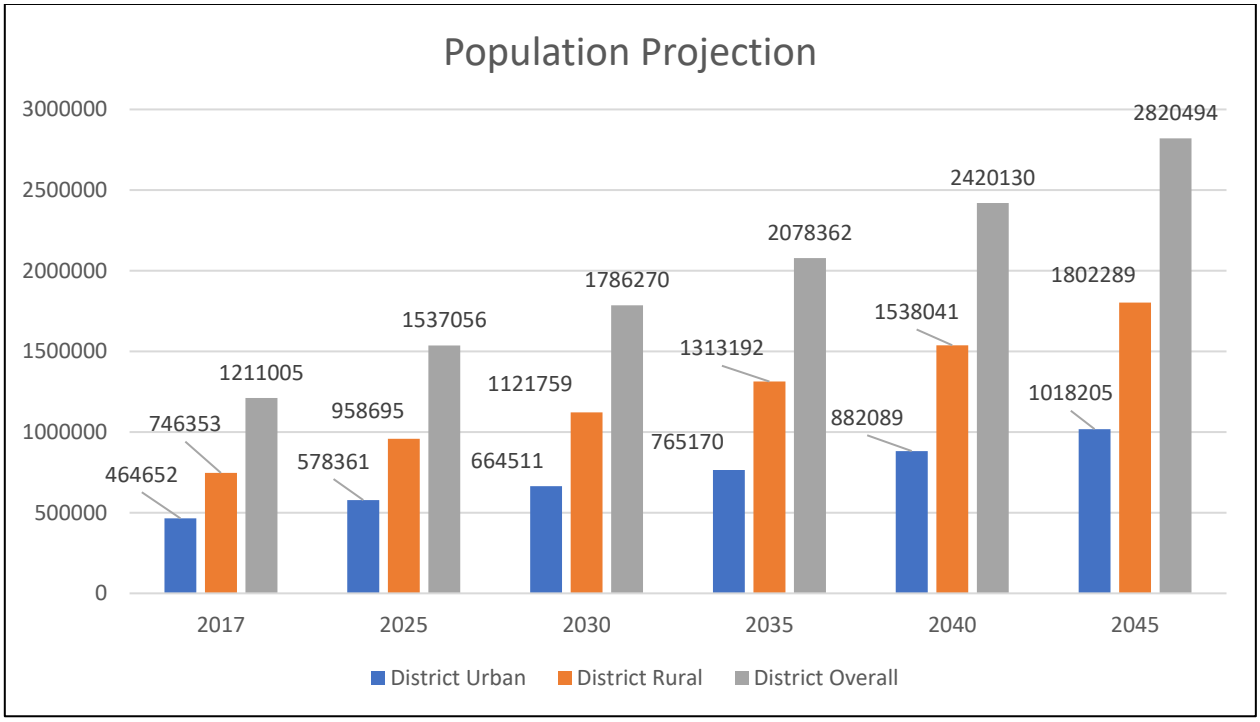


Figure 1-11: Population Projection for the plan period

1.4.4 Migration

Migration analysis for District Bannu, based on the 2020–21 Labor Force Survey, shows high rural-to-rural movement. In-migration (94.38%) mainly comes from North Waziristan, Lakki Marwat, and South Waziristan due to security and livelihood factors. Out-migration (90.2%) is also rural, with most moving to North Waziristan, Peshawar, and Islamabad for better opportunities. These trends underscore the need for planned housing, infrastructure, and economic zones to support migrants and reduce out-migration.

The in and out-migration details of District Bannu from urban and rural areas are given below in Table.

Table 1-5: District Bannu In-Migration from Labour Force Survey 2020-2021[9]

District/Country	In Migration			Out Migration		
	Urban	Rural	Total	Urban	Rural	Total
Abbottabad	1.12%	0.00%	1.12%	-	-	-
Bahawalpur	-	-	-	0.17%	0.00%	0.17%
Bannu	0.00%	6.74%	6.74%	0.00%	0.84%	0.84%
Bhakkar	-	-	-	0.34%	0.34%	0.68%
Charsadda	-	-	-	0.00%	0.51%	0.51%
Chitral	-	-	-	0.00%	0.17%	0.17%
Dera Ismail Khan	-	-	-	0.17%	0.51%	0.68%
Faisalabad	-	-	-	0.00%	0.17%	0.17%
Haripur	-	-	-	0.00%	0.17%	0.17%
Islamabad	-	-	-	1.18%	1.52%	2.70%
Karachi Central	-	-	-	0.00%	0.34%	0.34%
Karachi West	1.12%	0.00%	1.12%	0.00%	1.69%	1.69%
Karak	-	-	-	0.84%	0.00%	0.84%
Khushab	3.37%	2.25%	5.62%	0.00%	0.17%	0.17%
Kohat	-	-	-	0.00%	1.01%	1.01%

[9] *Pakistan Bureau of Statistics. (March, 2022). Pakistan Labour Force Survey 2020-2021. Micro Data*

District/Country	In Migration			Out Migration		
	Urban	Rural	Total	Urban	Rural	Total
Korangi	-	-	-	0.00%	1.69%	1.69%
Kurram	-	-	-	0.00%	1.01%	1.01%
Lahore	0.00%	1.12%	1.12%	0.00%	0.34%	0.34%
Lakki Marwat	0.00%	23.60%	23.60%	0.34%	0.68%	1.01%
Mandi Bahauddin	-	-	-	0.00%	0.34%	0.34%
Mardan	-	-	-	0.34%	0.84%	1.18%
Mianwali	0.00%	2.25%	2.25%	0.00%	0.84%	0.84%
Multan	0.00%	6.74%	6.74%	0.00%	0.51%	0.51%
North Waziristan	0.00%	38.20%	38.20%	6.42%	70.78%	77.20%
Nowshera	-	-	-	0.00%	0.68%	0.68%
Orakzai	0.00%	1.12%	1.12%	0.00%	0.17%	0.17%
Peshawar	-	-	-	0.00%	2.70%	2.70%
Sahiwal	-	-	-	0.00%	0.17%	0.17%
Sargodha	-	-	-	0.00%	0.17%	0.17%
Saudi Arabia	0.00%	2.25%	2.25%	-	-	-
South Waziristan	0.00%	6.74%	6.74%	-	-	-
Swabi	0.00%	1.12%	1.12%	0.00%	0.34%	0.34%
Swat	-	-	-	0.00%	0.84%	0.84%
Tank	0.00%	1.12%	1.12%	0.00%	0.68%	0.68%
Upper Dir	0.00%	1.12%	1.12%	-	-	-
Total	**5.62%**	**94.38%**	**100.00%**	**9.80%**	**90.20%**	**100.00%**

1.4.4.1 Reason for migrations

Migration trends in District Bannu, mainly rural-to-rural, are driven by security, family relocation, and return to home areas. In-migration stands at 94.38% and out-migration at 90.20%. These shifts impact housing demand, infrastructure, and agricultural land use, highlighting the need for responsive land use planning.

The details of reasons for in/out migrating from urban and rural areas of District Bannu are given in the Table.

Table 1-6: District Bannu Out-Migration Reasons from Labour Force Survey 2020-2021[10]

Reason	In Migration			Out Migration		
	Urban	Rural	Total	Urban	Rural	Total
Business	0.00%	6.10%	5.62%	0.00%	0.77%	0.67%
Change of Residence	0.00%	2.44%	2.25%	1.75%	2.05%	2.01%
Found a Job	14.29%	4.88%	5.62%	-	-	-
Education	-	-	-	7.02%	0.00%	0.89%
Job Transfer	-	-	-	0.00%	1.02%	0.89%
Marriage	0.00%	17.07%	15.73%	15.79%	5.12%	6.47%
Returned to Home	71.43%	1.22%	6.74%	57.89%	81.33%	78.35%
Security/Law & Order Situation	0.00%	21.95%	20.22%	8.77%	7.67%	7.81%
With Parents	0.00%	37.80%	34.83%	5.26%	0.00%	0.67%
With Son/Daughter	0.00%	2.44%	2.25%	-	-	-

[10] *Pakistan Bureau of Statistics. (March, 2022). Pakistan Labour Force Survey 2020-2021. Micro Data*

With Spouse	14.29%	6.10%	6.74%	3.51%	0.00%	0.45%
Searching for Better Agri- Land	-	-	-	0.00%	0.26%	0.22%
Searching for Job	-	-	-	0.00%	1.79%	1.56%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

1.4.5 Employment

The Employment section is essential in the land use plan for Bannu as it helps align land allocation with the population's employment trends. Based on LFS 2021 and HIS 2023, unemployment in District Bannu dropped from 53.69% to 38.74%. Reliance on agriculture declined from 12.68% to 3.45%, while private sector jobs rose from 3.39% to 5.92%, reflecting shifting employment patterns. The details of employment in District Bannu are given in the Table and visually represented in the Figure below.

Table 1-7: District Bannu Employment Details[11]

Source	Agriculture-Livestock	Business-Trade	Government Job	Labour	Private Job	Transport	Unemployed
Employment From LFS 2021	12.68%	11.41%	5.46%	9.59%	3.39%	3.79%	53.69%
Employment From HIS 2023	3.45%	5.37%	4.18%	10.64%	5.92%	1.96%	38.74%

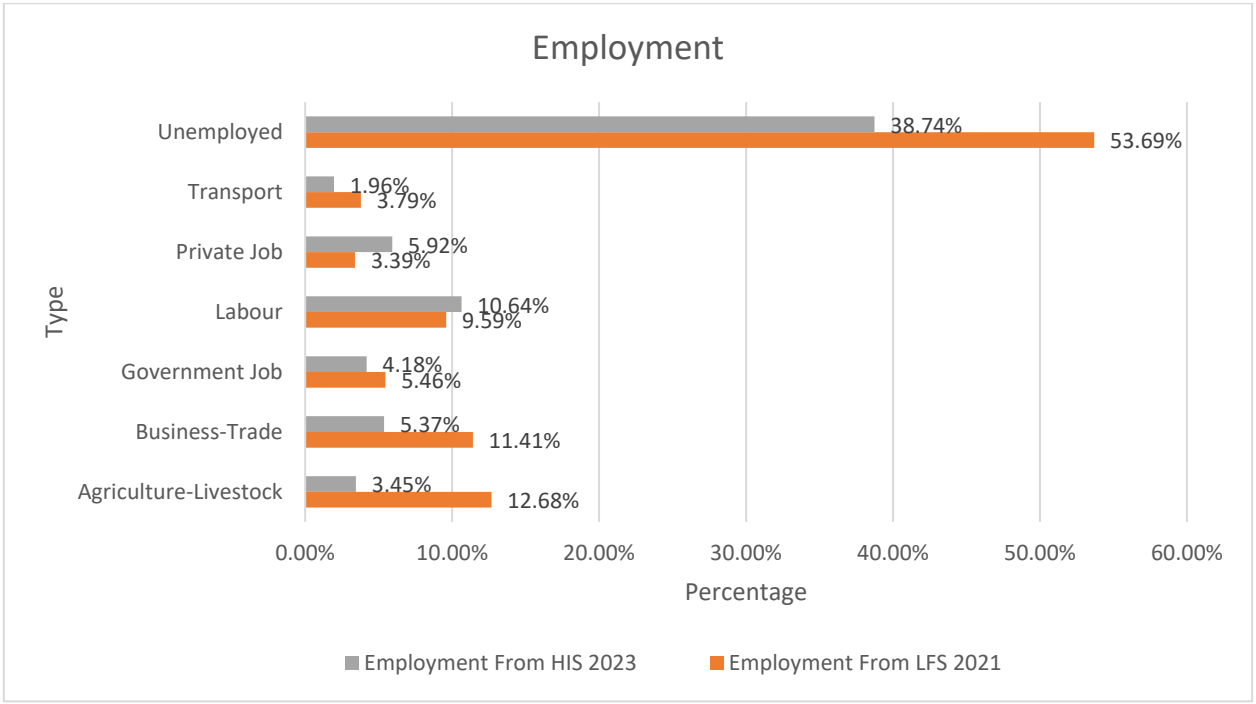


Figure 1-12: Employment in District Bannu

1.4.6 Literacy Ratio

A comparison of literacy data for District Bannu shows inconsistencies across sources, highlighting both progress and challenges. The Census reports a 46.56% overall literacy rate (males 66.87%, females 26.24%). HIS shows 58% overall (males 71%, females 25%), while PSLM reports 53% overall (males 75%, females 29%). This is due to variations in methodology and data collection periods, but such discrepancies

[11] *Calculated from the Labor Force Survey 2020-2021. And Calculated from the Household Survey conducted by the Consultant in January, 2023.*

stress the importance of using multiple data sources for informed planning and signal areas where focused interventions can further reduce gender disparities in literacy.

Table 1-8: District Bannu Literacy Ratio[12]

Literacy	Male	Female	Overall
Census 2017	66.87%	26.24%	46.56%
HIS 2023	71%	25%	58%
PSLM 2020	75%	29%	53%

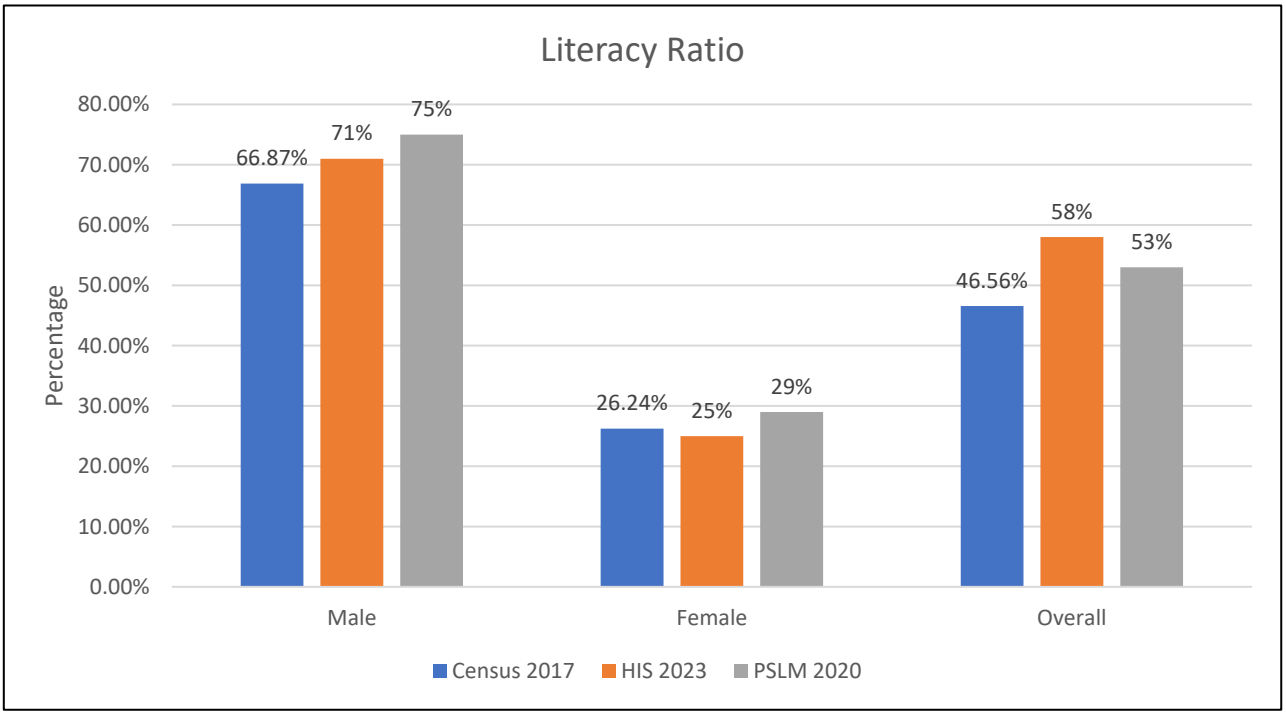


Figure 1-13: District Bannu Literacy Ratio Comparison

1.4.7 Education Attainment

The Education Attainment data shows variation in education levels across four sources (Census 2017, HIS 2023, LFS 2021, PSLM 2020). The proportion of people with education below matric remains highest, ranging from 21.01% to 33.18%. Matric and intermediate levels show moderate representation, while technical diploma holders are fewer. Graduate and postgraduate levels remain low but show slight improvement in HIS 2023. Overall, the total educated population has gradually increased from 45.42% (2017) to over 52% (2020–2021).

The district-wise breakdown of the Education attainment is given in the Table and represented in the Figure below:

Table 1-9: District Bannu Education Attainment[13]

Education Level	Census 2017	HIS 2023	LFS 2021	PSLM 2020
Below Matric	30.10%	21.01%	33.13%	33.18%

[12] Pakistan Bureau of Statistics. (2021, April 12). Final Results of Sixth Population and Housing Census-2017. Table-12: Population (10 Years and Above) By Literacy, Sex, Age Group and Rural/ Urban and Calculated from the Household Survey conducted by the Consultant in January, 2023 and Table 2.14(a) PSLM 2019-2020 District Level Report, Pakistan Bureau of Statistics.

[13] District Bannu- Table 15 - Population (5 Years and Above) By Level of Educational Attainment, Sex, Age Group and Rural/Urban Census 2017. And Calculated From The Household Survey Conducted By The Consultant In January, 2023. And Calculated From LFS 2020-2021 Microdata, Pakistan Bureau Of Statistics. And Calculated From Pslm 2019-2020 Microdata, Pakistan Bureau Of Statistics.

Matric	7.15%	15.18%	8.62%	7.35%
Intermediate	0.56%	5.06%	5.44%	4.96%
Technical Diploma and Other	3.40%	1.56%	0.67%	0.64%
Graduate	2.16%	2.72%	2.33%	3.68%
Master and above	2.06%	3.50%	2.10%	2.49%
Total	**45.42%**	**49.03%**	**52.28%**	**52.30%**

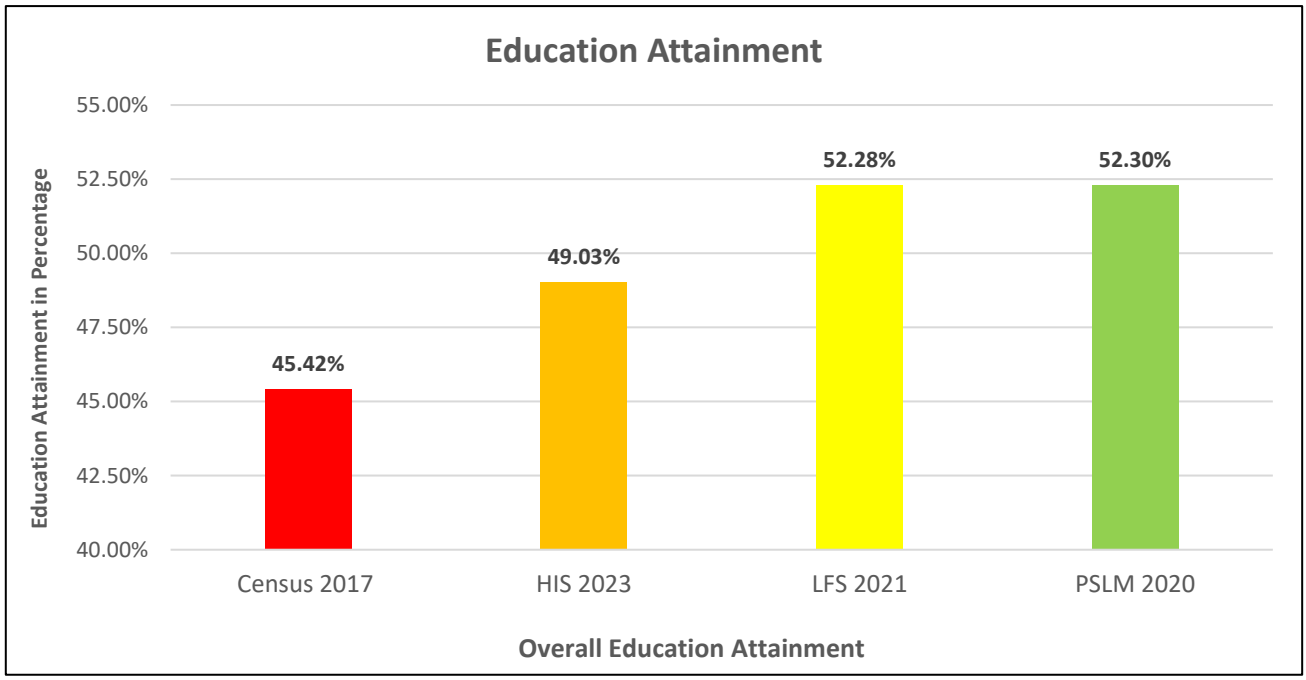


Figure 1-14: District Bannu Education Attainment

1.5 Urbanization & Hierarchy of Human Settlements

Urbanization refers to the process by which the urban population increases as compared to rural areas, due to economic development and industrialization. As per international literature, multiple factors contribute to urbanization in developed and developing countries.

Natural increase in urban population refers to growth due to a surplus of births over deaths, driven by improved healthcare, sanitation, and living standards, leading to population growth, increased service demand, economic boost, and social impact. Migration from rural to urban areas involves people relocating for better opportunities, contributing to population redistribution, economic growth, infrastructure demand, and social integration. Conversion of rural/peri-urban areas to urban involves transforming semi-rural landscapes due to urban expansion and demographic pressure, resulting in spatial growth, land use changes, environmental impact, and the need for effective planning and management. Globally, over half the population was urban in 2019, expected to reach 6 billion by 2041. In Pakistan, urbanization rose from 32.5% in 1998 to 36.4% in 2017[14].

[14] *Pakistan Bureau of Statistics. (2021, April 12). Final Results of Sixth Population and Housing Census-2017. Table-1: Area, Population by Sex, Sex Ratio, Population Density, Urban Proportion, Household Size and Annual Growth Rate.*

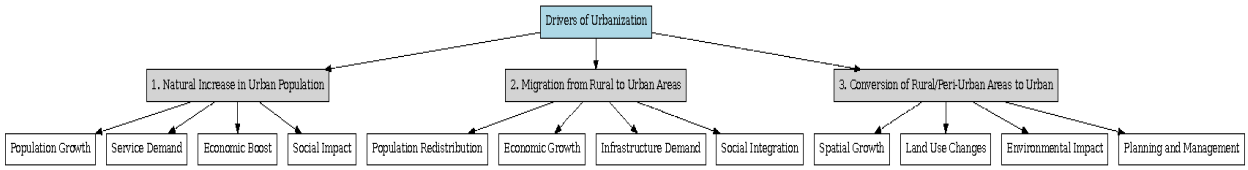


Figure 1-15: Drivers of urbanization

1.5.1 Urbanization trend

Urbanization in Pakistan is rising, especially in Khyber Pakhtunkhwa, but District Bannu shows a reverse trend. In 2017, only 4% of its population was urban, down from 7% in 1998 and 13% in 1951. This decline is mainly due to the unchanged urban boundary, which leaves newly urbanized areas still classified as rural, affecting the statistics over time. The urbanization trend of District Bannu is shown below in Figure.

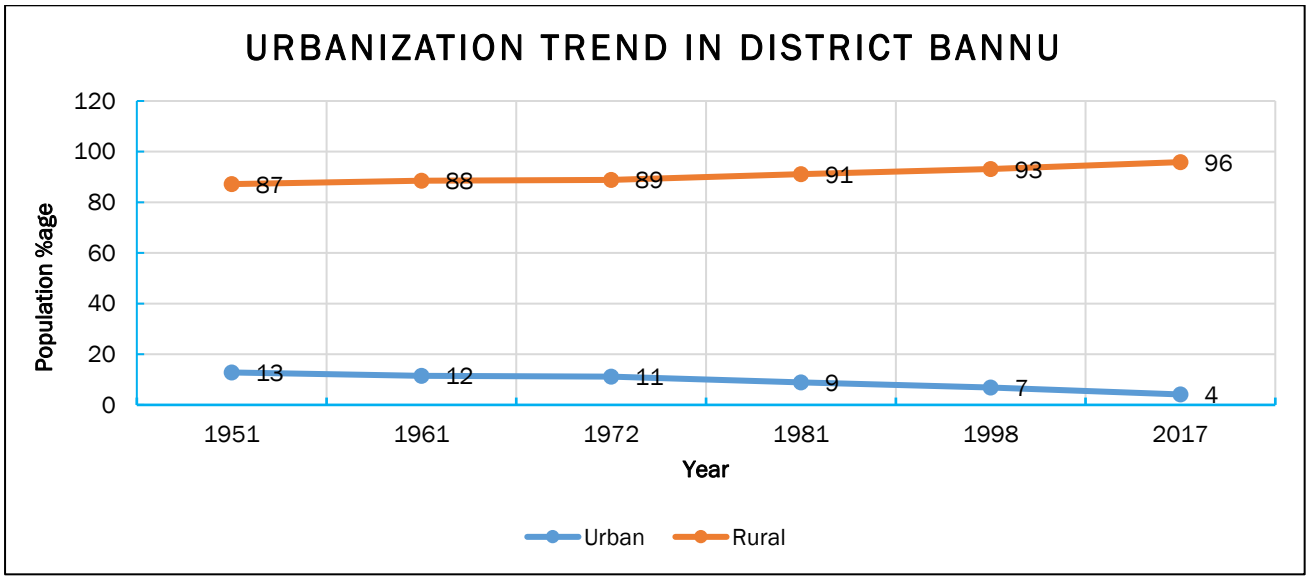


Figure 1-16: Urbanization trend in District Bannu

1.5.2 Declaration of Urban Settlements worldwide

Urban areas include cities, towns, and suburbs with dense infrastructure and mainly non-agricultural jobs. Definitions vary globally—what is a city in one country may be a village in another. Peri-urban zones and administrative limits often do not reflect real urban growth. There is no global standard for defining 'urban'; many countries use population thresholds. For example, Japan uses ≥50,000 people, India ≥5,000 with 75% non-agricultural jobs, Zimbabwe ≥2,500 with 50% non-agricultural, while Pakistan defines urban areas based on administrative status.[15].

The Degree of Urbanization identifies three types of settlements:

- Cities, which have a population of at least 50,000 inhabitants in contiguous dense grid cells (>1,500 inhabitants per km2);
- Towns and semi-dense areas, which have a population of at least 5,000 inhabitants in contiguous grid cells with a density of at least 300 inhabitants per km2; and
- Rural areas, which consist mostly of low-density grid cells (<300 inhabitants per km2).

[15] *United Nations. (2019). World Urbanization Prospects: The 2018 Revision. https://population.un.org/wup/publications/Files/WUP2018-Report.pdf*

More than half of national urban/rural definitions rely on population size. The Degree of Urbanization reflects this by using two thresholds: 50,000 for cities and 5,000 for towns/semi-dense areas. Among 100 countries using population thresholds, 85 use 5,000 or less. These thresholds have been rigorously tested to ensure accurate, balanced classification.

1.5.2.1 Guidelines for Declaration of Urban Settlements in KP

According to the 2017 census, Khyber Pakhtunkhwa has 62 officially "urban" areas—1 municipal corporation, 38 municipal committees, 12 town committees, and 11 cantonments. Of these, 25 exceed 50,000 residents (including Mardan, Mingora, and Dera Ismail MCs at over 200,000 and Peshawar MC at over 500,000), 31 range from 10,000–50,000, and 6 fall below 10,000 (Murree Gallies Cantonment at 613 and Cherat at 2,266). This wide variance—from 613 to 500,000+—highlights the absence of a consistent urban-area definition, a disparity that persists if one uses density or non-agricultural employment ratios.

Subsequent to the approach of the Degree of Urbanization, endorsed by the United Nations Statistical Commission, the following guidelines have been developed for identification of urban settlement,

A village council/settlement having:

- a population of at least 25,000 inhabitants
- a density of at least 500 inhabitants per sq. km
- at least 50% or more houses are in the main built-up area
- at least have the basic public utilities, such as roads, water supply, sanitary arrangements, etc.

1.5.3 Hierarchy of Human Settlements

A settlement hierarchy is when settlements are put in order and classified based on their size and/or the range of services that they provide for people. The higher up the hierarchy goes, the fewer settlements there are, but they increase in size in terms of population and the number of services provided. The general hierarchy of human settlements is shown in the Figure below:

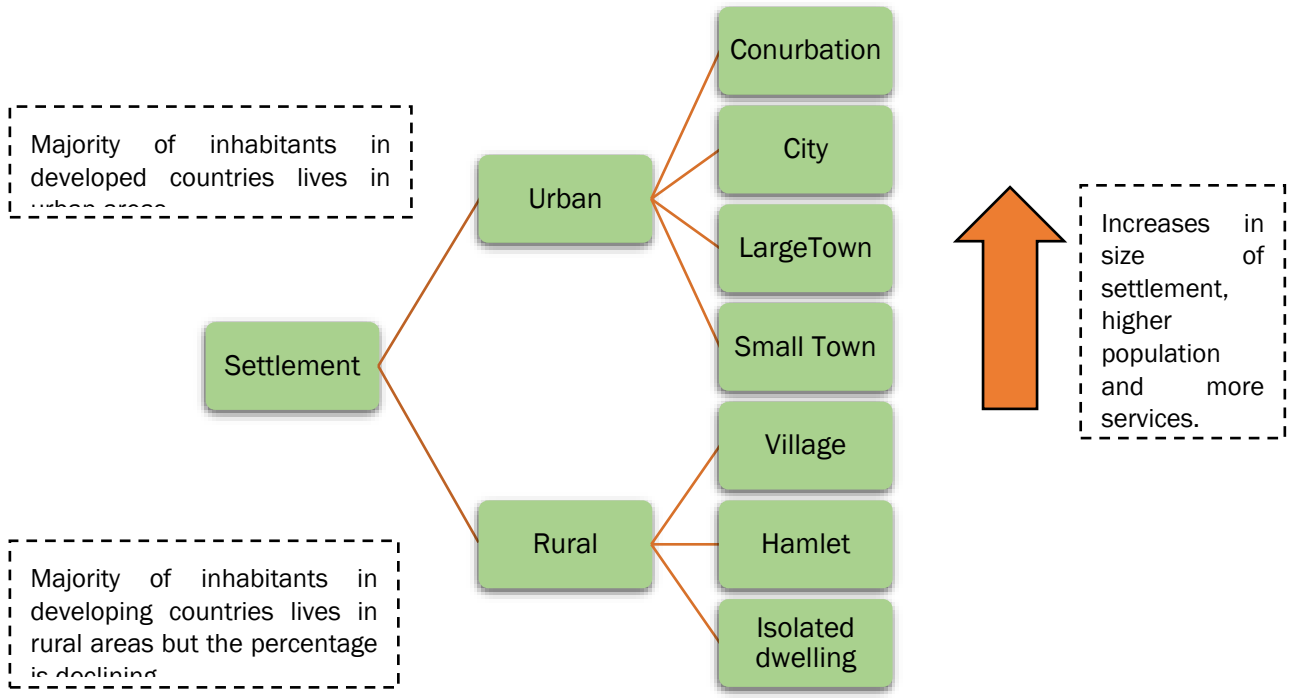


Figure 1-17: Hierarchy of Human Settlements

The process of developing a hierarchy of human settlements for District Bannu begins with an in-depth review of both international and national literature on settlement hierarchies. For settlement-wise analysis in this project, a settlement is defined as: "any declared urban area, regardless of the number of neighborhood councils it comprises, will be considered a single urban settlement, whereas each individual village council located outside urban areas will be regarded as a rural settlement."

1.5.4 Defining Characteristics and Scores

The criteria are prepared for District Bannu, and scoring is applied for each settlement of the district based on the characteristics shown in the table below.

Table 1-10: Characteristic Wise Distribution of Scores for Hierarchy Development[16]

Characteristics	Scoring Range
Population	• Every 10000 population = 1.0
Population Density	• Every 30 people per hectare = 1
Administrative Status of Settlement	• District Headquarter = 2.0 • Tehsil Headquarter = 1.5 • Town Committee = 1.0 • Village Council = 0.5 • Cantonment = 0.0
Education Facilities	• No Education Facility = 0.0 • Every 1 High School = 0.5 • Every 1 Higher Secondary School/Inter College = 1.0 • Every 1 Degree College = 1.5 • Every 1 University = 2.0
Health Facility	• No Health Facility = 0.0 • Every 1 Rural Health Center = 1.0 • Every 1 Other Health Center = 1.5 • Every 1 Hospital = 2.0
Access Roads	• Metaled Road = 2.0 • Unmetalled road = 1.0 • Inaccessible = 0.0

According to the availability of services and other factors mentioned above, the Bannu district's settlement hierarchy is split into five categories: first order, second order, third order, fourth order, and fifth order. The score range of each category has been given in the Table below.

Table 1-11: Hierarchy of Human Settlement Based on Score Range[17]

Hierarchy of Human Settlement	Score Range
1st Order	>20
2nd Order	20-14
3rd Order	14-11
4th Order	10-5
5th Order	<5

1.5.5 Settlement Hierarchy of District Bannu

The score for each settlement of the district is added, and based on the aggregate score, the hierarchy of settlements is established. The higher the total score of the settlement, the more focus will be given to planning and development for that settlement. The hierarchy of the settlements of District Bannu is also shown in the Map below.

The **1st-order settlement** in District Bannu is Bannu City, a densely populated and fully urbanized area that serves as the district's primary hub for services and infrastructure.

The **2nd-order settlements**, Fatima Khel and Sokari-2, are strategically located along the D.I. Khan/Lakki Road. Though officially rural, they exhibit urban features, have access to basic utilities, and support Bannu City by easing service demand and catering to nearby areas.

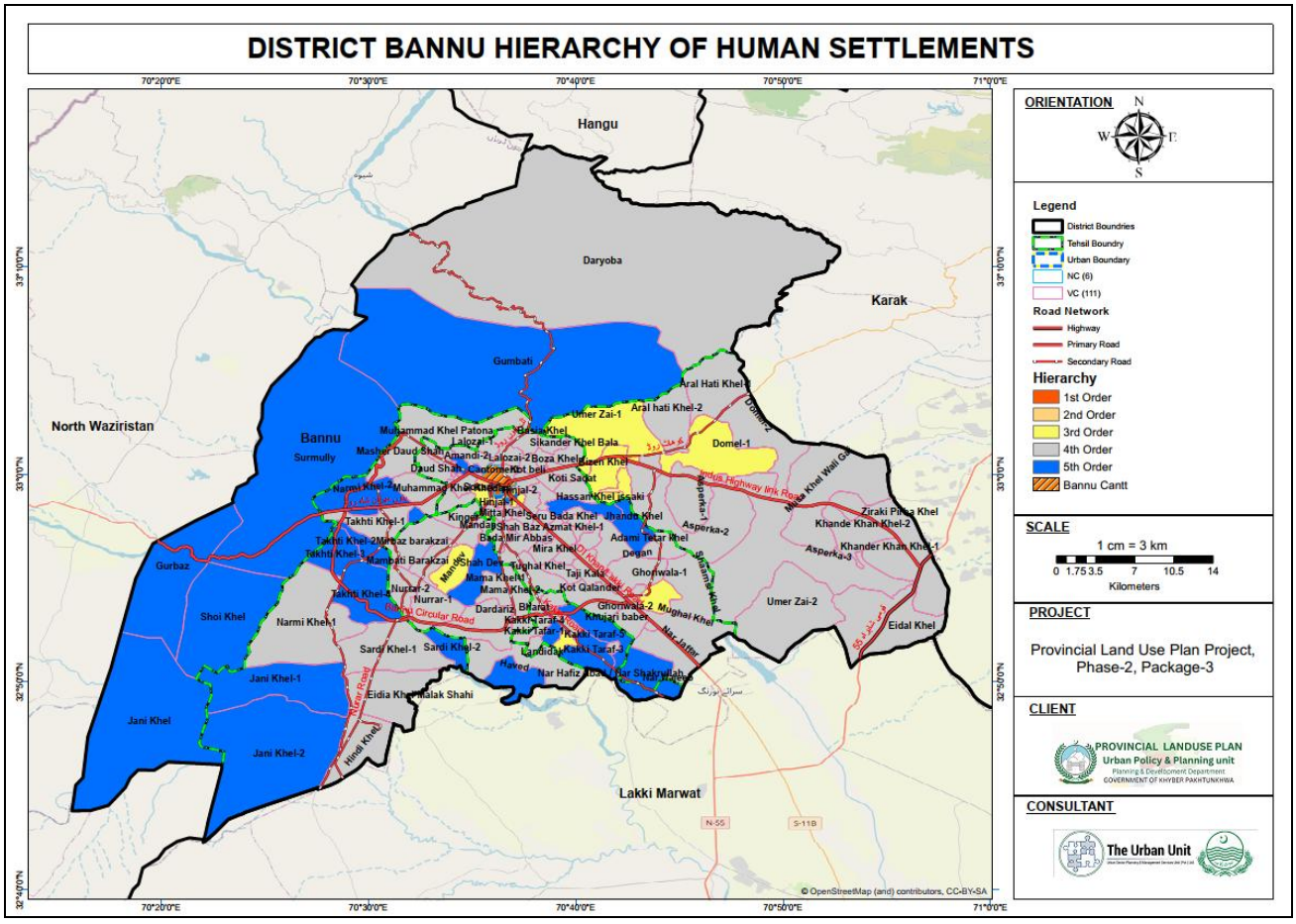
[16] The Urban Unit

[17] The Urban Unit

The **3rd-order settlements** are moderately developed, offering more services than lower tiers. District Bannu includes ten such settlements: Bizen Khel, Domel-1, Ghari Sher Ahmad, Ghoriwala-1, Hinjal-1, Hinjal-2, and Kakki taraf-2, Mandev, Sokari-1, and Umer Zai-1.

The **4th-order settlements** have limited service access—better than 5th-order areas, but below livable standards. There are seventy-seven in total.

The **5th-order settlements** are the most underdeveloped, isolated, and lacking basic amenities like water, power, and education. District Bannu has twenty-three of these low-density settlements.



Map 1-7: District Bannu Rank Wise Settlement Hierarchy

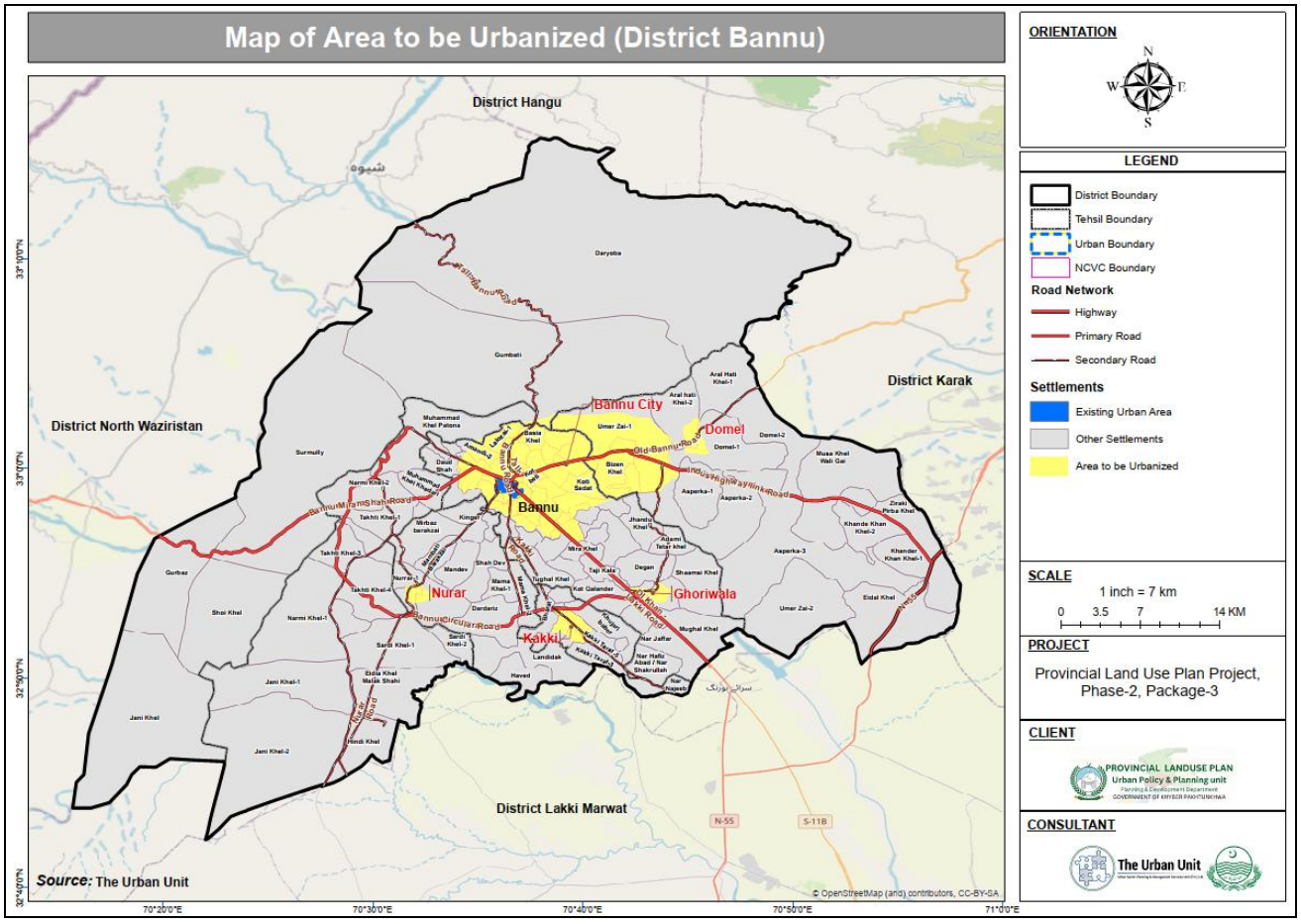
1.5.6 Declaration of Urban Area

For the identification of the areas that would be urbanized in the next 20 years, a detailed evaluation of all the settlements has been conducted through demographic analysis, settlement hierarchy analysis, functional matrix analysis, and change detection analysis.

1.5.7 Areas to be urbanized

Currently, **Bannu City** is the only designated urban area in District Bannu, functioning as the central hub for the region. It accommodates the majority of essential services and infrastructure, including healthcare, education, housing, industry, and other key facilities. However, with the district's population steadily increasing, the existing urban center is facing a burden, leading to congestion and overburdened services.

To address this imbalance and promote more equitable development, several potential areas have been identified for urbanization. These proposed urban centers aim to ease the load on the existing Bannu urban area by decentralizing essential services and guiding sustainable urban growth. The areas to be urbanized during the plan period are discussed below and shown on the map.



Map 1-8: District Bannu Areas to be urbanized

1.5.7.1 Settlements to be Urbanized Due to Urban Growth/Expansion around existing urban area

Based on settlement hierarchy, change detection, and the functional matrix (Background Studies III), several high-density settlements around Bannu, existing cities—such as Fatima Khel, Hinjal, Sokari, Umer Zai, and others—exhibit urban characteristics and services despite being officially classified as rural. Most of these settlements fall within 2nd to 5th order settlements.

These settlements are highly populated and display urban characteristics, yet remain classified as rural due to boundary restrictions. Despite this, they provide urban-like services, indicating they are on the verge of urbanization.

1.5.7.2 Settlements to be urbanized as Tehsil Headquarters

Domel, Kakki, and Nurar have been designated as Tehsil Headquarters for Domel, Kakki, and Miryan Tehsils, respectively. Domel's strategic location at the Kohat–Bannu Road and Indus Highway link road, along with its central position within the tehsil, positions it as a key development hub. It already hosts Bannu Township, a small industrial zone, educational institutions, and a medical college, though healthcare is limited to a Rural Health Centre (RHC). Kakki and Nurar currently lack adequate facilities to support their tehsils. Rather than declaring the entire settlements as urban, only the densely built-up areas will be considered urban under the plan.

1.5.7.3 Rural Growth Centers in District Bannu

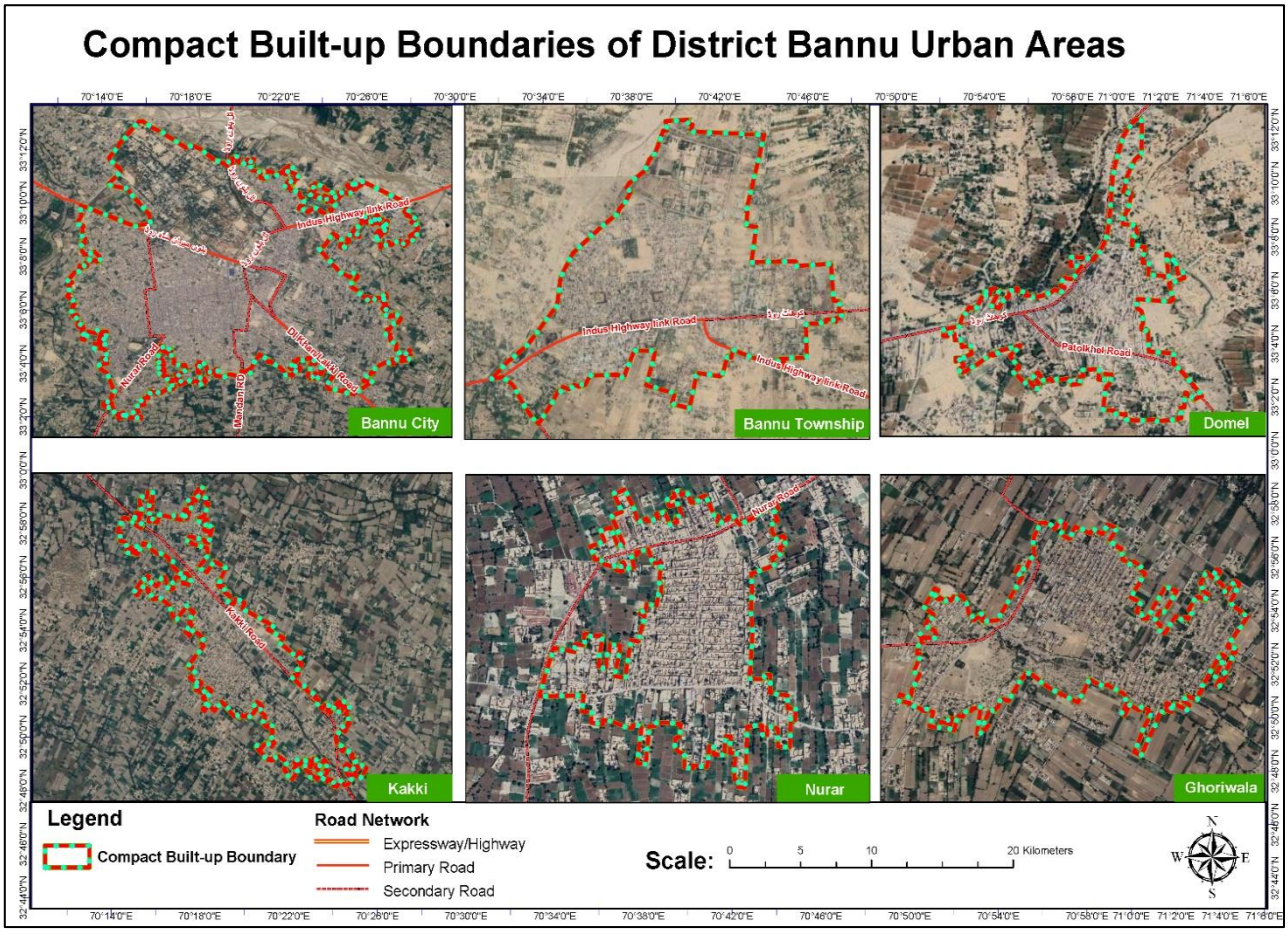
Ghoriwala, located in Tehsil Bannu, has been identified as a rural growth center to encourage focused development and improve service delivery in surrounding rural areas. It will help alleviate the burden on Bannu City, the district's primary hub. As a 3rd-order settlement with key facilities such as education and healthcare, only its dense built-up area will be considered as a rural growth center, strategically positioned along the D.I. Khan/Lakki Marwat Road. Ghoriwala is gradually expanding eastward and westward and is expected to absorb some of the development.

1.5.8 Compact Built-up Boundaries of Bannu Urban Areas

Demarcating Compact Built-up Boundaries (CBB) is vital for managing urban growth, preventing sprawl, and promoting sustainable development. Using existing land use maps, CBBs were drawn around dense, mixed-use areas, guided by natural or man-made features like roads or water bodies. This helps plan infrastructure efficiently and supports future urbanization. In Bannu, 06 Compact built-up boundaries are marked, including Bannu City, Domel Urban, Ghoriwala Urban, Kakki Urban, and Nurar Urban. The Area of each compact built-up is tabulated below and shown visually on the map.

Table 1-12: Compact Built-up Boundaries Areas (Hectare)

Name	Area (Hectare)
Bannu City	936.2
Bannu Township	477.7
Domel Urban	61.1
Ghoriwala Urban	66.23
Kakki Urban	115.2
Naurar Urban	51.1



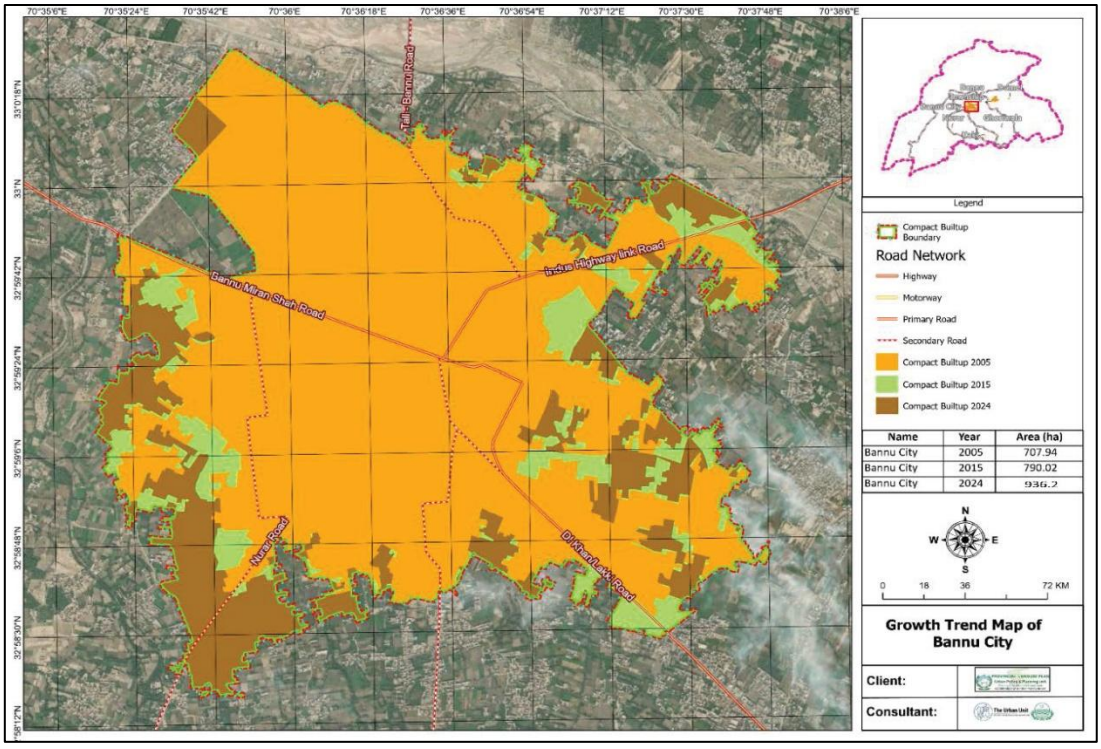
Map 1-9: Compact Built-up Boundaries of District Bannu Urban Areas

1.5.9 Growth Directions of Bannu Urban Areas

The growth direction of Bannu urban areas, based on compact built-up boundaries, has been assessed using historical Google Earth open imagery for the years 2005, 2015, and 2024

1.5.9.1 Bannu City

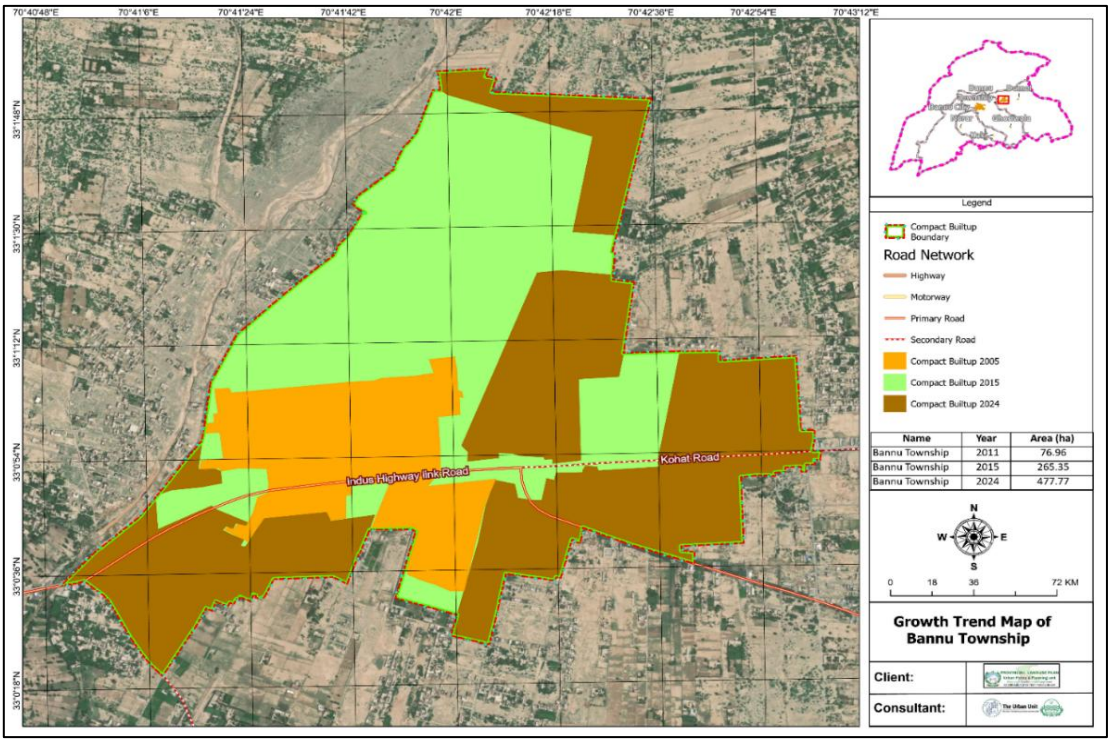
The Growth Trend Map of Bannu City shows a clear expansion pattern from 2005 to 2024. The city has primarily grown outward in all directions, with the most significant growth observed towards the south, southeast, and southwest. Moderate growth is also visible in the eastern and northern zones, while western areas show relatively limited expansion.



Map 1-10: Growth Trend of Bannu City Compact Built-up

1.5.9.2 Bannu Township

The Growth Trend Map of Bannu Township shows urban expansion mainly towards the east, southeast, and southwest from 2005 to 2024. Growth is concentrated along the Kohat Road and Bannu–Dera Ismail Khan Road, indicating infrastructure-driven development. Northern areas show limited expansion.

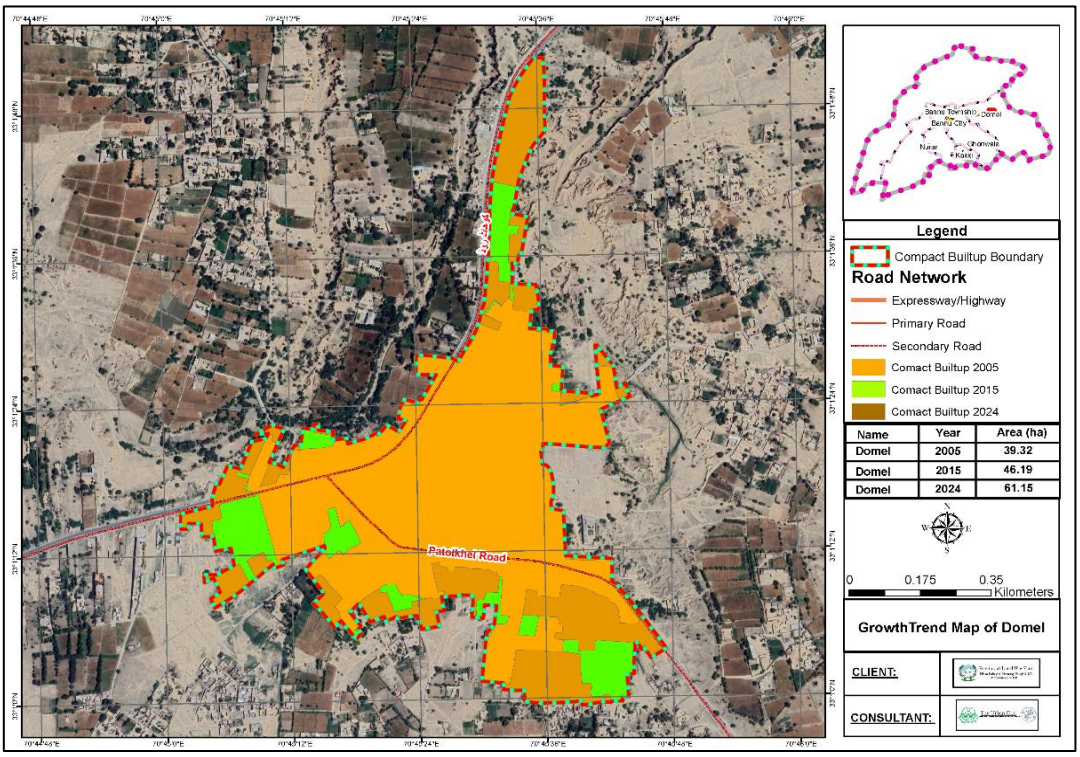


Map 1-11: Growth Trend of Bannu Township Compact Built-up

1.5.9.3 Domel

The Growth Trend Map of Domel shows urban expansion mainly along the south and southeast, with some development stretching northward along the main road network. The compact built-up area grew from

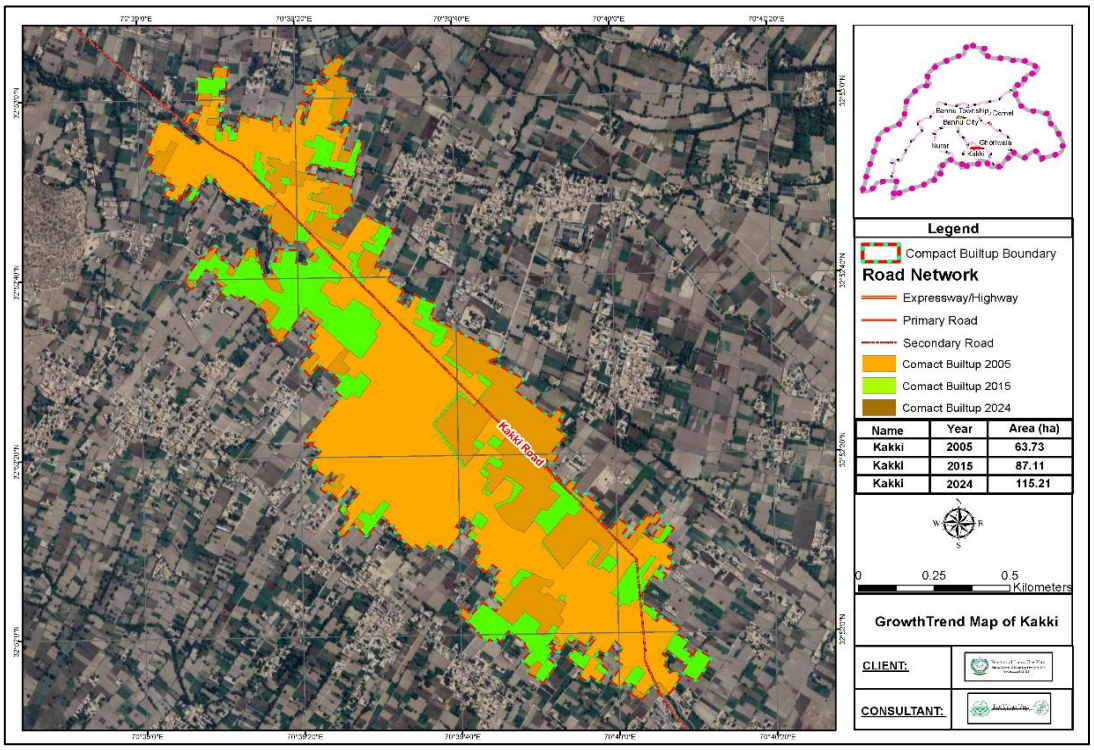
38.32 ha in 2005 to 61.15 ha in 2024. Growth follows the major Roads, creating a directional spread toward the south, southeast, and north.



Map 1-12: Growth Trend of Domel Compact built-up

1.5.9.4 Kakki

The Growth Trend Map of Kakki shows that urban growth between 2005 and 2024 has largely expanded along the east-west axis, following the main road corridor.

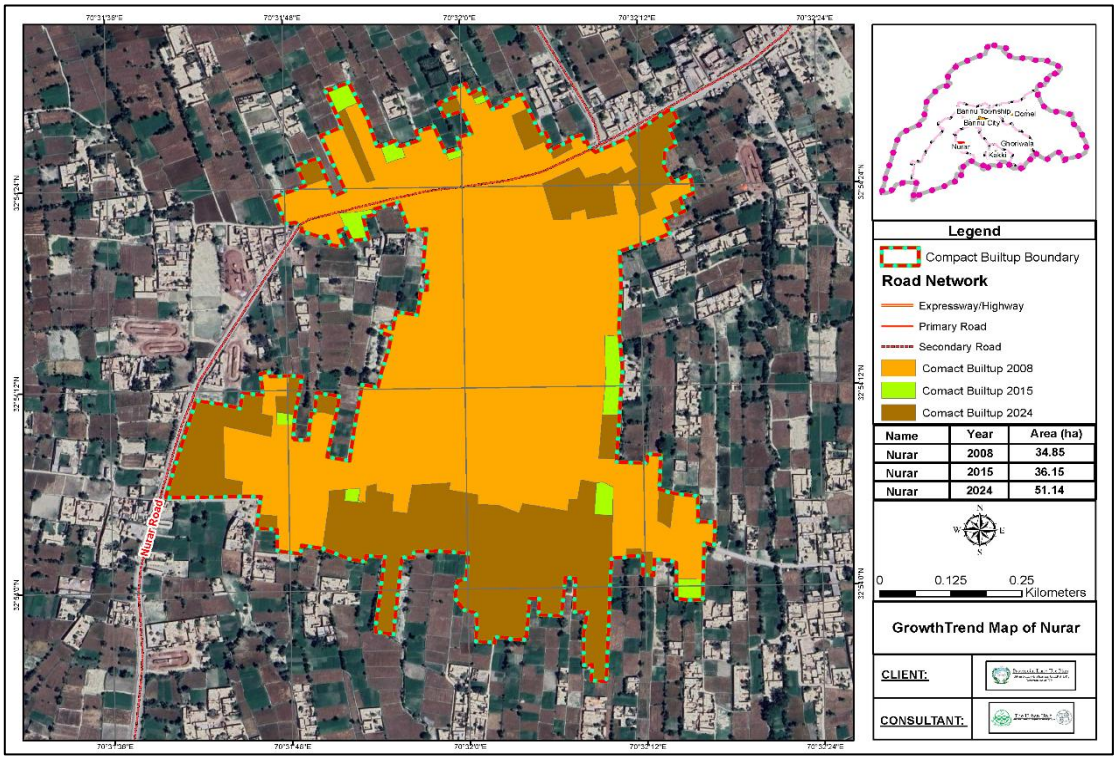


Map 1-13: Kakki Growth Trend of Compact Built-up

The compact built-up area increased from (63.73 ha) in 2005 to 115.21 (ha) in 2024. The dominant direction of expansion is eastward, with notable spread also observed toward the west, creating a linear growth pattern along the transport route.

1.5.9.5 Naurar

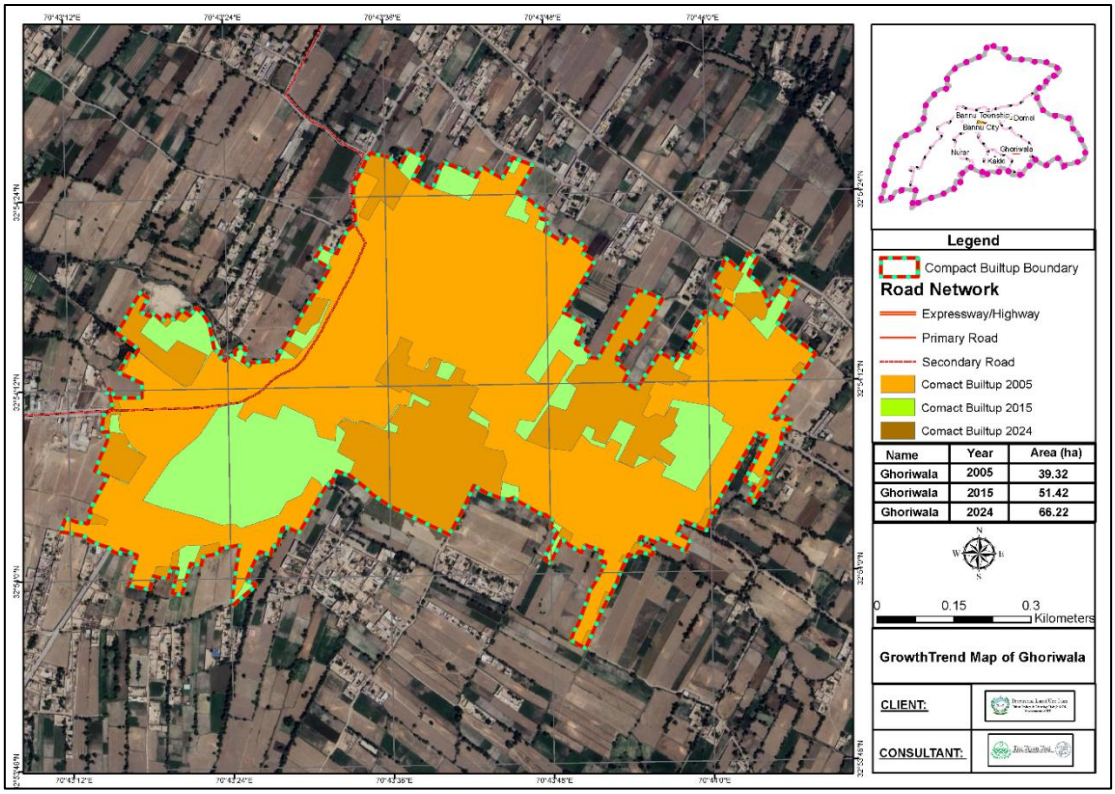
The Growth Trend Map of Naurar shows that from 2008 to 2024, because of the unavailability of historical images, the Naurar growth trend has been marked from the year 2008. Urban expansion has primarily occurred toward the south and southwest, with some spread to the north and east. The compact buildup area increased from 34.85 (ha) in 2008 to 51.14 (ha) in 2024. This indicates a steady outward sprawl with densification mainly in the southern parts of the settlement.



Map 1-14: Nurar Growth Trend of Compact Built-up

1.5.9.6 Ghoriwala

The Growth Trend Map of Ghoriwala shows expansion from 39.32 (ha) in 2005 to 66.22 (ha) in 2024. The main growth direction is towards the east and northeast, with some spread in the south and west. Development follows the secondary road network, indicating road-influenced growth and outward expansion over time.



Map 1-15: Growth Trend of Ghoriwala Compact Built-up

1.5.10 Planning Boundaries

Delineating urban boundaries is essential for sustainable land use and growth management. Clear boundaries support compact, high-density development, optimize infrastructure use, control unplanned expansion, and protect rural land. They also guide zoning, resource allocation, and future development, reducing costs and environmental impact. The figure below outlines the consultant's process for defining proposed urban boundaries.

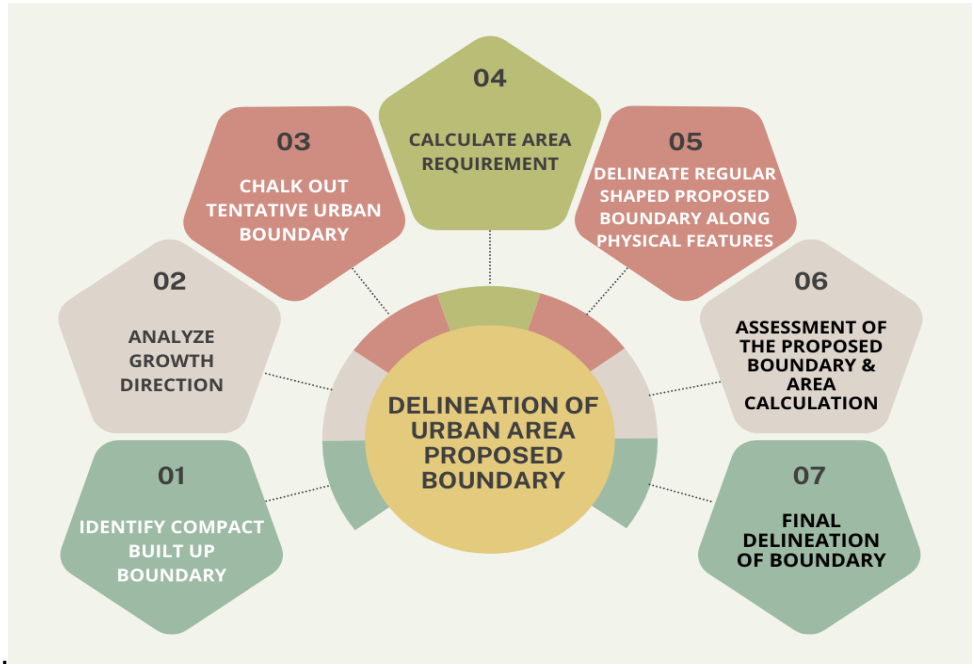


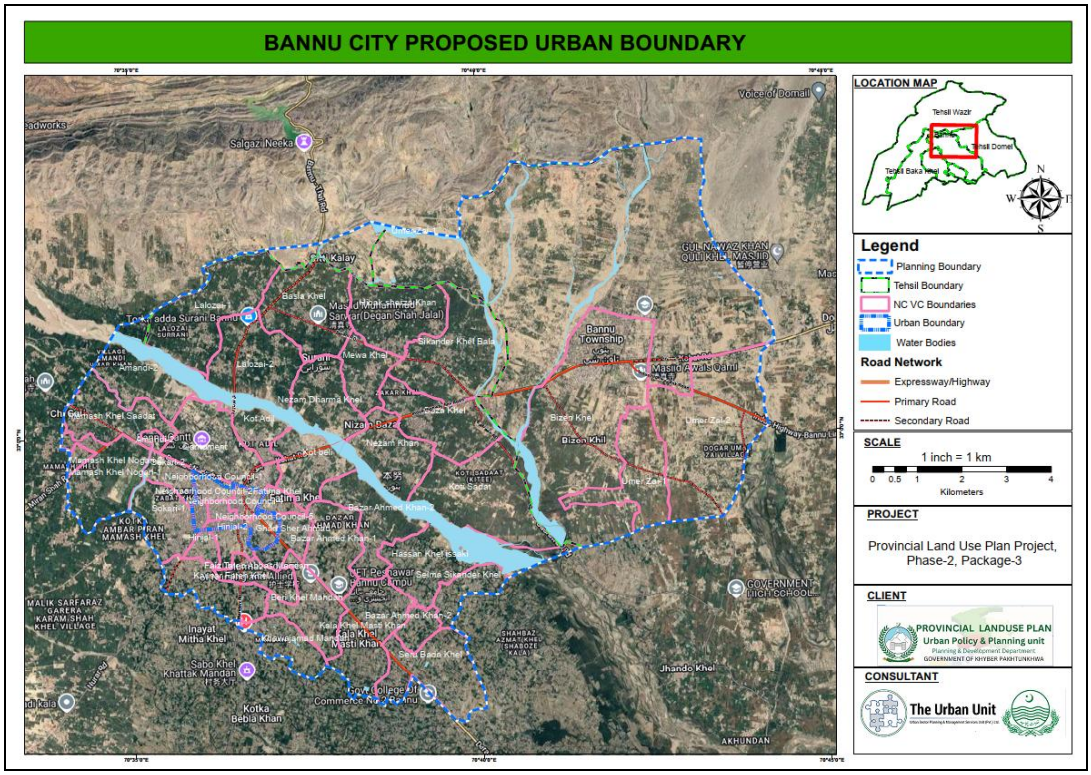
Figure 1-18: Delineation Process of Proposed Urban Boundaries

The delineation of proposed urban boundaries began with the compact built-up area and expanded along growth directions, including recent developments and planned projects like colleges and community centers. For existing urban areas, adjacent rural Village Councils were partially included based on

population proportions. In newly urbanized areas comprising multiple VCs, population-based area requirements were calculated to avoid excessive land allocation. Boundaries were drawn using natural and man-made features, ensuring regular shapes and clear jurisdiction. This approach supports sustainable growth, efficient land use, and minimizes conflict with sensitive areas.

1.5.10.1 Bannu City Proposed Boundary

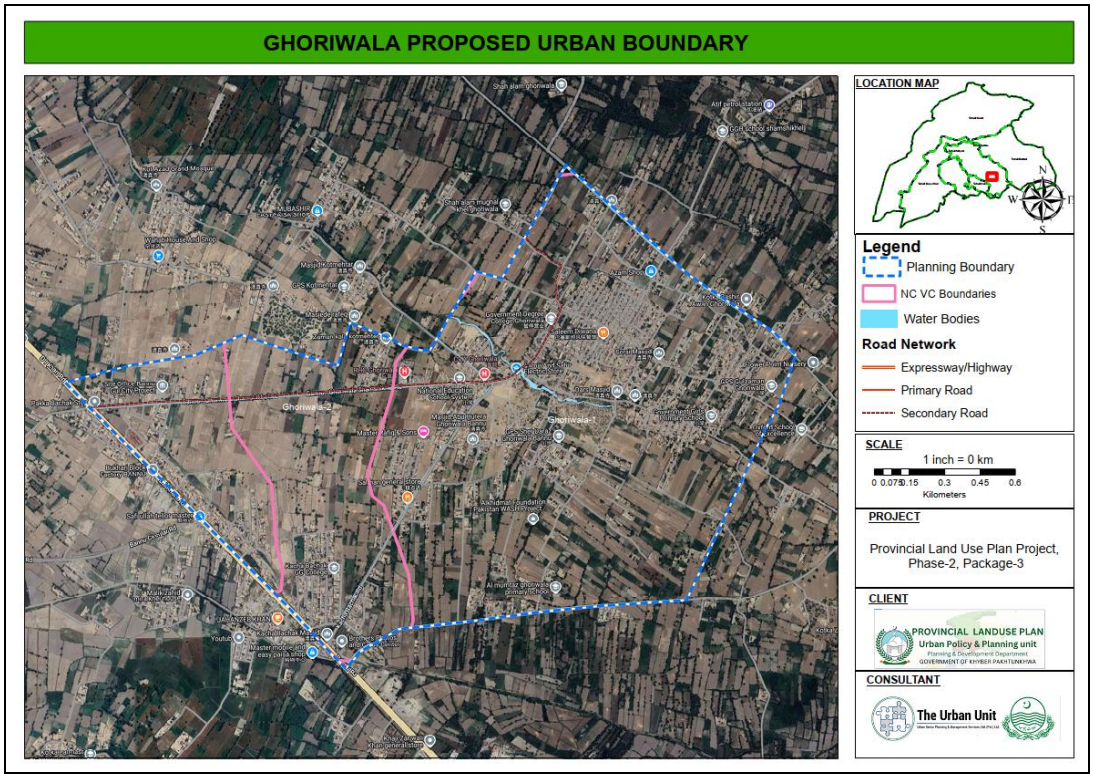
The delineation of the proposed urban boundary for Bannu City has been marked with careful consideration of key landmarks and infrastructural elements. To the east, the boundary has been delineated along the Kurram River, extending both South and North. In the North, the boundary follows the hilly terrain, crossing through Bannu-Thall Road, encompassing the prime agricultural area of Surani, crossing the Tochi River. To the West, the boundary follows the already delineated boundaries of the Neighborhood Councils up to Bannu-D.I. Khan Road, which lies in the South of District Bannu. From this point, the boundary follows the Neighborhood Councils' boundaries, crossing the Indus-Highway Link Road, reaching the Bannu-Kohat Road.



Map 1-16: Bannu City Proposed Urban Boundary

1.5.10.2 Ghoriwala Urban Area Proposed Boundary

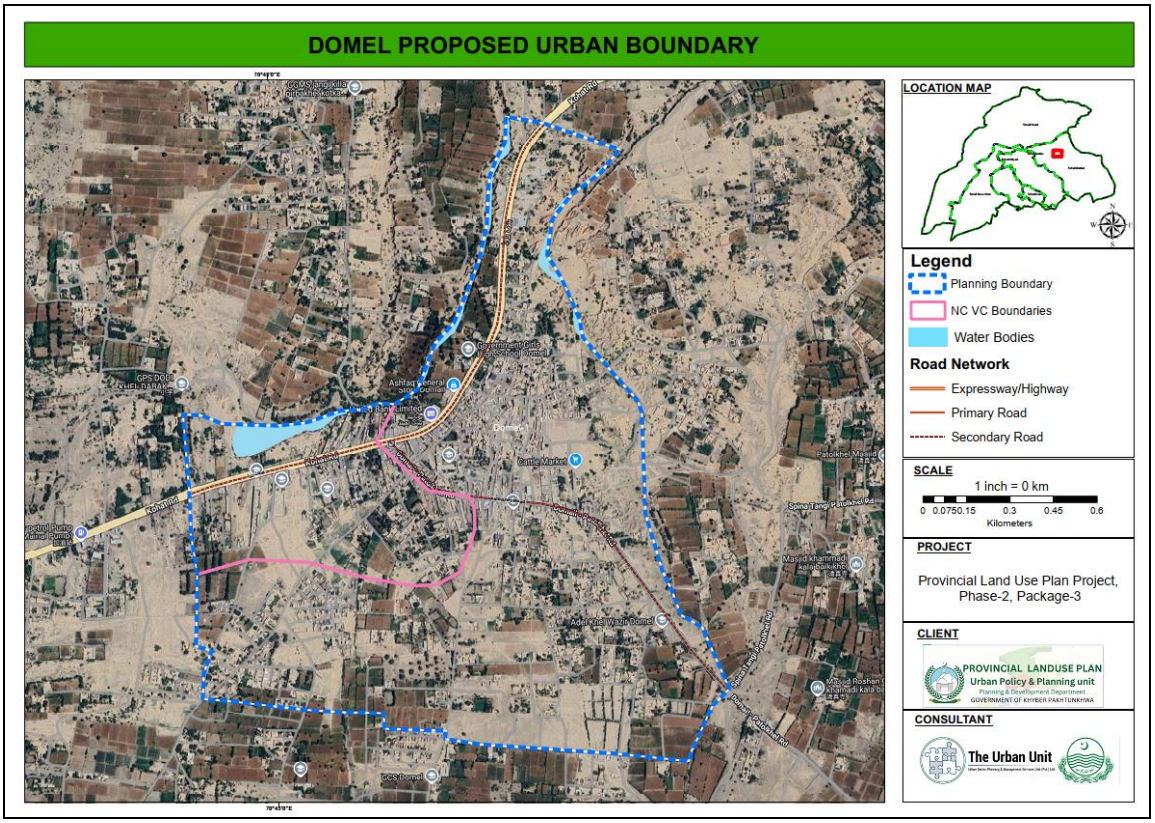
The delineation of the proposed urban boundary for Ghoriwala has been undertaken with careful consideration of key landmarks and infrastructural elements. To the West, the boundary has been delineated along Bannu-D.I. Khan road till Bannu Canal, from where it moves to the East following the Canal up till Ghoriwala-Akhundan Road in the North. From this point, the boundary follows the Neighborhood Councils' boundaries, crossing various agricultural fields and reaching the Bannu-D.I. Khan road to complete the boundary.



Map 1-17: Ghoriwala Urban Area Proposed Boundary

1.5.10.3 Domel Urban Area Proposed Boundary

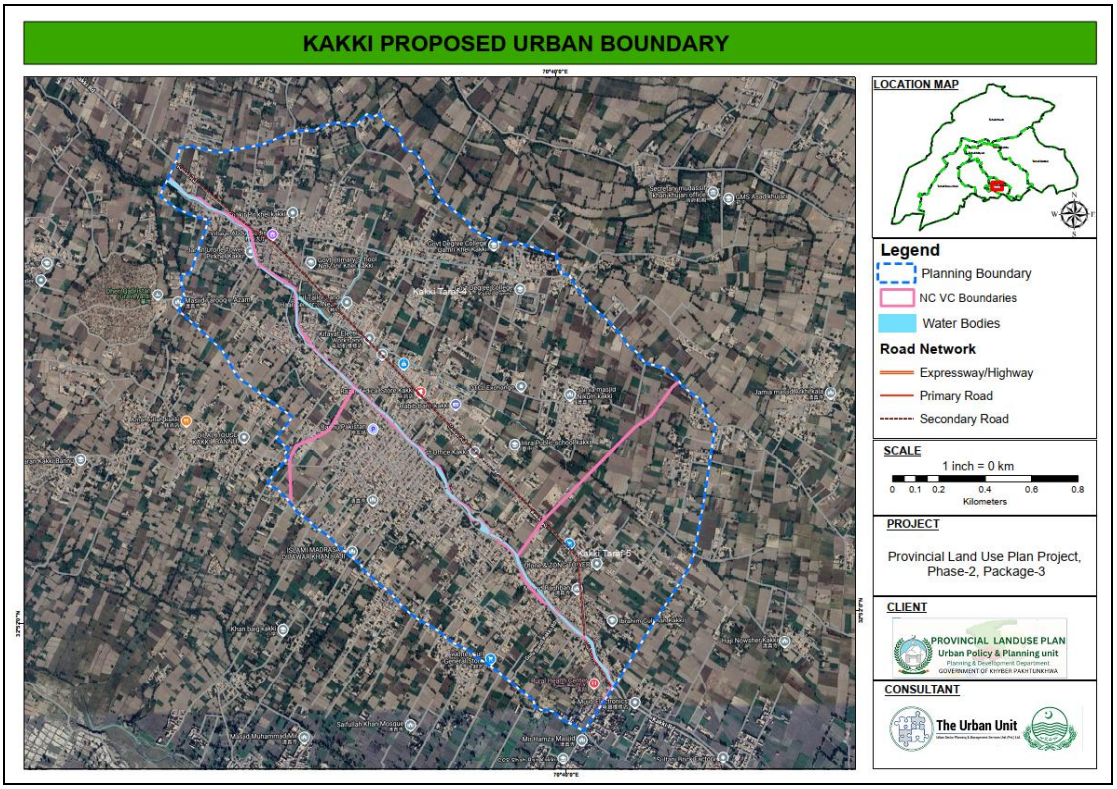
The delineation of the proposed urban boundary for Domel has been undertaken with consideration of key landmarks and infrastructural elements. To the West, the boundary has been delineated along the existing Built up for up to 1 km, after which it turns right to the East. The boundary then moves for about 1.8 km till the Domel-Patolkhel road. Moving upwards to the North, the boundary then follows the water body till the Bannu-Kohat road. In the North, the boundary then follows the dried-up water body till it reaches the starting point in the West.



Map 1-18: Domel Urban Area Proposed Boundary

1.5.10.4 Kakki Urban Area Proposed Boundary

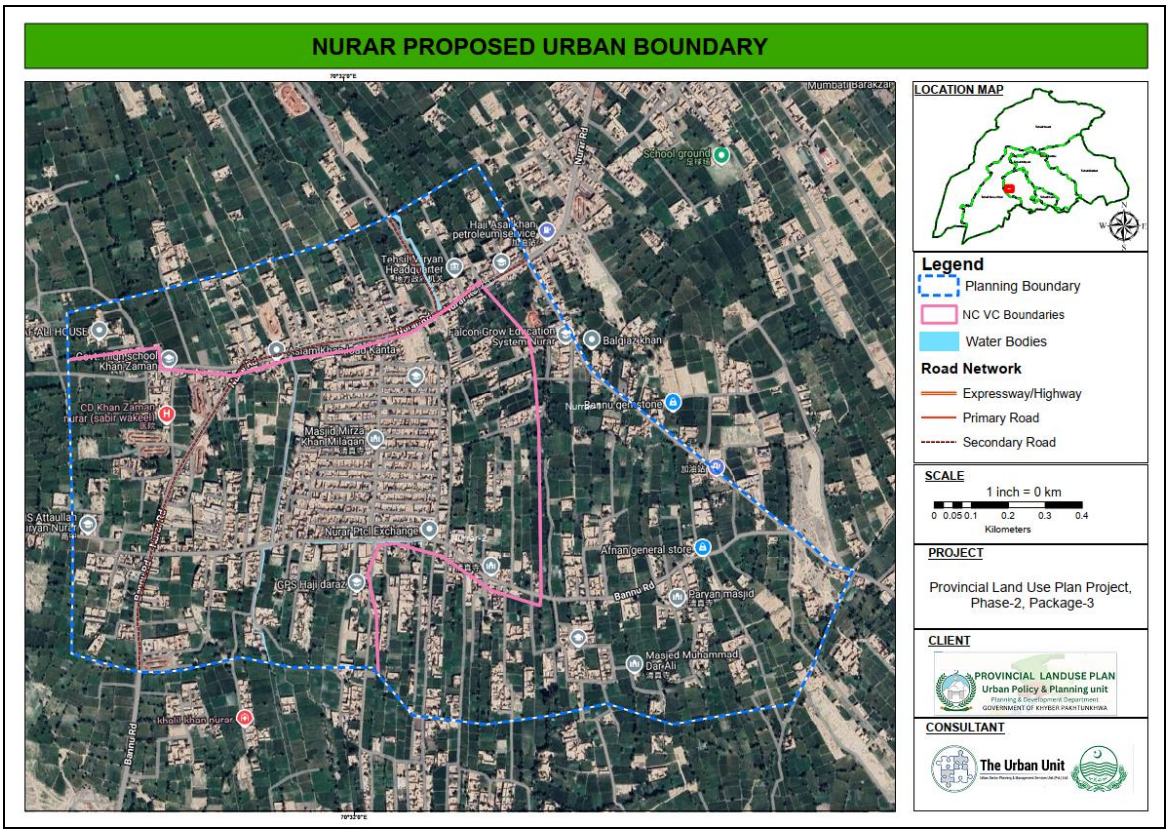
The delineation of the proposed urban boundary for Kakki has been marked with key landmarks and infrastructural elements. Kakki settlement lies on both sides of Kakki-Gambila Road; therefore, the boundary has been delineated around the major Kakki-Gambila road. In the West, the boundary passes near Dheri Qabristan, going South, passing through Islami Madrassa for 2 kms. Turning Eastwards along RHC Kakki, the boundary crosses Kakki-Gambila Road and runs for 1.5 kms after which it moves North crossing Government Degree College Qamar Khel Kakki following the natural course till the starting point.



Map 1-19: Kakki Urban Area Proposed Boundary

1.5.10.5 Nurar Urban Area Proposed Boundary

The delineation of the proposed urban boundary for Nurar has been marked with consideration of key landmarks and infrastructural elements. The boundary follows Nurar-Bannu Road in the West, after which it turns east, from there it moves upwards to the North, following the road and continuing for 1.5 km. The boundary moves for less than 500 meters before joining the initial point in the West.



Map 1-20: Nurar Urban Area Proposed Boundary

1.5.11 Review of Housing Schemes in the Public and Private Sectors

There is a total of 45 housing schemes in District Bannu, both public and private sectors out of which two public sector housing schemes in District Bannu, namely Bannu Township and Bannu Gul City.

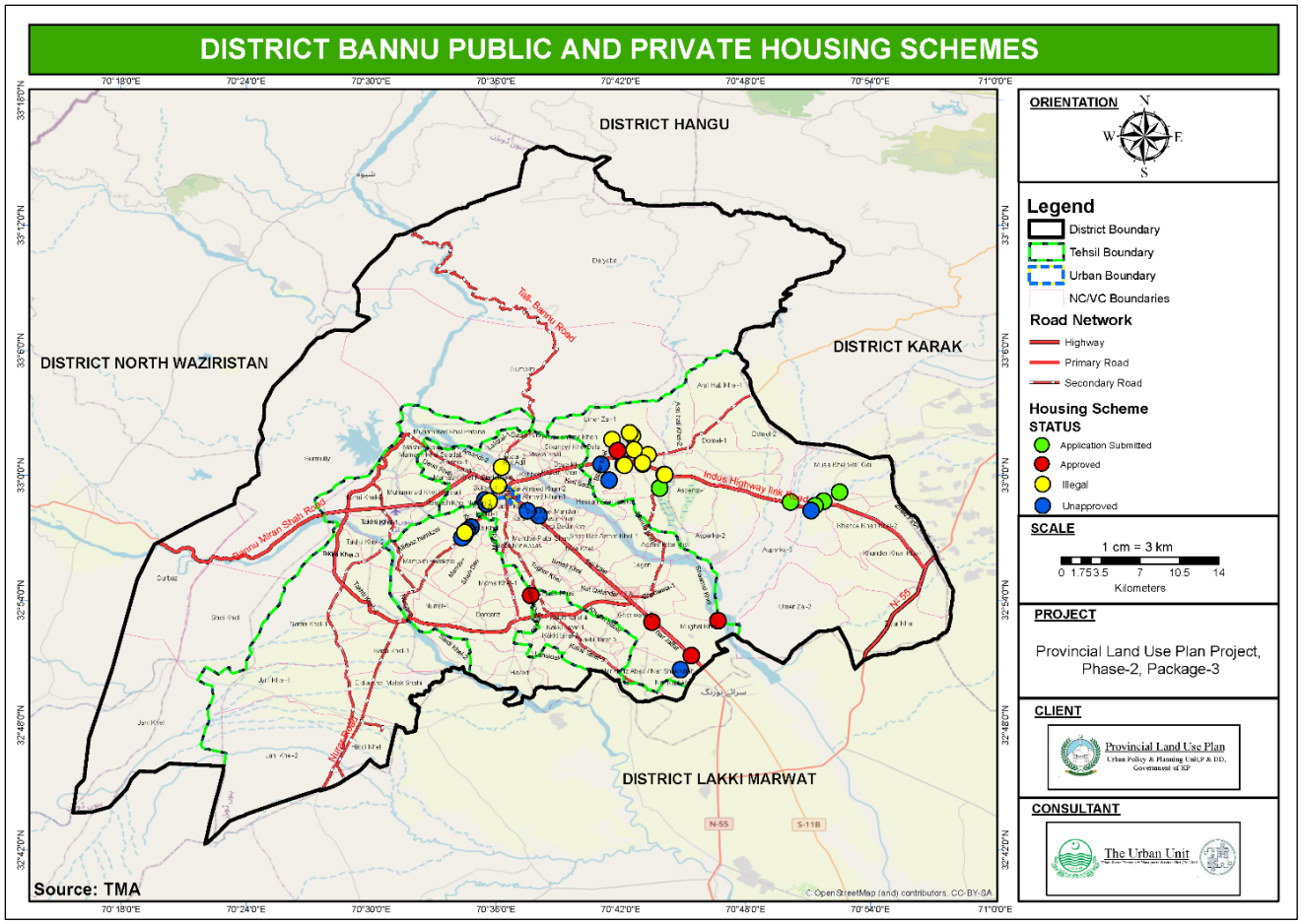
The review of housing societies across Domel, Miryan, Kakki, and Bannu TMAs reveals a concerning trend, particularly in Domel, where the majority of housing schemes are either unapproved or marked illegal, often lacking basic infrastructure like boundary walls and main gates. While a few projects, such as CPEC Residencia (Tehsil Kakki), Al Shafa Housing Society, and Jumera Town (Tehsil Bannu) are approved and progressing, most others remain under process or face regulatory issues. Housing schemes in Tehsil Miryan shows some registration activity, though one colony is sealed. Overall, the data highlights inadequate regulatory compliance, insufficient oversight, and the urgent need for stricter enforcement and public awareness to prevent unauthorized development. The details of housing schemes are provided in the Table and Map below.

Table 1-13: Existing Housing Schemes[18]

Sr. No	NAME	AREA TMA's	TEHSIL/TMA	LEGAL STATUS	TMA REMARKS
1	New Bahria Town	99.5 Kanals	Domel	Application Submitted	Under Process
2	Malik Sherin Modern Town	98 Kanals	Domel	Application Submitted	Under Process
3	New Economic Zone	55 Kanals	Domel	Application Submitted	Under Process
4	Gulistan Colony	98 Kanals	Domel	Application Submitted	Under Process
5	Malik Sherin residencia	83 Kanals	Domel	Illegal	Nil
6	Faqeer Appi Town	99 Kanals	Domel	Application Submitted	Under Process
7	Mir Bosh Colony	29 Kanals	Domel	Illegal	Under Process
8	Al Jazeera Town	99 Kanals	Domel	Unapproved	Under Process
9	Hayat City	80 Kanals	Domel	Unapproved	Under Process
10	Green Valley	27 Kanals	Domel	Unapproved	Under Process
11	Akhunzada Town	70 Kanals	Domel	Unapproved	Under Process
12	Shah Narz Town	50 Kanals	Domel	Illegal	Nil
13	Khan Town	300 Kanals	Domel	Illegal	Boundary wall no main gate
14	Khan Medical Town	120 Kanals	Domel	Illegal	Boundary wall no main gate
15	Khan Colony	100 Kanals	Domel	Illegal	No Boundary wall no main gate
16	Shanraz Town	60 Kanals	Domel	Illegal	No Boundary wall no main gate
17	Sherzada Town	60 Kanal	Domel	Illegal	No Boundary wall no main gate
18	Munsif Ali Town	50 Kanals	Domel	Illegal	No Boundary wall no main gate
19	Syed Akbar Town	100 Kanals	Domel	Illegal	No Boundary wall no main gate
20	Itehad Town	180 Kanals	Domel	Illegal	No Boundary wall no main gate
21	Inam Colony	100 Kanals	Domel	Illegal	No Boundary wall no main gate
22	Umar Hayat Khan	100 Kanals	Domel	Illegal	No Boundary wall no main gate
23	Sharifullah Town	160 Kanals	Domel	Illegal	No Boundary wall no main gate

[18] *Data Collected from TMA during consultation session held at DC office 17 march 2025*

Sr. No	NAME	AREA TMA's	TEHSIL/TMA	LEGAL STATUS	TMA REMARKS
24	Mansor Town	80 Kanals	Domel	Illegal	No Boundary wall no main gate
25	Industrial Town	125 Kanals	Domel	Illegal	No Boundary wall no main gate
26	Amun Colony	30 Kanals	Domel	Illegal	No Boundary wall no main gate
27	Malik Sherin Malik Miryan-1 colony	21 Kanals	Miryan	Unapproved	Under Process of Registration
28	Malik Sherin Malik Miryan-2 colony	16 Kanals	Miryan	Unapproved	Under Process of Registration
29	Malik Sherin Malik Miryan-3 colony	13 Kanals	Miryan	Unapproved	Under Process of Registration
30	Overseas Housing Society	50 Kanals	Miryan	Unapproved	Under Process of Registration
31	Malik Sarim colony	10 Kanals	Miryan	Illegal	Banned/ No Society/Sealed
32	CPEC Residencia	419 Kanals	Kakki	Approved	Under Process
33	Al Shafa Housing Society DIKhan road	33 Kanals	Bannu	Approved	NOC Issued
34	Jumera Town DIKhan Road	162 Kanals	Bannu	Approved	NOC Issued
35	Msm Modern City Colony Bannu City	15 Kanals	Bannu	Unapproved	Under Process
36	Garden City Nurang Road	279 Kanals	Bannu	Unapproved	Under Process
37	Mian Damsaz Colony	28 Kanals	Bannu	Unapproved	Under Process
38	Samiullah Haq Town	Not Known	Bannu	Unapproved	Old H.s/Notice Issued/Adv in News Paper
39	Nek Nawaz Malik Town	Not Known	Bannu	Unapproved	Old H.s
40	Doctor Colony Nurang Road	Not Known	Bannu	Unapproved	Old H.s
41	Abu Hanifa Town back side Degree No.1 College.	Not Known	Bannu	Unapproved	Old H.s
42	Waqeel Town back side degree No.1 Collage	Not Known	Bannu	Illegal	Old H.s
43	Zafar Town back side degree No.1 Collage	Not Known	Bannu	Illegal	Old H.s
44	Bannu Township	8000 Kanals	Domel	Approved	Government Scheme. BDA
45	Banni Gul City	11029 Kanals	Bannu	Approved	Government Scheme. PHA



Map 1-21: District Bannu Public and Private Housing Schemes

1.5.12 Spatial Analysis of Public/Private Housing schemes

The spatial development analysis of approved and NOC-issued housing schemes was conducted using data collected through field visits, consultation meetings with the respective TMA's, and the use of Google Earth and ArcGIS for identifying housing societies and their infrastructural development. Following the field visits and consultations, all approved and application submitted housing schemes were mapped using ArcGIS.

- In CPEC Residencia Housing Scheme, located in Tehsil Kakki, no substantial development work has been observed. Infrastructure development is limited to the construction of the main gate, the main boulevard, and the boundary wall.
- Similarly, in Al Shafa Housing Society, situated in Tehsil Bannu, only minimal development has taken place. Half of the main road, the main gate, and a portion of the boundary wall have been constructed.
- Jumaira Town, located along Dera Ismail Khan Road in Tehsil Bannu, shows relatively more progress, with approximately 30% to 40% of the development completed. The main roads and internal streets have been paved, a significant number of houses have been built, and both the boundary wall and main gate have been constructed.
- In Faqeer Appi Housing Society, situated in Tehsil Domel, limited development is visible. Only half of the main road and the boundary wall have been completed.
- Similarly, in the Malik Sherin Housing Scheme, also located in Tehsil Domel, development remains negligible. Only the main gate and part of the boundary wall have been constructed.
- In Gulistan Colony, located in Tehsil Domel, only minimal infrastructure development has been carried out. To date, only the layout plan has been implemented, showing the main road and streets, while the boundary wall has not been constructed.
- The New Bahria Town Housing Scheme, located in Tehsil Domel, also reflects limited infrastructure development. Only the main gate and parks have been constructed, and no boundary wall exists. Furthermore, the layout plan of the scheme is not aligned with on-ground conditions.

- In the so-called New Economic Zone Housing Society, no meaningful development has been observed. There are no constructed roads, houses, or boundary walls—only the main gate has been built.
- Bannu Township is a government housing scheme located in Domel Tehsil and managed by the Bannu Development Authority. The infrastructure work is nearly complete, and most houses have already been constructed. The township is divided into four sectors: A, B, C, and D. Among these, sectors A, C, and D are approximately 90% complete and fully livable, with developed main roads, streets, and utility services. Sector B, however, is around 50% complete.
- Banni Gul City is a proposed public sector housing society located in Tehsil Bannu under the Provincial Housing Authority. However, no physical development or infrastructure has been observed on the ground.

All remaining housing schemes are illegal/unapproved and lack defined boundaries, which prevents their spatial analysis. The details of the approved housing schemes are provided in the table and map below.

Table 1-14: Existing Legal Housing Schemes[19]

S.no	NAME	AREA TMA's	TEHSIL/TMA	STATUS	Infrastructural development in %	Built Houses in %
1	New Bahria Town	99.5 Kanals	Domel	Application Submitted	40 to 50	0.00
2	Malik Sherin Modern Town	98 Kanals	Domel	Application Submitted	30 to 50	0.00
3	New Economic Zone	55 Kanals	Domel	Application Submitted	10 to 20	0.00
4	Faqeer Appi Town	99 Kanals	Domel	Application Submitted	30 to 40	0.00
5	CPEC Residencia	419 Kanals	Kakki	Approved	20 to 30	0.00
6	Al Shafa Housing Society DIKhan road	33 Kanals	Bannu	Approved	50 to 60	5 to 10
7	Jumera Town DIKhan Road	162 Kanals	Bannu	Approved	60 to 70	40 to 60
8	Gulistan Colony	98 Kanals	Domel	Application Submitted	20 to 30	0.00
9	Bannu Township	8000 Kanals	Domel	Approved Govt. scheme Bannu Development Authority	80 to 90	70 to 80
10	Banni Gul City	11029 Kanals	Bannu	Approved Govt. scheme Provincial Housing Authority	0.00	0.00

[19] *Spatial analysis from Google earth and Data Collected from TMA during consultation session held at DC Office 17 March 2025*

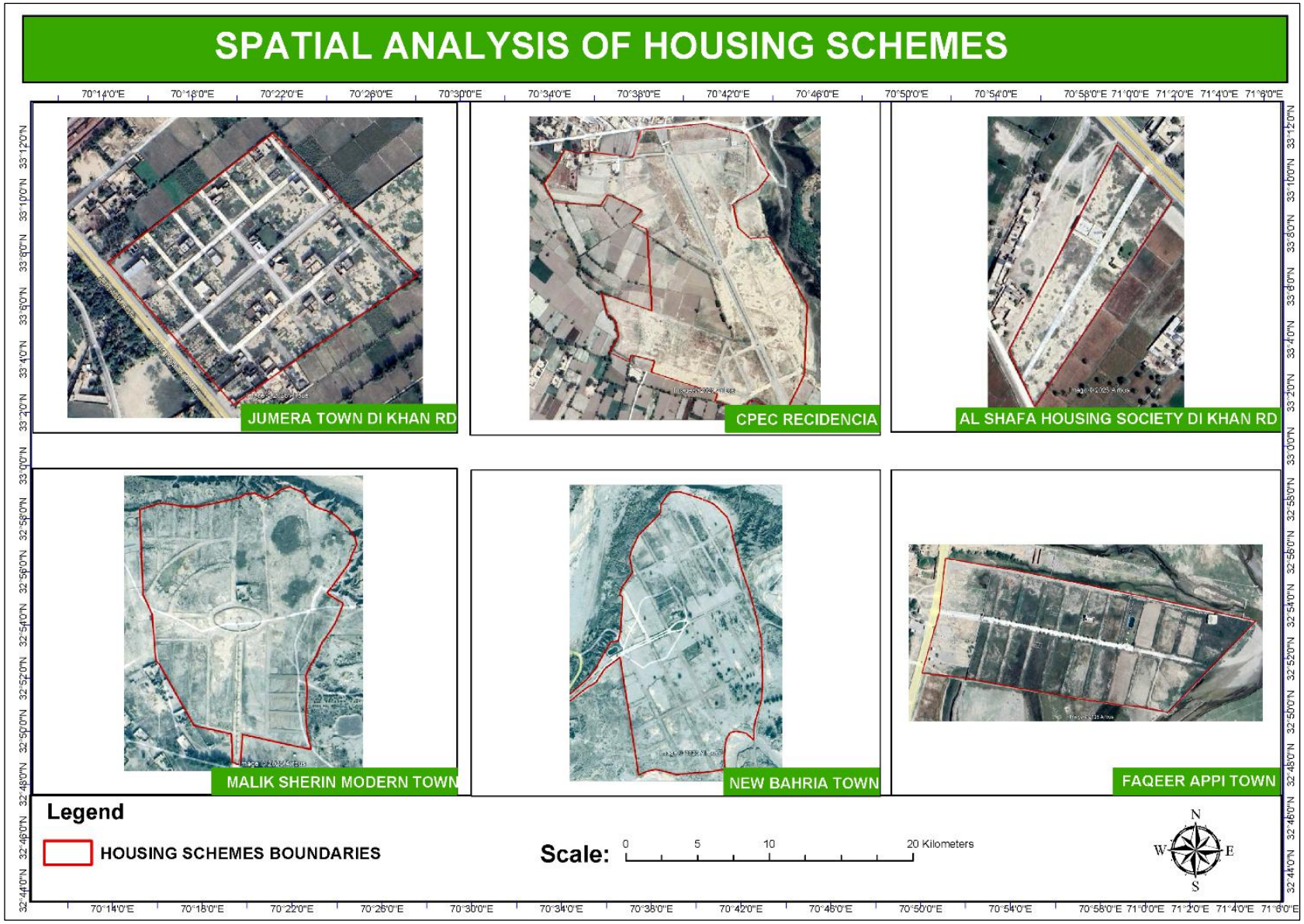


Figure 1-19: Spatial Analysis of Housing Schemes2

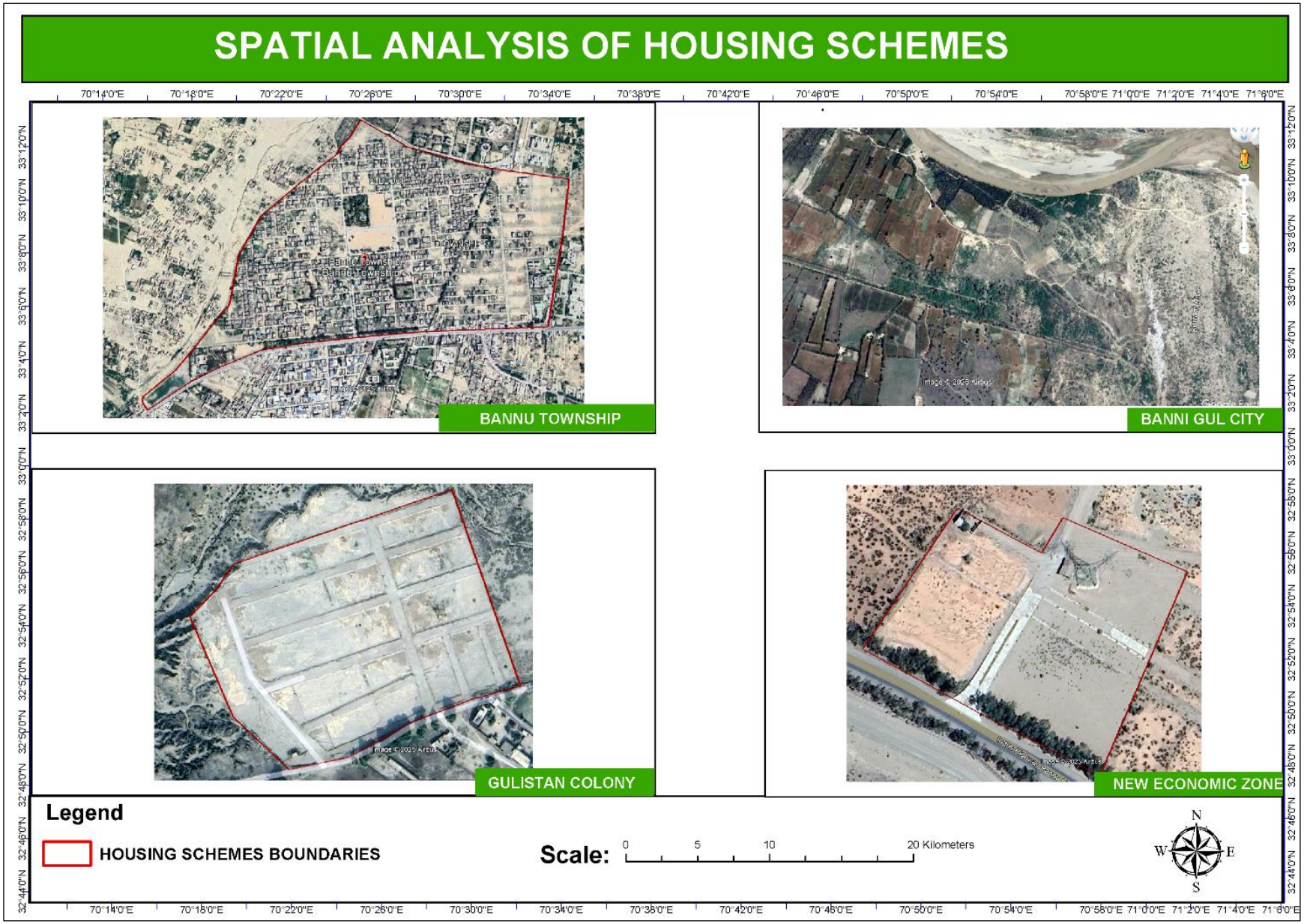


Figure 1-20: Spatial Analysis of Housing Schemes

2. EXISTING LANDUSE DISTRIBUTION

Land, a fundamental resource integral to human sustenance and progress, has witnessed centuries of exploitation and transformation. In the context of District Bannu, land emerges as a fundamental resource essential for the well-being and progress of its communities. Over centuries, humanity has honed its understanding of land resources, navigating the delicate balance between finite resources and ever-growing human needs. This equilibrium is notably strained, evident in the challenges faced by the district's land. The pressing demands on land manifest in various ways, from diminishing crop yields to the depletion of both the quality and quantity of available land.

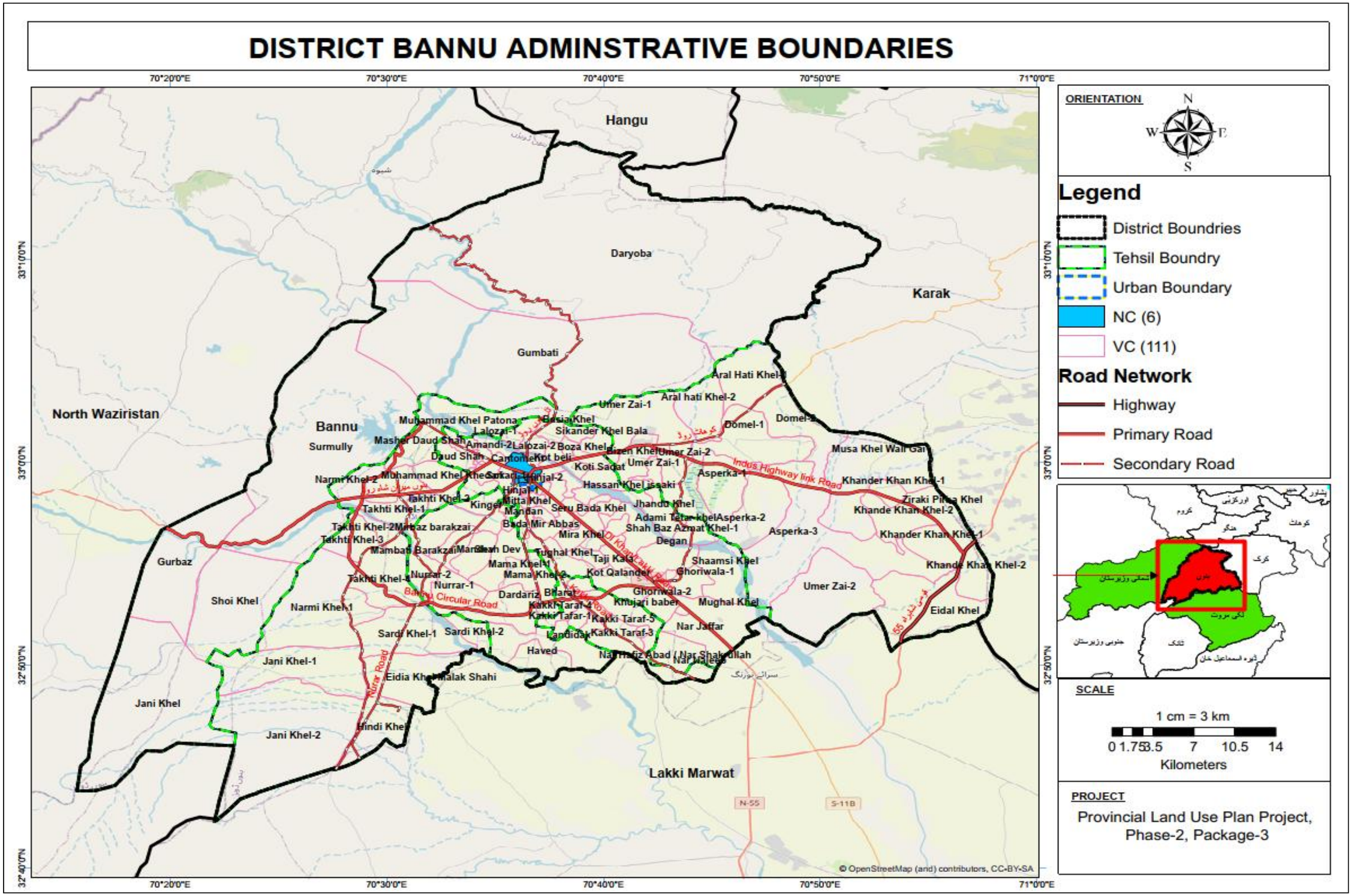
Agriculture, a cornerstone of land use, holds a pivotal role in sustaining the district's population. However, the encroachment of industrialization and urbanization, particularly in proximity to urban centers, presents a complex challenge. This encroachment poses threats to agricultural lands, impacting both ecosystems and socio-economic conditions within the district. As we delve into the existing land use/land cover pattern of District Bannu, the alterations in land use become apparent. Understanding this intricate relationship is crucial, especially in the context of population growth and its implications for food security, emerging as major concerns for the district's sustainable future.

2.1 Administrative Setup

Nestled in the northwestern region of Pakistan, District Bannu has been divided into six tehsils, each contributing uniquely to the district's dynamics. Tehsil Wazir, erstwhile Frontier Region (FR), covers the North and Northwest part of the district, spanning over 917.01 Sq. Km is the largest of all the tehsils area wise. Tehsil Bannu, which is the administrative Centre and District Headquarters, is at the center of the district covering 238.63 sq. Km of area. Tehsil Kakki, lying to the South of the district, is the smallest of them all with 44.10 sq. Km. collectively, these strategically positioned tehsils carve out a district-wide territory covering 2104.02 sq. Km area, creating a tapestry that reflects the geographical diversity and cultural richness of the region. Table 2-1 shows the details of the tehsil-wise area of District Bannu.

Table 2-1: Tehsil Setup of District Bannu

S. No	Tehsil	Covered Area (Sq. Km)	%age
1	Bannu Tehsil	238.63	11.34%
2	Domel Tehsil	421.69	20.04%
3	Meryan Tehsil	126.41	6.00%
4	Kakki Tehsil	44.10	2.1%
5	Baka Khel Tehsil	356.18	16.9%
6	Wazir Tehsil	917.01	43.58%
District Bannu Total Area		**2104.02**	**100.00%**



Map 2-1: Tehsil-wise Administrative Boundary

2.2 Urban Centers

District Bannu comprises five urban centers, of which four are proposed for future development, while the existing municipal entity—currently functioning as the District Headquarters (DHQ)—holds a central role in the district's governance and urban dynamics. The Bannu Municipal Committee, alongside the proposed urban centers of Ghoriwala, represents key nodes in the district's spatial development strategy. Additionally, the remaining tehsils also include significant proposed urban centers: Domel in tehsil Domel, Kakki in tehsil Kakki, and Naurar in tehsil Miryan.

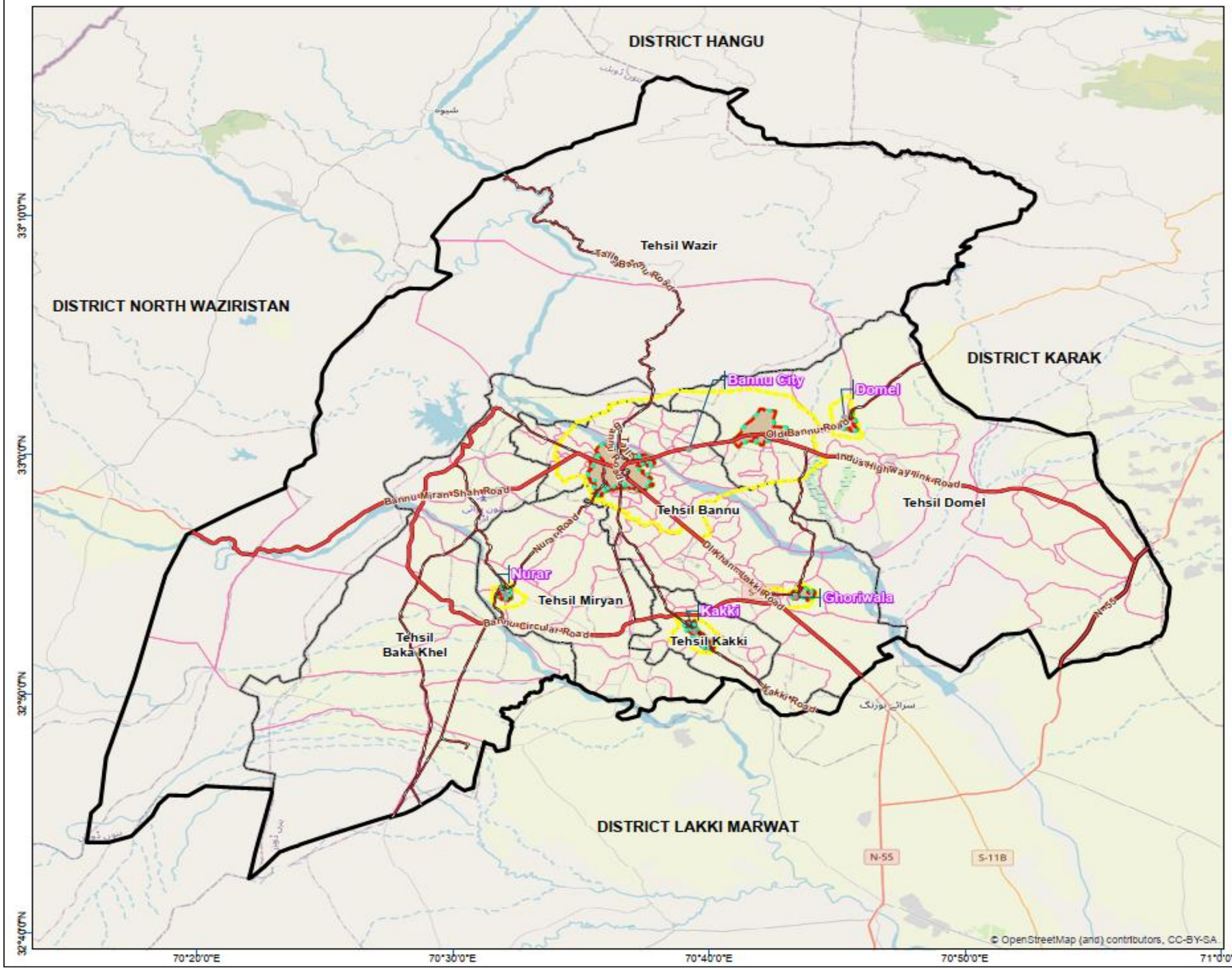
These urban centers, both existing and proposed, are integral to the district's urban framework, playing a critical role in shaping its land-use patterns, fostering economic activity, and promoting balanced regional growth. The strategic development of these centers is expected to enhance the district's connectivity, service delivery, and overall urban functionality, thereby driving the sustainable urbanization and long-term prosperity of Bannu.

In line with modern town planning principles, these proposed urban centers are designed to address the evolving socio-economic needs of the district, providing a balanced distribution of services and infrastructure while mitigating congestion in the existing municipal areas. Together, these centers will significantly contribute to the spatial planning objectives, enhancing the liveability and resilience of Bannu's urban landscape. The Bannu Municipal Committee covers 12079.41 hectares in Tehsil Bannu and Domel, while the area of the Ghoriwala urban area is 362.87 hectares. The Domel urban area spans 409.56 hectares of land which while the Kakki and Naurar urban area covers an area of about 557.47 and 278.67 hectares respectively. Recognizing the unique dynamics of urban centers is paramount for the formulation of a comprehensive and effective land-use strategy tailored to the distinct characteristics of District Bannu. Below Table 2-2 and Map 2-2 show the details of the areas of the urban centers of District Bannu.

Table 2-2: District Bannu Urban Areas

Tehsil	Urban Area	Area (ha)
Bannu	Bannu MC	12079.4
	Ghoriwala	362.87
Domel	Domel	409.56
Kakki	Kakki	557.47
Miryan	Naurar	278.67
Total Urban Area		**13687.97**

Urban Areas Map of District Bannu



ORIENTATION

N W E S

LEGEND

- District Boundary
- Tehsil Boundary
- Urban Boundary
- NC Boundary (6)
- VC Boundary (111)
- Compact Builtup Boundary
- Planning Boundary

Road Network

- Highway
- Primary Road
- Secondary Road

SCALE

1 inch = 7 km

0 3.5 7 14 KM

PROJECT

Provincial Land Use Plan Project, Phase-2, Package-3

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Planning & Development Department
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Map 2-2: Urban Areas of District Bannu

2.3 District Land Use Distribution

District Bannu spans about 210404.66 ha, of which the highest landuse is of Barren land, which accounts for 76332.3281 ha (36.28%) of land, followed by Agriculture with 63881.5503 ha (30.36%) of land occupation. This is indicative of agriculture being one of the main sources of income in the district. Thirdly, the area designated as Range land is 40405.5711 hectares is a part of natural composition, which is about 19.20% of the total area of the district. The landuse classification of district Bannu has been categorized below:

Residential and Commercial

The residential land use covers an area of 10071.7426 ha, constituting 4.79% of the total district land. This includes various housing and living spaces catering to the population's diverse needs; mixed-use zones offer a blend of residential and commercial 26.7315 ha (0.01%) contributing to a vibrant urban environment. The commercial landscape, spanning 353.100 ha (0.17%) of the district, including areas designated for business and trade activities. Combined, these 3 subclasses cover 10451.5741 ha. The km of area is broadly categorized as residential and commercial classes.

Concentrated Public Sector

Covering 438.0236 ha of education, education plays a crucial role in fostering intellectual growth and development within the district. Health facilities, occupying 50.9658 ha provides essential services to the community, ensuring the well-being of residents. Public Buildings and Civic Amenities encompassing 115.4912 ha serves as a hubs for civic engagement and public services, enhancing the overall quality of life. With an area of 55.7758 ha, religious buildings contribute to the cultural and spiritual landscape of the district. Parks, totaling 119.0403 ha of area, offer recreational opportunities, and contribute to the district's environmental sustainability. Combined, the concentrated public sector class occupies 779.2967 ha of area out of the total.

Industrial

Small industries and scattered industries distributed across occupy 133.0001 and 273.2885 sq. Km of area, respectively complementing the industrial landscape of the district by promoting economic diversity.

Physical Landscape

Extending over a vast area of 63881.5503 ha, agriculture remains a pivotal component of the District Bannu landscape, contributing significantly to the local economy and sustenance. The expansive range land covering 40405.5711 ha defines a substantial portion of the district, characterized by natural vegetation and serving various ecological functions. Encompassing 152.0872 ha, & 244.4816 ha the forested and Plantation areas contribute to biodiversity conservation, supporting a rich ecosystem within the district. The barren land, spanning 76332.3281 ha represents areas with limited vegetation, presenting both challenges and opportunities for sustainable land use planning. District Bannu is adorned with water bodies covering 12595.8298 ha, enhancing scenic beauty and providing essential resources. Orchards, occupying 1470.5965 ha, contributes little to the district's agricultural diversity, providing fruits and economic opportunities.

Other Land Uses

Graveyards, covering 439.6229 ha, serve as solemn spaces for final resting, integrated into the district's cultural and social fabric. Spanning 1024.9247 ha, vacant areas represent potential spaces for future development, requiring careful consideration in land use planning. Bus terminals throughout the district account for 5.9930 ha of area.

Notified Area

The Bannu Cantonment, which has been classified as a Notified area, occupies 161.7866 ha of area.

Transportation

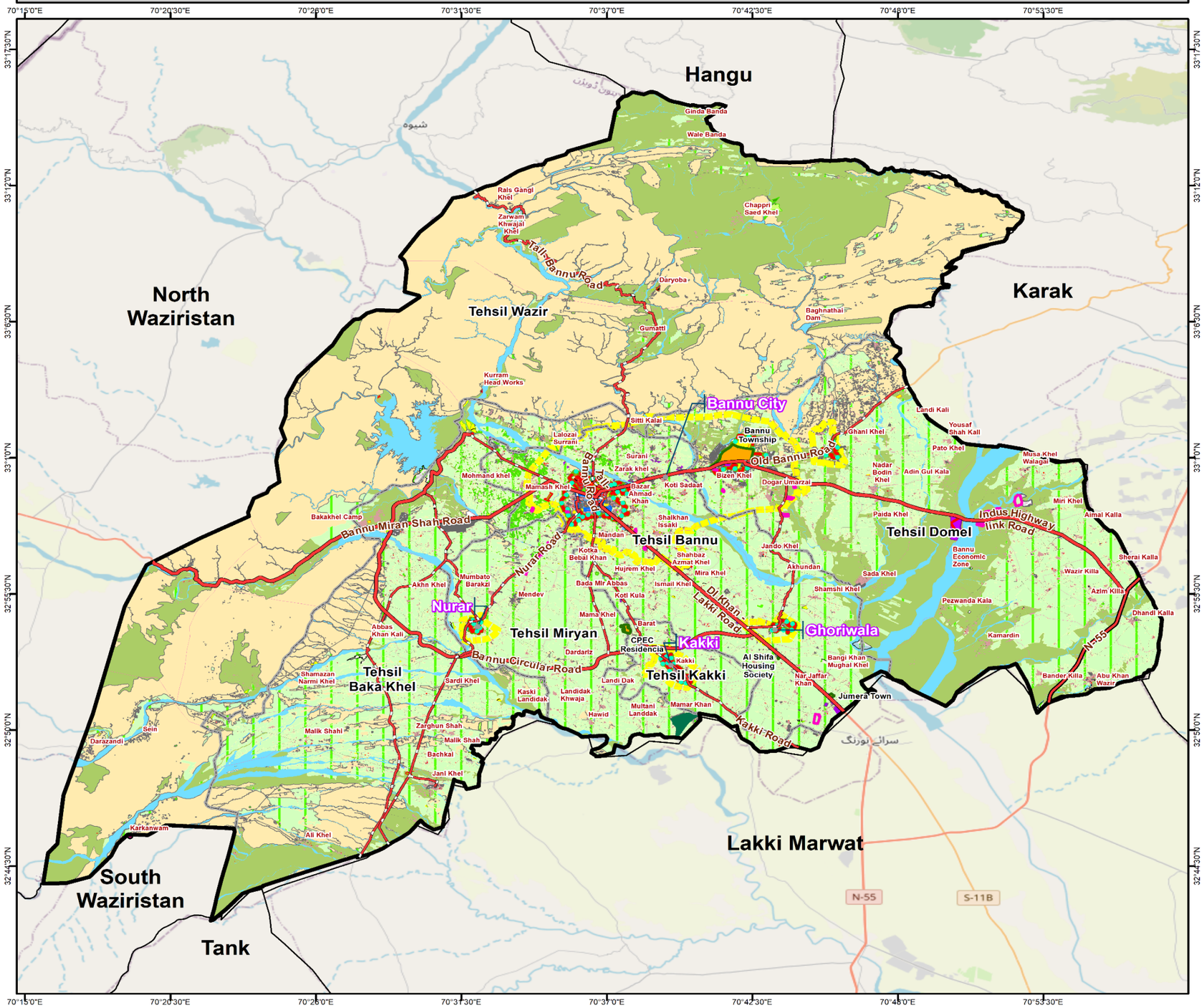
The extensive road network, covering 1873.8040 ha facilitates connectivity and accessibility, playing a crucial role in the district's transportation infrastructure. Bannu Airport covers an area of 174.7266 ha serve as hubs for public transportation, enhancing connectivity within the district.

The details of existing landuse distribution across District Bannu have been given below in Table 2-3.

Table 2-3: District Bannu Existing Landuse Distribution

District Landuse Area		
Land Use	**Area (hectares)**	**%age**
Education	438.0235746	0.21%
Health Facility	50.96575578	0.02%
Residential	10071.74255	4.79%
Residential and Commercial (Mixed Use)	26.73145352	0.01%
Graveyard	439.6229156	0.21%
Religious Building	55.77583892	0.03%
Scattered Industries	273.2885008	0.13%
Small Industrial Estate	133.0001458	0.06%
Commercial	353.1	0.17%
Public Buildings and Civic Amenities	115.4911692	0.05%
Bus Terminals	5.992954284	0.00%
Transportation	1873.803969	0.89%
Airport	174.7265625	0.08%
Orchards	1470.596503	0.70%
Parks	119.0403209	0.06%
Plantation	244.4815748	0.12%
Agriculture	63881.55028	30.36%
Barren Land	76332.3281	36.28%
Disposal Site	4.202303261	0.00%
Forest Land	152.0872345	0.07%
Military Lands/Cantonment	161.786623	0.08%
Range Land	40405.57106	19.20%
Vacant Area	1024.92469	0.49%
Water Bodies	12595.82975	5.99%
Grand Total	**210404.66**	**100.00%**

Existing Landuse Map of District Bannu



ORIENTATION

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LEGEND

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- Urban Boundary
- Compact Builtup Boundary
- Planning Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Airport
- Barren Land
- Bus Terminals
- Commercial
- Disposal Sites
- Education
- Small Industrial Estate
- Health Facility
- Military Lands/Cantonment
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Orchards
- Parks
- Plantation
- Range Land
- Religious Building
- Residential
- Scattered Industry
- Forest Land
- Graveyard
- Transportation
- Vacant Area
- Water Bodies

Housing Schemes

- Approved
- Unapproved

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 7 km

0 5 10 20 KM

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Map 2-3: District Bannu Existing Landuse Classification

2.4 Tehsil Land Use Distribution

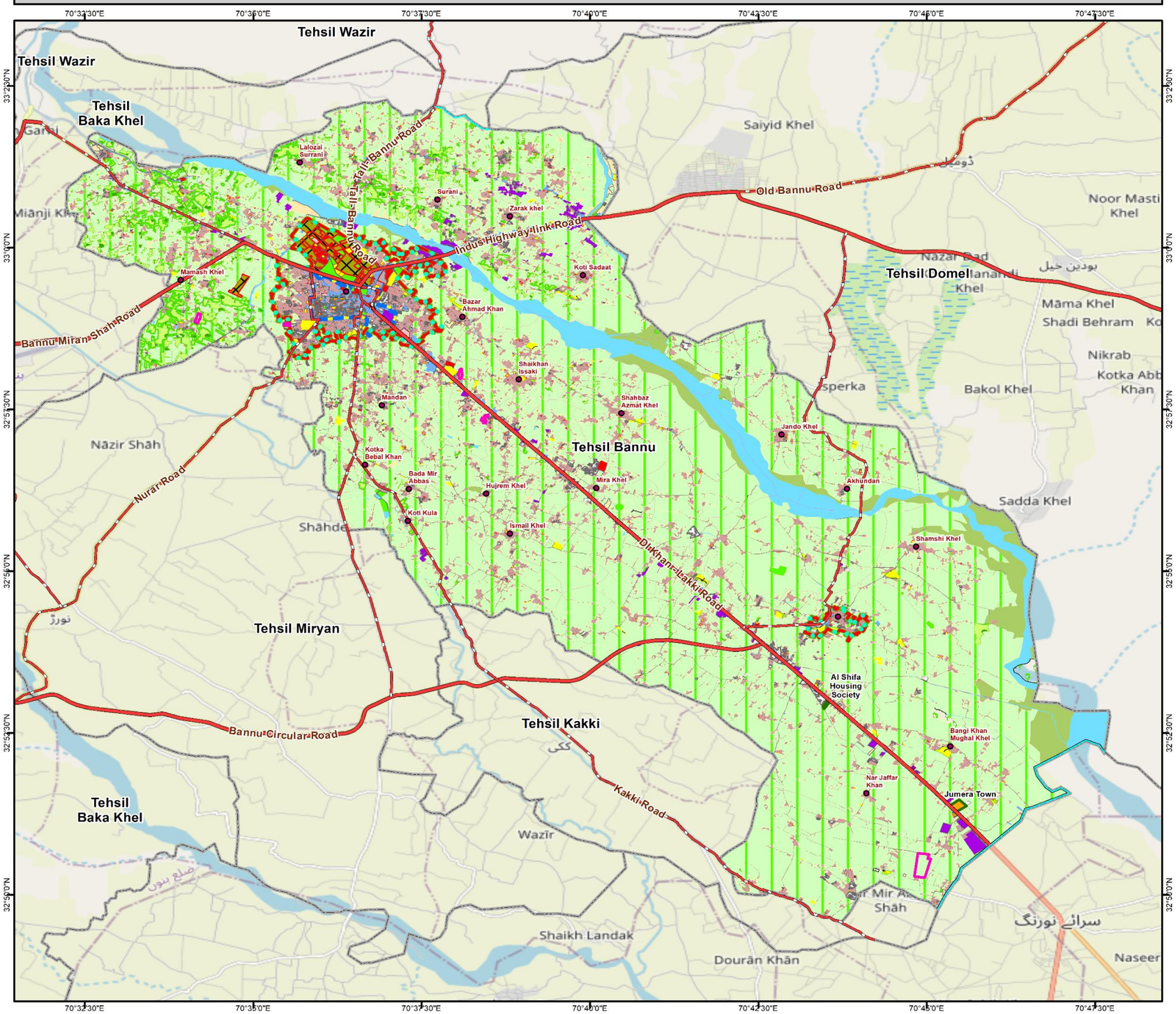
2.4.1 Tehsil Bannu

Tehsil Bannu encompasses a total area of 23862.55 Hectares. The largest individual land use category within this tehsil is Agriculture, which occupies 15974.29 Hectares or 66.94% of the total area. Residential land use holds a substantial share at 13.40%, covering 3196.71 Hectares. Orchards, a key landuse, accounts for 783.2 Ha constituting 3.28% of the total area. Additionally, the key settlement of Ghoriwala has been proposed for urban in Tehsil Bannu, identified for its distinct characteristics and topographical prominence. Ghoriwala currently functions as a rural growth hub and demonstrates significant potential to expand and enhance service provision to surrounding village councils. Concurrently, the existing urban area has been restructured to prioritize accessibility and streamline service delivery across essential line departments. The table below provides a comprehensive land use statistics for the region, while the accompanying map offers a detailed view of land use distribution within Tehsil Bannu.

Table 2-4: Tehsil Bannu Existing Landuse Statistics

Land Use	Area (ha)	%age
Agriculture	15974.29	66.94%
Barren Land	125.61	0.53%
Bus Terminals	5.99	0.03%
Commercial	223.76	0.94%
Education	128.85	0.54%
Graveyard	134.24	0.56%
Health Facility	17.47	0.07%
Military Lands/Cantonment	142.27	0.60%
Orchards	783.20	3.28%
Parks	73.48	0.31%
Plantation	42.32	0.18%
Public Buildings and Civic Amenities	53.65	0.22%
Range Land	708.15	2.97%
Religious Building	17.60	0.07%
Residential	3196.71	13.40%
Residential and Commercial (Mixed Use)	25.95	0.11%
Scattered Industry	173.06	0.73%
Small Industrial Estate	0.43	0.00%
Transportation	612.58	2.57%
Vacant Area	284.92	1.19%
Water Bodies	1138.03	4.77%
Grand Total	**23862.55**	**100.00%**

Existing Landuse Map of Tehsil Bannu



ORIENTATION

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LEGEND

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- Urban Boundary
- Compact Builtup Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Barren Land
- Bus Terminals
- Commercial
- Religious Building
- Education
- Small Industrial Estate
- Health Facility
- Military Lands/Cantonment
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Orchards
- Parks
- Plantation
- Range Land
- Residential
- Scattered Industry
- Graveyard
- Transportation
- Vacant Area
- Water Bodies

Housing Schemes

- Approved
- Unapproved

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 3 km

0 2 4 8 KM

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Map 2-4: Tehsil Bannu Existing Landuse

2.4.2 Tehsil Domel

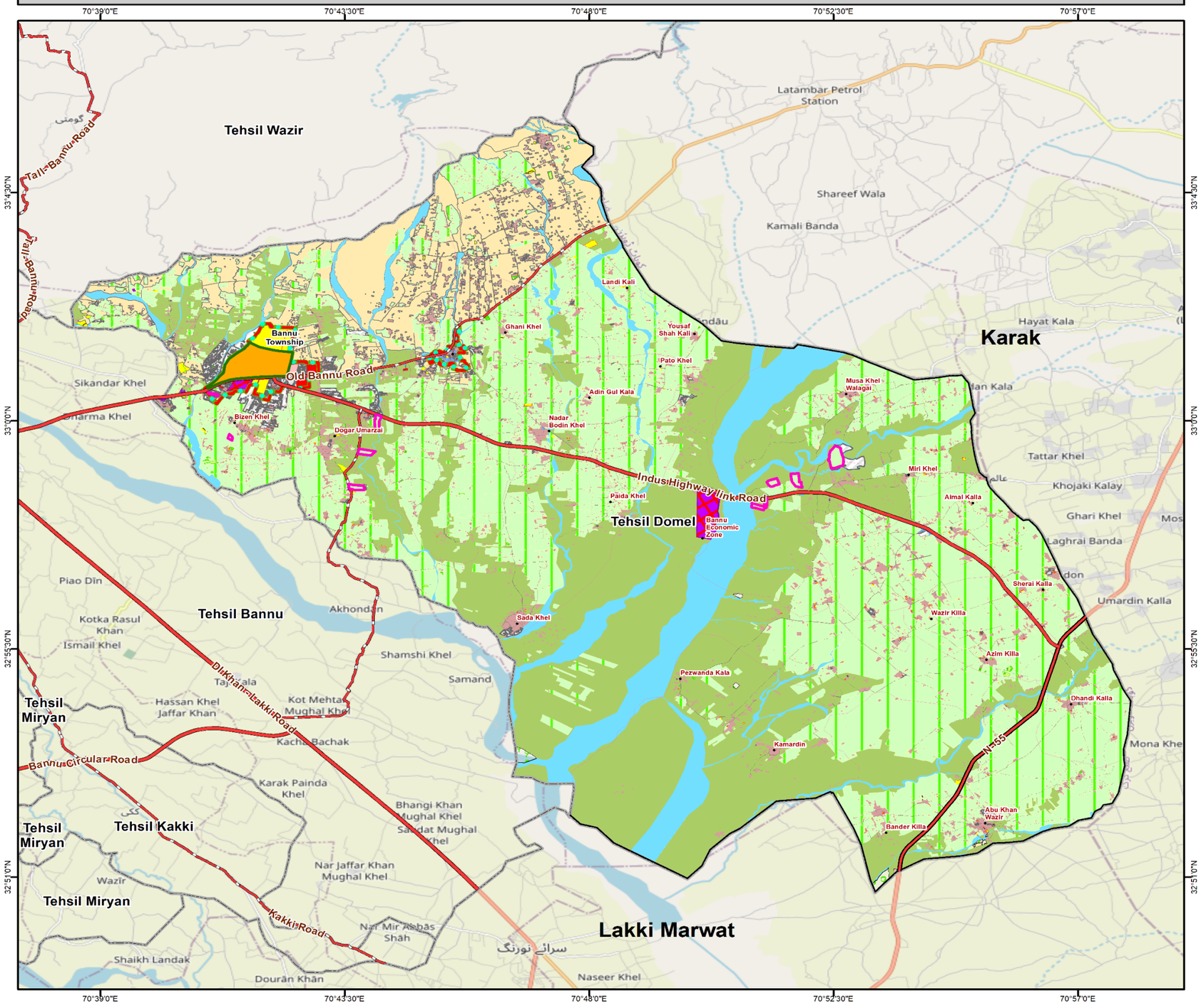
Tehsil Domel encompasses a total land area of 42169 Hectares, with a predominant focus on agriculture, which constitutes 41.51% of the total area, or approximately 17506 Hactares. Rangeland follows with 13216 Hectares, accounting for 31.34% of the tehsil's overall area. Barren land constitutes 3433 Hecatres (8.14%) of the total area, while residential land occupies 2822 Hectares.

Furthermore, the Village Council (VC) Domel, currently serving as the Tehsil Headquarters (THQ), is under consideration for designation as an urban area due to its infrastructural characteristics and available amenities. The land use statistics presented in the below Table 2-5 and Map 2-5 provide a comprehensive view of the spatial distribution and functional zoning within Tehsil Domel.

Table 2-5: Tehsil Domel Existing Landuse Statistics

Land Use	Area (ha)	%age
Agriculture	17506	41.51%
Barren Land	3433	8.14%
Commercial	80	0.19%
Disposal Sites	1	0.001%
Education	191	0.45%
Graveyard	41	0.10%
Health Facility	26	0.06%
Orchards	54	0.13%
Parks	21	0.05%
Plantation	53	0.13%
Public Buildings and Civic Amenities	46	0.11%
Range Land	13216	31.34%
Religious Building	8	0.02%
Residential	2822	6.69%
Residential and Commercial (Mixed Use)	0.26	0.001%
Scattered Industry	11	0.03%
Small Industrial Estate	133	0.31%
Transportation	460	1.09%
Vacant Area	553	1.31%
Water Bodies	3514	8.33%
Grand Total	**42169**	**100.00%**

Existing Landuse Map of Tehsil Domel



ORIENTATION

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LEGEND

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- Compact Builtup Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Barren Land
- Bus Terminals
- Commercial
- Religious Building
- Education
- Small Industrial Estate
- Health Facility
- Military Lands/Cantonment
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Orchards
- Parks
- Plantation
- Range Land
- Scattered Industry
- Residential
- Disposal Sites
- Graveyard
- Transportation
- Vacant Area
- Water Bodies

Housing Schemes

- Approved
- Unapproved

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 3 km

0 — 2.75 — 5.5 — 11 KM

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Map 2-5: Tehsil Domel Existing Landuse

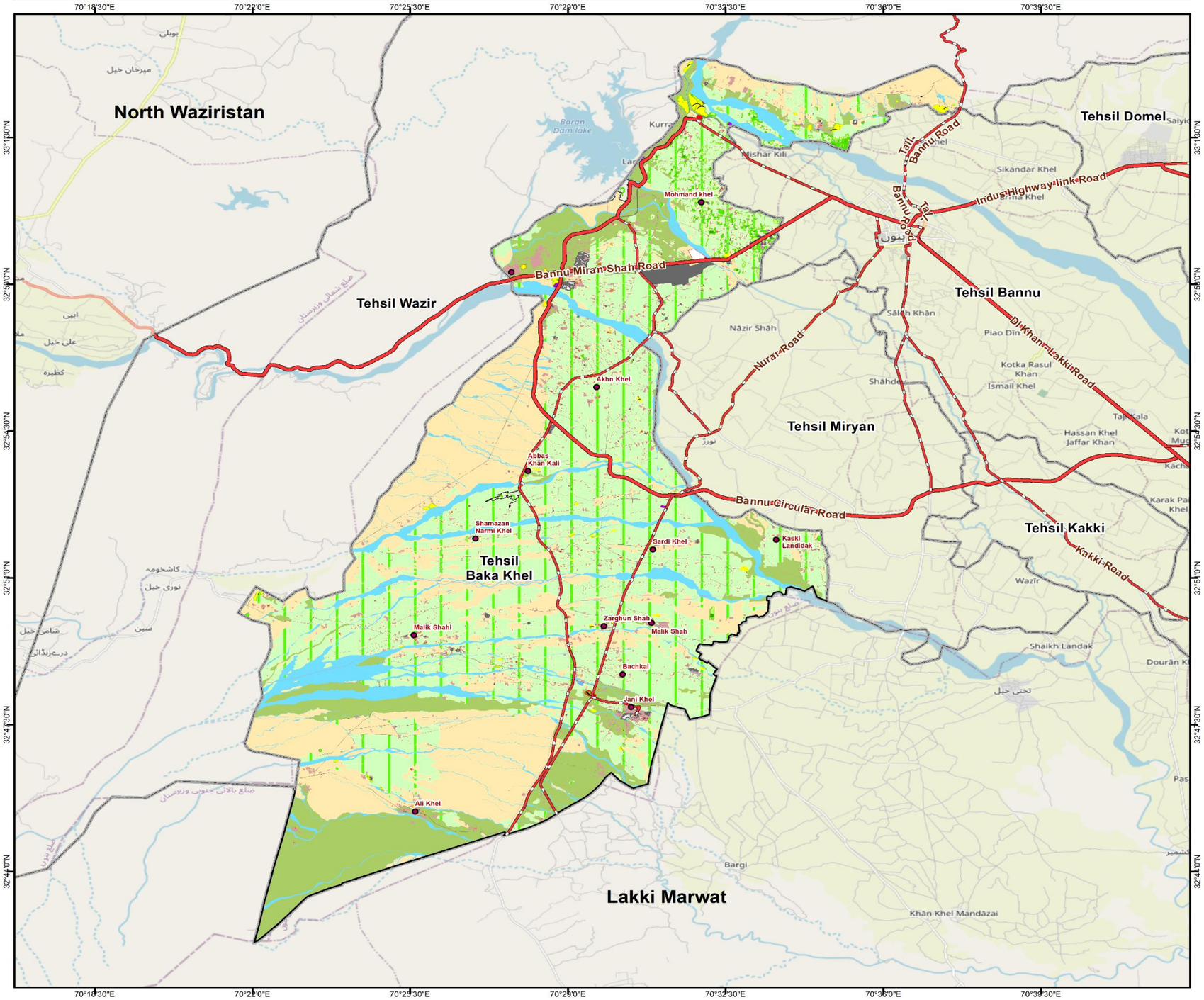
2.4.3 Tehsil Bakka Khel

Tehsil Bakka Khel encompasses a total land area of 35620.76 Hectares, with a predominant focus on agriculture, which constitutes 40.89% of the total area, or approximately 14564.51 Hectares. Barren land follows with 9521.23 Hectares, accounting for 26.73 % of the tehsil's overall area. Rangeland constitutes 5159.73 Hectares (14.49%) of the total area, while residential occupies 1868.6 Hectares.

Table 2-6: Tehsil Bakka Khel Existing Landuse Statistics

Land Use	Area (Sq. km)	%age
Agriculture	14564.51	40.89%
Airport	174.73	0.49%
Barren Land	9521.23	26.73%
Commercial	24.74	0.07%
Disposal Sites	1.00	0.003%
Education	59.18	0.17%
Graveyard	178.73	0.50%
Health Facility	4.60	0.01%
Military Lands/Cantonment	6.07	0.02%
Orchards	415.42	1.17%
Parks	16.08	0.05%
Plantation	62.23	0.17%
Public Buildings and Civic Amenities	7.59	0.02%
Range Land	5159.73	14.49%
Religious Building	24.81	0.07%
Residential	1868.60	5.25%
Residential and Commercial (Mixed Use)	0.03	0.0001%
Scattered Industry	19.39	0.05%
Transportation	344.52	0.97%
Vacant Area	79.16	0.22%
Water Bodies	3088.40	8.67%
Grand Total	**35620.76**	**100.00%**

Existing Landuse Map of Tehsil Baka Khel



ORIENTATION

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LEGEND

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Airport
- Barren Land
- Bus Terminals
- Commercial
- Religious Building
- Education
- Health Facility
- Military Lands/Cantonment
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Orchards
- Parks
- Disposal Sites
- Range Land
- Scattered Industry
- Residential
- Graveyard
- Transportation
- Vacant Area
- Water Bodies

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 4 km

0 3.25 6.5 13 KM

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Map 2-6: Tehsil Bakka Khel Existing Landus

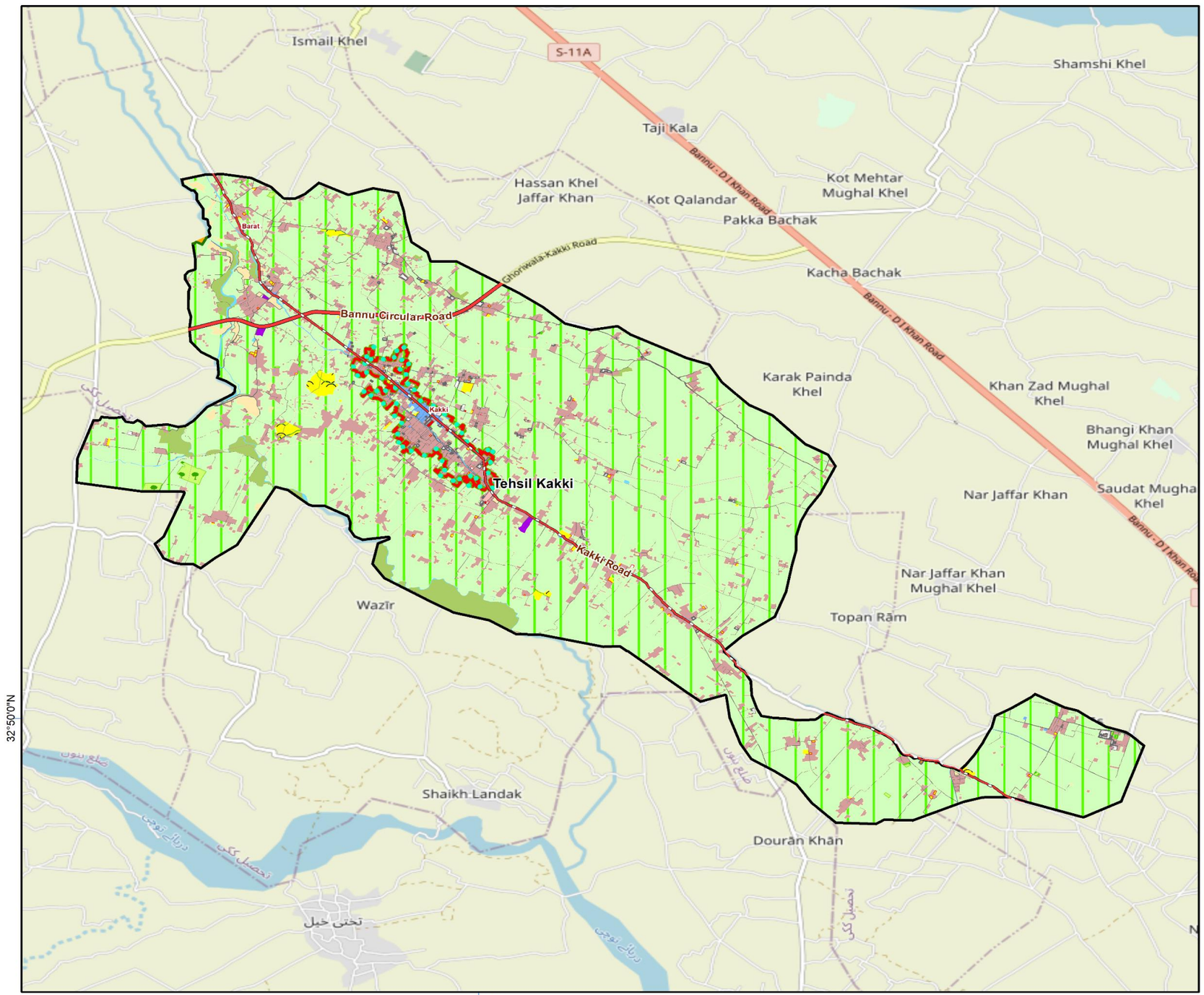
2.4.4 Tehsil Kakki

Tehsil Kakki is the smallest tehsil among all and encompasses a total land area of 4410.3699 ha, with a predominant landuse occupation of agriculture, which constitutes 79.59% of the total area, or approximately 3510.047 ha. The Second most occupied landuse is residential which accounts for 539.1087 ha (12.22%) of the tehsil's overall area. Furthermore, the Village Council (VC) Kakki, currently serving as the Tehsil Headquarters (THQ), has been proposed as an urban area due to its infrastructural characteristics and available amenities. Details of landuse classification statistics are provided below in Table 2-7.

Table 2-7: Tehsil Kakki Existing Landuse Statistics

Land Use	Area (hectares)	%age
Agriculture	3510.047	79.59%
Barren Land	34.69911	0.79%
Commercial	12.37674	0.28%
Education	13.52705	0.31%
Forest Land	0.11682	0.00%
Graveyard	21.34590	0.48%
Health Facility	1.25414	0.03%
Orchards	13.76559	0.31%
Parks	0.09471	0.00%
Public Buildings and Civic Amenities	1.28369	0.03%
Range Land	99.7576	2.26%
Religious Building	1.17115	0.03%
Residential	539.1087	12.22%
Residential and Commercial (Mixed Use)	0.26457	0.01%
Scattered Industry	3.91096	0.09%
Transportation	103.839	2.35%
Vacant Area	22.880	0.52%
Water Bodies	30.928	0.70%
Total	**4410.3699**	**100.00%**

Existing Landuse Map of Tehsil Kakki



ORIENTATION

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LEGEND

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- Compact Builtup Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Barren Land
- Bus Terminals
- Commercial
- Disposal Sites
- Education
- Small Industrial Estate
- Health Facility
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Water Bodies
- Orchards
- Parks
- Range Land
- Religious Building
- Residential
- Scattered Industry
- Forest Land
- Graveyard
- Transportation
- Vacant Area

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 1 km

0 1 2 4 KM

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Map 2-7: Tehsil Kakki Existing Landuse

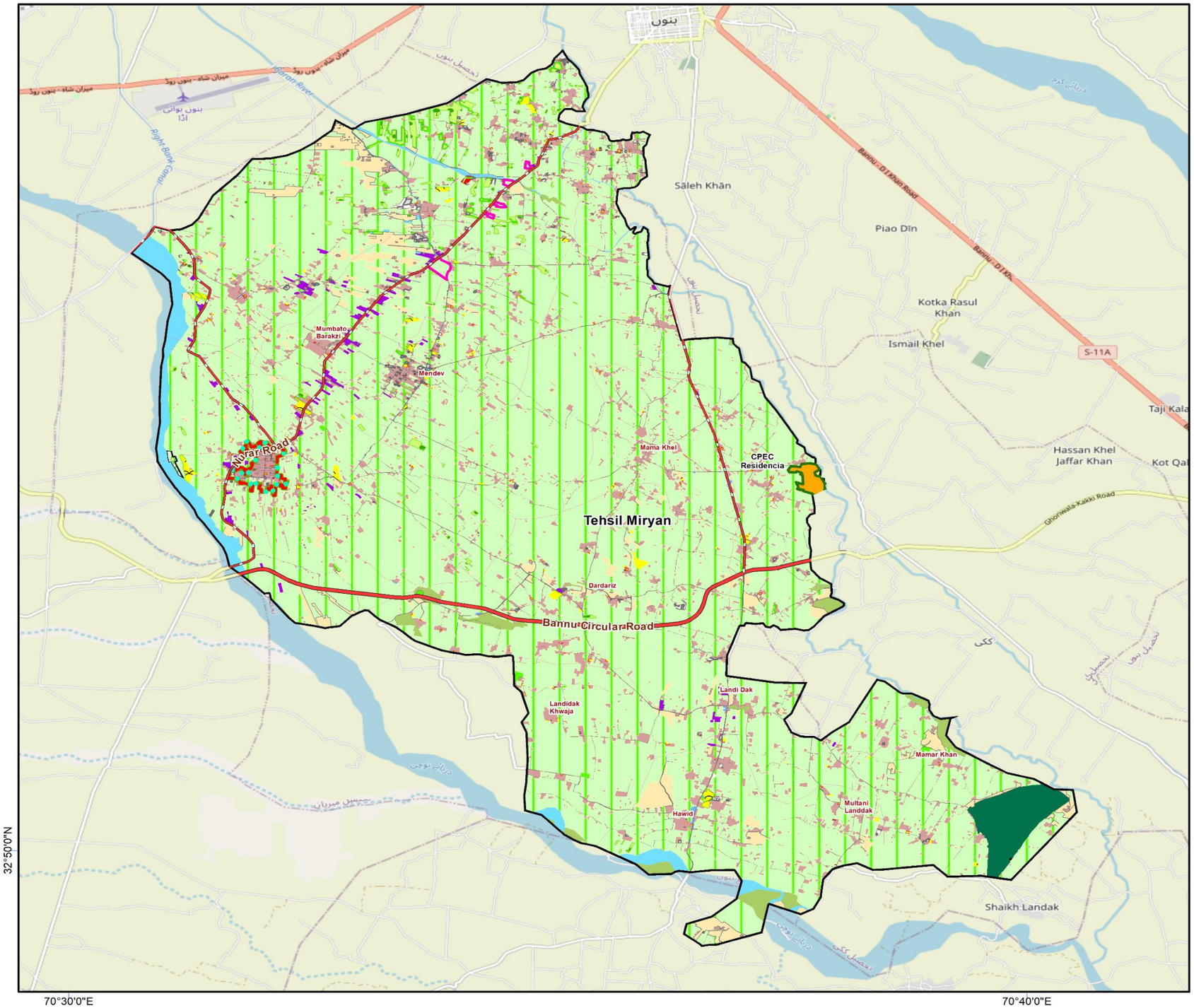
2.4.5 Tehsil Miryan

Tehsil Miryan encompasses a total land area of 12641.367 ha, with a predominant focus on agriculture, which constitutes 77.98% of the total area, or approximately 9858.022 ha. Residential follows with 1230.982 ha, accounting for 9.74% of the tehsil's overall area. Barren land constitutes 379.422 (3.00%) of the total area. Furthermore, the Village Council (VC) Naurar, currently serving as the Tehsil Headquarters (THQ), has been proposed as an urban area due to its infrastructural characteristics and available amenities. The land use statistics presented in the below Table 2-8 and Map 2-8 provide a comprehensive view of the spatial distribution and functional zoning within Tehsil Miryan.

Table 2-8: Tehsil Miryan Existing Landuse Statistics

Land Use	Area (hectares)	%age
Agriculture	9858.022	77.98%
Barren Land	379.422	3.00%
Commercial	11.096	0.09%
Disposal Sites	2.633	0.02%
Education	30.919	0.24%
Forest Land	151.970	1.20%
Graveyard	46.178	0.37%
Health Facility	1.635	0.01%
Orchards	128.482	1.02%
Parks	7.594	0.06%
Plantation	4.925	0.04%
Public Buildings and Civic Amenities	1.127	0.01%
Range Land	137.086	1.08%
Religious Building	3.248	0.03%
Residential	1230.982	9.74%
Residential and Commercial (Mixed Use)	0.223	0.00%
Scattered Industry	65.085	0.51%
Transportation	235.314	1.86%
Vacant Area	78.323	0.62%
Water Bodies	267.106	2.11%
Total	**12641.367**	**100.00%**

Existing Landuse Map of Tehsil Miryan



ORIENTATION

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LEGEND

Administrative Boundaries

- District Boundary
- Tehsil Boundary
- Compact Builtup Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Parks
- Barren Land
- Bus Terminals
- Commercial
- Disposal Sites
- Education
- Small Industrial Estate
- Health Facility
- Military Lands/Cantonment
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Orchards
- Plantation
- Range Land
- Religious Building
- Residential
- Scattered Industry
- Forest Land
- Graveyard
- Transportation
- Vacant Area
- Water Bodies

Housing Schemes

- Approved
- Unapproved

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 2 km

0 1.5 3 6 KM

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Map 2-8: Tehsil Miryan Existing Landuse

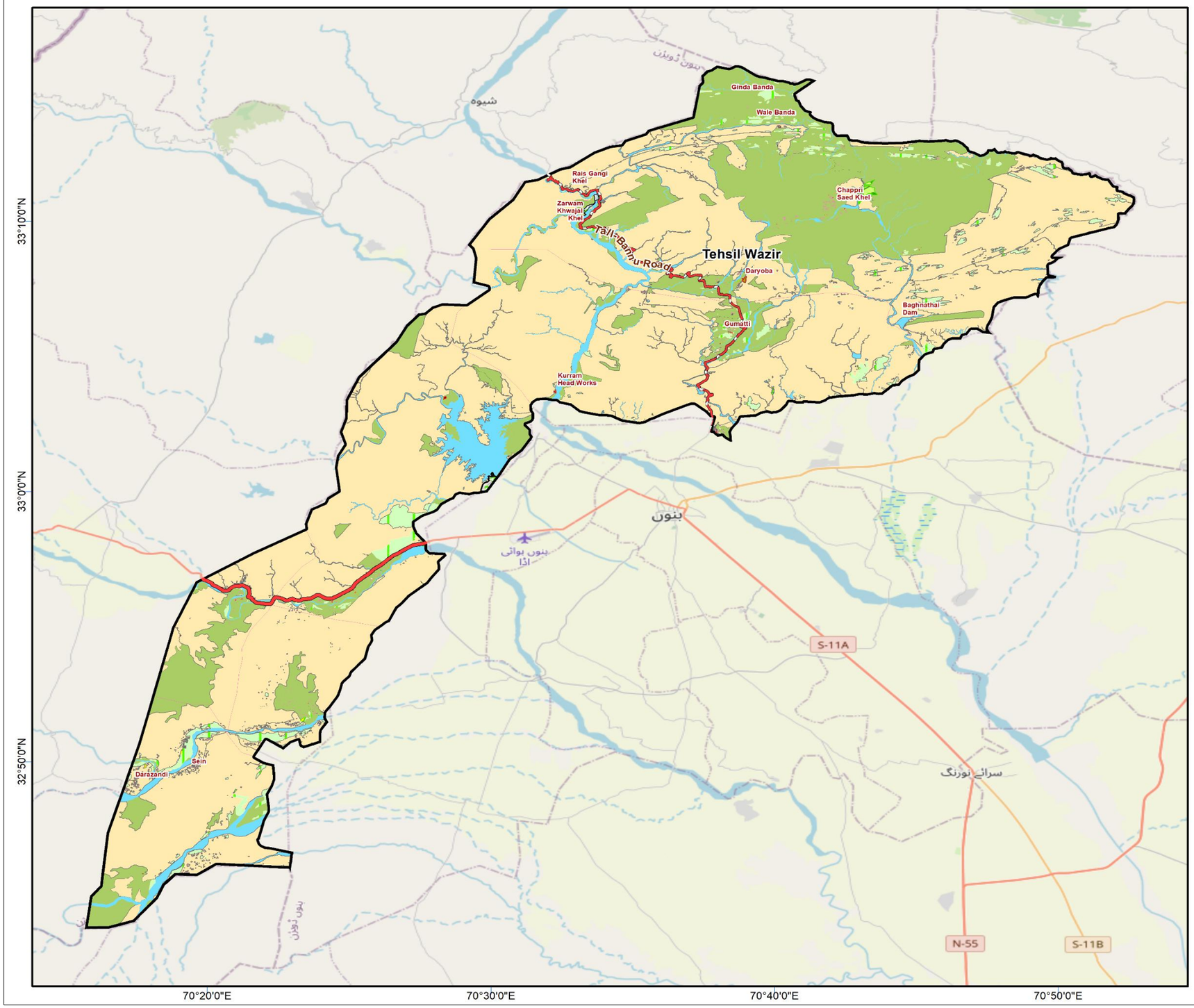
2.4.6 Tehsil Wazir

Tehsil Wazir is the largest tehsil among all and encompasses a total land area of 91700.808 ha, with a predominant landuse occupation of barren, which constitutes 68.53% of the total area, or approximately 62838.059 ha. The Second most occupied landuse is rangeland, which accounts for 21084.83 ha (22.99%) of the tehsil's overall area. Details of landuse classification statistics are provided below in Table 2-9, and Map 2-9 provides a comprehensive view of the spatial distribution and functional zoning within Tehsil Wazir.

Table 2-9: Tehsil Wazir Existing Landuse Statistics

Land Use	Area (hectares)	%age
Agriculture	2468.899	0.00%
Barren Land	62838.059	68.53%
Commercial	1.046	0.00%
Education	14.155	0.02%
Graveyard	18.035	0.02%
Health Facility	0.183	0.00%
Military Lands/Cantonment	13.442	0.01%
Orchards	75.668	0.08%
Parks	0.525	0.00%
Plantation	81.662	0.09%
Public Buildings and Civic Amenities	6.216	0.01%
Range Land	21084.83	22.99%
Religious Building	0.559	0.00%
Residential	414.047	0.45%
Scattered Industry	0.731	0.00%
Transportation	117.889	0.13%
Vacant Area	7.036	0.01%
Water Bodies	4557.821	4.97%
Total	**91700.803**	**100.00%**

Existing Landuse Map of Tehsil Wazir



ORIENTATION

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Administrative Boundaries

- District Boundary
- Tehsil Boundary
- NC Boundary
- VC Boundary

Existing Landuse

- Agriculture
- Residential
- Barren Land
- Bus Terminals
- Commercial
- Disposal Sites
- Education
- Small Industrial Estate
- Health Facility
- Public Buildings and Civic Amenities
- Residential and Commercial (Mixed Use)
- Military Lands/Cantonment
- Orchards
- Parks
- Plantation
- Range Land
- Religious Building
- Scattered Industry
- Forest Land
- Graveyard
- Transportation
- Vacant Area
- Water Bodies

Road Network

- Highway
- Primary Road
- Secondary Road

Scale

1 inch = 6 km

0 5 10 20 KM

CLIENT

PROVINCIAL LANDUSE PLAN
Urban Policy & Planning unit
Planning & Development Department
GOVERNMENT OF KHYBER PAKHTUNKHWA

CONSULTANT

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

Map 2-9: Tehsil Wazir Existing Landuse

2.5 Urban Land Use Distribution

District Bannu unfolds its unique urban land use distribution across various key areas. The urban fabric within the district is a dynamic amalgamation of residential, commercial, industrial, and recreational spaces, each contributing to the vibrancy and functionality of the urban environment. District Bannu comprises five urban areas, one of which is an officially designated urban center, while the other four are proposed for future urban development. The already designated urban center, located within Tehsil Bannu, serves as the district headquarters, acting as the administrative and economic hub of the region. Among the four proposed urban centers, Ghoriwala lies within Tehsil Bannu, reflecting its centrality in the district's urban framework. The remaining three proposed urban areas of Domel, Kakki, and Naurar are in Tehsil Domel, Kakki, and Miryan, respectively, with each playing a crucial role in the decentralization of urban services and fostering balanced regional development.

This strategic distribution of both existing and proposed urban centers highlights the district's forward-looking approach to urbanization, aimed at addressing the growing demand for infrastructure, housing, and public services. The proposed urban areas are critical for guiding future land use planning, improving connectivity, and promoting sustainable development throughout District Bannu. By expanding and formalizing these proposed centers, the district aims to enhance economic activity, provide better access to services, and support the overall growth of the region in a structured and organized manner.

2.5.1 Bannu City

Bannu's urban area is currently undergoing significant expansion, predominantly extending towards the northeast, where Tehsil Domel is situated. This growth trajectory reflects the increasing urbanization and the spillover effects of Bannu's central urban core. Domel, with its diverse mix of residential, commercial, and agricultural land uses, is becoming a focal point for development due to its proximity to the expanding urban boundaries of Bannu. The urban area of Bannu serves as a vital hub for essential facilities and services across the entire district, playing a crucial role in driving regional development. Covering a total area of 12079.41 hectares, its land use reflects a variety of functions that define its urban structure and support its economy.

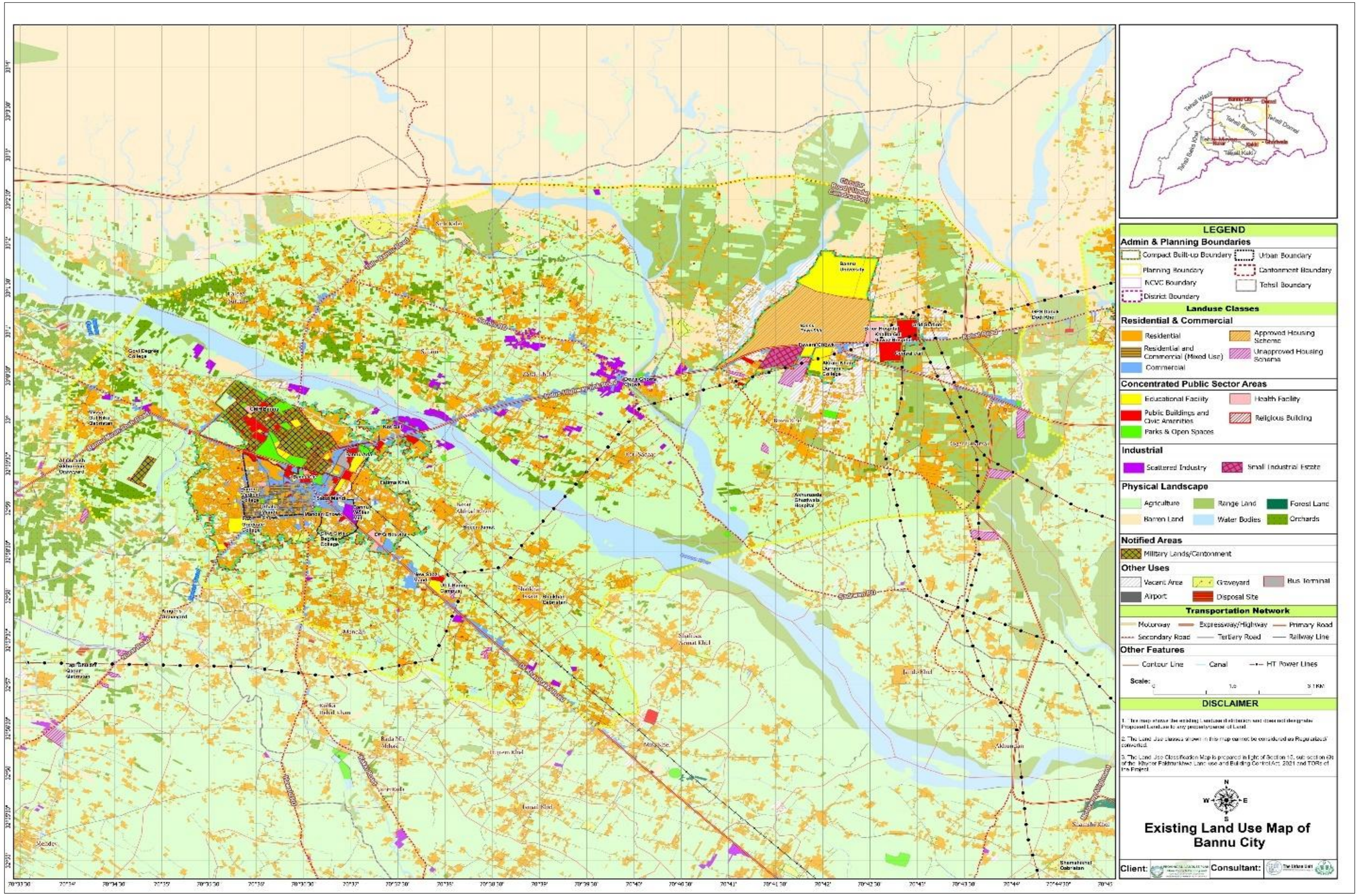
The land use analysis of Bannu Urban City reveals that the majority of the area is occupied by agriculture, covering 44.3% (5,354.1 ha), primarily outside the compact built-up area. Residential areas account for the second-largest share at 16.8% (2,032.8 ha), followed by range land with 9.3% (1,125.0 ha), and vacant land at 4.4% (537.4 ha). Water bodies also hold a significant portion at 4.9% (593.9 ha), mostly outside the urban core.

These land-use patterns highlight Bannu's strategic role in balancing urban growth with agricultural sustainability while identifying opportunities for future development and enhanced infrastructure. The detailed land use statistics of compact built-up and outside compact built-up are shown below in Table 2-10 and Map 2-10.

Table 2-10: Bannu MC Existing Landuse Statistics

Bannu Urban City					
Land Use	**Compact Built-up Outside Bannu City (ha)**	**Compact Built-up Inside Bannu City (ha)**	**Compact Built-up Inside Bannu town (ha)**	**Total Sum (ha)**	**%age**
Agriculture	5294.89	54.72	4.49	5354.1	44.3%
Barren Land	619.16	0.06	0.05	619.3	5.1%
Bus Terminals	0.00	5.32	0.00	5.3	0.0%
Commercial	116.54	95.04	18.93	230.5	1.9%
Education	52.74	38.06	115.64	206.4	1.7%
Graveyard	86.27	19.83	1.83	107.9	0.9%

Bannu Urban City					
Land Use	Compact Built-up Outside Bannu City (ha)	Compact Built-up Inside Bannu City (ha)	Compact Built-up Inside Bannu town (ha)	Total Sum (ha)	%age
Health Facility	1.81	13.03	13.77	28.6	0.2%
Military Lands/Cantonment	11.25	131.02	0.00	142.3	1.2%
Orchards	395.31	0.00	1.77	397.1	3.3%
Parks	11.42	41.64	11.45	64.5	0.5%
Public Buildings and Civic Amenities	6.30	39.55	40.61	86.5	0.7%
Range Land	1123.91	0.00	1.08	1125.0	9.3%
Religious Building	11.67	3.31	1.45	16.4	0.1%
Residential	1633.52	322.60	76.63	2032.8	16.8%
Residential and Commercial (Mixed Use)	1.36	22.01	0.00	23.4	0.2%
Scattered Industry	98.45	14.38	0.19	113.0	0.9%
Small Industrial Estate	0.00	0.00	24.48	24.5	0.2%
Transportation	245.05	84.55	39.80	369.4	3.1%
Vacant Area	361.03	50.84	125.55	537.4	4.4%
Water Bodies	594.75	0.28	0.05	595.1	4.9%
Total	**10665.417**	**936.22**	**477.8**	**12079.41**	**100.0%**



Map 2-10: Existing Landuse of Bannu Cit

2.5.2 Ghoriwala Urban Area

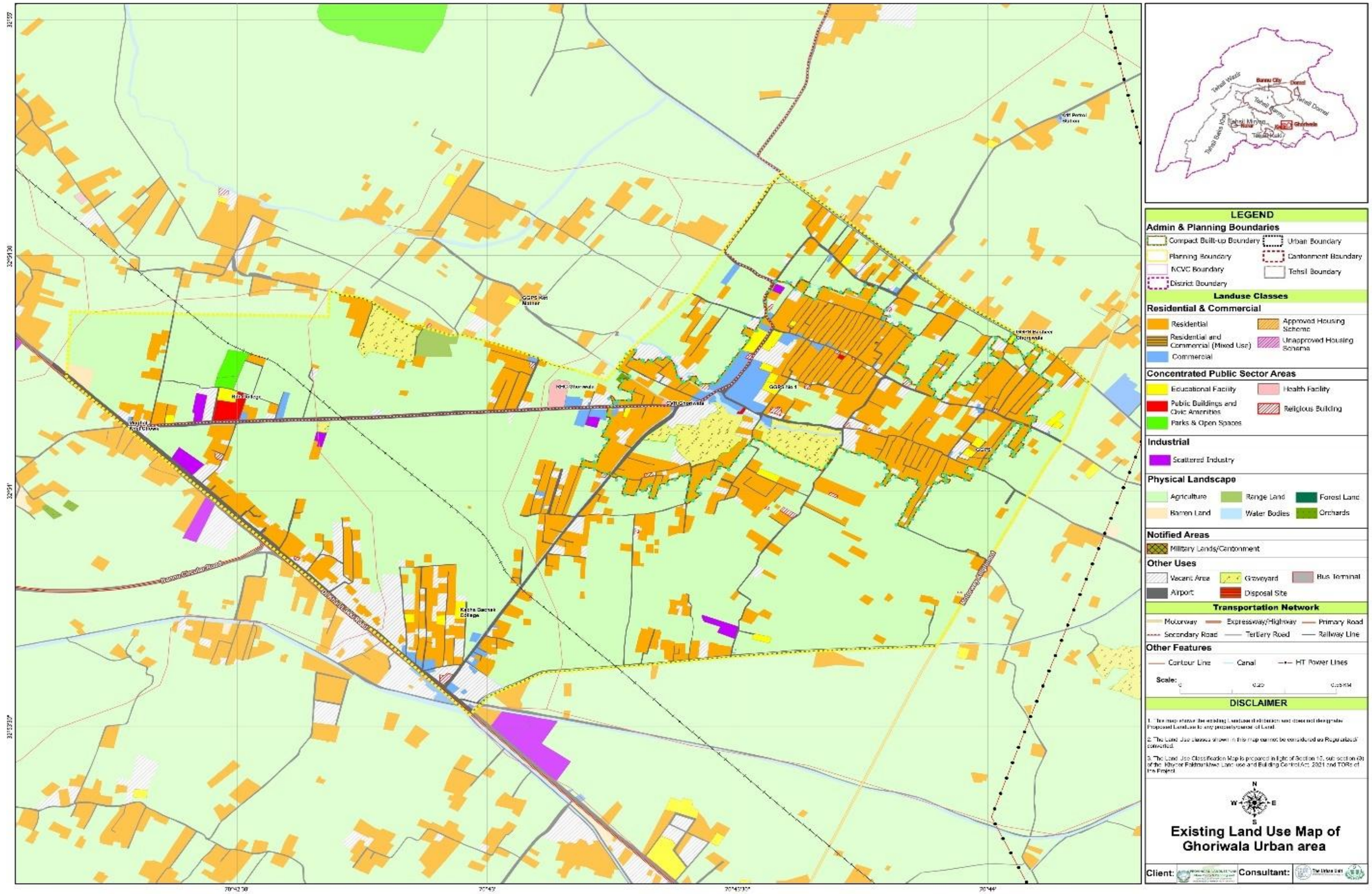
Ghoriwala Village Council (VC) in Bannu Tehsil has been identified as a potential area for future urban development along with the current designated urban area of Bannu MC. However, due to the growing population and increasing demand for urban services, Ghoriwala has been proposed to become urban during the plan period.

In Ghoriwala Urban, agriculture is the most dominant land use, occupying 221.96 ha, which makes up a substantial portion of the area, primarily outside the compact built-up limits. Residential land follows with 75.16 ha, reflecting notable urban settlement. Other significant uses include vacant land at 19.93 ha, and transportation infrastructure covering 19.05 ha. These patterns indicate that while agriculture remains the primary land use, residential growth and infrastructure development are gradually shaping the urban form of Ghoriwala.

Considering its land-use profile, Ghoriwala VC is well-positioned to accommodate future urbanization. Integrating this area into the urban framework of Bannu Tehsil can help decongest Bannu MC by providing alternative space for housing, commercial activities, and civic amenities, and support regional growth through sustainable urban planning. The detailed landuse the detailed land use statistics of compact built-up and outside compact built-up is shown in Table 2-11 and Map 2-11.

Table 2-11: Ghoriwala Urban Existing Landuse Statistics

Ghoriwala Urban			
Land Use	**Compact Built-up Outside (ha)**	**Compact Built-up Inside (ha)**	**Sum of both (ha)**
Agriculture	216.025	5.936	221.96
Barren Land	0.523	0.000	0.52
Commercial	2.181	3.370	5.55
Education	1.408	1.364	2.77
Graveyard	2.751	6.559	9.31
Health Facility	0.585	0.086	0.67
Orchards	0.084	0.000	0.08
Parks	0.964	0.000	0.96
Public Buildings and Civic Amenities	0.718	0.065	0.78
Range Land	1.135	0.000	1.13
Religious Building	0.454	0.482	0.94
Residential	38.747	36.416	75.16
Residential and Commercial (Mixed Use)	0.000	0.011	0.01
Scattered Industry	1.565	0.106	1.67
Transportation	13.776	5.274	19.05
Vacant Area	13.981	5.948	19.93
Water Bodies	1.745	0.610	2.36
Total	**296.643**	**66.229**	**362.87**



Map 2-11: Existing Landuse of Ghoriwala Urban

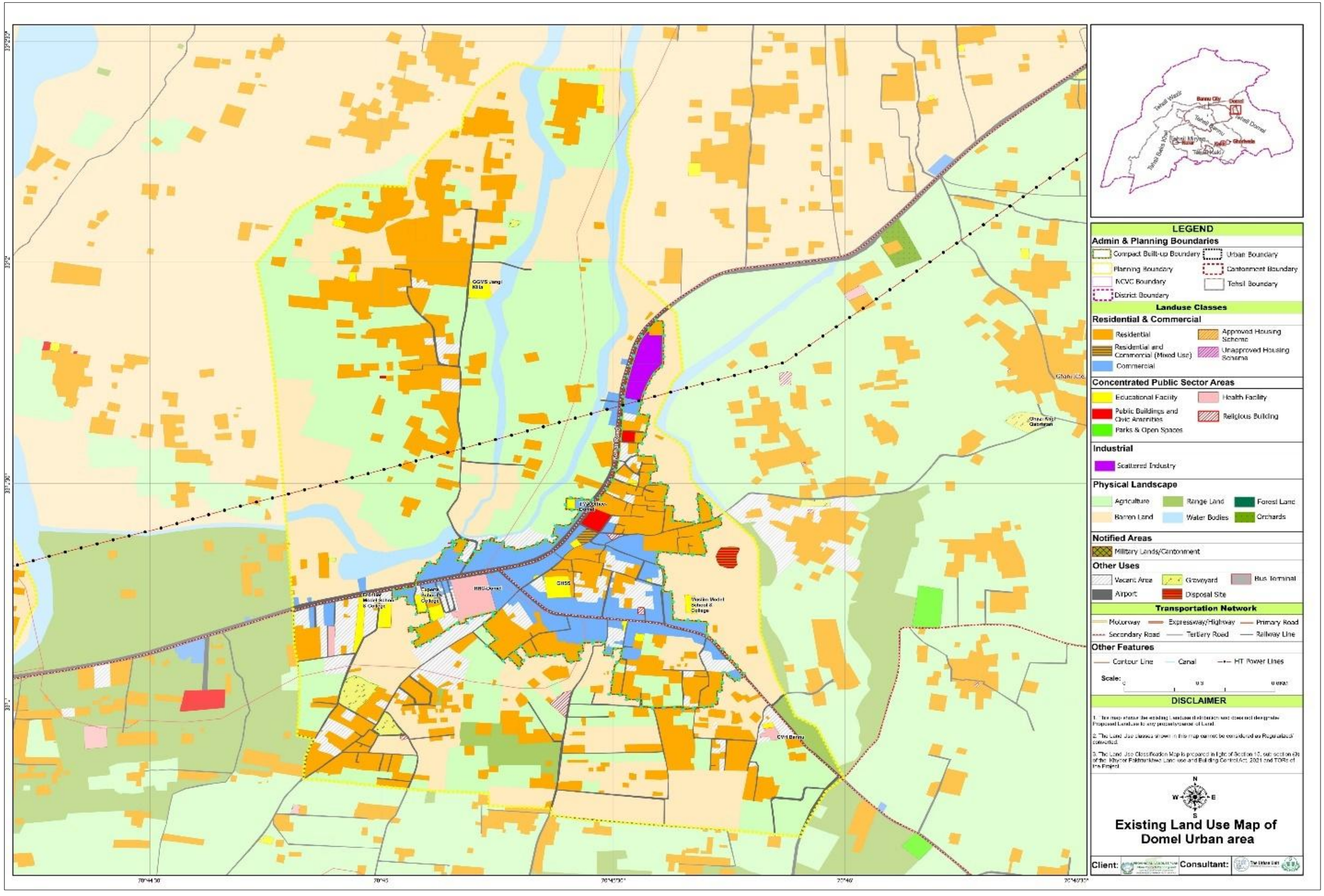
2.5.3 Domel Urban Area

In Domel Urban, the major land use is agriculture, covering 29.5% (120.85 ha), primarily within the compact built-up area. Barren land closely follows with 28.9% (118.56 ha), indicating a large portion of unused or undeveloped land. Residential areas make up 19.9% (81.48 ha), showing a moderate level of urban settlement. Other notable land uses include vacant areas at 4.5%, commercial zones at 4.8%, and water bodies occupying 4.3%, contributing to the mixed urban-rural nature of the area.

Overall, the table reveals a semi-urban environment where agriculture, residential zones, and commercial hubs dominate, with moderate investment in infrastructure and limited urban sprawl. This balance reflects a transitional landscape with significant rural roots and emerging urban characteristics. Detail of land use classification is shown in Table 2-12 and Map 2-12.

Table 2-12: Domel Urban Existing Landuse Statistics

Domel Urban				
Land Use	**Compact Built-up Outside (ha)**	**Compact Built-up Inside (ha)**	**Sum of both (ha)**	**%age**
Agriculture	118.899	1.950	120.85	29.5%
Barren Land	116.931	1.629	118.56	28.9%
Commercial	1.215	18.562	19.78	4.8%
Disposal Sites	0.569	0.000	0.57	0.1%
Education	2.224	1.861	4.08	1.0%
Graveyard	1.887	0.000	1.89	0.5%
Health Facility	0.522	2.149	2.67	0.7%
Public Buildings and Civic Amenities	0.026	0.774	0.80	0.2%
Range Land	5.587	0.030	5.62	1.4%
Religious Building	0.444	0.134	0.58	0.1%
Residential	61.219	20.266	81.48	19.9%
Residential and Commercial (Mixed Use)	0.000	0.263	0.26	0.1%
Scattered Industry	0.000	2.285	2.28	0.6%
Transportation	8.742	5.028	13.77	3.4%
Vacant Area	12.394	6.222	18.62	4.5%
Water Bodies	17.752	0.000	17.75	4.3%
Total	**348.41**	**61.15**	**409.56**	**100.0%**



Map 2-12: Existing Landuse of Domel Urban

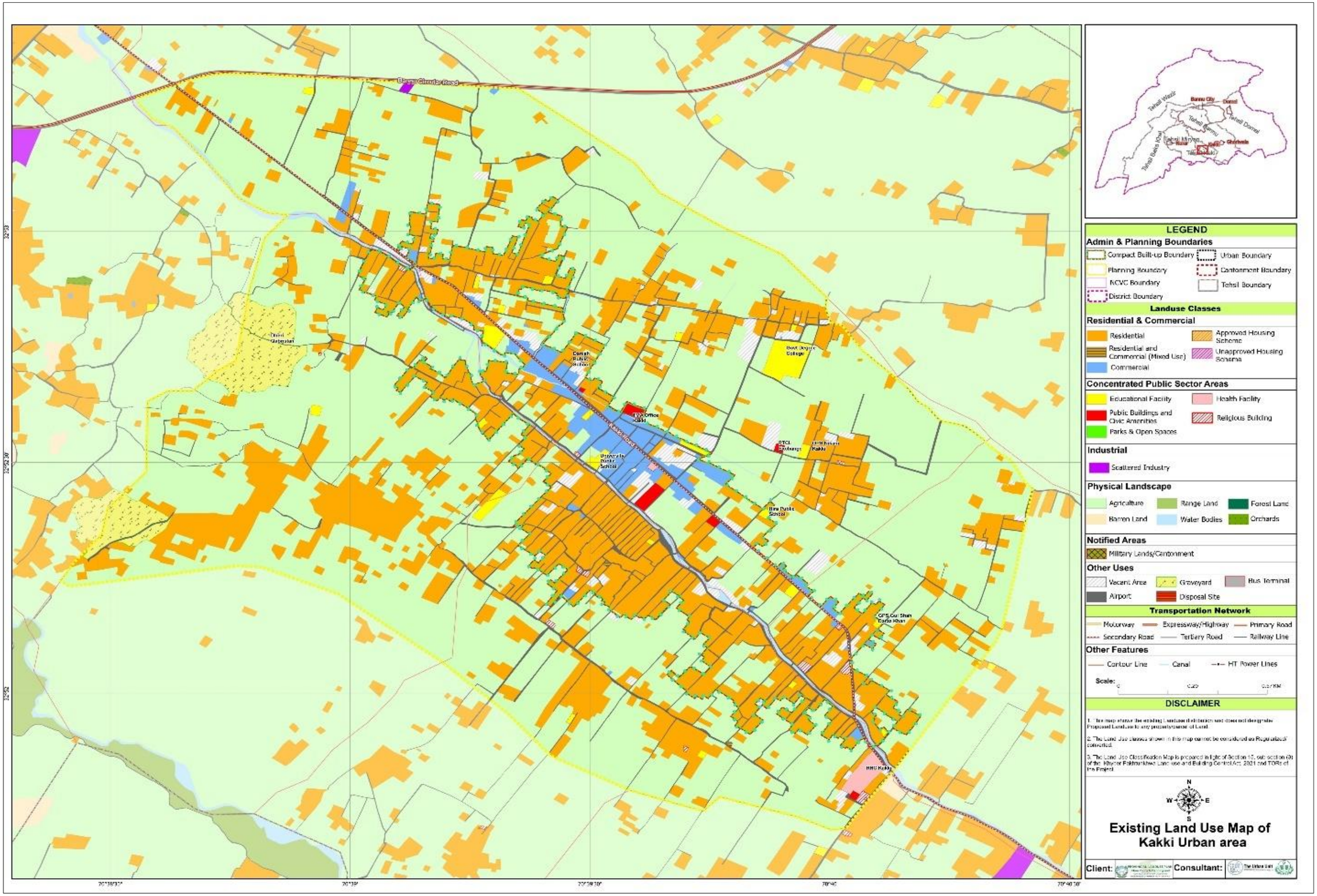
2.5.4 Kakki Urban Area

In Kakki Urban, agriculture dominates the land use pattern, covering 61.5% (342.57 ha), largely outside the compact built-up area. Residential land ranks second with 26.3% (146.53 ha), reflecting a significant urban settlement. Other notable uses include transportation at 4.3% and commercial areas at 2.0%, while vacant land also shares 2.0%. These figures suggest Kakki retains a predominantly agricultural character with developing residential and transportation infrastructure.

The details of land use classification are shown in Table 2-13 and Map 2-13.

Table 2-13: Kakki Urban Existing Landuse Statistics

Kakki Urban				
Land Use	**Compact Built-up Outside (ha)**	**Compact Built-up Inside (ha)**	**Sum of both (ha)**	**%age**
Agriculture	325.95	16.62	342.57	61.5%
Commercial	0.56	10.46	11.02	2.0%
Education	2.88	1.84	4.72	0.8%
Graveyard	10.14	0.00	10.14	1.8%
Health Facility	1.16	0.07	1.23	0.2%
Public Buildings and Civic Amenities	0.18	0.92	1.10	0.2%
Religious Building	0.28	0.44	0.72	0.1%
Residential	81.36	65.16	146.53	26.3%
Residential and Commercial (Mixed Use)	0.03	0.03	0.06	0.0%
Scattered Industry	0.13	0.00	0.13	0.0%
Transportation	12.39	11.49	23.88	4.3%
Vacant Area	5.25	5.90	11.15	2.0%
Water Bodies	1.95	2.28	4.23	0.8%
Total	**442.25**	**115.22**	**557.47**	**100.0%**



Map 2-13: Existing Landuse of Kakki Urban

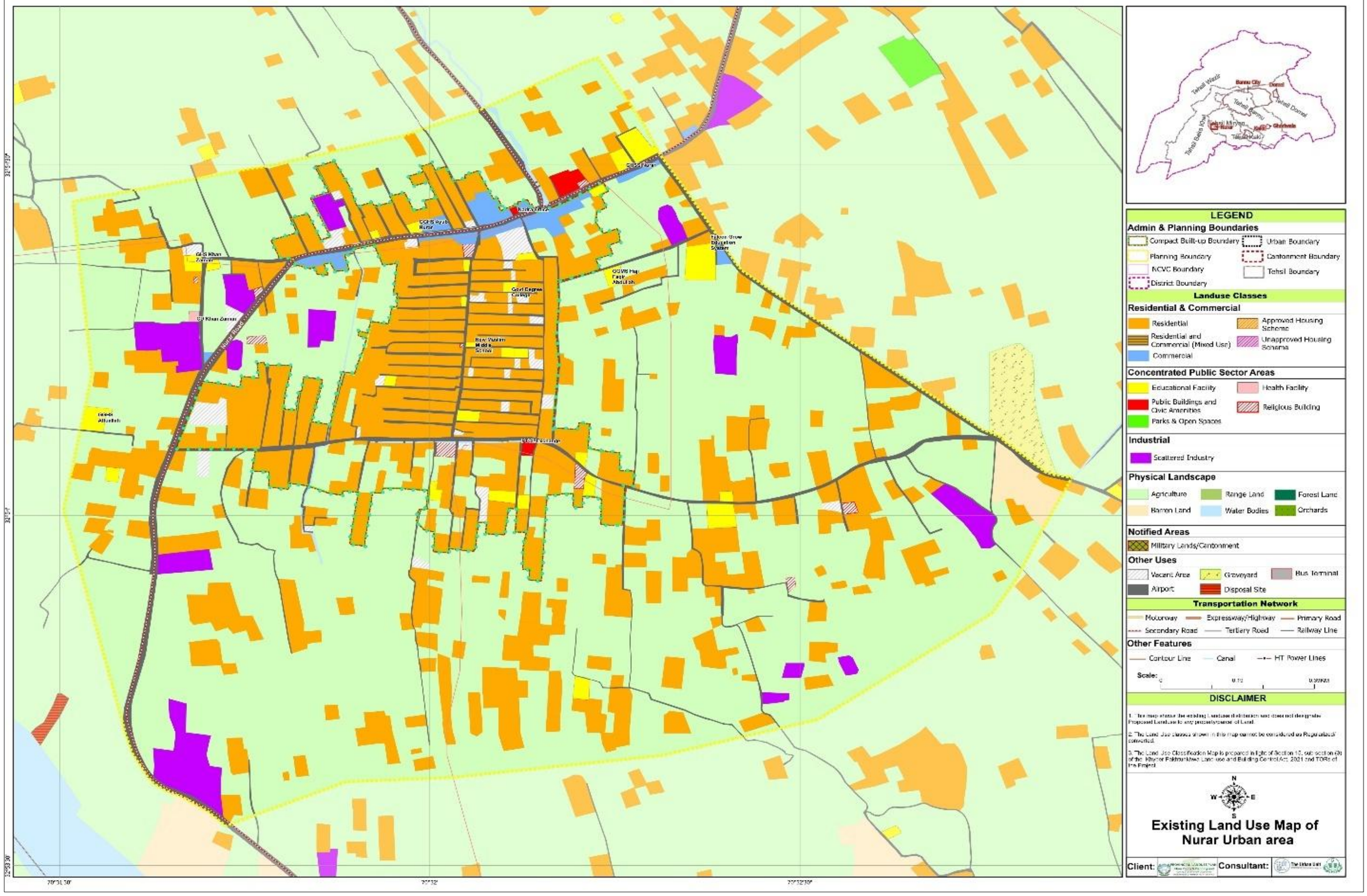
2.5.5 Nurar Urban Area

In Nurrar Urban, agriculture is the dominant land use, covering 60.5% (168.668 ha), mostly outside the compact built-up area. Residential areas occupy 26.9% (74.976 ha), contributing to the urban development of the region. Other significant land uses include transportation at 5.1% (14.186 ha), scattered industry at 2.9% (8.091 ha), and commercial zones at 0.9% (2.457 ha). The area's land use pattern indicates a strong agricultural base with growing residential and industrial development.

The detail land use is shown in Table 2-14 and Map 2-14.

Table 2-14: Naurar Urban area existing Landuse

Nurrar Urban				
Land Use	**Compact Built-up Outside (ha)**	**Compact Built-up Inside (ha)**	**Sum of both (ha)**	**%age**
Agriculture	163.519	5.148	168.668	60.5%
Barren Land	1.623	0.000	1.623	0.6%
Commercial	0.293	2.164	2.457	0.9%
Education	2.623	1.370	3.993	1.4%
Health Facility	0.061	0.000	0.061	0.0%
Public Buildings and Civic Amenities	0.329	0.138	0.467	0.2%
Religious Building	0.317	0.361	0.678	0.2%
Residential	41.603	33.373	74.976	26.9%
Scattered Industry	7.640	0.451	8.091	2.9%
Transportation	8.479	5.708	14.186	5.1%
Vacant Area	0.643	2.206	2.849	1.0%
Water Bodies	0.398	0.227	0.625	0.2%
Total	**227.528**	**51.146**	**278.673**	**100.0%**



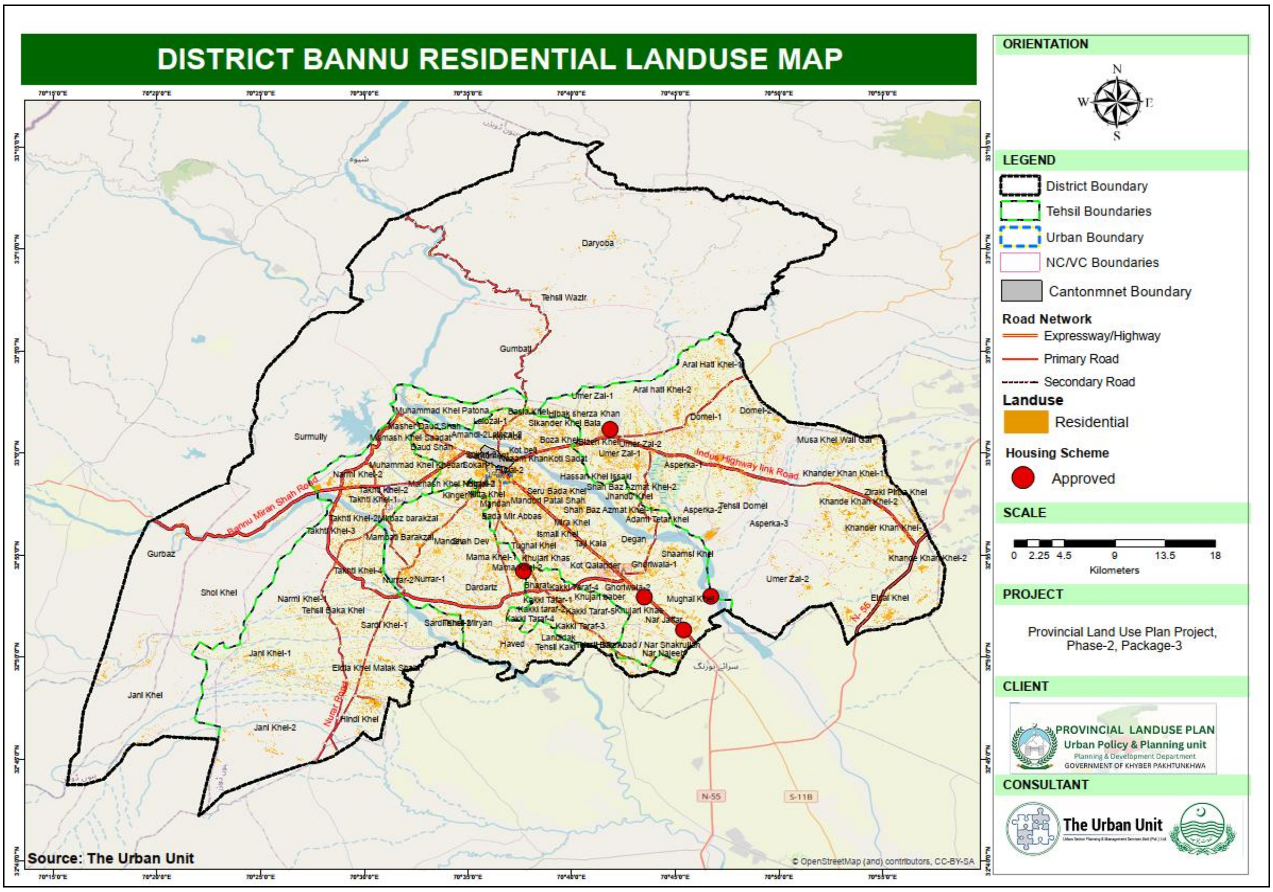
Map 2-14: Existing Landuse of Nurar Urban

3. SECTORAL STUDIES

3.1 Housing

Housing is needed for everyone, regardless of whether they live in urban or rural areas, which is further closely connected to other land uses. Therefore, the housing sector is diversified and encompasses all urban activities related to work, education, and recreation. To fulfill the required need for housing, other land uses is needed as well. A massive amount of land is required for residential purposes, and with it, other activities are facilitated accordingly. As housing is the most important area to focus on, it is crucial to study its existing characteristics and spatial dynamics to prepare future Land Use Plans. Both qualitative and quantitative aspects of the housing sector should be considered to analyze land suitability, limitations, and constraints.

The characteristics of the existing housing stock in District Bannu are studied using various data sources, including secondary data from the census as well as primary data from the Household Information Survey. The characteristics of the housing stock include the average household size, housing stock, growth pattern, and density trends, as well as the existing housing backlog and future housing demand in District Bannu for the plan period. Residential Land use of District Bannu is shown in the Map below.



Map 3-1: Existing Residential Land Use of District Bannu

3.1.1 Existing Housing Condition

3.1.1.1 Existing Housing Stock

To analyze the growth pattern and estimate the existing housing stock, data from the 1998 and 2017 Population and Housing Censuses have been utilized. Based on the previous housing data available between 1998 and 2017, projections for the year 2025 have been made using Arithmatic growth method.

During the period from 1998 to 2017, District Bannu witnessed a significant increase in housing units, rising from 71,143 to 122,638 an overall growth of 72%. This growth was more prominent in rural areas, which experienced an 81% increase, compared to a 60% rise in urban areas. This notable expansion

highlights the district's mounting demographic and settlement pressures, emphasizing the need for strategic infrastructure development and effective service delivery during that time.

Based on the projections, the urban housing stock in District Bannu is expected to reach 56,844 units in 2025, while the rural housing stock is anticipated to grow to 87,477 units. This will bring the total projected housing stock in the district to 144,320 units. Between 2017 and 2025, the overall housing stock is expected to grow by 18%, with urban and rural areas projected to grow by 16% and 19%, respectively

The table below shows the urban/rural and tehsil-wise housing growth patterns in District Bannu, highlighting the percentage increase in housing units over the specified periods.

Table 3-1: District Bannu Housing Units and Growth Pattern[20]

Administrative Area	Housing Units1998	Growth (1998-2017)	Housing Units 2017	Growth (2017-2025)	Projected Housing Units 2025
District Urban	30,574	60%	49,060	16%	56,844
District Rural	40,569	81%	73,578	19%	87,477
District Overall	71,143	72%	122,638	18%	144,320
Urban Areas					
Bannu City*	26,811	59%	42,639	16%	49,303
Domel Town	344	88%	645	20%	772
Kakki Town	1,912	49%	2,851	14%	3,246
Nurar Town	641	91%	1,223	20%	1,468
Ghoriwala Growth Center	866	97%	1,702	21%	2,054
Rural Areas					
Bannu Tehsil	14,863	80%	26,701	19%	31,685
Domel Tehsil	6,715	78%	11,931	18%	14,127
Meryan Tehsil	7,068	81%	12,819	30%	15,240
Kakki	3,924	60%	6,286	16%	7,281
Baka Khel	5,998	96%	11,742	10%	14,161
Wazir Tehsil	2,001	105%	4,099	22%	4,982

3.1.1.2 Housing Stock by Type

In 1998, Bannu District had a total of 71,143 housing units, with a dominant share of Katcha structures at 70.6%, followed by Pacca at 23.9%, and Semi Pacca at only 5.5%. Urban areas showed slightly better construction quality, particularly in Bannu Municipal Committee, where Pacca units made up 43% of the stock. Rural areas, however, remained heavily reliant on Katcha housing, highlighting a clear urban-rural disparity in construction standards. This distribution reflects limited development and infrastructure investment across much of the district then.

By 2017, the housing stock in Bannu District rose to 122,638 units, with a significant shift toward permanent structures. Pacca units now comprised nearly 49% of all housing, while Katcha structures declined to 35.2%. The most notable improvements occurred in urban areas like the Bannu Municipal Committee, where over 75% of the housing was Pacca. Rural tehsils such as Baka Khel and Miryan also saw substantial transitions toward more durable housing. This transformation indicates improved construction practices and better access to building materials and services, an essential consideration for future land use planning, infrastructure development, and service provision.

Table 3-2 below shows the details of the previous housing stock in District Bannu as per the census reports.

[20] *Pakistan Bureau of Statistics. (April, 2021). District Bannu-Final Results of Sixth Population and Housing Census-2017. Table-1: Area, Population by Sex, Sex Ratio, Population Density, Urban Proportion, Household Size and Annual Growth Rate. Table -30: Housing Units by Numbers of Rooms, Tenure and Rural/Urban.*

***** *The Cantonment housing units from 1998 and 2017 have also been included.*

Table 3-2: District Bannu: Previous Housing Stock[21]

Administrative Area	1998				2017			
	Katcha	Semi Pacca	Pacca	Total	Katcha	Semi Pacca	Pacca	Total
District Urban	16583	2056	11935	30574	9614	4796	34649	49060
District Rural	33643	1842	5084	40569	33605	14083	25890	73578
District Overall	50226	3898	17019	71143	43219	18879	60539	122638
Urban Areas								
Bannu City*	13288	1917	11606	26811	6589	3659	32391	42639
Domel Town	254	24	66	344	146	170	329	645
Kakki Town	1722	51	139	1912	1537	342	972	2851
Nurar Town	578	27	36	641	605	391	226	1223
Ghoriwala Growth Center	741	37	88	866	737	234	731	1702
Rural Areas								
Tehsil Bannu	12037	686	2140	14863	11777	3340	11584	26701
Tehsil Domel	5457	307	951	6715	3173	2541	6217	11931
Tehsil Baka Khel	5266	263	469	5998	6313	3499	1930	11742
Tehsil Kakki	3537	112	275	3924	3600	855	1831	6286
Tehsil Miryan	6091	398	579	7068	5926	3019	3874	12819
Tehsil Wazir	1255	76	670	2001	2816	829	454	4099

3.1.1.3 House Sizes in Bannu

The distribution of housing sizes in District Bannu reflects a combination of compact urban development and spacious rural housing patterns, shaped by population density, cultural norms, and land availability. Table 3-3 below presents a consolidated view of housing sizes across urban and rural areas of District Bannu as per the Housing Information Survey (HIS):

Table 3-3: District Bannu Housing Sizes[22]

Administrative Area	Less Than 5	5 - 10	11 - 20	Above 20
District Urban	19%	40%	31%	11%
District Rural	11%	41%	48%	40%
District Overall	13%	34%	33%	20%
Urban Areas				
Bannu City	20%	41%	29%	10%
Domel Town	20%	13%	47%	20%
Kakki Town	10%	26%	52%	13%
Nurar Town	0%	29%	43%	29%
Ghoriwala Growth Center	9%	50%	26%	15%
Rural Areas				
Bannu Tehsil	9%	31%	39%	21%
Domel Tehsil	8%	17%	32%	43%
Meryan Tehsil	5%	31%	31%	33%
Kakki	5%	47%	21%	26%
Baka Khel	6%	29%	35%	29%
Wazir Tehsil	7%	26%	22%	44%

[21] *Pakistan Bureau of Statistics. (April, 2021). District Bannu-Final Results of Sixth Population and Housing Census-2017. Table-24 and 26 Selected Housing Characteristics of Urban and Rural Localities.*

* *The Cantonment housing units from 1998 and 2017 have also been included.*

[22] *Household Information Survey*

These figures highlight a dual spatial trend: while urban areas tend toward moderate to high-density housing, rural settlements display a preference for larger, low-density plots. This variation demands differentiated planning strategies that account for diverse housing needs and land utilization approaches.

In urban areas, the majority of houses are within the 5 to 10 Marla range, making up approximately 40% of the housing stock. This is followed by 11 to 20 Marla units at 31%, reflecting a moderate-density urban fabric. Smaller plots, especially under 5 Marla, constitute a notable share particularly in Bannu City and Domel Town—indicating a growing trend toward compact, space-efficient residential development. The overall pattern suggests strong potential for infill housing, Vertical expansion, and Densification strategies, to accommodate urban growth without uncontrolled sprawl.

Conversely, rural areas of Bannu exhibit a marked preference for larger plot sizes. Approximately 44% of houses are larger than 20 Marla, especially in tehsils like Wazir and Domel, where traditional lifestyles support more spacious housing. Additionally, 48% of homes fall within the 11 to 20 Marla range, often supporting multi-generational families, agricultural activities, and livestock enclosures. Plots smaller than 5 Marla are relatively rare in rural settings, averaging only 11%, indicating that land availability is still generous in these areas.

3.1.1.4 Housing Occupancy

Housing occupancy refers to the legal and functional status of residential units, indicating whether homes are owner-occupied, rented, rent-free, or government provided. In District Bannu, housing occupancy is overwhelmingly skewed towards owner-occupied units, with an average of 94% of households owning their homes. This reflects a deeply rooted tradition of self-constructed housing, multi-generational ownership, and a strong attachment to ancestral land—particularly evident in rural areas. Rental housing accounts for only 5% of the district's total, while rent-free and government housing each make up approximately 1%.

In urban areas, ownership remains dominant at 91%, but a growing rental trend is becoming apparent, particularly in Bannu City, where 9% of homes are occupied by tenants, and 2% are under government housing schemes. This rental concentration suggests a transitional housing demand driven by urban migration, labor mobility, and increasing population pressures. Other urban areas like Domel Town, Kakki, Nurar, and Ghoriwala maintain 100% ownership, highlighting the resilience of traditional housing models outside the main city core.

In rural Bannu, the average homeownership rate is even higher at 96%, with only 3% rental housing and negligible government-provided options (0.2%). Several rural tehsils such as Domel, Meryan, and Miryan report 100% ownership, reflecting high levels of tenure security and self-sufficiency. The exception is Baka Khel, where 13% of homes are rented, potentially pointing to a marginalized tenant population, possibly landless agricultural workers or internal migrants. The near-universal ownership in rural areas supports strategies that promote: Incremental housing improvements, bsasic service provision and guided rural expansion with plot regularization.

Table 3-4 below shows the details of the Housing occupancy in District Bannu as per the HIS.

Table 3-4: District Bannu Housing Occupancy[23]

Administrative Area	Owned	Rented	Rent Free	Government
District Urban	91%	7%	0%	1%
District Rural	96%	3%	1%	0.2%
District Overall	94%	5%	1%	1%
Urban Areas				
Bannu City	91%	9%	0%	2%
Domel Town	100%	0%	0%	0%
Kakki Town	100%	0%	0%	0%
Nurar Town	100%	0%	0%	0%
Ghoriwala Growth Center	100%	0%	0%	0%

[23] *Household Information Survey*

Administrative Area	Owned	Rented	Rent Free	Government
Rural Areas				
Bannu Tehsil	94%	3%	2%	0.4%
Domel Tehsil	100%	0%	0%	0%
Meryan Tehsil	100%	0%	0%	0%
Kakki	97%	0%	3%	0%
Baka Khel	87%	13%	0%	0%
Wazir Tehsil	96%	4%	0%	0%

3.1.1.5 Average Household Size

The average size of a household is a key factor in housing projections as it directly impacts the demand for housing units. This value helps in determining the number of housing units required to accommodate a specific population. Smaller household sizes usually lead to a higher demand for housing units, while larger household sizes can reduce the number of units needed. Urban areas may have different average household sizes compared to rural areas due to factors such as housing costs, availability, and cultural preferences.

The table presents the average household size for various administrative areas of Bannu District in 2017 and projections for 2025 and 2045. A consistent declining trend is observed across both urban and rural areas, indicating a gradual reduction in household size over time. For example, Bannu City's average household size decreases from 9.21 in 2017 to 8.566 by 2045, while Domel Town shows a relatively slower decline from 11.75 to 11.06. Similarly, in rural areas, Wazir Tehsil drops from 10.34 to 9.55, and Bannu Tehsil from 9.16 to 8.55. These projections are crucial for estimating future housing needs and guiding residential land allocation in the Bannu District Land Use Plan. The household sizes have been projected using exponential growth method using the growth rate of household size of 1998 and 2017 censuses.

Table below shows the details of average household sizes in newly proposed urban areas of District Bannu as well as the rural areas.

Table 3-5: Average Household Size

Administrative Area	Hosuehold Size 2017	Projected Hosuehold Size 2025	Projected Hosuehold Size 2045
Urban Areas			
Bannu City	9.21	9.02	8.56
Domel Town	11.75	11.66	11.06
Kakki Town	10.18	8.74	8.30
Nurar Town	10.18	9.97	9.46
Ghoriwala Growth Center	9.02	8.83	8.38
Rural Areas			
Bannu Tehsil	9.16	8.98	8.55
Domel Tehsil	11.75	11.52	10.97
Meryan Tehsil	10.18	9.98	9.50
Kakki	8.93	8.76	8.34
Baka Khel	10.22	10.02	9.55
Wazir Tehsil	10.34	10.14	9.65

3.1.1.6 Housing Density

The existing housing density 2025 in District Bannu has been calculated using the residential area from the land use classification statistics and the projected housing stock 2025 calculated above in Table 3-1. According to the land use statistics, the total residential area in District Bannu is **10,090** hectares in which **2435** hectares is in occupied by the urban area of Bannu and **7,656** hectares is in rural area.

By dividing the number of housing units by the respective areas, the residential density in urban areas is found to be **23** housing units per hectare, while in rural areas, it is **11** units per hectare. The overall housing density for the district is **14** units per hectare. **Table** below shows the housing density for both urban and rural areas of District Bannu.

Table 3-6 District Bannu Housing Density (Hectares)

Administrative Area	Residential Area (Hectare)	Projected Housing Units 2025	Current Housing Density 2025 (Unit per Hectare)
District Urban	2435	55428	23
District Rural	7656	87477	11
District Overall	10090	142905	14
Urban Areas			
Bannu City	2056	47888	23
Domel Town	82	772	9
Kakki Town	147	3246	22
Nurar Town	75	1468	20
Ghoriwala Growth Center	75	2054	27
Rural Areas			
Bannu Tehsil	1634	31685	19
Domel Tehsil	2187	14127	6
Meryan Tehsil	1159	15240	13
Kakki	393	7281	19
Baka Khel	1869	14161	8
Wazir Tehsil	415	4982	12

3.1.2 Current Housing Backlog and Future Demand

A housing backlog refers to the gap between the demand for housing and the available supply of housing units. This unmet demand can have significant social and economic consequences, including increased housing costs, overcrowding, homelessness, and a decline in overall quality of life.

The current housing backlog of District Bannu has been calculated by dividing the projected population 2025 by the proposed average household size 2025, the result is the number of total existing housing demand 2025 in District Bannu. Then by subtracting the number total housing demand 2025 from the existing housing stock 2025, it gives us the current backlog as the result.

3.1.2.1 Current Housing Backlog

Currently, as per the calculation, there is a backlog of 18,689 houses in District Bannu. in urban areas, the backlog is 8,418 housing units, and in rural areas, the backlog is 10,271. The urban area housing backlog is further divided into 5 urban areas. In the Bannu City, the backlog is 7.323; in the Domel, Kakki, and Nurrar urban areas, the deficiency of housing units is 161, 482, and 118, respectively. While in Ghoriwala Growth Center, the housing backlog is less than all, which is 333.

In the rural areas of Bannu Tehsil and Baka Khel Tehsil, there is a backlog of 2,425 and 1,171. In Domel Tehsil, the backlog is 3,442 units, while Meryan Tehsil has a backlog of 1,364 housing units, whereas Kakki Tehsil has a backlog of 808 units. In the remaining Wazir Tehsil, the backlog stands at 941 housing units. Thus **Table 3-7**, it gives us the current backlog as the result.

Table 3-7 District Bannu Current Housing Backlog (2025)

Administrative Area	Population 2025 (A)	Existing Housing Stock 2025 (B)	Household Size 2025 (C)	Existing Housing Demand 2025 (D)	Housing Backlog (D-B)
District Urban	578,361	55,428	9.05	63,846	8,418
District Rural	958,695	87,477	9.80	97,748	10,131

Administrative Area	Population 2025 (A)	Existing Housing Stock 2025 (B)	Household Size 2025 (C)	Existing Housing Demand 2025 (D)	Housing Backlog (D-B)
District Overall	1,537,056	142,905	9.50	161,594	18,548
Urban Areas					
Bannu City	498004	47,888	9.02	55,211	7,323
Domel Town	10879	772	11.66	933	161
Kakki Town	32585	3,246	8.74	3,728	482
Nurar Town	15814	1,468	9.97	1,586	118
Ghoriwala Growth Center	21079	2,054	8.83	2,387	333
Rural Areas					
Bannu Tehsil	306227	31,685	8.98	34,110	2,425
Domel Tehsil	202192	14,127	11.52	17,549	3,422
Meryan Tehsil	165709	15,240	9.98	16,605	1,364
Kakki	70813	7,281	8.76	8,088	808
Baka Khel	153696	14,161	10.02	15,331	1,171
Wazir Tehsil	60058	4,982	10.14	5,924	941

3.1.2.2 Future Housing Demand

The future housing demand for 2025-2045 for the District Bannu has been calculated by dividing the additional population of 2045 by the average household size 2045. The overall future housing demand for 2025-2045 of District Bannu is 158,673 out of these, 59,499 houses are needed in the urban area, whereas 158,673 houses are required in the rural areas of District Bannu.

Table 3-8: District Bannu Future Housing Demand (2025-2045)

Administrative Area	Additional Population	Household Size 2045	Future Housing Demand 2045 (A)	Current Housing Backlog (B)	Total Housing Dmand (A+B)
District Urban	439844	8.61	51082	8418	59499
District Rural	843594	9.47	89043	10131	99174
District Overall	1283438	9.15	140125	18548	158673
Urban Areas					
Bannu City	373713	8.56	43676	7323	50999
Domel Town	12058	11.06	1090	161	1251
Kakki Town	25359	8.30	3057	482	3539
Nurar Town	12309	9.46	1302	118	1420
Ghoriwala Growth Center	16405	8.38	1958	333	2291
Rural Areas					
Bannu Tehsil	238323	8.55	27879	2,425	30303
Domel Tehsil	224106	10.97	20427	3,422	23849
Meryan Tehsil	128962	9.50	13571	1,364	14935
Kakki	55111	8.34	6611	808	7418
Baka Khel	119615	9.55	12531	1,171	13702
Wazir Tehsil	77478	9.65	8025	941	8967

3.1.2.3 Area Requirement

Based on the proposed housing density 2045 calculated, the additional housing demand is projected for 2025-2045.By subtracting the infill development area from the total area required, the net area required for the long-term period is calculated. The land available for infill development, as derived from the land use base map, has been taken into account. Infill development within the CBA of each urban area includes vacant land, barren land, rangeland, and agricultural land.

Based on an assessment of actual housing density, the NRM standards, and the Urban Policy 2030, the consultant has proposed housing densities aligned with current residential patterns, measured in persons per hectare (pph), followed by appropriate densification. These densities were then divided by the proposed household sizes to determine the recommended number of housing units per hectare.

For urban areas, the proposed housing density ranges from 20 to 36 houses per hectare. In rural areas, due to variations in household sizes across different tehsils, the proposed densities for projection purposes are as follows: 32 houses per hectare in Tehsils Bannu and Kakki, 21 houses per hectare in Tehsils Miryan and Baka Khel, and 16 houses per hectare in Tehsils Domel and Wazir. A summary of these details is presented in the table below.

Table 3-9: Area required 2025-2045 (Hectares)

Administrative Area	Total Future Housing Demand	Proposed Housing density 2045	Area Required (Hectares) (A)	Infill Development (Hectares) (B)	Net Area Required (Hectares) (A-B)
District Urban	59499	34	1754	288	1465
District Rural	99174	21	4651	435	4216
District Overall	158673	25	6404	723	5681
Urban Areas					
Bannu City	50999	35	1455	237	1218
Domel Town	1251	20	63	10	53
Kakki Town	3539	29	122	23	100
Nurar Town	1420	29	50	7	42
Ghoriwala Growth Center	2291	36	64	12	52
Rural Areas					
Bannu Tehsil	30303	32	963	131	832
Domel Tehsil	23849	16	1516	136	1380
Meryan Tehsil	14935	21	712	75	637
Kakki	7418	32	236	12	224
Baka Khel	13702	21	653	79	575
Wazir Tehsil	8967	16	570	2	568

3.1.3 Affordability Inputs Relative to Local Income Level

Housing is one of the basic human needs: the World Health Organization defined it as a “residential environment which includes, in addition to the physical structure that man uses for shelter, all necessary services, facilities, equipment and devices needed or desired for the physical and mental health and social well-being of the family”. Globally, housing is defined as affordable if a basic housing unit, which provides a minimum amount of personal space (anywhere from 250 to 500 square feet) and amenities, is accessible at 20% to 40% of gross monthly household income for either rent or mortgage.[24]

Beyond affordability in monetary terms, adequacy is also essential: a house cannot be deemed affordable if it is overcrowded, structurally unsafe, or lacking in basic services. Therefore, to evaluate the real cost and affordability of housing, expenditures related to water, electricity, gas, and sanitation must also be considered, alongside the structural quality and spatial sufficiency of the dwelling.25

According to the HIS carried out by the Consultant in District Bannu, only 4% of the households live in a rented house with monthly rent varying from Rs 1000 to Rs 30000, with an average rent of Rs 9000 per month for a household. The average household income of District Bannu is Rs 30000 per month. On average, about 30% of the household income is paid in rent, which according to the international definition stated above, falls in the affordable housing.

[24] *A framework for affordable housing in Pakistan, International Growth Center, 2019.*

[25] *What is affordable Housing? Habitat for Humanity.*

According to Table 5-4, 94% of the houses in the entire district of Bannu were owned by people which clearly put aside financial affordability defined above internationally. So, in the project area, affordability was studied with respect to adequacy through the following physical aspects keeping the average household size for the complete district:

- Structure of house
- Average covered area
- Rooms per house
- Bathrooms per house
- Persons per room
- Period of construction

The below Table 3-10 below demonstrates the analysis performed on the above physical criteria for affordable housing in District Bannu.

Table 3-10: Physical Criteria for Affordable Housing[26]

Structure of house (Pacca)	Avg. Covered Area (Marla)	Avg. Rooms per house	Avg. Bathrooms per house	Avg. Persons per room	Period of Construction (11-50 years)
43%	10	4	2	3	72%

In the light of the above table, less than half (43%) of the houses in District Bannu are constructed with permanent (pacca) materials. The average covered area is 10 marla (approximately 2,720 sq. ft.), and each house has an average of four rooms and two bathrooms. With an average household size of nine persons, this results in 302 sq. ft. of space per person, falling within the internationally accepted range of 250–500 sq. ft. for adequate living space. Additionally, the ratio of three persons per room in overall district is consistent with global standards for non-congested living environments.

Regarding the age of the housing, 72% of housing units were built within the last 11–50 years.[27] According to the U.S. Department of Housing and Urban Development, this falls below the average structural lifespan of 70 years, suggesting that most housing units are still structurally viable.

Housing adequacy was further evaluated based on access to essential services:

- Potable Water
- Electricity
- Gas
- Sanitation

The below Table 3-11 summarizes the facilities available to the housing units in District Bannu.

Table 3-11: Availability of Basic Facilities[28]

Potable Water	Electricity	Gas	Sanitation
46%	**89.8%**	**17.1%**	**22.5%**

Analyzing the above table, it is evident that potable water is accessible to 46% of the population. Although nearly 90% of households report access to electricity, the HIS indicates that 77% face load shedding exceeding 16 hours per day, limiting its usability. Access to gas is critically low, with only 17.1% of households connected to piped or LPG sources. Waste water and solid waste disposal, collectively termed as sanitation for analysis turned out to be available for only 22.5% population indicating that dispose their household solid waste and wastewater into open drains or spaces. Furthermorewhile the HIS findings show that over 93% of drinking water sources meet SDG Indicator 6.1.1 (“improved source”), 35% of these are located outside the household premises, compromising accessibility and convenience.[29]

[26] *Calculated from Household Survey conducted by Consultant, January 2023.*

[27] *Pakistan Bureau of Statistics*

[28] *Calculated from the Household Survey conducted by the Consultant in January, 2023.*

[29] *Calculated from the Household Survey conducted by the Consultant in January, 2023.*

Table 3-12: Housing Afforfability & Adequacy within District Bannu

Category	Indicator	Findings	Assessment
Economic Affordability	% of Households in Rented Units	4%	Low reliance on rental market
	Average Monthly Rent	PKR 9,000	30% of average income (PKR 30,000)
	International Benchmark (Rent-to-Income)	20–40%	Within affordable threshold
Physical Adequacy	Avg. Covered Area	10 marla (≈ 2,720 sq. ft.)	Meets space standards
	Avg. Persons per Room	3 persons	Acceptable standard (≤3 persons/room)
	Avg. Rooms per House	4	Adequate
	Avg. Bathrooms per House	2	Adequate
	Structure Type	43% Pacca houses	Below desirable standard
	Construction Age	72% houses built 11–50 years ago	Within structural lifespan
	Personal Space per Person	≈ 302 sq. ft./person	Within international norms (250–500)
Service Adequacy	Access to Potable Water	46% within premises	Low
	SDG Indicator 6.1.1 (Improved Water Source)	93% (but 35% sources outside premises)	Physically improved but not accessible
	Electricity Access	89.8% households	High access, but quality is poor
	Electricity Load Shedding	77% experience >16 hours/day	Severely impacts usability
	Access to Gas (Natural/LPG)	17.1%	Very low
	Access to Sanitation (Waste & Wastewater Disposal)	22.5%	Critically inadequate

In a nutshell, while housing in District Bannu appears affordable in terms of economic cost and physical adequacy, the lack of essential services undermines this affordability. Inadequate access to potable water, uninterrupted electricity, safe cooking fuel, and proper sanitation significantly affects quality of life and public health. These findings indicate that true housing affordability must be measured not only by cost or size but by the ability of households to live safely and with dignity. Therefore, ensuring equitable and reliable access to basic urban services is vital for fostering resilient, inclusive communities across District Bannu.

3.1.4 Future Plans

Based on the residential zoning requirements for 2025–2045 in District Bannu, a comprehensive housing strategy has been developed for Bannu City, Kakki Urban, Domel Urban, Nurrar Urban, and Ghoriwala Growth Center. Housing backlog figures show unmet current demand, with Bannu City having the highest backlog (7,323 units), followed by smaller gaps in the other urban centers.

To calculate additional housing demand (80% of the total additional population is allocated to Bannu and Kakki, while 90% is allocated to other urban areas. The remaining 20% in Bannu city and Kakki urban is considered for mixed-use development, whereas in other urban areas, 10% is designated for mixed-use).

The future area requirements for residential development across District Bannu's urban centers reflect anticipated population growth and housing demand. Bannu City, as the district's largest urban center, requires 1,207 hectares of land to accommodate its projected housing needs, driven by a significant net housing demand of 42,249 units.

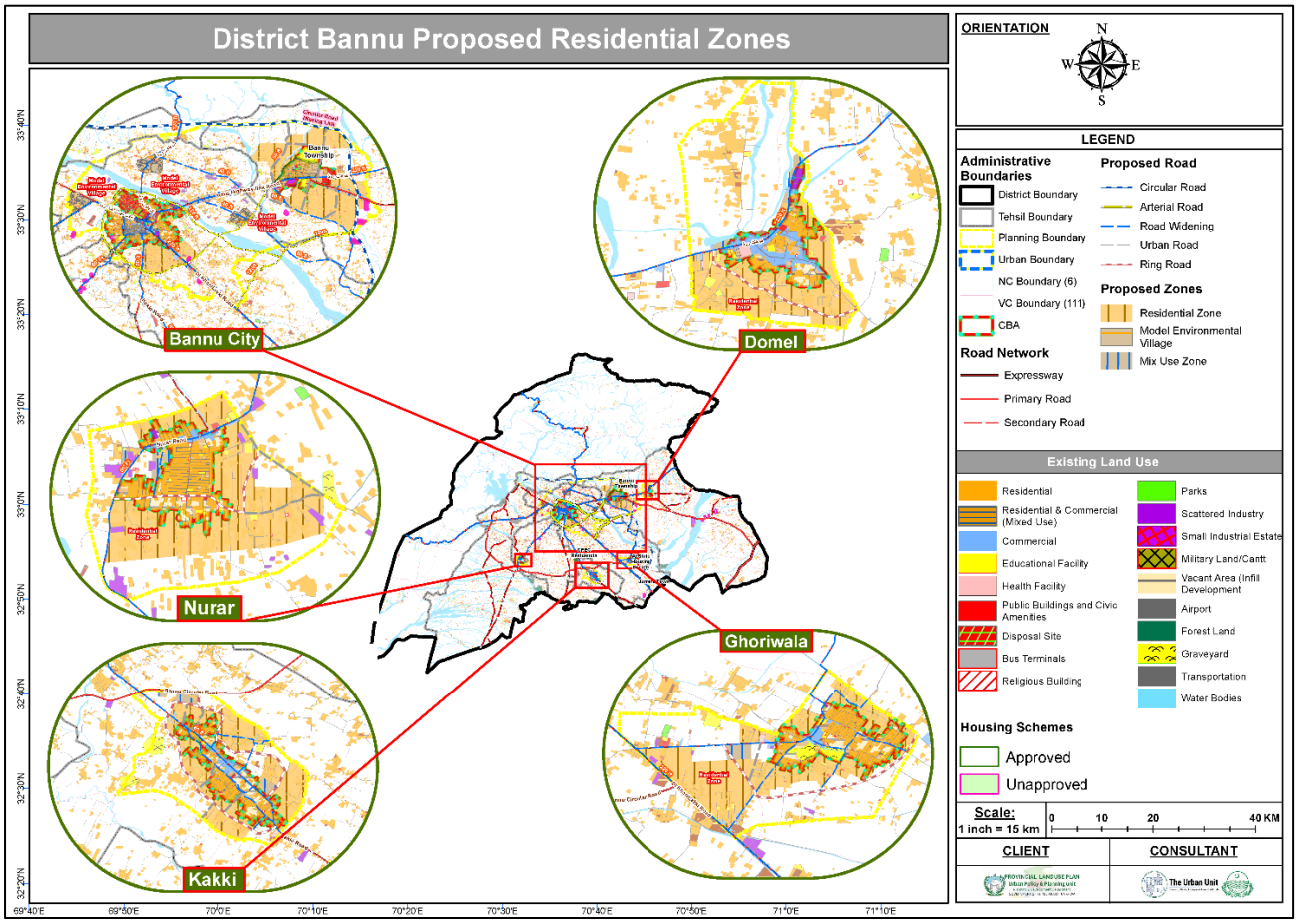
Smaller urban centers have proportionally lower requirements: Kakki Urban needs 101 hectares, Domel Urban requires 57 hectares, Nurrar Urban needs 44 hectares, and Ghoriwala Growth Center requires 58 hectares. These estimates are based on proposed housing densities ranging from 20 to 36 housing units per hectare, tailored to local urban characteristics.

To ensure the provision of essential infrastructure, services, and amenities, a 100% additional land allocation has been added to each center's base requirement. This brings the total residential land needs to 2,414 hectares for Bannu City, 102 hectares for Kakki, 114 hectares for Domel, 89 hectares for Nurrar, and 116 hectares for Ghoriwala.

Infill development is subtracted from the required residential zone. After accounting for this, the required residential zones total 2,177 hectares in Bannu City, 179.32 in Kakki, 104.39 in Domel, 81.56 in Nurrar, and 104.51 in Ghoriwala, respectively.

Table 3-13: Residential Zone calculation District Bannu

Residential Zoning Requirements (2025-45)	Bannu City	Kakki Urban	Domel Urban	Nurrar Urban	Ghoriwala Growth center
Housing Backlog	7323	482	161	118	333
Additional Population 2025-45 (80-90% of total Population)	298970	20287	10852	11078	14765
Additional Housing Demand 2025-45	34926	2444	981	1171	1762
Net Housing Demand	**42249**	**2927**	**1142**	**1289**	**2095**
Proposed Housing Density (Housing Unit Per Hactare)	35	39	20	29	36
Future Area Requirment	**1207**	**101**	**57**	**44**	**58**
100% Additional area for Services and Amenities (A)	**2414**	**202**	**114**	**89**	**116**
Infill Development (B)	236.78	22.51	9.83	7.35	11.88
Required Residential Zone (A-B)	**2177**	**179.32**	**104.39**	**81.56**	**104.51**



Map 3-2: District Bannu Proposed Residential Zones

3.1.4.1 Residential Zone Locational Criteria

The allocation of residential zones across various urban centers of District Bannu is based on criteria, including accessibility, land availability, existing land use, proximity to employment centers, and access to basic utilities, amenities, and public services. Each proposed zone has been identified through a careful analysis of urban growth trends, current development patterns, and future infrastructural expansion.

3.1.4.1.1 Bannu City

Multiple residential zones have been proposed within Bannu City:

Northeastern Zone: This area benefits from strategic connectivity to the under-construction circular road, enhancing its accessibility. It lies adjacent to the University of Science and Technology Bannu and the proposed educational neighborhood, making it an ideal location for residential expansion. The presence of existing built-up residential areas and expanses of vacant barren land supports its suitability for residential development.

Eastern Zone: Accessible from Kohat Road (Old Bannu Road), Indus Highway Link Road, and the under-construction circular road, this zone is well-positioned in terms of transportation connectivity. It is flanked to the north by the proposed health neighborhood and the existing Khalifa Gul Nawaz Hospital, while the proposed institutional zone lies to the northeast. The existence of surrounding residential development reinforces its viability for further residential zoning.

Southeastern Zone: Located adjacent to the Indus Highway Link Road and in proximity to the above-mentioned eastern residential zone, this area benefits from excellent accessibility via both the Indus Highway Link Road and the under-construction circular road. It is bounded to the south by Bizen Khel Road, which further enhances its connectivity. The zone already contains a substantial amount of built-up residential development. These factors collectively make this area a strategically suitable location for future residential expansion.

Southern Zone: Positioned along the main DI Khan/Lakki Marwat Road, this area already contains a high concentration of residential land use. The remaining vacant parcels within this area are proposed for residential zoning to accommodate projected urban expansion.

Modern Environmental Village:

A Model Environmental Village is a purposefully planned settlement that embodies sustainable and inclusive living, with a strong emphasis on environmental preservation, social cohesion, and quality of life. Designed with a planned layout, these villages offer high-quality, affordable housing, efficient infrastructure, and integrated green spaces that enhance the natural environment. Key features include access to essential services such as education, healthcare, and clean water; promotion of sustainable livelihoods and local employment; and the provision of community facilities that foster participation and inclusivity. By incorporating practices such as renewable energy use, waste recycling, water conservation, and eco-friendly construction, these villages serve as replicable models for environmentally sustainable and socially balanced communities. They also function as tools to manage scattered development and protect agricultural land, offering practical and resilient frameworks for climate-conscious growth.

Three model environmental villages have been proposed in Bannu urban area one is at the Southeast of the city, 2nd is at Northwest and third is at West of the urban area. The Southeast is located at Koti Saddat settlement which is accessible through Koti Saddat road, which is connected to Indus highway link road. The second model environmental village is located on the Northwest side of the urban area, located at Lalozai 2 and Basia Khel settlement. This village is accessible through Thall-Bannu road and Sorani road which is further connected to Indus highway link road. The 3rd model environmental villageons at western west side of the urban area, located at the Mamash Khel Nogari 1, Mamash Khel Nogari 2 and Mamash Khel Sadat settlement. It is accessible through Bannu Miran Shah Road and Mamash khel-Baran Dam road.

3.1.4.1.2 Kakki Urban Area

The proposed residential zone in Kakki is located on both sides of the Main Kakki Road, ensuring direct accessibility. A ring road has also been proposed to enhance external connectivity and reduce traffic congestion within the core residential area. The zone is already characterized by dense residential

development, which is being systematically extended. Surrounding land use includes the proposed industrial zone to the northwest, institutional zone to the north, educational neighborhood to the east, and health neighborhood to the southeast, all of which will generate employment opportunities and complement the residential function of the area.

3.1.4.1.3 Domel Urban Area

In Domel, the proposed residential zone has been delineated based on current land use and connectivity. It is linked via the Old Bannu Road and Domel-Patolkhel Road, while a new ring road is also proposed to further improve access. The area includes a mix of existing residential development and vacant barren or range land, which has been earmarked for future residential use in line with urban expansion needs.

3.1.4.1.4 Nurar Urban Area

The proposed residential zone in Nurar is accessible via Nurar Road and Bannu Road, with a ring road planned to enhance connectivity. Existing land use data reveals substantial built-up residential areas, making this location suitable for additional residential development. Moreover, the proximity to scattered existing industries and a proposed industrial zone will provide employment opportunities for residents, strengthening the economic viability of this residential zone.

3.1.4.1.5 Ghoriwala Urban Area

The residential zone proposed in Ghoriwala is strategically located with direct connections to DI Khan/Lakki Marwat Road (west), Bannu-Ghoriwala Road (north), and Kacha Bachak Road (east). Its proximity to the Central Business District (CBD) and the proposed industrial zone ensures accessibility to employment hubs. The area already contains significant built-up residential land, which justifies its inclusion in the residential zone.

3.1.4.2 Mixed Use Calculation of urban areas:

The mixed-use zone has been allocated under the residential zone. The consultant also reviewed international examples of population distribution within mixed-use zones, where typically 10% to 40% of the population resides in such areas. These case studies provided valuable insights into the effectiveness and functionality of mixed-use development in diverse urban contexts[30],[31].. Based on this analysis, the consultant allocated 20% of the additional population to mixed-use zones in Bannu City and Kakki Urban due to their relatively higher populations. In contrast, 10% is allocated to mixed-use zones in other urban areas, reflecting their comparatively lower population.

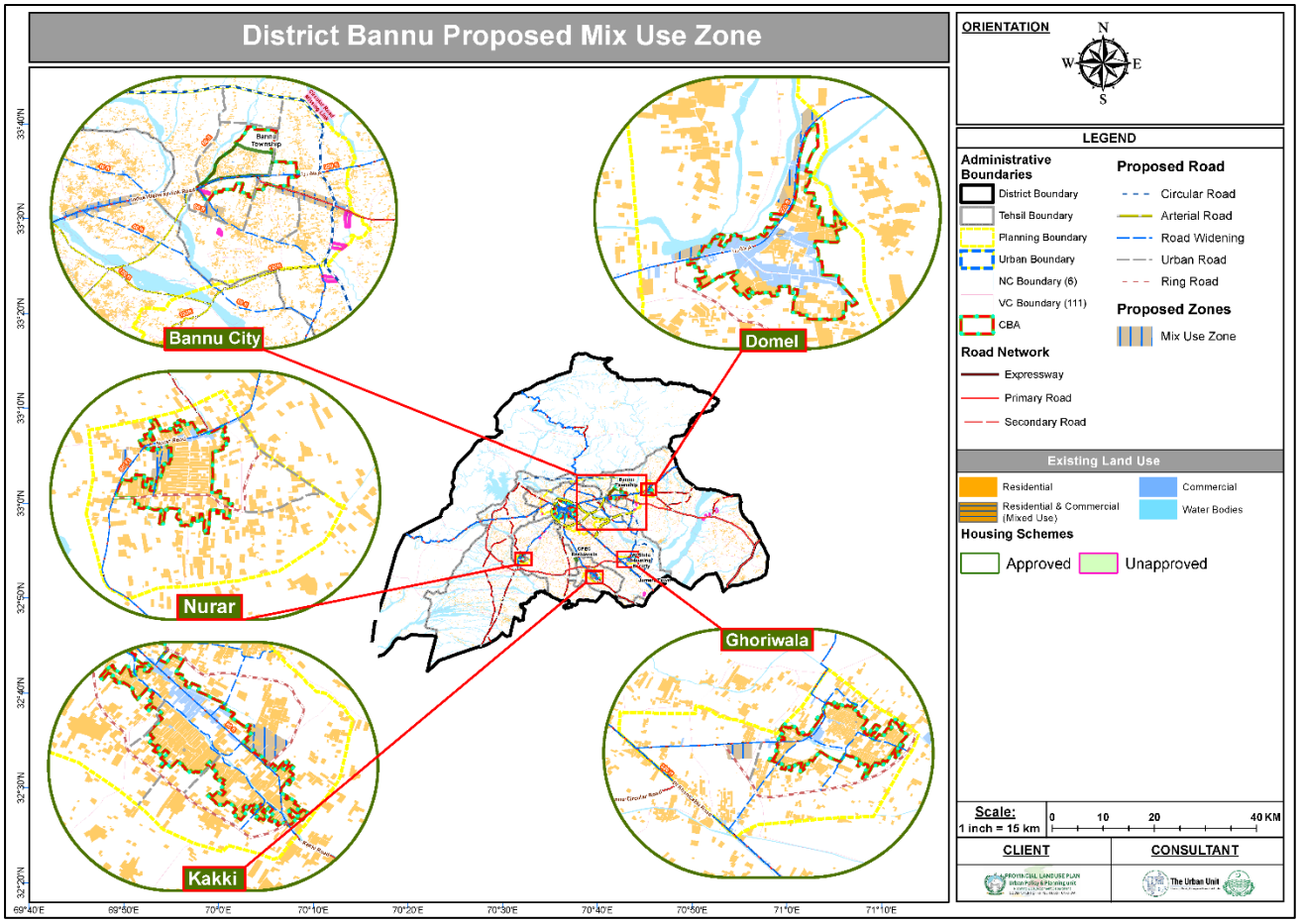
The proposed density of the mixed-use is determined based on the existing residential density patterns and the guidelines provided in the KP Urban Policy 2022–2030. Accordingly, the consultant developed the proposed density in line with these observations. The table below indicates the district of Bannu urban areas mixed zones.

Table 3-14: District Bannu Urban areas Mixed-use zones

Urban Area	Mixed-use Population	Proposed Density (PPH)	Area Required (Hectares)
Bannu Urban	74743	350	213.55
Domel Urban	1206	250	4.82
Kakki Urban	5072	300	16.91
Nurar Urban	1231	300	4.10
Ghoriwala Urban	1640	350	4.69

[30] *Evaluating the challenges and impacts of mixed-use neighborhoods on urban planning: an empirical study of a megacity, Karachi, Pakistan*

[31] *Evaluative structure of perceived residential environment quality in high-density and mixed-use urban settings: An exploratory study on Taipei City*



Map 3-3: District Bannu proposed Mixed-use Zones

3.1.4.2.1 Mixed Use Zone Locational Criteria

The allocation of mixed land use zones across District Bannu is based on key criteria, including accessibility from major roads, the existing pattern of mixed-use development, and the availability of suitable land.

In Bannu City, mixed land use zones are proposed at multiple strategic locations:

- One zone is located centrally, between the existing Bannu city and its new urban extension, along the main Bannu-Kohat Road. This area includes established commercial activity such as Nizam Bazar and existing residential developments, making it an ideal location for mixed land use.
- Another mixed-use zone is located on the Southern side of the city, along the D.I. Khan/Lakki Road. The presence of both existing commercial and residential structures supports its suitability for mixed-use designation.
- A third zone is proposed on the Eastern side of the urban area, also along the Indus Highway Link Road. Similar to the other locations, the coexistence of commercial and residential development makes it a strong candidate for mixed land use.
- Additionally, a mixed-use zone is designated on the Southern side of the proposed industrial zone, adjacent to the proposed Central Business District (CBD) and accessible from Bizen Khel Road. This zone is strategically planned to accommodate the residential and service needs of people associated with nearby industries and the CBD. Moreover, it will support the trading of industrial goods, enhancing the economic integration of the area.

In Domel Urban Area, the proposed mixed land use zones are situated on the northeastern and western sides of the town.

- The Western mixed-use zone is located along Kohat Road (Old Bannu Road). It is strategically positioned between two proposed Central Business Districts (CBDs) to its East and West, with a water body lying to its North, enhancing the environmental and commercial appeal of the area.

- The Northeastern mixed-use zone, also situated along Kohat Road, features existing CBD and residential development, making it a suitable location for mixed-use designation. To its west, the zone is bordered by a water body and riverine forest, while to the East, there are scattered industrial establishments, allowing for a diverse and integrated urban layout.

In Ghoriwala, the proposed mixed land use zone is centrally located at the heart of the growth center, along the main Bannu–Ghoriwala–Shamshikhel Road. It is strategically positioned with a recreational zone to the West, a proposed Central Business District (CBD) to the East, and a proposed residential zone to the South, making it an ideal location for integrated urban development.

In Kakki Urban Area, two mixed land use zones are proposed—one in the north and the other in the southeast:

- The northern mixed-use zone is situated along the main Bannu Circular Road and features existing commercial and residential development. It is bordered by the proposed CBD to the west, an institutional zone to the East, and a proposed residential zone to the south. The proximity to the CBD and industrial zone to the West makes this area suitable for accommodating both the workforce and commercial activities, including the trading of industrial goods.
- The southeastern mixed-use zone is located along Kakki Road and is also accessible from the proposed ring road. The presence of existing commercial establishments and built-up residential areas makes it a highly appropriate location for a mixed land use zone, supporting a vibrant blend of residential, commercial, and service activities.

The proposed mixed land use zone in Nurar Urban Area is located on the northwestern side and is accessible from Nurar Road. This area features existing commercial activities and built-up residential development, and is situated at the core of Nurar city, making it an ideal location for mixed-use planning. Additionally, it is adjacent to the proposed Central Business District (CBD) and existing residential areas, further enhancing its potential for integrated urban development.

3.2 Communication

Communications are an integral component of the socio-economic functions of an administered area, having direct and indirect impacts on quality of life, agriculture, tourism, commerce, industry, and security. The movement of people and goods within and throughout District Bannu is therefore highly influential to the quality of life, economy, and safety of its residents; thus, making transportation a critical component of any spatial intervention, particularly the Land Use Plan.

Communication infrastructure, such as highways, terminals, and bridges, consumes substantial amounts of land. In urban settings, roads alone comprise between 20% and 30% of land space. Therefore, it is necessary to optimize the quantity of land reserved for communications infrastructure such that long-term transportation needs are satisfied while leaving ample space for other land uses.

The communications plan has been prepared for the Bannu District to enhance the following in the district:

- Road Infrastructure
- Public and Goods Transport
- Rail Network
- Air Transport Facilities
- Postal services and
- Telecommunication Services

3.2.1 Baseline Data

This report utilized the primary and secondary data to develop the communications context for District Bannu.

3.2.1.1 Primary Data

Two-way traffic counts and Origin-Destination Interviews were conducted in the district. Moreover, Bus terminals, truck stands, telecommunication, postal services, and cellular towers were marked in the land use survey.

3.2.1.1.1 Traffic Counts

Traffic counts were used to observe daily traffic volumes along the major roads of District Bannu and identify existing roadway constraints and candidate roads for geometric improvements, i.e., widening or dualization.

The surveyed roads and their count locations were selected based on the following criteria in consultation with the Client:

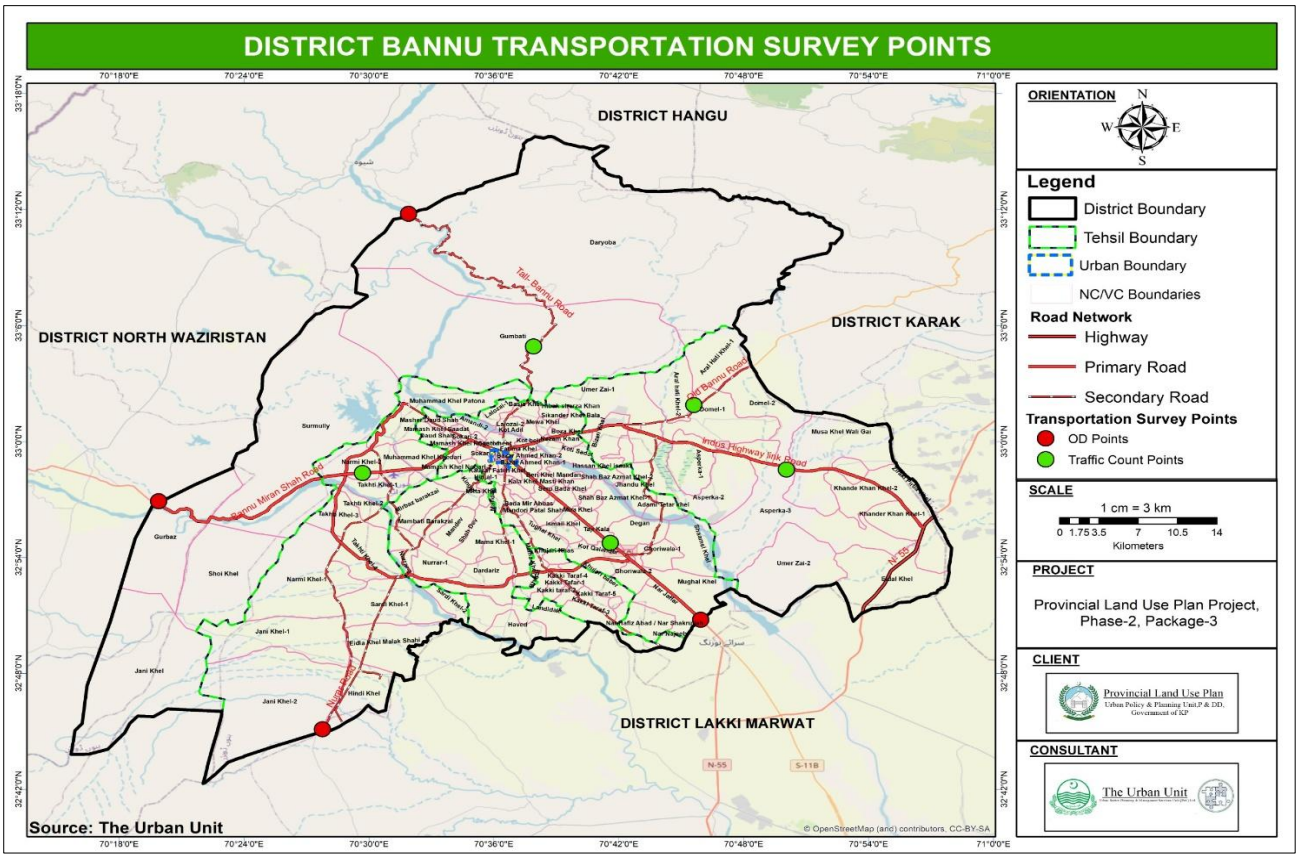
- The subject road is a major Provincial Transportation Corridor, i.e. Is a primary road or provincial highway;
- Road is not a National Highway, as traffic data can be obtained from the National Highway Authority.
- The road provides inter-district connectivity, and
- The road provides access to major settlements.

Nine (9) hour-Traffic counts were conducted over a period of 6 days at 30-minute Intervals from 8 am to 5 pm.

3.2.1.1.2 Origin-Destination Interviews

Roadside interviews were conducted near Bannu's inter-district boundaries to determine the popular origins and destinations of travelers in and out of District Bannu.

The locations for the traffic count and Origin Destination surveys are shown the map below. These locations were approved by before the initiation of the survey activities.



Map 3-4: Transportation Survey points of District Bannu

3.2.1.2 Secondary Data

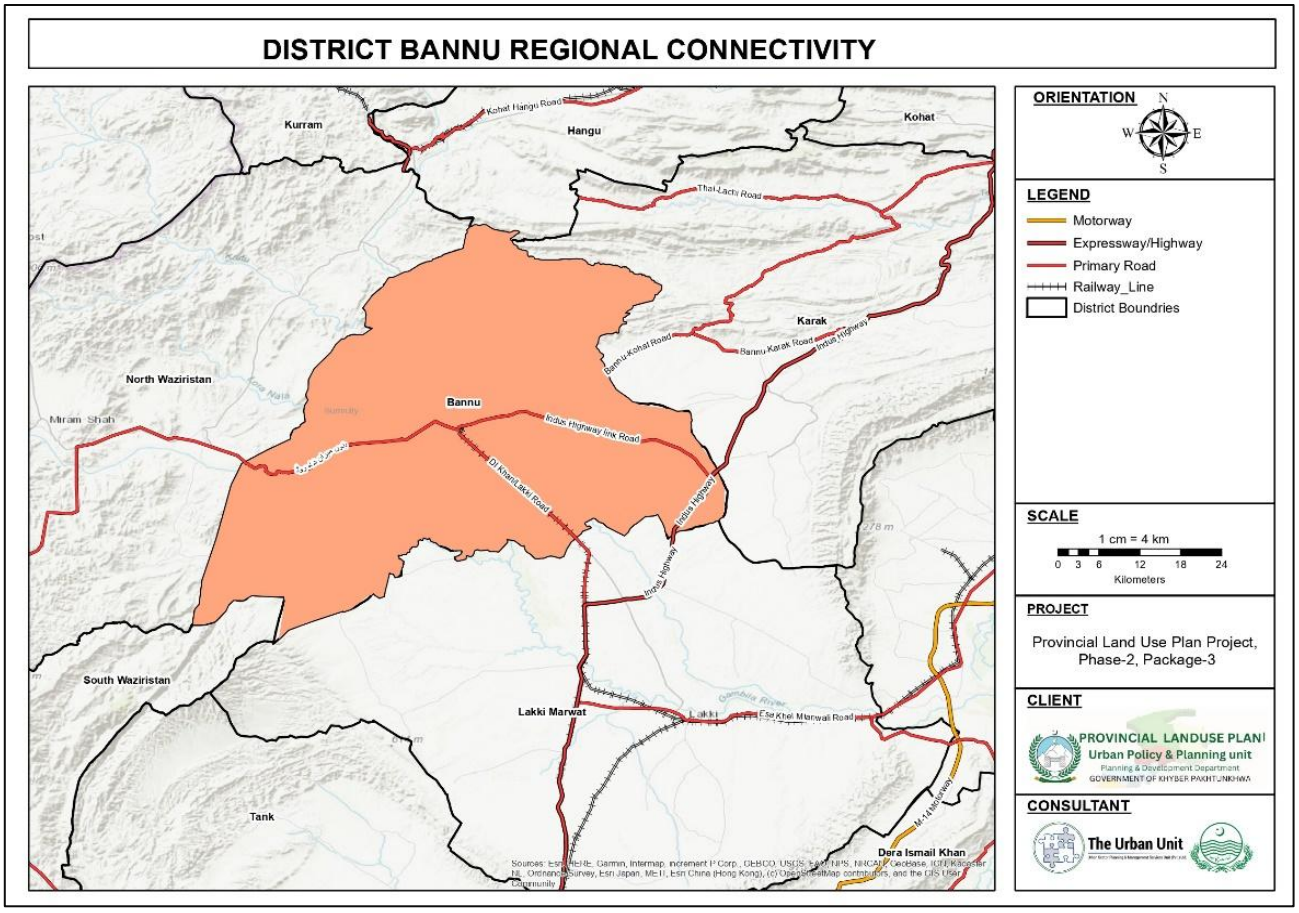
In addition to the primary traffic and infrastructure data collected from the traffic counts and land use survey, the following secondary data sources were consulted to develop the communications context of District Bannu:

i. Existing Road inventory and ongoing and future development plans from the respective departments:
   a. Communication & Works
   b. National Highway Authority
   c. Pakhtunkhwa Highway Authority
ii. Published Annual Development Program from the *KP Planning & Development Website*
iii. Bus and Truck Stand data, along with route permits and goods forwarding agency information from:
   a. District Regional Transport Authority;
   b. Provincial Transport Authority;
iv. Airport Facilities Layouts from Satellite Imagery;
v. Airport Operational Data from Civil Aviation Authority;
vi. Post Office Locations from Pakistan Postmaster General;
vii. Ongoing and Future Development Plans for Railway Infrastructure from Pakistan Railways (Divisional Office Peshawar);
viii. Existing Telephone Exchanges and Network Data from Pakistan Telecommunication Company Limited (PTCL);

3.2.2 Transportation Network

District Bannu, spanning over 1200 square kilometers, is one of Khyber Pakhtunkhwa's relatively more developed districts, with industries in manufacturing, agriculture and dairy, and livestock. In addition to these features that influence inter-district travel demand, there are also several major settlements that rely on transportation infrastructure for accessing commercial centers, education, and healthcare. Bannu also contains some tourist attractions such as Akra, Baran Dam, and Mandan Park.

The key map showing District Bannu, its major roadways, and neighboring districts is provided in the map below.

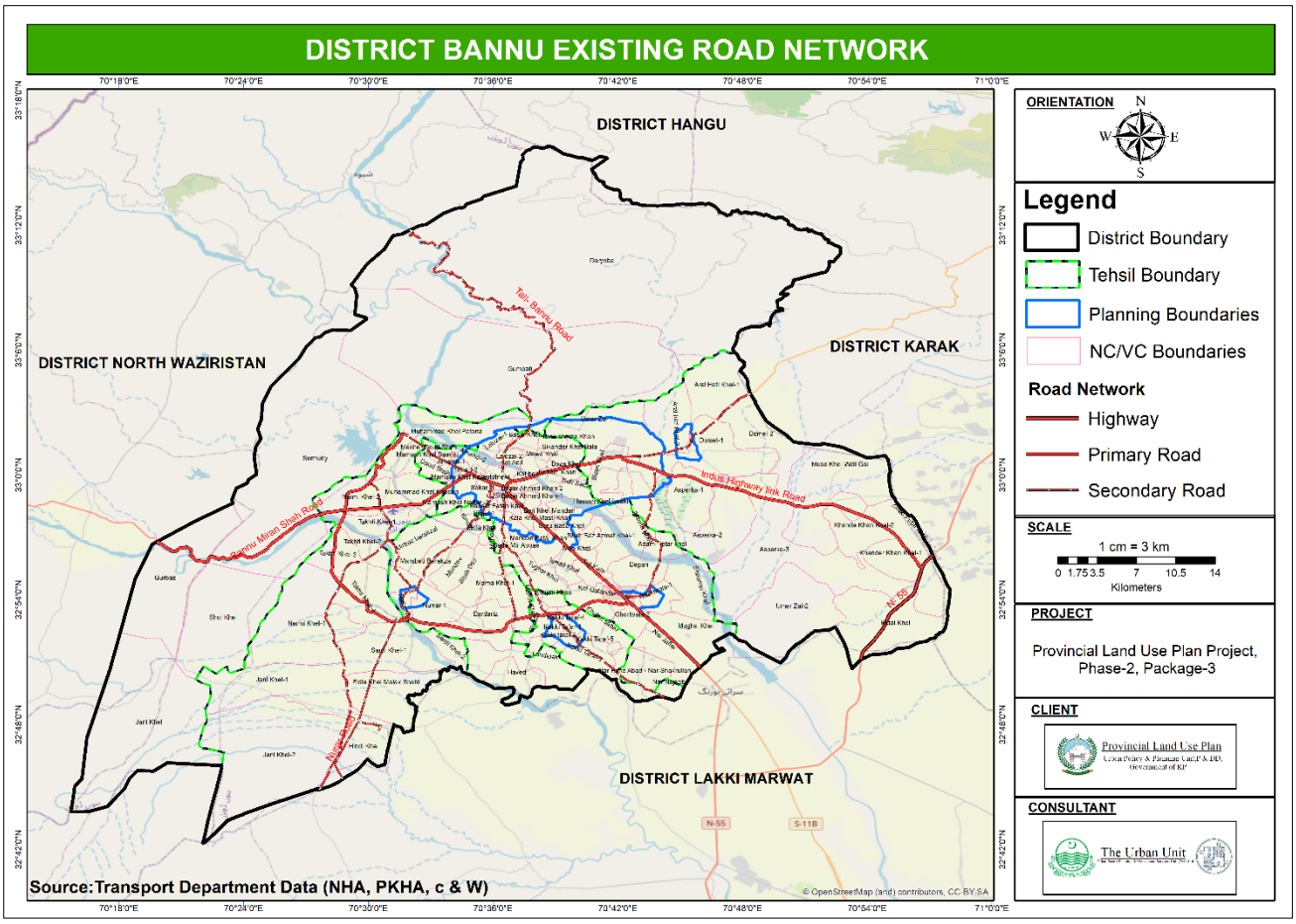


Map 3-5: District Bannu Regional connectivity

3.2.2.1 Existing Road Network

District Bannu contains a reasonable road network, primarily made up of Highways, Secondary Roads, and Local Roads, providing connectivity within and between the neighboring districts of Hangu, Karak, Kohat, Tank, and D.I Khan. The existing road network of Bannu spans over 1,758 kilometers and includes roads owned and operated by federal (e.g., National Highway Authority), provincial (Government of Khyber Pakhtunkhwa), and local entities.

The key roadways passing through Bannu are the N-55 (Indus Highway), DI Khan Road, Kohat Road, Indus Highway Link Road, Thall Road, and Miranshah Road. These roads not only provide intra-district connectivity but also provide access to the neighboring regions: Kohat, Dera Ismail Khan, and Miranshah.



Map 3-6: District Bannu Existing Road Network

A breakdown of District Bannu's road network is provided in the Table below.

Table 3-15: District Bannu Road Inventory

Road Type	Length (km)
National Highways	11
Provincial Highways	62
Primary Roads	4
Secondary Roads	402
Local Roads	1280
Unpaved Tracks / Shingle Roads	No Data Available
Total	**1758**

3.2.2.2 Observed Traffic Patterns

The results of the traffic count survey and Origin-Destination surveys are summarized in this section.

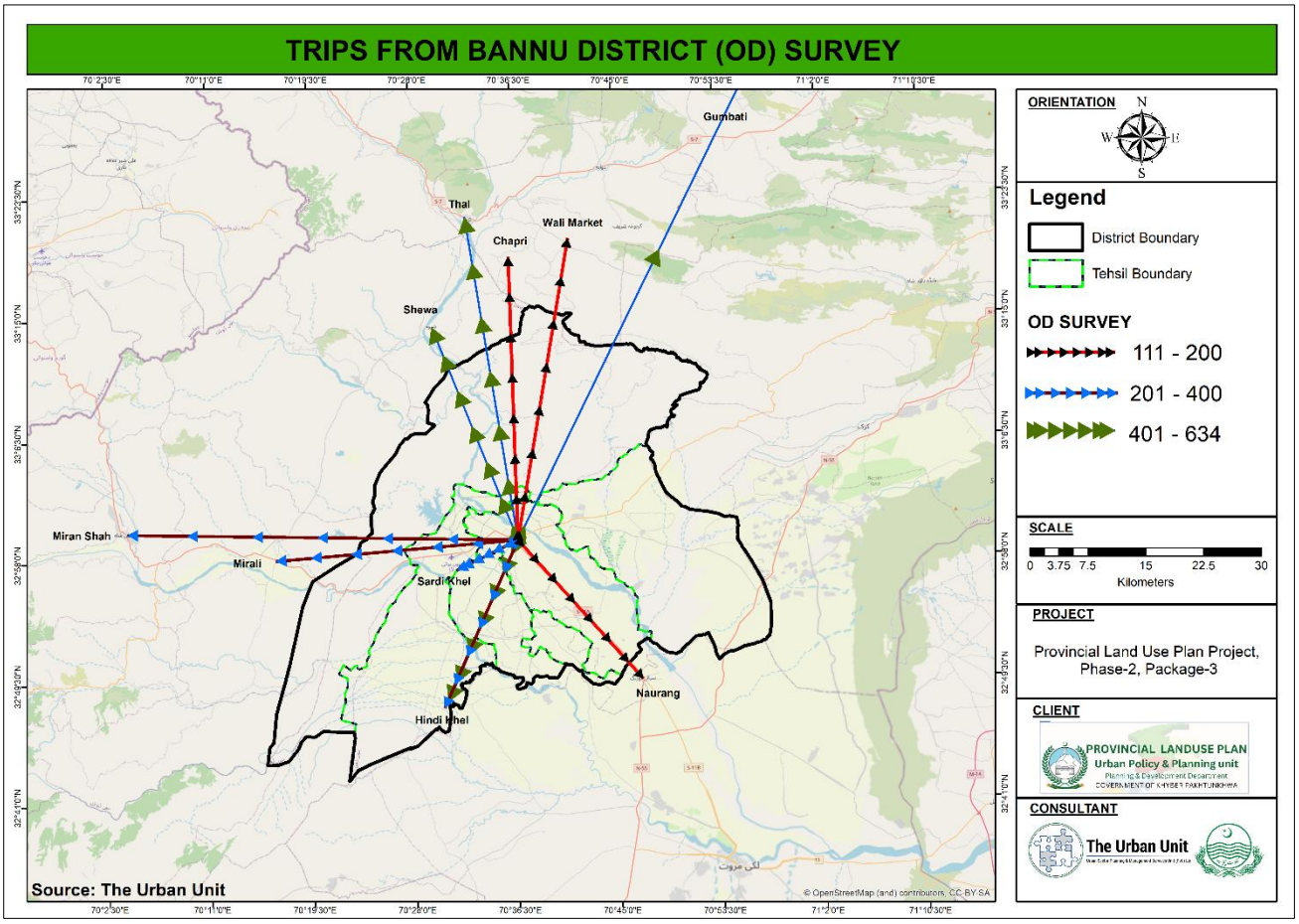
3.2.2.2.1 Major Origins and Destinations

The Origin-Destination survey helped identify the major trip generators and attractors for District Bannu, along with trip purpose. For this analysis, popular origins and destinations to and from Bannu have been tabulated as shown in the Table below. The trip purpose is indicative of whether these areas possess commercial or tourism-oriented attractors that would require improved road infrastructure for utilizing their potential.

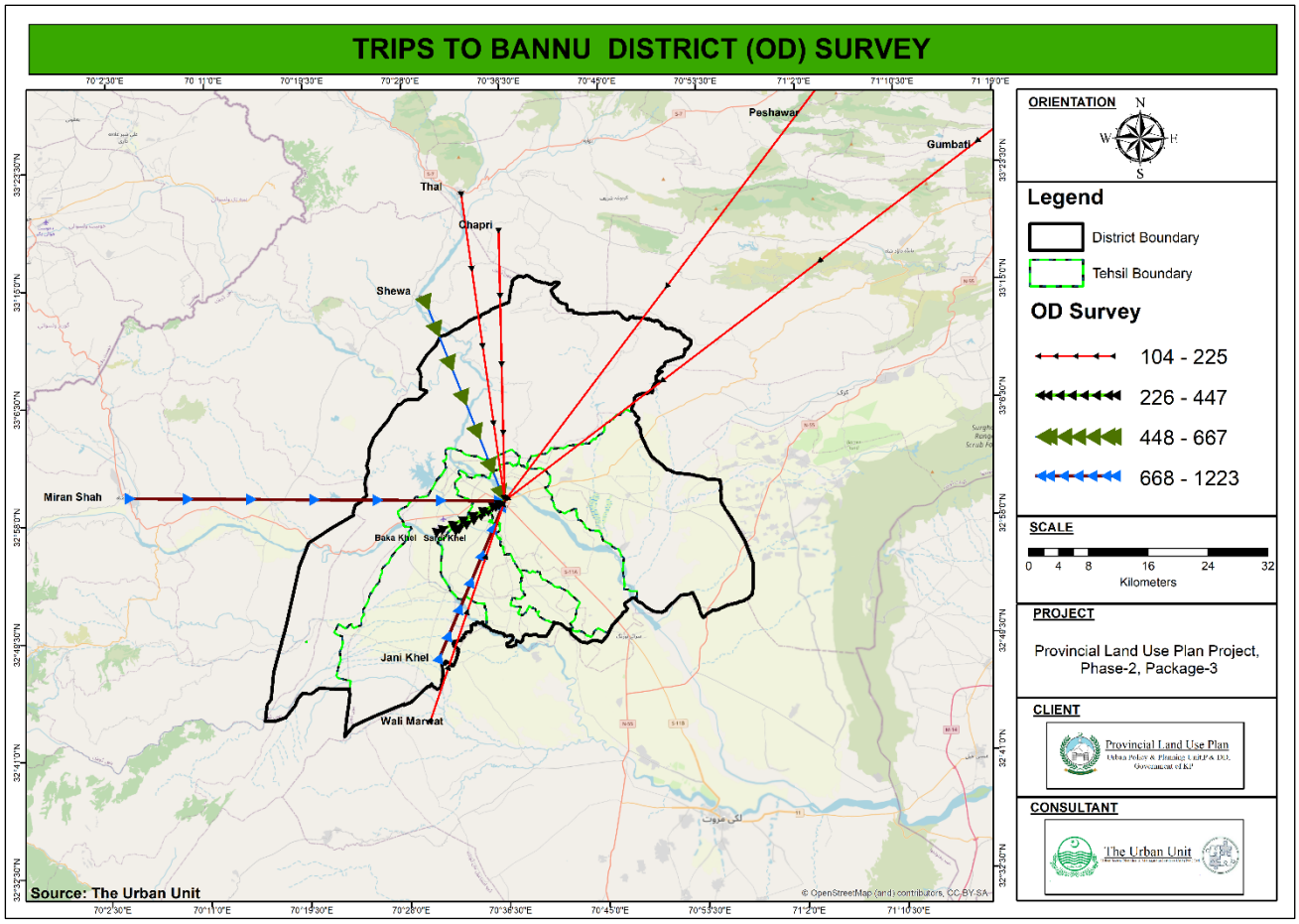
Table 3-16: Prominent Trip Purpose for O-D Pairs with Sum of Trip Counts

OD Pairs	Sum of Trip Count	Purpose of Trip
Bannu-Bannu	389	Serving Passengers / Personal / Business/ Employment/ Shopping
Jani Khel-Bannu	997	Serving Passengers / Personal / Business/ Employment/ Shopping
Sardi Khel-Bannu	467	Serving Passengers / Personal / Business/ Employment/ Shopping
Chapri-Bannu	155	Serving Passengers / Personal / Business/ Employment/ Shopping
Gumbati-Bannu	411	Serving Passengers / Personal / Business/ Employment/ Shopping
Miran Shah-Bannu	1223	Serving Passengers / Personal / Business/ Employment/ Shopping
Shewa-Bannu	667	Serving Passengers / Personal / Business/ Employment/ Shopping
Thal-Bannu	225	Serving Passengers / Personal / Business/ Employment/ Shopping
Wali Marwat-Bannu	104	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Bannu	494	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Chapri	179	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Gumbati	435	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Hindi Khel	205	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Jani Khel	619	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Mirali	376	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Miran Shah	359	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Naurang	111	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Sardi Khel	377	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Shewa	523	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Thal	634	Serving Passengers / Personal / Business/ Employment/ Shopping
Bannu-Wali Market	136	Serving Passengers / Personal / Business/ Employment/ Shopping
Baka Khel-Barakzai	33	Serving Passengers / Personal / Business/ Employment/ Shopping
Jani Khel-Barakzai	41	Serving Passengers / Personal / Business/ Employment/ Shopping
Jani Khel-Kohat	35	Serving Passengers / Personal / Business/ Employment/ Shopping
Jani Khel-Peshawar	179	Serving Passengers / Personal / Business/ Employment/ Shopping
Miran Shah-Islamabad	107	Serving Passengers / Personal / Business/ Employment/ Shopping
Miran Shah-Naurang	39	Serving Passengers / Personal / Business/ Employment/ Shopping
Miran Shah-Peshawar	204	Serving Passengers / Personal / Business/ Employment/ Shopping
Miran Shah-Rawalpindi	60	Serving Passengers / Personal / Business/ Employment/ Shopping
Baka Khel - Bannu	333	Serving Passengers / Personal / Business/ Employment/ Shopping

OD Pairs	Sum of Trip Count	Purpose of Trip
Baka Khel -Jani Khel	111	Serving Passengers / Personal / Business/ Employment/ Shopping
Baka Khel - Miran Shah	68	Serving Passengers / Personal / Business/ Employment/ Shopping
Baka Khel - Sardi Khel	90	Serving Passengers / Personal / Business/ Employment/ Shopping
Peshawar - Miran Shah	136	Serving Passengers / Personal / Business/ Employment/ Shopping



Map 3-7: Origin Destination Trips from Bannu District



Map 3-8: Origin Destination Trips to District Bannu

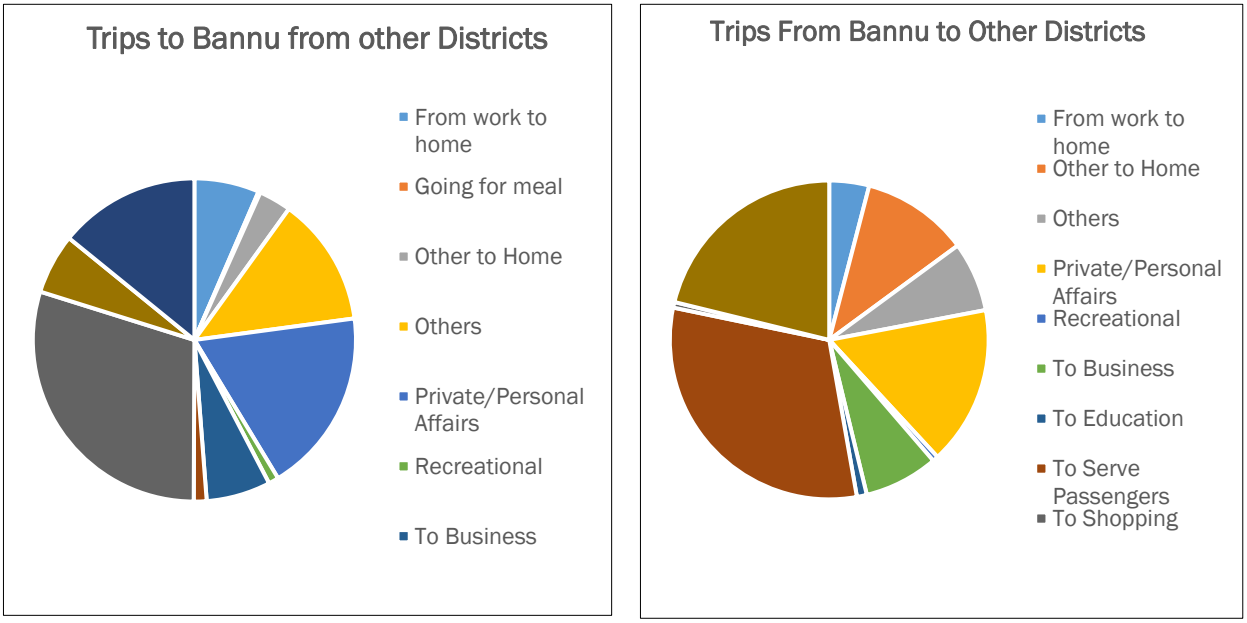


Figure 3-1: Trip Purpose Analysis

Trip purpose analysis for District Bannu shows that the trip purpose patterns for people travelling to Bannu from other districts are other to home, private personal affairs, and work to home. While the purpose of Bannu to other districts is to serve passengers, private/personal affairs, and others to their homes.

3.2.2.2.2 Traffic Volumes

A brief overview of traffic volume is provided in the Table. Mode-wise highest directional traffic volume on the five traffic count points in district Bannu has been summarized in the Table. The passenger car Unit

(PCU) was calculated for various modes of traffic. Notably, the maximum traffic volume was observed on Monday, Wednesday, Thursday, and Saturday.

Roads have been determined as adequate or inadequate based on the common thresholds for widening and dualization stipulated by the *Punjab Planning & Development Board*. For roads having a Daily Traffic Volume (VPD) of more than 800 vehicles, widening to 20/24 ft is recommended. Roads exhibiting a VPD of more than 8000 may be considered for dualization. The traffic count shows calculation of VPD, PCU, and peak hour for the maximum daily traffic volume observed over a period of 6 days for each survey point.

Table 3-17: Summary of traffic volumes

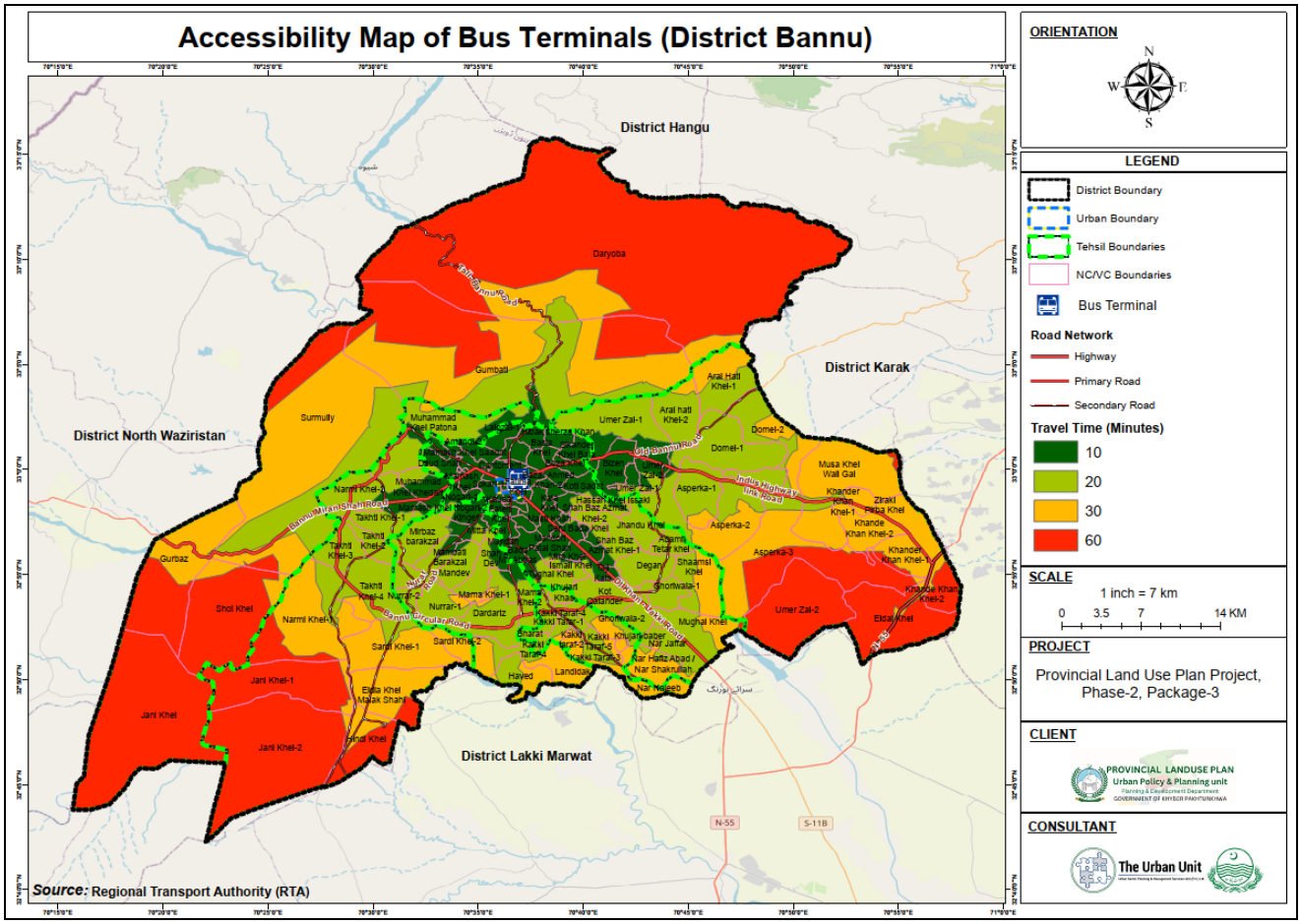
Point No	Day	Peak Hour Volume	Peak Hour	Total Volume	
				Veh.	PCU
Point 1 (Karak-Bannu Road)	Thursday	1031	09:30 – 10:30	10091	7951
Point 2 (Bannu-Thal Road)	Wednesday	235	16:00 –17:00	2590	1714
Point 3 (Bannu-Miran Shah Road)	Thursday	589	15:30 –16:30	3257	3679
Point 4 (Bannu-DI Khan Road)	Saturday	1973	08:00–09:00	16905	13105
Point 5 (Bannu-N-55 Link Road)	Monday	546	14:00 –15:00	4314	4193

Table 3-18 Mode Wise Daily Traffic Volume

Vehicle Class	Point 1 (Karak-Bannu Road)		Point 2 (Bannu-Thal Road)		Point 3 (Bannu - Miran Shah Road)		Point 4 (Bannu – DI Khan Road)		Point 5 (N-55 Link Road)	
	26/01/23 Thursday		25/01/23 Wednesday		26/01/22 Thursday		28/01/23 Saturday		23/01/23 Monday	
	To Bannu	*To Karak*	*To Bannu*	*To Thal*	*To Bannu*	*To Miran Shah*	*To Bannu*	*To DI Khan*	*To Bannu*	*To N 55*
Motorcycle	2188	227	1713	1713	346	372	4388	3136	707	771
Rickshaw	1453	59	240	240	286	304	3178	2875	345	307
Car/Jeep	984	73	78	78	451	386	1048	541	626	647
Suzuki/Bolan	23	7	64	64	19	8	104	100	50	42
Pick Up/ Hi-Ace	127	26	14	14	339	278	380	182	162	181
Bus/Coaster	6	0	35	35	7	0	16	28	18	28
Loader/Suzuki	137	12	0	0	52	96	280	236	54	81
Pick up/Shezore	60	9	16	16	81	64	67	107	97	63
Tractor Trolley/Truck	48	8	9	9	82	86	106	133	55	80
Total Volume (vehi)	5026	5065	421	2169	1663	1594	9567	7338	2114	2200
Total Volume (PCU)	3891	4060	337	1377	1903	1776	7311	5795	2022	2171

3.2.2.3 Bus Terminals

The existing bus terminals are evaluated for coverage in terms of the cities or settlements that can access them. Those settlements that do not have any terminals in their drivable vicinity were identified based on spatial analytics. The map below illustrates the existing bus terminals in District Bannu. Each neighborhood in District Bannu has been analyzed for bus terminal accessibility in terms of drive time to the nearest terminal. Those areas having a bus terminal within a 10-minute drive, 20-minute drive, 30-minute drive, and 60-minute drive. Areas lying within the 30-60-minute regions are deemed to be underserviced and may be candidate localities for new terminals.



Map 3-9: District Bannu Bus Terminals Accessibility

3.2.2.4 Rail Network

There used to be a narrow-gauge railway line connecting Bannu with Mari In; however, that line has been dismantled. Currently, the nearest operational railway station is Mari Indus, which connects via rail to Daud Khel and onwards to Mianwali in the South and Jand Junction Railway Station in the North. In addition, Kohat Railway Station is also nearby, which provides another option to connect Bannu to the rest of the country via Rail. While Kohat Railway Station offers another connection option, establishing a direct link between Kohat and Bannu is complicated due to the absence of a prior rail connection.

3.2.2.5 Air Transportation

The civilian airport in Bannu is classed as a tertiary airport by the Civil Aviation Authority. The CAA require air that wish to obtain a Regular Public Transport (RPT) license to operate at least two frequencies; either on one of the socio-economic routes or on one of the tertiary routes. Eight destinations (Chitral, Gilgit, Skardu, Gwadar, Panjgur, Turbat, Pasni, and Jiwani) are treated as socio-economic routes, while 19 routes (Sukkur, Rahim-Yar-Khan, Moenjodaro, D. I. Khan, Bahawalpur, D. G. Khan, Zhob, Nawabshah, Saidu Sharif, Hyderabad, Jacobabad, Ormara, Dalbandin, Khuzdar, Bannu, Rawalakot, Parachanar, Muzaffarabad, and Sehwan Sharif) are considered tertiary routes including. However, the CAA data for the year 2021-2022 showed that no flights/passenger movements were witnessed on Bannu Airport.

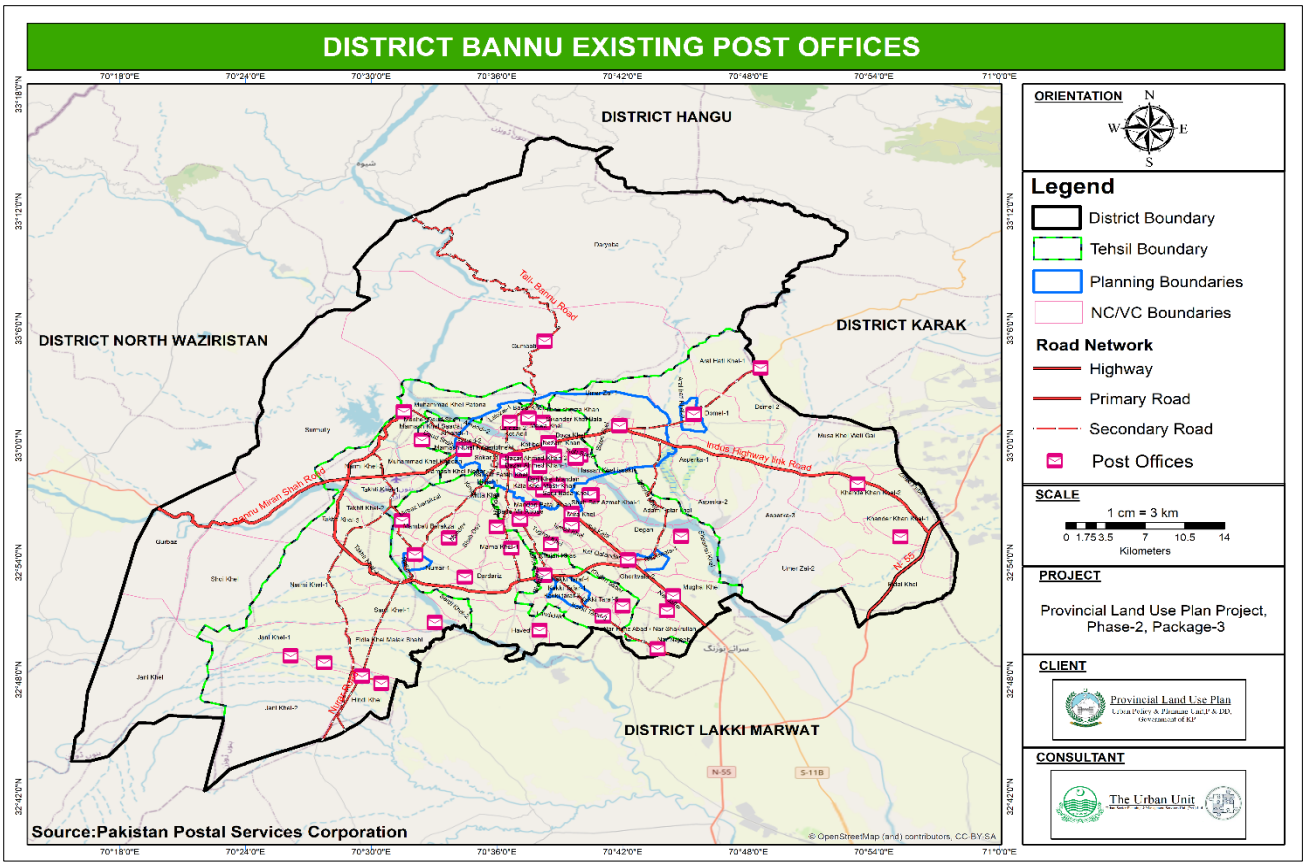
The nearest operational airports to Bannu are the Bacha Khan Airport in Peshawar and the Islamabad International Airport in Fateh Jang.The figure below illustrate the distance and travel time between Bannu and the aforementioned airports.

Figure 3-2: Distance and Travel Time between Bannu and Airports

3.2.2.6 Postal Network Coverage

The existing postal services have been mapped using the Pakistan Postal Code Directory available on the Pakistan Post Website and overlaid on maps of settlements obtained from the Land Use survey.

To understand District Bannu's postal services, all post offices within the district boundary have been marked in GIS format as shown in the **Map** below.

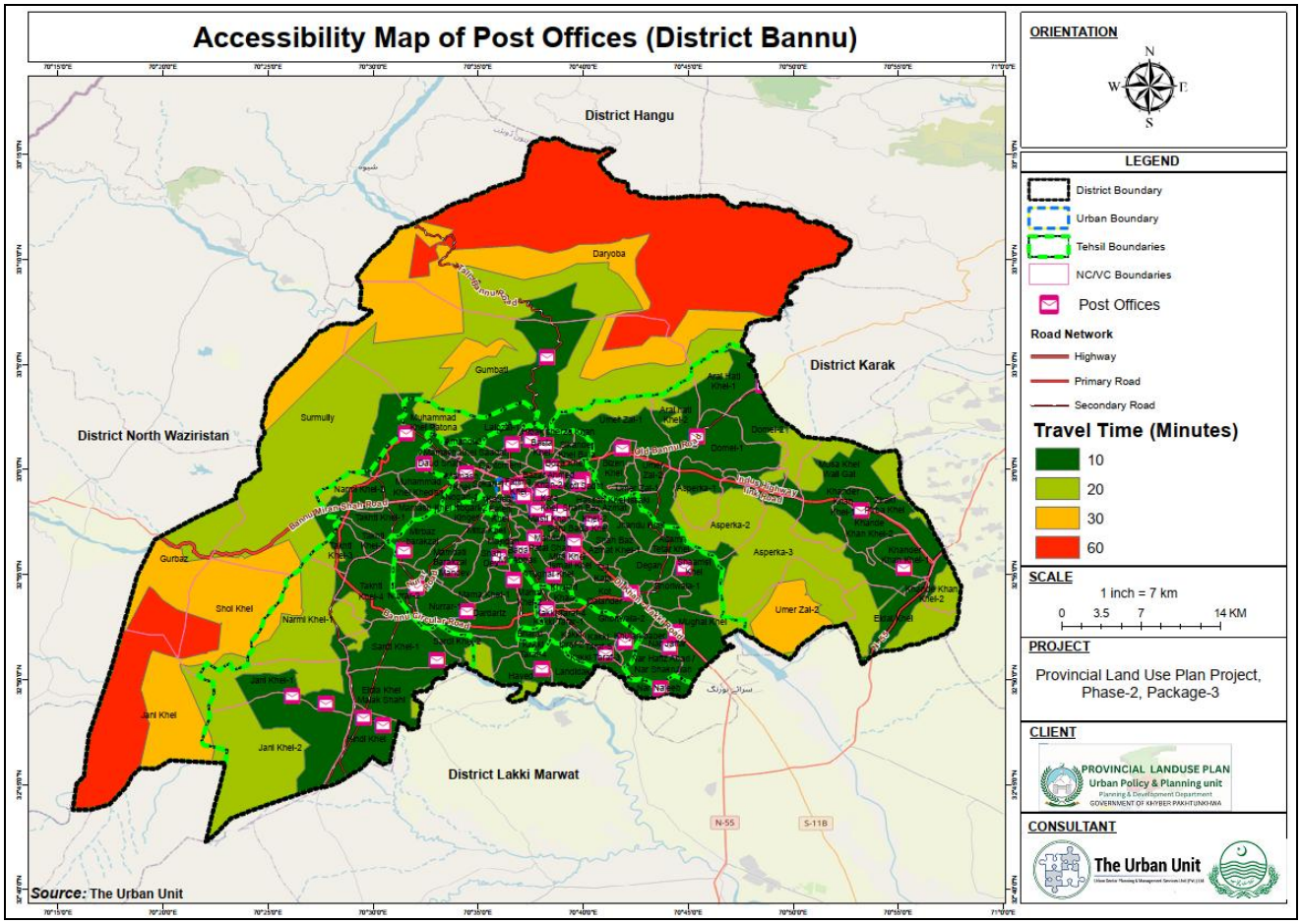


Map 3-10: District Bannu Post Offices

3.2.2.7 Post Office Accessibility

An accessibility analysis to quantify the service coverage of each post office has been conducted in District Bannu to analyze the various areas of Bannu. Given that today's postal services are conducted using motorcycles, drive time has been used as the metric for accessibility.

It should be noted that postmen typically deliver to neighborhoods rather than recipients coming to post offices. This accessibility analysis is therefore from the perspective of the post offices rather than of the neighborhoods. Areas lying beyond a 40-minute drive from the nearest post office shall become candidate localities for a new post office. Candidate localities were also assessed for whether they meet the necessary population thresholds stipulated by Pakistan's National Reference Manual. The post office accessibility analysis is provided in the Map below.



Map 3-11: Bannu Post Office Accessibility Analysis

3.2.2.8 Telecommunication Services

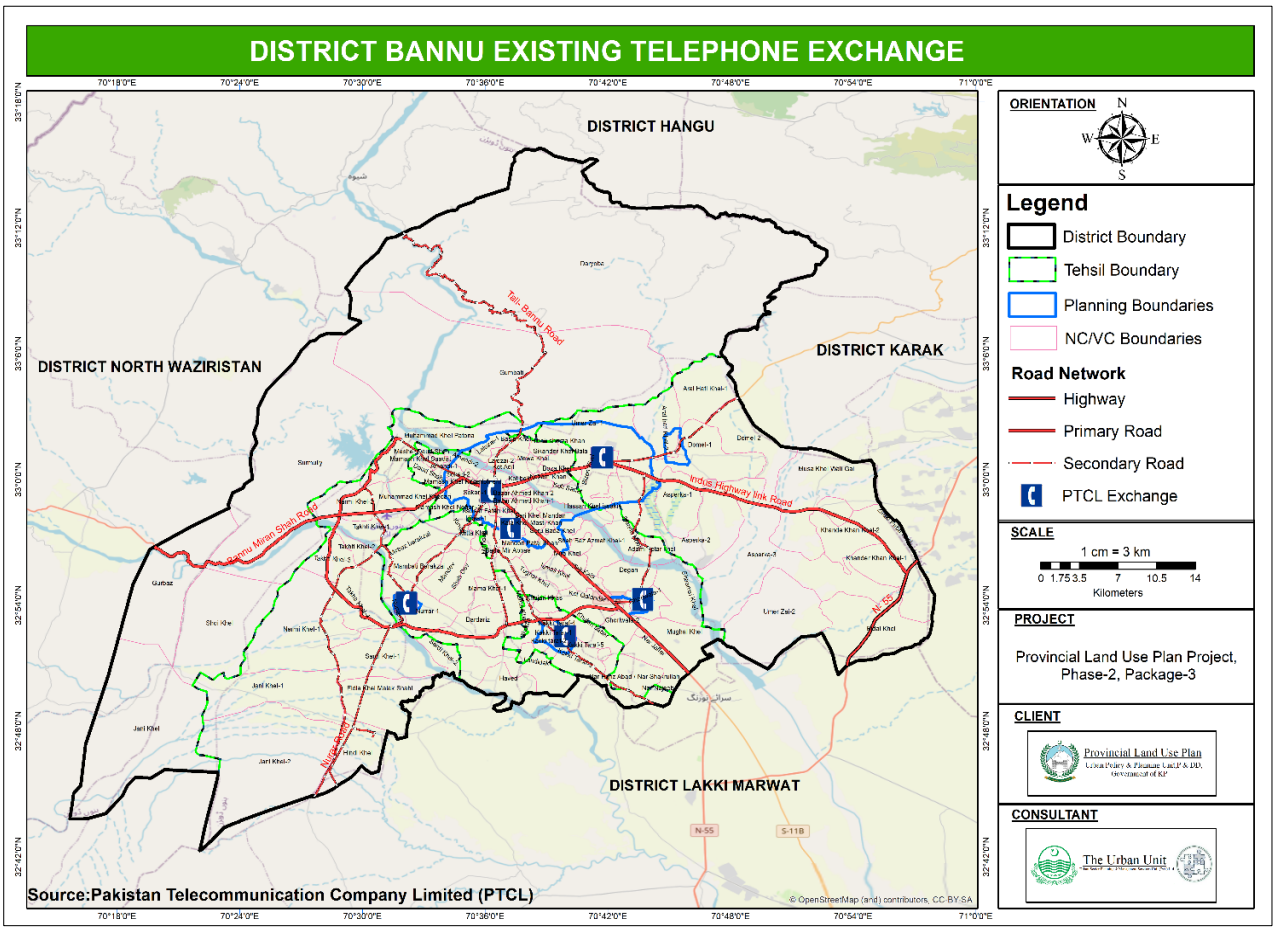
The Telecommunication services data, as obtained from the Pakistan Telecommunication Company Limited (PTCL), includes information on the existing telephone Exchanges for District Bannu.

Table below lists the existing telephone exchanges in District Bannu as provided by PTCL. The same telephone exchanges are mapped as shown in the map below using the Main Feeding Area information for reference.

Table 3-19: List of Telephone Exchanges in District Bannu

Region	Exchange Name	Type (Exchange/MSAG)	Address	Main Feeding Area	PSTN	BB
NTR-II	Bannu	BANNU-II (EWSD 0 LINES)	MSAN	Bannu City	BANNU	Bannu City
NTR-II	Bannu	BANNU-II	MSAN	Bannu City	BANNU	Bannu City
NTR-II	Bannu	BANNU TOWN SHIP	DSLAM	Bannu Town Ship	BANNU TOWN SHIP	Bannu Town Ship
NTR-II	Bannu	BANNU-I	DSLAM	Bannu City	BANNU	Bannu City
NTR-II	Bannu	DOMEL	DSLAM	Domel City	DOMEL	Domel City
NTR-II	Bannu	GHORIWALA	DSLAM	Ghoriwala Wala	ghoriwala	Ghoriwala Wala
NTR-II	Bannu	KAKKI	DSLAM	kakki Village	kakki	kakki Village
NTR-II	Bannu	KOTKA M.KHAN	DSLAM	Kotka M.Khan Village	KOTKA M.KHAN	Kotka M.Khan Village
NTR-II	Bannu	NIZAM BAZAR	DSLAM	Bannu City	NIZAM BAZAR	Bannu City

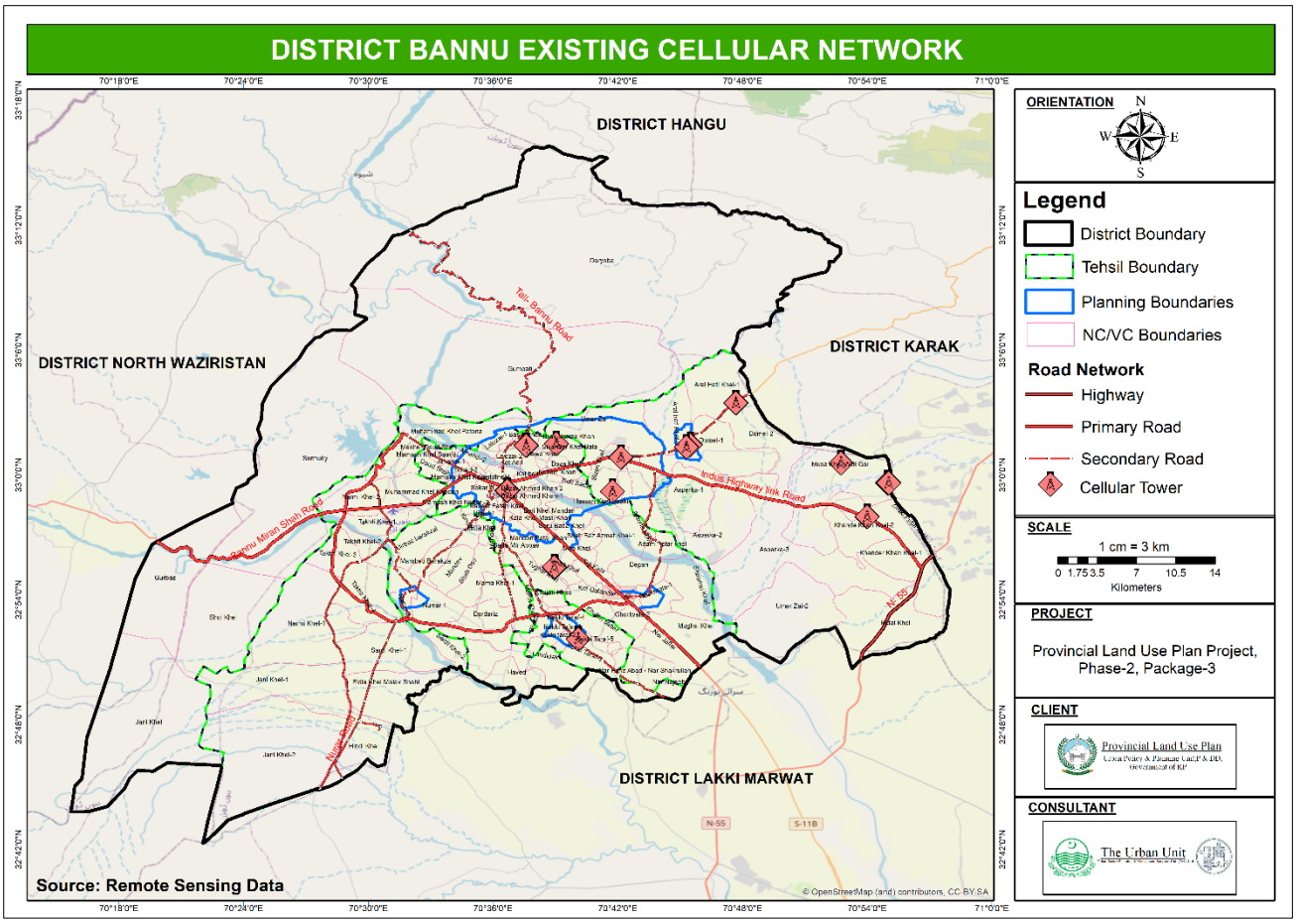
Region	Exchange Name	Type (Exchange/MSAG)	Address	Main Feeding Area	PSTN	BB
NTR-II	Hangu	JEHANGIR LALOZAI	DSLAM	Data Lalozai Village	JAHANGIR LALOZAI	Data Lalozai Village
Region	BM	Exchange Name	Type (Exchange/MSAG)	District	Address	Main Feeding Area



Map 3-12: Telephone Exchanges in District Bannu

3.2.2.9 Cellular Tower

The locations of the existing cellphone towers in District Bannu were obtained during the land use survey. The respective service provider for each tower has not been identified in this study, as the Pakistan Telecommunication Authority and Private Cellular Operators have not furnished any data regarding their assets. However, for land inventory purposes, the obtained locations of existing Cellular Towers have been mapped. The map below illustrates the location of District Bannu's telecommunication infrastructure, including Cellular towers and telephone exchanges.



Map 3-13: District Bannu Existing Cellular Tower

3.2.2.10 Key Findings

- The Karak–Bannu Road currently carries over 10,000 vehicles per day and is dualized only up to Domel. Given the high traffic volume, there is a strong justification for the immediate dualization of the remaining section. Similarly, the Bannu–DI Khan Road, with an estimated daily traffic of around 17,000 vehicles, also requires immediate dualization, particularly the segment from Sarai Naurang to N-55.
- In contrast, the Bannu–N–55 Link Road currently sees a traffic volume of 4,314 vehicles per day, which does not require dualization at present. However, with an assumed annual growth rate of 7%, the traffic is projected to reach 8,826 vehicles per day by the year 2033, indicating that dualization will likely be needed within the next ten years, potentially earlier if road safety becomes a concern.
- The Bannu–Miran Shah Road handles around 3,257 vehicles daily and is expected to reach the dualization threshold of 8,000 vehicles per day by 2037. While current capacity is adequate, safety concerns may necessitate earlier intervention. Lastly, the Bannu–Thal Road, with a daily traffic count of 2,590 vehicles, does not require dualization shortly. Projections show it may reach the threshold by 2040, assuming traffic continues to grow at a steady rate of 7% annually.
- The absence of reliable truck stand data in District Bannu hinders a thorough evaluation of truck stand accessibility. This limitation affects effective infrastructure planning and may result in inadequate resource allocation for freight movement, leading to inefficiencies in transportation logistics.
- The dismantling of the narrow-gauge railway line that once connected Bannu to Mari Indus has restricted direct rail access for residents. The nearest operational station is Mari Indus, linking to Daud Khel and Mianwali in the south and Jand Junction in the north. While Kohat Railway Station offers another connection option, establishing a direct link between Kohat and Bannu is complicated due to the absence of a prior rail connection.

- Bannu's civilian airport, classified as a tertiary airport by the Civil Aviation Authority (CAA), requires airlines to operate at least two flight frequencies on socio-economic or tertiary routes for a Regular Public Transport (RPT) license. Despite the airport's designation for eight socio-economic routes and 19 tertiary routes, CAA data for 2021-2022 showed no flights or passenger movements.
- An analysis of postal services in District Bannu reveals that while most areas are accessible within a 30-minute drive from a post office, several neighborhoods—including Domel, Kakki, Baka Khel, Miryan, and Wazir—are located beyond this range.

3.2.2.11 Ongoing Projects

The ongoing road network and transportation-related initiatives in the study area have been extracted from the Khyber Pakhtunkhwa Annual Development Program for the years 2022-2023.

The table below summarizes the development schemes in District Bannu.

Table 3.14: Ongoing Transportation Schemes

Sr.	Scheme Name	Approval Date
	Khyber Pakhtunkhwa Annual Development Program Schemes	
1	Reconstruction / Rehabilitation of Road from Narmi Khel to Miryan, District Bannu.	16-02-22
2	Design & Construction of 05 km road from Bannu City to Kakki via Mundan, Bannu.	15-09-2017
3	Rehabilitation/ BTR road from Baran Dam to Jani Khel and Police Station Miryan to Hawaid road, District Bannu.	31-01-2018
4	Construction/ Reconstruction/Rehabilitation of road, UC Nar Jaffar, UC Kakki-I, UC Baharat, UC Kosar Fateh Khel, UC Mandan, UC Shamshi Khel & UC Mira Khel, District Bannu.	02-06-2020
5	Construction/ Rehabilitation of road, UC Mira Khel, UC Kakki-II, UC Ismail Khel, UC Qalander, UC Khujare, UC Khujamad Mandan, UC Kala Khel and UC Shamsi Khel, and Street Pavements along with Drain in UCs of PK-89, District Bannu.	23-07-2020
6	Construction of Hindi Khel Haved Road and Construction of roads at UC Momand Khel, UC Mitha Khel, District Bannu.	10-08-2019
7	Construction / BT and Reconstruction of Road at Kalan Mera Khel via Barara Mera Khel to Hamedi road Hassan Khel via Khujari to Barat Ada Kakki Road, District Bannu (8.50 Km)	21-04-2022
8	Construction/Rehabilitation/Widening/BT to Chakar Mandan road from DI.Khan road to Kakki Road, including Narjaffar Nar Shukrullah road Bannu.	21-04-2022
9	Construction of Shaktoo bridge on Janikhel road and Construction/Rehabilitation of roads in Tehsil Bakha Khel and adjoining areas District Bannu.	21-08-2019
10	Construction/Rehabilitation of road from Kacha Bachak Meerakhel to Shegi Machankhel (10 Km) District Bannu	
11	F/S & Construction of Circular Bypass Road, Bannu (64.90 Km)	25-03-2022
12	Feasibility Study, Detailed Engineering Design and construction of Dualization of road from Indus Highway to Bannu City (26-KM)	
13	Feasibility Study, Detailed Engineering Design and construction of Road connecting Indus Highway (N-55) at Take Off Bannu Link Road with Hakla - Yarak - D.I.Khan Motorway (M-14)	
14	CoTechnically Economically Feasible 35km Roads in Bannu Division	30-05-2022

Sr.	Scheme Name	Approval Date
15	Constn: of Black Topped Road from Telephone Exchange to SM Rocha, FR Bannu. (10 Kms) (Revised) [MA]	09-06-2017
16	Construction and Rehabilitation of Road from Tanga Bridge to Rocha Phase-II (10 km) TSD Bannu	01-11-2021
17	Construction of Road from Malik Khidmat Khan Chappari up to Dargah Shahidan TSD Bannu (10-KMs)	01-11-2021
18	Improvement and widening of black topped road from Ali Khel to Nokori up to NWA Border Sub Division Wazir Bannu (5km)	08-10-2019
19	Construction of Road connecting Subdivision Wazir to Bannu circular Road (AIP)	25-03-2022

3.2.2.12 Proposals

3.2.2.12.1 Road Proposals

To address growing transportation demands and improve infrastructure efficiency, a series of proposals have been developed for road networks, bus terminals, truck terminals, railways, and air transportation in District Bannu. These proposals focus on dualization, upgradation, and the establishment of new facilities to enhance regional connectivity and economic growth.

a). Dualization of Roads for Regional Connectivity

To enhance regional connectivity and support Bannu District's integration with neighboring areas, a series of major road dualization projects have been proposed.

Dualization of Bannu Road from Sordag Petrol Pump to Karak: This road connection between Bannu and Karak, serving as a major regional artery. The dualization aims to accommodate increasing traffic volumes resulting from urban growth and economic activity. Dualization of this road will reduce travel times, and support the movement of goods and people between Bannu and Karak, and will provide mobility and easy access to the Peshawar–D.I. Khan Motorway (M-16)

Dualization of Bannu DI Khan Road up to Gaandi Chowk: This road links Bannu with DI Khan and passes through Gaandi Chowk. The dualization is necessary due to the high volume of passenger and freight traffic, which currently leads to congestion and safety issues. Upgrading this section will provide a smoother, safer, and more efficient route for inter-district travel, facilitate trade, and support the anticipated rise in traffic from new development projects of the proposed zones.

Dualization of Bannu–Indus Highway Link Road: This link road connects Bannu directly to the Indus Highway (N-55). The current single carriageway is insufficient for the increasing number of heavy vehicles, leading to frequent bottlenecks and safety hazards. Dualization will enhance the capacity and efficiency of this strategic link, supporting the movement of goods to and from national highways, and providing an essential alternate route for heavy traffic, thereby reducing pressure on the Indus Highway

Dualization of Bannu Miran Shah Road from University Plaza to Miran Shah: This road is an important link connecting Bannu to Miran Shah and the broader North Waziristan region. The dualization will improve accessibility to remote areas and facilitate the movement of people and goods. Given the strategic importance of this route for both people and freight logistics, upgrading it will promote socio-economic development and enable better service by integrating marginalized areas with urban centers.

Dualization of Thall Bannu Road Near Nizam Bazar (Bannu) to Shawa Khonzodgon: This route serves as a key connector between Bannu and Thall, passing through important localities and linking with regional growth zones. The dualization is intended to handle the expected increase in traffic due to new land uses and urban sprawl. It will enhance mobility, reduce travel times, and improve road safety for both passenger and commercial vehicles. This project is also expected to stimulate local economies by improving access to markets and services, and by supporting the overall development vision for Bannu District landuse plan.

b). Upgradation of Roads for Intra-Zonal Connectivity

To strengthen intra-regional mobility and facilitate efficient access to major links, roads upgradation/Improvement projects have been proposed.

Upgradation/Improvement of Kakki Road from Kakki to Peshawar–D.I. Khan: This link between Kakki and Motorway (M-16) corridor will be connectivity to southern regions to key economic hubs like Peshawar and D.I. Khan. Its upgradation will facilitate smoother inter-district movement, reduce travel time, and support logistic flows on the national highway network.

Upgradation/Improvement of Domail–Patolkhel Road: This road segment provides local access between Domail, Patolkhel, and the Indus Highway. Its improvement will be provided last-mile connectivity, rural access, and integration of remote areas into the regional transportation network.

Upgradation/Improvement of Nurar Bannu Road: A key intra-urban route strengthens interzonal connectivity by linking the Narur with central Bannu via the Bannu. The improvement aims to alleviate inner-city congestion, streamline traffic flow, and densely populated urban zones and better mobility and improve overall accessibility across rural areas.

Upgradation/Improvement of Bannu–Ghoriwala–Shamshi khel Road: This road serves as an important rural route connecting Bannu city to peripheral settlements including Ghoriwala and Shamshikhel. The upgradation will enhance rural-urban linkage, boost agricultural transportation, and support equitable regional development.

Right-of-way reservations for these upgradation projects will vary based on road classification and ownership.

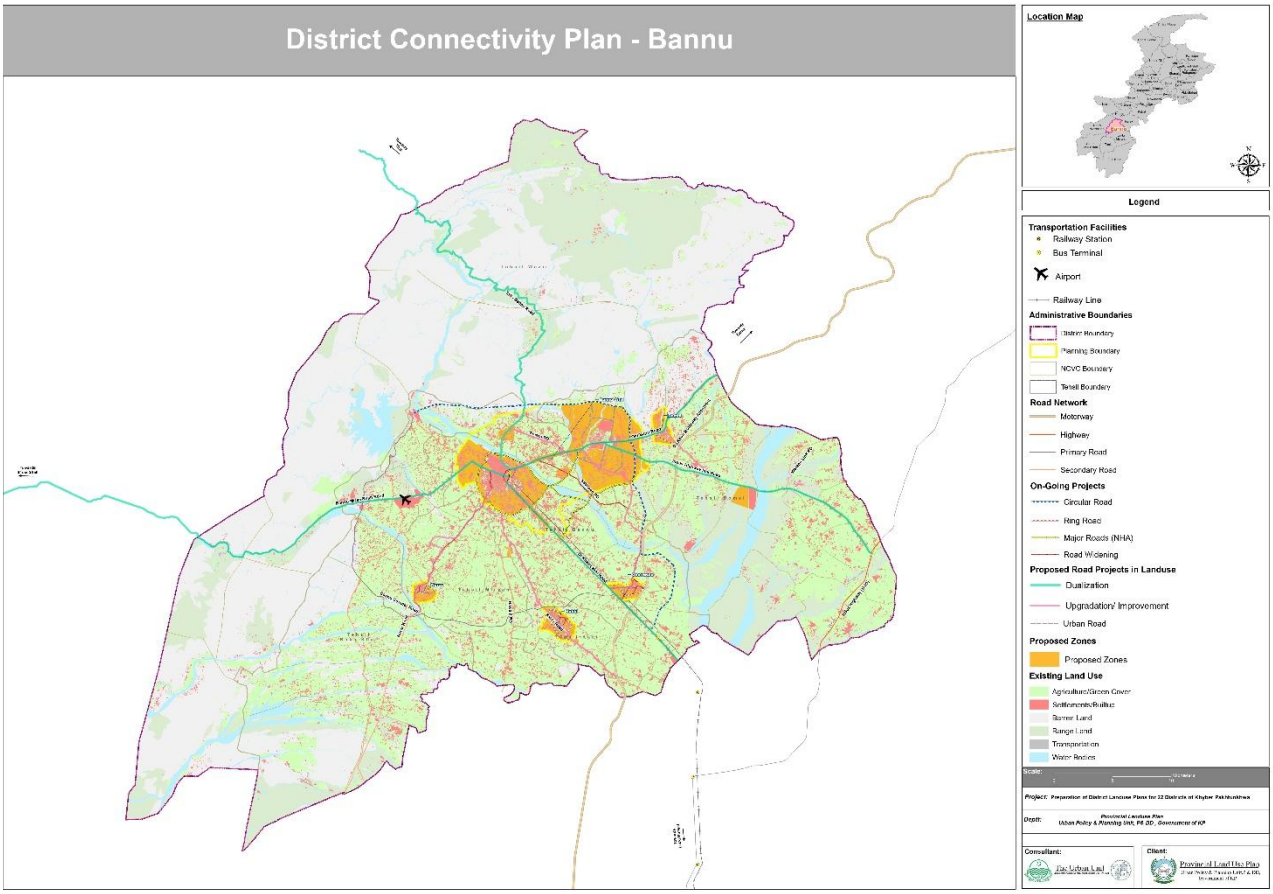
c). Urban Roads Connectivity

Urban road projects have been proposed to improve local circulation and strengthen internal connectivity, considering the future development needs of Bannu City, Kakki, Ghoriwala, and Nurar. These proposed roads will connect urban zones with regional, provincial, and national transport networks. The road segments are scheduled for phased development between 2025 and 2042. The proposed Right-of-Way (R.O.W) for all roads is up to 60 feet, with flexibility to adapt to varying spatial and land ownership conditions.

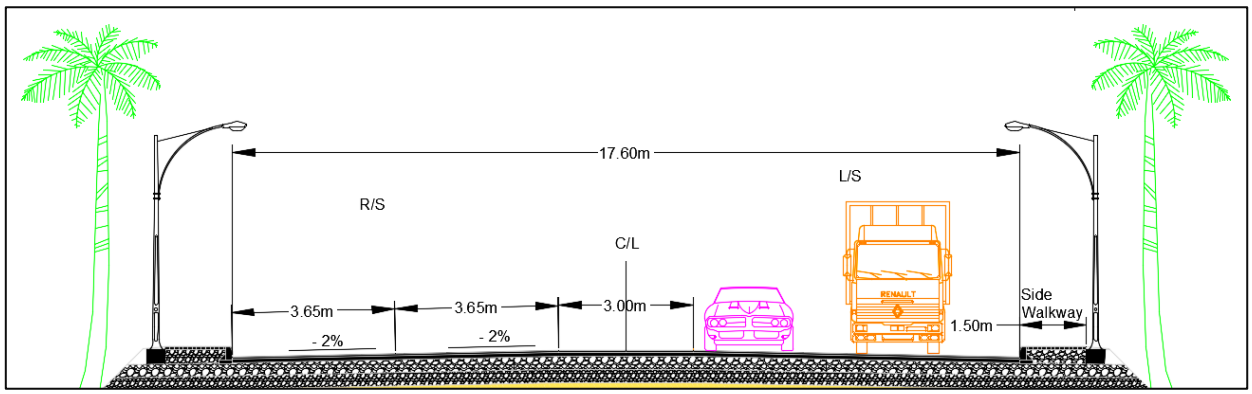
Table 3-20: Proposed Road Projects of District Bannu

Road Projects				
Sr. No	**Project**	**Length (Km)**	**Year**	**Right of Way to be Reserved**
1	Dualization of Bannu Road from Sor dag Petrol Pump to Karak (Near Daffodils Model School).	17	2025	60-90 ft and it may vary in urban areas
2	Dualization of Bannu DI Khan Road up to Gaandi Chowk	8.6	2025	60-90 ft and it may vary in urban areas
3	Dualization of the Bannu-Indus Highway Link Road	26	2033	60-90 ft and it may vary in urban areas
4	Dualization of Bannu Miran Shah Road from University Plaza to Miran Shah	60	2037	60-90 ft and it may vary in urban areas
5	Dualization of Thall Bannu Road Near Nizam Bazar (Bannu) to Shawa Khonzodgon	48.3	2040	60-90 ft and it may vary in urban areas
Road Upgradation				
Sr. No	**Project**	**Km**	**Year**	**Right of Way to be Reserved**
6	Upgradation of Kakki Road from Kakki to Peshawar-D.I. Khan (M-16)	18	2025-40	Up to 60 ft (Variable)

Road Projects				
7	Upgradation/ Improvement of Domail Patolkhel road from Patokhel adda bus stop to Indus highway Bannu link road	6	2025-40	Up to 60 ft (Variable)
8	Upgradation/ Improvement of Nurar Bannu road near Govt. Postgraduate College Bannu to Bannu Circular Road	17	2025-40	Up to 60 ft (Variable)
9	Upgradation/ Improvement of Bannu-Choriwala Shamshikhel road	24	2025-40	Up to 60 ft (Variable)
Urban Roads				
Sr. No	**Project**	**Km**	**Year**	**Right of Way to be Reserved**
10	Proposed Urban Road1 (Banu City)	0.6	2025 - 42	Up to 60 ft (Variable)
11	Proposed Urban Road2 (Banu City)	0.6	2025 - 42	Up to 60 ft (Variable)
12	Proposed Urban Road3 (Banu City)	2.0	2025 - 42	Up to 60 ft (Variable)
13	Proposed Urban Road4 (Banu City)	2.1	2025 - 42	Up to 60 ft (Variable)
14	Proposed Urban Road5 (Banu City)	2.2	2025 - 42	Up to 60 ft (Variable)
15	Proposed Urban Road6 (Banu City)	2.3	2025 - 42	Up to 60 ft (Variable)
16	Proposed Urban Road7 (Banu City)	3.1	2025 - 42	Up to 60 ft (Variable)
16	Proposed Urban Road8 (Banu City)	3.7	2025 - 42	Up to 60 ft (Variable)
18	Proposed Urban Road1 (Ghoriwala)	0.5	2025 - 42	Up to 60 ft (Variable)
19	Proposed Urban Road1 (Kakki)	0.3	2025 - 42	Up to 60 ft (Variable)
20	Proposed Urban Road2 (Kakki)	0.4	2025 - 42	Up to 60 ft (Variable)
21	Proposed Urban Road3 (Kakki)	0.5	2025 - 42	Up to 60 ft (Variable)
22	Proposed Urban Road4 (Kakki)	0.6	2025 - 42	Up to 60 ft (Variable)
23	Proposed Urban Road5 (Kakki)	0.6	2025 - 42	Up to 60 ft (Variable)
24	Proposed Urban Road1 (Nurar)	0.7	2025 - 42	Up to 60 ft (Variable)
25	Proposed Urban Road2 (Nurar)	1.0	2025 - 42	Up to 60 ft (Variable)



Map 3-14: District Bannu Connectivity Plan



Depending on the road classification and ownership, the following rights-of-way (Table below) shall be reserved for each type of cross section.

Table 3-21: Right-of-Way for Road Classes

Owner Class	Cross-section Type	Right-of-Way
Provincial Roads	Single Carriageway (24 ft.)	Variable
	Dual Carriageway (60 ft.)	110 ft. or 55 ft. from Centerline
National Highway	Single Carriageway	Variable
	Dual Carriageway (60 ft.)	220 ft ft. from Centerline

3.2.2.12.2 Bus Terminal Future Proposals

The analysis highlights significant gaps in bus terminal coverage, particularly in areas requiring long travel times to access existing facilities. To address these issues, new bus terminals are proposed in underserved regions such as Tehsil Domel, Baka Khel, Meryan, Kaki, and Wazir. These terminals will be constructed in

phases from 2025 to 2040, improving accessibility and service efficiency for passengers. The proposed bus terminals will adhere to the relevant transportation regulations and will be developed in coordination with the concerned transport authorities. The details of the proposed new bus stand projects are summarized in Table below.

Table 3-22: Proposed Bus Stand in District Bannu

Bus Terminal				
Sr.	**Project**	**Year**	**Land Required**	**Concerned Departments**
1	Construction of Class-C Bus Terminal in Tehsil Domel (Urban Area)	2025-30	As Per Motor Vehicles Ordnance 1965 and Motor Vehicles Rules 1969	Transport Department / Provincial/ District Regional Transportation Authority
2	Construction of Class-C Bus Terminal in Tehsil Baka Khel (Urban Area)	2025-30		
3	Construction of Class-C Bus Terminal in Tehsil Meryan (Urban Area)	2030-35		
4	Construction of Class-C Bus Terminal in Tehsil Kaki (Urban Area)	2030-35		
5	Construction of Class-C Bus Terminal in Tehsil Wazir (Urban Area)	2035-40		

3.2.2.12.3 Truck Terminal Proposal

A dedicated truck terminal and logistics facility is proposed as part of the land use plan for District Bannu. The facility will support efficient freight movement, reduce congestion in urban areas, and improve overall logistics management. The truck terminal is planned for implementation between 2025 and 2030, with land acquisition and development being carried out in accordance with the Motor Vehicles Ordinance and related regulations. The Transport Department and regional transportation authorities will oversee the execution of this project. The implementation timeline, land requirements, and concerned departments are detailed in Table below.

Table 3-23: Proposed Truck Terminal and Logistics Facility

Truck Terminal			
Project	**Year**	**Land Required**	**Concerned Departments**
Construction of a Truck Terminal/Logistics Facility in Bannu City	2025-30	As Per Motor Vehicles Ordnance 1965 and Motor Vehicles Rules 1969	Transport Department / Provincial/ District Regional Transportation Authority

3.2.2.12.4 Air Transportation Proposals

To improve air accessibility, the non-operational Bannu Airport is proposed to be made operational between 2025 and 2030. Enhancing the airport's functionality will help meet regional air travel demands and promote economic development. Efforts will be made to engage airlines and improve airport facilities to attract air traffic. The operationalization of the airport will be carried out under the guidelines of the National Aviation Policy 2019 and International Civil Aviation Organization (ICAO) regulations, with oversight from the Civil Aviation Authority (CAA) and other relevant stakeholders.

Table 3-24: Operationalization of Bannu Airport, Land Acquisition Rules, and Stakeholders Involved

Air Transportation			
Project	**Year**	**Land Required**	**Concerned Departments**

Revitalizing/Revamping of Operations at Bannu Airport	2025-30	As per National Aviation Policy 2019 & International Civil Aviation Organization (ICAO) Rules and Guidelines	Civil Aviation Authority (CAA) in Pakistan, Airlines, Local Government

3.2.2.12.5 Postal Network Proposal

The establishment and upgrading of Sub Post Offices are proposed at Tehsil Headquarters, smaller towns, and time-scale post offices in neighborhoods that currently fall outside the service range and may experience postal delays. These initiatives, planned from 2025 to 2045, aim to bridge service gaps in underserved areas and improve accessibility by introducing new post offices. These locations will be selected based on population requirements, land required for each new post office, and the concerned department is mentioned Table below as per the national reference manual.

Table 3-25: Summary provision Sub Post Offices, Land required and Stakeholder

Provision of Sub Post Offices as Per National Reference Manual				
Sr.	**Project**	**Year**	**Land Required**	**Concerned Departments**
1	Sub Post Offices, Tehsils HQ (Higher Selection Grade)	2025-30	As per the National Reference Manual	Pakistan Post
2	Sub Post Offices, Smaller Towns of Tehsils HQ (Lower Selection Grade)	2025-30		
3	Provision of Time-scale-Post offices in Smaller Towns /Large Villages /Neighborhoods (Having a Population around 50,000)	2030-40		

3.3 Social Infrastructure

3.3.1 Education

Education is vital to human development. It reduces poverty and inequality, promotes employment, and improves health, economic stability, and living standards. Thus, prioritizing education is essential for any development plan.

According to the Annual Statistical Report of Government Schools 2021-2022, Khyber Pakhtunkhwa (KP) has 34,183 government schools, with 33,405 functional and 778 non-functional. Additionally, there are 9,021 private schools, including 600 boys' schools, 173 girls' schools, and 8,248 co-education schools. These schools include 1,848 primary, 3,144 middle, 2,803 high, and 1,226 higher secondary institutions.

Government school enrolment in KP totals 5.974 million, with 67.22% in primary and 32.77% in secondary schools. The province has 174,278 government teachers (111,260 male and 63,018 female) distributed across boys' and girls' schools. In private schools, 126,475 teachers work at various levels, including 12,965 in primary, 32,522 in middle, 51,637 in high, and 29,351 in higher secondary schools[32].

3.3.1.1 Existing educational Institutes

The existing educational institutions in District Bannu are divided into urban and rural areas and are discussed below in detail.

3.3.1.1.1 Government Education Institutes

Government education institutes in District Bannu are divided into primary, middle, high, and higher secondary schools, degree colleges, universities, special education institutes, and technical colleges.

[32] *Khyber Pakhtunkhwa Education Monitoring Authority (KPEMA). (2023). Annual Statistical Report of Government Schools 2021-2022. Executive Summary*

The district has 1542 primary schools, 185 middle schools, 132 high schools, 36 higher secondary schools, 19 degree colleges, **2** universities, **3** special education institutes, and 4 technical colleges. These institutes are divided between urban and rural areas, with a significantly higher concentration in rural regions.

Urban Areas

In urban areas, there are 358 primary schools, 65 middle schools, 46 high schools, 14 higher secondary schools, 14 degree colleges, and 2 universities. Additionally, the area includes 1 special education institute and 4 technical colleges.

Rural Areas

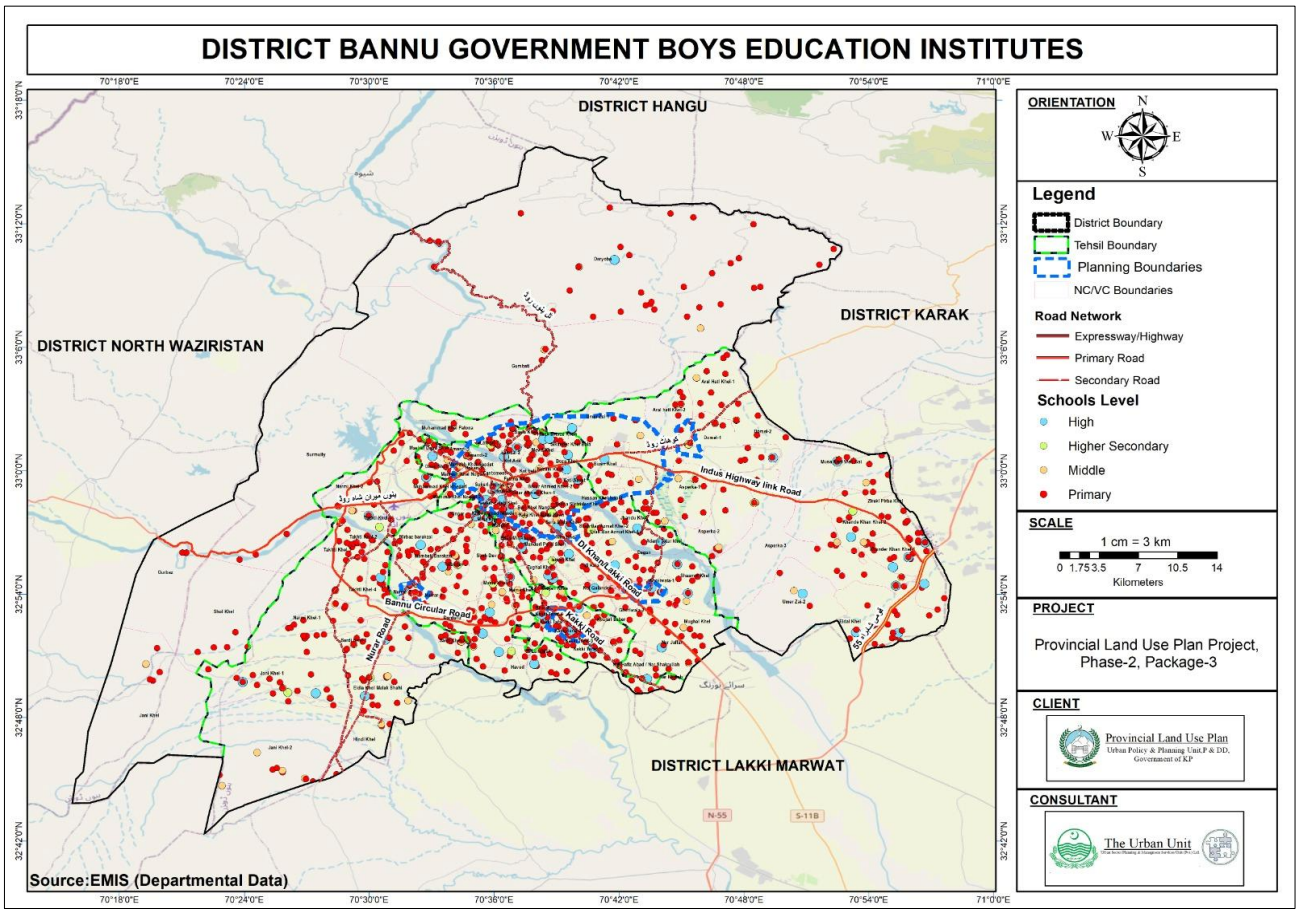
Rural areas have a much larger number of educational institutes, with 1184 primary schools, 120 middle schools, 86 high schools, 22 higher secondary schools, **5**-degree colleges, and **2** special education institutes. The rural region shows a greater provision for boys in all categories except universities and technical institutes. The details are shown in the table below.

Table 3-26: Government Educational Institutes in District Bannu[33]

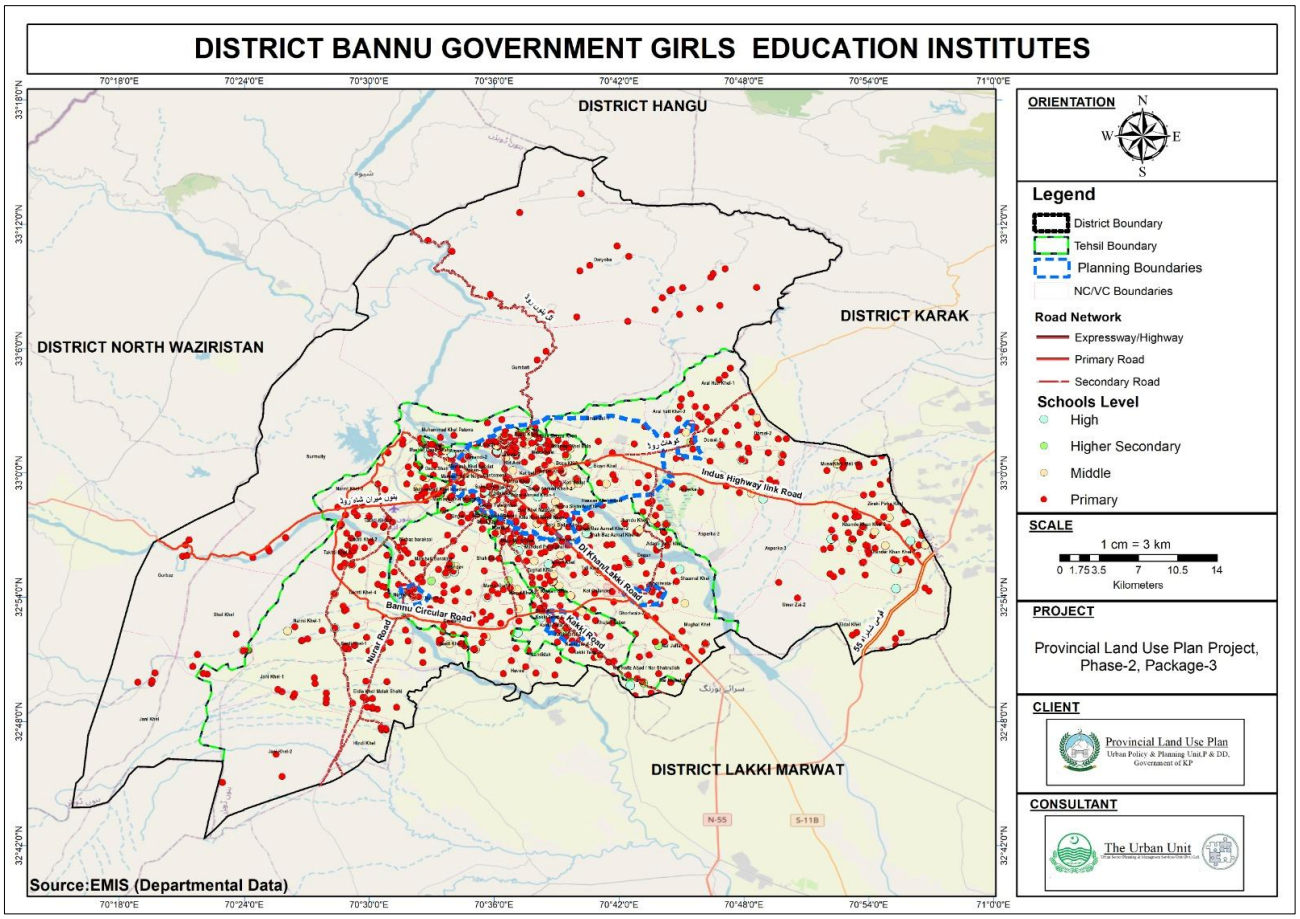
Administrative Area		Primary Schools	Middle Schools	High Schools	Higher Secondary Schools	Degree Colleges	Universities	Special Education Institutes	Technical Colleges
District Urban	Boys	174	26	25	7	8	2	1	3
	Girls	184	39	21	7	6			1
	Total	358	65	46	14	14	2	1	4
District Rural	Boys	625	68	58	13	5	-	2	-
	Girls	559	52	28	9	-			-
	Total	1184	120	86	22	5	-	2	-
District Overall	Boys	799	94	83	20	13	2	3	3
	Girls	743	91	49	16	6			1
	Total	1542	185	132	36	19			4
Urban Areas									
Bannu Urban	Boys	136	24	21	5	5	2	1	3
	Girls	150	35	18	4	5			1
Ghoriwala Urban	Boys	8	-	2	-	1	-	-	-
	Girls	8	-	1	1	-	-	-	-
Domel Urban	Boys	3	-	-	1	-	-	-	-
	Girls	5	1	-	1	-	-	-	-
Kakki Urban	Boys	20	1	1	-	1	-	-	-
	Girls	12	-	-	1	1	-	-	-
Nurar Urban	Boys	7	1	1	1	1	-	-	-
	Girls	9	3	2	-	-	-	-	-
Rural Areas									
Tehsil Bannu	Boys	137	13	17	3	1	-	-	-
	Girls	133	18	10	3	-	-	-	-
Tehsil Domel	Boys	129	19	20	3	3	-	2	-
	Girls	131	15	9	2	-	-		-
Tehsil Kakki	Boys	49	5	4	1	-	-	-	-
	Girls	31	3	3	1	-	-	-	-
Tehsil Miryan	Boys	121	10	9	3	1	-	-	-

[33] *Secondary data were collected from the Khyber Pakhtunkhwa Education Monitoring Authority (KPEMA); Directorate of Higher Education; Directorate of Social Welfare, Special Education, and Women Empowerment; and Khyber Pakhtunkhwa Technical Education and Vocational Training Authority in January 2023.*

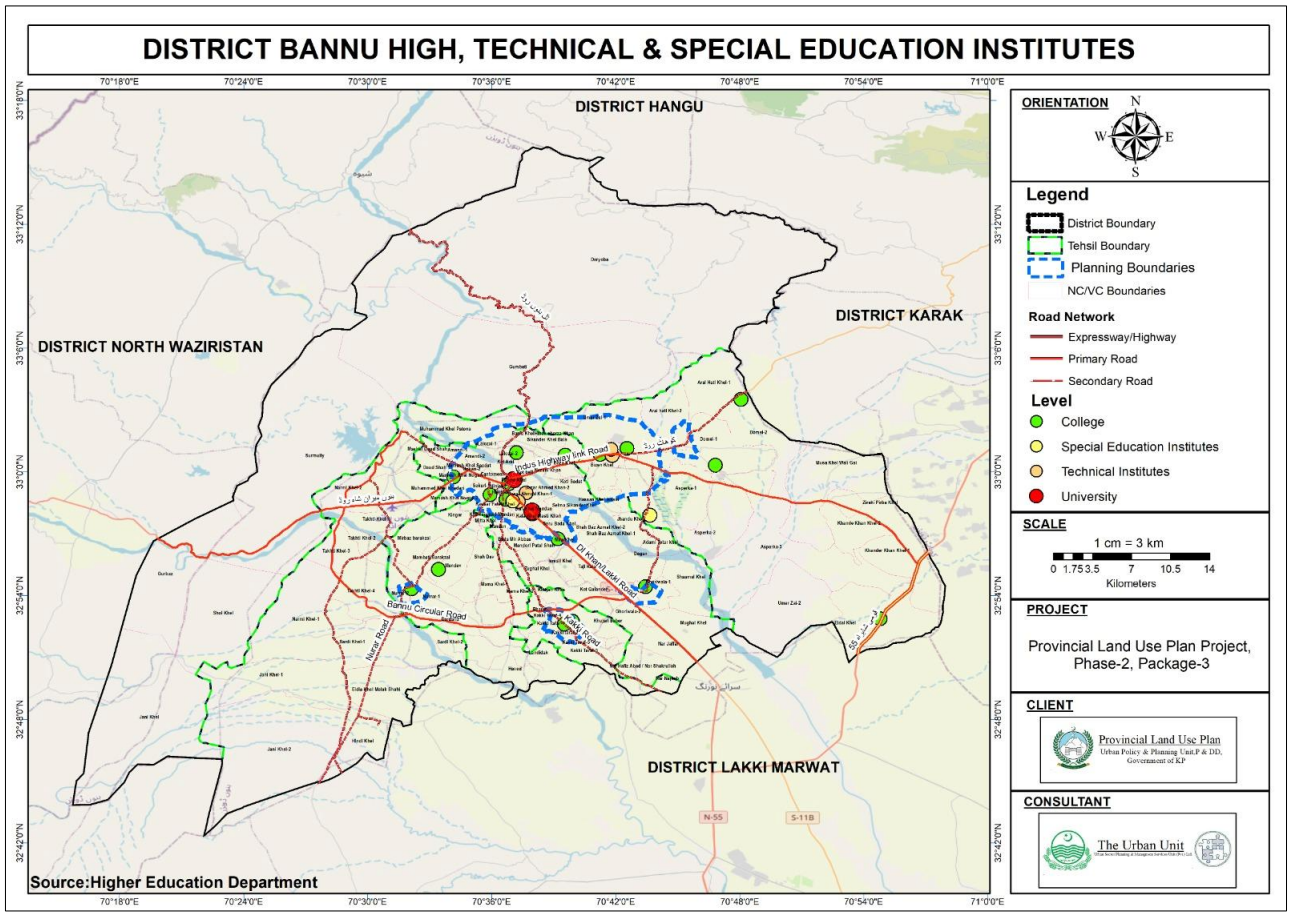
Administrative Area		Primary Schools	Middle Schools	High Schools	Higher Secondary Schools	Degree Colleges	Universities	Special Education Institutes	Technical Colleges
	Girls	80	7	3	3	-	-	-	-
Tehsil Bakakhel	Boys	138	17	7	3	-	-	-	-
	Girls	139	8	3	-	-	-	-	-
Tehsil Wazir	Boys	51	4	1	-	-	-	-	-
	Girls	45	1	-	-	-	-	-	-



Map 3-15: District Bannu Government Boys Institutes



Map 3-16: District Bannu Government Girls' Institutes



Map 3-17: District Bannu Higher Education Institutes

3.3.1.2 Teacher-Student Ratio

The teacher-student ratio is one of the important variables for analyzing the educational infrastructure of any settlement. It reflects the workload of the teacher and how many students are enrolled against one teacher.

In primary schools, Bannu (1:29) has a huge difference compared to the provincial ratio (1:39). At the middle (1:8 vs. 1:13) and high school (1:13 vs. 1:21), Bannu performs better than the provincial average. However, at the higher secondary level, Bannu (1:14) has a better ratio compared to KPK (1:23), suggesting better teacher availability. In universities (1:33) and technical institutes (1:14), Bannu aligns with provincial trends, while degree colleges in Bannu (1:22) show better student-teacher interaction than the provincial average. The table below shows the total enrollment, working teachers, and the teacher-student ratio of government institutes in District Bannu.

Table 3-27: District Bannu Teacher-Student Ratio of Government Education Institutes[34]

Type of Institute		Primary Schools	Middle Schools	High Schools	Higher Secondary Schools	Degree Colleges	Universities	Technical Institutes
Enrolled Students	Boys Institutes	78257	6183	19242	7868	10,784	4769	660
	Girls Institutes	50354	3966	7035	4935	4,059		0
Working Teachers	Boys Institutes	2678	680	1342	600	474	144	45
	Girls Institutes	1693	521	623	313	172		0
Teacher-Student Ratio	Boys Institutes	1:29	1:9	1:14	1:13	1:22	1:33	1:14
	Girls Institutes	1:29	1:7	1:11	1:15	1:23		nil
	Overall	1:29	1:8	1:13	1:14	1:22	1:33	1:14

3.3.1.3 Need for New Education Institutes (Current backlog and future projection)

3.3.1.3.1 Primary Schools (Current Backlog and Future Projection)

The need for new primary schools was determined using NRM standards: one boys' school per 7,500 population and one girls' school per 8,200. The backlog was calculated by dividing each settlement's population by these thresholds and then subtracting existing schools to find the shortfall.

The detailed analysis has been conducted at the NC/VC (Neighborhood Council/Village Council) level. When the population of a specific NC/VC is divided by the NRM standards for the required and backlog columns, the resulting values often include decimals. For planning purposes, these decimal values are not rounded up; instead, they are taken as the lower whole number. For example, values like 0.5 or 0.9 are considered as 0, while values such as 2.5 or 2.9 are treated as 2. This approach is applied to the education sector, including primary, high, and higher secondary schools.

In District Bannu, the number of existing primary schools in urban areas exceeds current needs. For boys, there are 174 schools compared to a required 74, and for girls, 184 schools exist while 67 are required, with no backlog, indicating no immediate need for additional schools. In rural areas, the total number of existing schools for both boys and girls is 1,184, again exceeding the requirement and showing no backlog. Overall, the district has a total of 1,540 primary schools, far surpassing the required 313, reflecting a well-established educational infrastructure. In District Bannu, the projected population for education at the NC/VC level showed minimal requirements. Therefore, the consultant merged multiple VCs to meet the necessary criteria. Further details on the existing and future projections are presented in the table below.

[34] *Khyber Pakhtunkhwa Education Monitoring Authority (KPEMA). (2023).* Annual Statistical Report of Government Schools 2021-2022. *Enrollment in Government Schools and Teaching Staff in Government Schools.*

Bureau of Statistics, Planning & Development Department, Government of Khyber Pakhtunkhwa. Development Statistics of Khyber Pakhtunkhwa 2023. *Table No. 79, 80, 81, 83, 84, 85, and 86*

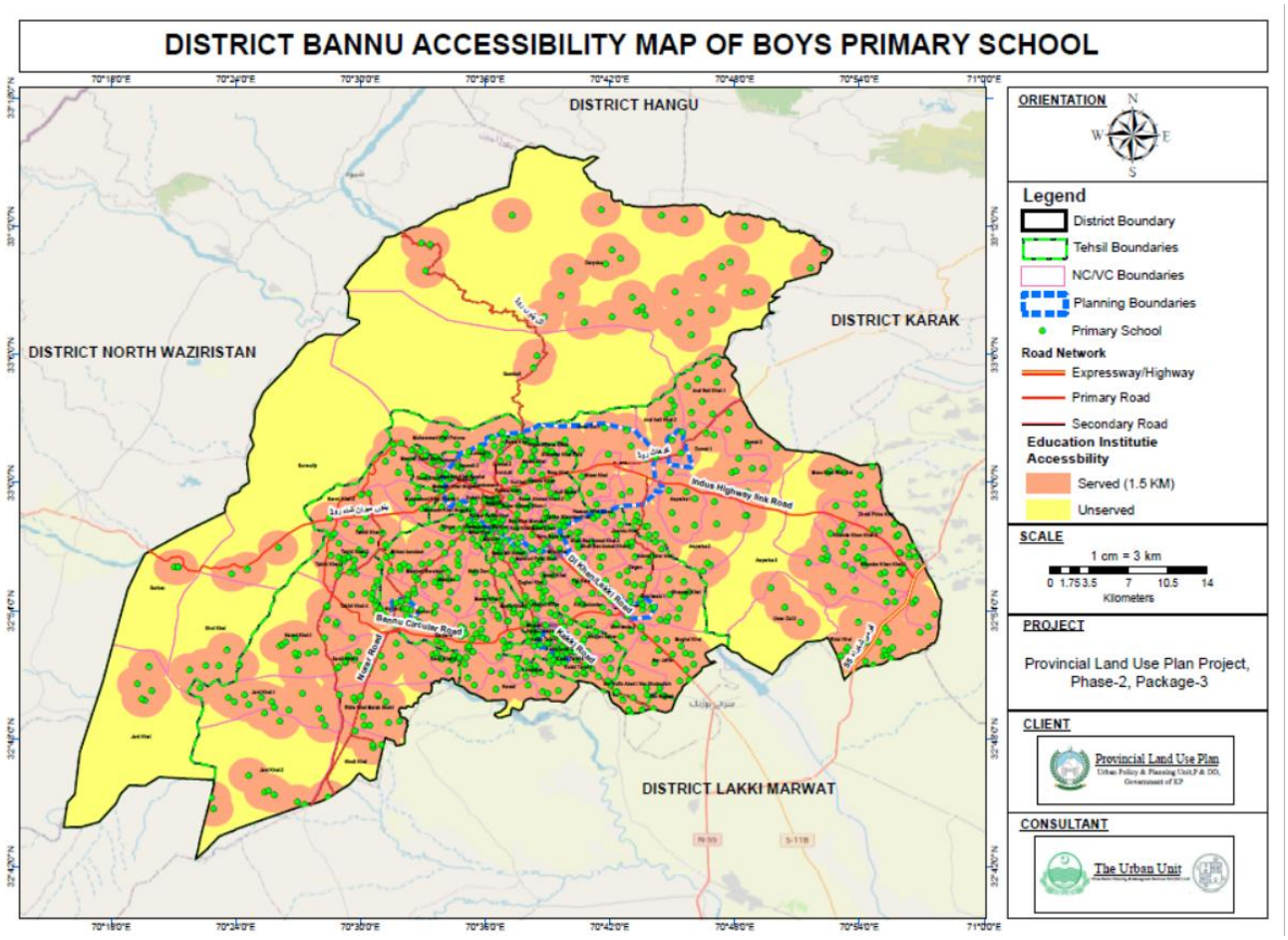
Table 3-28: Need for New Primary Schools

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing Primary Schools		Required Primary Schools 2025		Backlog Primary Schools 2025		NC/VC	Population 2045	Required Primary Schools 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
Urban	Bannu	Bannu Urban	490132	136	150	65	59	0	0	Bannu Urban	864863	115	105
	Bannu	Ghoriwala Urban	21079	8	8	2	2	0	0	Ghoriwala Urban	37484	5	4
	Domel	Domel Urban	10879	3	5	1	1	0	0	Domel Urban	22937	3	2
	Kakki	Kakki Urban	32585	20	12	4	4	0	0	Kakki Urban	63534	8	8
	Miryan	Nurrar Urban	15814	7	9	2	1	0	0	Kakki Taraf-4			
Rural	Bannu	Adami Tetar khel	14695	4	7	2	1	0	0	Nurrar Urban	28123	3	3
	Bannu	Amandi-1	9827	4	5	1	1	0	0	Adami Tetar khel	26132	3	3
	Domel	Aral Hati Khel-1	19286	8	8	2	2	0	0	Amandi-1	17475	2	2
	Domel	Aral hati Khel-2	13751	5	4	1	1	0	0	Aral Hati Khel-1	40663	5	5
	Domel	Asperka-1	17119	7	3	2	2	0	0	Aral hati Khel-2	28990	3	3
	Domel	Asperka-2	15300	13	9	2	1	0	0	Asperka-1	36094	4	4
	Domel	Asperka-3	20932	11	13	2	2	0	0	Asperka-2	32258	4	3
	Bannu	Bada Mir Abbas	10059	10	10	1	1	0	0	Asperka-3	44132	5	5
	Kakki	Bharat	20716	13	9	2	2	0	0	Bada Mir Abbas	17887	2	2
	Miryan	Dardariz	14426	23	13	1	1	0	0	Bharat	36838	4	4
	Wazir	Daryoba	13352	33	23	1	1	0	0	Dardariz	25653	3	3
	Bannu	Daud Shah	13834	7	7	1	1	0	0	Daryoba	30577	4	3
	Bannu	Degan	13256	9	9	1	1	0	0	Daud Shah	24601	3	3
	Domel	Domel-1	13177	8	14	1	1	0	0	Degan	23573	3	2
	Domel	Domel-2	16902	5	11	2	2	0	0	Domel-1	27783	3	3
	Domel	Eidal Khel	26166	19	6	3	3	0	0	Domel-2	35636	4	4
	Baka Khel	Eidia Khel Malak Shahi	14977	12	11	2	1	0	0	Eidal Khel	55168	7	6
	Bannu	Ghoriwala-1	4606	1	2	0	0	0	0	Eidia Khel Malak Shahi	26634	3	3
	Bannu	Ghoriwala-2	8935	3	2	1	1	0	0	Ghoriwala-1	8191	1	1
	Wazir	Gumbati	12172	2	3	1	1	0	0	Ghoriwala-2	15888	2	1
	Wazir	Gurbaz	10300	3	4	1	1	0	0	Gumbati	27875	3	3
	Miryan	Haved	8946	3	3	1	1	0	0	Gurbaz	23587	3	2
	Baka Khel	Hindi Khel	14256	5	4	1	1	0	0	Haved	15908	2	1
	Bannu	Ismail Khel	13537	3	5	1	1	0	0	Hindi Khel	25351	3	3
	Wazir	Jani Khel	9052	5	4	1	1	0	0	Ismail Khel	24073	3	2
	Baka Khel	Jani Khel-1	10954	13	11	1	1	0	0	Jani Khel	20729	2	2
	Baka Khel	Jani Khel-2	12441	10	3	1	1	0	0	Jani Khel-1	19479	2	2
	Bannu	Jhandu Khel	10678	8	3	1	1	0	0	Jani Khel-2	22123	2	2
	Kakki	Kakki Taraf-3	11965	7	5	1	1	0	0	Jhandu Khel	18989	2	2
	Kakki	Kakki Taraf-4	3144	2	1	0	0	0	0	Kakki Taraf-3	21277	2	2
	Kakki	Kakki Taraf-5	5858	5	4	0	0	0	0	Kakki Taraf-5	10419	1	1
	Domel	Khande Khan Khel-2	11729	12	17	1	1	0	0	Khande Khan Khel-2	24728	3	3

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing Primary Schools		Required Primary Schools 2025		Backlog Primary Schools 2025		NC/VC	Population 2045	Required Primary Schools 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
	Domel	Khander Khan Khel-1	13440	10	14	1	1	0	0	Khander Khan Khel-1	28337	3	3
	Kakki	Khujari baber	10571	11	6	1	1	0	0	Khujari baber	18798	2	2
	Kakki	Khujari Khas	10214	5	2	1	1	0	0	Khujari Khas	18162	2	2
	Miryan	Kinger	13956	10	7	1	1	0	0	Kinger	24818	3	3
	Bannu	Kot Qalander	18359	8	5	2	2	0	0	Kot Qalander	32647	4	4
	Miryan	Landidak	19064	20	7	2	2	0	0	Landidak	33900	4	4
	Miryan	Mama Khel-1	15212	9	7	2	1	0	0	Mama Khel-1	27050	3	3
	Miryan	Mama Khel-2	12555	9	5	1	1	0	0	Mama Khel-2	22326	3	2
	Bannu	Mamash Khel Nogari-2	14396	3	5	1	1	0	0	Mamash Khel Nogari-2	25599	3	3
	Miryan	Mambati Barakzai	14366	6	4	1	1	0	0	Mambati Barakzai	25546	3	3
	Bannu	Mandan	13214	8	9	1	1	0	0	Mandan	23497	3	2
	Miryan	Mandev	17198	13	9	2	2	0	0	Mandev	30583	4	3
	Bannu	Mandori Patal Shah	21097	5	5	2	2	0	0	Mandori Patal Shah	37516	5	4
	Bannu	Masher Daud Shah	11786	3	5	1	1	0	0	Masher Daud Shah	20959	2	2
	Bannu	Mira Khel	12185	4	5	1	1	0	0	Mira Khel	21668	2	2
	Miryan	Mirbaz barakzai	15713	10	7	2	1	0	0	Mirbaz barakzai	27941	3	3
	Miryan	Mitta Khel	16045	4	2	2	2	0	0	Mitta Khel	28532	3	3
	Bannu	Mughal Khel	15898	11	5	2	1	0	0	Mughal Khel	28270	3	3
	Baka Khel	Muhammad Khel Khedari	13133	7	18	1	1	0	0	Muhammad Khel Khedari	23354	3	2
	Baka Khel	Muhammad Khel Patona	16482	11	15	2	2	0	0	Muhammad Khel Patona	29309	3	3
	Domel	Musa Khel Wali Gai	7490	15	17	1	0	0	0	Musa Khel Wali Gai	15792	2	1
	Bannu	Nar Hafiz Abad / Nar Shakrullah	12554	8	6	1	1	0	0	Nar Hafiz Abad / Nar Shakrullah	22324	3	2
	Bannu	Nar Jaffar	16720	4	8	2	2	0	0	Nar Jaffar	29732	4	3
	Kakki	Nar Najeeb	8345	6	4	1	1	0	0	Nar Najeeb	14840	2	1
	Baka Khel	Narmi Khel-1	12199	15	10	1	1	0	0	Narmi Khel-1	21693	2	2
	Baka Khel	Narmi Khel-2	5912	6	9	0	0	0	0	Narmi Khel-2	10513	1	1
	Miryan	Nurrar-1	11198	9	11	1	1	0	0	Nurrar-1	20974	2	2
	Miryan	Nurrar-2	597	0	0	0	0	0	0	Nurrar-2			
	Baka Khel	Sardi Khel-1	14685	14	13	2	1	0	0	Sardi Khel-1	26114	3	3
	Baka Khel	Sardi Khel-2	5596	8	8	0	0	0	0	Sardi Khel-2	9951	1	1
	Bannu	Shaamsi Khel	15217	9	5	2	1	0	0	Shaamsi Khel	35875	4	4
	Bannu	Shah Baz Azmat Khel-1	9631	4	4	1	1	0	0	Shah Baz Azmat Khel-1	27059	3	3

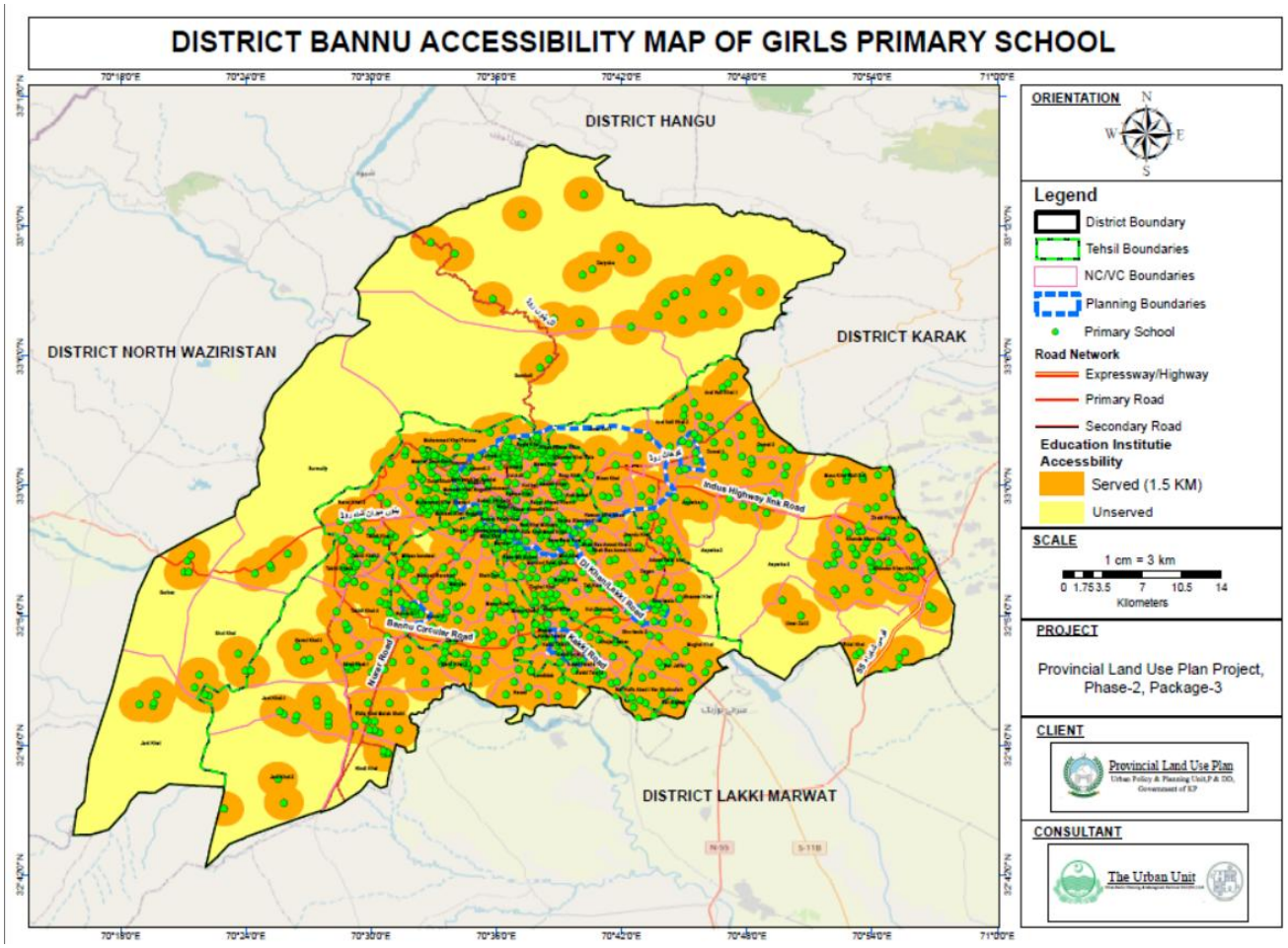
NC/VC	Tehsil	Name NC/VC	Population 2025	Existing Primary Schools		Required Primary Schools 2025		Backlog Primary Schools 2025		NC/VC	Population 2045	Required Primary Schools 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
	Bannu	Shah Baz Azmat Khel-2	6433	8	6	0	0	0	0	Shah Baz Azmat Khel-2	17126	2	2
	Miryan	Shah Dev	20174	5	5	2	2	0	0	Shah Dev	11440	1	1
	Wazir	Shoi Khel	6970	5	5	0	0	0	0	Shoi Khel	15963	2	1
	Wazir	Surmully	8212	3	4	1	1	0	0	Surmully	18805	2	2
	Bannu	Taji Kala	12272	5	4	1	1	0	0	Taji Kala	21823	2	2
	Baka Khel	Takhti Khel-1	9803	4	8	1	1	0	0	Takhti Khel-1	17433	2	2
	Baka Khel	Takhti Khel-2	7731	7	5	1	0	0	0	Takhti Khel-2	13748	1	1
	Baka Khel	Takhti Khel-3	6869	12	13	0	0	0	0	Takhti Khel-3	12214	1	1
	Baka Khel	Takhti Khel-4	8658	14	11	1	1	0	0	Takhti Khel-4	15395	2	1
	Bannu	Tughal Khel	13298	8	11	1	1	0	0	Tughal Khel	23647	3	2
	Domel	Umer Zai-2	7850	3	2	1	1	0	0	Umer Zai-2	16551	2	2
	Domel	Ziraki Pirba Khel	19050	13	13	2	2	0	0	Ziraki Pirba Khel	40165	5	4
Overall	**Urban**		**570489**	**174**	**184**	**74**	**67**	**0**	**0**				
	Rural		**958696**	**626**	**558**	**91**	**81**	**0**	**0**				
	Total		**1529185**	**799**	**741**	**165**	**148**	**0**	**0**		**2813641**	**340**	**307**

The map below illustrates the spatial distribution and accessibility of boys' primary schools across the district Bannnu, using a 1.5 km radius buffer as the standard for service coverage. Green dots represent the locations of existing primary schools, while shaded areas depict the accessibility zones: pink for served areas (within 1.5 km of a school) and yellow for unserved areas (beyond 1.5 km). The map shows that most schools are concentrated around central Bannu and along the primary and secondary road networks, such as the Bannu Circular Road and Indus Highway Bannu Road. However, substantial unserved regions are visible in the northern, northwestern, and southern parts of the district, particularly near the borders with District North Waziristan, Hangu, and Lakki Marwat. These peripheral areas, highlighted in yellow, lack adequate access to boys' primary schools and represent potential zones where new schools should be proposed to enhance equitable education access. Establishing schools in these unserved pockets will ensure wider coverage and reduce the educational gap in rural and remote parts of Bannu.



Map 3-18: District Bannu Accessibility Analysis of Boys Primary School

The spatial accessibility of girls' primary schools in District Bannu is shown in below map, with a service radius of 1.5 kilometers. Green dots indicate the locations of existing schools, while orange-shaded areas represent populations within walking access (served), and yellow areas indicate unserved zones. Most of the school coverage is concentrated in central Bannu and along major roads such as Bannu Circular Road and Indus Highway. This indicates relatively good access in urban and semi-urban areas. However, large unserved areas remain in the northern and southwestern parts of the district, particularly near the borders with North Waziristan and Lakki Marwat. Establishing new schools in these regions can significantly enhance education access for girls.



Map 3-19: District Bannu Accessibility Analysis of Girls Primary School

3.3.1.3.2 High Schools (Current Backlog and Future projection)

The need for new high schools is based on the NRM standard: one boys' high school per 23,000 population and one girls' high school per 31,000. Backlog calculations consider each tehsil's urban area and rural area population. The required schools were determined by dividing the population by the respective standard and subtracting existing schools, resulting in the backlog for each locality.

In District Bannu, the existing institutions in urban areas generally exceed the required number, with the exception of Kakki Urban for girls, where there is a backlog of 1 high school. Furthermore, in rural areas, “VC Edal Khel” required 1 high school with the backlog of 1. District Bannu has a total of 132 high schools, exceeding the required 39, indicating a surplus at the district level. However, there is an overall backlog of 2 high schools 1 in urban areas and 1 in rural areas. In District Bannu, the projected population for high schools at the NC/VC level showed minimal requirements. Therefore, the consultant merged multiple VCs to meet the necessary criteria future projections are detailed in the table below.

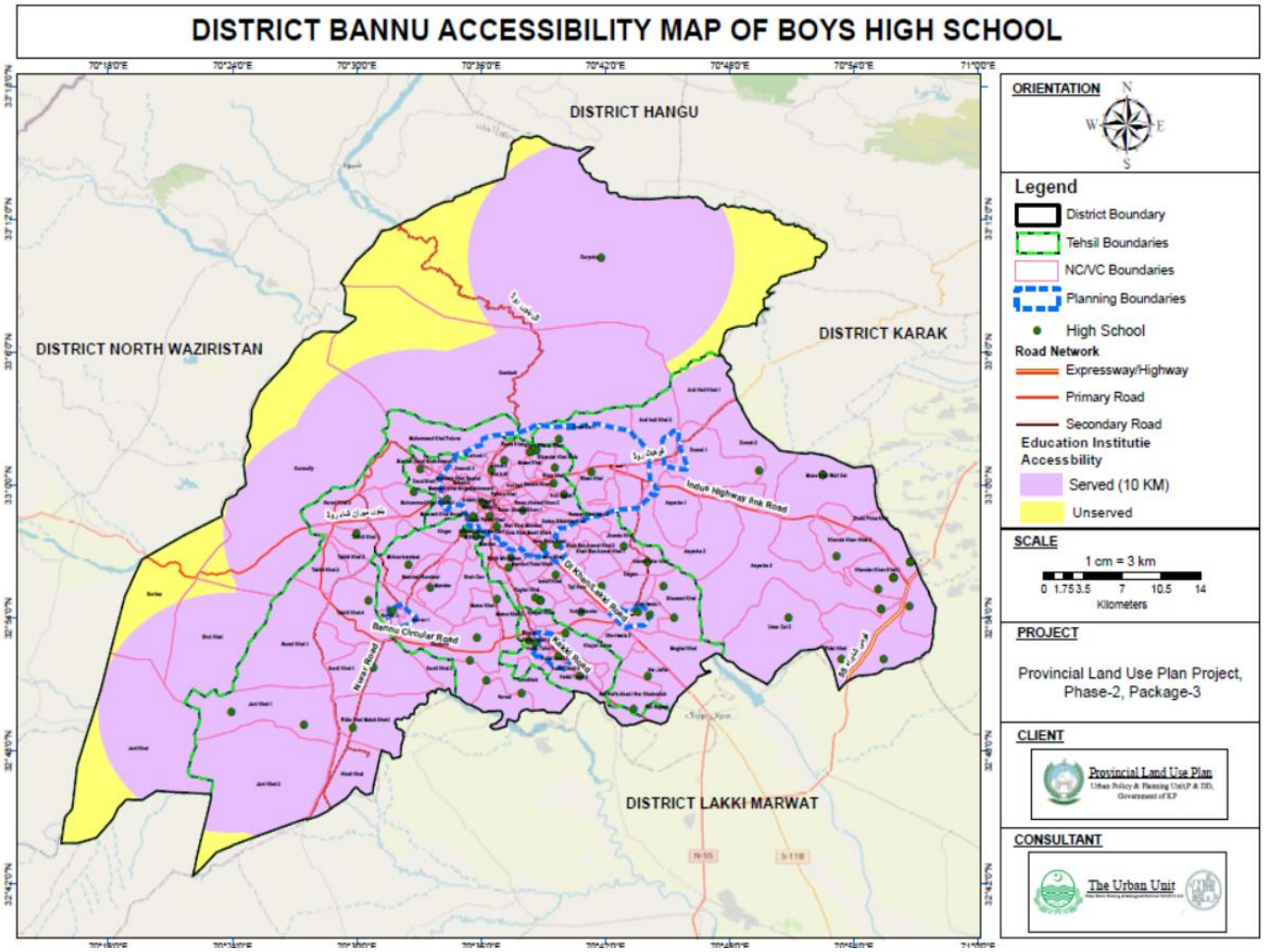
Table 3-29: District Bannu High School Current Backlog and Future Projection

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing		Required 2025		Backlog 2025		NC/VC	Population 2045	Required 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
URBAN	**Bannu**	**Bannu Urban**	**490132**	**21**	**18**	**21**	**15**	**0**	**0**	**Bannu Urban**	864863	37	27
	Bannu	**Ghoriwala Urban**	**21079**	**2**	**1**	**0**	**0**	**0**	**0**	**Ghoriwala Urban**			
	Domel	**Domel Urban**	**10879**	**0**	**0**	**0**	**0**	**0**	**0**	Ghoriwala-1	61563	2	2
	Kakki	**Kakki Urban**	**32585**	**1**	**0**	**1**	**1**	**0**	**1**	Ghoriwala-2			
	Miryan	**Nurrar Urban**	**15814**	**1**	**2**	**0**	**0**	**0**	**0**	**Domel Urban**			
RURAL	Bannu	Adami Tetar khel	14695	1	1	0	0	0	0	Domel-1	79710	3	2
	Bannu	Amandi-1	9827	0	1	0	0	0	0	Aral hati Khel-2			
	Domel	Aral Hati Khel-1	19286	0	0	0	0	0	0	**Kakki Urban**	57944	2	1
	Domel	Aral hati Khel-2	13751	0	0	0	0	0	0	**Nurrar Urban**			
	Domel	Asperka-1	17119	0	0	0	0	0	0	Nurrar-1	49097	2	1
	Domel	Asperka-2	15300	0	0	0	0	0	0	Nurrar-2			
	Domel	Asperka-3	20932	2	4	0	0	0	0	Adami Tetar khel			
	Bannu	Bada Mir Abbas	10059	2	2	0	0	0	0	Degan	68694	2	2
	Kakki	Bharat	20716	2	2	0	0	0	0	Jhandu Khel			
	Miryan	Dardariz	14426	2	0	0	0	0	0	Amandi-1			
	Wazir	Daryoba	13352	1	0	0	0	0	0	Daud Shah	92344	4	3
	Bannu	Daud Shah	13834	1	1	0	0	0	0	Muhammad Khel Patona			
	Bannu	Degan	13256	1	1	0	0	0	0	Masher Daud Shah			
	Domel	Domel-1	13177	1	1	0	0	0	0	Bada Mir Abbas			
	Domel	Domel-2	16902	0	0	0	0	0	0	Mandan	69916	3	2
	Domel	Eidal Khel	26166	2	0	1	0	1	0	Mitta Khel			
	Baka Khel	Eidia Khel Malak Shahi	14977	1	0	0	0	0	0	Dardariz			
	Bannu	Ghoriwala-1	4606	0	0	0	0	0	0	Mama Khel-1	86469	3	2
	Bannu	Ghoriwala-2	8935	0	0	0	0	0	0	Mama Khel-2			
	Wazir	Gumbati	12172		0	0	0	0	0	Shah Dev			
	Wazir	Gurbaz	10300	0	0	0	0	0	0	Eidia Khel Malak Shahi			
	Miryan	Haved	8946	1	0	0	0	0	0	Sardi Khel-1	88050	3	2
	Baka Khel	Hindi Khel	14256	0	0	0	0	0	0	Sardi Khel-2			
	Bannu	Ismail Khel	13537	0	1	0	0	0	0	Hindi Khel			
	Wazir	Jani Khel	9052	0	0	0	0	0	0	Gumbati			
	Baka Khel	Jani Khel-1	10954	2	0	0	0	0	0	Surmully	86230	3	2
	Baka Khel	Jani Khel-2	12441	0	0	0	0	0	0	Gurbaz			
	Bannu	Jhandu Khel	10678	1	0	0	0	0	0	Shoi Khel			
	Kakki	Kakki Taraf-3	11965	1	0	0	0	0	0	Haved			
	Kakki	Kakki Taraf-4	3144	0	0	0	0	0	0	Landidak	81504	3	2
	Kakki	Kakki Taraf-5	5858	0	0	0	0	0	0	Kakki Taraf-3			
	Domel	Khande Khan Khel-2	11729	2	0	0	0	0	0	Kakki Taraf-5			

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing		Required 2025		Backlog 2025		NC/VC	Population 2045	Required 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
	Domel	Khander Khan Khel-1	13440	5	1	0	0	0	0	Ismail Khel	91211	4	3
	Kakki	Khujari baber	10571	1	0	0	0	0	0	Mira Khel			
	Kakki	Khujari Khas	10214	0	0	0	0	0	0	Taji Kala			
	Miryan	Kinger	13956	1	0	0	0	0	0	Tughal Khel			
	Bannu	Kot Qalander	18359	1	0	0	0	0	0	Jani Khel	62331	2	2
	Miryan	Landidak	19064	1	0	0	0	0	0	Jani Khel-1			
	Miryan	Mama Khel-1	15212	0	1	0	0	0	0	Jani Khel-2			
	Miryan	Mama Khel-2	12555	1	0	0	0	0	0	Musa Khel Wali Gai	68857	3	2
	Bannu	Mamash Khel Nogari-2	14396	0	0	0	0	0	0	Khande Khan Khel-2			
	Miryan	Mambati Barakzai	14366	0	0	0	0	0	0	Khander Khan Khel-1			
	Bannu	Mandan	13214	0	0	0	0	0	0	Bharat	42428	1	1
	Miryan	Mandev	17198	1	2	0	0	0	0	Kakki Taraf-4			
	Bannu	Mandori Patal Shah	21097	0	0	0	0	0	0	Khujari baber	36960	1	1
	Bannu	Masher Daud Shah	11786	0	0	0	0	0	0	Khujari Khas			
	Bannu	Mira Khel	12185	1	0	0	0	0	0	Mamash Khel Nogari-2	73771	3	2
	Miryan	Mirbaz barakzai	15713	1	0	0	0	0	0	Muhammad Khel Khedari			
	Miryan	Mitta Khel	16045	1	0	0	0	0	0	Kinger			
	Bannu	Mughal Khel	15898	0	0	0	0	0	0	Mambati Barakzai	53487	2	1
	Baka Khel	Muhammad Khel Khedari	13133	1	0	0	0	0	0	Mirbaz barakzai			
	Baka Khel	Muhammad Khel Patona	16482	0	1	0	0	0	0	Mughal Khel	44821	2	1
	Domel	Musa Khel Wali Gai	7490	3	2	0	0	0	0	Umer Zai-2			
	Bannu	Nar Hafiz Abad / Nar Shakrullah	12554	1	0	0	0	0	0	Nar Hafiz Abad / Nar Shakrullah	37164	1	1
	Bannu	Nar Jaffar	16720	1	0	0	0	0	0	Nar Najeeb			
	Kakki	Nar Najeeb	8345	0	1	0	0	0	0	Narmi Khel-1	49302	2	1
	Baka Khel	Narmi Khel-1	12199	0	1	0	0	0	0	Takhti Khel-3			
	Baka Khel	Narmi Khel-2	5912	0	1	0	0	0	0	Takhti Khel-4			
	Miryan	Nurrar-1	11198	0	0	0	0	0	0	Narmi Khel-2	41694	1	1
	Miryan	Nurrar-2	597	0	0	0	0	0	0	Takhti Khel-1			
	Baka Khel	Sardi Khel-1	14685	1	0	0	0	0	0	Takhti Khel-2			
	Baka Khel	Sardi Khel-2	5596	0	0	0	0	0	0	Shah Baz Azmat Khel-1	44185	2	1
	Bannu	Shaamsi Khel	15217	2	1	0	0	0	0	Shah Baz Azmat Khel-2			
	Bannu	Shah Baz Azmat Khel-1	9631	0	0	0	0	0	0	Aral Hati Khel-1	40663	1	1
	Bannu	Shah Baz Azmat Khel-2	6433	0	1	0	0	0	0	Asperka-1	36094	1	1
	Miryan	Shah Dev	20174	0	0	0	0	0	0	Asperka-2	32258	1	1
	Wazir	Shoi Khel	6970	0	0	0	0	0	0	Asperka-3	44132	1	1
	Wazir	Surmully	8212	0	0	0	0	0	0	Daryoba	30577	1	1

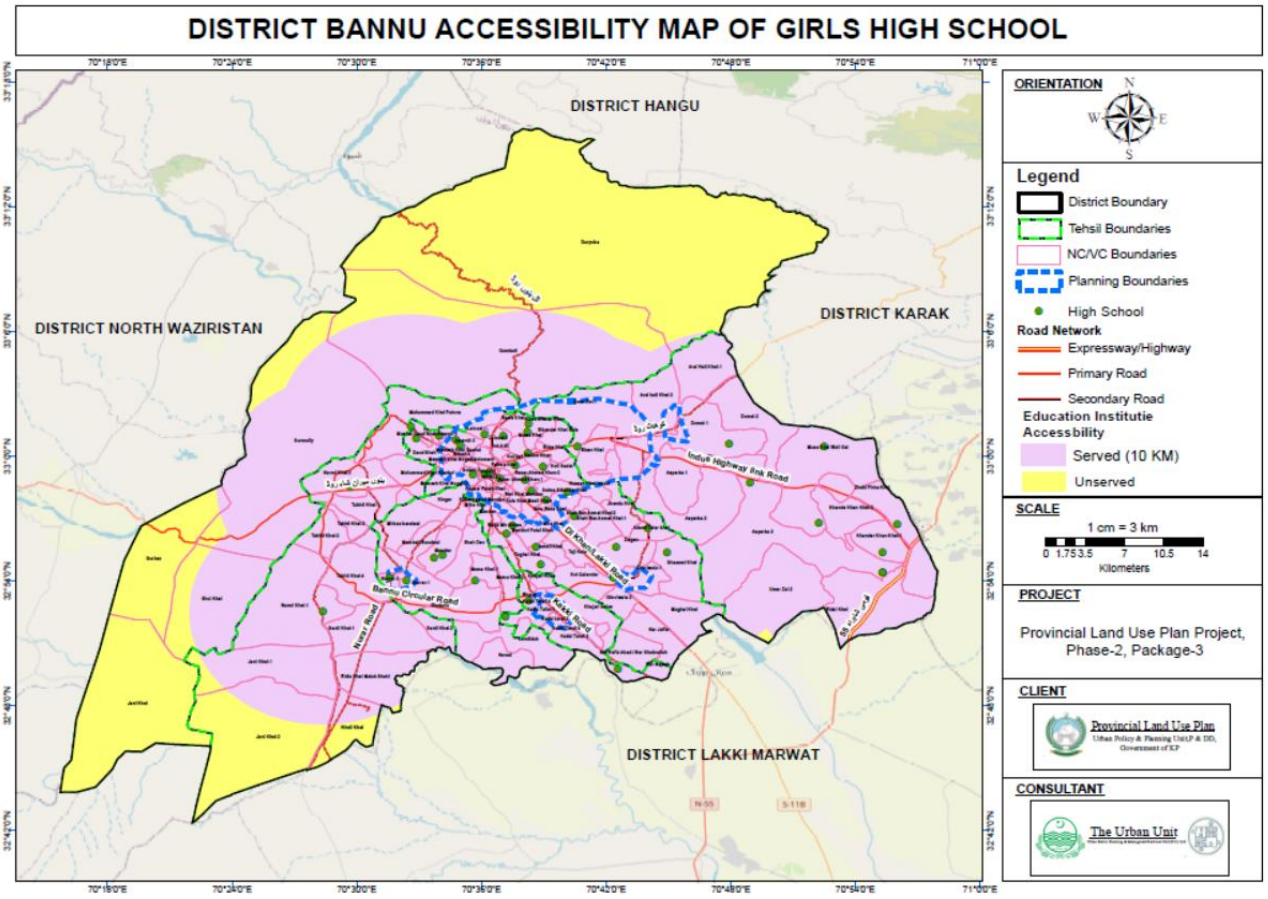
NC/VC	Tehsil	Name NC/VC	Population 2025	Existing		Required 2025		Backlog 2025		NC/VC	Population 2045	Required 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
	Bannu	Taji Kala	12272	0	0	0	0	0	0	Domel-2	35636	1	1
	Baka Khel	Takhti Khel-1	9803	1	0	0	0	0	0	Eidal Khel	55168	2	1
	Baka Khel	Takhti Khel-2	7731	0	0	0	0	0	0	Kot Qalander	32647	1	1
	Baka Khel	Takhti Khel-3	6869	0	0	0	0	0	0	Mandev	30583	1	1
	Baka Khel	Takhti Khel-4	8658	1	0	0	0	0	0	Mandori Patal Shah	37516	1	1
	Bannu	Tughal Khel	13298	5	1	0	0	0	0	Nar Jaffar	29732	1	1
	Domel	Umer Zai-2	7850	1	0	0	0	0	0	Shaamsi Khel	35875	1	1
	Domel	Ziraki Pirba Khel	19050	4	1	0	0	0	0	Ziraki Pirba Khel	40165	1	1
OVERALL	**Urban**		**570489**	**25**	**21**	**22**	**16**	**0**	**1**				
	Rural		**958696**	**58**	**28**	**1**	**0**	**1**	**0**				
	Total		**1529185**	**83**	**49**	**23**	**16**	**1**	**1**		**2813641**	**105**	**78**

The map below illustrates the spatial distribution and accessibility of boys' high schools in District Bannu, using a 10-kilometer buffer radius as the service threshold. Green dots represent the locations of existing boys' high schools, while the surrounding shaded areas indicate their coverage zones. Areas within 10 kilometers of a school are marked as served, while regions beyond this buffer are classified as unserved and highlighted in yellow. The majority of high schools are concentrated in the central part of the district. This concentration ensures good access for students living in and around the city center. However, the map also reveals several large unserved zones in the northern, western, and southwestern parts of the district, especially near the borders with North Waziristan and Hangu. These areas lack adequate access to boys' high schools and underscore the need for targeted interventions to establish new schools.



Map 3-20: District Bannu Accessibility Analysis of Boys High School

The map below presents the spatial distribution and accessibility of girls' high schools in District Bannu, using a 10-kilometer buffer to define the service area around each school. Regions falling within this radius are considered served, indicating reasonable access to a nearby high school, while areas beyond this threshold are categorized as unserved and are shown in yellow. The underserved zones, often situated near remote or rural borders, highlight significant gaps in educational infrastructure for girls. Addressing these gaps through the establishment of new high schools in unserved areas is essential for ensuring equitable access to secondary education across the district.



Map 3-21: District Bannu Accessibility Analysis of Girls High School

3.3.1.3.3 Higher Secondary (Current Backlog and Future projection)

The need for new high schools is based on the NRM standard: one boys' high school per 23,000 population and one girls' high school per 31,000. Backlog calculations consider each tehsil's urban area and rural area population. The required schools were determined by dividing the population by the respective standard and subtracting existing schools, resulting in the backlog for each locality.

In District Bannu, the existing institutions in urban areas generally exceed the required number, with the exception of Kakki Urban for girls, where there is a backlog of 1 high school. Furthermore, in rural areas, “VC Edal Khel” required 1 high school with the backlog of 1. District Bannu has a total of 132 high schools, exceeding the required 39, indicating a surplus at the district level. However, there is an overall backlog of 2 high schools 1 in urban areas and 1 in rural areas. In District Bannu, the projected population for high schools at the NC/VC level showed minimal requirements. Therefore, the consultant merged multiple VCs to meet the necessary criteria future projections are detailed in the table below.

Table 3-30: District Bannu Higher Secondary Current Backlog and Future projection

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing		Required 2025		Backlog 2025		NC/VC	Population 2045	Required 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
URBAN	**Bannu**	**Bannu Urban**	**490132**	**21**	**18**	**21**	**15**	**0**	**0**	**Bannu Urban**	864863	37	27
	Bannu	**Ghoriwala Urban**	**21079**	**2**	**1**	**0**	**0**	**0**	**0**	**Ghoriwala Urban**			
	Domel	**Domel Urban**	**10879**	**0**	**0**	**0**	**0**	**0**	**0**	Ghoriwala-1	61563	2	2
	Kakki	**Kakki Urban**	**32585**	**1**	**0**	**1**	**1**	**0**	**1**	Ghoriwala-2			
	Miryan	**Nurrar Urban**	**15814**	**1**	**2**	**0**	**0**	**0**	**0**	**Domel Urban**			
RURAL	Bannu	Adami Tetar khel	14695	1	1	0	0	0	0	Domel-1	79710	3	2
	Bannu	Amandi-1	9827	0	1	0	0	0	0	Aral hati Khel-2			
	Domel	Aral Hati Khel-1	19286	0	0	0	0	0	0	**Kakki Urban**	57944	2	1
	Domel	Aral hati Khel-2	13751	0	0	0	0	0	0	**Nurrar Urban**			
	Domel	Asperka-1	17119	0	0	0	0	0	0	Nurrar-1	49097	2	1
	Domel	Asperka-2	15300	0	0	0	0	0	0	Nurrar-2			
	Domel	Asperka-3	20932	2	4	0	0	0	0	Adami Tetar khel			
	Bannu	Bada Mir Abbas	10059	2	2	0	0	0	0	Degan	68694	2	2
	Kakki	Bharat	20716	2	2	0	0	0	0	Jhandu Khel			
	Miryan	Dardariz	14426	2	0	0	0	0	0	Amandi-1			
	Wazir	Daryoba	13352	1	0	0	0	0	0	Daud Shah	92344	4	3
	Bannu	Daud Shah	13834	1	1	0	0	0	0	Muhammad Khel Patona			
	Bannu	Degan	13256	1	1	0	0	0	0	Masher Daud Shah			
	Domel	Domel-1	13177	1	1	0	0	0	0	Bada Mir Abbas			
	Domel	Domel-2	16902	0	0	0	0	0	0	Mandan	69916	3	2
	Domel	Eidal Khel	26166	2	0	1	0	1	0	Mitta Khel			
	Baka Khel	Eidia Khel Malak Shahi	14977	1	0	0	0	0	0	Dardariz			
	Bannu	Ghoriwala-1	4606	0	0	0	0	0	0	Mama Khel-1			
	Bannu	Ghoriwala-2	8935	0	0	0	0	0	0	Mama Khel-2	86469	3	2
	Wazir	Gumbati	12172		0	0	0	0	0	Shah Dev			
	Wazir	Gurbaz	10300	0	0	0	0	0	0	Eidia Khel Malak Shahi			
	Miryan	Haved	8946	1	0	0	0	0	0	Sardi Khel-1	88050	3	2
	Baka Khel	Hindi Khel	14256	0	0	0	0	0	0	Sardi Khel-2			

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing		Required 2025		Backlog 2025		NC/VC	Population 2045	Required 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
	Bannu	Ismail Khel	13537	0	1	0	0	0	0	Hindi Khel			
	Wazir	Jani Khel	9052	0	0	0	0	0	0	Gumbati	86230	3	2
	Baka Khel	Jani Khel-1	10954	2	0	0	0	0	0	Surmully			
	Baka Khel	Jani Khel-2	12441	0	0	0	0	0	0	Gurbaz			
	Bannu	Jhandu Khel	10678	1	0	0	0	0	0	Shoi Khel			
	Kakki	Kakki Taraf-3	11965	1	0	0	0	0	0	Haved	81504	3	2
	Kakki	Kakki Taraf-4	3144	0	0	0	0	0	0	Landidak			
	Kakki	Kakki Taraf-5	5858	0	0	0	0	0	0	Kakki Taraf-3			
	Domel	Khande Khan Khel-2	11729	2	0	0	0	0	0	Kakki Taraf-5			
	Domel	Khander Khan Khel-1	13440	5	1	0	0	0	0	Ismail Khel	91211	4	3
	Kakki	Khujari baber	10571	1	0	0	0	0	0	Mira Khel			
	Kakki	Khujari Khas	10214	0	0	0	0	0	0	Taji Kala			
	Miryan	Kinger	13956	1	0	0	0	0	0	Tughal Khel			
	Bannu	Kot Qalander	18359	1	0	0	0	0	0	Jani Khel	62331	2	2
	Miryan	Landidak	19064	1	0	0	0	0	0	Jani Khel-1			
	Miryan	Mama Khel-1	15212	0	1	0	0	0	0	Jani Khel-2			
	Miryan	Mama Khel-2	12555	1	0	0	0	0	0	Musa Khel Wali Gai	68857	3	2
	Bannu	Mamash Khel Nogari-2	14396	0	0	0	0	0	0	Khande Khan Khel-2			
	Miryan	Mambati Barakzai	14366	0	0	0	0	0	0	Khander Khan Khel-1			
	Bannu	Mandan	13214	0	0	0	0	0	0	Bharat	42428	1	1
	Miryan	Mandev	17198	1	2	0	0	0	0	Kakki Taraf-4			
	Bannu	Mandori Patal Shah	21097	0	0	0	0	0	0	Khujari baber	36960	1	1
	Bannu	Masher Daud Shah	11786	0	0	0	0	0	0	Khujari Khas			
	Bannu	Mira Khel	12185	1	0	0	0	0	0	Mamash Khel Nogari-2	73771	3	2
	Miryan	Mirbaz barakzai	15713	1	0	0	0	0	0	Muhammad Khel Khedari			
	Miryan	Mitta Khel	16045	1	0	0	0	0	0	Kinger			
	Bannu	Mughal Khel	15898	0	0	0	0	0	0	Mambati Barakzai	53487	2	1
	Baka Khel	Muhammad Khel Khedari	13133	1	0	0	0	0	0	Mirbaz barakzai			

NC/VC	Tehsil	Name NC/VC	Population 2025	Existing		Required 2025		Backlog 2025		NC/VC	Population 2045	Required 2045	
				Boys	Girls	Boys	Girls	Boys	Girls			Boys	Girls
	Baka Khel	Muhammad Khel Patona	16482	0	1	0	0	0	0	Mughal Khel	44821	2	1
	Domel	Musa Khel Wali Gai	7490	3	2	0	0	0	0	Umer Zai-2			
	Bannu	Nar Hafiz Abad / Nar Shakrullah	12554	1	0	0	0	0	0	Nar Hafiz Abad / Nar Shakrullah	37164	1	1
	Bannu	Nar Jaffar	16720	1	0	0	0	0	0	Nar Najeeb			
	Kakki	Nar Najeeb	8345	0	1	0	0	0	0	Narmi Khel-1	49302	2	1
	Baka Khel	Narmi Khel-1	12199	0	1	0	0	0	0	Takhti Khel-3			
	Baka Khel	Narmi Khel-2	5912	0	1	0	0	0	0	Takhti Khel-4			
	Miryan	Nurrar-1	11198	0	0	0	0	0	0	Narmi Khel-2	41694	1	1
	Miryan	Nurrar-2	597	0	0	0	0	0	0	Takhti Khel-1			
	Baka Khel	Sardi Khel-1	14685	1	0	0	0	0	0	Takhti Khel-2			
	Baka Khel	Sardi Khel-2	5596	0	0	0	0	0	0	Shah Baz Azmat Khel-1	44185	2	1
	Bannu	Shaamsi Khel	15217	2	1	0	0	0	0	Shah Baz Azmat Khel-2			
	Bannu	Shah Baz Azmat Khel-1	9631	0	0	0	0	0	0	Aral Hati Khel-1	40663	1	1
	Bannu	Shah Baz Azmat Khel-2	6433	0	1	0	0	0	0	Asperka-1	36094	1	1
	Miryan	Shah Dev	20174	0	0	0	0	0	0	Asperka-2	32258	1	1
	Wazir	Shoi Khel	6970	0	0	0	0	0	0	Asperka-3	44132	1	1
	Wazir	Surmully	8212	0	0	0	0	0	0	Daryoba	30577	1	1
	Bannu	Taji Kala	12272	0	0	0	0	0	0	Domel-2	35636	1	1
	Baka Khel	Takhti Khel-1	9803	1	0	0	0	0	0	Eidal Khel	55168	2	1
	Baka Khel	Takhti Khel-2	7731	0	0	0	0	0	0	Kot Qalander	32647	1	1
	Baka Khel	Takhti Khel-3	6869	0	0	0	0	0	0	Mandev	30583	1	1
	Baka Khel	Takhti Khel-4	8658	1	0	0	0	0	0	Mandori Patal Shah	37516	1	1
	Bannu	Tughal Khel	13298	5	1	0	0	0	0	Nar Jaffar	29732	1	1
	Domel	Umer Zai-2	7850	1	0	0	0	0	0	Shaamsi Khel	35875	1	1
	Domel	Ziraki Pirba Khel	19050	4	1	0	0	0	0	Ziraki Pirba Khel	40165	1	1
OVERALL	**Urban**		**570489**	**25**	**21**	**22**	**16**	**0**	**1**				
	Rural		**958696**	**58**	**28**	**1**	**0**	**1**	**0**				
	Total		**1529185**	**83**	**49**	**23**	**16**	**1**	**1**		**2813641**	**105**	**78**

3.3.1.3.4 College (Current Backlog and Future projection)

The need for new degree colleges was assessed using the NRM standard: one boys' college per 400,000 population and one girls' college per 750,000. The backlog was calculated at the tehsil level by dividing the population by these thresholds, then subtracting existing colleges from the required number.

The existing degree colleges in District Bannu are adequate for both boys and girls based on the current population, indicating no deficiency in college availability across the district. The details current backlog and future projection are detailed in the table below.

Table 3-31: District Bannu Colleges Current Backlog and Future projection

Administrative Area		Degree Colleges	Required Colleges (Current)	Colleges Backlog	Required Colleges by 2045
Bannu Tehsil	Boys	6	2	0	4
	Girls	4	1	0	2
Domel Tehsil	Boys	3	1	0	1
	Girls	0	0	0	1
Kakki Tehsil	Boys	0	0	0	0
	Girls	0	0	0	0
Miryan Tehsil	Boys	1	0	0	1
	Girls	0	0	0	0
Bakakhel Tehsil	Boys	0	0	0	1
	Girls	0	0	0	0
Wazir Tehsil	Boys	0	0	0	0
	Girls	0	0	0	0

3.3.1.3.5 Recommendations

- Set up special education centers and technical colleges in tehsils outside Tehsil Bannu to make education more accessible, especially for special needs children and female students who struggle to travel long distances.
- Launch awareness campaigns to emphasize the value of education, especially in rural communities, where literacy rates are likely lower than the district average.
- Establish new high schools in Kakki urban and Tehsil Miryan, Bakakhel, and Wazir, especially for girls, and upgrade the existing facilities.
- Lack of higher secondary schools creates new higher secondary schools in Bannu Urban areas. Also needed in rural areas of the district.
- Rural areas of District Bannu lack technical institutes; there should be at least one technical institute for rural areas.
- Set up a strong monitoring and evaluation system to track the impact of implemented initiatives. Regular reviews will help pinpoint areas that need improvement, ensuring continued progress in strengthening the education sector in District Bannu.

3.3.1.4 Future Plan

As part of the long-term land use planning for District Bannu, Education Neighborhoods are proposed in selected urban areas based on the projected population for the year 2045, specifically in areas where the population is expected to exceed 50,000 individuals. These neighborhoods are intended to accommodate educational facilities beyond the matriculation level, including public and private universities, colleges, technical institutes, research institutes, training centers, and tuition academies, to meet the future higher education and skill development needs of the district. The educational needs up to the matriculation level—such as primary, middle, and secondary schools—are addressed through land allocated from the 100% additional area reserved for services and amenities under the district development framework.

Additionally, 25% of the total designated area within each Educational Zone will be reserved for the aforementioned specialized land use.

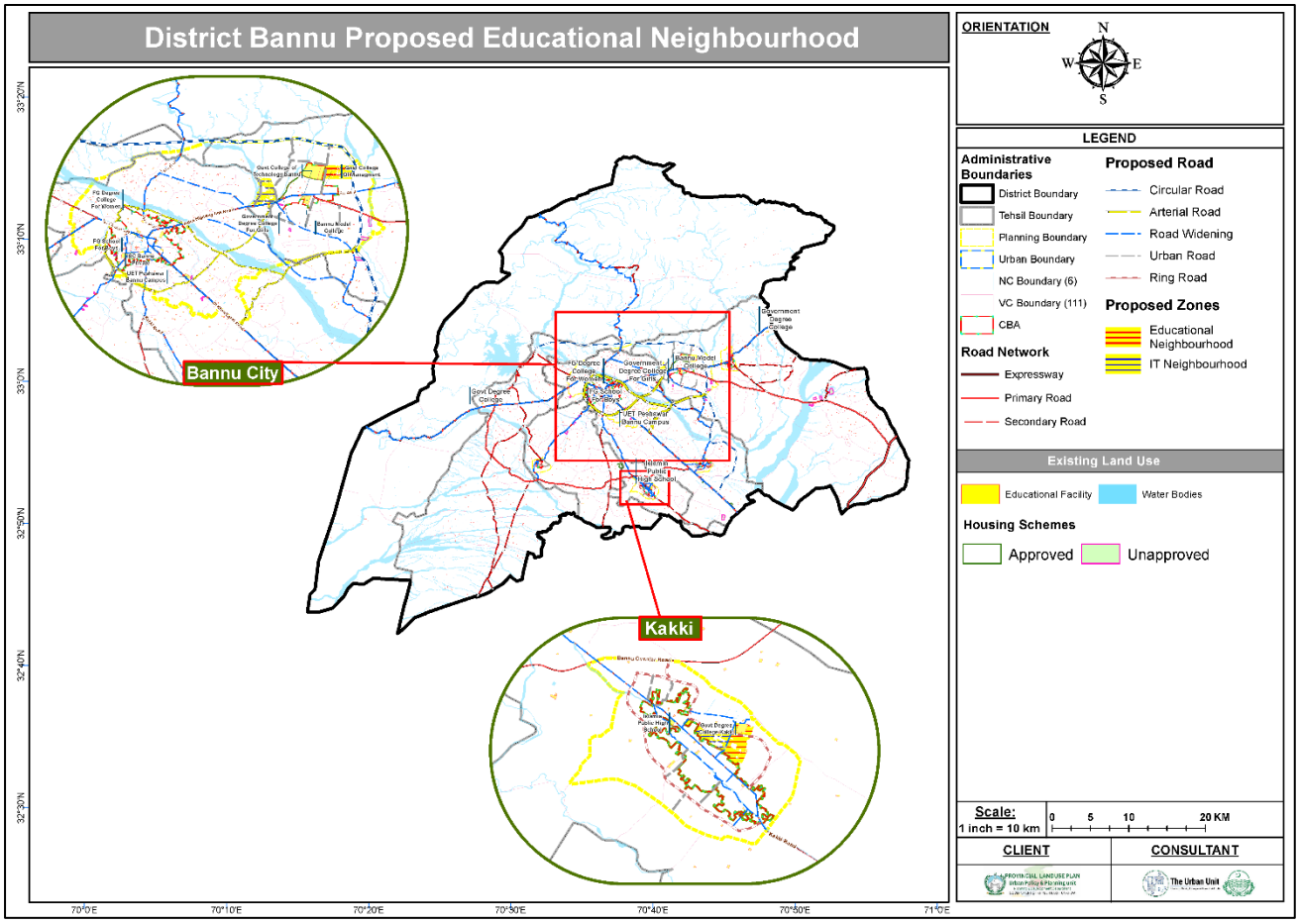
District Bannu Educational Zone

In Bannu City, the Education Neighborhood is strategically planned to meet the evolving educational demands of the population, ensuring equitable access to quality learning environments within a structured urban framework. Approximately 6% of the total proposed residential area is allocated for the education neighborhood. The neighborhood is designated to accommodate institutions of higher education, including public and private colleges, vocational and research institutes, and training centers. Notably, 25% of its total area is earmarked for specialized educational functions, reinforcing the city's commitment to fostering a well-educated and skilled workforce. This strategic allocation plays a pivotal role in driving sustainable socio-economic development and encouraging innovation across the region.

In Kakki City, the Education Neighborhood is strategically planned to serve the growing educational needs of the whole urban population, ensuring access to quality learning environments within a well-defined urban framework. Approximately 6% of the total proposed residential area is allocated for the education neighborhood. It is designed for higher education, vocational institutes, and training centers. With 25% of its area hectares dedicated to such educational activities. The development of a skilled and educated population, promoting long-term socio-economic growth and innovation

Due to its smaller population size, Domel City has not been allocated a separate Education Neighborhood. However, it is located near Bannu City, which includes a significantly large proposed Education Neighborhood planned to serve both provincial and national-level educational needs. As a result, the educational requirements of Domel City can be efficiently met through the facilities available in Bannu, eliminating the need for a separate educational zone within Domel itself.

The Ghoriwala and Nurar Urban Centers are served by proposed Institutional Zones, which are designed to accommodate educational, health, and public facilities. Due to the relatively low population in both urban centers, a dedicated Education Neighborhood has not been proposed. However, the educational needs of these areas are addressed through the Institutional Zones, which support both public and private educational institutions, as well as specialized training centers and technical institutes.



Map 3-22: District Bannu Proposed Educational Neighborhood

3.3.1.4.1 Educational Neighborhood Locational Criteria

The allocation of educational neighborhoods is based on several key criteria: proximity to residential developments, adjacency to existing educational institutions or green/open spaces, accessibility to road networks, and availability of suitable land parcels.

In **Bannu City**, the proposed educational neighborhood is strategically located adjacent to the existing University of Science & Technology on its west side. To the east lies the proposed recreational zone, while the southern boundary connects with the planned health neighborhood, which will host research institutes and maintain functional links with the educational zone. The area will be accessible from the under-construction circular road on the east and a newly proposed urban road on the west, enhancing connectivity. To the north, the zone is bordered by both existing and proposed residential developments. The site itself is currently barren land, making it highly suitable for development based on all the outlined criteria.

In **Kakki Urban Area**, the educational neighborhood is proposed adjacent to the Government Degree College on its north side. A recreational zone is planned to the northeast of the site. The area is currently accessible from Kakki Road, with a proposed ring road planned to further improve its connectivity

3.3.2 Health

A health facility refers to an institution that offers both curative and preventive health services to the public, whether through outpatient or inpatient care. Before the partition of the Subcontinent, Pakistan's healthcare system followed the British model. Since then, it has developed into a network of public and private sector services, offering primary, secondary, and tertiary care. In rural and peri-urban areas, healthcare is mainly provided through dispensaries, Basic Health Units (BHUs), sub-health centers, maternity and child health centers, and rural health centers. In urban areas, both public and private sectors run tertiary care facilities, forming a comprehensive healthcare system.

3.3.2.1 Existing Health Facilities

In District Bannu, health facilities are categorized into government and private institutions.

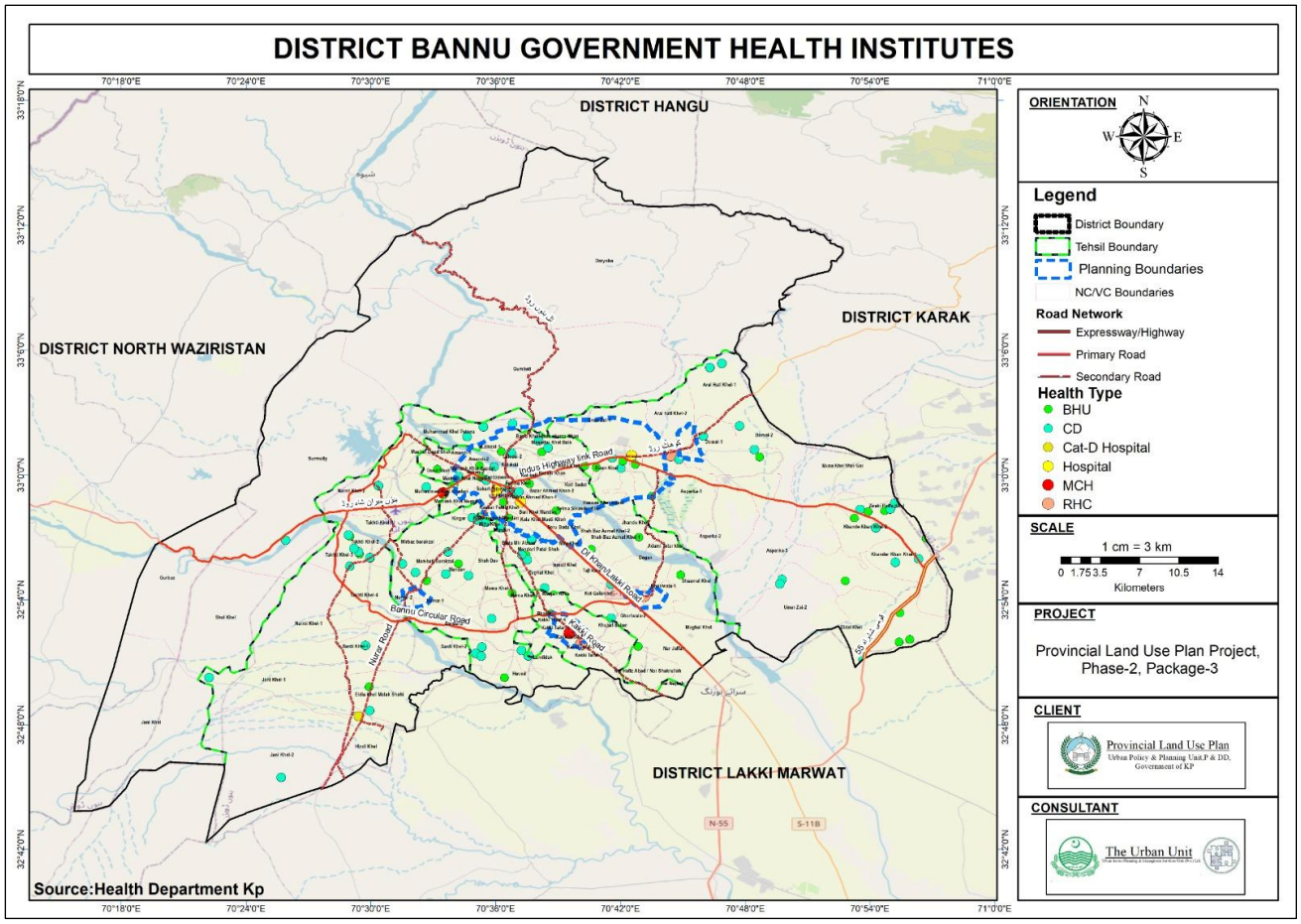
3.3.2.1.1 Government Healthcare

District Bannu has 6 hospitals with 862 beds across urban and rural areas. The urban areas have 5 hospitals with 822 beds; furthermore, 2 Rural Health Centers (RHCs) with 28 beds, 14 Basic Health Units (BHUs), 11 Dispensaries, and 2 Mother Child Health Centers (MCHCs). While the rural areas have only 1 hospital with 40 beds. Additionally, the rural areas include 1 Rural Health Center (RHCs) with 18 beds, 29 Basic Health Units (BHUs), and 56 dispensaries.

Table 3-32: District Bannu Public Health Institutes[35]

Administrative Area	Hospitals		Rural Health Centers		Basic Health Units	Dispensaries	Mother Child Health Centers
	Number	Beds	Number	Beds			
District Urban	5	822	2	28	14	11	2
District Rural	1	40	1	18	29	56	-
District Overall	6	862	3	46	43	67	2
Urban							
Bannu Urban	4	782	-		12	11	-
Ghoriwala Urban	-	-	1	18	-	-	1
Domel Urban	-	-	-	-	-	-	-
Kakki Urban	1	40	1	10	2	-	1
Nurar Urban	-	-	-	-	-	-	-
Rural							
Tehsil Bannu	-	-	-		11	8	-
Tehsil Domel	-	-	1	18	10	15	-
Tehsil Kakki	-	-	-	-	-	1	-
Tehsil Miryan	-	-	-	-	4	15	-
Tehsil Bakakhel	1	40	-	-	4	16	-
Tehsil Wazir	-	-	-	-	-	1	-

[35] *Secondary data were collected from the Independent Monitoring Unit, Health Department, Khyber Pakhtunkhwa, and District Health Information System, Khyber Pakhtunkhwa in January 2023.*



Map 3-23: District Bannu Public Health Facilities

3.3.2.1.2 Private Facilities

District Bannu has a total of 2 hospitals, 74 clinics, 11 medical centers, 27 homeopathic clinics, 11 Unani clinics, and 97 laboratories. A breakdown of healthcare facilities by area shows that urban areas host the majority of services, including all 2 hospitals, 70 clinics, 10 medical centers, 25 homeopathic clinics, 10 Unani clinics, and 93 laboratories. In contrast, rural areas have limited healthcare access, with only 4 clinics, 1 medical center, 2 homeopathic clinics, 1 Unani clinic, and 4 laboratories, and no hospitals available.

Table 3-33: District Bannu Private Health Facilities[36]

Administrative Area	Hospitals	Clinics	Medical Center	Homeopathic Clinic	Unani Clinic	Laboratories
District Urban	2	70	10	25	10	93
District Rural	0	4	1	2	1	4
District Overall	2	74	11	27	11	97
Urban						
Bannu	2	64	10	23	10	88
Ghoriwala	-	-	-	1	-	-
Domel	-	5	-	-	-	5
Kakki	-	1	-	1	-	-
Nurar	-	-	-	-	-	-
Rural						
Tehsil Bannu	-	2	-	1	1	4
Tehsil Domel	-	2	1	-	-	-

[36] *Secondary data were collected from the Health Care Commission, Khyber Pakhtunkhwa in January 2023.*

Administrative Area	Hospitals	Clinics	Medical Center	Homeopathic Clinic	Unani Clinic	Laboratories
Tehsil Kakki	-	-	-	1	-	-
Tehsil Miryan	-	-	-	-	-	-
Tehsil Bakakhel	-	-	-	-	-	-
Tehsil Wazir	-	-	-	-	-	-

3.3.2.2 Doctor to Population Ratio

The doctor-to-population ratio, also known as physician density, is a key metric used to assess healthcare accessibility and the distribution of healthcare providers within a population. It is typically expressed as the number of physicians per 1,000 or 10,000 inhabitants. The ideal doctor-to-population ratio varies depending on factors such as the healthcare needs of the population, the distribution of healthcare resources, the prevalence of diseases, and the level of healthcare infrastructure and services available.

Human resources are crucial for quality healthcare, with a minimum threshold of 4.45 health workers per 1,000 people to achieve UHC/SDG-3. This includes 1.11 doctors and 3.34 nurses, LHVs, and midwives per 1,000.

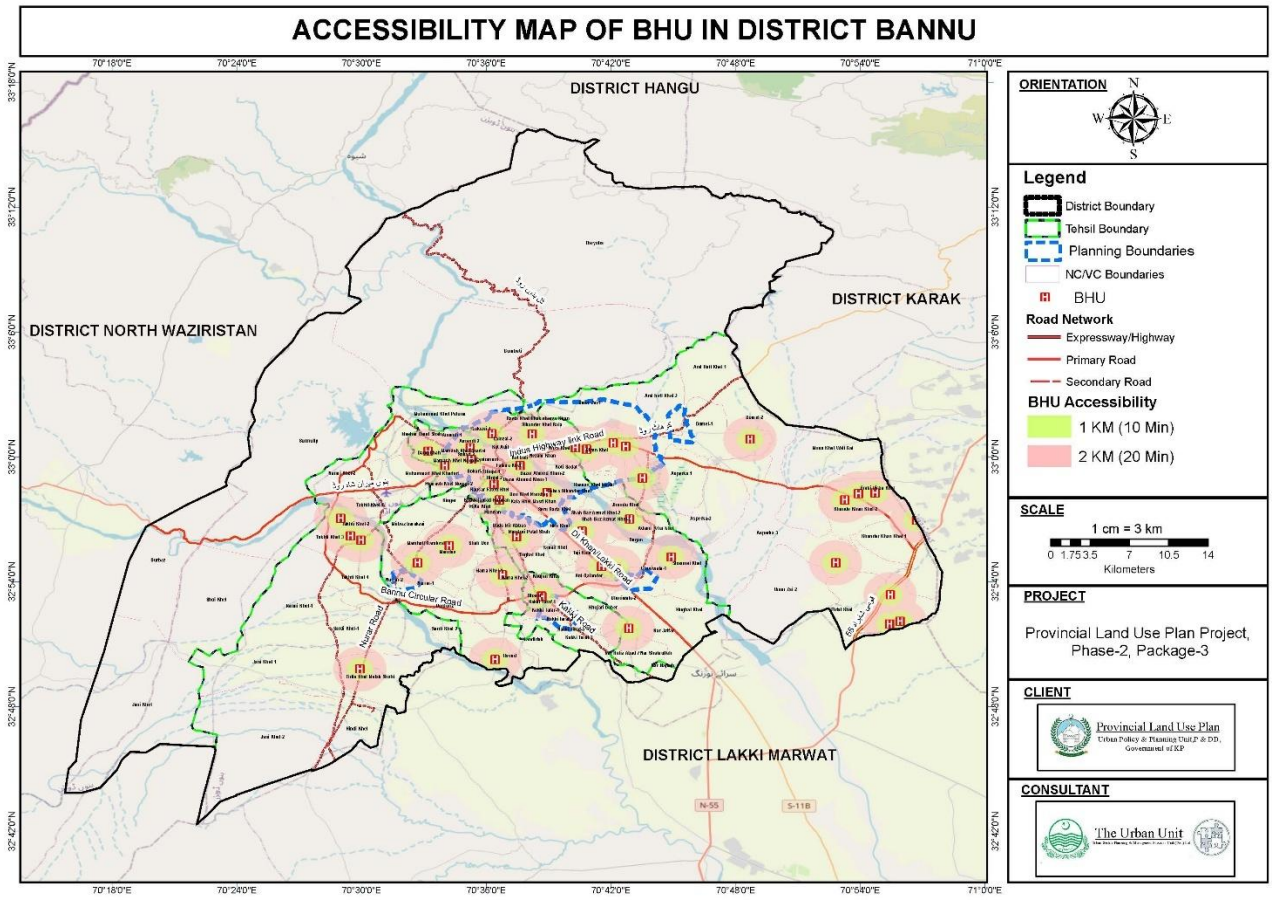
In District Bannu, 70 doctors serve a projected 2025 population of 1,529,185, resulting in a doctor-to-population ratio of 0.045:1,000. According to the population ratio, it is found that a single doctor is serving 22,222 individuals in District Bannu. The district also has 20 nurses, 40 LHVs, and 105 midwives, with a combined ratio of 0.10:1,000. Overall, the essential health workforce ratio is just 0.15:1,000—significantly below the UHC standard[37].

3.3.2.3 Accessibility Analysis of BHUs and RHCs

The accessibility map of Basic Health Units (BHUs) in District Bannu illustrates the spatial distribution of healthcare services and highlights both served and unserved areas based on proximity to BHUs. Areas falling within 10–20-minute walk around BHU are considered served, as they offer relatively easy access to primary healthcare. Settlements such as Mandan, Mama Khel (1 & 2), Ghoriwala (1 & 2), Jani Khel (1 & 2), Umer Zai (1 & 2), Domel (1 & 2), Ismail Khel, and Kakki Taraf (1, 3, 4, 5) fall within these zones and benefit from timely access to health services. However, a significant portion of District Bannu remains underserved. Villages including Gumbati, Daryoba, Degan, Kinger, Asperka (1–3), Takhti Khel (1–4), Shoi Khel, Narmi Khel (1 & 2), and Musa Khel Wali Gai are located beyond the 2 km buffer, indicating a lack of adequate access to BHUs. These areas either suffer from geographic remoteness or poor road connectivity, making it difficult for residents to reach healthcare facilities. Accessibility is further constrained in peripheral regions where infrastructure is underdeveloped. To bridge this gap, strategic interventions such as the establishment of new BHUs in high-need localities (e.g., Asperka and Takhti Khel), enhancement of road networks, and the deployment of mobile health units are recommended to ensure equitable healthcare access across the district. Hence accessibility analysis gap requires;

i. Establish new BHUs in high-density, underserved areas such as Asperka, Takhti Khel, and Gumbati.
ii. Upgrade connectivity through better roads to existing BHUs.
iii. Deploy mobile BHU vans for distant villages like Musa Khel Wali Gai and Degan.

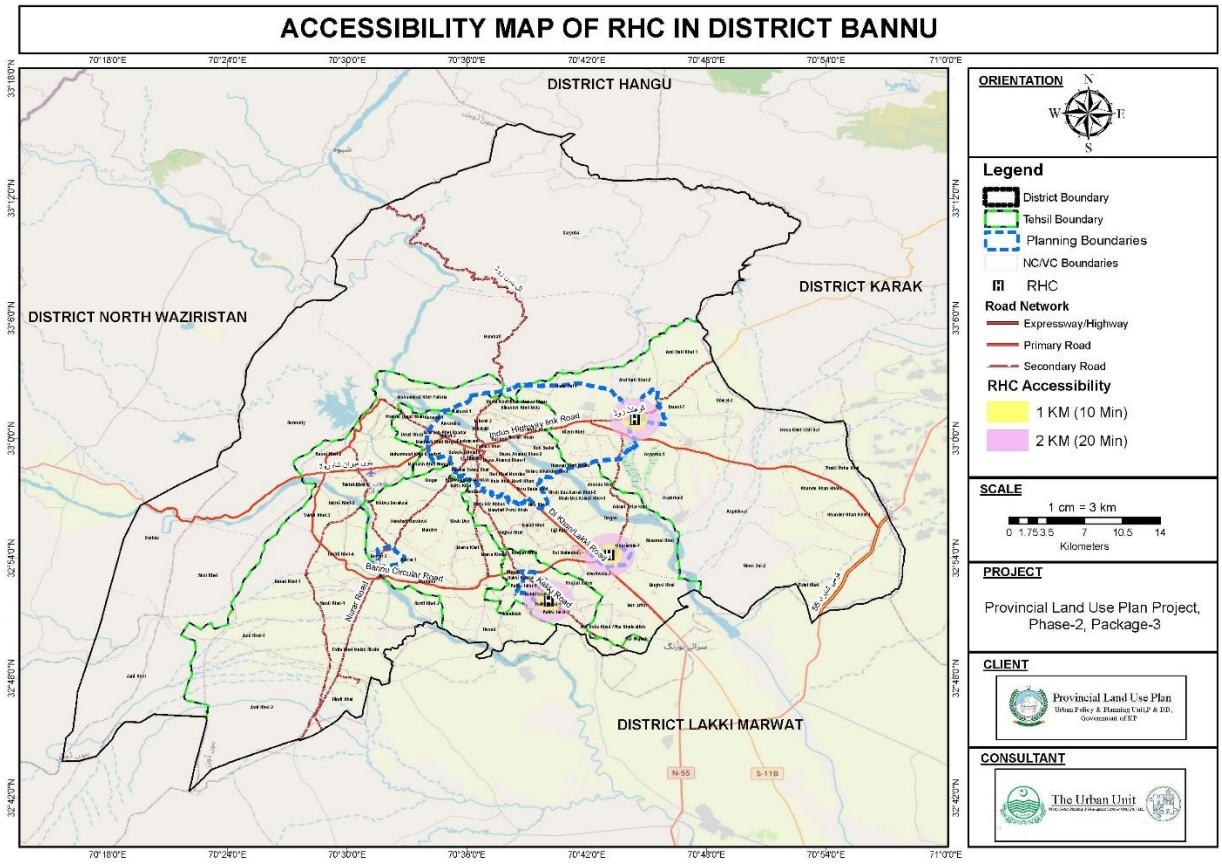
[37] *Secondary data collected from Heath department*



Map 3-24: District Bannu Accessibility Analysis of BHU

The Accessibility Map of Rural Health Centres (RHCs) in District Bannu provides a spatial overview of healthcare coverage by mapping the areas falling within 10–20-minute buffers around each RHC. The map reveals that the central and semi-urban areas of the district, particularly settlements along major roads such as the Indus Highway Link Road and Bannu Circular Road, enjoy relatively better access to RHC services. Key localities like Mandori Patal Shah, Kot Qalander, Domel, Ghoriwala, Ismail Khel, Mughal Khel, Mandan, and Mama Khel are all situated within the accessible range of existing RHCs. These areas benefit from proximity to both health facilities and primary transportation routes. However, a significant number of peripheral and rural settlements remain underserved. Villages such as Boza Khel, Basia Khel, Jani Khel-2, Daryoba, Gumbati, Ziraki Pirba Khel, Kinger, Landidak, and Asperka fall outside the 2 km buffer zones, indicating poor accessibility. These areas are not only distant from existing RHCs but also lack adequate road infrastructure, making healthcare access more challenging. The northern, western, and southeastern belts of the district are particularly underserved. To address these disparities, the establishment of new RHCs in high-need remote areas, improvements in rural road connectivity, and the introduction of mobile or outreach health services are essential steps toward ensuring equitable healthcare access across District Bannu. Hence accessibility analysis gap requires;

i. Establish new RHCs in western (Gumbati, Daryoba), southeastern (Boza Khel, Basia Khel), and eastern (Landidak, Kinger) clusters.
ii. Upgrade and extend road infrastructure to support faster travel from remote villages to existing RHCs.
iii. Deploy mobile health units and telehealth services to bridge the access gap in hilly or hard-to-reach regions.



Map 3-25: District Bannu Accessibility Analysis of RHC

3.3.2.4 Need for New Health Facilities

3.3.2.4.1 New BHUs (Current Backlog and Future Requirement)

The need for new BHUs has been calculated based on Health Department Standards 1 BHU for every 12000 population (Tehsil-Wise). The required BHUs were calculated by dividing the total population of each Tehsil by 12,000. The required BHUs of each Tehsil were then subtracted from the existing BHUs, and the result was the backlog of BHUs in that Tehsil.

The detailed analysis has been conducted at the NC/VC (Neighbourhood Council/Village Council) level. When the population of a specific NC/VC is divided by the NRM standards for the required and backlog columns, the resulting values often include decimals. For planning purposes, these decimal values are not rounded up; instead, they are taken as the lower whole number. For example, values like 0.5 or 0.9 are considered as 0, while values such as 2.5 or 2.9 are treated as 2. This approach is applied to the health sector, including BHU's and RHC's.

District Bannu, based on its current population, experiences a significant shortage in healthcare facilities. In urban areas, there are currently 15 existing Basic Health Units (BHUs) against a requirement of 44, resulting in a backlog of 29 BHUs. In rural areas, 28 BHUs are available, whereas the requirement stands at 49 with a backlog of 32. Overall the district has 43 Basic Health Units (BHUs) against a required 93, resulting in a backlog of 61 units. According to projections, the population is expected to reach 2,813,641 by 2045, in urban areas, the maximum population threshold considered for establishing a Community Health Center is 20,000. Due to the existing facilities such as hospitals. BHU's at the VC level showed minimal requirements. Therefore, the consultant merged multiple VCs to meet the necessary criteria. A detailed VC wise breakdown is provided in the Table below.

Table 3-34: Plan Period requirement of CHC's in District Bannu

Tehsil	Name of NC/VC	Population 2025	Required CHC's 2025	Population 2045	Required CHC's 2045
Bannu	Bannu Urban	490132	25	864863	43
Bannu	Ghoriwala Urban	21079	1	37484	2
Domel	Domel Urban	10879	1	22937	1
Kakki	Kakki Urban	32585	2	57944	3
Miryan	Nurrar Urban	15814	1	28123	1

Table 3-35: Plan Period requirement of BHU's in District Bannu

Tehsil	Name NC/VC	Population 2025	Existing BHU's	Required BHU's 2025	Backlog BHU's 2025	Spatially Clustered NC/VCs	Population 2045	Required BHU's 2045
Bannu	Adami Tetar khel	14695	0	1	1	Adami Tetar khel	26132	2
Bannu	Amandi-1	9827	0	0	0	Amandi-1	17475	1
Domel	Aral Hati Khel-1	19286	0	1	1	Aral Hati Khel-1	40663	3
Domel	Aral hati Khel-2	13751	0	1	1	Aral hati Khel-2	28990	2
Domel	Asperka-1	17119	0	1	1	Asperka-1	36094	3
Domel	Asperka-2	15300	1	1	0	Asperka-2	32258	2
Domel	Asperka-3	20932	1	1	0	Asperka-3	44132	3
Bannu	Bada Mir Abbas	10059	0	0	0	Bada Mir Abbas	17887	1
Kakki	Bharat	20716	0	1	1	Bharat	36838	3
Miryan	Dardariz	14426	0	1	1	Dardariz	25653	2
Wazir	Daryoba	13352	0	1	1	Daryoba	30577	2
Bannu	Daud Shah	13834	1	1	0	Daud Shah	24601	2
Bannu	Degan	13256	3	1	0	Degan	23573	2
Domel	Domel-1	13177	1	1	0	Domel-1	27783	2
Domel	Domel-2	16902	0	1	1	Domel-2	35636	3
Domel	Eidal Khel	26166	3	2	0	Eidal Khel	55168	4
Baka Khel	Eidia Khel Malak Shahi	14977	1	1	0	Eidia Khel Malak Shahi	26634	2
Bannu	Ghoriwala-1	4606	0	0	0	Ghoriwala-1	24079	2
Bannu	Ghoriwala-2	8935	0	0	0	Ghoriwala-2		
Wazir	Gumbati	12172	0	1	1	Gumbati	27875	2
Wazir	Gurbaz	10300	0	0	0	Gurbaz	23587	2
Miryan	Haved	8946	1	0	0	Haved	15908	1
Baka Khel	Hindi Khel	14256	0	1	1	Hindi Khel	25351	2
Bannu	Ismail Khel	13537	0	1	1	Ismail Khel	24073	2
Wazir	Jani Khel	9052	0	0	0	Jani Khel	20729	1
Baka Khel	Jani Khel-1	10954	0	0	0	Jani Khel-1	19479	1

Tehsil	Name NC/VC	Population 2025	Existing BHU's	Required BHU's 2025	Backlog BHU's 2025	Spatially Clustered NC/VCs	Population 2045	Required BHU's 2045
Baka Khel	Jani Khel-2	12441	0	1	1	Jani Khel-2	22123	1
Bannu	Jhandu Khel	10678	1	0	0	Jhandu Khel	18989	1
Kakki	Kakki Taraf-3	11965	0	1	1	Kakki Taraf-3	21277	1
Kakki	Kakki Taraf-4	3144	0	0	0	Kakki Taraf-4	34807	3
Kakki	Kakki Taraf-5	5858	0	0	0	Kakki Taraf-5		
Domel	Khande Khan Khel-2	11729	0	1	1	Khujari baber		
Domel	Khander Khan Khel-1	13440	1	1	0	Khande Khan Khel-2	24728	2
Kakki	Khujari baber	10571	0	0	0	Khander Khan Khel-1	28337	2
Kakki	Khujari Khas	10214	0	0	0	Khujari Khas	18162	1
Miryan	Kinger	13956	0	1	1	Kinger	24818	2
Bannu	Kot Qalander	18359	0	1	1	Kot Qalander	32647	2
Miryan	Landidak	19064	0	1	1	Landidak	33900	2
Miryan	Mama Khel-1	15212	1	1	0	Mama Khel-1	27050	2
Miryan	Mama Khel-2	12555	0	1	1	Mama Khel-2	22326	1
Bannu	Mamash Khel Nogari-2	14396	0	1	1	Mamash Khel Nogari-2	25599	2
Miryan	Mambati Barakzai	14366	1	1	0	Mambati Barakzai	25546	2
Bannu	Mandan	13214	0	1	1	Mandan	23497	2
Miryan	Mandev	17198	1	1	0	Mandev	30583	2
Bannu	Mandori Patal Shah	21097	0	1	1	Mandori Patal Shah	37516	3
Bannu	Masher Daud Shah	11786	0	1	1	Masher Daud Shah	20959	1
Bannu	Mira Khel	12185	0	1	1	Mira Khel	21668	1
Miryan	Mirbaz barakzai	15713	0	1	1	Mirbaz barakzai	27941	2
Miryan	Mitta Khel	16045	0	1	1	Mitta Khel	28532	2
Bannu	Mughal Khel	15898	0	1	1	Mughal Khel	28270	2
Baka Khel	Muhammad Khel Khedari	13133	0	1	1	Muhammad Khel Khedari	23354	1
Baka Khel	Muhammad Khel Patona	16482	0	1	1	Muhammad Khel Patona	29309	2
Domel	Musa Khel Wali Gai	7490	0	0	0	Musa Khel Wali Gai	15792	1
Bannu	Nar Hafiz Abad / Nar Shakrullah	12554	0	1	1	Nar Hafiz Abad / Nar Shakrullah	22324	1
Bannu	Nar Jaffar	16720	1	1	0	Nar Jaffar	29732	2
Kakki	Nar Najeeb	8345	0	0	0	Nar Najeeb	14840	1
Baka Khel	Narmi Khel-1	12199	0	1	1	Narmi Khel-1	21693	1
Baka Khel	Narmi Khel-2	5912	0	0	0	Narmi Khel-2	27946	2
Miryan	Nurrar-1	11198	0	0	0	Takhti Khel-1		
Miryan	Nurrar-2	597	0	0	0	Nurrar-1	20974	1
Baka Khel	Sardi Khel-1	14685	0	1	1	Nurrar-2		

Tehsil	Name NC/VC	Population 2025	Existing BHU's	Required BHU's 2025	Backlog BHU's 2025	Spatially Clustered NC/VCs	Population 2045	Required BHU's 2045
Baka Khel	Sardi Khel-2	5596	0	0	0	Sardi Khel-1	36065	3
Bannu	Shaamsi Khel	15217	1	1	0	Sardi Khel-2		
Bannu	Shah Baz Azmat Khel-1	9631	0	0	0	Shaamsi Khel	35875	3
Bannu	Shah Baz Azmat Khel-2	6433	1	0	0	Shah Baz Azmat Khel-1	27059	2
Miryan	Shah Dev	20174	0	1	1	Shah Baz Azmat Khel-2	17126	1
Wazir	Shoi Khel	6970	0	0	0	Shah Dev	11440	1
Wazir	Surmully	8212	0	0	0	Shoi Khel	15963	1
Bannu	Taji Kala	12272	1	1	0	Surmully	18805	1
Baka Khel	Takhti Khel-1	9803	0	0	0	Taji Kala	21823	1
Baka Khel	Takhti Khel-2	7731	0	0	0	Takhti Khel-2	13748	1
Baka Khel	Takhti Khel-3	6869	3	0	0	Takhti Khel-3	12214	1
Baka Khel	Takhti Khel-4	8658	0	0	0	Takhti Khel-4	15395	1
Bannu	Tughal Khel	13298	1	1	0	Tughal Khel	23647	2
Domel	Umer Zai-2	7850	0	0	0	Umer Zai-2	16551	1
Domel	Ziraki Pirba Khel	19050	3	1	0	Ziraki Pirba Khel	40165	3
TOTAL		**958696**	**28**	**49**	**32**		**1802290**	**125**

3.3.2.4.2 New RHCs (Current Backlog and Future)

The need for New RHCs has been calculated based on Health Department standards. 1 RHC for every 50.000 population (Tehsil-Wise). The required RHCs were calculated by dividing the total population of each Tehsil by 50,000. The required RHCs of each Tehsil were then subtracted from the existing RHCs, and the result was the backlog of RHCs in that Tehsil.

District Bannu, based on its current population, experiences a significant shortage in healthcare facilities. It has only 3 Rural Health Centers (RHCs) against a required 9, resulting in a backlog of 9 units in urban area. According to projections, the population is expected to reach 2,813,641 by 2045, so more than one VC is merged with neighboring VCs to meet the criteria, which will increase the requirement to 29 RHCs to ensure sufficient healthcare services. A detailed tehsil-wise breakdown is provided in the table below.

Table 3-36: Plan Period requirement of RHC's in District Bannu

Tehsil	Name of VC	Population 2025	Existing RHC's	Required RHC's 2025	Backlog RHC's 2025	Spatially Clustered VCs	Population 2045	Required RHC's 2045
Bannu	Adami Tetar khel	14695	0	0	0	Adami Tetar khel	104569	2
Bannu	Amandi-1	9827	0	0	0	Degan		
Domel	Aral Hati Khel-1	19286	0	0	0	Jhandu Khel		
Domel	Aral hati Khel-2	13751	1	0	0	Shaamsi Khel		
Domel	Asperka-1	17119	0	0	0	Amandi-1	92344	1
Domel	Asperka-2	15300	0	0	0	Daud Shah		
Domel	Asperka-3	20932	0	0	0	Muhammad Khel Patona		
Bannu	Bada Mir Abbas	10059	0	0	0	Masher Daud Shah		
Kakki	Bharat	20716	0	0	0	Aral Hati Khel-1	133072	2
Miryan	Dardariz	14426	0	0	0	Aral hati Khel-2		
Wazir	Daryoba	13352	0	0	0	Domel-1		
Bannu	Daud Shah	13834	0	0	0	Domel-2		
Bannu	Degan	13256	0	0	0	Asperka-1	112484	2
Domel	Domel-1	13177	0	0	0	Asperka-2		
Domel	Domel-2	16902	0	0	0	Asperka-3		
Domel	Eidal Khel	26166	0	0	0	Bada Mir Abbas	155152	3
Baka Khel	Eidia Khel Malak Shahi	14977	0	0	0	Mandori Patal Shah		
Bannu	Ghoriwala-1	4606	0	0	0	Mandan		
Bannu	Ghoriwala-2	8935	0	0	0	Mitta Khel		
Wazir	Gumbati	12172	0	0	0	Ismail Khel		
Wazir	Gurbaz	10300	0	0	0	Tughal Khel		
Miryan	Haved	8946	0	0	0	Bharat	128897	2
Baka Khel	Hindi Khel	14256	0	0	0	Kakki Taraf-4		
Bannu	Ismail Khel	13537	0	0	0	Dardariz		
Wazir	Jani Khel	9052	0	0	0	Mama Khel-1		
Baka Khel	Jani Khel-1	10954	0	0	0	Mama Khel-2		
Baka Khel	Jani Khel-2	12441	0	0	0	Shah Dev		
Bannu	Jhandu Khel	10678	0	0	0	Ghoriwala-1	84996	1
Kakki	Kakki Taraf-3	11965	0	0	0	Ghoriwala-2		
Kakki	Kakki Taraf-4	3144	0	0	0	Mughal Khel		
Kakki	Kakki Taraf-5	5858	0	0	0	Kot Qalander		
Domel	Khande Khan Khel-2	11729	0	0	0	Daryoba	116807	2
Domel	Khander Khan Khel-1	13440	0	0	0	Gumbati		
Kakki	Khujari baber	10571	0	0	0	Surmully		
Kakki	Khujari Khas	10214	0	0	0	Gurbaz		
Miryan	Kinger	13956	0	0	0	Shoi Khel		

Tehsil	Name of VC	Population 2025	Existing RHC's	Required RHC's 2025	Backlog RHC's 2025	Spatially Clustered VCs	Population 2045	Required RHC's 2045
Bannu	Kot Qalander	18359	0	0	0	Jani Khel	62331	1
Miryan	Landidak	19064	0	0	0	Jani Khel-1		
Miryan	Mama Khel-1	15212	0	0	0	Jani Khel-2		
Miryan	Mama Khel-2	12555	0	0	0	Khujari baber	118464	2
Bannu	Mamash Khel Nogari-2	14396	0	0	0	Khujari Khas		
Miryan	Mambati Barakzai	14366	0	0	0	Haved		
Bannu	Mandan	13214	0	0	0	Landidak		
Miryan	Mandev	17198	0	0	0	Kakki Taraf-3		
Bannu	Mandori Patal Shah	21097	0	0	0	Kakki Taraf-5		
Bannu	Masher Daud Shah	11786	0	0	0	Mamash Khel Nogari-2	157841	3
Bannu	Mira Khel	12185	0	0	0	Muhammad Khel Khedari		
Miryan	Mirbaz barakzai	15713	0	0	0	Kinger		
Miryan	Mitta Khel	16045	0	0	0	Mambati Barakzai		
Bannu	Mughal Khel	15898	0	0	0	Mirbaz barakzai		
Baka Khel	Muhammad Khel Khedari	13133	0	0	0	Mandev		
Baka Khel	Muhammad Khel Patona	16482	0	0	0	Musa Khel Wali Gai	180741	3
Domel	Musa Khel Wali Gai	7490	0	0	0	Khande Khan Khel-2		
Bannu	Nar Hafiz Abad / Nar Shakrullah	12554	0	0	0	Khander Khan Khel-1		
Bannu	Nar Jaffar	16720	0	0	0	Ziraki Pirba Khel		
Kakki	Nar Najeeb	8345	0	0	0	Eidal Khel		
Baka Khel	Narmi Khel-1	12199	0	0	0	Umer Zai-2		
Baka Khel	Narmi Khel-2	5912	0	0	0	Nurrar-1	109024	2
Miryan	Nurrar-1	11198	0	0	0	Nurrar-2		
Miryan	Nurrar-2	597	0	0	0	Eidia Khel Malak Shahi		
Baka Khel	Sardi Khel-1	14685	0	0	0	Sardi Khel-1		
Baka Khel	Sardi Khel-2	5596	0	0	0	Sardi Khel-2		
Bannu	Shaamsi Khel	15217	0	0	0	Hindi Khel		
Bannu	Shah Baz Azmat Khel-1	9631	0	0	0	Nar Hafiz Abad / Nar Shakrullah	66896	1
Bannu	Shah Baz Azmat Khel-2	6433	0	0	0	Nar Najeeb		
Miryan	Shah Dev	20174	0	0	0	Nar Jaffar		
Wazir	Shoi Khel	6970	0	0	0	Narmi Khel-1	90996	1
Wazir	Surmully	8212	0	0	0	Takhti Khel-1		
Bannu	Taji Kala	12272	0	0	0	Takhti Khel-2		

Tehsil	Name of VC	Population 2025	Existing RHC's	Required RHC's 2025	Backlog RHC's 2025	Spatially Clustered VCs	Population 2045	Required RHC's 2045
Baka Khel	Takhti Khel-1	9803	0	0	0	Takhti Khel-3		
Baka Khel	Takhti Khel-2	7731	0	0	0	Takhti Khel-4		
Baka Khel	Takhti Khel-3	6869	0	0	0	Narmi Khel-2		
Baka Khel	Takhti Khel-4	8658	0	0	0	Shah Baz Azmat Khel-1		
Bannu	Tughal Khel	13298	0	0	0	Shah Baz Azmat Khel-2	87676	1
Domel	Umer Zai-2	7850	0	0	0	Mira Khel		
Domel	Ziraki Pirba Khel	19050	0	0	0	Taji Kala		
TOTAL		**958696**	**1**	**0**	**0**		**1802290**	**29**

3.3.2.4.3 Recommendations

- Improve the availability of private healthcare services in rural areas to reduce travel time and ease the burden on public health facilities.
- Develop and expand BHUs across all tehsils to meet the needs of the current population, while also considering future population growth to ensure adequate healthcare services in District Bannu by 2045.
- Establish 27 new Rural Health Centers (RHCs) across the district, equipped with modern facilities, to enhance healthcare services.
- Increase the number of healthcare professionals—including doctors, nurses, LHVs, and midwives—to improve the health workforce ratio and move closer to the Universal Health Coverage (UHC) standard.
- In the tehsil of Domel and Bakakhel, upgrade Cat-D hospitals to C according to the health department's population threshold.

3.3.2.5 Future Plans

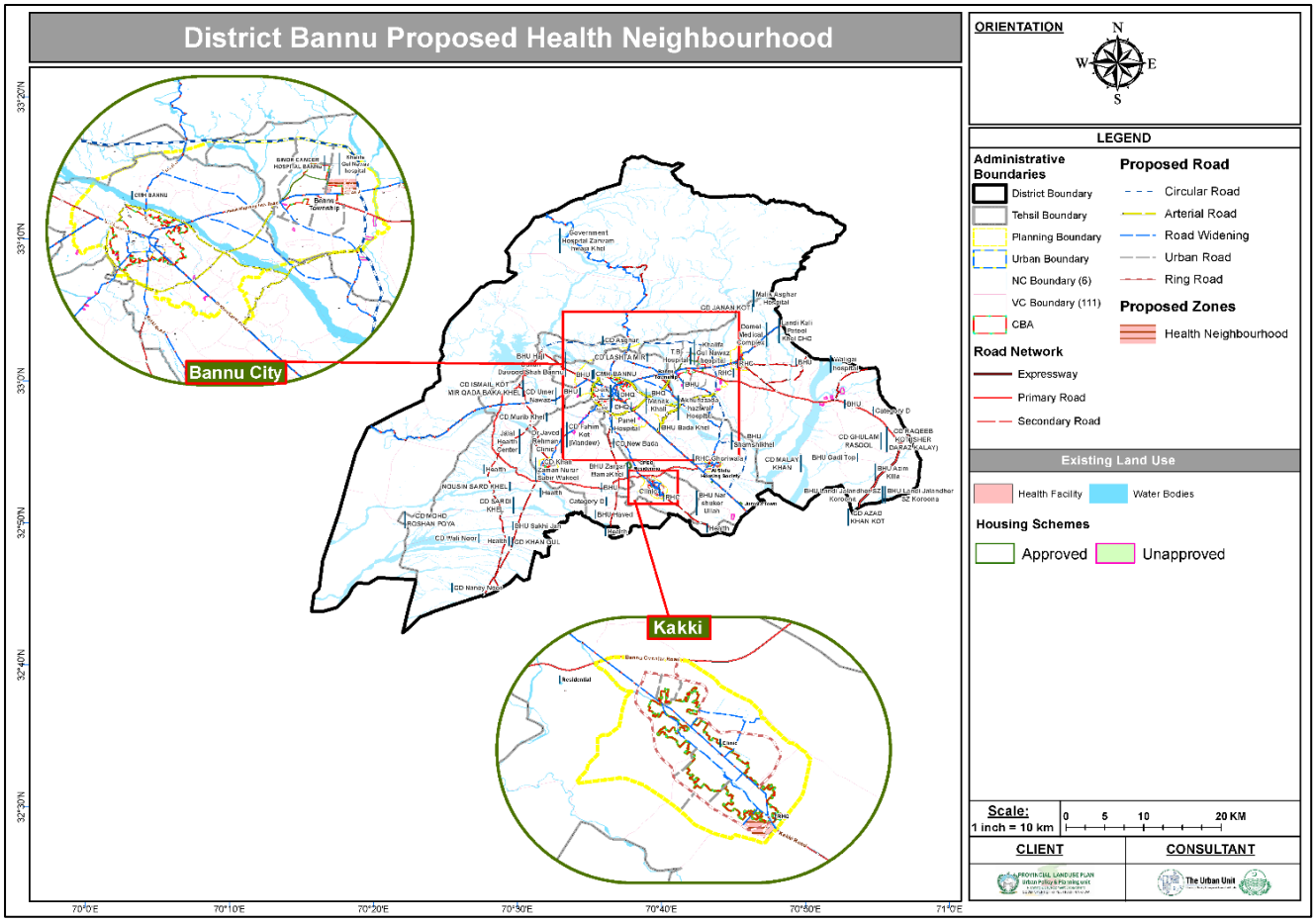
As part of the long-term land use planning for District Bannu, Health Neighborhoods are proposed in selected urban areas based on the projected population for the year 2045, specifically in urban areas where the population is expected to exceed 50,000 individuals. These neighborhoods are planned to accommodate a comprehensive range of health facilities, including public and private hospitals, laboratories, research centers, diagnostic clinics, and dispensaries, to meet the growing healthcare demands of the district. Basic healthcare needs—such as Basic Health Units (BHUs) and Rural Health Centers (RHCs)—are addressed through land allocated from the 100% additional area reserved for services and amenities under the district development framework. Additionally, 25% of the total designated area within each Health Zone will be reserved for the aforementioned specialized land use.

3.3.2.5.1 District Bannu Health Neighborhood

The proposed Health Neighborhood in Bannu City is proposed considering up to 4% of the total proposed residential land use area, and is strategically planned to cater to the evolving healthcare needs of a growing urban population. Designed as a comprehensive health zone, 25% of this area is reserved for specialized facilities, including hospitals, research centers, and medical training institutes, forming a hub for advanced medical services in the region. However, Ghoriwala's urban area falls within Bannu Tehsil; this health neighborhood is also intended to serve the Ghoriwala urban area. Additionally, the Domel urban area, located near Bannu City, is naturally integrated into this healthcare network and will rely on the services and infrastructure available within the Bannu Health Zone. To ensure complete coverage, essential primary healthcare services such as Basic Health Units (BHUs) and Rural Health Centers (RHCs) are separately accommodated within the additional land earmarked for amenities and public services. This forward-looking approach ensures that health services are not only accessible and well-distributed but also resilient and scalable to meet future demands across the district's urban landscape.

In the Kakki urban area, the health neighborhood (up to 4% of the total residential proposed land use area) is proposed to serve the healthcare needs of the growing population. Of this, 25% is reserved for specialized facilities such as hospitals, research centers, and medical training institutes. This ensures accessible, well-distributed, and future-ready health services within the urban framework.

The basic healthcare facilities for the Nurrar urban area, including services such as Basic Health Units (BHUs) and Rural Health Centers (RHCs), are accommodated within the 100% additional land allocated for services and amenities. In addition to these, private healthcare establishments—such as hospitals, clinics, and laboratories—are planned within the designated Institutional Zone, ensuring a balanced provision of both public and private health services to meet the current and future needs of the community.



Map 3-26: District Bannu Proposed Health Neighbourhood

3.3.2.5.2 Health Neighborhood Locational Criteria

The criteria for selecting a location for the health neighborhood include accessibility from the road, proximity to existing health facilities, availability of suitable land parcels, adjacency to open or green spaces, and a nearby residential area.

In **Bannu city**, the health neighborhood has been strategically allocated near the existing Khalifa Gul Nawaz Teaching Hospital. The site is accessible from Kohat Road (Old Bannu Road). To its south lies a proposed residential zone, the northeast side borders a recreational zone, and the north side is adjacent to a proposed educational neighborhood, reflecting the natural link between health and education. These factors collectively make this site an ideal location for a health neighborhood.

In the **Kakki urban area**, the proposed health neighborhood also meets the defined criteria. It is accessible from the main Kakki Road and is adjacent to the existing healthcare facility, RHC Kakki. To the west, it borders a recreational zone, while residential zones are situated to the north and northwest. These locational advantages support the suitability of this area for health-related development.

3.3.3 Recreational Facilities

Recreational facilities are an essential part of human life and find many different forms that are shaped naturally by individual interests but also by the surrounding environment. A list of recreational activities includes sports and playgrounds.

3.3.3.1 Sports Facilities

Sporting events have played pivotal roles in creating healthy communities around the globe. Today, contests pushing physical limits are more popular than ever before. As interest in health and longevity continues to rise, and government businesses continue to see sporting events as sound investments and long-lasting impacts, sports can play a vital role in shaping a vigorous society for the foreseeable future.

3.3.3.2 Existing Sports Facilities

The Existing sports facilities in District Bannu are identified from the data collected from the sports and youth affairs department and the district land use classification map.

3.3.3.2.1 Government Sports Facilities

In District Bannu, there are a total of 11 sports facilities which include 1 sports complex, 4 playgrounds, 1 cricket ground, 1 badminton court, 1 golf course, 1 hockey ground, and 2 tennis/basketball clubs.

In urban regions, Bannu city is comparatively well-equipped with sports facilities compared to other urban areas in the district. However, in rural areas, only Tehsil Bannu has a single playground, while the remaining tehsils lack any sports facilities altogether. The detailed data show in table below.

Table 3-37: District Bannu Government Sports Facilities[38]

Administrative Area	Government							
	Sports Complex	Playgrounds	Cricket Grounds	Football Grounds	Badminton	Golf	Hockey Ground	Tennis/Basketball Club
District Urban	1	3	1	-	1	1	1	2
District Rural	-	1	-	-	-	-	-	-
District Overall	1	4	1	0	1	1	1	2
Urban								
Bannu	1	3	1		1	1	1	2
Ghoriwala	-		-	-	-	-	-	-
Domel	-	-	-	-	-	-	-	-
Kakki	-	-	-	-	-	-	-	-
Nurar	-	-	-	-	-	-	-	-
Rural								
Tehsil Bannu	-	1	0	-	-	-	-	-
Tehsil Domel	-		-	-	-	-	-	-
Tehsil Kakki	-	-	-	-	-	-	-	-
Tehsil Miryan	-	-	-	-	-	-	-	-
Tehsil Bakakhel	-	-	-	-	-	-	-	-
Tehsil Wazir	-		-	-	-	-	-	-

3.3.3.2.2 Private Sports Facilities

In District Bannu, a total of 39 sports facilities have been identified, providing valuable spaces for residents to engage in physical activity and promote community well-being. These include 14 general-purpose playgrounds, 15 cricket grounds, 9 football grounds, and 1 volleyball ground. These facilities serve as important recreational hubs.

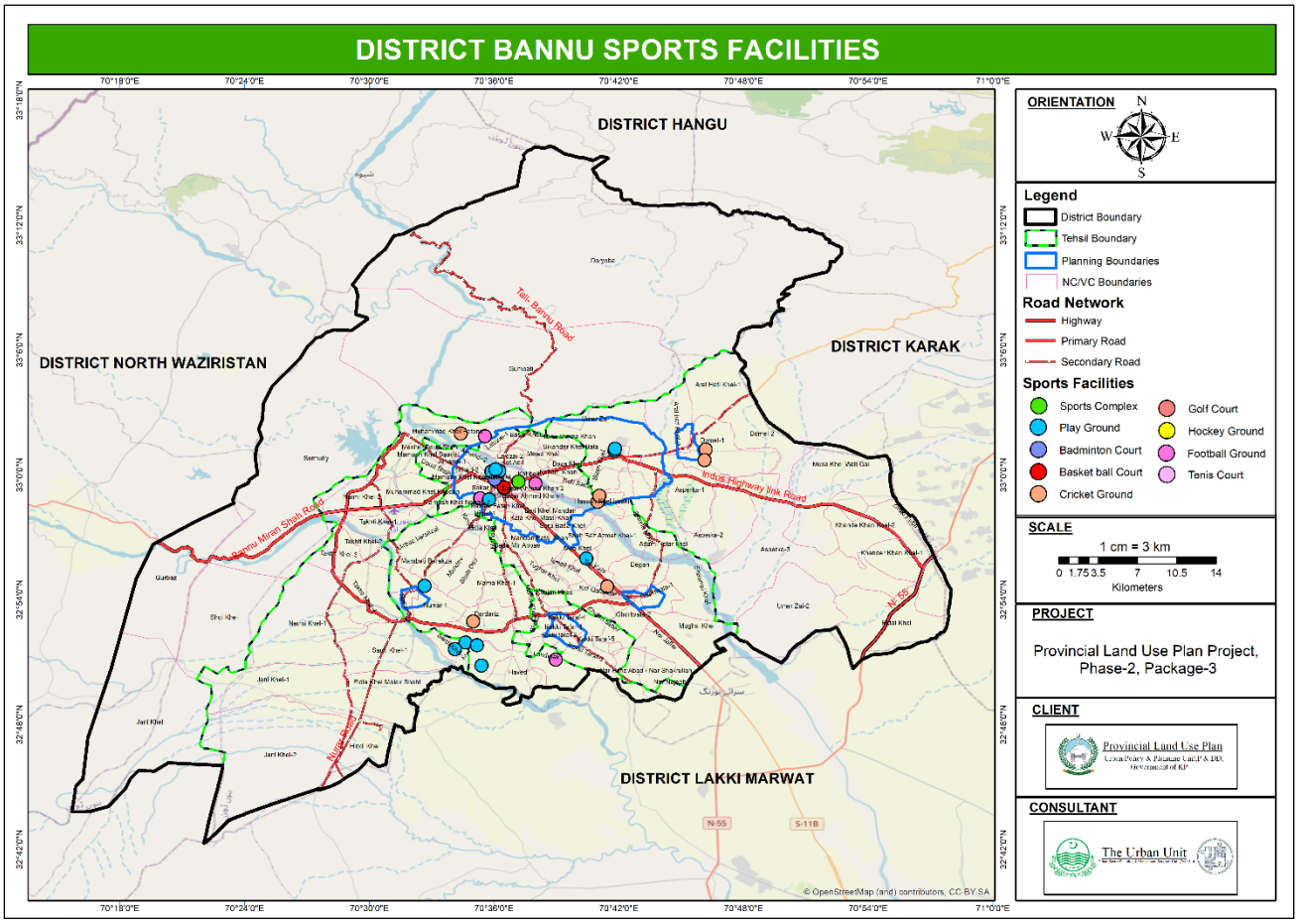
In the urban areas of District Bannu, Bannu city is relatively better equipped, featuring 3 playgrounds, 1 cricket ground, and 4 football grounds. In contrast, Ghoriwala urban has only 1 playground, while the remaining urban centers lack any dedicated sports facilities.

In the rural areas of District Bannu, the distribution of sports facilities varies across tehsils. Tehsil Bannu is equipped with 4 playgrounds, 3 cricket grounds, 1 football ground, and 1 volleyball ground. Tehsil Domel has 1 playground, 2 cricket grounds, and 2 football grounds. Tehsil Miryan features 3 playgrounds, 2 cricket grounds, and 1 football ground. Meanwhile, Tehsil Bakakhel stands out with 2 playgrounds, 7 cricket grounds, and 1 football ground. The detailed data is presented in the table below.

[38] *Secondary data collected from sports and youth affair department*

Table 3-38: District Bannu private Sports Facilities

Administrative Area	Private						
	Sports Complex	Playgrounds	Cricket Grounds	Football Grounds	Badminton	Golf	Tennis/Basketball Club
District Urban	-	4	1	4	-	-	-
District Rural	-	10	14	5	-	-	-
District Overall	-	14	15	9	-	-	-
Urban							
Bannu	-	3	1	4	-	-	-
Ghoriwala	-	1	-	-	-	-	-
Domel	-	-	-	-	-	-	-
Kakki	-	-	-	-	-	-	-
Nurar	-	-	-	-	-	-	-
Rural							
Tehsil Bannu	-	4	3	1	-	-	-
Tehsil Domel	-	1	2	2	-	-	-
Tehsil Kakki	-				-	-	-
Tehsil Miryan	-	3	2	1	-	-	-
Tehsil Bakakhel	-	2	7	1	-	-	-
Tehsil Wazir	-	-	-	-	-	-	-



Map 3-27: District Bannu Sports Facilities

3.3.3.2.3 Future requirements of sports facilities

Active recreation comprises formal and informal, outdoor and indoor games. The more capital-intensive the facility, the larger the catchment required for its viable operations. Sub-standard sizes may be considered for cricket and football, where the games are limited to the pre-teen and early teen age group. The table below delineates the standards set forth by the National Reference Manual for Infrastructure

and Planning for the establishment of new active recreational facilities at various levels of settlements and threshold populations:

Table 3-39: Active Recreation Facilities Allocation Criteria

Type of Facility	Population Criteria	Sports	Size
Metropolitan City Stadiums	Above 2,000,000	Cricket	2.5 hectares
		Hockey	2.8 hectares
		Football	1.5 hectares
City Stadiums	Above 300,000	Cricket	2 hectares
	Above 200,000	Hockey	1.15 hectares
		Football	1.4 hectares
Community Level Playgrounds	Around 100,000	Combined Playground	2.14 hectares
Neighborhood Level Playgrounds	Around 25,000	Combined Playground	1.63 hectares

3.3.3.2.4 Playgrounds (Current Backlog and Future Requirement)

The need for new playgrounds was assessed using NRM standards, which recommend one neighborhood-level playground for every 25,000 people in each NC/VC. To determine the backlog, this standard threshold divided the population of each settlement, and the number of existing playgrounds was subtracted to calculate the backlog.

In District Bannu, there are currently 18 existing playgrounds, while the total required is 21, resulting in a backlog of 15 playgrounds. In urban areas, the existing number of playgrounds 7, falls short of the required 20, leaving a gap of 14. In rural areas, there are 11 playgrounds available, compared to a need for 1, creating a backlog of 1. This indicates a clear need for the development of additional sports facilities to meet the demands of the current population. The projected future requirements for playgrounds are also presented in the Table below.

Table 3-40: Need for new playgrounds (Current backlog and future projection)

Area	Tehsil	Name NC/VC	Population 2025	Existing Playgrounds	Required Playgrounds 2025	Backlog Playgrounds 2025	Population 2045	Required Playgrounds 2045
URBAN	**Bannu**	**Bannu Urban**	**490132**	**6**	**19**	**13**	**864863**	**34**
	Bannu	**Ghoriwala Urban**	**21079**	**1**	**0**	**0**	**37484**	**1**
	Domel	**Domel Urban**	**10879**	**0**	**0**	**0**	**22937**	**0**
	Kakki	**Kakki Urban**	**32585**	**0**	**1**	**1**	**57944**	**2**
	Miryan	**Nurrar Urban**	**15814**	**0**	**0**	**0**	**28123**	**1**
RURAL	Bannu	Adami Tetar khel	14695	**0**	0	0	26132	1
	Bannu	Amandi-1	9827	**0**	0	0	17475	0
	Domel	Aral Hati Khel-1	19286	**1**	0	0	40663	1
	Domel	Aral Hati Khel-2	13751	0	0	0	28990	1
	Domel	Asperka-1	17119	0	0	0	36094	1
	Domel	Asperka-2	15300	0	0	0	32258	1
	Domel	Asperka-3	20932	0	0	0	44132	1
	Bannu	Bada Mir Abbas	10059	0	0	0	17887	0
	Kakki	Bharat	20716	0	0	0	36838	1
	Miryan	Dardariz	14426	0	0	0	25653	1
	Wazir	Daryoba	13352	0	0	0	30577	1
	Bannu	Daud Shah	13834	0	0	0	24601	1
	Bannu	Degan	13256	1	0	0	23573	0
	Domel	Domel-1	13177	1	0	0	27783	1
	Domel	Domel-2	16902	0	0	0	35636	1
	Domel	Eidal Khel	26166	0	1	1	55168	2
	Baka Khel	Eidia Khel Malak Shahi	14977	0	0	0	26634	1
	Bannu	Ghoriwala-1	4606	0	0	0	8191	0
	Bannu	Ghoriwala-2	8935	0	0	0	15888	0
	Wazir	Gumbati	12172	0	0	0	27875	1
	Wazir	Gurbaz	10300	0	0	0	23587	0
	Miryan	Haved	8946	0	0	0	15908	0
	Baka Khel	Hindi Khel	14256	0	0	0	25351	1
	Bannu	Ismail Khel	13537	0	0	0	24073	1
	Wazir	Jani Khel	9052	0	0	0	20729	0
	Baka Khel	Jani Khel-1	10954	0	0	0	19479	0
	Baka Khel	Jani Khel-2	12441	0	0	0	22123	0
	Bannu	Jhandu Khel	10678	0	0	0	18989	0
	Kakki	Kakki Taraf-3	11965	0	0	0	21277	0
	Kakki	Kakki Taraf-4	3144	0	0	0	5590	0
	Kakki	Kakki Taraf-5	5858	0	0	0	10419	0
	Domel	Khande Khan Khel-2	11729	0	0	0	24728	1
	Domel	Khander Khan Khel-1	13440	0	0	0	28337	1
	Kakki	Khujari baber	10571	0	0	0	18798	0
	Kakki	Khujari Khas	10214	0	0	0	18162	0
	Miryan	Kinger	13956	0	0	0	24818	1

Area	Tehsil	Name NC/VC	Population 2025	Existing Playgrounds	Required Playgrounds 2025	Backlog Playgrounds 2025	Population 2045	Required Playgrounds 2045
	Bannu	Kot Qalander	18359	0	0	0	32647	1
	Miryan	Landidak	19064	2	0	0	33900	1
	Miryan	Mama Khel-1	15212	0	0	0	27050	1
	Miryan	Mama Khel-2	12555	0	0	0	22326	0
	Bannu	Mamash Khel Nogari-2	14396	0	0	0	25599	1
	Miryan	Mambati Barakzai	14366	0	0	0	25546	1
	Bannu	Mandan	13214	0	0	0	23497	0
	Miryan	Mandev	17198	0	0	0	30583	1
	Bannu	Mandori Patal Shah	21097	0	0	0	37516	1
	Bannu	Masher Daud Shah	11786	0	0	0	20959	0
	Bannu	Mira Khel	12185	1	0	0	21668	0
	Miryan	Mirbaz barakzai	15713	0	0	0	27941	1
	Miryan	Mitta Khel	16045	0	0	0	28532	1
	Bannu	Mughal Khel	15898	0	0	0	28270	1
	Baka Khel	Muhammad Khel Khedari	13133	0	0	0	23354	0
	Baka Khel	Muhammad Khel Patona	16482	0	0	0	29309	1
	Domel	Musa Khel Wali Gai	7490	0	0	0	15792	0
	Bannu	Nar Hafiz Abad / Nar Shakrullah	12554	0	0	0	22324	0
	Bannu	Nar Jaffar	16720	1	0	0	29732	1
	Kakki	Nar Najeeb	8345	0	0	0	14840	0
	Baka Khel	Narmi Khel-1	12199	0	0	0	21693	0
	Baka Khel	Narmi Khel-2	5912	0	0	0	10513	0
	Miryan	Nurrar-1	11198	1	0	0	19913	0
	Miryan	Nurrar-2	597	0	0	0	1061	0
	Baka Khel	Sardi Khel-1	14685	0	0	0	26114	1
	Baka Khel	Sardi Khel-2	5596	2	0	0	9951	0
	Bannu	Shaamsi Khel	15217	1	0	0	35875	1
	Bannu	Shah Baz Azmat Khel-1	9631	0	0	0	27059	1
	Bannu	Shah Baz Azmat Khel-2	6433	0	0	0	17126	0
	Miryan	Shah Dev	20174	0	0	0	11440	0
	Wazir	Shoi Khel	6970	0	0	0	15963	0
	Wazir	Surmully	8212	0	0	0	18805	0
	Bannu	Taji Kala	12272	0	0	0	21823	0
	Baka Khel	Takhti Khel-1	9803	0	0	0	17433	0
	Baka Khel	Takhti Khel-2	7731	0	0	0	13748	0
	Baka Khel	Takhti Khel-3	6869	0	0	0	12214	0
	Baka Khel	Takhti Khel-4	8658	0	0	0	15395	0
	Bannu	Tughal Khel	13298	0	0	0	23647	0
	Domel	Umer Zai-2	7850	0	0	0	16551	0
	Domel	Ziraki Pirba Khel	19050	0	0	0	40165	1
OVE RALL	**Urban**		**570489**	**7**	**20**	**14**	**1011351**	**38**
	Rural		**958696**	**11**	**1**	**1**	**1802290**	**37**
	Total		**1529185**	**18**	**21**	**15**	**2813641**	**75**

3.3.3.3 Existing Parks

Access to green spaces like parks and open areas has been linked to improved mental and physical health. They offer opportunities for recreation, exercise, relaxation, and stress relief. Playgrounds encourage physical activity and outdoor play, which are essential for children's development and well-being. The table below shows existing parks in district Bannu.

Table 3-41: District Bannu Existing Parks

Sr. No	Park Name	Tehsil	Settlement
1	Mandan Park Bannu	Bannu	Mandan, Bada Mir Abbas
2	Lady Park	Bannu	Bannu MC
3	Bannu Central Park	Bannu	Bannu MC
4	Melad Park Bannu	Bannu	Bannu MC
5	Qazi Fazal Qadir Park	Bannu	Bannu MC
6	Public Park	Bannu	Bannu Cantt
7	Bannu Garrison Park	Bannu	Bannu Cantt
8	Cantonment Park	Bannu	Bannu Cantt
9	Ladies Park	Bannu	Bannu Cantt
10	Children Park	Domel	Umer Zai-2
11	Block A Park	Domel	Bizen Khel, Bannu Town Ship
12	Park B Park	Domel	Bizen Khel, Bannu Town Ship
13	block C park	Domel	Bannu Town Ship, Bizen Khel
14	Pesentry Park	Domel	Bannu Town Ship, Bizen Khel
15	Bannu Town Ship PARK	Domel	Bannu Town Ship Bizen Khel

3.3.3.4 Planning Standards for Establishing New Parks and Playgrounds

The Table below delineates the standards set forth by the National Reference Manual for Infrastructure and Planning for the establishment of new active recreational facilities at various levels of settlements and threshold population:

Table 3-42: Passive Recreation Facilities Allocation Criteria

Type of Facility	Description	Allocation Criteria (Population)	Area (Hectares)	Hectare/1000 pop
City Park	Wide range of amusement facilities, fountains, lakes, landscaping, etc.	400,000	12 to 15	0.03 to 0.037
Community Park	Selected amusement facilities fountains, lakes, landscaping, etc.	100,000	4 to 5	0.04 to 0.05
Neighborhood Park	Wide range of child play fixtures, walking & jogging paths.	25,000	3.25 to 4	0.13 to 0.16
Mohalla Parks (3-8 per Mohalla, average size 0.45ha each)	Tot lots with slides, swings, and seesaws; other spaces with some turf	6,250	1.6 to 3.6	0.26 to 0.58

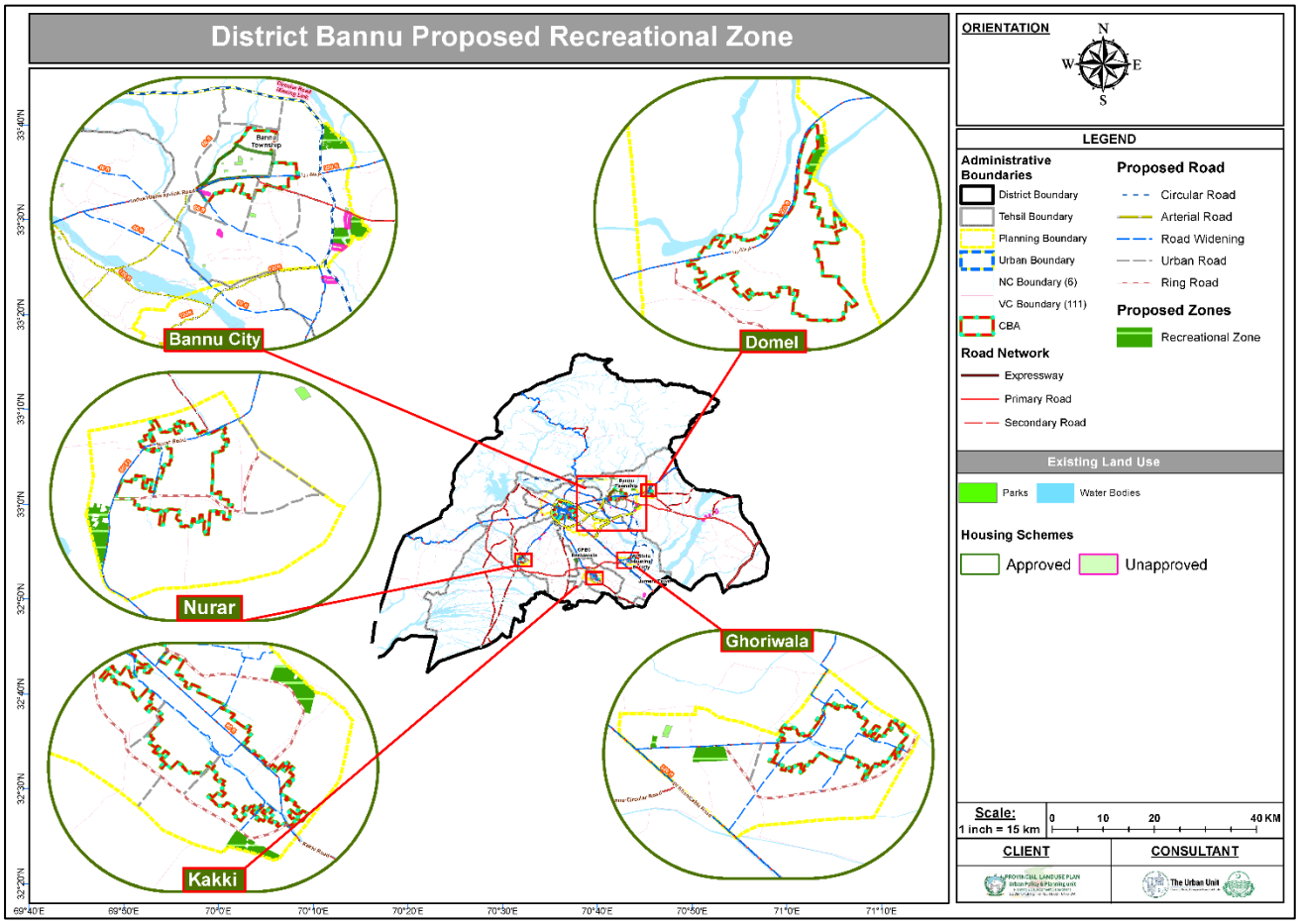
3.3.3.5 Future Plan

To ensure equitable access to recreational/open spaces and promote healthy urban living, the future provision of recreational facilities has been carefully integrated into the overall land use strategy. At the neighborhood level, parks and playgrounds will be accommodated within the 100% additional land reserved alongside to the proposed residential areas. These decentralized green spaces are intended to serve the daily recreational needs of local communities, thereby supporting inclusive and active neighborhoods. At the broader urban scale, community-level recreational facilities have been planned within the designated Recreational Zones. These zones will host larger infrastructure such as sports complexes, public parks, city parks, and multipurpose playgrounds. The proposed allocation of recreational zones has been carefully calibrated to supplement existing facilities and meet future demand. When combined with current recreational areas, the total provision aligns with NRM benchmarks for urban open

space. As shown in the table below and mapped in the subsequent map, the proposed recreational zones cover a total of 128.55 hectares in Bannu City, which represents the largest share of recreational land due to its population size and urban footprint. Additional allocations include 2.29 hectares in Domel Urban, 12.04 hectares in Kakki Urban, 7.03 hectares in Ghoriwala Urban, and 6.32 hectares in Naurar Urban. These allocations reflect a balanced distribution based on projected population, spatial availability, and existing service gaps. Together, these neighborhood- and community-level recreational provisions will play a vital role in enhancing urban quality of life, promoting environmental sustainability, and fostering social cohesion across the five urban centers.

Table 3-43: Proposed Recreational Zones Area (Hectares)

Administrative Area	Existing Area	Proposed Area (Hectares)	Sum of Existing and Proposed	%	NRM Standards
Bannu City	461.59	128.55	590.14	4.9	0.5 – 7%
Kakki Urban	_	12.04	12.04	2.16	
Domel Urban	_	2.29	2.29	0.56	
Naurar Urban	_	6.32	6.32	2.27	
Ghoriwala Urban	1.05	7.03	8.08	2.23	



Map 3-28: District Bannu Urban areas Proposed Recreational Zone

3.3.3.5.1 Recreational Zone Locational Criteria

The allocation of recreational zones across various urban centers in District Bannu is guided by several key criteria: accessibility for nearby residents, connectivity through road networks, availability of suitable land parcels, central or peripheral positioning, and proximity to existing water bodies.

In **Bannu Urban Area**, two primary recreational zones have been designated—one in the **Northeast** and the other in the **Southeast** of the urban center.

The **Northeast recreational zone** is strategically located adjacent to both the educational and health neighborhoods, making it easily accessible to individuals associated with those sectors. An institutional zone lies to its south, while a nearby water body on the eastern side adds to the aesthetic and environmental value of the area. Furthermore, this zone benefits from direct access to the under-construction circular road, enhancing its connectivity.

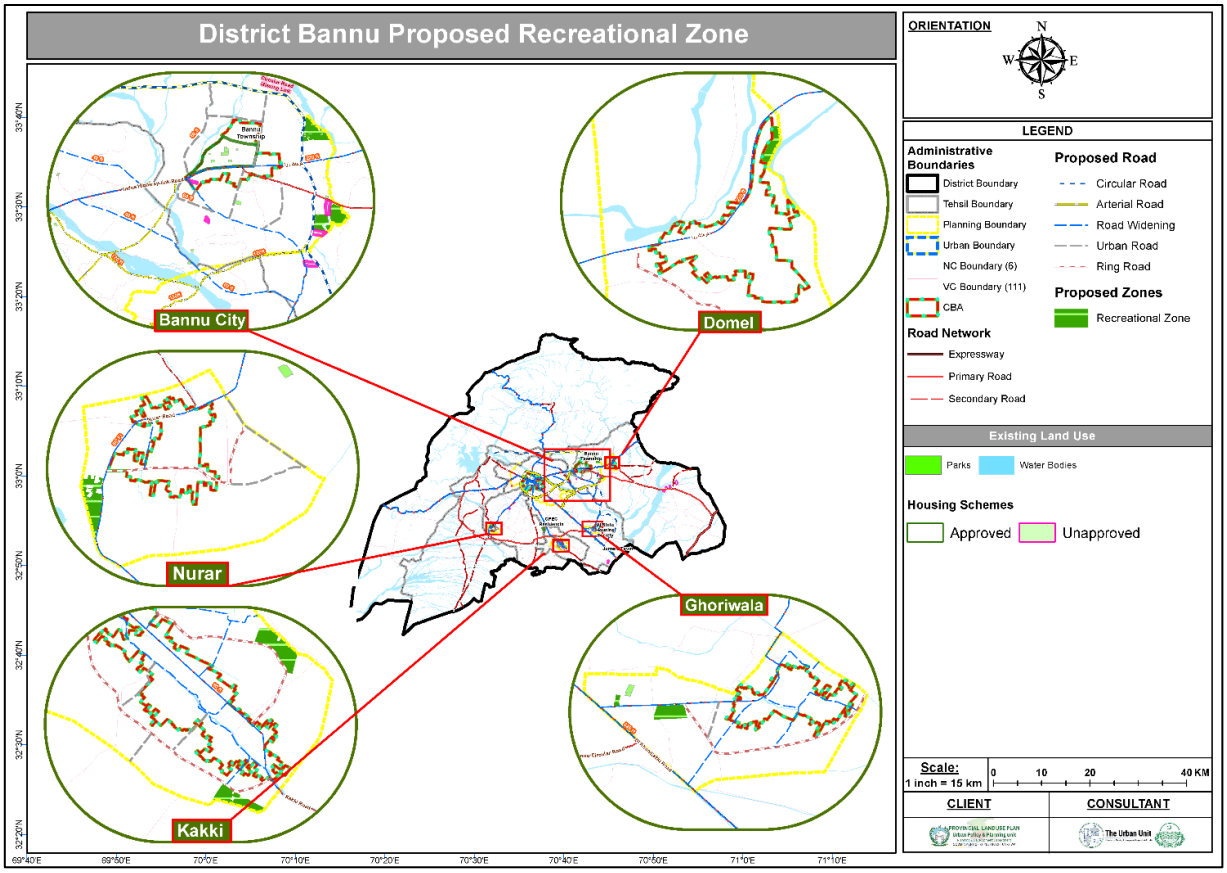
The **Southeast recreational zone** is near a proposed residential area, offering convenient access to local inhabitants. It is also connected to the circular road under construction. A water body located within the zone and its position in a wetland area enhance its environmental appeal and make it an ideal location for recreational use.

In **Kakki Urban Area**, recreational zones are designated at the **Eastern** and **Southern** edges of the town. Both zones are accessible from the proposed ring road, ensuring ease of connectivity. The **Eastern** recreational zone is located adjacent to both the educational neighborhood and a residential zone, providing convenient access for students and residents alike. Similarly, the **Southern** recreational zone is situated next to the health neighborhood and another residential zone, offering nearby recreational opportunities for healthcare-related personnel and residents. Each zone effectively serves the surrounding neighborhoods, aligning with the planning criteria.

In the **Domel Urban Area**, the recreational zone is situated on the **Northeastern** outer edge of Domel. A water channel to the east, a residential zone to the south, and an industrial area to the west border it. The site is easily accessible from Kohat Road (Old Bannu Road). The land designated for this zone is currently barren, making it highly suitable for recreational development. The surrounding features and accessibility make this location ideal for establishing a recreational zone.

In **Nurar Urban Area**, the recreational zone is located on the **Southwestern outer edge** of the town and is accessible via Nurar Road. To the **East** lies a proposed residential zone, while the **Southeast** is occupied by another proposed residential area along with some existing scattered industrial units. To the **North**, an existing residential zone is situated, whose residents are expected to benefit from this recreational facility. Additionally, the Central Business District (CBD) is located a short distance to the **Northeast**, along Nurar Road. These locational advantages make this site a highly suitable and strategic choice for a recreational zone.

The recreational zone in **Ghoriwala** is accessible from the Bannu–Ghoriwala–Shamshikhel Road. It is bordered by proposed residential zones to the **South** and **West**, a mixed-use zone to the **East**, and an institutional zone to the **Northwest**. Given its central location among these surrounding zones, the recreational area will serve as a valuable amenity for residents, institutions, and mixed-use developments, offering widespread benefits to the local community.



Map 3-29: District Bannu Urban areas Proposed Recreational Zone

3.3.3.5.2 Recreational Zone Location Criteria

The allocation of recreational zones across various urban centers in District Bannu is guided by several key criteria: accessibility for nearby residents, connectivity through road networks, availability of suitable land parcels, central or peripheral positioning, and proximity to existing water bodies.

In Bannu Urban Area, two primary recreational zones have been designated—one in the Northeast and the other in the Southeast of the urban center.

The Northeast recreational zone is strategically located adjacent to both the educational and health neighborhoods, making it easily accessible to individuals associated with those sectors. An institutional zone lies to its south, while a nearby water body on the eastern side adds to the aesthetic and environmental value of the area. Furthermore, this zone benefits from direct access to the under-construction circular road, enhancing its connectivity.

The Southeast recreational zone is near a proposed residential area, offering convenient access to local inhabitants. It is also connected to the circular road under construction. A water body located within the zone and its position in a wetland area enhance its environmental appeal and make it an ideal location for recreational use.

In Kakki Urban Area, recreational zones are designated at the Eastern and Southern edges of the town. Both zones are accessible from the proposed ring road, ensuring ease of connectivity. The Eastern recreational zone is located adjacent to both the educational neighborhood and a residential zone, providing convenient access for students and residents alike. Similarly, the Southern recreational zone is situated next to the health neighborhood and another residential zone, offering nearby recreational opportunities for healthcare-related personnel and residents. Each zone effectively serves the surrounding neighborhoods, aligning with the planning criteria.

In the Domel Urban Area, the recreational zone is situated on the Northeastern outer edge of Domel. A water channel to the east, a residential zone to the south, and an industrial area to the west border it. The site is easily accessible from Kohat Road (Old Bannu Road). The land designated for this zone is currently

barren, making it highly suitable for recreational development. The surrounding features and accessibility make this location ideal for establishing a recreational zone.

In Nurar Urban Area, the recreational zone is located on the Southwestern outer edge of the town and is accessible via Nurar Road. To the East lies a proposed residential zone, while the Southeast is occupied by another proposed residential area along with some existing scattered industrial units. To the North, an existing residential zone is situated, whose residents are expected to benefit from this recreational facility. Additionally, the Central Business District (CBD) is located a short distance to the Northeast, along Nurar Road. These locational advantages make this site a highly suitable and strategic choice for a recreational zone.

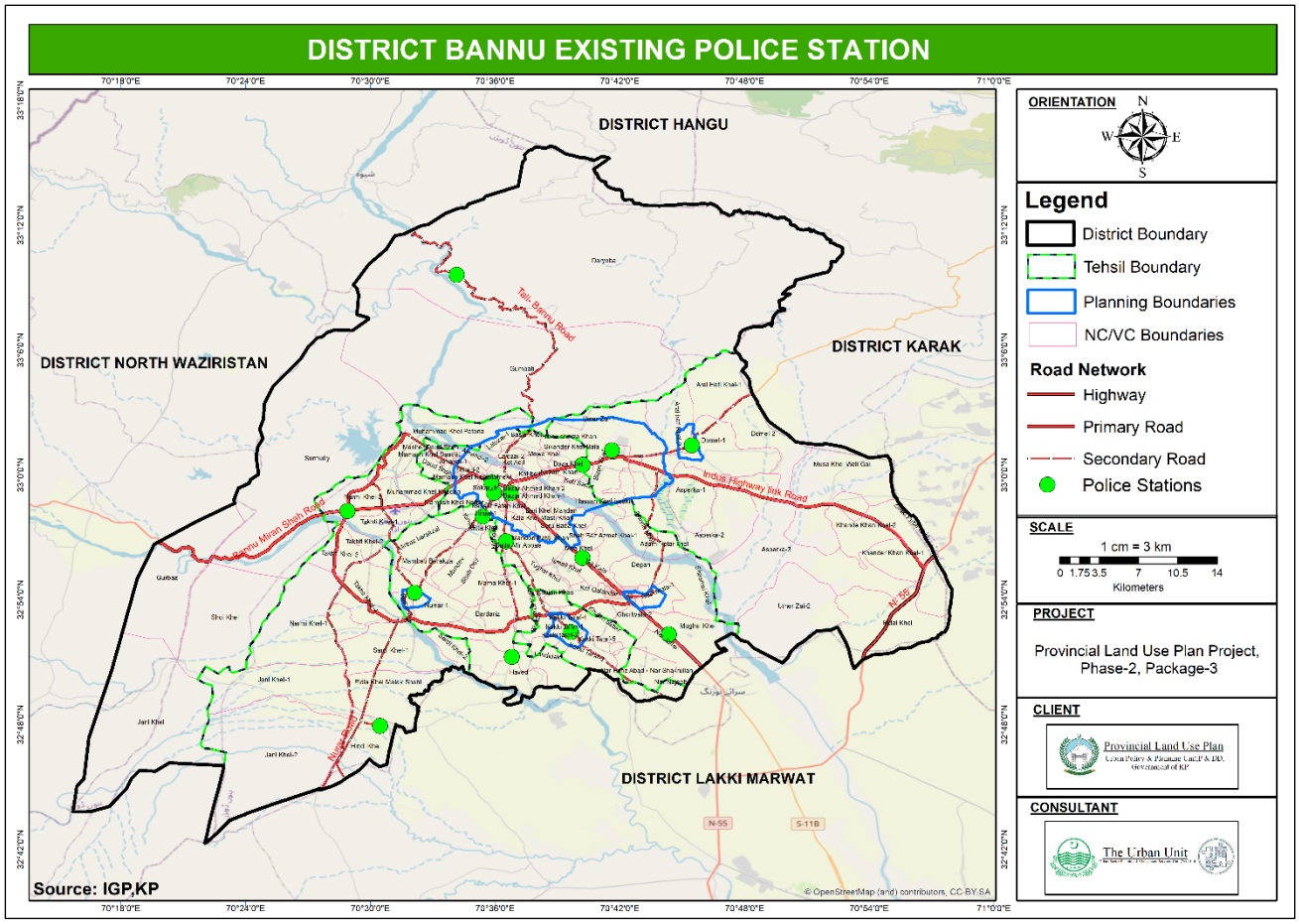
The recreational zone in Ghoriwala is accessible from the Bannu–Ghoriwala–Shamshikhel Road. It is bordered by proposed residential zones to the South and West, a mixed-use zone to the East, and an institutional zone to the Northwest. Given its central location among these surrounding zones, the recreational area will serve as a valuable amenity for residents, institutions, and mixed-use developments, offering widespread benefits to the local community.

3.3.3.6 Recommendation

- Develop a comprehensive strategy to promote a more balanced distribution of playgrounds and sports facilities across all tehsils of District Bannu, ensuring that residents in every area have fair and equal access to recreational opportunities.
- The government should establish new sports complexes in each tehsil of District Bannu to provide recreational and entertainment opportunities for the local population.
- As the population projection of 2045 using National Manual Reference (NRM) upgrade the existing sports complex to a metropolitan city stadium.
- Develop 43 additional playgrounds to meet the recreational needs of the current population.
- Add green spaces and landscaping around sports facilities to enhance their appeal and create a welcoming environment.

3.3.4 Social Security

Security plays a significant role in various aspects of social, economic, and political progress. It creates an environment of safety and stability, which are fundamental prerequisites for development. Effective police security helps prevent crime, corruption, and violence, fostering an environment where individuals and businesses can thrive. The rule of law, upheld by police enforcement, provides certainty and predictability for economic activities, attracting investment and promoting entrepreneurship. Overall, police security is integral to sustainable development, creating an enabling environment where individuals can live in safety, exercise their rights, and participate in social, economic, and political activities.



Map 3-30: District Bannu Existing Police Stations

3.3.4.1 Entry and Exit Points

District entry and exit points typically refer to the designated locations where individuals can enter or exit a particular administrative district, such as a city, county, or other geopolitical subdivision. These points serve various purposes, including monitoring traffic, controlling access, and ensuring security.

In regions where districts or jurisdictions are separated by borders, there may be official checkpoints staffed by law enforcement or border control authorities. These checkpoints monitor the movement of people and goods between districts, enforcing regulations and screening for illegal activities. Toll booths on highways often serve as entry or exit points for districts, where motorists pay fees for using the road infrastructure. Highway exits also serve as entry or exit points for specific districts or municipalities, providing access to local roads and communities.

There are 17 entry and exit points in District Bannu. The details of entry and exit points of District Bannu are given in the following Table.

Table 3-44: District Bannu Enter and Exit Points

S. No	Name of Establishment	ASIs	Sis	HC	FC	Total
1	PP Basia Khel	1	-	1	12	14
2	PP Town Ship Main Gate	1	-	-	7	8
3	PP Spina Tangi Domel	1	-	-	15	16
4	PP Kasho Bridge Domel	1	-	2	18	21
5	PP Highway Domel	1	-	1	15	17
6	PP Darey Bridge Ghoriwala	1	-	1	25	27
7	PP Ismail Khani Mira Khel	-	-	1	10	11

S. No	Name of Establishment	ASIs	Sis	HC	FC	Total
8	PP Khujari Kakki	-	-	1	14	15
9	PP Mandan Gate City	1	-	1	3	5
10	PP Railway gate City	1	-	-	3	4
11	PP Miryan Gate	1	-	1	3	5
12	PP Yak Qabar Mandan	-	-	1	15	16
13	PP Lorra Bridge Mandan	-	-	3	18	21
14	PP Kinger Bridge	-	-	5	20	25
15	PP New Sabzi Mandi	-	-	1	7	8
16	PP Mazanga Haved	1	-	2	24	27
17	PP Sheikh Landak	1	-	2	24	27

3.3.4.2 Need for New Police Stations

To determine the number of new police stations needed to meet current demand, a detailed assessment of existing facilities was conducted. According to the National Reference Manual for Infrastructure and Planning, one police station is recommended for every 50,000 people. This evaluation is based on demographic data from the 2025 population census of District Bannu, with projections extending to the year 2045.

The assessment of new police stations is conducted on the basis of the tehsil. In District Bannu, there are currently 16 existing police stations, while the total required is 31, resulting in a backlog of 14 police stations.

- Tehsil Bannu currently has 7 police stations, while 16 are required, resulting in a backlog of 9 police stations.
- Tehsil Domel has 3 existing police stations, with a requirement of 4, leaving a backlog of 1 station.
- Tehsil Kakki has 1 existing police station, with a requirement of 2, resulting in a backlog of 1 station.
- Tehsil Miryan currently has 2 police stations, while 4 are required, leading to a backlog of 2 stations.
- Tehsil Bakakhel has 2 existing police stations, with a requirement of 3, resulting in a backlog of 1 station.
- Tehsil Wazir has 1 existing police station, which meets the current requirement of 1, resulting in no backlog.

This indicates a clear need for the development of additional police stations to meet the demands of the current population. The projected future requirements for police stations are also presented in the table below.

Table 3-45: District Bannu Need for new police stations

Administrative Area	Population (2025)	Existing Police Stations	Required Police Stations	Police Stations Backlog	Projected Population (2045)	Required Police Stations
Tehsil Bannu	817439	7	16	9	1446898	29
Tehsil Domel	213071	3	4	1	449234	9
Tehsil Kakki	103398	1	2	1	183868	4
Tehsil Miryan	181523	2	4	2	322794	6
Tehsil Bakakhel	153696	2	3	1	273311	5
Tehsil Wazir	60058	1	1	0	137536	3

3.3.4.3 Recommendations

- Due to a major shortage of security staff, increase manpower, provide logistics support, and train in modern policing to tackle crime and terrorism.
- Enforce standard duty hours with a maximum of eight-hour shifts, especially at key entry and exit points, to support the health, alertness, and effectiveness of police officers.
- Redesign training programs for functional specialization and ongoing professional development to equip officers for challenges like terrorism, organized crime, and public safety.
- Establish new police stations across the district to ensure a safe environment and meet the needs of the growing population.
- Police infrastructure requires improvement, as many police stations and post buildings are in poor condition and in need of renovation.

3.4 Agriculture and Livestock

Land use assessment in District Bannu shows that agriculture is the dominant land use, covering 640.47 square kilometers (30.44% of the total area). It is the backbone of the local economy and the primary livelihood for most of the population. The district's fertile alluvial soils, especially in irrigated areas, make it highly suitable for diverse crops. Farmers cultivate staple and cash crops, with wheat, gram, and barley grown in the Rabi season, while maize, rice, bajra, and sugarcane dominate the Kharif season. Fruits such as bananas, guavas, apples, plums, dates, and mangoes flourish in Kharif, whereas bananas, citrus, loquats, and guavas grow in Rabi. Around 45% of the agricultural land is irrigated, primarily by the Kurram Garhi Canal, with tube wells and lift irrigation supplementing the water supply in non-canal areas. The rest depends on seasonal rainfall, making irrigation a crucial factor in sustaining district Bannu agricultural productivity.

3.4.1 Agriculture Land Utilization

According to the Crop Statistics Khyber Pakhtunkhwa, the total reported area of district Bannu is 206523 hectares, out of which according to the year 2021-22 the total cultivated area is 88,730 hectares. Whereas, the uncultivated covers 117,793 hectares, regions that are beneath highways, canals, rivers, mountains, or other arid or hilly terrains areas that are not being used for the agricultural purposes. Along this, the district also possesses a forest area which encloses 772 hectares comprising 0.66% of the total uncultivated area. However, the Culturable waste has increased unknowingly from 7.2 to 17.2% within an interval of five years. This shows that the district has potential to be cultivated, but due to some factors such as poor irrigation system, soil fertility and degradation, and lack of modern farming practices and approach to market, this land has been underutilized. By utilizing cultivable waste, it is possible to increase agricultural production, improve food security, and enhance the livelihoods of local communities.

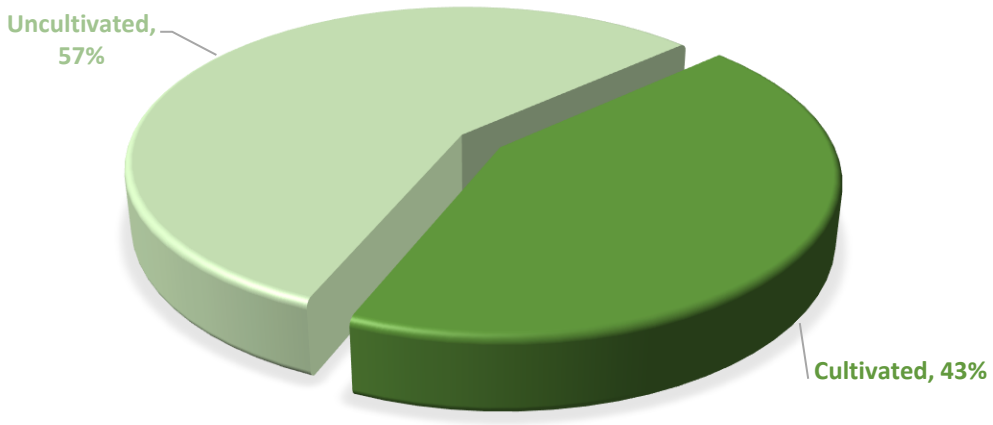


Figure 3-3: Agriculture Land in District Bannu

3.4.2 Production Profile

Agriculture in the plains of Pakistan follows a well-defined seasonal cycle, categorized into two primary cropping periods: Rabi and Kharif. These seasons determine the sowing and harvesting schedules for various crops based on climatic conditions and water availability. Rabi crops are typically sown in the winter months (October–December) and harvested in early summer (April–May). These crops rely primarily on irrigation rather than monsoon rains. The major Rabi crops cultivated in District Bannu include wheat, gram, barley, oilseeds, and pulses, which serve as staple food sources and contribute significantly to the region's agrarian economy. Kharif crops, on the other hand, are planted at the onset of summer (April–June) and harvested in early winter (October–December). These crops depend heavily on monsoon rainfall. The key Kharif crops grown in Bannu district include maize, rice, bajra (pearl millet), and sugarcane. Among these, sugarcane is particularly important due to its role in supporting local sugar mills and related agro-industries.

The region also produces a variety of seasonal fruits. In District Bannu, Kharif fruits include banana, apple, date, guava, mango, and plum, benefiting from the warm climate and extended growing season. Meanwhile, Rabi fruits comprise banana, citrus (such as kinnow and oranges), loquat, and guava, which thrive in the cooler months.

In addition to crops and fruits, District Bannu agricultural sector is supported by livestock farming, which plays a crucial role in the local economy. Dairy farming and poultry production complement crop cultivation, providing food security and income opportunities for farmers. Furthermore, irrigation infrastructure, primarily dependent on the Kurram River and canal networks, is vital for sustaining agricultural productivity, especially in the Rabi season when natural rainfall is limited.

Overall, District Bannu's agricultural profile reflects a diverse and balanced mix of food, cash crops, and fruit production, ensuring year-round farming activity and contributing to the region’s food supply and economy.

Table 3-46: Distribution of Area by Crops in District Bannu (Hectare)[39]

Year	Indicators	Wheat	Maize	Rice	Gram	Bajra	Jowar	Barley	Sugarcane	Rapeseed & Mustard
2021-22	Area (ha)	17,693	6,138	2,990	3,336	26	0	91	357	2,980
	Production (Ton)	34,552	11,930	5,791	1,558	20	0	83	14,838	984
	Yield per Hectare in Kg	1953	1944	1937	467	769	0	912	41563	330
2020-21	Area (ha)	18,125	5,924	2,869	3,103	5	12	184	439	3,025
	Production (Ton)	36,013	11,533	5,385	1,413	4	8	184	18,538	991
	Yield per Hectare in Kg	1,987	1,947	1,877	455	800	667	1000	42,228	328
2019-20	Area (ha)	17,468	6,479	2,819	3,517	15	0	143	527	3,050
	Production (Ton)	33,311	12,628	5,330	1,663	12	0	135	22478	995
	Yield per Hectare in Kg	1,907	1,949	1,891	473	800	0	944	42653	326
2018-19	Area (ha)	18,013	5,860	2,060	3,636	25	0	370	588	18
	Production (Ton)	36,977	11,276	3,854	1,810	19	0	372	25,330	11
	Yield per Hectare in Kg	2053	1924	1871	498	731	0	1005	43078	611

[39] *Development Statistics-2022, District Wise Area, Production, Table no.15, page no.16*

2017-18	Area (ha)	17,021	5,620	2,884	3,227	10	0	62	471	25
	Production (Ton)	33,618	9,764	5,185	1,480	7	0	46	17,180	14
	Yield per Hectare in Kg	1,975	1,737	1,798	459	700	0	742	36,476	560

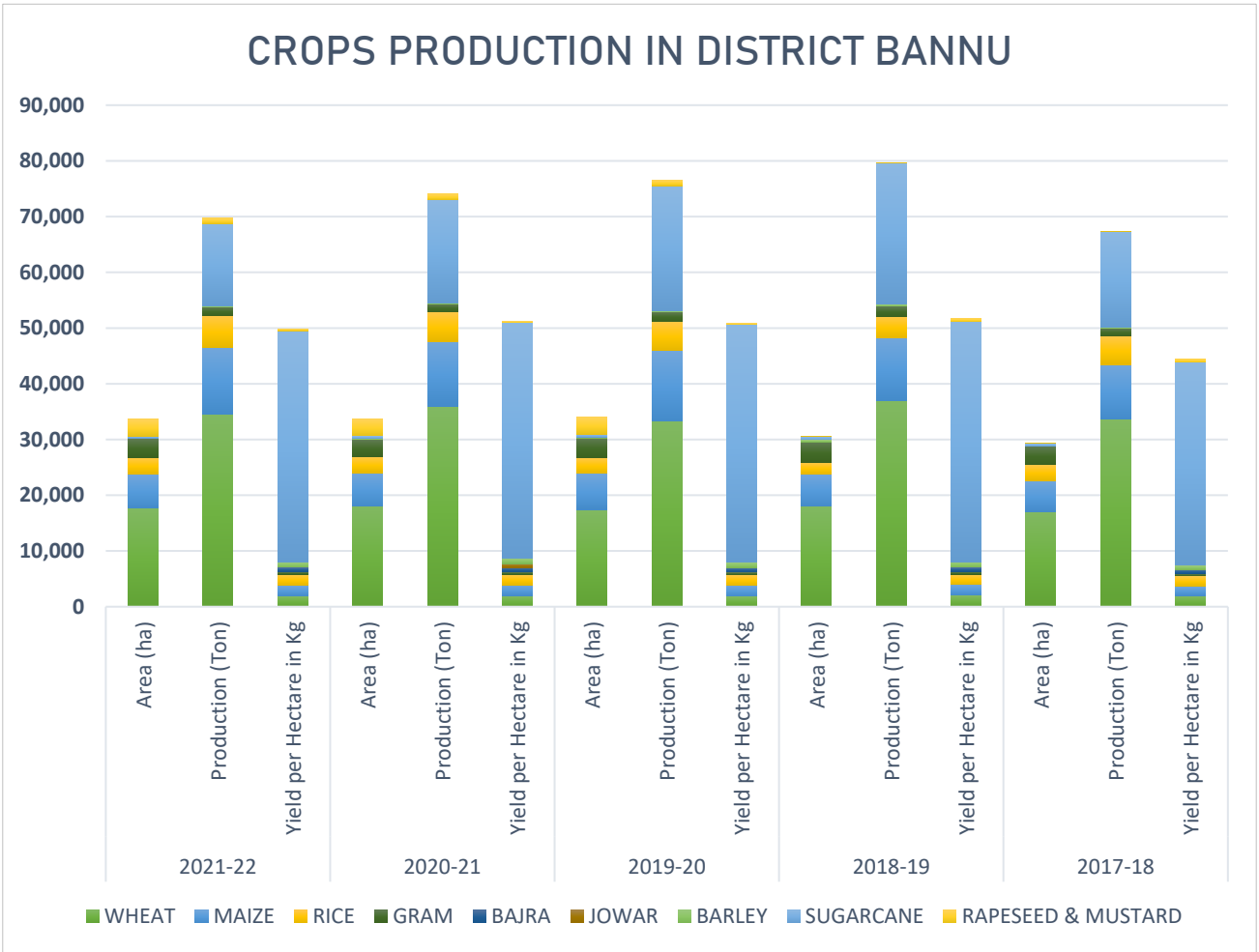


Figure 3-4: Year-wise Crops Production in District Bannu

Table 3-47: Distribution of Area by Crops (Vegetables and Fruits) in District Bannu (Hectare)[40]

Year	Indicators	Vegetables			Fruits		
		Rabi	Kharif	Total	Rabi	Kharif	Total
2021-22	Area (ha)	143	165	308	552	324	876
	Production (Ton)	871	1,002	1873	3,274	5,024	8298
	Yield per Hectare in Kg	6091	6073	12164	5931	15506	21437
2020-21	Area (ha)	133	155	288	553	369	922
	Production (Ton)	802	981	1783	3,278	5,997	9275
	Yield per Hectare in Kg	6,030	6,329	12359	5,928	16,252	22180
2019-20	Area (ha)	208	494	702	783	1,278	2061
	Production (Ton)	2,050	3,415	5465	5,222	20,854	26076
	Yield per Hectare in Kg	9,856	6,913	16769	6,669	16,318	22987
2018-19	Area (ha)	232	486	718	777	1,275	2052
	Production (Ton)	2,372	3,327	5699	5,211	20,815	26026

[40] *Development Statistics-2022*

Year	Indicators	Vegetables			Fruits		
		Rabi	Kharif	Total	Rabi	Kharif	Total
	Yield per Hectare in Kg	10224	6846	17070	6707	16325	23032
2017-18	Area (ha)	218	463	681	772	1,276	2048
	Production (Ton)	2,168	3,226	5394	5,170	20,695	25865
	Yield per Hectare in Kg	9,945	6,968	16913	6,697	16,219	22916

3.4.3 Water Management, Irrigation System, and Type of Irrigation

3.4.3.1 Water Management

Bannu District, situated in Khyber Pakhtunkhwa, Pakistan, benefits significantly from its irrigation and canal systems, primarily supported by the Kurram and Tochi Rivers. These rivers and their tributaries have transformed a significant area of the district into a fertile region suitable for diverse crops and fruits, contributing substantially to the district's agricultural productivity.

There are several techniques utilized for irrigation in District Bannu. The most essential source is rivers and their tributaries, particularly the “Kurram and Tochi rivers”. The “Kurram River” originates from the Koh-e-Safed Mountains in Afghanistan and streams into Pakistan, playing a pivotal role in watering the agricultural lands of Bannu. It ultimately merges with the Indus River near Kalabagh. This river extends across key areas of Bannu, including Ghoriwala, Domel, and Bannu city. Likewise, the “Tochi River”, entering Bannu from the southern side of the Kurram River, is also significant for irrigation, particularly in localities such as Bakkakhel, Janikhel, and Domel.

Moreover, to address water scarcity in certain areas for agricultural purposes, irrigation dams such as Baran Dam, and Khurram Tangi Dam are constructed to store rainfall and river water to ensure a steady supply of water during dry seasons for irrigation purposes. Baran Dam is a crucial water source for local farmers, supporting the cultivation of various crops such as wheat, sugarcane, and fodder. It helps to irrigate Bannu, Lakki Marwat, and the surrounding areas, it also plays a significant role in groundwater recharge and water conservation. Aside from this, tube wells and lift irrigation systems are also utilized to increase irrigated land and crop production. Private agencies and government stakeholders in supporting irrigation systems in the region install these systems. However, certain regions of Bannu depend on rain-fed (barani) agriculture, where water is preserved through small dams, ponds, and check dams. These techniques assist in supplementing irrigation, particularly in areas with limited access to canal water.

Table 3.39: Type of Irrigation used for Agriculture in District Bannu[41]

Year			2017-18	2018-19	2019-20	2020-21	2021-22
Irrigated	Total		60,155	60,160	60,189	57249	57,205
	Canals	Govt.	5,817	5,808	5,812	6428	6,441
		Private	30,997	30,844	30,851	45677	45,657
	Tanks		-	22,060	22,060	120	120
	Tube wells		22,001	227	232	3698	3,763
	wells		820	697	704	684	624
	Lift Pump		270	277	272	256	232
	Others		250	247	258	386	368

[41] *Development Statistics-2022, Area Irrigated by different source, Table no 39, Page no.49*

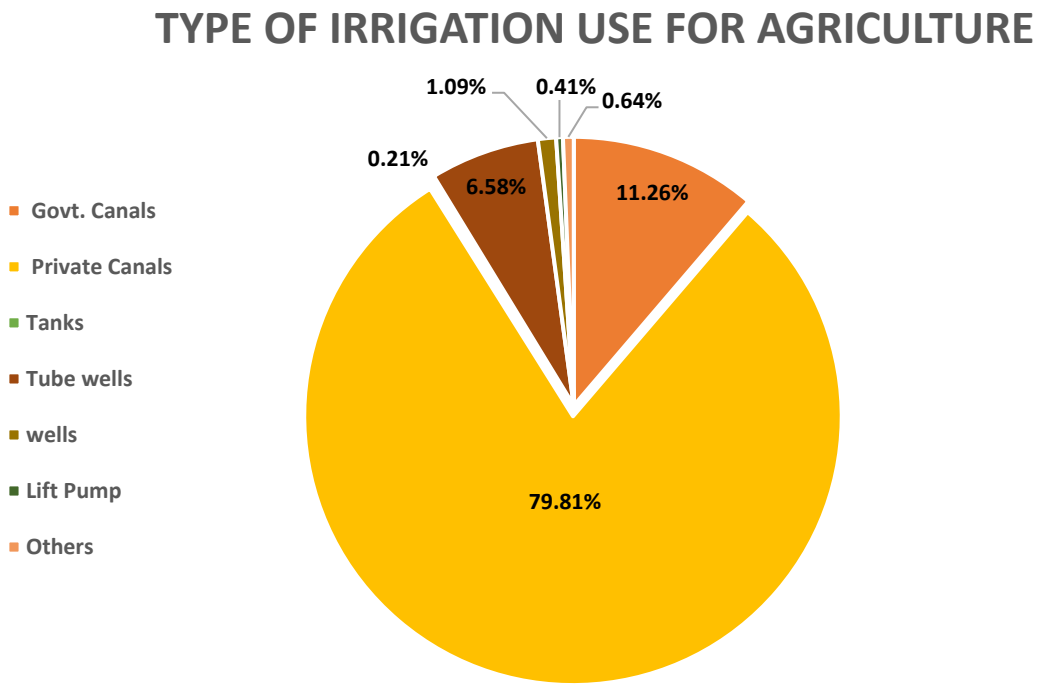


Figure 3-5: Type of Irrigation Use for Agriculture in District Bannu

3.4.3.2 Key Features of the Irrigation and Canal Systems

3.4.3.2.1 Irrigation and Canal System

Streams, which play a vital role in the irrigation of District Bannu, are spread across the region, providing essential water resources to support local farmers in cultivation. Which includes “Kasho Domel, Dawa River, Khysor Baka Khel, Ghunda Kai Jani Khel, Tarkhoba Domel and Baraganatho Algad”.

In addition to its streams, District Bannu has a well-developed canal system, consisting of two major canals: The “Bannu Canal System” and the “Marwat Canal System”, both of which play a crucial role in irrigating vast agricultural lands. The Bannu Canal System extends over 256 km, with a discharge capacity of 600 cusecs, irrigating approximately 107,500 acres of land, including Bannu Tehsil, Miryan, and surrounding areas. Similarly, the Marwat Canal System spans 267.2 km, discharging 800 cusecs, and irrigates around 170,500 acres, covering Jani Khel, Bakakhel, Lakki Marwat, and neighboring regions.

3.4.3.3 Key Irrigation Structures

The irrigation system in District Bannu relies on a network of dams, headworks, and canals that store and regulate water to support agriculture and power generation. These projects play a vital role in ensuring water availability for crops, mitigating the impacts of droughts, and controlling floods.

3.4.3.4 Canals

The main canal systems in District Bannu include the Bannu and Marwat Canal Systems. Several other main streams, such as Kasho Domel, Dawa River, Khysor Baka Khel, Ghunda Kai Jani Khel, Tarkhoba Domel, and Barganatho Algad also serve specific localized areas. These canals supports the region’s irrigation infrastructure and are extend across the district. These canals play a crucial role in distributing water to agricultural lands, especially in areas where groundwater levels are deep, or rainfall is insufficient. The canal system supports crop cultivation in various tehsils, including Bannu, Domel, and parts of Kaki and Miryan, thereby contributing to the overall agricultural productivity of the district. Efficient management and maintenance of these canals are essential to ensure sustainable water delivery for farming communities in Bannu.

Table 3-48: District Bannu Major Streams[42]

Canal System	Extent (km)	Discharge (cusecs)	Irrigated Area (acres)	Irrigated Regions
Bannu Canal System	256	600	107,500	Bannu tehsil, Miryan and surrounding regions
Marwat Canal System	267.2	800	170,500	Jani Khel, Bakakhel, Lakki Marwat, surrounding regions
Kasho Domel	-	-	-	Tehsil Domel
Khysor Baka Khel	-	-	-	Baka Khel
Ghunda kai Jani Khel	-	-	-	Jani Khel
Dawa River	-	-	-	Surani
Tarkhoba Domel	-	-	-	Tehsil Domel
Barganatho Algad	-	-	-	Near Bannu City

3.4.3.5 River

Kurram River originates from the Koh-e-Safed in Afghanistan, flows into Pakistan, and plays a crucial role in irrigating Bannu. It joins the Indus River near Kalabagh, while the Tochi River enters Bannu from the south of the Kurram River and is vital for irrigation, especially for the residents of Bakkakhel Wazir and Bannu.

Table 3-49: District Bannu Existing Rivers

Rivers	Irrigated Regions
Kurram River	Bannu City, Domel, and Ghoriwala
Tochi River	Bakkakhel, Janikhel, and Domel

3.4.3.6 Dams

The dams figure details several water management structures in District Bannu, including Kurram Garhi Head works for power and irrigation, and Baran Dam, currently undergoing enhancement. Kurram Tangi Dam stands out with significant power generation and irrigation potential, alongside flood control benefits. Additionally, the Kachkot Feeder Channel and Left Bank Canal serve specific irrigation needs within the district.

Table 3-50: District Bannu Existing Dams[43]

Dams	Key Feature	Value	Associated Benefits/Areas
Kurram Garhi Head works	Current Power Capacity	3.5 MW to 5 MW	Irrigations, Power Generations (Bannu tehsils, Ghoriwala)
Baran Dam	Power Capacity	5.8 MW	Irrigation (Bannu, Lakki Marwat, surrounding area) and increased capacity (100,000 acre-feet)
Kurram Tangi Dam	Dam height, Reservoir capacity and power generation	98.17 m, 1.2 MAF, 83.4 MW	Irrigation (North Waziristan, Bannu Lakki, Marwat) and Flood Control
Kachkot Feeder channel	Discharge	600 cusecs	Irrigation (Bannu, Ghoriwala)
Left Bank Canal	Discharge	52 cusecs	Irrigation (Surrani)

3.4.4 Agriculture Employment

[42] *https://www.irrigation.gkp.pk/canalsys.php*

[43] *https://en.wikipedia.org/wiki/Kurram_Tangi_Dam,Kurram_Garhi_headworks_Baran_Dam*

Most of the people in rural areas are farmers by profession. They are engaged either directly or indirectly in agriculture. Agriculture is the major source of employment in rural areas. Like other parts of Pakistan, the share of agriculture in employment has decreased over the years. Still, it is larger than any other sector of the economy. The agriculture sector employs a significant proportion of the district's workforce, with 32.4% of the total workforce being employed in agriculture in 2020-21. This indicates the importance of the agriculture sector to the local economy.

In rural areas, the proportion of people employed in agriculture is 33.4% of the rural workforce being employed in agriculture. This highlights the significant role of agriculture in rural livelihoods and the local economy.

In terms of gender, there is a slight difference in the proportion of males and females employed in the agriculture sector, with 23.9% of males and 81.5% of females being employed in agriculture[44]. This suggests that both genders are involved in agricultural activities to a similar extent. The data also shows that the urban workforce's involvement in agriculture is 0%. This indicates the shift towards non-agricultural employment opportunities in urban areas.

Overall, agriculture remains an important source of employment and livelihoods in the Bannu District, particularly in rural areas.

Table 3-51 Division of Labor Force in Rural and Urban Areas in Bannu District[45]

Indicators		Total	Male	Female
Labour Force	All Areas	358.4	291.6	66.8
	Rural	348.2	282.1	66.1
	Urban	10.2	9.5	0.7

Table 3-52: Employment by Sector in the Bannu District (in percentage)[46]

Indicators		Total	Male	Female
Employment by Sector (%)	Agriculture	32.4	23.2	80.5
	Rural	33.4	23.9	81.5
	Urban	0	0	0

3.4.4.1 Recommendations

- Establish agricultural training centers and extension services to educate farmers on modern techniques and crop management.
- Introduce microfinance schemes and credit facilities to help small farmers invest in modern farming inputs.
- Set up demonstration farms and provide incentives for adopting advanced agricultural practices and machinery.
- Develop drainage systems and soil treatment programs to combat waterlogging and salinity issues.
- Encourage land consolidation and cooperative farming to create economically viable and resource-efficient farms.
- Promote efficient irrigation systems like drip, sprinkler, and rainwater harvesting to conserve water and improve supply.
- Strengthen pest control through Integrated Pest Management (IPM) and research on disease-resistant crop varieties.
- Upgrade road infrastructure and provide affordable transport to improve farmers' access to markets.
- Boost crop yields by promoting high-yield, climate-resilient varieties and balanced fertilizer use.
- Educate farmers on water conservation and transition from flood irrigation to more efficient irrigation methods.
- Construct small dams and reservoirs for water storage and promote on-farm rainwater harvesting.

[44] *Labor Force Survey 2020-21*

[45] *Labor Force Survey 2020-21*

[46] *Labor Force Survey 2020-21*

- Utilize precision agriculture techniques like soil moisture sensors and satellite monitoring for better farm management.
- Implement flood control infrastructure and early warning systems to mitigate flood damage.
- Develop market information systems and farmer cooperatives to improve price negotiations and market access.
- Encourage crop diversification and value addition initiatives to increase farmers' income and reduce market risks.

3.4.5 Future Plan

Agriculture in District Bannu faces many challenges, including inefficient irrigation systems, declining groundwater levels, and soil degradation due to excessive fertilizer use, outdated irrigation systems, and soil problems like erosion and salinity. Many farmers still use traditional methods, with little access to modern technology or machinery, leading to low crop yields. Climate change brings unpredictable weather, droughts, and floods, making farming even harder. Small farmers struggle with financial issues, while poor roads and market access reduce their profits. The livestock sector also faces problems like limited grazing land and a lack of veterinary services. To improve agriculture, better irrigation systems like center pivot irrigation, drip irrigation, modern farming techniques, and financial support are needed.

3.4.5.1 Center Pivot Irrigation System

Center pivot irrigation is an advanced and efficient method of irrigating large agricultural fields. It consists of a rotating sprinkler system that moves around a fixed central point, creating a circular pattern of water distribution. This system is designed to maximize water use efficiency, reduce labour costs, and improve crop yields by delivering precise amounts of water directly to the soil.

The system operates by extracting water from a central source, such as a well, canal, or reservoir, and distributing it through a series of pipes mounted on wheeled towers. These towers move in a circular motion, powered by electric or hydraulic motors, ensuring uniform coverage across the field. The speed of rotation and the amount of water applied can be adjusted based on crop requirements, soil conditions, and climate factors. The typical center pivot has a span of 400 meters. And covers an area of 50 hectares (125 acres). However, it spans as long as 800 meters and covers an area of 200 hectares (500 acres). In Bannu, where the land is semi-arid with vast open areas, implementing a center pivot irrigation system can be highly beneficial for farmers. Given the region's limited water resources, this system can play a crucial role in conserving water while significantly improving agricultural productivity.

3.4.5.1.1 Components

Several key components of Center Pivot Irrigation work together to distribute water efficiently across the agricultural fields. Each part is responsible for the movement, control, or structure of the machine. Each component is described in detail.

1. Pivot Point

The pivot point anchors the machine to a permanent location in the field. It also houses a system of subcomponents that contribute to the overall functionality of the pivot.

- **Pivot Legs:** Four pivot legs are bolted or chained to a concrete pivot pad, providing support.
- **Riser Pipe:** Water supply enters the pivot through this pipe.
- **Pivot Swivel:** An elbow-shaped fitting that connects the riser pipe to the first span.
- **Control panel:** The panel is the command center of the pivot.
- **J-Pipe:** Power and control circuit wires travel through the J-pipe to the collector ring assembly.
- **Collector Ring:** Contact brushes rotate around stationary brass rings to provide a continuous flow of electricity to the pivot.

2. CONTROL PANEL

A control panel is a piece of hardware attached to the pivot point that gives commands to the center pivot. Control panels are considered the ‘brain’ of the machine. They control starting, stopping, changing directions, running wet versus dry, and much more. A variety of control panels are available, and you can choose panels with very basic capabilities or digital panels that can be programmed to work with advanced irrigation technologies.

3. SPANS

The long pipes between drive units are called spans, also known as “Main water lines”. Spans consist of the main water pipeline, sprinklers, and a supporting structure of trussing that holds the weight between towers. Different span lengths can be combined to create a center pivot that fits almost any field. It also has two subcomponents that functions as the main water lines.

- **Trussing:** Span pipes are supported by trussing and the drive units. Trussing is engineered to keep the pipes stable and to create an arch, allowing for easy drainage of the pipes. The number of trusses will vary depending on the length of the span.
- **Riser Pipe:** The riser pipe is connected to the first span through the pivot swivel. The swivel rotates around the riser as the machine travels around the field. Water travels through the riser out to the spans and is distributed by the machine’s sprinklers.

4. Sprinkler System

The sprinkler system ensures even water distribution across the field. It consists of:

- **Sprinkler Heads**: Different types (e.g., impact sprinklers, low-pressure sprinklers, or LEPA nozzles) depending on the crop and soil type.
- **Pressure Regulators**: Maintain consistent pressure along the pivot to prevent uneven irrigation.
- **Drop Tubes**: Deliver water closer to the ground, reducing evaporation and wind drift.

5. Drive Units

A drive unit or drive tower is the part of the machine that touches the ground and contains the necessary components for the machine to move. It consists of a base beam, drive train, wheels, and various structural supports. The drive units and the supporting structure provide clearance above the crop for the spans and control the movement of the machine. The Last Regular Drive Unit, or LRDU, is the last tower on a regular pivot or the last tower before a corner arm or pivot add-on that extends your irrigated acres. When the control panel tells the machine to move, 480 VAC is sent to the drive motor through the tower box, causing the drive unit to move.

6. Electrical Control Boxes

Each drive unit has a tower box that uses various components to control pivot movement and alignment. Power to the drive units occurs in three steps.

- Power from a generator or public power supply runs through the collector ring at the pivot point.
- Span cables carry 120 and 480 VAC to each tower box. 120 VAC maintains the safety circuit, and 480 VAC supplies power to the drive units.
- Tower boxes send 480 VAC to the drive motors when signaled to move by the 120 VAC control circuit.

7. End Gun (Optional)

The end gun is a high-pressure sprinkler located at the far end of the last span. It helps extend irrigation coverage beyond the circular pattern. Some systems use booster pumps to increase end gun efficiency.

3.4.5.1.2 Economic viability of center pivot irrigation for district Bannu

The center pivot irrigation system offers a cost-effective and sustainable solution for agriculture in District Bannu. It enhances water efficiency, reducing wastage and lowering operational costs. With uniform water distribution, crops receive optimal moisture levels, reducing stress and enhancing growth. This results in higher yields per acre, making agriculture more profitable. Studies have shown that center pivot systems can increase crop yields by 20-50% compared to conventional methods. Automation reduces labor costs and maintenance efforts, making it a practical alternative to traditional irrigation. Although the initial investment is high, long-term savings and increased productivity ensure a return on investment within 5-7 years. The government and agricultural development programs often provide subsidies or financial

assistance for modern irrigation technologies. Accessing such support can make the project more feasible for farmers in District Bannu.

3.4.5.1.3 Implementation

Since most of Bannu's agricultural land is irrigated through canals, channels, and tube wells, implementing a center pivot irrigation system requires careful planning and integration with existing water sources. To successfully implement a center pivot irrigation system in District Bannu. Large open farmlands with fewer obstacles should be selected to allow easy movement of the system. The land should be checked for soil type, water availability, and terrain suitability, and if needed, it should be leveled for better operation. Since most of the land in the area is owned by local farmers, the government should introduce a scheme to help them adopt center pivot irrigation. Under this plan, farmers can combine 10 to 20 small farmland patches, as each center pivot system typically covers 50 hectares (125 acres). Training programs should be arranged to teach farmers how to operate and maintain the system and use water efficiently. Crop diversification should also be encouraged to increase productivity. To support the farmers, the government should provide subsidies for modern irrigation systems. Cooperative farming models should be promoted, allowing farmers to share costs and benefits. By implementing these steps, the center pivot irrigation system can improve agriculture and water use in District Bannu.

The introduction of a center pivot irrigation system in District Bannu will transform agricultural productivity, ensuring optimal water use and sustainable farming practices. Given the challenges of water scarcity and inefficient irrigation techniques, adopting this modern technology will secure long-term agricultural growth, improve farmers' livelihoods, and enhance food security in the region.

3.4.5.2 Drip Irrigation System

“Drip irrigation,” also called “Trickle irrigation,” system is a precise and efficient irrigation method that delivers water directly to the root zone of plants through a network of tubes, pipes, valves, and emitters.

Alongside the (Center pivot irrigation) system, the drip irrigation system, unlike traditional flood irrigation that causes evaporation and runoff, ensures precise and controlled water distribution, making it especially beneficial for arid and semi-arid regions. In District Bannu, where most agricultural land relies on groundwater, canals, and tube wells, the southern region of tehsil Domel remains largely uncultivated due to a lack of water availability. Applying drip irrigation in the surrounding area would enable efficient water use, transforming barren lands into productive fields while supporting the cultivation of high-value crops such as fruits and vegetables. This approach not only conserves groundwater, prevents soil erosion, and enhances climate resilience but also boosts local economic growth. By promoting sustainable agriculture and reducing reliance on water-intensive irrigation methods, drip irrigation presents a viable solution for optimizing land use, ensuring food security, and fostering long-term agricultural development in District Bannu.

3.4.5.2.1 Components

Drip irrigation includes multiple components that work together effectively. These components ensure water is distributed precisely to the required areas. Key components include:

1. **Water pump**:

The water pump is used to supply water through the components of the drip irrigation system at a specific level of pressure. If the source of a water supply is a bore well, open well, or a Canal there is the possibility of organic and inorganic foreign bodies in the water. In this case, use the suction filter to get relatively clean water. The electric motors or diesel engines are the common prime mover of the pump.

2. **Filter unit:**

A filter unit is a crucial component of drip irrigation systems that removes debris, sediments, and impurities from water before it reaches the emitters. Proper filtration prevents clogging, ensures efficient water distribution, and extends the lifespan of the system.

3. **Types of filters**

- **Gravel Filter (Sand Filter):** Water passes through a bed of sand to filter out fine sediments and organic matter. It is best for high-sediment water sources, such as rivers or ponds.

- **Screen Filter:** Uses a fine mesh screen to trap large particles like sand and debris. It is suitable for relatively clean water sources and requires periodic cleaning.
- **Disc Filter:** Contains stacked plastic discs with grooves that capture finer particles. It provides better filtration than screen filters and is ideal for water with moderate debris levels.
- **Media filter:** Uses various filtration materials like sand, gravel, or activated carbon to remove fine particles and organic contaminants. It is effective for water with mixed debris types and is commonly used in large-scale irrigation systems.

4. **Main line:**

The main line is the primary pipeline that carries water from the water source (pump, reservoir, or storage tank) to the sub-main lines and laterals. It plays a crucial role in distributing water efficiently throughout the system. It is typically made of PVC, HDPE, or GI (Galvanized Iron) for durability and pressure resistance. It is larger in diameter to handle high water flow

5. **Sub main:**

The sub-main is a secondary pipeline that connects the main line to the laterals**,** distributing water evenly across the field. It helps regulate flow and pressure before water reaches the emitters. It is usually made of PVC, HDPE, or LDPE for durability and flexibility.it is smaller than the mainline but larger than lateral pipes and controls water distribution and pressure, ensuring uniform irrigation.

6. **Laterals:**

A lateral is a small-diameter pipeline that carries water from the sub main to the drippers (emitters)**,** delivering water directly to plant roots. Laterals are made up of low-density polyethylene (LDP) or linear low-density polyethylene (LLDPE) material and are available in different sizes 12 mm, 16mm, and 20 mm.

7. **Drippers:**

Drippers are also called emitters. It is small devices installed on laterals that release water drop by drop directly to the plant roots, ensuring efficient irrigation with minimal water loss. Two types of drippers are available on the market.

- **Online Dripper:**
  These drippers are attached externally to the lateral pipes at specific intervals. They offer flexibility as they can be installed based on plant spacing. This type of dripper is used mostly for Orchards, nurseries, and crops with irregular plant patterns.
- **Inline Dripper:**
  These drippers are pre-installed inside the lateral pipes at fixed intervals. Best for row crops and uniform planting patterns. They provide consistent water distribution along the pipeline. Furthermore, there are three types of inline drippers.
  1. **Non-Pressure Compensating Drippers (NPC):** This is a very simple dripper, which does not maintain uniform pressure.
  2. **Pressure Compensating Drippers (PC):** This dripper is more advanced it maintains a constant flow rate of water regardless of changes in pressure. These drippers ensure uniform water distribution, making them ideal for areas with varying elevations and long lateral pipelines.
  3. **Non-Draining (ND) Drippers**: Close when the system shuts off, preventing water drainage and maintaining pipeline pressure.

8. **Fertilizing unit:**

A fertilizing unit is an essential component in drip irrigation, allowing fertilizers to be delivered directly to plant roots through the irrigation system. Application of fertilizer into the irrigation system is done by either a bypass pressure tank or by venture pump or a direct injection system.

9. **Pressure gauge:**

It is used to determine water pressure in the drip irrigation system.

10. **Control valves:**

This valve is used to control water flow. They are made up of plastic and iron.

11. **Flush valve:**

The flush valve is placed at the end of the sub-Maine pipe, it used to flush out dirt.

12. **Non-return valve:**

Non -return valve is useful to stop return water toward the water pump.

13. **Air valve:**

It helps to prevent sucking of mud by the drippers and releases air in the drip irrigation system.

14. End cap:

The end cap is used to close one end of the lateral pipe; it is removed at the time of cleaning.

3.4.5.2.2 High skill requirements

High skill is required for designing the installation and subsequent operation. The technical improvement in the designs of emitters, fittings, filters, etc. has been necessary. The development procedures for preventing or correcting emitter clogging & equipment failure have been difficult, and the development of the proper methods for injection of fertilizers & other chemicals has sometimes been a problem. A higher level of design, management & maintenance is required with drip than with other irrigation methods.

3.4.5.2.3 Economic viability of drip irrigation for district Bannu

The drip irrigation system is economically viable for District Bannu due to its ability to minimize water wastage, given the region's water scarcity and the need for efficient farming practices. By delivering water directly to plant roots, drip irrigation minimizes evaporation and runoff, making it particularly beneficial for the southern areas where limited water availability restricts cultivation. Compared to traditional flood irrigation, it reduces water usage by 30-50% while enhancing yield per unit of water applied, and it can increase 20-50% of productivity. This not only boosts farm income but also strengthens food security. The system optimizes fertilizer application through fertigation, cutting fertilizer and herbicide costs by up to 30%, while controlled watering reduces plant diseases, lowering pesticide expenses. Additionally, it minimizes weed growth, conserves groundwater, prevents soil erosion, and improves soil health, ensuring sustainability. By adopting drip irrigation, farmers in Bannu can cultivate high-value crops like tomatoes, onions, chilies, citrus, dates, and guavas, which thrive under controlled irrigation, yielding better quality produce and higher market prices. Automation further reduces labour costs and effort, aligning with District Bannu's long-term land use planning goals for sustainable agriculture.

3.4.5.2.4 Implementation

Water scarcity in the southern district of Bannu leaves vast lands uncultivated due to inadequate irrigation. Drip irrigation is proposed to optimize water use, reduce wastage, and boost crop yields by delivering water directly to the root zone. A land and water assessment will identify suitable areas, prioritizing water-stressed and underutilized lands. It is highly suitable for orchards, the focus will be on high-value, drought-tolerant crops like tomatoes, onions, citrus, dates, sunflower, and lentils to ensure better profits and efficient water use. To offset the high initial cost, the government offers subsidies, grants, interest-free loans, and cost-sharing through public-private partnerships. Technical training and awareness programs will support farmers in installation, operation, and maintenance. Pilot sites (5-10 acres each) in water-stressed areas will demonstrate best practices to build confidence and encourage adoption. Drip irrigation will conserve water, prevent soil erosion, improve soil fertility, boost farm income, and reduce reliance on inefficient flood irrigation. A monitoring framework will track its impact on water efficiency, crop yields, and sustainability, ensuring continuous improvements.

3.4.5.3 Sources of water

3.4.5.3.1 Baran dam:

Baran Dam, located in the Bannu district of Khyber Pakhtunkhwa, Pakistan, was originally constructed in 1962 to support irrigation in the region. The dam's reservoir has a total storage capacity of approximately 100,000 acre-feet, enabling it to irrigate around 170,000 acres of agricultural land through the Marwat Canal. In 2018, a project was initiated to raise the dam's height by 7 meters, aiming to enhance its water storage capacity and extend its irrigation coverage. Baran Dam serves as a vital water source for irrigation in District Bannu, ensuring a reliable supply for agricultural activities, particularly in areas facing water shortages. It helps regulate water distribution, allowing farmers to cultivate crops more efficiently and reduce dependence on unpredictable rainfall. The dam supports higher crop yields, improves soil moisture retention, and enhances overall agricultural productivity. Water from the dam is released through a controlled system of canals and distributaries, reaching farmlands as needed. For future agricultural planning, integrating Baran Dam with modern irrigation techniques can significantly improve water

conservation, expand cultivation in arid areas, and promote sustainable farming practices across the district.

Improvement of existing canals:

District Bannu agriculture depends on its canal network, fed by the Kurram River and smaller tributaries. However, outdated infrastructure, seepage, and inefficient distribution reduce water efficiency. Modernizing the canal system and improving management practices are crucial for sustainable agricultural growth.

Current challenges in the existing canals:

1. **Water Seepage and Losses**: A significant portion of water is lost due to seepage, cracks, and inefficient canal lining, reducing the water available for irrigation.
2. **Siltation and Blockage**: Accumulation of silt and debris in canals leads to reduced water flow and inefficient distribution.
3. **Outdated Infrastructure**: Many canal structures, including gates and regulators, are old and inefficient, leading to uncontrolled water distribution.
4. **Illegal Water Diversion**: Unauthorized water extraction and breaches in canals affect the equitable distribution of irrigation water.
5. **Poor Maintenance**: Lack of periodic maintenance results in the deterioration of canal embankments and structures, further affecting efficiency.
6. **Limited Water Availability**: During dry seasons, the demand for water exceeds the available supply, leading to water shortages in certain agricultural areas.

Proposed Improvements and Modernization:

1. **Canal Lining and Rehabilitation**
   - Concrete lining of major and secondary canals to minimize seepage losses and enhance water efficiency. Repair of damaged sections to prevent leakage and erosion.
2. **Desilting and Maintenance**
   - Regular dredging and removal of silt deposits to maintain smooth water flow. Strengthening embankments to prevent erosion and overflow.
3. **Modernization of Canal Structures**
   - Installation of automated control gates and water distribution systems for precise management. Rehabilitation of outdated structures, including weirs, regulators, and sluice gates, to improve operational efficiency.
4. **Equitable Water Distribution**
   - Implementation of monitoring systems to prevent unauthorized diversions and ensure fair distribution. Introduction of digital water allocation systems using remote sensing and GIS technology.
5. **Community Participation and Management**
   - Formation of Water User Associations (WUAs) to engage farmers in canal management and maintenance. Awareness campaigns on efficient water use and conservation practices.
6. **Integration with Modern Irrigation Techniques**
   - Linking the canal water supply with proposed center pivot and drip irrigation systems for optimized water use. Encouraging farmers to adopt water-efficient irrigation methods.

3.4.5.3.2 Check Dams

To enhance water conservation and reduce soil erosion, constructing check dams in key locations across District Bannu is essential. These small barriers will regulate water flow, recharge groundwater, and improve irrigation efficiency. By controlling runoff, they will help mitigate water losses and support sustainable agriculture in water-scarce areas.

3.4.5.3.3 Tube Wells

To supplement irrigation, installing tube wells in areas with suitable groundwater potential is necessary. These wells will provide a reliable water source, especially in regions with limited canal coverage. Efficient water extraction and management will ensure sustainable use, helping to bridge irrigation gaps and boost agricultural productivity.

3.4.5.4 Awareness workshops and seminars for farmers

Conducting workshops and seminars is essential to educate farmers on modern irrigation techniques, efficient water management, and sustainable farming practices. These sessions will enhance their understanding of advanced methods like drip irrigation, center pivot systems, and soil conservation strategies. By increasing awareness, farmers can optimize resource use, improve productivity, and adapt to changing agricultural challenges.

3.4.6 Livestock

The district of Bannu has enormous potential that can be harnessed through appropriate livestock policies. The livelihoods of farmers in the Bannu district are directly impacted by the livestock sector, which provides food, wool, fuel, and farming resources. This sector offers consistent daily financial support, employment opportunities, and a stable food source. Additionally, it serves as a safeguard against the risks associated with crop failure or other unforeseen events.

3.4.6.1 Livestock population in district Bannu

The livestock population in District Bannu has significantly declined between 2006 and 2021, with the total count dropping from 3,354,449 to 1,096,341. Cattle decreased from 266,356 to 185,008, while buffaloes declined from 67,703 to 31,541, and sheep saw a sharp reduction from 220,612 to 76,528. Goats experienced the most significant drop, from 861,509 to 178,456, whereas donkeys also declined from 25,109 to 9,480. Poultry farming faced a major setback, reducing from 1,909,142 to 568,600. In contrast, camels increased from 1,713 to 3,801, horses rose from 1,824 to 4,420, and mules grew from 481 to 1,257, reflecting their continued role in transportation and agriculture. The overall decline in livestock suggests factors such as urban expansion, water scarcity, economic constraints, and changing agricultural practices, while the increase in camels, horses, and mules highlights their adaptability and sustained demand.

Table 3-53: Livestock Population in District Bannu[47]

Livestock	2006	2021
Cattle	266356	185008
Buffaloes	67703	31541
Sheep	220612	76528
Goats	861509	178456
Camels	1713	3801
Horses	1824	4420
Mules	481	1257
Donkey	25109	9480
Poultry	1909142	568600
Others	0	37250
Total	3354449	1096341

3.4.7 Assessment of Fisheries and Poultry

3.4.7.1 Fisheries

The fisheries sector in Bannu district, Pakistan, has shown significant growth in fish production between 2018-19 and 2021-22, indicating a positive trend in this sector. In 2018-19, the district produced 38.62 metric tons of non-trout fish, valued at Rs. 9.66 million, as there was no trout production. However, in the year 2021-22, the district witnessed a significant increase in non-trout production, with 80.33 metric tons produced, valued at Rs. 20.08 million. The table below provides the annual fish production and its corresponding values for the province and district of Bannu from 2018-19 to 2021-22.

[47] *Livestock Census 2006 and 2021 report, Khyber Pakhtunkhwa*

Table 3-54 Fish Production in District Bannu[48]

Years	Description	Type	KP	Bannu	% in Bannu From KP
2018-19	Production in M. Tons	Trout	27.78	0	0.00
		Non-Trout	1,093.44	38.62	3.53
		Total	1,121.23	38.62	3.44
	Value in Million RS.	Trout	27.78	0	0.00
		Non-Trout	273.36	9.66	3.53
		Total	301.14	9.66	3.21
2019-20	Production in M. Tons	Trout	67.34	0	0.00
		Non-Trout	1,065.43	30.00	2.82
		Total	1,132.76	30.00	2.65
	Value in Million RS.	Trout	67.34	0	0.00
		Non-Trout	266.36	7.50	2.82
		Total	333.69	7.50	2.25
2020-21	Production in M. Tons	Trout	603.99	0	0.00
		Non-Trout	2,899.98	35.21	1.21
		Total	3,503.97	35.21	1.00
	Value in Million RS.	Trout	603.99	0	0.00
		Non-Trout	725.00	8.8	1.21
		Total	1,328.99	8.8	0.66
2021-22	Production in M. Tons	Trout	780.00	0	0.00
		Non-Trout	4,209.96	80.33	1.91
		Total	4,989.96	80.33	1.61
	Value in Million RS.	Trout	780.00	0	0.00
		Non-Trout	1,052.49	20.08	1.91
		Total	1,832.49	20.08	1.10

3.4.7.2 Poultry

The poultry population in Khyber Pakhtunkhwa (KP) has shown a substantial increase from 27,695,116 in 2006 to 40,996,000 in 2021. This significant growth reflects the expanding poultry industry in the province, driven by increasing demand for poultry products such as meat and eggs. The growth trend indicates advancements in poultry farming practices, enhanced veterinary care, and possibly increased investment in the sector, which collectively contribute to the rising poultry numbers. In contrast to the provincial trend, the poultry population in District Bannu has declined sharply from 1,909,142 in 2006 to 568,600 in 2021[49]. This decline suggests several underlying issues affecting the poultry sector in Bannu. Notably, there are 27 poultry farms in the district, but the population data from these farms is not available. This lack of comprehensive data likely contributes to the reported decrease in poultry numbers, as the actual population might be higher than documented. The decrease could also be attributed to other factors such as inadequate veterinary services, disease outbreaks, or economic challenges faced by poultry farmers.

3.4.8 Livestock Facilities

The total count of veterinary institutes in the Bannu district has decreased from 158 in 2018-19 to 78 presently. In detail, the number of hospitals has decreased from 7 to 6, dispensaries from 69 to 63, and centers from 72 to 9. The table below provides a comprehensive overview of the veterinary institutes in Bannu.

Table 3-55 Veterinary Institutes in Bannu[50]

Year	Total	Hospitals	Dispensaries	Centers
2018-19	158	7	79	72
2019-20	141	7	80	54

[48] *Development Statistics-2022*

[49] *Development Statistic- 2023*

[50] *Development Statistics-2022*

Year	Total	Hospitals	Dispensaries	Centers
2020-21	90	6	60	24
Current	78	6	63	9

The effectiveness of these institutes can be assessed by analyzing the number of animals and birds receiving treatment and protection. In the fiscal year 2020-21, a total of 140 animals were treated, while 30 animals were protected, along with 70 birds.

Table 3-56: Performance of Veterinary Institutes in Bannu [51]

Year	No. of Animals Treated	Number of Animals Protected	No. of Birds Protected
2018-19	239	214	498
2019-20	291	333	585
2020-21	140	30	70

3.4.9 Institutional Structure of Livestock sector in KP

The organizational structure of the Directorate General (Research) for Livestock & Dairy Development in Khyber Pakhtunkhwa, Pakistan. It is divided into three main divisions: the Veterinary Research Institute, Planning & Development Cell, and Livestock Research & Development. The Veterinary Research Institute oversees various centers, including the Center of Microbiology & Biotechnology, Center of Biological Production, and Foot & Mouth Disease Vaccine Research Center, as well as Veterinary Research & Disease Investigation Centers. The Livestock Research & Development division encompasses several facilities, such as Livestock Research & Development Stations. It also includes the Center of Animal Nutrition, Poultry Research Institute, Arid Zone Small Ruminants Research Institute, and the Goat Production Research. The Planning & Development Cell is positioned between these two divisions, likely responsible for coordinating and strategizing their activities.

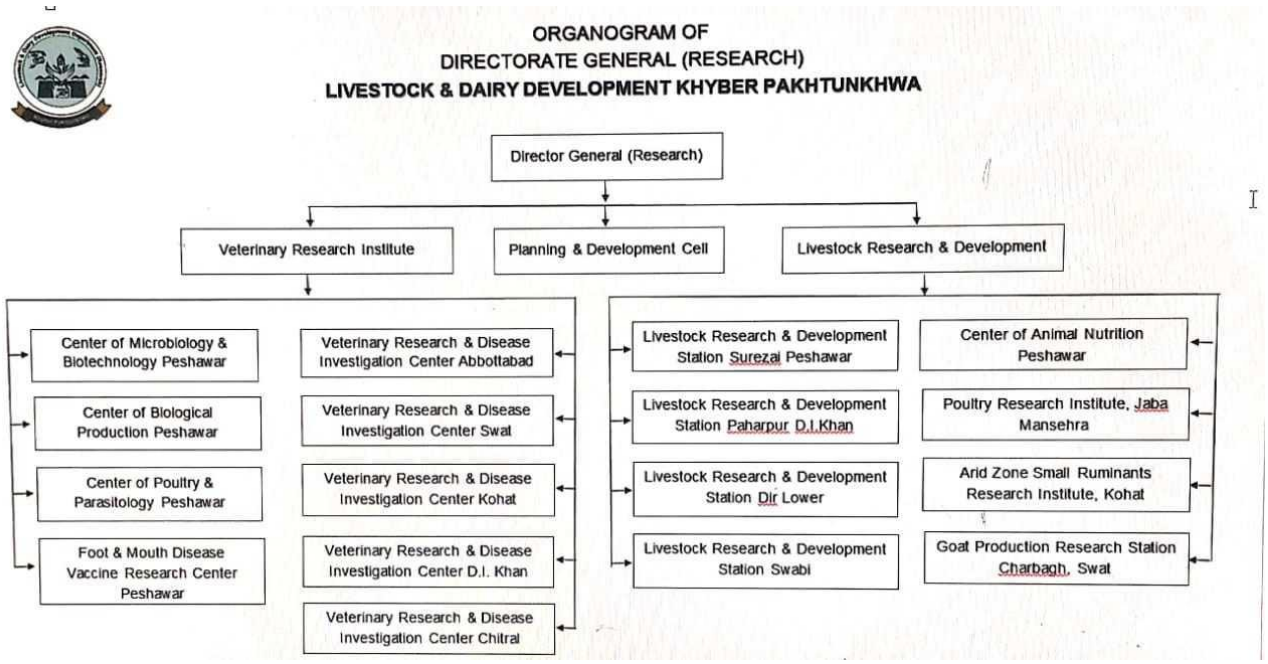


Figure 3-6 Institutional Structure of Livestock Sector in KP[52]

3.4.10 Recommendations

[51] *Development Statistics-2022*

[52] *Directorate of Livestock and Dairy Development Khyber Pakhtunkhwa*

- Increase the number of veterinary hospitals, dispensaries, and centers to enhance animal health services.
- Improve the efficiency of veterinary institutes by increasing the number of animals and birds treated and protected.
- Develop efficient water utilization strategies for livestock, including water source development, watering points, and conservation methods.
- Conduct assessments to identify suitable grazing lands and pastures, ensuring sustainable usage practices and adequate fodder availability.
- Encourage the cultivation of fodder crops, forage preservation techniques, and feed storage facilities to maintain a continuous supply of quality feed for livestock.
- Implement vaccination programs and establish comprehensive veterinary services to improve animal health and reduce disease prevalence.
- Strengthen disease surveillance, diagnosis, and control mechanisms.
- Recognize and support the crucial role of women in livestock raising and production through targeted training and resources.
- Promote gender mainstreaming in livestock policies and programs to ensure equitable participation.
- Review and enhance existing livestock policies to address issues related to nutrition, breeding, disease control, and marketing.
- Foster private sector-led development with public sector support through effective policy interventions.
- Engage local communities in sustainable livestock practices by providing training and resources to improve livelihoods and empower farmers.
- Conduct research on native livestock and poultry to address challenges such as diseases, pests, and inadequate feeding.
- Promote innovative breeding techniques to conserve and improve native livestock breeds.
- Support backyard poultry production in rural areas through training on poultry management, access to affordable inputs, and market linkages.
- Conduct research on poultry nutrition, disease prevention, and management practices to address sector challenges.
- Foster national and international cooperation to promote sustainable fishing practices and increase cold-water fish production.
- Conduct research on fish health, feeding practices, and husbandry to address challenges in the fisheries industry.

3.5 Mining and Energy

Mines and mineral resources serve as the foundational pillars of various industries, driving economic growth and fostering employment opportunities. These resources provide essential raw materials for sectors ranging from construction and manufacturing to energy production and technology. By harnessing these resources through responsible mining practices, regions can leverage their natural endowments to stimulate local economies, create jobs, and support sustainable development initiatives.

3.5.1 Existing Mineral Resources

According to the data provided by the Mineral Development Department KP, the Bannu district has significant production of limestone, shale clay, silica sand, iron ore, coal, sandstone, and laterite. The mineral production in Bannu District from 2017 to 2022 reveals notable variations across different minerals, with limestone and shale clay emerging as the highest producers.

The production trends of various minerals in Bannu between the fiscal years 2017–18 and 2021–22. Notable changes are observed across multiple mineral categories. Iron ore production saw a significant increase, rising from 5,600 tons in 2017–18 to 30,231 tons in 2021–22. Similarly, shale clay production experienced substantial growth, increasing from 895,450 to 1,043,256 tons. Silica sand production nearly doubled, growing from 18,800 to 36,400 tons. Conversely, the production of laterite and limestone showed a marked decline; laterite dropped from 67,279 to 25,670 tons, while limestone production fell sharply from 1,861,549 to 904,019 tons. Sandstone production, however, rose notably from 1,650 to 13,512 tons. This data reflects dynamic shifts in mineral extraction patterns, possibly influenced by

industrial demand, resource availability, and mining policy changes over the years. Data are given in the table below.

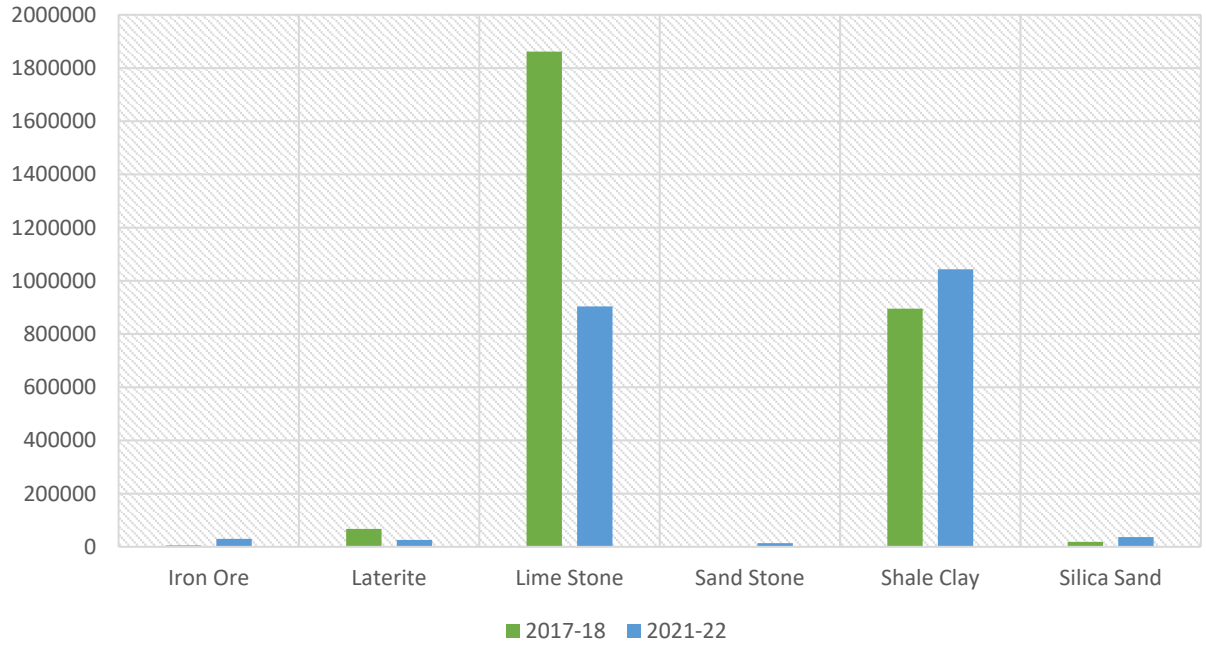


Figure 3-7: Yearly Mineral Production Statistics of Bannu District in tons (2017 – 2022)[53]

3.5.2 Existing Practices of Mineral Extraction

Bannu district is rich in various minerals, including limestone, shale clay, iron ore, laterite, sand stone, distinct mining practices and applications. Limestone mining, for instance, involves quarrying large blocks of sedimentary rock, which are then crushed and processed for use in construction materials like concrete and asphalt. Likewise, the extraction of shale clay has its process. Beginning with the identification of suitable clay-rich shale formations. These formations are typically found through geological surveys and exploratory drilling. Once identified, the shale is mined using traditional excavation methods or advanced techniques such as hydraulic fracturing to access deeper layers. The extracted shale is then transported to processing facilities where it undergoes crushing, screening, and sometimes thermal treatment to remove impurities and enhance its properties. Shale clay is prominently used in the construction and ceramics industries. It is utilized as a raw material for manufacturing bricks, tiles, and cement. The high plasticity and binding properties of shale clay make it ideal for these applications. Additionally, shale clay is also employed in the production of lightweight aggregate and as a drilling mud additive in the oil and gas industry due to its swelling and fluid loss control properties. The mining process of iron ore starts with extensive geological surveys and drilling to identify and estimate the ore deposits. Once deposits are confirmed, mining involves either open-pit or underground methods, depending on the depth and location of the ore. Extracted ore is then crushed and ground into finer particles to facilitate the separation of iron from other minerals. This involves processes like magnetic separation, flotation, and gravity separation to increase the iron content and remove impurities. Finally, the ore undergoes smelting in blast furnaces or direct reduction plants to produce iron, which is then used to make steel. The steel produced is crucial for various sectors, including construction, infrastructure development, and the manufacturing of machinery and vehicles.

However, while mining activities in Bannu district offer economic benefits, they also pose environmental and social challenges that warrant careful consideration and management. Environmental degradation, such as land subsidence, soil erosion, and pollution, can result from inadequate mining practices and insufficient mitigation measures. Moreover, the health and safety of workers in the mining industry require attention to ensure compliance with occupational health and safety standards. Community engagement and consultation are essential to address concerns regarding land use, water resources, and the overall

[53] *Development Statistics, 2023*

impact of mining activities on local livelihoods and ecosystems. Therefore, sustainable mining practices that prioritize environmental stewardship, worker safety, and community well-being are crucial for the responsible exploitation of mineral resources in Bannu district.

The mining practices in Bannu district, can harm the environment if not carefully managed. Surface mining can damage habitats, cause erosion, and pollute waterways with sediment and chemicals. Underground mining can lead to land subsidence, air pollution, and contamination of soil and water. Proper waste disposal and implementing sustainable practices are crucial to minimize these impacts and protect the environment and the health of local communities.

3.5.3 Recommendations

- **Implement Sustainable Mining Practices**: Adopt and enforce sustainable mining practices to minimize environmental degradation, including the use of pollution control technologies and proper waste management. Focus on reducing land subsidence, soil erosion, and water and air pollution.
- **Stabilize Revenue Management**: Develop strategic plans to stabilize revenue from mineral extraction, ensuring consistent economic contributions and mitigating fluctuations. Implement financial planning tools to manage revenue variability effectively.
- **Enhance Health and Safety Measures**: Improve compliance with occupational health and safety standards to protect mining workers. This includes regular health check-ups, safety training programs, and provision of personal protective equipment such as safety helmets, gloves, and safety boots.
- **Promote Technological Advancements**: Invest in advanced mining and processing technologies to increase efficiency and reduce environmental impacts. Promote the adoption of autonomous mining systems and modern equipment to enhance productivity and safety.
- **Strengthen Legal and Regulatory Frameworks**: Update and enforce the legal and regulatory frameworks to ensure sustainable and responsible mining practices. Address gaps in enforcement and monitoring, and ensure stringent environmental regulations with regular inspections.
- **Community Engagement and Consultation**: Foster community engagement and consultation to address local concerns, promote transparency, and ensure that mining activities benefit local communities. Establish mechanisms for regular dialogue between mining companies and residents.
- **Rehabilitate Mined Areas**: Implement rehabilitation programs for mined areas to restore ecosystems, including reforestation and soil stabilization projects. Ensure that post-mining land use plans are developed and followed.
- **Education and Training**: Provide education and training programs for local communities and workers to enhance skills, increase employment opportunities, and promote sustainable livelihoods. Establish vocational training institutes to meet the demand for skilled labor in the mining sector.
- **Monitor Environmental Impact**: Establish a robust environmental monitoring system to track the impact of mining activities. Ensure timely intervention and mitigation of adverse effects through continuous assessment and reporting.
- **Address Infrastructural Hurdles**: Improve infrastructure to support mining activities, such as ensuring a stable electricity supply, improving mine access roads, and providing essential utilities like water and gas connections. Address electricity cuts and other infrastructural issues to enhance operational efficiency.
- **Promote Brick Kilns and Crush Plants Hub**: Capitalize on Bannu's potential to serve as a "brick kilns hub" and "crush plants hub" for the region. Address regulatory and infrastructural challenges to attract investment and develop these sectors.
- **Enhance Waste Management**: Develop and implement effective waste management strategies for tailings and other mining by-products. Ensure proper disposal and minimize contamination to protect the environment.
- **Strengthen Stakeholder Participation**: Create a mechanism for stakeholder participation in decision-making processes. Establish a regulatory body to oversee mining activities and ensure the inclusion of community and industry representatives.

- **Promote Data and Investment**: Develop comprehensive fact books on mineral reserves in the district to attract investment. Actively promote the mining sector to potential investors and explore opportunities for public-private partnerships.

3.6 Industry

3.6.1 Existing Industrial Distribution

District Bannu has a diverse industrial landscape that plays a significant role in the local economy. The district is known for its cottage industries, particularly in the production of textiles, carpets, and leather goods. These industries are deeply rooted in local tradition and craftsmanship, providing employment to a significant portion of the population.

In addition to traditional cottage industries, Bannu is home to several small to medium-sized enterprises (SMEs) involved in food processing, construction materials, and light engineering. The food processing industry, in particular, has seen growth due to the district's strong agricultural base, which supplies raw materials for products such as dairy products and grain-based foods. The construction industry also benefits from local production of bricks, tiles, and other building materials, supporting both local infrastructure projects and regional markets.

The district's industrial landscape includes two Small industrial estates and one economic zone: Small Industrial Estate-1 is situated opposite to Bannu Township, and Small Industrial Estate-2 and Bannu Economic Zone are situated on Indus Highway Link Road, Kasho. Additionally, Bannu hosts various scattered industries, including brick kilns, crushing plants, marble factories, textile mills and food processing units, ice factories, sugar mills, and flour mills.

3.6.1.1 Bannu Economic Zone

Bannu Economic Zone is an initiative of Khyber Pakhtunkhwa Economic Zones Development and Management Company (KPEZDMC). Bannu Economic Zone (BEZ) covers an area of 408 acres and aims to host 265 small and large-scale industrial units. The zone is expected to attract an investment of approximately Rs 10 billion and generate about 64,000 jobs, including 16,000 direct and 48,000 indirect employment opportunities. It is geographically located in the Bannu District; BEZ has a high potential to benefit the nearby areas and become a factor of improvement in their economic landscape. Bannu Economic Zone has easy access to KP, Baluchistan and Punjab provinces. Moreover, to the Ghulam Khan Border crossing with Afghanistan, which is the gateway to the Central Asian Republics. Bannu Division has a literacy rate of 32%, which will facilitate local industries by making skilled and educated laborers accessible. BEZ has the potential to attract large amounts of investment due to the availability of copious natural resources and its strategic location. It will not only bolster Bannu's economy but will also boost the economies of Lakki Marwat, Karak, and North Waziristan.

3.6.1.2 Small Industrial Estates (SIE)

Bannu is home to two small industrial estates, managed by the Small Industries Development Board (SIDB). Established by an act of the NWFP Parliament in 1972, SIDB aims to promote small-scale industries. Since its inception, SIDB has developed nine Small Industrial Estates across the province. Additionally, SIDB has set up training and manufacturing centers specializing in woodworking, automotive, carpet weaving, knitting, weaving, stitching, and leather goods.

In Bannu, SIDB successfully established a small industrial estate near Bannu Township, which now hosts 110 operational and 97 under construction industries, including food processing, leather, agro-based industries, and furniture manufacturing. Following the success of this project, SIDB launched the Bannu Small Industrial Estate-II, located on Bannu Link Road near Kashu Bridge, adjacent to the site of Bannu Economic Zone. Details of the site provided by Small Industrial Development Board are tabulated below.

Table 3-57 SIDB Ongoing project in Bannu[54]

Small Industrial Estate (SIE) Name	Address	Location with Grid Reference	Status of Activation	Capacity of Site* (Units)	Area of Industrial Site in Acres
SIE Bannu-II	Bannu Link Road, Near Kashu Bridge, Bannu	32° 58′ 43″ N 70° 50′ 00″ E	Land Acquisition is in Process	-	125

3.6.1.3 Scattered Industries

In addition to its three designated industrial zones, Bannu is home to a variety of scattered industries. As per the 2023 data provided by the director general of Industries, there are 176 scattered industries in the district Bannu mostly comprising Crush plants and Aluminum/Steel Products/Utensils Industries. In addition to these industries, during preparation of the land use base map 144 Brick Kilns are identified. Notably, the crush plants are primarily concentrated along the Kurram water channel. Meanwhile, brick kilns are distributed across Bannu Tehsil, Domel, and Baka Khel. The agro-based and food processing industries are more widely spread, with a significant presence in Bannu city and on Bannu D.I. Khan Road. Details of scattered industries are given in the table below:

Table 3-58 Scattered industries[55]

S.no	Industrial Type	Industrial Units
1	Aluminum / Steel Products / Utensils	63
2	Charcoal	2
3	Color Coated Film / Powder Yarn	1
4	Flour Mill	8
5	Food Industry	4
6	Handicrafts	10
7	Ice Factory	21
8	Marble Factory	3
9	Stone Crushers / Crush Plants	63
10	Sugar Mills	1
Grand Total		**176**
Brik Kilns		**144**

3.6.1.4 Categorization of Industrial Establishments by size

Industries are pivotal to economic development, and categorizing them by type and size is essential for understanding the industrial landscape and devising targeted growth strategies. District Bannu industrial categorization utilizes data from the Small Industries Development Board (SIDB), scattered industries data from the Directorate General of Industries, brick kilns digitized in the land use base map. Industries in District Bannu are classified into three main categories based on capital investment, number of employees, production capacity, and technological infrastructure.

3.6.1.4.1 Small Industries

Small-scale industries are characterized by modest capital investment, fewer employees, and limited production capacity. These industries primarily cater to local or regional markets. The average number of employees in small-scale industries ranges from 0 to 50. In District Bannu, there are approximately 100 operational units in Small Industrial Estate-I, with an average employment of 25 persons per unit. Additionally, scattered industries such as 144 brick kilns, 63 crush plants, 63 manufacturers of Aluminum/Steel Products/Utensils, 6 food processing units, and 21 ice factories employ a similar workforce size, qualifying them as small-scale industries.

[54] *Small Industries Development Board Khyber Pakhtunkhwa*

[55] *Directorate General of Industries & Commerce Khyber Pakhtunkhwa*

3.6.1.4.2 Medium Industries

Medium industries involve more substantial operations with significant capital investment and a larger workforce. These industries typically employ between 50 to 250 people, serving regional or national markets with a formal organizational structure. As of current data, no medium-scale industries exist in District Bannu. However, the ongoing development of the Bannu Economic Zone is expected to accommodate several medium and large-scale industries in the near future.

3.6.1.4.3 Large Industries

Large industries encompass extensive operations with substantial capital investment, infrastructure, and workforce. These industries employ over 250 people and operate both nationally and internationally. They have complex organizational structures with specialized departments. Prominent examples in District Bannu include the Bannu Woolen Mill and a sugar mill (currently non-operational). The Bannu Woolen Mill, for instance, employs 396 individuals, significantly contributing to the local and provincial economy.

Table 3-59: Categorization of Industries by size

Type	Small	Medium	Large
Mix/General (SIDB)	100		
Aluminum / Steel Products / Utensils	63		
Charcoal	2		
Color Coated Film / Powder Yarn	1		
Flour Mill	8		
Food Industry	4		
Handicrafts	9		1
Ice Factory	21		
Marble Factory	3		
Stone Crushers / Crush Plants	63		
Sugar Mills			1
Brik Kilns	144		
Total	**418**		**2**

3.6.2 Industrial Growth Pattern

Bannu District has a diverse industrial sector encompassing medium and small manufacturing units. This section provides an in-depth analysis of the industrial landscape in Bannu, focusing on historical trends, recent develop sectoral composition. Through an examination of data from Development Statistics, KP 2023, and other sources, this analysis sheds light on the growth trajectory, challenges, and opportunities within the industrial sector.

Analyzing the data from Development Statistics regarding industrial establishments, it's evident that the overall number of industrial units in Bannu District has gradually increased over five years. It noted that there were 62 industry units in 2017-18 and increased to 99 units in 2018-19. While in the next year 2020-21, the number of industry units surplus to 185 units, and it declined to 117 units in the year 2021-22. In the year 2017-18, the running units were 38, and the closed units were the running units peaked at 155 in 2020-21, while they again declined to 177 in 2021-22

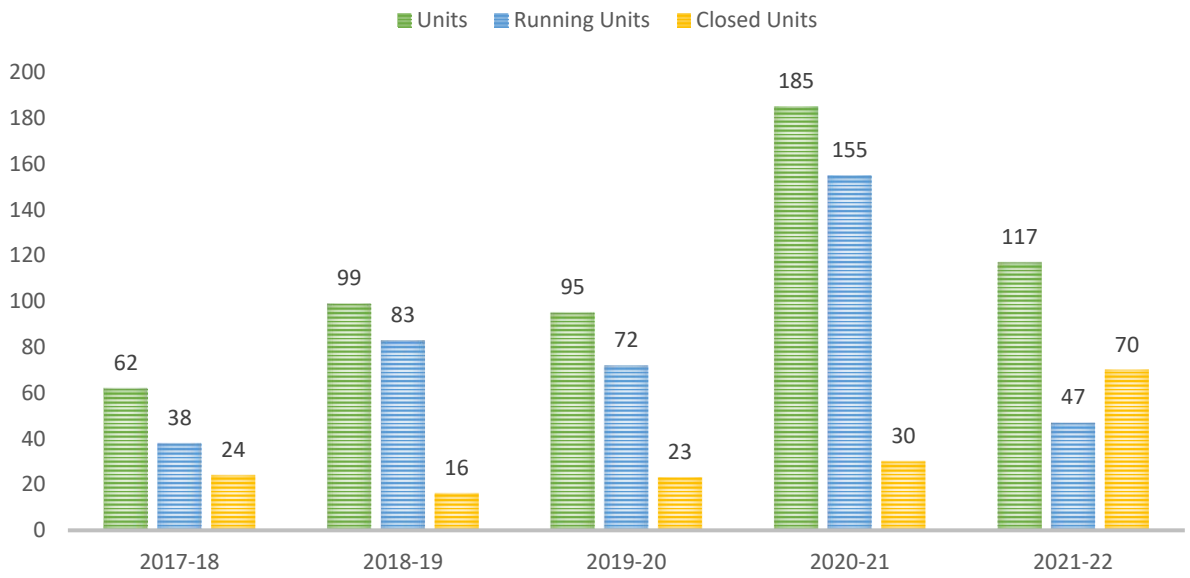


Figure 3-8: Historical Overview of Industrial Sector in District Bannu[56]

3.6.3 Industrial Employment

Diverse soil types and rich natural resources in District Bannu underpin its agricultural and economic activities. This region not only offers fertile grounds for agricultural pursuits but also presents ample opportunities across its robust industrial and services sectors.

In District Bannu, the total labor force recorded 358,400 individuals. Sectoral employment distribution reveals diverse roles across agriculture, industry, and services. Agriculture plays a significant role, employing 32.4% of the workforce, reflecting its moderate impact on employment generation. The industrial sector employs 26% of the workforce, indicating a substantial presence encompassing manufacturing, construction, and energy activities. Services lead in employment share, engaging 41.5% of the workforce, highlighting a robust service sector encompassing retail, healthcare, education, hospitality, and finance.

Table 3-60 Sectoral Employment of Bannu District (%)[57]

Sector	Employment
Total labor force	358400
Agriculture	32.4%
Industry	26%
Services	41.5%

[56] *Development Statistics of KP, 2023 District Bannu*

[57] *Labor Force Survey 2020-21*

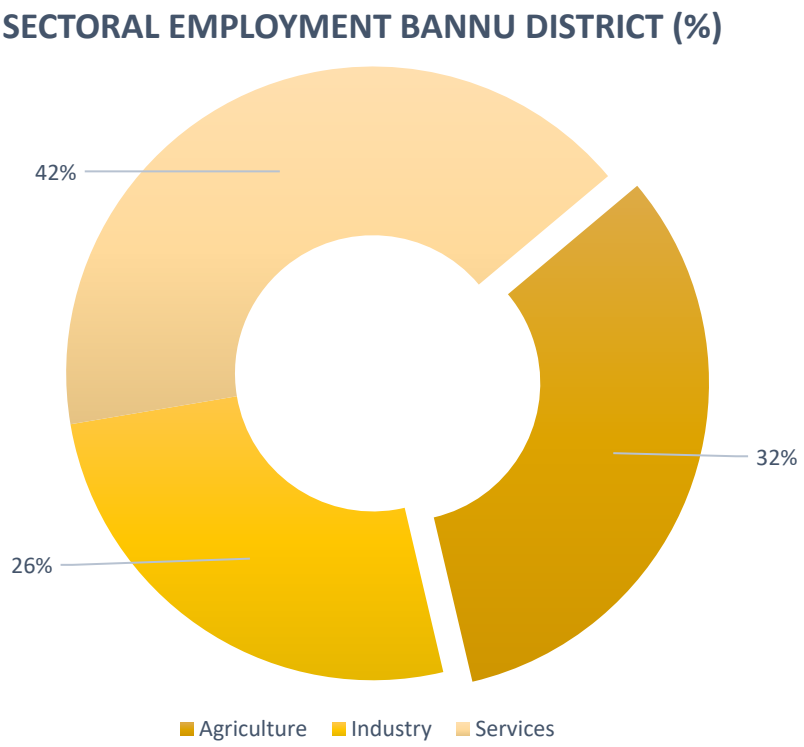


Figure 3-9: Sectoral Employment Bannu District (%)[58]

3.6.4 Recommendations

1. **Infrastructure Development:**
    - **Roads and Connectivity:** Improve Road infrastructure to facilitate smoother transportation of goods and raw materials.
    - **Power Supply:** Invest in reliable and uninterrupted electricity supply to support industrial operations.
    - **Water Management:** Implement water conservation and management strategies to address scarcity issues.
2. **Environmental Sustainability:**
    - **Emission Control:** Enforce strict pollution control measures and encourage industries to adopt cleaner technologies.
    - **Resource Efficiency:** Promote sustainable practices in resource use and waste management to minimize environmental impact.
3. **Industrial Clustering:**
    - **Zoning and Clustering:** Establish industrial zones for brick kilns, crushing plants, and other scattered industries to centralize operations and manage environmental impacts effectively.
4. **Skill Enhancement and Employment:**
    - **Training Programs:** Expand vocational training programs to bridge the skills gap and enhance employability in modern manufacturing techniques.
    - **Promote Inclusive Growth:** Ensure equitable distribution of economic opportunities between rural and urban areas through targeted employment initiatives.
5. **Policy Support and Incentives:**

[58] *Labor Force Survey 2020-21*

- **Incentive Programs:** Introduce tax incentives, subsidies, and low-interest loans to attract investments and stimulate industrial growth.
- **Regulatory Reforms:** Streamline regulatory processes and provide clear guidelines to facilitate compliance and encourage sustainable industrial practices.

6. **Promote Industrial Diversity:**
    - **Diversification:** Encourage diversification of industries beyond heavy sectors like sugar and wool to include high-value manufacturing and technology-driven enterprises.
    - **Value Addition:** Support agro-based industries and promote value addition to agricultural products to boost rural development and economic resilience.

Implementing these recommendations can help address the identified constraints and foster sustainable industrial development in District Bannu, enhancing economic growth, employment opportunities, and environmental sustainability.

3.6.5 Future Plan

In the district of Bannu, multiple industrial zones are proposed in the district Bannu urban areas. The calculation for proposed industrial zones is carried out using the labour force survey, which shows that 26% of the total employment population in Bannu District falls within the industrial sector. When this percentage, 26%, is applied to the overall district population, it translates to approximately 7% of the overall population engaged in industrial activities. To promote more employment in the district, this 7% figure was used by the consultant as a basis for calculating the required industrial land for the urban areas of District Bannu.

Bannu City and Domel Urban:

Based on the population, Bannu City, with an additional population of 373713, requires 212 hectares of land for an industrial zone, and Domel Urban, with an additional population of 12058, requires 7 hectares, an existing industrial estate is situated in both of these Tehsils. Additional areas are proposed with these existing industrial estates in Bannu city and for Domel urban, the proposed industrial zone is allocated with existing industrial sites situated in Domel tehsil.

Kakki Urban:

Kakki Urban currently hosts a population of 32,585 with a minimal existing industrial area of 0.13 acres. By 2045, the projected population is expected to reach 57,944, with an additional population of 25,359. Based on 7% of the additional population for industrial need, 1,775 people will require industrial space, translating into an area requirement of approximately 14 hectares.

Nurar Urban:

Nurar Urban has a current population of 15,814 and an existing industrial area of 8.09 acres. The population is projected to increase to 28,123 by 2045, additional population of 12,309. Applying the 7% on the additional population, 862 people will require industrial employment, so 7 hectares of land will be required for it.

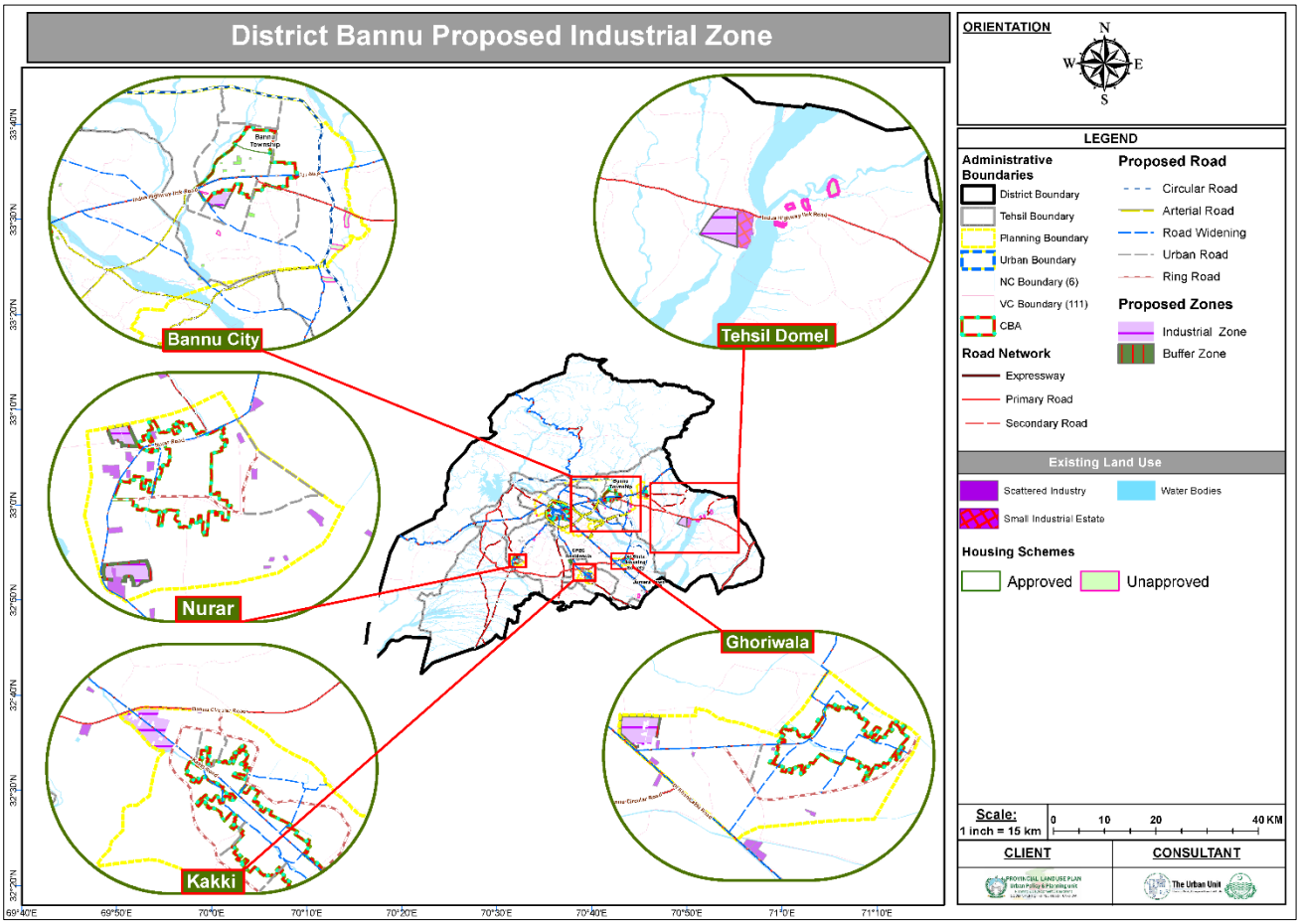
Ghoriwala Growth Center:

Ghoriwala Growth Center, with an existing population of 21,079 and 1.67 acres of industrial land, is projected to grow to 37,484 by 2045. The additional population of 16,405 implies that 1,148 people (7%) will need industrial employment opportunities. Accordingly, 9 hectares of additional industrial area will be required to support this growth.

Table 3-61: District Bannu Proposed industrial zones in Urban Areas

Administrative Area	Existing Population	Existing Industrial Area	Additional Population	@7% of population	Area Requirement	Total Population 2045
Bannu City	498,004	137.5	373,713	26,160	212	871,717
Domel Urban	10,879	2.28	12,058	844	7	22,937

Administrative Area	Existing Population	Existing Industrial Area	Additional Population	@7% of population	Area Requirement	Total Population 2045
Kakki Urban	32,585	0.13	25,359	1,775	14	57,944
Nurar Urban	15,814	8.09	12,309	862	7	28,123
Ghoriwala Growth Center	21,079	1.67	16,405	1,148	9	37,484



Map 3-31: District Bannu proposed urban areas Industrial zone

3.6.6 Industrial Zone Locational Criteria

The allocation of industrial zones across District Bannu is guided by key criteria, including accessibility from major roads, proximity to existing industrial areas, and the availability of suitable land.

In the Bannu Urban Area, a proposed industrial zone is located to the South of the existing Small Industrial Estate. It is accessible from Kohat Road (Old Bannu Road) to the North, and also from the Bizen Khel Road to the Southwest. To the South of this industrial zone lies a proposed mixed-use zone, while the Southwestern side is adjacent to the Central Business District (CBD), enhancing its strategic connectivity and economic potential.

An additional industrial zone is proposed outside the urban boundary of Bannu city, located to the West of the Bannu Economic Zone. This site is accessible from the main Indus Highway link road and is situated near a water channel, Kashu Algada, which could support industrial operations. These locational features make both sites suitable for industrial Development in line with planning objectives.

In the Kakki Urban Area, the industrial zone is located along the outer edge of the urban boundary. It is well-connected, with access from both the Bannu Circular Road and Kakki Road. To the Northeast lies a mixed land use zone, while the East is bordered by the Central Business District (CBD), enhancing the zone's economic integration.

In the Nurar Urban Area, due to the presence of scattered existing industries, two industrial zones have been proposed:

- The southwestern industrial zone is situated adjacent to existing industries to its south and is accessible from Nurar Road. It is bordered by a proposed residential estate to the north and a recreational zone to the northwest, creating a buffer between industrial and residential uses.
- The northwestern industrial zone, also accessible from Nurar Road, is bordered by a proposed mixed-use zone and existing industries to the south, and by a residential zone to the north.

The proposed industrial zone in the Ghoriwala Growth Center is located on the northwestern outer edge of the urban boundary. It is accessible from both the D.I. Khan/Lakki Road and the Bannu–Ghoriwala–Shamshikhel Road. To its southeast, a proposed recreational zone is situated, providing a well-balanced land use layout

3.7 Trade and Commerce

3.7.1 Distribution of Commerce and Trade Center

Trade and commerce play a pivotal role in the economic vitality and development of Bannu. Serving as a crucial commercial hub, Bannu unique geographical position along the banks of the Kurram River and its proximity to North Waziristan endow it with significant historical and cultural importance. This chapter delves into the multifaceted dimensions of trade and commerce in Bannu, exploring its contributions to the local and regional economy, its integration into national and international trade networks, and the challenges and opportunities that shape its commercial landscape. Through a comprehensive overview, the Consultant aims to highlight the essential role that trade and commerce play in fostering economic growth, enhancing livelihoods, and driving the socio-economic development of Bannu and its surrounding areas.

The services sector plays a significant role in the economy of Khyber Pakhtunkhwa, accounting for 55.65% of its total economic activity. Within the services sector, Wholesale and Retail Trade (WRT) stands out as the largest subsector. WRT, along with Hotels and Restaurants (HR), collectively contributes 40.37% to the services sector and 22.47% to KP's overall GDP. Furthermore, this sector holds a noteworthy position nationally, representing 13% of the Wholesale and Retail Trade and Hotels and Restaurants sector across the country. However, the onset of the coronavirus pandemic resulted in a downturn for this subsector, leading to negative growth. Nevertheless, there is optimism for a rebound in the post-pandemic era. The following table illustrates the gross value added by various subsectors within the services sector, highlighting the adverse Year-on-Year (YoY) growth rates as a consequence of the pandemic's impact.

Table 3-62 Sectorial Contribution of Services Sub-Sectors towards Gross Value Added[59]

Sub-Sectors of Services Sector	2018-2019 GVA (in Million)	Percentage of Total	2019-2020 GVA (in Million)	Percentage of Total
Gross Value Added of Services Sector	720266		681074	
Wholesale & Retail trade and Hotel and restaurant	312853	43.44	274953	40.37
Transport, Storage & Communication (TS&C)	125872	17.48	116745	17.14
Finance & Insurance (FI)	33089	4.59	-32747	-4.81
Housing Services (HS)	40836	5.67	41161	6.04
General Government Services	98529	13.68	102395	15.03
Other Private Services	109087	15.15	113072	16.6
YoY Growth Rate	0.012		-0.054	

3.7.2 Commercial Activities in the District

A mix of traditional markets and modern enterprises, supporting the livelihoods of its residents and contributing to regional commerce, strengthens the district's economy. Various bustling markets, industrial

[59] *Economic Review of KP 2019-20*

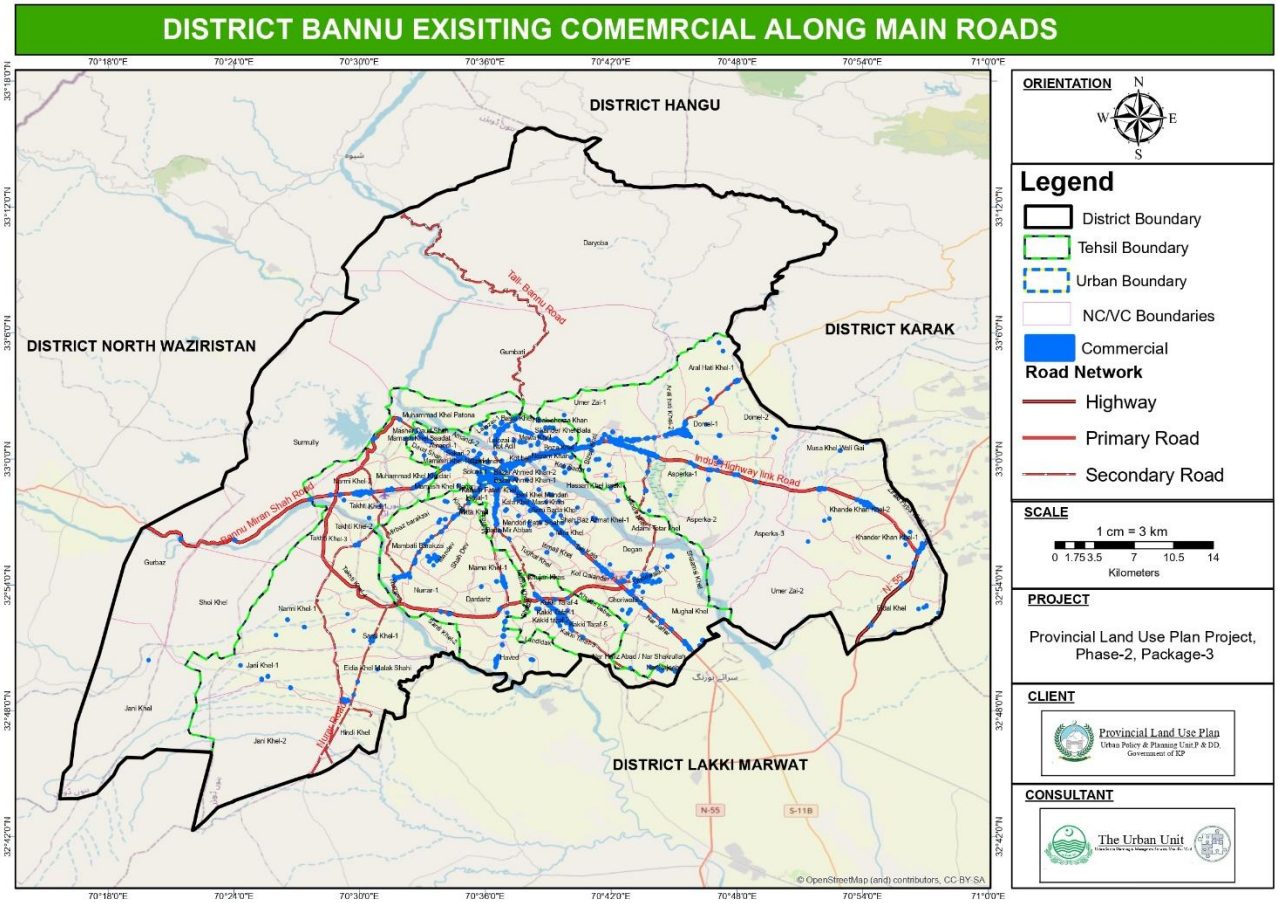
zones, and a rich agricultural sector that produces a wide array of fruits, vegetables, and grains characterize the commercial landscape of Bannu. These elements collectively define Bannu's economic vitality and growth potential. The total commercial area of Bannu District is 293.67 hectares, according to the land use classification map.

Bannu City, serving as the administrative headquarters of Bannu Division, is the primary commercial hub of the region. It's not only catering to the local population but also to the surrounding rural areas and neighboring districts. The Bannu City Market stands out as a central hub, bustling with activity and offering a wide variety of goods. Wholesale markets, including the prominent Sabzi Mandi (Vegetable and Fruit Market), play a crucial role in supplying fruits and vegetables. Additionally, the Cattle Market (Mawaishi Mandi) is a significant commercial area, providing livestock and meat. Key markets and bazaars in Bannu City include Tanchi Bazar, Chowk Bazar, Lakki Gate, the Old Vegetable Market, and the New Vegetable Market, each contributing to the vibrant commercial life of the area. According to the land use classification, the commercial area of Bannu tehsil is 18.61 hectares. The commercial areas in Bannu are predominantly in a ribbon or linear form along the roads.

Domel Bazar is another important commercial center. It features several key markets, including the Domel Bazaar, Sabzi Mandi (Vegetable Market), and Mawaishi Mandi (Cattle Market), which serve as wholesale hubs for the region. The Domel Bazaar, centrally located along the Bannu-Kohat road, is a bustling market offering a wide range of products from clothing and footwear to electronics and groceries. Sabzi Mandi specializes in fresh produce, supporting the local agricultural economy and ensuring a steady supply of vegetables and fruits to the community. Mawaishi Mandi, focused on livestock trading, is crucial for the agricultural sector, providing cattle for meat production and agricultural work. These markets not only cater to the local population but also attract traders and buyers from surrounding areas, highlighting Domel Bazar as a key commercial hub in the Tehsil Domel. Through land use classification analysis, the commercial area in the Domel tehsil turns out to be 71.69 hectares.

Kakki Tehsil, Miryan Tehsil, Baka Khel Tehsil, and Wazir Tehsil, though smaller compared to Bannu and Domel, have their unique commercial landscapes that contribute significantly to the district's economy. The commercial areas of Kakki Tehsil, Miryan Tehsil, Baka Khel Tehsil, and Wazir Tehsil, according to land use classification analysis, are 7.27 hectares, 8.43 hectares, 26.16 hectares, and 1.50 hectares, respectively. Kakki Tehsil's commercial activities are concentrated along Kakki Main Road, featuring a variety of retail shops and industries such as food processing plants and brick kilns. Miryan Tehsil, with its commercial areas primarily along Nurar Road, hosts various markets and industries that support the local economy. Baka Khel Tehsil's commercial sector is aligned along Miran Shah Road, providing essential goods and services to the local population through a mix of retail shops and local markets. Wazir Tehsil has commercial activities centered along the main Bannu-Miran Shah Road and Thall-Bannu Road, offering a range of shops and services to meet the daily needs of its residents. These areas, however, do not have large, specific bazaars like those found in Bannu and Domel, resulting in a more dispersed and localized pattern of commercial activity.

Overall, the commercial activities in District Bannu are characterized by a dynamic mix of retail trade, agricultural products, industrial operations, construction, transport and logistics, financial services, and hospitality. Each tehsil within the district, from the bustling markets of Bannu and Domel to the local commercial areas in Kakki, Miryan, Baka Khel, and Wazir, contributes to the economic vibrancy and growth potential of the region. The district's strategic location and rich history as a trade route further enhance its commercial significance, making Bannu a crucial hub for trade and commerce in Khyber Pakhtunkhwa.



Map 3-32: Bannu Existing Commercial Land Use

3.7.2.1 Main Bazars in Bannu

Some of the prominent bazars in District Bannu are:

i. Tanchi Bazar Bannu

Located on 2nd Street near Phori Gate, Tanchi Bazar is one of the oldest and busiest markets in Bannu. This market features a diverse array of shops, including hotels, cafes, opticians, bookshops, stationery stores, medicine shops, general stores, fast food outlets, mobile shops, vegetable shops, meat shops, and poultry shops. Tanchi Bazar is known for its historical significance, with its central water tank being a landmark from the British era. The market provides a wide range of services and goods, catering to various needs of the city's residents and visitors.

ii. Chowk Bazar Bannu

Chowk Bazar is renowned for its variety of goods and services, making it a central point for shoppers in Bannu. It offers a wide selection of dry fruits, clothing, spices, printing services, electronics, jewelry, and banking services. This market is a hub for those looking for both daily necessities and specialty items, contributing significantly to the commercial vibrancy of Bannu.

iii. Lakki Gate Bannu

Lakki Gate market is well-known for its diverse range of products, especially for vehicle-related needs. It includes clothing shops, banks, tire shops, hardware stores, auto parts, and electronics. The market has a notable concentration of auto parts shops, making it a go-to place for vehicle maintenance and repair needs. The variety of products available here caters to a broad spectrum of consumer requirements.

iv. Old Vegetable Market Bannu

The Old Vegetable Market, also known as Sabzi Mandi, is primarily focused on produce but also includes shops selling clothes, shoes, and general stores. Bannu Model Bazar, situated within this market, features numerous vegetable shops and a few poultry shops. The market spans a large area with carts and small

cabins dedicated to fruits and vegetables. It is a bustling center for fresh produce and other goods, playing a key role in the daily lives of Bannu's residents.

v. New Vegetable Market Bannu

The New Vegetable Market serves as the main wholesale market for fruits and vegetables in Bannu. It includes clothing stores, shoe stores, and general stores. This market has a large area with carts and small cabins for fruits and vegetables, where trucks unload produce for the entire city. The New Vegetable Market is a key distribution point for fresh produce, ensuring a steady supply of fruits and vegetables to the city's various markets and households.

vi. Qasaban Gate Market Bannu

Qasaban Gate Market is another significant commercial area in Bannu. Although specific details about its offerings are less documented, it is an integral part of the city's commercial network. The market contributes to the overall economic activity in Bannu, supporting various types of businesses and services.

vii. Nizam Bazar Market Bannu

Nizam Bazar Market features a range of shops and stalls, continuing the theme of Bannu's vibrant commercial life. While details about the specific types of shops are not extensively covered, the market likely offers a variety of goods similar to other markets in the city, playing a significant role in the local economy.

viii. Chai Bazar Bannu

Chai Bazar, located on Chai Bazar Road in Bannu city, includes shops selling tea, fruits, vegetables, dry fruits, sanitary items, hardware, and stationery. This market is known for its diverse offerings, making it a popular spot for residents seeking various goods in one place.

ix. Cattle Market (Mawaishi Mandi) Bannu

Situated at the back of the Old Sabzi Mandi, opposite Bannu Central Park on Cattle Market (Mawaishi Mandi) Road, the Cattle Market deals exclusively in livestock. It supplies cattle and meat to the whole city and surrounding areas, playing a crucial role in the local meat supply chain.

x. Domel Bazaar

This is the central market in Domel Tehsil, situated along the busy Bannu-Kohat Road. It’s a vibrant commercial hub with a variety of permanent shops and temporary stalls. A wide range of products is available here, from clothing and footwear to electronics and groceries. Domel Bazar serves the residents and the surrounding neighborhoods. The bazaar is a popular shopping destination and serves as both an economic engine and a social gathering spot for the local community.

xi. Sabzi Mandi (Vegetable Market) Domel

Located near the main road of Domel, this market is crucial for fresh produce. It features a large open area with small cabins and carts where farmers sell vegetables, fruits, and herbs. Although primarily a wholesale market where local farmers sell their harvest, it also caters to retail shoppers. Sabzi Mandi plays a key role in supporting the local agricultural economy and ensuring residents have access to fresh, affordable produce.

xii. Cattle Market (Mawaishi Mandi) Domel

This market is focused on livestock trading and is a significant part of Domel’s agricultural sector. It spans a large area where traders buy and sell cattle such as cows, goats, sheep, and buffalo. Mawaishi Mandi is essential for meat production and agricultural work and serves as a wholesale market that attracts buyers and sellers from Domel Tehsil and surrounding areas. It also holds cultural importance, especially during traditional festivals and celebrations.

3.7.2.2 Main Products and Services Mechanic Shops

Mechanic shops, auto stores, and auto dealers are scattered throughout the city but are mainly concentrated near Lakki Gate, Tall-Bannu Road, Kohat Road, Hasnain Das, Kachehri Road, and Tanchi Bazar.

i. Clothes and Garments

Garments and clothes stores are available citywide but are predominantly found on Kohat Road near Daral-Alum, the road connecting Kohat Road and Chai Bazar Road, Chai Bazar Road, Gardanali Road, and Custodian Road.

ii. Shoe Shops

Shoe shops are scattered across the city, with clusters located on Qasban Road, Kohat Road near Sabzi Mandi, and Railway Road near Lady Park. Some shops are also situated on Bannu-Miran Shah Road.

iii. IVIVElectronic Shops

Electronic and electric stores are widespread but form clusters on Chai Bazar Road, near Murgh Mandi, Chowk Bazar, Railway Road, and near Gur Mandi.

iv. Jewelry Shops

Jewelry shops are primarily located in Tanchi Bazar and Tehsil Bazar.

v. IT, Laptops, Computers, and Mobile Shops

Clusters of shops selling IT products, laptops, computers, and mobiles can be found at Qasaban Chowk, Das Chowk, City Police Station Road, City Police Lines 2, near Bannu Press Club, and Saddar Police Station.

vi. Hardware, Sanitary, Paint, Steel, and Plastic Stores

The main markets for these stores include Jaman Road, Chazar Bazar, Lakki Gate, Sabzi Mandi Road, Saddar Police Station Road, and Mohalla Akram Khan Road.

3.7.3 Commercialization along Main Roads of Urban Centers

1. Bannu

In Bannu City, the commercial activities are concentrated primarily along major corridors such as **Bannu-Miranshah Road**, **Bannu-DI Khan Road**, **Talli-Bannu Road**, **Musazai-Kurram Highway**, and **Bannu-Murad Ali Khan Road**. These commercial clusters are mostly located along primary roads and expressways, facilitating accessibility and connectivity.

The compact built-up area of Bannu City extends beyond several major arterial roads, with commercial development spreading outward from the core urban center in linear patterns along transportation routes—indicating a strong tendency toward ribbon development.

2. Kakki

The commercial activity in Kakki Town, primarily concentrated along the **Miran Shah–Bannu Road.** This linear pattern reflects ribbon development, with shops and services clustered along the main corridor and around key nodes like the central bazaar and public facilities. The commercial areas benefit from high accessibility and connectivity to nearby settlements such as Bannu and Ghoriwala.

3. Domel

In Domel, commercial activity is primarily concentrated along key transportation routes such as **Kohat Road**, **Indus Highway Link Road**, and **Painda Khel Road**, following a linear pattern along these corridors.

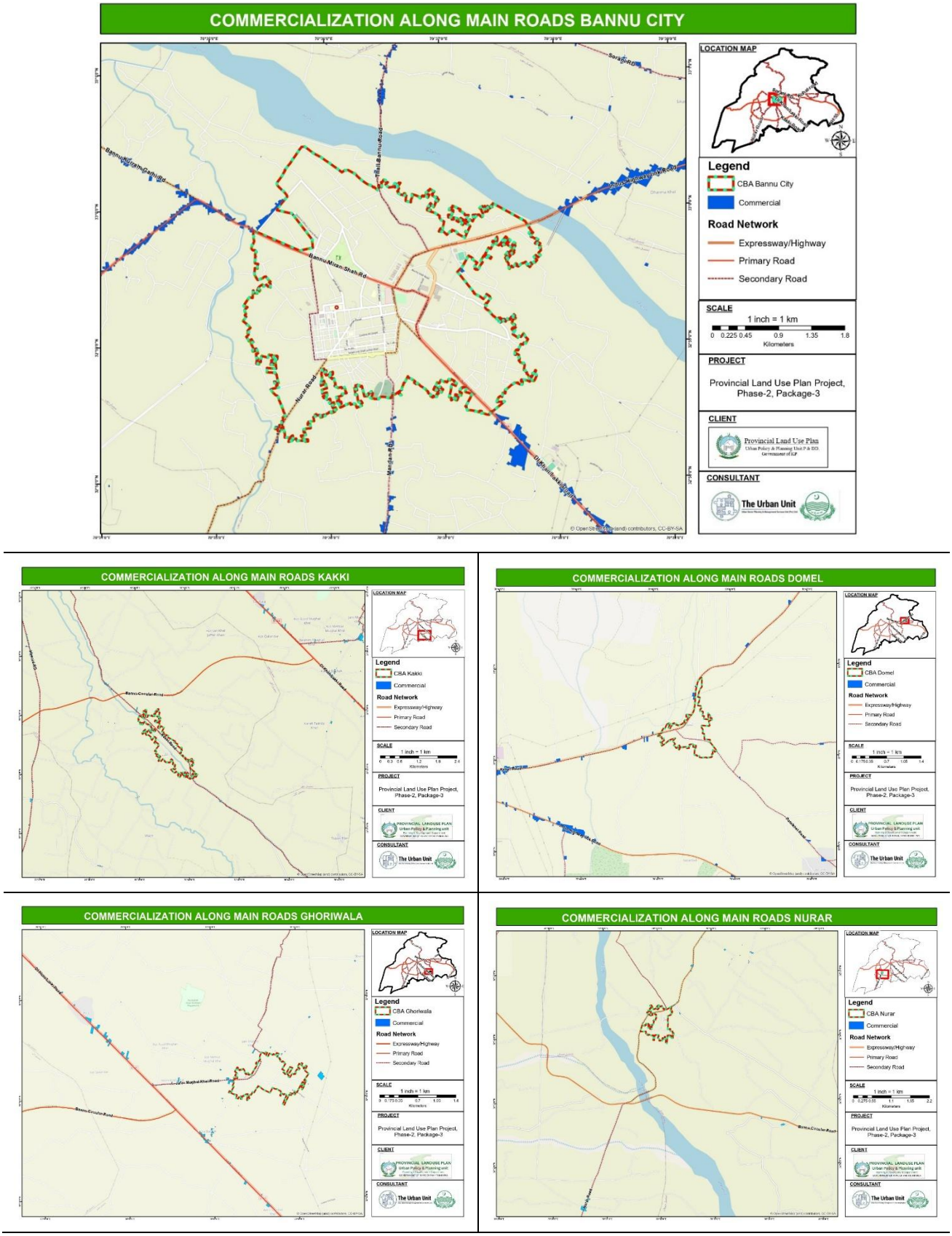
4. Ghoriwala

The urban area of Ghoriwala features key commercial development along major roads including the **DI Khan–lakki Road**, **Jafar Mughal Khel Road**, and parts of the **Bannu Circular Road**. These roads serve as the primary commercial corridors, with concentrated commercial activity visible along their stretches.

5. Nurar

In Nurar, commercial development is primarily concentrated along key roads such as the **Bannu Circular Road**, **Nurar Road**, and surrounding primary and secondary roads.

Commercialization along main roads in Banu Urban Centers



Map 3-33: Commercialization along Main Roads Bannu Urban Areas

3.7.4 Recommendation

Some initiatives that can improve the comparative advantage of Bannu are:

Enhancing Resources for Regional Industrial and Commercial Development

- **Brief:** Boosting the Chamber of Commerce and Industry's resources is crucial for fostering regional industrial and commercial growth. Allocating a portion of tax revenue from the southern districts can support this endeavor.
- **Timeline:** Short Term

Business Incubation Centers for Youth & Women

- **Brief:** To offer specialized support and resources to aspiring young entrepreneurs and women. Through mentorship, training, and access to resources, these centers aim to nurture innovation and empower these demographics economically. By fostering a conducive environment for business growth, the project aims to catalyze entrepreneurship among youth and women, driving socioeconomic progress and inclusive prosperity.
- **Timeline:** Short-Term

Artisan/Handicraft Center

- **Brief:** Establishing a dedicated marketplace to support local artisans. This includes building a work shed with essential tools, equipment, and electrification, as well as collaborating with artisan communities to design market stalls. The initiative provides a platform for artisans to showcase and sell handmade products, preserving cultural heritage. Marketing strategies will attract tourists and engage museum visitors, creating economic opportunities for artisans and enriching the region's cultural landscape.
- **Timeline:** Short-Term

Ensuring Gas Connections for Local Industries under Article 158

- **Brief:** Providing gas connections to local industries at CNG rates under Article 158 is essential to ensure their success and uphold the legal rights of the area's residents.
- **Timeline:** Medium Term

Establishing a Wholesale Market to Address Urban Congestion

- **Brief:** Establishing a wholesale market outside Bannu's main market is crucial to alleviate congestion and other issues in the city, while also meeting the pressing needs of wholesalers.
- **Timeline:** Medium Term

Formation of a Committee for Business Community Resolution

- **Brief:** Forming a committee chaired by the Bannu Chamber of Commerce, comprising representatives from key institutions such as SMEDA, agricultural and industrial departments, is imperative. Regular meetings should be held to address and resolve issues facing the business community.
- **Timeline:** Medium Term

Enhancing Awareness of Legal and Investment Opportunities

- **Brief:** Providing awareness of legal requirements, amnesty schemes, and investment opportunities to traders, industrialists, and investors is crucial. Recommendations based on local realities should be submitted to policymakers for informed decision-making.
- **Timeline:** Medium Term

Anticipated Labor Force Expansion and Job Creation Imperatives

- **Brief:** Projecting an increase in the labor force and employment in Bannu over the next 20 years underscores the need to create 0.6 million jobs within the district to meet future demands.
- **Timeline:** Long Term

- Road and Transportation Improvements

  Invest in the maintenance and expansion of road networks, enhance drainage systems, and improve street lighting to facilitate smoother and safer business operations.

- Parking Facilities

  Develop dedicated parking areas in commercial zones to alleviate traffic congestion and provide convenient access for shoppers and business owners.

- **Waste Management Solutions**

  Strengthen waste management systems by increasing the frequency and efficiency of waste collection in commercial areas. Implement recycling programs to manage waste sustainably.

- **Telecommunications Infrastructure**

  Upgrade telecommunications infrastructure to improve internet and mobile connectivity, facilitating better business operations and attracting investors.

- **Access to Finance**

  Create financial support programs, such as low-interest loans and grants, to help local businesses in the industrial and agricultural sectors expand and modernize.

- **Designation of Key Roads as Commercial Zones for Economic Growth**

  The Indus Highway Link Road, Bannu-Miran Shah Road, D.I. Khan Road, Nurar Road, and Mandan Road should be designated as commercial roads due to the significant presence of commercial areas along these routes. Consequently, commercial taxes should be levied on businesses operating in these areas, and the government should provide enhanced commercial services. This policy will not only boost the government's revenue but also ensure that businesses receive optimal services, fostering economic growth and development.

By addressing these constraints and implementing the recommended actions, Bannu District can unlock its full economic potential, fostering sustainable development and improving the quality of life for its residents

3.7.5 Future Plan

To accommodate the projected population growth in urban areas of District Bannu by 2045, the commercial land demand will significantly increase. The table below summarizes the required expansion in commercial areas:

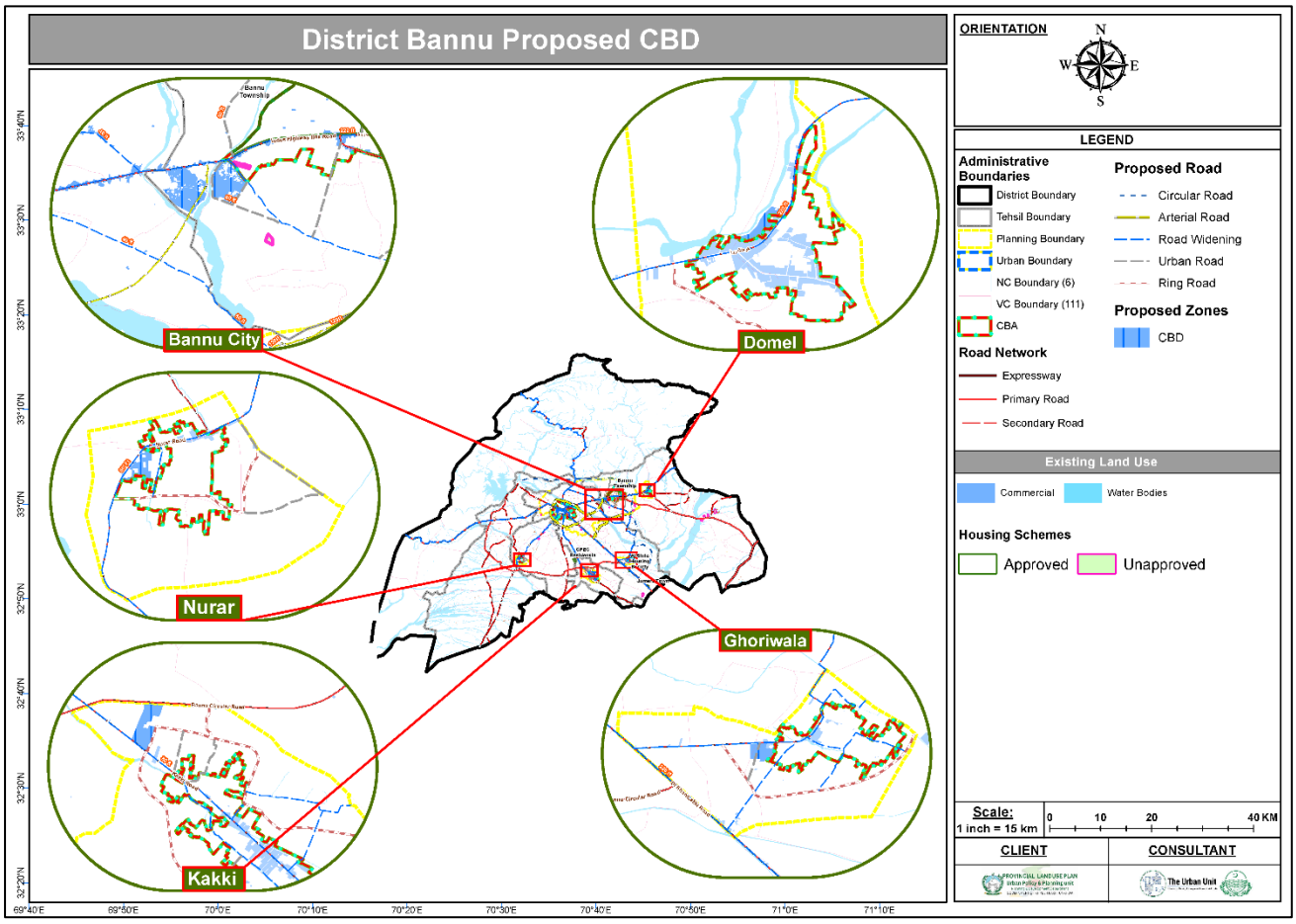
- Bannu City will experience the highest growth, with its population increasing to 871,717 by 2045. An additional 151.24 hectares of commercial land will be needed, raising the total commercial area to 381.75 hectares.
- Domel Urban will require 4.88 hectares of additional commercial space, totaling 24.66 hectares, for a projected population of 22,937.
- Kakki Urban is expected to grow to 57,944 people, requiring 10.26 hectares more commercial area, bringing the total to 21.28 hectares.
- Nurar Urban will expand to 28,123 people, needing 4.98 hectares more, totaling 7.44 hectares of commercial land.
- Ghoriwala Growth Center, a key emerging node, will need an additional 6.64 hectares of commercial space, totaling 12.189 hectares for its future population of 37,484.

Table 3-: 3-63 Future Commercial Area Requirement 2045 (Hectares)

Urban Area	Existing Population	Existing Commercial Area (A)	Additional Population	Additional Commercial Area Requirement (B)	Total Area (A+B)	Total Population 2045
Bannu City	498,004	230.51	373713	151.239	381.749	871717
Domel urban	10,879	19.78	12058	4.88	24.66	22937
Kakki urban	32,585	11.02	25359	10.26	21.283	57944
Nurar urban	15,814	2.46	12309	4.98	7.442	28123
Ghoriwala Growth Center	21,079	5.55	16405	6.64	12.189	37484

The commercial areas have been allocated under two categories: Central Business District (CBD) and Mixed Use Zones. Within the CBD, 72.41 hectares have been allocated in Bannu City, 2.47 hectares in Domel, 3.47 hectares in Nurar, 5.67 hectares in Kakki, and 4.72 hectares in Ghoriwala. The remaining

commercial areas in each urban center have been accommodated within their respective Mixed Use Zones, supporting integrated residential, commercial, and Physical Utilities/Amenities. The map below shows the existing commercial and proposed Commercial Business District (CBD) in District Bannu.



Map 3-34: District Bannu urban areas CBD

3.7.5.1 Commercial Zone (CBD) Locational Criteria

The allocation of commercial zones across District Bannu is guided by key criteria such as accessibility from major roads, central positioning within the city and the availability of suitable land parcels.

In Bannu City, the commercial zone is located on the eastern side of the city, along the main Bannu-Kohat road. To the east of the Central Business District (CBD) lies the proposed industrial zone, and the area already contains existing commercial activity, making it a strategic and viable location for further commercial development.

In Domel, the CBD is situated at the city center, along the main Kohat Road (Old Bannu Road), aligned with the established commercial area, enhancing its accessibility and functionality.

In the Ghoriwala Growth Center, the proposed CBD is positioned along the Bannu–Ghoriwala–Shamshikhel Road. To its West lies a proposed mixed land use zone, followed by a proposed recreational zone. On the east and south, it is bordered by a proposed residential zone. The presence of existing commercial activities in this area further supports its designation as the CBD, ensuring convenience and economic integration.

In Kakki Urban Area, an existing commercial area is located at the city center along Kakki Road, which supports the proposal for a new Central Business District (CBD) to the north of the city. This proposed CBD is well connected—accessible from the north from Bannu Circular Road, from the south via Kakki Road, and from the east through the proposed ring road. It is strategically positioned with the proposed industrial zone to the west, a mixed land use zone to the northeast, and a proposed residential zone to the southeast. Being near the industrial zone, this CBD will serve as a hub for trading industrial goods while also benefiting the surrounding residential neighborhoods through enhanced commercial services.

In the Nurar Urban Area, the proposed CBD is located at the heart of the city, along Nurar Road. It is adjacent to a mixed land use zone and existing residential areas, and lies near the proposed industrial zone, making it a strategically integrated location for commercial and economic activities.

3.7.5.2 Standards for Commercial Buildings (from KP Model Building Bye-Laws 2020)[60]

1. Maximum Building Height

- The maximum height of commercial buildings shall not exceed 82 feet (24.99 meters) or 7 storeys, including the mezzanine floor whichever is less.
- Total height including stair tower/machine room may be up to 90 feet from the center of the adjacent road level.

2. Floor Heights

- Ground Floor: Minimum 9.5 ft
- First & Second Floors: 9.5 ft each (if applicable)
- Mezzanine Floor: Max height 7 ft; only allowed where clear height of room is ≥16 ft
- Basement Height: Clear height minimum 9 ft
- Arcade Height: Max height from adjacent road level 10 ft 6 in.

3. Setbacks (Commercial & Mixed Use)

Table 3-64 :Setbacks (Commercial&Mixed Use)

Plot Size (sq. yd)	Arcade	Rear Setback	Side Setback
Up to 151 (5 Marla)	None	3 ft	None
152–250 (5.1–8.3 Marla)	None	5 ft	None
251–400 (8.3–13.2 Marla)	None	7.5 ft	None
401–600 (13.2–20 Marla)	8 ft	7.5 ft	5 ft
601–999 (20–33 Marla)	8 ft	8 ft	5 ft
1000–1999 (33–66 Marla)	8 ft	10 ft	7.5 ft

4. Footprint & Floor Area Ratio (FAR)

Table 3-65: Floor Area Ratio

Plot Size (sq. yd)	Ground Floor Coverage	Upper Floor Coverage	FAR
Up to 80	100%	–	1:6
81–250	95%	–	1:6
251–400	90%	–	1:6
401–600	85%	75%	1:6
601–999	80%	70%	1:6
1000–1999	70%	65%	1:6

3.7.5.3 Managing Existing Commercial Activities

The management of the existing commercial Activities is of greater importance in order to curtail and discourage it's haphazard and uncontrolled growth. As Bannu land use plan designates the zoning and regulatory measures for future commercial needs of the city, existing commercial activities can be managed through these strategies:

a. Phased Regularization

- The existing commercial activities will be allowed to continue if they meet basic safety and zoning standards (e.g., structural integrity, fire safety).
- Require non-compliant structures (e.g., those violating setbacks or height limits) to be regularized within a set timeframe (e.g., 2–3 years) through retrofitting or partial demolition.

[60] *https://www.lgkp.gov.pk/wp-content/uploads/2020/11/Public-Notice-of-draft-of-Model-Building-Bye-Laws-2020.pdf*

- Incentives like tax breaks or low-interest loans should be provided for businesses to comply with regularization.

Implementation:

- Conduct a survey of existing commercial structures along roads to identify non-compliant ones.
- Issue notices with clear regularization guidelines and timelines, enforced by a local building control authority.

b. Relocation of Non-Conforming Uses

- Identification of commercial activities that are incompatible with zoning plans (e.g., heavy industries in retail zones) and planning their relocation to designated industrial zones.
- Providing relocation incentives, such as subsidized land or infrastructure support, funded through public-private partnerships (PPPs) or ADB/AIIB grants.

Implementation:

- Mapping non-conforming commercial activities.
- Develop a relocation plan with timelines, funding sources, and stakeholder consultations.

c. Selective Freezing

- Freezing further expansion of non-compliant commercial structures (e.g., no additional floors or extensions) until they meet zoning and building standards.
- Allowing compliant structures to continue operating without restrictions.
- Enforcing freezing through strict monitoring by a local building control authority.

Implementation:

- The building control authority under the KP Land-Use and Building Control Act 2021 to monitor and enforce freezing.
- Usage of land digitization (as recommended in KP Urban Policy 2030) to track compliance and prevent illegal expansions.

3.7.5.3.1 Proposals for Containment, Regulation, and Upgradation

The following policy interventions are proposed to address existing and future ribbon development in Bannu:

Framework	Relevant Provisions	Application
KP Land Use & Building Control Act, 2021	*Sec. 21, 22, 31*	Legal basis for DCLs, development permissions, and urban improvement plans
KP Urban Policy 2022–2030	*Para 32, 37, 38*	Mandates compact growth, discourages ribbon development, promotes GIS monitoring
KP Building Regulations, 2023	*Setbacks, access rules*	Technical standards for roadside development (e.g., minimum building lines, access control)
KP Local Government Act, 2013	*Tehsil and neighborhood council authority*	Legal support for local monitoring, by-laws enforcement, and development control

1. Establishment of Development Control Lines (DCLs)

- Define clear development boundaries along major corridors to prohibit new unplanned construction beyond designated limits.
- Enforced through the KP Land Use and Building Control Act, 2021 (Sections 21 & 22) which mandates permission-based land use conversion and construction within notified plans.

2. Regularization and Retrofit of Existing Ribbon Areas

- Existing residential and commercial units will not be demolished but instead retrofitted with:
- Service lanes or rear access where feasible

- Enforced setbacks and uniform building lines
- Basic infrastructure (water, sewerage, drainage, streetlights)
- This complies with **Section 31 of the KP Land Use and Building Control Act, 2021**, which allows urban design improvement plans for existing structures.

3. Restriction of Future Ribbon Development

- No new commercial conversion or subdivision shall be permitted outside of designated zones.
- Controlled through zoning provisions under the KP Urban Policy 2022–2030, which mandates contiguous and compact development (Para 32) and discourages linear growth.

4. Planned Commercial Clustering

- Identify and promote planned commercial hubs within the city core and future growth nodes to absorb new commercial demand, reducing pressure on linear roadside strips.

5. Community-Based Monitoring and Enforcement

- Empower Tehsil-level councils and neighborhood units under the KP Local Government Act, 2013 to monitor encroachments and regulate roadside activity.

This supports decentralized enforcement and stakeholder participation in curbing unregulated construction.

3.8 Solid Waste Management

This section outlines a comprehensive Solid Waste Management (SWM) system for the Bannu District to improve waste collection, transportation, and disposal processes. The proposed framework addresses the distinct needs of both urban and rural areas, bridging resource gaps and incorporating modern techniques to optimize waste management services.

Bannu's urban areas, in particular, face escalating challenges in municipal solid waste management due to rapid urbanization, population growth, and economic expansion. Waste generation in 2025 is estimated at 567 tons per day, based on per capita waste production rates of 0.45 kg/day in urban areas and 0.32 kg/day in rural areas (Excluding the Cantonment). By 2045, waste generation is projected to exceed 1035 tons daily, with an annual growth rate of 1.5%.

The proposed SWM system has been meticulously designed following an in-depth evaluation of existing infrastructure, as documented in the Situational Analysis Report (Bannu Deliverable-IV). The plan includes a strategic 20-year roadmap (2025–2045) to modernize waste collection, transportation, and environmentally sustainable disposal systems.

3.8.1 Existing Infrastructure

In district Bannu, there is currently no planned solid waste management (SWM) system. Solid waste is often left unattended in open plots and on main roads, with only a small portion being collected and transferred to dumping sites by the TMAs. In rural areas, residents commonly dispose of waste near their houses or in empty plots, causing a nuisance to neighboring households. Most households, shops, and establishments dispose of their waste directly outside their doors, in streets, plots, sewers, and open areas.

Figure 3.11: Current SWM Situation in District Bannu

3.8.2 Existing Resources

In District Bannu, the Water and Sanitation Services Company Bannu (WSSCB) and the Tehsil Municipal Administrations (TMA) lack skilled workers for in-house vehicle repair and maintenance. Maintenance is managed on a day-to-day basis to ensure timely maintenance. WSSCB parks its machinery in designated areas after daily operations, while TMAs use their office premises for vehicle parking. These locations are documented in maps and photographs. This approach ensures efficient waste management operations, allowing WSSCB and TMAs to focus on other critical responsibilities while addressing repair needs as they arise.

Figure 3.12: SWM Vehicles parking sites of Bannu District

The Water and Sanitation Services Company Bannu (WSSCB) provides solid waste management (SWM) services exclusively in the urban areas of Bannu city, while the Tehsil Municipal Administrations (TMAs) manage SWM in the rural areas of Bannu and the remaining tehsils of the district. The resources, which WSSCB contains, are;

Table 3.51: Existing resources of WSSCB Bannu (Machinery)[61]

WSSCB Bannu (Machinery)	
Name	**Qty.**
Tractor trolleys	1
Tractor Loader	4
Mini Dumper	4
compactor	2
Arm roll	2
Excavator	1
Mechanical sweeper	3
Tractor Mechanical Sweeper	3
Tractor Container	1
Water Bowser	5
Hal Blade Tractor	1

Table 3.52: Existing Resources of WSSCB Bannu (HR)

WSSCB (HR) Bannu			
Resources	**Qty.**	**Resources**	**Qty.**
Managerial staff	10	Jamadar	6
Drivers	27	Bill Distributer	3
Sanitary worker	22	Valve man	3
Sweeper	37	Mate	1
Beldar	92	Plumber	1
Workers	43	Pipe Fitter	3
Beheshti	15	Lab Technician	1
Supervisor	3	**Summary (Table)**	
Clerk (J/C & N/Q)	11	Company Cadre	61
Helper & Cleaner	9	TMA Deputed	282
Chowkidar	18	daily Wager	4

Based on the collected data, TMA Domel holds 1 tractor trolley, 1 excavator, 2 water browsers, 3 Loader Rikshaw, 25 dustbins, and 2 containers of 5m³ capacity. Their workforce includes 4 drivers and 45 workers. TMA Wazir's resources include 15 containers of 8m³, 1 compactor of 7m³, 9 containers of 5m³, and 1 arm roll, supported by 1 driver and 15 workers. The details of these mechanical and human resources are essential for understanding the capacity and operational scope of SWM services in these areas. The mechanical and HR resources for these TMAs are tabulated and graphed below for better visualization and analysis.

Table 3-66: Existing Resources of TMAs of Bannu District[62]

TMA Bannu		TMA Domel		TMA Wazir		TMA Miryan		TMA Baka Khel		TMA Kaki	
Name	Qty.	Name	Qty.	Name	Qty.	Name	Qty.	Name	Qty.	Name	Qty.
Tractor trolleys	1	Tractor trolleys	1	Container 8m³	15	Loader Rickshaw	1	Tractor Trolly	1	Tractor Trolly	1
Loader Rickshaw	3	Containers 5m³	2	compactor 7m³	1	Waste Bins (A. Roadside)	12	Waste Bins (A. Roadside)	20	Waste Bins along the Roadside	18
Mini Dumper	1	Water Browser	2	5m³ Container	9	Workers	20			Workers	17
-	-	Loader Rickshaw	3	arm roll	1	-	-	-	-	-	-

[61] *Data Shared by WSSC BANNU*

[62] *Primary Data Source*

TMA Bannu		TMA Domel		TMA Wazir		TMA Miryan		TMA Baka Khel		TMA Kaki	
Name	Qty.	Name	Qty.	Name	Qty.	Name	Qty.	Name	Qty.	Name	Qty.
-	-	Dustbins	25	Driver	1	-	-	-	-	-	-
-	-	Excavator	1	Worker	15	-	-	-	-	-	-
-	-	Driver	4		-	-	-	-	-	-	-
-	-	Worker	45			-	-	-	-	-	-

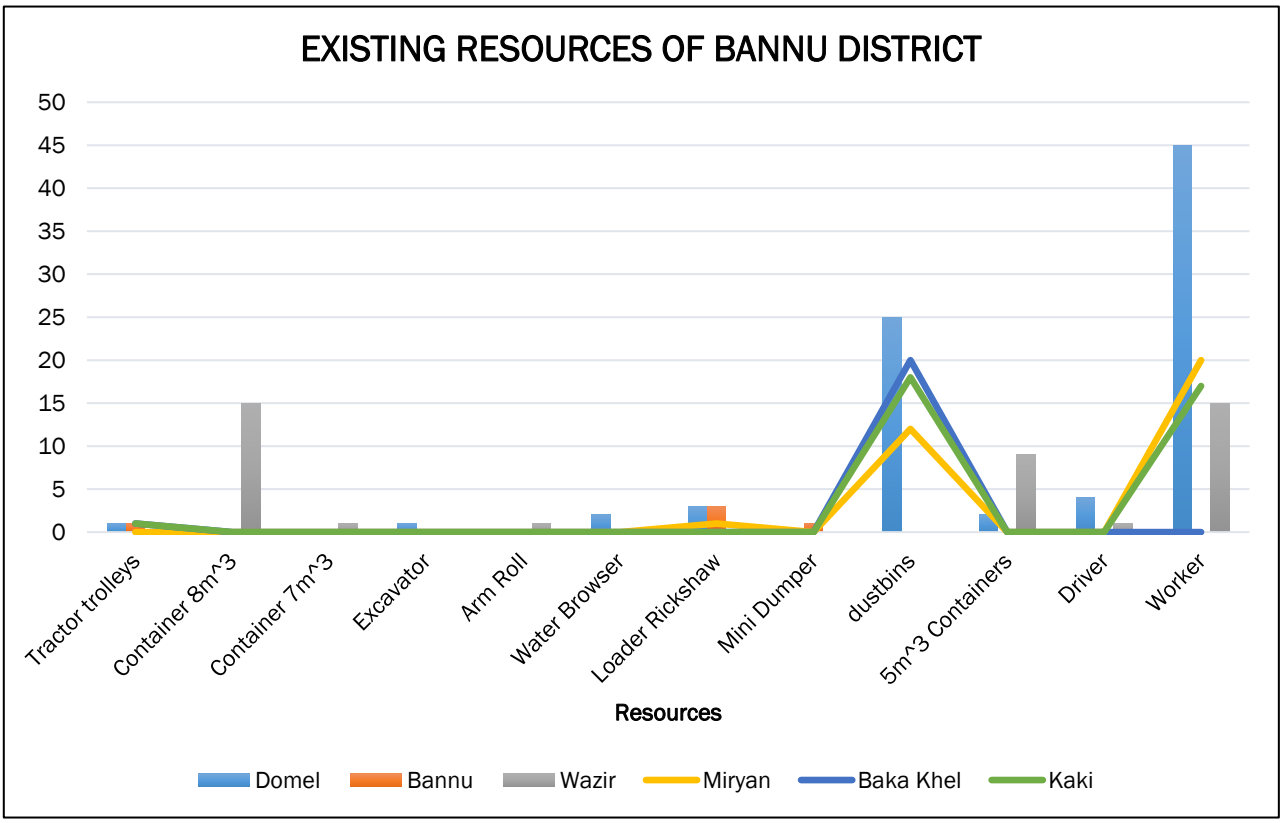
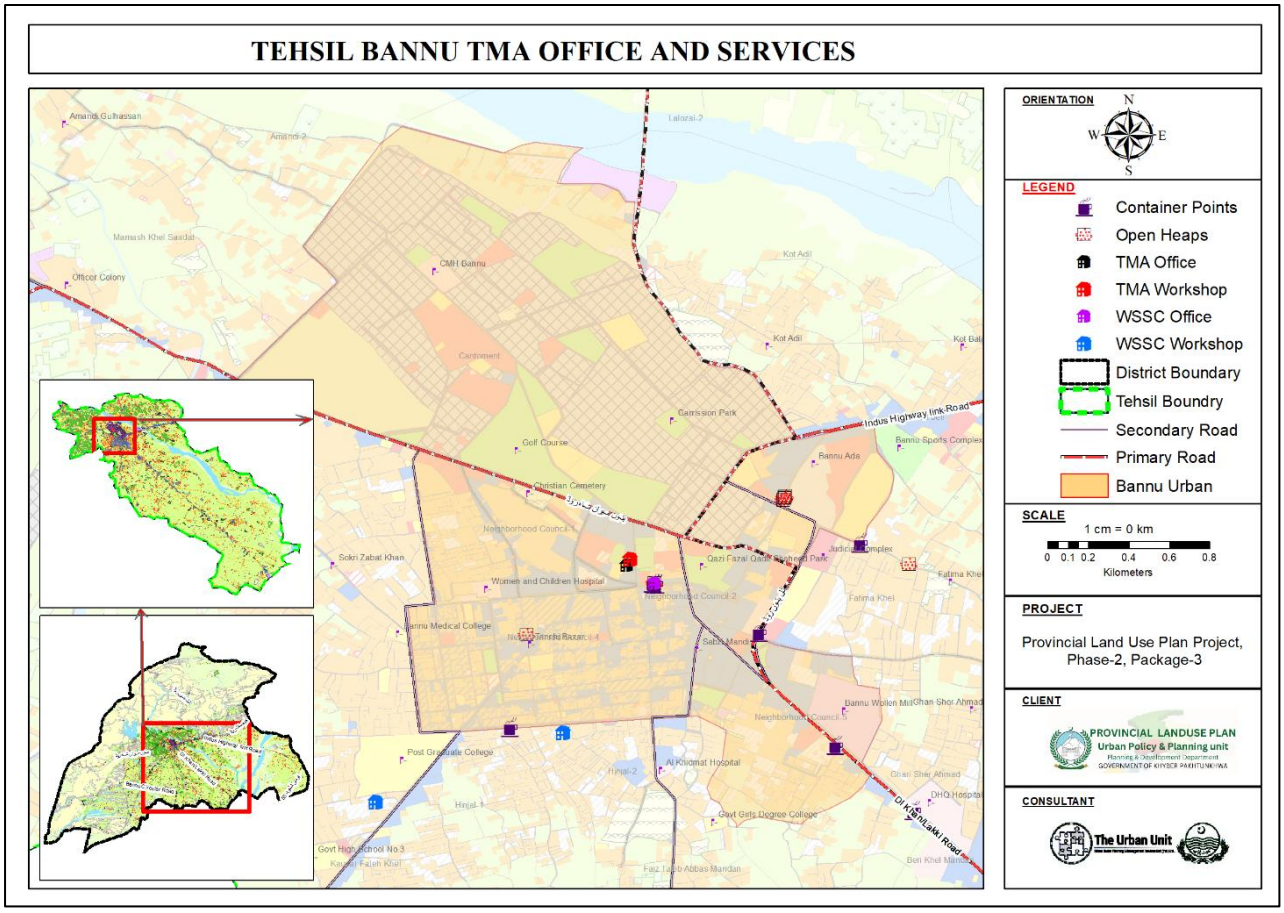
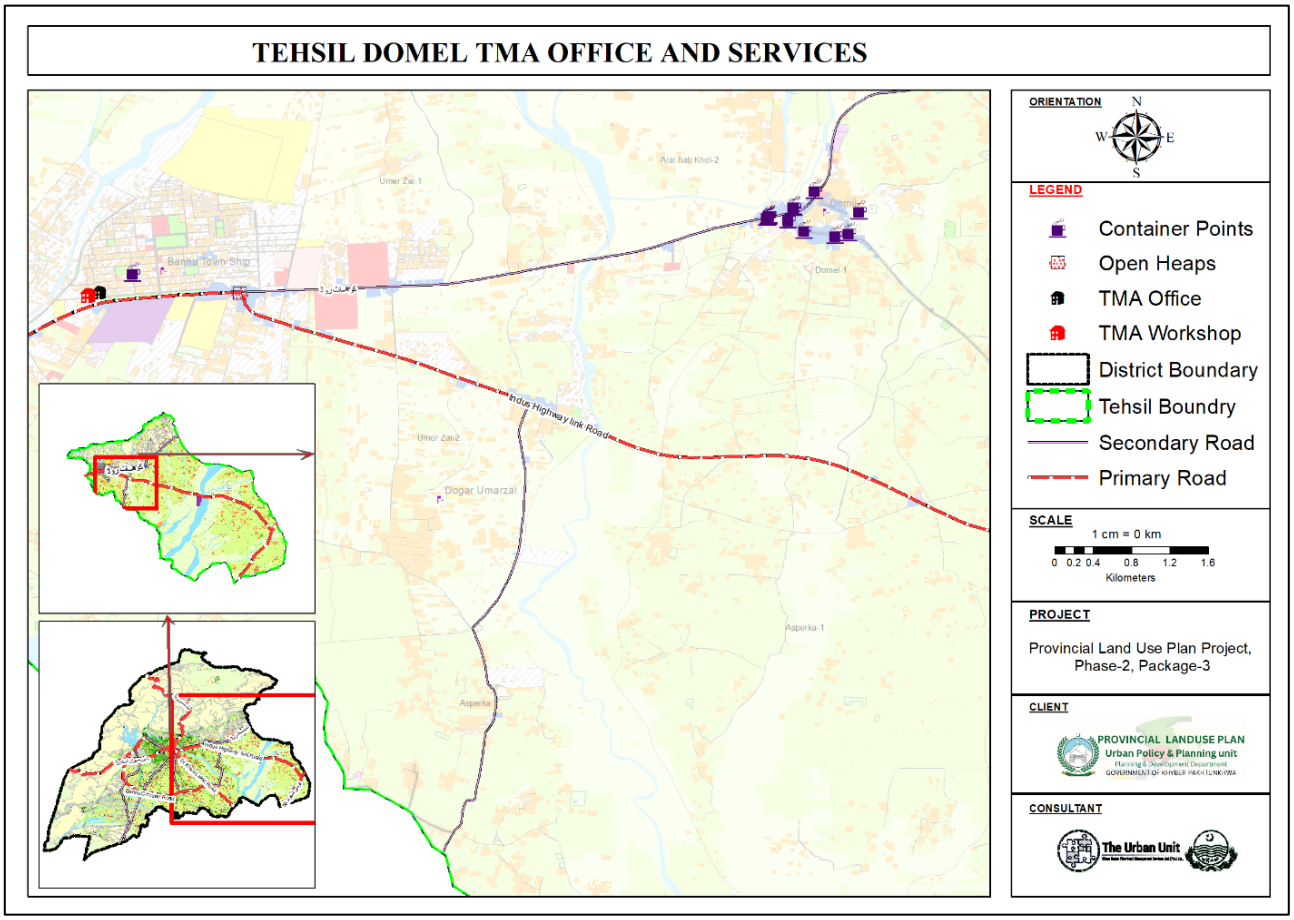


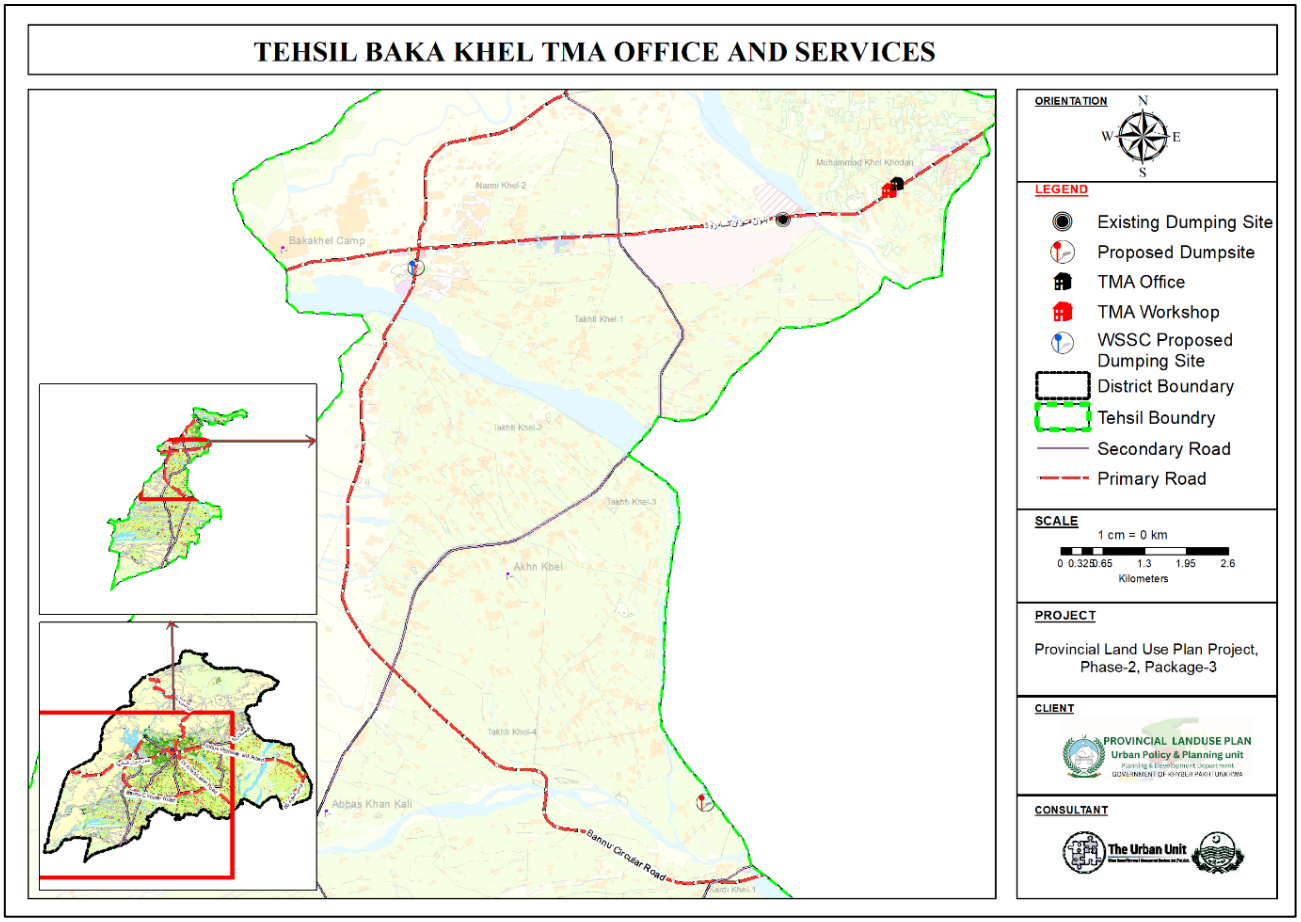
Figure 3-10: Existing Resources of TMA Domel and Wazir



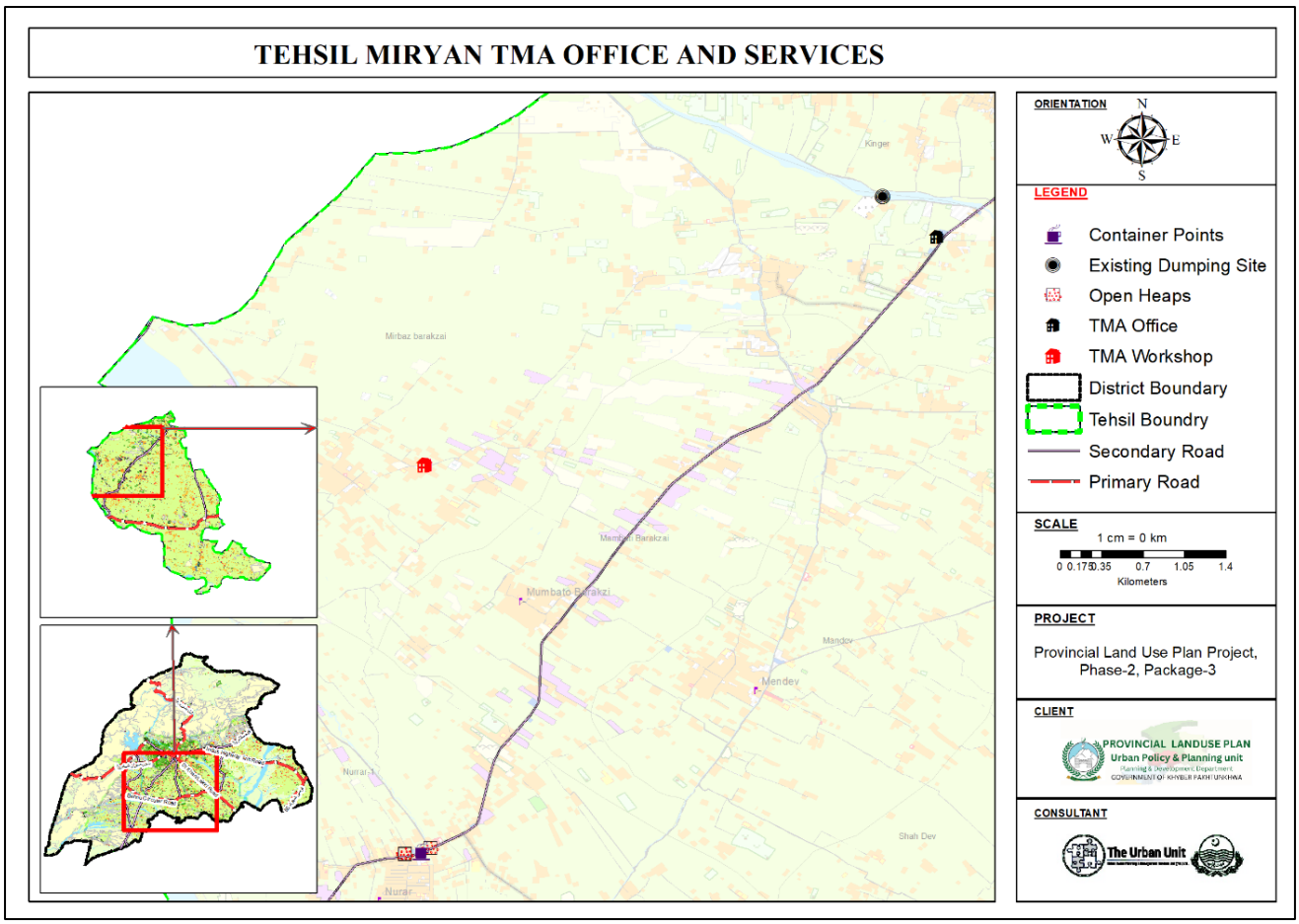
Map 3-35: SWM Infrastructure of Bannu Tehsil



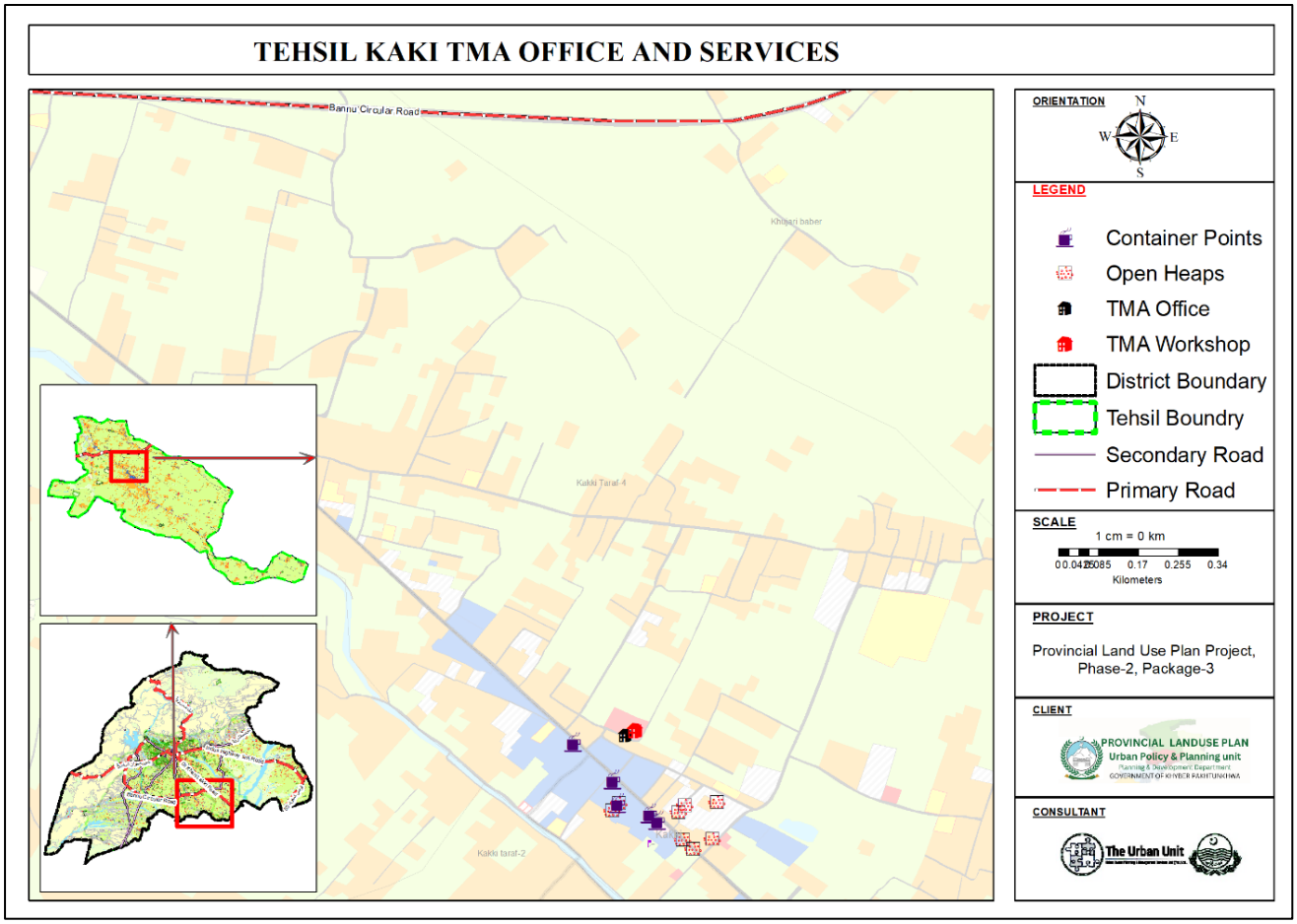
Map 3-36: SWM Infrastructure of Domel Tehsil



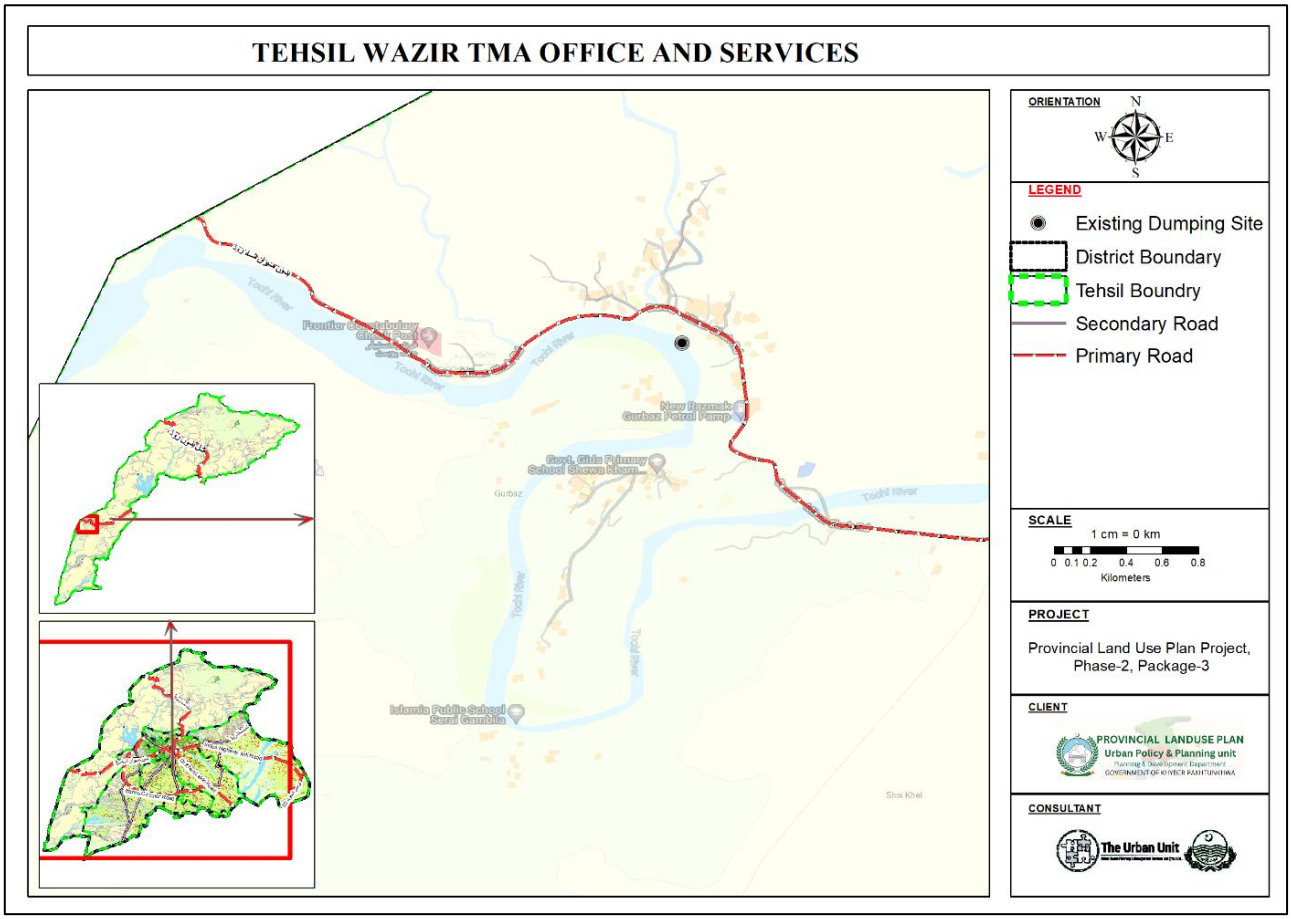
Map 3-37: Infrastructure of Baka Khel Tehsil



Map 3-38: Infrastructure of Miryan Tehsil



Map 3-39: SWM Infrastructure of Kaki Tehsil



Map 3-40: SWM Infrastructure of Wazir Tehsil

3.8.3 Existing and Future Waste Generation

The urban tehsils of Bannu District are witnessing increasing solid waste generation as urbanization intensifies across Bannu Urban, Ghoriwala, Domel, Kakki, and Nurar. In 2025, these areas are projected to generate approximately 260 tons of municipal solid waste (MSW) per day, translating to an annual total of 94,900 tons. Among these, Bannu Urban contributes 224 tons per day, Ghoriwala generates 9 tons, Kakki produces 15 tons, Domel accounts for 5 tons, and Nurar contributes 7 tons daily. By 2045, total MSW generation across these urban tehsils is expected to rise to 458 tons per day, amounting to approximately 167,170 tons annually. This includes 392 tons from Bannu Urban, 17 tons from Ghoriwala, 26 tons from Kakki, 10 tons from Domel, and 13 tons from Nurar. Around 87% of the total waste is municipal solid waste from residential, commercial, and institutional sources, while the remaining 13% comprises bulk waste such as construction and demolition debris, sludge, dung, and desilted material. The Cantonment area is excluded from these calculations, as the solid waste management (SWM) plan is limited to areas under the jurisdiction of WSSCB and TMA. These projections emphasize the urgent need for a well-planned, efficient SWM system to address the mounting waste volumes in Bannu District's growing urban landscape.

Total waste generation of District Bannu = 567 tons/day (87% MSW= 493tons/day, while 13% Bulk Waste= 74 tons/day)

Total waste generation (District) = 206,955 tons/year **while**

Total Waste generation of the Urban tehsils of Bannu = 260 tons/day

Total waste generation of the Urban tehsils of Bannu = 94,900 tons/Year

The waste projection has been done to analyze the situation of waste generation for the next 20 years of the Bannu District for a proper solid waste management system.

Table 3-67: Population vs Waste Generation Trends in Urban Area (City)

Urban Tehsils	Bannu		Domel		Kakki		Nurar		Ghoriwala	
Year	Population	WG	Population	WG	Population	WG	Population	WG	Population	WG
2017	401390	181	8073	4	25883	12	12562	6	16743	8
2025	498004	224	10879	5	32585	15	15814	7	21079	9
2030	571169	257	13109	6	37629	17	18263	8	24341	11
2035	656722	296	15797	7	43453	20	21090	9	28108	13
2040	756062	340	19035	9	50178	23	24354	11	32460	15
2045	871717	392	22937	10	57944	26	28123	13	37484	17

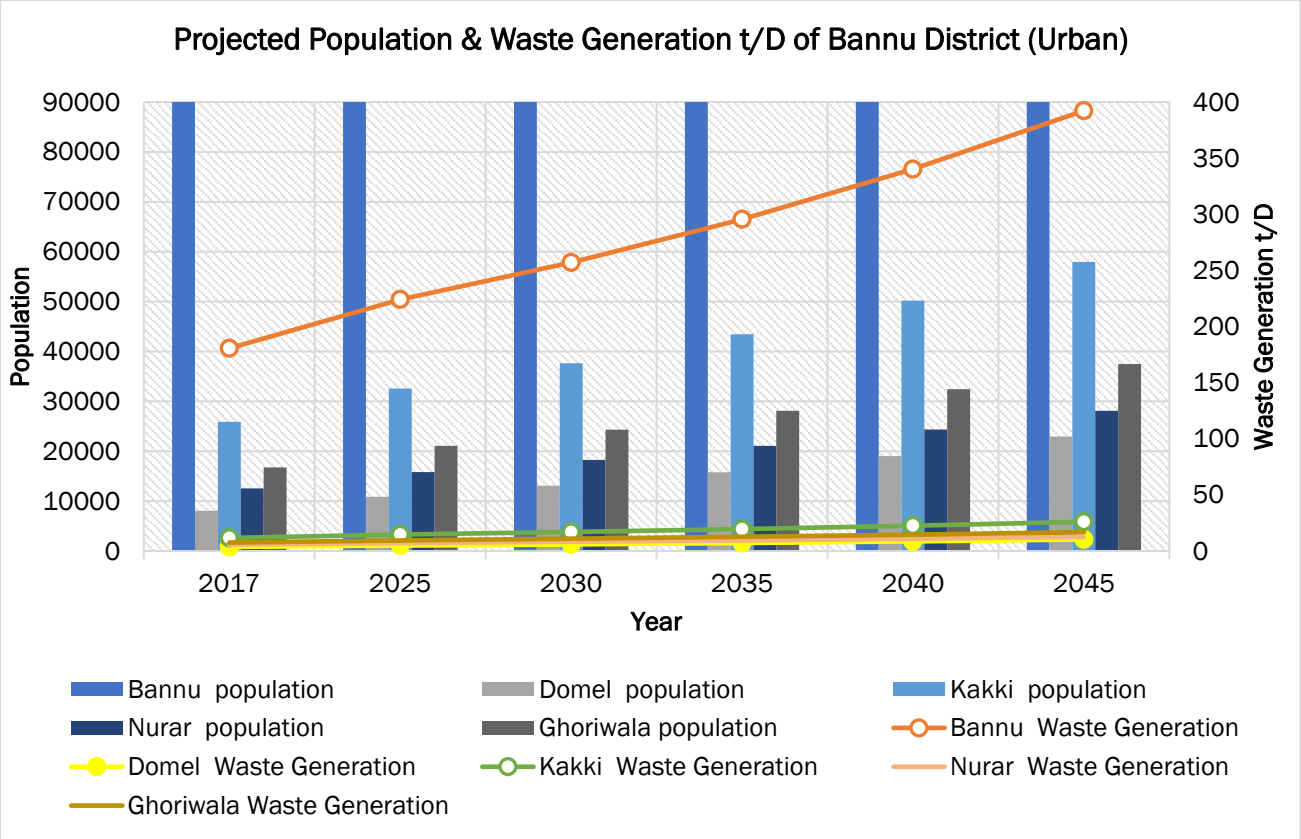


Figure 3-11: Projected Population & Waste Generation T/D of Bannu District (Urban)

In the urban tehsils of Bannu District, most waste is generated from residential and mixed-use areas, reflecting the population density and daily household activities. Bannu Urban produces the highest waste due to its larger residential, commercial, and institutional presence. Kakki and Ghoriwala also generate moderate waste, mainly from homes and some commercial and public facilities. Nurar and Domel contribute smaller amounts, mostly from residential zones. Overall, residential areas are the dominant source of waste across all tehsils.

Table 3-68: Municipal Waste Generation based on Land Use of Bannu District (Urban)

Land-use	Bannu WG t/d	Domel WG t/d	Kakki WG t/d	Nurar WG t/d	Ghoriwala WG T/D
Commercial	31	0	2	1	1
Institutes (Edu., Health & Pub. Buildings)	25	0	2	1	1
Residential & Mixed	138	4	9	4	6
Total	**195**	**4**	**13**	**6**	**8**

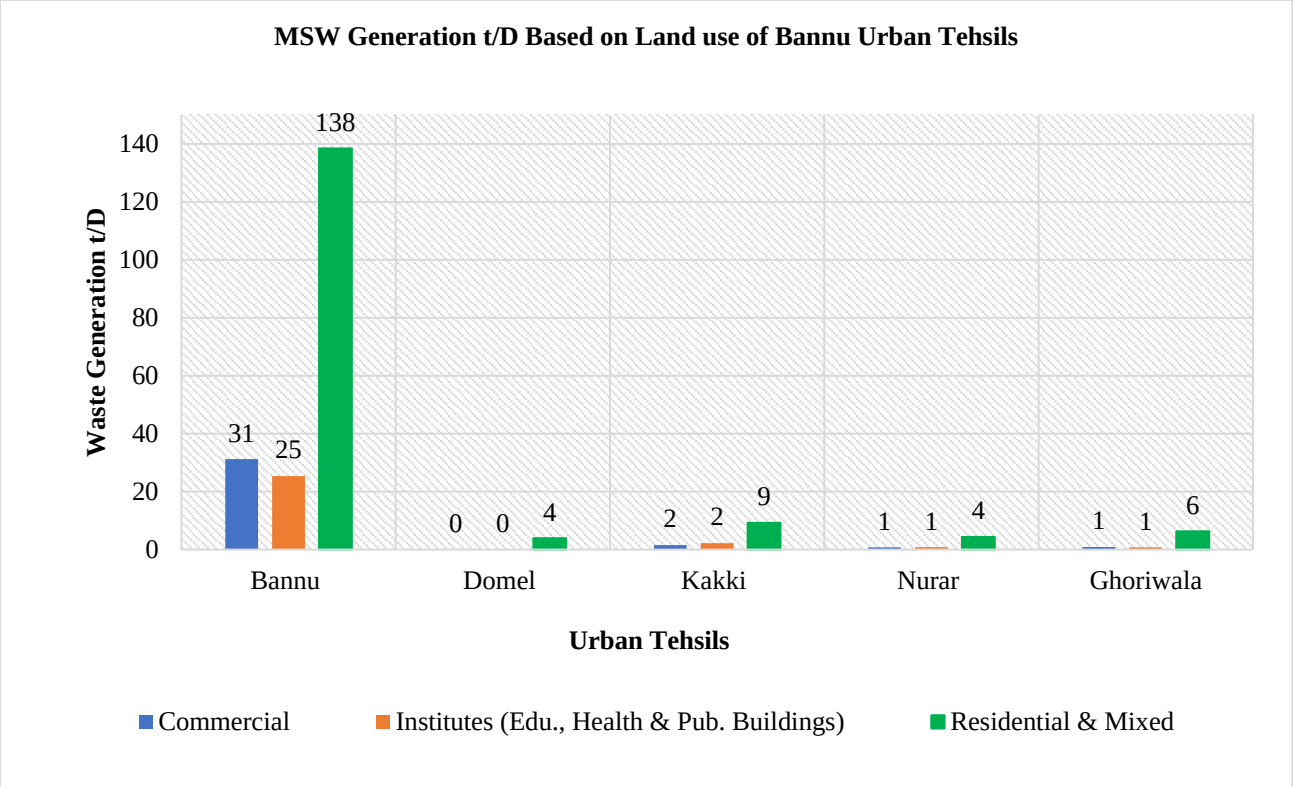


Figure 3-12: MSW Generation (t/d) Based on Land Use

Waste generation in the rural areas of Bannu District is steadily increasing in line with population growth across all tehsils. By 2025, rural areas collectively generate approximately 307 tons per day, which amounts to 112,055 tons annually. This includes contributions from Bannu Tehsil, Domel, Meryan, Kakki, Baka Khel, and Wazir Tehsil, with each area showing a noticeable rise in daily waste due to expanding residential settlements and related activities. By 2045, the total rural waste generation is projected to reach 575 tons per day, equaling 209,875 tons annually. This continuous rise highlights the pressing need to strengthen waste management infrastructure in rural regions to handle increasing waste volumes effectively and sustainably over the coming years.

Table 3-69: Population vs Waste Generation Trends in Rural Areas

Rural Tehsil	Bannu Tehsil		Domel Tehsil		Meryan Tehsil		Kakki		Baka Khel		Wazir Tehsil	
Year	Population	WG	Population	WG	Population	WG	Population	WG	Population	WG	Population	WG
2017	243,246	78	150,033	48	131,627	42	56,249	18	122,085	39	43,114	14
2025	306,227	98	202,192	65	165,709	53	70,813	23	153,696	49	60,058	19
2030	353,622	113	243,642	78	191,357	61	81,772	26	177,486	57	73,880	24
2035	408,361	131	293,589	94	220,974	71	94,429	30	204,955	66	90,884	29
2040	471,565	151	353,773	113	255,177	82	109,046	35	236,678	76	111,802	36
2045	544,550	174	426,297	136	294,671	94	125,924	40	273,311	87	137,536	44

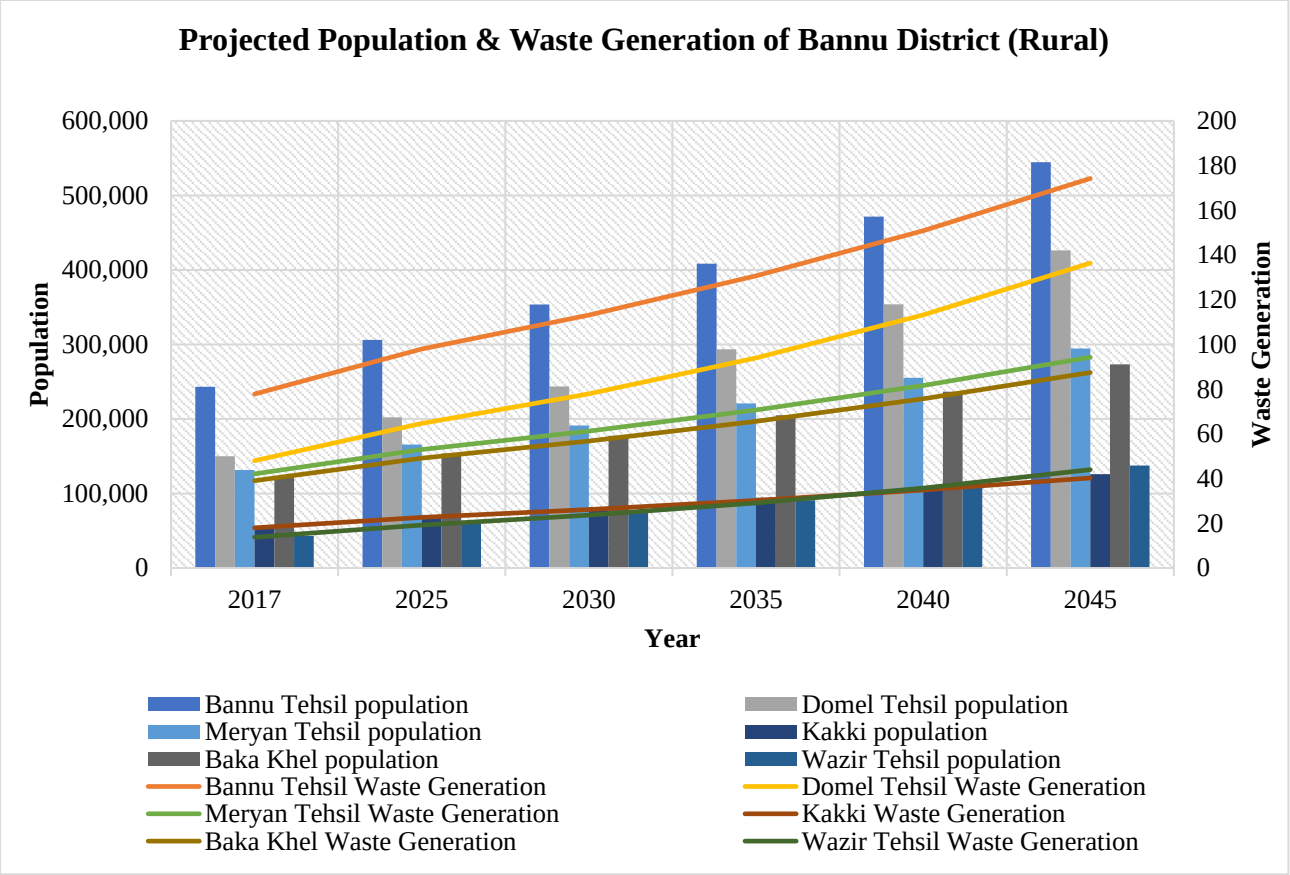


Figure 3-13: Population Vs Waste Generation t/y (Rural)

3.8.4 Proposed Solid Waste Management Plan

A comprehensive Solid Waste Management (SWM) system is essential for addressing waste management challenges in the Bannu urban areas. The plan, designed from 2025 to 2045, aims to transform current waste management practices into a more efficient and advanced system. This long-term strategy focuses on waste collection from households, commercial establishments, institutions, offices, public spaces, and parks, ensuring proper storage in containers and environmentally safe transportation to controlled dumpsites, unlike the existing practice of open dumping.

The proposed SWM system for Bannu's urban areas will consist of four major components:

- Primary & Secondary collection system
- Waste Transportation
- Final Disposal

This system will identify the necessary resources and infrastructure required to manage solid waste in Bannu district for the next 20 years, aiming to modernize the operations and enhance the efficiency of SWM practices.

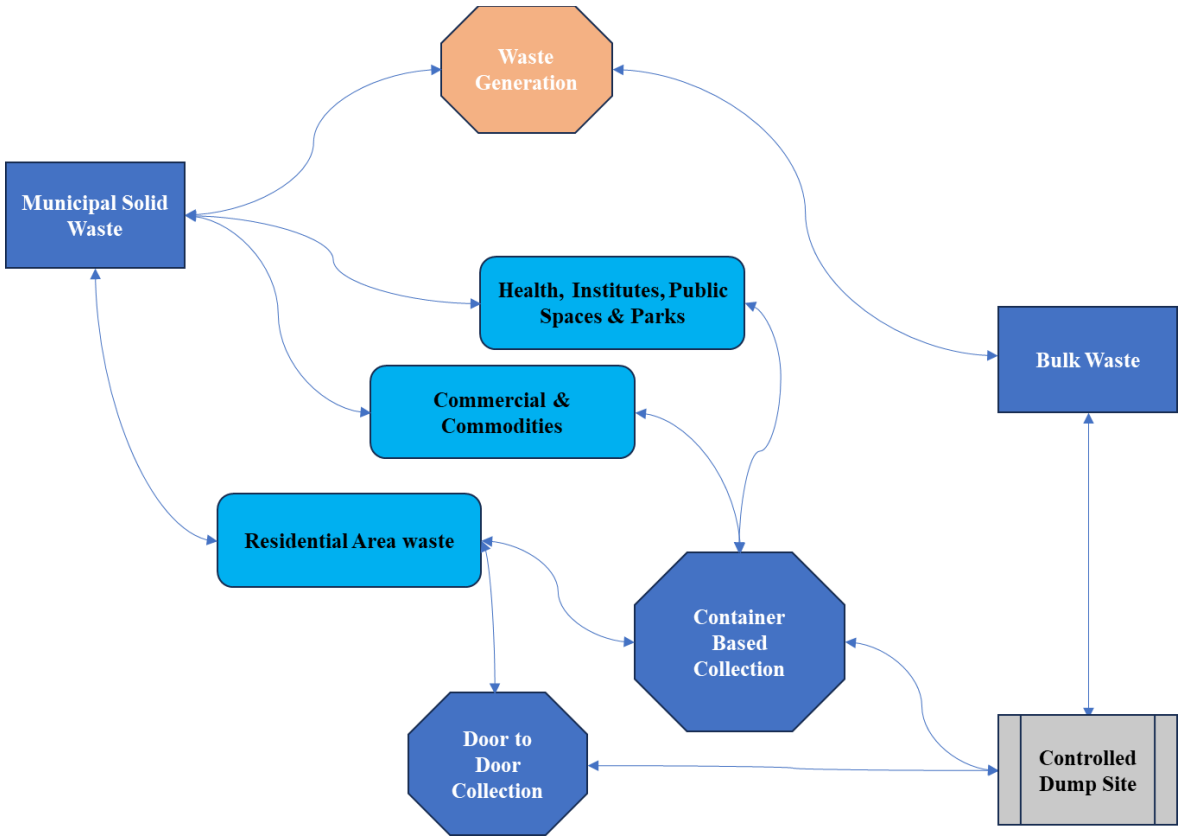


Figure 3-14: Proposed Waste Management Model for Bannu Urban Area

3.8.4.1 Design Standards and Criteria

Service level benchmarks have been established based on key performance indicators (KPIs). These KPIs encompass service delivery, operational efficiency, institutional strength, and financial sustainability. The present study identifies specific indicators to assess Solid Waste Management (SWM) services, along with their current status and targeted improvements. The objectives for outsourcing SWM services have also been outlined to ensure better performance over time.

Table 3-70: Service Delivery Indicators

Service Delivery Indicators	Current Status (Baseline)	Target (2026)	Target (2028)	Target (2030)	Target (2035)
Household-level waste collection (door-to-door service)	10% covered under door-to-door collection through Hand carts	30% coverage in planned areas	50% coverage in planned areas	70% coverage in planned areas	90% coverage in planned areas
Collection Efficiency (Percentage of waste transported to the final disposal site)	30% collection efficiency	50% efficiency	60% efficiency	85% efficiency	90% efficiency
Mechanical Sweeping Coverage	5km	15 km	Expansion as per infrastructure improvements	Expansion as per infrastructure improvements	Expansion as per infrastructure improvements

To effectively plan a Solid Waste Management (SWM) system for any area, it is crucial to analyze its existing infrastructure, socio-economic conditions, available development resources, and topographical characteristics. The Urban Unit team conducted field visits across Bannu city and the tehsils to evaluate the specific needs and requirements for the proposed SWM system.

Table 3-71: System Indicators

System Parameter	Existing System	Proposed System
Street Sweeping	Conducted irregularly without a fixed schedule	Daily sweeping, litter clearance, and organized waste collection from households and shops
Waste Containment	Waste is dumped in open heaps and transferred to collection points, causing health and environmental hazards.	Introduction of hand carts and waste containers. Urban/rural areas will have 0.8m³ & 5m³ waste containers.
Waste Transportation	Waste is transported in open vehicles, leading to pollution and health risks	Garbage compactors & Arm roll vehicles of various capacities according to requirement will be used in urban areas to ensure safer and more hygienic waste transportation. While in Urban areas waste will be collected and transported by using tractor trolleys, dumpers, mini dumpers with hydraulic lifting, and loader models will be proposed.
Waste disposal	Waste is disposed of in open disposal sites in an uncontrolled manner	Controlled dumpsites are proposed in Urban areas for safer waste disposal and leachate management.

For Bannu City, various parameters have been gathered from secondary data sources, validated through field surveys, and analyzed using statistical models to project future requirements. The proposed Solid Waste Management (SWM) system has been designed considering the following key factors:

- Projected population growth to estimate future waste management needs.
- Waste generation trends across different zones of the city.
- Area classification based on demographics and land use characteristics.

3.8.4.2 Operational Design Modules

The operational design for Bannu City integrates various waste streams into the main waste collection system. Key modules are outlined below:

Table 3-72: Operational Design Modules for Bannu City

Modules	Description	Methodology
Design Module I	Door-to-Door Waste Collection	Collection using Handcarts with waste emptied into mini dumpers or in containers placed at main roads /streets
Design Module II	Container-Based Collection	Waste is collected from containers (0.8 m³& 5 m³) using compactors.
Design Module III	Commercial Waste Collection	Containers 0.8m³ in commercial areas were emptied using Mini tippers with modification of the hydraulic jack. This design is modified by considering local circumstances and small amount of generated waste from scattered commercial areas.
Design Module IV	Waste from Institutions, Societies, and Public Places	Waste from healthcare units, Edu, Industry & bus stands, sports facilities, is collected using a mini dumper with hydraulic lifting from (0.8 m³) containers.
Design Module V	Manual Sweeping	Workers deployed based on population ratio (1 worker per 900 population for urban areas, 1 worker per 1400 population for rural areas).

Modules	Description	Methodology
Design Module VI	Bulk Waste Collection (Green Waste, Debris, Desilted Waste)	Collection using Tractor loader, and Dumper 5 m^3 in Bannu, while in other tehsils, Tractor Trolley and Front-end loader are proposed.
Design Module VII	Mechanical Sweeping and Washing	Main roads were cleaned using mechanical sweepers (4 m^3 capacity) for the urban area as per requirement.

3.8.4.3 Basic Principles and Standards Used

The Solid Waste Management (SWM) system in Bannu City has been designed to focus on economic feasibility, social impact, environmental sustainability, and equitable service delivery. The key design standards for SWM operations are outlined below:

Table 3-73: Design Standards

Sr. No.	Activity	Standards
1	Waste Storage Containers	• 0.8m^3 & 5m^3 containers compatible with garbage compactors.
2	Door-to-Door Waste Collection	• Handcarts and Mini Tipper/Dumber (1m^3) for household waste collection, preventing littering, collecting waste bags from streets, and lifting sludge. • Garbage compactors (7m^3) for planned areas.
3	Mechanical Sweeping	Mechanical sweepers will cover 10-15 km of road length daily.
4	Waste Transportation	• Three trips per day to the landfill by 7m^3 compactors. • Two trips per day by Dumper 5$m^3$and also used Tractor Loader. • Chain Arm roll Vehicles compatible with 5m^3 Containers in Bannu.
5	Manual Sweeping Standard.	• Each sanitary worker will cover 800 meters per day
6	Sanitation Workforce	• One worker will be allocated per 900 residents in Urban while in rural one worker is allocated on 1400 persons.

3.8.4.4 Proposed Waste Handling Design/ Scheme

Based on a thorough assessment of sanitation operations, administrative jurisdiction of Bannu Municipal Corporation, and existing waste management infrastructure—including transfer stations (Waste transport is not proposed for urban area due to small amount of generated waste but for rural areas it is proposed in case of transfer distance exceed 15km from city center and landfill sites—the following recommendations are proposed for improving MSW handling in Bannu urban areas:

- The MSW generated from residential, commercial, and institutional sectors has been analyzed based on tonnage estimates
- Waste collection varies by area: mini dumpers (1 m^3), compactors (7 m^3) and Chain Arm roll vehicles 5m^3 will be utilized for waste collection from residential and commercial centers, and 0.8m^3 containers support waste storage. The machinery at the controlled dumpsite will do the final disposal.
- A new controlled dumpsite is proposed in Urban areas of Bannu district as it will serve as a cost-effective solution. The site area is calculated in this report, which will accommodate waste disposal for the next 20 years.

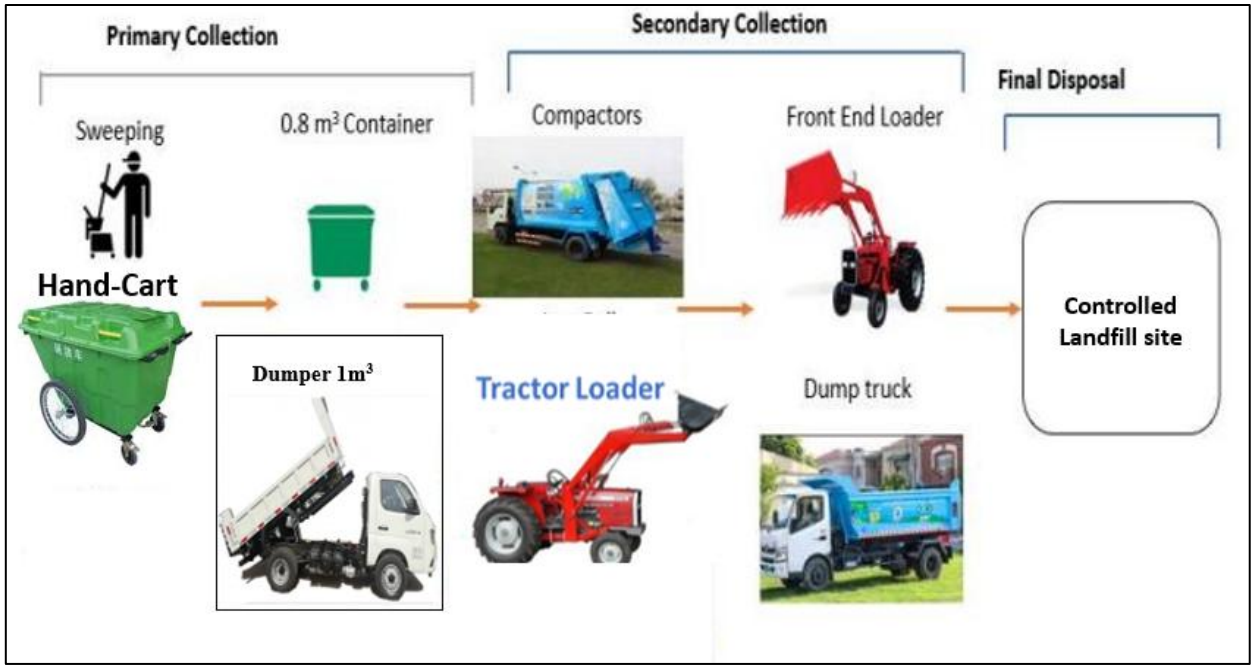


Figure 3-15: Solid Waste Management System for Bannu Urban Areas

Bannu District's rural tehsils, with a combined population of approximately 958,695 and 128,840 households, generate an estimated 307 tons of waste daily. Of this, around 267 tons are municipal solid waste (MSW), while 40 tons consist of bulk waste. These figures highlight the pressing need for a structured and context-sensitive solid waste management system.

Rural areas in Bannu—including Domel, Meryan, Kakki, Baka Khel, and Wazir Tehsils—face significant challenges such as poor road infrastructure, dispersed populations, and limited formal waste collection and disposal mechanisms. Given these constraints, a community-driven and adaptive approach is essential. Establishing small-scale transfer stations, promoting waste segregation at the source, and involving local communities in waste management activities can help improve sanitation and reduce environmental and public health risks.

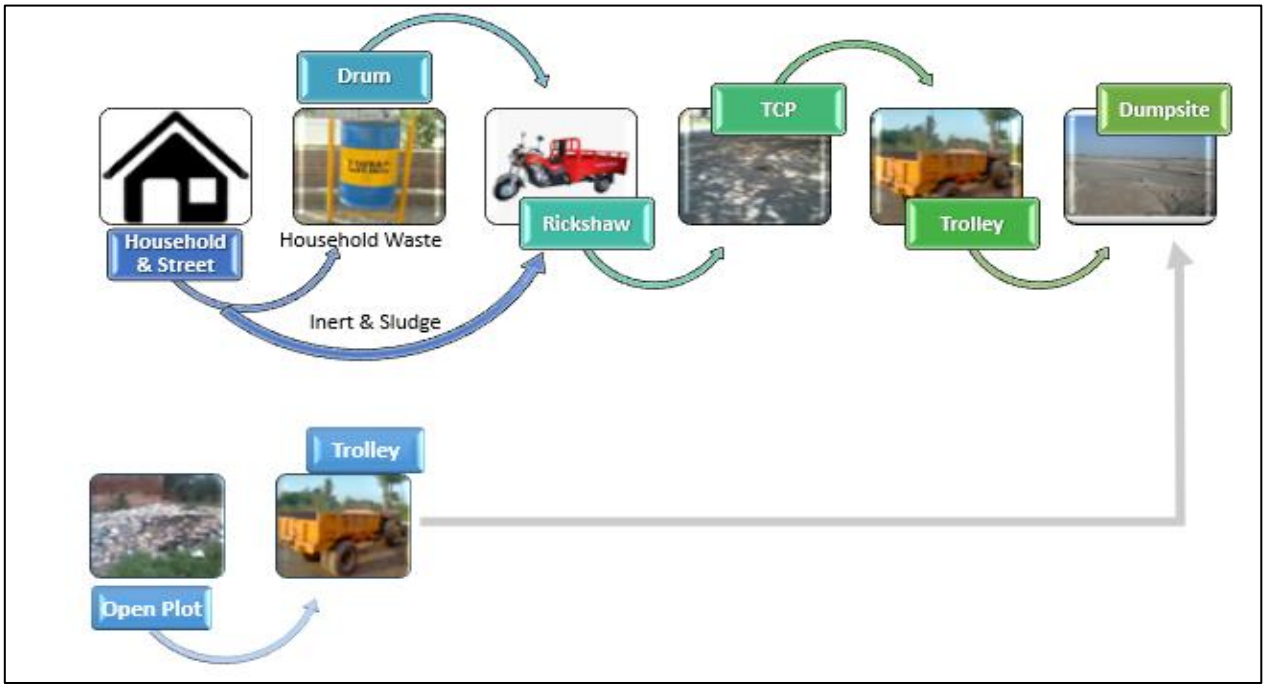


Figure 3-16: Solid Waste Management System for the rural area of District Bannu

- **Hand carts and Mini Dumpers (2.5m³)** will be used for door-to-door waste collection twice a week, particularly in villages where narrow streets prevent access by larger vehicles.

- **Tractor Trolleys** will be deployed to lift waste from open plots and temporary collection points, facilitating easy disposal for rural households.
- **Small-scale Dumpers (10m³)** and loaders will transport waste from these designated spots to transfer stations located at accessible points in each tehsil.
- **Front-end Loaders** will be used to move bulk waste efficiently, ensuring transportation to final disposal sites without overburdening smaller collection vehicles.

This rural-focused waste management strategy is designed to improve cleanliness, reduce health risks, and ensure sustainable waste disposal across the rural tehsils of Bannu District, including Domel, Meryan, Kakki, Baka Khel, and Wazir Tehsil. The initiative aims to enhance overall living conditions and support environmental protection in these areas.

3.8.5 Modes of Solid Waste Collection, Haulage and Way Forward

3.8.5.1 Primary Waste Collection

In Bannu Tehsil (Urban), waste management responsibilities are handled by the Tehsil Municipal Administration (TMA) and Water and Sanitation Services Company Bannu (WSSCB). Primary waste collection in residential areas is conducted through door-to-door collection by sanitary workers using handcarts (HC). In commercial zones, institutional areas, and marketplaces, waste is managed through a Container-Based Collection (CBC) system, utilizing mini dumpers (1m³) equipped with hydraulic lifters for efficient loading and unloading. Bulk waste from open plots, roadsides, and public spaces is cleared using front-end loaders and loader tractors, which transport the waste to designated collection points, transfer stations, or controlled dumpsites. To improve efficiency and coverage, Bannu aims to transition to 100% handcart-based collection for residential areas and maintain CBC with mini dumpers for commercial and institutional zones. Achieving this goal requires upgrading infrastructure, procuring modern waste collection machinery, and ensuring comprehensive waste collection coverage to address environmental challenges and safeguard public health.

Table 3-74: Proposed Modes for Primary Waste Collection

Bannu Urban Tehsils	Residential Waste (Ton/Day) (D.t.D Waste Collection)	Residential Waste (Ton/Day) (C.B.C Waste Collection)	Proposed Waste Collection Mode	Commercial Waste (Ton/Day) (C.B.C Waste Collection)	Proposed Waste Collection Mode	Way Forward
Bannu	14	125	Container-based and hand carts are provided to pick up waste from households & Transfer to the Dumpsite by mini dumpers (1 m³) and Compactor (7m³)	31	CBC with Mini Dumper with hydraulic lifting (1 m³)	Procurement of new machinery
Domel	0	4		0		
Kakki	0	9		2		
Nurar	0	4		1		
Ghoriwala	0	6		1		
Total	14	148	162	35	100%	
	10%	90%	100%	100%	100%	

3.8.5.2 Secondary Waste Collection

Bannu's urban tehsils are currently grappling with unregulated waste disposal practices, largely due to the absence of a formal transfer station. Waste is often dumped in open plots, along roadsides, or in unmanaged heaps, creating significant environmental and public health concerns. The lack of a structured secondary collection and transfer system further undermines efficient waste management. To address this, a strategy is proposed wherein waste will be transported directly from collection points to controlled

dumpsites, bypassing the need for a transfer station in urban areas. Moreover, bulk, debris, and construction & demolition (C&D) waste will be reused for road construction and site development. To strengthen operations, TMA and WSSCB Bannu will invest in modern waste collection and haulage machinery, enhancing efficiency, minimizing pollution, and ensuring a cleaner, more sustainable urban environment.

Table 3-75: Proposed Modes for Secondary Waste Collection in Bannu City

Intermediate Facilities	Way forward
Collection Points/Containers	By WSSC Bannu
Waste from Containers	Containers lifting by Compactors (7m^3), arm roll 5m^3 and Mini dumper (1m^3) to the Controlled Dumpsite
Bulk/ Debris/ C&D Waste	Utilization of road infrastructure at the disposal facility or open plots
Resources for Secondary Waste Collection & Haulage at Disposal Facility	Procurement of Machinery by WSSC Bannu & TMA

3.8.5.3 Machinery/ Fleet Required for Waste Handling

The summary of the total resources required to perform waste collection from the city is calculated and explained in the Table below.

Table 3-76: Summary of total proposed resources for the Bannu Urban Area[63]

S. No	Heterogeneous Fleet	Bannu	Domel	Kakki	Nurar	Ghoriwala	Qty.
1	Compactor 7cum	13	0	1	0	0	14
2	Mini Tipper 1cum	0	2	3	4	5	14
3	Chain Arm Roll 5cum	4	0	0	0	0	4
4	T Loader (4*4)	1	0	0	0	0	1
6	Front End Loader	0	1	1	1	1	4
7	Dumper 5cum	3	0	0	0	0	3
8	Container 0.8cum	641	18	56	28	37	780
9	Container 5cum	15	0	0	0	0	15
10	Trolleys	0	1	2	1	1	5
11	Mech Sweeper 4 m^3	1	0	0	0	0	1
12	Helpers	46	4	14	4	10	78
13	Workers	553	12	36	18	23	642

3.8.5.4 Container-Based Collection (CBC)

The Container-Based Collection (CBC) system offers a more efficient and convenient approach for municipalities by providing communal storage bins or containers that are easily accessible for residents to dispose of waste. The proposed resources required to manage 148 tons per day of waste through the CBC system are outlined in the following table:

[63] *SWM-HMAFH (updated version).xlsx- Summary Sheet*

Table 3-77: Container-Based Collection in Bannu Urban Areas

Waste Category	Resources	Bannu Urban	Domel Urban	Kakki Urban	Nurar Urban	Ghoriwala Urban	Total Fleet
Container-Based Collection (CBC)	Compactor 7cum	8	0	1	0	0	9
	Mini Tipper 1cum	0	2	2	0	3	7
	Chain Arm Roll 5cum	4	0	0	0	0	4
	Container 0.8cum	389	18	40	22	27	496
	Container 5cum	15	0	0	0	0	15
	Handcarts	277	6	18	9	12	322
	Drivers	12	2	1	2	3	20
	Helpers	20	4	2	4	6	36
	Workers	553	12	36	18	23	642

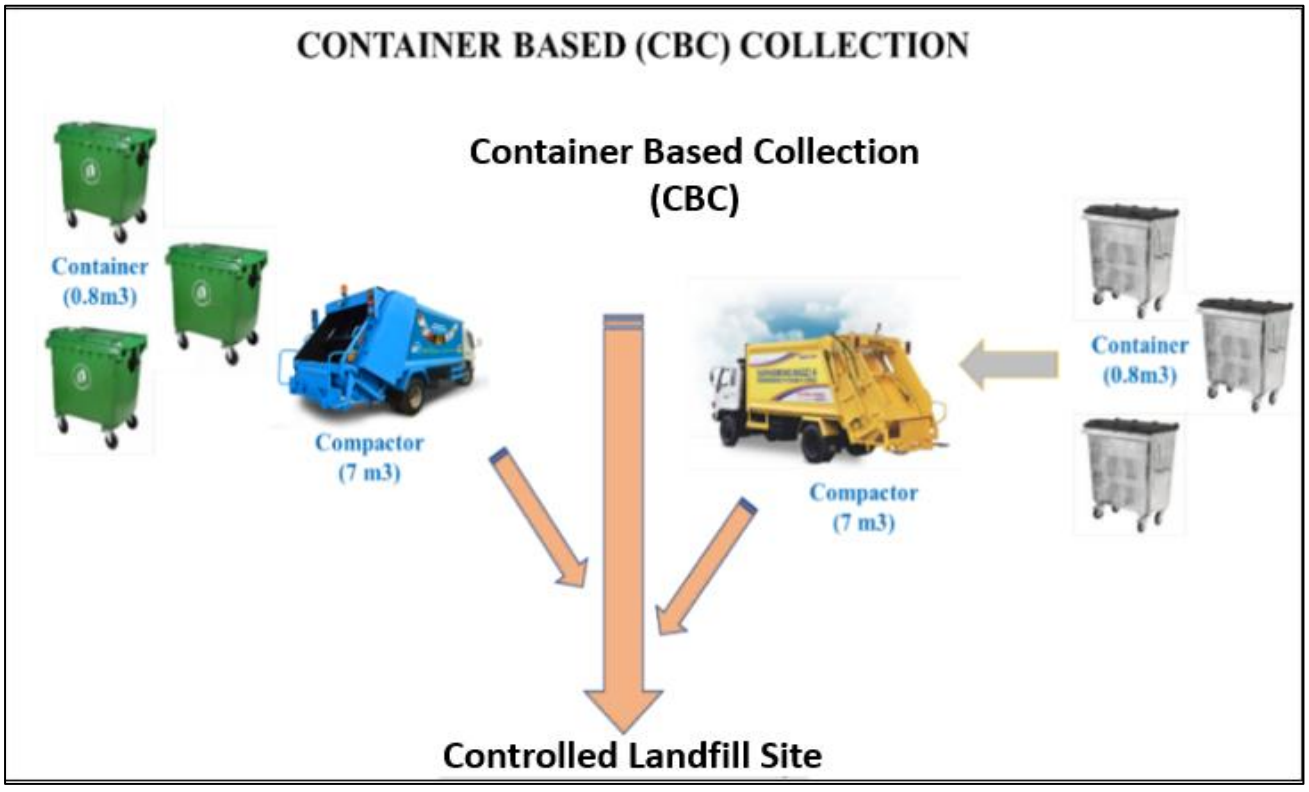


Figure 3-17: Container-Based Collection in Bannu Urban Area

3.8.5.5 Door-to-Door with Mini Dumpers

A Door-to-Door (D.t.D) collection system using hand carts is proposed to collect 14 tons/day of waste from the densely populated residential areas of Bannu urban tehsils. This system is tailored to the local context, taking into account the city's road infrastructure, socio-economic conditions, and the presence of congested, mountainous urban pockets. To ensure efficient waste collection, the plan includes the deployment of 321 hand carts and a workforce of 643 sanitary workers. Waste will be collected directly from households using hand carts and then transferred to 1m³ mini dumpers and 0.8m³ containers, establishing a structured and effective solid waste management system across the tehsils. In the Bannu tehsil chain arm roll is also used for the collection of waste from containers.

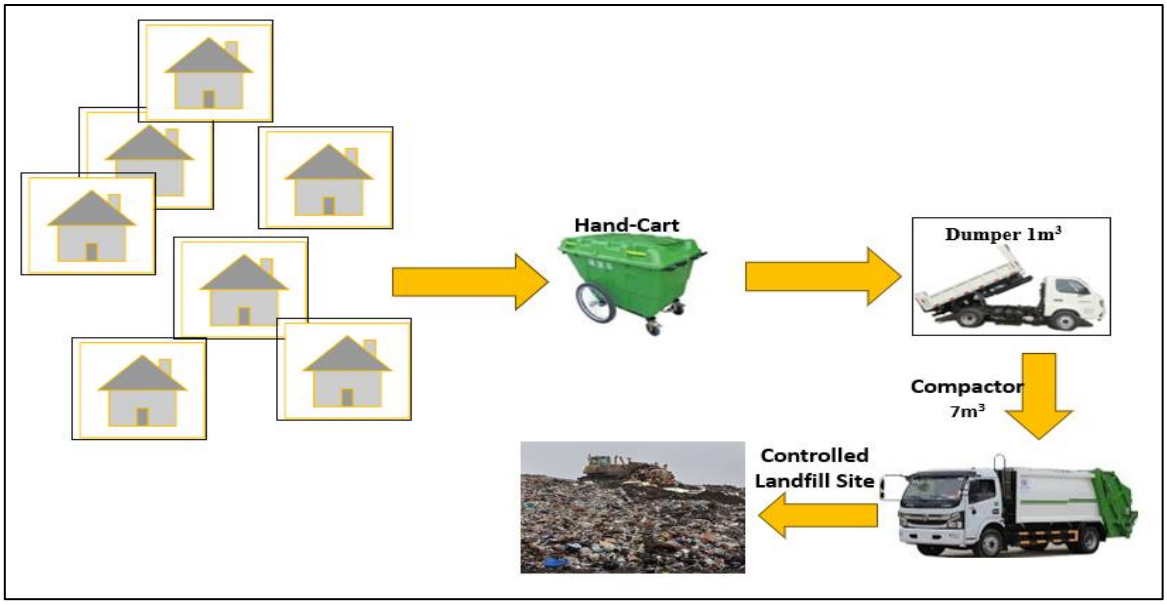


Figure 3-18: Door-to-Door Collection Modes in Bannu Urban Areas

3.8.5.6 Commercial Waste Collection

The commercial areas of Bannu urban tehsils generate a considerable amount of waste, requiring a robust and efficient collection and disposal system. To address this, a Container-Based Collection (CBC) model utilizing Mini Tippers with hydraulic lifting systems is proposed to ensure 100% coverage of commercial zones and markets. This system, customized to suit Bannu's urban dynamics and informed by global best practices, will involve 0.8m³ containers emptied by 1m³ mini dumpers equipped with container lifter arms. The initiative aims to improve overall waste handling, enhance the city's visual appeal, reduce informal scavenging, and support greater recovery of recyclable materials. As waste volumes increase over time, 5m³ containers will be introduced in high-waste-generating areas such as vegetable and fruit markets, which will be serviced using chain arm roll vehicles, creating a scalable and future-ready waste management framework. The proposed resources for commercial waste collection are detailed in the table below:

Table 3-78: Modes for Commercial Waste Collection of Bannu Urban Areas

Waste Category	Resources	Bannu Urban	Domel Urban	Kakki Urban	Nurar Urban	Ghoriwala Urban	Total Fleet
Commercial and Commodity	Mini Tipper 1cum	0	0	1	1	1	3
	Compactor 7cum	3	0	0	0	0	3
	Container 0.8cum	139	0	7	3	4	153
	Drivers	3	0	1	1	1	6
	Helpers	6	0	2	2	2	12

Figure 3-19: Proposed resources for commercial Area waste collection mode

3.8.5.7 Health and Educational Institutions, Societies, and Industries

Municipal Solid Waste (MSW) generation in Bannu urban tehsils from health and educational institutions, industries, and civic amenities amounts to approximately 29 tons per day. This waste stream includes a diverse mix of food waste, packaging materials, plastic bags, bottles, paper, and general litter. Since there are no formal residential societies in these areas, no waste is attributed to such sources. The institutional buildings—such as offices, educational and healthcare facilities, and government establishments—are the key contributors to this category of waste, significantly adding to the urban waste burden.

To address this, a structured collection and disposal system has been proposed, involving 1m³ mini tipper cum compactors, 7m³ compactors, and 0.8m³ containers, supported by trained drivers and helpers tailored to each tehsil's needs. The system has been planned for Bannu, Kakki, Nurar, and Ghoriwala, while Domel does not require additional resources for this category.

This initiative will streamline institutional waste handling, reduce environmental and public health risks, and enhance the overall sanitation of urban Bannu. The detailed resource allocation is summarized in the table below:

Table 3-79: Proposed resources for Institutional, Industrial Areas & Societies, and waste collection mode

Waste Category	Resources	Bannu	Domel	Kakki	Nurar	Ghoriwala	Total Fleet
HEALTH, EDU, INDUSTRY & CIVIC AMENITIES	Mini tipper Hydraulic Lifting-1cum	0	0	2	1	1	4
	Compactor 7cum	2	0	0	0	0	2
	Container 0.8cum	113	0	10	4	4	131
	Drivers	2	0	2	1	1	6
	Helpers	4	0	4	2	2	12

3.8.5.8 Bulk Waste Collection and Handling

Managing bulky construction and demolition (C&D) waste is a growing need in Bannu's urban areas as the city develops and transforms. With an estimated 34 tons per day of debris and bulk waste being generated, it's essential to handle this separately from regular household waste to ensure cleaner streets and a healthier environment.

To address this, a dedicated bulk waste collection system is being introduced. In Bannu tehsil, three 5m³ dumper trucks and one 4x4 tractor loader will be used to collect and transport waste from renovation and

development sites. Meanwhile, other urban tehsils—including Domel, Kakki, Nurar, and Ghoriwala—will be equipped with trolleys and front-end loaders to manage local needs effectively.

The overall fleet includes 3 dumpers, 1 tractor loader, 5 trolleys, 5 front-end loaders, 14 drivers, and 3 helpers, ensuring a well-coordinated system that keeps pace with urban growth while supporting sustainable and responsible waste management.

Table 3-80: Proposed Bulk Waste Collection Modes

Waste Category	Resources	Bannu	Domel	Kakki	Nurar	Ghoriwala	Total Fleet
Bulk	Dumper 5cum	3	0	0	0	0	3
	T Loader (4*4)	1	0	0	0	0	1
	Trolleys	0	1	2	1	1	5
	Frond End Loader	0	1	2	1	1	5
	Drivers	4	2	4	2	2	14
	Helpers	3	0	0	0	0	3

Figure 3-20: Modes for Bulk Waste Collection

3.8.5.9 Mechanical Sweeping & Washing

Advancements in technology have brought forward highly efficient mechanical sweeping machines that are quieter, more economical, and environmentally friendly. The integration of such equipment in Bannu is expected to significantly reduce dependency on general labor while creating opportunities for skilled personnel like trained drivers and street sweepers.

In Bannu's urban environment, mechanical sweeping and road washing play a vital role in maintaining city cleanliness by effectively removing dust and litter from roads and public spaces. This not only improves the aesthetic appeal of the city but also helps reduce airborne pollutants and related health risks. However, recognizing on-ground challenges such as parked vehicles and narrow streets, mechanical sweeping will be complemented by manual sweeping to ensure thorough and effective cleaning across all areas.

Table 3-81: Proposed resources for Mechanical Sweeping and Washing

Waste Category	Resources	Bannu	Domel	Kakki	Nurar	Ghoriwala	Total Fleet
Mechanical Sweeping & Washing	Mech Sweeper 4 m3	1	0	0	0	0	1
	Drivers	1	0	0	0	0	1
	Helpers	1	0	0	0	0	1

Considering the climatic conditions of Bannu, mechanical sweeping is proposed for major roads on alternate days. Additionally, city furniture, monuments, marketplaces, and footpaths will be washed weekly, if recommended. This integrated approach aims to significantly enhance sanitation standards and promote improved urban hygiene across Bannu's urban areas.

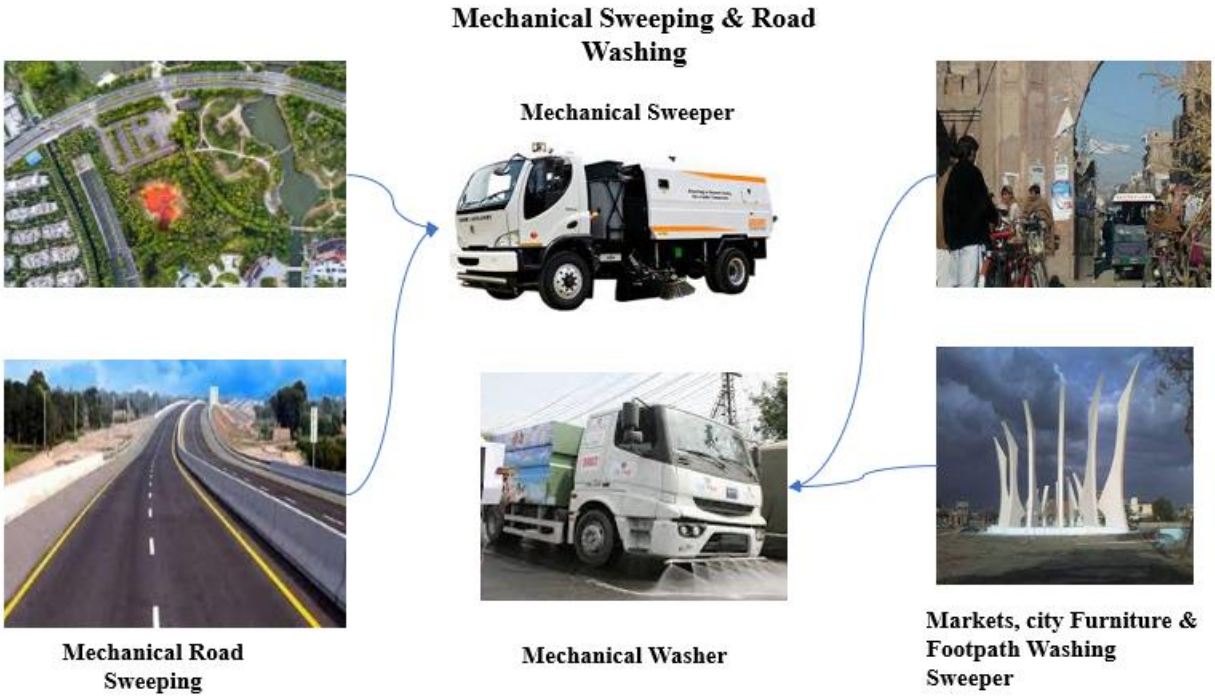


Figure 3-21: Mechanical Sweeping and Road Washing in Bannu Urban Areas

3.8.5.10 Manpower & Manual Sweeping Operation

In Bannu urban and its rural tehsils, solid waste management relies heavily on manual labor, with workers involved in waste collection, transfer, and disposal. However, a lack of proper training on equipment use, maintenance, and health risks poses challenges. Inefficiencies arise due to limited coordination among local authorities, affecting waste management operations. The required number of sanitary workers is based on a standard ratio of one worker per 900 residents. Given Bannu's developing status, manual sweeping with basic tools like brooms, shovels, and hand carts remains essential, particularly in residential areas. However, improper waste disposal by residents, due to weak enforcement and cultural habits, contributes to unclean streets. Daily manual sweeping is necessary to maintain cleanliness, but resource limitations hinder effective implementation. The resources offered for manual sweeping mode in Bannu Urban tehsils are given here in Table below:

Table 3-82: HR & Machinery Proposed for Bannu City

Waste Category	Resources	Bannu	Domel	Kakki	Nurar	Ghoriwala	Total Fleet
Manual Sweeping	Handcarts	277	6	18	9	12	321
	Workers	553	12	36	18	23	643

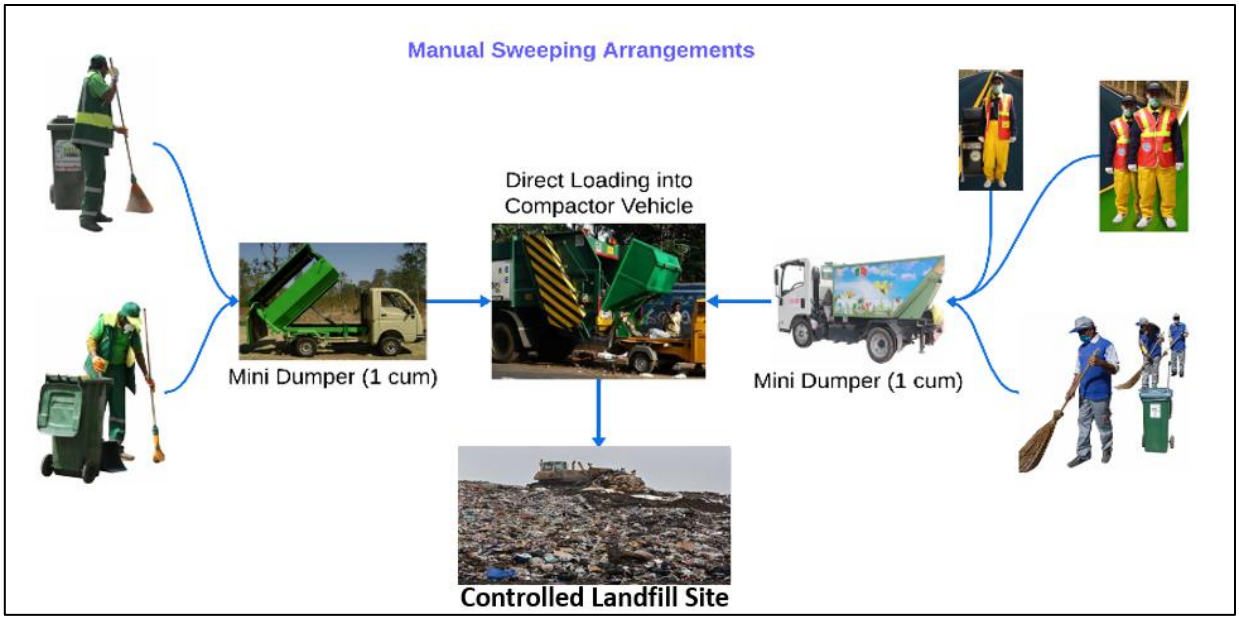


Figure 3-22: Graphics of manual sweeping mode

3.8.5.11 Working Hours

Government offices typically operate for 8 hours per day, and the Bannu Water and Sanitation Services Company (WSSC) and the TMAs of other tehsils within the district also maintain these standard working hours schedule. In the proposed system, these working hours will remain unchanged; however, various task teams may operate in two shifts to improve efficiency. For example, street sweeping may be conducted early in the morning, while mechanical washing takes place during the night shift.

3.8.5.12 Digital Monitoring of the Operations

It is proposed that the Bannu Water and Sanitation Services Company (WSSC) and the TMAs of other tehsils install tracking devices and Radio Frequency Identification (RFID) cards on all compactors, mini dumpers, dumpers, mechanical sweepers, and washer vehicles. This initiative aims to enable real-time online monitoring of the fleet in the field and track the number of trips to the dumping site. The monitoring system will enhance transparency in waste collection by comparing the collected tonnage with the fuel issued for operations. Additionally, the attendance of field staff is proposed to be recorded through an Android application to ensure accountability and efficiency. The cost of the IT-based monitoring system is included in the cost estimate section.

If the Government of Khyber Pakhtunkhwa expresses interest in digitizing the Solid Waste Management (SWM) system, The Urban Unit, Lahore, will facilitate the Bannu WSSC and the TMAs of other tehsils in developing the IT-based tracking system for fleet monitoring and the Android application for workers' and drivers' attendance.

3.8.5.13 Drain Cleaning

The Bannu Water and Sanitation Services Company (WSSC) and the TMAs of other tehsils are responsible for cleaning drains and sewers. Currently, the removed sludge is often left along roadsides for extended periods. Within the urban limits, numerous smaller drains fall under the maintenance of the TMAs, along with multiple open drains.

It is proposed that a dedicated drain cleaning team be deployed in urban areas, with manpower allocated based on population density and drain length. The team should follow a structured, year-round desilting schedule, ensuring each drain is cleaned at least once per quarter.

3.8.5.14 Transfer Station and Controlled Dump Site/Landfill Site

Effective solid waste management in Bannu is critical for ensuring environmental sustainability and protecting public health. With an estimated urban waste generation of approximately 260 tons per day (or 94,900 tons annually), establishing a centralized controlled dumpsite is essential for managing and disposing of waste efficiently in Bannu's urban tehsils.

- Key Features of the Proposed Controlled Dumpsite:

i. Capacity and Design:

A controlled dumpsite is proposed to span 53 acres, with a height of 15 meters and a total volume capacity of approximately 3,163,333 cubic meters. This design will accommodate the projected waste accumulation of 2,372,500 tons over the next 25 years, based on a waste density of 0.75 tons/m^3.

ii. Environmental Safeguards:

The controlled dumpsite will include measures such as waste compaction and daily coverage, which are crucial to minimizing environmental hazards, controlling odors, and reducing health risks associated with open dumping.

iii. Site Area Allocation:

The total area required, including space for allied facilities (such as access roads, administrative buildings, leachate collection, and stormwater drainage), is calculated to be 210,889 square meters, equivalent to 53 acres.

Table 3-83: Area Calculation for Proposed Dumpsite

Waste Generation per day (Tons)	260
Waste Generation per year (Tons)	94,900
Waste Generation (25 years)	2,372,500
Bulk Density	0.75
Volume (m3)	3,163,333
Height (m)	15
Area	2,10,889
Area in Acres	**53**

Figure 3-23: Bannu Urban Tehsils: Transportation of Waste from Container to Controlled Dumpsite

3.8.5.15 Key Components of the Controlled Dumpsite

Each component of the Landfill/Controlled dumpsite is designed to support the semi-aerobic environment and enhance the efficiency of the landfill's operations:

a) **Leachate Collection and Drainage System**

Design and Layout: The leachate collection system is typically installed at the base of the landfill and includes perforated pipes, drainage layers (usually gravel or sand), and catchment areas for collecting leachate. These pipes direct leachate to designated treatment areas and simultaneously allow air to flow through the landfill bodxy.

Dual Functionality: As leachate moves downward through the collection pipes, it creates a vacuum-like effect that draws oxygen into the waste layers above. This passive aeration reduces reliance on mechanical aeration systems, lowering operational costs and simplifying maintenance.

Prevention of Groundwater Contamination: This system is also essential for collecting and removing potentially harmful leachate, preventing it from seeping into the surrounding soil or groundwater.

b) **Aeration and Passive Ventilation System**

Enhanced Decomposition: By allowing air to circulate naturally through the waste layers, the landfill supports aerobic bacterial activity. These bacteria break down organic matter at a faster rate than anaerobic bacteria, which not only stabilizes waste more quickly but also reduces odor and pest attraction.

Reduction in Methane Emissions: Traditional anaerobic landfills produce significant amounts of methane, a potent greenhouse gas. In contrast, the Fukuoka Method minimizes methane generation, as the aerobic

conditions encourage the production of carbon dioxide and water as end products—both of which have a much lower environmental impact.

c) Layering and Compaction of Waste

Sequential Layering: Waste is deposited in layers, with each layer compacted and then covered with a thin layer of soil. This layering approach prevents excessive settling, minimizes odor, and reduces the risk of spontaneous combustion.

Soil Cover for Containment: The soil covering helps contain leachate within each layer, further supporting aerobic decomposition by maintaining the balance between moisture and air within the waste. Covering also provides insulation, stabilizing temperatures and improving overall decomposition rates.

Final Cap: Once each landfill cell is filled to capacity, it is capped with an impermeable layer (such as clay or geosynthetic materials) to prevent rainwater infiltration and reduce the risk of surface water contamination. This cap also contains any remaining gases and enhances the long-term stability of the landfill.

d) Leachate Collection Pond and Treatment System

Leachate Pond Design: After collection, leachate is directed to a leachate pond for treatment. The pond can include natural or constructed wetlands, which use plants and microorganisms to filter and neutralize contaminants, providing a low-cost and ecologically friendly treatment option.

Integrated Treatment Approaches: For enhanced purification, the system can integrate chemical and biological treatment processes tailored to local environmental conditions. The treated leachate can then be safely released or reused within the landfill for moisture control.

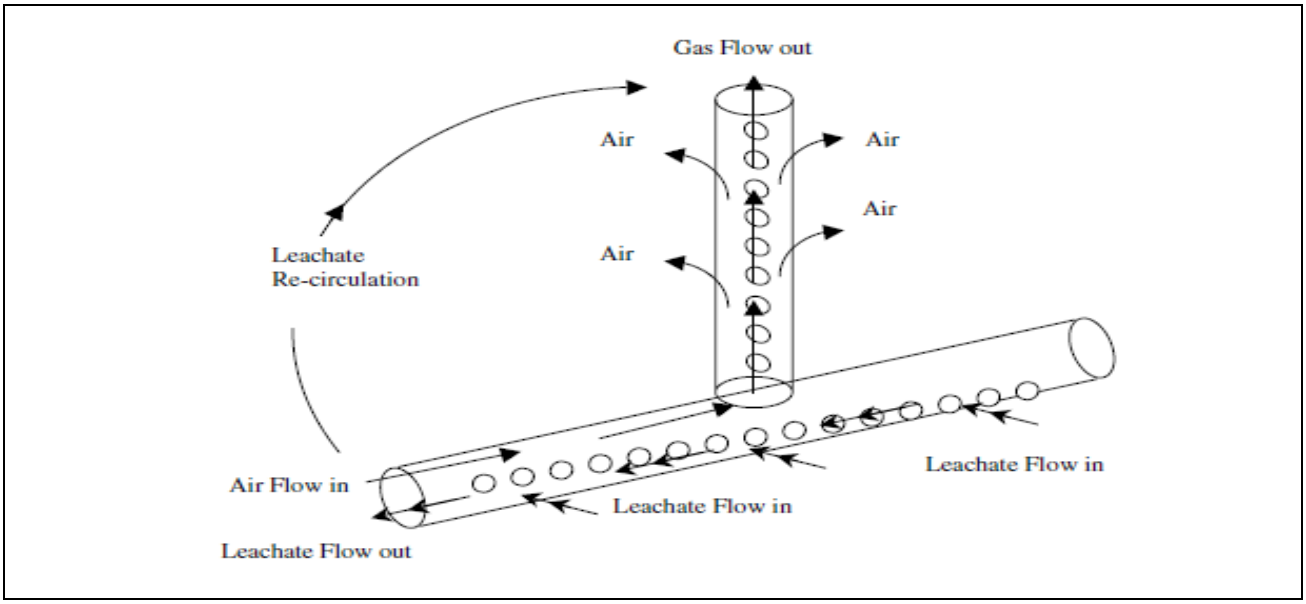
e) Gas Collection and Ventilation System

Strategic Gas Vent Pipes: Pipes are installed vertically at various points in the landfill to manage any gases that do form. These pipes release gases in a controlled manner, preventing pressure buildup and minimizing the risk of spontaneous combustion or leaks.

Ventilation for Stability: By maintaining semi-aerobic conditions, these gas vent pipes enable consistent oxygen flow, which promotes stable decomposition and reduces the need for complex and costly gas extraction systems.

f) Monitoring and Maintenance Systems

Regular Leachate and Gas Monitoring: Leachate quality and gas emissions are monitored regularly to assess the landfill's environmental impact. Instruments for measuring leachate composition and gas flow are crucial for ensuring landfill safety and compliance with environmental standards.



Concepts used in semi-aerobic system (Fukuoka method)

Samples of Leachate Collection Pipe

Leachate Retention Ponds

Vertical Gas Venting Pipe installed on Pipe Connection Pit

3.8.6 Modes of Solid Waste Collection, Haulage, and Way Forward (Rural-Tehsils)

3.8.6.1 Primary Waste Collection

In the rural tehsils of Bannu District—including Bannu Tehsil, Domel, Meryan, Kakki, Baka Khel, and Wazir Tehsil—waste management is being shaped by local realities and resource limitations. With no formal

municipal waste collection systems in place, the primary mode of waste collection relies on hand carts and mini tippers (2.5m³). A total of 116 hand carts and 53 mini tippers are distributed across the six tehsils, forming the backbone of the collection process. Additionally, 4 trolleys are available to support the system.

To manage the collected waste efficiently, a transfer station-based approach will be adopted. Waste gathered from homes and neighborhoods will first be brought to these local transfer stations. From there, it will be transported using larger vehicles—such as tractor loaders, 10m³ dumpers, and tractor trolleys—to designated disposal sites outside the settlements.

Supporting this system, sanitary teams—assigned at a ratio of one worker per 1,400 residents—will operate twice weekly in each tehsil. Their work will focus on cleaning public spaces, parks, and graveyards, promoting a healthier and more dignified living environment for the people of Bannu's rural communities.

Table 3-84: Summary of total proposed HR Resources for Rural Area

Items	Bannu Tehsil	Domel Tehsil	Meryan Tehsil	Kakki	Baka Khel	Wazir Tehsil	Total
Hand Carts	37	24	20	9	19	7	**116**
Mini Tipper 2.5 m³	17	11	9	4	9	3	**53**
Trolleys	1	1	1	0	1	0	**4**

3.8.6.2 Bulk and MSW Waste

The rural tehsils of Bannu District require targeted resources and planning for the effective management of Municipal Solid Waste (MSW) and bulk waste. Among them, Bannu Tehsil is the largest contributor, generating 98 tons/day (t/d) of total waste, including 85 t/d of MSW and 13 t/d of bulk waste.

Domel Tehsil follows with 65 t/d total waste (56 t/d MSW, 8 t/d bulk waste), while Meryan Tehsil produces 53 t/d (46 t/d MSW, 7 t/d bulk). Smaller yet still significant contributors include Baka Khel with 49 t/d (43 t/d MSW, 6 t/d bulk), Kakki with 23 t/d (20 t/d MSW, 3 t/d bulk), and Wazir Tehsil with 19 t/d (17 t/d MSW, 2 t/d bulk waste).

Collectively, these rural tehsils generate 307 tons of waste daily, including 267 t/d of MSW and 40 t/d of bulk waste. To manage this volume efficiently, each tehsil requires an appropriately sized fleet of collection vehicles, trained workforce, and strategically placed collection points. Without these, the risk of waste accumulation and environmental degradation remains high. A comprehensive, locally tailored waste management plan is essential to ensure effective collection, transport, and environmentally sound disposal across the district.

Table 3-85: Bulk and MSW in Rural Areas of District Bannu

Tehsil	MSW Portion	Bulk Waste
Bannu Tehsil	85	13
Domel Tehsil	56	8
Baka Khel Tehsil	46	7
Kaki Tehsil	20	3
Miryan Tehsil	43	6
Wazir Tehsil	17	2

To effectively manage the growing waste volumes in Bannu's rural tehsils, a strategic allocation of resources is essential. The proposed waste management system includes the deployment of sanitary workers, loaders, dumpers, trolleys, and compactors, aimed at ensuring timely and efficient waste collection and transportation. Special attention must be given to bulk waste, such as construction and demolition (C&D) debris and garden waste, which requires separate handling mechanisms and designated vehicles for safe transfer to disposal or repurposing sites. The graphical representation of rural waste generation across Bannu clearly illustrates the distribution between Municipal Solid Waste and bulk waste, emphasizing the need for a differentiated and well-coordinated response to waste management in each localities:

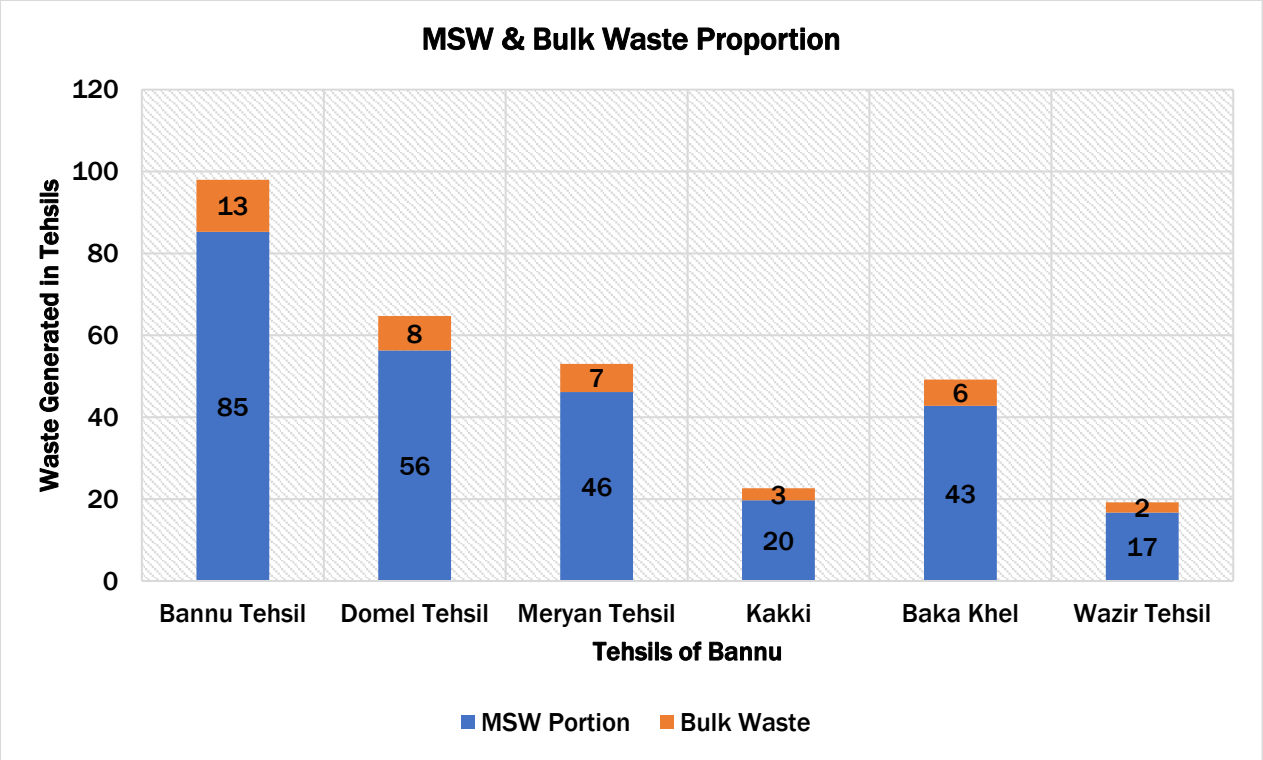


Figure 3-24: Graphical Representation of Bulk and MS Waste

3.8.6.3 Machinery/ Fleet Required for Waste Handling

Efficient waste management across the rural tehsils of Bannu namely Bannu, Domel, Meryan, Kakki, Baka Khel, and Wazir—requires both adequate machinery and a dedicated human resource structure to support day-to-day operations. Given the scale of waste generated and the geographic spread of settlements, a comprehensive system has been designed to ensure timely collection, transportation, and disposal.

The machinery deployed includes a large number of hand carts and mini tippers (2.5m³) to enable primary waste collection directly from households and narrow streets. These tools are essential for maintaining regular collection cycles in congested or informal residential areas. For areas with greater accessibility, mini tippers serve as a bridge between the initial collection points and local transfer stations.

To manage secondary transport, the fleet includes dumpers with capacities of 10m³ and 25m³, which are critical for transferring large volumes of waste to designated disposal or processing sites. Trolleys supplement this operation by assisting in smaller or more difficult-to-access zones. Heavy equipment, including loaders and front-end loaders, is used to handle bulk waste particularly construction and demolition debris, green waste, and other heavy materials that cannot be managed manually. Additionally, waste drums are strategically placed in public spaces and along streets to act as fixed collection points, allowing communities to dispose of waste conveniently and responsibly.

Table 3-86: Bulk and MSW in Rural Areas of District Bannu

Items	Bannu Tehsil	Domel Tehsil	Meryan Tehsil	Kakki	Baka Khel	Wazir Tehsil	Total
Hand Carts	37	24	20	9	19	7	**116**
Mini Tipper 2.5m³	17	11	9	4	9	3	**53**
Trolleys	1	1	1	0	1	0	**4**
Dumpers (10CM)	4	3	2	1	2	1	**13**
Loaders	2	1	1	0	1	0	**5**
Dumpers (25CM)	2	1	1	0	1	0	**5**
Front End Loader	1	1	1	0	1	0	**4**
Drums	204	135	110	47	102	40	**638**

Complementing this machinery is a well-structured human resource setup. A total of 228 sanitation workers have been assigned across the rural tehsils to perform manual sweeping and street cleaning duties, ensuring cleanliness in both residential and public areas. These workers are supported by 18 helpers designated for door-to-door waste collection, facilitating the smooth transfer of household waste to collection vehicles. Each tehsil has at least one dedicated drain cleaner to maintain open drains and prevent blockages, which are crucial for public hygiene and environmental health.

To ensure smooth field operations and effective supervision, nine supervisors are deployed across the tehsils, providing oversight and addressing day-to-day logistical or performance issues. The transportation operations are supported by a fleet of 90 trained drivers who operate the various collection and transport vehicles, maintaining timely and efficient movement of waste within and between tehsils.

Table 3-87: Summary of total proposed HR Resources for Bannu Tehsils (Rural Area)

Tehsil	Helpers DTD	Workers Manual Sweeping	Drain Cleaner	Supervisors	Drivers
Bannu Tehsil	6	73	1	3	28
Domel Tehsil	4	48	1	2	19
Meryan Tehsil	3	39	1	1	16
Kakki	1	17	1	1	6
Baka Khel	3	37	1	1	16
Wazir Tehsil	1	14	1	1	5
Total	**18**	**228**	**6**	**9**	**90**

Together, this combined allocation of manpower and machinery provides Bannu's rural areas with a robust and responsive waste management system. It allows for comprehensive service delivery, minimizes environmental hazards, and supports cleaner, healthier communities throughout the district.

3.8.6.4 Transfer Station or Disposal site for Waste

The rural tehsils of Bannu District, which operate under the jurisdiction of their respective Tehsil Municipal Administrations (TMAs), face unique challenges in solid waste management due to their dispersed population and large geographic areas. Waste collection points in these rural areas are often located far from centralized disposal sites, making direct transportation inefficient and costly. To address these challenges and promote sustainable waste management, the establishment of transfer stations is essential. Transfer stations act as intermediate collection and consolidation points where waste from multiple small collection points is temporarily gathered, sorted if necessary, and then transported in bulk to the final disposal or landfill site.

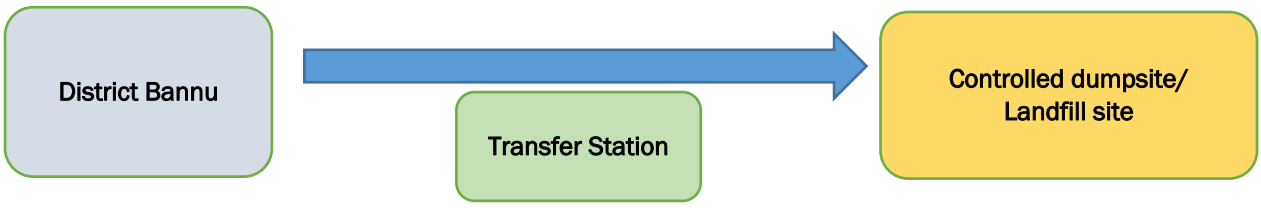


Figure 3-25: Bannu Rural Areas transportation of Waste to Controlled Dumpsite

This approach significantly reduces transportation costs by optimizing fleet routes and decreasing the number of trips needed to reach distant disposal sites. Moreover, transfer stations help minimize health hazards by preventing uncontrolled dumping along transportation routes and improving waste handling practices. Given that most experts recommend a transfer station when the distance between waste generation points and disposal sites exceeds 20 to 25 kilometers, the rural tehsils of Bannu, where disposal sites are often located beyond this range, would greatly benefit from such infrastructure. The Solid Waste Management (SWM) team of The Urban Unit supports this view, suggesting that proper transfer stations be established where the distance to disposal sites exceeds 15 kilometers, further emphasizing the importance of these facilities in reducing fleet costs and environmental risks. Therefore, implementing transfer stations in Bannu's rural tehsils under TMAs is critical for enhancing the efficiency, sustainability, and environmental safety of solid waste management systems in these areas.

3.8.7 Proposed 3R System (Reduce, Reuse, Recycle) for Bannu District

To promote sustainable waste management in Bannu District, it is important to introduce simple, community-friendly 3R practices; Reduce, Reuse, and Recycle that are realistic and effective in the local context.

3.8.7.1 Reduce (Minimize Waste at the Source)

- Launch local awareness campaigns to discourage the use of plastic bags and promote cloth or jute bags.
- Encourage buying in bulk to reduce packaging waste at homes and shops.
- Promote use of reusable containers for daily shopping, especially in markets.
- Encourage schools and mosques to spread messages about reducing waste in daily life.

3.8.7.2 Reuse (Use Again Instead of Throwing Away)

- Promote the culture of donating old clothes, utensils, and school supplies to neighbors or community centers.
- Encourage households to reuse jars, bottles, and plastic containers instead of throwing them away.
- Support local repairmen (e.g., cobblers, electricians, tailors) who can fix broken items instead of replacing them.
- Introduce weekly “reuse days” in schools to teach children the value of extending product use.

3.8.7.3 Recycle (Turn Waste into Useful Products)

- Encourage simple waste separation at home: organic (kitchen waste), recyclable (plastic, paper), and non-recyclable waste.
- Promote composting of food and garden waste in homes or communities, especially in rural areas, for use as natural fertilizer.
- Support informal waste pickers and small recycling businesses by providing community drop-off points for items like bottles, cardboard, and cans.
- Organize regular community clean-up and collection drives with support from local authorities.

3.8.8 Proposed Capacity Building for Sustainable Solid Waste Management in Bannu District

To ensure sustainable solid waste management in Bannu District, a comprehensive capacity-building plan is needed. This includes:

- **Machinery & Equipment:** Procurement of modern waste collection vehicles, mechanical sweepers, and landfill management tools to enhance efficiency.
- **Financial Management:** Allocating adequate funds for SWM operations, exploring public-private partnerships, and implementing revenue-generation strategies like waste collection fees.
- **Human Resource Development:** Hiring skilled staff, training WSSC and TMA personnel in waste management techniques, and conducting capacity-building programs with expert support.

Strengthening these areas will improve waste collection, disposal, and overall environmental sustainability in Bannu District.

3.8.9 Future Direction

The Solid Waste Management (SWM) department faces significant challenges due to outdated equipment and limited resources. To enhance waste management, the department should focus on the following key areas:

- **Immediate Procurement:** Documenting the urgent procurement of equipment and services to implement the proposed SWM system, establishing a baseline for future planning.
- **Data Management:** Currently, there is no system to track waste generation, collection rates, or daily disposal quantities. Adequate staff must be appointed to manage and maintain accurate waste data.
- **Private Sector Involvement:** The concept of service delivery through private contracting does not exist. Given the lack of technical and managerial expertise, involving the private sector in waste disposal and treatment should be explored.
- **Capacity Building:** Institutional capacity must be strengthened through training programs on SWM, with assistance from the Urban Unit to support Bannu WSSC.
- **Sustainable Waste Management:** WSSCB should establish agreements for proper waste treatment and management to ensure long-term environmental sustainability.

3.8.10 Early Actions Required

To efficiently execute the project and avoid unnecessary delays, the SWM department must undertake key preparatory activities before launching the project and mobilizing contractors:

- **Procurement & Monitoring:** Acquiring a new fleet, hiring additional human resources, and installing a weighbridge at the dumping site to track waste collection and transfer.
- **Landfill Site Selection:** The existing dumpsite poses environmental and health risks, making it necessary to identify and evaluate potential new Controlled landfill or dump sites for the city and tehsils.
- **Site Infrastructure:** Basic infrastructure at the dumpsite must be established for waste arriving during night shifts, allowing operations to commence before private partners are mobilized.
- **Urban Infrastructure Improvement:** Enhancing infrastructure in the city and tehsils to support operations such as mechanical sweeping and efficient waste collection.

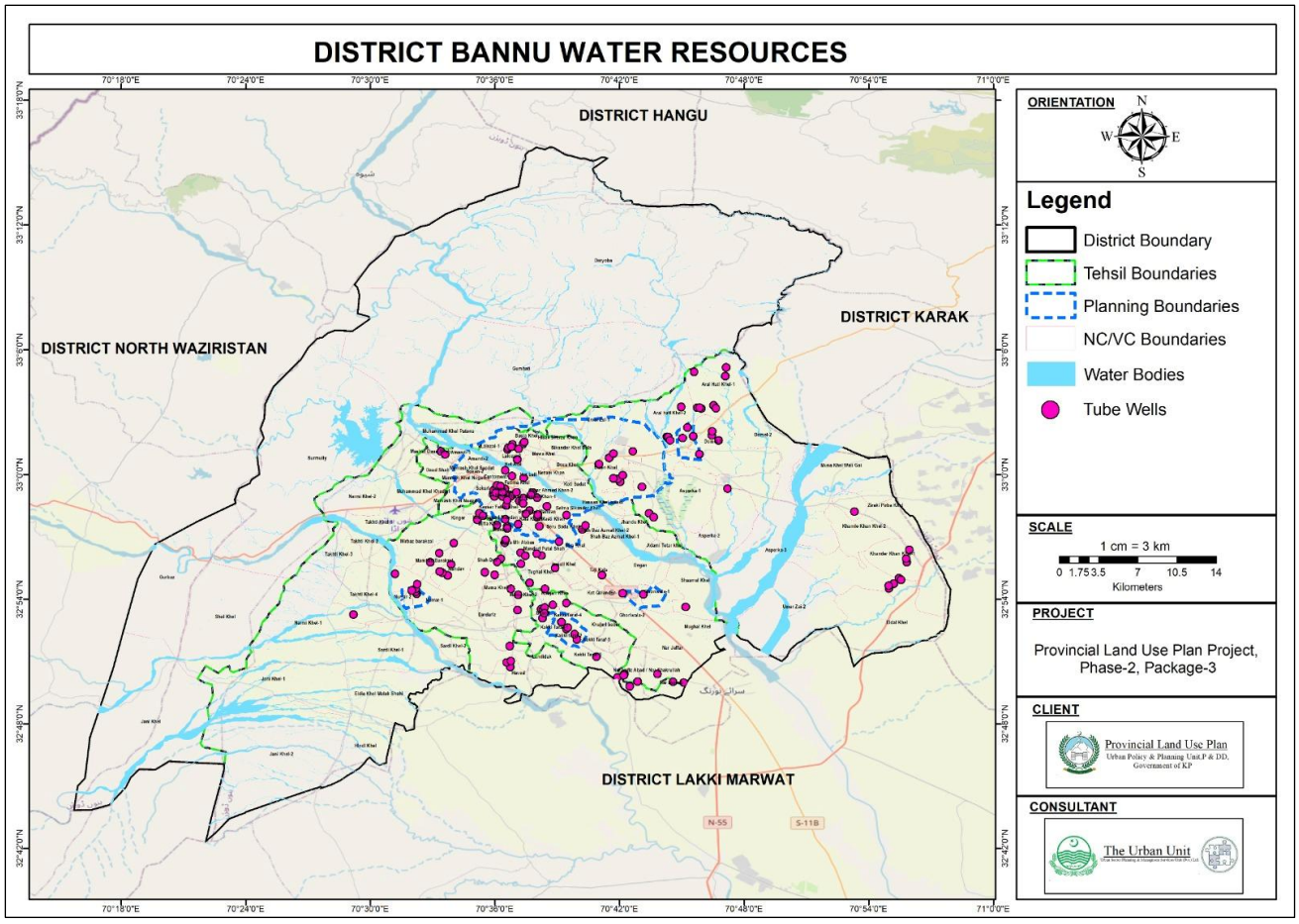
3.9 Water Supply, Sewerage and Drainage

Water is one of the most significant natural resources available to humans. However, due to increasing global demands and challenges, its availability has declined considerably due to mismanagement/misuse, culminating in an intricate scenario in terms of water availability in various regions.

3.9.1 Overview of Water Resources

The surface water sources of Bannu include major water bodies, most notably the Kurram River, which is the mainstream passing through the region. The second major stream is the Gambila River, which enters the basin southwest of Bannu, runs southeast, and eventually merges with the Kurram River west of Lakki. In addition to these main streams, several ephemeral streams carry surface runoff toward the Gambila and Kurram Rivers, but only during rainstorms.

Groundwater is the primary source of drinking water in the Bannu district, extracted through tube wells in the form of small schemes spread throughout the district. The initiative is public sector with most of these tube wells installed by the Public Health Engineering Department (PHED) in rural areas in Bannu. Similarly, WSSC Bannu and BDA are the major stakeholders providing water supply in the district's urban areas. The discharge capacity of these tube-well-based schemes is dependent on the groundwater potential of the area, which varies across the district.



Map 3-41: District Bannu Surface Water Resources

3.9.2 Current and Future Water Demands

The current and future water demands, as calculated for the district's urban and rural settlements, have been discussed in detail in the Baseline and Analysis Report for District Bannu. The section below discusses the observed trend and projected water needs for Bannu residents.

3.9.2.1 Water Demand Estimation

Water demands have been calculated for the urban and rural areas of District Bannu, keeping in view the population augmentation and the minimum per capita water demand of 30 GPCD for urban areas and 15 GPCD for rural areas of the district.

3.9.2.2 Water Demands for Urban Areas

The current and future water demands have been calculated for the urban settlements of Bannu District. Bannu city is the major urban settlement in the district. The current water demand for the urban area of Bannu Tehsil is approximately 19.42 MGD, which is expected to reach 34.0 MGD by the end of 2045. Based on the population forecasts and water demand factors, the relative demands of urban areas for various planning horizons will be as follows:

Table 3-88: Average Daily Water Demands for Urban Settlements of Bannu District

Urban Settlements	Average Daily Demand (MGD) 2025	Average Daily Demand (MGD) 2045
Bannu (Urban)	19.42	34.00
Domel (Urban)	0.42	0.89
Kakki (Urban)	1.27	2.26
Nurar (Urban)	0.62	1.10
Ghoriwala (Urban)	0.82	1.46

The trend of water demand increase over the project's planning period has been pictorially represented in the graph below.

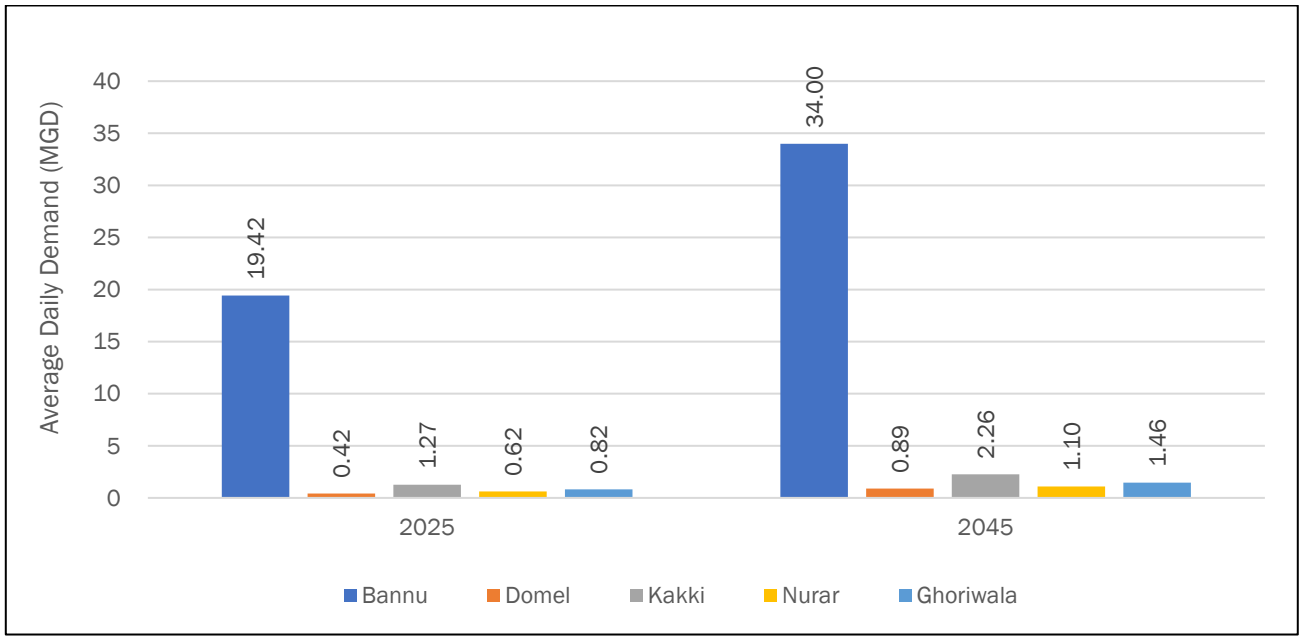


Figure 3-26: Average Daily Demands of Urban Settlements of Bannu District

3.9.2.3 Water Demands for Rural Areas

The rural areas of Bannu District consist of the rural populations of the Bannu, Domel, Miryan, Kakki, Baka Khel, and Wazir Tehsils. The current water demand for rural areas of Bannu is approximately 18.69 MGD and is expected to reach 35.14 MGD by the end of 2045. The current and future water demands have been calculated for the rural settlements in these Tehsils based on the population forecast and the relative water demand factors, as tabulated below.

Table 3-89: Average Daily Demands for Rural Settlements of Bannu District

Rural Settlements	Average Daily Demand (MGD) 2025	Average Daily Demand (MGD) 2045
Bannu (Tehsil)	5.97	10.62
Domel (Tehsil)	3.94	8.31
Miryan (Tehsil)	3.23	5.75
Baka Khel (Tehsil)	1.38	2.46
Kakki (Tehsil)	3.00	5.33
Wazir (Tehsil)	1.17	2.68

The trend of water demand increase over the project's planning period has been pictorially represented in the graph below.

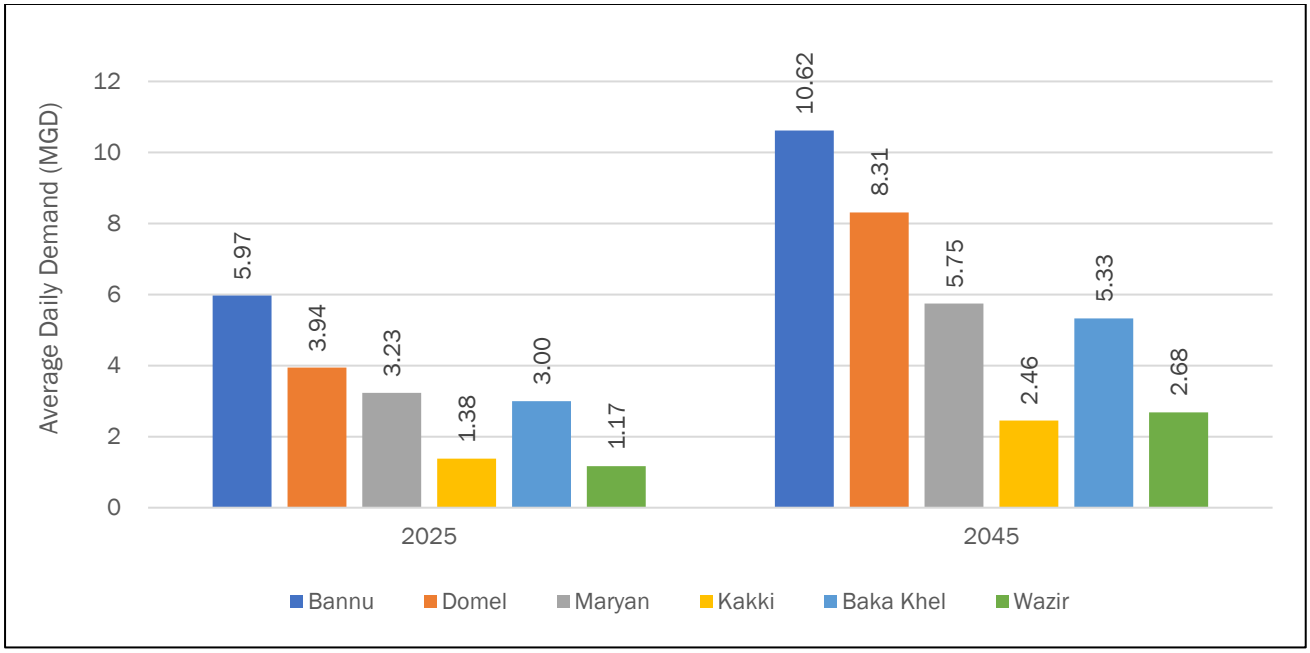


Figure 3-27: Average Daily Demand for Rural Settlements of Bannu District

3.9.3 Wastewater Generation

Sewerage Flow is calculated using 30 GPCD as Average Water Demand, including Non-Revenue Water or Losses. In addition, 10% of Commercial, 10% of Institutional and 10% of Industrial water demand is also calculated and added. The provision of stormwater has also been added as 50% of the peak sewage flow to cater for the rainwater run-off into the sewerage system.

The wastewater flows from Bannu District, collectively for urban and rural areas are estimated to be around 142.80 MGD at the end of 2045. The urban areas contribute to 53% of this wastewater, whereas the rural communities generate the remaining 47%.

3.9.3.1 Waste Water Flows for Urban Areas

The wastewater generated by the urban settlements has been forecasted and tabulated below.

Table 3-90: Waste Water Flows for Urban Settlements of Bannu District

Urban Settlements	Sewage Flow (MGD) 2025	Sewage Flow (MGD) 2045
Bannu (Urban)	37.05	64.86
Domel (Urban)	0.81	1.71
Kakki (Urban)	2.42	4.31
Nurar (Urban)	1.18	2.09
Ghoriwala (Urban)	1.57	2.79

It is evident from the table that the total sewage flow of the urban areas of Bannu is expected to reach 75.75 MGD by the end of 2045. The trend of wastewater generation over the project's planning period has been pictorially represented in the graph below.

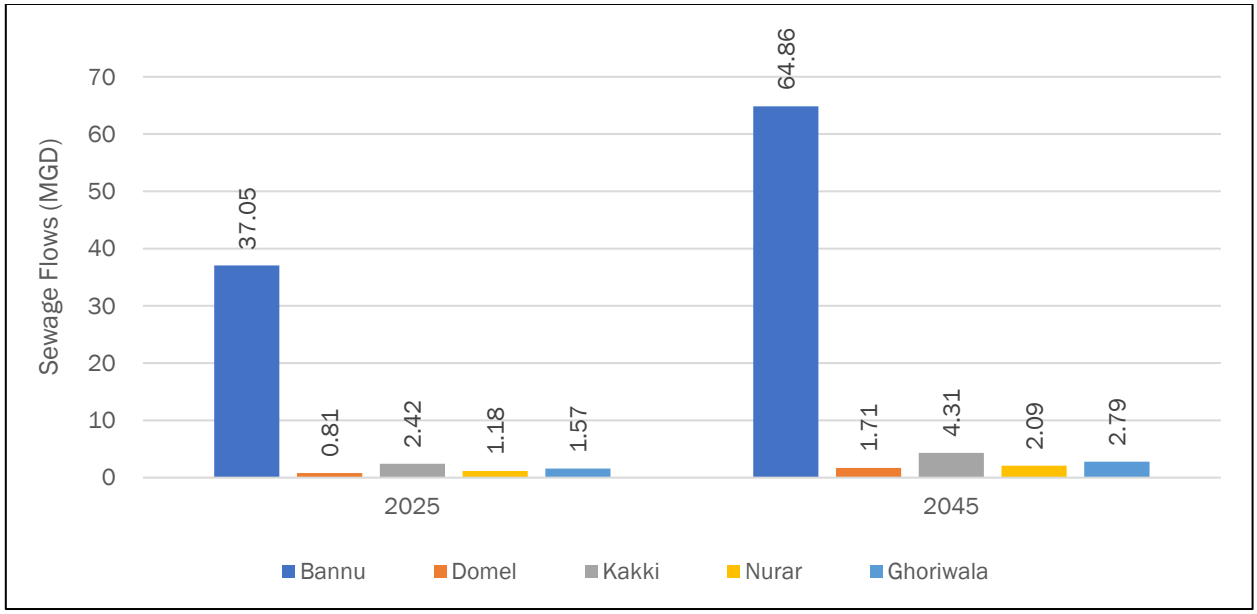


Figure 3-28: Waste Water Generation for Urban Settlements of Bannu District

3.9.3.2 Waste Water Flows for Rural Areas

The wastewater generated by the rural settlements of Bannu District has been forecasted and tabulated below.

Table 3-91: Waste Water Flows for Rural Areas of Bannu

Rural Settlements	Sewage Flow (MGD) 2024	Sewage Flow (MGD) 2044
Bannu	11.39	20.26
Domel	7.52	15.86
Miryan	6.16	10.96
Baka Khel	2.63	4.68
Kakki	5.72	10.17
Wazir	2.23	5.12

It is evident from the table above that the rural settlements of Bannu Tehsil are the major contributors to the sewage flow generation from the rural areas of Bannu District. The total sewage flow of all the rural areas of the district is expected to reach 67.05 MGD by the end of 2045.

The trend of wastewater generation over the project's planning period has been pictorially represented in the graph below.

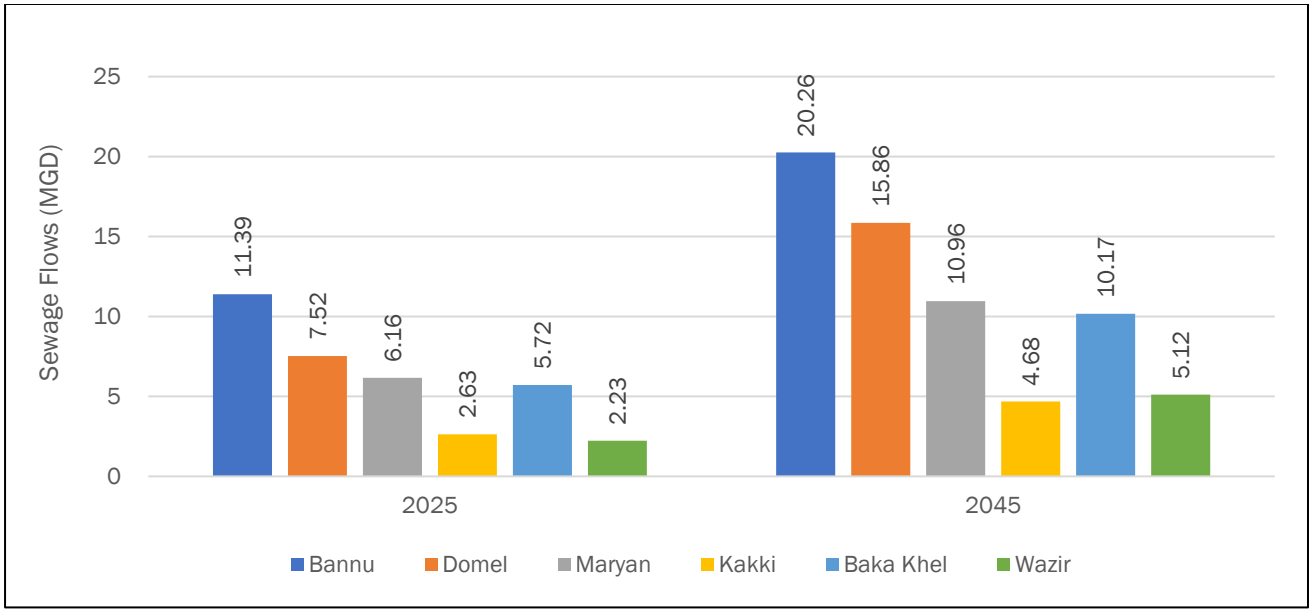


Figure 3-29: Waste Water Generation for Rural Settlements of Bannu District

3.9.4 Comparative Analysis & Implications

The projected water consumption and wastewater generation patterns for Bannu District demonstrate a relatively balanced distribution between urban and rural areas, with urban settlements accounting for a slightly higher share. By 2045, urban areas will consume approximately 53% of the total water demand, while rural areas will account for 47%. Similarly, wastewater generation trends follow this distribution, with urban areas contributing around 53% (75.75 MGD) of the total projected wastewater flows and rural areas generating 47% (67.05 MGD). This indicates a steady urbanization trend influencing both water consumption and wastewater volumes.

This balanced yet shifting pattern necessitates simultaneous investments in both urban and rural water supply and sanitation infrastructure. The growing urban demands require capacity enhancement of water supply schemes, sewerage systems, and wastewater treatment facilities, while the rising rural consumption highlights the need for expanding decentralized and community-based water management solutions. Understanding these comparative trends is critical for formulating equitable, sustainable water resource management policies and infrastructure planning to minimize future water stress and environmental risks across both settlement types.

3.9.5 Future Plan & Strategic Intent

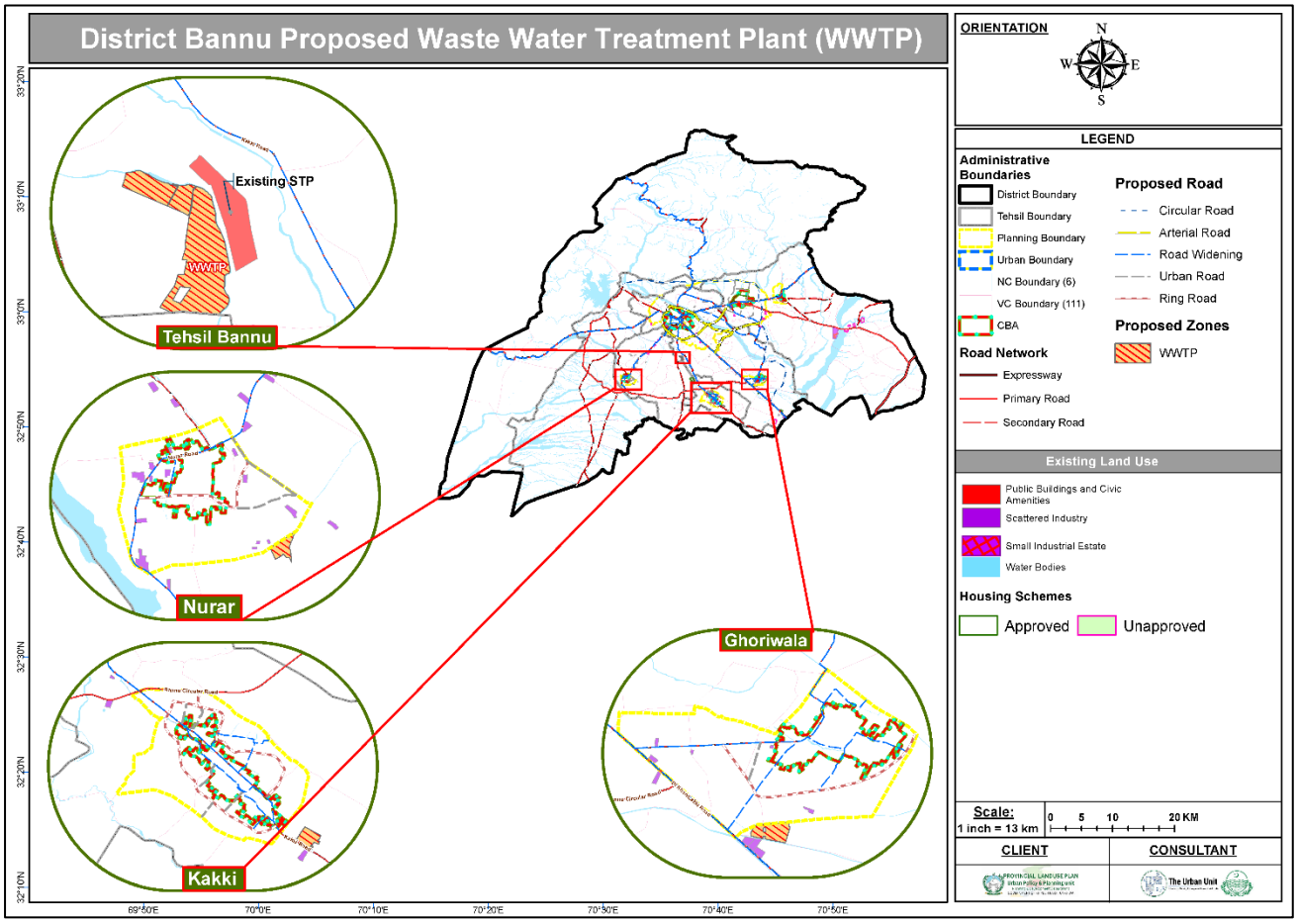
The high-level plans in terms of strategic directions to answer what, where, and how questions have been proposed as per the existing situation and projected growth trends in the district. However, it should be noted that these plans are representative of only an abstract of the solution and are subject to detailed design and master planning. The focus is on Short, Medium, and Long-Term phases.

Sr.	Period	Area	Project	Scope	Stakeholder
1	Short	Bannu, Domel, Miryan, Baka Khel, Kakki and Wazir	Rehabilitation of existing water supply infrastructure in rural areas of Bannu, Domel, Miryan, Baka Khel, Kakki, and Wazir	Rehabilitation of Tubewell, including repair of Pumping Machinery, Electrical Panels, Civil Structure of Pump House, along with replacement of distribution network (as per requirement) of existing non-operational water supply schemes	PHED Bannu District

Sr.	Period	Area	Project	Scope	Stakeholder
2	Short	Bannu, Domel, Miryan, Baka Khel, Kakki and Wazir (Urban & Rural)	Extension of Sewerage System to Unserved Areas of Bannu District in Tehsils of Bannu, Domel, Miryan, Baka Khel, Kakki, and Wazir (Phase I)	Design & Execution of an integrated sewerage system complete with trunk & lateral sewer lines, pumping stations, manholes, and other related works with solar and integration of SCADA	Local Govt. in Bannu, Domel, Miryan, Baka Khel, Kakki, and Wazir
3	Medium	Bannu, Domel, Miryan, Baka Khel, Kakki, and Wazir (Rural)	Provision of new Water Supply Schemes for rural areas of Bannu District in Tehsils of Bannu, Domel, Miryan, Baka Khel, Kakki, and Wazir (Phase-I)	Provision of surface water or ground water-based schemes complete with machinery, pump-house, well bores, valves, bulk meters, chlorinators, and other related works.	PHED Bannu District
4	Medium	Bannu, Domel, Kakki, Nurar, Ghoriwala	Rehabilitation of existing & provision of new Water Supply Schemes for urban areas of Local Govt. in Bannu district	Provision of water supply schemes (surface water or groundwater based) complete with machinery, pump-house, valves & meters, chlorinators and other related works, including rehabilitation of existing water supply infrastructure (as per requirement)	Local Govt. in Bannu district
5	Long	Bannu District (Urban & Rural)	Provision of Filtration Plants in Bannu District	Installation of filtration plants (RO or UV as per requirements) with complete structure, machinery, boring, and other appurtenances.	Local Govt. in Bannu, Domel, Miryan, Baka Khel, Kakki, and Wazir
6	Long	Bannu District (Urban)	Construction of WWTPs for Urban Areas of Bannu district	Construction of WWTPs of type WSP completed with construction of ponds, civil works, and other auxiliary infrastructure works as required	Local Govt. in Bannu, Domel, Kakki, Nurar and Ghoriwala
7	Long	Bannu District (Rural)	Construction of decentralized WWTPs for Rural Areas of Bannu district	Construction of low-cost wastewater treatment solutions such as Anaerobic Baffled Reactors, Aerated Lagoons, and Oxidation Ditches complete in all aspects including	District Council Bannu / Local Governing Bodies for Rural Areas of Bannu District

Sr.	Period	Area	Project	Scope	Stakeholder
				mechanical works, civil works and land acquisition as per settlement requirements.	

The map illustrates the proposed locations for Waste Water Treatment Plants (WWTPs) in District Bannu, including specific sites in Tehsil Bannu, Nurar, Kakki, and Ghoriwala. These proposed WWTP zones are strategically placed to support existing and proposed urban areas,



Map 3-42: District Bannu Proposed Waste Water Treatment Plant

3.10 Environment

The District Land Use Plan for Bannu envisions a sustainable future where environmental preservation and forestry management play pivotal roles in fostering ecological balance and socio-economic development in the province. Bannu's unique environmental profile, characterized by its semi-arid climate, agricultural dependency, and diverse natural resources, faces pressures from urbanization, deforestation, water scarcity, mining & industrial sectors, and climate change.

The extensive Range Land zone, which covers 217,682.02 (42.1% of the total land area), is primarily used for grazing and pastoral activities, is under threat due to overgrazing, land degradation, and climate change. These challenges, compounded by the region's reliance on traditional practices and inadequate resource management, highlight the urgent need for integrated strategies that align with modern environmental principles.

This chapter underscores the findings from comprehensive background studies and proposes actionable interventions to enhance environmental conservation, promote sustainable forestry practices, and build resilience against climate vulnerabilities while supporting the livelihoods of local communities.

3.10.1 Key Challenges

The following key environmental and climate challenges have been identified in District Bannu, based on background studies, field surveys, analysis of legal gaps, and consultations with government departments and local communities:

- District Bannu is one of Khyber Pakhtunkhwa's most biodiverse regions, home to a wide variety of flora and fauna. However, human activities have significantly altered habitats and ecosystems, posing a serious threat to local biodiversity. Key vulnerabilities include uncontrolled deforestation leading to habitat loss; illegal hunting and poaching endangering wildlife species; and overgrazing is increasing pressure on rangelands and reducing forage production, which intensifies competition between livestock and wildlife, ultimately driving critical wildlife species out of the area.
- Limited Recreational is another area of concern. Spanning 2,104 square kilometers, Bannu's landscape comprises residential, commercial, industrial, and public sectors. Despite this diversity, recreational spaces like parks are alarmingly scarce, occupying just 1.27 square kilometers.
- The district has only 337 acres of forest land, and the existing tree cover is insufficient to fulfill the environmental needs of the city, such as mitigating urban heat and pollution.
- Although air pollution in Bannu is not currently a critical concern, the district's air quality shows signs of vulnerability, likely influenced by localized pollution sources and limited green cover. Continuous emissions from brick kilns and other industrial operations pose increasing risks. Without proactive measures, these factors could lead to significant air quality deterioration shortly, despite any mitigating effects from geographical or meteorological conditions.
- The district's capacity for climate change adaptation and mitigation needs substantial improvement to minimize the impacts of climatic extremes, such as irregular rainfall, temperature fluctuations, and extreme weather events.
- Soil erosion is a critical environmental challenge in Bannu, negatively impacting agricultural productivity and land stability. This issue poses a threat to both livelihoods and food security in the region.
- The absence of baseline environmental data and resource statistics at the district and tehsil levels hinders effective decision-making and limits understanding of the current state of the environment.
- There is a need to mainstream climate change adaptation and mitigation measures at the district and tehsil levels. This includes integrating climate considerations into local development plans and policies.
- The environment and climate change sector lacks institutionalization at lower levels of government. Clear roles and responsibilities need to be defined and implemented for effective action at the district and tehsil levels.
- Weak enforcement and monitoring, and limited resources (HR, funds, and equipment) are restraining the efforts to implement environmental standards in the district.

3.10.2 Recommendations and Future Directions

To propose future interventions, a comprehensive primary and secondary data analysis was conducted of protected /environmentally sensitive areas of District Bannu.

For Restoration and Forest Management, a criterion was developed for field assessments to identify the needs for restoration activities and to plan future interventions. The criteria and the assessment results of the selected sites are tabulated below;

Name	Forested Land	Blank Area	Soil Suitability	Plantable Area	Category*
Rakh Sarkar	●	●	●	●	A
Bannu Pheasantry	●	●	●	●	B
Land Along Lora Nullah	●	●	●	●	B

*Classification

A: More Suitable for Reforestation and Forest Management

B: Moderate, Suitable for Reforestation and Forest Management

C: Less Suitable for reforestation and Forest Management

3.10.3 Future Plan of Action

What	How	When	Who	Where	Why
Green Spaces	Rehabilitation of existing parks;	ADP 2025-Onward	Local Government; Urban Development Sector; Bannu Development Authority (BDA)	All Public Parks	Enhances green spaces, improves community well-being, boosts biodiversity, and revitalizes degraded urban areas.
	Establishment of new parks	ADP 2025-Onward		Bannu District	Expands recreational opportunities, promotes environmental sustainability, mitigates urban heat, improves air quality, and fosters social cohesion
	Greening of Cities	ADP 2025-Onward	Local Government; Forestry, Environment &Wildlife Department; BDA	Open spaces, public buildings and institutions; newly constructed buildings; green belts; road site plantations; landscape development	Reduce Urban Heat Island effect; Act as a permeable surface to hold heavy precipitation; improve environmental quality; Increase aesthetics and land market value.
Greening of Industries (specifically brick kilns)	Identify and introduce advanced technologies to reduce emissions from brick kilns	ADP 2025-Onward	Industries Dept, EPA	Bannu District	Reduce emissions, improve air quality and citizens' health, and promote sustainable industrial practices.
	Establish a funding mechanism or credit facilities in collaboration with financial institutions to support businesses in upgrading to cleaner technologies.	ADP 2025-Onward	Industries Dept, EPA	Bannu District	
	Set up industrial zones away from residential and sensitive areas, ensuring that wind and storm patterns are considered for optimal placement.	ADP 2026-Onward	Industries Dept, P&DD, PMD	Bannu District	Reduced pollution, improved public health, and promoted sustainable growth
Air Quality Monitoring	Installation of AQ Monitors/ Sensors	ADP 2025-Onward	EPA KP	Brick Kilns Crushing Units	To improve environmental quality and reduce air-

What	How	When	Who	Where	Why
			(and the EPA Southern Directorate)	Residential/Built-up areas and main roads (Congestion Points)	attributed disease burden
Multi-Hazard Vulnerability and Risk Assessment (MHVRA)	Carry out a district-level climate-inclusive Multi-Hazard Vulnerability and Risk Assessment (MHVRA) study	ADP 2025-Onward	Relief, Rehabilitation & Settlement Department, PMD, EPA, Forest Dept.	Bannu District	identify, assess, and mitigate local hazards, ensuring improved disaster preparedness and climate-compatible development
Reforestation/ Urban Afforestation	Seed Broadcasting and Planting Native Species	Spring 2025-Onward	Forest & Wildlife Department, KP	Rakh Sarkar, Bannu Pheasantry, Land Along Lora Nullah, Private Plantation initiative through PPP	Habitat Restoration, Forest Conservation, and Environmental Improvement
Community Involvement and Academia Engagement	Awareness and Community-Based Organization	Throughout the year	Forest & Wildlife Department; KP EPA; LG; Health Department; Non-profit sector, local community	Bannu district	Conservation of threatened Species; greening of the area, environmental improvement initiatives
Enhance Technical Capacities	Training Programs – Environmental Protection, Climate Resilience, Forestry, and Biodiversity Conservation	As per the Training Plan	EPA, Forest Department, and other Relevant Departments	District and NC/VC	Increased knowledge of the technical aspects will lead to better planning and implementation.

The following section provides a detailed explanation of some of the proposed interventions discussed above.

3.10.4 Greening of District

In Bannu, soil degradation, water scarcity, urbanization, and urban exploitation are critical issues contributing to the destruction of natural landscapes by replacing vegetation and ground cover with concrete. These leading concerns are intensifying the urban heat island effect in urban centers.

The district spans 2,104 square kilometers, featuring a blend of residential, commercial, industrial, and public sectors, which contribute to its vibrant and varied landscape. However, recreational areas, such as parks, occupy only 1.27 square kilometers. Moreover, the current forest land, which is only 337 acres in Bannu, and tree cover is also insufficient to meet the city's environmental needs; therefore, required an extensive urban greening initiative is required.

3.10.4.1 Policy and Regulatory Measures:

The following measures need to be taken for Bannu to enhance the environmental sustainability and resilience of the district.

- Strict enforcement of existing laws and action plans enacted to provincial scale like KP Environmental Protection Act, 2014 and the KP Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015, KP Climate Action Plan 2022, etc. along with KP Land-Use and Building Control Act, 2021 and the KP Urban Areas Development Authorities Act, 2020 and other related instruments to ensure environmental sustainability at district scale.

- Introduce heavy fines for illegal felling of trees to deter deforestation and encourage responsible construction practices in the Bannu district.
- Ensure that only indigenous tree species are planted in public spaces, parks, and along roads for ecological compatibility and to preserve local biodiversity. This would also help maintain Bannu's natural habitat and enhance the beauty of urban areas.
- Develop urban green corridors to improve the environmental values and beautification of Bannu urban centers. These urban corridors are linear parks and green belts that can connect existing green spaces. The green corridor may also develop along railway lines, roads, canals, and nullahs in the district. The linear plantation can also be done through the extensive ornamental plantation. Such green corridors not only cool urban areas and improve air quality by creating cool air paths, but also provide significant benefits for urban biodiversity.
- Given Bannu's proximity to agricultural and semi-arid regions, there should be a concerted effort to green the canal roads and surrounding tracts. Planting trees along these routes would serve as natural windbreaks, prevent soil erosion, and improve the visual landscape.
- Encourage private property owners to convert rooftops of 100 m^2 or larger into green roofs, which can help in managing stormwater, improving air quality, and creating green urban spaces. Green roofs would also provide significant insulation and reduce the urban heat island effect.
- Ensure that a minimum of 9 m^2 of accessible, urban green space per inhabitant is provided. This includes parks, gardens, and tree-lined streets. This would improve public health, reduce pollution, and provide recreational spaces for Bannu's growing urban population.
- In all large development and construction projects, including housing societies, the removal of trees should be prohibited unless necessary. If the removal is required, it should be mandated that new trees be planted according to the area’s ecological needs.

3.10.4.2 Urban Greening Monitoring Framework

- Establish a monitoring framework to track the progress of greening efforts in the district, particularly tree plantation, park development, and green roof initiatives.
- Implement a community-based geotagging system that allows residents to crowdsource data on tree locations and share pictures of them. This system would not only engage citizens in conservation efforts but also help create a real-time database of urban trees, which can be used for planning and maintenance purposes.
- Regular assessments should be made to ensure that the greening of district goals is being met, and corrective measures should be implemented when necessary.

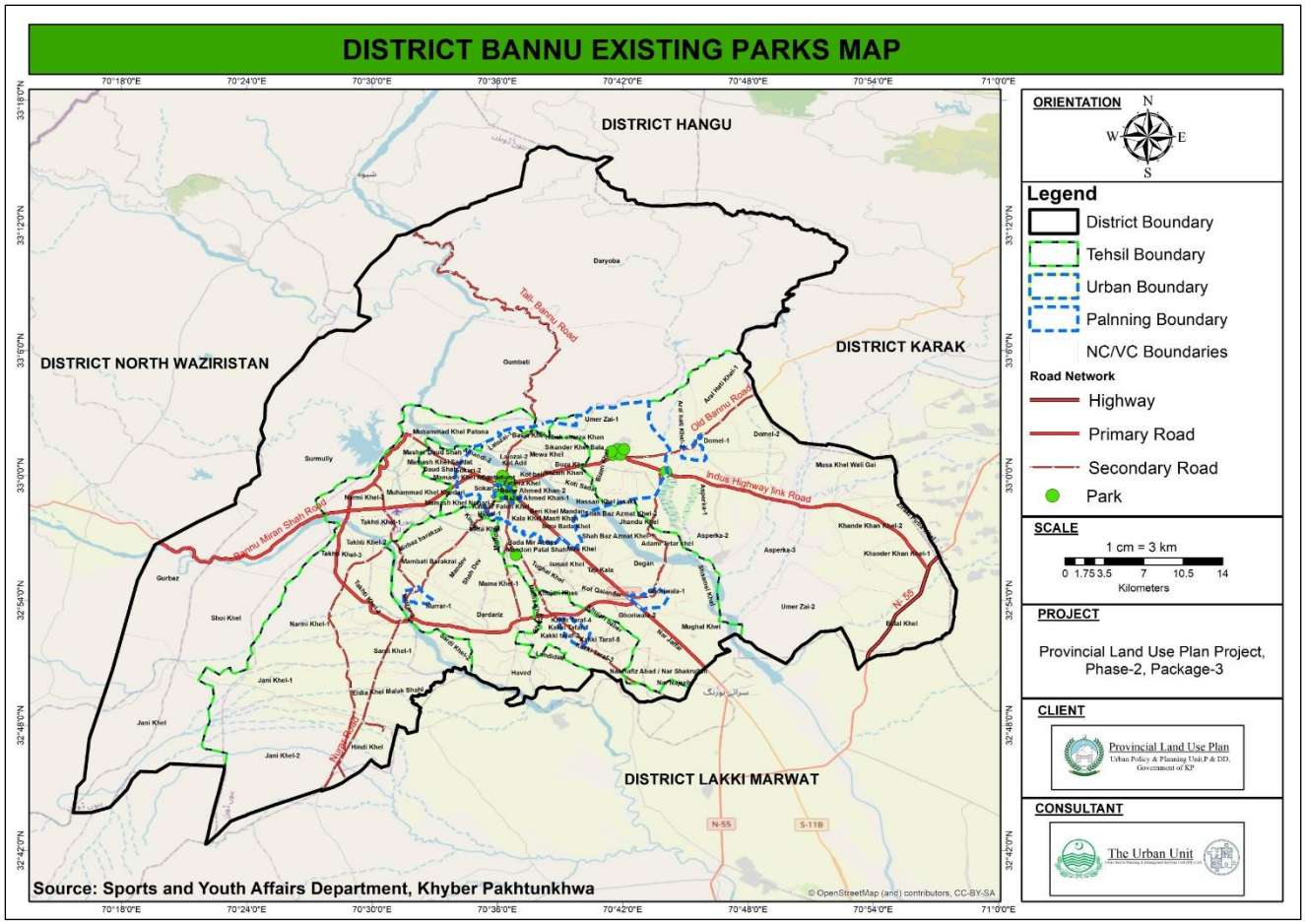
3.10.4.3 Rehabilitation of Existing Parks

Parks are essential for striking green spaces, promoting sustainability, and improving the visual appeal of urban areas. Currently, Bannu faces unplanned urban expansion and land use, coupled with few parks for the whole district.

The availability of developed parks is crucial for a liveable city, serving as a key indicator of a sustainable urban ecosystem and quality of life. The World Health Organization recommends a minimum benchmark of 9 sq. meters of green space per person (UN-Habitat, 2013). This standard offers valuable guidance for sustainable land use planning to mitigate green space challenges

3.10.4.4 Proposed Sites

All existing Parks, shown in the map below:



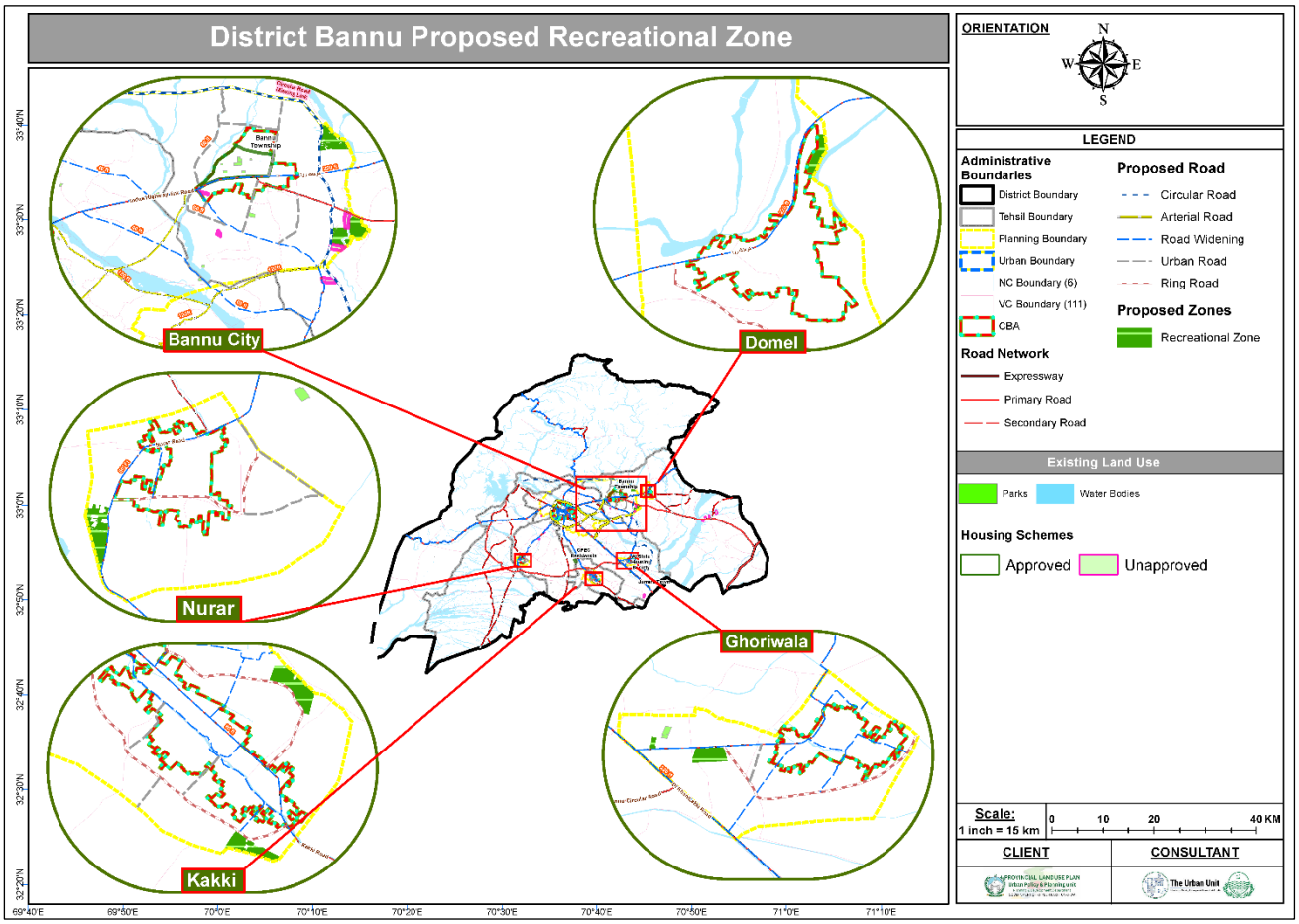
Map 3-43: District Bannu Existing Parks

3.10.4.5 Conceptual Design

The proposed conceptual design for the provision of parks in Bannu district strives to create an inclusive, sustainable, and vibrant green space that caters to the diverse needs of the local community, with particular attention to gender aspects. The following elements are recommended for the rehabilitation of existing parks and the development of new parks.

- Provision of softscape including grassy lawns, a rose garden, and scattered plantations to enhance aesthetic appeal, promote biodiversity, and provide a peaceful environment for all visitors.
- Proposed plantation of indigenous, ornamental, medicinal, flowering, and fruiting plants, which will support faunal diversity, especially attracting regional birdlife and contributing to the ecological balance.
- Hardscaping components such as a parking area, toilet block, jogging track, recreational facilities like swings, play land, and a cycling track to encourage physical activity and provide entertainment options for the entire community.
- Women' Women-only spaces within the park, such as dedicated walking tracks, sitting areas, and outdoor exercise zones, to create a comfortable and secure environment for women.
- Seating areas are designed with a focus on comfort and safety, encouraging social interaction, relaxation, and inclusive participation from all genders.
- Child-friendly zones with designated play areas and safe, shaded seating to cater to families, with special consideration for mothers and caregivers.
- Water features such as small ponds or fountains contribute to a serene ambiance while creating spaces for quiet reflection and social interaction.

- Lighting is designed to ensure safe evening use, with a particular focus on well-lit pathways and areas frequented by women and children.
- Gender-sensitive public restrooms, with separate facilities for women and men, ensuring privacy and security.
- Accessibility features, such as ramps and wide pathways, to accommodate people with disabilities, ensuring that the park is inclusive for all members of society.
- Waste management facilities like bins and recycling stations that promote cleanliness and environmental consciousness while ensuring convenience and accessibility for all visitors.



Map 3-44: District Bannu proposed Recreational Zone

3.10.5 Urban Afforestation

The forest plantation initiative in Bannu aims to significantly expand tree cover by planting native species on barren, degraded, and ecologically suitable lands. This effort focuses on selecting tree species that are well-adapted to the local climate, soil, and ecological conditions, thereby boosting biodiversity and creating valuable wildlife habitats. With only 337 acres currently under forest cover, there is an urgent need for large-scale plantation activities. By introducing a diverse range of tree species, this initiative will help restore habitat connectivity, combat deforestation, and address land degradation and water scarcity. Furthermore, integrating land use planning and fostering community participation in forestland management will ensure sustainable and effective stewardship of these resources for future generations.

3.10.5.1 Proposed Site

- Rakh Sarkar
- Bannu City and Pheasantry
- Land along Lora Nullah
- Private Plantation initiative through PPP

3.10.5.2 Conceptual Design

- The seedling plantation and seed dispersal may be based on the mixed indigenous plantation to attain the desired tree cover and conserve the wild diversity of the region.
- The species selection based on indigenous plant species which are native to the division includes:
    - *Acacia modesta* (Phulai)
    - *Acacia nilotica* (Kikar)
    - *Ziziphus nummularia* (Beri)
    - *Dodonia viscosa* (Snatha)

3.10.6 Enhance Air Quality

Bannu district is facing moderate air quality issues that are mainly associated with industries (including brick kilns) and the transport sector. To maintain the air quality below the national ambient quality standards, sound policy and physical measures must be included in the plan to attain the desired results.

3.10.6.1 Policy and Regulatory Measures:

- Provide eco-friendly transportation infrastructure to ease commuting, reduce traffic jams, better connectivity, and reduce environmental pollution.
- Stringent enforcement of environmental quality standards in the pollution hotspot areas and industries.
- Encourage industries to focus on renewable energy sources, such as solar or wind, to reduce reliance on fossil fuels.
- Monitor and impose a fine on stubble or waste burning.
- Increase in tree cover through tree plantation campaigns along roadsides, in public parks, and around industrial zones to act as natural air filters and accord environmental approval of all development projects as per KEPA 2014.
- Implement stricter regulations on mining operations, particularly concerning dust control and emissions.
- Promote the use of non-motorized vehicles, such as bicycles, as a means to reduce pollution from mobile sources.
- Improvement of road infrastructure to avoid dust and noise with a provision of dedicated bike paths, pedestrian zones, and repair & maintenance work.

3.10.6.2 Technology Transfer:

- Technology diffusion in brick kilns to manage black smoke.
- Greening of all industries located in the Bannu district and ensuring the installation of the emission control system.
- Introduce dust suppression technologies such as water spraying systems on mining sites and roads used by mining trucks.

3.10.7 Air Quality Monitoring

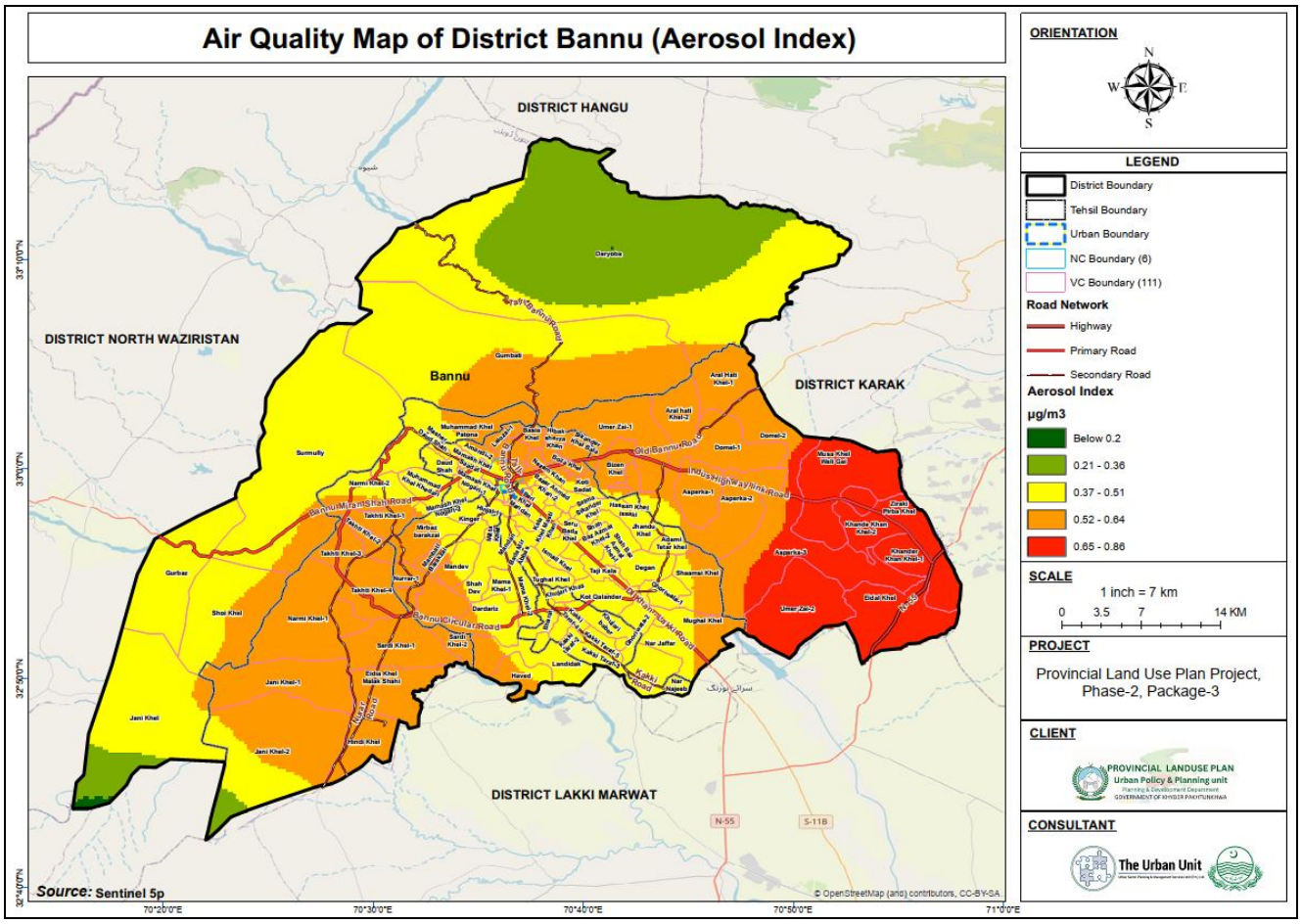
- Installation of an air quality monitoring station for continuous monitoring of ambient air in the Bannu district.

3.10.7.1 Scope:

This project aims to record particulate matter concentrations (PM2.5 and PM10) in the hotspot areas of Bannu district for continuous monitoring and informed decision making. A district-level air quality monitoring dashboard for disclosure of information and issuance of health advisories is recommended.

3.10.7.2 Activities:

Installation of air quality monitoring equipment /stations and a network of low-cost sensors in hotspot areas of District Bannu.



Map 3-45: District Bannu Air Quality

3.11 Natural Hazards

Bannu faces multiple natural hazards, including **earthquakes, floods, and heat waves,** each posing risks to socio-economic stability.

- **Earthquakes**: Located in Seismic Zone 2B with moderate risk. The 2015 earthquake highlighted the need for earthquake-resistant infrastructure, adherence to seismic building codes, and community preparedness.
- **Floods**The 2010 and 2022 floods had significant impacts. Contributing factors include poor drainage, a lack of early warning systems, and unregulated construction. Improved forecasting, water infrastructure, and preparedness are essential.
- **Landslides**: No significant history, but risks may rise due to heavy rainfall or unregulated land use. Preventive measures include slope stabilization, vegetative cover, and proper land use planning.
- **Heatwaves**: Due to climate change, they are intensifying, with temperatures exceeding **45°C**. Health risks are high for vulnerable groups. Mitigation requires heat-resilient urban planning, green spaces, and public awareness.

3.11.1 EARTHQUAKE RESISTANT PLANS

Located in Seismic Zone 2B, Bannu faces moderate earthquake risk due to the tectonic activity of the Indian and Eurasian plates. Though historically less affected, past quakes (magnitude 4–5) have caused localized damage and service disruption. Vulnerabilities arise from inadequate infrastructure and limited preparedness, highlighting the need for earthquake-resistant construction and proactive risk reduction measures.

3.11.1.1 Seismic-Resistant Building Design in KP

3.11.1.2 Compliance with Pakistan Building Code 2007 (Seismic Provisions)

Pakistan's seismic design requirements are laid out in the Building Code of Pakistan – Seismic Provisions 2007, which is enforced for new constructions, especially for public buildings. In KP, and specifically in Bannu:

The code classifies Bannu as Seismic Zone 2B (moderate risk).

It mandates minimum structural safety features such as:

- Use of reinforced concrete frames.
- Provision of shear walls.
- Anchored and tied-down roofs.
- Foundation reinforcements suitable for regional soil types.

Note: In Bannu, actual enforcement is often weak in private constructions due to a lack of regulatory oversight, but public sector projects (schools, hospitals) increasingly follow the code.

3.11.1.3 Low-Cost Seismic-Resistant Solutions Implemented in KP

In resource-constrained settings like Bannu, the following locally adapted, low-cost seismic-resilient designs are practiced:

Confined Masonry Construction:

- Used widely in rural KP and small towns.
- Brick or stone walls are confined with reinforced concrete tie columns and ring beams.
- More resilient than traditional unreinforced masonry and used in low-rise housing schemes (e.g., Earthquake Reconstruction and Rehabilitation Authority (ERRA) projects).

RC (Reinforced Concrete) Frame Structures with Brick Infill:

- Preferred for schools and healthcare buildings.
- Concrete columns and beams form the structural skeleton; brick walls act as infill panels.
- This design is increasingly adopted in government-funded infrastructure across southern KP.

3.11.1.4 Retrofitting Practices in Existing Buildings

Steel Bracing and Jacketing:

- Retrofit older school buildings and health units by adding steel braces or jackets to beams and columns.
- Common in ERRA-funded post-2005 earthquake programs, extended into KP districts.

Shear Wall Addition:

- Existing structures in KP cities (including Bannu) are sometimes retrofitted with external or internal shear walls, especially in public schools.

FRP Wrapping:

- **Fiber Reinforced Polymer (FRP)** sheets are used to strengthen columns and beams in critical public buildings.
- Though relatively expensive, this method has been piloted in urban KP (e.g., Peshawar) and may be extended to district centers like Bannu through donor projects.

3.11.1.5 Common Materials and Techniques in the Bannu Region

- **Locally Available Brick and Stone**: Combined with cement mortar and reinforced with rebar cages.
- **Use of Tori (ring beams)**: A traditional method of placing horizontal RCC bands at the plinth, lintel, and roof levels in rural homes.
- **Steel Reinforcement from Local Markets**: Mild steel bars and mesh are widely used in both confined masonry and RC frame structures.
- **Plinth-Level Reinforcement**: Local masons often raise the plinth and include horizontal ties to prevent differential settlement and improve seismic performance.

3.11.1.6 Government and NGO-Funded Implementations

School Safety Program (SSP-KP):

- Introduced earthquake-resistant retrofits in vulnerable schools using braced frames and shear walls.
- Piloted in **southern KP, including Bannu**, through PDMA and UNICEF collaboration.

National Disaster Risk Management Fund (NDRMF):

- Supports structural strengthening of health and education infrastructure.
- Projects in KP include seismic strengthening of buildings using confined masonry and base isolation prototypes.

3.11.1.7 Seismic Zoning of Bannu

Zoning and land-use planning are important tools for reducing the risk of earthquakes by controlling how land is used and developed in areas that are susceptible to seismic activity. This can help to avoid and mitigate the effects of earthquakes on human settlements.

According to the Pakistan Building Code 2007, Pakistan is divided into 5 zones, which are mentioned in the table below. These zones have been identified for the Bannu district as shown in the figure below.

Table 3-92: Seismic zone distribution indicating hazard level and PGA

Zone	Seismic Hazard Level	Peak Ground Acceleration (PGA)
Zone 1	Low	0.05 to 0.08g
Zone 2A	Moderate-Low	0.08 to 0.16g
Zone 2B	Moderate-High	0.16 to 0.24g
Zone 3	High	0.24 to 0.32g
Zone 4	Very High	>0.32g

Where 'g' is the acceleration due to gravity

3.11.1.7.1 Zone 2B (Moderate-High Risk)

Structure: Reinforced Concrete (RC) frame structures with shear walls or braced frames mandatory.

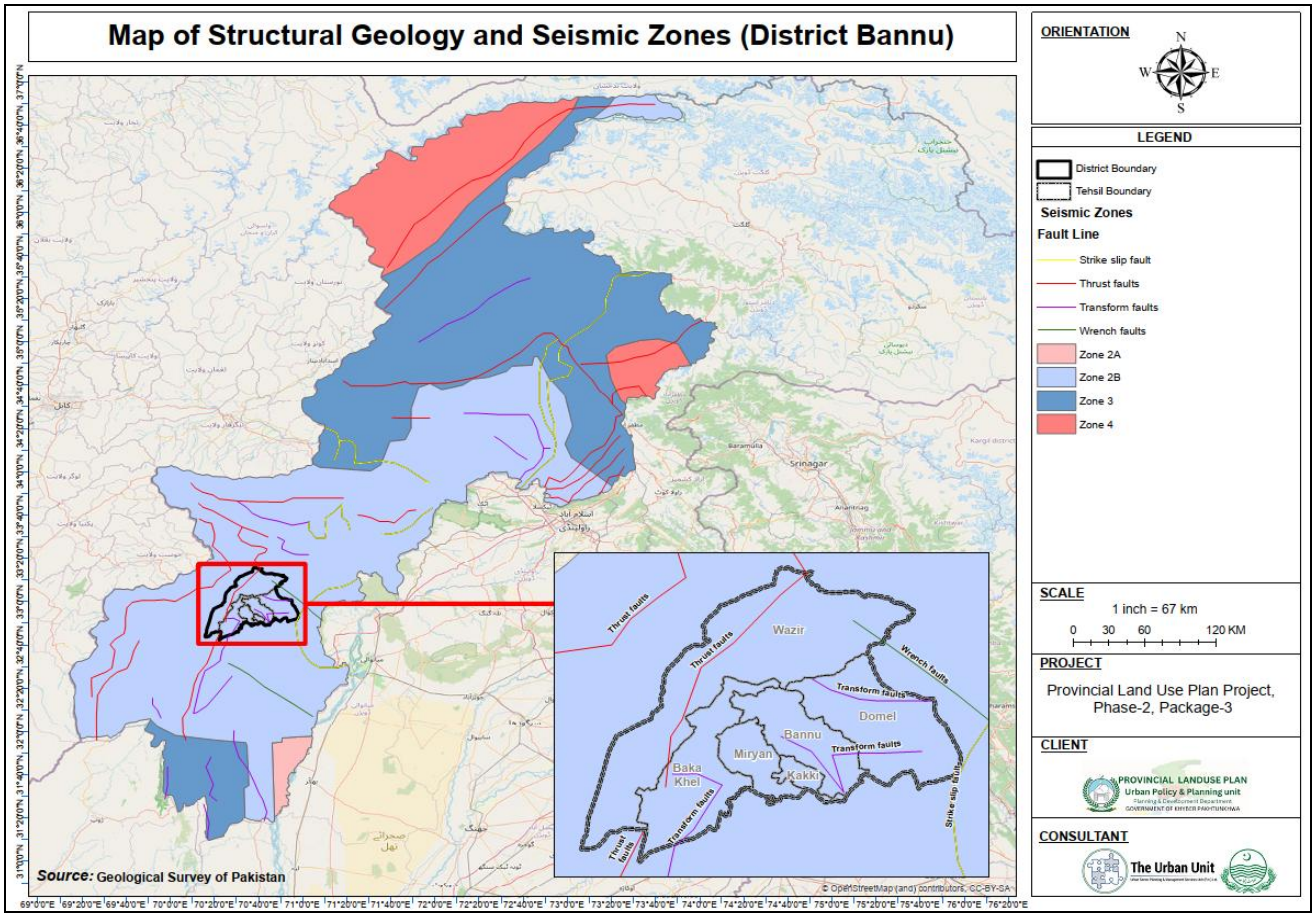
Foundation: Deepened or pile foundations may be recommended based on soil conditions.

Design Requirements:

Seismic design must follow Zone 2B requirements in BCP-2007 (use seismic coefficient Z = 0.24).

Importance Factor (I): 1.0 for residential, 1.25–1.5 for critical facilities (schools, hospitals).

Retrofit Need: Retrofitting of all unreinforced masonry or adobe structures in urban areas.



Map 3-46: Seismology zones of District Bannu

The summarized requirements regarding infrastructure development and land use planning are mentioned in the table below.

Table 3.81: Summary of development strategies by seismic zones

Seismic Zone	Land Use Planning	Infrastructure Development
Zone 2A	Permit moderate density; avoid soft soils.	Require basic seismic detailing.
Zone 2B	Controlled densification; restrict hillside or slope cuts.	Use RC frames, tie beams, and confined masonry. Mandatory code checks.
Zone 3	Limit high-rise development. Focus on horizontal expansion.	Reinforced shear walls, ductile detailing, and critical facility retrofitting.
Zone 4	Avoid construction on slopes and soft deposits.	Only permit development with isolation techniques or deep foundations.

3.11.1.8 Land-use Planning of Bannu District

The existing land-use planning data of the Bannu District are mentioned in the table below.

Table 3.82: Existing land-use planning data of Bannu District

EXISTING LAND-USE		
Planning Classes	Total Area (Hectares)	%
Agriculture	5355.24	44.33
Barren Land	619.28	5.13
Bus Terminals	5.32	0.04
Commercial	230.51	1.91

EXISTING LAND-USE		
Planning Classes	Total Area (Hectares)	%
Education	206.44	1.71
Graveyard	107.93	0.89
Health Facility	28.61	0.24
Military Lands/Cantonment	142.27	1.18
Orchards	397.08	3.29
Parks	64.51	0.53
Public Buildings and Civic Amenities	86.46	0.72
Range Land	1124.99	9.31
Religious Building	16.43	0.14
Residential	2032.75	16.83
Residential and Commercial (Mixed Use)	23.36	0.19
Scattered Industry	113.02	0.94
Small Industrial Estate	24.48	0.20
Transportation	369.40	3.06
Vacant Area	537.41	4.45
Water Bodies	593.93	4.92
Total	12079.41	100.00

3.11.1.9 Early Warning Systems

In Pakistan, earthquake early warning systems (EWS) are at a foundational stage. While there is no fully operational public EWS, several institutional measures exist:

- The Pakistan Meteorological Department (PMD) operates the National Seismic Monitoring Centre (NSMC), with over 30 seismic stations across Pakistan, including in KP.
- These stations collect real-time seismic data, which is analyzed at PMD. Alerts are relayed to the Provincial Disaster Management Authorities (PDMA).
- In KP, PDMA KP collaborates with district administrations (including Bannu) to issue warnings via SMS, media, and administrative channels.
- While automated citizen alerts (e.g., apps, sirens) are not fully implemented, Pakistan is engaged in partnerships (e.g., with Japan and UNDP) to develop such systems.

Community Awareness and Training

The Earthquake Reconstruction and Rehabilitation Authority (ERRA) and NDMA have created earthquake safety training materials distributed through schools and local government structures.

In KP, school safety drills are periodically conducted in collaboration with PDMA KP and the Education Department.

Awareness campaigns have been conducted in districts like Bannu to train community volunteers, teachers, and health staff on safe evacuation and emergency protocols.

3.11.1.10 Risk Assessment

- NDMA and UNDP have carried out Multi-Hazard Vulnerability Risk Assessments (MHVRA) across KP, identifying seismic risks at district and tehsil levels.
- PDMA KP has developed a Hazard Risk Profile Atlas that includes earthquake risk zones. Bannu is classified as a Zone 2B (moderate risk).
- These assessments guide decisions on zoning, building approvals, and public infrastructure planning.

3.11.1.11 Policy and Regulation

- The Building Code of Pakistan – Seismic Provisions 2007 (BCP-2007) is enforced in public and institutional buildings, requiring compliance with earthquake-resistant design.
- The KP Land Use and Building Control Act 2021 empowers authorities to regulate construction based on seismic hazard zoning.
- Tehsil Municipal Administrations (TMAs) in KP are legally responsible for ensuring that private development complies with seismic safety standards.

3.11.1.12 Preparedness Planning

- District Disaster Management Plans (DDMPs) have been prepared by PDMA KP in collaboration with local governments, covering emergency evacuation, shelter management, and communications during earthquakes.
- Regular mock drills and simulations are conducted in public institutions in coordination with the Health and Education departments.

Bannu District has participated in such planning efforts through its local disaster management committees.

3.11.1.13 Insurance and Financial Planning

- Earthquake insurance coverage is still limited, but promoted under the State Bank of Pakistan's micro-insurance frameworks.
- Some donor-funded initiatives (e.g., through NDRMF) have supported pilot disaster risk financing for vulnerable communities in KP.

3.11.1.14 Stakeholder Collaboration

- After the 2005 earthquake, ERRA, NDMA, and various NGOs collaborated to develop earthquake-resistant designs now used in KP.
- PDMA KP works with organizations such as UNICEF, UNDP, and GIZ to improve infrastructure safety and institutional capacity.
- Universities in KP, including UET Peshawar, contribute through research, seismic vulnerability studies, and training of engineers and planners.

3.11.1.15 FLOOD RESISTANT PLANS

Floods are one of the most frequent and destructive hazards in Khyber Pakhtunkhwa (KP), with districts like Bannu being particularly vulnerable to riverine and flash floods. A comprehensive flood resistance plan tailored to the region's needs can significantly reduce the impacts of future flood events.

3.11.2 Flood-Resilient Infrastructure

Levees and Embankments:

Constructed and maintained along rivers like the Gambila and Kurram in Bannu by the KP Irrigation Department to contain riverine floods.

Retention Ponds and Check Dams:

Small reservoirs and check dams built upstream in KP's semi-arid districts help manage runoff during monsoon rains.

Elevated Construction:

Houses in flood-prone villages are increasingly built on raised plinths or stilts, particularly in southern KP.

Public buildings (e.g., schools) are constructed above high-flood levels as part of PDMA's flood-resilient infrastructure initiatives.

Urban Drainage Systems:

In towns like Bannu, open brick-lined storm drains are built alongside roads to drain floodwater.

KP Local Government departments have also piloted covered drain systems in urban areas.

3.11.2.1 Early Warning and Monitoring

Telemetry-Based River Monitoring:

Used by the KP Irrigation Department to track water levels in real-time during the monsoon season.

Public Alerts via SMS and Radio:

PDMA KP issues flood warnings through SMS, FM radio, and loudspeaker announcements, especially in low-lying rural areas.

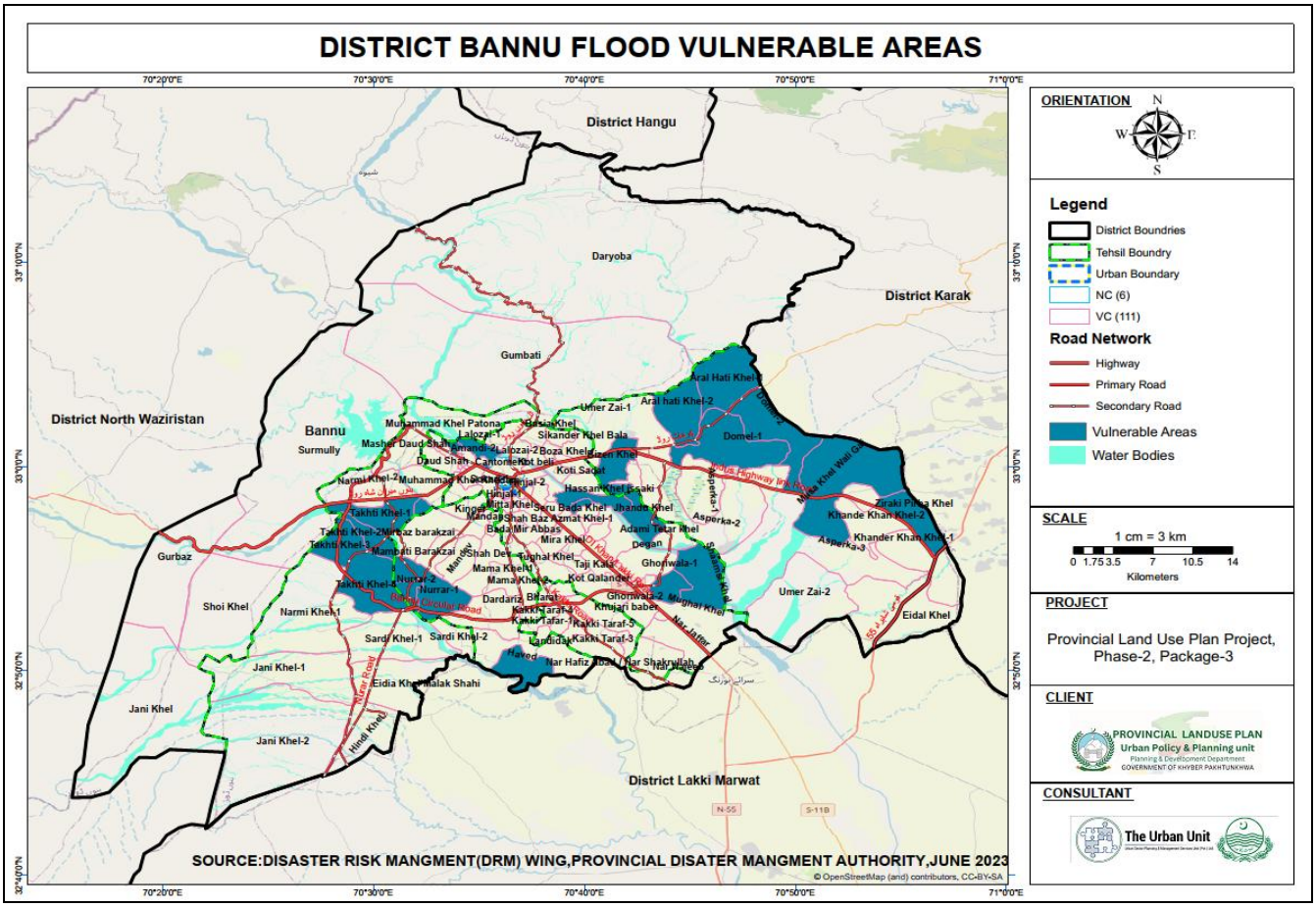
Community Watch Groups:

In collaboration with NGOs, local volunteers in high-risk villages monitor rainfall and river behavior to trigger alerts.

3.11.2.2 Land Use and Zoning Practices

Floodplain Mapping and Construction Control:

KP's Urban Policy Unit and PDMA integrate floodplain maps into district land use planning to restrict development in hazard zones.



Map 3-47: District Bannu flood vulnerable areas.

Relocation of At-Risk Settlements:

After major flood events (e.g., 2010), some informal settlements near riverbanks were relocated under provincial programs.

Use of Green Buffer Zones:

Areas adjacent to rivers are reserved for parks, agriculture, or natural drainage, not housing.

3.11.2.3 Nature-Based Mitigation

Reforestation and Riverbank Vegetation:

Tree plantation and bioengineering using vetiver grass are promoted to stabilize banks and reduce erosion.

Restoration of Natural Drainage Paths:

Blocked nullahs and seasonal streams are being cleared and desilted by local governments before the monsoon season.

3.11.2.4 Community Preparedness

Evacuation Plans and Route Mapping:

District Disaster Management Units (DDMUs) prepare community-level evacuation routes and safe shelters in flood-prone Union Councils.

Household-Level Training:

Red Crescent and NGOs run training on how to prepare emergency kits and protect documents and valuables from flood damage.

3.11.3 LANDSLIDE RESISTANT PLANS

3.11.3.1 Excavation of Rock

3.11.3.1.1 Methods of Excavation

No major event of landslide event was reported in District Bannu as per PDMA reports. But in Pakistan, rock excavation is primarily carried out using conventional and mechanized methods. The common practices include:

Drilling and Blasting:

This is the most widely used technique, where explosives are placed in drilled holes to break rock. The fragmented rock is then removed by mechanical loaders or trucks.

Mechanical Excavation:

Machines such as excavators, bulldozers, and road headers are employed for softer rock formations to reduce reliance on blasting.

Manual Excavation:

In areas with limited access to heavy machinery, manual labor is used for small-scale projects, involving hand tools for breaking rock and removing debris.

Ground Support Installation:

After excavation, rock bolting and mesh are installed to stabilize the tunnel or shaft walls and prevent collapses.

3.11.3.1.2 Excavation Practices

Slope Height Reduction:

In KP, especially in highway and road construction by the C&W Department, cutting the slope height is used to reduce the weight and driving force of soil on unstable slopes. This technique is commonly employed on road sections through hilly or dissected terrain.

Benching of Slopes:

In road and irrigation projects, benching (terracing the slope into horizontal steps) is practiced to reduce runoff speed and soil erosion. It's commonly used in rural areas of southern KP to stabilize road cuts and canal banks.

Controlled Excavation and Cutting:

The National Highway Authority (NHA) and KP Communication & Works (C&W) departments follow excavation protocols to minimize undercutting of steep slopes. Excavation is avoided in landslide-prone areas unless supported by slope studies.

Backfilling with Local Material:

In some areas, especially along rural roads and canals, lighter backfill materials such as gravel and sand are used in combination with proper compaction to reduce sliding forces.

3.11.3.2 Strengthening Slopes

In Pakistan, especially in regions like Bannu and other parts of Khyber Pakhtunkhwa (KP), local slope stabilization practices include the following:

3.11.3.2.1 Gabion Retaining Walls

Constructed using galvanized steel wire mesh boxes filled with locally sourced stone boulders. These are commonly used along roadways, riverbanks, and embankments. Gabions are particularly effective in flash flood-prone areas as they allow water to pass through while holding soil in place.

3.11.3.2.2 Dry Stone Pitching

A traditional method where stones are manually arranged in sloped layers without mortar. Often used along irrigation channels and roadside embankments in KP, this technique stabilizes the surface and reduces erosion effectively.

3.11.3.2.3 Vegetative Turfing

Native grasses such as Vetiver and Bermuda grass are planted on slopes to control erosion. Sometimes, coir mats or jute netting are used to support early-stage growth. This method is cost-effective and supports biodiversity.

3.11.3.2.4 Terracing

Terraces are flat steps created on slopes to control runoff and prevent erosion. This method is used in agriculture and slope stabilization across hilly areas of KP and is suitable for integration with farming.

These methods are low-cost, labor-intensive, and suitable for the socio-economic context of KP, making them practical for local governments and communities in Bannu.

3.11.3.3 Drainage Techniques

In Khyber Pakhtunkhwa (KP), especially in districts like Bannu, effective slope drainage is crucial for landslide and erosion control. Local practices focus on low-cost, practical techniques suitable for the regional terrain and community resources:

3.11.3.3.1 Surface Drainage Channels

Open, unlined, or brick-lined channels are constructed along road embankments and hillsides to divert rainwater. These are commonly seen in Bannu's rural areas and are maintained seasonally to prevent blockages.

3.11.3.3.2 Cross-Drainage Structures

Culverts and causeways are installed across roads and streams to allow proper water flow. KP Highway and Irrigation Departments frequently use these in flood-prone or erosion-sensitive areas.

3.11.3.3.3 Earthen Berms and Contour Trenches

These are built to intercept runoff on slopes, slowing water flow and increasing infiltration. NGOs and community development programs often implement these in agricultural and peri-urban settings.

3.11.3.3.4 Subsurface PVC Drainpipes

Installed in areas with recurrent slope failures, these horizontal drains reduce groundwater pressure. Used selectively due to higher costs, often supported by donor-funded or provincial hazard mitigation programs.

These drainage strategies are context-appropriate and enhance slope stability, especially during monsoon seasons common to southern KP.

3.11.3.4 Rock Slope Stabilization/Mitigation Techniques

In Pakistan, rockfall and slope instability are addressed through cost-effective engineering practices adapted to local terrain and resource constraints, especially in hilly and semi-arid regions like Bannu and Kohat. Common techniques include:

3.11.3.4.1 Wire Mesh and Netting

Double-twisted galvanized wire mesh is draped over rocky slopes to contain loose rock. Used widely along highways in KP, including the Karakoram Highway and Kohat Tunnel approaches.

3.11.3.4.2 Rock Bolting and Anchoring

Steel anchors and bolts are installed into unstable rock faces to prevent detachment. Frequently used in infrastructure projects under the National Highway Authority (NHA) in northern KP and tribal areas.

3.11.3.4.3 Shotcrete Application

Concrete sprayed over exposed rock surfaces provides stabilization and prevents weathering. Deployed in tunnel portals and vertical road cuts, particularly in government and donor-funded projects.

3.11.3.4.4 Catch Ditches and Stone Barriers

Excavated ditches or stacked stone walls are placed at the base of rocky slopes to catch falling debris. Common in rural Bannu and Kohat for basic protection, where budgets are limited.

3.11.3.4.5 Bench Cutting

Slopes are stepped or benched to reduce slope angle and limit rockfall velocity. Applied in new road construction or widening projects by the KP Communication & Works Department.

These localized methods are implemented based on site-specific risk, geology, and resource availability, often involving local contractors and manual labor to ensure cost-effectiveness.

3.11.3.4.6 Recommendations

According to the Pakistan Building Code 2007, the following are the recommendations regarding land use mapping of Bannu District;

- Before deciding about placing a building on or adjacent to sloping ground in mountainous terrain, an examination of the hill slope stability conditions shall be made. The stability of sthe loping ground shall be evaluated by geotechnical engineers, and improvements, if required, shall be designed through an established analytical geotechnical engineering method
- The site selection for an important engineered building on potentially liquefiable soils shall be preceded by evaluation of liquefaction potential of the sub-surface through detailed geotechnical investigations and established analytical techniques. Necessary mitigation measures shall be taken to minimize the potential risk.
- The selection of a site for a building on such soils shall be made based on the detailed geotechnical investigations and adopting necessary mitigating measures in the structure and/or bearing ground.

3.11.4 HEAT WAVES RESISTANT PLANS

3.11.4.1 Public Awareness and Health Preparedness

3.11.4.1.1 Heatwave Warnings and SMS Alerts

During peak summer months (May–July), PDMA KP disseminates heatwave alerts via SMS in southern KP districts, including Bannu, through coordination with the District Administration and Health Departments.

3.11.4.1.2 Community Health Awareness Campaigns

The District Health Office (DHO) Bannu, in collaboration with Lady Health Workers (LHWs), conducts heatstroke awareness drives, especially in schools and rural communities. Posters, community meetings, and mosque announcements are used to spread preventive information.

3.11.4.2 Infrastructure and Facility Readiness

3.11.4.2.1 Heat-Ready Public Health Facilities

Bannu's public hospitals and Basic Health Units (BHUs) have been directed by the Health Department KP to ensure:

- Availability of ORS (oral rehydration salts),
- Emergency beds for heatstroke patients, and
- Backup electricity supply (generators or solar) to run fans and coolers during outages.

3.11.4.2.2 Shaded Rest Areas for Workers

During recent summers, temporary shade structures have been installed at bus terminals, bazaar entry points, and traffic police checkpoints to protect field workers and the public.

3.11.4.3 Water Access Measures

3.11.4.3.1 Public Water Points in Urban Bannu

During heatwaves, Tehsil Municipal Administration (TMA) Bannu establishes temporary water distribution points, especially in crowded commercial areas like Railway Bazaar and Mandan Road.

3.11.4.3.2 Water Tanker Services to Peri-Urban Areas

Tankers are dispatched to underserved neighborhoods experiencing water shortages, particularly in peri-urban union councils like Ghoriwala and Domel.

Heatwaves have become increasingly severe in KP, particularly in southern districts like Bannu, Lakki Marwat, and Dera Ismail Khan. Rising temperatures, often exceeding 45°C, pose serious risks to health, infrastructure, and agriculture. A targeted heatwave resistance plan can help mitigate these impacts effective.

3.12 District Economy

District Bannu, with a population of over 1.2 million as recorded in the 2017 Census, presents a dynamic socio-economic profile shaped by a young population, large households (averaging 8.5 members), and a diverse labor force. The 5–9 age group is the largest, and while the literacy rate stands at 58%—peaking at 62% among those aged 10–14—many discontinue education after secondary school, highlighting a gap in higher education and skills development. Housing remains a pressing issue, with more than one-third of the population living in temporary (katcha) structures and an estimated shortfall of 10,000 units.

The district's labor force, comprising 358,400 individuals, is distributed across agriculture (32.4%), industry (26%), and services (41.5%), reflecting a gradually diversifying economy. The workforce includes 25% skilled, 30% semi-skilled, 35% unskilled, and 10% managerial staff—showing a varied capacity for economic roles. However, infrastructure challenges persist. The healthcare system, with 898 beds across 121 facilities, provides just 5.5 beds per 10,000 people well below national standards indicating a need for urgent investment. Similarly, formal sports and recreational infrastructure is limited mostly to urban areas, while rural communities rely on informal facilities, despite a strong local culture around traditional sports like Kabaddi.

Amid these challenges, major strategic development initiatives are underway to reshape Bannu's economy. The 408-acre Bannu Economic Zone (BEZ), supported by an investment of approximately Rs 10 billion, is projected to house 265 industrial units and generate around 64,000 job opportunities 16,000 directly within the zone and 48,000 indirectly through ancillary services. In parallel, the Small Industrial Estate Bannu Phase II, led by the KP Small Industries Development Board, aims to facilitate industrial expansion by offering plots and support infrastructure to both small and large enterprises. Additionally, Bannu's proximity to a route of the China-Pakistan Economic Corridor (CPEC) positions it to benefit from improved regional connectivity, logistical upgrades, and increased investment flows.

Crucially, the district's Land Use Plan will guide sustainable development by designating zones for residential, agricultural, and industrial use. This will help ensure that employment generation aligns with spatial planning and economic priorities.

Together, these developments are driving Bannu toward a new phase of economic growth and stability. Based on these trends and investments, the key growth sectors in District Bannu can be identified as following:

3.12.1 Key growth sectors of District Bannu

3.12.1.1 Agriculture

Agriculture is the backbone of Bannu's economy, employing 32.4% of the district's total workforce and over 33% of the rural population. It remains the primary livelihood source, particularly in rural areas,

despite a gradual employment shift toward other sectors in urban zones. The sector is supported by fertile loamy soils and an extensive irrigation network sourced from the Kurram and Tochi Rivers, enabling the cultivation of major crops such as wheat, maize, and sugarcane, along with fruits and vegetables in suitable areas.

According to Crop Statistics KP (2021–22), Bannu has a reported area of 206,523 hectares, with 43% (88,730 ha) under cultivation. The remaining area includes 20,289 hectares of culturable waste, indicating potential for agricultural expansion with improved inputs and irrigation. Wheat is the dominant Rabi crop (17,693 ha), while maize leads in Kharif (6,138 ha); sugarcane, though grown on a smaller area, yields the highest output per hectare (41,563 kg/ha).

Fruit cultivation (876 ha) surpasses vegetables (308 ha) in both area and production, contributing more significantly to crop output. A majority of cultivated land is irrigated via private canals (45,657 ha), government canals (6,441 ha), and farmer-led systems like tube wells and lift pumps.

Despite its importance, the agriculture sector in Bannu faces challenges such as low productivity, soil erosion, underutilized land, outdated practices, and limited investment in research and technology. Addressing these constraints is crucial for enhancing food security, reducing poverty, and driving sustainable economic growth in the district.

3.12.1.1.1 Rural-Urban Linkages

Agriculture in Bannu is predominantly rural, with 33.4% of the rural workforce engaged in the sector and virtually no urban agricultural employment. Strengthening rural-urban linkages through improved transport infrastructure, cold chains, and market access will help rural producers connect with urban consumers and processing facilities. Developing agro-logistics hubs and collection centers near towns can reduce transaction costs and enhance efficiency in the supply chain.

3.12.1.1.2 Strategies for Local Economic Resilience

Diversifying crop production, adopting climate-resilient varieties, and promoting water-efficient irrigation can reduce climate and market risks. Enhancing soil fertility, expanding agricultural research, and educating farmers on sustainable practices will strengthen productivity. Community-level water harvesting and small storage dams will ensure water security in dry periods, while farmer cooperatives and digital advisory services will build long-term resilience through collective action and access to timely information.

3.12.1.1.3 Constraints

Agriculture in District Bannu faces multiple structural and resource-based challenges. A significant portion of farmland is fragmented into small, uneconomical plots due to generational subdivision, making efficient land utilization difficult. Limited education and technical awareness among farmers further impede the adoption of modern, sustainable farming practices, while continued reliance on traditional methods exacerbates low productivity. Poor soil conditions—caused by water logging and salinity in certain areas—degrade land quality, reducing the long-term viability of agriculture. Additionally, issues like pest infestation, crop diseases, and low yields indicate the absence of extension services and research-backed interventions, limiting both productivity and resilience.

Water scarcity remains a critical constraint to optimal land use. Despite existing irrigation infrastructure such as Baran Dam and the Marwat and Bannu canals, silting, poor maintenance, and inefficient flood irrigation methods lead to substantial water losses. The use of unlined canals, coupled with inadequate water distribution and conservation measures, further exacerbates shortages. Limited access to capital prevents smallholders from investing in modern inputs and technologies needed for sustainable intensification. Furthermore, poor transportation infrastructure hampers market connectivity, discouraging investment in high-value crops and value-added activities. Addressing these issues through integrated land and water management, infrastructure development, and targeted capacity-building is essential to improve agricultural productivity and ensure sustainable land use in Bannu.

3.12.1.1.4 Recommendations

To promote efficient and sustainable land use in District Bannu, a strategic focus is required on building human capital and modernizing farming systems. Strengthening agricultural education through training centers, adult literacy programs, and robust extension services will empower farmers with knowledge of modern techniques, pest management, and water-efficient irrigation. Encouraging cooperative farming and land consolidation will address the challenge of fragmented holdings, enabling economies of scale, better access to finance, and shared use of technology. The promotion of demonstration plots, improved machinery, high-yielding climate-resilient seeds, and soil testing will enhance land productivity while closing yield gaps. Establishing localized job hubs in scientific farming, pest surveillance, and precision agriculture will create employment while supporting more sustainable land management practices.

Water resource optimization and infrastructure development are central to effective land use planning in the district. Improving irrigation through the adoption of drip, sprinkler, and smart irrigation systems, combined with canal lining and desilting, will reduce water losses and enhance the productive use of arable land. Constructing small dams, seasonal reservoirs, and rainwater harvesting structures will bolster water availability and climate resilience, particularly in water-scarce zones. Investments in flood protection infrastructure and early warning systems are also vital to protect agricultural land from extreme weather events. Upgrading rural road networks and transport systems will improve access to markets, reduce post-harvest losses, and make land-based activities more viable and profitable.

To further enhance land productivity and economic returns, value addition and market integration must be prioritized. Establishing agro-processing units for fruit drying, pulse processing, and sugarcane by-products will allow farmers to capture higher value from existing crops. Investments in cold storage, mini silos, and processing infrastructure will reduce post-harvest losses and extend the usability of agricultural produce. Supporting local agri-businesses through cooperatives, shared services, mobile-based soil testing, and solar-powered irrigation will promote rural entrepreneurship. Public-Private Partnerships (PPPs) can play a crucial role in scaling smart irrigation systems, expanding research and development on region-specific crops, and building digital platforms for market access and farmer advisories—thereby aligning land use with modern, market-oriented, and climate-resilient agricultural development.

3.12.1.2 Livestock

Livestock is a vital and growing sector in Bannu, providing steady income, food security, and employment—especially in rural and peri-urban areas. It plays a crucial role in local livelihoods and acts as a buffer against crop failure and economic shocks. Despite a decline in major livestock populations (e.g., cattle, goats, poultry) from 2006 to 2021, the sector holds strong potential, particularly for meat, milk, and by-products that are in demand both locally and in the halal export market.

Women play a major but often unrecognized role in livestock care, particularly in household dairy production. The sector is gradually shifting toward semi-commercial models, supported by public-private strategies aimed at boosting productivity and sustainability. Livestock contributes significantly to national GDP (11.53% at constant prices), and in Bannu, it remains central to the district's rural economy.

The fisheries sector, though smaller, has shown consistent growth, with non-trout fish production doubling between 2018–19 and 2021–22. This reflects the district's untapped potential in aquaculture and the growing market for inland fish farming.

3.12.1.2.1 Constraints

From a land use planning perspective, the declining livestock and poultry population in District Bannu signals underlying structural challenges in the sector that impact rural livelihoods and agricultural sustainability. The reduction in veterinary institutions and inadequate animal health services—such as limited vaccination, disease surveillance, and treatment coverage—have weakened animal health and productivity. Additionally, poor management of water resources for livestock and the degradation of traditional grazing lands hinder effective land utilization for livestock-based farming systems. Inconsistent fodder availability, due to the absence of dedicated fodder zones or integrated crop-livestock planning, further restricts livestock output and resilience.

Effective livestock land use planning must also address institutional and social dimensions. The absence of a strong regulatory framework and weak enforcement mechanisms undermine progress in key areas such as breeding, nutrition, and disease control. Moreover, the critical but underrecognized role of women in livestock management points to a gender gap in both policy and support services. Integrating gender-responsive planning, strengthening veterinary infrastructure, and allocating designated spaces for grazing and fodder cultivation are essential to revitalize the livestock sector. These measures will contribute to diversified and sustainable rural land use, ensuring better animal health, improved incomes, and enhanced food security for the region.

3.12.1.2.2 Recommendations

From a land use planning perspective, revitalizing the livestock sector in District Bannu requires the strategic expansion and equitable distribution of veterinary infrastructure and services across rural areas. Increasing the number of veterinary hospitals, dispensaries, and mobile units will improve animal health and ensure widespread treatment coverage. Strengthening disease surveillance, vaccination drives, and diagnostic systems is vital to safeguarding livestock assets. Integrated land use planning should also identify and manage dedicated grazing lands to prevent overuse, support rotational grazing practices, and sustain fodder supply systems. Promoting fodder crop cultivation and establishing feed banks or silage units will contribute to year-round availability of quality feed, supporting healthier and more productive livestock populations.

The land use framework should also support value-added livestock activities to increase economic returns from existing land-based resources. Investment in small-scale on-farm processing—such as milk chilling, dairy packaging, meat cutting, leather tanning, and fish preservation—can enhance rural incomes while optimizing land productivity. Introducing halal certification, branding, and cold chain infrastructure will improve the quality and marketability of livestock products. Special attention should be given to rural poultry and fisheries through targeted training, access to inputs, and sustainable pond or hatchery management. These interventions can absorb local labor and empower women and youth through backyard farming and microenterprise development, particularly in underutilized rural spaces.

Finally, enabling policies and public-private partnerships (PPPs) are essential to link land use with livestock modernization. A revised regulatory framework should guide land allocation for veterinary centers, fodder cultivation, and processing zones, while supporting private sector participation in breeding centers, feed mills, fish hatcheries, and solar-powered water systems. Community-led management of grazing areas can create small rural enterprises focused on fodder supply and land maintenance. PPPs can also help establish innovation hubs and livestock R&D incubators, aligned with universities and agri-tech firms. These partnerships will bring in investment, modern practices, and digital tools needed for sustainable, climate-resilient livestock and fisheries development—transforming land into a productive, inclusive, and economically viable asset.

3.12.1.3 Industry, Mining, Energy & Trade and Commerce

In the Industry, Mining and Energy and trade and commerce chapters These points are partly addressed, which highlight major sectors, local trade activities, and rural-urban connections. They also touch on how agriculture supports industry and markets. There are also some parts that talk about strategies on job creation, ways to add value locally, support for small businesses. The explanation is given below:

3.12.1.3.1 Key Growth Sectors Identified

The report highlights several sectors with growth potential in Bannu:

- Mining and Mineral Resources: The district has substantial reserves of limestone, shale clay, silica sand, iron ore, coal, and sandstone. Production data show increasing trends in iron ore and shale clay, indicating future growth potential.
- Industrial Development: Cottage industries, SMEs in food processing, construction materials, and light engineering are key drivers. The Bannu Economic Zone is projected to host 265 industries, creating 64,000 jobs and attracting Rs. 10 billion in investment.

- Trade and Services: Wholesale/Retail Trade and Services account for 41.5% of employment, with Bannu's commercial hubs playing a vital role in economic dynamism.

3.12.1.3.2 Rural-Urban Linkages

- Bannu City serves as a major commercial and service hub not only for urban populations but also for surrounding rural tehsils like Domel, Kakki, Baka Khel, and Wazir. The ribbon development of markets along major roads reflects a strong rural-urban connection.
- Rural-based industries like brick kilns and crush plants supply urban construction markets, indicating vertical value chains across regions.

3.12.1.3.3 Economic Resilience Strategies

The report includes several forward-looking strategies:

- Promotion of SME Clusters: Designation of industrial zones and clustering of brick kilns and crushing plants to centralize and regulate production.
- Infrastructure Improvements: Recommendations for roads, electricity, and water management underpin economic stability.

3.12.1.3.4 Job Creation and Value Addition

- Direct and Indirect Employment: 64,000 jobs expected from the Bannu Economic Zone. Industrial employment already contributes 26% of the labor force.
- Value Addition: Agro-based industries are supported with proposals to expand food processing and local manufacturing. The report recommends promoting value addition in agriculture and local crafts.
- Vocational Training: Expansion of technical training centers is proposed to improve employability and support industrial transition.

3.12.1.3.5 Public-Private Partnerships and Local Business Support

- The document proposes business incubation centers, artisan markets, and collaborations with the Chamber of Commerce, explicitly recognizing the role of private sector engagement.
- The recommendation to form a business resolution committee involving SMEDA and the Chamber aims to institutionalize ongoing public-private dialogue.

4. PROPOSED LAND USE ZONING

Land use planning is integral to building and managing cities and towns. It involves looking at how land should be used, ranging from green space to residential areas and industrial sites. It's also the basis of zoning laws and restricts particular land use. Careful planning also helps reduce our environmental footprint by ensuring that resources are managed responsibly. As a result, it helps preserve the environment, conserve resources, promote social gatherings, enhance communities, and support transportation, industry, and economic activity.

The proposed land use plan is formulated to accommodate the projected population growth and associated land use demands over the next two decades. This plan not only addresses the needs of an expanding population but also aims to conserve critical values related to heritage, environment and food chain. The land use strategy is designed to balance urban expansion with the preservation of rural land, ensuring sustainable growth across the district.

4.1 Land Use Planning through Zoning

Zoning is a pivotal regulatory tool in urban and regional planning, used to manage land development in a way that promotes orderly growth and protects public interests. Through the division of land into well-defined zones, each with specific regulations regarding use, intensity, and built form, zoning ensures that spatial development aligns with broader policy objectives such as public health and safety, environmental sustainability, economic efficiency, and social equity.

The proposed zoning framework encompasses a broad spectrum of land use categories to accommodate anticipated spatial needs and promote balanced regional development. These designated zones include: Residential Zone, Educational Zone, Health Zone, Information Technology (IT) Zone, Agricultural Zone, Industrial Zone, Recreational Zone, Mixed-Use Zone, Mining Zone, and the Central Business District (CBD). This typology provides the institutional structure for integrated and controlled land development, enabling the district to evolve in a sustainable, inclusive, and economically dynamic manner.

While zoning offers the legal and regulatory mechanism for implementation, land use planning delivers the strategic vision—integrating spatial, socio-economic, and environmental considerations into a cohesive framework. Together, they form the backbone of sound urban governance, ensuring that future growth is not only feasible, but also desirable in terms of livability, functionality, and resilience.

To support spatial planning decisions, population projections for the plan horizon were derived using demographic trend analysis. Based on these projections, future housing demand was calculated and integrated with the existing housing backlog to estimate the total residential unit requirement. The gross residential land has been obtained from the proposed densities, which were derived from existing densities and then appropriately densified.

The total residential area thus calculated has been divided into a variety of functional neighborhoods, based on the assumption—drawn from the existing land use pattern and in line with the approach adopted in the *District Land Use & Zoning Plan for Dera Ghazi Khan*[64]—that the approximate spatial coverage would be distributed as follows:

- Educational Neighborhood – 6%
- Health Neighborhood – 4%
- Information Technology (IT) Neighborhood – 6%
- General Residential Zone – 84%

This neighborhood typology has been applied only to those areas where the population is projected to exceed 50,000 by the plan horizon year 2045. These percentages are indicative and serve as planning benchmarks; however, they are subject to adjustment based on the specific characteristics and existing land use patterns of each urban and rural settlement.

[64] *Planning & Development Department, Government of Punjab. (n.d.). District land use & zoning plan for Dera Ghazi Khan. Local Government & Community Development Department. Retrieved from https://pmu-lgcdd.gop.pk/public/ReportController/Landuse_DGKhan*

These allocations are intended to foster spatial diversity, functional clustering, and equitable access to services, thereby supporting a well-integrated and sustainable urban form. Each neighborhood typology is further organized into functional subcategories to optimize internal land use distribution and service delivery. The following tables present the proportional area distribution within two key neighborhood types:

Area Distribution in Specialized Neighborhoods

- Specialized Activities (Health, Education, IT, etc.): 25%
- Residential Use: 35%
- Open/Public Green Spaces: 7%
- Commercial Use: 3%
- Public Buildings and Institutions: 5%
- Graveyards: 2%
- Roads and Circulation: 23%

Area Distribution in Residential Zone

- Residential Use: 50%
- Open/Public Green Spaces: 10%
- Commercial Use: 3%
- Public Buildings and Institutions: 10%
- Graveyards: 2%
- Roads and Circulation: 25%

The above spatial configuration ensures that each neighborhood supports a mix of complementary land uses while maintaining functional coherence and accessibility. This zoning methodology promotes efficient land utilization, enhances service delivery, and contributes to the development of vibrant, well-serviced communities. The detailed proposed zoning structure for the district, including all urban centers, is presented below.

4.2 District Bannu Proposed Landuse

The 2045 Land Use Plan for District Bannu establishes a strategic framework balancing ecological preservation, agricultural productivity, and measured urban growth. A total of 51.85 % of the district is designated as Range, Barren, and Forest Land to safeguard watershed functions and enhance habitat connectivity. Agricultural lands comprise 37.33% of the territory, ensuring continuity in crop cultivation and reinforcing food security objectives. By dedicating over one third of its land to agriculture, the plan reinforces zoning regulations that advocate for sustainable farming practices and long-term rural economic stability.

District Bannu allocates 7.64 % of its area as Riverine Forests, aligning with large-scale forest restoration principles to increase biodiversity resilience and mitigate climate change impacts.

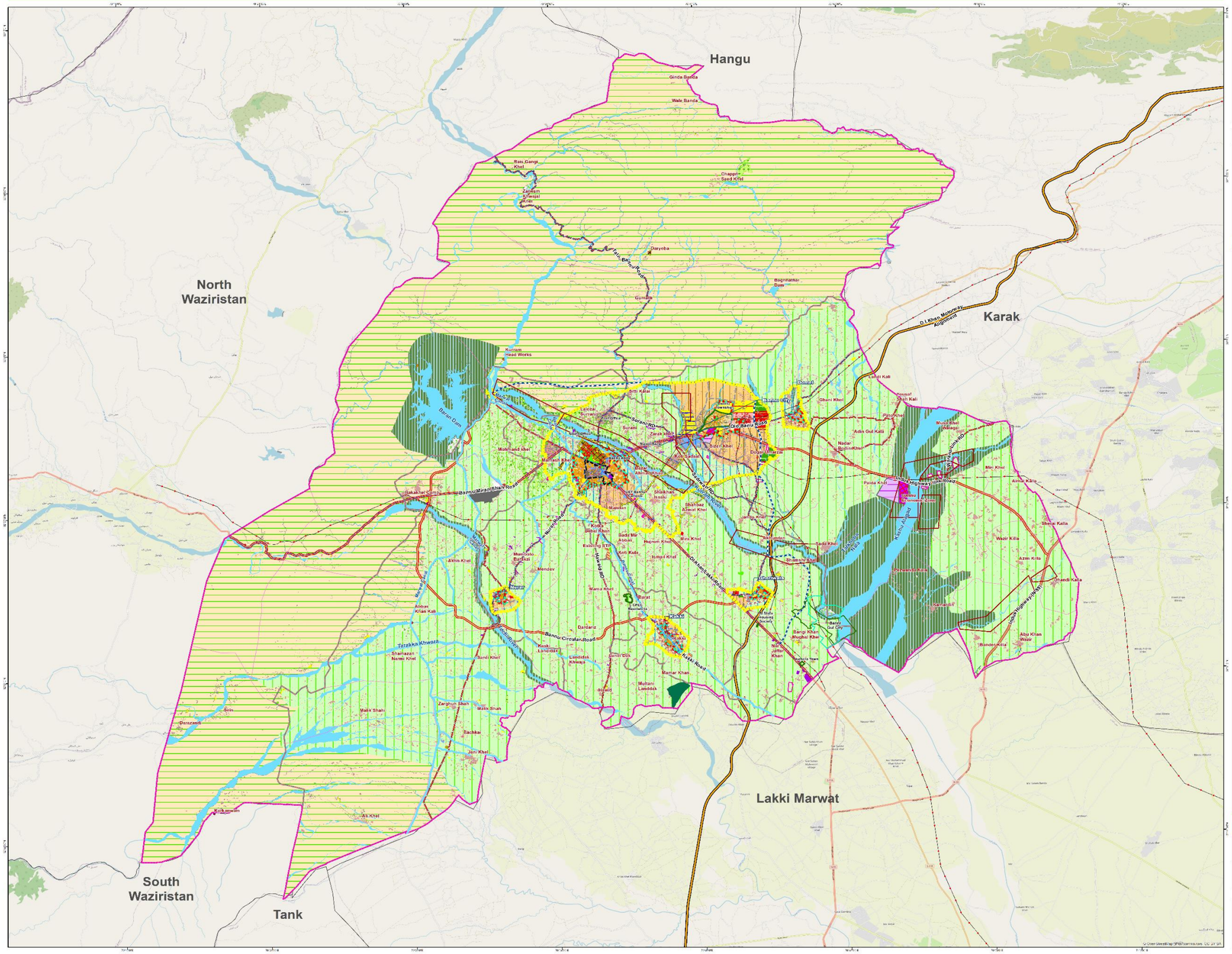
Residential Zones cover just over 1.25 % of the land to deliver targeted housing growth without compromising the district's rural character. A 0.15 % Mix Use Zone fosters active living and economic vitality by integrating residential, commercial, and recreational functions in close proximity. Specialized designations such as the 0.08 % IT Neighborhoods and 0.10 % Model Environmental Village signal a forward-looking commitment to knowledge-based industries and pilot sustainable community models. Institutional, health, educational, recreational, and industrial zones collectively occupy under 0.14 % of the area, demonstrating a compact service-delivery paradigm that maximizes infrastructure efficiency and supports equitable access to public services. This integrated land use framework positions District Bannu to achieve balanced economic growth, strengthen environmental stewardship, and enhance social well-being through 2045.

Bannu proposed zone calculations are given in the below Table 4-1:

Table 4-1: Bannu District Proposed Land Use

District Bannu		
PROPOSED LAND USE		
Planning Classes	Total Area (Hectares)	%
Agriculture Zone	67813.94666	37.33
Buffer Zone	30.46651396	0.02
CBD	89.02475509	0.05
Educational Zone	142.3595781	0.08
Health Zone	94.49406274	0.05
Industrial Zone	256.0390058	0.14
Institutinal Zone	127.1599457	0.07
IT Neighbourhood	141.9228728	0.08
Mix Use Zone	271.3275402	0.15
Model Environmental Village	174.7388768	0.10
Range/Barren/Forest Land	94188.71267	51.85
Recreational Zone	156.7877124	0.09
Infill Development	288.3764915	0.16
Residential Zone	2270.967	1.25
Reverine Forest	13870.85629	7.64
Urban Farm Land	1681.810024	0.93
WWTP	44.59423503	0.02
Total	**181643.5842**	**100.00**

Proposed Zones Map of District Bannu (2025- 2045) - Draft



Location Map

Legend

Administrative Boundaries
- Urban Boundary Bannu
- District Boundary
- Tehsil Boundry
- NCVC Boundary

Road Network
- Motorway
- Highway
- Primary Road
- Secondary Road

Others
- High Tension Power Lines

Existing Landuse
- Residential
- Rural Settlement
- Residential & Commercial (Mixed Use)
- Commercial
- Educational Facility
- Health Facility
- Public Buildings and Civic Amenities
- Disposal Site
- Small Industrial Estate
- Airport
- Community Game Reserve
- Minor Mineral Areas
- Scattered Industry
- Military Lands/Cantonment
- Religious Building
- Graveyard
- Plantation
- Forest Land
- Orchards
- Parks
- Bus Terminals
- Transportation
- Water Bodies

Housing Scheme
- Approved Housing Scheme
- Unapproved Housing Scheme

Proposed Landuse
- Planning Boundary
- Residential Zone
- Model Environmental Village
- Mix Use Zone
- CBD
- Health Neighbourhood
- Educational Neighbourhood
- Institutinal Zone
- IT Neighbourhood
- Industrial Zone
- Minning Zone
- Infill Development
- Recreational Zone
- Buffer Zone
- Reverine Forest
- Urban Farm Land
- Agriculture Zone
- Range/Barren/Forest Land
- WWTP

Proposed Road
- Circular Road
- Road Widening
- Ring Road
- Major Roads(NHA)
- Urban Road

Scale: 0 3.75 7.5 15 KM

Project: Preparation of District Landuse Plans for 22 Districts of Khyber Pakhtunkhwa

Deptt: Provincial Landuse Plan
Urban Policy & Planning Unit, P& DD , Government of KP

Consultant: The Urban Unit

Client: Provincial Land Use Plan
Urban Policy & Planning Unit,P & DD, Government of KP

Map 4-1: Proposed Zones of District Bannu

The total area under study is 190598.56 hectares. “Other Uses”, accounting for 90.6% of the total area, dominate the existing land use. In the proposed land use, the overall residential share to 6.8%, which falls within the NRM recommended range of 24–50%.

Industrial, Commercial, Institutional, and Recreational/Open Spaces are proposed in modest proportions—each showing slight increases in their overall land share, yet all remaining below NRM standard minimums except for Recreational/Open Spaces, which meets the 0.5–7% range. In table below the area statement is given for the District Bannu:

Table 4-2: Bannu District Area Statement of Existing and Proposed Land Uses

Planning Classes	Existing	Area (Hecatres)	Proposed	Area (Hectares)	Sum of Existing and Proposed	Percentage	NRM Standards
Residential	Education	438.0235746	Educational Zone	142.3595781	580.38	6.8	24 - 50
	Health Facility	50.96575578	Health Zone	94.49406274	145.46		
	Residential	10071.74255	Residential Zone	2270.96651	12342.71		
	Residential and Commercial (Mixed Use)	26.73145352	Mix Use Zone (40%)	108.5310161	135.26		
	Graveyard	439.6229156	infill development	288.3764915	439.62		
	Religious Building	55.77583892	IT Neighbourhood	141.9228728	55.78		
	–		Model Environmental Village	174.7388768	288.38		
			–		141.92		
					174.74		
	Total	**11082.86**	**Total**	**3221.39**	**14304.25**		
Industrial	Scattered Industries	273.2885008	Industrial Zone	256.04	662.33	0.3	2 - 20
	Small Industrial Estate	133.0001458					
	Total	**406.29**	**Total**	**256.04**			
Commercial	Commercial	353.10	CBD	89.02475509	550.66	0.3	0.5 - 5
			Mix Use Zone (40%)	108.53			
	Total	**353.10**	**Total**	**197.56**			
Institutional	Public Buildings and Civic Amenities	115.4911692	Institutional Zone	127.1599457	242.65	0.12	2 - 21
	Total	**115.49**	**Total**	**127.16**			
Arterial Circulation/Terminals	Bus Terminals	5.992954284	–		2054.52	1.0	2 - 29
	Transportation	1873.803969					
	Airport	174.7265625					
	Total	**2054.52**					
Recreational/Open Spaces	Orchards	1470.596503	Recreational Zone	156.79	1990.91	0.9	0.5 - 7
	Parks	119.0403209					
	Plantation	244.4815748					
	Total	**1834.12**	**Total**	**156.79**			
Other Uses	Agriculture	63881.55028	Agriculture Zone	67813.94666	190598.56	90.6	–
	Barren Land	76332.3281	Buffer Zone	30.46651396			
	Disposal Site	4.202303261	Reverine Forest	13870.85629			
	Forest Land	152.0872345	Urban Farm Land	1681.810024			
	Military Lands/Cantonment	161.786623	Mix Use Zone (20%)	54.27			
	Range Land	40405.57106	WWTP	44.59423503			

Planning Classes	Existing	Area (Hecatres)	Proposed	Area (Hectares)	Sum of Existing and Proposed	Percentage	NRM Standards
	Vacant Area	1024.92469	Range/Barren/Forest Land	94188.71267			
	Water Bodies	12595.82975					
	Total	**194558.28**	**Total**	**177684.65**			
Grand Total		**210404.7**		**181643.58**	**210404**	100.0	

4.3 Urban Areas

The proposed zoning of all urban areas has been described individually in the following sections. Detailed calculations for each sector are provided in Section 3: Sectoral Studies. The residential zones are explained in Section 3.1.4, with the corresponding land requirement calculations presented in Table 3.12. The education and health neighborhoods are discussed in Sections 3.3.1.4 and 3.3.2.4, respectively. Industrial zones across all urban areas are outlined in Section 3.6.5, with supporting calculations in Table 3.58. Similarly, the commercial zones (CBD) are covered in Section 3.7.4, and their area calculations are provided in Table 3.60. Mixed-use development is explained in Section 3.1.4.2, with its respective land requirement detailed in Table 3.13. The recreational zone is elaborated in Section 3.3.3.5 with the associated calculations given in Table 3.36 of this report.

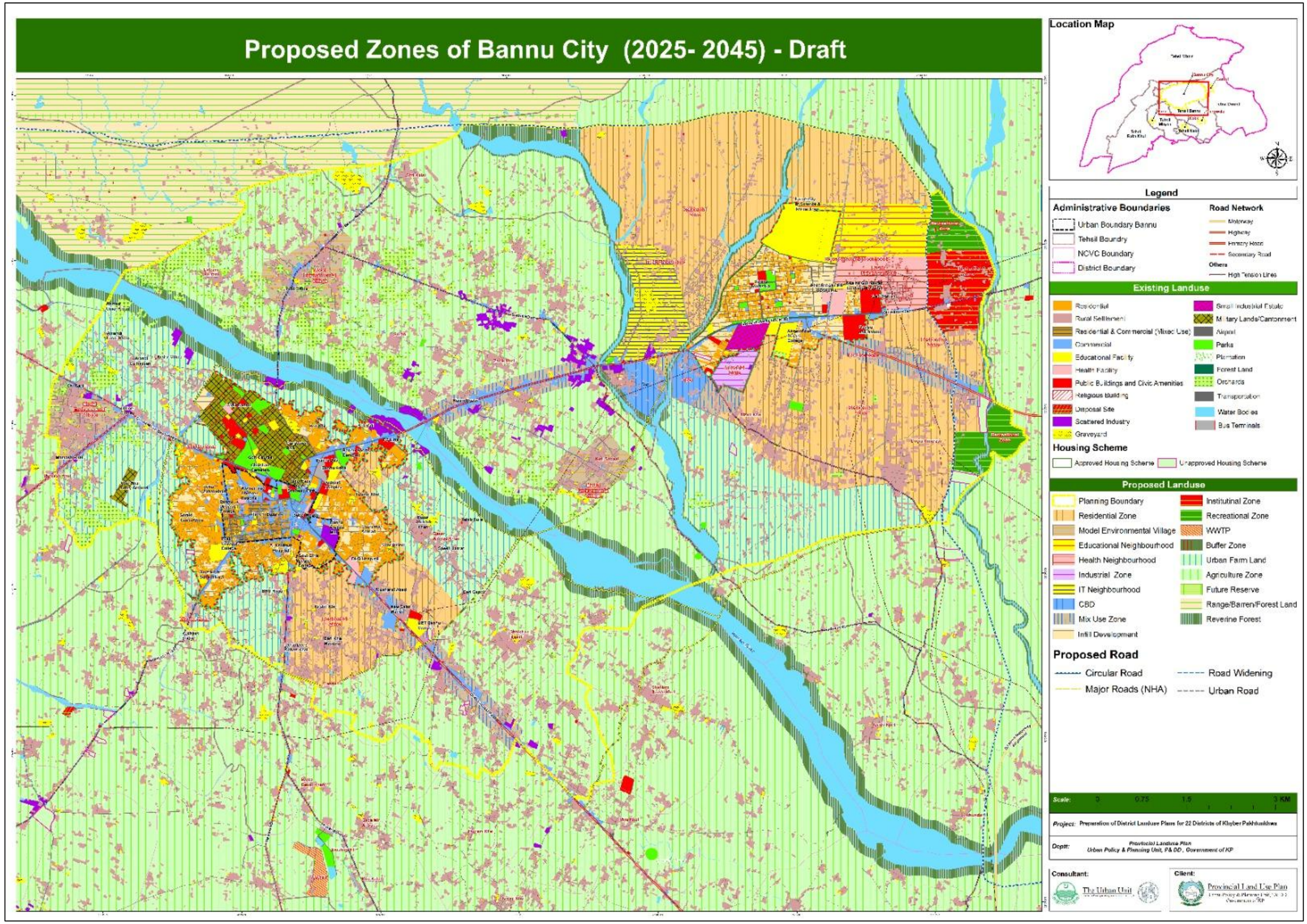
4.3.1 Bannu City

The 2045 Land Use Plan for Bannu City reflects a deliberate integration of urban development with peri-urban agriculture and environmental conservation. The distribution of proposed landuse comprises 35.08 % in Agriculture and an additional 17.61 % as Urban Farm Land ensuring local food security and preserving rural livelihoods within the city's footprint. Residential development is carefully scaled at 23.96%, providing sufficient housing capacity in the coming years. A 5.83 % Riverine Forest network creates natural corridors that bolster flood resilience, enhance biodiversity, and maintain vital ecosystem services.

Urban functions are clustered within a lean, mixed-use core to maximize infrastructure efficiency and foster walkability. The Central Business District (0.95 %) and Mix-Use Zone (3.13 %) concentrate commercial, residential, and recreational activities, reducing travel distances and energizing street life. Forward-looking subzones the 1.72 % IT Neighborhood and the 2.29% Model Environmental Village signal Bannu City's commitment to nurturing knowledge-based industries and piloting sustainable community prototypes. Public facilities occupy minimal land: Educational (1.72 %), Health (1.14 %), and Institutional (1.31 %) Zones ensure equitable access to essential services, and a modest Industrial Zone (0.39 %) accommodates light manufacturing.

Table 4-3: Bannu City Proposed Land Use

Bannu City		
PROPOSED LAND USE		
Planning Classes	**Total Area (Hectares)**	**%**
Agriculture Zone	2678.648	35.08%
Buffer Zone	6.6215	0.09%
CBD	72.4059	0.95%
Educational Zone	131.2039	1.72%
Health Zone	87.3678	1.14%
Industrial Zone	30.1525	0.39%
Institutinal Zone	100.1452	1.31%
IT Neighbourhood	131.0734	1.72%
Mix Use Zone	238.8774	3.13%
Model Environmental Village	174.7389	2.29%
Range/Barren/Forest Land	0.0026	0.00%
Recreational Zone	128.5507	1.68%
Infill Development	236.788	3.10%
Residential Zone	1829.3852	23.96%
Reverine Forest	445.369	5.83%
Urban Farm Land	1344.4629	17.61%
Grand Total	**7635.79**	**100.00%**



Map 4-2: Proposed Zones of Bannu City

The draft land use plan for Bannu City reflects a significant reorganization of urban space in line with NRM standards. Residential land use is proposed to increase substantially to 42.2, addressing growing housing needs and aligning with the recommended 24–50% range. Commercial land use is notably enhanced to 3.3%, within the 0-5–5% NRM benchmark, indicating a push toward economic activity and service provision. Institutional and industrial areas remain within or close to acceptable limits, while recreational/open spaces increase to 4.9%, supporting livability and environmental balance.

The table shows Existing and Proposed area of Bannu city:

Table 4-4: Bannu City Area Statement of Existing and Proposed Land Uses

Planning Classes	Existing	Area (Hecatres)	Proposed	Area (Hectares)	Sum of Existing and Proposed	Percentage	NRM Standards
Residential	Education	206.44	Educational Zone	131.2038666	337.64	42.2	24 - 50
	Health Facility	28.61	Health Zone	87.36776944	115.98		
	Residential	2032.75	Residential Zone	1829.385164	3862.14		
	Residential and Commercial (Mixed Use)	23.36	infill development	236.788	236.79		
	Graveyard	107.93	Mix Use Zone (40%)	95.55	118.91		
	Religious Building	16.43	–		107.93		
	–				16.43		
			IT Neighbourhood	131.0734472	131.07		
			Model Environmental Village	174.7388805	174.74		
	Total	**2415.53**	**Total**	**2686.11**	**5101.63**		
Industrial	Scattered Industries	113.02	Industrial Zone	30.15	167.65	1.4	2 - 20
	Small Industrial Estate	24.48					
	Total	**137.50**	**Total**	**30.15**			
Commercial	Commercial	230.51	CBD	72.41	398.46	3.3	0.5 - 5
			Mix Use Zone (40%)	95.55			
	Total	**230.51**	**Total**	**167.96**			
Institutional	Public Buildings and Civic Amenities	86.46	Institutional Zone	100.15	186.60	2	2 - 21
	Total	**86.46**	**Total**	**100.15**			
Arterial Circulation/Terminals	Bus Terminals	5.32	–		374.70	3.1	2 - 29
	Transportation	369.39					
	Total	**374.70**					
Recreational/Open Spaces	Orchards	397.08	Recreational Zone	128.55	590.14	4.9	0.5 - 7
	Parks	64.51					
	Total	**461.59**	**Total**	**128.55**			
Other Uses	Agriculture	5354.09	Agriculture Zone	2678.65	5260.23	43.5	–
	Barren Land	619.28	Buffer Zone	6.62			
	Military Lands/Cantonment	142.27	Reverine Forest	445.37			
	Range Land	1124.99	Urban Farm Land	1344.46287			
	Vacant Area	537.41	Mix Use Zone (20%)	47.77548096			
	Water Bodies	595.08					
	Total	**8373.12**	**Total**	**4522.88**			
Grand Total		**12079**		**7635.79**	**12079**	100.0	

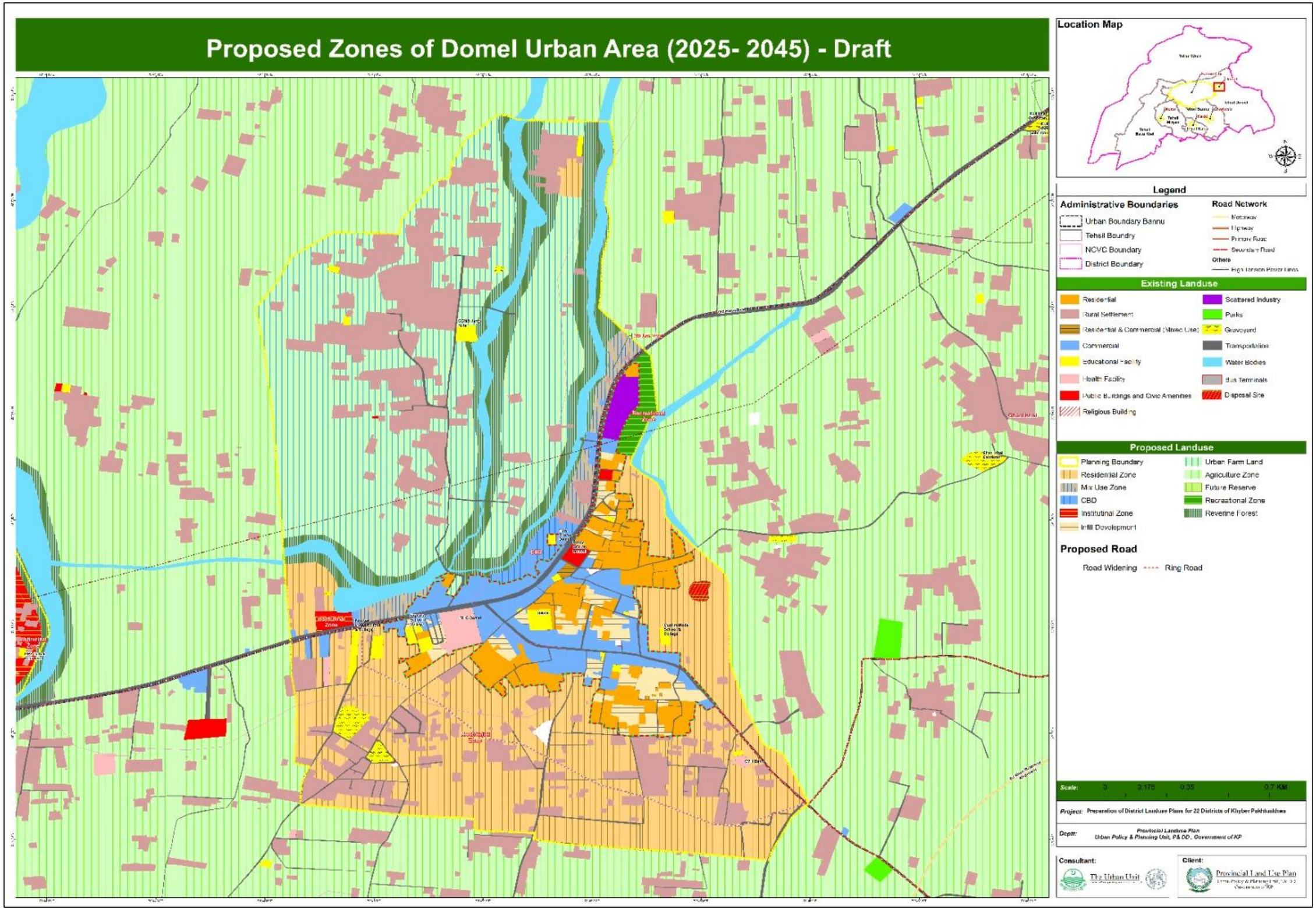
4.3.2 Domel Urban

The 2045 Land Use Plan for Domel City prioritizes sustainable food systems and residential growth within a compact urban framework. Urban Farm Land accounts for 420.47% (106.682 ha) of the total area, reflecting a strategic commitment to local food production, community gardening, and peri-urban agriculture. Residential Zones comprise 39.72 % (104.706 ha), ensuring ample, well-distributed housing capacity to accommodate demographic expansion without compromising green space.

Other propose zones are, Reverine Forest at 11.54 % (30.426 ha) establishes an essential network of riparian corridors that enhance flood resilience, support biodiversity, and deliver critical ecosystem services. The Mix-Use Zone (2.08 %; 5.472 ha) encourages compact, walkable neighborhoods by integrating residential, commercial, while the Recreational Zone (1.08 %; 2.851 ha) provides targeted opportunities for active and passive leisure. This finely calibrated land-use mix positions Domel urban to achieve resilient growth, foster community well-being, and safeguard its environmental assets through 2045.

Table 4-5: Domel urban proposed Landuse

Domel Urban		
PROPOSED LAND USE		
Planning Classes	**Total Area (Hectares)**	**%**
CBD	2.750	1.04%
Institutinal Zone	0.922	0.35%
Mix Use Zone	5.472	2.08%
Recreational Zone	2.851	1.08%
Infill Development	9.831	3.73%
Residential Zone	104.706	39.72%
Reverine Forest	30.426	11.54%
Urban Farm Land	106.682	40.47%
Grand Total	**263.64**	**100.00%**



Map 4-3: Proposed Zones of Domel Urban Area

The draft land use plan for Domel urban shows a major shift toward organized development aligned with NRM standards. Residential land is significantly expanded, now accounting for 49.1% of the total area, aligning with the recommended range of 24–50%, to meet the growing housing demand. Commercial land use also rises to 6.0%, within the NRM standard, highlighting a strong focus on economic activity. Recreational and institutional uses are introduced modestly, supporting livability and social services. In below table the area statement is given for the Domel Urban.

Table 4-6: Domel Urban Area Statement of Existing and Proposed Land Uses

Planning Classes	Existing	Area (Hecatres)	Proposed	Area (Hectares)	Sum of Existing and Proposed	%	NRM Standards
Residential	Residential	81.48	Residential Zone	104.70557568287	186.19	49.1	24 - 50
			Infill Development	9.831394466	9.83		
	Residential and Commercial (Mixed Use)	0.263101012	Mix Use Zone (40%)	2.18868711083	2.45		
	Graveyard	1.886762716	–				
	Religious Building	0.577744707					
	Total	**84.21**	**Total**	**116.73**	**200.94**		
Industrial	Scattered Industries	2.284628987			2.28	0.6	2 - 20
	Total	**2.28**					
Commercial	Commercial	19.77704287	CBD	2.749585293	24.72	6.0	0.5 - 5
			Mix Use Zone (40%)	2.188687111			
	Total	**19.78**	**Total**	**4.94**			
Institutional	Public Buildings and Civic Amenities	0.80033122	Institutional Zone	0.92	9.05	2	2 - 21
	Education	4.084518068					
	Health Facility	2.670339626					
	Disposal Sites	0.56883198					
	Total	**8.12**	**Total**	**0.92**			
Arterial Circulation/Terminals	Transportation	13.77	–	–	13.77	3.4	2 - 29
	Total	**13.77**					
Recreational/Open Spaces	–	–	Recreational Zone	2.850568166	2.85	0.7	0.5 - 7
			Total	**2.85**			
Other Uses	Agriculture	120.849214	Reverine Forest	30.42613247	155.95	38.1	–
	Barren Land	118.5599268	Urban Farm Land	106.68170043971			
	Range Land	5.61707093	Mix Use Zone (20%)	1.094343555			
	Vacant Area	18.61567594	–				
	Water Bodies	17.75215949					
	Total	**281.39**	**Total**	**138.20**			
Grand Total		**409.56**		**263.64**	**409.56**	**100**	

4.3.3 Ghoriwala Growth Center

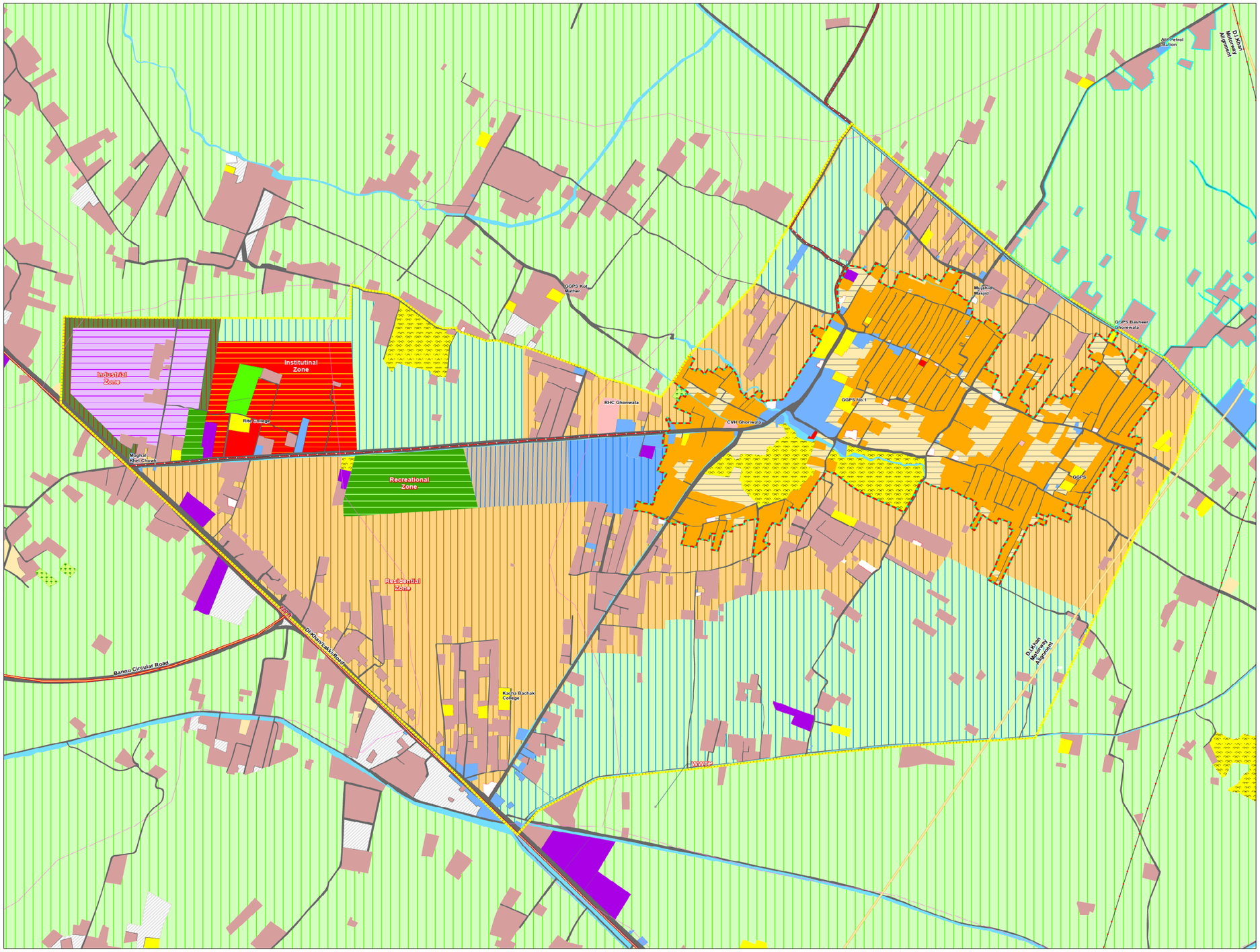
The Ghoriwala Growth Center will act as a supporting center for Bannu city which will help the people living far from Bannu city get basic facilities in Ghoriwala Growth Center. The 2045 Land Use Plan for Ghoriwala Growth Center establishes a clear framework that balances residential growth with urban agriculture, environmental buffering, and economic activity. Nearly half of the area (42.90 %; 104.480 ha) is dedicated to Residential Zones, ensuring sufficient housing capacity to accommodate population growth in coming years. Urban Farm Land comprises a further 35.60% (86.699 ha), underscoring a commitment to peri-urban agriculture, community gardens, and fresh-food access. A 1.32 % Buffer Zone (3.205 ha) encircles sensitive edges, mitigating land-use conflicts and providing transition areas that enhance environmental resilience.

The Central Business District (1.94 %; 4.720 ha) and Industrial Zone (4.16 %; 10.121 ha) supply focal points for commerce, light manufacturing, and employment, reducing commute times and infrastructure costs. Recreational Zones (2.89 %; 7.027ha)—are strategically sited to deliver public buildings, parks, and sports fields within easy reach of all neighborhoods. The table below shows the detailed proposed land use of Ghoriwala growth center.

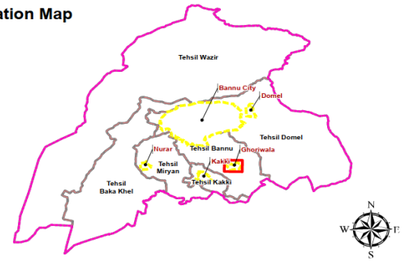
Table 4-7: Ghoriwala Growth Center proposed Landuse

GHORIWALA GROWTH CENTER		
PROPOSED LAND USE		
Planning Classes	**Total Area (Hectares)**	**%**
Buffer Zone	3.205	1.32%
CBD	4.720	1.94%
Industrial Zone	10.121	4.16%
Institutinal Zone	10.351	4.25%
Mix Use Zone	5.054	2.08%
Recreational Zone	7.027	2.89%
Infill Development	11.884	4.88%
Residential Zone	104.480	42.90%
Urban Farm Land	86.699	35.60%
Grand Total	**243.54**	**100.00%**

Proposed Zones of Ghoriwala Urban Area (2025- 2045) - Draft



Location Map



Legend

Administrative Boundaries

- Urban Boundary Bannu
- Tehsil Boundry
- NCVC Boundary
- District Boundary

Road Network

Others
- High Tension Power Line
- Motorway
- Highway
- Primary Road
- Secondary Road

Existing Landuse

- Residential
- Rural Settlement
- Residential & Commercial (Mixed Use)
- Commercial
- Educational Facility
- Health Facility
- Public Buildings and Civic Amenities
- Scattered Industry
- Parks
- Vacant (Infill Development)
- Graveyard
- Transportation
- Water Bodies
- Religious Building

Proposed Landuse

- Planning Boundary
- Buffer Zone
- Residential Zone
- Mix Use Zone
- Institutinal Zone
- Industrial Zone
- Recreational Zone
- Urban Farm Land
- CBD

Proposed Road

- Circular Road
- Major Roads (NHA)
- Road Widening
- Urban Road
- Ring Road

Scale: 0 0.15 0.3 0.6 KM

Project: Preparation of District Landuse Plans for 22 Districts of Khyber Pakhtunkhwa

Deptt: Provincial Landuse Plan
Urban Policy & Planning Unit, P& DD , Government of KP

Consultant: The Urban Unit

Client: Provincial Land Use Plan
Urban Policy & Planning Unit,P & DD, Government of KP

Map 4-4: Proposed Zones of Ghoriwala Urban Area

The draft land use plan for Ghoriwala urban area reflects a strategic reorganization to align with NRM standards and support balanced urban growth. Residential land use increases significantly to 56.2%, addressing housing demand align with the recommended 24–50% range, indicating a need for careful density management. Industrial and commercial zones expand moderately to 3.3% and 3.4% respectively, promoting local employment and economic activity. Institutional land use rises to 4.0%, enhancing access public services, while recreational spaces are strengthened to 2.2%, improving urban livability. In below table the area statement is given for the Ghoriwala growth center:

Table 4-8: Ghoriwala Growth Center Statement of Existing and Proposed Land Uses

Planning Classes	Existing	Area (Hecatres)	Proposed	Area (Hectares)	Sum of Existing and Proposed	Percentage	NRM Standards
Residential	Residential	75.16326564	Residential Zone	104.4800492	179.64	56.2	24 - 50
	Residential and Commercial (Mixed Use)	0.0113048	Mix Use Zone (40%)	2.021788512	2.03		
	Graveyard	9.310224146	Infill Development	11.88382819			
	Religious Building	0.935466357					
	Total	**85.42**	**Total**	**118.39**	**203.81**		
Industrial	Scattered Industries	1.670931995	Industrial Zone	10.12130798	11.79	3.3	2 - 20
	Total	**1.67**	**Total**	**10.12**			
Commercial	Commercial	5.551810231	CBD	4.719551986	12.29	3.4	0.5 - 5
			Mix Use Zone (40%)	2.021788512			
	Total	**5.55**	**Total**	**6.74**			
Institutional	Public Buildings and Civic Amenities	0.782918813	Institutional Zone	10.35	14.58	4	2 - 21
	Education	2.772518668					
	Health Facility	0.671552589					
	Total	**4.23**	**Total**	**10.35**			
Arterial Circulation/Terminals	Transportation	19.05	–	–	19.05	5.3	2 - 29
	Total	**19.05**					
Recreational/Open Spaces	Orchards	0.083690703	Recreational Zone	7.03	8.08	2.2	0.5 - 7
	Parks	0.964241982					
	Total	**1.05**	**Total**	**7.03**			
Other Uses	Agriculture	221.961155	Buffer Zone	3.205423114	93.27	25.7	–
	Barren Land	0.522840023					
	Range Land	1.13488996	Urban Farm Land	86.69913165			
	Vacant Area	19.92868678	Mix Use Zone (20%)	1.010894256			
	Water Bodies	2.355418464					
	Total	**245.90**	**Total**	**90.92**			
Grand Total		**362.8**		**243.54**	**362.87**	**100**	

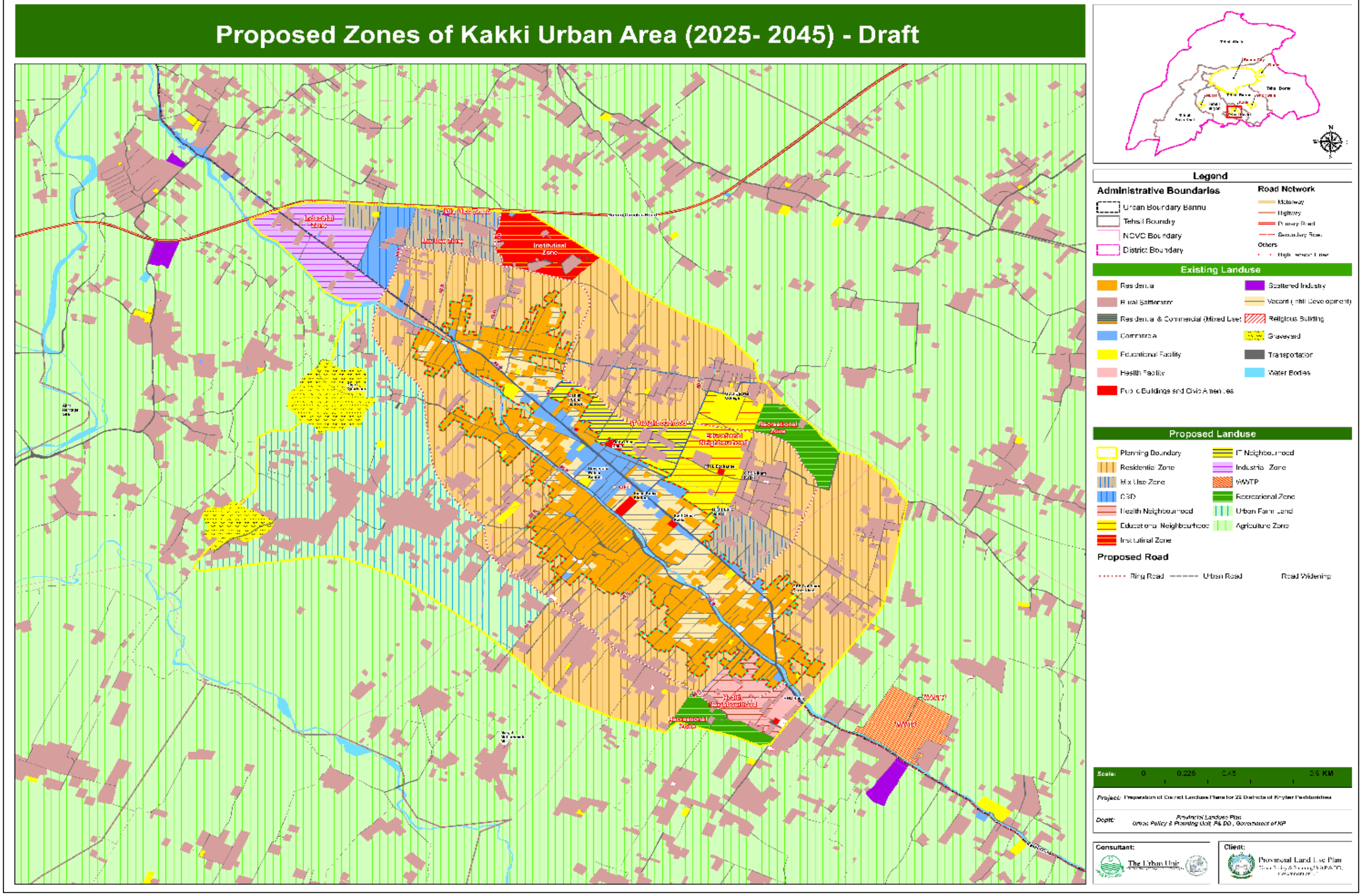
4.3.4 Kakki Urban

Kakki City's 2045 Land Use Plan strategically allocates 42.58% of its 150.616 ha to Residential Zones and 25.97 % to Urban Farm Land, underscoring a dual commitment to meeting housing needs and bolstering local food security through peri-urban agriculture.

A 4.291% Mix-Use Zone further promotes walkable, mixed-function neighborhoods—enhancing economic diversification and reducing commute distance. Essential public services are proposed such as Educational (3.15 %), Health (2.01 %), Institutional (2.67 %), and IT Neighbourhood (3.07 %) Zones ensure equitable access to schools, clinics, civic facilities, and technology-oriented enterprises, while a 3.6 % Recreational Zone provides targeted green space for leisure.

Table 4-9: Kakki Urban proposed Landuse

Kakki Urban		
PROPOSED LAND USE		
Planning Classes	**Total Area (Hactares)**	**%**
CBD	5.672	1.60%
Educational Zone	11.156	3.15%
Health Zone	7.126	2.01%
Industrial Zone	15.071	4.26%
Institutinal Zone	9.443	2.67%
IT Neighbourhood	10.849	3.07%
Mix Use Zone	17.370	4.91%
Recreational Zone	12.037	3.40%
Infill Development	22.519	6.37%
Residential Zone	150.616	42.58%
Urban Farm Land	91.853	25.97%
Grand Total	**353.71**	100.00%



Map 4-5: Proposed Zones of Kakki Urban Area

The draft land use plan for Kakki urban area demonstrates a focused effort to restructure development in line with NRM standards. Residential land use expands substantially to 66.8%, exceeding the recommended 24–50% range, highlighting the need for future density management strategies. Commercial land use increases to 4.3%, well within the 0.5–5% standard, reflecting a push to stimulate local economic growth. Institutional use is set at 2.0%, closely aligning with standards, while recreational spaces are introduced at 2.2%, still slightly below the 0.5-7% target. In table below the area statement is given for the Kakki Urban:

Table 4-10: Kakki Urban Area Statement of Existing and Proposed Land Uses

Planning Classes	Existing	Area (Hecatres)	Proposed	Area (Hectares)	Sum of Existing and Proposed	Percentage	NRM Standards
Residential	Education	4.71965991	Educational Zone	11.15574263	372.61	66.8	24 - 50
	Health Facility	1.225879967	Health Zone	7.126288229			
	Residential	146.5264292	Residential Zone	150.6159077			
			Infill Development	22.51886175			
	Residential and Commercial (Mixed Use)	0.0614259	Mix Use Zone (40%)	6.947958637			
	Graveyard	10.13929194	IT Neighbourhood	10.84934919			
	Religious Building	0.718430344	**Total**	209.21			
	Total	**163.39**					
Arterial/Transportation	Transportation	23.88066205	–		23.88	4.3	
	Total	**23.88**					
Industrial	Scattered Industries	0.131551996	Industrial Zone	15.07078553	15.20	2.7	2 - 20
	Total	**0.13**	**Total**	**15.07**			
Commercial	Commercial	11.01943667	CBD	5.672068087	23.64	4.2	0.5 - 5
			Mix Use Zone (40%)	6.947958637			
	Total	**11.02**	**Total**	**12.62**			
Institutional	Public Buildings and Civic Amenities	1.095881015	Institutional Zone	9.442601509	10.54	2	2 - 21
	Total	**1.10**	**Total**	**9.44**			
Recreational/Open Spaces	Recreational	–	Recreational Zone	12.03707777	12.04	2.2	0.5 - 7
			Total	**12.04**			
Other Uses	Agriculture	342.5655112	Urban Farm Land	91.85	99.56	17.9	–
	Vacant Area	11.14879479					
	Water Bodies	4.233913157					
	–	–	Mix Use Zone (20%)	3.47			
	Total	**357.95**	**Total**	**95.33**			
Grand Total		**557**		**353.71**	**557**	**100.0**	

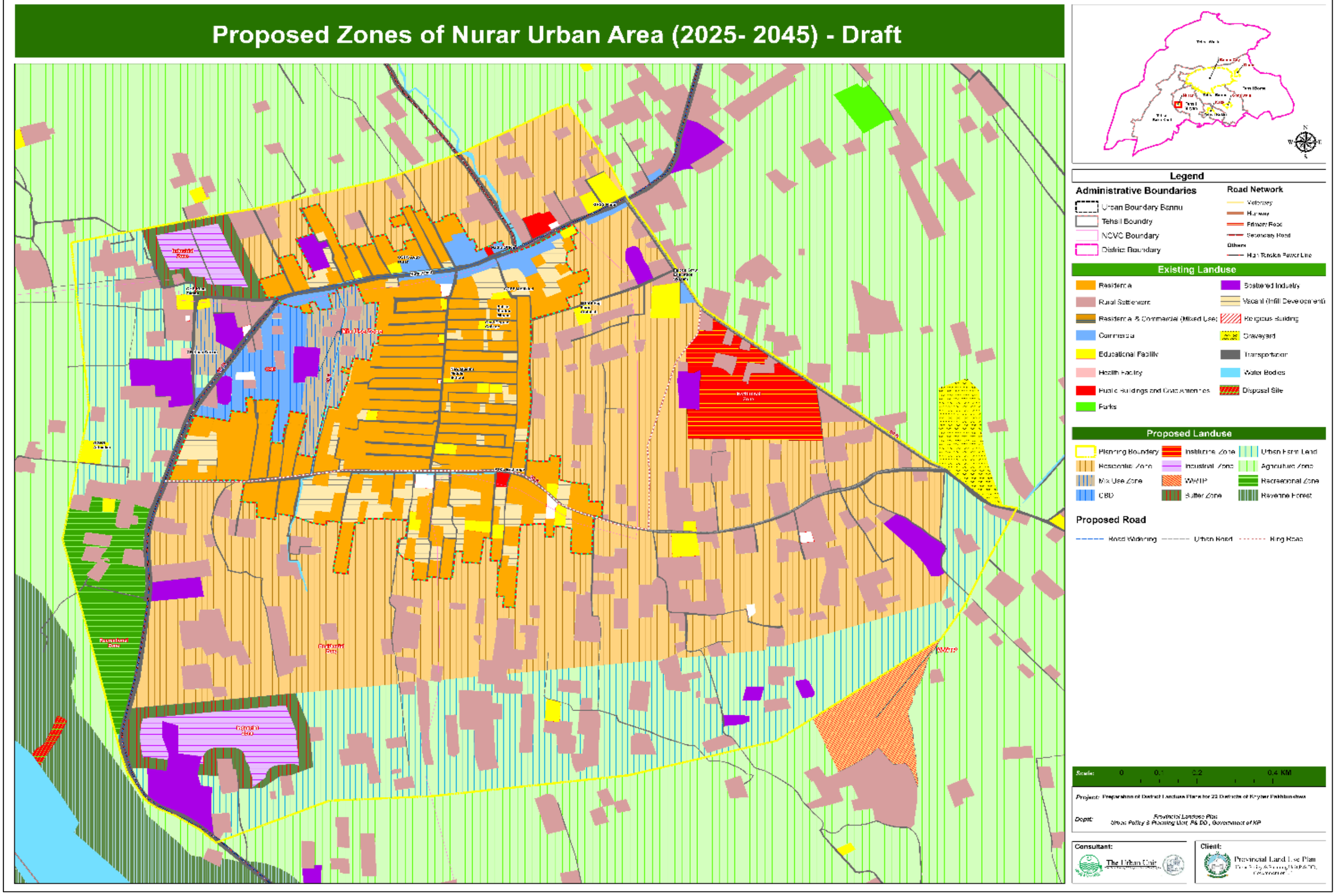
4.3.5 Nurar Urban

The 2045 Land Use Plan for Nurar urban dedicates over 47.15 % of its 81.63037 ha footprint to core residential purposes. Urban Farm Land accounts for 30.05% (52.02657 ha), reinforcing local food security, supporting peri-urban agriculture enterprises, and preserving green buffers within the urban fabric. This strong emphasis on housing and urban farming underscores Nurar's commitment to a resilient, community-driven development model that balances demographic needs with sustainable resource use.

Other proposed land-use classes are strategically compact to optimize infrastructure and service delivery. The Central Business District occupies 2.01 % (3.47 ha), anchoring commercial and administrative activities in a walkable core. An Industrial Zone of 3.59 % (6.21 ha) supports light manufacturing and employment nodes without encroaching on residential or agricultural areas. Institutional (3.64 %; 6.21 ha) and Recreational (3.65 %; 6.322 ha), while a modest Mix-Use Zone of 2.63 % (4.55 ha) promotes integrated live work environments.

Table 4-11: Nurar urban proposed Landuse

Nurar Urban		
PROPOSED LAND USE		
Planning Classes	Total Area (Hactares)	%
Buffer Zone	5.26153	3.04%
CBD	3.47766	2.01%
Industrial Zone	6.21636	3.59%
Institutinal Zone	6.29939	3.64%
Mix Use Zone	4.55338	2.63%
Recreational Zone	6.32216	3.65%
Infill Development	7.354357	4.25%
Residential Zone	81.63037	47.15%
Urban Farm Land	52.02657	30.05%
Grand Total	**173.14**	**100.00**



Map 4-6: Proposed Zones of Nurar Urban Area

The draft land use plan for Nurar urban area shows a major restructuring to meet NRM standards and support organized growth. Residential land use rises to 59.73%, which is significantly higher than the recommended 24–50% range, indicating a strong focus on housing provision but necessitating future control over urban density. Industrial and institutional allocations, at 5.13% and 3.88% respectively, fall within NRM standards, supporting employment and public service needs. Commercial land use increases to 2.78%, aligning the ideal range, reflecting a strategy to boost local economic activities. Recreational spaces, at 2.27%, align well with livability goals. In below table the area statement is given for the Nurar Urban.

Table 4-12: Nurar Urban Area Statement of Existing and Proposed Land Uses

Planning Classes	Existing Landuse	Area (Hectares)	Proposed	Area (Hectares)	Sum of Existing and Proposed	Percentage	NRM Standards
Residential	Religious Building	0.678254735	Residential Zone	81.63037099256	166.46	59.73	24 - 50
	Residential	74.97562411	Mix Use Zone (40%)	1.821350608			
	_	_	Infill Development	7.35435748			
	Total	**75.65**	**Total**	**90.81**			
Industrial	Scattered Industry	8.090990593	Industrial Zone	6.216360798	14.31	5.13	2 - 20
	Total	**8.09**	**Total**	**6.22**			
Commercial	Commercial	2.456878232	CBD	3.477663578	7.76	2.78	0.5 - 5
			Mix Use Zone (40%)	1.821350608			
	Total	**2.46**	**Total**	**5.30**			
Institutional	Education	3.993131243	Institutinal Zone	6.299388118	10.82	3.88	2 - 21
	Health Facility	0.060730599					
	Public Buildings and Civic Amenities	0.467239					
	Total	**4.52**	**Total**	**6.299388118**			
Arterial Circulation/Terminals	Transportation	14.18637444	–		14.19	5.09	2 - 29
	Total	**14.19**					
Recreational/Open Spaces	–		Recreational Zone	6.322162311	6.32	2.27	0.5 - 7
			Total	**6.32**			
Other Uses	Agriculture	168.6676579	Urban Farm Land	52.02656926531	58.82	21.11	
	Barren Land	1.622900009	Buffer Zone	5.261532608			
	Vacant Area	2.849361205	Mix Use Zone (20%)	0.910675304			
	Water Bodies	0.624331416	_				
	Total	**173.76**	**Total**	58.20			
Grand Total		**278.67**		**173.14**	**278.68**	**100**	

4.4 Comparative Review of Bannu City Master Plan (2024–2042) and District Land Use Plan

The Bannu City Master Plan (2024–2042) is an initiative of the Urban Policy and Planning Unit, Government of Khyber Pakhtunkhwa. It is currently under preparation, and the final version has not yet been published. The present analysis is based on the latest available document titled Task C – Strategic Scenario Development Report of Bannu City, submitted in January 2024, which forms a key part of the master planning process.

It is important to note that while the master plan is focused exclusively on Bannu City, the District Land Use Plan prepared in this document covers the entire Bannu District, including multiple urban and rural areas. To ensure consistency in spatial planning and zoning logic, the available master plan has been critically reviewed and compared with the proposed district-level land use plan.

4.4.1 Urban Growth Direction and Boundary Delineation

The master plan outlines four development scenarios, one of which is selected as the preferred option. This preferred scenario emphasizes urban expansion towards the east, which is similarly adopted in the District Land Use Plan. This consistency strengthens the alignment between both planning efforts.

The proposed urban boundary in both documents is largely similar, with only minor variations. For instance, on the western side, the land use plan excludes a part of Mamash Khel Nogari 2, which the master plan includes entirely. In the land use plan, only the residential portion is retained, while the agricultural part is excluded based on existing land use. Additionally, the land use boundary is extended slightly westward beyond the master plan boundary, aligning with a manmade feature (a road) to establish a more coherent boundary edge.

Towards the north and northeast, the land use boundary is constrained by the under-construction circular road, while the master plan boundary extends slightly beyond this feature. From the northeast to southeast, differences are minimal, as the land use plan follows a natural boundary, namely a water body.

4.4.2 Residential Zones

The master plan divides residential areas into subcategories: infill housing, low-income housing, new housing, and Model Villages 1, 2, and 3. The land use plan consolidates these under a unified residential zone, yet the locational logic is consistent.

- **Model Villages**: The location of Model Environmental Village 1 is identical in both plans. Village 2 is at the same site but extended slightly in the land use plan to incorporate existing built-up. Village 3 is also in the same location, though its shape and extent are modified to reflect on-ground realities.
- **Infill Development:** The southwest infill housing proposed in the master plan overlaps with residential zoning in the land use plan, though zone sizes differ based on updated requirements. Along DI Khan/Lakki Road, the land use plan designates a mixed-use zone due to existing commercial-residential developments, while the master plan treats this as infill housing.
- An infill zone proposed west of the city, near the Kurram River, is reclassified in the land use plan as riverine forest and urban farmland to account for its environmental sensitivity.
- **Low-income housing** and **new housing** are both proposed towards the east in the master plan and similarly zoned for residential use in the land use plan, with only slight differences in boundary alignment.
- In the northeast, the residential zone in the land use plan is larger, extending to the under-construction circular road. It also stretches westward up to the water body to accommodate housing demand. On the southeast, along both sides of the Indus Highway Link Road, the land use plan proposes mixed-use zoning due to existing commercial-residential development, while the master plan classifies it as new housing.

4.4.3 Agricultural Zones

The master plan introduces multiple categories under agriculture: agriculture zone, botanical garden, orchard reserves, and urban farmland. In the western zone, what is marked as agricultural land in the master plan is designated as urban farmland in the land use plan. Here, the Model Environmental Village is slightly extended in the land use plan due to existing residential built-up.

A small part of the agricultural/urban farm area is converted to residential in the land use plan to reflect ground realities. The rest remains consistent between both plans. The urban farmland in the southeast is aligned in both documents. However, in the northeast, part of the farmland identified in the master plan is reclassified in the land use plan as residential and future reserves, considering accessibility, existing land condition (barren/range), and directional growth.

The buffer zone along the Kurram River, marked in the master plan, is designated as a riverine forest in the land use plan, reinforcing its ecological protection.

4.4.4 Institutional Zones

The institutional zones are located consistently in both plans, though the land use plan allocates a slightly larger area to meet the projected future demand for public and semi-public uses.

4.4.5 Recreational Zones

The master plan proposes four types of recreational zones: sports/recreational zones, regional parks, and a botanical garden. The land use plan retains the same locations, with minor area adjustments.

- The sports/recreational zone in the northeast and the regional park in the southeast are retained in both plans with slight variations.
- The technology park from the master plan corresponds to the IT neighborhood in the land use plan, which has a larger footprint to reflect its role as a specialized urban node.
- The botanical garden shown in the master plan is reclassified as urban farmland in the land use plan.

4.4.6 Commercial Zones

The Central Business District (CBD) is situated in the same location in both plans. The master plan labels it as a New CBD and Trade & Business Hub, while the land use plan simply refers to it as CBD.

A third commercial zone in the master plan, named the logistics and trade zone, is not separately marked in the land use plan, as the two designated CBDs are considered sufficient to meet future commercial requirements.

4.4.7 Industrial Zone

Both plans identify the light industrial zone near the existing industrial estate, with only a slight difference in total area. The location and intent remain aligned.

4.4.8 Mixed-Use Zones

Mixed-use zoning is proposed along the Indus Highway Link Road in both plans, located at the center of the urban boundary. There is a slight difference in area allocation. The second mixed-use zone proposed in the northeast by the master plan is designated as an IT neighborhood in the land use plan to reflect a more specialized land use function.

4.4.9 Conclusion

The comparison reveals a strong alignment between the Bannu City Master Plan (2024–2042) and the District Land Use Plan, particularly in terms of spatial growth direction and overall development strategy. Both emphasize eastward urban expansion and demonstrate consistency in the distribution of residential, commercial, institutional, recreational, and industrial zones.

While minor differences exist, mainly due to the broader geographic scope and district-level considerations, they do not alter the core vision. The District Land Use Plan builds upon the foundation of the master plan

to provide a more comprehensive and adaptable framework for guiding long-term development across Bannu District.

4.5 Land Use Regulations and Guidelines

Land use regulations constitute the legal and procedural backbone of spatial governance, enabling the orderly transformation of land while safeguarding public interest, environmental assets, and urban form. As part of the zoning framework, these regulations establish the functional character of each land parcel by defining what activities are allowable, conditionally approvable, or strictly restricted within designated zones.

Central to this framework are three key categories:

- **Permitted Uses** refer to those land use activities that are inherently aligned with the primary intent and planning objectives of a specific zone. These uses are allowed by-right and do not require discretionary approval, provided they comply with applicable building codes, design guidelines, floor area ratios (FAR), setbacks, and height restrictions. Permitted uses facilitate predictable development outcomes and ensure efficient processing of building permits and planning approvals.
- **Permissible Uses** represent a secondary tier of land use activities that may be allowed within a zone subject to certain conditions. These uses are not automatically permitted but may be approved through a special review process—often involving impact assessment, stakeholder consultation, and compliance with supplementary criteria. The intent is to provide flexibility while maintaining compatibility with surrounding uses and minimizing potential land use conflicts.
- **Prohibited Uses** encompass activities that are fundamentally incompatible with the intended function of a zone due to their adverse environmental impacts, socio-spatial externalities, or infrastructure demands. These uses are categorically disallowed to preserve the integrity of zoning objectives, protect public health and safety, and maintain functional coherence in urban and rural areas.

These regulatory distinctions are essential to preserving urban form, promoting functional integration, managing growth, and facilitating context-sensitive development. They also empower local planning authorities to enforce zoning compliance, monitor land use change, and guide investment in alignment with strategic spatial frameworks.

The zoning regulations apply uniformly across the district and are tailored to the land use character and development intensity of each zone. The regulatory structure covers the following major land use categories:

- Residential Zones
- Commercial Zone (CBD)
- Industrial Zones
- Agricultural Zones
- Mining Zones
- Forest Zones
- Institutional Zones (including Education, Health, and Governmental uses)
- Mixed Land Use Zones
- Recreation Zone

Each of these zones is governed by a specific matrix of permitted, permissible, and prohibited uses, as detailed in the following subsections. This structured approach ensures the development of an inclusive, sustainable, and resilient urban-rural fabric while balancing socio-economic development with environmental stewardships.

4.5.1 Residential Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Detached/semi-detached dwellings, • place of worship or prayer, • Social/cultural institutions, • Parks and playgrounds, • Apartment buildings, • Graveyard or place of burial, horticultural nursery, • Urban farm, • Old age home or orphanage, • Urban forest,	• Commercial offices and service, • Shops of local character, • Raising of poultry for non-commercial purposes, • Private community centre or club • Day-care centre or Pre-schools, • primary school; • secondary school; • Rehabilitation centres, • Petrol pump, • Gas filling station, • Taxi/rickshaw stand. • Guest houses offices of TMAs/other tiers of local Govt. • Offices of professionals with adequate parking facilities, • Local shopping areas/retail shops, • Clinics/dispensaries	• Heavy, large and extensive industries: noxious, obnoxious and hazardous industries, • Warehousing, storage go-downs of perishables, hazardous, inflammable goods, • Workshops for buses, • Slaughter-housing, • wholesale mandis, • Sewage treatment plant/disposal work, • Water treatment plant, • Solid waste dumping yards, • Outdoor games stadium, • Indoor games stadium, shooting range, • Zoological garden, botanical garden, • Bird sanctuary, • Picnic hut, • International conference centre, • Sports training centre, reformatory and all uses not specifically permitted or permissible • Any other land uses which is neither permitted nor permissible

4.5.2 Commercial Zone (CBD)

Permitted Uses	Permissible Uses	Prohibited Uses
• Commercial buildings, • Markets, shopping mall departmental stores and Outlets, • Shops except dealing in hazardous dangerous substances • Taxi/rickshaw stand. • Public Squares and Parks • Bakery or confectionary, • Clinic or polyclinic, • place of worship or prayer, • Courier service or logistics office, • Private telephone exchange or cable operation or mobile franchise offices,	• Pedestrian friendly streetscape, • Mixed- use buildings, • Technical and vocational institution, • Seasonal commercial fare site, • Stadium; amusement park / play land, • Bus terminal, • Fuel Stations, • Wholesale market, • Second hand goods market, • Coal, wood or Timber yard. • Education institution • Marriage or banquet hall, concert hall • petrol pump or gas or LPG or LNG station; • bus or truck terminal; • private hospital; • auto workshop;	• Dwellings except those of service apartment, essential operational, watch and ward personnel, • Heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units, • Hospitals/research laboratories treating contagious diseases, • Poultry farms/dairy farms, • Slaughter-houses, • Sewage treatment/disposal sites, • Agricultural uses, • Storage of perishable and inflammable commodities, • Quarrying of gravel, sand, clay and stone, • Zoological garden, botanical garden, • Bird sanctuary,

Permitted Uses	Permissible Uses	Prohibited Uses
• Memorial and monument, • Hotel or motel, • Hostel • Car showroom, • Police station, post office and fire station, • Boutique or garment outlets or beauty parlour, • Restaurant, • Social welfare institutions such as community centre, art gallery and museum, • Parking plaza or Parking site.	• athletic club, gymnasium, fitness centre or • indoor sport facility;	• Forensic science laboratory and all other activities which may cause nuisance and are noxious and obnoxious in nature. • A local government shall not allow person to use land or building commercial area for any purpose which is neither permitted nor permissible.

4.5.3 Industrial Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Small and Medium Scale Industries • vertical green industry; • construction equipment, building material store; • Processing Units • Manufacturing Activities • Warehouses storage or Go-down; • Workshops • Cold storage and Ice factory • Petro chemicals, petroleum and gas products • Loading and unloading space; • Parking lot • Industrial park or estate • Police station, fire station and post office; • restaurant; • green area, park or forest • bank or automated teller machine (ATM); • Industrial research institute; • Treatment or recycling plant; • Grid station; • Vocational training institute	• Showrooms • Mixed- used buildings • Residence for workers • Fuel stations and Oil depot; • Restaurant; • Hospital; • Power plant • Grid Station • Place of Worship • Essential residential, • commercial, health and educational facility for workers or employees • Auto workshop, service garage and service station;	• Private residential housing schemes • Large health, recreational commercial and educational institutions • The land use for storing, packing, pursing, cleaning, preparing, and manufacturing of blushing power, ammunition, fireworks, gun powder, Sutphin, mercury, gases, nitro-compounds, phosphorous, 'dynamite, explosives, bombs or any other obnoxious hazardous material shall not be permissible In a declared industrial area. • A local government shall not allow person to use land or property in an industrial area for any purpose which is neither permitted nor permissible.

4.5.4 Agriculture Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Crop, • Orchard, • Pastureland • livestock such as dairy or poultry farm • Forest, • Nursery or a green house, horticulture, • Tube well, • Existing rural settlement or village, • Place of worship or prayer. • Agro-based industry • Public slaughterhouse • Storage activities of agricultural goods which are non-hazardous in nature.	• Milk Chilling and Pasteurization • Animal husbandry clinic, veterinary dispensary or hospital. • Agricultural machinery workshop • Basic health unit • clinic or hospital; • Country club, • Zoological garden, • Farmhouse • Individual Housing unit • Slaughterhouses, • Dairy production, • Botanical garden, • recreational club or resort or country club; • Bird sanctuary, • Zoo or wildlife park, • Grain market • Cattle farm • Poultry Farm, • Cattle market • Fruit and vegetable market, • Agriculture, Livestock research institute • Park, monument, playground, gymnasium or sports complex • public or private recreational or theme park; • Vegetable, fruit and grain market • water filtration plant; • wastewater treatment plant; • Power plant • Petrol pump or gas station or LPG or LNG storage and filling station. • Base trans-receiver station • Or communication tower. • shooting range; • swimming pool; • library;	Other than permitted and permissible

4.5.5 Mining Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Extraction of minerals (e.g., coal, sand, gravel, stone), quarrying, and other resource mining activities.	• Housing or colony for workers (including schools and corner shops, health facility) • Processing plants for mined materials,	• Residential developments, • Commercial buildings, • Agricultural uses (crop farming, livestock farming), • Any land use that interferes with mining operations or is

Permitted Uses	Permissible Uses	Prohibited Uses
	• storage facilities for mined goods, Industrial parks related to mining activities (Processing plants, Storage facilities • Workshops and manufacturing units, Logistics infrastructure), Transportation infrastructure. • Utilities for mining operations (water treatment plants, power plants for mining operations), • Vocational training centers for workers in the mining sector.	incompatible with mining activities. • Any non-essential developments such as recreational areas, large-scale residential, or commercial zones within mining areas

4.5.6 Forest Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Forestry activities such as timber extraction (sustainable logging), reforestation, agroforestry, controlled ecotourism (e.g., hiking, camping), conservation efforts. • Wildlife conservation and habitat restoration, national parks, nature reserves.	• Forestry research institutes, sustainable wood processing industries (e.g., paper mills), eco-tourism facilities (lodges, visitor centers), and community-based forest management activities. • Educational and training centers focused on environmental conservation and sustainable forestry practices	• Urban development (residential, commercial, industrial), large-scale agriculture (e.g., crop farming), mining activities, infrastructure projects (e.g., roads, buildings), land clearing for non-forest related uses. • Any activities that lead to deforestation, illegal logging, or degradation of forest ecosystems.

4.5.7 Institutional Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Large Scale education zone • General education universities • Scientific research institutes • IT and Media institutes • City Level libraries, book banks, data and information centers • Large Scale Health Institutions; Hospitals, • Scientific research institutes, • Clinics, • Clinical Laboratory, • BHUs and RHCs, • Maternity Care Centres	• Staff residences (teaching and non-teaching, health workers, employees) • Separate hostels for Boys and Girls • Auditoriums, seminar halls, workshop spaces, • Community facilities (Parks, Playgrounds, neighbourhood commercial) • Athletic club, gymnasium, Sports facilities, fitness center or indoor sport facility, • Banks or Automated Teller • Machine (ATM), • Departmental Store, • Taxi or bus stand. • Hotel or Motel,	Other than permitted and permissible

• Government or semi-government offices (District Secretariat, Town Hall etc. • Social welfare institution such as community center, art gallery, museum and auditorium • Local and zonal municipal office • Police station, fire station or post office • Shelter home, • Pannahgahh, • Convention Centre	• Guest house,	

4.5.8 Mixed Land Use Zone

Permitted Uses	Permissible Uses	Prohibited Uses
• Detached/semi-detached homes • Residential apartments • Social institutions (schools, places of worship) • Retail shops, cafes, local businesses, offices for professionals (doctors, lawyers) • Schools, • Clinics, • Community centers, • Public parks, • Transportation hubs (bus stations and public transport terminals) • Small workshops, • Artisan businesses, • Local food production, local manufacturing units • Libraries, post offices	• Additional housing developments, Housing Schemes, housing societies and residential apartments • Hotels, motels, restaurants, specialized retail outlets. • Day-care centers, health centers, cultural centers. • Cottage industries, home-based businesses, small-scale production units. • Public sports complexes, recreation centers.	• Large-scale housing projects incompatible with zoning. • Hazardous goods stores, large malls, or heavy industry shops. • Large hospitals, forensic labs, military facilities. • Large factories producing hazardous materials, heavy industrial operations. • Sewage plants, waste disposal sites, power plants.

4.5.9 Recreation Zone

Permitted Uses	Permissible (Conditional) Uses	Prohibited Uses
• Public parks, playgrounds, green spaces • Sports facilities (fields, courts, pools) • Community/recreation centers • Nature preserves • Accessory uses (parking, restrooms) • Educational facilities (nature centers)	• Commercial amenities (e.g., cafés) • Event venues (festivals, concerts) • Campgrounds/RV parks • Private recreational facilities (marinas) • Small-scale lodging (eco-lodges) • Temporary uses (farmers' markets)	• Industrial activities (factories) • Heavy commercial (malls) • Residential housing (high density) • High-impact infrastructure (highways) • Polluting uses (landfills) • Intensive agriculture (livestock farming) • Waste disposal facilities • Transport depots/terminals

5. LEGAL & INSTITUTIONAL FRAMEWORK

5.1 Legal Framework for Implementation of District Land Use Plans

Under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, the implementation of District Land-Use Plans involves a structured process. Initially, the Planning Control Authority or designated unit formulates the plan, which is then reviewed and approved by the Provincial Land-Use and Building Control Council. Once approved, the plan is officially notified, and public consultations may be conducted to raise awareness. The plan is integrated with broader urban and infrastructure plans to ensure alignment with development goals and service provision. Landowners and developers must ensure their activities comply with the plan, with the Planning Control Authority monitoring compliance and enforcing regulations through inspections and notices. Applications for land-use and development permissions must align with the plan. The plan is subject to periodic reviews and updates, with significant changes leading to amendments. The Planning Control Authority monitors implementation, prepares regular reports, and resolves disputes through the Appellate Tribunal, ensuring effective and organized land development across Khyber Pakhtunkhwa.

5.1.1 Constitution and Functions of the Council

The Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021 establishes the Provincial Land-Use and Building Control Council, a key body responsible for overseeing land-use and building regulations. The Council is chaired by the Chief Minister of Khyber Pakhtunkhwa, with the Minister for Local Government, Elections, and Rural Development serving as the Vice Chairperson. The Council's membership includes various provincial ministers—such as those for Agriculture, Industries, and Environment—as well as senior officials from the Planning and Development Department, the Board of Revenue, and other government departments. Additionally, the Council features five experts, with at least three from the private sector, who are nominated by the Chairperson. The Director General of the Authority acts as the Member-cum-Secretary. While co-opted members with specific expertise may be invited for discussions, they do not possess voting rights. Members are expected to attend all meetings and may receive honoraria, particularly those from the private sector. Terms for members from clause (q) are three years, renewable, and vacant seats must be filled within one month.

The Council’s functions are multifaceted. It is responsible for approving policies and guidelines related to the Authority’s operations, reviewing and endorsing urban policies, physical planning standards, and land-use regulations proposed by the Authority. The Council oversees the creation and modification of strategic and master plans, including district land-use plans, and approves the Authority’s annual budgets. Additionally, the Council manages financial provisions for private sector expert members and oversees the preparation and implementation of various plans, providing directives as needed.

Meetings of the Council are chaired by the Chief Minister or, in their absence, by the Vice Chairperson. The Council is required to meet at least bi-annually, though additional meetings may be convened at the Chairperson’s discretion. A quorum for meetings is two-thirds of the total members, and the Council determines its own procedural rules.

5.1.2 Provincial Land-Use and Building Control Authority

The Act also establishes the Provincial Land-Use and Building Control Authority as a corporate entity with perpetual succession, capable of managing property, entering into agreements, and engaging in legal actions. The Council serves as the Board of Directors for the Authority, which is headquartered in Peshawar with the option to open sub-offices across the province. The Authority's actions are authenticated by the Director General, who is supported by the Urban Planning Policy Unit of the Planning and Development Department.

The Director General leads the Directorate General, overseeing the Authority’s operational aspects. Responsibilities include proposing and recommending planning standards, land-use guidance, and regulatory amendments to the Council, and supervising the development and implementation of master plans, strategic development plans, and district land-use plans. The Director General conducts research, publishes reports, and advises the Council on land conservation, classification, and development, and supervises the District Land-Use Planning and Management Committees. The Director General may be

appointed from a panel of recommended candidates or through direct recruitment. This role involves administrative and financial management of the Authority, preparation of meeting agendas, implementation of Council decisions, progress monitoring, and compliance management, including recommending inquiries into non-performance.

This comprehensive framework under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, aims to ensure organized development and regulatory compliance across the province, fostering effective land-use planning and building control.

5.1.3 District Local Enforcement Unit

The planning regulation outlines the establishment of a Local Planning and Enforcement Unit in each district to ensure effective land-use management. This Unit comprises a Chief Planning Control Officer, Planning Control Officers, Inspectors, and additional staff appointed by the government in consultation with the relevant authority. The Chief Planning Control Officer is responsible for the administration and operational functions of the Unit and reports directly to the District Land-Use Planning and Management Committee. Moreover, the Chief Officer is required to maintain coordination with local governance bodies, including the Chairperson of the Tehsil Council, City Mayor, Tehsil Municipal Officer, Director of the Urban Area Development Authority, as well as Deputy and Assistant Commissioners. This inter-agency coordination ensures transparency and accountability, particularly in identifying and reporting deviations from approved land-use and master plans.

The Unit's primary responsibilities include supporting the District Land-Use Planning and Management Committee in conducting surveys and preparing district land-use and master plans. It is also tasked with ensuring the implementation of relevant legislative provisions within its jurisdiction. Furthermore, the regulation empowers the government to appoint Planning Control Officers and Inspectors as required, and to authorize other agencies or designated officials to perform these roles during the enforcement period of the Act. Overall, this chapter emphasizes a structured, collaborative, and compliance-driven approach to land-use governance at the district level.

5.1.4 District Land-Use Planning and Management Committee

The District Land-Use Planning and Management Committees are constituted as institutional mechanisms to oversee and guide land-use governance at the district level in accordance with statutory provisions. Each committee is chaired by the Deputy Commissioner and comprises key departmental heads and representatives from local councils, with the Additional Deputy Commissioner (Finance and Planning) serving as both a member and the Secretary. The committees are mandated to convene on a monthly basis or as required, with a two-thirds quorum necessary for proceedings. Their core functions include the facilitation and supervision of land-use surveys, zoning activities, strategic and master planning, and coordination with local government bodies. They are also responsible for reviewing no-objection certificates (NOCs), development permissions, and recommending land-use plans to the relevant Authority for approval. Additionally, the committees are empowered to take enforcement action against unauthorized developments and violations of approved land-use plans. The inclusion of co-opted members with technical expertise further strengthens the committee’s capacity for informed decision-making. These provisions collectively promote a structured, accountable, and efficient approach to district-level land-use planning and management.

5.1.5 Planning Control Permissions

Under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, certain permissions are required for land and building developments. These include both land-use and development permissions. Land-use permission is necessary for any land or building unless specifically exempted by the Act, while development permission is required for any land development or building construction. It is important to note that land-use permissions granted before the commencement of this Act will still be subject to its provisions.

5.1.6 Land Use Permission

To obtain land-use or master planning permissions, applications must be submitted to the Planning Control Officers. These applications need to be in the prescribed format and include all necessary documents,

along with any additional documentation that the Planning Control Officer may request. Only the landowner or their authorized representative is eligible to apply for land-use permission.

When a land or building use does not comply with the district land-use plan, the owner must submit a land-use conversion plan within three months of the notification of the plan. If the owner fails to submit a plan, the Planning Control Officer will issue a notice requiring submission within 30 days. Should the plan still not be provided, the Planning Control Officer will create and issue a conversion plan on behalf of the owner. Owners must align their land or building use with the issued conversion plan.

5.1.7 Development Permissions

The Act defines three types of development permissions: land development permissions, road remodeling permissions, and building permissions. Applications for these permissions must be accompanied by the prescribed fee.

Applications for development permissions should be submitted to the Planning Control Officer, following the prescribed format and including all necessary documents. Additional documentation may be requested by the Planning Control Officer. Land development and building permissions can only be requested by the property owner or their authorized representative, whereas road remodeling permissions can be requested by relevant authorities or entities.

Certain exemptions apply to building permissions. Specifically, no building permission is required for constructions based on standard designs notified by the Authority. Similarly, repairs, rehabilitation, or renovation of historic buildings, provided they have the approval of the relevant authority, are exempt from building permission requirements.

Owners of buildings that do not comply with the district land-use plan must submit a building conversion plan within three months of the notification of the plan. If no plan is submitted, the Planning Control Officer will issue a notice requiring submission within 30 days. Should the plan still be lacking after this notice, the Planning Control Officer will create and issue a conversion plan. Compliance with the issued conversion plan is mandatory for all building owners.

This framework provides clear procedures for obtaining and managing planning and development permissions, ensuring adherence to land-use and building regulations, while also allowing for necessary modifications and exemptions.

5.1.8 Certificates and Renewal of Building Stock

Under the Khyber Pakhtunkhwa Land-Use and Building Control Act, 2021, a compliance certificate is mandatory for anyone who has obtained development permission. This certificate must be submitted within the time specified in the development permission and must confirm that the development has been executed in accordance with the granted permissions and applicable regulations. The compliance certificate should adhere to the form and include the documents specified by the Authority or any additional documents requested by the Planning Control Officer. If the Planning Control Officer determines that the development aligns with the permissions and regulations, they will issue the compliance certificate.

Buildings may be subject to renewal regulations, and owners are required to renew their buildings in accordance with these regulations.

5.1.9 Improvement of Urban Design

Improvement proposals are necessary if an area's urban design is deemed poor or if directed by the Government. These proposals must include a land use change plan (if required), a redevelopment plan, a building stock renewal program (if necessary), cost estimates for the redevelopment and renewal programs, any required changes in development and ownership, and steps to ensure a smooth transition to the planned development. Land use change plans will follow the procedures outlined in Section 18 of the Act.

When land use changes occur, an infrastructure change proposal must be formulated within 60 days. This proposal will include directives for utilities and agencies to plan for the municipal services required to support the new land use.

The Unit has the authority to prepare and execute schemes, direct government agencies, standardize building plans, acquire land, enter into public-private partnerships, reallocate land and building rights with Government approval, and support the establishment of Real Estate Investment Trusts (REITs).

A betterment fee may be charged to cover the costs of improvement or infrastructure proposals, with prior Government approval. This fee is based on the ownership of physical assets and may be recovered as arrears of land revenue. It can cover all or part of the costs associated with improvements.

If the full cost of improvements is not covered by the betterment fee, a development charge may be imposed on the owners of physical assets who have benefited from the development. This charge is payable upon the sale or lease of the asset exceeding 11 months. It correlates with the development costs and may be recovered as arrears of land revenue, subject to Government approval.

5.1.10 Enforcement and Penalties

Planning Control Officers are responsible for assessing and evaluating planning permissions, while Planning Control Inspectors handle unauthorized land use and development and prepare contravention reports.

Authorized officers have the power to seal buildings or structures for violations of the Act, rules, or regulations. They may also attach areas or open spaces for such violations.

Penalties for offenses are specified in the First Schedule of the Act. These offenses are cognizable and non-bailable. No court can take cognizance of these offenses except on a complaint by an authorized officer or the District Land-Use Planning and Management Committee. The Code of Criminal Procedure, 1898 applies to offenses under this Act.

The Government will establish an Appellate Tribunal to hear appeals against decisions or orders issued by the Authority or its officers. The Tribunal will consist of a chairperson and two expert members. Appeals must be filed within 15 days of receiving the decision. The Tribunal's decisions are final, and its members will serve a three-year term. Directors and officers of corporate bodies are responsible for offenses under this Act unless they can prove otherwise.

5.1.11 Inspection

The Government may establish an external Land Use Inspectorate to monitor enforcement of the Act. This Inspectorate will include a Chief Inspector and Deputy Chief Inspectors and will be funded by the Government.

The Chief Inspector and Deputy Chief Inspectors have the authority to inspect records, enter premises, and obtain court records related to the enforcement of the Act.

Inspections will follow an annual schedule prepared in consultation with the Authority. Unannounced inspections may only occur on the Department's directions. Draft findings from inspections will be shared with enforcement officials for feedback, and final reports will be provided to the relevant authorities.

5.1.12 Inclusion of Technical Experts in District Planning framework

In order to ensure a robust and effective decision-making in district land-use planning, the framework requires the active participation of technical experts, a provision made possible through the co-option of members in the District Land-Use Planning and Management Committee, in collaboration with the newly established Local Planning and Enforcement Unit. Some strong alternatives include:

- Inclusion of local enforcement unit in District Land-Use Planning
- Engagement of Urban Planners, GIS Experts for District-Level Planning
- Integration of specialized workforce for effective Land-Use Planning
- Integration of Sectoral Expertise in District Committees
- Appointment of Technical Consultants for Planning Oversight
- Expert Advisory Mechanism for District Planning Committees
- Involving Technical Experts in District Land-Use Planning.

5.2 Institutional Gaps and Implementation Strategy

Despite the presence of a legislative and administrative framework for land use planning at the provincial and district levels, effective implementation remains hindered by several institutional shortcomings. Key

challenges include limited technical and human resource capacity, poor inter-agency coordination, weak monitoring and enforcement mechanisms, and minimal stakeholder engagement. Local planning units often operate without qualified professionals such as urban planners and GIS experts, leading to delays in plan preparation, poor compliance, and ineffective development control. Fragmented mandates, cumbersome regulatory processes, and lack of data-sharing protocols further exacerbate inefficiencies and duplication of efforts.

5.2.1 Institutional Gap Analysis and Actionable Mechanisms

To address these issues, a set of targeted, actionable mechanisms has been developed to strengthen institutional performance and bridge the gap between planning and implementation. These include establishing formal coordination bodies, implementing training programs, introducing GIS-based monitoring tools, reforming regulatory procedures, and creating participatory platforms for community engagement. The following table outlines the key institutional gaps and corresponding strategies designed to enhance accountability, coordination, and responsiveness in the planning system.

Identified Gap	Detailed Description	Proposed Mechanism / Action Plan	Responsible Institutions
Fragmented Inter-Agency Coordination	Agencies at provincial, district, and tehsil levels often operate in silos with unclear communication and reporting lines. This leads to duplication of work and conflicting decisions in planning and enforcement.	• Establish formal coordination committees at each level. • Conduct quarterly inter-departmental coordination meetings. • Develop shared digital dashboards for real-time data sharing.	District Planning Committees
Inadequate Institutional Capacity	District and tehsil-level units often lack adequately trained urban planners, GIS experts, data analysts, and enforcement officers, limiting the quality and timeliness of plan implementation.	• Launch mandatory training & certification programs for planning staff. • Hire technical staff through P&D-led recruitment. • Allocate dedicated funds for technical equipment and planning software.	Planning Control Authority, P&D Department
Weak Monitoring and Enforcement System	Lack of real-time monitoring tools and irregular site inspections lead to unauthorized developments going unchecked.	• Integrate GIS-based monitoring systems. • Schedule routine and surprise inspections. • Publish quarterly compliance and enforcement reports. • Establish citizen complaint response mechanisms.	Inspectorate Wing, District Enforcement Units, Planning Control Officers
Obsolete Land Use Data and Delayed Updates	Land use plans are often based on outdated or incomplete data, and there is no structured timeline for their periodic review.	• Make five-year plan revision mandatory by regulation. • Institutionalize data collection using satellite imagery and public surveys. • Create a rolling update mechanism at the district level.	DG of Authority, District Committees, Urban Planning Policy Unit
Limited Community Engagement and Public Awareness	Citizens remain unaware of land-use regulations, their responsibilities, or the grievance redressal mechanisms available to them.	• Launch public education campaigns (radio, TV, social media, town halls). • Establish digital portals for plan access and feedback. • Form citizen advisory groups for plan reviews.	District Committees, LG Department, Communication & Outreach Unit

Identified Gap	Detailed Description	Proposed Mechanism / Action Plan	Responsible Institutions
Ambiguous Regulatory Roles and Overlaps	Institutional mandates are sometimes overlapping or undefined, resulting in confusion over responsibilities (e.g., plan approval vs enforcement).	• Revise and harmonize regulations to clearly demarcate roles. • Issue standard operating procedures (SOPs) for plan review, approval, and monitoring. • Set up grievance handling protocols for inter-agency disputes.	Provincial Council, Law Department, DG LU&BCC Authority
Lack of Specialized Technical Input in Decision-Making	Strategic decisions are often made without input from subject experts, resulting in plans that may lack technical depth.	• Form Expert Advisory Panels with GIS, climate, transport, and housing experts. • Involve academia and research institutes in plan review stages. • Institutionalize co-opting of experts in District Committees.	Planning Control Authority, District LU Committees, P&D Experts Pool
Insufficient Funding for Implementation	Planning and enforcement units face budgetary constraints that affect staffing, technology adoption, and project execution.	• Introduce dedicated development and enforcement budget lines. • Mobilize funding through betterment charges and public-private partnerships (PPPs). • Explore federal and donor funding for capacity building.	Finance Dept., LU&BCC Authority, District Governments
Weak Legal Enforcement and Appeal Mechanisms	Legal processes for penalizing violations or resolving appeals are often slow and cumbersome, reducing the credibility of enforcement.	• Strengthen the Appellate Tribunal with adequate staffing and infrastructure. • Simplify and digitize appeal filing processes. • Publicly disclose tribunal decisions to ensure transparency.	Appellate Tribunal, Law Department, DG LU&BCC Authority
Disconnected Infrastructure Planning	Land-use decisions are not always aligned with utility and transport infrastructure planning, creating long-term inefficiencies.	• Mandate joint planning between land-use and infrastructure agencies. • Require infrastructure feasibility reports with all major land-use changes. • Create integrated spatial development models.	LG & Public Health Engineering, Transport Department