



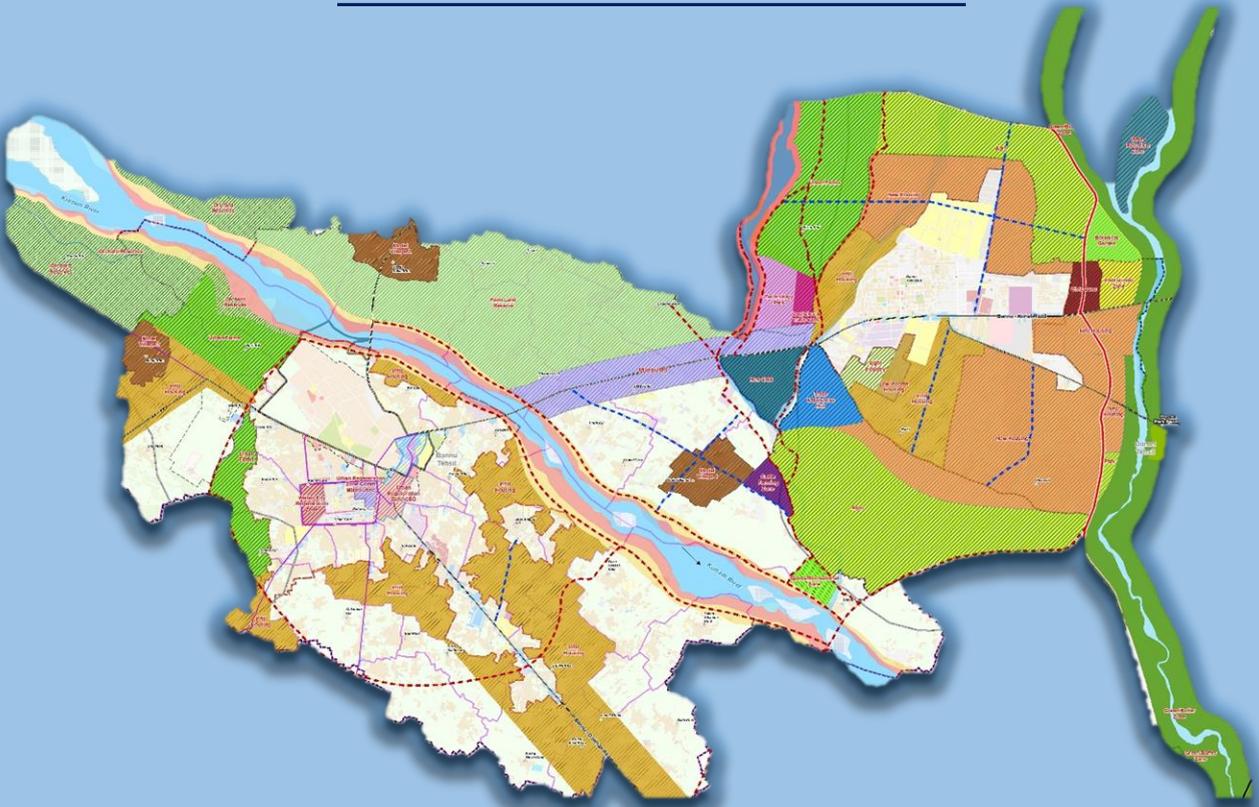
**URBAN POLICY UNIT**  
Planning and Development Department  
GOVERNMENT OF KHYBERPAKHTUNKHWA



# **CONSULTANCY SERVICES FOR THE MASTER PLAN OF URBAN CENTER OF KHYBER PAKHTUNKHWA DIVISIONAL AND SELECTED DISTRICT HEAD QUARTER CITIES**

*Package 2: Kohat, Bannu and DI Khan*

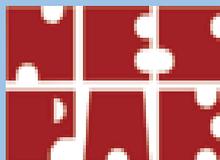
## **STRATEGIC SCENARIO DEVELOPMENT REPORT OF BANNU CITY**



**JANUARY, 2024**



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## Table of Contents

1. Introduction .....	1
1.1. Project Area.....	1
1.2. Study Objectives .....	1
1.3. Scope Of Services.....	3
1.4. Current status of the project Deliverables.....	3
2. Vision Development of Bannu City.....	5
2.1. Importance of Vision Development.....	5
2.2. Bannu City Vision Statement.....	6
3. Existing Landuse Typology Of Project Area.....	6
3.1. Brief Analysis of Bannu .....	6
3.2. Project Area Population .....	7
3.3. Land Cover Analysis .....	8
3.4. Population Density .....	9
3.5. Landuse Typology of Project Area .....	9
3.6. Existing Landuse Distribution Part-B .....	10
4. Sustainable Development Goals, 2030 .....	11
4.1. SDG 6: Clean Water And Sanitation .....	11
4.1.1. Goal Targets .....	12
4.2. SDG 11: Sustainable Cities and Communities.....	12
5. Drivers Of Urban Growth For Bannu City.....	14
5.1. Major Road Projects.....	14
5.1.1. Bannu Road Upgradation Project.....	14
5.1.2. Kohat-Bannu Road.....	14
5.1.3. Bannu Circular Road.....	15
5.2. Major Residential Sector Projects.....	16
5.2.1. Bannu Township.....	16
5.3. Major Social Sector Projects .....	16
5.3.1. Water Storage Reservoirs/Dams Around Bannu .....	16
5.3.2. Bannu University Of Science And Technology .....	17
5.3.3. New Bridge In Kurram River.....	17
5.3.4. IDP's Camp On Miran Shah Road.....	18



5.3.5.	New vegetable and fruit market Bannu .....	18
5.3.6.	Cattle Market.....	18
5.3.7.	Divisional Health Development Center (DHDC) Bannu.....	18
5.3.8.	Sports Complex Bannu. ....	18
5.3.9.	Qazi Mohib Hockey Stadium .....	19
5.3.10.	Medical Teaching Institution Bannu.....	19
5.4.	Major Industrial Sector Projects.....	19
5.4.1.	Bannu S.I.E .....	19
5.4.2.	Bannu Woolen Mills.....	20
5.4.3.	Bannu Economic Zone .....	20
5.5.	Overall Growth of Bannu City 2009-2022 .....	22
5.5.1.	Urban Sprawl .....	22
5.5.2.	Spatial Urban Growth Trend.....	22
6.	Population Projection .....	24
6.1.	Mathematical Method .....	24
6.2.	Arithmetic Method .....	24
6.3.	Geometric Increase/Progression Method .....	25
6.4.	Preferred approach for population projection .....	28
7.	Multi-Hazard Vulnerability Zoning Based on Thematic Layers .....	28
7.1.	Multi-Hazard Zoning .....	28
7.2.	Highly Hazardous Zone (HHZ) .....	29
7.3.	High Multi-Hazard Zone (HMZ).....	29
7.4.	Moderate Multi-Hazard Zone (MMZ).....	30
7.5.	Low Multi- Hazard Zone (LMZ) .....	30
8.	Safer Urban Landuse Suitability Zoning.....	31
8.1.	Construction Suitability Recommendations for Geo hazard Zones .....	31
8.2.	High Construction Suitability (HCS) Zone.....	31
8.3.	Moderate Construction Suitability (MCS) Zone .....	31
8.4.	Low Construction Suitability (LCS) Zone .....	31
8.5.	Not Suitable for Development (NSD).....	32
9.	Multi-Criteria Analysis .....	36
9.1.	Qualitative Multi-Criteria Analysis .....	36



9.2.	Quantitative Multi-Criteria Analysis.....	40
9.3.	Methodology.....	40
9.4.	Framework for Landuse Suitability Analysis based on GIS .....	41
10.	GIS BASED LAND SUITABILITY ANALYSIS.....	44
11.	KPK URBAN POLICY 2022-2030 .....	47
11.1.	Landuse Regulations.....	47
11.2.	Landuse Recommendations.....	48
11.3.	Proposed Density .....	49
12.	Urban Growth Models.....	49
12.1.	Concentric Zone Model .....	50
12.2.	Sector Model .....	50
12.3.	Multi-Nuclei Model.....	50
12.4.	Applicability Of Multiple Nuclie Growth Model On Bannu .....	51
13.	District Spatial Strategy .....	51
13.1.	District Level Economic Potentials .....	51
13.2.	Evolution Of Urban Form Of Bannu.....	52
13.3.	Ongoing/Proposed projects in Bannu District.....	54
13.4.	Constraints And Opportunities On Urban Expansion In District Bannu .....	55
13.5.	Infrastructure Challenges .....	55
13.6.	Environmental Concerns .....	55
13.7.	Limited economic opportunities .....	55
13.8.	Opportunities for Urban Expansion in Bannu .....	56
14.	Strategic Scenario Mapping .....	56
14.1.	Scenario Mapping In Bannu .....	60
14.2.	Preferred Scenario for Zoning .....	62
15.	Proposed Zones of Selected Scenario .....	64
15.1.	Description of Zones .....	65
15.1.1.	Commercial Zone .....	65
15.1.2.	Proposed Residential Zone .....	68
15.1.3.	Rural Urban Integration Plan.....	70
15.1.4.	Transportation Plan.....	73
15.1.5.	Parks and Recreational zone .....	77



15.1.6.	Technology Zone.....	80
15.1.7.	Proposed Green Spaces and Agriculture Map .....	80
15.1.8.	Civic Zone .....	82
15.1.9.	Industry and Trade Plan .....	84
15.1.10.	Religious Area Plan.....	86
15.1.11.	Proposed Utilities Map .....	88
15.1.12.	Proposed Center City Map of Bannu.....	94
16.	Planning Standards and Zoning Calculations.....	98
16.1.	Area Requirement for Zones .....	98
16.2.	Household Income Details for Housing Affordability in Bannu.....	100
17.	Urban Design Regulations.....	103
17.1.	Strategies for Sustainable Neighborhood Development.....	106
18.	Transportation & Road Up gradation Strategies .....	108
18.1.	Improvement in existing Transportation Infrastructure .....	108
18.1.1.	Improvement of important roads.....	108
18.1.2.	Improvement of Intersections .....	108
18.1.3.	Improvement of Traffic Management.....	109
18.1.4.	Parking Management and Enforcement .....	110
18.1.5.	Improvement of Public Transportation.....	110
18.1.6.	Improvement of Traffic Safety .....	111
18.1.7.	Land Use Control Building Control .....	112
18.1.8.	Improvement of Pedestrian Movement.....	112
18.1.9.	General Recommendations for existing Transportation in Bannu .....	113

## List of Figures

Figure 1-1: Project Area.....	1
Figure 5-1: Bannu Road Upgradation .....	14
Figure 5-2: Old Bannu Road.....	14
Figure 5-3: Project Map of Bannu Circular Road .....	15
Figure 5-4: Township Bannu Master Plan.....	16
Figure 5-5: Baran Dam, Bannu.....	17
Figure 5-6: Bannu University of Science and Tehnology .....	17
Figure 5-7: Bannu Sports Complex.....	18
Figure 5-8: Qazi Mohib Hockey Stadium .....	19
Figure 5-9: Khalifa Gul Nawaz Teaching Hospital .....	19
Figure 5-10: Location of Bannu Economic Zone.....	20
Figure 5-11: Master Plan of Bannu Economic Zone .....	21
Figure 5-12: Spatial Growth Map Bannu.....	23
Figure 5-13: Year wise Spatial Growth Map Bannu .....	23
Figure 6-1: Population Growth Rate of Bannu .....	28
Figure 8-1: Geo-Hazard Map of Bannu.....	33
Figure 8-2: Construction Suitability Map of Bannu.....	34
Figure 8-3: Bannu Multi Hazard Zonation Map .....	35
Figure 9-1: Framework for Landuse Suitability Analysis based on GIS .....	41
Figure 10-1: Bannu Land Suitability Ma.....	46
Figure 11-1: Important sections of KP Urban Policy .....	47
Figure 12-1: Urban Growth Models.....	49
Figure 12-2: Concentric Zone Model .....	50
Figure 12-3: Sector Growth Model.....	50
Figure 12-4: Multiple Nuclie Model .....	51
Figure 13-1: Factors to consider the urban expansion at District Level .....	51
Figure 13-2: Evolution of Bannu City .....	53
Figure 13-3: Developments Of Recent Past Influencing Urban Form.....	54
Figure 13-4: Constraints and Opportunities on Urban Expansion in District Bannu.....	55
Figure 13-5: Unpaved Road in Bannu .....	55
Figure 13-6: People searching for daily job in Bannu .....	56
Figure 13-7: Opportunities for Urban Expansion in Bannu .....	56
Figure 14-1: Stages before Scenario Mapping .....	57
Figure 14-2: Process of Strategic Scenario Mapping.....	58
Figure 14.2-1: Features of preferred scenario for Zoning in Bannu District .....	62
Figure 14.2-2: Bannu Scenario Mapping .....	63
Figure 15-1: Features of commercial corridors .....	66
Figure 15-2: Proposed Commercial Zone Plan.....	67
Figure 15-3: Bannu Proposed Residential Zone Map .....	69
Figure 15-4: Features of Model Village.....	70
Figure 15-5: Proposed Rural Urban Integration Plan Bannu .....	72
Figure 15-6: Typical Cross Section (120') for arterial roads.....	74



Figure 15-7: Typical Cross Section (60') for collector roads .....	75
Figure 15-8: Proposed Transportation Plan Bannu.....	76
Figure 15-9: Urban Farming Methods.....	77
Figure 15-10: Miyawaki Forest Layers.....	78
Figure 15-11: Features of Miyawaki Forest .....	78
Figure 15-12: Proposed Park & Recreational Plan Bannu .....	79
Figure 15-13: Proposed Green Spaces and Agriculture Plan .....	81
Figure 15-14: Key features of a civic zone.....	82
Figure 15-15: Proposed Civic Zone Bannu.....	83
Figure 15-16: Proposed Industry Trade Plan Bann.....	85
Figure 15-17: Proposed Religious Area Plan of Bannu .....	87
Figure 15-18: Proposed Water Treatment Plants in Bannu .....	89
Figure 15-19: Proposed Sewerage Treatment Plant Bannu .....	91
Figure 15-20: Proposed Landfill Site Plan Bann .....	93
Figure 15-21: Benefits of Urban Regeneration Zone .....	94
Figure 15-22: Proposed Center City Map of Bannu .....	95
Figure 15-23: Proposed Zoning Plan of Bannu (Regional Scale) .....	96
Figure 15-24: Proposed Zoning Plan of Bannu.....	97
Figure 16-1: Monthly Household Income of people in Bannu (PKR).....	100
Figure 17-1: Importance of urban design.....	103



## List of Tables

Table 1-1: Current Status of the Project .....	4
Table 2-1: Characteristics of Urban Quality Of Life .....	6
Table 3-1: Population Of Bannu Tehsil By Rural-Urban Distribution.....	7
Table 3-2 Project Area Population .....	7
Table 3-3: Bannu Land Cover Stats (Part A) .....	8
Table 3-4 Bannu Land Cover Stats (Part B) .....	9
Table 3-5 Area Distribution under existing Landuse (Part A) .....	9
Table 3-6 Summary of Bannu Cantonment (exists in Part A) .....	10
Table 5-1: Details of Old Bannu Road .....	14
Table 5-2: Bannu Circular Road Project Status .....	15
Table 5-3: Estimated Urban Area for Year 2009 & 2022 .....	22
Table 5-4: Growth Trend from 2009 to 2022.....	22
Table 6-1: Population projection of Neighborhood Council by Arithmetic method .....	25
Table 6-2: Population projection of Neighborhood Council by Geometric method .....	26
Table 6-3: Population Projection of Village Councils by Geometric method .....	26
Table 9-1: Qualitative Multi Criteria Analysis .....	36
Table 9-2 Quantitative Multi-Criteria Analysis .....	41
Table 11-1: Proposed Densities as per KP Urban Policy.....	49
Table 13-1: Ongoing/ Proposed projects in Bannu District .....	54
Table 14.1-1: Features of Proposed Scenarios .....	60
Table 14.1-2: Area Statement for Planning Boundaries of Scenarios.....	61
Table 15-1: Proposed Zones Details in Respective VC's of Bannu .....	64
Table 16-1: Area Requirement for Zones in Bannu .....	98
Table 16-2: Residential Land Requirement of Bannu City .....	101
Table 16-3: Area statement of proposed zones.....	102
Table 17-1: Features of a Sustainable Neighborhood .....	107

## 1. Introduction

Master planning of cities is a comprehensive and long-term approach to urban development. It involves the systematic and strategic planning of various aspects of a city's growth and development to ensure sustainability, functionality, and livability. It begins with defining how land within the city will be used. This includes designating areas for residential, commercial, industrial, recreational, and green spaces. The goal is to create a balanced and efficient use of land resources. Cities need robust infrastructure for water supply, sewage and wastewater management, electricity, telecommunications, and more. Master planning ensures that these services are not only available but also sustainable and resilient. For this purpose KPK Government has also been working diligently to formulate a master plan for its cities.

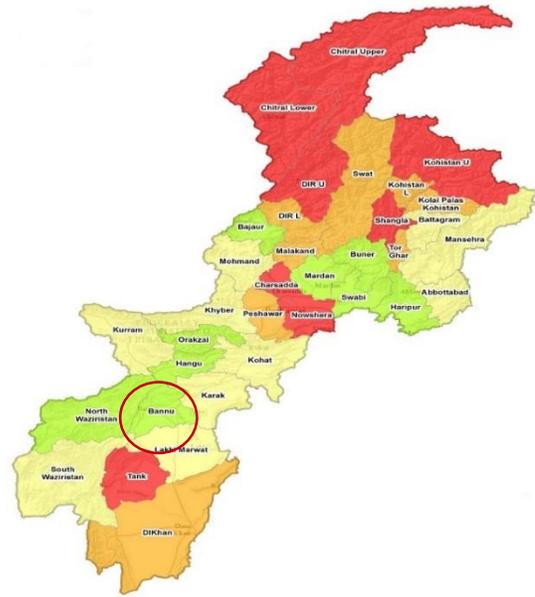


Figure 1-1: Project Area

### 1.1. Project Area

Khyber Pakhtunkhwa province consists of 34 districts and seven divisions. Bannu (Bana) is located in the KPK province, approximately 120 kilometers South-West of Kohat City and 140 kilometers North of Dera Ismail Khan City. Bannu has a total area of 1227 sq.kms. The area has seen a population growth of approximately 72% in the last 19 years<sup>2</sup>. The Kurram River (Koorma) flows through Bannu providing a rich source for the agricultural area.

Major population of Bannu lives in the rural areas surrounding the city. There is a strong tribe system prevalent in the region. Bannu Woolen Mills is famous all over Pakistan for producing the great quality fabrics. There is a very powerful legal system in place in Bannu and the surrounding region.

### 1.2. Study Objectives

- a) To critically review the current policies and ongoing schemes of urban development to pinpoint the short comings, suggest appropriate changes in the current policies and strategies to remove its deficiencies.
- b) To assess the impact of urbanization (population growth, re-classification and expansion in the urban boundaries) on the basic services and to suggest strategies to upgrade/extend urban infrastructure to keep pace with the urban growth.
- c) To examine the existing regulatory and institutional framework, including governance measures of the city and suggest improvements.
- d) Identify and conceptualize the scale and type (i.e. built form, density, mix of uses) of development appropriate for various intensification areas;
  - a. Devise strategies for affordable housing, livelihood and recreation facilities for all in close proximity both in the existing city and new areas;
- e) Devise strategies for urban regeneration/slum up gradation and to encourage mixed used high density vertical development at appropriate location within the existing urban core;
- f) Devise a policy framework and specific design guidelines to address local issues affecting

intensification / densification currently and in the future;

- g) Assess the adequacy of municipal services (storm water, solid waste management, sewage treatment and municipal water supply) and social amenities such as (parks and playground, public and private transits, bus stops and terminals; roads capacities, junctions improvement and parking facilities) to achieve the required levels of intensification for identified and conceptualized development scenarios;
- h) To suggest a legal, financial and technical mechanism between urban planning and land administration systems to enable feasible land to be accessed and used for development in future.
- i) Recommend appropriate criteria for intensification proposals. Criteria should address matters such as, but not be limited to:

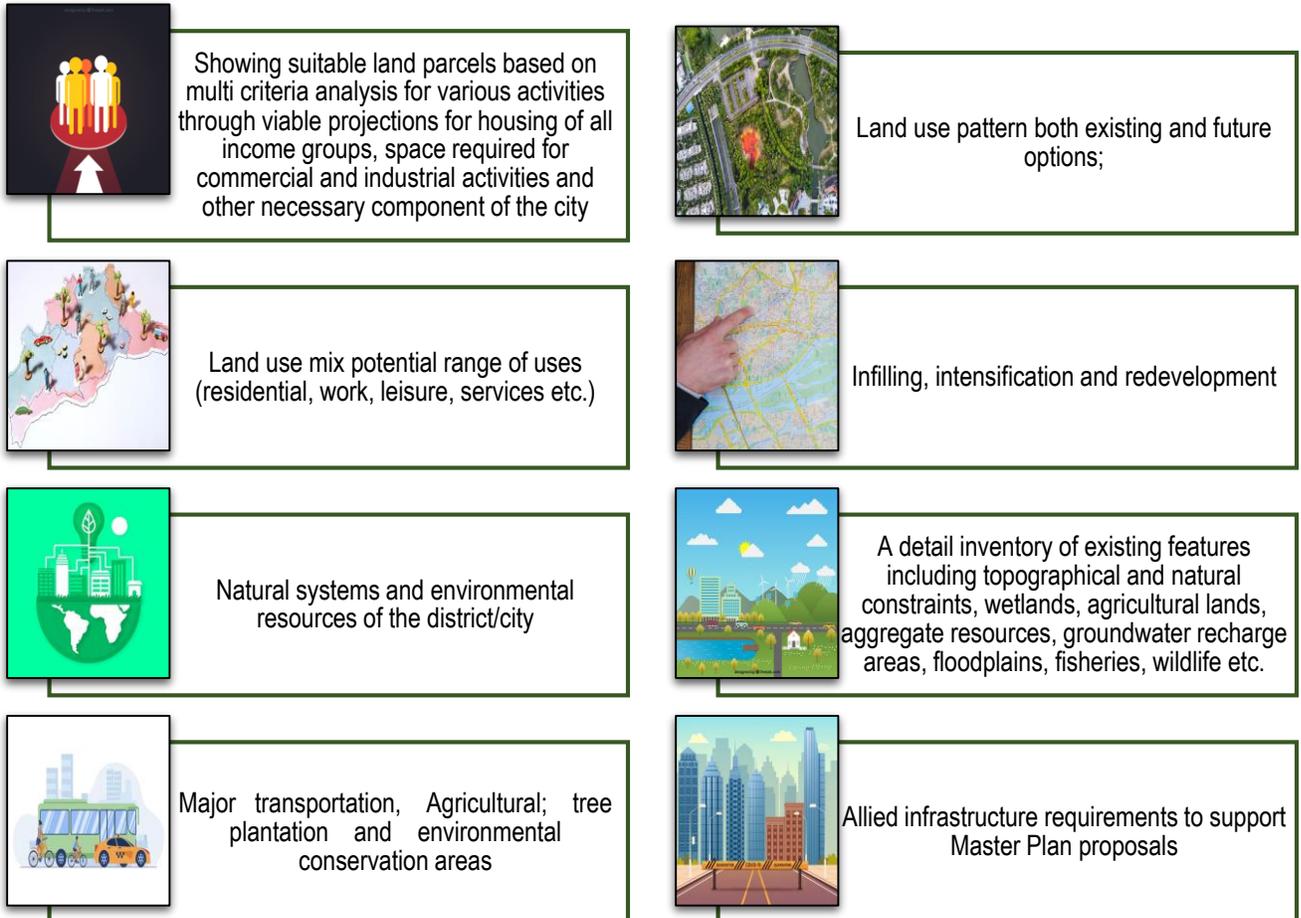


- j) Strategies to ensure coordination among public/private institutions to carry out desired development in a coordinated manner (Proper development control mechanism);
- k) Strategies to enhance urban security issues;
- l) Strategies to conserve heritage, built and natural environments of the region;
- m) Strategies to explore and enhance urban tourism to serve as an essential part of future urban economy;
- n) economy;
- o) Strategies to improve system of revenue generation/economic productivity of the institutions through the, identification of buoyant sources of tax and revenue generation such as land valuation (betterment) taxation; urban land taxation etc.
- p) Enhance connectivity and transit mobility to support and complement mixed use high-rise development to reduce financial and environmental burdens of conventional commuting;

- q) Strategies for the plan Implementation and to establish a system of monitoring and review of the plan proposals.

### 1.3. Scope Of Services

-  **TASK A: VISION FORMULATION AND COMMUNITY CONSULTATION**
-  **TASK B: BACKGROUND STUDY AND ANALYSIS**
-  **TASK-C. MASTER PLAN STRATEGIC SCENARIO DEVELOPMENT/MAPPING**



### 1.4. Current status of the project Deliverables

The study deliverables include documents containing the study findings with supporting diagrams/maps, charts and analytical summaries and recommendations with respect to policy direction. All deliverables shall be submitted to the Urban Policy Unit (Client). At the end of first month inception report will be submitted. Current status of the project is shown below:



Table 1-1: Current Status of the Project

Table 1.1: Deliverables and Timelines		
Sr. #	Deliverables	Status
1.	Inception Report	Submitted & Approved
2.	Report on Vision Development and Public Consultation	Submitted & Approved
3.	Data Analysis and Background Studies Report	Submitted & Approved
4.	Master Plan & Scenario Maps	In process
5.	Formulation of Sector wise Action Plans	To be followed
6.	Final Master Plan	To be followed

## 2. Vision Development of Bannu City

### 2.1. Importance of Vision Development

Vision development is a crucial aspect of city planning, as it sets the long-term direction and goals for a city's growth and development. A well-defined vision serves as a roadmap, guiding decisions and actions that shape the physical, social, and economic fabric of a city. Here are several key reasons why vision development is essential for effective city planning:



#### **Alignment of Goals and Objectives:**

A clear vision helps align the goals and objectives of various stakeholders, including city officials, planners, developers, and the community.



#### **Sustainability and Resilience:**

It allows city planners to integrate environmentally friendly practices, such as green infrastructure, renewable energy, and efficient transportation systems.



#### **Quality of Life:**

This includes factors like access to parks, public transportation, affordable housing, healthcare, and educational opportunities.



#### **Economic Growth:**

Identifying opportunities for job creation, fostering innovation hubs, and attracting businesses and investment.



#### **Infrastructure Planning:**

Construction or renovation of essential infrastructure, such as roads, bridges, and utilities.



#### **Cultural and Historic Preservation:**

Respects and preserves this heritage while allowing for growth can create a unique identity and sense of place that attracts both residents and tourists.



#### **Long-Term Planning:**

A vision development process encourages thinking beyond short-term gains and focuses on the city's long-term health and prosperity.



#### **Adaptability to Change:**

A well-crafted vision is not static; it allows for adaptation to changing circumstances and new challenges.

## 2.2. Bannu City Vision Statement

Because of absence of any master plan, development control mechanism and lack of access to basic Social Amenities & Physical Infrastructure in the City of Bannu, people are more focused and desirous of having basics of a good City Life. Managing the City's resources to make the City livable for all segments of life should be the primary concern for all stakeholders in preparing and implementing the Future Plans. However, as evident from comprehensive consultations and based on realization of Quality Urban Living, Following Vision may be adopted for Bannu City:



**“Safe, Clean & Affordable City through Inclusive Urban Planning while continuously striving to revitalize the existing Old City Areas to improve the Quality of Life for the Citizens”**

The above statement emphasizes a proactive approach by the local government / agencies that value safety and affordability while recognizing the need to continually seek opportunities for enhancing the quality of urban life of the Entire City.

Following strategic elements are to be ensured and to make the stated vision realized which also related to “Urban Quality Of Life” Values:-

*Table 2-1: Characteristics of Urban Quality Of Life*

<b>Health &amp; Safety</b>	Safe, Secure & Healthy Living
<b>Resilient</b>	Resilient Communities to withstand natural disasters
<b>Prosperity</b>	Economic opportunities and prosperity, Diversify Tax Base
<b>Education</b>	Educated citizenry & civic sense
<b>Diversity</b>	Vibrant, all segments of population be properly served
<b>Stewardship</b>	Intelligent & Sustainable management of City's natural, cultural & economic resources, Strengthen and clarify urban regulations
<b>Pursuit Of Happiness</b>	Enhanced environmental, natural, recreational & cultural Opportunities
<b>Heritage</b>	Preservation of historic, architectural & cultural resources
<b>Shelter</b>	Neighborhood preservation, affordable housing
<b>Efficiency</b>	Convenience, accessibility & mobility, Walkable Community
<b>Landuse</b>	Diverse Mixed Use & Compact land use
<b>Civic Involvement</b>	Engaged public in planning & managing the City
<b>Cityscape</b>	Beautiful Urban Landscape, Preserving historic Urban Fabric

## 3. Existing Landuse Typology Of Project Area

### 3.1. Brief Analysis of Bannu

Bannu District is a district in Bannu Division of Khyber Pakhtunkhwa province in Pakistan. It was recorded as a district in 1861 during the British Raj. It is one of 26 districts that make up the Khyber Pakhtunkhwa province of Pakistan. It borders North Waziristan to the northwest, Karak to the northeast, Lakki Marwat and Bettani to the southeast, and South Waziristan to the southwest.

Total area for Bannu district is 1227 sq. km. while that for Bannu Tehsil is 802 sq. km and this area holds the total population of 958,103 with the population density of 1194.64 per sq. km. Bannu district has further 3 tehsils which are: Domel, Kaki and Bannu.

*Table 3-1: Population Of Bannu Tehsil By Rural-Urban Distribution*

<b>POPULATION OF BANNU TEHSIL BY RURAL-URBAN DISTRIBUTION</b>					
<b>Years</b>	<b>1951</b>	<b>1961</b>	<b>1972</b>	<b>1981</b>	<b>1998</b>
<b>Total</b>	185,434	222,173	341,690	422,027	675,667
<b>Rural</b>	158,235	190,550	297,933	378,817	627,991
<b>Urban</b>	27,199	31,623	43,757	43,210	47,676
<b>Bannu M.C.</b>	20,192	23,859	36,644	35,170	38,194
<b>Bannu Cantt.</b>	7,007	7,764	7,113	8,040	9,482

### 3.2. Project Area Population

Total project area population is 350726 person including the population of 5 neighborhood councils and approximate 32 village councils falls under project area. Following are the population of NCs/VCs falling in project area:-

*Table 3-2 Project Area Population*

<b>Population Density Statistics of Bannu</b>					
<b>Sr.</b>	<b>Name</b>	<b>Constituency</b>	<b>Pop.</b>	<b>Areas (Acres)</b>	<b>Density (Pop/Acre)</b>
1	Cantonment	Cantt.	8320	749.40	11.10
2	NC 1	NC	7904	119.32	66.24
3	NC 2	NC	7583	100.56	75.41
4	NC 3	NC	9411	49.87	188.71
5	NC 4	NC	11737	60.15	195.12
6	NC 5	NC	5010	167.20	29.96
7	Amandi 2	VC	7206	793.90	9.08
8	Basia Khel	VC	1908	845.90	15.04
9	Bazar Ahmad Khan 1	VC	7273	529.87	13.73
10	Bazar Ahmad Khan 2	VC	9041	763.97	11.83
11	Bheri Khel Mandan	VC	5660	465.12	12.17
12	Boza Khel	VC	10059	676.71	14.86
13	Faiz Talab Abbas Mandan	VC	9374	245.81	38.13
14	Fatima Khel	VC	7558	102.54	73.71
15	Gharri Sher Ahmad	VC	11023	229.44	48.04
16	Hassan Khel Issaki	VC	7602	1541.33	4.93
17	Hebak Sherza Khan	VC	842	707.81	11.90
18	Hinjal 1	VC	13579	188.15	72.17
19	Hinjal 2	VC	6504	148.56	43.78

20	Kala Khel Masti Khan	VC	13863	784.28	17.68
21	Kausar Fateh Khel	VC	8560	540.23	15.85
22	Khwaja Mad	VC	13630	403.76	33.76
23	Kot Adil	VC	9677	316.46	30.58
24	Kot Baily	VC	12594	515.89	24.41
25	Koti Sadat	VC	7896	1144.26	6.90
26	Lalozai 1	VC	3963	1028.54	8.56
27	Lalozai 2	VC	12016	830.72	14.46
28	Mamash Khel 1	VC	7969	743.50	10.72
29	Mamash Khel 2	VC	1143	996.18	11.48
30	Mamash Khel Sadat	VC	6553	513.54	12.76
31	Mewa Khel	VC	7519	364.12	20.65
32	Nizam Dharman Khel	VC	9938	551.52	18.02
33	Nizam Khan	VC	7494	607.30	12.34
34	Selma Sikandar Khel	VC	10363	296.75	34.92
35	Sero Bada Khel	VC	7970	777.83	10.25
36	Sikandar Khel Bala	VC	2960	910.47	10.84
37	Sokari 1	VC	13842	440.66	31.41
38	Sokari 2	VC	15559	188.15	82.69
<b>TOTAL PROJECT AREA POPULATION</b>			350726		

(Source: Office of Assistant Director Local Govt and Rural Development Department Bannu)

### 3.3. Land Cover Analysis

The surface of the Earth includes a variety of natural and artificial geographical features such as ecosystems, landforms, human settlements, and engineered constructions. Land use and land cover (LULC) analysis is a general term used to depict Earth surface cover, whether it is natural or manmade. In case of Bannu city, the landcover analysis has been performed in six major land cover classes. The built-up percentage is 27.08 % and cultivated land is 56.08%. However, the land available for development is 3.8 % of total project area. Following table shows the percentages and areas of different classes: -

Table 3-3: Bannu Land Cover Stats (Part A)

Bannu Land Cover Stats (Part-A)				
Sr. No.	Land Cover Class	Area(m)	Area (Acre)	Percentage
1	Builtup	16895187.80	4174.89	27.08%
2	Cultivated Land	35241768.79	8708.43	56.48%
3	Graveyard	559034.83	138.14	0.89%
4	Open Land	2427170.43	599.77	3.8%
5	Orchard	2544066.51	628.65	4.07%
6	Water Body	4720632.47	1166.49	7.56%
<b>Grand Total</b>		<b>62387860.84</b>	<b>15416.38</b>	<b>100%</b>

In case of Bannu Cantonment, the landcover analysis has been performed in five major land cover classes. The built-up percentage is 30.7% and cultivated land is 22.3%. However, the land available for development is 45% of total project area. Following table shows the percentages and areas of different classes: -

Table 3-4 Bannu Land Cover Stats (Part B)

Bannu Land Cover Stats (Part-B)				
Sr. No.	Land Cover Class	Area(m)	Area (Acre)	Percentage
1	Builtup	6081409.79	1502.75	30.7%
2	Cultivated Land	4416045.96	1091.23	22.3%
3	Graveyard	18853.60	4.66	0.1%
4	Open Land	8903743.97	2200.16	45%
5	Water Body	382878.31	94.61	1.9%
	<b>Grand Total</b>	<b>19802931.62</b>	<b>4893.41</b>	<b>100%</b>

### 3.4. Population Density

Population density is the concentration of individuals within a species in a specific geographic locale. Population density data can be used to quantify demographic information and to assess relationships with ecosystems, human health, and infrastructure. To distribute the project area into density zones, different ranges and classes has been fixed based on the prevailing trend of Bannu city: -

- **Low Density**
  - ✚ Less than 10 persons per acre
  - ✚ 11-20 persons per acre
- **Medium Density**
  - ✚ 21-30 persons per acre
  - ✚ 31-50 persons per acre
- **High Density**
  - ✚ above 51-80 persons per acre
  - ✚ above 80 persons per acre

As per density classes, total six village Councils and two neighborhood councils are falls in high density. As per density classes, total one neighborhood council and nine village councils, and all other remaining neighborhood councils and village councils falls in low density class. Twenty-three village councils, cantonment and Township falls in low density class.

### 3.5. Landuse Typology of Project Area

The land use map prepared on the basis of a comprehensive land use and buildings survey. For this purpose, an observation sheet was developed for each and every parcel of land (polygon on GIS map). This survey identified the detailed:

- Land use of Bannu city
- Landuse of Bannu Cantonment
- Height of Buildings

The project area is divided into two major parts as Part-A & Part-B. Part-A is predicting the major city area which is 64.64 sq km including built-up, cultivated and Open land. Part- B is showing the total area of Bannu Township including the developed Phase and future expansion phases.

Table 3-5 Area Distribution under existing Landuse (Part A)

No	Landuse	Area In Acres	Percentage
1	Residential	3284.28	49.32
2	Commercial	326.17	4.90
3	Public Buildings	228.17	3.43
4	Green/Open spaces	660.89	9.93
5	Industry	289.81	4.35

6	Graveyard	138.14	2.07
7	Roads (including Transport Terminals & Railway Line)	558.09	8.38
8	Public Utility Buildings	3.78	0.06
9	Water Body	1161.44	17.44
10	Restricted Area	7.8	0.12
<b>Grand Total</b>		<b>6659 (26.97 sq km)</b>	<b>100.00</b>

*Table 3-6 Summary of Bannu Cantonment (exists in Part A)*

No	Landuse	Area in Acres
1	Administrative	19.81
2	Built Up	376.06
3	Canal/Nullah	0.18
4	Commercial	37.77
5	Cultivated Land	281.43
6	Education	39.57
7	Graveyard	4.25
8	Green Belt	0.92
9	Health	2.99
10	Mixed Landuse	1.19
11	Open Land	0.64
12	Orchard	8.14
13	Park & Playground	59.93
14	Public Building	3.28
15	Religious	0.86
16	Residential	7.06
17	Restricted Area	15.42
18	Road	73.84
19	Transport Terminal	7.13
20	Vacant Land	46.32
<b>Grand Total</b>		<b>986.81</b>

### 3.6. Existing Landuse Distribution Part-B

Part-B of the project area shows the area distribution of Bannu Township over 5265 acre including Open land of total 1226.85 Acres and 973.31 acre vacant land for development respectively.

Following are the areas and percentages of Built-up area of Part-B

No	Landuse	Area In Acres	Percentage
1	Residential	946.62	47.97
2	Commercial	58.40	2.96
3	Public Buildings	361.61	18.32
4	Green/Open spaces	40.96	2.08
7	Industry (SIE)	55.93	2.83
8	Graveyard	4.66	0.24
9	Roads (including Transport Terminals & Railway Line)	371.32	18.82
10	Public Utility Buildings	39.23	1.99
11	Water Body	94.61	4.79
<b>Grand Total</b>		<b>1973</b>	<b>100.00</b>

## 4. Sustainable Development Goals, 2030

The Sustainable Development Goals are collection of seventeen interlinked objectives designed to serve as a shared blueprint for peace and prosperity for people and the planet, now and in future. Pakistan affirmed its commitment to the 2030 Agenda for Sustainable Development by adopting the Sustainable Development Goals (SDGs) as its own national development agenda through National Assembly Resolution in 2016. Since then, the country has made considerable progress by mainstreaming these goals in national policies and strategies and developing an institutional framework for SDGs implementation in Pakistan.

Two sustainable development goals are integrated for the master planning project in KP cities. Goal 6, purpose is to ensure the sustainable management of water and sanitation and Goal 11, purpose is to ensure sustainable cities and communities for all. SDG 6 and SDG 11 are closely interconnected as they address key aspects of urban development, infrastructure and public health. Both goals have direct impact on both well-beings, public health and sustainability of the community. Integrating these goals in master planning project can ensure sustainable development, considering both water and sanitation aspects as well as the overall livability and resilience of cities

### 4.1. SDG 6: Clean Water And Sanitation



**Ensure availability and sustainable management of water and sanitation for all**

Goal 6 aims to ensure availability and sustainable management of water and sanitation for all. Water and sanitation are critical to the health of people and the planet. Improvements in drinking water, sanitation and hygiene are essential for progress in other areas of development too, such as nutrition, education, health and gender equality. By selecting this goal, prioritize addressing issues such as water scarcity, inadequate sanitation facilities, water pollution, and water-related diseases. Achieving SDG 6 can have a significant impact on public health, education, gender equality, and overall sustainable development. This goal also emphasizes the importance of protecting and restoring water-related ecosystems, ensuring sustainable use of water resources, and enhancing international cooperation to address water-related challenges.

SDG 6 emphasizes the need for efficient water management, including access to clean water, wastewater treatment, and addressing water scarcity issues. By incorporating SDG 6 would play vital role in Bannu master planning, to develop strategies and infrastructure solutions that prioritize sustainable water supply, promote water conservation and manage wastewater effectively.

### 4.1.1. Goal Targets

Achieve universal and equitable access to safe and affordable drinking water for all

Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation

Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials

Substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially

Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes

Support and strengthen the participation of local communities in improving water and sanitation management

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes

Expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes

### 4.2. SDG 11: Sustainable Cities and Communities



**Make cities and human settlements inclusive, safe, resilient and sustainable.**

SDG 11 focuses on creating sustainable cities and communities by addressing issues like urban sprawl, inadequate housing and transportation challenges. Making cities sustainable means creating career & business opportunities, safe and affordable housing, building resilient societies and economies. It involves investment in public transport, creating green public spaces, improving urban planning in participatory and inclusive ways. The rapid growth of cities, as a result of rising population and increasing migration to mega-cities, especially in the developing countries and slums are becoming a more significant feature of urban life. By incorporating SDG 11, master planning project would focus on designing sustainable infrastructure, promoting compact & well-connected communities, encouraging mixed land-use planning and integrating green spaces and public amenities.



## Goals Targets

Ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

Provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety and expanding public transport

Enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management

Strengthen efforts to protect and safeguard the world's cultural and natural heritage

Significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters

Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management

Provide universal access to safe, inclusive and accessible, green and public spaces

Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

Substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters

Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

## 5. Drivers Of Urban Growth For Bannu City

### 5.1. Major Road Projects

#### 5.1.1. Bannu Road Upgradation Project

The National Highway Authority (NHA) is working on the dualization and upgrading project of the 83-kilometer Old Bannu Road in the Bannu district of Khyber Pakhtunkhwa, despite the economic downturn.

According to sources, the project is divided into three packages, with the first package, the 40-kilometer Domail-Khurrum portion, being awarded to the Frontier Works Organization (FWO) at a bid price of Rs. 7.132 billion.

The highway being the second largest road connection after Grand Trunk Road, and provides an alternate north-south link while traversing 491 km in Sindh, 360 km in Punjab and 396 km in KPK, and connecting Rajanpur, D.G.Khan, D.I.Khan, Bannu, Kohat and Peshawar.



Figure 5-1: Bannu Road Upgradation

#### 5.1.2. Kohat-Bannu Road

The main route from Kohat to Bannu before annexation passed by Nar and Karak through the Khuni Gah ravine. As early as 1850 a scheme was taken in hand for opening out a more direct route vid Bahadar Khel and the Surdagh pass. A military road to Bahadar Khel was absolutely necessary to enable them control the great salt mines at that place, which were jeopardized by the rebellious character of the neighboring Khattaks as well as by attacks from the Waziris of the adjoining border. It is also called the old Bannu Road and its details are given below:

Table 5-1: Details of Old Bannu Road

<b>Name</b>	Koah-Bannu Road
<b>Length</b>	83 Km
<b>Start</b>	Bannu
<b>End</b>	Karappa

(Source: National Highway Authority)

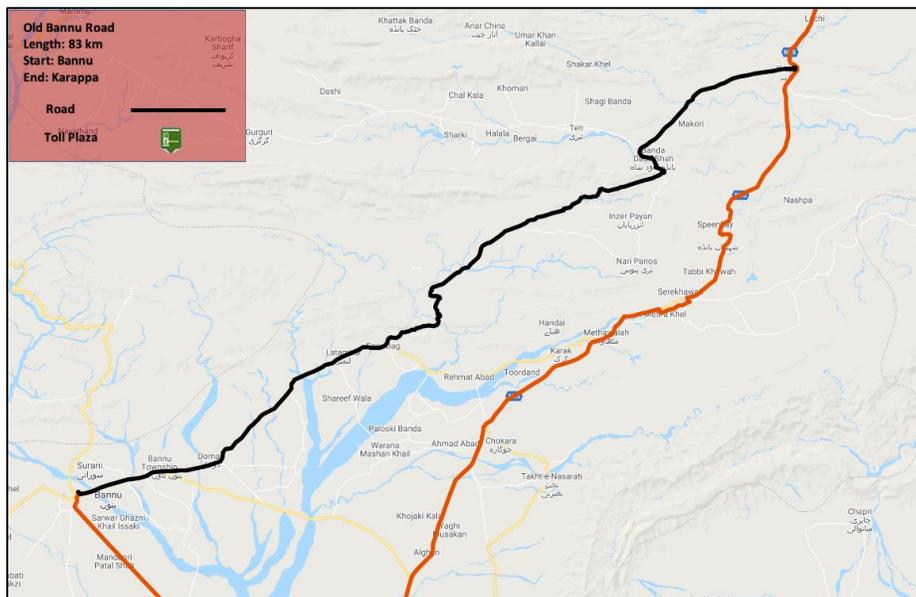


Figure 5-2: Old Bannu Road

### 5.1.3. Bannu Circular Road

Bannu circular road has been developed to increase the connectivity at local and intercity level. The details of this project are mentioned below;

Table 5-2: Bannu Circular Road Project Status

PACKAGE	RD	Length	Contractor	Status
I	0+000 ~ 10+000	10 kms	M/S Khyber Grace Pvt Ltd	100% completed
II	10+000 ~ 20+000	10 kms	M/S Khyber Grace Pvt Ltd	100% completed
VII	Bridges	06 Nos.	M/S Al-Mehreen Enterprises	98% completed
IX	63+000 ~ 74+000	11 kms	-	Tender Under Process
X	74+000 ~ 84+000	10 kms	-	Tender Under Process

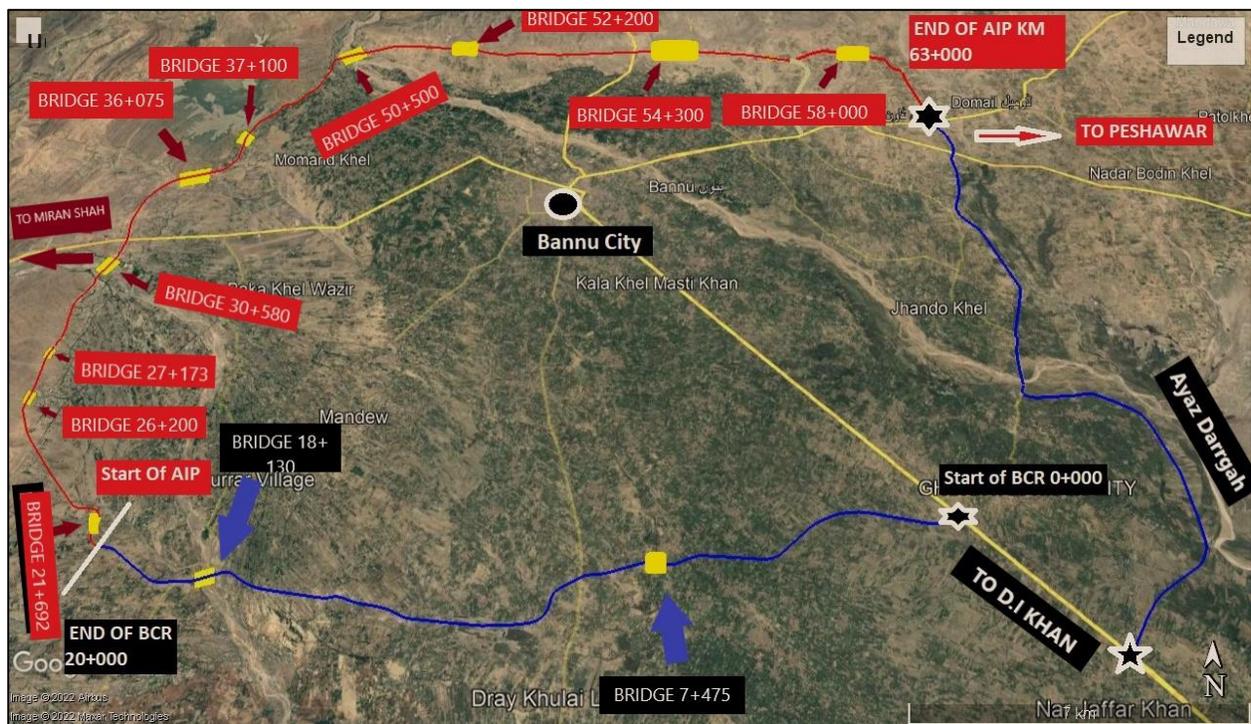


Figure 5-3: Project Map of Bannu Circular Road

## 5.2. Major Residential Sector Projects

### 5.2.1. Bannu Township

The BDA developed Bannu Township Scheme in the Eastern side on Kohat Road comprises two Phases i.e., Phase-I and Phase II (Total Approximately 500 Acres). BDA also proposed future expansion of Township on an area of around 8000 Kanal in the east of existing Phases. The Government Girls Degree College Township is situated at a very ideal location in Township Bannu. A network of roads connects the college to different phases of Township and other adjacent areas. Following facilities are provided in Township Bannu.

- Neighborhood Parks
- Main Park
- Public Buildings
- Schools
- Jamia Masjid
- Graveyard
- Commercial
- Bank
- WAPDA Office
- Bus Stand
- Parking Space

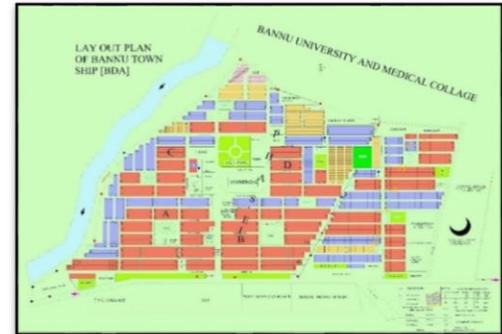


Figure 5-4: Township Bannu Master Plan

## 5.3. Major Social Sector Projects

### 5.3.1. Water Storage Reservoirs/Dams around Bannu

A body of water or water body (often spelled water body) is any significant accumulation of water on the surface of Earth or another planet. The term most often refers to oceans, seas, and lakes, but it includes smaller pools of water such as ponds, wetlands, or more rarely, puddles. A body of water does not have to be still or contained; rivers, streams, canals, and other geographical features where water moves from one place to another are also considered bodies of water. Most are naturally occurring geographical features, but some are artificial.

#### **BARAN DAM**

The word “Baran” is derived from Pashto word “Baaraan” meaning “rain”. The Baran Dam is situated about 8 kilometer away from Bannu city towards the northwest. Its construction was finished in 1962 on Kurram River as a component of Kurram Garhi Project to irrigate 61,700 acres of land in both Lakki Marwat and Bannu districts. Over the course of 60 years, the silt had reduced the dam’s storage capacity and has thus badly affected the agriculture sector in southern districts. To address the problem, the government has started a project for de-silting and raising the dam’s height which would increase the water storage capacity up to 100,000 acres feet, and diverting Tochi River flows through Tochi-Baran Feeder Canal which is designed for 1000 Cusecs.



Figure 5-5: Baran Dam, Bannu

### 5.3.2. Bannu University Of Science And Technology

University of Science and Technology Bannu (UST Bannu) aspiration is to bridge disciplines and establish new partnerships while identifying creative approaches of enhancing academic quality and research potentialities. The UST Bannu is a newly established Public Sector University in Khyber Pakhtunkhwa under Provincial Assembly Act No.XIII, 2005 vide Notification No: PA/NWFP/Legis:1/2005/28/16 dated, Peshawar, the 15/11/2005.



Figure 5-6: Bannu University of Science and Tehnology

### 5.3.3. New Bridge In Kurram River

The Bannu district forms a basin drained by the Kurram River and Tochi River which originate in the hills of Waziristan. The two rivers merge at Lakki Marwat falling into the Indus River south of Kalabagh. Kurram is a larger river than Tochi - rising in the southern slopes of the Koh-e-Safed. It flows from Paktia province in Afghanistan into Pakistan. After traversing the lands of the Tori and Bangash tribes, it flows near Kohat district forming its western boundary for a few files. Rushing through the mountains held by Kabulkhel and Darweshkhel Wazirs, it finally emerges about five miles northwest of Bannu. Entering the District at its north-western corner, it runs at first southeast, then south, and finally flows eastward through the Darra Tang in Lakki Marwat which lies between the extremities of the Maidani and Marwat ranges. This united stream empties itself into a branch stream of the Indus by numerous channels after turning the southern end of the Khatak-Niazi Hills. The Indus River cuts through the salt range above Kalabagh through a narrow channel. After passing through Kalabagh, the river expands into a wide and open bed, and flows with a fall of about one foot to the mile in the southern direction for about 40 miles, till it passes into Dera Ismail Khan District. Bannu city possess beautiful Kurram Riverscape in its north east with its three beautifully articulated bridges

for the north and east connection with Kohat and other villages around. The riverscape alongwith its bridges adds beauty and relaxing environment to the otherwise congested outlook of the old Bannu city.

#### **5.3.4.IDP's Camp On Miran Shah Road**

The government-run camp for internally displaced people in the village of Bakkakhel, in Pakistan's Frontier Region Bannu district, is a sight to behold. There are rows upon rows of new tents, each equipped with electrical connections for lights and fans, as well as distribution points for several tones of daily food rations, a mobile hospital and dental center, and a small dispensary. There is just one problem: there are hardly any people, internally displaced or otherwise, in it. Of the almost half a million people the Pakistani government has registered as having fled a military offensive against the Taliban and its allies in the neighboring tribal area of North Waziristan, only about 340 have chosen to take the government's offer to house them at the Bakkakhel camp, the only such camp that has been set up. Instead, most have gone to the adjacent town of Bannu, a dusty town of about a million people, where they are either renting at twice or three times the regular rate, or staying with relatives, internally displaced people, or IDPs, told Al Jazeera.

#### **5.3.5.New vegetable and fruit market Bannu**

Bannu Fruit and vegetables market built at DI Khan Road in 2000, about 2km south of banana city.

#### **5.3.6.Cattle Market**

In 2005, the area was completely vacant and the surrounding areas were also undeveloped. In 2015, surrounding areas developed and the growth pattern of the area was same as 2005. But in 2022, cattle market established along Mawaishi Mandi Road and Sardar Police Station Road.

#### **5.3.7.Divisional Health Development Center (DHDC) Bannu**

The first efforts to improve human capacity in the Health Sector were started by the World Bank and IDA funded Family Health Project which was launched in 1992. One Provincial Health Development Center and seven Divisional Health Development Center including Divisional Health Development Center Bannu were established to organize in-service and on-the-job training for all categories of health personnel, with special emphasis on management training. The number of DHDCs have now been reduced to Five. Divisional Health Development Center (DHDC) Bannu is working as a sub office of Provincial Health Services Academy Khyber Pakhtunkhwa Peshawar, with the aim of capacity building of Human Resource, attached with the health department at the district level, as elsewhere in the province.

#### **5.3.8.Sports Complex Bannu.**

*Bannu Sports Complex* is one of the popular sport region located in Peshawar listed under Local business in, sports & recreation in Peshawar. *Sports Complex* is the main *stadium* and space in District *Bannu*, where different types of sports activities are performed. Inter-districts and intra District cricket, hockey, football and volleyball tournaments are playing here. Sports complex has a wide and lush green stadium for football and other sports activities



Figure 5-7: Bannu Sports Complex

### 5.3.9. Qazi Mohib Hockey Stadium

Qazi Mohib Hockey Stadium is one of the popular Sports Club located in, Bannu Qazi Mohib Hockey Stadium is located at Regal Cinema nearby to Police line Bannu. Bannu district is known for hockey as it has produced renowned players. In 2004, Hockey Ground was not built, the area was completely vacant. In 2015, ground was developed and plays vital role as growth driver in surrounding area. In 2021, the hockey ground was completely established with the provision of facilities which is located along Bannu Miranshah Road and Kohat Road. The city park adjacent to these roads develop and the vicinity also developed over time.



Figure 5-8: Qazi Mohib Hockey Stadium

### 5.3.10. Medical Teaching Institution Bannu

Medical Teaching Institution Bannu was built with the concept of providing the best healthcare to every citizen. It provides the best healthcare facilities to the people district of Bannu, Karak, Lakki Marwat, and North Waziristan. MTI Bannu Hospitals are being staffed by a highly qualified medical faculty that will be introducing tertiary care Medical procedures. When fully equipped. it will have Cath Labs, MRI, Mammography, Modular system, Harden ladder, and Collaborative stage. MTI Bannu aims to provide ethical, evidence-based, and cost-effective treatment to the people of Khyber Pakhtunkhwa. It will introduce new project which is Khalifa Gul Nawaz Teaching Hospital which will be under construction.

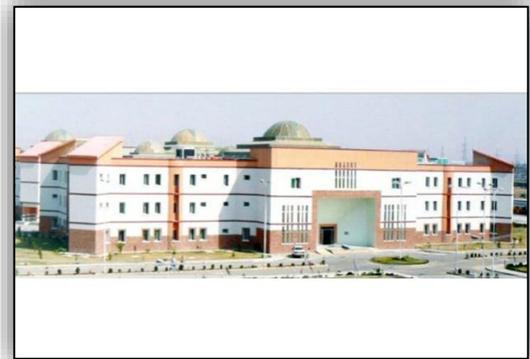


Figure 5-9: Khalifa Gul Nawaz Teaching Hospital

## 5.4. Major Industrial Sector Projects

### 5.4.1. Bannu S.I.E

In KP, industrial estates have been utilized as an effective tool for the promotion and growth of small-scale industries. They have also been used as an effective tool to decentralize industrial activity to rural and backward areas. Industrial estates are also known by different names, e.g. industrial region, industrial park, industrial area, industrial zone, etc. Bannu Small Industrial Estate is a place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there. Indus Highway Bannu Link Road is First Major Road junction while entering the Bannu City from Indus Highway Link. Bannu – Kohat Road here is approximately 80 feet wide dual carriageway and also connects Bannau Township with Bannu City. Indus Highway Link is another 80 Ft Single carriageway functioning as a bypass link for Bannu City. Owing to prime location of this T-junction as an Entry point, it should be well designed to accommodate pedestrian movements, parking and landscape areas. Currently the abutting uses are either commercial or mixed use activities creating on-street parking demands and direct public access to buildings. Road signage is almost non-existent.

### 5.4.2. Bannu Woolen Mills

Industrial area of Bannu district is characterized in different classes' i.e., large factories/industries and Small Industrial Estate Bannu. In large industries there are different types of eight industrial units containing sugar and flour mills etc. Small industrial estate of Bannu contains units of small factories of different categories. Some units are under construction and some are completed but not functional yet. The district is also famous for the export of snuff and curry powder throughout the country. Bannu Woolen Mills is famous all over Pakistan for producing the great quality fabrics. There is a very powerful legal system in place in Bannu and the surrounding region.

### 5.4.3. Bannu Economic Zone

Enveloping the vast land of 408 acres, Bannu Economic Zone (BEZ) is geographically located in close proximity to districts of Lakki Marwat, North Waziristan, Karak and D.I.Khan. The second main intervention for Bannu city is the establishment of Bannu Economic Zone near Domel for industrial growth. Khyber Pakhtunkhwa Economic Zones Development and Management Company (KPEZDMC) is non-profit organization to develop and manage



Figure 5-10: Location of Bannu Economic Zone

world class industrial estates in the province to help organizing and establishing planned and rapid industrialization. The mission is to facilitate focused industrial growth, by developing modern industrial estates, leading to mass job creation, skill enhancement, increased productivity, contributing to the GDP, aiming to reduce poverty, and gearing towards a prosperous Khyber Pakhtunkhwa Province.

The proposed economic zone is launched in 2022 and land allocated of approximately 3200 kanals. The proper office is established while development has not been yet started. The exact location of zone is on Indus Highway-Bannu Link Road at 32°58'41.1"N 70°50'04.3"E.

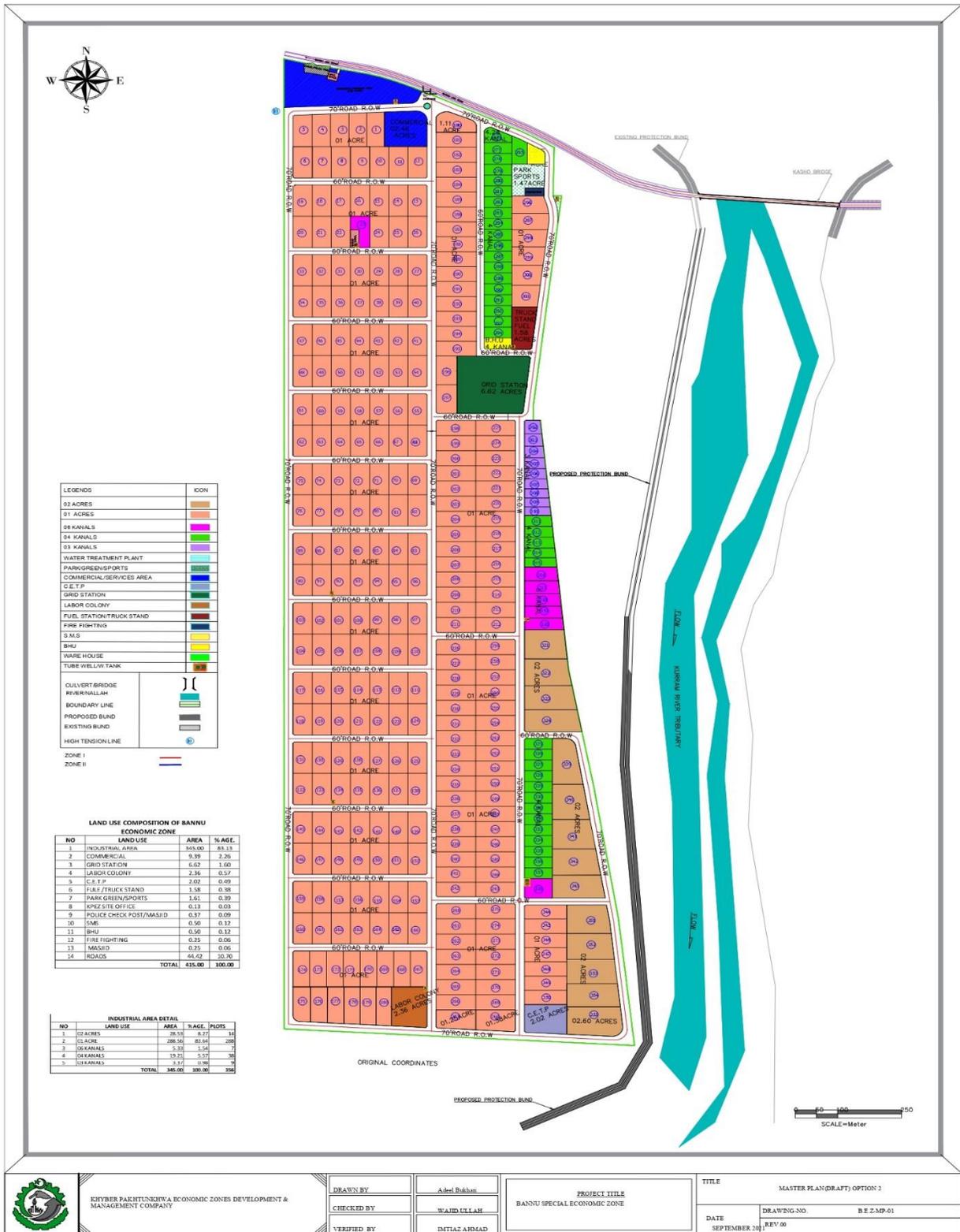


Figure 5-11: Master Plan of Bannu Economic Zone

### ❖ Key Features

Some of the main features of Bannu Economic Zone are:

- Provision of Developed Land for Investors
- Attract New Businesses by Providing an Integrated Infrastructure
- Business Friendly Environment for Sustainable Industrial Growth
- Process Innovation according to International Standards
- Dedicated Facilitation Office at the Zone

### ❖ Accessibility

Bannu Economic Zone has an easy access via N-55 highway and N-5 Bannu link road to make it an ideal vantage point for all investors from Peshawar, D.I. Khan and Bannu divisions. The accessibility of BEZ will further be enhanced after the construction of Western route of CPEC.

### ❖ Economic Impact

Investment in Bannu Economic Zone is going to generate 16,000 direct and 48,000 indirect jobs upon its growth. Rs 10 billion approximately is expected upon full colonization.

## 5.5. Overall Growth of Bannu City 2009-2022

Total growth ratio of Bannu is 0.62 sqkm per year. In 2009, urban area of Bannu was 15.71 sqkm and in 2022, the urban area is 23.74 sqkm. In 2009, the area in the north-east direction was 3.34 sq km, the area of north-west direction was 3.63 sq km, the south-west was 4.52 sq km, and the south-east was 4.22 sq km. In 2022, Bannu city became densified and Bannu Urban area grew over time. The area in the north-east direction is 7.49 sq km, the area of north-west direction is 4.46 sq km, the south-west is 5.59 sq km, and area of south-east direction is 6.19 sq km. Bannu Urban Area grew from all sides in the period of 2009 to 2022. The area mainly built over time from north-east direction. In 2009, the growth is along south-east direction which is same as 2021. In 2009, Growth was along Bannu- DI Khan Road and Bannu Miranshah Road. In 2022, mainly development is along Bannu Kohat Road.

### 5.5.1. Urban Sprawl

GIS Techniques are used to monitor the dynamic phenomenon of urbanization with the help of satellite images. The high-resolution imagery of Google Earth was analysed for the year 2009, 2013, 2017, & 2022 to precisely monitor the urban changes. The estimated area under these years is as follows:

Table 5-3: Estimated Urban Area for Year 2009 & 2022

No	Years	Area In Sq.KM	Area in Acres
1	Urban Area (2009)	15.71	3882
2	Urban Area (2022)	23.74	5866

### 5.5.2. Spatial Urban Growth Trend

The growth of Bannu's urban area was not limited to a specific direction, and all regions experienced growth over the last 13 years (2009-2022). This data indicates the significant expansion and growth of the urban area of Bannu over the last 13 years.

Table 5-4: Growth Trend from 2009 to 2022

Quad No.	Quad Name	Year 2009	Year 2022	Ratio (sq. km per year)
1	North-East (NE)	3.34	7.49	0.32
2	North-West (NW)	3.63	4.46	0.06
3	South-West (SW)	4.52	5.59	0.08
4	South-East (SE)	4.22	6.19	0.15
<b>Grand Total</b>		15.71	23.74	0.62

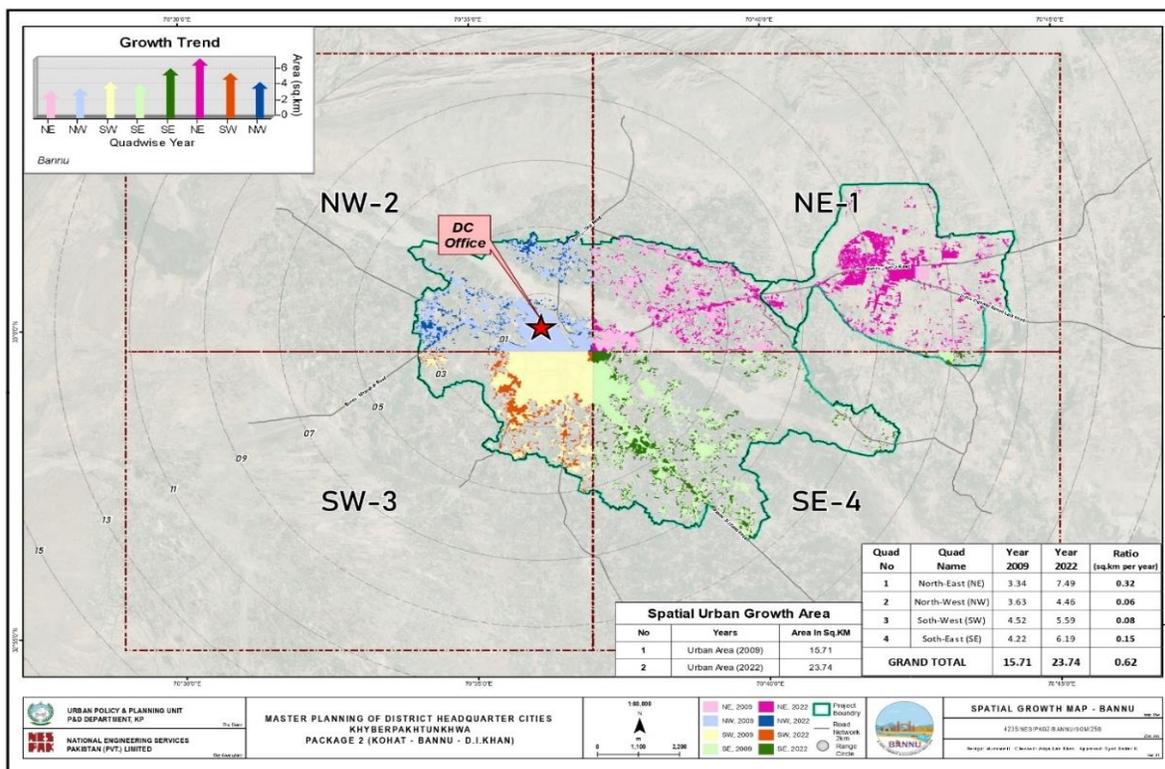


Figure 5-12: Spatial Growth Map Bannu

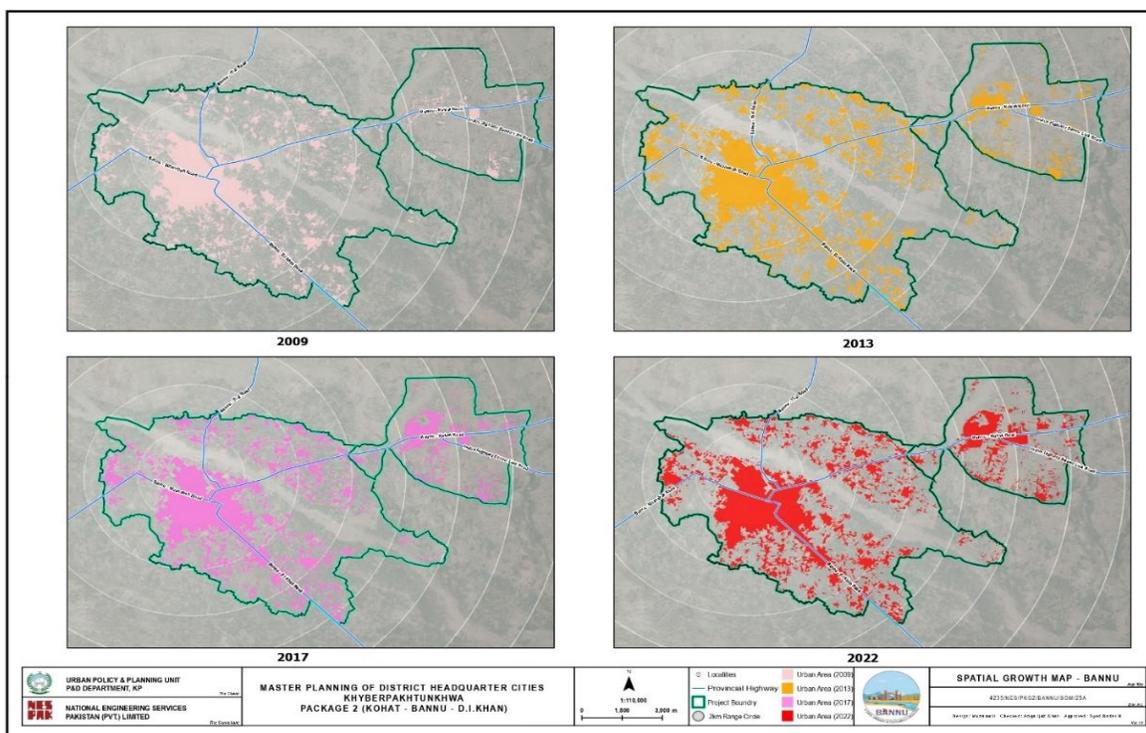


Figure 5-13: Year wise Spatial Growth Map Bannu

## 6. Population Projection

Population projection is of utmost importance in the field of master planning for various reasons. Master planning involves the systematic development and organization of land use, infrastructure, and resources within a region or municipality. Accurate population projections are essential for creating sustainable, functional, and economically viable communities. City planners and urban designers use population projections to shape the growth and development of urban areas. This includes decisions about zoning, land use, transportation networks, and the location of commercial and residential areas. It is also used to plan for services like elder care, child care, and social assistance programs which are crucial for social and economic wellbeing of a city. Accurate projections ensure that these services are available to those who need them.

Population projection methods used in urban planning vary in complexity and data sources. The choice of method depends on the available data, the level of accuracy required, and the specific goals of the urban planning project. Here are some common population projection methods used in urban planning:

### 6.1. Mathematical Method

The mathematical method is the earliest one to be used for population projection. “The resistance or the sum of the obstacles opposed to the unlimited growth of population increases in proportion to the square of the velocity with which the population tends to increase.” It means that the growth of population declines in proportion to the increase in density of population. However, demographers use simple arithmetic and geometric formulas and graphs for population projection.

### 6.2. Arithmetic Method

In the arithmetic projection method, it is assumed that the annual change (increase or decrease) in population remains the same throughout the projection period and the crude birth and death rates are taken. The formula for such linear interpolation is

$$p_p = p_t + \frac{n(p_1 - p_2)}{N}$$

Where, ***Pp*** = Population projection in the future;

***P1*** = Present population as per the recent census;

***P2*** = Size of population in the previous census;

***n*** = Number of years between the projection year and the previous census; and

***N*** = Total number of years between the recent and previous consensus.

Table 6-1: Population projection of Neighborhood Council by Arithmetic method

Sr. No	Description	Total Population 2017	AAGR (1998-2017)	Total Projected Population 2022	Total Projected Population 2042
1	NC's	49961	0.24	49969	49974
2	VC's	328254	2.92	328673	330351
3	<b>Total</b>	<b>378215</b>		<b>378642</b>	<b>380325</b>

### 6.3. Geometric Increase/Progression Method

Geometric mean increase is used to find out the future increment in population. In this method the percentage increase in population from decade to decade is assumed to remain constant. This method is adopted for young and developing towns, where the rate of growth of population is proportional to the population at present (i.e.,  $dP/dt \propto P$ ). Therefore, it is assumed that the percentage increase in population is constant. It is similar to compound interest calculations. The population predicted by this method is the highest of all. The population at the end of nth decade 'P<sub>n</sub>' can be estimated as:

$$P_n = p \left( 1 + \frac{1 + IG}{100} \right)^n$$

Where, IG = geometric mean (%)

P = Present population

N = no. of decades

The choice of method depends on the specific requirements of the urban planning project, the availability of data, and the desired level of accuracy. Often, a combination of methods and scenario planning is used to provide a range of possible future population scenarios for more comprehensive urban planning. In this report, Geometric Growth Method is used for population projection.

Table 6-2: Population projection of Neighborhood Council by Geometric method

Sr.	Names of NC	Population (2017)	Area in Acre	AAGR (1998-2017)	Projected Population (2017-22)	Projected Population (2023-27)	Projected Population (2027-32)	Projected Population (2032-37)	Projected Population (2037-2042)
1	Cantonment	8316	749.4	-0.69	8033	7760	7496	7241	6994
2	NC 1	7904	119.32	0.24	7999	8096	8193	8292	8392
3	NC 2	7583	100.56	0.24	7674	7767	7861	7955	8051
4	NC 3	9411	49.87	0.24	9524	9639	9756	9873	9992
5	NC 4	11737	60.15	0.24	11879	12022	12167	12313	12462
6	NC 5	5010	167.2	0.24	5070	5132	5193	5256	5319
	<b>Total</b>	<b>49961</b>			<b>50180</b>	<b>50415</b>	<b>50665</b>	<b>50931</b>	<b>51211</b>

Table 6-3: Population Projection of Village Councils by Geometric method

Sr.	Names of VC	Population (2017)	Area in Acre	AAGR (1998-2017)	Projected Population (2017-22)	Projected Population (2023-27)	Projected Population (2027-32)	Projected Population (2032-37)	Projected Population (2037-2042)
1	Amandi 2	7206	793.9	2.92	8321	9609	11097	12814	14798
2	Basia Khel	1908	845.9	2.92	2203	2544	2938	3393	3918
3	Bazar Ahmad Khan 1	7273	529.87	2.92	8399	9699	11200	12933	14935
4	Bazar Ahmad Khan 2	9041	763.97	2.92	10440	12056	13922	16077	18566
5	Bheri Khel Mandan	5660	465.12	2.92	6536	7548	8716	10065	11623
6	Boza Khel	10059	676.71	2.92	11616	13414	15490	17888	20656
7	Faiz Talab Abbas Mandan	9374	245.81	2.92	10825	12500	14435	16669	19249
8	Fatima Khel	7558	102.54	2.92	8728	10079	11639	13440	15520
9	Gharri Sher Ahmad	11023	229.44	2.92	12729	14699	16974	19602	22636
10	Hassan Khel Issaki	7602	1541.33	2.92	8779	10137	11706	13518	15611
11	Hebak Sherza Khan	842	707.81	2.92	972	1123	1297	1497	1729
12	Hinjal 1	13579	188.15	2.92	15681	18108	20911	24147	27884
13	Hinjal 2	6504	148.56	2.92	7511	8673	10016	11566	13356
14	Kala Khel Masti Khan	13863	784.28	2.92	16009	18487	21348	24652	28468
15	Kausar Fateh Khel	8560	540.23	2.92	9885	11415	13182	15222	17578
16	Khwaja Mad	13630	403.76	2.92	15740	18176	20989	24238	27989



Sr.	Names of VC	Population (2017)	Area in Acre	AAGR (1998-2017)	Projected Population (2017-22)	Projected Population (2023-27)	Projected Population (2027-32)	Projected Population (2032-37)	Projected Population (2037-2042)
17	Kot Adil	9677	316.46	2.92	11175	12904	14902	17208	19872
18	Kot Baily	12594	515.89	2.92	14543	16794	19394	22395	25862
19	Koti Sadat	7896	1144.26	2.92	9118	10529	12159	14041	16214
20	Lalozai 1	3963	1028.54	2.92	4576	5285	6103	7047	8138
21	Lalozai 2	12016	830.72	2.92	13876	16024	18504	21368	24675
22	Mamash Khel 1	7969	743.5	2.92	9202	10627	12272	14171	16364
23	Mamash Khel 2	1143	996.18	2.92	1320	1524	1760	2033	2347
24	Mamash Khel Sadat	6553	513.54	2.92	7567	8739	10091	11653	13457
25	Mewa Khel	7519	364.12	2.92	8683	10027	11579	13371	15440
26	Nizam Dharman Khel	9938	551.52	2.92	11476	13252	15304	17672	20408
27	Nizam Khan	7494	607.3	2.92	8654	9993	11540	13326	15389
28	Selma Sikandar Khel	10363	296.75	2.92	11967	13819	15958	18428	21280
29	Sero Bada Khel	7970	777.83	2.92	9204	10628	12273	14173	16366
30	Sikandar Khel Bala	2960	910.47	2.92	3418	3947	4558	5264	6078
31	Sokari 1	13842	440.66	2.92	15984	18459	21315	24615	28425
32	Sokari 2	15559	188.15	2.92	17967	20748	23960	27668	31950
<b>ADDITION OF BANNU TOWNSHIP AREA IN DOMEL</b>									
33	Bizen Khel	21409		3.8	25798	31086	37459	45138	54391
34	Umer Zai 1	20011		3.8	24113	29056	35013	42191	50840
35	Umer Zai 2	15696		3.8	18914	22791	27463	33093	39877
	<b>Total</b>	<b>328254</b>			<b>381929</b>	<b>444500</b>	<b>517464</b>	<b>602576</b>	<b>701890</b>

#### 6.4. Preferred approach for population projection

- Geometric increase method of population forecasting is suitable for towns where growth rate of population is proportional to the present population.
- Geometric increase method is more applicable in city or towns which are in developing phase.
- It can be applied to estimate the population of developing towns and cities.
- It can be applied to the cities having growth rate of population proportional to the present population.
- This method is more complex than the arithmetical increase method but is considered more accurate.

Constant population growth rate is based on past population growth patterns. Population growth rate is relatively stable over certain period. However, due to increased urban and civic amenities, the population has increased over time. Constant population growth rate is influenced by various factors, including current spatial expansion trends, past trends, economic conditions, social changes, policy interventions, and environmental factors. Furthermore, migration to developed cities is also one of the dominant influences on urban growth. Thus, for the neighbourhood councils, the average population growth rate remained constant at 0.24 from 1998 to 2017, while the average growth rate for the village councils remained constant at 2.92.

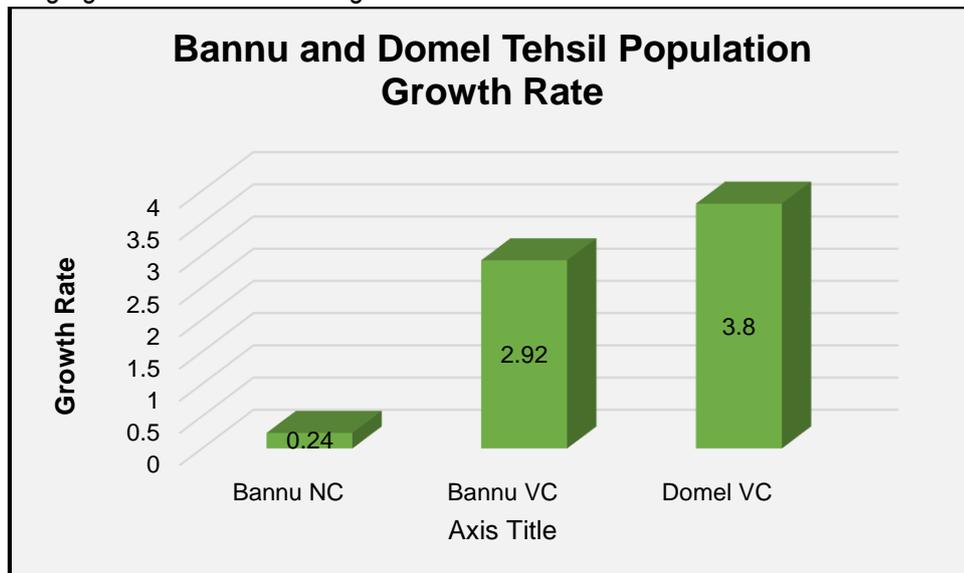


Figure 6-1: Population Growth Rate of Bannu

## 7. Multi-Hazard Vulnerability Zoning Based on Thematic Layers

### 7.1. Multi-Hazard Zoning

The strategic scenario of the Bannu City master plan involves the Multi Hazard Vulnerability and Risk Assessment (MVHRA) based on the concept of Total Hazard. Total Hazard is the gross accumulative impact of all types and intensities of the envisage geo hazards to which the certain piece of land is exposed over a given timeframe of recurrence. It involves the gross effect of all types of direct and indirect Natural Hazards that may be associated with an earthquake to which the area understudy may be subjected within a defined period of time.

Multi Hazard maps are primarily used for Urban Master Planning, Safer land use management and town planning. It is an efficient tool to mitigate the geo hazards or otherwise minimize the impacts of these on urban population. These maps can be used for future planning regarding selection of sites for

urban development and location/ relocation of critical public lifeline facilities and utilities which should be directed towards areas of relatively lower hazard. Based on the result of Multi hazard assessment, the project area has been categorized into following zones.

- Highly Hazardous Zone (HHZ)
- High Multi hazard Zone (HMZ)
- Medium Multi hazard Zone (MMZ)
- Low Multi hazard Zone (LMZ)

The detail of these zones are describes as under;

### 7.2. Highly Hazardous Zone (HHZ)

This seismic zone constitutes an active geologic fault and any seismic activity associated to this fault may result in lateral, vertical and horizontal ground ruptures. As per BCP, SP-2007, sub-clause 3.2, No construction should be carried out within the HHZ and the landuse should be restricted to open areas as it is not suitable for build-up structures. This zone also includes areas prone to massive slope failures, huge rock falls and high flood hazard zone which are difficult to manage by engineering solutions.

Generally, avoid any new construction in the Highly Hazardous Zone (HHZ) and for any unavoidable construction such as roads, buildings, electrical lines, water/gas pipelines, the requisite of safe design should be adherent with special risk evaluation studies as this zone constitutes surface rupture zone of active geologic faults, capable of generating a hazardous earthquake. Permissible Landuse should be preferably restricted to open spaces, recreational area, parking lots, forest, graveyards, crossing of utilities and transportation facilities etc.

Any structure / facility constructed in this zone should not involve permanent human occupancy or part time large occupancy, such as students / teacher's hostel, places of worship, hotels/restaurants, cultural and community gatherings and other residential buildings. Any unavoidable construction in this zone should be single story scattered and disseminated using light weight prefabricated construction materials. Avoid the construction of multistory or high rising lifeline structures within the highly buildings and located at a safe distance from adjoining upper and lower hill slopes.

This zone is not suitable for essential and critical infrastructure like health, education, governance, disaster and emergency response facilities and detachments with high importance factor. This zone is also not suitable for storage of ammunitions, toxic, inflammable and radioactive materials. Indigenous and innovative construction technologiessuch as using wood / steel framed, prefab, light weight and flexible structures should be encouraged an account of their seismic performance and energy efficiency. Necessary emergency exists and safe escapes should be suitably located and must be of sufficient capacity to ensure the prompt and safe exit of all the occupants from the buildingsalong with the safe areas allocated for the public assembly during the Earthquake/disaster within the building.

Site Specific detailed geologic and geotechnical investigations are mandatory for the determination of engineering characteristics of rocks/soils as foundation materials. Nearest known seismic source distances should be considered zero as this zone situates within a highly active seism tectonic source that may result in a hazardous Earthquake.

### 7.3. High Multi-Hazard Zone (HMZ)

Very high seismic ground shaking and other indirect earthquake induced localized geohazards such as rockfalls, slope failure, mud/ debris flows, and snow/debris avalanchesthis zone also includes areas prone

to moderate flood hazard and bank collapse. Suitable only for restricted urban land use planning and development with relatively very low population density. Any structure / facility constructed in this zone should not involve permanent human occupancy such as hotels, students / teachers hostel and other residential buildings. Any construction in this zone should be scattered and disseminated; avoid dense housing and construction. Critical infrastructure such as education, health, governance and storage of hazardous and toxic/inflammable and radioactive materials including ammunition is forbidden in the high seismic hazard zone.

Avoid the construction of high rising lifeline structures within the High Hazardous Zone. Any new construction should be restricted to single storey buildings. Innovative construction technologies such as prefab, light weight should be employed for construction an account of their seismic performance. Masonry structure must be adequately design, procured and constructed by adopting confined reinforced concrete masonry structures and RCC and masonry in-filled concrete frames (MICF). Necessary emergency exists and escapes should be suitably located and must be of sufficient capacity to ensure the prompt and safe exit of all the occupants within the building during a hazardous seismic event. During a major earthquake (magnitude  $\geq 7$ ) the probability of surface rupturing is high to moderate. Nearest known seismic source distance varies from 300m – 1000m.

#### **7.4. Moderate Multi-Hazard Zone (MMZ)**

High seismic ground shaking and other indirect earthquake induced localized geo hazards. Prone to minor rockfalls, slope failure, mud/ debris flows, and low flood hazard. Suitable for all types of land use and new construction involving educational, residential, office buildings, public service & infrastructural facilities as per generalized structural design provisions mentioned in Building Code of Pakistan, Seismic Provisions - 2007 in conjunction with the recommendation of site specific Seismic Design Parameters. Site specific geologic and geotechnical investigations are mandatory for the evaluation of engineering characteristics of rocks and soils. Necessary emergency approaches, exits and other crisis management facilities be suitably located for prompt earthquake relief and disaster mitigation. For areas comprising hill slopes, necessary slope protection measures should be adopted based on detailed engineering studies.

During a major earthquake, magnitude  $\geq 7$ , the probability of surface rupturing is moderate to low. Nearest known seismic source distance varies from 1000m – 3000m. Innovative construction technologies such as light weight constructions like light gauge (cold formed) Galvanized sheet technology (LGST) and structural concrete insulated panels (SCIP)

#### **7.5. Low Multi- Hazard Zone (LMZ)**

Seismic ground shaking envisaged during a strong earthquake with very low risk of earthquake induced indirect and localized geo-hazards. Not prone to rock falls, slope failure, mud/ debris flows, and flood hazard.

Suitable for all types of Land use and new construction involving educational, residential, office buildings, public service & infrastructural facilities, involving permanent human occupancy such as hotels, student's / teachers hostels and other residential buildings, high rising buildings as per generalized structural design provisions mentioned in Building Code of Pakistan, Seismic Provisions – 2007. Probability of surface rupturing is low. Nearest known seismic source distance varies from 3000m – 6000m.

## 8. Safer Urban Landuse Suitability Zoning

### 8.1. Construction Suitability Recommendations for Geo hazard Zones

Multi Hazard zonation map covering the envisaged spectra of all the potential regional and localized geo hazards shall be carried out to assess the risks involved in the perspective of the enhanced built-up exposure and the anticipated recurrence of the geo hazards during the service life of the development. For carrying out the Multi-Geo hazard zonation mapping of the project area, all the thematic map layers shall be overlaid with their gravity ratings to prepare the Multi Hazard Zonation Map based on the concept of Total Hazard. As these studies now serve as an indispensable tool for Master Planning / Urban Landuse Management of any City being based on the concept of Total Hazard, it looks appropriate that the construction Suitability Zoning Map of City which furnishes the fundamental guidelines for Landuse Planning should better be anchored to the Seismic and Structural Design Provisions.

Based on the results Multihazard vulnerability assessment, the project area shall be divided into four zones of construction suitability which are.

- Highly Construction Suitability Zone (HSC)
- Moderate Construction Suitability Zone (MSC)
- Low Construction Suitability Zone (LSC)
- Not Suitable for Development (NSD)

### 8.2. High Construction Suitability (HCS) Zone

Suitable for all types of urban landuse planning and development without any population density limitations involving vertical growth of the urban population compliant as per the design provisions of Building Code of Pakistan (BCP), SP 2007 and any other Codal practices and Building Byelaws as notified and indemnified by the Federal, Provincial and City Governments. Site specific geologic and geotechnical investigations and necessary engineering solutions for prevention and mitigation of localized geohazards (if any) are mandatory.

### 8.3. Moderate Construction Suitability (MCS) Zone

Suitable for urban landuse planning and development with relatively moderate population density, as per design provisions of Building Code of Pakistan (BCP), SP 2007 and any other Codal practices and Building Byelaws as notified and indemnified by the Federal, Provincial and City Governments. Some limitations apply for the safe urban landuse and design optimization of proposed (and existing) development due to high seismic ground shaking. Site specific geologic, geotechnical investigations and necessary engineering solutions for prevention and mitigation of localized geohazards (if any) are mandatory.

### 8.4. Low Construction Suitability (LCS) Zone

Suitable only for restricted urban landuse planning and development with relatively very low population density as per design provisions of Building Codes of Pakistan (BCP), SP 2007 and any other Codal practices and Building Byelaws and as notified and indemnified by the Federal, Provincial and City Governments.

Not recommended for high rising buildings, towns, high occupancy community buildings, governance buildings, critical infrastructure, ammunition and toxic storage, unless disaster resilience is ensured by specialized engineering studies and solutions.



### 8.5. Not Suitable for Development (NSD)

Not available for construction except very restricted urban landuse such as open/green areas, grazing land, parks etc. Prone to seismic surface rupturing and other limiting indirect and localized geo hazards requiring very specialized studies and engineering solutions for any proposed development. Specialized and specific studies and investigations are mandatory to ensure disaster resilience by High-Tech engineering solutions for any unavoidable infrastructural development such as transportation corridors (including bridges), water supply and electric lines, communication towers and other high rising structures etc.

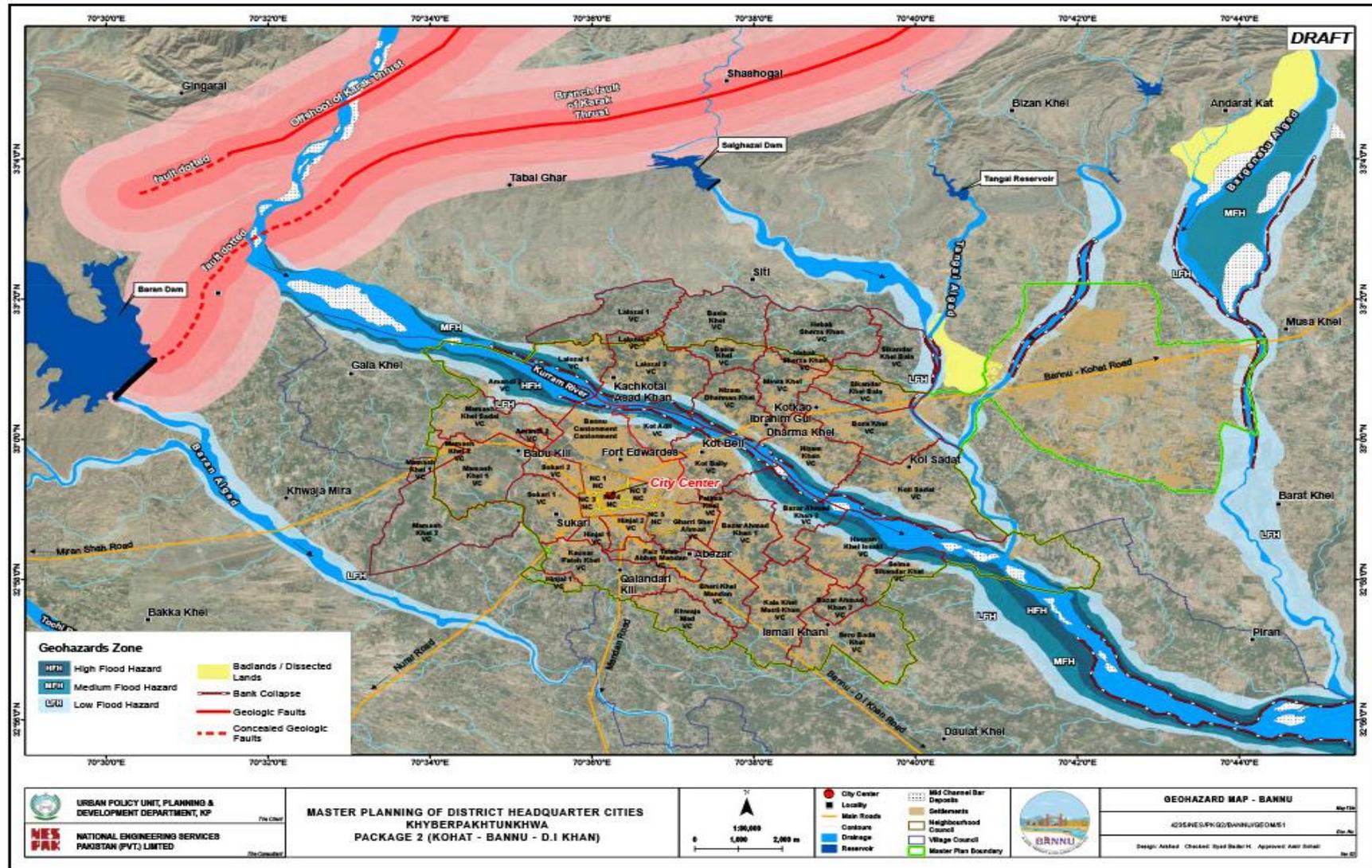


Figure 8-1: Geo-Hazard Map of Bannu



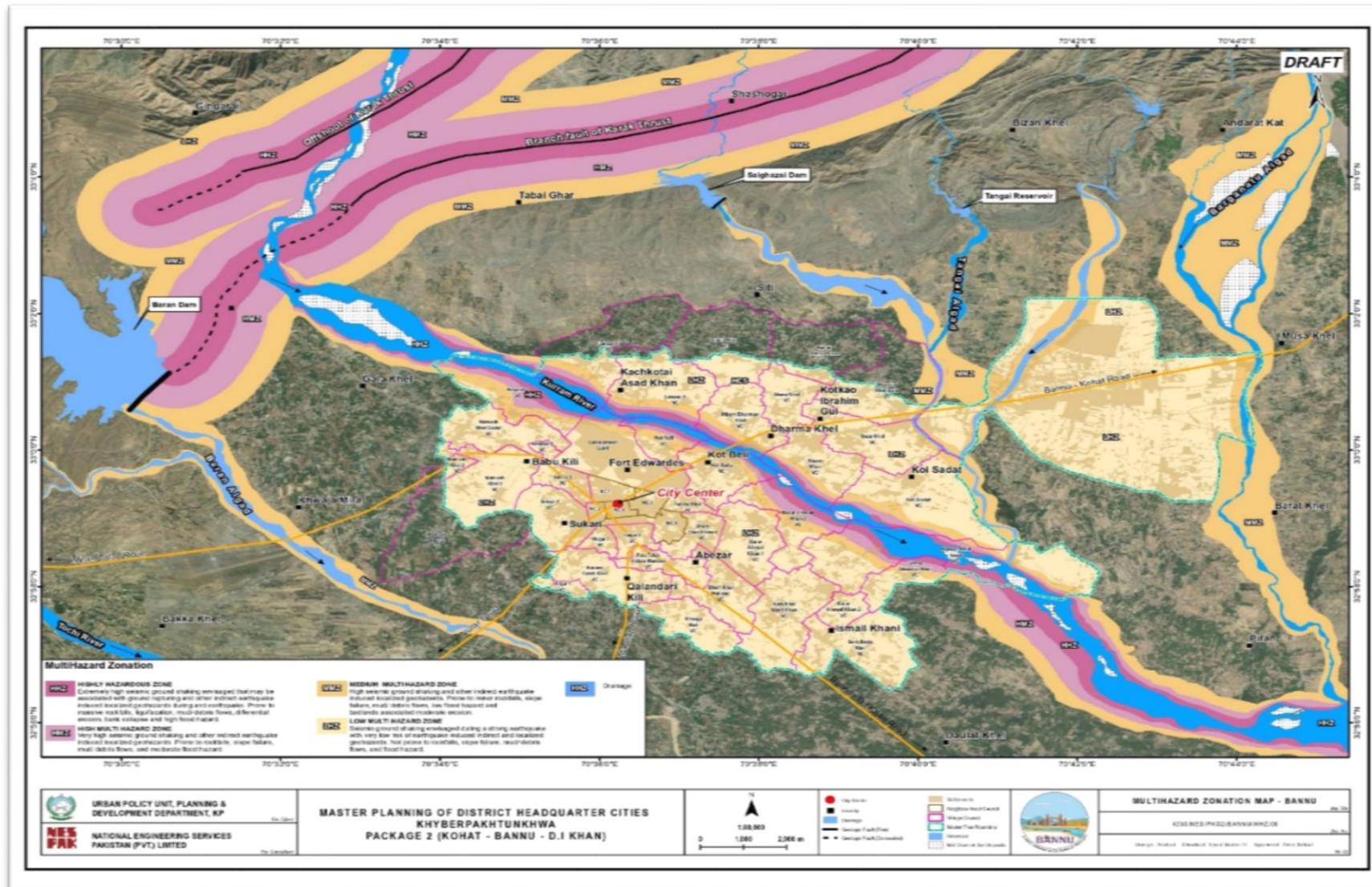


Figure 8-3: Bannu Multi Hazard Zonation Map

## 9. Multi-Criteria Analysis

Suitability of Landuse based on multi-criteria analysis, which categorized into qualitative and quantitative analysis.

### 9.1. Qualitative Multi-Criteria Analysis

Qualitative Multi-Criteria Analysis which includes;

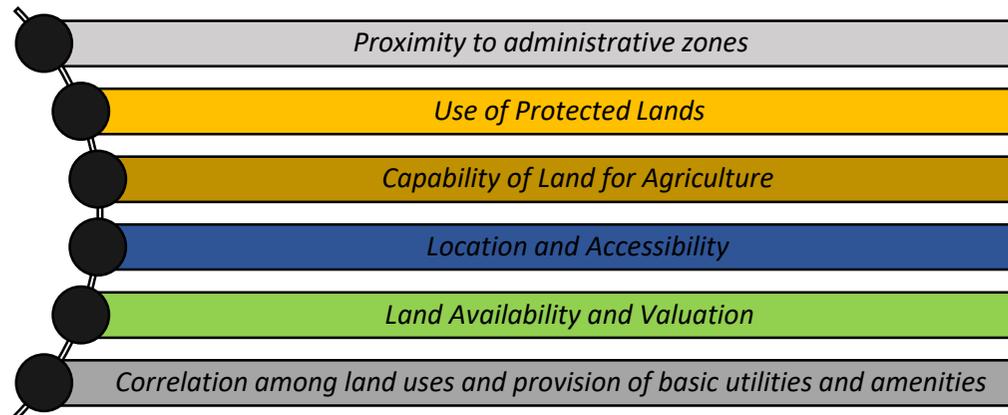


Table 9-1: Qualitative Multi Criteria Analysis

Sr.	Landuse	Criteria Categories & Description		
1	Residential	<p><b>Low Income Housing &amp; Apartments</b></p> <ul style="list-style-type: none"> <li>● Access to public transport</li> <li>● Accessible to Employment center</li> <li>● Availability of Parks/Open spaces, Landscape</li> <li>● Availability of affordable basic utilities/services and Public sector social amenities</li> <li>● Security and safety</li> <li>● Better quality of life</li> </ul>	<p><b>Middle Income</b></p> <ul style="list-style-type: none"> <li>● Affordable access to quality housing</li> <li>● Neighborhood scale</li> <li>● Low/medium density detached housing</li> <li>● Sense of Community</li> <li>● Availability of basic utilities and services</li> <li>● Affordable land prices</li> </ul>	<p><b>High Income</b></p> <ul style="list-style-type: none"> <li>● Efficient size and design</li> <li>● Low density areas</li> <li>● Sense of community</li> <li>● Livable /calm societies</li> <li>● Safe and secure neighborhoods</li> <li>● Green &amp; clean environment</li> <li>● Good quality road infrastructure</li> <li>● Uninterrupted supply of basic utilities and services</li> <li>● Access to quality social amenities</li> </ul>



Sr.	Landuse	Criteria Categories & Description			
		<ul style="list-style-type: none"> <li>Highly dense areas</li> <li>Proximity to industrial area</li> <li>Proximity to existing low income residential areas</li> <li>Affordable land prices</li> <li>Supply of subsidized state land</li> </ul>	<ul style="list-style-type: none"> <li>Access to public transport and quality roads</li> <li>Access to social amenities</li> <li>Less environmental issues</li> </ul>	<ul style="list-style-type: none"> <li>High land prices</li> <li>Connectivity to existing high income areas</li> </ul>	
2	Commercial	<p><b><u>PROPOSED CBD</u></b></p> <ul style="list-style-type: none"> <li>Availability of large land parcel(s)</li> <li>Adjacent to open / green spaces</li> <li>Multi-nuclei city centers</li> <li>Access from major Roads</li> <li>High Land Prices</li> <li>Proximity to new development zone</li> </ul>	<p><b><u>Special Development Zones</u></b></p> <ul style="list-style-type: none"> <li>Existing trend of mixed use</li> <li>Availability of land parcel(s)</li> <li>Availability of parking spaces</li> <li>Accessible from public transport</li> <li>Access from major roads</li> <li>Central locations with reference to new development</li> </ul>	<p><b><u>Neighborhood Centers</u></b></p> <ul style="list-style-type: none"> <li>Centralized with respect to neighborhood</li> <li>Providing primary level services of daily use</li> <li>Preferably pedestrian friendly</li> <li>Adequate parking space</li> <li>Walkability to catchment population</li> </ul>	<p><b><u>Business and Trade Zone</u></b></p> <ul style="list-style-type: none"> <li>Proximity to inert city highway</li> <li>Availability of land parcel</li> <li>Proximity to other city level zones</li> <li>Availability of parking spaces</li> <li>Accessible to public transport</li> </ul>
3	Industrial	<p><b><u>Economic/Technology Zone</u></b></p> <ul style="list-style-type: none"> <li>Accessible from major roads</li> <li>Adjacent to transport terminal(s)</li> <li>Nearby existing economic activities</li> <li>nearby city peripheral areas</li> <li>Buffer of residential areas</li> <li>Close to city level recreational activities</li> </ul>	<p><b><u>Industrial Zone</u></b></p> <ul style="list-style-type: none"> <li>Nearby existing industries</li> <li>Favorable wind direction</li> <li>Accessible from major roads</li> <li>Away from city center</li> <li>Nearby transport terminal(s)</li> <li>Close proximity to target labor</li> </ul>	<p><b><u>Logistics Hub</u></b></p> <ul style="list-style-type: none"> <li>Multiple transport options – major inter-modal facilities and road highway interchanges.</li> <li>Connections to other divisional logistics hubs</li> <li>Access to a large consumer market</li> <li>Domestic economy engaged in trade of goods and services</li> </ul>	



Sr.	Landuse	Criteria Categories & Description		
		<ul style="list-style-type: none"> <li>• Close proximity to high utility lines</li> <li>• Proximity to the existing ecological corridors</li> </ul>		
4	<b>Sports and Recreational</b>	<u><b>City level Facilities</b></u> <ul style="list-style-type: none"> <li>• Availability of large land parcel(s)</li> <li>• Approachable from major roads</li> <li>• Either available at center or at outskirts of town</li> <li>• Adequate parking spaces</li> <li>• Around existing water resource</li> </ul>		<u><b>Neighborhood Level</b></u> <ul style="list-style-type: none"> <li>• Within each neighborhood</li> <li>• Pedestrian friendly approach</li> <li>• Accessible for catchment population</li> <li>• Suitable to all income groups</li> </ul>
5	<b>Public Buildings</b>	<u><b>Education</b></u> <u><b>Schools</b></u> <ul style="list-style-type: none"> <li>• Preferably on walking distance for Low income groups</li> <li>• Nearby residential development</li> <li>• Adjacent to open / green spaces</li> <li>• Suitable for all income groups</li> <li>• Away from noisy business areas</li> <li>• Away from intercity highways</li> </ul> <u><b>Colleges</b></u> <ul style="list-style-type: none"> <li>• Nearby mixed use facilities</li> <li>• Approachable via secondary roads</li> <li>• Adjacent to open / green spaces</li> <li>• Adequate parking space</li> <li>• Adjacent to playgrounds</li> </ul> <u><b>Universities</b></u>	<u><b>Health</b></u> <ul style="list-style-type: none"> <li>• Preferably on walking distance for low income group especially</li> <li>• Nearby residential development</li> <li>• Adjacent to green spaces</li> <li>• Nearby mixed use facilities</li> <li>• Adequate parking space</li> <li>• Approachable from major roads</li> <li>• Accessible through public transport</li> <li>• Availability of land parcel(s)</li> </ul>	<u><b>Religious</b></u> <ul style="list-style-type: none"> <li>• Preferably on walking distance for low income group especially</li> <li>• Nearby residential development</li> <li>• Adjacent to green spaces</li> <li>• Nearby mixed use facilities</li> <li>• Adequate parking space</li> <li>• Availability of land parcel(s)</li> </ul>



Sr.	Landuse	Criteria Categories & Description	
		<ul style="list-style-type: none"> <li>• Approachable from intercity &amp; primary roads</li> <li>• Nearby periphery areas</li> <li>• Availability of large land parcels</li> </ul>	
6	<b>Administration/ Civic Zone</b>	<p><b><u>Administrative Buildings</u></b></p> <ul style="list-style-type: none"> <li>• At city Multiple centers</li> <li>• Ideally to be located in city center near CBD</li> <li>• Accessible from major roads</li> <li>• Availability of land parcel(s)</li> <li>• Adjacent to existing civic services</li> </ul>	
7	<b>Transportation Road Network</b>	<p><b><u>Transportation Corridors</u></b></p> <ul style="list-style-type: none"> <li>• Avoid traffic congestion</li> <li>• Main connectivity</li> <li>• Occurrence of prime activities</li> <li>• Presence of important land uses</li> </ul>	<p><b><u>Transport Terminal</u></b></p> <ul style="list-style-type: none"> <li>• On outskirts of town</li> <li>• Near industries / economic zones</li> <li>• Adjacent to provincial roads</li> <li>• Vacant land parcel(s)</li> <li>• At crossing of major roads</li> <li>• Nearby significant landmarks</li> </ul>
8	<b>City level Graveyards</b>	<ul style="list-style-type: none"> <li>• On outskirts of town</li> <li>• Low land prices</li> <li>• Accessible from major roads</li> </ul>	

## 9.2. Quantitative Multi-Criteria Analysis

The quantitative multi-criteria analysis involves various parameters related to land uses. Quantitative analysis generates a suitability map using Geographic Information Systems (GIS), which helps identify suitable locations and allocate different zones.

## 9.3. Methodology

Land-use suitability assessment is an important step in land use planning for urban development. GIS has been considered one of the most suitable methods for land suitability analysis process. The method focuses mainly on the identification of the evaluation criteria and on the determination of the preference structure such as weightage criteria. In GIS process, each parameter is assigned a weightage which indicates its values and its importance to evaluate of criteria. Geographic Information Systems (GIS) used to determine the most suitable areas for various land uses.

For the assessment of Land Suitability in case of Bannu, which involve six landuses categories including residential, commercial, industrial, civic, sport & recreation zones and agriculture zones. Propose a GIS-based land suitability map that takes into account with different parameters and assign weightages, to identify both the opportunities and constraints present in each zone. The evaluation process considers multiple parameters as suitability criteria. Weightage criteria are used to assess both constraints and opportunities within each landuse. A weighted scale ranging from 0 to 5 used to evaluate constraints, while scale from 6 to 10 used for opportunities. These weightage criteria help in identifying the suitability of land uses within each zone. By weightage criteria, identify and prioritize the areas that determine the highest suitability for each specific land-use category.

Based on the suitability results, three categories are used to identify landuse suitability. Which classified as:

1. Not Suitable
2. Moderately Suitable
3. Highly Suitable

### 9.4. Framework for Landuse Suitability Analysis based on GIS

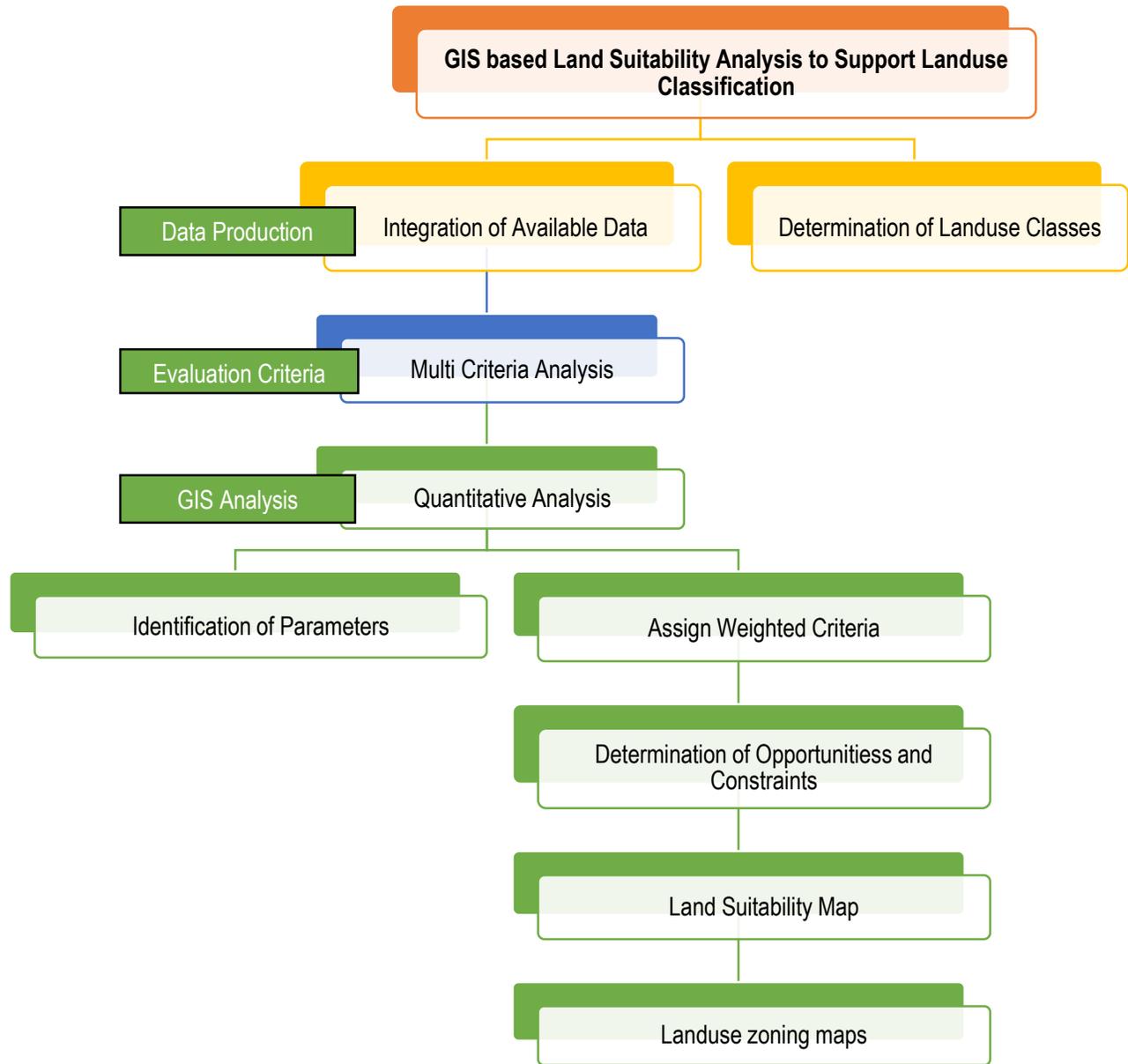


Figure 9-1: Framework for Landuse Suitability Analysis based on GIS

Table 9-2 Quantitative Multi-Criteria Analysis

Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
<b>RESIDENTIAL ZONES</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08



Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0-2
6	Land parcels near landfill/dumping sites & STP (200m)		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines, firing range etc.		Constraints	0-2
8	Land available near obnoxious industries		Constraints	0
9	Vacant land parcels within Built-up Areas	Opportunities		07
10	Large land parcels (open/barren land) other than Built-up Areas	Opportunities		10
11	Land parcels accessible to transportation network	Opportunities		08
12	Land availability proximal to community facilities	Opportunities		07
13	Land availability proximal to employment opportunities	Opportunities		08
14	Availability of land parcels over Slope less than 20%	Opportunities		10
15	Availability of land parcels over Slope from 20-30%		Constraints	05
16	Availability of land parcels over Slope above 30%		Constraints	0
<b>COMMERCIAL ZONES</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0
6	Land parcels near landfill/dumping sites & STP (200m)		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	0-2
8	Land available near obnoxious industries		Constraints	0-2
9	Vacant land parcels within Built-up Areas	Opportunities		08
10	Large land parcels other than Built-up Areas	Opportunities		08
11	Land parcels accessible to transport corridors/network	Opportunities		10
12	Lands proximal to existing physical infrastructure services	Opportunities		08
13	Existing trend of mixed Landuse along primary roads of city	Opportunities		10
14	Availability of suitable land parcel on central location with reference to new development	Opportunities		09
15	Availability of land parcels over Slope less than 20%	Opportunities		08
16	Availability of land parcels over Slope from 20-30%		Constraints	04
17	Availability of land parcels over Slope above 30%		Constraints	0
<b>INDUSTRIAL ZONES</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06

Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0
6	Land parcels near landfill/dumping sites & STP		Constraints	0-2
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	0-2
8	Land parcels along major highways	Opportunities		10
9	Lands proximal to existing main trunk utility lines	Opportunities		07
10	Land parcel availability proximal to exiting industries	Opportunities		06
11	Availability of large land parcels	Opportunities		08
12	Availability of land parcels over Slope less than 20%	Opportunities		08
13	Availability of land parcels over Slope from 20-30%		Constraints	04
14	Availability of land parcels over Slope above 30%		Constraints	0
<b>CIVIC ZONES (ADMINISTRARTION/PUBLIC BUILDING/COMMUNITY FACILITIES) (Administration, Education, Health &amp; Religious)</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	0
2	High Multi-hazard Zone (HMZ)		Constraints	02
3	Medium Multi-hazard Zone (MMZ)	Opportunities		06
4	Low Multi-hazard Zone (LMZ)	Opportunities		08
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	0
6	Land parcels near landfill/dumping sites & STP		Constraints	0
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	0-2
8	Land available near obnoxious industries		Constraints	0-2
9	Vacant land parcels within Built-up Areas	Opportunities		08
10	Large land parcels other than Built-up Areas	Opportunities		08
11	Land parcels accessible to public transport corridors	Opportunities		10
12	Lands proximal to existing physical infrastructure services	Opportunities		08
13	Availability of suitable land parcel on central location with reference to new development	Opportunities		09
14	Availability of land parcels over Slope less than 20%	Opportunities		08
15	Availability of land parcels over Slope from 20-30%		Constraints	04
16	Availability of land parcels over Slope above 30%		Constraints	0
<b>SPORTS &amp; RECREATIONAL ZONE</b>				
1	Highly Hazardous Zone (HHZ)		Constraints	02
2	High Multi-hazard Zone (HMZ)		Constraints	04
3	Medium Multi-hazard Zone (MMZ)	Opportunities		08
4	Low Multi-hazard Zone (LMZ)	Opportunities		10
5	Land parcels suitable for agriculture use including cultivation, orchards & forests.		Constraints	03-04
6	Land parcels near landfill/dumping sites & STP		Constraints	0

Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
7	Land parcels near protected areas including high tension (HT) Lines		Constraints	04
8	Land available near obnoxious industries		Constraints	0
9	Vacant land parcels within Built-up Areas	Opportunities		09
10	Large land parcels other than Built-up Areas	Opportunities		08
11	Lands proximal to existing water bodies (lakes, canals & water channels)	Opportunities		10
12	Availability of suitable land parcel on central location with reference to new development	Opportunities		07
13	Availability of land parcels over Slope less than 20%	Opportunities		05-08
14	Availability of land parcels over Slope from 20-30%	Opportunities		05-08
15	Availability of land parcels over Slope above 30%	Opportunities		05-08
<b>AGRICULTURE ZONES</b> <i>(Cultivation, Orchards, Urban Farms, Forest)</i>				
1	Land parcels suitable for cultivation outside Established Built-up Area	Opportunities		08
2	Land parcels along/near water irrigation system	Opportunities		08
3	Land proximal to transport services	Opportunities		07
4	Lands proximal to farm markets	Opportunities		07
5	Lands proximal to existing agricultural activities	Opportunities		08
6	Availability of land parcels over Slope less than 20%	Opportunities		07-10
7	Availability of land parcels over Slope from 20-30%	Opportunities		07-10
8	Availability of land parcels over Slope above 30%	Opportunities		07-10
9	Land available near obnoxious industries		Constraints	0-2
10	Land available near landfill/dumping sites & STP		Constraints	0-2

## 10. GIS BASED LAND SUITABILITY ANALYSIS

Suitability map is generated through GIS based quantitative multi-criteria prepared to identify the potential of land for suitability of different Landuses, which considers various parameters and their weightage to determine the best locations and allocation for different residential zones. Three categories have been used to identify and designate residential zones which are as follows:-

1. Existing Built-up Area
2. Not Suitable
3. Moderately Suitable
4. Highly Suitable

Restricted areas have already been identified and merged in the maps with the not suitable for construction/development activity of specific Landuse. The other areas which are suitable for residential zones regardless of scale of zone have been shown/presented with Green and Yellow color tones. The overall suitability map indicates that most of the area is under highly suitable area which is towards northern side, while areas with medium suitability can properly utilized for residential purposes.



Constraints for residential development include Highly Hazardous zones, highly multi-hazard zones, agricultural land, areas near dumping sites, proximity to obnoxious industries, land parcels with slopes of 20% or more, and proximity to fault lines, water channels, and hilly areas. On the other hand, parameters that contribute to medium suitability includes medium-multi hazard zones, low-multi hazard zones, large land parcels within built-up areas, land parcels easily accessible to transportation networks, proximity to employment opportunities, and land parcels with slopes less than 20%.

The land suitability map have been generated taking into account the various parameters and assigned weightage to determine the most suitable locations for residential zones.

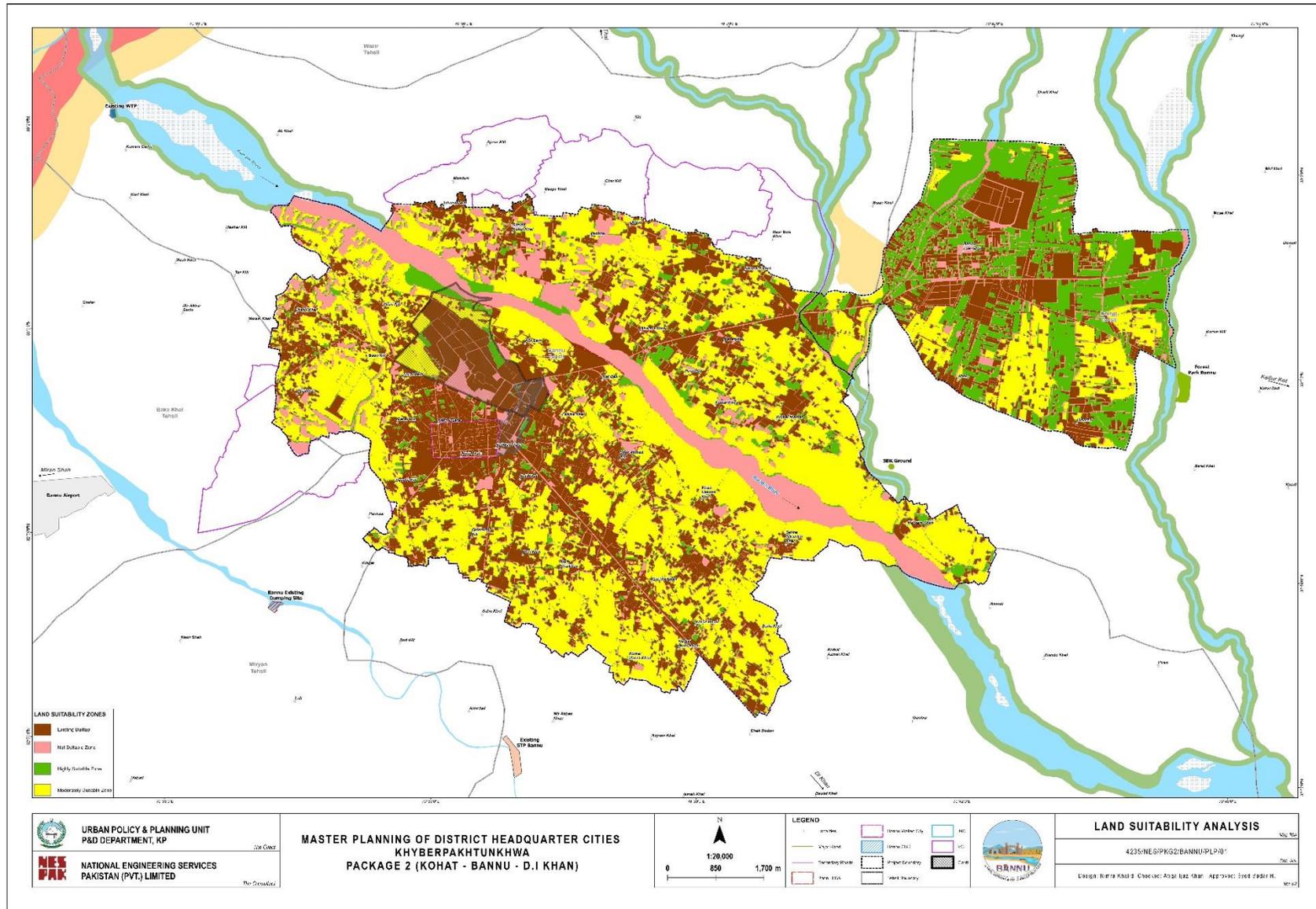


Figure 10-1: Bannu Land Suitability Ma

## 11. KPK URBAN POLICY 2022-2030

The vision of the KP Urban Policy 2022-2030 is to provide strategic-level direction and a roadmap to the governments in KP, for creating inclusive opportunities for individuals, businesses, and communities in urban centers, leading towards social and economic mobility while ensuring environmental sustainability. The vision of the Khyber Pakhtunkhwa Urban Policy 2022–2030 is to provide strategic-level direction and a roadmap to the governments in Khyber Pakhtunkhwa in regard to creating inclusive opportunities for individuals, businesses, and communities in urban centers, leading towards increased social and economic mobility, while ensuring environmental sustainability. This Policy will be reviewed and updated every two years by the Government of Khyber Pakhtunkhwa until 2030. From 2030 onwards, a new Urban Policy will be developed every five years, on a rolling basis. The important sections of KP Urban Policy are presented below:

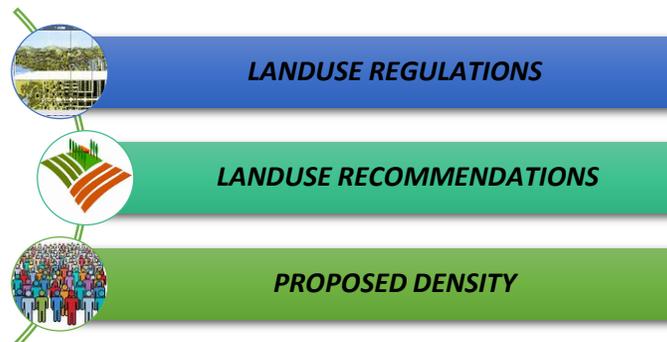


Figure 11-1: Important sections of KP Urban Policy

### 11.1. Landuse Regulations

Land use, building control, and zoning rules, bylaws, standing orders, and instructional circulars shall be revised, updated, and consolidated in conformity with the Khyber Pakhtunkhwa Urban Policy and codified into a single detailed Land Use, Building and Zoning Code. The following clauses shall serve as guiding principles for land use plans and floor area planning in urban areas.

1. On-the-ground land use conversion or reclassification shall be implemented one year after the date of decision (to convert or reclassify), i.e. there will be a one-year gestation period, during which the infrastructure capacity for municipal amenities must be developed.
2. A robust management information system and Geographic Information System (GIS) mechanism shall be developed to monitor, maintain, and regulate land use plans and conversions/reclassifications (in addition to other building control elements).
3. Mixed-use development shall require vertical growth and a mix of residential, commercial, light industrial, office, and other land uses. These diverse functions must be compatible and must be carefully designed and administered
  - A. For a sustainable and mixed-use neighborhood, the recommended total floor space allocations (or total covered area proportions) are 40–60% for economic use, 30–50% for residential usage, and 10–20% for public utilities/amenities. The proposed criteria are in a range to provide for flexibility so that cities can tailor them to their unique circumstances.
  - B. There shall be an increase in economic (light industrial and commercial) activity and at least 40% of the covered area in a neighborhood shall be allocated for economic space.
  - C. Low-cost housing should account for 20% to 30% of total residential floor area (especially for new developments), with owner occupancy accounting for no more than 50% of the total, to assist the rental market.
4. Single function blocks of segregated land use (other than the transport network, graveyards, and

- public open spaces) shall cover less than 10% of the total.
5. The transport network shall occupy not more than 30–40% of the land, including roads and parking.
    - A. Disabled parking shall cover 5% of the total land allocated to parking.
  6. Graveyards in urban centers and housing societies, being an essential requirement, shall occupy at least 2% of land.
    - A. An assessment shall be conducted to determine the current need in respect of graveyards, in and around existing urban built-up areas.
    - B. As this is an urgent matter, a relevant plan shall be created within six months of the approval of this Policy.
    - C. Housing societies shall be mandated to provide space for graveyards, in accordance with the aforementioned parameters.
  7. There shall be an increase in social, public places, especially places for families and women. Guidelines for the design of urban public places are:
    - A. . At least 15–20% of land use shall be allocated to public open spaces in new developments, including towns under Development Authorities and private housing societies.
    - B. Urban regeneration shall be carried out in existing built-up areas so as to create small public spaces for communities.
    - C. Public open spaces include sidewalks, parks, market squares, greenways, public libraries, sports and community centers, and other recreational spaces.
    - D. Public open spaces must be located within a maximum of 1,000 meters, or within a walking distance of 15–20 minutes, of every household.
    - E. Neighborhoods and housing societies shall be mandated to add a prayer area in each residential block or building.
    - F. Community centers for senior citizens and women shall be mandatory in neighborhoods and housing societies.
  8. All urban development shall encourage and legally enforce urban forestation and vegetation.
    - A. A minimum of 9 m<sup>2</sup> of accessible, urban green space per inhabitant shall be provided.
    - B. All roof space of 100 m<sup>2</sup> or more shall be converted to green roofs.
    - C. A community geo tagging system shall be designed allowing citizens to crowd source data about the location of trees, and pictures of them.
    - D. Protected areas shall be designated within cities to secure natural habitats and urban heritage.
    - E. All empty, state-owned pieces of land shall be converted to urban forests.

## 11.2. Landuse Recommendations

1. Indicative land use plans shall be prepared at the city level, while detailed and enforceable land use plans must be prepared at the Neighborhood Council level.
2. Plans shall incorporate a proper grid-and-iron layout (where the terrain is conducive) for new cities or developments, and for urban regeneration.
  - A. New development plots and urban regeneration parcels shall be rectangular in shape.
  - B. Planning shall encompass existing green spaces and natural elements within the terrain and surroundings. Natural features like trees, lakes, rivers, streams etc. shall be protected, and planning and construction shall take place around them.
3. Plans shall incorporate polycentric development, with more than one central business district, to alleviate pressure from having just one city centre.
4. Housing and other residential development shall be established adjacent to previous residential developments in a contiguous manner, to avoid leapfrog development
  - A. . Housing societies and other mega projects shall be developed in arid areas and banned in

cultivated areas.

5. Land use plans developed at neighborhood and housing society level shall be based on density targets and flexible standards.
  - A. A medium level of population density shall be maintained, with the aim of ensuring an average density of 20,000 persons per square kilometer (200 persons per hectare (PPH)) in the Central Zone (especially for new developments or urban regeneration).
  - B. Proposed densities shall vary by density zone or by distance from transit line in the Central Zone.

### 11.3. Proposed Density

The density targets for private housing schemes in the Northern and Southern zones shall be prescribed by the Local Government, Elections, and Rural Development Department.

Table 11-1: Proposed Densities as per KP Urban Policy

Density zone	Distance from transit	Average population density
Mixed use, with high-density residential developments (central business district)	<400 meters	301 to 400 PPH (Persons per Hectare)
Mixed use with medium-density residential developments	400 to 800 meters	201 to 300 PPH
Low-density residential developments	>800 meters	100 to 200 PPH

## 12. Urban Growth Models

Cities are not simply random collections of buildings and people. They exhibit functional structure: they are spatially organized to perform their functions as places of commerce, production, education, and much more. One of the most important forces determining where certain buildings or activities are located within a city deals with the price of land. This tends to be the highest in the downtown area and declines as one moves outward from the center. The United States is the only country in the world in which the majority of the people live in the suburbs. Even though house prices may be higher in the suburbs, the land value is lower (a downtown apartment complex will produce much more revenue per year than a few suburban homes occupying the same amount of space). In every other country the majority resides in either rural or urban areas. Three major urban growth models are:

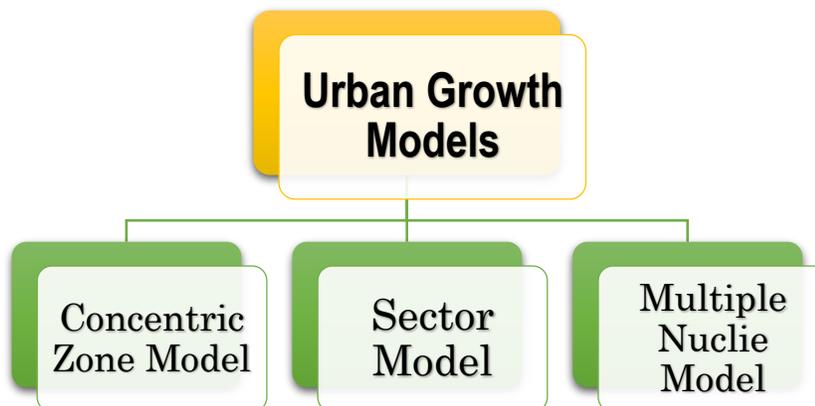


Figure 12-1: Urban Growth Models

### 12.1. Concentric Zone Model

The first model is called the concentric zone model, which states that cities have the ability to develop in five concentric rings. The inner zone of the cities tends to be the CBD, followed by a second ring that tends to be the zone of transition between the first and third rings. In this transition zone, the land tends to be used by industry or low quality housing. The third ring is called the zone of independent workers' homes and tends to be occupied by working-class households. The fourth ring is called the zone of better residences and is dominated by middle-class families. Finally, ring five is called the commuter's zone, where most people living there have to commute to work every day.

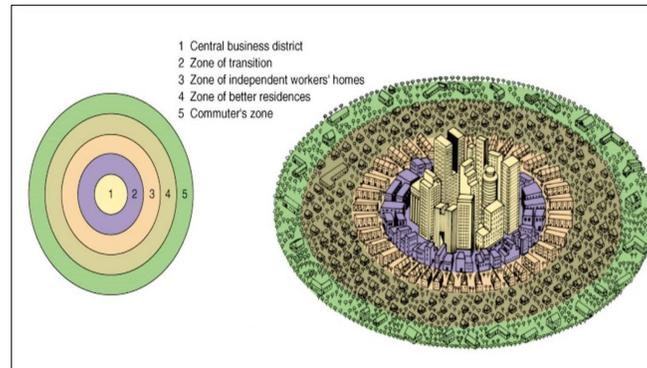


Figure 12-2: Concentric Zone Model

### 12.2. Sector Model

The second model for city development and growth is called the sector model. This model states that cities tend to grow in sectors rather than concentric rings. The idea behind this model is that “like groups” tend to grow in clusters and expand as a cluster. The center of this model is still the CBD. The next sector is called the transportation and industry sector. The third sector is called the low-class residential sector, where lower income households tend to group. The fourth sector is called the middle-class sector and the fifth is the high-class sector.

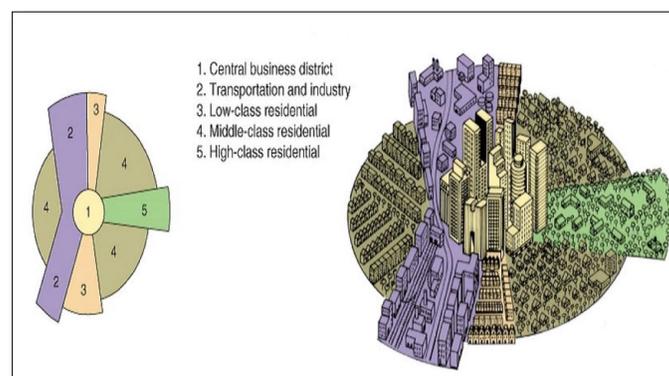


Figure 12-3: Sector Growth Model

### 12.3. Multi-Nuclei Model

The third and final urban design is called the multiple nuclei model. In this model, the city is more complex and has more than one CBD. A node could exist for the downtown region, another where a university is situated, and maybe another where an international airport may be. Some clustering does exist in this model

because some sectors tend to stay away from other sectors. For example, industry does not tend to develop next to high-income housing.

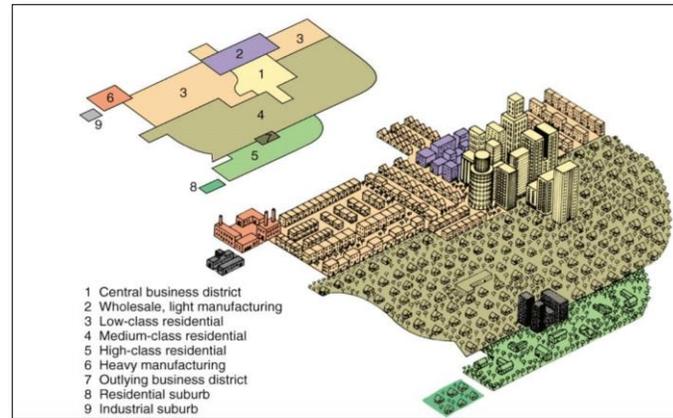


Figure 12-4: Multiple Nuclei Model

### 12.4. Applicability Of Multiple Nuclei Growth Model On Bannu

As far as the applicability is concerned, the multiple nuclei growth model is highly applicable and feasible for Bannu city. The existing city and expected growth footprint of Bannu Township would create another center of the city from which it is going to be developed. Furthermore, the proposal of low class residential zones along the fault lines and water bodies would develop a new direction of city’s growth towards South and East. The provision of New CBD in West depicts that the city would not have only one center to grow rather it would grow in multiple points and through multiple commercial avenues. The proposed new residential zone on the land under BDA jurisdiction will serve the purpose of residential suburb. This will not only increase the density of existing urban areas but will also serve the purpose of urban and civic sense among the residents who are not near to CBD.

## 13. District Spatial Strategy

### 13.1. District Level Economic Potentials

At District Level, the following factors should be considered while deciding core urban expansion area:



Figure 13-1: Factors to consider the urban expansion at District Level

Bannu District, located in the Khyber Pakhtunkhwa province of Pakistan, has several economic potentials and opportunities. Chief among them are Manufacturing, Agriculture and Dairy and Livestock

[Agriculture](#)

Bannu is primarily an agrarian district, and agriculture plays a significant role in its economy. The district is known for the cultivation of wheat, sugarcane, maize, cotton, and various fruits and vegetables. There is potential for improving crop yields through modern farming techniques and technology. This district produce enough cereal and pulses to have Agro Based Industry of its own.

#### Livestock Farming

Livestock farming, including cattle, goats, and poultry, is a vital economic activity in Bannu. The district has the potential to enhance livestock productivity and promote meat and dairy processing facilities.

#### Mining And Minerals

Bannu is rich in mineral resources, including gypsum, salt, and coal. These minerals have the potential for extraction and processing, contributing to the local economy and creating job opportunities.

#### Trade And Commerce

Bannu serves as a significant trading hub due to its strategic location near the border with Afghanistan. The district can capitalize on its role as a transit route for trade between Pakistan and Afghanistan, fostering cross-border economic activities.

#### Cottage Industries

Cottage industries, such as hand-woven carpets, traditional embroidery, and pottery, have the potential to be further developed and marketed both domestically and internationally.

#### Tourism

Bannu's natural beauty and historical sites, such as the Kurram River, Shahi Bagh Park, Bannu walled city and various archaeological sites, offer potential for tourism development. Investment in infrastructure and promotion of tourism can generate revenue and employment opportunities.

#### Infrastructure Development

Improving transportation infrastructure, such as roads and highways, can facilitate the movement of goods and people, making it easier for businesses to thrive and expand in the region.

#### Small And Medium Enterprises (Smes)

Encouraging the growth of SMEs in Bannu can stimulate economic activities, create jobs, and support entrepreneurship. Access to financing and business support services is essential for SME development. In areas like Bannu small industrial estate have also been used as an effective tool to decentralize industrial activity to rural and backward areas. Bannu Small Industrial Estate is a place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there.

### **13.2. Evolution Of Urban Form Of Bannu**

The evolution of the urban form of Bannu, a city in Khyber Pakhtunkhwa, Pakistan, has been shaped by historical, geographical, and socio-economic factors.

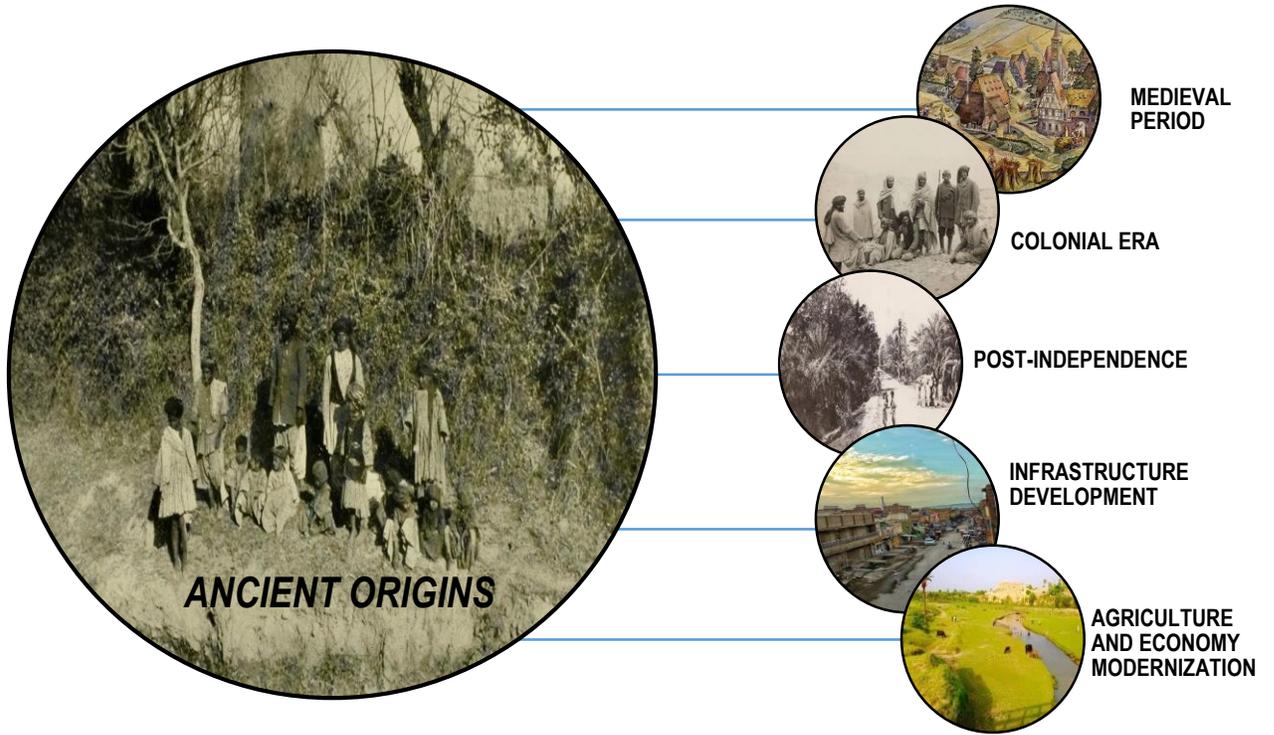


Figure 13-2: Evolution of Bannu City

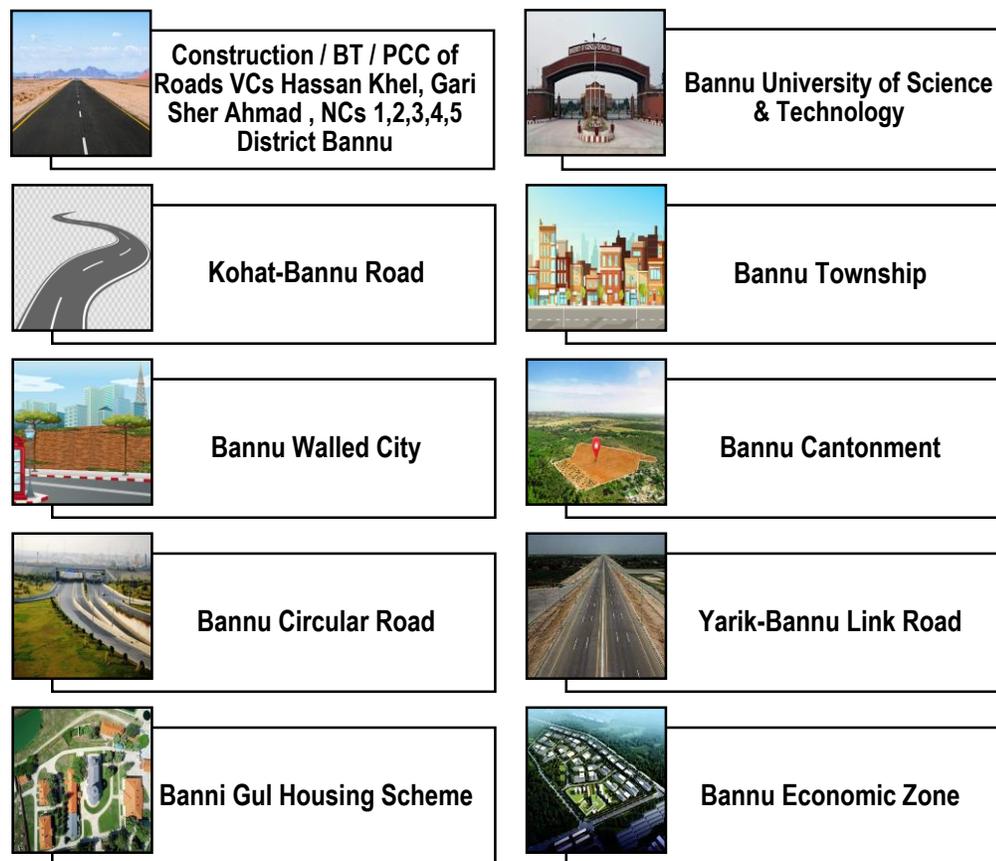


Figure 13-3: Developments Of Recent Past Influencing Urban Form

### 13.3. Ongoing/Proposed projects in Bannu District

Land commitments could include promises to allocate or use land for specific purposes, such as building infrastructure, establishing businesses, or creating public spaces. Likewise, for environmental conservation; governments, organizations, or individuals may commit to maintaining specific tracts of land in their natural state. In Bannu District, different land commitments are mentioned below;

Table 13-1: Ongoing/ Proposed projects in Bannu District

Ongoing/Proposed projects in Bannu District	
1.	Establishment of Khalifa Gul Nawaz Medical Complex, Bannu.
2.	Development of Small Industrial Estate on Bannu Miranshah Road, NW (AIP)
3.	Reconstruction / Rehabilitation of road from Narmi Khel to Miryan, District Bannu
4.	F/S, Design & Construction of 05 Km road from Bannu City to Kakki via Mundan, Bannu
5.	Rehabilitation/ BTR road from Baran Dam to Jani Khel and Police station Miryan to Hawaid road District Bannu
6.	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)
7.	Construction/Rehabilitation of road from Kacha Bachak Meerakhel to Shegi Machankhel (10Km) District Bannu
8.	F/S & Construction of Circular Bypass Road, Bannu (64.90 Km)

9.	Construction and Rehabilitation of Road from Tanga Bridge to Rocha Phase-II (10-Km) TSD Bannu
10.	Construction of Road from Malik Khidmat Khan Chappari upto Dargah Shahidan TSD Bannu (10-KMs)
11.	Improvement and widening of black topped road from Ali Khel to Nokori upto NWA Border Sub Division Wazir Bannu ( 5km) (ER) (AIP)
12.	Construction of Road connecting Sub Division Wazir to Bannu circular Road (AIP)
13.	Construction of Sitti Kali Dam District Bannu
14.	Dualization of Bannu Circular Road
15.	Development of Bani Gul city

### 13.4. Constraints And Opportunities On Urban Expansion In District Bannu

Urban expansion in Bannu District, like in many other areas, faces a combination of constraints and opportunities. Understanding these factors is crucial for sustainable and well-planned development. Here are some of the key constraints and opportunities related to urban expansion in Bannu.



Figure 13-4: Constraints and Opportunities on Urban Expansion in District Bannu

### 13.5. Infrastructure Challenges

Expanding urban areas require significant investments in infrastructure, including roads, water supply, sanitation, and utilities. The existing infrastructure require substantial upgrades to accommodate urban expansion.



Figure 13-5: Unpaved Road in Bannu

### 13.6. Environmental Concerns

Unplanned urban expansion can lead to environmental degradation, including deforestation, pollution, and habitat destruction. Maintaining a balance between urban growth and environmental conservation is essential.

### 13.7. Limited economic opportunities

Expanding urban areas need to create economic opportunities and jobs to support the growing population. Limited economic opportunities lead to migration to larger cities in search of work.



Figure 13-6: People searching for daily job in Bannu

### 13.8. Opportunities for Urban Expansion in Bannu



DIVERSIFICATION

**Economic Diversification:** Bannu District can explore opportunities for economic diversification, including promoting small and medium-sized enterprises (SMEs), agriculture-based industries, and tourism, to support urban expansion with a strong economic base. In KP, industrial estates have been utilized as an effective tool for the promotion and growth of small-scale industries. They have also been used as an effective tool to decentralize industrial activity to rural and backward areas. Bannu Small Industrial Estate is a place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there.



#### Investment Opportunities

Urban expansion attract investments in real estate, retail, and services as it is close to Bannu Economic Zone which can boost the local economy and create jobs.

Figure 13-7: Opportunities for Urban Expansion in Bannu

## 14. Strategic Scenario Mapping

Strategic scenario mapping is a process used in strategic planning to explore and understand different possible future situations of development a city may face. It involves creating a set of scenarios to help leaders anticipate challenges, identify opportunities, and make more informed decisions. The stages prior to

scenario planning are described below and after that an overview of how to conduct strategic scenario mapping is given:

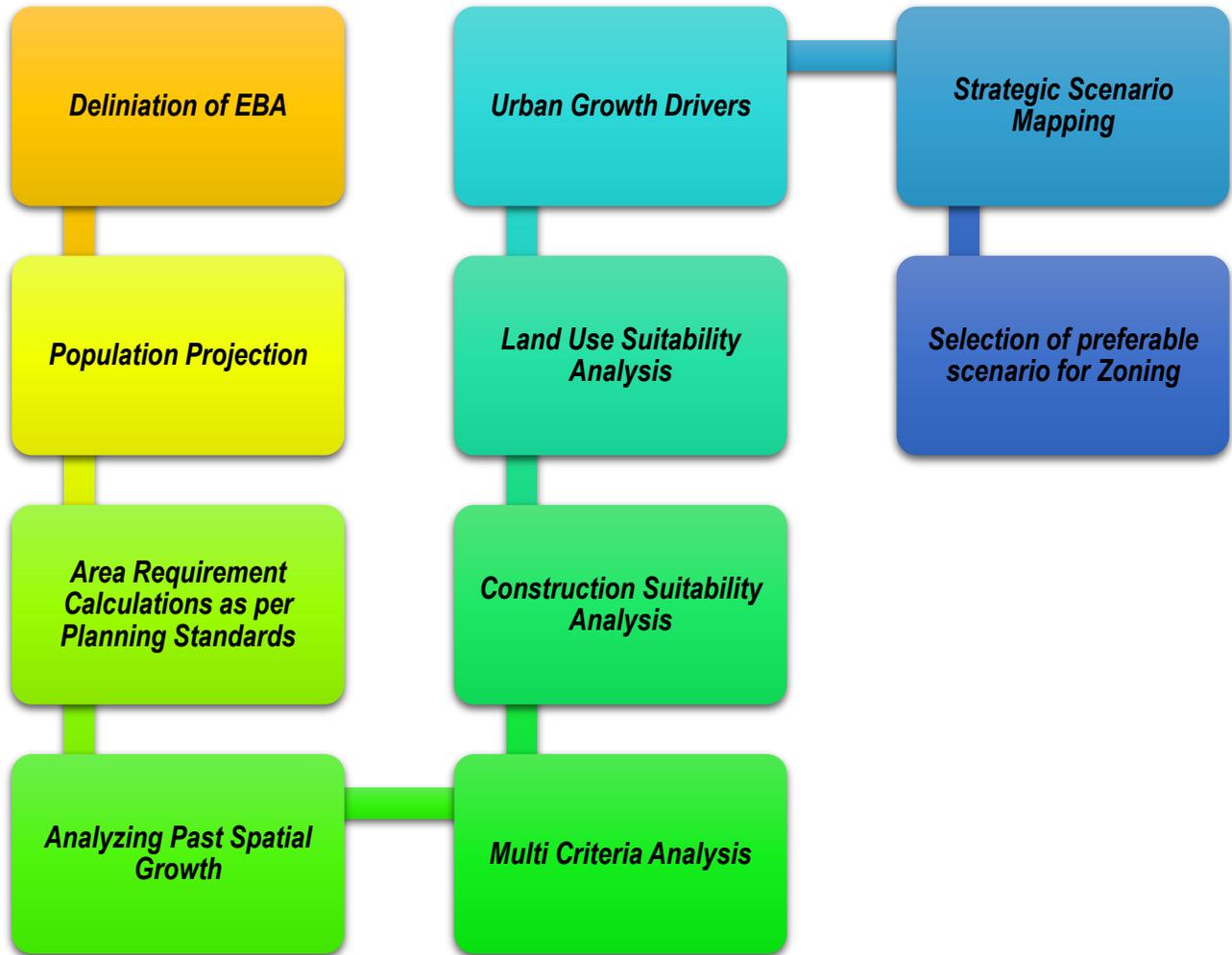


Figure 14-1: Stages before Scenario Mapping

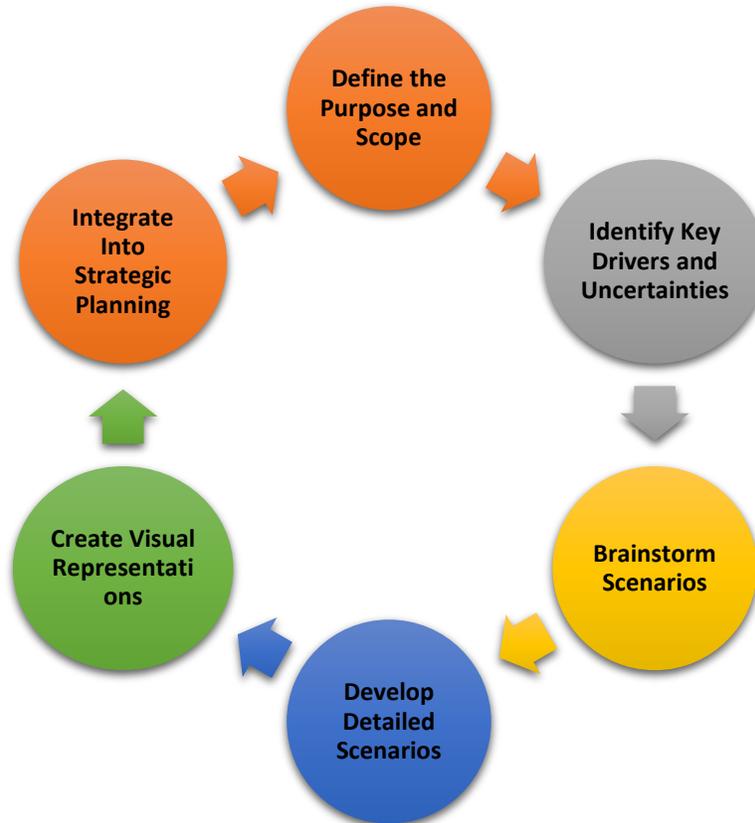


Figure 14-2: Process of Strategic Scenario Mapping

- 1. Define the Purpose and Scope:**  
Clearly articulate the purpose of the strategic scenario mapping exercise. Determine the specific aspects of the environment that is to be explored, such as growth trends, landuse changes, land cover shifts, or competitive landscapes.
- 2. Identify Key Drivers and Uncertainties:**  
Identify the key drivers and uncertainties that could significantly impact the study area. These could include factors such as economic conditions, technological advancements, geopolitical events, customer behavior, and regulatory changes.
- 3. Brainstorm Scenarios:**  
Conduct brainstorming sessions to generate a range of possible scenarios. Encourage creative thinking and consider extreme, but plausible, situations. Aim for a set of diverse scenarios that cover a spectrum of possibilities.
- 4. Develop Detailed Scenarios:**  
For each selected scenario, develop a detailed narrative that describes the key events, trends, and dynamics. Consider the implications for the organization in terms of opportunities, threats, strengths, and weaknesses.
- 5. Create Visual Representations:**  
Develop visual representations of the scenarios. This could be in the form of scenario maps, graphs, or charts that illustrate the key elements and relationships in each scenario. Visualization aids in communication and understanding.
- 6. Evaluate Strategic Responses:**  
For each scenario, assess the organization's current strategic position and identify potential responses.



Consider adjustments to the business model, changes in market focus, new partnerships, or technological investments that may be required.

**7. Integrate Into Strategic Planning:**

Use the insights gained from scenario mapping to inform the organization's strategic planning process. Develop strategies that are robust and adaptable to a range of possible futures.

### 14.1. Scenario Mapping In Bannu

The features along with the location of different scenarios considered under strategic scenario mapping of Bannu

Table 14.1-1: Features of Proposed Scenarios

North Linear Zone	Bannu Township Expansion Zone	Bannu Eastern Motorway Zone	New City Bannu
<ul style="list-style-type: none"> <li>• Located in north, Between EBA Boundary and Bannu Ring Road</li> <li>• Feasible for tourism economic development</li> <li>• Major portion of land is not suitable for agriculture purposes</li> <li>• Suitable city shape depicting as linear city model</li> <li>• Has major existing landmarks such as Bannu Thal Road and Kurram River</li> </ul>	<ul style="list-style-type: none"> <li>• Comprises of Bannu Township suburb area, likewise the vacant and open land present within project area-A (Bannu City)</li> <li>• Has larger portion of vacant and open land available</li> <li>• Solidifies and gives shape to the existing city along with physical expansion</li> <li>• Important landmarks such as connecting road between project area A &amp; B is present</li> <li>• Serves the scenario of immediate physical development of city in both Bannu city and Bannu Township</li> <li>• Has improved and developed road network</li> </ul>	<ul style="list-style-type: none"> <li>• Potential economic zone between water body and Peshwar-DI Khan Motorway</li> <li>• Has two major connectivities i.e. Bannu-Kohat Road and Indus Highway Bannu Link Road</li> <li>• Important landmarks such as Bannu Forest Park is present</li> <li>• Potential zone for Transit Oriented Development along motorway</li> <li>• Potential for tourism economic development, as well industrial development as it is closed to Bannu Economic Zone</li> </ul>	<ul style="list-style-type: none"> <li>• Located along Bannu Gul City and proposed Motorway</li> <li>• Has major landmarks such as Peshwar DI Khan Motorway, Bannu DI Khan Road and Proposed Ring Road</li> <li>• At left side of this scenario, Kurram river flows</li> <li>• Land cover is not very suitable for agricultural purposes</li> <li>• It would give a satellite town development of Bannu City because present at a distance from main city</li> <li>• Already has the proposed residential scheme of Bannu Development Authority i.e. Bannu Gul City</li> </ul>



Table 14.1-2: Area Statement for Planning Boundaries of Scenarios

Area For Planning Boundary Zones		
Sr.	Planning Boundary Zone	Area (acre)
1	North Linear Zone	6825.93
2	New City Bannu	7759.38
3	Bannu Eastern Motorway Zone	8408.41
4	Bannu Township Expansion Zone	15346.24

## 14.2. Preferred Scenario for Zoning

The preferred scenario for zoning of Bannu City is Bannu Township Expansion Zone because of the following reasons,



Figure 14.2-1: Features of preferred scenario for Zoning in Bannu District

While planning a city, some features collectively contribute to the overall success and functionality of cities, fostering sustainable development and a high quality of life for residents. Many planned cities incorporate sustainable practices, such as green building standards, energy-efficient infrastructure, waste management systems, and water conservation measures. Cities often feature mixed-use developments, where residential, commercial, and recreational spaces are integrated within the same area. This design promotes a more walkable and interconnected urban environment. For this purpose, Scenario of Bannu Township expansion Zone has been taken for detailed future zoning of Bannu. Future population is more likely to be accommodated in the adjacent areas of Bannu city or in Bannu Township. That's why this scenario gives the most viable conditions of sustainable planning of Bannu City. It will not only give a shape to existing built up area but will also pave the way for sustainable future residential, commercial and economic development of Bannu.

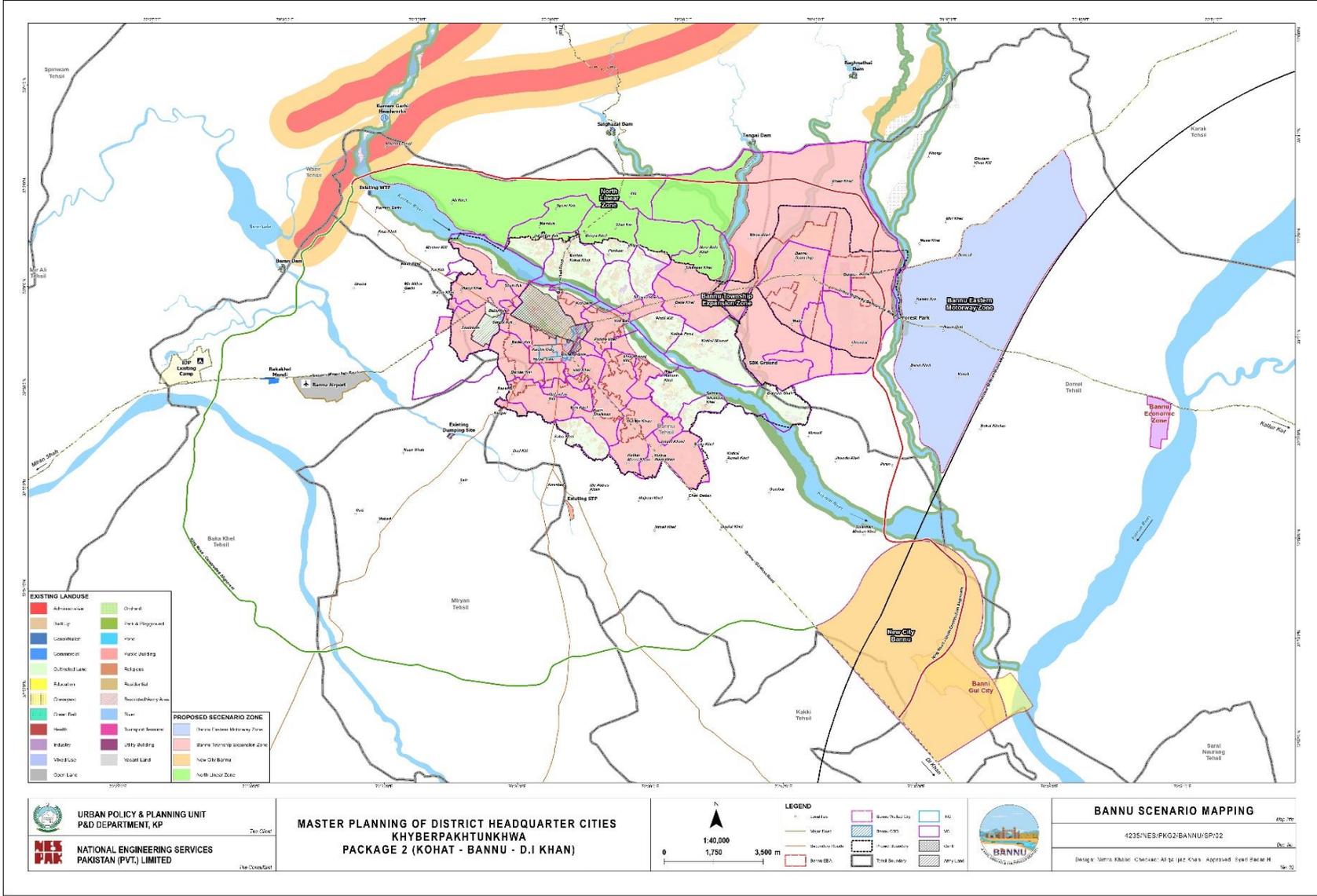


Figure 14.2-2: Bannu Scenario Mapping

## 15. Proposed Zones of Selected Scenario

The list of proposed Zones in Bannu Zoning Map is mentioned below:

1. Infill Development Zone
2. New Housing Zone
3. Mixed Use Zone
4. Model Villages
5. Commercial Corridors
6. Orchard Reserves
7. Agricultural zone
8. Rural Urban Integration Zone
9. Water Retention Zone
10. CBD
11. Urban Farming Zone
12. Botanical Garden
13. City Graveyard
14. Logistics & Trade Zone
15. Bus Terminal
16. Walled City Regeneration zone
17. Urban Regeneration zone (mixed-use)
18. Urban Regeneration zone (CBD)
19. Botanical Garden
20. Sports & Recreational zone
21. Civic Zone Plan
22. Industry & Trade Plan
23. Regional Park
24. Baran Dam Recreational Zone

*Table 15-1: Proposed Zones Details in Respective VC's of Bannu*

Sr.	Name	Major Settlement	Proposed Zone
7	Amandi 2	Village Amandi Umar Khan	Farm Land Reserve
8	Basia Khel	Char Kili	-
9	Bazar Ahmad Khan 1	Bazar Ahmad Khan	Infill Housing
10	Bazar Ahmad Khan 2	Bazar Ahmad Khan	Infill Housing
11	Bheri Khel Mandan	Bheri Khel	Infill Housing
12	Boza Khel	Boza Khel	Mixed Use, Farm land Reserve
13	Faiz Talab Abbas Mandan	Mandan Road	Infill Housing
14	Fatima Khel	Fatima Khel	Infill Housing
15	Gharri Sher Ahmad	Gharri Sher Ahmad	-
16	Hassan Khel Issaki	Hassan Khel Issaki	-
17	Hebak Sherza Khan	Hebak Sherza Khan	-
18	Hinjal 1	Hinjal 1	Infill Housing
19	Hinjal 2	Hinjal 2	-
20	Kala Khel Masti Khan	Kala Khel Masti Khan	Infill Housing
21	Kausar Fateh Khel	Kausar Fateh Khel	-

22	Khwaja Mad	Mandan	-
23	Kot Adil	Kot Dain	Infill Housing
24	Kot Baily	Kot Baily	-
25	Koti Sadat	Koti Sadat	Model Village 1, Cattle Farming Zone
26	Lalozai 1	Lalozai Surrani	Farm Land Reserve
27	Lalozai 2	Lalozai 2	Farm Land Reserve
28	Mamash Khel 1	Mamash Khel Nogari	-
29	Mamash Khel 2	Mamash Khel Nogari	-
30	Mamash Khel Sadat	Chi Gari	Urban Farms
31	Mewa Khel	Mewa Khel	Mixed Use, Farm Land Reserve
32	Nizam Dharman Khel	Kotkan Khatkhan Surrani	Farm Land Reserve
33	Nizam Khan	Nizam Khan	Mixed Use
34	Selma Sikandar Khel	Selma Sikandar Khel	-
35	Sero Bada Khel	Sero Bada Khel	Infill Residential, Proposed Bus Terminal
36	Sikandar Khel Bala	Sikandar Khel Bala	Farm Land Reserve
37	Sokari 1	Sokari 1	Urban Farms
38	Sokari 2	Sokari 2	Urban Farms
<b>VC's in Domel Tehsil</b>			
39	Bizen Khel	Bizen Khel	Trade & Business Hub, Light Industry, Low Income Housing, Agriculture Zone
40	Umar Zai 1	Bannu Medical College	Urban Farms, Botanical Garden, Technology Park, Trade and Logistic Zone, Civic Zone, Institutional Zone, New CBD
41	Umar Zai 2	Dogar Umar Zai Village	New Housing, Proposed Bus Terminal 2

## 15.1. Description of Zones

### 15.1.1. Commercial Zone

In Bannu Zoning Plan the area of proposed Commercial Zone is 210.97 acres. It consists of further sub-zones such as;

- CBD
- Commercial Corridors
- Urban Regeneration Zone (CBD)
- Mixed Use Development Zone

It is referred to as a business or commercial district, an area within a city or town that is designated for commercial and business activities. These zones are typically characterized by the presence of various types of businesses, retail establishments, offices, and services. The purpose of creating commercial zones is to concentrate and organize economic activities, promote business growth, and enhance the overall economic

vitality of an area. It will have a variety of businesses, such as retail stores, restaurants, offices, hotels, and service providers. Some important features of commercial corridors are described below:

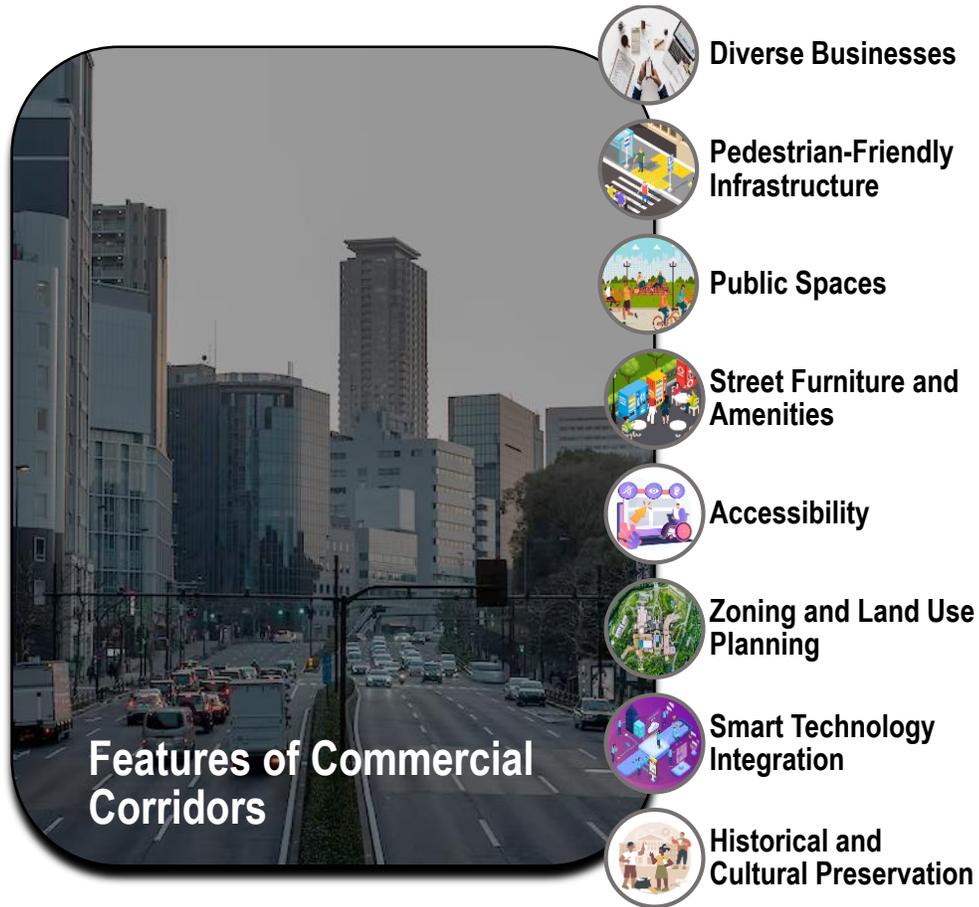


Figure 15-1: Features of commercial corridors





### **15.1.2. Proposed Residential Zone**

Proposed residential zone plan of Bannu has three major sub-zones as,

- Infill development Zone
- New Housing Zone
- Mixed Use Development Zone

Residential zones play a pivotal role in urban planning by providing designated spaces for housing development and contributing to the overall well-being and livability of communities. Effective residential planning considers a mix of housing types, infrastructure, amenities, and community engagement to create sustainable and vibrant neighborhoods. It is a designated area within a city or town that is primarily intended for housing and related purposes. The purpose of creating residential zones is to provide a planned and organized environment for housing development, ensuring that the community has suitable spaces for people to live.

This zone accommodate various types of housing, including single-family homes, multi-family dwellings, apartments, condominiums, townhouses, and sometimes mixed-use developments that include both residential and commercial spaces. Residential zones are typically equipped with the necessary infrastructure and services to support residents. This includes roads, utilities (water, sewer, and electricity), schools, parks, and other amenities essential for a residential community.

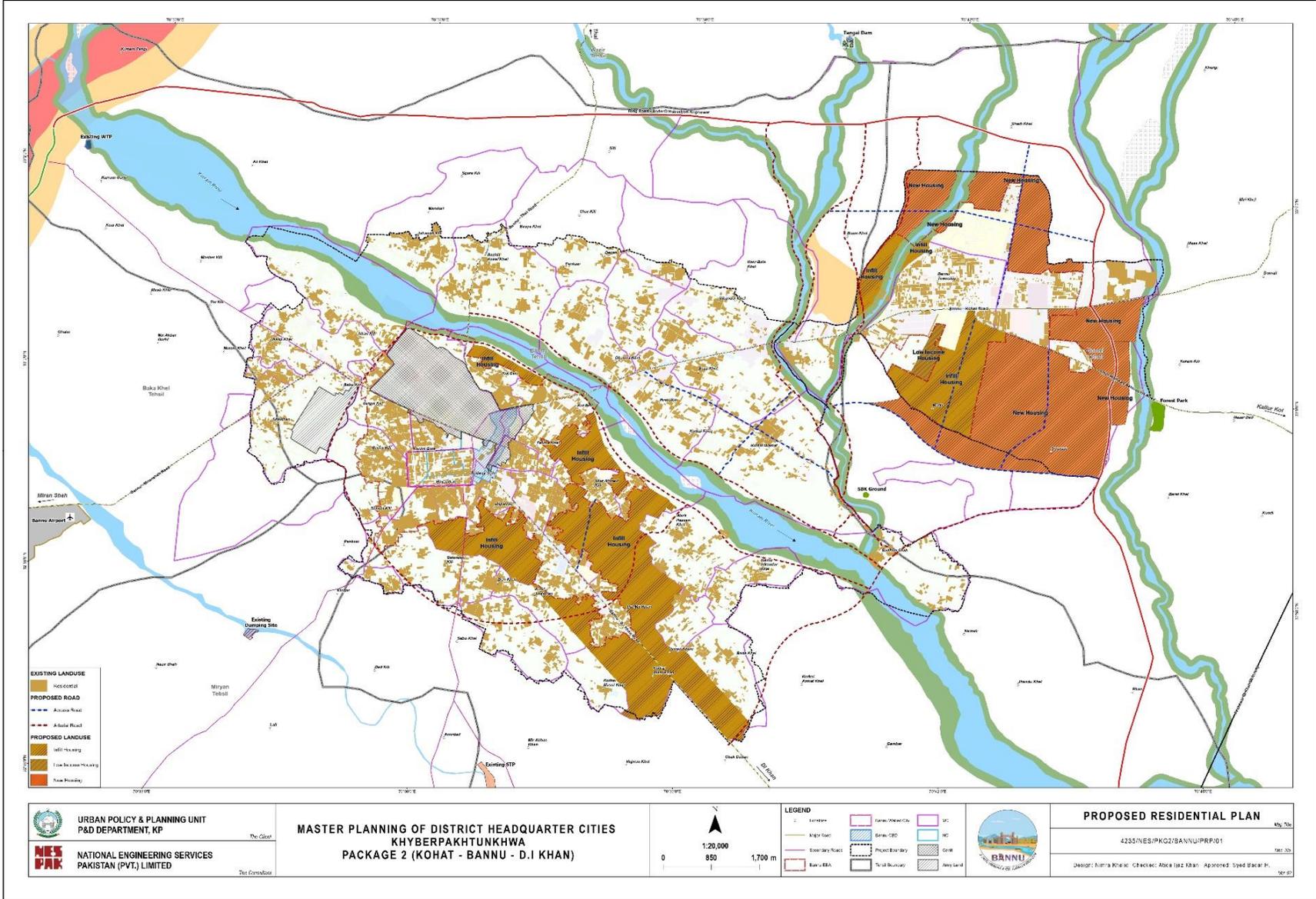


Figure 15-3: Bannu Proposed Residential Zone Map

### 15.1.3. Rural Urban Integration Plan

The proposed model village of Bannu has an area of 207.26 acres. Rural Urban Integration Plan has the following key features;

- Model Villages
- Cattle Farming
- Agriculture Land
- Orchards & Farms

A model village is a planned community or settlement designed to serve as an example of ideal living conditions, often incorporating various amenities and features aimed at providing a high quality of life for its residents. The concept of a model village has historical roots in the 19th and early 20th centuries when social reformers, philanthropists, and industrialists sought to address issues related to housing, sanitation, and the well-being of workers. Here are some key features and characteristics commonly associated with model villages:



Figure 15-4: Features of Model Village

### Cattle Farming Zone

A cattle farming zone, also known as a cattle ranching or livestock farming zone, refers to a geographic area or region where the primary agricultural activity is the breeding and raising of cattle. These zones are characterized by the presence of pastureland or grazing areas suitable for cattle, as well as the necessary infrastructure for cattle farming.

Key features and benefits of cattle farming zone include:

**1. Climate and Vegetation:** Cattle farming zones are typically located in areas with a climate conducive to pasture growth and a variety of vegetation that can serve as feed for cattle. These areas may include grasslands, savannas, or regions with suitable forage crops.

- 2. Land Availability:** Sufficient land is essential for cattle farming. Cattle require ample grazing space, and the availability of large expanses of land is a defining characteristic of a cattle farming zone.
- 3. Water Resources:** Access to water is crucial for both cattle and the vegetation they graze on. Cattle farming zones are often situated near rivers, lakes, or other water sources to ensure a stable water supply.
- 4. Infrastructure:** Adequate infrastructure, including roads, transportation facilities, and veterinary services, is essential for the successful operation of cattle farms. This helps in transporting cattle, providing medical care, and bringing in necessary supplies.
- 5. Support Services:** Cattle farming zones may have support services such as feed suppliers, equipment dealers, and marketplaces for buying and selling cattle. These services contribute to the efficiency and sustainability of cattle farming operations.
- 6. Market Access:** Proximity to markets for selling cattle and related products is important for the economic viability of cattle farms. Access to processing facilities and distribution networks is also a factor.
- 7. Climate Resilience:** The climate of a cattle farming zone should be considered for its resilience to extreme weather conditions. Certain regions may be more susceptible to droughts, floods, or other environmental challenges that can impact cattle farming.



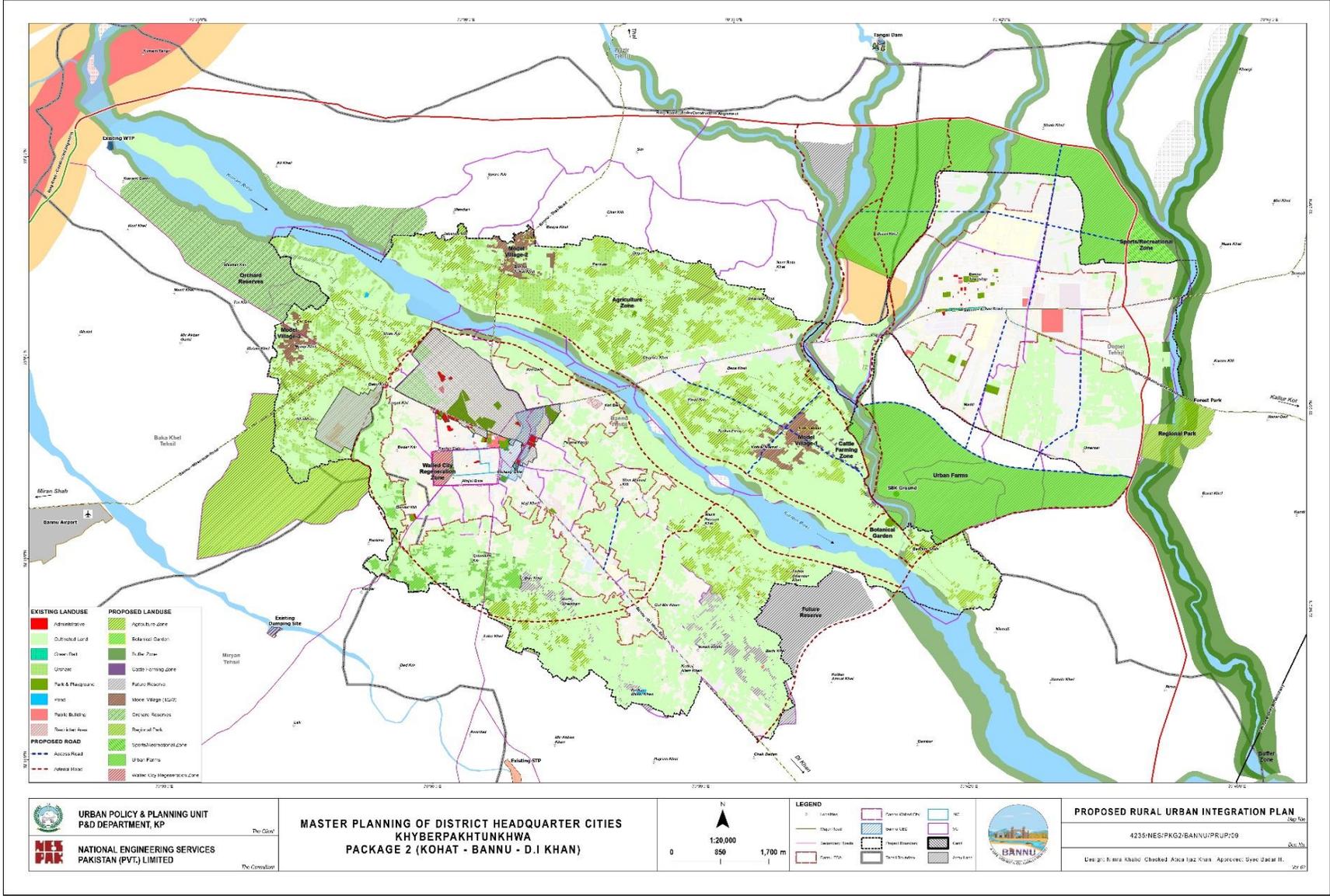


Figure 15-5: Proposed Rural Urban Integration Plan Bannu

#### 15.1.4. Transportation Plan

A transportation plan is a comprehensive document that outlines strategies and policies to address the movement of people and goods within a region. It typically covers various modes of transportation, including roadways, public transit, cycling, walking, and, in some cases, air and water transportation. The goal of a transportation plan is to create an efficient, safe, and sustainable transportation network that meets the needs of the community while considering environmental and economic factors. This zone is covered under the transportation plan of Bannu City in which the following components are present;

- Logistics/Bus Terminal Zone
- Proposed Roads

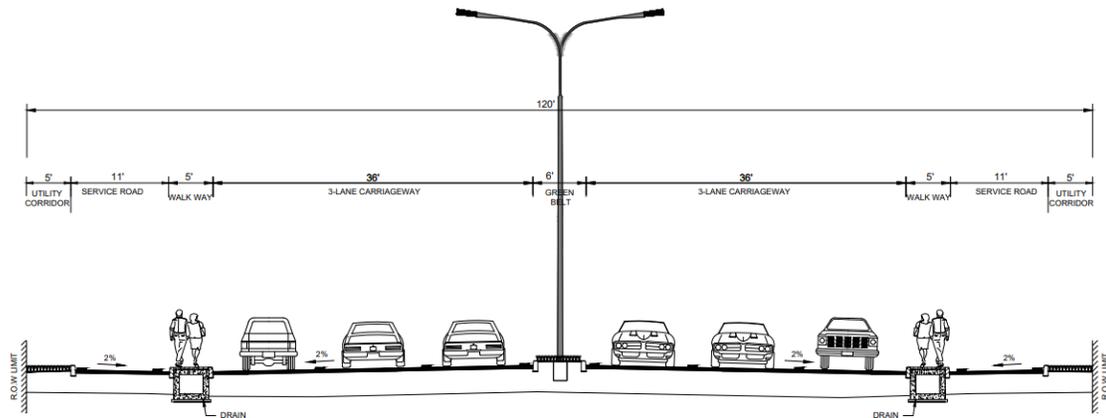
Commercial corridors, often referred to as business districts or commercial streets, are specific sections of urban or suburban areas characterized by a concentration of commercial establishments, retail spaces, and economic activity. These corridors play a crucial role in the economic vitality and urban fabric of a community. Successful commercial corridors are often designed to be pedestrian-friendly, with wide sidewalks, pedestrian crossings, street furniture, and landscaping. This encourages foot traffic and creates a more enjoyable experience for shoppers.

The development of new zones in Bannu requires careful planning and consideration of the city's future transportation needs. As a result, the master plan for Bannu proposes the construction of new arterial roads to support these new zones. These roads will provide essential transportation links between different parts of the city and enable easier access to the new areas. Overall, the inclusion of new arterial roads in the master plan for Bannu demonstrates a commitment to sustainable urban development and a focus on providing efficient and effective transportation infrastructure to support the city's growth. These roads alignments pertain to planning phase, which may vary on account of detail design. Extension of Ring Road from Kurram village to the existing Bannu Ring Road (at Bannu DI Khan Road) with the existing ROW is also proposed to ensure the connectivity of corridor traffic.

#### Proposed Inter-Zonal Arterial Roads (120' R.O.W.)

For this purpose, ROW of all new proposed arterial roads within the zones is set as 120 feet. This ROW will cater future demand of traffic that will generate due to growth of existing population as well as new development. These roads alignments pertain to planning phase, which may vary on account of detail design. It is recommended to phase-wise develop these roads as and when development of adjacent zones takes place. These proposed arterial roads are shown in figure 4.

Most of these roads are identified by linking existing isolated minor roads/tracks in such a way as to provide not just the connectivity to new zones but also to act as new arteries to add up in the existing road network of the city. This will also help to ease traffic congestion in existing areas by diverting traffic to alternative routes. Final alignment of these proposed roads will depend on the engineering studies for these roads in future. Approximate length of these newly proposed arterial roads is 64.71 KM. The proposed typical cross section for arterial road is illustrated in the following figure.



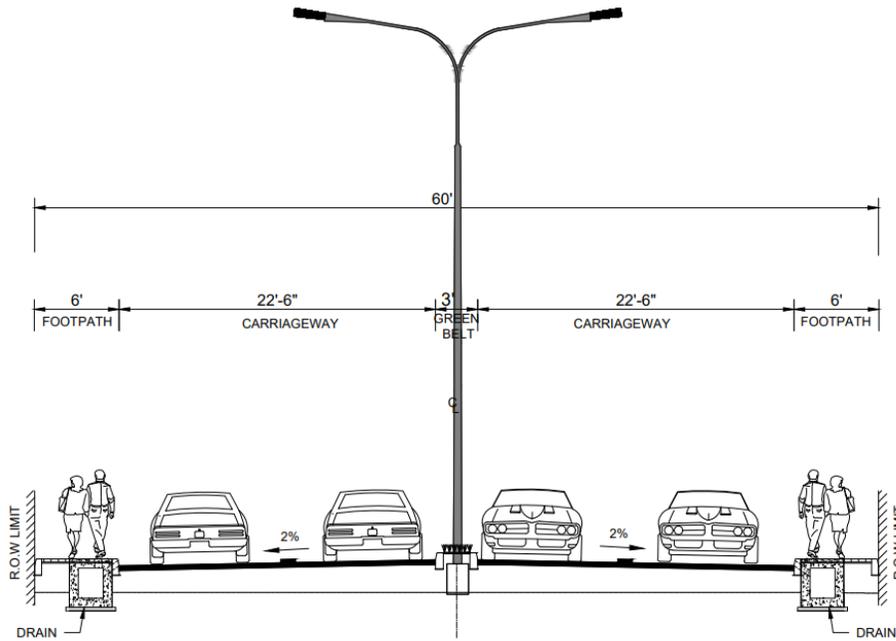
TYPICAL CROSS SECTION (120')  
 ARTERIAL ROADS  
 SPEED=60 Km/h

Figure 15-6: Typical Cross Section (120') for arterial roads

#### ✚ Proposed Inter-Zonal Collector Roads (60' R.O.W.)

The proposed collector roads within the proposed zones are planned with a right-of-way (ROW) width of 60 feet. This ROW is intended to accommodate the anticipated increase in traffic demand resulting from both the growth of existing developments and the introduction of new ones. It is advisable to implement these roads gradually, aligning with the progress of development in adjacent zones. These proposed collector roads are shown in figure 4.

Many of these roads are selected by strategically connecting existing isolated minor roads and pathways. This approach not only establishes connectivity to the new zones but also integrates them into the existing urban road network, effectively transforming them into new main arteries. Furthermore, this initiative aims to alleviate traffic congestion in existing areas by diverting traffic onto alternative routes. Final alignment of these proposed roads will depend on the engineering studies for these roads in future. Approximate length of these newly proposed collector roads is 19.40 KM.



TYPICAL CROSS SECTION 60 FT WIDE ROAD

Figure 15-7: Typical Cross Section (60') for collector roads

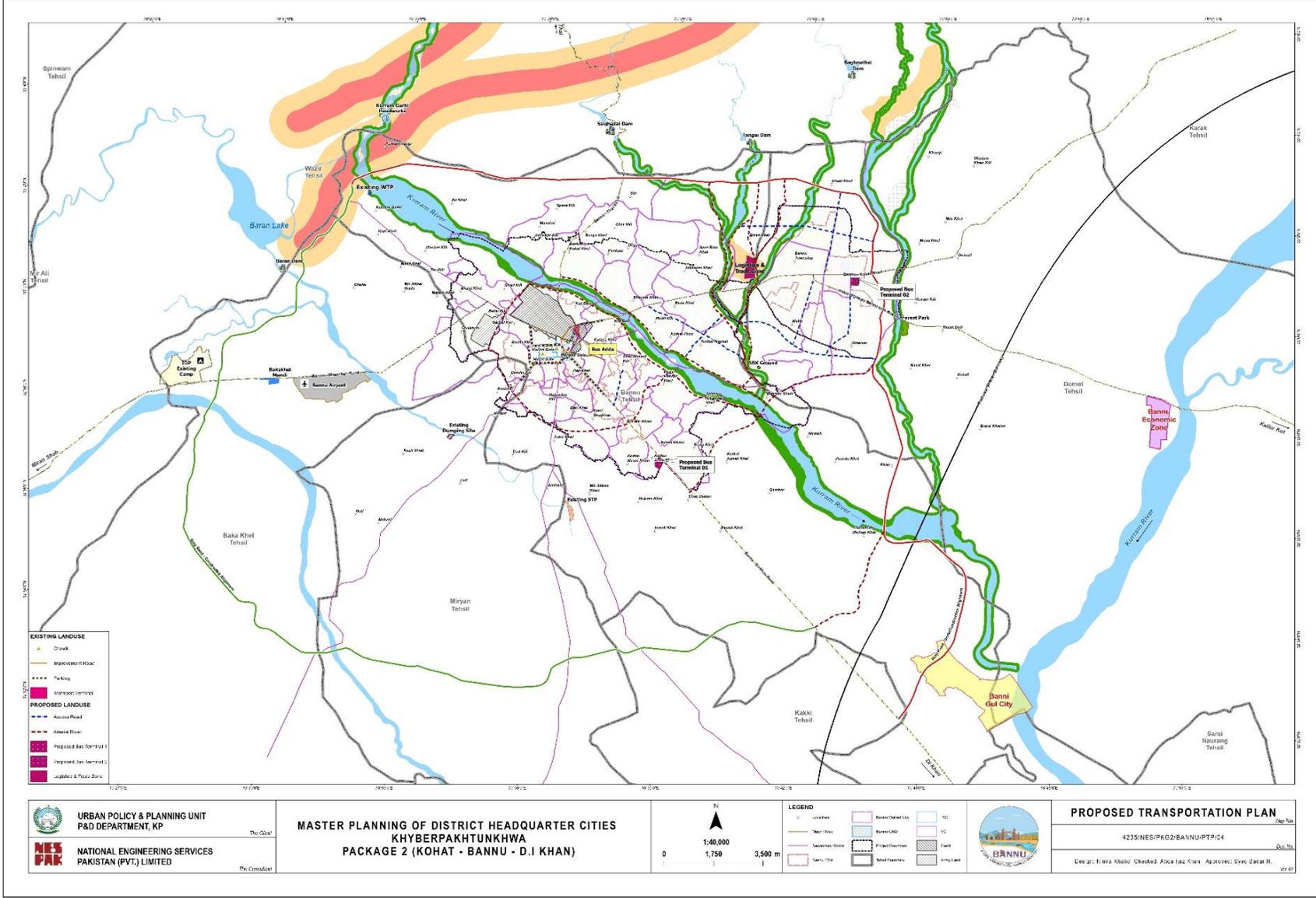


Figure 15-8: Proposed Transportation Plan Bannu

### 15.1.5. Parks and Recreational zone

An agriculture zone, often referred to as agricultural land or rural zoning, is an area designated for farming and related agricultural activities. The purpose of creating agriculture zones is to protect and promote agricultural land use, support the farming community, and manage land in a way that is conducive to sustainable and productive agriculture. They may include infrastructure to support farming operations, such as irrigation systems, farm roads, and storage facilities. Adequate infrastructure helps enhance the efficiency and productivity of agricultural activities. This includes the following sub-zones;

- Regional Park
- Botanical Garden
- Sports & Recreational Zone
- Baran Dam Recreational Zone

Urban farming, also known as urban agriculture, refers to the practice of cultivating, processing, and distributing food in or around urban areas. This form of agriculture takes advantage of available space in cities, using innovative and sustainable methods to grow crops, raise animals, or produce food products. It includes the following types of farming;

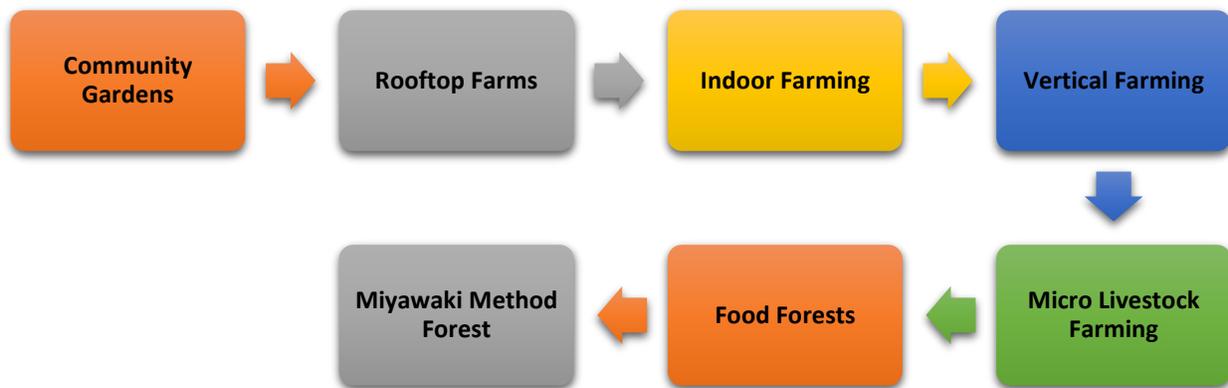


Figure 15-9: Urban Farming Methods

#### Miyawaki Method Forest

The Miyawaki Method is named after its creator, Akira Miyawaki, a Japanese botanist and plant ecologist who has a particular interest in phytosociology, i.e. how plant species interact with each other within communities. When Miyawaki combined these concepts, he developed a new way of planting forests. This was based on the native vegetation that he postulated should be growing in that area, as deduced from PNV studies, and his understanding of how these species would interact and grow to produce a dynamic forest ecosystem. His early field trials showed great promise that this method could dramatically accelerate forest growth and result in a stable and diverse forest ecosystem.

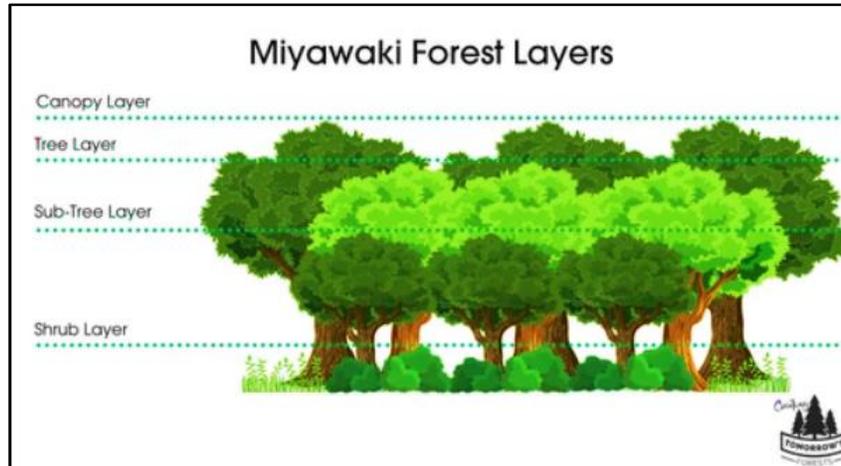


Figure 15-10: Miyawaki Forest Layers

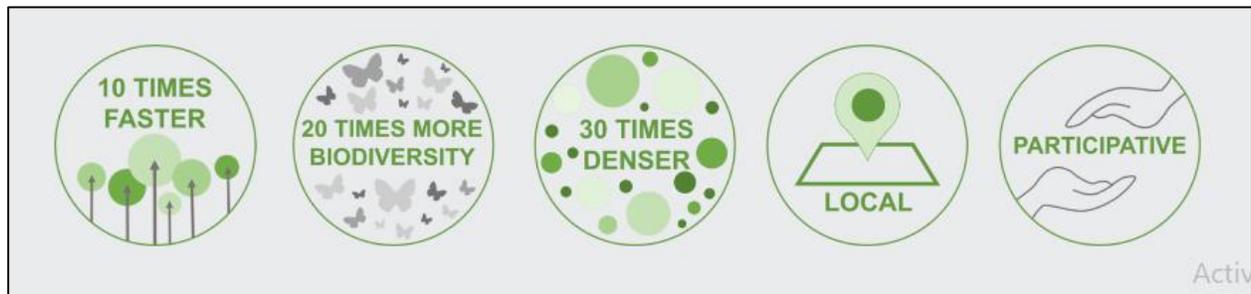


Figure 15-11: Features of Miyawaki Forest





### **15.1.6. Technology Zone**

Technology zones may incorporate smart city technologies to enhance efficiency, sustainability, and the overall quality of life. This could involve the use of data analytics, sensor networks, and other innovative solutions. In city planning, a "technology zone" typically refers to a designated area within a city that is specifically planned and developed to foster innovation, technology-driven businesses, research institutions, and related activities. These zones are often created with the goal of promoting economic growth, attracting tech companies, and creating a hub for technological advancements. To support startups and small businesses, technology zones may include business incubators and accelerators that provide resources, mentorship, and shared facilities.

### **15.1.7. Proposed Green Spaces and Agriculture Map**

This map consists of the proposed green spaces in the project area consisting of buffer zone and agriculture zone. It consists of the following categories of green areas;

- Buffer zone
- Agriculture zone
- Orchard reserve
- Urban Farms



### 15.1.8. Civic Zone

This zone often includes important government buildings, municipal offices, courts, and other institutions that serve the public. The civic zone is a hub for governmental and administrative activities, and it plays a crucial role in the functioning of the city. The civic zone is designed to be accessible to the public and serves as a focal point for civic engagement, participation, and interaction between the government and the community. It's a reflection of the city's commitment to public service and the democratic process.



Figure 15-14: Key features of a civic zone



### 15.1.9. Industry and Trade Plan

An industry and trade plan is a strategic document used to guide and promote the growth and development of specific industries and trade activities within a region. Such plans are designed to create a framework for fostering economic development, competitiveness, and sustainability. The goals and components of an industry and trade plan can vary based on the priorities and challenges of a particular region, but here are some common elements:

#### Analysis and Assessment:

- ✚ **Market Analysis:** An evaluation of domestic and international markets to identify opportunities and challenges for key industries.
- ✚ **SWOT Analysis:** Assessing the strengths, weaknesses, opportunities, and threats facing the industries and trade activities in the region.

#### Policy Framework:

- ✚ **Regulatory Environment:** Identification of regulatory and legal frameworks that impact industry and trade.
- ✚ **Policy Recommendations:** Proposals for policy changes or enhancements to support industry growth and trade facilitation.

#### Infrastructure Development:

- ✚ **Logistics and Transportation:** Planning for efficient transportation and logistics networks to support the movement of goods.
- ✚ **Technology Infrastructure:** Developing and upgrading technology infrastructure to enhance productivity and competitiveness.

#### Investment Promotion:

- ✚ **Incentives:** Introducing financial and non-financial incentives to attract investment in key industries.
- ✚ **Promotion Strategies:** Developing strategies to market the region as an attractive destination for investment and trade.

#### Skills Development:

- ✚ **Workforce Training:** Implementing programs to enhance the skills and capabilities of the local workforce to meet industry demands.
- ✚ **Education and Research:** Investing in education and research institutions to support innovation and development.

#### International Trade Relations:

- ✚ **Trade Agreements:** Negotiating and fostering international trade agreements to facilitate exports and imports.
- ✚ **Market Access:** Working on reducing trade barriers and improving market access for local industries.

#### Sustainability and Environmental Considerations:

- ✚ **Environmental Regulations:** Ensuring that industry and trade activities comply with environmental standards.
- ✚ **Sustainable Practices:** Promoting sustainable practices and technologies within industries

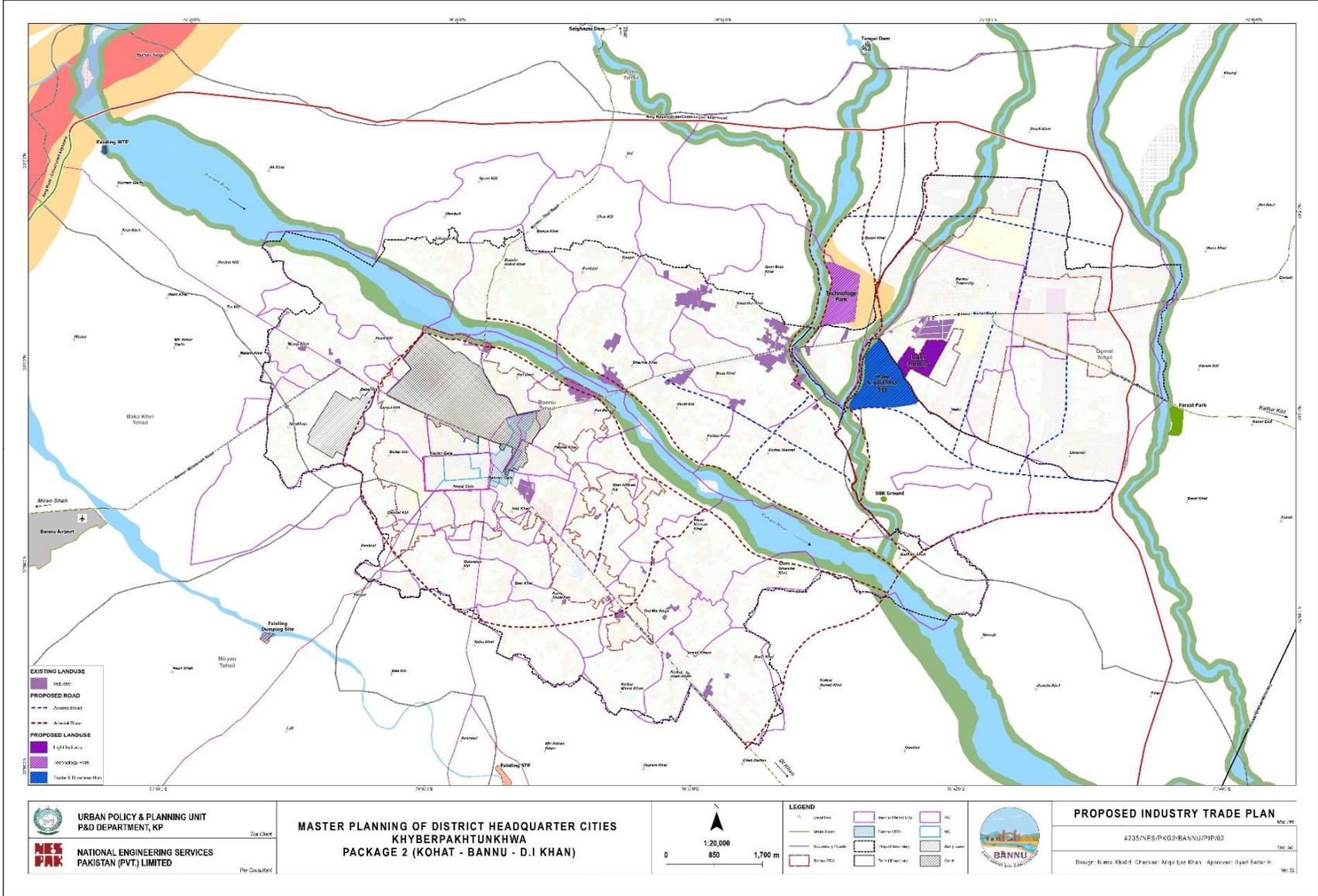


Figure 15-16: Proposed Industry Trade Plan Bann



#### **15.1.10. Religious Area Plan**

A "religious area plan" typically refers to a plan or strategy developed for the organized development, management, and enhancement of areas or sites that hold religious significance. The planning process for religious areas takes into account both the spiritual and practical needs of the community and aims to ensure the preservation and sustainable management of these spaces. The specifics of a religious area plan will vary based on the religious traditions, local context, and the scale of the religious site. The Religious Area and Graveyard Plan of Bannu consists of a masjid of 9.18 acres and graveyard proposed on the northern side of the city comprising an area of 84.27 acres.

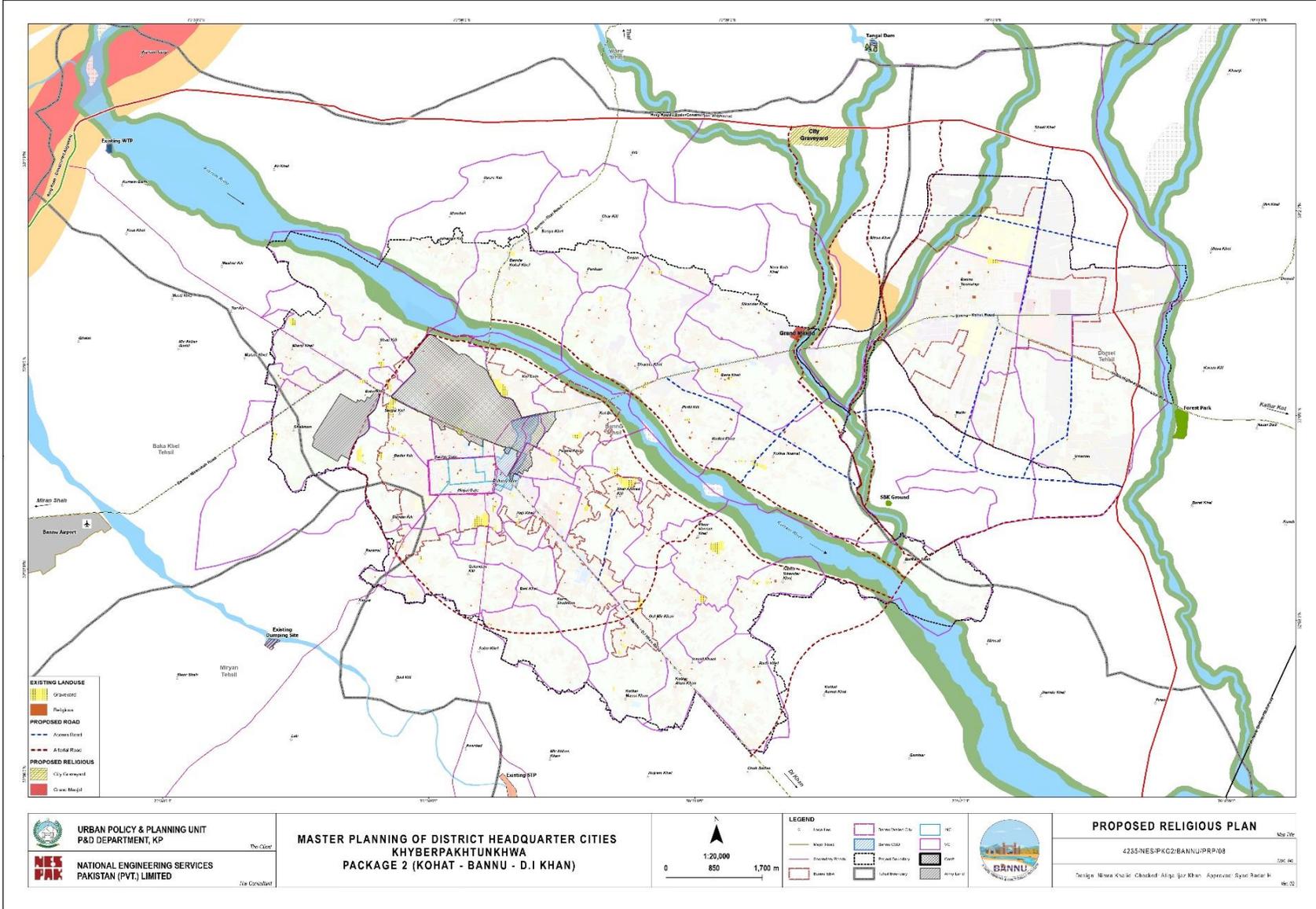


Figure 15-17: Proposed Religious Area Plan of Bannu



### 15.1.11. Proposed Utilities Map

#### 15.1.11.1. Water Supply System

Urbanization has indeed a significant impact on water resources, both in terms of quantity and quality. As more people concentrate in urban areas, the natural landscape undergoes changes that lead to water-related problems affecting daily life. Large cities require huge amount of water to satisfy both domestic and industrial needs.

Currently, both groundwater and surface water are used as water supply source in Bannu. The ground water is pumped directly from tube wells into water supply pipes or through OHRs. There is also a surface reservoir in the project area at Kurram Garhi having storage capacity of 100,000 gallons per day. The water supply distribution network in project area is very old with rusted pipes which results mixing of sewage in water supply lines and significant amount of drinking water is wasted due to leakages.

With the growing urban population, it may become necessary to explore additional water sources to meet the future needs of the city. In future, the excessive demand of Bannu may be fulfilled through different surface water sources near the Project area. Prominent surface water sources for water supply to the city are Baran Dam and Kurram River. Utilizing these surface water sources can provide an alternative or supplementary water supply to meet the increasing demands of the urban population. However, it is important to consider the sustainability and environmental impact of extracting water from these sources to ensure long-term water availability and ecosystem preservation.

#### Water Demand

Sufficient potable water is required to fulfill the requirement of domestic and various non-domestic consumptions. Importance of water demand estimation cannot be overstated for the planning and design of water supply systems.

Calculation of water demand of project area is fundamentally based on the value of average per capita water demand and the number of persons to be served in a project area.

Existing population (year 2023)	= 424,281 Persons
Per Capita Water demand	= 35 gpcd
Total domestic average demand	= 14,849,835 Gallons/day = 14.85 MGD
Projected Population (year 2043)	= 728,659 Persons
Per Capita Water demand	= 35 gpcd
Total domestic average demand	= 25,503,066 Gallons/day = 25.50 MGD
Total maximum day demand	= 38,254,599 Gallons/day = 38.25 MGD

The source will be designed on maximum day demand either tube well or surface water treatment plant. Overhead storage based on 1/10<sup>th</sup> of diurnal water demand will be provided for balancing reservoir. Water supply network will be proposed based on peak demand.



### 15.1.11.2. Sewerage System

The description of the existing wastewater collection system in Bannu city highlights the use of a partially combined system which involves a combination of sewer pipes, open and covered drains to collect both wastewater and storm water generated in the developed area. Presently, there are no lift/disposal stations for the disposal of wastewater in the whole project area but there is one sewage treatment plant present in the project area which was constructed in 1994 for the sewage flows of Bannu City (urban area). Now this plant is partially operational. Remaining sewage is being disposed of into nearby irrigation channels and Nullahs by gravity without treatment which leads to environmental pollution.

Proper sewerage system shall be proposed for Bannu. Total catchment area shall be divided into different zones depending upon the topography of the area. Trunk and secondary sewers shall be proposed to collect and transport the sewage from the project area to sewage disposal station (if any) by gravity, situated at the downstream of the project area. The sewage from disposal station will be pumped through force main pipe to Sewage Treatment Plant (STP) for its treatment. The sewage after treatment from STP will be disposed-off into water body passing in the vicinity of the project area or stored for reuse. Storm water allowance will be taken in proposed sewer lines.

Proposed sewerage system will consist of the following components:

- Primary trunk sewer
- Secondary sewers
- Disposal stations (if any)
- Sewage Treatment Plant (STP)

#### Sewage Generation

Calculation of sewage flow generated in project area is fundamentally based on the value of average per capita water demand and the number of persons to be served in a project area.

Projected Population (year 2043) = 728,659 Persons

Per Capita Sewage generation = 85% of water consumption (35 gpcd)

Total average Sewage Generation = 21,677,606 Gallons/day  
= 21.7 MGD

#### Sewage Treatment Plant (STP)

In the case of Bannu City, the implementation of a sewage treatment plant (STP) is recommended to treat the wastewater effectively. The sewage treatment plant will be designed on average flow. The area requirement for sewage treatment plant will depends on sewage treatment technology and number of treatment plant to be installed. The location of STP will be provided in later stage.

STP site location with a low elevation level shall be chosen. This will allow gravity flow, where wastewater can flow naturally without the need for excessive pumping. Gravity flow can be more energy-efficient and cost-effective compared to relying solely on pumping systems. However, other factors such as proximity to water sources, environmental considerations, and land availability also need to be taken into account when selecting the site for the STP.

Implementing a sewage treatment plant in Bannu will significantly improve the quality of water discharged into the environment, helping to prevent water pollution and protect the surrounding ecosystems.





### 15.1.11.3. Solid Waste Management System

Solid Waste Management services are mainly provided by Water & Sanitation Services Company (WSSC) in Bannu city area and Bannu Development Authority (BDA) in Bannu Township area.

There is currently no permanent dumping or sanitary landfill site available. As a temporary solution, the Water and Sanitation Services Company (WSSC) is dumping all the garbage and municipal solid waste of Bannu city at Gharhi Shah Jahan. In Bannu Township, solid waste is collected by BDA and dumped at the bank of nearby Nullah (near town police chowki).

Unfortunately, Residents of the nearby areas have to face health problems as a result of continuous exposure to chemicals; inhalation of toxic fumes and dust from the landfill sites.

To address this issue, it is essential for Bannu to establish a permanent sanitary landfill site. The total production of solid waste upto year 2043 will be 2,402,954 Ton by assuming generation rate 0.5-0.6 kg/c/d. The total land requirement for landfill site is estimated to be around 45 acres. This landfill site should be carefully planned and designed to ensure proper waste disposal, minimize environmental impact and mitigate health risks for the surrounding communities.

When selecting a location for the sanitary landfill site, factors such as distance from residential areas, hydrogeological considerations, and environmental regulations need to be taken into account. Additionally, proper waste management practices including waste segregation, recycling and composting should be implemented to minimize the volume of waste going to the landfill and promote sustainable waste management practices.

Establishing a permanent sanitary landfill site in Bannu will provide a long-term solution for managing solid waste effectively, protecting public health and minimizing environmental pollution caused by improper waste disposal



### 15.1.12. Proposed Center City Map of Bannu

Proposed center city map of Bannu city basically comprises of the zones who need regeneration, remodeling or commercial corridors. The main categories of zone proposed in it are as follows,

- Commercial Corridors
- Urban Regeneration Zone (CBD)
- Walled City Regeneration Zone
- Urban Regeneration Zone-Comm Mixed Use

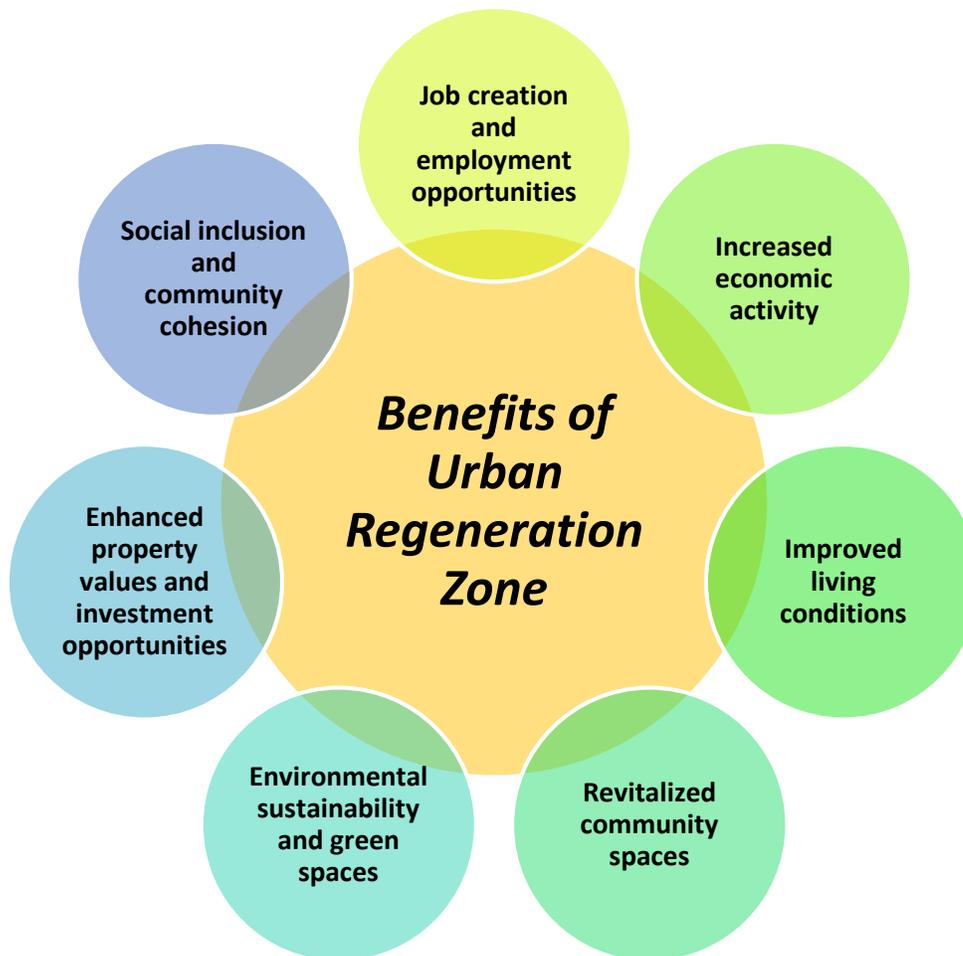


Figure 15-21: Benefits of Urban Regeneration Zone



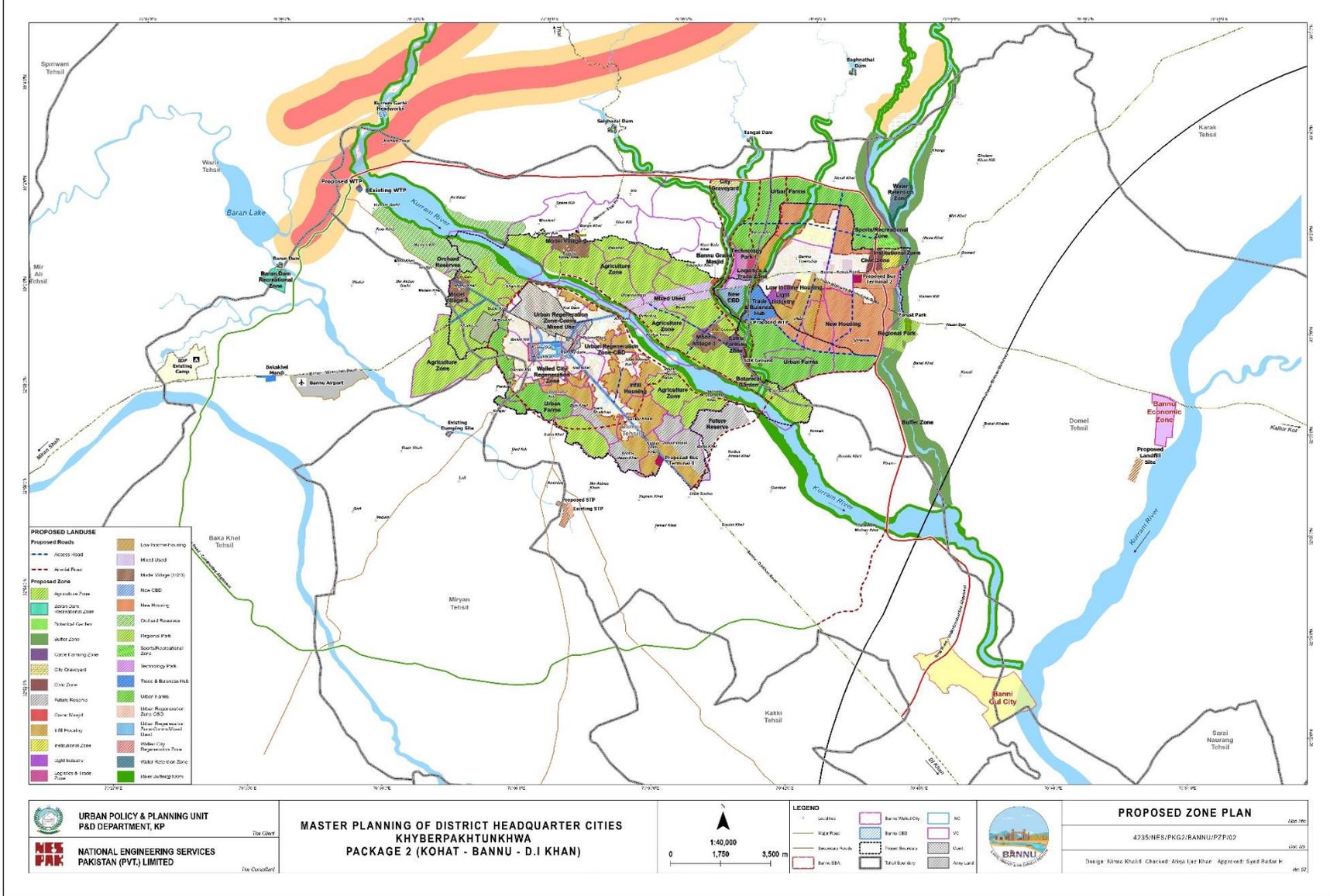


Figure 15-23: Proposed Zoning Plan of Bannu (Regional Scale)



## 16. Planning Standards and Zoning Calculations

This plan consist of the following area statements;

### 16.1. Area Requirement for Zones

Table 16-1: Area Requirement for Zones in Bannu

Land Requirements for Bannu City					
Sr No.	Landuse Type	NRM Standard	Total Requirements for 662013		
			Nos	Area / Unit (Kanal)	Total Required Area
<b>RELIGIOUS</b>					
1	Muhallah Masjid	1 / 5000 pop	132	3	49.65
	Neighbourhood / Jamia Masjid	1 / 25000 pop	26	6	19.86
	Central Mosque	1 / 100,000 pop	7	12	9.93
	Grand Mosque	1 / 400,000	2	50	10.34
	Graveyard	2-3%			500
<b>Education</b>					
2	Primary School (Boys Urban)	1/ 7500 pop	88	1.48	130.64
	Primary School (Girls Urban)	1/ 8200 pop	81	1.48	119.49
	Primary School	1 / 12,000 pop			0.00
	Secondary School (Boys)	1 / 23,000 pop	29	5	143.92
	Secondary School (Girls)	1 / 31,000 pop	21	5	106.78
	Inter College (Boys)	1 / 2 Lac pop	3	8.5	28.14
	Inter College (Girls)	1 / 2 Lac pop	3	5.6	18.54
	Degree College (Male)	1 / 2.5 Lacs	3	10	26.48
	Degree College (Female)	1/ 3.5 lacs	2	7.4	14.00
	Polytechnical College		2	7.4	14.8
	Vocational Training Institute		2	7.4	14.8
	Youth Hostels		4	1	4
<b>Sports &amp; Recreations (8-10%)</b>					
3	Muhallah Park (6000-8000)	3-8 Parks (1.6 to 3.6 Hec)	221	2.47	545.06
	Neighbourhood Parks	1 for 25000 pop.(3.25 Hec to 4 Hec)	26	3.25	86.06169
	Neighbourhood Playgrounds	One Combined Playfield for 25000 pop	26	4.03	106.61
	Community Level Park	1 / 100,000 pop (4-5 Hectare)	7	9.88	65.406884
	City Level Park	1/ 400000 pop (12-15 Hec)	2	29.64	49.055163
	Community Level Sports Ground	1 / 100,000 pop (2.14 Hec)	7	5.29	34.99



	Cricket	1 / 300,000 pop (2 Hec) + Parking	2	6.18	13.63	
	Hockey	1 / 200,000 pop (1.15 Hec) + Parking	3	3.71	12.26	
	Football	1 / 200,000 pop (1.4 Hec) + Parking	3	3.71	12.26	
<b>Health Facilities</b>						
<b>Primary Care</b>						
4	Basic Health Unit	1/13000 pop	51	2.5 Kanal	15.91	
	Rural Health Centre (10-12 Beds)	1/50,000 pop	13	1.5 Acres	19.86039	
	Civil Dispensaries (Urban Disp.)	1/25000 pop.	26	10 Marla	1.6550325	
	Mother and child health centers (MCH) upto 25 Bed	1/100000 pop	7	2.4 Acres	15.888312	
	<b>Tertiary &amp; Secondary Care</b>					
	Category B Hospital (210 Beds)	1 for every 500,000 pop	1	4	5.296104	
	Category C Hospital (110 Beds)	1 for every 300,000 pop	2	3	6.62013	
Category D Hospital (40 Beds)	1 for every 100,000 pop	7	2	13.24026		
<b>Commercial Facilities</b>						
5	Sub Muhallah Centre (3000 pop)	3-4 Shops	221	0.5	110.34	
	Muhallah Shopping Centres (6000)	10-12 Shops	110	1	110.34	
	Neighbourhood Centres (25,000)	40-50 Shops	26	5	132.4026	
	Coommunity Level Commercial Centre (100000)	125-150 Shops	7	2.5	16.550325	
	Regional Shopping Centre	450-500 Shops	1	20	20	
	Fruit & Vegetable Markets		1	5	5	
	Grain Market		1	5	5	
	Wholesale Markets		1	5	5	
	Meat Markets		1	5	5	
	Business & Trade Centre		1	10	10	
	Food Courts		2	5	10	
Hyper Markets / Shopping Malls		2	5	10		
<b>Civic Facilities</b>						
	Municipal Secretariat	3 to 5 Hectare	1	37.05	37.05	
	DHQ Offices	10 Hectare				
	Divisional HQ Office	15 Hectare				

	Police Stations	1 for each 50,000 pop. (0.4 - 0.8 Hec.)	13	1	13.24026
	District Cultural Complex		1	10	10
	Hotel ( 4 star) (75 Beds)	2223 Sq M.	1	5	5
	Hotel ( 3 star) (50 Beds)	1963 Sq M.			
<b>Industry</b>					
<b>7</b>	50 Industrial Workers per Acre				<b>61</b>

**16.2. Household Income Details for Housing Affordability in Bannu**

The survey results indicate that most of the local community having less than 20,000 per month income level. There are 33% household having monthly income less than 20,000 while maximum household income is 1% having more than 200000. The results shows that there is high income disparity between the poor and rich community. The majority of the household belong to low monthly income group.

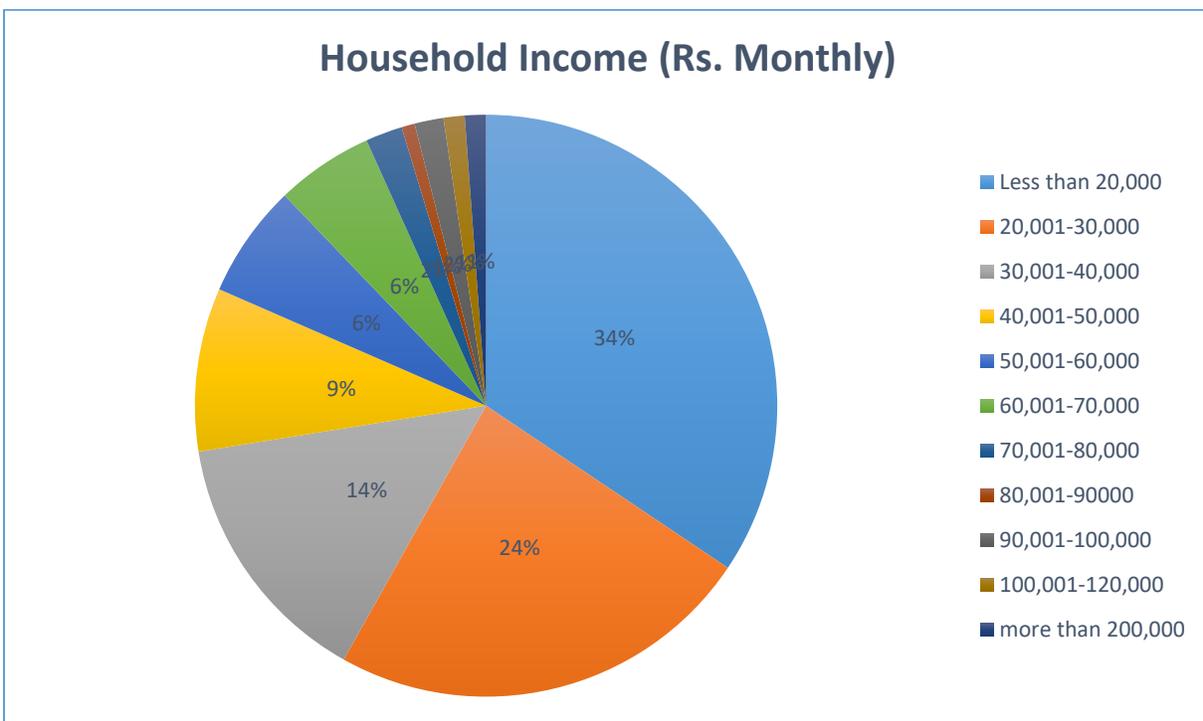


Figure 16-1: Monthly Household Income of people in Bannu (PKR)

Hence, the future housing calculations/requirement for residential zones will be calculated on the basis of income level of residents. In area requirement for future housing, 45% land will be for low income housing, 45% for medium income people and likewise for high income residents 10% land of the total will be designated for housing purposes.

Table 16-2: Residential Land Requirement of Bannu City

Land Requirements in Residential Sector of Bannu City					
	Population (2022-2042)	Low Income 45%	Middle Income 45%	High Income 10%	TOTAL
	497300	223785	223785	49730	
<b>Additional Population</b>	239930	107969	107969	23993	
HH Size MC-Bannu		7.68	7.68	7.68	
HH Size Urban-Bannu		7.42	7.42	7.42	
HH Size Bannu Tehsil		9.06	9.06	9.06	
HH Size Domel Tehsil		10.98	10.98	10.98	
<b>Houses Required @7.5</b>		14396	14396	3199	<b>31991</b>
<b>Existing Housing Stock of Bannu City</b>	<b>17382</b>				
Replacement Demand @ 25 % of existing Stock including Overcrowding, Old and Katcha Houses		1955	1955	435	<b>4346</b>
<b>Required Housing Stock of Bannu City-2042</b>	<b>13037</b>				
Future Replacement Demand @ 15 % of existing Stock		880	880	196	<b>1955</b>
Existing Rural Housing Backlog	1451				
Total Rural Housing in Project Area	20741				
Future Replacement Demand @ 5% of existing Rural Housing Stock	1037				
<b>Total Future Housing Demand</b>		<b>40780</b>			
		16540	16540	3675	<b>36755</b>
<b>Land Requirement upto 2042</b>		<b>5-Marla</b>	<b>10-Marla</b>	<b>1-Kanal</b>	
<b>Kanals</b>		<b>3420.42</b>	<b>6840.84</b>	<b>3040.37</b>	<b>13301.63</b>
<b>Add. Of Amenties 120% (including all neighborhood level amenities)</b>		4104.50	8209.01	3648.45	15961.96
<b>Total of Land Requirement</b>					
<b>Kanals</b>		7524.92	15049.85	6688.82	<b>29263.59</b>
<b>Acres</b>		940.6	1881.2	836.1	<b>3657.95</b>
<b>Sq Km.</b>		3.8	7.6	3.4	<b>14.81</b>

Table 16-3: Area statement of proposed zones

Area Statement of Existing and Proposed Land Uses								
Sr. no.	Description	Existing		Proposed		Total		NRM Standards (for a similar size city)
		Area (Acres)	%age	Area (Acres)	%age	Area (Acres)	%age	
1	Residential	4230.9	49%	5258.46	63.0%	9489.36	56%	40-45%
2	Commercial	384.57	4%	1081.38	12.9%	1465.95	9%	2-3%
3	Public Buildings	589.78	7%	208.86	2.5%	798.64	5%	3-5%
4	Industry	345.74	4%	84.38	1.0%	430.12	3%	2-10%
5	Parks & Green Spaces	701.85	8%	659.19	7.9%	1361.04	8%	3-5%
6	Graveyard	142.8	2%	84.27	1.0%	227.07	1%	2-3%
7	Water Bodies (Canals/Lake etc)	1256.05	15%	196.83	2.4%	1452.88	9%	12-25%
8	Roads	929.41	11%	778.74	9.3%	1708.15	10%	15-20%
	<b>TOTAL BUILT UP (A)</b>	8581.1	100%	8352.10	100%	16933.2	100%	
	<b>Built Up Area (A) Percentage of Total Area</b>	8581.1	95%	8352.10	34%	16933.2	51%	
<b>OTHERS</b>								
9	Water Bodies (Canals/Lake etc)	478.302	5%	15875.6	66%	16353.9	49%	12-25%
10	Restricted Area (Cantt / Army Land)							
11	Agriculture							
12	Orchards							
13	Vacant							
14	Open Lands							
15	Future Reserve							
16	Water Supply & Utilities							
	<b>TOTAL NON BUILT UP (B)</b>	478.302	5%	15875.5	66%	16353.8	49%	
	<b>TOTAL PROJECT BOUNDARY AREA (A+B)</b>	9059.40	100%	24227.6	100%	33287.1	100%	

Note: Proposed Residential Zone covers all neighborhood level social amenities, roads, graveyards and local streets.

## 17. Urban Design Regulations

Urban design plays a crucial role in shaping the physical, social, economic, and environmental aspects of cities and communities. It is a multifaceted domain that has a profound impact on the livability, functionality, and sustainability of cities. By addressing various aspects of the urban environment, designers can contribute to creating vibrant, inclusive, and resilient communities.



Figure 17-1: Importance of urban design

### Residential zones:

- A mix of uses including higher density mid- to high-rise residential development, as well as new retail, service, and office uses should be directed to these areas in order to balance the local needs of new and established communities.
- Residential areas within the City should continue to include low- to high-rise built form development, both as infill in existing neighborhoods and development in new subdivisions.

### Preservation Of Natural Features:

- Trees, native ground cover, natural watercourses, and topography shall be preserved when possible, and the private housing schemes shall be so designed as to prevent excessive grading and scarring of the landscape in conformance with land use.

### Hazardous Areas To Be Fenced:

- All areas of the proposed zones or features adjacent to the zones, which present a potential threat to the public safety e.g. grid station, shall be fenced with a six foot (6') non climbable fence



or acceptable alternative, as required by the planning commission or its designee. Such hazardous areas may include, but are not limited to, rivers and streams, canals, cliffs, ravines, railroad rights of way, and steep slopes. Required fencing shall be constructed and included as part of the subdivision improvements and shall be bonded.

#### Access To Public Streets:

- All lots or parcels created by the subdivision of land shall have access to a public street improved to standards required by this title, unless a private street or modified standards are approved by the planning commission as part of a planned development.
- Private streets shall not be permitted unless the planning commission finds that the most logical development of land requires that lots be created which are served by a private street or other means of access.
- A well connected network of streets and blocks is encouraged to reduce congestion, improve public transit and emergency vehicle access, and promote walking and cycling by providing multiple and convenient routes.
- Streets and blocks should be aligned to ensure building orientation can maximize solar gain and use of active and passive solar energy.
- A variety of block and lot sizes should be provided to accommodate diversity in uses and the built form, and to enhance visual interest along the streetscape.
- Sites should be designed to facilitate inter-modal connections between the bicycle, pedestrian and transit network.

#### Pedestrian Circulation

- Connect pedestrian walkways between adjacent properties in order to facilitate circulation between sites and reduce conflicts with vehicles for pedestrians traveling between sites.
- Identify and emphasize major pedestrian routes through the use of signage, bollards, new sidewalk linkages, pavement marking, trees, appropriately scaled lighting and continuous hard surfaces.
- Provide site furnishings such as benches at building entrances and amenity areas.

#### Landscaping:

- A landscaped area shall be required in all residential zones and may be required in nonresidential zones as well. Said landscaping shall be located either within the non-paved portion of the street right of way, or within a dedicated landscaping easement, not less than five feet (5') wide, adjacent to the street. The type of landscaping and street trees shall be selected,



installed, and maintained in accordance with standard specifications prepared by District Administration Bannu.

- Green roofs are encouraged to be accommodated on rooftops and building step backs. Where green roofs cannot be accommodated due to outdoor amenity spaces, landscaping such as potted plants is encouraged for storm water retention.
- Low impact development measures for storm water management are encouraged to filter, absorb, and/or store storm water runoff, rain gardens, permeable paving, rain barrels, and green roofs.

#### Utilities And Easements:

- All utilities shall be provided through underground services.
- Easements for utility and drainage purposes shall be provided within the proposed zones. However, in no event shall such easement be less than five feet (5') in width when proposed along the front lot line.

#### Public Access ways:

- Bannu city shall require within the development site the improvement of access ways for pedestrian and bicyclist use to connect the development site to adjacent cul-de-sacs or to an adjacent site that is undeveloped, publicly owned, or developed with an access way that connects to the subject site.

#### Proposed roads/streets Standards:

- The proposed zones shall include street connections to any road that abut, are adjacent to, or terminate at the zone site. The proposed development shall also include street connections in the direction of all existing or planned streets adjacent to the development site as determined by the planning officer.
- The proposed development shall include streets that extend to undeveloped or partially developed land that is adjacent to the development site or that is separated from the development site by a drainage channel, transmission easement, survey gap, or similar property condition. The streets shall be in locations that will enable adjoining properties to connect to the proposed development's street system.

#### Guidelines for Industrial zones

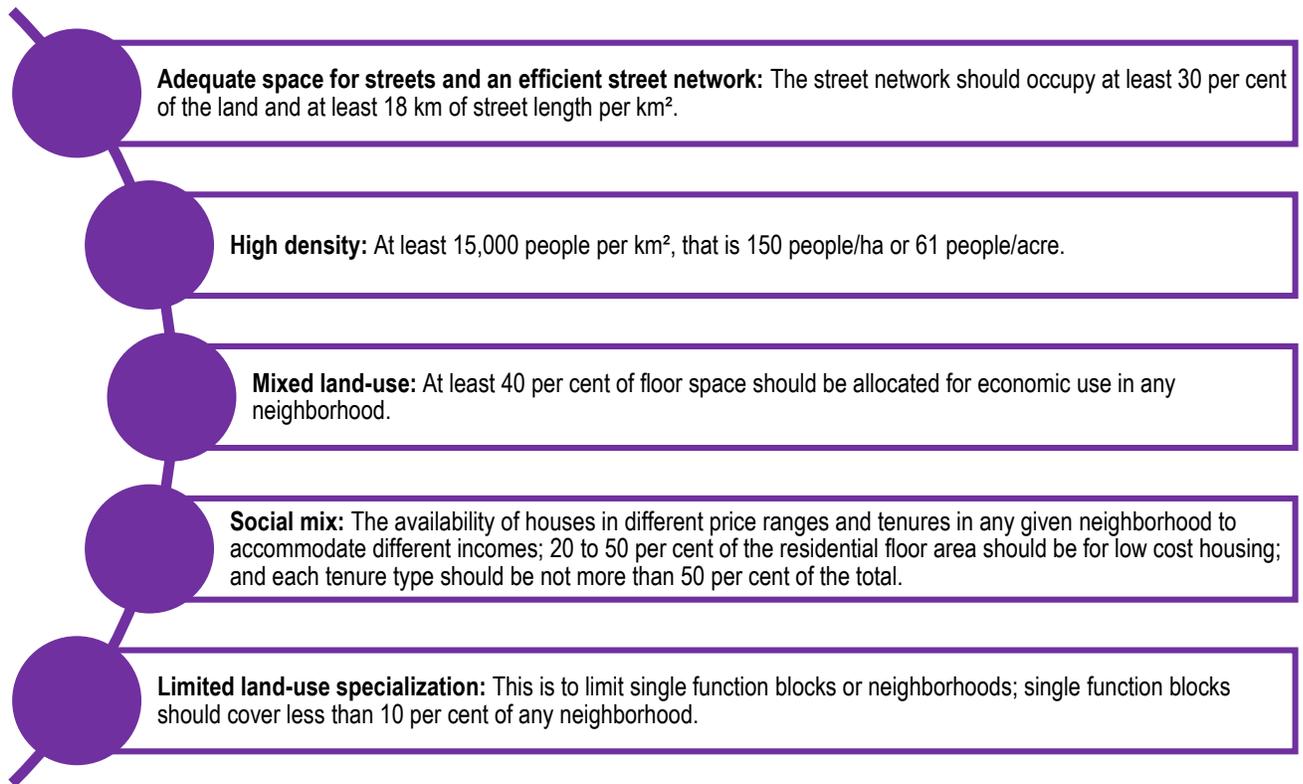
- Address traffic flow and circulation within the industrial zone.
- Consider the impact of industrial traffic on surrounding road networks and implement measures to manage congestion.

- Promote alternative transportation options and ensure proper infrastructure for freight movements.
- Ensure that industrial zones have adequate utility infrastructure, including water supply, wastewater treatment, and energy services.
- Implement regulations for the responsible use and disposal of hazardous materials.
- Implement guidelines for the maintenance of green buffers to minimize the visual and environmental impact of industrial activities.

### 17.1. Strategies for Sustainable Neighborhood Development

UN-Habitat supports countries to develop urban planning methods and systems to address current urbanization challenges such as population growth, urban sprawl, poverty, inequality, pollution, congestion, as well as urban biodiversity, urban mobility and energy.

In supporting sustainable neighborhoods, the Five Principles are:



1

**The Five Principles can be applied in the following contexts:**

<sup>1</sup> UN HABITAT: A new strategy of sustainable neighborhood planning: Five Principles

1. **Fast growing cities** - the Five Principles can be applied to help cities that have to provide land, infrastructure and public services for a fast-growing population resulting from: natural growth; rural immigrants seeking employment; or even internally displaced people fleeing conflict or disaster.
2. **New urban settlements and urban extensions** - the Five Principles can be applied in new urban areas to avoid repeating past mistakes.
3. **Urban renewal and renaissance** - declining cities can apply the Five Principles for revitalization and urban transformation initiatives.
4. **Urban densification** - growing cities that have no land for further extension can use the Five Principles to achieve a smoother densification process.

*Table 17-1: Features of a Sustainable Neighborhood*

Sr. No	Features of a Sustainable Neighborhood	Critical Strategies
1.	Accessible, efficiently serviced location	<ul style="list-style-type: none"> <li>• Support high quality infill</li> <li>• Redevelop greenfield and brownfields</li> <li>• Develop transit-oriented neighborhoods</li> </ul>
2.	Mixed use, offering easy access to amenities, jobs, and services	<ul style="list-style-type: none"> <li>• Mix land uses</li> </ul>
3.	Diverse residents living in diverse housing	<ul style="list-style-type: none"> <li>• Mix housing types</li> </ul>
4	Walking, cycling, transit, and road networks linked to the city and region	<ul style="list-style-type: none"> <li>• Integrate circulation networks</li> <li>• Introduce transit-oriented development (TOD)</li> </ul>
5	Multi-functional streets that support social and environmental functions as well as multi-modal transportation	<ul style="list-style-type: none"> <li>• Design complete streets</li> <li>• Reduce parking</li> </ul>
6	An accessible network of green space that functions well ecologically and supports recreation and food production	<ul style="list-style-type: none"> <li>• Create integrated green space networks</li> <li>• Cluster development</li> <li>• Encourage urban agriculture</li> </ul>
7	A safe, social, and attractive environment	<ul style="list-style-type: none"> <li>• Strengthen social and cultural networks</li> <li>• Incorporate great public meeting spaces</li> </ul>
8	A unique identity, referenced within the regional identity	<ul style="list-style-type: none"> <li>• Use place making approaches</li> </ul>
9	Energy efficient buildings and renewable energy systems	<ul style="list-style-type: none"> <li>• Develop district and renewable energy systems</li> <li>• Optimize solar orientation and access</li> <li>• Use eco-industrial approaches</li> </ul>
10	Water-efficient buildings and landscapes	<ul style="list-style-type: none"> <li>• Use water-efficient technology</li> <li>• Use low-impact storm water management techniques</li> </ul>

*(Source: Sustainable Neighborhood Development: Practical Solutions to Common Challenges)*

## 18. Transportation & Road Up gradation Strategies

### 18.1. Improvement in existing Transportation Infrastructure

#### 18.1.1. Improvement of important roads

The current road system in Bannu is not being properly utilized and is inadequate for future development. Unplanned land development and unregulated land use generate a significant amount of traffic putting additional strain on the main roads of the city. The high reliance on private vehicles, unavailability of accessible & safe public transport leads to an increase in traffic volume. These factors create a significant disparity between the demand and supply of road infrastructure, ultimately resulting in traffic congestion. This, in turn, increases the social and economic costs of the city. Furthermore, drivers' irresponsible behavior also contributes to traffic congestion and causes accidents and other social problems.

1. Circular road
2. Shahbaz Ahmed Khel Road
3. Bannu Road
4. DI Khan Road

Above are corridors that required improvement to cater for the existing traffic demand as well as the future traffic load on these corridors. These roads are shown in Figure 1. To reduce traffic congestion on these urban roads during peak hours, consider imposing access restrictions or channelization in certain areas. This measure can limit the entry of specific types of vehicles, such as delivery trucks and heavy vehicles, during certain times of the day especially on circular road. To improve traffic management in market areas, parking plazas should be provided and vehicle entry into market streets should be restricted with barricades and warning signs. Park and ride services could be introduced to further mitigate car entry and to facilitate customers. Commercial and delivery vehicles should also face entry constraints; such as only being allowed at certain time period for product deliveries. Allowing traffic movement in one-way direction where ROW is less. Sometimes, it can be an effective way to avoid conflicts and reduce traffic congestion if a proper traffic circulation is possible.

Since, Circular Road is one of the most congested roads due to its location within main CBD of Bannu. Since widening is not feasible, some alternate solutions can be taken up for following roads in CBD area: Traffic management measures can be implemented such as restriction of encroachments and on road parking within circular road. Careful future planning also required for developing new zones to reduce the trip attraction.

More congested areas near Sabzi Mandi at Lakki Gate and other main markets should be converted into a car free area with only pedestrians allowed. This can be achieved systematically after provision of proper car parking areas at strategic locations.

#### 18.1.2. Improvement of Intersections

Major intersections in Bannu are without any proper traffic control devices; this results in traffic flow congestion and compromises the safety of pedestrians. Most of the intersections are manually controlled by Traffic Police during peak hours to ease the flow of traffic. It is required to regulate the traffic movements at intersections by deploying geometric improvements and proper traffic signaling system with proper phasing and timing at critical time of the day. Graphical representation of these intersections is shown in figure 1. Following are the intersections that require geometric improvement as these intersections are failing to fulfil the demand and capacity.

- Qasban Gate
- Bazar Ahmed Khan Chowk
- Lakki Gate
- Chai Bazar Intersection
- Tanchi Bazar Intersection
- Mandan Gate
- Marian gate
- Abdullah Shah Road Chowk

Below is the list of key solutions to congestion problems at intersections. These improvement measures will facilitate future traffic demand at intersections as well relieve the traffic flow.

- ✚ Geometric remodeling of critical intersections along with provision of dedicated left slip and right turn lanes.
- ✚ Grade separation at highly congested intersections.
- ✚ Removal of Illegal parking of public transport and private vehicles near intersections.
- ✚ Installation of proper advanced traffic signals at the intersections.
- ✚ Provision of proper pedestrian facilities for crossing of pedestrian at signalized and unsignalized intersections
- ✚ provision of proper traffic signage, safety devices, lane marking and road furniture.

### **18.1.3. Improvement of Traffic Management**

The presence of rickshaws and chingchis is significant number in Bannu City which causes congestion in the city. Their haphazard movements and spontaneous stoppage on roads for pick & drop of passengers created issues of safety and congestion. According to traffic police, the main problematic traffic modes in city are chingchis (used for public transportation) and unregistered rickshaws.

All the intersections in the Bannu City are currently unsignalized as traffic signals are not operational due to absence of electricity within Bannu City. Electricity is provided only for 4 to 5 hours in Bannu city so signals cannot be operated anyways. Bannu suffers from a lack of traffic management measures within the city. To ensure the smooth traffic operation at congested intersections, adaptive traffic signals should be installed on selective intersections where delay is observed in peak hours. Adaptive traffic signals can automatically adjust signal timings in real-time based on traffic flow throughout the day. They can also respond to changes in traffic patterns or emergencies more quickly than fixed time signals or manual traffic control. Adaptive traffic signals offer more flexibility and responsiveness than fixed time signals or manual traffic control, resulting in improved traffic flow, reduced congestion, and enhanced safety.

Additionally, establishment of integrated security surveillance is a mandatory requirement and traffic monitoring system similar to those in place in Lahore and Islamabad is recommended for Bannu City. This system can smartly handle intelligent traffic management on the basis of real-time data by controlling traffic signals. These systems are also very effective for emergency response. In absence of electricity, traffic police should operate the traffic manually at all congested intersections. Moreover, provide proper signs, markings and priority rules at intersections to address the absence of electricity.

#### **18.1.4. Parking Management and Enforcement**

There are severe issues of on street parking in different areas of Bannu City Immediate resolution of parking issues and construction of proper parking areas near busy commercial areas are required. Some particular points identified as parking hotspots are:

- Whole Circular Road
- Kohat Road
- DI Khan Road
- New General Bus Stand
- Katchery Road
- Nurar Road

There are many schools, hospitals and plazas which have been issued NOCs for construction by TMA without considering the required parking spaces. Locations of these hospitals and commercial plazas are within the heart of the city which aggravates parking issues This on street parking in busy downtown areas of city leads to congestion hence traffic flow breakdown. Strict requirements should be enforced to issue NOCs to plazas and all commercial development. Establish clear and enforced parking regulations for new developments, including TIA, parking spaces. Zoning regulations can help designate specific areas for parking, discouraging encroachment.

There is a huge problem on encroachment in busy commercial areas in the city especially on Kohat Road, near Sabzi Mandi, Circular Road. Shop owners have illegally extended buildings on the ROW of roads causing bottlenecks. It is observed that all kinds of vehicles are found parked on the roads including Wagons, coasters, busses and trucks. The demand of parking far outweighs the available parking spaces in the commercial areas of a city. Therefore, construction of properly planned smart parking system especially within the busy city area are the need of the hour to solve on street parking issues.

To address the issue of illegal Parking, the authorities must consider implementation of stricter rules and regulations for on-road parking. It is proposed to regularize the existing parking spaces and to construct the new smart parking systems near commercial buildings. Proper parking fee structure needs to be designed and implemented for different vehicle types. Implementation of developed regulations is required through enforcement agencies.

Increase enforcement efforts to discourage illegal parking and encroachment. Removal of temporary encroachment and towing of illegally parked vehicles will discourage violations. Problematic roads that required removal of illegal parking is shown in figure.

Successful modal shift from private to public transport would require provision of parking facilities near bus stops and paratransit terminals to encourage park and ride transportation. Additionally, educating the public about the importance of responsible parking and enforcing penalties for non-compliance can also help improve traffic flow along busy roads. To alleviate traffic congestion and maintain the integrity of main arterial roads, strict enforcement measures must be implemented by the traffic police to deter illegal parking.

#### **18.1.5. Improvement of Public Transportation**

Currently, there is no properly planned standardized intra city public transport available in Bannu City. Chingchis are the main local mean of public transportation in Bannu and they are operated without any regulations. There is no legislation regarding their health and control so they are operated without any NOC or permit. There are no bays or stops along roads nor any proper parking spaces so these chingchis stop on roads to pick and drop the passengers. Moreover, they are found parked all over the busy roads and

commercial areas throughout the Bannu City hence cause traffic congestion and safety issues. To reduce traffic congestion, consider launching a proper bus service immediately, covering all important roads in Bannu like Bannu Kohat Road, Bannu DI Khan Road and proposed arterial roads. Initially, a conventional bus system is recommended, which could be followed by a Mass Transit Service in the long term. To ensure the sustainability of the system, existing public transport modes need to be restricted and serve as feeder services to this bus service. This would help reduce a significant number of rickshaws and chingchis from these main roads. Feeder facilities are needed at terminal locations for pickups and drop off of passengers. It is crucial to integrate the bus service with the existing para-transit modes to reduce accessibility and transfer issues between modes. This will also require providing park-and ride spaces near local bus stops and para transit terminals. This can reduce the number of private vehicle trips and promote a more sustainable and eco-friendly form of transportation.

It is also necessary to regulate para-transit vehicles, which involves registering vehicles and issuing route permits. After providing bus services, entry of these vehicles may be prohibited on major arteries. In the long run, chingchis should be discouraged even as a feeder service and HiAce wagons with good fitness and proper managed feeder routes should be encouraged as an alternate to rickshaw and chingchis. Fitness certificate should be regulated by the TMA authority for the public safety purpose.

HiAce and coaster busses are also operating on intercity and inter-district routes. These are bound to get fitness certificate from Regional Transport Authority (RTA) but there are many loopholes in laws which the operators can easily circumvent to their advantage. Bannu has main General Bus Stand (GBS) which is C-class stand. This is called New Bus Stand This is located on Kohat Road in the heart of busy commercial area of the city. This stand has a very large area and is causing major traffic congestion on nearby road network especially Allah Chowk. Another smaller Hiace/Coaster stand is located near Allah Chowk. This is reportedly an illegal stand. These bus stands should be moved out of the city to relieve traffic congestion. Relocation and proper management of these bus terminals under an authorized department are required immediately. Displaced locations of bus terminals are shown in Figure 1. These both relocations will assist in reduction of congestion from the city.

#### **18.1.6. Improvement of Traffic Safety**

Proper regulatory, informatory and warning signs are required at each arterial and collector road. It is crucial to convey the significance of road signage to the general public and foster awareness about the importance of these signs in ensuring road safety and effective traffic management. Lane marking should be provided to ensure smooth traffic flow, organization and discipline of vehicles. Traffic regulations should be imposed for smooth and safe traffic operation. Public awareness campaigns and signage highlighting the consequences of illegal parking can aid the efforts of traffic police in curbing this issue on main arterial roads. Occurrence of accidents is generally low within Bannu city area. It is reported that accidents mostly happen on DI Khan Road. Speed limit should also be imposed on national highways and urban routes.

Available intra city public transport in Bannu (rickshaws and chingchis) does not meet any standard of safety and reliability and is generally unsafe for local commuting. The uncontrolled and disorganized spread of chingchis generates many complications for traffic safety. Furthermore, sudden on road stoppage for passenger pickup and drop off increase the vulnerability of traffic accidents.

### **18.1.7. Land Use Control Building Control**

It is imperative that before any construction of commercial areas or buildings in the city, a thorough Traffic Impact Assessment (TIA) study should be conducted under the supervision of regulatory authority. This study should be a mandatory requirement for new development purpose and NOC should not be granted without its completion. The TIA study is necessary to prevent traffic congestion and parking issues that may arise as a result of the development. Thus, ensuring the smooth flow of traffic and reducing the burden on the existing infrastructure mitigation of traffic impact are necessary. Parking is another major issue on main roads which can be controlled through provision of proper parking space for each commercial building. TIA Should include Traffic Impact studies, parking studies and traffic circulation plans.

### **18.1.8. Improvement of Pedestrian Movement**

Pedestrian safety is being compromised on main arterial as well as on collector roads of Bannu. There are no on-road or grade-separated crossing facilities provided for pedestrians' maneuvers in the city. In the absence of signals, pedestrians cannot cross the roads even on intersections therefore, Pedestrian bridges or underpasses need to be constructed in busy commercial areas where there is sufficient pedestrian road crossing especially near schools, hospitals and markets. Additionally, a pedestrian safety study can be carried out to pinpoint locations where grade separated pedestrian underpasses/bridges are required. Additionally, at grade signalized or unsignalized pedestrian cross-walks should be provided on the basis of requirement and road characteristics. To prevent road damages regulations should be enforced and penalties imposed for non-compliance.

#### **Traffic Congestion Issues:**

- Circular Road is highly congested due to its location in the main CBD of Bannu..
- Congestion near Sabzi Mandi at Lakki Gate and other main markets.
- Illegal parking and encroachments contribute to congestion.

#### **Intersections and Traffic Control:**

- Major intersections lack proper traffic control devices.
- Traffic congestion and safety compromised at intersections.
- Manual control by Traffic Police during peak hours.

#### **Traffic Management and Security:**

- Presence of rickshaws and chingchis causing congestion and safety issues.
- Unsignalized intersections due to electricity shortage.

#### **Parking Management and Enforcement:**

- Lack of proper parking areas near busy commercial zones.
- NOCs are issued without considering required parking spaces.
- Illegal parking and encroachments, particularly on Kohat Road and Circular Road.

#### **Public Transportation Issues:**

- Lack of properly planned standardized intra-city public transport.
- Chingchis operate without regulations and fitness certificate, causing congestion and safety concerns.

#### **Traffic Safety Concerns:**

- Absence of Traffic signs on arterials and circular roads
- Lack of adherence to traffic regulations, particularly on DI Khan Road.
- Unsafe intra-city public transport (rickshaws and chingchis)

#### **Land Use and Building Control:**

- Lack of planned zones and careful future planning.

#### **Pedestrian Movement Issues:**

- Pedestrian safety compromised on main arterial and collector roads due to Lack of on-road or grade-separated crossing facilities.

#### **18.1.9. General Recommendations for existing Transportation in Bannu**

- Traffic signal cannot be operational within the city due to un-availability of electricity.
- There is no on-road or grade separated crossings for pedestrians in the city.
- There are many commercial plazas and institutions which have been issued NOCs for construction without considering the required parking spaces. This causes the huge problem of on street parking in busy areas of the city.
- No proper public transport stops along the roads. Provision of proper public transport stops/bays along primary roads to make sure efficient public transport operation.
- Bannu City has a drainage problem due to its topography. This problem causes severe damages to roads and infrastructure of the city.
- Permit/fitness certificate should only be issued by designated department of Bannu. This will help to ensure the safety of passengers as well as ensure smooth traffic flow within the city. In addition, regular maintenance and fitness checks should be carried out on the vehicles to ensure they are roadworthy, safe for the passengers and do not pose a danger on other road users
- Since the number of chingchis is growing very rapidly in Bannu but no regulation or proper stands are available. They also violate traffic rules and thus aggravate traffic congestion, impose risk on pedestrian safety & block the visibility of following vehicles in the city. Therefore, enforcing traffic rules and regulations on these public transport modes, such as prohibiting them from stopping or parking in certain areas or during certain times, would help to regulate traffic problems & operation.
- Education and awareness campaigns could also be conducted to encourage public transport drivers to obey traffic rules and promote safe and responsible driving practices. It is necessary to make legislations that regulate and control Suzuki Pickups and similar para transit modes, as well as to ensure they are safe for users.
- Unplanned change in land-use should be controlled through a proper collaboration
- Inter-departmental coordination must be improved to execute projects smoothly and to avoid damage to infrastructure after completion for laying utilities and other activities by other departments not taken care of during construction.



- Occurrence of accidents is generally low within Bannu city area. It is reported that accidents mostly happen on DI Khan Road. Pedestrian facilities should be provided near educational institutes and sabzi mandi. Speed limits should also be imposed on main roads as a crash measure.
- Lack of parking, lack of standardized public transport and increase of cars traffic are the main causes of traffic congestion. Poor road conditions, lack of traffic signs and signals and unethical behavior of drivers are the main concern of traffic safety. This can be improved by rehabilitation of road networks, by awareness and strict enforcement of rules.
- Most important measures to be adopted for its improvement are taxi/rickshaw services and Bus services. The highlighted flaws of the public transport are route system, frequency, punctuality, speed and unavailability of waiting area near bus bays.