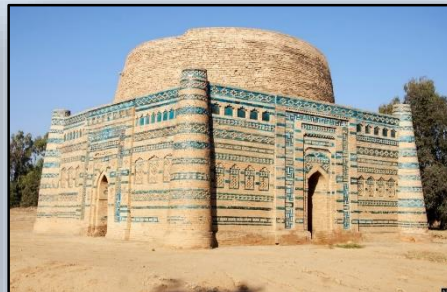




CONSULTANCY SERVICES FOR THE MASTER PLAN OF URBAN CENTER OF KHYBER PAKHTUNKHWA DIVISIONAL AND SELECTED DISTRICT HEAD QUARTER CITIES

Package 2: Kohat, Bannu and DI Khan



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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.

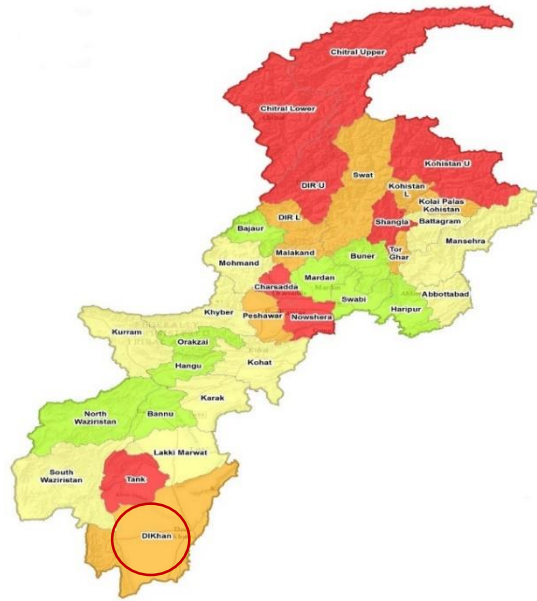


Figure 1-1: Project Area

1.1. Project Area

The district derives its name from the district headquarters town which is also administrative headquarters of DI Khan. It is said that in 1496 Sultan Hussain the Governor of Multan made the Indus frontier to a Baloch Malik Sohrab Khan who founded the town of Dera Fateh Kahn and Dera Ghazi Khan and named them on the names of his three sons. According to another account it was founded by Ismail Khan himself. Dera Ismail Khan takes its name from Ismail Khan, a Bloch chief who settled here towards the end of the 15th century in 1469 A.D. according to most accounts. His descendants ruled the city for 300 years. "Dera" means a place people gather for activities. The old town was swept away by a flood in 1823, and the present town stands four miles back from the permanent channel of the river. The population is the mix of ethnic Balochi and pashtun segments, while a significant segment of Urdu speaking immigrants is also present. Urdu, the national language is understood and spoken by all, while Seraiki is the native language and language of people. Pashto is also spoken, but is mostly restricted to the Pashtuns only. The district of DI Khan is a beautiful area with a historically strategic location and has traditionally been a crossroads for many cultures and trading routes.

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:



Compatibility/suitability of the new development with existing built-up area,



Relationship between density, massing and height of existing and proposed buildings including minimum and maximum permitted densities,



Provision of appropriate access to existing and proposed development Existing built and natural environments,



Transit supportive densities/proximity to transit facilities



Connections to existing transport system



Contributions to attractive, safe, and comfortable pedestrian environments



Traffic impacts

- 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

- 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



Showing suitable land parcels based on multi criteria analysis for various activities through viable projections for housing of all income groups, space required for commercial and industrial activities and other necessary component of the city



Land use pattern both existing and future options;



Land use mix potential range of uses (residential, work, leisure, services etc.)



Infilling, intensification and redevelopment



Natural systems and environmental resources of the district/city



A detail inventory of existing features including topographical and natural constraints, wetlands, agricultural lands, aggregate resources, groundwater recharge areas, floodplains, fisheries, wildlife etc.



Major transportation, Agricultural; tree plantation and environmental conservation areas



Allied infrastructure requirements to support Master Plan proposals

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 DI Khan 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. DI Khan 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 DI Khan, 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 DI Khan City:



“Safe & Resilient City through Inclusive Urban Planning while continuously striving to revitalize the existing urban fabric & River landscape 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

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

2.3. Population Data

Election commission shared the population data of DI Khan as per NC VC in a hard copy. That was then scanned and manually made part of NC VC shapefile as shown below:

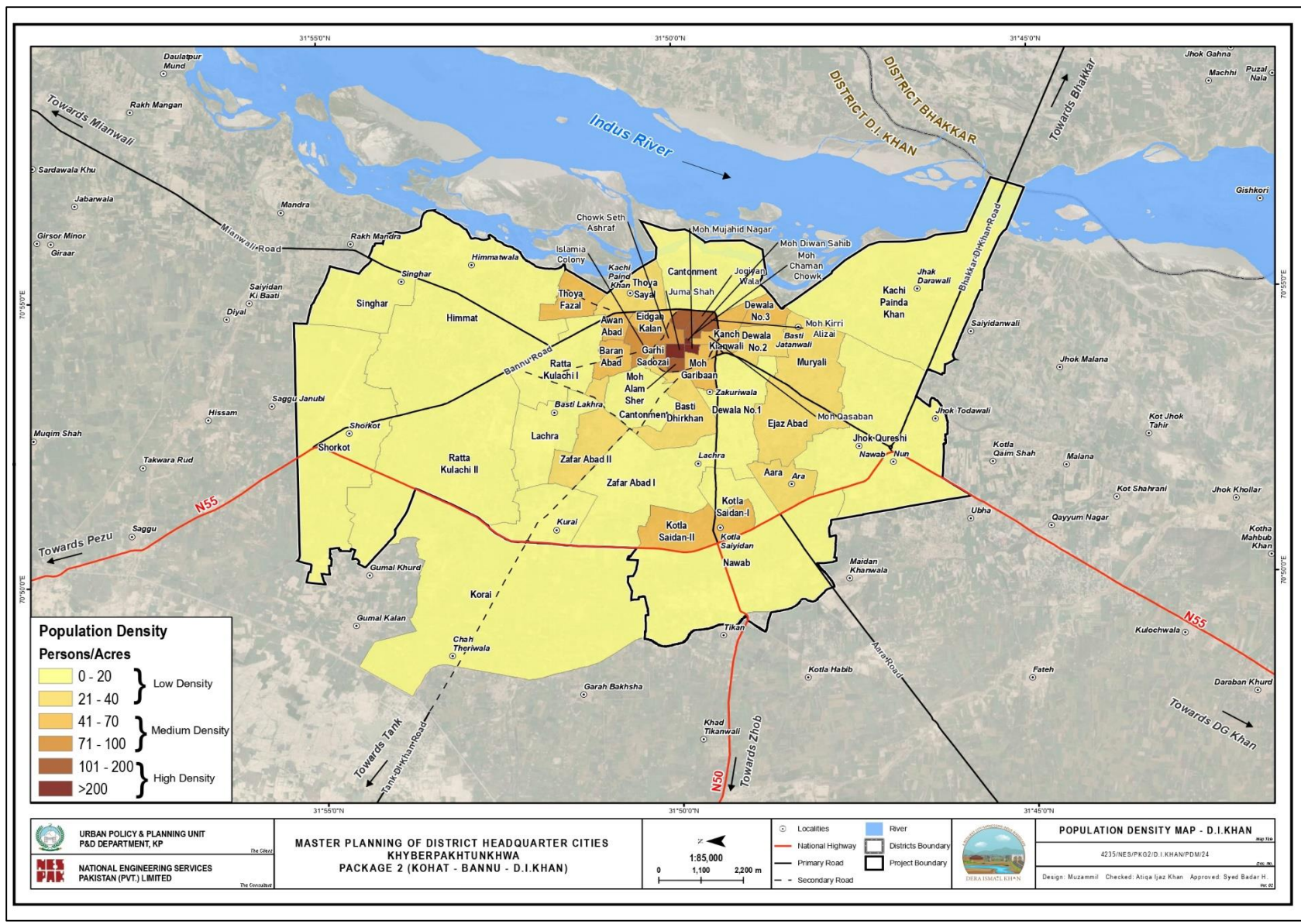


Figure 2-1: Population Density Map



Table 2-2: Population Density of the Study Area

Sr No.	Name	Type	Population - 2021 (Election Commission)	Area (Acres)
1	D.I Khan Cantonment	Cantonment	5697	1925.383587
2	Thoya Fazal	NC	13542	334.79685
3	Awan Abad	NC	6939	116.627878
4	Eidgah Kalan	NC	8567	145.793167
5	Islamia Colony	NC	11851	157.2942
6	Jogiyan Wala	NC	10074	66.541661
7	Chowk Seth Ashraf	NC	6115	66.081957
8	Moh Kirri Alizai	NC	9769	74.376753
9	Moh Chaman Chowk	NC	6337	33.895627
10	Moh Diwan Sahib	NC	5232	7.210045
11	Moh Mujahid Nagar	NC	7143	22.756611
12	Moh Qasaban	NC	3187	53.956299
13	Garhi Sadozai	NC	4127	55.893494
14	Juma Shah	NC	10386	46.917897
15	Moh Alam Sher	NC	4846	41.583704
16	Kanchkianwali	NC	11323	196.15864
17	Dewala No.3	NC	12440	189.194782
18	Dewala No.2	NC	7257	289.578805
19	Dewala No.1	NC	10053	977.841094
20	Baran Abad	NC	11688	204.914615
21	Basti Dhirkhan	NC	14079	667.256605
22	Thoya Sayal	NC	14330	427.293162
23	Moh Garibaan	NC	12651	199.913077
24	Singhar	VC	10392	935.937815
25	Himmat	VC	17778	4479.774607
26	Shorkot	VC	12943	3103.489566
27	Muryali	VC	17008	842.431984
28	Ratta Kulachi I	VC	12984	893.796601
29	Lachra	VC	12381	846.898105
30	Zafar Abad II	VC	14878	550.885435
31	Zafar Abad I	VC	16144	1805.503703
32	Kotla Saidan-II	VC	24329	516.725213
33	Kotla Saidan-I	VC	8647	214.503852
34	Ejaz Abad	VC	16123	798.52165
35	Aara	VC	9322	398.100636
36	Jhok Qureshi	VC	12971	3111.080766
37	Nawab	VC	22290	3556.138472
38	Ratta Kulachi II	VC	14432	3185.607389
39	Korai	VC	20749	6678.729
40	Kachi Painsa Khan	VC	16587	3464.750811



2.4. 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 DI Khan city, the landcover analysis has been performed in six major land cover classes. The built-up percentage is 25.36% and cultivated land is 56.32% and graveyard percentage is 0.40%. However, the land available for development is 11.38% of total project area, orchard percentage 2.58% and water bodies having percentage of 3.95%. Following table shows the percentages and areas of different classes:

DI Khan Land Cover Stats					
Sr. No.	Land Cover Class	Area(m)	Area (Sq km)	Area (Acre)	Percentage
1	Builtup	32834266.45	32.83	8113.52	25.36
2	Cultivated Land	72910376.99	72.91	18016.55	56.32
3	Graveyard	522007.03	0.52	128.99	0.40
4	Open Land	14732837.57	14.73	3640.56	11.38
5	Orchard	3335178.78	3.34	824.14	2.58
6	Water Body	5115038.46	5.12	1263.95	3.95
Grand Total		129449705.28	129.45	31987.72	100

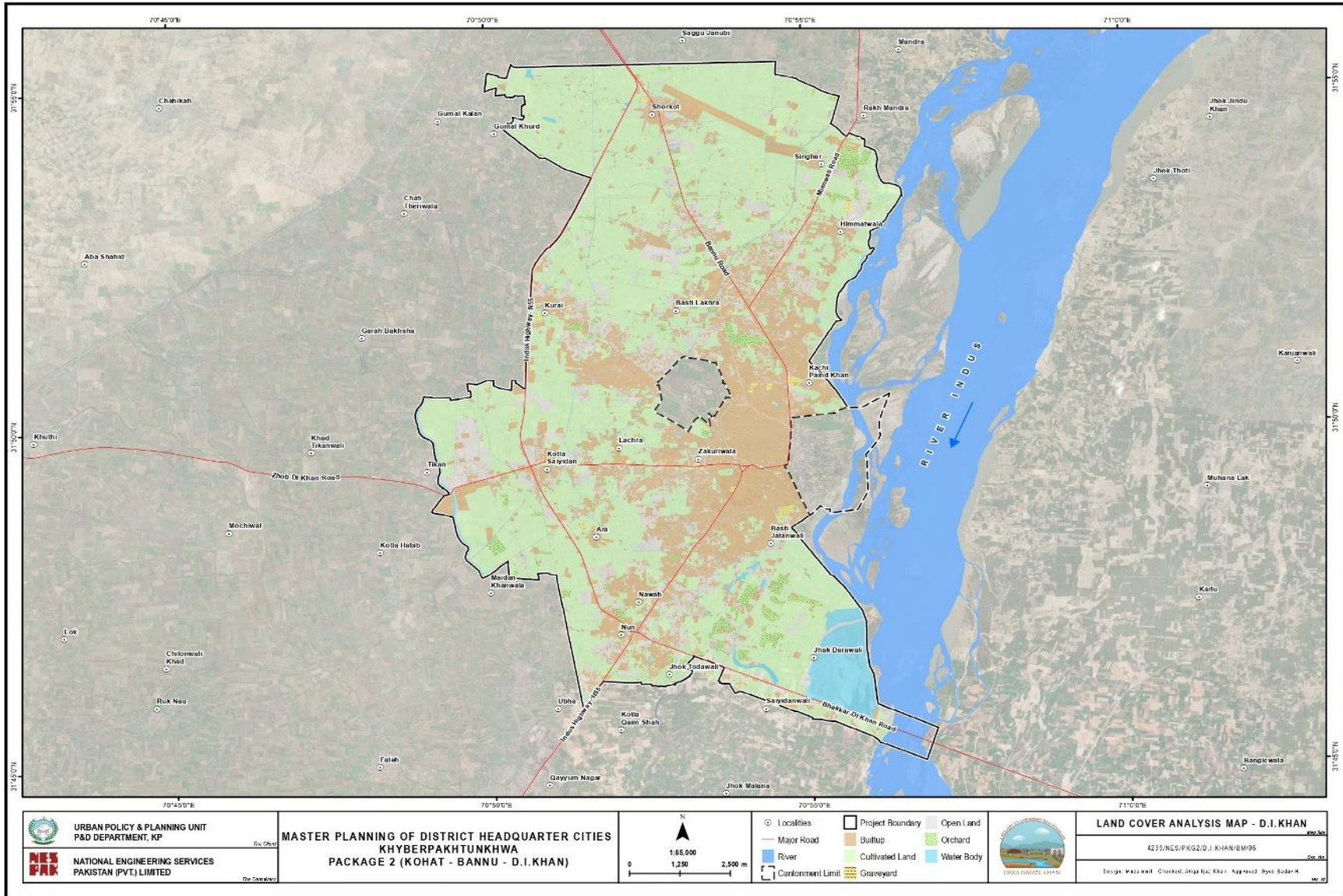


Figure 2-2: DI Khan Land Cover Analysis Map

2.5. 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 DI Khan city: -

- **Low Density**
 - + 0-20 persons per acre
 - + 21-40 persons per acre
- **Medium Density**
 - + 41-70 persons per acre
 - + 71-100 persons per acre
- **High Density**
 - + 101-200 persons per acre
 - + Above 200 persons per acre

As per density classes, cantonment and total thirteen village councils are falls in 0-20 persons per acre low density. Four village councils and 3 neighbourhoods councils area fall in 21-40 persons per acre low density. As per Medium density classes, total eight neighbourhood councils and 2 village councils fall in 41-70 persons per acre density class. Three neighbourhood councils fall in medium density of 71-100 persons per acre. Four neighbourhood councils fall in 101-200 persons per acre high density class, three neighbourhood councils fall in above 200 person per acre high density class.

2.6. Landuse Distribution In Project Area

Landuse profile of a city portrays the relationship of human activities and spatial uses. This is essential for better urban planning in general and Landuse zoning in particular. Like all urban areas, Landuse pattern in DI Khan is also a reflection of two elements;

- i) Nature of Landuse and their location, and
- ii) Level of spatial accumulation, which indicates their intensity and concentration.

A key for understanding urban entities like DI Khan lies in the analysis of patterns and processes of the Landuse system. This system is highly complex and involves several relationships between the transport system, spatial interactions and Landuse.

- + **Transport system:** Considers the set of transport infrastructures and modes that are supporting urban movements of passengers and freight. It generally expresses the level of accessibility.
- + **Spatial interactions:** Considers the nature, extent, origins and destinations of the urban movements of passengers and freight. These take into consideration the attributes of the transport system as well as the Landuse factors that are generating and attracting movements.
- + **Landuse:** Considers the level of spatial accumulation of activities and their associated levels of mobility requirements. Landuse is commonly linked with demographic and economic attributes.

Landuse is the most stable component of urban dynamics, as changes are likely to modify the Landuse structure over a rather long period of time. The main impact of Landuse on urban dynamics is its function of

a generator and attractor of movements. The proportions and forms of urban scape are the resultants of past and present socio-economic forces. The market processes have a strong pervasive power, and hence the scope of planned interventions in urban Landuse pattern needs to be understood.

2.7. Landuse Typology

The Landuse survey was carried out for the entire Project area, spread over 145 square kilometers. The information obtained through Landuse surveys was fed into GIS. The overall Landuse pattern of DI Khan is diffused and the city has been expanding haphazardly. Development continues mostly along the major roads. The City is expanding in all directions, but the major growth is towards north and north-West. In other directions, spatial growth is less intensive, sporadic and along the main roads. Such leap-frog developments cause unnecessary urban sprawl, increasing the cost of infrastructure, distances, travel time, traffic and pollution. The areas under City, Cantonment and nearest archeological site in terms of absolute numbers (acres) as well as percentages.

Table 2-3 Landuse Area of DI Khan

Sr no	Landuse	Area in Sq Km	Percentage
1	DI Khan City	137	94.48
2	Cantonment	8	5.52
Total Project Area		145	100

The central City contains admixture of Landuses, which apart from residential, include commercial activities, small-scale industrial establishments and also heritage buildings. The built-up area is currently about 60.63 square kilometers, the largest portion of which is under residential uses (42.09%). It is important here to distinguish between 'residential' and 'residential' uses. Residential uses include not only residential uses i.e. land used for dwelling units, but also internal roads & streets, pedestrian lanes, parking & loading areas, local mosques, play areas for children, kindergartens, local libraries, personal services (hair dressers, tailoring, shoe-makers, laundries etc.), and residential manufacturing such as repair shops, inoffensive production or manufacturing carried on in or adjacent to residences and properties.

The area under commercial uses is about 450.76 acres, which is about 3.02% of the built-up area. The industrial area currently is about 360.95 acres. However, even the present percentage is within the observed range of Landuse proportions in large cities. The areas of built-up, cultivated land, hilly terrain and open land in terms of absolute numbers (acres) as well as percentages.

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 DI Khan city
- ❖ Landuse of DI Khan Cantonment
- ❖ Height of Buildings

2.8. Existing Land Uses Distribution PART-A

The core city center occupied with commercial areas, administrative buildings, bus stands, historic settlements, open and recreation areas. It is reported that city has been growing in unplanned manner instead of following any physical development plan or any planning policy resulting in haphazard and uncoordinated development in different sectors. This scattered growing trend resulted in inefficient provision and accessibility of services like water, electricity, roads, sewerage, drainage, etc. No municipal committee or town committee has been given/assigned functions to control and guide developments in the town.

Table 2-4 Landuse Area Percentages Part-A

Sr No	Landuse	Area in Sq Km	Percentage
1	Built-up	50	36.10
2	Cultivated Land	72.96	53.16
3	Open Land	1.14	0.83
4	Vacant Land	13.60	9.91
Grand Total		137	100

The built-up area including the core city area is spread over an area of 50 sqkm.

Table 2-5 Area Distribution under existing Landuse

No	Landuse	Area In Acres	Percentage
1	Residential	5822.84	47.56
2	Commercial	1074.96	8.78
3	Public Buildings	983.80	8.04
4	Green/Open spaces	975.37	7.97
5	Industry	53.99	0.44
6	Graveyard	128.99	1.05
7	Roads (including Transport Terminals & Railway Line)	1932.20	15.78
8	Public Utility Buildings	13.33	0.11
9	Water Body	1257.40	10.27
Grand Total		12242.89	100

2.9. DI KHAN Cantonment Landuse Distribution

The Cantonment area of DI Khan spread over 8 Sq Km which is 5% of overall project area with diversified Landuse categories including Garrison Ground, Station HQ Football Ground, Army Golf Course, Firing Range, Karnal Sher Khan Shaheed Family Park and Pasban Cricket Ground. In addition to above, CMH, DC Office Complex and other government office as well as public sector institutions also located within Cantonment Boundary. Public Buildings spreads over 1.5 acres and parks and playgrounds 122 acres. DI Khan Cantonment was developed during early British period in 1891 and most of the Landuses were as per

Military requirements. The cantonment mostly occupies low density army units including their offices, residences and other support facilities. Cantonment has sufficient areas under green & open spaces also including agricultural fields. Community facilities like schools, colleges and hospitals as well commercial areas are well planned. Despite having low density Army units (Residences, office, training facilities) Cantonment area still have major percentage of cultivated / open land.

Table 2-6 Summary of DI Khan Cantonment

No	Landuse	Area in Acres	Area In Sq.KM
1	Administrative	4.933146	0.019963
2	Archeology Site	205.192648	0.830385
3	Built-up	328.705471	1.330226
4	Commercial	15.052465	0.060916
5	Cultivated Land	511.043648	2.068122
6	Education	25.029242	0.10129
7	Health	27.100661	0.109673
8	Mixed Landuse	2.187675	0.008854
9	Open Land	325.261416	1.316286
10	Orchard	2.091585	0.008464
11	Parks & Playground	122.038343	0.493872
12	Public Building	1.500136	0.006071
13	Religious	0.359476	0.001455
14	Residential	27.075082	0.109566
15	Restricted Area	12.653212	0.051206
16	River	160.060372	0.647741
17	Road	63.961906	0.258847
18	Transport Terminal	1.5227	0.006162
19	Vacant Land	86.839721	0.351428
Grand Total		1922.61	8

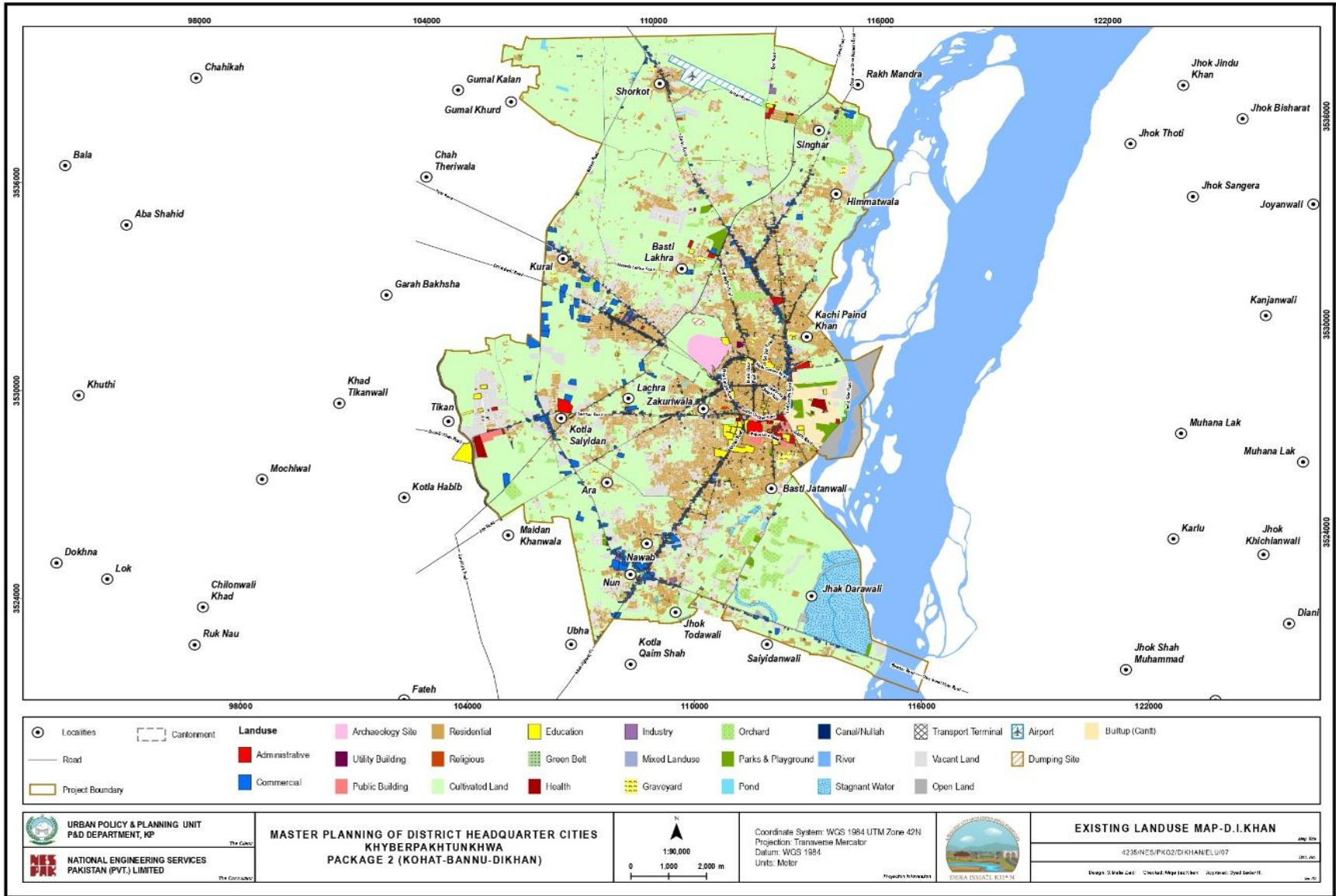


Figure 2-3: Landuse Classification Map of DI Khan

3. Drivers Of Urban Growth

3.1. Residential Projects

DI Khan Cantonment 1891

Cantonment Board Dera Ismail Khan (CB D.I.Khan) is an autonomous body working under Military Lands and Cantonment Department, Ministry of Defence, Government of Pakistan. With ever increasing population of the Cantonment, CB DIK was established 1891 upon bifurcation of D.I.Khan Cantonment into two Cantts i.e. Main Cantt and Fort Iqbal Cantt. CB D.I.Khan aims at providing high-quality services with access to all which can make a decent living place to live in and to leave a sustainable world for future generations

Indus Highway

The Indus Highway also known as National Highway 55 (N-55) is a 1264 km long two to four-lane national highway that runs along the Indus River in Pakistan connecting the port city of Karachi with the northwestern city of Peshawar via Dera Ghazi Khan. It is part of Pakistan's National Highways network and is maintained and operated by Pakistan's National Highway Authority. The Indus Highway passes through the Kohat Tunnel connecting Peshawar with Karachi. In 1980, the Indus Highway was proposed to provide an alternative and shorter route to the heavily used N-5 and to also aid the development of western Sindh province and eastern Khyber Pakhtunkhwa province. Construction began in 1981 from Kotri and was completed in 1985 in Peshawar.

N55 D.I Khan Bypass

Paroa is a junction point for a link road between highways N55 and N50. This link road takes off from Paroa to the west and connects to D.I. Khan-Loralai-Kuchlak highway called N55. Bhakkar Road goes east of N55 and connects to Kotla Jam which in turn is connected to Darya Khan to the north and Bhakkar to the south. N55's approach to Friendship tunnel between Kohat and Dara Adam Khel – one of the landmarks.

DI Khan Airport

Dera Ismail Khan Airport or D. I. Khan Airport (IATA: DSK, ICAO: OPDI) is situated 10 km away from the city centre of Dera Ismail Khan, a city in Khyber-Pakhtunkhwa province of Pakistan. The airport is the only airport besides Bannu Airport that connects the southern districts of Khyber-Pakhtunkhwa with other parts of the country. Now airport off without any reason. Dera Ismail Khan airport was closed following the start of the Afghan-US war in 2001 for unspecified reasons. After a total of six years the airport was decided to reopen after a delegation of the district visited Islamabad. The reopening was stated to cost around Rs4 million, which was spent on repairing the runway and on the renovation and repair of the terminal building. Pakistan International Airlines (PIA) was the sole operator at the airport, providing feeder services between Peshawar, Zhob, Multan, Lahore and Islamabad using Fokker F-27 aircraft.[3] With the reopening plans, the CAA has decided to upgrade the airport which would eventually facilitate the initiation of international flights for the people of the area working abroad and in the business community.[4] The first flight is expected to be launched on the 27 October 2008 to Islamabad via Peshawar.

✚ Small Industrial Estate DI Khan

S.I.E is located in Multan Road, D.I. Khan, 19 km From D.I. Khan City.

1.	Name	S.I.E DI Khan
2.	Total Area	189 Acres
3.	Established	1990-91
4.	Total No. of Plots	141
5.	Size of Plots	A/10000, B/5000 Sq: Ft.
6.	Total No. of Plots allotted	139
7.	Infrastructure Facilities	Available

✚ Gomal University DI Khan

Founded in 1974, Gomal University is a non-profit public higher-education institution located in the medium city of Dera Ismail Khan. Gomal University (GU) is a small coeducational Pakistani higher education institution. Gomal University (GU) offers courses and programs leading to officially recognized higher education degrees such as bachelor degrees in several areas of study. GU also provides several academic and non-academic facilities and services to students including a library, housing, sports facilities, study abroad and exchange programs, online courses and distance learning opportunities, as well as administrative services.



Figure 3-1: Gomal University DI Khan

✚ Gomal Medical College

Gomal Medical College GMC, is a public medical institute located in Dera Ismail Khan, Pakistan. It is one of the newer generations of medical colleges in the public sector that were set up by the government in the 1990s to meet the ever-growing demand for health service providers in the Pakistan. It started functioning in 1998 and now has grown into an established seat of medical learning in the region. It was initially affiliated with the University of Peshawar, which has been the premium public sector university in the province of Khyber-Pakhtunkhwa since 1952. Now it is affiliated with the Khyber Medical University.



Figure 3-2: Gomal Medical College DI Khan

Chashma Sugar Mills

The sponsors set up this sugar mill in 1991. The sponsors have so far helped growers to develop 150,000 acres of land for the cane supply by providing technical expertise and other assistance and have expanded the factory to 18,000 tones per day, the largest in Pakistan.



Figure 3-3: Chashma Sugar Mills DI Khan

Dera Sports Complex, Bannu Road

Dera Sports Complex is one of the top-rated place listed as Sports Club in Dera Ismail Khan.

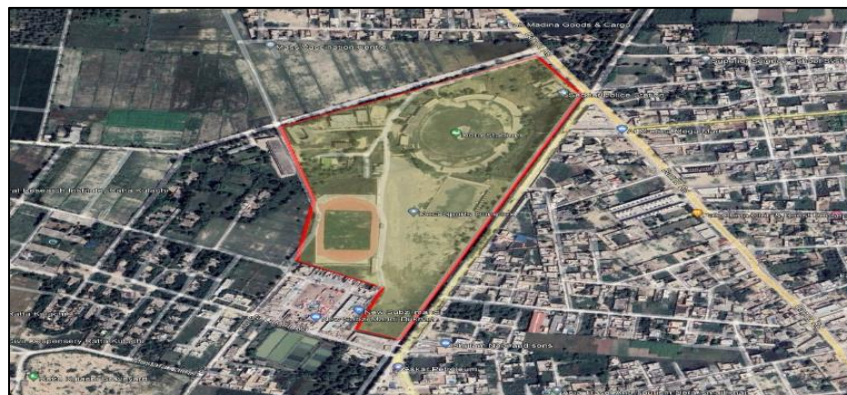


Figure 3-4: Dera Sports Complex Bannu Road

New Sabzi Mandi D.I Khan Road

Dera Ismail Khan Sabzi Mandi is a marketplace in Khyber Pakhtunkhwa. Dera Ismail Khan Sabzi Mandi is situated nearby to Christian Church and Government Girls Degree College No. 2.



Figure 3-5: New Sabzi Mandi DI Khan

Dera Township by Dera Development Authority

Dera Development Authority was established in 1988 prior to its establishment, work on self-financing scheme i.e D.I. Khan Township Scheme & Bannu Township Scheme had been initiated and was supervised during 1984-85 under the control of Kohat Development Authority Kohat.

Indus View Road

Indus View Road is next to Nāiwāla Basti and is located in North-West Frontier Province, Pakistan. Indus View Road has a length of 2.29 kilometres.

Chashma Right Bank Canal

Chashma Right Bank Irrigation Project (CRBIP) is located at Chashma in Damaan, Punjab, Pakistan. Chashma Right Bank canal off-takes from Chashma Barrage on its right bank and extends south ward up to Tounsa Barrage on Indus River. Chashma Right Bank Irrigation Canal was constructed to cultivate an area of 606,000 acres out of which, 366,000 acres in Khyber Pakhtunkhwa and 240,000 acres in Punjab. The project is located on the right bank of Indus River in D.I. Khan District, KP.



Figure 3-6: Chashma Right Bank Canal, DI Khan

New vegetable and fruit market D.I Khan

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

4. Overall Growth of DI KHAN City 2003-2022

Total growth ratio of DI Khan is 0.68 sqkm per year. In 2003, urban area of DI Khan was 27.41 sqkm and in 2022, the urban area expands and become 40.24 sqkm. In 2003, the area in the north-east direction was 0.57 sq km, the area of north-west direction was 19.08 sq km, the south-west was 7.82 sq km, and the south-

east was no developed. In 2022, DI Khan city became densified and DI Khan Urban area expand and grew over time. Over these years, the area in the north-east direction increase to 0.84 sq km, the area of north-west direction increases and became 28.56 sq km, area of south-west direction become 10.96 sq km and the south-east direction of DI Khan urban area still not developed and no development take place over these years. DI Khan Urban area grow from all direction except south-east direction in the period of 2003 to 2022. The area mainly developed over time from north-west direction. In 2003, the growth is along north-west and south-west direction spatial growth is same in 2022.

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 2003, 2010, 2016, & 2022 to precisely monitor the urban changes. The estimated area under these years is as follows:

Table 4-1: Estimated Urban Area for Year 2003, 2010, 2016, & 2022

No	Years	Area In Sq.KM	Area in Acres
1	Urban Area (2003)	27.41	6773.15
2	Urban Area (2010)	34.98	8643.06
3	Urban Area (2016)	39.23	9695.60
4	Urban Area (2022)	40.24	9943.22

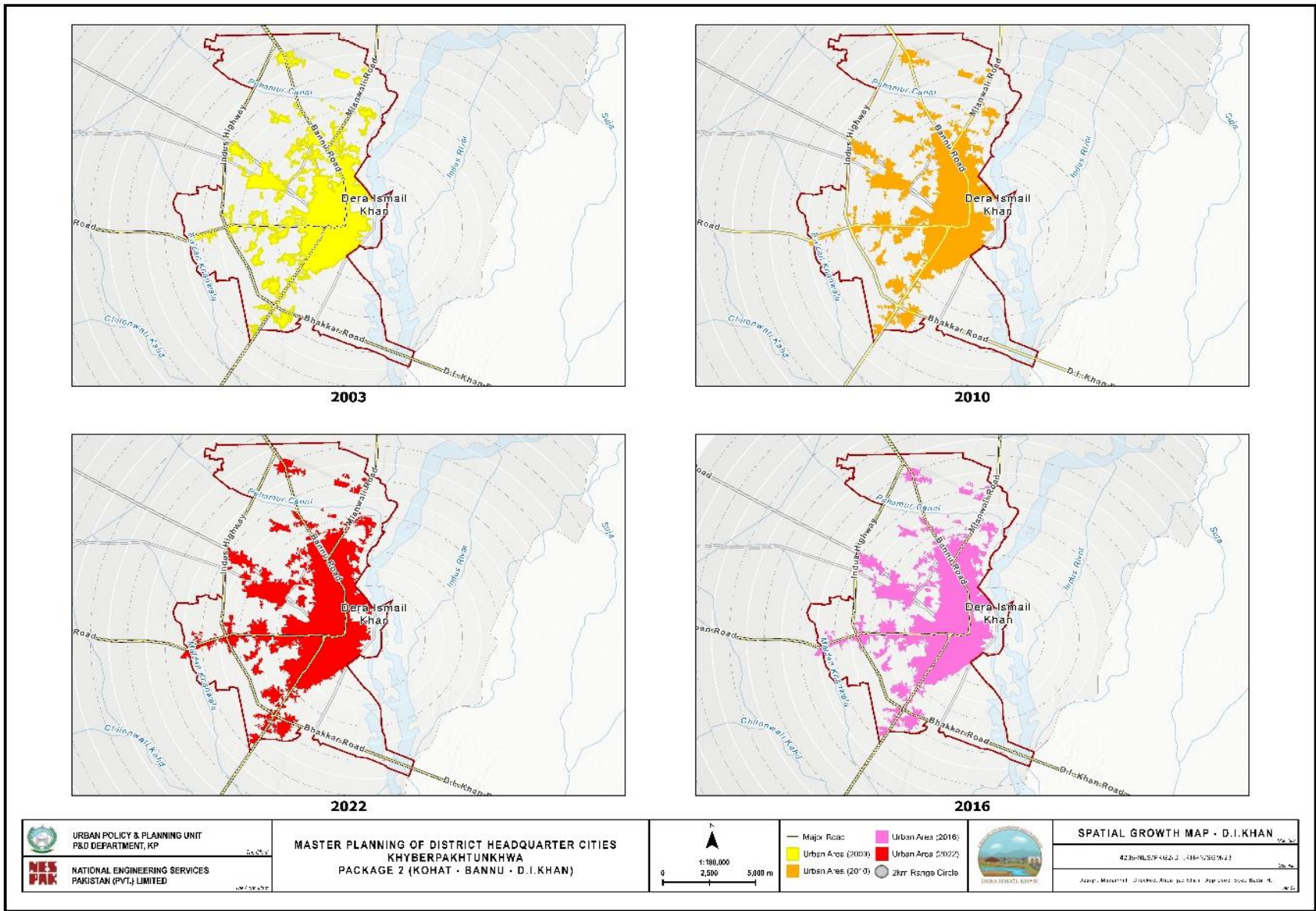


Figure 4-1: Spatial Growth Map DI Khan

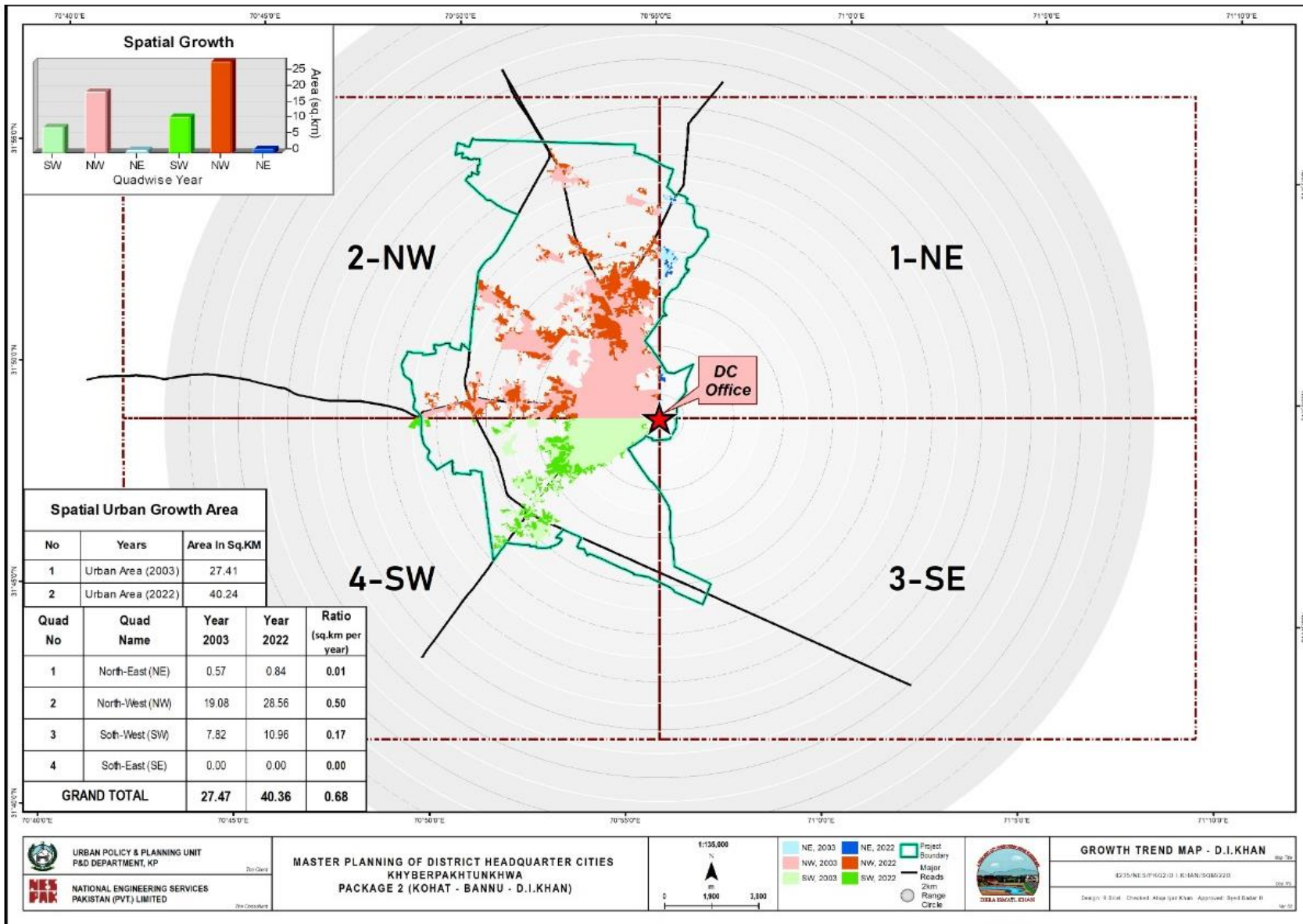


Figure 4-2: Growth Trend Map DI Khan

5. 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

5.1. 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 DI Khan master planning, to develop strategies and infrastructure solutions that prioritize sustainable water supply, promote water conservation and manage wastewater effectively.

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

5.2. 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

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	209123	4.63	209530	211160
2	VC's	243171	3.36	243399	244313
3	Total	452294		452929	455474



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_n' can be estimated as:

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

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.



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	Awan Abad	7597	116.09	4.63	9526	11946	14979	18783	23553
2	Baran Abad	14150	205.01	4.63	17743	22249	27900	34985	43869
3	Basti Dhirkhan	14079	666.9	4.63	17654	22138	27760	34809	43649
4	Chowk Seth Ashraf	6115	66.69	4.63	7668	9615	12057	15119	18958
5	Dewala No.1	9131	978.12	4.63	11450	14358	18004	22576	28309
6	Dewala No.2	9571	288.99	4.63	12002	15049	18871	23664	29673
7	Dewala No.3	11048	190.19	4.63	13854	17372	21783	27315	34252
8	Eidgah Kalan	16716	145.73	4.63	20961	26284	32959	41329	51825
9	Garhi Sadozai	4127	56.81	4.63	5175	6489	8137	10204	12795
10	Islamia Colony	6514	158.08	4.63	8168	10243	12844	16105	20195
11	Jogiyana Wala	10074	66.69	4.63	12632	15840	19863	24907	31233
12	Juma Shah	10386	46.93	4.63	13024	16331	20478	25679	32200
13	Kanchkianwali	11323	195.13	4.63	14199	17804	22326	27995	35105
14	Moh Alam Sher	4846	41.99	4.63	6077	7620	9555	11981	15024
15	Moh Chaman Chowk	6337	34.58	4.63	7946	9964	12495	15668	19647
16	Moh Diwan Sahib	5232	7.41	4.63	6561	8227	10316	12936	16221
17	Moh Garibaan	12651	200.07	4.63	15864	19892	24944	31279	39222
18	Moh Kirri Alizai	5264	74.1	4.63	6601	8277	10379	13015	16320
19	Moh Mujahid Nagar	7143	22.23	4.63	8957	11232	14084	17661	22146
20	Moh Qasaban	4505	54.34	4.63	5649	7084	8883	11138	13967
21	Thoya Fazal	16163	335.92	4.63	20268	20268	20268	20268	20268
22	Thoya Sayal	16151	427.31	4.63	20253	20253	20253	20253	20253
	Total	209123	4379.31		262230	318534	389137	477669	588684



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	Aara	9322	397.67	3.36	10997	12973	15304	18053	21297
2	Ejaz Abad	12861	797.81	3.36	15172	17898	21114	24907	29382
3	Himmat	17778	4480.58	3.36	20972	24740	29186	34430	40616
4	Jhok Qureshi	17234	3112.2	3.36	20331	23983	28293	33376	39373
5	Kachi Painsa Khan	16587	3465.41	3.36	19567	23083	27230	32123	37895
6	Korai	4149	6678.88	3.36	4894	5774	6811	8035	9479
7	Kotla Saidan-I	8647	214.89	3.36	10201	12033	14196	16746	19755
8	Kotla Saidan-II	14244	516.23	3.36	16803	19822	23384	27586	32542
9	Lachra	12381	847.21	3.36	14606	17230	20326	23978	28286
10	Muryali	16007	842.27	3.36	18883	22276	26278	31000	36570
11	Nawab	22290	3556.8	3.36	26295	31020	36593	43168	50924
12	Ratta Kulachi I	14486	894.14	3.36	17089	20159	23781	28054	33095
13	Ratta Kulachi II	22828	3186.3	3.36	26930	31768	37476	44210	52153
14	Shorkot	12943	3102.32	3.36	15269	18012	21248	25066	29570
15	Singhar	10392	936.13	3.36	12259	14462	17060	20126	23742
16	Zafar Abad I	16144	1805.57	3.36	19045	22467	26503	31265	36883
17	Zafar Abad II	14878	550.81	3.36	17551	20705	24425	28813	33990
	Total	243171	35385.22		286863	338405	399208	470936	555551

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 neighborhood councils, the average population growth rate remained constant at 4.63 from 1998 to 2017, while the average growth rate for the village councils remained constant at 3.36. Multi-Hazard Vulnerability Zoning Based on Thematic Layers

7. Multi-Hazard Zoning

The strategic scenario of the DI Khan 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 envisaged 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 under study 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;

7.1. 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 land use 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 technologies such 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 exits 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 buildings along 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.

7.2. 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 avalanches this zone also includes areas prone to moderate flood hazard and bank collapse. Suitable only for restricted urban landuse 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 ≥ 7) the probability of surface rupturing is high to moderate. Nearest known seismic source distance varies from 300m – 1000m.

7.3. 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 ≥ 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 (coldformed) Galvanized sheet technology (LGST) and structural concrete insulated panels (SCIP)

7.4. 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.

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;

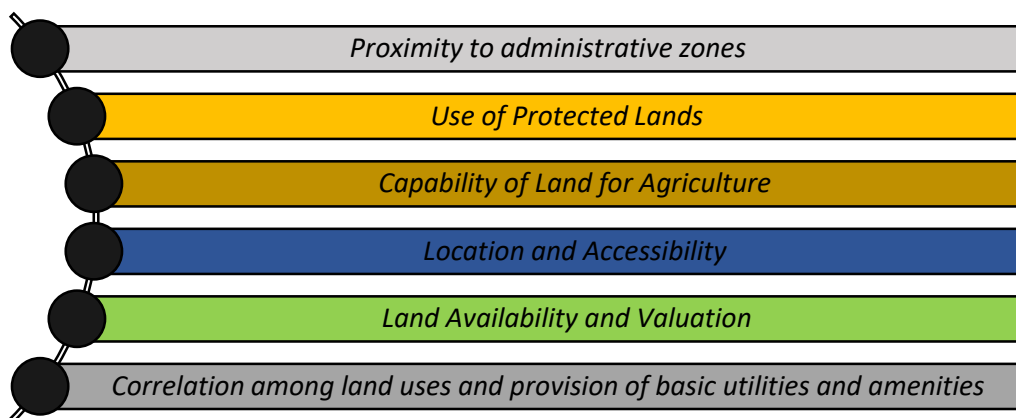


Table 9-1: Qualitative Multi Criteria Analysis

Sr.	Landuse	Criteria Categories & Description			
1	Residential	<p><u>Low Income Housing & Apartments</u></p> <ul style="list-style-type: none"> • Access to public transport • Accessible to Employment center • Availability of Parks/Open spaces, Landscape • Availability of affordable basic utilities/services and Public sector social amenities • Security and safety • Better quality of life • Highly dense areas • Proximity to industrial area • Proximity to existing low income residential areas • Affordable land prices • Supply of subsidized state land 	<p><u>Middle Income</u></p> <ul style="list-style-type: none"> • Affordable access to quality housing • Neighborhood scale • Low/medium density detached housing • Sense of Community • Availability of basic utilities and services • Affordable land prices • Access to public transport and quality roads • Access to social amenities • Less environmental issues 	<p><u>High Income</u></p> <ul style="list-style-type: none"> • Efficient size and design • Low density areas • Sense of community • Livable /calm societies • Safe and secure neighborhoods • Green & clean environment • Good quality road infrastructure • Uninterrupted supply of basic utilities and services • Access to quality social amenities • High land prices • Connectivity to existing high income areas 	
2	Commercial	<p><u>PROPOSED CBD</u></p> <ul style="list-style-type: none"> • Availability of large land parcel(s) • Adjacent to open / green spaces • Multi-nuclei city centers • Access from major Roads • High Land Prices • Proximity to new development zone 	<p><u>Special Development Zones</u></p> <ul style="list-style-type: none"> • Existing trend of mixed use • Availability of land parcel(s) • Availability of parking spaces • Accessible from public transport • Access from major roads • Central locations with reference to new development 	<p><u>Neighborhood Centers</u></p> <ul style="list-style-type: none"> • Centralized with respect to neighborhood • Providing primary level services of daily use • Preferably pedestrian friendly • Adequate parking space • Walkability to catchment population 	<p><u>Business and Trade Zone</u></p> <ul style="list-style-type: none"> • Proximity to inert city highway • Availability of land parcel • Proximity to other city level zones • Availability of parking spaces • Accessible to public transport

Sr.	Landuse	Criteria Categories & Description		
3	Industrial	<p><u>Economic/Technology Zone</u></p> <ul style="list-style-type: none"> • Accessible from major roads • Adjacent to transport terminal(s) • Nearby existing economic activities • nearby city peripheral areas • Buffer of residential areas • Close to city level recreational activities • Close proximity to high utility lines • Proximity to the existing ecological corridors 	<p><u>Industrial Zone</u></p> <ul style="list-style-type: none"> • Nearby existing industries • Favorable wind direction • Accessible from major roads • Away from city center • Nearby transport terminal(s) • Close proximity to target labor 	<p><u>Logistics Hub</u></p> <ul style="list-style-type: none"> • Multiple transport options – major inter-modal facilities and road highway interchanges. • Connections to other divisional logistics hubs • Access to a large consumer market • Domestic economy engaged in trade of goods and services
4	Sports and Recreational	<p><u>City level Facilities</u></p> <ul style="list-style-type: none"> • Availability of large land parcel(s) • Approachable from major roads • Either available at center or at outskirts of town • Adequate parking spaces • Around existing water resource 		<p><u>Neighborhood Level</u></p> <ul style="list-style-type: none"> • Within each neighborhood • Pedestrian friendly approach • Accessible for catchment population • Suitable to all income groups
5	Public Buildings	<p><u>Education</u></p> <p><u>Schools</u></p> <ul style="list-style-type: none"> • Preferably on walking distance for Low income groups • Nearby residential development • Adjacent to open / green spaces • Suitable for all income groups • Away from noisy business areas • Away from intercity highways <p><u>Colleges</u></p> <ul style="list-style-type: none"> • Nearby mixed use facilities • Approachable via secondary roads • Adjacent to open / green spaces 	<p><u>Health</u></p> <ul style="list-style-type: none"> • Preferably on walking distance for low income group especially • Nearby residential development • Adjacent to green spaces • Nearby mixed use facilities • Adequate parking space • Approachable from major roads • Accessible through public transport • Availability of land parcel(s) 	<p><u>Religious</u></p> <ul style="list-style-type: none"> • Preferably on walking distance for low income group especially • Nearby residential development • Adjacent to green spaces • Nearby mixed use facilities • Adequate parking space • Availability of land parcel(s)



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

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 DI Khan, 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. Existing Built-up Area
2. Not Suitable
3. Moderately Suitable
4. Highly Suitable

9.4. Framework for Landuse Suitability Analysis based on GIS

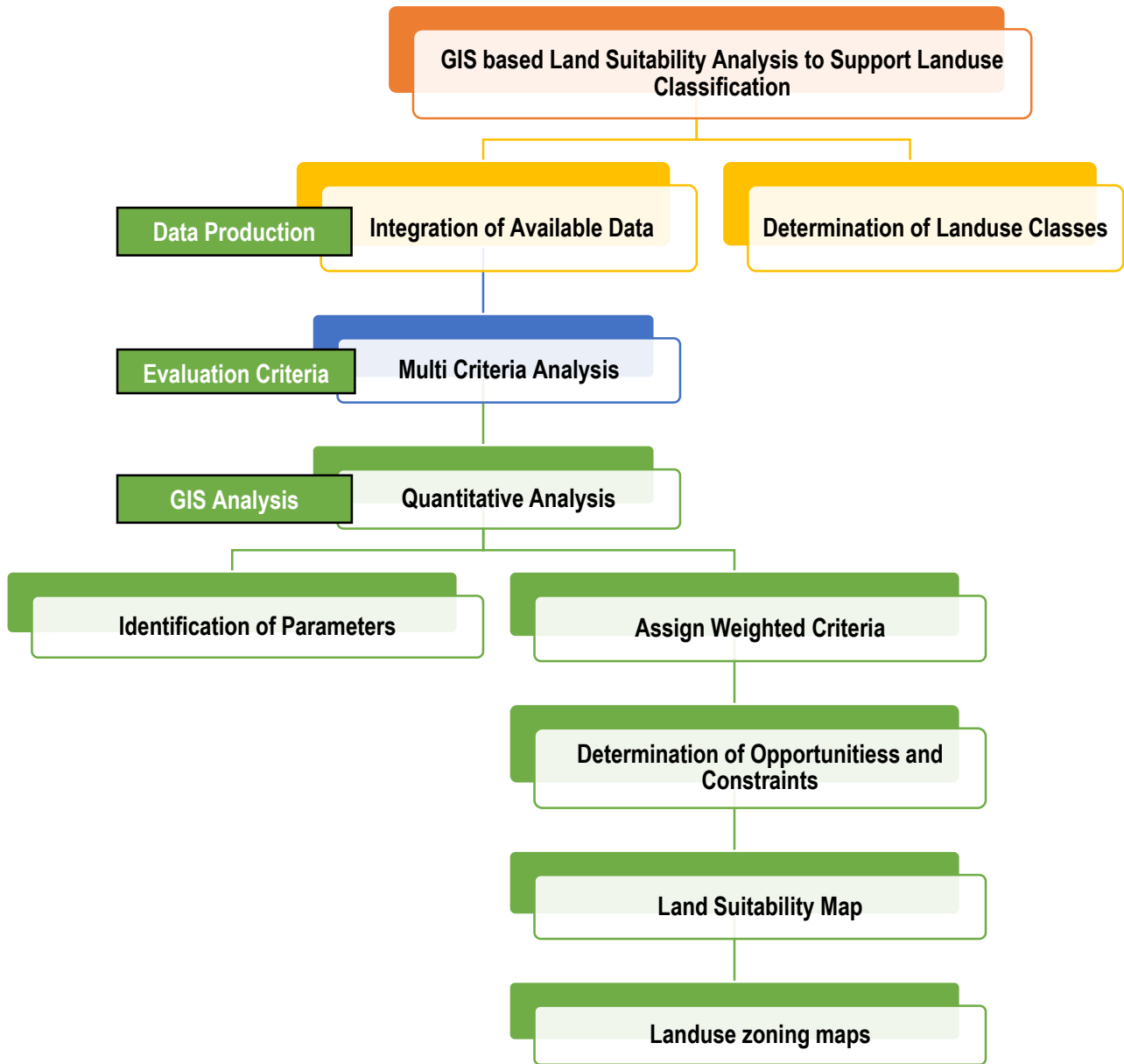


Figure 9-1: Framework for Landuse Suitability Analysis based on GIS

Table 9-2 Quantitative Multi-Criteria Analysis

Sr.	Parameter	Opportunities	Constraints	Weighting Criteria
RESIDENTIAL ZONES				
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
COMMERCIAL ZONES				
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
INDUSTRIAL ZONES				
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
CIVIC ZONES (ADMINISTRARTION/PUBLIC BUILDING/COMMUNITY FACILITIES) (Administration, Education, Health & Religious)				
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
SPORTS & RECREATIONAL ZONE				
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
AGRICULTURE ZONES <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.

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:

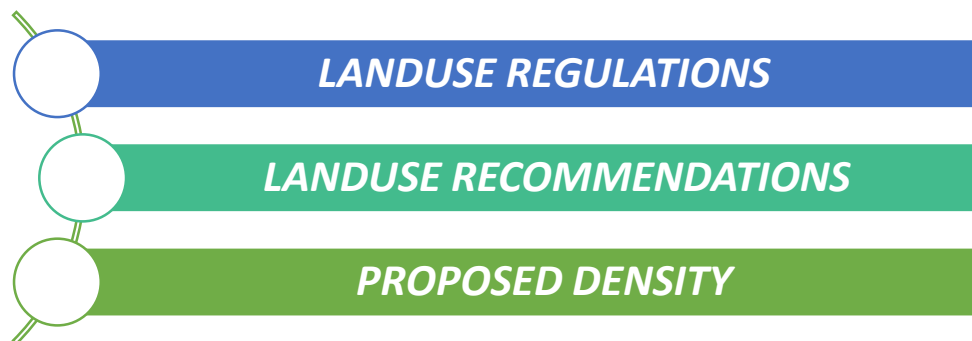


Figure 11-1: Important sections of KP Urban Policy

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 m² of accessible, urban green space per inhabitant shall be provided.
 - B. All roof space of 100 m² 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:

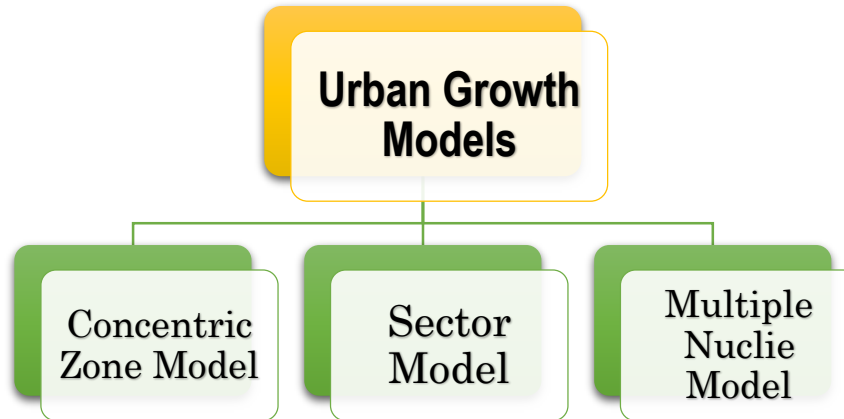


Figure 12-1: Urban Growth Models

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 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.

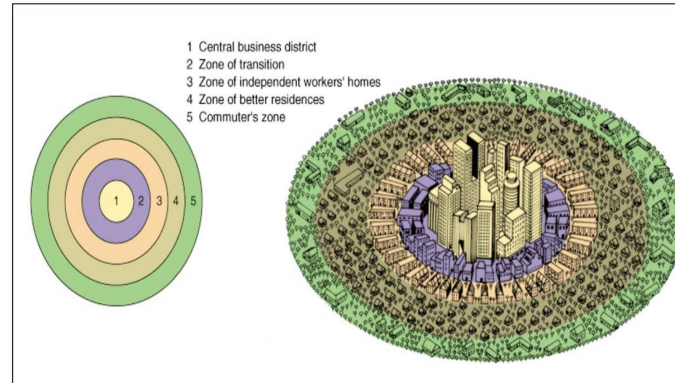


Figure 12-2: Concentric Zone Model

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.

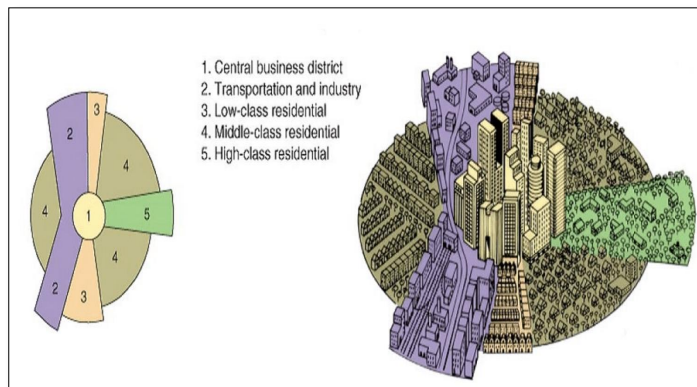


Figure 12-3: Sector Growth Model

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.

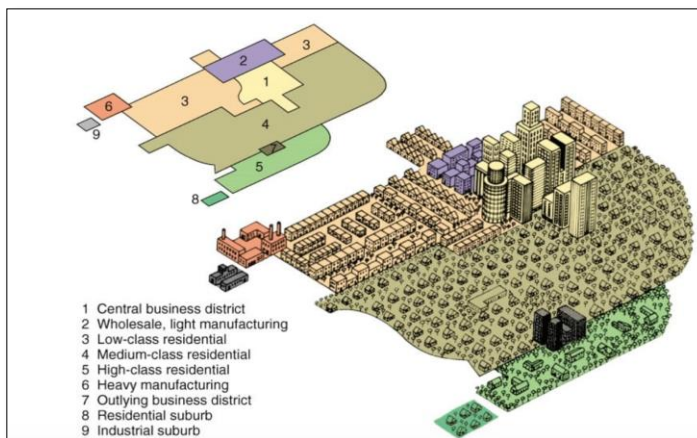


Figure 12-4: Multiple Nuclie Model

12.4. Applicability Of Sectoral Growth Model On DI Khan

As far as the applicability is concerned, the sector growth model is more applicable on DI Khan city because city is already growing in the shape where major arterial roads are dividing it in sectors. Moreover, walled city and congested built-up area in inner side and development of housing schemes and industries in the outer corner is according to sector model growth. For future zoning, the project area is firstly densified and then most suitable uses are placed at the best possible locations.

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

Dera Ismail Khan (DI Khan) is a district in the Khyber Pakhtunkhwa province of Pakistan, known for its agricultural and trading activities. Assessing the economic potential of a district like DI Khan involves considering various factors such as its natural resources, infrastructure, demographics, industries, and investment opportunities.

- 1. Agriculture:** DI Khan's economy heavily relies on agriculture, with crops like wheat, sugarcane, cotton, and fruits being major contributors. Assessing the potential for modernizing agricultural practices, improving irrigation systems, and introducing high-yield crop varieties could enhance productivity and profitability.
- 2. Livestock Farming:** Livestock farming, including cattle, sheep, and goats, is another significant aspect of the district's economy. There may be potential for improvements in breeding, veterinary services, and market access for livestock products.
- 3. Natural Resources:** DI Khan possesses natural resources like natural gas and minerals. Assessing the potential for sustainable extraction of these resources while ensuring environmental protection and equitable distribution of revenues is essential.
- 4. Industry and Manufacturing:** There might be opportunities for promoting small and medium-scale industries in DI Khan, particularly in agro-processing, textile, and mineral-based industries. Infrastructure development and access to finance could facilitate the growth of the manufacturing sector.
- 5. Infrastructure Development:** Investing in infrastructure such as roads, bridges, and energy supply can improve connectivity within the district and with other regions, thus stimulating economic activities and trade.
- 6. Tourism:** DI Khan has historical and cultural sites like the Tomb of Ghazi Khan and Sheikh Badin Hills, which could be developed to attract tourists. Developing tourism infrastructure and promoting cultural events can create employment opportunities and generate revenue.
- 7. Education and Skill Development:** Investing in education and skill development programs can empower the local workforce, making them more competitive in the job market and attracting potential investors looking for skilled labor.

8. Trade and Commerce: Improving market access for local products and facilitating trade through measures like setting up marketplaces and improving transportation networks can boost commercial activities in the district.

9. Technology and Innovation: Embracing technology and innovation in agriculture, manufacturing, and services sectors can enhance productivity, efficiency, and competitiveness.

10. Government Support and Policy Reforms: Enacting favorable policies, providing incentives for investment, and ensuring good governance are crucial for unlocking DI Khan's economic potential.

13.2. Evolution Of Urban Form Of DI Khan

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

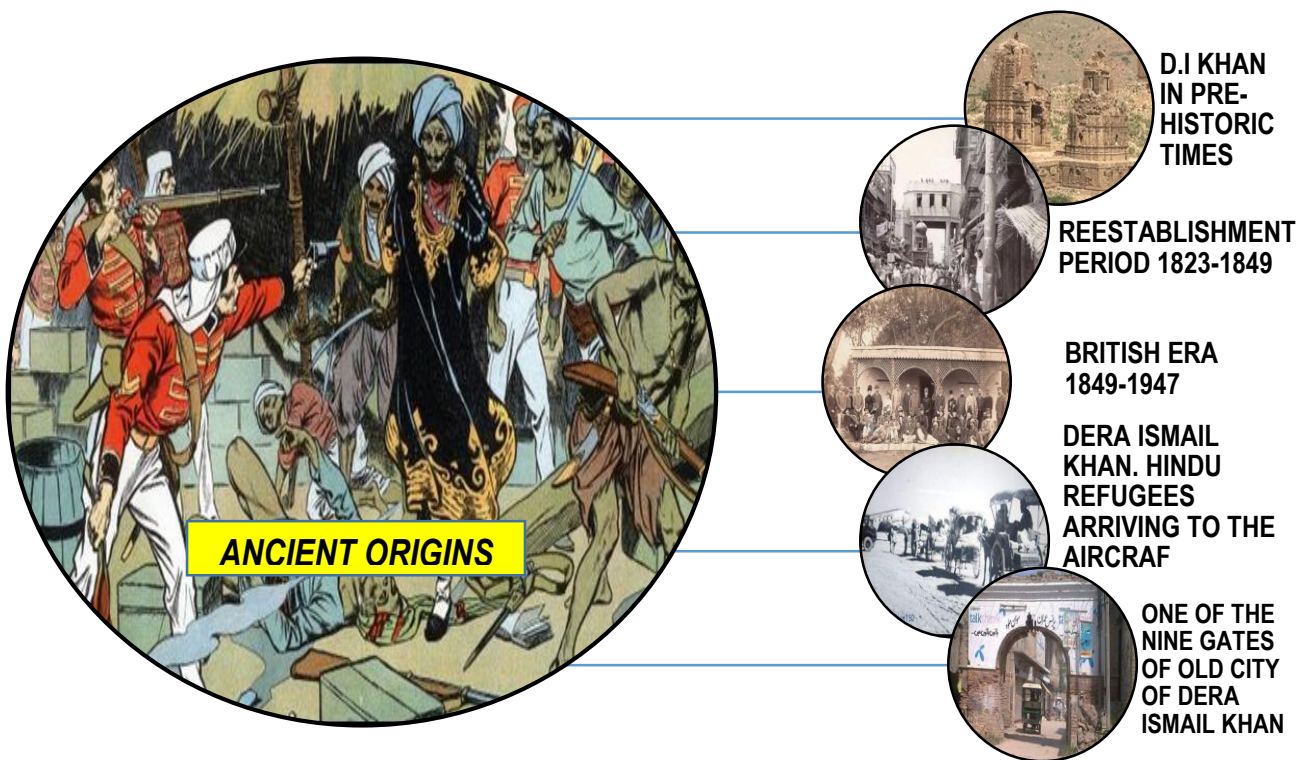


Figure 13-2: Evolution of DI Khan City

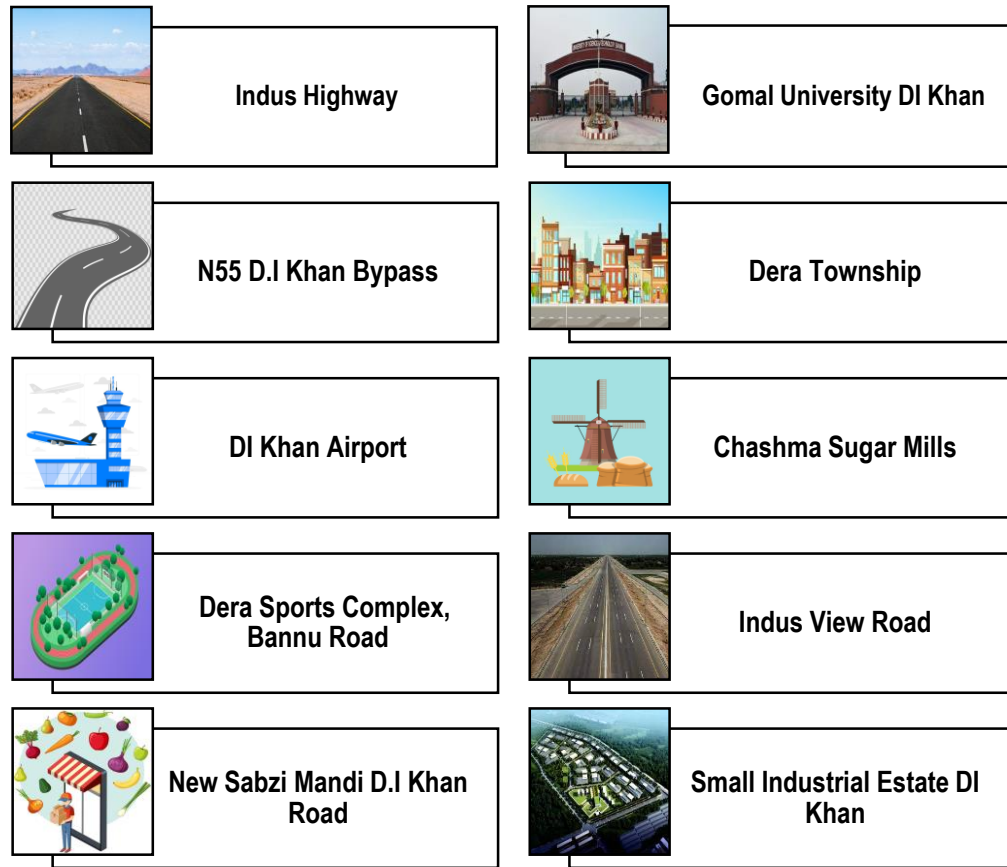


Figure 13-3: Developments Of Recent Past Influencing Urban Form

13.3. Ongoing/Proposed projects in DI Khan 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 DI Khan District, different land commitments are mentioned below;

Table 13-1: Ongoing/ Proposed projects in DI Khan District

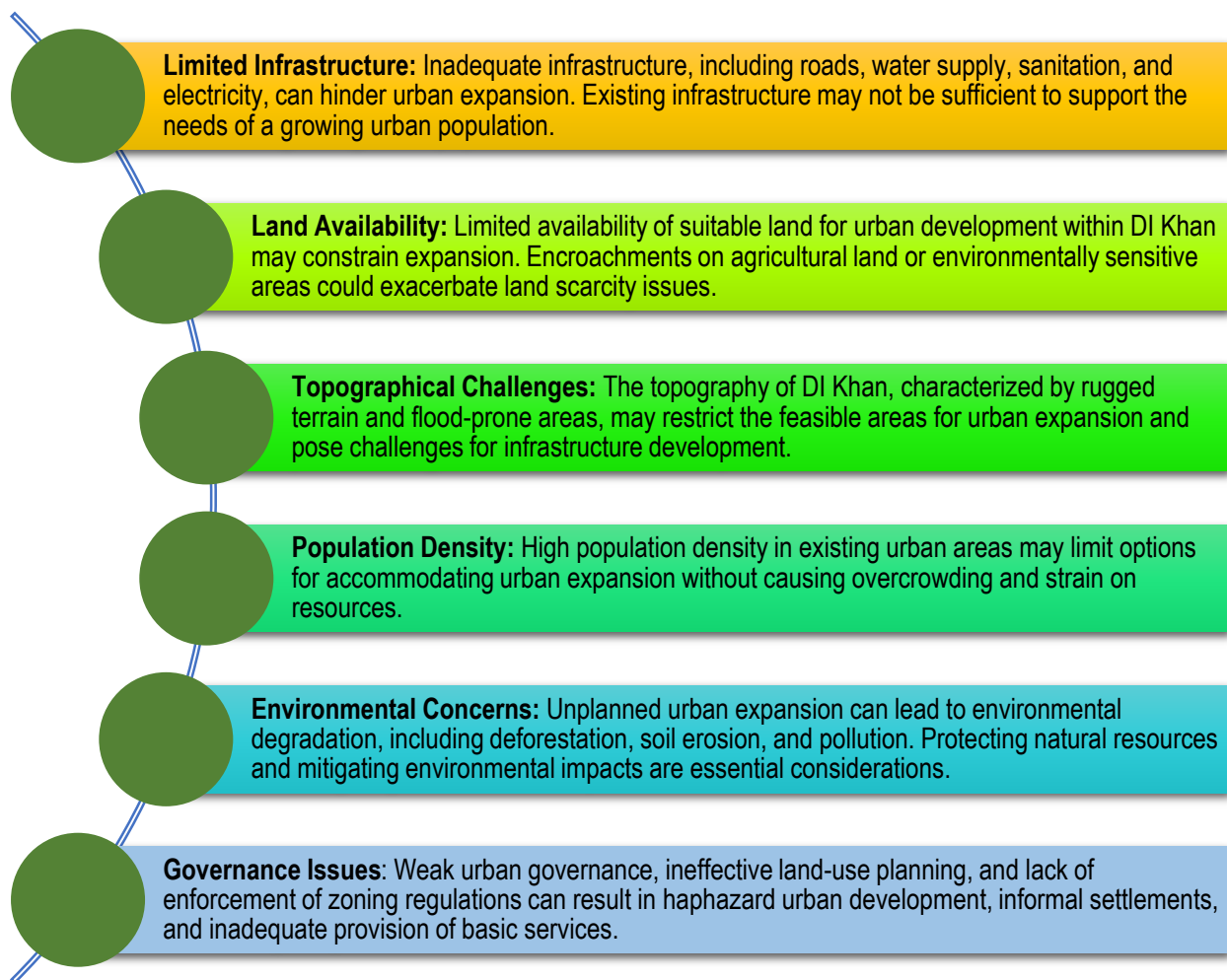
Ongoing/Proposed projects in DI Khan District	
1.	Energy Plantation in Sub-Division D.I Khan
2.	Regional Development Programme for Tehsil Parowa & surrounding Areas, D.I Khan
3.	Construction of roads at UCs 1, 2, 3, 4, 5, DD-1, DD-2, Shorkot, Ratta Kulachi, Dewali District D.I Khan
4.	Rehabilitation of Gandhi Ashiq to Gandhi Umer Khan Road (11-Km) District D.I.Khan
5.	Construction of 5 Km road from Indus highway to Jhoke Karlo and 8 KM road from Jalebi Morh to Baghwani DI KHAN
6.	Construction of B/T road from Mosazai to Gara Sheikh 15 Km, D.I Khan
7.	Construction of Technically & Economically Feasible 35 KMs Roads in D.I.Khan Division
8.	Construction of Peshawar - D.I. Khan motorway

9.	Construction of BT Roads in Sub-Division DI Khan
10.	Establishment of Model Vocational & Women Resource Centres at D.I. Khan
11.	Construction of Bus Terminal/ Taxi Stand, Fruit & Vegetable Market and Family Park in Sub-Division, Jandola Tank and Sub-Division, Darzinda, D.I.Khan

13.4. Constraints And Opportunities On Urban Expansion In District DI Khan

Urban expansion in Dera Ismail Khan (DI Khan) faces both constraints and opportunities, influenced by various factors such as infrastructure, land availability, demographics, governance, and environmental considerations. Here are some constraints and opportunities:

Constraints:



Opportunities:



14. Strategic Scenario Development & 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:

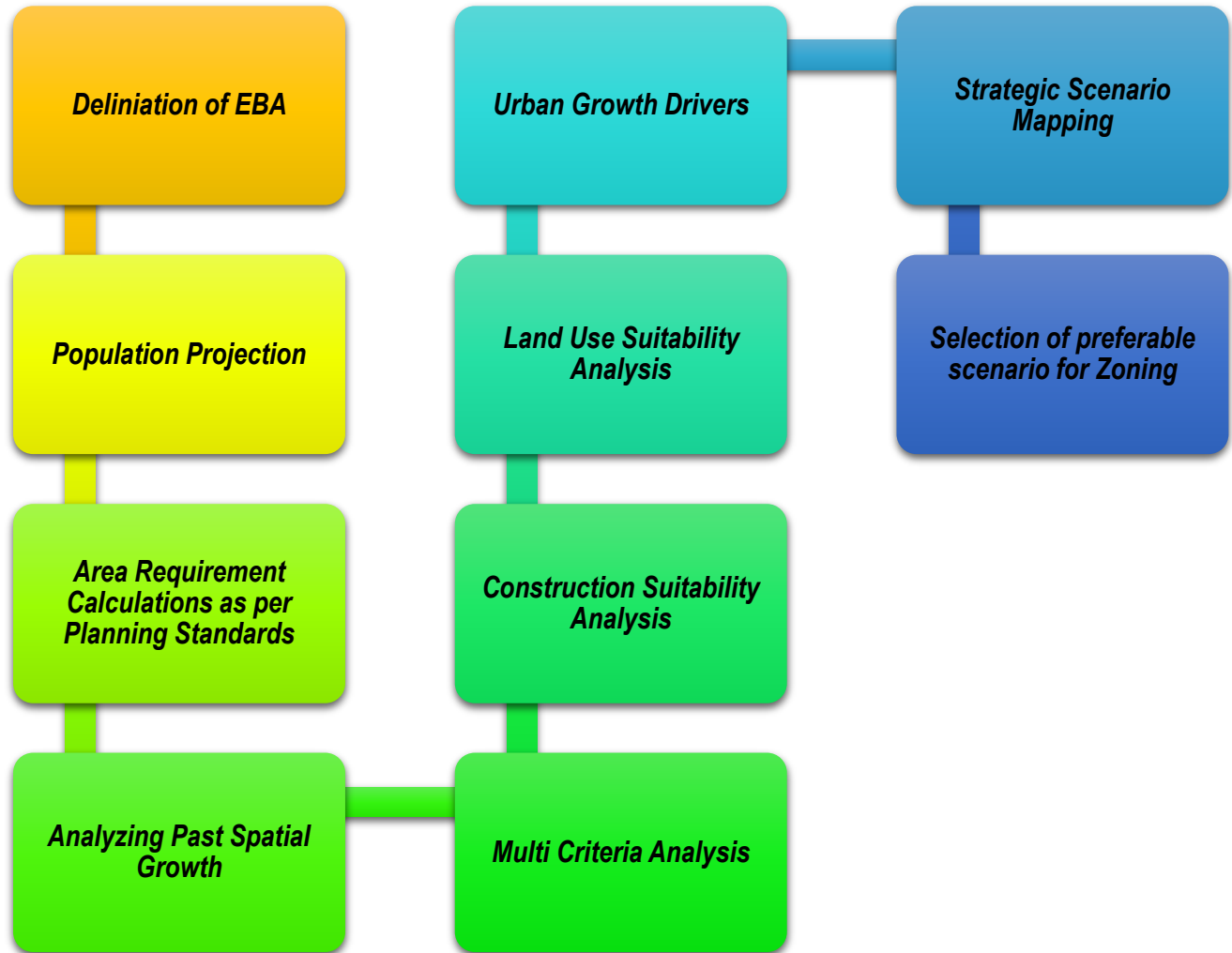


Figure 14-1: Stages before Scenario Mapping

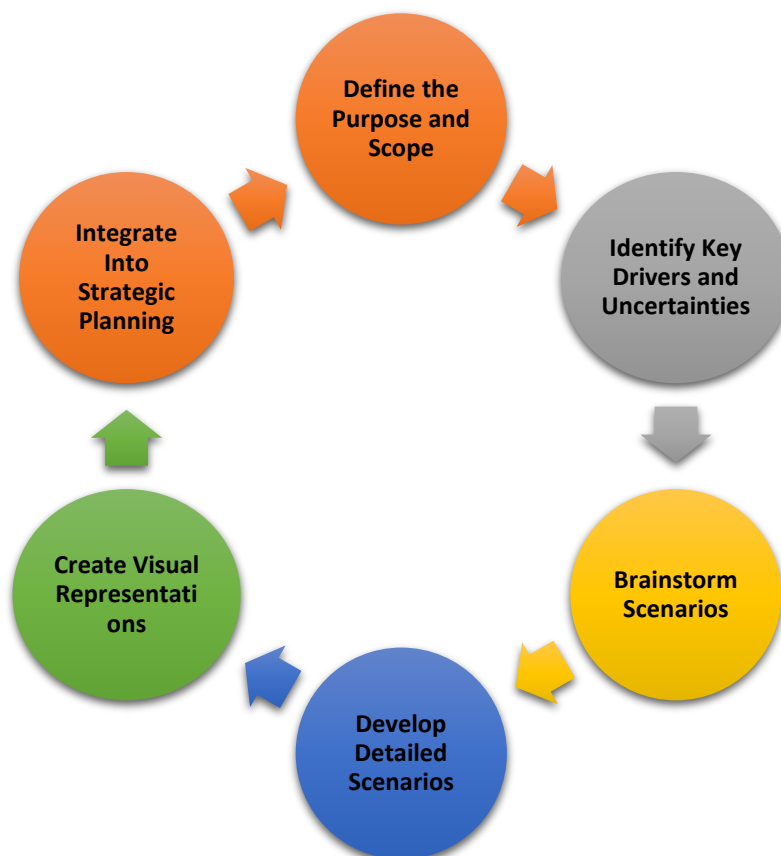


Figure 14-2: Process of Strategic Scenario Mapping

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 DI Khan

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

Table 14-1: Features of Proposed Scenarios

South Growth Zone	North New DI Khan City	Existing Expansion Zone
<ul style="list-style-type: none"> Falls in the southern side of DI Khan city, along N-55. Serves the purpose of covering the haphazard development along N-55 in southern side of the city. But has serious environmental and developmental concerns due to the presence of river on the eastern side of this zone. If developed, then will support the growth of city in linear format or ribbon development would occur. 	<ul style="list-style-type: none"> It is supposed to be a satellite town where the city will develop from scratch. It falls between the proposed Peshawar-DI Khan motorway alignment, starting from IDP Camp DI Khan and ending at M-14, N-55 and Tank road junction. This New city development will provide an opportunity to build modern infrastructure, including roads, public transportation systems, utilities, and green spaces, which can improve the quality of life for residents. 	<ul style="list-style-type: none"> Will compact the already expanding city along with densification and planned expansion in sectoral growth model. Covers almost all VC/NC boundaries and their planned development will occur in the future. Supports the agenda of giving the city a compact shape and sustainable infrastructure to serve the future population. Has major connections with surroundings through important arterial and primary road connections.

Table 14-2: Area Statement for Planning Boundaries of Scenarios

AREA OF PROPOSED SCENARIOS			
Sr.	Proposed Scenarios	Area (sq.km)	Acres
1	North New City DI Khan	113.38	28016.81
2	South Growth Zone	71.55	17680.39
3	Existing Expansion Zone	169.20	41810.23

14.2. Preferred Scenario for Zoning

The preferred scenario for zoning of DI Khan City is Existing Expansion Zone because of the following reasons,



Figure 14-3: Features of preferred scenario for Zoning in DI Khan District

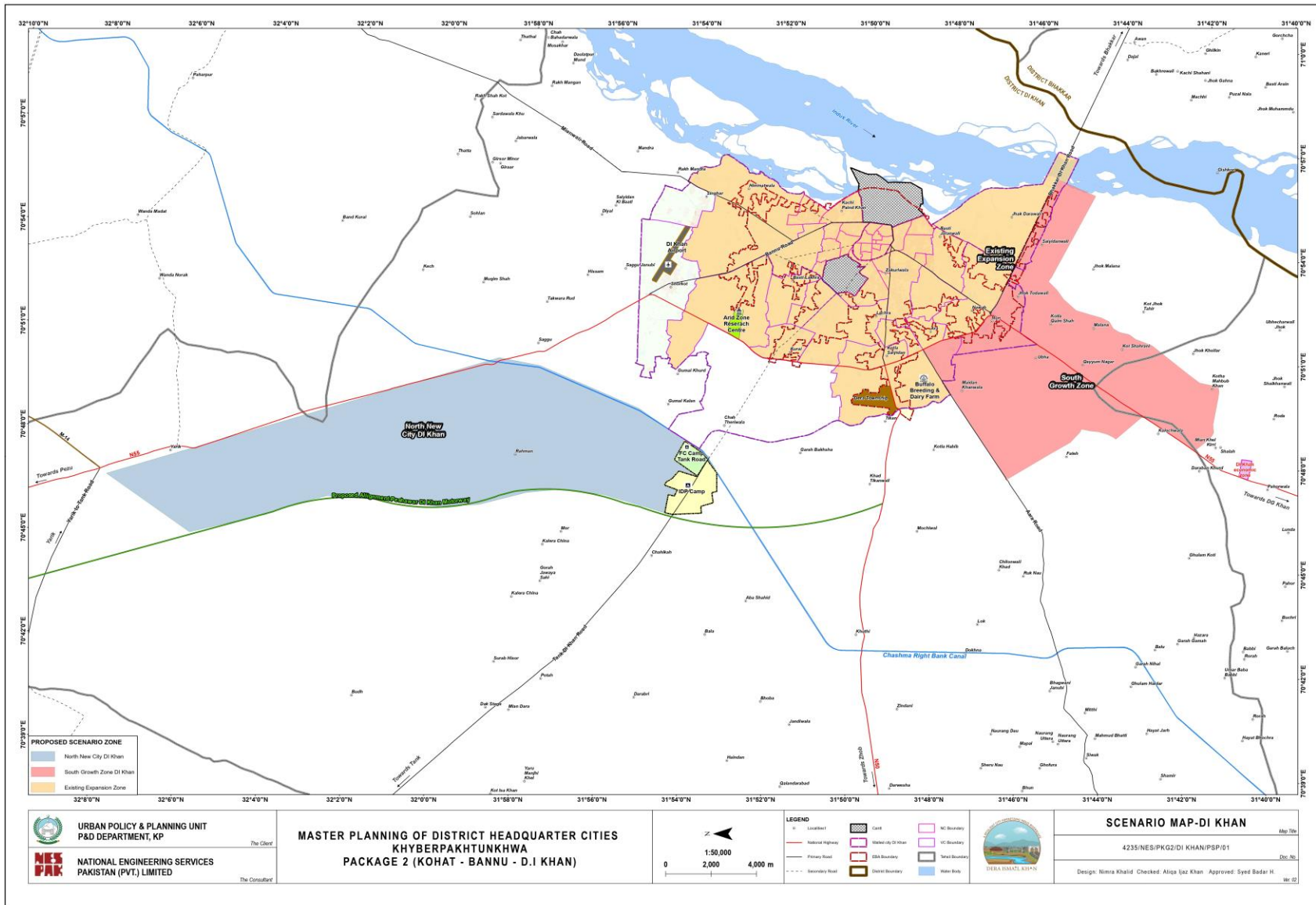


Figure 14-4: Proposed Strategic Scenario Map DI Khan



15. Proposed Zones of Selected Scenario

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

1. Infill Development Zone
2. New Housing Zone
3. Mixed Use Corridor
4. Farm Housing Zone
5. Labor Housing Zone
6. Model Village
7. Cattle Farming Zone
8. Commercial Corridors
9. Orchard Reserves
10. Agricultural zone
11. New CBD
12. Urban Farming Zone
13. River Front Park
14. City Graveyard
15. City Masjid
16. Logistics & Trade Zone
17. Bus Terminal
18. Walled City Regeneration zone
19. Urban Regeneration zone (mixed-use)
20. Regeneration of Trade & Business zone
21. Botanical Garden/Wildlife Park
22. Sports & Recreational zone
23. New Civic & Administrative Zone Plan
24. Industry & Trade Plan

Table 15-1: Detail of Proposed Zones in DI Khan

Detail of Proposed Zones in DI Khan		
1.	NC/VC NAME	Proposed Zones
2.	Awan Abad	-
3.	Baran Abad	-
4.	Basti Dhirkhan	-
5.	Chowk Seth Ashraf	-
6.	Dewala No.1	-
7.	Dewala No.2	-
8.	Dewala No.3	Urban Regeneration Zone (Residential)
9.	Eidgah Kalan	-
10.	Garhi Sadozai	-
11.	Islamia Colony	-
12.	Jogiyana Wala	Urban Regeneration Zone (Mixed Use)
13.	Juma Shah	-
14.	Kanchkianwali	-
15.	Moh Alam Sher	-
16.	Moh Chaman Chowk	Walled City Regeneration Zone
17.	Moh Diwan Sahib	-



18.	Moh Garibaan	-
19.	Moh Kirri Alizai	-
20.	Moh Mujahid Nagar	-
21.	Moh Qasaban	-
22.	Thoya Fazal	-
23.	Thoya Sayal	-
24.	Aara	Infill Housing
25.	Ejaz Abad	Infill Housing
26.	Himmat	Urban Farms, Infill Housing
27.	Jhok Qureshi	Infill Housing, Sports & Recreation Zone, Urban Farms, New Housing, Regeneration of Trade & Business Zone
28.	Kachi Painda Khan	Farm Housing Zone, Mixed Use Corridor, River Front Water Park, Urban Farms
29.	Korai	Agriculture Zone, New Housing
30.	Kotla Saidan-I	Infill Housing
31.	Kotla Saidan-II	New Housing
32.	Lachra	New Housing
33.	Muryali	Farm Housing Zone
34.	Nawab	New Housing, New CBD West, City Masjid, Botanical Garden/Wildlife Park, Industrial Zone, City Graveyard, New Civic & Administration Zone Industrial Corridor
35.	Ratta Kulachi I	New Housing
36.	Ratta Kulachi II	New Housing, New CBD North
37.	Shorkot	Model Village, Cattle Farming Zone
38.	Singhar	Agriculture Zone
39.	Zafar Abad I	Trade & Logistics Zone, Labour Housing Zone Industrial Corridor
40.	Zafar Abad II	New Housing

15.1. Description of Zones

15.1.1. Commercial Zone

In DI Khan Zoning Plan the area of proposed Commercial Zone is 637 acres. It consists of further sub-zones such as;

- New CBD North
- New CBD West
- Commercial Corridors
- Mixed Use Corridor

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:

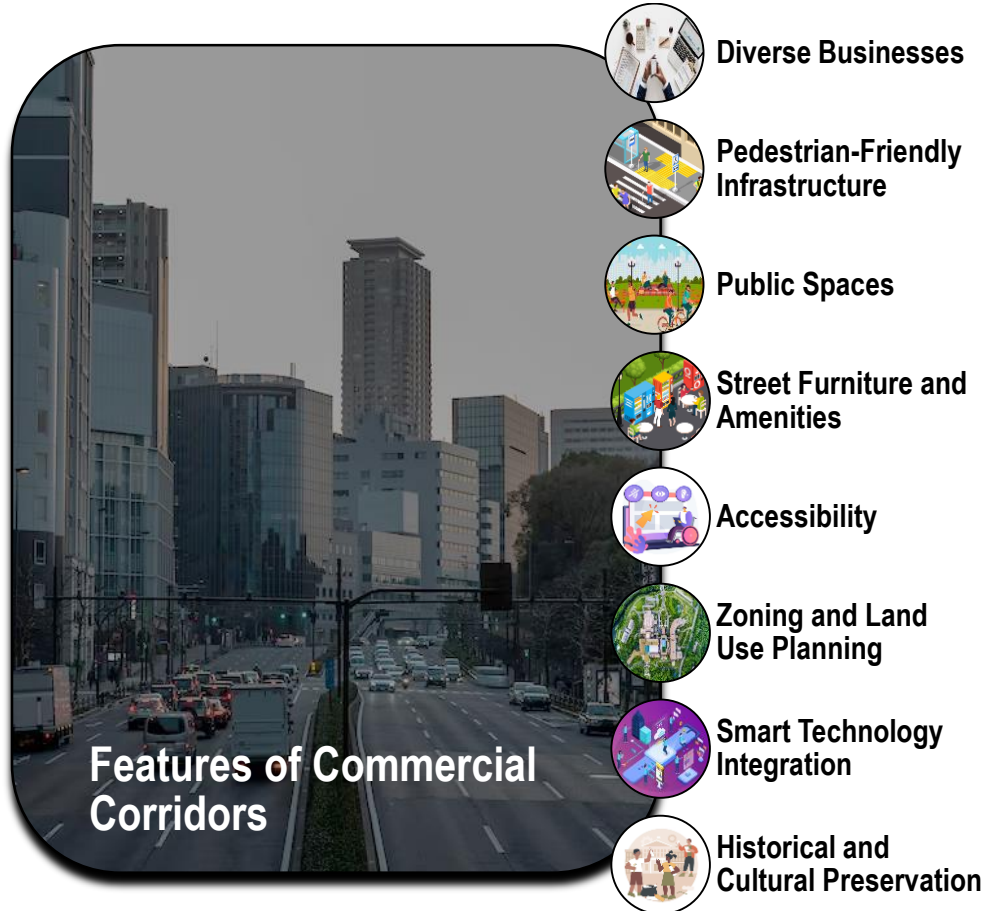


Figure 15-3: Features of commercial corridors



15.1.2. Proposed Residential Zone

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

- Infill development Zone
- New Housing Zone
- Mixed Use Development Zone
- Farm Housing Zone
- Labor Housing 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.

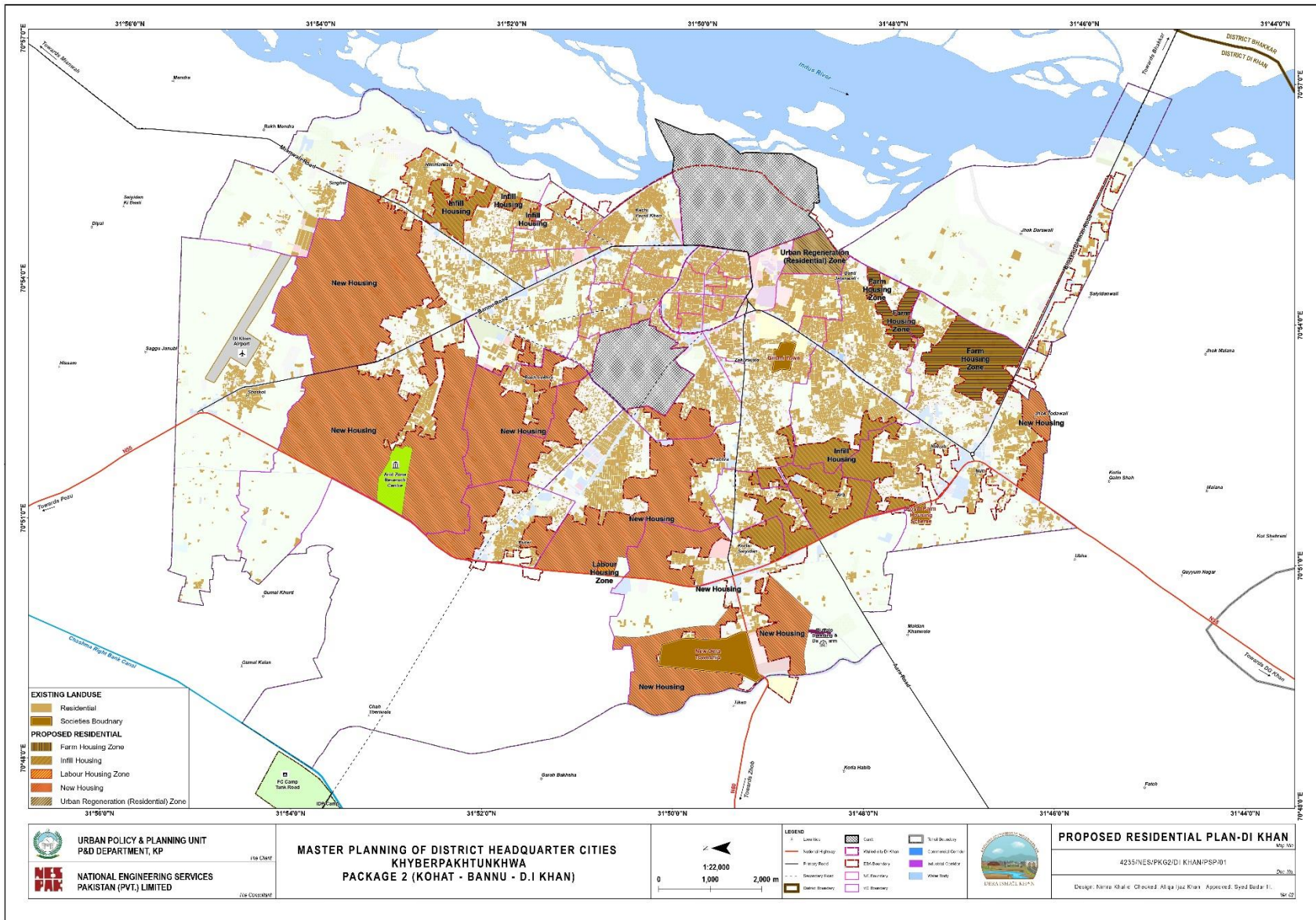


Figure 15-5: Proposed Residential Map DI Khan



15.1.3. Rural Urban Integration Plan

The proposed model village of DI Khan has an area of 245 acres. Rural Urban Integration Plan has the following key features;

- Model Villages
- Cattle Farming
- Agriculture Land
- Orchards & Urban 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 15-6: Features of Model Village

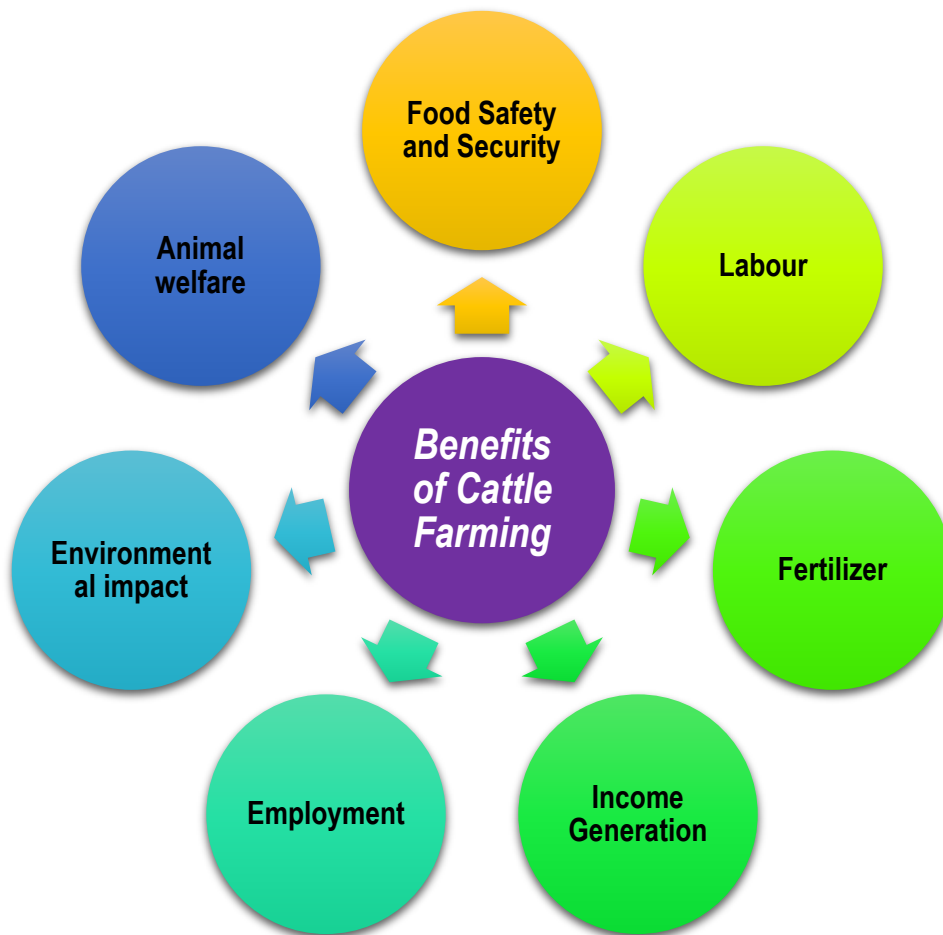
Cattle Farming Zone

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.



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 DI Khan 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.

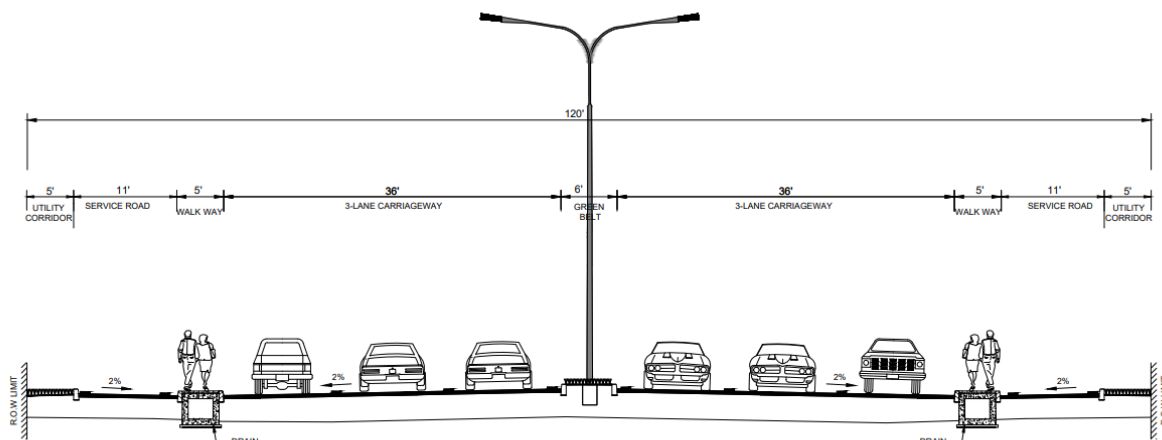
❖ Proposed new roads for future urban development

The development of new zones in DI Khan requires careful planning and consideration of the city's future transportation needs. As a result, the master plan for DI Khan 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 and connectivity to the new areas. Overall, including new arterial roads in the master plan for DI Khan demonstrates a commitment to sustainable urban development and a focus on providing efficient and effective transportation infrastructure to support the city's growth. These road alignments pertain to the planning phase, which may vary on account of detail design.

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

To address the issue of connectivity and accessibility of new zones, new arterial roads are being proposed with a right-of-way (ROW) width of 120 feet. This wider ROW is planned to accommodate future traffic demands from population growth and new developments. These road alignments are part of the initial planning phase and may be adjusted during detailed design. It's recommended to develop these roads gradually as adjacent zones develop with time. These proposed arterial roads are shown in Figure 15-3.

These proposed arterial roads aim to connect existing minor roads and tracks, enhancing connectivity to new areas while expanding the city's road network. By providing alternative routes, they can alleviate traffic congestion in current areas. The exact alignment of these roads will be determined through feasibility studies in the future. In total, the proposed arterial roads cover approximately 18.96 kilometers in length. The proposed typical cross-section for the arterial road is illustrated in Figure 15-3.



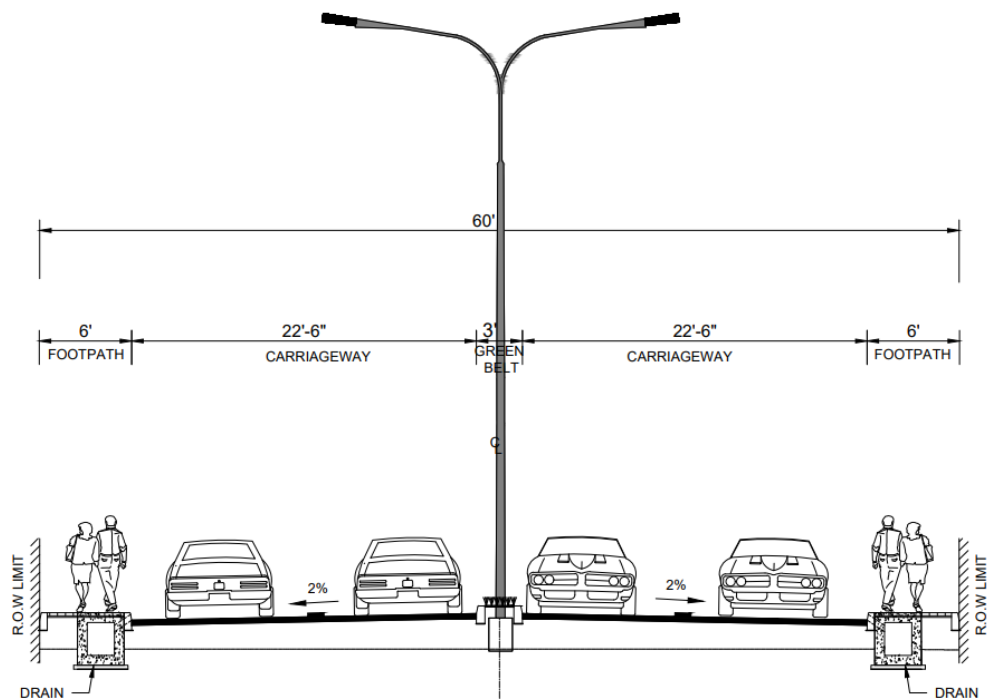
TYPICAL CROSS SECTION (120')
 ARTERIAL ROADS
 SPEED=60 Km/h

Figure 15-8: Typical Cross Section (120') for arterial roads

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

The collector roads planned for the proposed zones are designed with a right-of-way (ROW) width of 60 feet. This width is intended to accommodate the expected growth in traffic due to both existing and new developments. It's recommended to introduce these roads gradually, in sync with the development of nearby zones. These proposed collector roads are shown in Figure 15-4.

Several of these roads are strategically chosen by connecting isolated minor roads and pathways. This method not only creates connections to the new zones but also integrates them into the existing urban road network, effectively turning them into new main roads. Moreover, this effort aims to ease traffic congestion in current areas by redirecting traffic to other routes. The exact alignment of these proposed roads will be determined by feasibility studies. The total length of these newly proposed collector roads is approximately 40.42 kilometers. The proposed typical cross-section for the collector road is illustrated in Figure 15-4.



TYPICAL CROSS SECTION 60 FT WIDE ROAD

Figure 15-9: Typical Cross Section (60') for collector roads

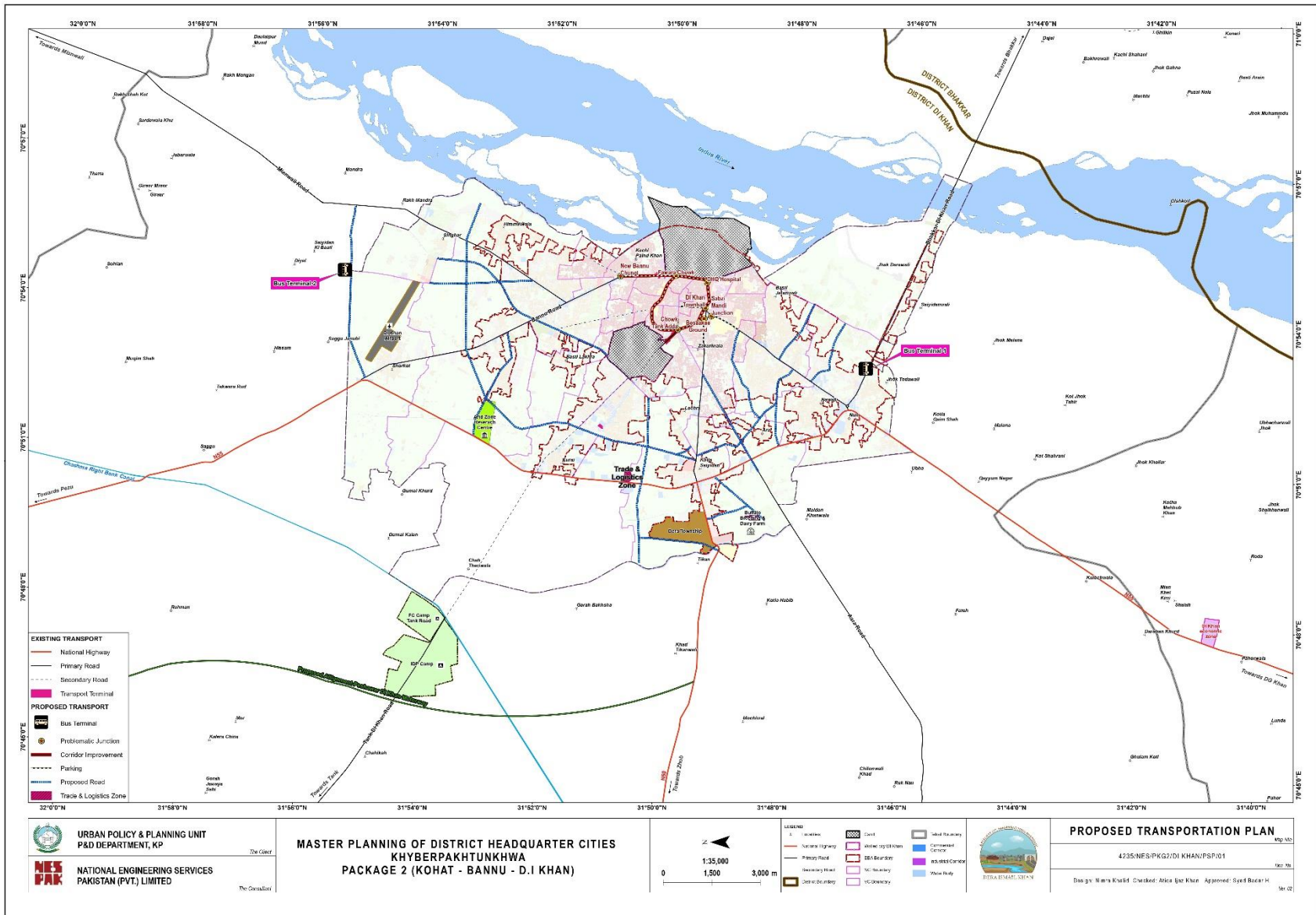


Figure 15-10: Proposed Transportation Plan DI Khan

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;

- River Front Park
- Botanical Garden/Wildlife Park
- River Front Water Park
- Sports & 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;

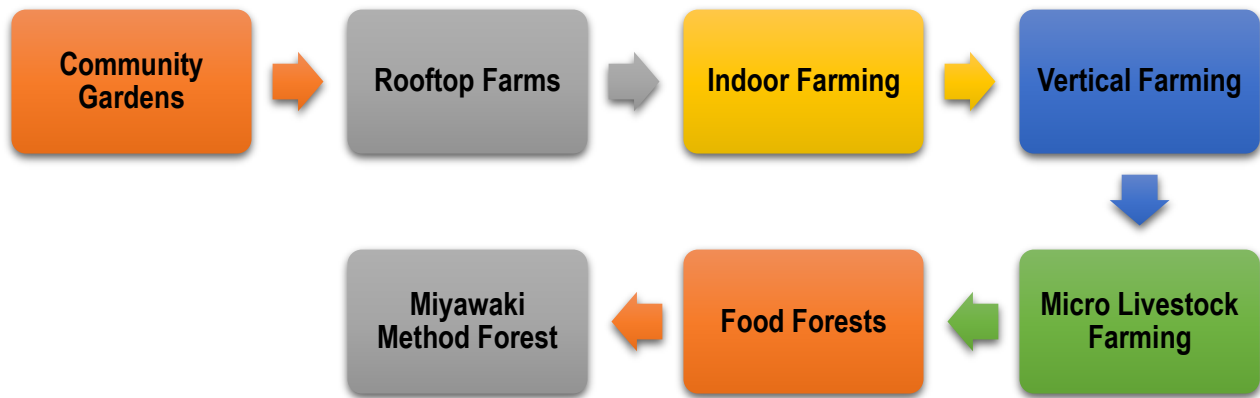


Figure 15-11: Urban Farming Methods

[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.

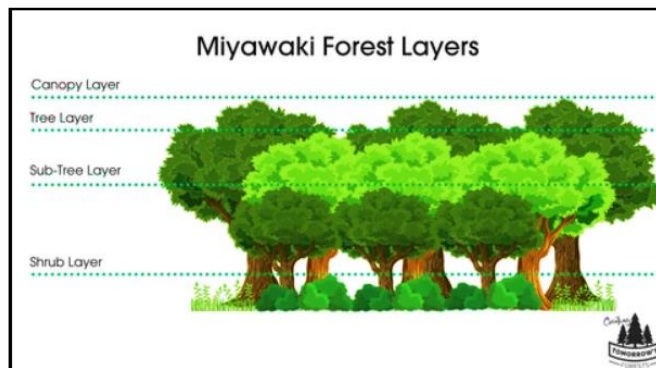


Figure 15-12: Miyawaki Forest Layers

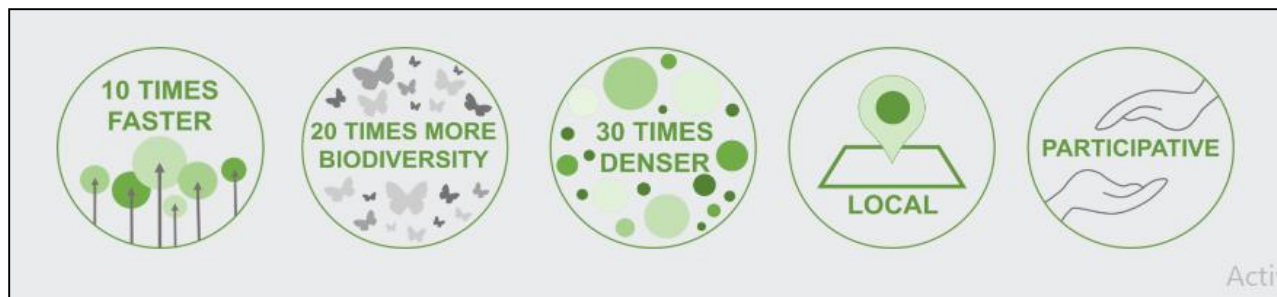


Figure 15-13: Features of Miyawaki Forest

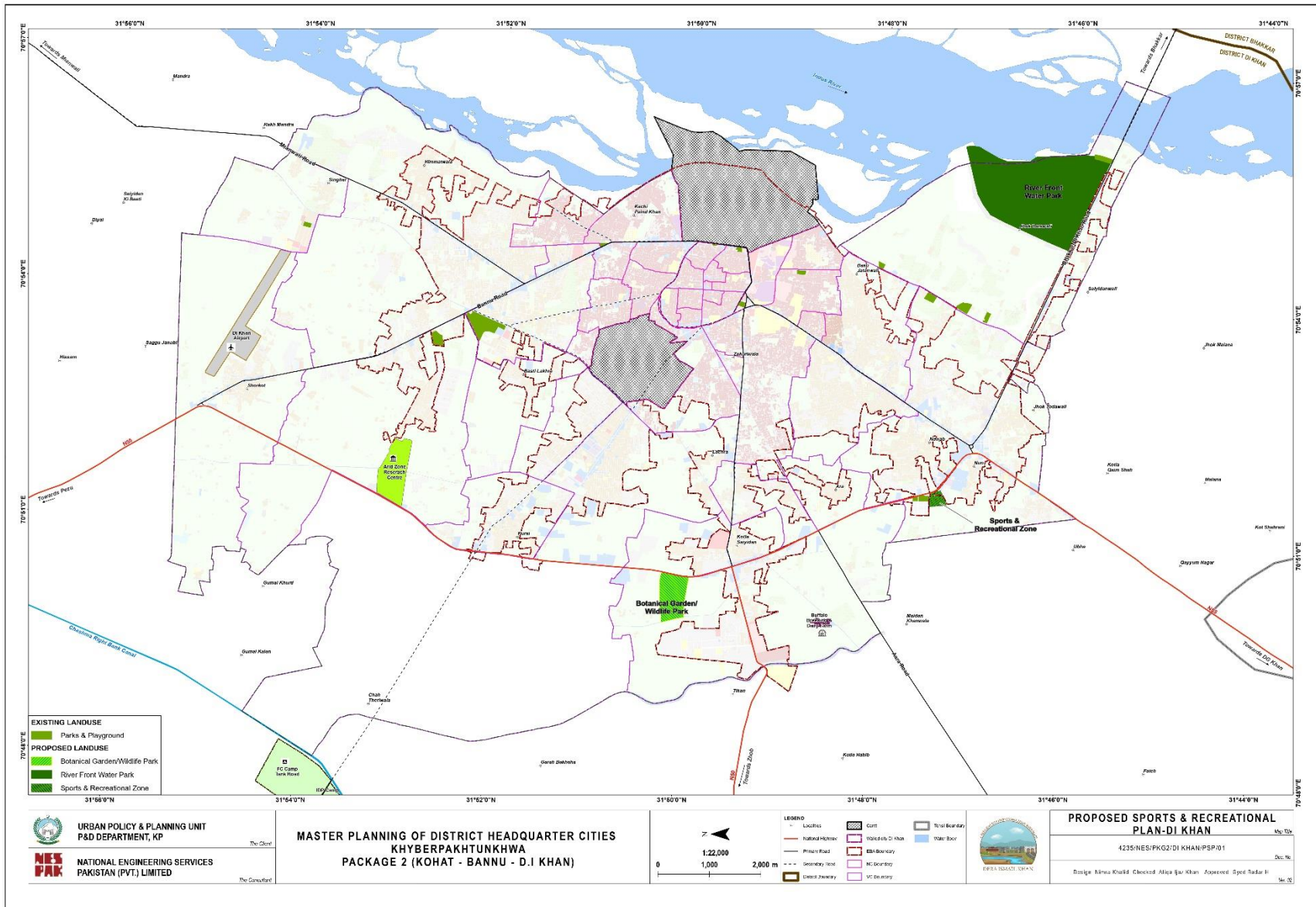


Figure 15-14: Proposed Park & Recreational Map DI Khan



15.1.6. 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;

- Agriculture Zone
- Orchard Reserve
- Urban Farms

Total area of agriculture zone is 9682 acres which is located in the future VC's of DI Khan. Orchard reserve is 36 acres. Urban Farms are 5623 acres that are located in the future NC's.

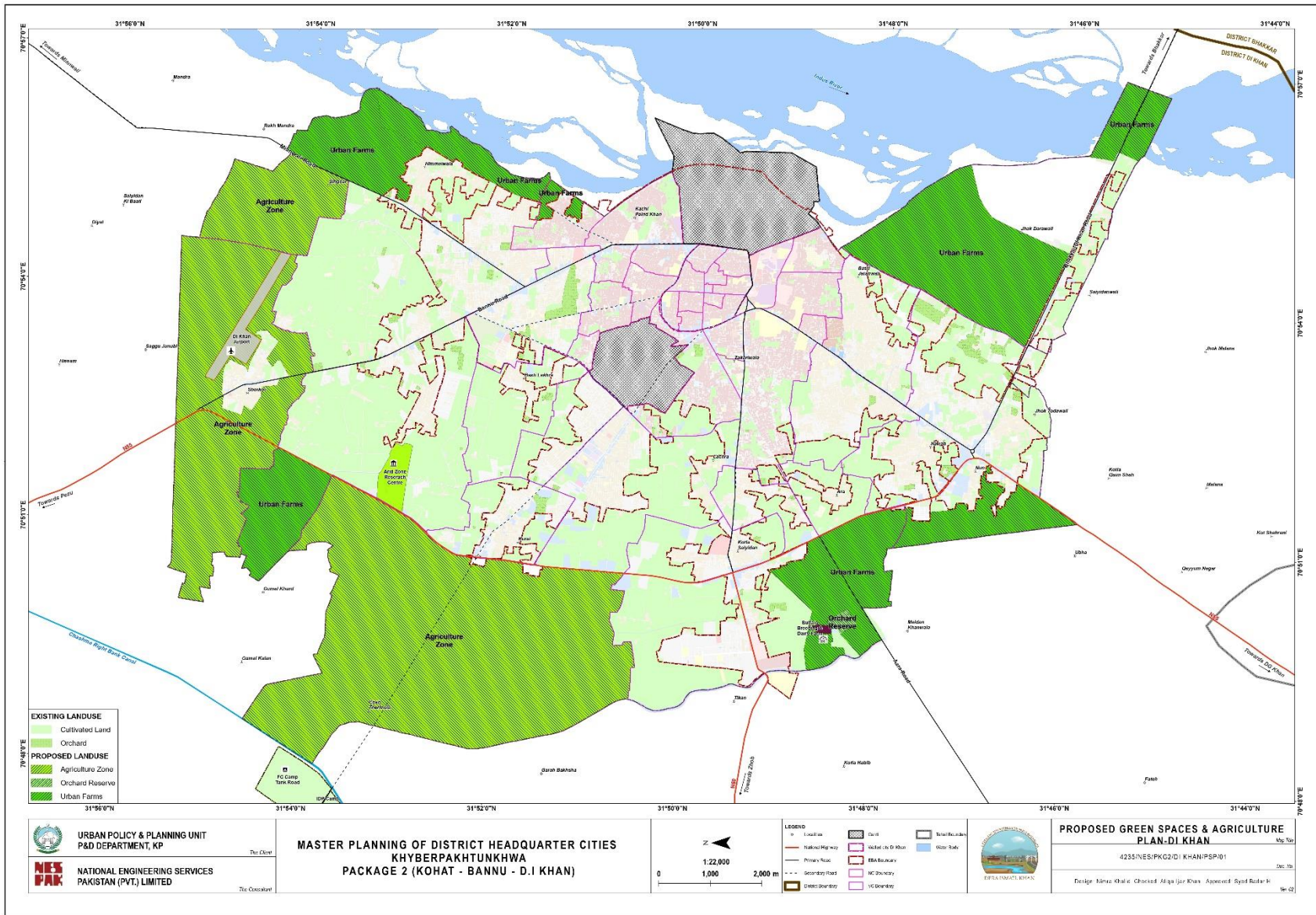


Figure 15-15: Proposed Green Spaces and Agriculture Map DI Khan

15.1.7. 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.

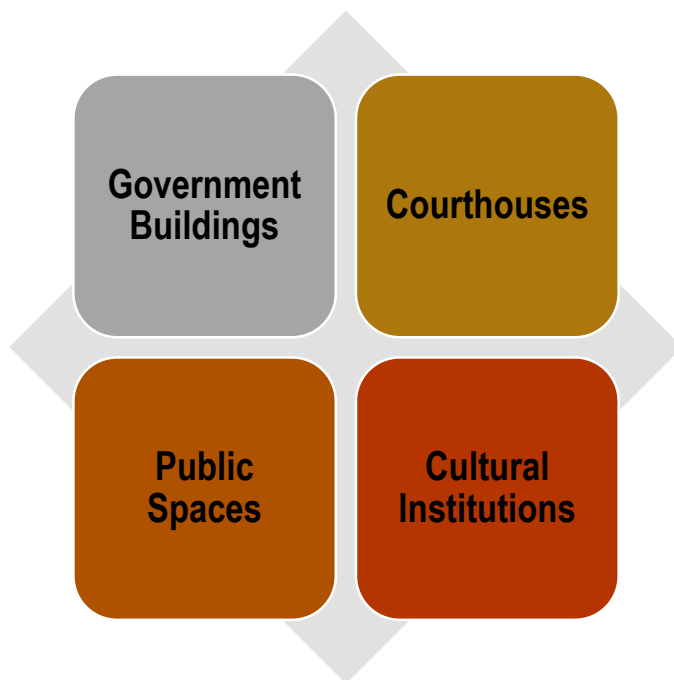


Figure 15-16: Key features of a civic zone

15.1.8. 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



15.1.9. 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 DI Khan consists of a masjid of 22 acres and graveyard proposed on the Southern side of the city comprising an area of 88 acres.

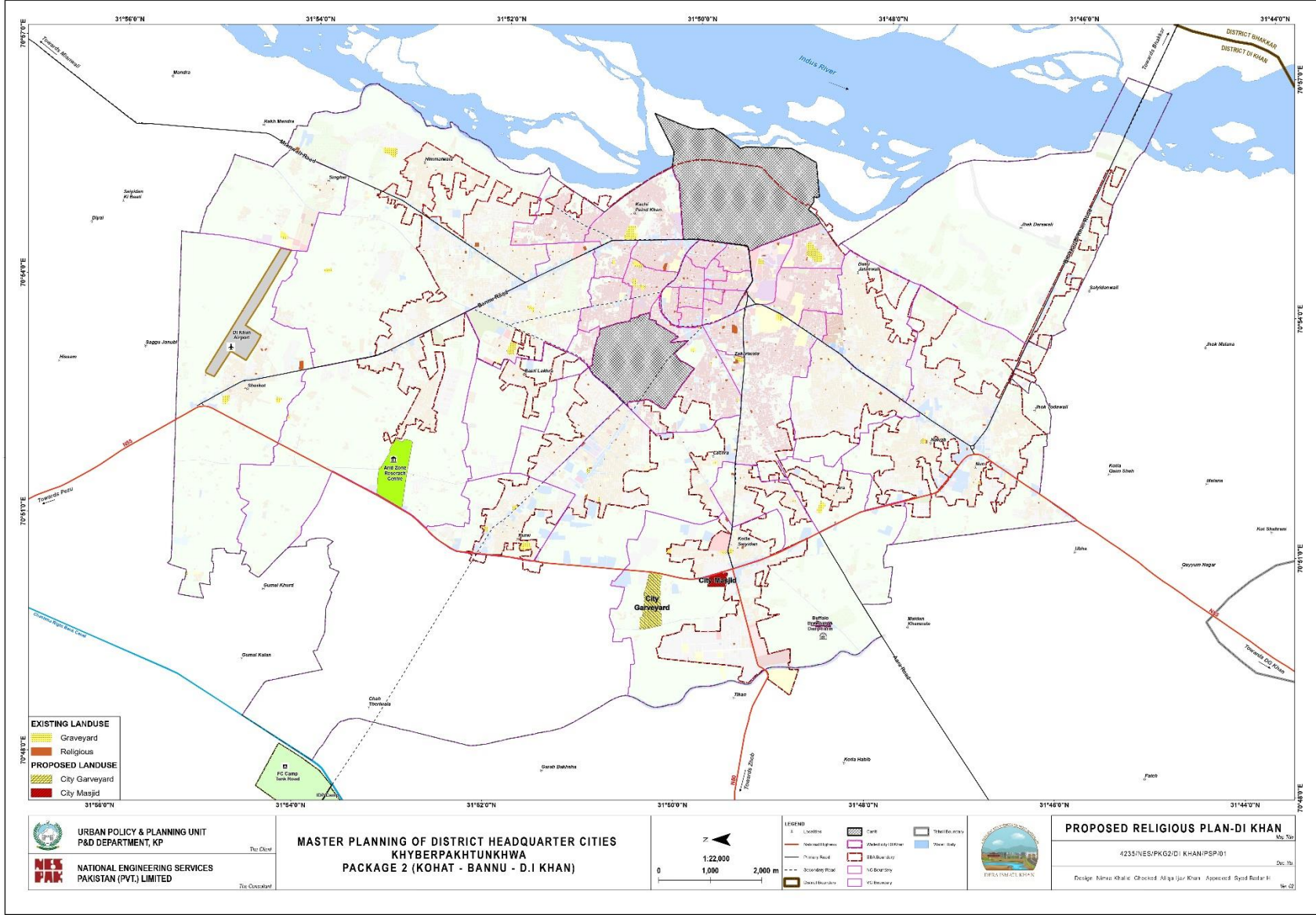


Figure 15-19: Proposed Religious Area Map of DI Khan

15.1.10. Proposed Utilities Map

1.1.1.1. Water Supply System

Groundwater is being used as main water supply source in DI Khan. Currently, no water is supplied to city from WSSC network as all tube wells not connected to any network. Within the Municipal limits most of households have also installed their own pumps to cater for water use needs. There are also four (04) overhead reservoirs (OHRs) in the city, which are non-functional. After field visits of the OHRs by the consultant team, it is concluded that all the reservoirs require maintenance i.e., plastering, finishing of structures, replacement of delivery and rising mains and doors installation. The connection of OHR with the distribution system and tube wells needs to be reinstated by installation of new connecting pipelines. Most of DI Khan growth is occurring in the areas outside the old municipal limit. The source of water outside the city boundary is also tube wells and most water supply schemes installed and operated by the Public Health Engineering Department (PHED) DI Khan.

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 DI Khan may be fulfilled through different surface water sources near the Project area. Prominent surface water sources for water supply to the city is Indus 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)	= 570,873 Persons
Per Capita Water demand	= 35 gpcd
Total domestic average demand	= 19,980,556 Gallons/day = 19.98 MGD
Projected Population (year 2043)	= 1,249,123 Persons
Per Capita Water demand	= 35 gpcd
Total domestic average demand	= 43,719,301 Gallons/day = 43.72 MGD
Total maximum day demand	= 65,578,951 Gallons/day = 65.58 MGD



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

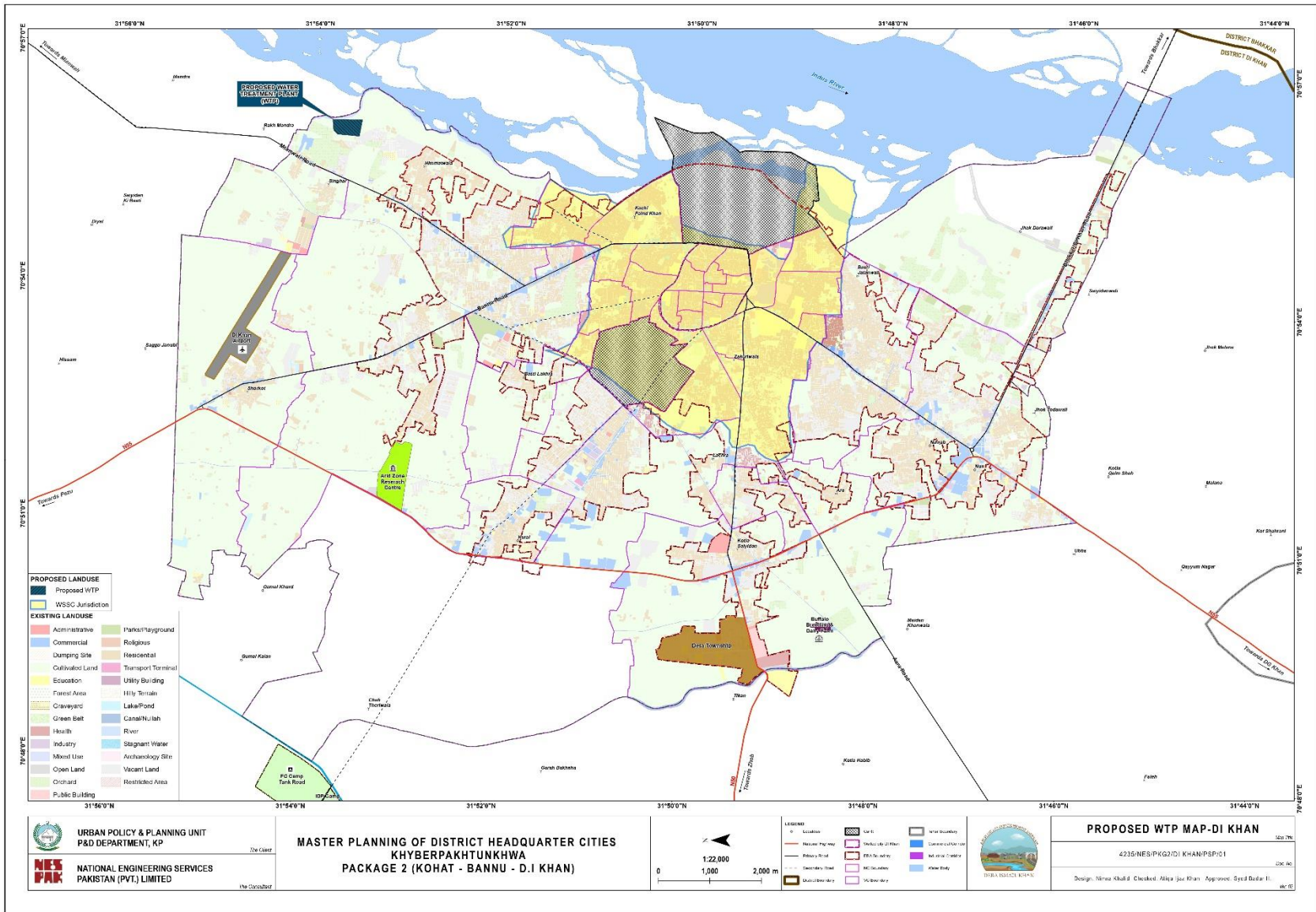


Figure 15-20: Proposed WTP Map DI Khan

15.1.10.1. Sewerage System

Partially Combined wastewater collection system exists in DI Khan city which is served through mainly combination of sewer pipes, open drains and covered drains. The drains and sewers in DI Khan city are not in good condition and blocked at many places. In DI Khan city, due to constraint of resources sewerage facilities have not been developed in a planned way. Therefore, sewerage problems went on intensifying day by day resulting in overflowing of sewage and drainage water in the contributing catchment areas, in addition to choking of sewers which is causing unhygienic conditions in the city. Wastewater ponding can also be seen in some areas. This situation necessitates improvement in the existing sewerage system as well as enhancement of the sewerage coverage in un-served areas. The description of the existing wastewater collection system in DI Khan 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 stormwater generated in the developed area.

Presently, the sewerage system of DI Khan city does not have any arrangement for ultimate treatment of raw sewage. A wastewater treatment plant has been proposed at Mouza Mallana which will cater the flow of four major Nullahs of city but its construction is halted due to unavailability of funds. Proper sewerage system shall be proposed for DI Khan. 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. Stormwater 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)	= 1,249,123 Persons
Per Capita Sewage generation	= 85% of water consumption (35 gpcd)
Total average Sewage Generation	= 37,161,406 Gallons/day = 37.16 MGD

Sewage Treatment Plant (STP)

Sewage treatment is a crucial process that aims to remove contaminants from wastewater, making it suitable for discharge into the environment or for reuse. The implementation of a sewage treatment plant (STP) scheme 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 depend on sewage treatment technology and number of treatment plant to be installed.

STP site location with a low elevation level shall be chosen. 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 will significantly improve the quality of water discharged into the environment, helping to prevent water pollution and protect the surrounding ecosystems. The total land requirement for STP is estimated to be around 45 acres. Proposed Sewerage treatment plant shows in the figure 2.

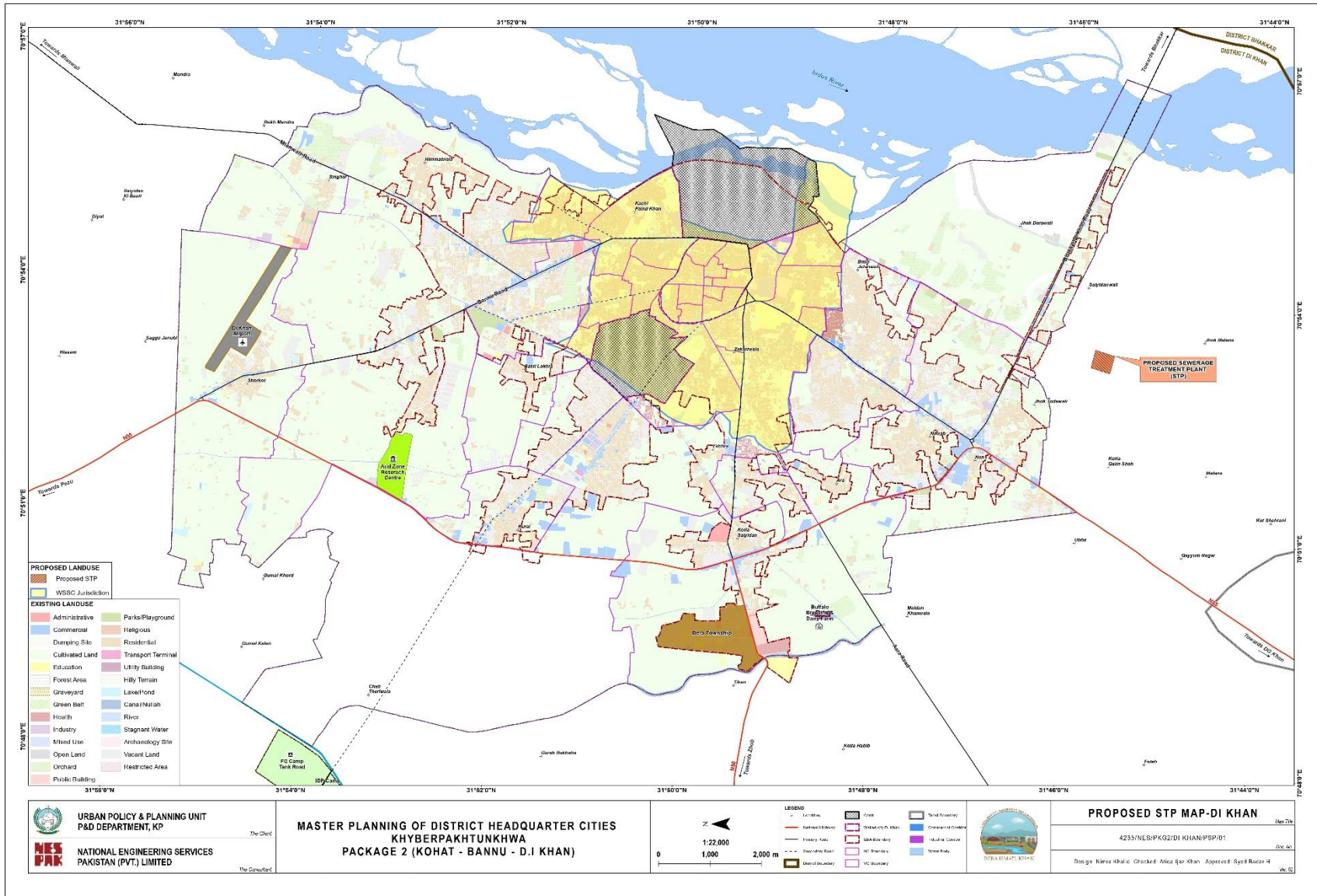


Figure 15-21: Proposed STP Map DI Khan

15.1.10.2. Solid Waste Management System

Solid waste is being produced since the inception of human history. Solid waste production has increased over time due to population growth, expanding human activities, and increased resource utilization. Solid waste management poses a significant challenge, especially for developing countries that often face resource shortages and have inadequate institutional setups to handle waste effectively.

Solid Waste Management services are mainly provided by Water & Sanitation Services Company (WSSC). DI Khan city did not own a permanent dumping/ sanitary landfill site. WSSC is temporarily dumping all solid waste of DI Khan city at Darband Road. 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 to establish a permanent sanitary landfill site. The total production of solid waste upto year 2043 will be 3,727,513 Ton by assuming generation rate 0.5-0.6 kg/c/d. The total land requirement for landfill site is estimated to be around 71 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 will provide a long-term solution for managing solid waste effectively, protecting public health and minimizing environmental pollution caused by improper waste disposal. Proposed Land fill site shows in the figure.

15.1.11. Proposed Center City Map of DI Khan

Proposed center city map of DI Khan 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

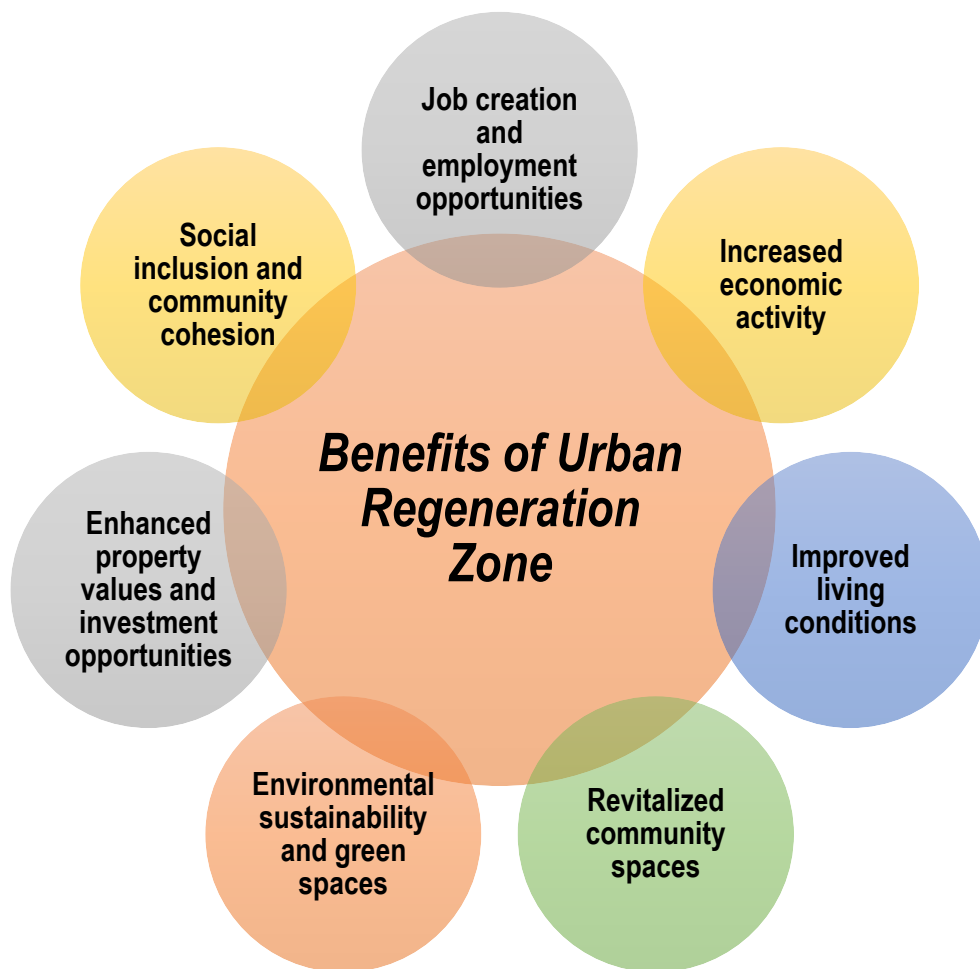


Figure 15-23: Benefits of Urban Regeneration Zone



16. Planning Standards and Zoning Calculations

This plan consist of the following area statements;

16.1. Area Requirement for Zones

Land Requirements for DI Khan City					
Sr No.	Landuse Type	NRM Standard	Total Requirements for 1144235		
			Nos	Area / Unit (Kanal)	Total Required Area
RELIGIOUS					
	Central Mosque	1 / 100,000 pop	11	12	17.16
	Grand Mosque	1 / 400,000	3	50	17.88
	Eid Gah	1/ 100000			
	Graveyard	2-3%			500
Education					
	Inter College (Boys)	1 / 2 Lac pop	6	8.5	48.63
	Inter College (Girls)	1 / 2 Lac pop	6	5.6	32.04
	Degree College (Male)	1 / 2.5 Lacs	5	10	45.77
	Degree College (Female)	1/ 3.5 lacs	3	7.4	24.19
	Polytechnical College		2	7.4	14.8
	Vocational Training Institute		2	7.4	14.8
	University (General / Spec.)				
	Youth Hostels		4	1	4
Sports & Recreations (8-10%)					
	Community Level Park	1 / 100,000 pop (4-5 Hectare)	11	9.88	113.0504
		(0.04 -0.05 Hec. / 1000 pop)			
	City Level Park	1/ 400000 pop (12-15 Hec)	3	29.64	84.78781
		(0.03 - 0.037 Hec / 1000 pop)			
	Community Level Sports Ground	1 / 100,000 pop (2.14 Hec)	11	5.29	60.48
		(separate fields for cricket, hockey, football & other games)			
	City Stadium / Sports Complex	1 / 300,000 pop			
	Cricket	1 / 300,000 pop (2 Hec) + Parking	4	6.18	23.55
	Hockey	1 / 200,000 pop (1.15 Hec) + Parking	6	3.71	21.20
	Football	1 / 200,000 pop (1.4 Hec) + Parking	6	3.71	21.20

Health Facilities					
4	Primary Care				
	Mother and child health centers (MCH) upto 25 Bed	1/100000 pop	11	2.4 Acres	27.46164
	Tertiary & Secondary Care				
	Category B Hospital (210 Beds)	1 for every 500,000 pop	2	4	9.15388
	Category C Hospital (110 Beds)	1 for every 300,000 pop	4	3	11.44235
	Category D Hospital (40 Beds)	1 for every 100,000 pop	11	2	22.8847
	Private Health Facilities				
Commercial Facilities					
	Coommunity Level Commercial Centre (100000)	125-150 Shops	11	2.5	28.60588
	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
Civic Facilities					
	Municipal Secretariat	3 to 5 Hectare	1	37.05	37.05
	DHQ Offices	10 Hectare			
	Divisional HQ Office	15 Hectare			
	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.			
Industry					
7	50 Industrial Workers per Acre				61

16.2. Household Income Details for Housing Affordability in DI Khan District

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.

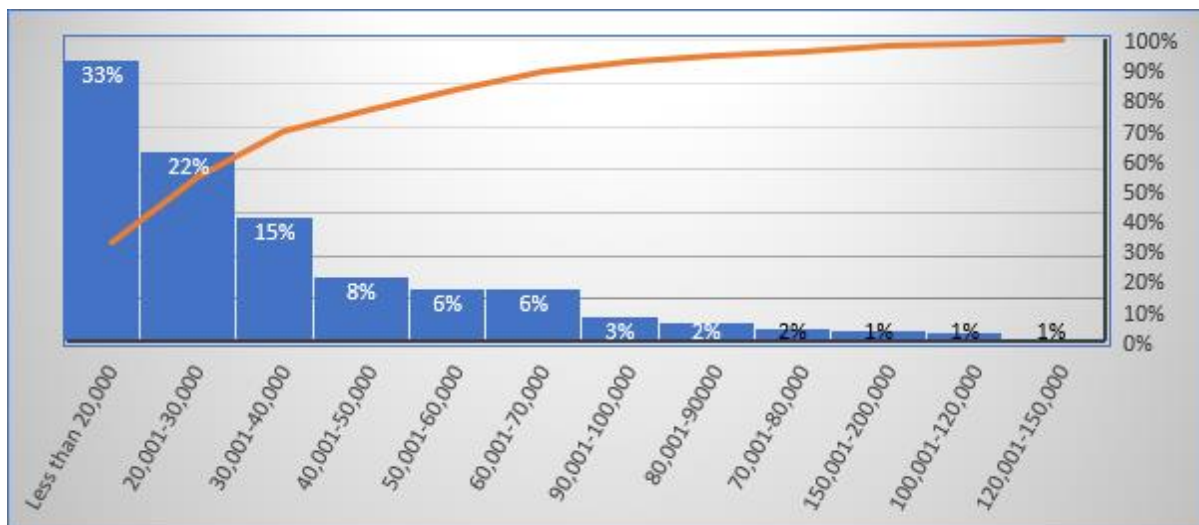


Figure 16-1: Monthly Household Income DI Khan

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.

Land Requirements in Residential Sector of DI KhanCity					
	Population (2022-2042)	Low Income 45%	Middle Income 45%	High Income 10%	TOTAL
	1144235	514906	514906	114424	
Additional Population	691941	311373	311373	69194	
HH Size MC-DI Khan		6.58	6.58	6.58	
HH Size Urban-DI Khan		6.54	6.54	6.54	
HH Size DI KhanTehsil		6.54	6.54	6.54	
Houses Required @6.54		47611	47611	10580	105801
Existing Housing Stock of DI Khan City		446089			
Replacement Demand @ 25 % of existing Stock including Overcrowding, Old and Katcha Houses		50185	50185	11152	111522
Required Housing Stock of DI Khan City-2042		334567			
Future Replacement Demand @ 15 % of existing Stock		22583	22583	5019	50185
Existing Rural Housing Backlog		1451			
Total Rural Housing in Project Area		20741			
Future Replacement Demand @ 5% of existing Rural Housing Stock		1037			



Total Future Housing Demand		269997			
		49754	49754	11057	110565
Land Requirement upto 2042		5-Marla	10-Marla	1-Kanal	
Kanals		10289.29	20578.58	9146.03	40013.90
Add. Of Amenties 120% (including all neighborhood level amenities)		12347.15	24694.29	10975.24	48016.68
Total of Land Requirement					
Kanals		22636.43	45272.87	20121.27	88030.57
Acres		2829.6	5659.1	2515.2	11003.82
Sq Km.		11.5	22.9	10.2	44.55



Table 16-1: 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	5822.84	47.6	9365	54%	9365	40%	40-45%
2	Commercial	1074.96	8.8	637	4%	1711.96	7%	2-3%
3	Public Buildings	983.8	8.0	72	0.4%	1055.8	5%	3-5%
4	Industry	53.99	0.4	152	1%	205.99	1%	2-10%
5	Parks & Green Spaces	975.37	8.0	6658	38%	7633.37	33%	3-5%
6	Graveyard	128.99	1.1	88	0.5%	216.99	1%	2-3%
7	Water Bodies (Canals/Lake etc)	1257.4	10.3	-	0	1257.4	3%	12-25%
8	Roads	1932.2	15.8	362.46	0.02	2294.66	10%	15-20%
	TOTAL BUILT UP (A)	12229.55	100%	17334.46	100%	23741.17	100%	
	Built Up Area (A) Percentage of Total Area	12229.55	91%	16972	62%	23378.71	67%	
OTHERS								
9	Water Bodies (Canals/Lake etc)	1270.73	9%	10337	38%	11607.73	33%	12-25%
10	Restricted Area (Cantt / Army Land)							
11	Agriculture							
12	Orchards							
13	Vacant							
14	Open Lands							
15	Future Reserve							
16	Water Supply & Utilities							
	TOTAL NON BUILT UP (B)	1270.73	9%	10337	38%	11607.73	33%	
	TOTAL PROJECT BOUNDARY AREA (A+B)	13500.28	100%	27309	100%	34986.44	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 DI Khan.

- 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:

- DI Khan 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

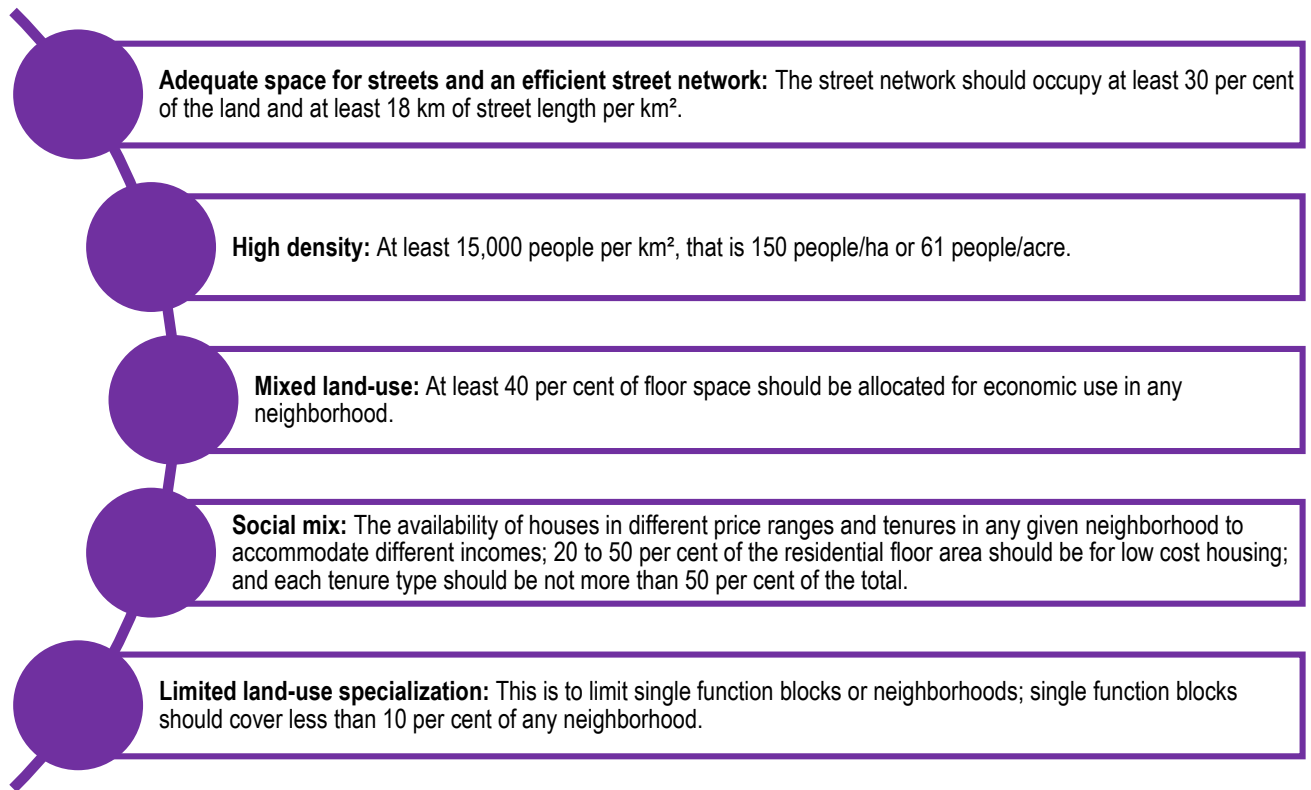
- Address traffic flow and circulation within the industrial zone.
- Consider the impact of industrial traffic on surrounding road networks and implement measures to manage congestion.

- 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:



The Five Principles can be applied in the following contexts:

- 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"> • Support high quality infill • Redevelop greenfield and brownfields • Develop transit-oriented neighborhoods
2.	Mixed use, offering easy access to amenities, jobs, and services	<ul style="list-style-type: none"> • Mix land uses
3.	Diverse residents living in diverse housing	<ul style="list-style-type: none"> • Mix housing types
4	Walking, cycling, transit, and road networks linked to the city and region	<ul style="list-style-type: none"> • Integrate circulation networks • Introduce transit-oriented development (TOD)
5	Multi-functional streets that support social and environmental functions as well as multi-modal transportation	<ul style="list-style-type: none"> • Design complete streets • Reduce parking
6	An accessible network of green space that functions well ecologically and supports recreation and food production	<ul style="list-style-type: none"> • Create integrated green space networks • Cluster development • Encourage urban agriculture
7	A safe, social, and attractive environment	<ul style="list-style-type: none"> • Strengthen social and cultural networks • Incorporate great public meeting spaces
8	A unique identity, referenced within the regional identity	<ul style="list-style-type: none"> • Use place making approaches
9	Energy efficient buildings and renewable energy systems	<ul style="list-style-type: none"> • Develop district and renewable energy systems • Optimize solar orientation and access • Use eco-industrial approaches
10	Water-efficient buildings and landscapes	<ul style="list-style-type: none"> • Use water-efficient technology • Use low-impact storm water management techniques

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

18. Improvement of the Current Road network

18.1. General

The current transportation system in DI Khan is not being used effectively and is not enough for future growth. The city's roads face extra pressure due to unplanned development and uncontrolled land usage, leading to heavy traffic. With limited reliable and safe public transport options, people heavily rely on their vehicles, further adding to the traffic. This creates a big gap between the demand for better roads and what's available, causing traffic jams. As a result, the city faces increased social and economic challenges. Additionally, reckless driving behavior worsens congestion, leading to accidents and other issues.

18.2. Issues Related to Transportation

Traffic Congestion Issues:

- Circular Road is highly congested due to its location in the main CBD of DI Khan.
- Congestion near bazars within the city center and on Sabzi mandi.
- Illegal parking and encroachments contribute to congestion.

Intersections and Traffic Control:

- All intersections are currently unsignalized
- Traffic congestion and safety compromised at intersections.

Traffic Management:

- Presence of Qingqis causing congestion and safety issues.
- Bus & freight terminals located within the city are causing hindrance to traffic operations on circular road.

Parking Management and Enforcement:

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

Public Transportation Issues:

- Lack of properly planned standardized intra-city public transport.
- Qingqis operate without a route permit and fitness certificate, causing safety concerns.

Traffic Safety Concerns:

- The arterials and circular roads suffer from a lack of traffic signs.
- There is a disregard for traffic regulations, notably on the Indus bypass.
- The intra-city public transport (Hi-ace and Qingqis) is unsafe and unreliable.

Land Use and Building Control:

- Lack of planned zones and careful future planning.

Pedestrian Movement Issues:

- There are no on-road or grade-separated crossings for pedestrians in the city.

18.3. Improvement of important roads

1. Circular road
2. Bannu Road
3. Portion of Tank Road

The mentioned corridors need enhancements to meet both current and future traffic demands. These roads, as illustrated in Figure 1, require access restrictions or channelization in specific areas, like markets, to ease congestion during peak hours. This strategy involves limiting certain types of vehicles, such as delivery trucks, from entering during designated times, especially on circular roads.

Improving traffic management in market areas entails providing parking plazas and restricting vehicle access to market streets using barricades and warning signs. Introducing park-and-ride services can further reduce car entries and assist customers. Moreover, commercial and delivery vehicles may face entry constraints, only allowed for product deliveries during specific periods, while traffic flow can be optimized by implementing one-way directions where space permits. This approach can effectively prevent conflicts and minimize traffic congestion with proper traffic circulation.

As Circular Road experiences significant congestion as the outer periphery of DI Khan's central business district (CBD), widening it is not a viable solution. However, alternative measures can be implemented for roads in the CBD area. These include implementing traffic management measures such as restricting encroachments and on-road parking along Circular Road. Additionally, careful future planning is necessary for developing new zones to reduce trip attraction.

In highly congested areas like Sabzi Mandi near Town Hall and other main bazars such as Ghalla Mandi and Gomal Market within the walled city, converting them into car-free areas with only pedestrian access is recommended. This transition can be carried out systematically after providing proper car parking areas at strategic locations near the bazars.

18.4. Improvement of Intersections:

All intersections in DI Khan are without any proper traffic control devices; this results in traffic flow congestion and compromises the safety of pedestrians. It is required to regulate the traffic movements at intersections by deploying geometric improvements and a proper traffic signaling system with proper phasing and timing at critical times of the day. A graphical representation of these intersections is shown in Figure 1. Following are the intersections that require geometric improvement as these intersections are failing to fulfill the demand and capacity.

- Tank Adda
- Mission Mor
- Sabzi Mandi
- Fawara Chowk
- DHQ Hospital
- Town hall Junction

- Bannu Chunghee

Here are the key solutions aimed at addressing congestion problems at intersections, which will not only accommodate future traffic demand but also improve traffic flow:

- Redesigning critical intersections to include dedicated left slip and right turn lanes can enhance traffic flow and reduce congestion.
- Implementing grade separation at highly congested intersections can alleviate traffic congestion by separating conflicting traffic streams.
- Removing illegal parking of both public transport and private vehicles near intersections is essential to maintain smooth traffic flow.
- Installing advanced traffic signals at intersections can optimize traffic flow by efficiently managing the movement of vehicles.
- Providing proper pedestrian facilities at signalized and un-signalized intersections ensures safe crossing for pedestrians and minimizes disruptions to vehicular traffic.
- Installing appropriate traffic signage, safety devices, lane markings, and road furniture enhances visibility and organization at intersections, contributing to improved traffic flow and safety.

18.5. Improvement of Traffic Management:

The abundance of Qingqis in DI Khan City contributes to congestion issues. Their unregulated movements and frequent stops on roads for passenger pick-up and drop-off pose safety hazards and worsen traffic congestion.

Currently, all intersections in DI Khan City lack operational traffic signals, resulting in a deficiency in traffic management measures. To alleviate congestion at these intersections, the installation of adaptive traffic signals is recommended at select locations where peak-hour delays occur. Adaptive traffic signals can automatically adjust signal timings based on real-time traffic flow, thereby improving traffic operation and reducing congestion.

Furthermore, it is imperative to establish integrated security surveillance systems similar to those in Lahore and Islamabad. These systems can facilitate intelligent traffic management by controlling traffic signals based on real-time data. They also enhance emergency response capabilities. In the event of power outages, traffic police should manually manage traffic at congested intersections. Additionally, proper signage, markings, and priority rules should be implemented at intersections. These measures collectively aim to enhance traffic flow, reduce congestion, and improve overall safety in DI Khan City.

18.6. Parking Management and Enforcement

To address the severe issues of on-street parking in various areas of DI Khan City, immediate action is needed to resolve parking problems. Constructing proper parking areas near busy commercial zones is essential. Some specific corridors have been identified as hotspots for on-road parking, including:

- Whole Circular Road
- Bannu Road
- Multan Road
- Darban Road

- Pawanda Bazar Road
- Commissioner Bazar Road

These corridors experience high levels of on-street parking, leading to congestion and inconvenience for both pedestrians and motorists. Implementing solutions such as designated parking zones, multi-level parking structures, and enforcement of parking regulations can help alleviate the parking issues in these areas. Additionally, promoting alternative modes of transportation and providing incentives for using public transit can reduce reliance on on-street parking.

The issuance of NOCs for construction by TMA (Town Municipal Administration) without considering the necessary parking spaces has resulted in numerous schools, hospitals, and commercial plazas being situated within the heart of the city without adequate parking facilities. Moreover, Bazar's shop owners have illegally extended shops on the ROW of roads causing bottlenecks. This exacerbates parking issues, particularly in busy downtown areas, leading to congestion and traffic flow disruptions. To address this problem, it is imperative to enforce strict requirements for issuing NOCs to plazas and all commercial developments. Clear and enforced parking regulations should be established for new developments, including Traffic Impact Assessments (TIAs) to determine parking space requirements. Zoning regulations can play a crucial role in designating specific areas for parking and discouraging encroachment on public spaces. By implementing these measures, authorities can mitigate parking-related congestion and ensure smoother traffic flow in downtown areas.

It is suggested to construct the current parking areas and install modern parking systems near commercial structures. It's important to establish a fair fee system for parking, tailored to different types of vehicles. Enforcing these regulations will be essential, requiring action from 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 the removal of illegal parking.

A successful modal shift from private to public transport would require the 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.

18.7. Improvement of Public Transportation

Currently, DI Khan City lacks properly organized intra-city public transport options. Qingqis and hi-ace vans serve as the primary local transportation, operating without regulation or permits. Their unregulated operation, including stopping on roads for passenger pickup and drop-off, contributes to traffic congestion and safety concerns throughout the city.

To alleviate congestion and improve transportation, implementing a comprehensive bus service covering key routes like Bannu Road and Circular Road is recommended. Initially, a conventional bus system can be introduced, with plans for an integrated public transport system in the long term. To ensure sustainability, existing public transport modes should be restricted, acting as feeder services to the new bus system. This approach aims to reduce the number of rickshaws and Qingqis on major roads.

Feeder facilities at terminal locations will facilitate passenger transfers, and integrating the bus service with existing para-transit modes will improve accessibility and reduce transfer issues. Park-and-ride spaces near bus stops and para-transit terminals can encourage the use of public transportation and reduce private vehicle trips, promoting a more sustainable and eco-friendly transportation system for DI Khan City.

According to public opinion, the most important measure to be adopted for the improvement of public transport is planning a bus system that will be accessible to major routes. The highlighted flaws of existing public transport are route system, frequency, punctuality, speed, and unavailability of waiting areas near bus bays. Regulating para-transit vehicles is essential, including registering them and issuing route permits. Once bus services are established, the entry of these vehicles may be restricted on the main arteries. In the future, Qingqis should be discouraged even as feeder services, while HiAce wagons with good fitness and well-managed feeder routes should be promoted as alternatives to rickshaws and Qingqis. The TMA authority should regulate fitness certificates for public safety.

HiAce and coaster busses are also operating on intercity and inter-district routes. These are bound to get fitness certificates from the Regional Transport Authority (RTA). Cantt Executive Stand is a C-class stand but its location is causing problems of traffic so this stand needs to be shifted outside the city. Similarly, Tank Adda which is a TMA-controlled General Bus Stand (GBS) is located on the start of Tank DI Khan Road and this is causing major traffic problems on nearby intersections. New Khan Adda which is an illegal stand needs to be shifted outside as it is situated in narrow street without proper space for maneuvering of busses. There are some other Bus terminals on eastern Circular Road and the start of Bannu Road for example Daewoo Terminal, Karachi Adda, and Rahman Terminal. These bus terminals are located right on the main roads of the city. Especially Rahman Terminal is causing problems in traffic as it has no proper parking spaces for passenger vehicles nor any space for bus entry and exit. So, all such problematic terminals should be moved out of the city to resolve traffic management issues. Displaced locations of bus terminals are shown in Figure 18-1. These relocations will assist in the reduction of congestion in the city.

18.8. Improvement of Traffic Safety:

The occurrence of accidents is generally low within the DI Khan city area. It is reported that accidents mostly happen on the Indus Highway. Speed limits should also be imposed on national highways and urban routes. Pedestrian facilities should be provided near educational institutes and sabzi mandi. Speed limits should also be imposed on main roads as a crash measure. It is essential to install proper regulatory, informative, and warning signs along every arterial and collector road. Emphasizing the importance of road signage to the general public is crucial to raising awareness about road safety and effective traffic management. Lane markings should be visible to ensure smooth traffic flow, organization, and vehicle discipline. Enforcing traffic regulations is necessary for safe and efficient traffic operations.

Public awareness campaigns and signage highlighting the consequences of illegal parking can assist traffic police in addressing this issue on main arterial roads. By educating the public about the importance of adhering to traffic regulations and respecting road signage, we can promote safer roads and more efficient traffic management. Available intra-city public transport in DI Khan (Qingqis) does not meet any standard of safety and reliability and is generally unsafe for local commuting. The uncontrolled and disorganized spread

of Qingqis generates many complications for traffic safety. Furthermore, sudden on-road stoppages for passenger pickup and drop-off increase the vulnerability of traffic accidents. This unethical behavior of drivers is the main concern of traffic safety. This can be improved by awareness & strict enforcement of rules.

18.9. Land Use Control Building Control

Prior to any construction of commercial areas or buildings in the city, it is crucial to conduct a comprehensive Traffic Impact Assessment (TIA) study under the oversight of the regulatory authority. This study should be made mandatory for all new development projects, and a No Objection Certificate (NOC) should not be granted without its completion. The TIA study is essential to anticipate and mitigate potential traffic congestion and parking problems that may arise due to new developments. This ensures smooth traffic flow and reduces strain on existing infrastructure.

Parking is another significant issue, particularly on main roads, which can be addressed by providing adequate parking space for each commercial building. The TIA should encompass Traffic Impact studies, parking assessments, and traffic circulation plans to comprehensively address the impact of new developments on the city's traffic and infrastructure.

18.10. Improvement of Pedestrian Movement:

Pedestrian safety is a concern on both the main arterial and collector roads of DI Khan. Currently, there are no facilities for pedestrians to safely cross these roads, whether through on-road crossings or grade-separated options. Without proper signals, pedestrians face challenges crossing roads, especially at intersections. It's crucial to address this issue by constructing pedestrian bridges or underpasses in busy commercial areas, particularly near schools, hospitals, and markets.

Conducting a pedestrian safety study can help identify specific locations where grade-separated pedestrian crossings are necessary. Additionally, at-grade signalized or un-signalized pedestrian crosswalks should be provided based on the needs and characteristics of the roads. Enforcement of regulations to prevent road damage and penalties for non-compliance should also be implemented to ensure pedestrian safety.

18.11. General Issues and Recommendations

- One of the problems of D.I Khan is sewerage disposal. New colonies should take into account the level of sewerage and nearby roads so that effective drainage can be ensured and new sewerage lines don't have to be laid all the time by dismantling roads after their construction TMA should give NOCs to societies with consideration of Sewerage levels.
- Permits and fitness certificates should exclusively be issued by the designated department of DI Khan. This measure will enhance passenger safety and promote smooth traffic flow within the city. Furthermore, regular maintenance and fitness checks should be conducted on vehicles to ensure they are roadworthy, safe for passengers, and do not pose a risk to other road users.



- Education and awareness campaigns should be initiated to encourage public transport drivers to adhere to traffic rules and promote safe driving practices. Additionally, it is imperative to enact legislation regulating Suzuki Pickups and similar para-transit modes to ensure the safety of users.
- Improving inter-departmental coordination is crucial to ensure the smooth execution of projects and to prevent infrastructure damage post-completion due to activities such as laying utilities by other departments.
- The bypass road is completely worn out and cracks and rutting has developed throughout its length. This bypass should be rehabilitated to ensure the smooth traffic operation.