PARACHINAR MASTER PLAN 2040

Volume I - Scenario Mapping Development

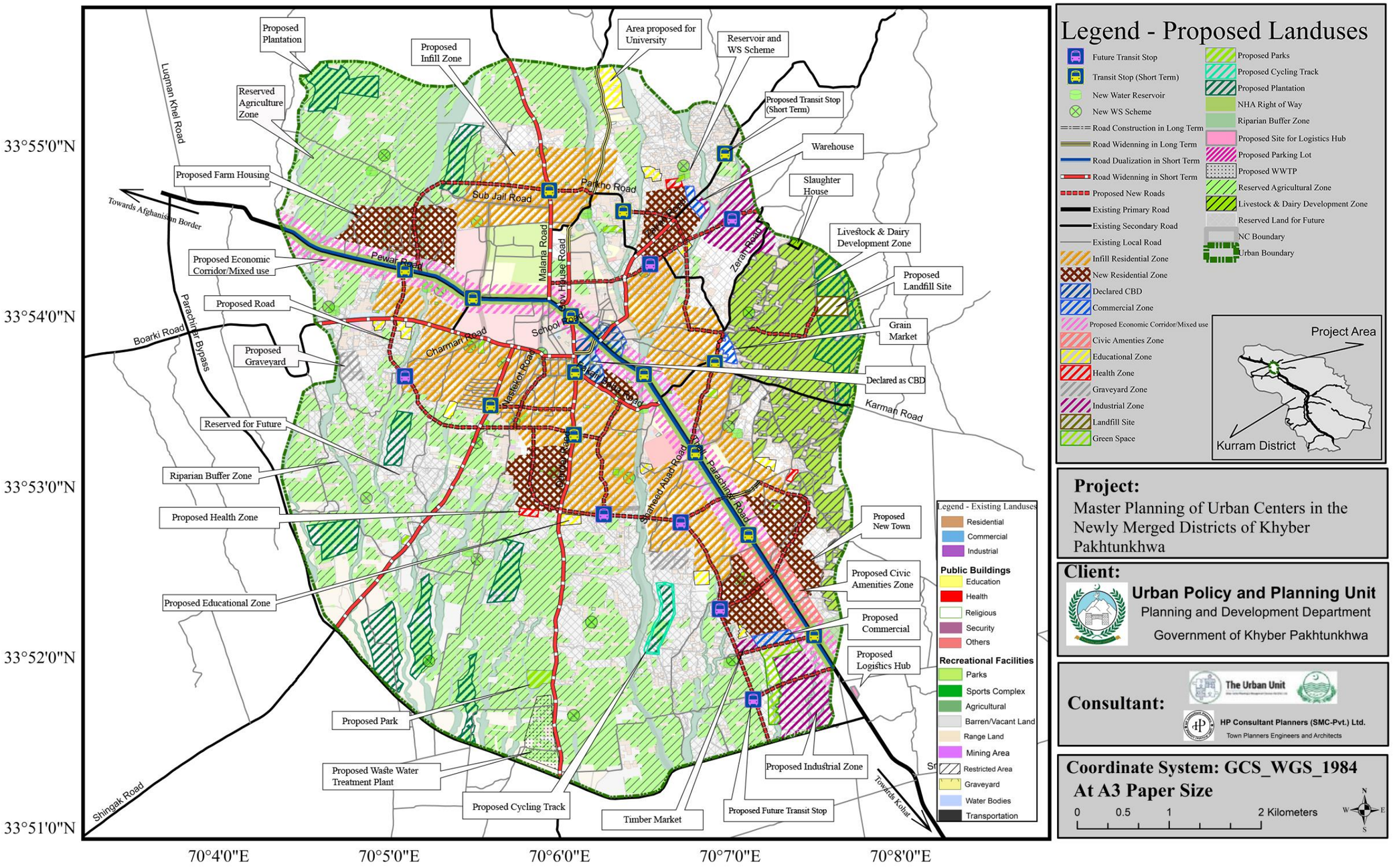
Master Plans for the Urban Centers of Merged Areas
in Khyber Pakhtunkhwa

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

HP Consultant Planners (SMC-Private) Limited

The proposed master plan aspires to transform Parachinar Urban Center into sustainable city through efficient public service delivery, rising trade and promote tourism activities. By focusing and creating a well functional dynamic environment for businesses, and trade of ideas, goods, and services on international scale as it is close to Afghanistan border the city economic growth will be fostering. The blueprint of urban metamorphosis integrates infrastructure, and sustainable practices to ensure a seamless and inviting experience for residents and tourists. Simultaneously, as a burgeoning tourism hub, the urban center aspires to showcase its cultural richness, historical significance, and modern amenities, inviting travelers to explore and immerse themselves in the vibrant tapestry of evolving Parachinar Urban Center.

Parachinar Proposed Master Plan



Legend - Proposed Landuses

- Future Transit Stop
- Transit Stop (Short Term)
- New Water Reservoir
- New WS Scheme
- Road Construction in Long Term
- Road Widenning in Long Term
- Road Dualization in Short Term
- Road Widenning in Short Term
- Proposed New Roads
- Existing Primary Road
- Existing Secondary Road
- Existing Local Road
- Infill Residential Zone
- New Residential Zone
- Declared CBD
- Commercial Zone
- Proposed Economic Corridor/Mixed use
- Civic Amenties Zone
- Educational Zone
- Health Zone
- Graveyard Zone
- Industrial Zone
- Landfill Site
- Green Space
- Proposed Parks
- Proposed Cycling Track
- Proposed Plantation
- NHA Right of Way
- Riparian Buffer Zone
- Proposed Site for Logistics Hub
- Proposed Parking Lot
- Proposed WWTP
- Reserved Agricultural Zone
- Livestock & Dairy Development Zone
- Reserved Land for Future
- NC Boundary
- Urban Boundary

Project:
Master Planning of Urban Centers in the Newly Merged Districts of Khyber Pakhtunkhwa

Client:
Urban Policy and Planning Unit
Planning and Development Department
Government of Khyber Pakhtunkhwa

Consultant:
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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers
N W E S

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Abbreviations

BAU	Business as Usual
BHU	Basic Health Unit
CBD	Central Business District
CHC	Community Health Center
MCHC	Mother and Child Health Center
KP	Khyber Pakhtunkhwa
MCA	Multi-Criteria Analysis
NC	Neighborhood Council
NRM	National Reference Manual
OD	Origin Destination
SMEDA	Small Medium Enterprise Development Authority
TPR	Thall-Parachinar Road
UTM	Universal Transverse Mercator
VPD	Vehicles Per Day

Definitions

1. Eco Sustainable

It refers to actions and practices that maintain or enhance environmental well-being while ensuring the ability of future generations to do the same.

2. Ribbon Development

Linear urban development along transportation routes.

3. Leapfrog

Urban development that skips over intermediate areas to expand outward.

4. Vacant Land

Land that has no buildings on it and is not being used

5. Infill Land

Infill sites are tracts of empty or under-utilized land in urban and built-up areas. These sites are ripe with opportunity because of their location.

6. Range Land

Rangeland is any extensive area of land that is occupied by native herbaceous or shrubby vegetation which is grazed by domestic or wild herbivores.

7. New Town

New Towns are cities or towns that are designed from scratch and built in a short period of time.

8. Revitalization

Renewal and improvement of a place or community

9. Compact Development

Dense urban development with minimal space between buildings.

10. Commercialization

The process of introducing and promoting a product or service for profit.

11. Permitted Use

The Land Use, which is allowed in each land use class.

12. Allied Permissible Use

The land use, though not permitted, may be allowed by the authority subject to the payment of the fee.

13. Prohibited Use:

The land use, which is neither permitted nor permissible.

14. Sustainable

Sustainability is the practice of meeting present needs without compromising the ability of future generations to meet their own.

15. Sporadic Growth

Sporadic growth refers to irregular or unpredictable patterns of expansion or development.

Chapter 1: Existing Land Use Spatial Pattern and Urban Form of Parachinar

1.1 Overview

Parachinar is a small town with a population of approximately 53,000 people located in the Upper Kurram tehsil of Kurram district of the Khyber Pakhtunkhwa province. Parachinar is bordered by the central Kurram tehsil on the East, the Nangarhar province of Afghanistan on the North, the Logar Province of Afghanistan on the North-West, the Paktiya province of Afghanistan on the West, the Khost province of Afghanistan on the South, and the Lower Kurram tehsil on the South-East and central Kurram tehsil on the East side.

The town of Parachinar is located at 33.9011°N, 70.0860°E with an elevation of 1,726m (5,663 ft) from the mean sea level. It is also the fourth coldest location in Pakistan.

The town lies near the Kurram River, which originates from the Spin Ghar watershed in the Paktia province of Afghanistan and the Kurram district of Pakistan and flows through North Waziristan and Bannu to join the Indus River near Isa Khel. The Parachinar basin contains a single unconfined aquifer with a deep-water table that is more than 100 m below the land surface near the mountains and intersects the land surface close to the Kurram river.[1]

In terms of regional connectivity, Parachinar is easily accessible by major cities of KP (Thall, Kohat and Peshawar) via the Thall – Parachinar Road (TPR). Despite Parachinar's high altitude, there are no steep slopes or difficult bends along the route from Peshawar. In addition, there are several country roads branching out from the TPR that provide access to the Afghan Border at Kharlachi, Pewar Ahmadzai, Kirman, Zeeran, Boshera and other places of local importance. It also has a civilian airport.

[1] https://www.ircwash.org/sites/default/files/822-PK.NO89-5660.pdf

1.2 Existing Urban Form of Parachinar

Parachinar is envisioned as a model, eco-sustainable modern city, a focal point of social and economic services delivered to a large local and regional population, and a symbol of good local governance.

The 'Sector Theory' of urban land use, promulgated by American land Economist Homer Hoyt in 1939, explains that a city develops in sectors instead of rings. This urban land use model therefore focuses on arrangement of activities in an urban area as certain areas of a city are more attractive for various activities. As a city grows and these activities flourish and expand outward, they do so in a wedge and become a sector. For example, if a district is set up for high income housing, any new development in that district will expand from the outer edge[2].

Five types of land use zones are in this model:

- CBD Central Business District
- Wholesale and light industry zone
- Low class residential zone
- Medium class residential zone
- High class residential zone

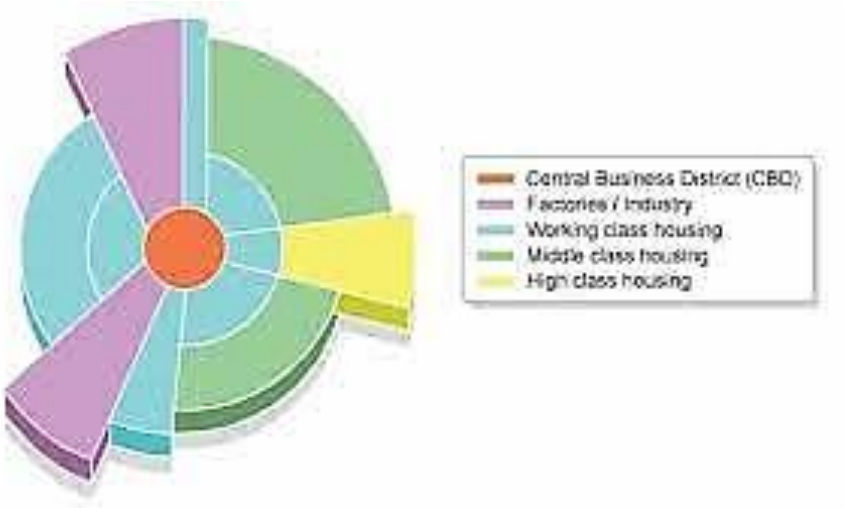


Figure 1-1: Sector Model, Homer Hoyt

[2] ASKARI, S., BANDHOKAR, N., & BHAWE, S. (1958). General and Other. birth, 26, 617-20.

Using the Sector Model, Parachinar has been divided into the following land use zones.

1.2.1 Zone “A” : Cantonment Area

This zone covers the town’s most developed area and is situated along the Pewar road, which is a continuation of the Thall Parachinar road. It includes the important buildings of the Kurram Militia, Kurram Scouts, Frontier Constabulary, officer’s mess, a primary school, government high school and other public sector offices.

The Cantonment is also served by Malana Road, which starts at RP Chowk and provides access to the Bajligar colony, FATA colony, government model school, Fatima Jinnah Memorial Garden, District Courts, Government Degree College for girls and the Farms Services Center.

The whole area is a high security zone and the movement of people and vehicles is generally restricted. The security forces have however constructed markets to generate revenue and made significant contribution towards urban development.

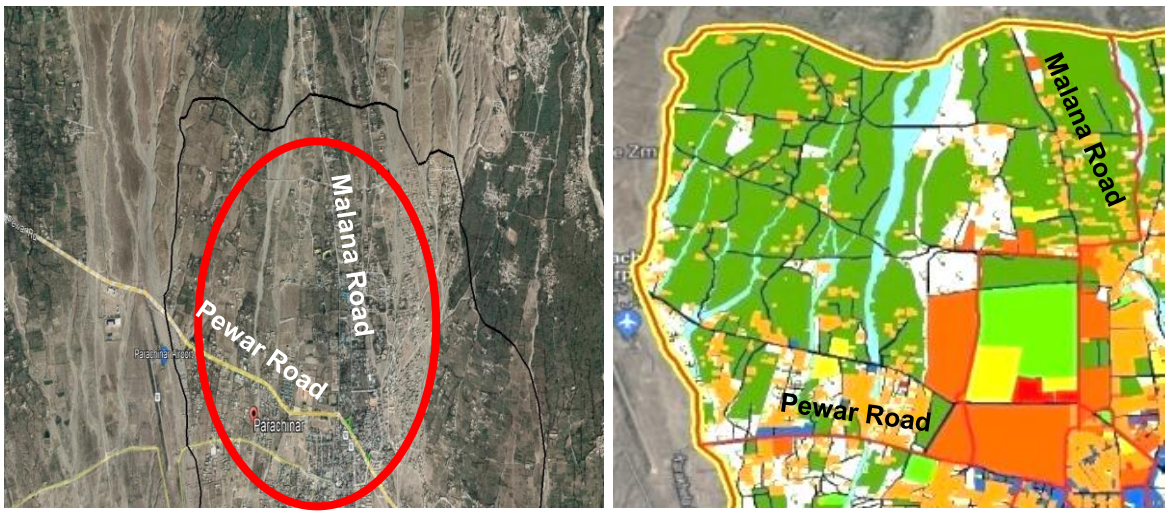


Figure 1-2: Zone A (Cantonment Area)

1.2.2 Zone “B” Institutional Zone

East of the Cantonment is an Institutional zone comprised of large public land uses. These include the FATA Development Authority, Circuit House, Governor House, Kurram Militia Office, Political Agent’s Residences, Forestry Office, Agriculture Research Office, Public Health Engineering Department, Courts, Observatory, Post Office, PTCL Exchange, Shalozan House, WAPDA House, Library, Town Hall, NADRA office and many land uses relating to health, education, religious facilities,

burial grounds and recreational activities. These lie along the TPR and Zeran road in the form of Ribbon Developments.

The TPR corridor acts as a CBD of the Parachinar urban center. The nearby built up and rural areas of Parachinar fulfil their needs from this urban center by using several radial roads converging towards the city center.

North of the CBD is the Zeran road corridor which leads to the Zeran village in the outskirts of Parachinar. Although primarily residential there are some commercial markets and educational institutes along Zeran Road.

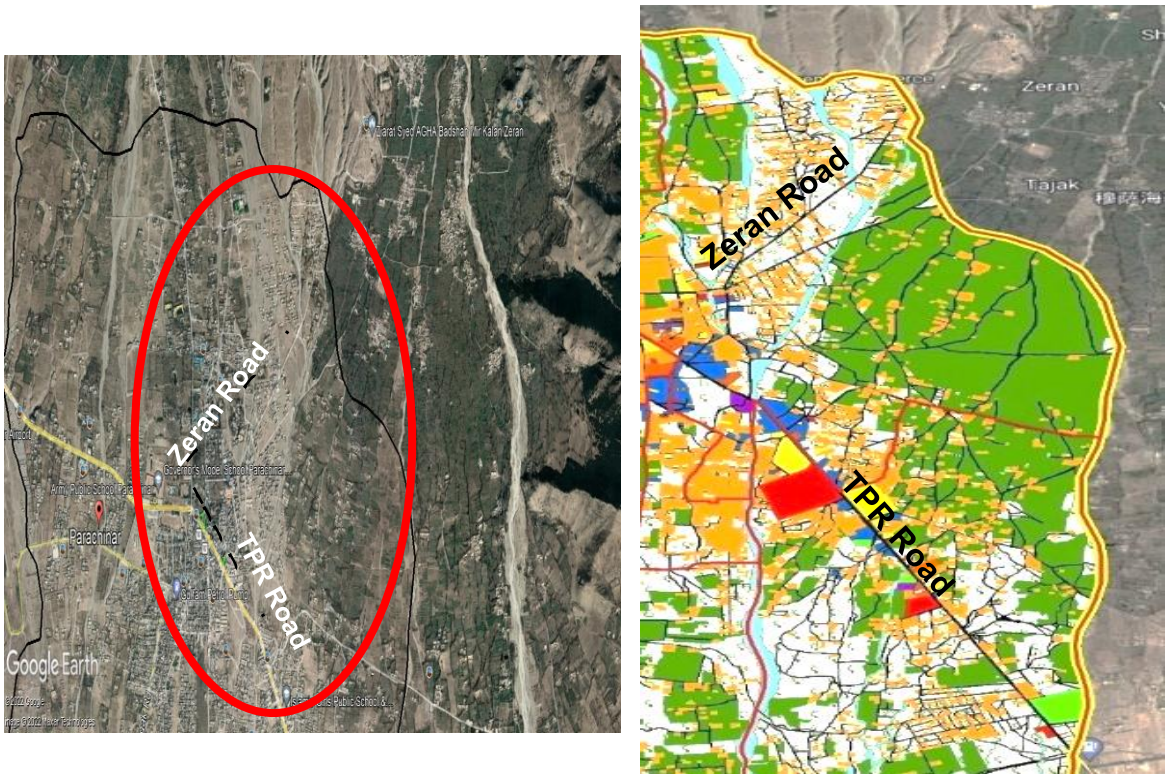


Figure 1-3: Zone B (Main Public Administration)

1.2.3 Zone "C" Old City Center/CBD

This is the main city center/market place which lies at the core of the town. Historically, this was the site of a fort used by rulers of this area. Zone C is a mixed land-use area, including major residential and commercial land uses including the main business center. The area is accessible via Punjabi Bazar road originating at RP chowk.

The prominent commercial places of this zone are: Punjabi Bazar, Karmi Bazar, Usmani Market, Har Bazar, Noor Market, Shah Market, Qasi Center, Masjid Center, Jamia Masjid and an Imam Bargah. The building density in this area is relatively high, with most of the buildings comprising 2 to 3 stories.

South of the City Center are residential areas, public buildings, and commercial that lies along Dandar Road, which eventually leads to expanses of green area and open spaces.

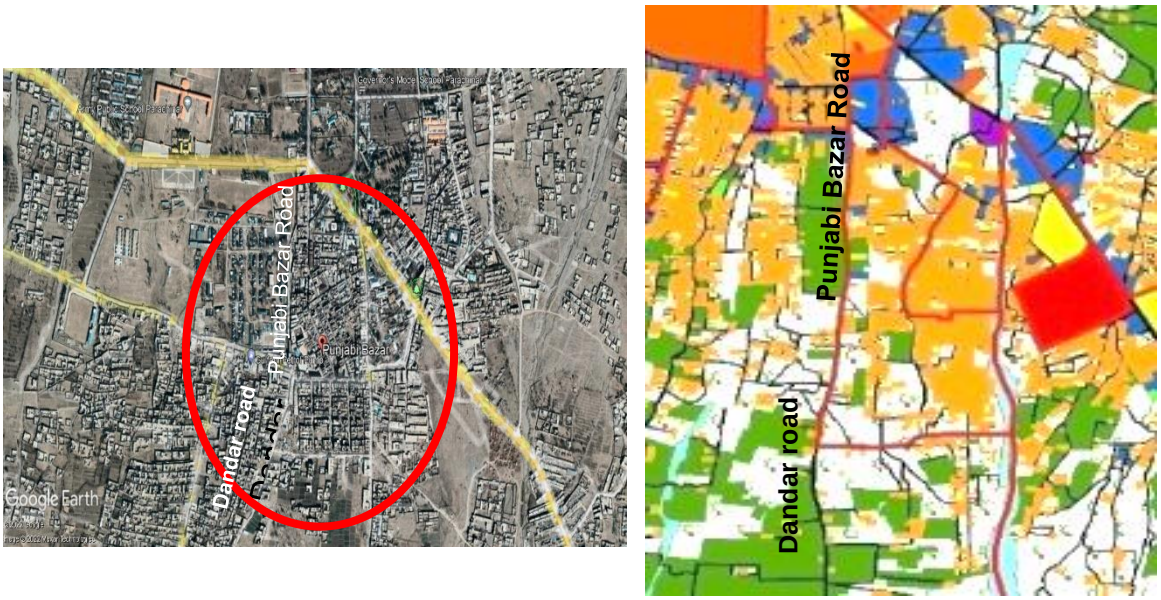


Figure 1-4: Zone C (Old city center/CBD)

Due to their commercial and Institutional significance, Zone B and Zone C are two centers of gravity which characterize Parachinar as the premier town of District Kurram and service center for the greater region.

1.2.4 Zone “D” Residential Clusters

This zone includes housing colonies, scattered in medium and small size clusters in the south-west quarter of the town. This zone is served by several important roads of the town such as Burki Road, Charmari Road and Nastikot Road. Notable residential areas of this zone include are: Stadium Colony, Hamza Colony, Islamia Colony, Wazir Bagh Village Colony, Turi Qabristan Colony, Dandar Colony, Meer Ali Jan Colony, Shaheedabad Colony, Professor Colony and Grid Station Colony.

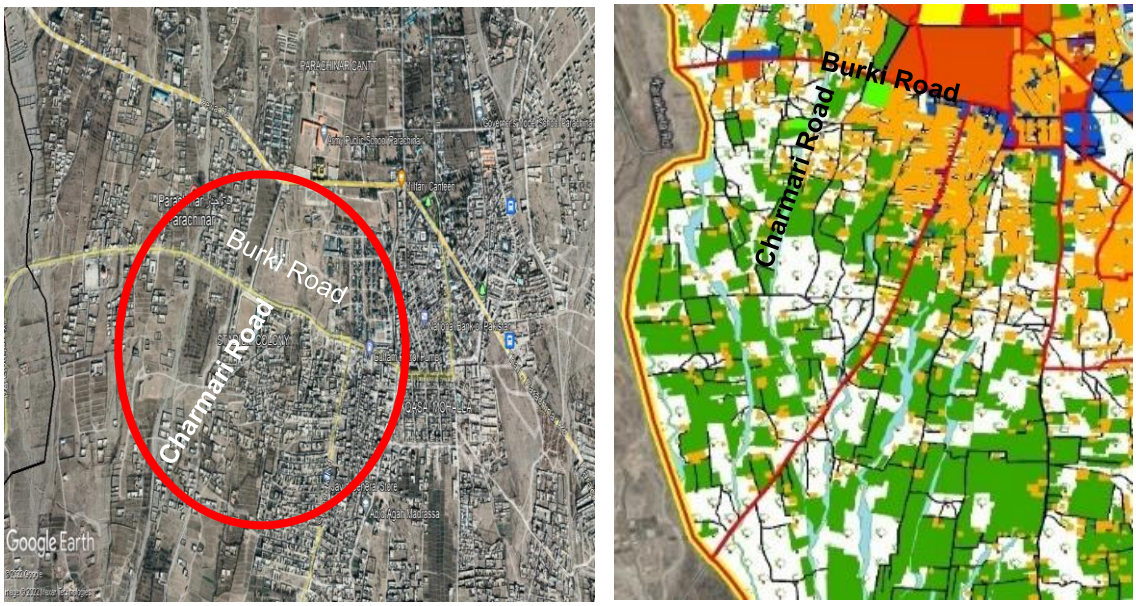


Figure 1-5: Zone D (Residential Cluster)

Other important places relating to educational, health and community services in this area include: Agency Headquarter Hospital, Israr Shaheed Boys High School, Government Postgraduate College and University, Asad Medical Centre, Nadra Office, Kurram Public School, Silai Karai Centre, Cricket Ground, Government Girls High School, Turi graveyard, graveyard, Christian graveyard ,Football Stadium, Grid Station, Animal Husbandry, Sport Complex, and Muntazar Shaheed Market.

A spatial analysis of the current situation shows an urban pattern with the existing market area in the center and the town growing in north and south directions along major roads. Public administration and security uses are concentrated in the north while community facilities and residential areas are predominant in the South. These patterns are consistent with the sector model of Homer Hoyt.

1.3 Pros and Cons of Sector Land Use Model

Table 1-1 outlines the pros and cons of the sector model to provide a better picture of Parachinar's existing urban form relation with the model.

Table 1-1: Pros and Cons of Sector Land Use Model

Pros	Cons
It looks at the effect of transport and communication links.	There is no reference to out of town development.
Numerous cities seem to have followed this model.	There is no reference to the physical environment.
Pie shaped wedges made by Hoyt compensated for the drawbacks of the Ring model.	The theory is based on nineteenth century transport and does not make allowances for private cars that enable commuting from cheaper land outside city boundaries.
Though not perfect, it considers the lines of growth.	
It allows for an outward progression of growth.	

The distinctiveness and eminence of the existing urban center needs to be maintained or enhanced in the future plan. It is recommended that the existing neighborhood councils be considered for urbanization and new development should not be promoted outside the Thall-Parachinar Road in order to limit the linear development.

In order to confine the future urban development of Parachinar urban center, it is suggested to convert prospective Village Councils into Neighborhood Councils based on their characteristics. This way, the interconnection of radial roads with the TPR around the existing city will keep the development compact and avoid haphazard development. Compact development is promoted to give maximum benefit to the people.

The phenomenon of ribbon development (The establishment of houses in a continuous row along the main road) is a critical issue in urban growth. Due to the improvement of road connectivity and the rise of traffic, people tend to build houses, shops and factories near highways and roads for better business and transportation.

Parachinar's radial road pattern emanating from the old town is likewise subject to dramatic ribbon development as shown in Figure 1-7. In particular TPR is subject to significant ribbon development along both its sides, and exhibits large public land uses such as commercial, industrial, educational institutes and sports facilities.

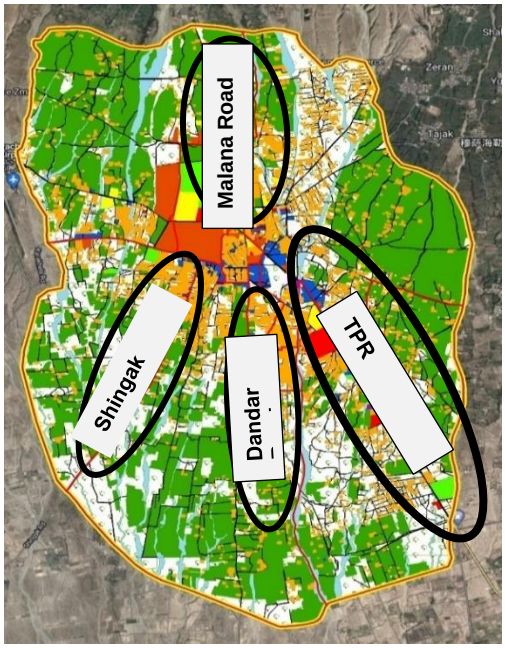


Figure 1-6: Ribbon Development

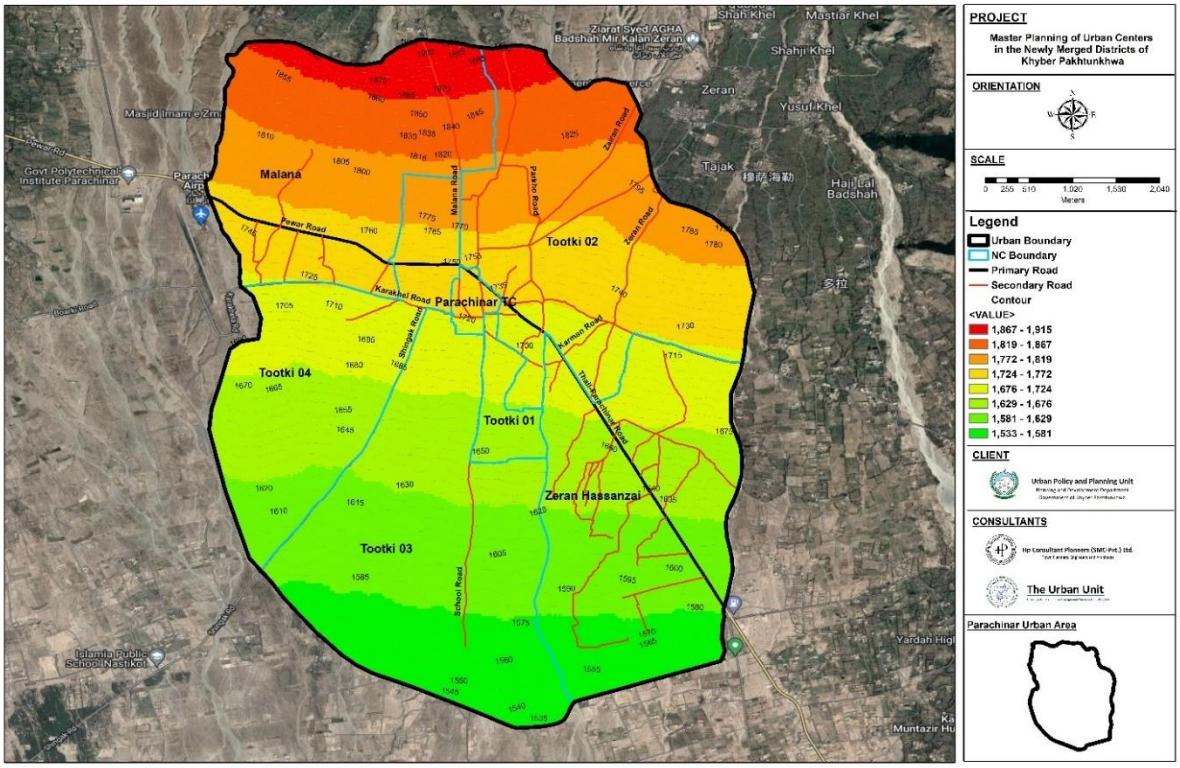
Some pros and cons of ribbon development are summarized in Table 1-2:

Table 1-2: Pros and Cons of Ribbon Development

Pros	Cons
Flexibility and openness for growth	Unnecessarily long distances to be travelled daily
All structures are close to the main line and easily accessible in terms of time or effort, considering the transport efficiency	Infrastructure development more expensive

1.4 Contour Map

A contour map has been prepared with contour lines drawn at 500-meter intervals. The general slope of the Parachinar urban center moves from North to South with the highest elevation point at 1915 meters and the lowest point at 1535 meters. The 380-meter difference in contour levels from North to South suggests that the terrain of the Parachinar urban center is relatively steep.



Map 1: Contour Map (500-meter intervals), Parachinar
Source: Google Earth (2022), resolution 1000 dpi

1.5 Population Density

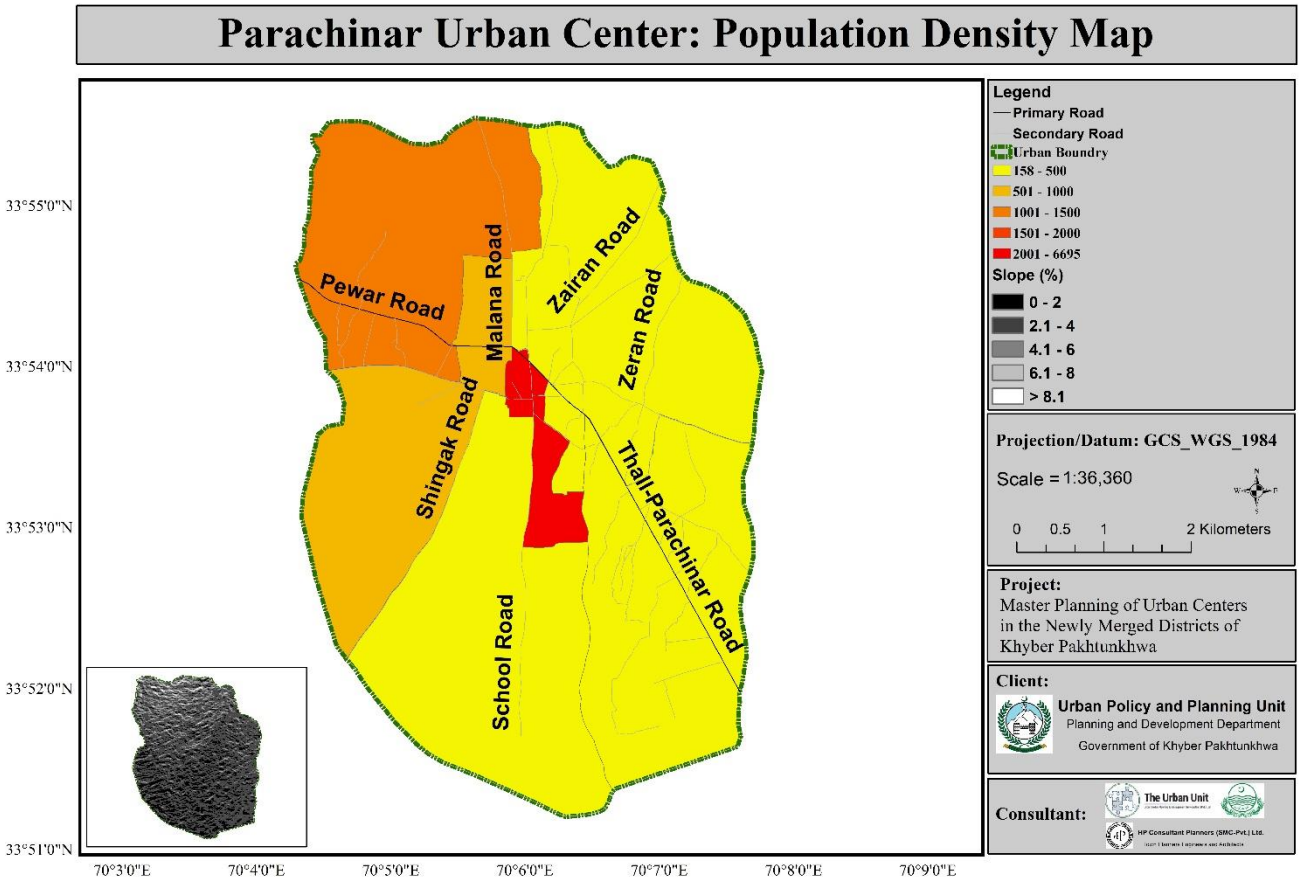
According to the Bureau of Statistics Report 2017; the population of upper Kurram tehsil is 252,436 and out of this figure 246,934 population are declared as rural while just 5,502 population declared as urban, whereas in 2020 the Provincial Election Commissioner Delimitation Committee published a final list of village/ Neighborhood councils and declared seven NC'S included 27 blocks as the urban center which makes a total population of approximately 52,729.

Table 1-3: Population densities of all NCs of Parachinar

Neighborhood council	Population (2017)	Area sq. km	Density (pop per sq. km)
Parachinar NC	5502	0.26	21162
Malana	7532	6.05	1245
Zeran Hassanzai	8392	6.88	1220

Tootki 1	8841	0.68	13001
Tootki 02	6769	7.24	935
Tootki 03	7507	7.84	958
Tootki 04	8186	5.07	1615

Source: The Urban Unit and HP Consultants



Map 2: Population Density Map, 2017

1.6 Existing Land Use Classification

The government of Khyber Pakhtunkhwa on 24 November 2021 passed "The Khyber Pakhtunkhwa Land-use and Building control, Act 2021". Under this, the following shall be formed:

- Provincial Land use and Building Control Council,

- Land Use and Building Control Authority

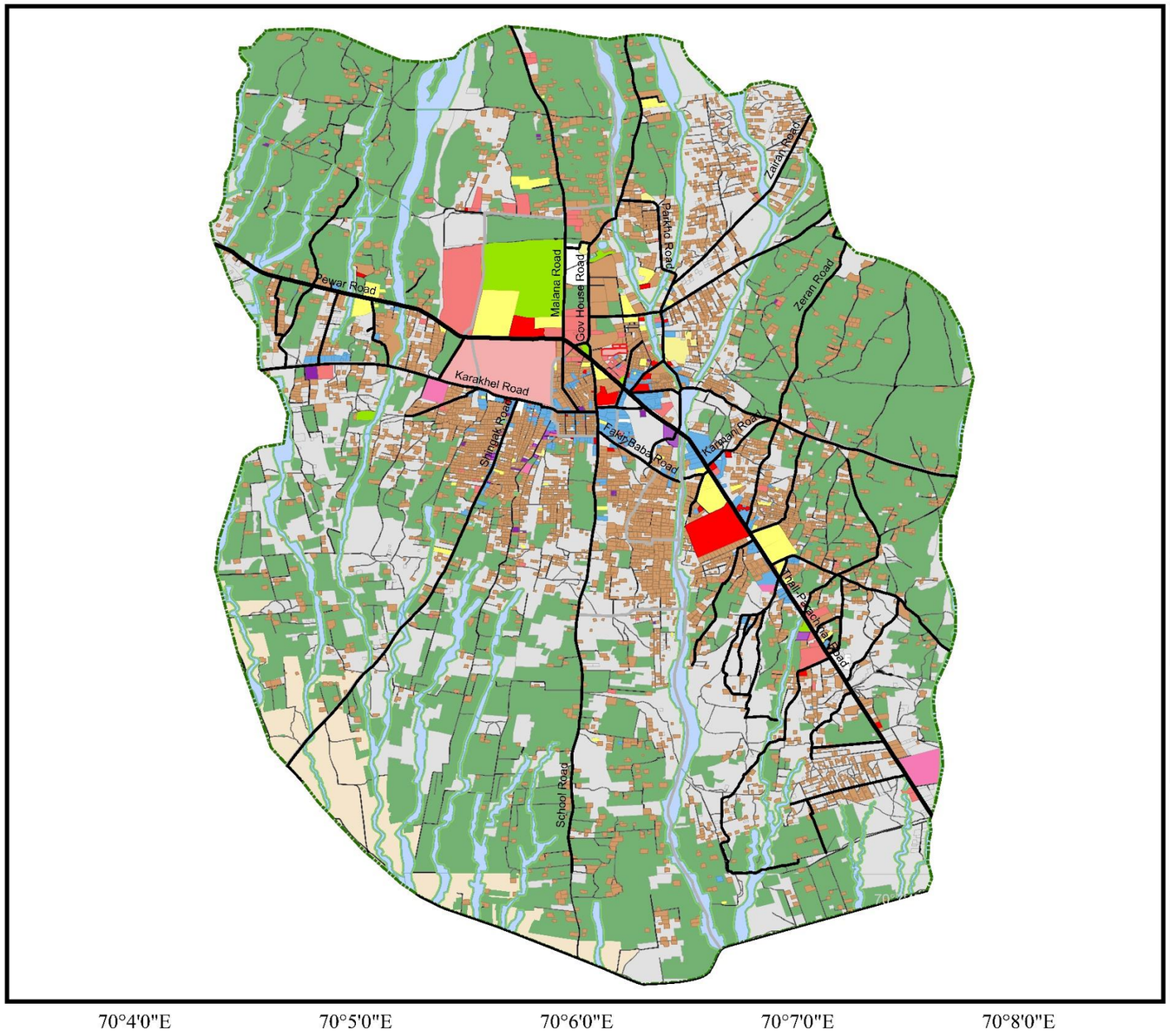
The functions of Provincial Land-use and building control council includes approval of Master plans and district land use plans. Provincial land-use and building control authority shall perform the functions of supervision of district land use and management committee and proposing planning standards to Provincial land use and building control councils for the approval. The district land use and management committee will perform the functions of preparing master plans and district land use plan with the help of concerned local government. The local planning and enforcement will provide support to the district land use and management committee. The existing land uses of Parachinar are categorized as per subsection (3) of section 15 of Land use and Building Control Act 2021, which are as follows:

- Residential area
- Commercial area
- Industrial area
- Forest, national park, range land and other related areas
- Mining areas (if exists)
- Agricultural area (irrigated, barani and fallow etc.)
- Concentrated public sector area
- Recreational area
- Mixed land use areas
- Barren and vacant land (to be further classified as culturable waste land or otherwise).
- Water bodies
- Area prone to natural hazard

The land use classification is explained in the KP Land use and Building Control Act 2021; however, no specific percentages are given under which certain land use or master plans shall be prepared. Thus, the consultants have prepared the existing and proposed land use base map Parachinar using NRM standards. Moreover, on the basis of existing land uses of Parachinar and current population, future population for 2040 is projected along with it proposed future land uses. The proposed land use map of Parachinar 2040 contains all the above-mentioned land uses calculated on the basis of existing land uses and projected land use proportion as mentioned in table above

to fill the gap and fulfill the future need of the people. Below table and map shows the land use categories as per the Land Use and Building Control Act, 2021.

Existing Landuse of Parachinar



Legend

Land Uses	Area (Sq. Km)	Percentage
Residential	4.24	12.45%
Commercial	0.38	1.12%
Industrial	0.03	0.09%
Public Buildings		
Education	0.39	1.15%
Health	0.21	0.62%
Religious	0.03	0.09%
Security	0.34	0.99%
Others	0.47	1.38%
Recreational Facilities		
Parks	0.34	1.00%
Sports Complex	0.10	0.29%
Agricultural	13.41	39.42%
Barren/Vacant Land	9.08	26.68%
Range Land	1.10	3.23%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.05	0.15%
Water Bodies	2.00	5.88%
Transportation	1.86	5.47%
Total	**34.03**	**100%**

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At A3 Paper Size
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Map 3: Existing Land Use Base Map of Parachinar

In addition to the land use classifications above, Table 1-3 compares the existing land use percentages with the NRM standards in order to demonstrate the gaps and calculate future land use requirements.

Table 1-4: Land Use Classification[3]

Land Use		Area (Sq. Km.)	Percentage %	NRM Standards	
Residential		4.24	12.46	Residential	27%-43%
Commercial		0.38	1.12	Commercial	1%-5%
Industrial		0.03	0.09	Industrial	2%-20%
Public Buildings	Education	0.39	1.15	Institutional	3%-11%
	Health	0.21	1.59		
	Religious	0.03	0.09		
	Security	0.34	0.03		
	Others	0.47	1.38		
Recreational Facilities	Parks	0.34	1.00	Recreational	1%-6%
	Sports Complex	0.10	0.29		
Agricultural		13.41	39.42		
Barren/Vacant Land		9.08	26.67	Vacant Land	8%-26%
Range Land/Forest		1.10	3.23		
Mining Area		0.00	0.00		
Restricted Area		0.00	0.00		
Graveyard		0.05	0.15	Graveyard	0.5%-6%
Water Bodies		2.00	5.88		
Transportation		1.86	5.47	Transportation	3%-27%
Total		**34.03**	**100**		

[3] Calculated from GIS base map

It is observed that the percentages of built up land uses such as residential, industrial, institutional, recreational, graveyard and circulation are lesser than those suggested by the NRM standards while the percentage of protected / reserved lands are higher.

The future land use proposal can therefore address the area deficiencies in each land use classification and utilize those areas of range, vacant land, agricultural lands that are in excess.

1.6.1 Existing Land Use Classification in NCs

Parachinar is comprised of 7 Neighborhood Councils:

- Parachinar
- Malana 2
- Zeeran Hassanzai
- Tootki 1
- Tootki 2
- Tootki 3
- Tootki 4

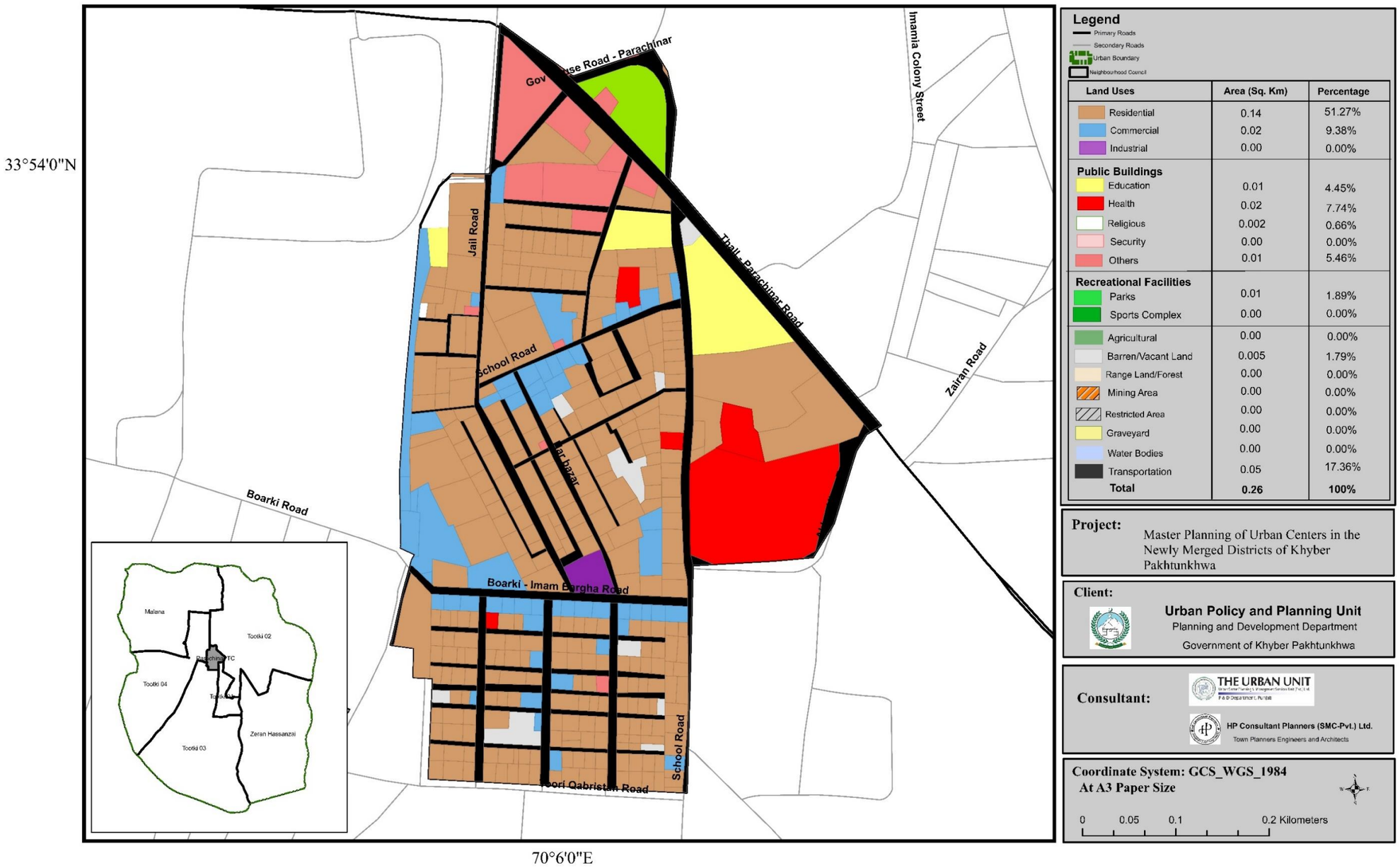
Table 1-4 and Maps 3 - 9 summarize the existing land usage in each NC in Parachinar

Table 1-5: Parachinar Neighborhood Council Level Land Use Statistics

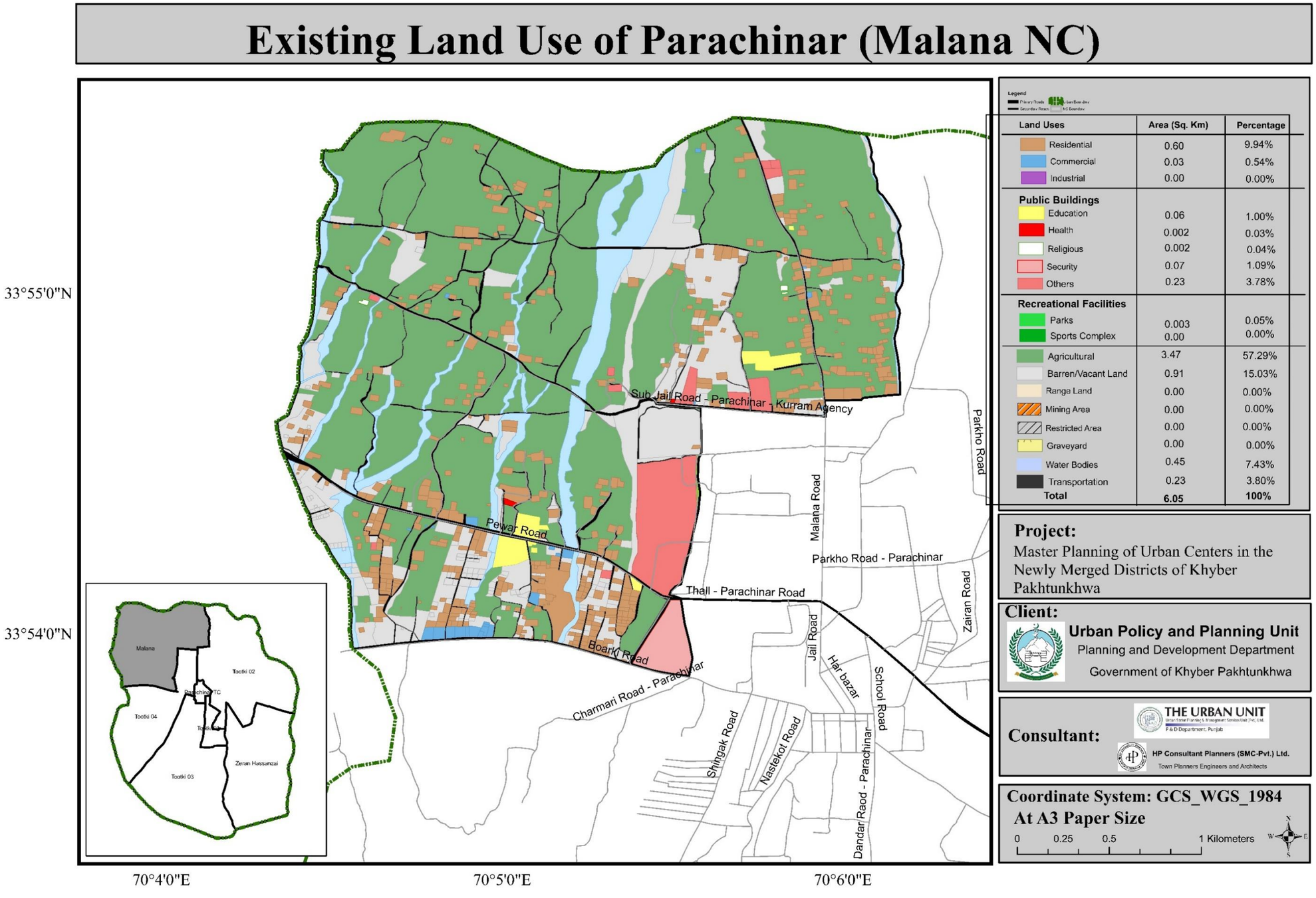
Neighbourhood Council		Parachinar	Malana	Zeeran Hassanzai	Tootki 1	Tootki 2	Tootki 3	Tootki 4	Total Area
Population (People)		5,502	7,532	8,392	8,841	6,769	7,507	8,186	52,729
Census Blocks		5	3	3	5	5	3	3	27
Land Uses		**Area (sq.km)**							
Residential		0.14	0.60	0.81	0.26	1.28	0.64	0.51	4.24
Commercial		0.02	0.03	0.06	0.04	0.16	0.04	0.02	0.38
Industry		0.00	0.00	0.01	0.00	0.02	0.01	0.003	0.03
Public Buildings	Education	0.01	0.06	0.12	0.003	0.06	0.01	0.13	0.03
	Health	0.02	0.002	0.12	0.002	0.03	0.002	0.04	0.39
	Religious	0.002	0.002	0.00	0.001	0.003	0.01	0.01	0.21
	Security	0.00	0.07	0.00	0.00	0.01	0.00	0.26	0.03
	Others	0.01	0.23	0.06	0.0003	0.12	0.01	0.04	0.34
	Sub-Total Public Buildings	0.04	0.36	0.3	0.01	0.22	0.03	0.48	1.44
Recreational Facilities	Parks	0.01	0.003	0.01	0.00	0.01	0.00	0.31	0.34
	Sports Complex	0.00	0.00	0.07	0.00	0.00	0.004	0.03	0.1
Agricultural		0.00	3.47	2.16	0.04	2.75	3.53	1.46	13.41
Barren/Vacant Land		0.004	0.91	2.64	0.26	1.91	1.95	1.40	9.08
Range Land/Forest		0.00	0.00	0.00	0.00	0.00	0.77	0.33	1.1
Mining Area		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Restricted Area		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Graveyard		0.00	0.00	0.00	0.00	0.05	0.002	0.00	0.05
Water Bodies		0.00	0.45	0.37	0.02	0.40	0.50	0.26	2.00
Transportation		0.05	0.23	0.44	0.06	0.46	0.37	0.26	1.86
Total		**0.26**	**6.05**	**6.88**	**0.68**	**7.24**	**7.84**	**5.07**	**34.03**

Source: Land Use Survey, 2021

Existing Land Use of Parachinar (Parachinar NC)

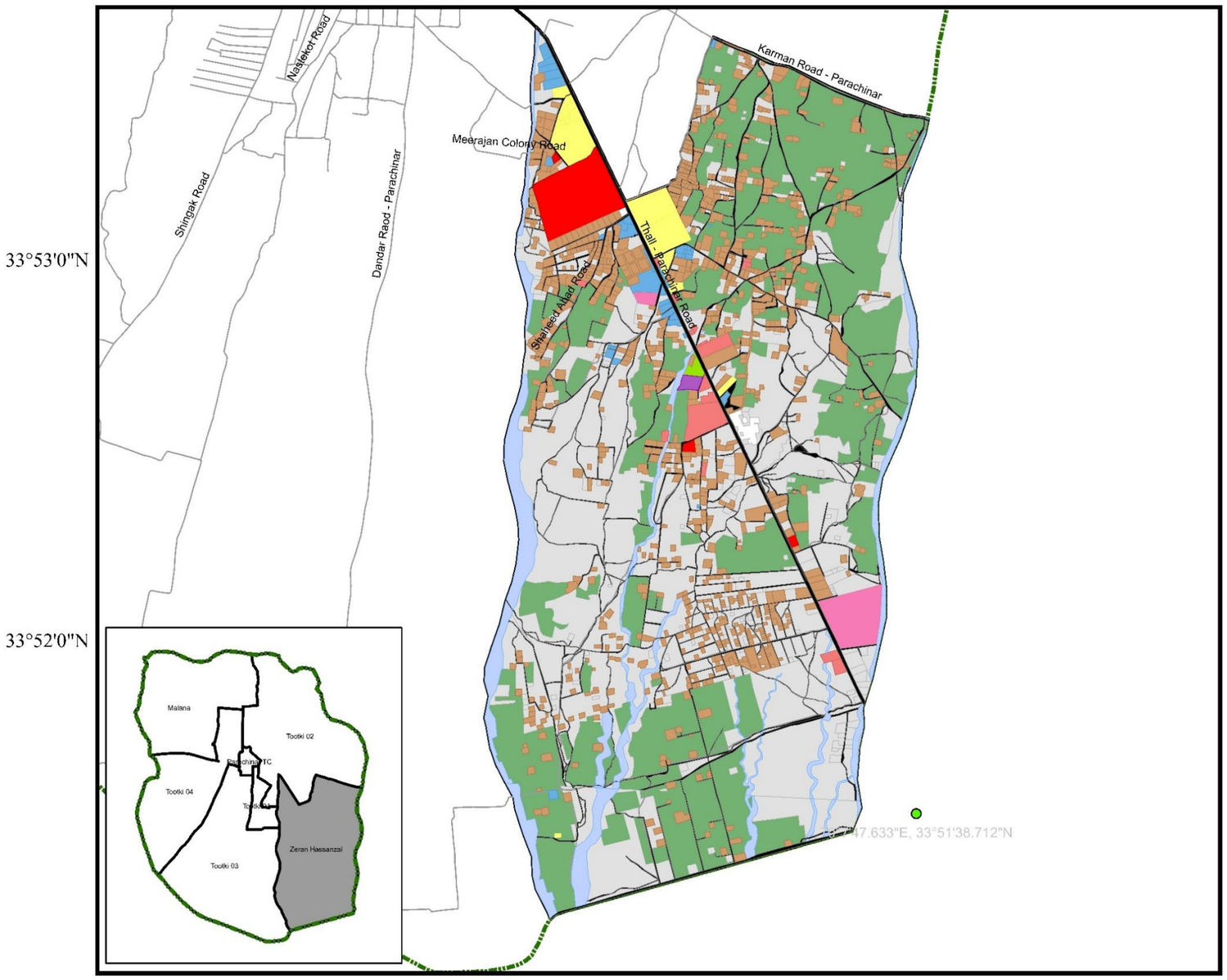


Map 4: Existing Land Uses in Parachinar NC



Map 5: Existing Land Uses in Malana NC

Existing Land Use of Parachinar (Zeran Hassan Zai NC)



Legend

- Primary Roads
- Secondary Roads
- Urban Boundary
- Neighbourhood Council

Land Uses	Area (Sq. Km)	Percentage
Residential	0.81	11.78%
Commercial	0.06	0.88%
Industrial	0.01	0.10%
Public Buildings		
Education	0.12	1.75%
Health	0.12	1.75%
Religious	0.00	0.00%
Security	0.00	0.00%
Others	0.06	0.87%
Recreational Facilities		
Parks	0.01	0.09%
Sports Complex	0.07	1.06%
Agricultural	2.16	31.47%
Barren/Vacant Land	2.64	38.44%
Range Land/Forest	0.00	0.00%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.00	0.00%
Water Bodies	0.37	5.42%
Transportation	0.44	6.40%
Total	**6.88**	**100%**

Project:
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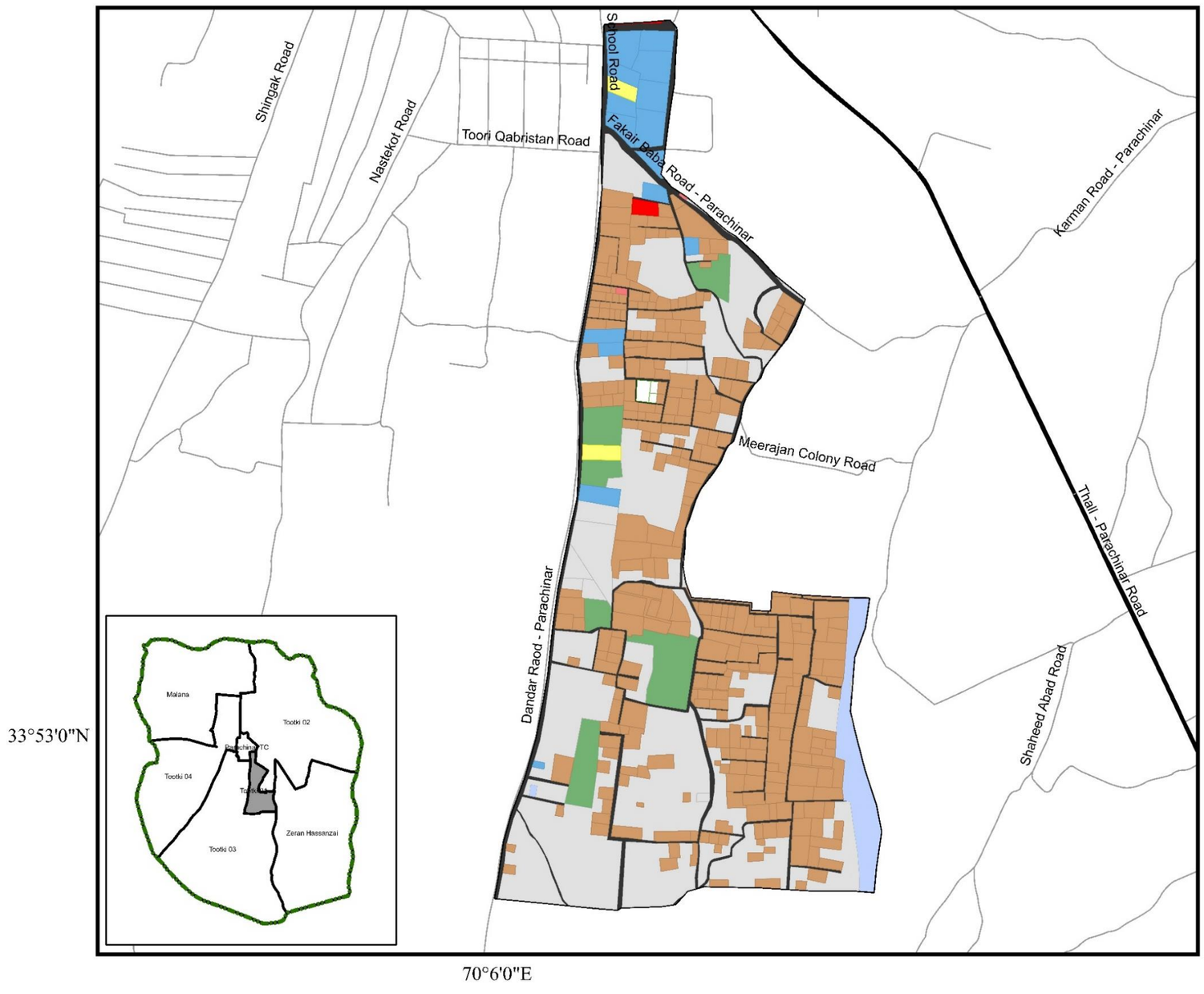
Client:
Urban Policy and Planning Unit
Planning and Development Department
Government of Khyber Pakhtunkhwa

Consultant:
THE URBAN UNIT
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.3 0.6 1.2 Kilometers

Map 6: Existing Land Uses in Zeeran Hassanzai NC

Existing Land Use of Parachinar (Tootki 1 NC)



Legend

- Primary Roads
- Secondary Roads
- Urban Boundary
- Neighbourhood Council

Land Uses	Area (Sq. Km)	Percentage
Residential	0.26	38.81%
Commercial	0.04	5.25%
Industrial	0.00	0.00%
Public Buildings		
Education	0.004	0.58%
Health	0.002	0.25%
Religious	0.002	0.26%
Security	0.00	0.00%
Others	0.0003	0.05%
Recreational Facilities		
Parks	0.00	0.00%
Sports Complex	0.00	0.00%
Agricultural	0.04	5.66%
Barren/Vacant Land	0.26	37.71%
Range Land/Forest	0.00	0.00%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.00	0.00%
Water Bodies	0.02	3.11%
Transportation	0.06	8.32%
Total	**0.68**	**100%**

Project: Master Planning of Urban Centers in the Newly Merged Districts of Khyber Pakhtunkhwa

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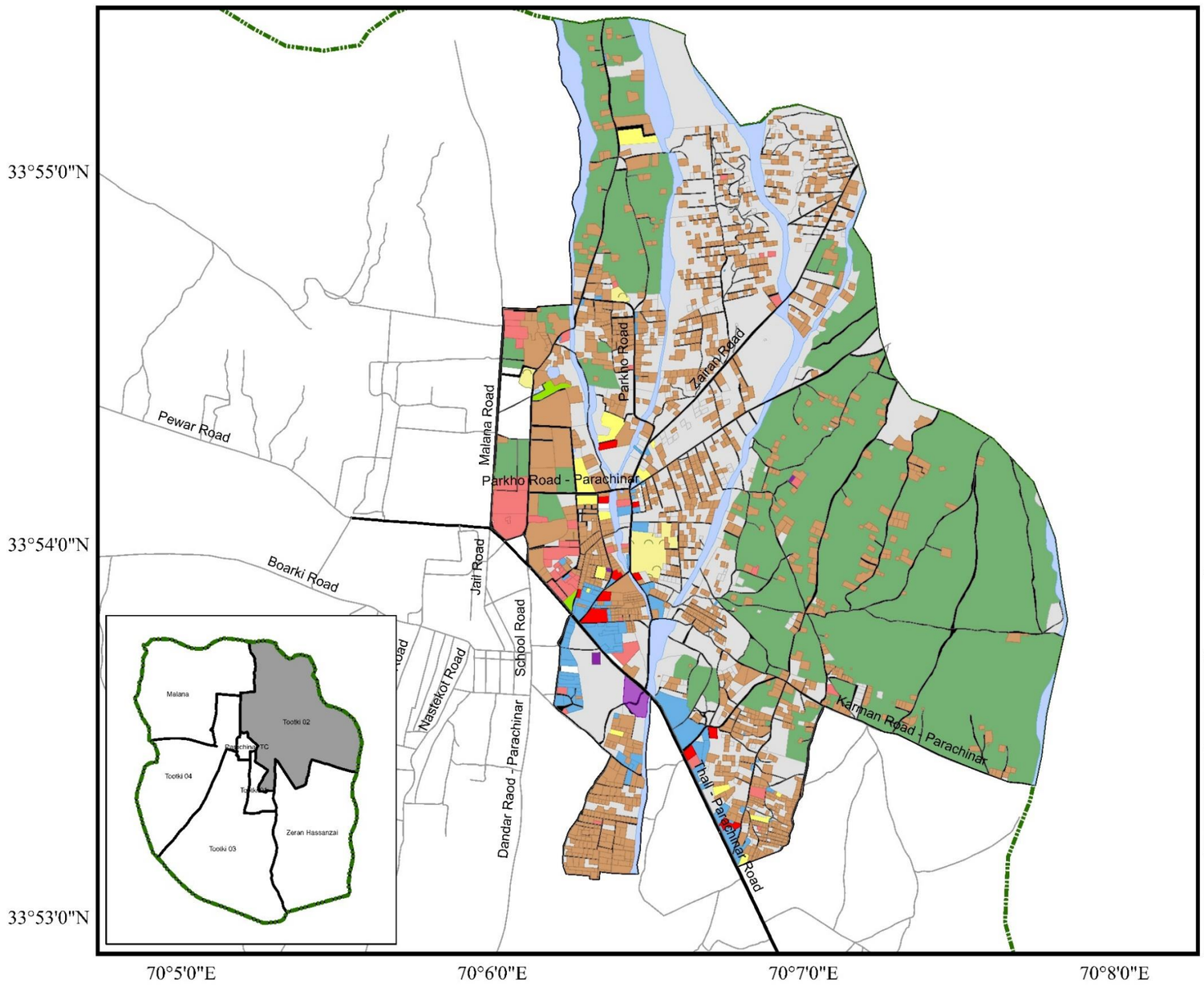
Planning and Development Department
Government of Khyber Pakhtunkhwa

Consultant: HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.1 0.2 0.4 Kilometers

Map 7: Existing Land Uses in Tootki 01 NC

Existing Land Use of Parachinar (Tootki 2 NC)



Legend

- Primary Roads
- Secondary Roads
- Urban Boundary
- Neighbourhood Council

Land Uses	Area (Sq. Km)	Percentage
Residential	1.28	17.68%
Commercial	0.16	2.18%
Industrial	0.02	0.21%
Public Buildings		
Education	0.06	0.77%
Health	0.03	0.38%
Religious	0.004	0.05%
Security	0.01	0.14%
Others	0.12	1.64%
Recreational Facilities		
Parks	0.01	0.14%
Sports Complex	0.00	0.00%
Agricultural	2.75	37.92%
Barren/Vacant Land	1.91	26.30%
Range Land/Forest	0.00	0.00%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.05	0.71%
Water Bodies	0.40	5.49%
Transportation	0.46	6.38%
Total	**7.24**	**100%**

Project: Master Planning of Urban Centers in the Newly Merged Districts of Khyber Pakhtunkhwa

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Consultant: THE URBAN UNIT, F&D Department, Punjab; HP Consultant Planners (SMC-Pvt.) Ltd., Town Planners Engineers and Architects

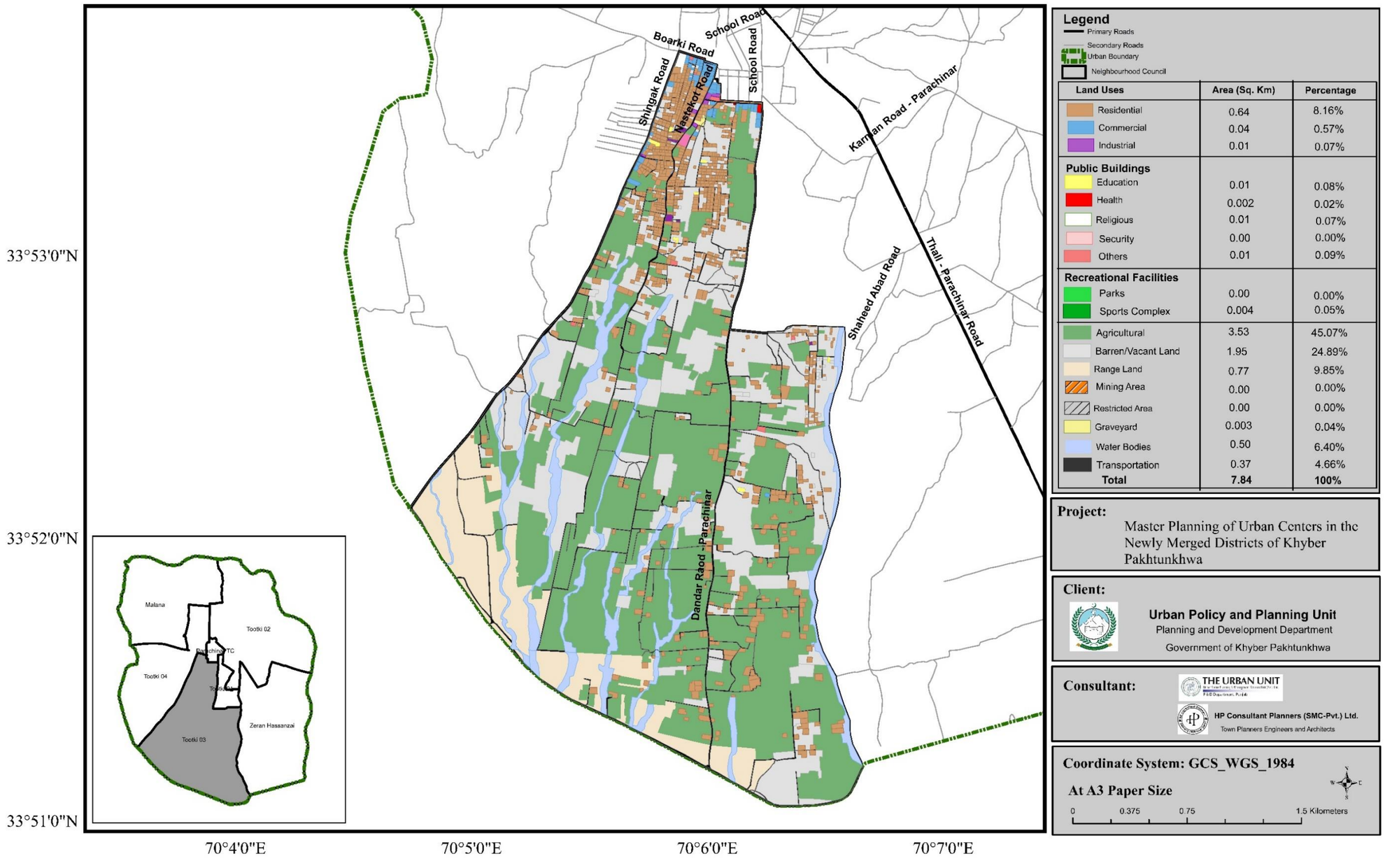
Coordinate System: GCS_WGS_1984

At A3 Paper Size

0 0.3 0.6 1.2 Kilometers

Map 8: Existing Land Uses in Tootki 02 NC

Existing Land Use of Parachinar (Tootki 3 NC)



Legend

Primary Roads
Secondary Roads
Urban Boundary
Neighbourhood Council

Land Uses	Area (Sq. Km)	Percentage
Residential	0.64	8.16%
Commercial	0.04	0.57%
Industrial	0.01	0.07%
Public Buildings		
Education	0.01	0.08%
Health	0.002	0.02%
Religious	0.01	0.07%
Security	0.00	0.00%
Others	0.01	0.09%
Recreational Facilities		
Parks	0.00	0.00%
Sports Complex	0.004	0.05%
Agricultural	3.53	45.07%
Barren/Vacant Land	1.95	24.89%
Range Land	0.77	9.85%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.003	0.04%
Water Bodies	0.50	6.40%
Transportation	0.37	4.66%
Total	**7.84**	**100%**

Project:
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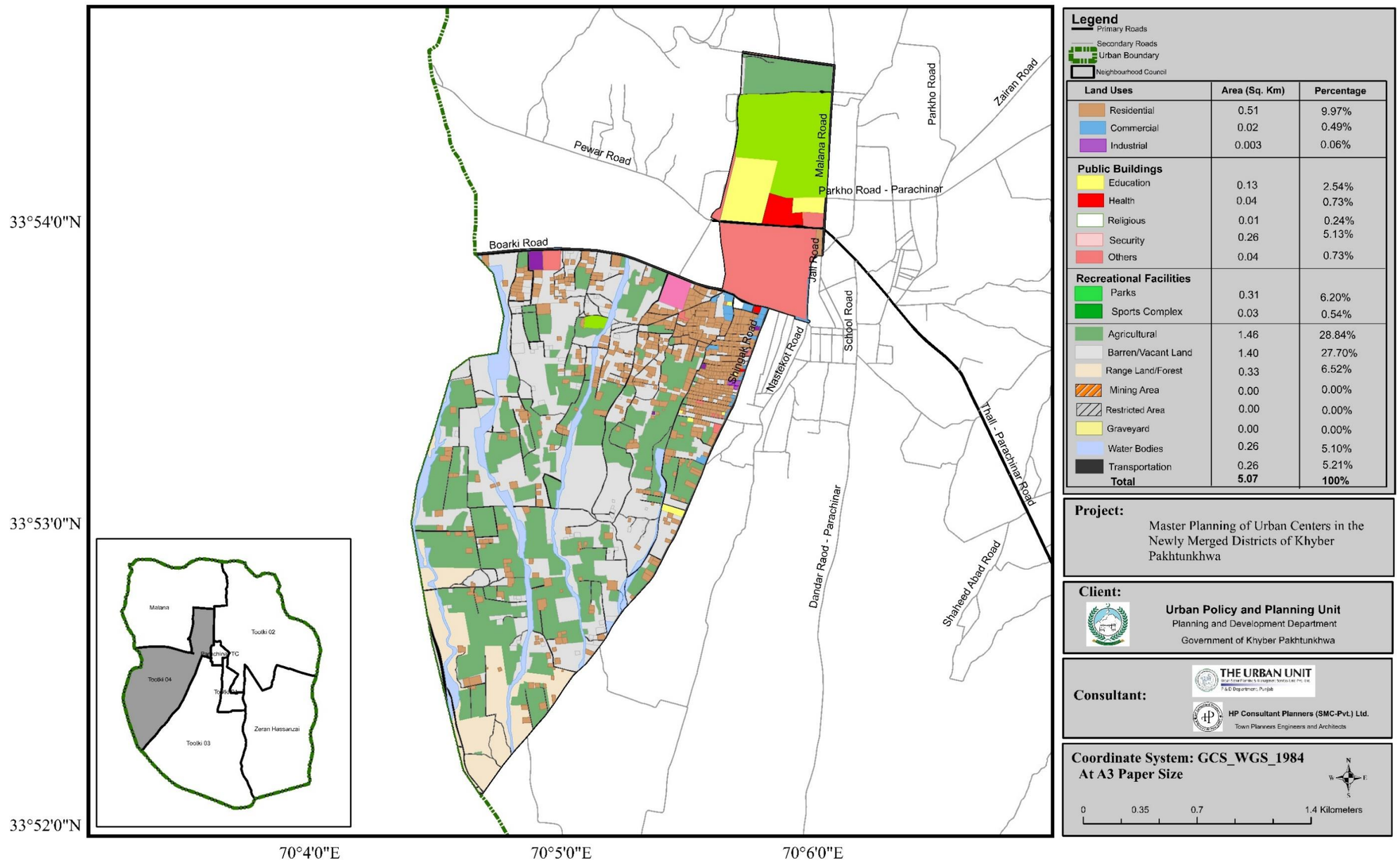
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.375 0.75 1.5 Kilometers

Map 9: Existing Land Uses in Tootki 03 NC

Existing Land Use of Parachinar (Tootki 4 NC)



Legend

Primary Roads
Secondary Roads
Urban Boundary
Neighbourhood Council

Land Uses	Area (Sq. Km)	Percentage
Residential	0.51	9.97%
Commercial	0.02	0.49%
Industrial	0.003	0.06%
Public Buildings		
Education	0.13	2.54%
Health	0.04	0.73%
Religious	0.01	0.24%
Security	0.26	5.13%
Others	0.04	0.73%
Recreational Facilities		
Parks	0.31	6.20%
Sports Complex	0.03	0.54%
Agricultural	1.46	28.84%
Barren/Vacant Land	1.40	27.70%
Range Land/Forest	0.33	6.52%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.00	0.00%
Water Bodies	0.26	5.10%
Transportation	0.26	5.21%
Total	**5.07**	**100%**

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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size

0 0.35 0.7 1.4 Kilometers

Map 10: Existing Land Uses in Tootki 04 NC

Chapter 2: Multi Criteria Analysis

Urban development is based on different benchmarks such as availability of resources, amenities, land uses and other services. Availability of resources are vital in the development of urban areas while amenities and land use also define the current use of land and how they can be planned for the coming years. The *scenario development* approach is employed for the future planning of the Parachinar Urban Center. These scenarios inform the planning and development process while exploring all potentials, weaknesses, opportunities and constraints of Parachinar.

The scenario development and suitability analyses have been prepared for different sectors including residential, commercial, industries, health and education. Using the survey-based studies as in the Background Studies and Analysis report, the suitable land has been determined for the planning horizon. GIS was used to prepare Land suitability Maps for different sectors according to the Multi criteria analysis methodology, a technique used to consider multiple criteria when analyzing an area's suitability for different uses.

For the multi-criteria analysis, all the existing land use layers were first converted to a projected coordinate system (Universal Transverse Mercator (UTM) zone 43N). Next, existing built up areas, water bodies, and preserved agriculture lands were set as constraint areas, and the remaining lands are used for proposing suitable land uses for Parachinar Urban Center. Figure 2-1 illustrates the removal of constrained areas and the resulting 13.72 sq. km. of land available for future development in Parachinar.

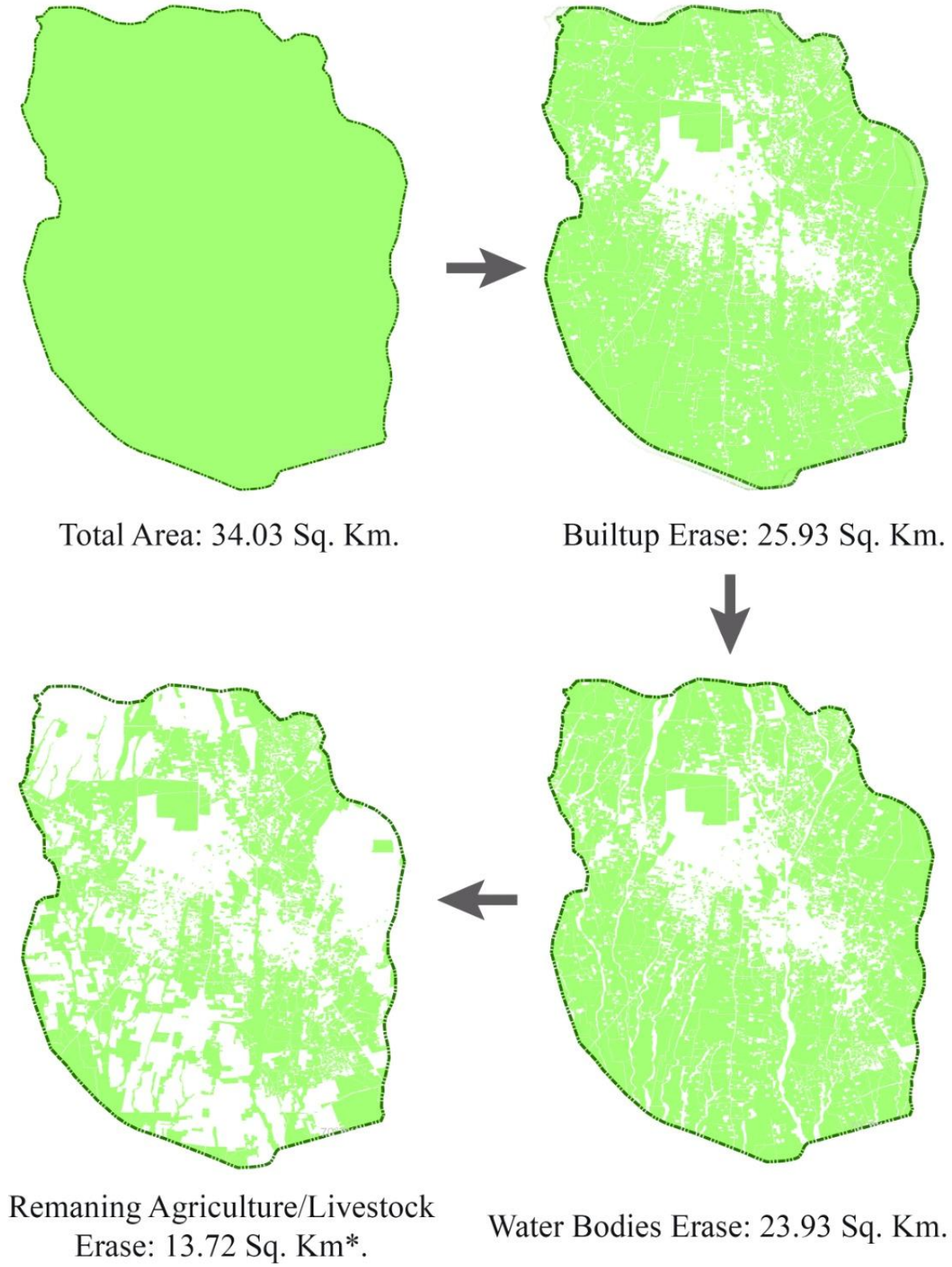


Figure 2-1: Constraint Areas in Parachinar Urban Center

Adjacent agricultural land to contiguous build-up converts to other land uses, such as residential and commercial, because 100% of agricultural land cannot be maintained for use in agriculture due to future city expansion. Therefore, by 2040, the 8.04 sq.km of remaining agricultural land, 2.17 sq.km land for livestock zone will be protected and considered as a development constraint.

As finalized with the UPPU, the land suitability analysis has been conducted for the following sectors:

- Residential,
- Commercial,
- Industrial, and
- Landfill site

Each sector is described along with its suitability criteria in the following sections:

2.1 Commercial

First, the main commercial hub was isolated from the proposed residential areas. Euclidean tool was used for the existing built-up areas.

The scoring system for the land suitability for Commercial areas is provided in Table 2-1. In general, lower weights mean less considerable areas whereas higher weight values mean more considerable areas.

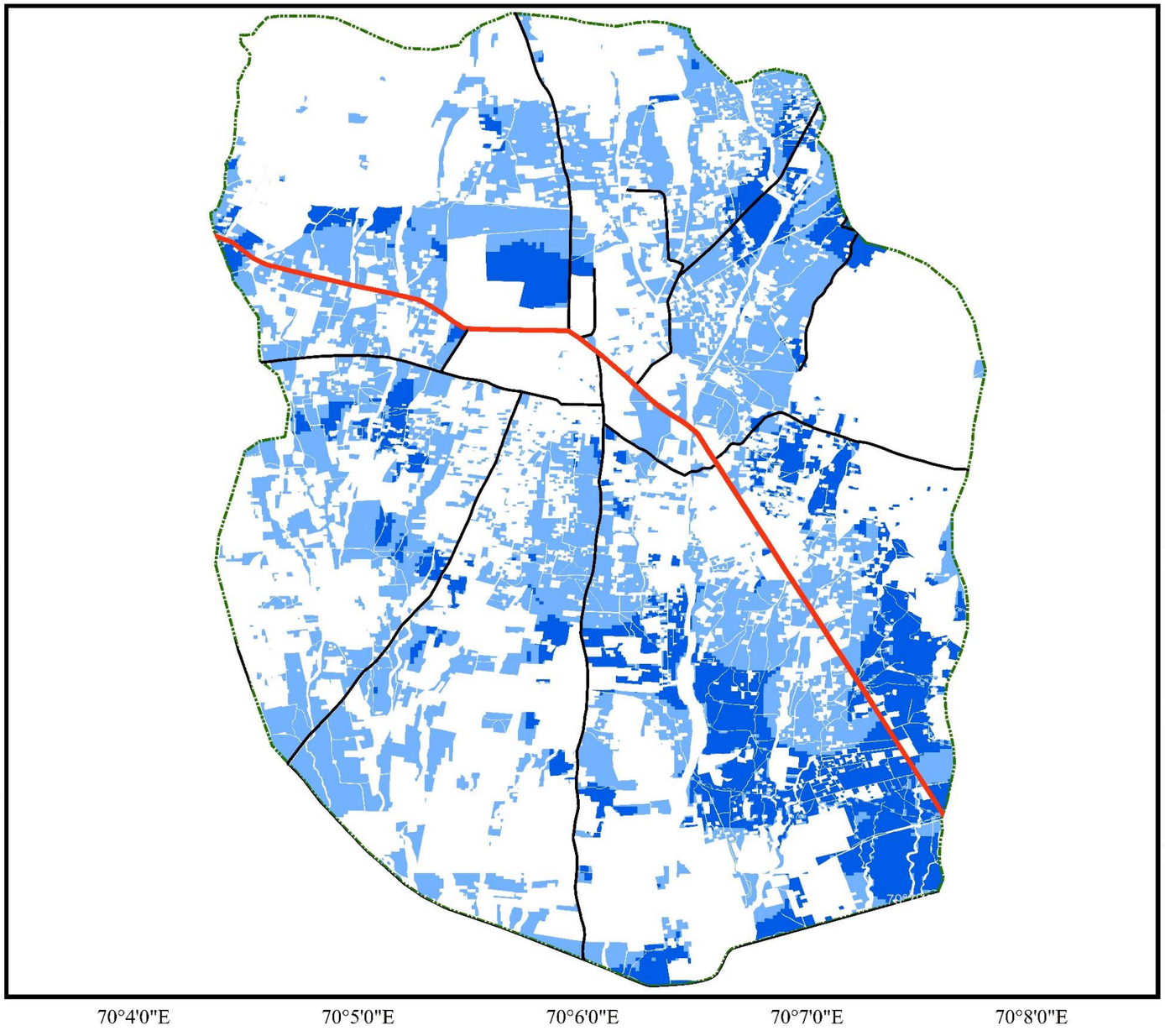
Similarly, the layer of existing built-up areas was reclassified. Areas within walking distance of existing built-up were given higher values and weightages while areas away from built-up areas were given lower values. The values assigned to different layers are based on the requirement of each land use.

Table 2-1: Multi Criteria Analysis for Commercial Development

No	Parameters/Layers	Influence (Total = 100)	Units	Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	Primary Road	15	m	17-800	4
				801-1600	3
				1601-2400	2

No	Parameters/Layers	Influence (Total = 100)	Units	Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
				2401-3200	1
				Above 3200	0
2	Secondary Road	5	m	17-200	4
				201-400	3
				401-600	2
				601-800	1
				Above 800	0
3	Land Cover	20		Agriculture/Range Land	1
				Open space	2
4	Land Value Rs. Per Marla	10	PKR	80,000-200,000	0
				200,001-400,000	1
				400,001-600,000	2
				600,001-800,000	3
				Above 800,000	4
5	Water Bodies	10	m	0-200	0
				201-400	1
				401-600	2
				601-800	3
				Above 800	4
6	Existing Built-up	20	m	0 -150	0
				151 – 300	1
				301 – 450	4
				451-600	3
				Above 600	2
7	Slope	5	degrees	0.02 º - 2 º	4
				2.1 º - 4 º	3
				4.1 º - 6 º	2
				6.1 º - 8 º	1
				Above 8º	0
8	Existing Commercial	15	m	0-400	0
				401-800	4
				801-1200	3
				1201-1600	2
				Above 1600	1

Parachinar Commercial Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	21.02	61.77%
Moderate Suitable	9.30	27.33%
High Suitable	3.71	10.90%
Total	**34.03**	**100%**

Project:
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Client:
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Planning and Development Department
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Consultant:
The Urban Unit
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 11: Parachinar Urban Center: Suitability Map of Commercial

2.2 Industry

Zones close to existing built-up were given lower values for the suitability of industrial areas, while the zones farther away were given greater values. Lower values mean less considerable areas whereas higher values mean more considerable.

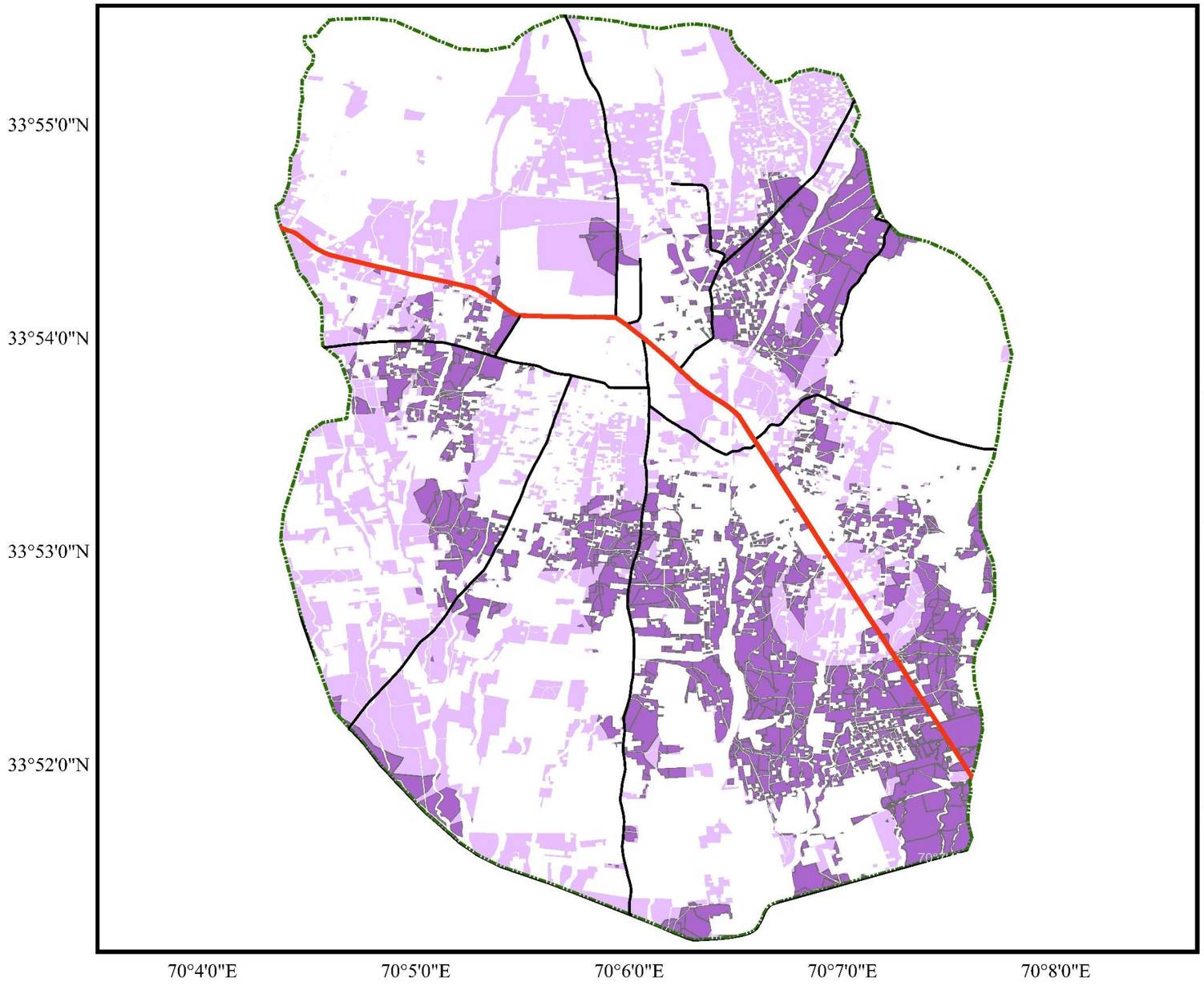
Likewise, the layer of existing built-up area was reclassified; the area near the existing built-up area was given a lower value whereas the area away from the built-up area was given a higher value. Table 2-2 outlines the important parameters for proposing a new site for industries. The values assigned to different layers are based on the requirement of each land use.

Table 2-2: Multi Criteria Analysis for Industrial Development

No	Parameters/Layers	Influence (Total = 100)	Units	Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	Secondary Road	15	m	17-300	4
				301-600	3
				601-900	2
				901-1200	1
				Above 1200	0
2	Land Cover	15		Agriculture/Range Land	0
				Open space	1
3	Land Value Rs. Per Marla	10	PKR	800,00-200,000	4
				200,001-400,000	3
				400,001-600,000	2
				600,001-800,000	1
				Above 800,000	0
4	Existing Industry	10	m	0-500	0
				501-1000	4
				1001-1500	3
				1501-2000	2
				Above 2000	1
5	Water Bodies	10	m	0-200	3
				201-400	4
				401-600	2
				601-800	1
				Above 800	0
6	Existing Built-up	20	m	0 -150	0
				151 - 300	1
				301 - 450	2
				451-600	3

No	Parameters/Layers	Influence (Total = 100)	Units	Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
				Above 600	4
7	Slope	10	degrees	0.02 º - 2 º	3
				2.1 º - 4 º	4
				4.1 º - 6 º	2
				6.1 º - 8 º	1
				Above 8º	0
8	Water Table	10	ft	30-120	2
				121-200	3
				201-400	4
				401-600	1
				601-750	0

Parachinar Industrial Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	20.15	59.21%
Moderate Suitable	7.43	21.83%
High Suitable	6.45	18.95%
Total	**34.03**	**100%**

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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 12: Parachinar Urban Center: Suitability Map of Industry

2.3 Landfill

For Landfill suitability, most of the influence was given to secondary roads, land cover and existing built-up area. The values and layers considered to be influential to landfills are shown in Table 2-3.

Table 2-3: Multi Criteria Analysis for Landfill

No	Parameters/Layers	Influence (Total = 100)		Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	Secondary Road	20	m	17-200	0
				201-400	1
				401-600	2
				601-800	3
				Above 800	4
2	Land Cover	20		Agriculture/Range Land	0
				Vacant Land	1
3	Land Value Rs. Per Marla	10	PKR	800,00-200,000	4
				200,001-400,000	3
				400,001-600,000	2
				600,001-800,000	1
				Above 800,000	0
4	Water Table	10	ft	30-120 ft	0
				121-200 ft	1
				201-400 ft	2
				401-600 ft	3
				601-750 ft	4
5	Existing Built-up	20	m	0 -500	0
				501 - 1000	1
				1001 - 1500	2
				1501-2000	3
				Above 2000	4
6	Slope	20	degrees	0.02 º - 2 º	0
				2.1 º - 4 º	2
				4.1 º - 6 º	4
				6.1 º - 8 º	3
				Above 8º	1

Parachinar Landfill Suitability Map

Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	23.31	68.50%
Moderate Suitable	4.81	14.13%
High Suitable	5.91	17.37%
Total	**34.03**	**100%**

Project:
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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 13: Parachinar Urban Center: Suitability Map of Landfill Site

2.4 Residential

An effort was made to ensure that the projected residential area would not be too far from the current built-up area. For this purpose, the distance from built up area was calculated and zones near the existing built-up area were given higher values.

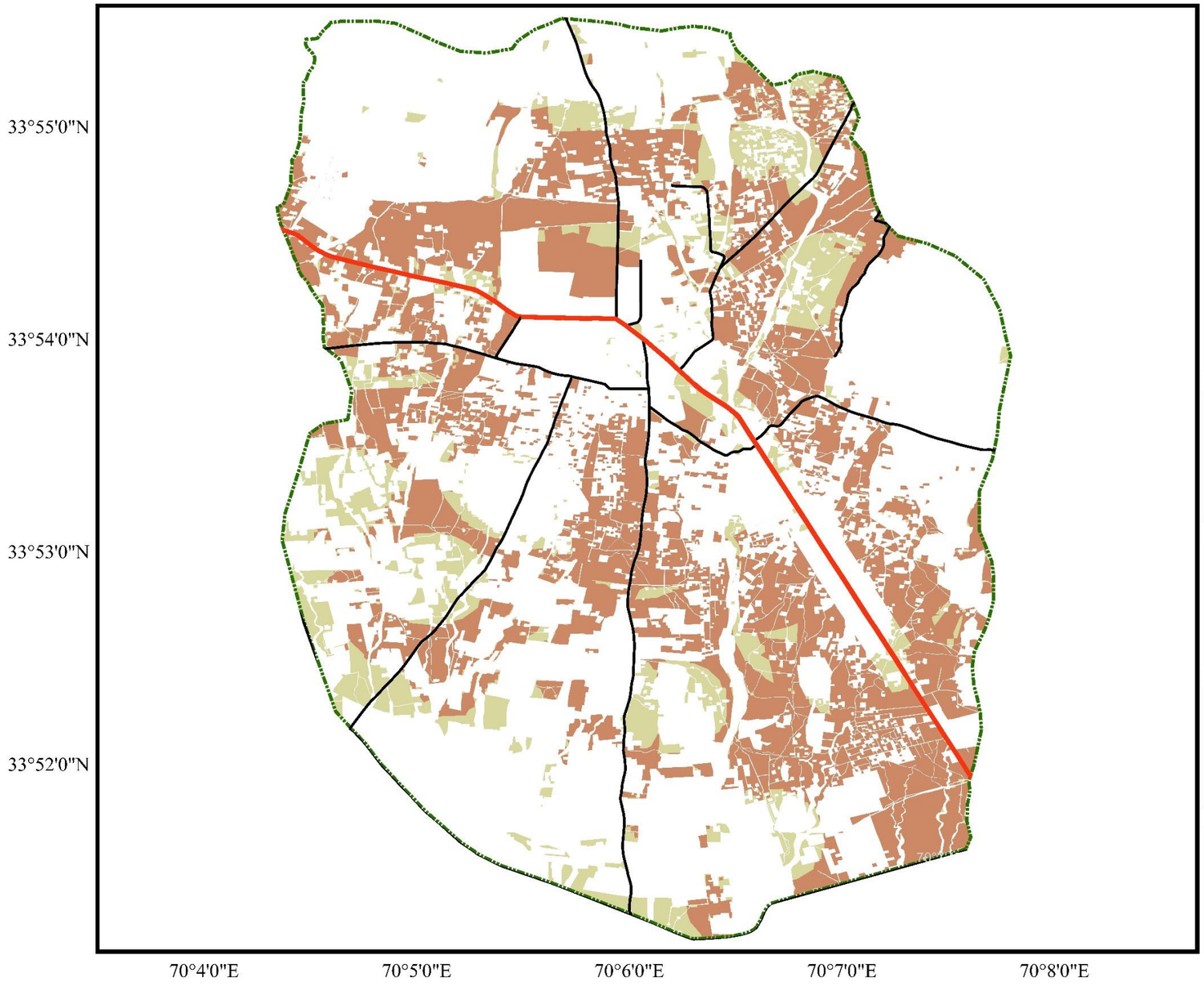
A selection of proper site for residential purpose is needed to protect the agricultural land and efforts should be made that suitable land is located on vacant land instead of farm land. To this end, agricultural lands were assigned less values and open spaces was given the highest value.

Table 2-4: Multi Criteria Analysis for Residential Development

No	Parameters /Layers	Influence (Total = 100)	Units	Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	Primary Road	5	m	17-800	4
				801-1600	3
				1601-2400	2
				2401-3200	1
				Above 3200	0
2	Secondary Road	10	m	17-300	4
				301-600	3
				601-900	2
				901-1200	1
				Above 1200	0
3	Land Cover	20		Agriculture/Range Land	1
				Vacant Land	2
4	Land Value Rs. Per Marla	15	PKR	800,00-200,000	4
				200,001-400,000	3
				400,001-600,000	2
				600,001-800,000	1
				Above 800,000	0
5	Slope	10	degrees	0.02 º - 2 º	3
				2.1 º - 4 º	4
				4.1 º - 6 º	2
				6.1 º - 8 º	1
				Above 8 º	0
6	Existing Commercial	10	m	0-400	0
				401-800	4
				801-1200	3
				1201-1600	2
				Above 1600	1

No	Parameters /Layers	Influence (Total = 100)	Units	Classes	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
7	Existing Industry	10	m	0-800	0
				801-1600	3
				1601-2400	4
				2401-3200	2
				Above 3200	1
8	Water Table	10	ft	30-120 ft	4
				121-200 ft	3
				201-400 ft	2
				401-600 ft	1
				601-750 ft	0
9	Water Bodies	10	m	0-200	0
				201-400	1
				401-600	2
				601-800	3
				Above 800	4

Parachinar Residential Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
least Suitable	20.61	60.56%
Moderate Suitable	4.81	14.13%
High Suitable	8.61	25.30%
Total	**34.03**	**100%**

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Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 14: Parachinar Urban Center: Suitability Map of Residential

Chapter 3: Approaches and Standards for Land Use Planning

3.1 Land Suitability

Land Suitability is an important aspect of land use planning and helps identify the most viable locations for future development and expansion of land uses, with respect to topography, environment, demography, infrastructure, and existing urban dynamics.

Land suitability should however not be seen as static and constant throughout the planning horizon. Instead, a well-developed Master Plan focuses on improving the land suitability of an area through provision of infrastructure, holistic land use planning, and development of planning guidelines and regulations. The existing land suitability analysis is therefore used as a starting point for improving the development conditions of Parachinar.

In this regard, a comprehensive strategy has been developed to improve the water supply, sanitation, sewerage, and solid waste management infrastructure (see Volume II Section 14) in order to facilitate future urban development in the underserved areas of Parachinar. Furthermore, a holistic land use plan has been developed based on the future needs of the area along with planning standards based on the National Reference Manual.

This master plan therefore focuses on providing a mix of compatible land uses based on these planning concepts and standards. Applications include; separating proposed industrial and residential land uses to prevent hazards and negative health outcomes, maintaining proximity of proposed commercial and residential uses to ensure that the population is well served with commercial outlets and job opportunities, and proposing low-income housing near industrial areas to reduce travel time and costs to places of work.

3.2 Land Allocation Standards – National Reference Manual

The subject area is comprised of various land use zones of which substantial uses include residential, commercial and industries. The proposed land uses include residential, commercial, industrial, educational and health facilities, an economic corridor, parking lots, and a logistics hub.

The National Reference Manual provides guidelines on the ideal mix of land uses in terms of recommended percentages of land allocation for each land use based on population. The projected population 2040 has been used as a basis for adopting the appropriate NRM guidelines on land use allocation. The NRM recommendations are summarized in Table 3-1.

Table 3-1: NRM Guidelines

City/Town Population Size Class	Residential %	Industrial %	Commercial %	Institutional %	Arterial Circulation/ Terminals %	Recreational Open Spaces %	Graveyards %	Vacant %
All Size Classes	24-50	2-20	0.5-5	2-21	2-29	0.5-7	0.5-6	3-45
500,000+	24-32	2-15	1-2	3-8	13-20	2-5	0.5-3.5	9-45
100,000-499,000	26-48	3-8	0.5-2	2-10	12-29	1-7	0.5-4	3-17
50,000-99,000	27-43	2-20	1-5	3-11	3-27	1-6	0.5-6	8-26
25,000-49,000	26-50	3-11	0.5-3	2-21	2-18	0.5-2	1-4	7-31

Source: National Reference Manual, 1985

3.3 Proposed Urban Form of Parachinar

Using Homer Hoyt's sectoral Land Use model, the following five type of Land Use Zones have been proposed for Parachinar:

- Commercial Zone
- Light industry zone
- Infill Development zone
- New Town (Residential Zone)
- Mixed Use Zone/ Economic Corridor

Details of each proposed land use zone to be implemented in the master plan of Parachinar are provided in the following sections.

3.3.1 Zone “A” Commercial Zone

This zone covers the proposed commercial zones in Parachinar urban center. Commercial zones are proposed in the middle of the city area for ease of access. Economic development often follows major transportation arteries because these areas offer high visibility and accessibility, making them attractive to businesses and consumers. Therefore, proximity to primary roads, secondary roads, existing commercial land, industrial areas, residential areas, transit points (bus stands, railway station, shopping malls etc.) and existing municipal infrastructure services have therefore been the selected criteria for determining commercial development.

3.3.2 Zone “B” Light industry zone

As per international best practices and the National Reference Manual for Infrastructure Standards, two industrial zones have been proposed in the Zeran Hassanzai and Tootki 2 areas, alongside the Southeastern border of the urban area and Zairan Road respectively. These locations are suitable due to their relatively flat terrain and accessibility by main roads, such as Thall-Parachinar Road. Moreover, they are segregated from the existing and proposed residential areas with an appropriate distance in line with the NRM standards.

3.3.3 Zone “C” Infill Housing

Infill housing refers to the development of new residential units on vacant or underutilized land within an already built-up urban area.

According to the *KP Local Government Private Housing Schemes Management and Regulations, Rules 2021*, up to 50 Kanals is the minimum area for the development or declaration of new town. Therefore, the lands spanning less than 50 Kanals between built-up areas have been considered as part of the Infill Zone.

This involves utilizing the available lands within existing neighborhoods, which include spaces between buildings or vacant lots, to create additional housing options. Infill housing helps maximize land use efficiency, reduces urban sprawl, and revitalizes established urban areas. Some advantages of infill housing for areas like Parachinar are:

1. People live in closer proximity to their place of work;
2. Increased dependence on walking and public transportation;
3. Increased number of affordable housing units;
4. Ability to utilize existing infrastructure like roads, transit, and parks;
5. Ability to redevelop vacant or underused properties; and
6. Creates mixed-use projects i.e. urban regeneration

The land allocation percentage for infill housing and development can vary depending on the specific goals and characteristics of the urban center, existing land use patterns, and the overall development strategy. It is however common for urban planning practices to encourage a significant portion of new housing development to occur through infill projects.

While there are no universally prescribed percentages, land allocations for infill housing are influenced by factors such as:

- **Land Availability:** The amount of vacant or underutilized land within the urban center. If there is limited available land, a higher percentage of development may be directed towards infill projects.
- **Revitalization Objectives:** Infill development is often used as a tool for urban revitalization and neighborhood renewal. In such cases, a higher land allocation percentage for infill housing may be prioritized to promote economic development and improve the quality of existing urban areas.
- **Zoning and Land Use Policies:** Zoning regulations and land use policies can influence the allocation of land for different types of development. If the zoning code allows for higher densities or mixed-use development in certain areas, it can encourage more infill housing allocation.
- **Community Priorities:** Community input and preferences can also influence the land allocation percentage for infill housing. It is important to consider the needs and aspirations of the local community when determining the allocation of land for infill development.

3.3.4 Zone “D” Residential New Towns

Infill development alone will not be sufficient to meet the housing needs of the Parachinar urban core during the course of the 20-year plan. Although infill housing is an option for compact development, it is suggested that the substantial unoccupied land inside the Parachinar urban area boundary be used for improved and planned housing schemes at various sites to accommodate all socioeconomic levels. A new housing zone is therefore being proposed along the south side of the main Thall-Parachinar Road (TPR).

3.3.5 Zone “E” Mixed Use Zone/Economic Corridor

City’s like Parachinar are more prone to growth along a main road than concentrically. A linear mixed use/economic corridor has therefore been proposed along the TPR to promote ribbon development in an efficient and planned manner. This results in defined sectors and partial rings of activity and land uses around this economic corridor which features a mixed zone containing public and private health and education facilities and economy generating land uses. The city's mixes of various layers and how they are kept together will enhance the existing quality of life for the people in light of its socio-cultural legacy.

With the sector land use model in mind, proposals have been made for the Parachinar urban area such that sector-based growth and development alongside transportation corridors is optimized. Given that the CBD is conveniently located in the center of the city and is highly reachable, the proposed development is in accordance with the Sector Land Use model with slight variations.

Chapter 4: Scenario Development

Scenarios are possible future conditions of Parachinar that can be predicted using models and spatial data. It assists in proactive decision making about the many ways the future may unfold and how authorities can be responsive, resilient, and effective in the short- and long- terms.[4]

The scenario planning process in Parachinar begins with scanning the current reality, forming forecasts, and considering the influential internal and external factors to produce a set of plausible potential futures (i.e. scenarios). It then develops a series of initiatives, projects, and policies that may help support a preferred scenario, a component of a scenario, multiple scenarios, or all scenarios which indicate how a scenario component is likely to occur. This alerts authorities when the likelihood of a scenario becoming a reality is higher, prompting them allocate funds and moving into implementation.[5]

As land use is the foundation of all urban development, land development scenarios have been used to represent the future development in Parachinar urban center. This helps understand the potentials and constraints in the development of the Parachinar urban area for the planning period.

Three scenarios have been envisioned to provide a better look at the future proposals for Parachinar city. The details of each are explained in the sections below.

4.1 Scenario A: Business as Usual (BAU)

The Business as Usual (BAU) scenario has been developed for the Parachinar urban center keeping in view that “things won’t change” and grow as per convenience. This focuses on the identification of problems that exist in the Parachinar urban center without any planning interventions. Future projections have been made in the *Background Study Report* to forecast the effects of the current scenario for future years.

According to the 2021 land use survey conducted by the Urban Unit and HP Consultants, the total population of the Parachinar Urban Area is 52,729 people, and

[4] https://www.planning.org/knowledgebase/scenarioplanning/

[5] https://www.planning.org/knowledgebase/scenarioplanning/

the average annual growth rate is 1.63%[6]. The population growth is predicted based on the previous census reports. The population for the year 2040 is projected using the geometric growth method and is approximately 76,500 people. As the population increases, so will the demand for utilities, services, and housing. 'Doing Nothing' means there would be lesser education and employment opportunities for future generations and the provision of amenities and services will pose a great challenge for development authorities.

4.1.1 Sector-Wise Problems and Future Projections

The existing problems and their impacts on each sector have been discussed in this section to foresee the future situation if no interventions are made. The BAU for each sector is given below to examine how they will unfold their respective dimensions in the future.

4.1.1.1 Residential

Housing is an important sector as housing, besides providing shelter and raising the quality of life, is closely associated with the process of overall socio-economic development.

The weak structure of Local Government, overlapping of existing laws, land-use rules and regulations, local conflicts, and lack of disaster management has caused many social, environmental and economic issues which have directly affected the housing sector of Parachinar. This has resulted in housing dilapidation, shortage, and overcrowding. The quality of housing has deteriorated due to the poor economic condition of people, weak building control, and low awareness of modern construction methods.

Table 4-1: Existing Housing Structure in Parachinar

Structure type	Percentage
Katcha	19.46%
Pakka	60.00%
Semi Pakka	20.54%
Grand Total	100.00%

Source: HIS Survey, Urban Unit and HP Consultants

[6] Pakistan Bureau of Statistics, Census 2017

The existing layout of residential buildings of the Parachinar urban center is irregular and the primary building material is mud and brick stone. The trend of making new buildings using concrete is replacing the traditional environmentally friendly construction materials which will create a jungle of concrete in the future.

As per the *Background Study report*, housing structures in Parachinar are not according to planning standards and the current situation of housing is highly unsatisfactory as 19.46% of the houses in the area are Katcha. If this pattern continues, there will be no development in the housing infrastructure and the katcha housing will eventually collapse following a disaster and cost the lives, economy and infrastructure of the Parachinar urban center.

Figure 4-1: Existing Condition of Residential Buildings

Owing to the tradition of the area, specifically privacy, almost 72.78% of the total houses are single-story. As prices are low in rural and tribal areas, most houses are single story with a maximum height of 20-25 feet from the ground. If no interventions are made, there will be insufficient land for future housing as the density is low at the current stage. With increasing population and housing demand, will aggravate this problem and cause agricultural land to be utilized to accommodate more housing. This

results in urban sprawl which ultimately degrades the environment and hinders proper land utilization.

Table 4-2: Existing Size of Housing Units in Parachinar

Size of housing units	Percentage
Less than 5_Marlas	4.86%
5-10 Marlas	31.35%
11-20 Marlas	35.68%
Above_20 Marlas	28.11%
Grand Total	100.00%

Source: HIS Survey, Urban Unit and HP Consultants

The household survey reveals that approximately 28.11% of the sample housing units are greater than 20 Marla's. 35.68% of the housing units are between 11 and 20 Marlas, 31.35 % of housing units are between 5 to 10 Marlas, and only 4.86% of the total housing units are less than 5 Marlas.

Meanwhile, 30% of the population earns less than 30,000 PKR a month. The income level is low while the land ownership and area of housing is greater than required. Accommodating less population and utilizing larger plots of land will trigger problems in the quality of housing due to low income and investment on housing. The backlog of prime developable land will cause abuse of resourceful agricultural and forest lands for housing.

The existing scenario shows that the land utilized for housing or residential purposes is insufficient for the current population of the Parachinar urban center, with an overall shortage of 4,138 housing units. The projection shows that the area required for 2040 is 3.96 sq.km. for residential zones with a proposed household size of 5.30 person. This translates to a projected housing supply 14,428 units. Details for these projections and housing demand are provided in **Section 6.1: Residential Zone**.

Based on current housing conditions, the situation may worsen by 2040 if the BAU is adopted. It will not only widen the gap between the demand and supply but also trigger associated problems such as lack of water supply causing decreased water levels of the area, lack of sanitation services causing health and hygiene issues, and overcrowding, which will affect the living standards and livability of the urban center.

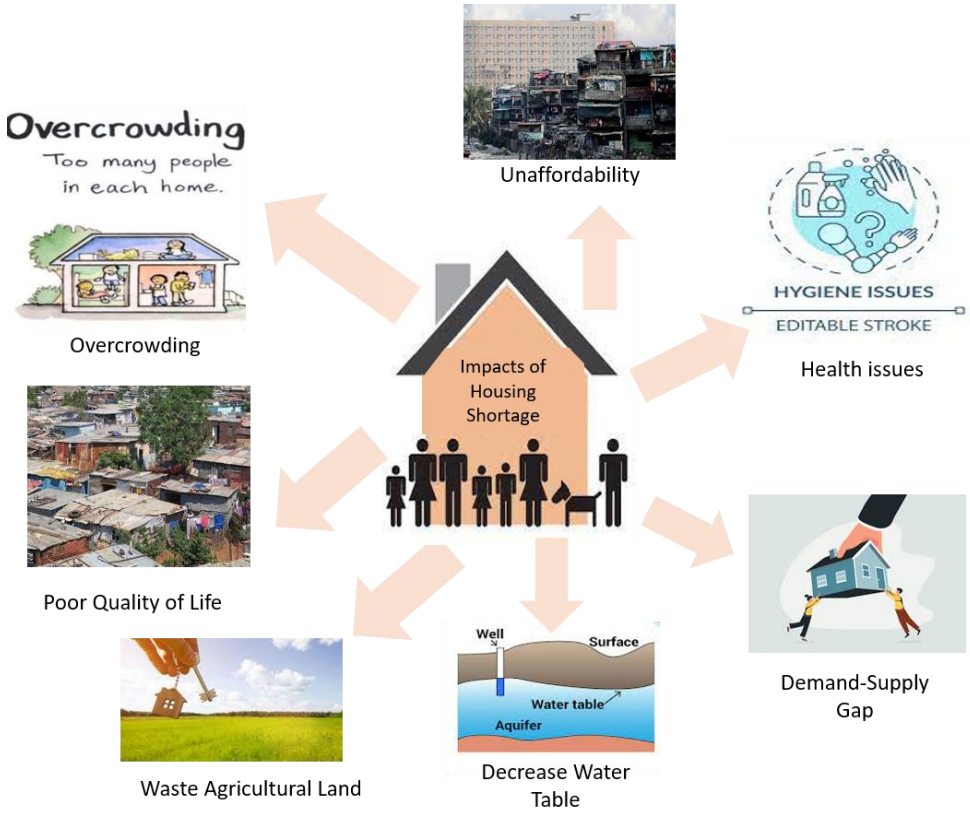


Figure 4-2: Impact of Housing Shortage

4.1.1.2 Commercial

Parachinar urban center has been economically underdeveloped due to the illegal conversion of land, the absence of a tax collection system, the unavailability of electricity and gas supply to markets/bazaars, the non-availability of raw materials and the lack of infrastructure. If no interventions have been made in the future, the area will not be stable enough to contribute to the overall national economy of the country.

Parachinar is close to the Afghanistan border and is a hub of commercial activities. As of 2021, Commercial land use occupies about 93.9 acres of land, which is around 1.12% of the total 0.38 sq. km. of Parachinar's built-up area and 1.18% of the total land use. The urban population of the Parachinar urban area in 2021 was 52,729 persons.

The projected population of Parachinar for the year 2040 is 76,481. According to the National Reference Manual, the commercial area must be between 1-5 percent of the total land use for such population. While the current area is 1.12 percent, there is a need for further commercial development. If the current situation continues and the required commercial area is not provided, there will be less employment for locals,

decrease marketability, less sales and purchases of commodities, reduced capital value and ultimately low productivity of the area.

The commercial buildings are deteriorated and the natural skyline of the area is not followed due to the absence of design guidelines and standards. There are apparently no by-laws that are given or enforced by the authorities. Open sewage lines add to the unpleasant experience of the commercial areas, and there are no designated parking spaces. If no interventions are made, the economy, trade, visitor influx, and overall commercial fabric of the area would be ultimately degraded.

Figure 4-3: Existing Condition of Commercial Area

Moreover, the conversion of residential land uses into various types of economic activities is a new phenomenon, particularly along major roads of residential areas and arterial roads of the urban center. This conversion has proceeded with and without official consent in a haphazard manner. In the future, this will result in parking problems, reduced traffic capacity of roads, and subsequently increased congestion, energy use, air and noise pollution, and burden on utility services.

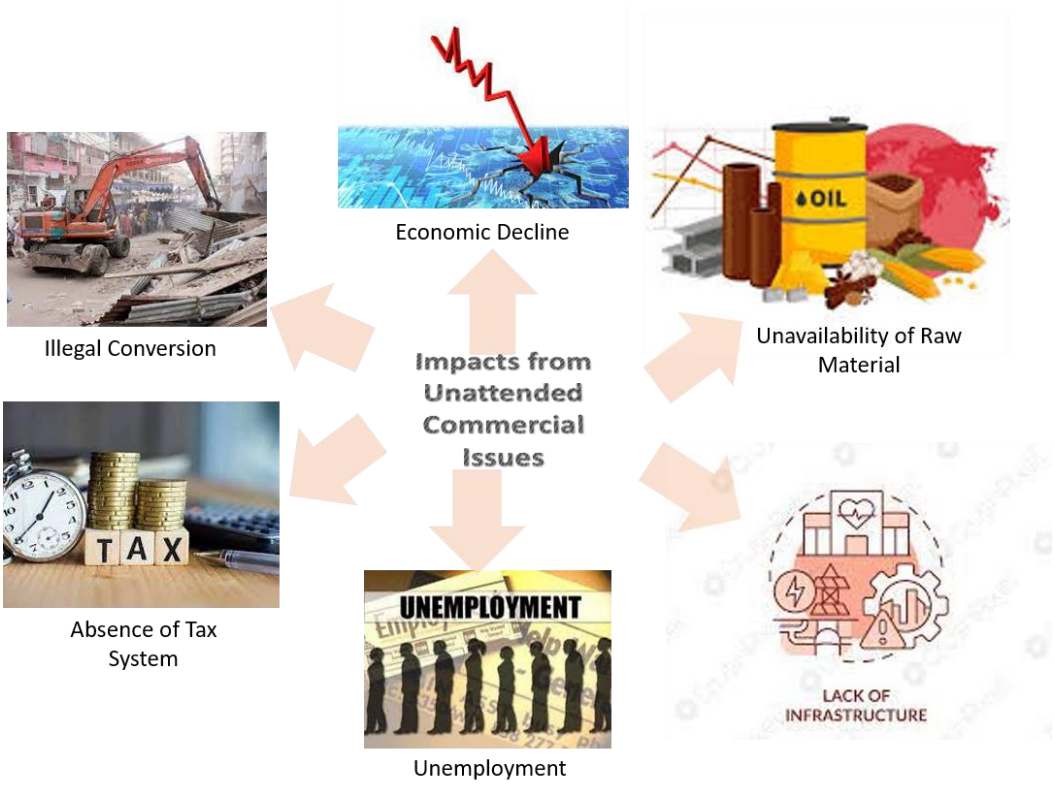


Figure 4-4: Impact of unattended Commercial Area

4.1.1.3 Industry

Owning to its proximity to the border, the industrial products-related needs are not fully met under the Afghanistan Transit Trade. The security of the area has hampered any industrial growth and has resulted in a small base for industrial production in the area. The existing industrial development in the area has been unplanned and has mostly happened in the center where all the urban development exists, alongside major arteries.

Lack of power is a significant issue of low industrial productivity in Parachinar. If no interventions are made, the area will lose industrial potential (from Afghanistan), and exhibit lower levels of productivity and employment, less human capital and finances, higher costs of production and substandard products, weak infrastructure, less role of public and private sector enterprise and trade policy distortion.

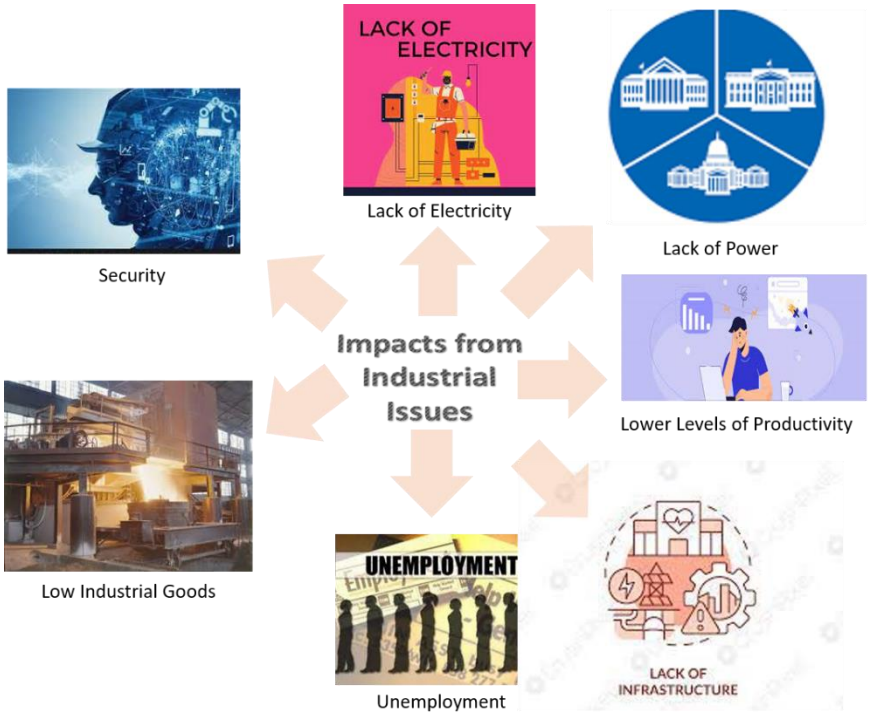


Figure 4-5: Impact of Industrial Issues

4.1.1.4 Education

Low literacy rate, high gender disparity, and substandard infrastructure are significant issues in Parachinar urban center. Lack of middle schools for girls and vocational and training centers will eventually affect the economy, employability and contribution to the GDP of the future generations.

The supply of educational facilities and gender inequality in Parachinar has an impact on a family's socioeconomic position such as uneven access to education, job segregation, absence of legal protections and religious freedom, poor medical care, and lack of political representation.

If education supply issues are not addressed by 2040, future generations of Parachinar will be unable to attain high-order life skills such as reflection, critical thinking, analysis, research and creativity, shortened human capital and lower employability.

Figure 4-6: Consequence of Lack of Education

4.1.1.5 Health

Accessible, equitable, and quality healthcare for all people is the apparition of the Parachinar government. However, Parachinar is challenged in the health sector with few health facilities available in the urban centers which do not fulfil the health requirements of its people. This has resulted in inaccessibility of basic health facilities, ignorance of personal hygiene, overcrowding, and improper sanitation.

Few private clinics are operating in the area. According to the *Background Studies of Parachinar*, the entire tehsil Upper Kurram has only one hospital, eleven basic health units, ten community health centers, eighteen community dispensaries, and one mother and child health center.

By 2040, if health services will not expand and are overlooked by the authorities, health disparity will worsen. Subsequently, inadequate, inaccessible, and/or poor medical care further will exacerbate healthcare costs. The workforce will also not be robust enough to function effectively following Parachinar's requirements as health disparities increase.

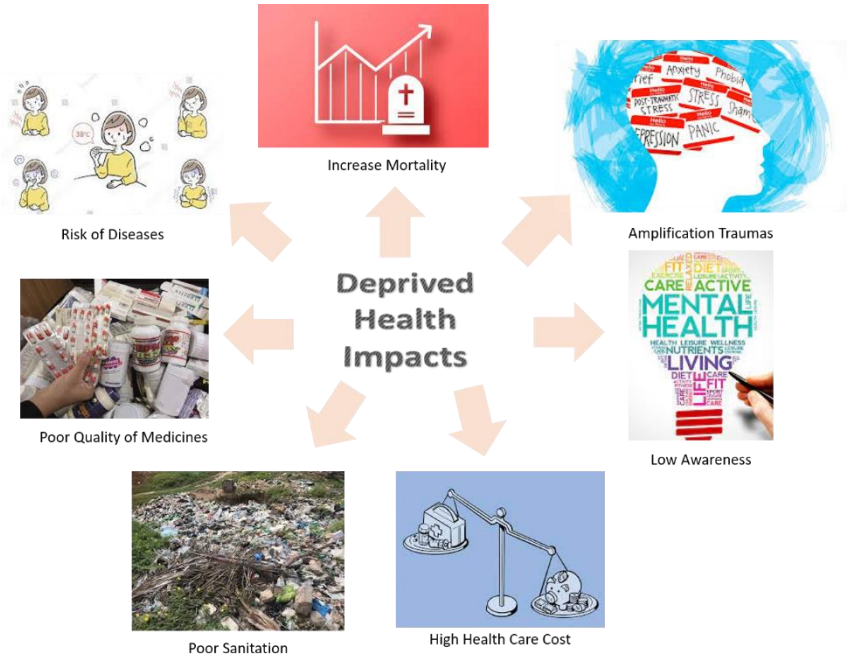


Figure 4-7: Impact of Deprived Health Facilities

4.1.1.6 Connectivity and Accessibility

The major problems of poor infrastructure, lack of public transport, shortage of trained police staff, absence of parking spaces, limited pedestrian movement and congestion continue to affect tourism and trade in the Parachinar urban center.

Furthermore, the lack of paved roads, shoulders, footpaths, drains, or metaled surfaces cause difficulties for the locals affect the accessibility of basic health, education, and economic activities in Parachinar.

If the road network remains in the same condition, there will be a decline in the tourist influx which will adversely affect the revenue generation and economic growth of the Parachinar urban center. Moreover, it will also burden the transport sector by damaging vehicles, increasing fuel consumption, cost of travel, and degrade the environment of the urban center. Traffic congestion in the city is causing an increase in travel costs and delays the travel time of the people which is making it impossible for outsiders to navigate in the city, eventually affecting the tourism of the city.

Absence of public transport causes accessibility issues in the urban center, motorization, irregular development of public transport systems, increase in private vehicle ownership, which ultimately burdens the environment and creates an inefficient transportation system in the future.

All parking activity in the Parachinar Urban Center is informal. People their vehicles on streets or footpath. Formal parking spaces for vehicles will be required to accommodate the future traffic and parking demand on Parachinar's road network.

The roads of Parachinar are deprived of basic traffic signage. The absence of signage complicates intersections, and puts pedestrians and vehicles at risk of collisions, during times of congestion. The low-income population will be most affected by these problems as they are more vulnerable to suffering the effects of the current transportation system.

Figure 4-8: Challenges of immobility

4.1.1.7 Landfill Site

According to the household information survey, there is no mechanism for solid waste collection, transportation and dumping implemented by the TMA. Every neighborhood council has garbage dumps, locally called "Derans," where solid waste is disposed-off. The TMA does not serve the entire area, which is a major service delivery problem in the urban center. Solid waste is left unattended in an open area and often ends up in open drains and in sewers which cause choking and overflowing of drains during Monsoon season.

An inefficient municipal solid waste management system creates serious negative environmental impacts like infectious diseases, land and water pollution, obstruction of drains and loss of biodiversity.

According to the *Background Study report* the waste generation of the urban center in the current scenario is 24 tons per day. The projections for 2040 show that it will increase to 31 tons per day and 11,166 tons per year. Under the BAU scenario, the Parachinar urban center will be filled with waste, adversely affect the environment, and eventually make it an endangered city.

Figure 4-9: Challenges of Solid Waste

4.2 Scenario B: Sectoral Planning

Focused on the sectoral development in order to prevent urban expansion and mushroom growth in the urban core of Parachinar. Different zoning and planning technique have been used such as infill housing, new towns, commercial, industrial, a logistic center, and a bypass to meet the area's long-term demands. This will

contribute to the sustainability of Parachinar's economic growth and prosperity. The below maps show the detailed sector wise scenario:

4.2.1 Residential

A *compact development* approach has been employed to better utilize the available land area for providing housing in Parachinar. The existing residential area is 4.24 sq.km and includes a total of 5,239 existing housing units.

The NRM suggests a housing supply standard of between 27%-43% of a subject area with population between 50,000 and 99,000. The minimum and maximum residential areas are therefore 9.18 sq.km and 14.62 sq.km respectively based on a total study area of 34 sq. km. The below table shows the existing housing statistics in Parachinar.

Table 4-3: Existing Housing Characteristics

Existing area (sq. km.)	4.24
Existing area (in %)	12.46
Existing number of houses	5,239
Recommended NRM standard	27% to 43%
Recommended residential area – min (sq. km.)	9.18
Recommended residential area – max (sq. km.)	14.62
Required (Recommended (min) – Existing Land Use) sq. km.	4.95
Required (Recommended (max) – Existing Land Use) sq. km.	10.38

For Parachinar, both new housing and infill are recommended. Infill development is emphasized as it helps delineate the limits of growth for urban areas and protects undeveloped land at the periphery of the city. Locals are benefited from being nearer to social services and places of work. It also utilizes the existing infrastructure and facilities.

A total of 14,428 dwelling units are required for Parachinar for the planning horizon. Detailed calculations of the housing requirements are provided in Section 6.1. The figure below illustrates the zones where housing may be provided under this scenario.

Figure 4-10: Proposed Residential Zone

Table 4-4: Key Features and Rationale for Scenario B: Residential

Key Features	Rationale
Infill housing in the strips close to the existing main road to fill the vacant parcels within existing residential area	Future housing development within existing residential area is highly feasible due to urban agglomeration dynamics, and will efficiently utilize existing space and promote denser urban form
New housing to be proposed on largely vacant land and along the main Thall-Parachinar road	This will cater the need for new housing units and helps to overcome the housing shortage

4.2.2 Commercial

The commercial zones are proposed based on the growing population and the requirements for commercial areas. This allows businesses to identify new opportunities, enter new markets, and expand their products or services. Parachinar is important because it is close to Afghanistan Border. The existing commercial area is 0.38 sq.km.

The NRM suggests the commercial standard between 1%-5% of a subject area with population between 50,000 and 99,000. The minimum and maximum commercial areas are therefore 0.34 sq.km and 1.7 sq.km respectively based on a total study area of 34 sq. km. The below table shows the existing commercial statistics in Parachinar.

Table 4-5: Existing Commercial Characteristics

Existing area (sq. km.)	0.38 Sq. km
Existing area (in %)	1.12 %
Recommended NRM standard	1% to 5%
Recommended commercial area – min (sq. km.)	0.34
Recommended commercial area – max (sq. km.)	1.7
Required Area [Recommended (min) – Existing Land Use]	-0.04
Required [Recommended (max) – Existing Land Use]	1.32

Currently there are 93.9 acres of commercial area and 355.83 acres of mixed use/institution zone that includes health, education, public facilities, masjid hujras etc. This indicates that Parachinar needs more commercial land to cater to the needs of its residents for the next 20 years.

Appropriate parking, loading and unloading facilities and upgraded infrastructure needs to be provided to support the commercial areas and mixed-use activities. The Main Thall-Parachinar Road is suggested as an economic corridor to generate more commercial activities and to make this area economically sustainable. Furthermore, commercial areas are proposed near industrial areas.

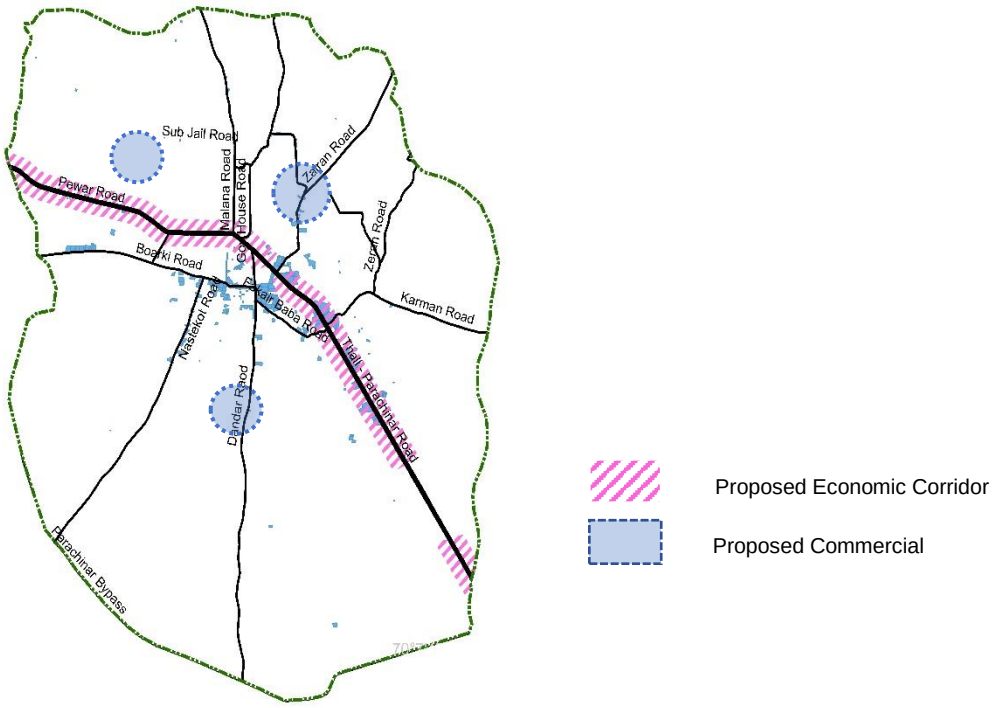


Figure 4-11: Proposed Commercial Zone

Table 4-6: Key Features and Rationale for Scenario B: Commercial

Key Features	Rationale
Main Thall Parachinar road to be a main economic corridor. Commercial centres to be proposed alongside the infill housing	They will provide connection between economic nodes or hubs, usually cantered on urban landscapes, in which large amount of economic resources and actors are concentrated. Also, link the supply and demand sides of markets. These high-visibility locations offer opportunities for infill development for local retail, housing, and social and cultural destinations.

4.2.3 Industry

Industrial zones are proposed to capitalize on Parachinar's natural resources and subsequently strengthen the local economy in terms of GDP. Parachinar's proximity to the Afghan border is also an influential factor with regards to import and export activity. The existing industrial area of Parachinar is 0.03 sq.km.

For an area with a population between 50,000 and 99,000, The NRM suggests the commercial standard between 1%-5% utilization for industrial purposes. The range of industrial area to be provided is therefore between 0.34 sq.km and 1.7 sq.km based on a total study area of 34 sq. km.

Table 4-7: Existing Industrial Characteristics

Existing area (sq. km.)	0.03
Existing area (in %)	0.09
Recommended NRM standard	2% to 20%
Recommended industrial area – min (sq. km.)	0.68
Recommended industrial area – max (sq. km.)	6.8
Required (Recommended (min) – Existing Land Use) sq. km.	0.65
Required (Recommended (max) – Existing Land Use) sq. km.	6.77

The industrial area is proposed on the lower south-east end of the study area as it is reasonably distant from prominent residential areas and can be accessible by the TPR and the Parachinar Bypass. A logistics hub is also proposed in this scenario to support the industrial area with shipment and lodging facilities.

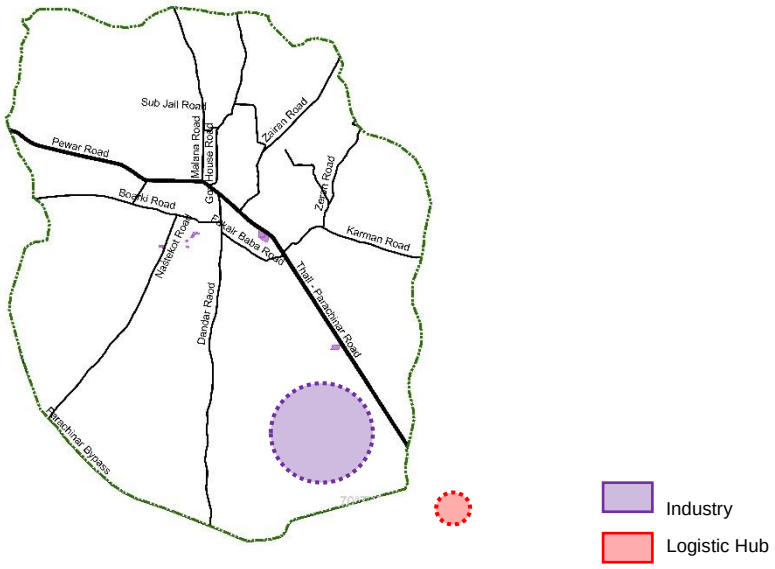


Figure 4-12: Proposed Industrial Zone

The detailed rationale of each scenario with justification is elaborated in the below table:

Table 4-8: Key Features and Rationale for Scenario B: Industry

Key Features	Rationale
Industry is proposed in the south side with a buffer alongside the main road Housing is proposed alongside of the industrial area A logistic hub is proposed near the industry and it will allow the urban centre to connect with different freight types	The productivity of an area will increase by industrial development. Alongside to this with an appropriate buffer, housing is provided which also helps to aid to provide shelter to labour. Logistic hub will help to ease the flow of goods across area.

4.3 Scenario C: Multi-Nuclei Development

This option focuses on compact development to control urban sprawl in Parachinar urban center and explore alternative utilizations of land for their effects on adjacent and complimentary land uses. Compact development not only preserves the environment, but also generates synergies across urban systems which provide more equitable growth. This results in smaller areas of impact, makes more efficient use of utilities and infrastructure such as roads, reduces consumption of land, and can result in significant energy savings.

4.3.1 Residential

Residential zones are proposed based on the present and future demand of Parachinar's Urban Center. There are 5,239 dwelling units spread throughout 4.24 square kilometers.

As per NRM standard, the minimum and maximum area requirements are 9.18 sq. km and 14.62 sq. km respectively. This translates to a housing requirement of 14,428 units by 2040.

Two forms of housing are suggested to fulfil these requirements: new development and infill development. In order to boost compactness and density, infill housing is suggested within the vacant lots of the current built-up area. In the city, there is 9.08 sq.km of vacant or barren land available out of 34.04 sq.km. The total proposed area for residential development is 3.96 Sq. km out of which 2.80 Sq.km is infill. 1.16 sq. km of land is allocated for new housing development. The proposed residential zones under Scenario C are depicted in the figure below.

Figure 4-13: Proposed Residential Zone

Table 4-9: Key Features and Rationale for Scenario C: Residential

Key Features	Rationale

Infill housing in the centre of city, near proposed industrial area and along the main Thall-Parachinar road	Future housing development within existing residential area is highly feasible as it will efficiently utilize existing space and discourage the speculation
New housing to be proposed along Thall-Parachinar road and Pewar Road and near proposed industrial area	This will cater the need for new housing units and helps to overcome the housing shortage and commute problem will be resolved for the low-income people.

4.3.2 Commercial

In line with the multi-nuclei approach, the commercial zones have been proposed to distribute the commercial activity and make it more accessible to its adjacent land uses. This is preferable to concentrating the commercial uses into a singular large nucleus which has negative effects such as congestion. In this scenario, the Thall-Parachinar Road is proposed as a commercial corridor in order to constrain future haphazard and/or illegal commercial developments in its vicinity.

There are currently 93.9 acres of commercial spaces. By 2040, 22.2 acres of land is proposed for commercial land use to fulfil the needs of locals. 1.2 sq.km is proposed for the mixed land use to enhance the livability and walkability of urban areas, by

providing a mix of housing, employment, services, and amenities within a short distance.

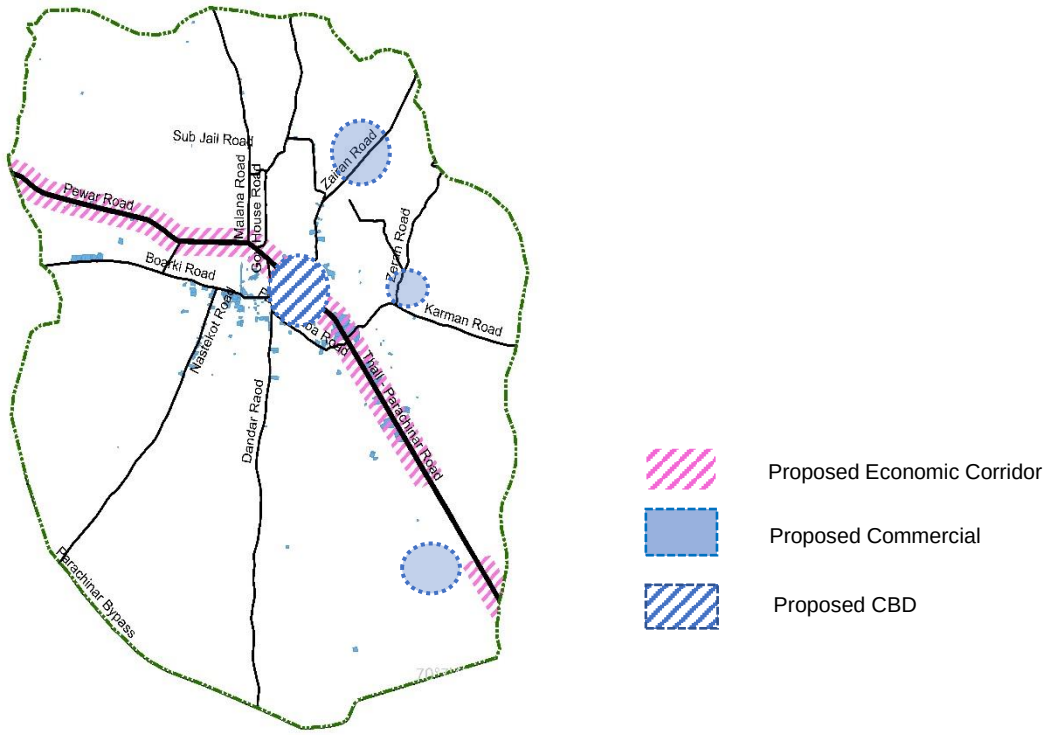


Figure 4-14: Proposed Commercial Zone

Table 4-10: Key Features and Rationale for Scenario C: Commercial

Key Features	Rationale
New commercial areas to be proposed near the proposed residential zones and industrial area	Commercial area near industrial area will give multiple benefits to residents and area in terms of economic development. Industrial goods and services are well distributed across area and it will increase overall profits by creating new revenue streams. It improves internal operations by adding services to products and enhances overall customer relationships.

4.3.3 Industry

Industrial area to be proposed keeping in view the existing and future needs of the study area. Given that the existing industrial area is 0.03 sq. km and the NRM recommended land allocation for industrial areas is between 2%–20%, the required industrial area is between 0.68 and 6.8 sq.km. A total of 0.7 sq.km area has therefore been proposed to fulfill the industrial demand of the area.

The industrial areas are proposed in the upper North side along Zairan Road and on the lower side along the Thall Parachinar Road. Both locations are feasible for daily commute and providing access to the Afghan border.

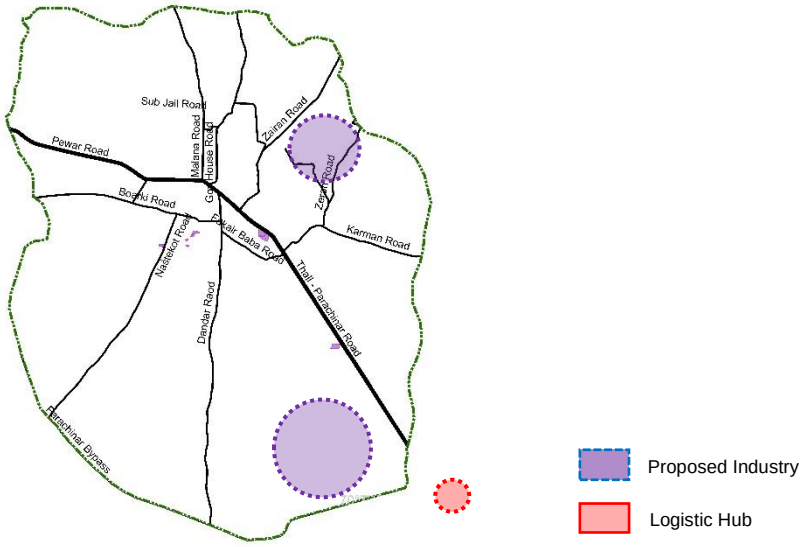


Figure 4-15: Proposed Industrial Zone

Table 4-11: Key Features and Rationale for Scenario C: Industry

Key Features	Rationale
Industrial area to be proposed in the upper North side along Zairan Road and on the lower side along main Thall Parachinar Road.	Currently, industry is on one side of the study area that is located on the Thall Parachinar Road. To overcome the load two industrial zones are proposed on North and South side. Industrialization offers a range of potential benefits, including more job creation, higher economic growth.

Both scenarios B and C have their own impacts on the study area. However, Scenario C is preferable due to its focus on compact development, and efficient utilization of land resources. Compact development is often supplemented with mixed-use development to incorporate a variety of functions (housing, offices, retail, etc.). As a result, it reduces the need for driving and promotes walkability. The detailed explanation of this scenario is explained in the following Chapter.

Chapter 5: Proposed Strategies of Scenario Development

The progressive features that are shared by the different scenarios are considered and undesirable facts have been avoided.

Parachinar: A Rising Trade and Tourism Hub

In this scenario, Parachinar urban center adopts a comprehensive and strategic approach to its development, with a focus on ensuring the long-term viability of its economic, social, and security systems.

To achieve this, investments are prioritized in infrastructure, such as transportation networks, energy systems, and connectivity, to create an environment that is conducive to business growth and innovation. It also focuses on attracting and retaining businesses and skilled workers through policies that support entrepreneurship, innovation, and development.

This scenario prioritizes sustainable and inclusive economic growth, with a focus on reducing inequality and promoting equity. This could involve investments in social infrastructure, such as affordable housing, education, healthcare, and cultural amenities, to improve the quality of life for all residents.

In addition to economic development, Parachinar prioritizes trade for economic prosperity. This involves raising job opportunities and living standards for people by providing affordable goods and services, investments in green infrastructure, such as renewable energy systems, green spaces, and sustainable transportation, as well as policies and programs to encourage sustainable behavior among residents and businesses.

Overall, the goal is to create a safe, resilient, livable, and sustainable urban environment that supports economic growth and prosperity for all residents, while safeguarding the planet for future generations.

5.1 Strategies

The strategies which are adopted in the scenario development of the Parachinar urban center comprise compact development, eco-tourism, environmental conversation,

economic development, sustainable infrastructure and transportation, and institutionalization.

Compact development aims to create more livable, sustainable, and vibrant urban communities that support economic development, social equity, and environmental sustainability. This strategy targets the issues of large-scale horizontal development, urban sprawl, overutilization of land, single land use, and lack of interlinked road network arising in housing, commercial, land management and transportation sectors.

Ecotourism aims to achieve a balance between economic growth and the conservation of natural resources by promoting responsible and sustainable tourism practices. This addresses the issues of environmental degradation, lack of tourism infrastructure, conservation practices, awareness, local economy, and limited tourist facilitation in the tourism sector.

Environmental conservation aims to protect and preserve the natural environment and its resources for the benefit of present and future generations This helps resolve the issues of endangered biodiversity, climate change, depletion of natural resources, deforestation, absence of environmental management plans and inadequate environmental monitoring and assessment, lack of greening strategy, fragile environmental state, deteriorating quality of air, water and land pollution, and lack of sustainable practices in environment sector of Parachinar urban center.

Economic development aims to create sustainable and long-term economic growth and improvement in the standard of living in the Parachinar urban center. It mainly concerns the issues of poverty, limited productivity, low capacity of adaptation to market demand, lack of taxation rules and regulations, unemployment, regional economic disparities, and poor infrastructure in the sectors of housing, tourism, trade and commerce, transportation, taxation, revenue, quality of life and industry.

Sustainable infrastructure and transportation aim to develop infrastructure and transportation systems that minimize negative impacts on the environment and promote sustainable economic growth. It aims to resolve the issues of environmental degradation, climate change, public health, higher consumer costs, social equity, accessibility and mobility, lack of road infrastructure, education and awareness, delipidated infrastructure, and inventory issues in the sectors of transportation,

economy, housing, environment, water supply, sanitation, solid waste management, tourism, urban design and quality of life.

Institutionalization aims to establish a set of policies, procedures, and practices that ensure the long-term stability and sustainability of Parachinar urban center. This strategy will target the problems of institutional capacity, governance, public services, economic growth, scalability, stability, adequate service delivery, policy, rules and regulations in the sectors of Land use, land management, governance and institutions, taxation and revenue.

Chapter 6: Proposed Master Plan of Parachinar City

The progressive features of both sector and multi nuclei planning models have been utilized to prepared the Proposed Master Plan for Parachinar City. The proposed Master Plan of Parachinar city is provided in Map 16.

Given the trend of development along the main Thall-Parachinar road, the proposed future development intends to alleviate the pressure on the existing land uses. The areas beyond the main road are recommended to be reserved for future economic activities. Thus, proposed Parachinar Master Plan 2040 includes area along the road to be proposed as an economic corridor/mixed use zone.

The overall structure of the plan is in sectoral form, with the existing major road, serving as a main transportation corridor, with future development either side. Furthermore, the intersection of this economic corridor/mixed use zone help in forming different sectors.

The total area of Parachinar urban center is 34.03 sq. km. out of which 8.10 sq. km. is covered by a built-up (including roads) serving population of 52,729 persons with an average household size of 6.97. Keeping in view the population and area occupation, the total extent of the proposed additional land use area including livestock and dairy development zone is 8.85 sq. km. for a population of 76,481 by 2040.

New towns and infill development have been proposed with the proposed industrial areas as these land uses complement each other. the residential zones are proposed along the main economic corridor looking at the ribbon development pattern, however, if planned in an organic form, the ribbon development can alleviate the pressures on the existing mushroom growth.

The seven NCs of Parachinar comprise the project area. Outside the project's boundary is rural / agricultural regions. Development outside the project boundary is not suggested in this proposed master plan. The District Land Use Plan will include recommendations for rural regions. Table 6-1 shows the details of each proposed land use zone:

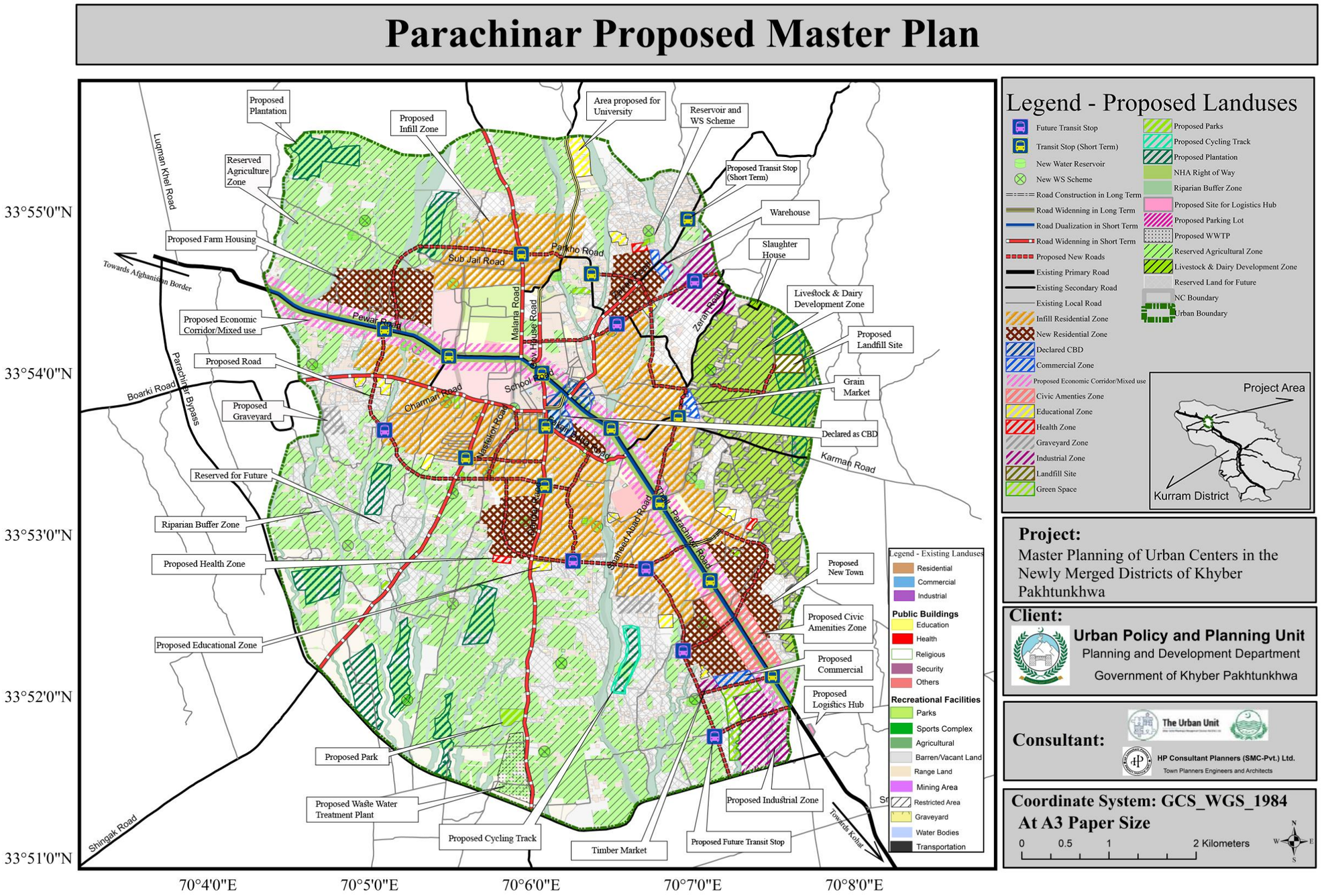
Table 6-1: Land Allocation for Proposed Land Uses in Parachinar City

Proposed Land Use	NRM Standard %	Recommended Area – min (sq. km.)	Recommended Area – max (sq. km.)	Existing Land Use Area (sq. km.) (2021)	Required (Recommended Area (min) – Existing Land Use) (Sq. km.)	Required (Recommended Area (max) – Existing Land Use) (sq.km)	Proposed Area (sq. km.)
Residential Zone	27 to 43	9.18	14.62	4.24	4.94	10.38	3.96
Commercial Zone	1 to 5	0.34	1.7	0.38	-0.04	1.32	0.09
Industry Zone	2 to 20	0.68	6.8	0.03	0.65	6.77	0.7
Civic Amenities	3 to 11	1.02	3.74	1.44	-0.42	2.30	0.2
Economic Corridor/Mixed Use Zone							1.25
Graveyard	0.5 to 6	0.17	2.04	0.05	0.12	1.99	0.14
Reserved Agriculture							8.04
Livestock and Dairy Development Zone							2.18
Green Space							5.87
Landfill							0.06
Reserved for future							7.04

Source: Recommended by the Consultants using NRM standards

Total available area for future development is 13.72 sq.km. The total proposed area is 6.68 sq.km which includes residential, commercial, mixed use/economic corridor, etc. 7.04 sq. km area is allocated for the future permitted extension zone.

Adjacent agricultural land to contiguous build-up converts to other land uses, such as residential and commercial, because 100% of agricultural land cannot be maintained for use in agriculture due to future city expansion. However, by 2040, the 8.04 sq.km of agricultural land will be reserved as agriculture land. 2.18 sq.km is reserved for the Livestock and Dairy Development Zone.



Map 15: Proposed Master Plan of Parachinar

The sector-wise recommended proposals and their future implications on each sector have been discussed in the sections below:

6.1 Residential Zone

One of the key features of the proposed master plan is the provision of suitable housing for all income groups. The residential areas have been proposed keeping in mind the increasing population and housing needs of Parachinar.

Proposals for the housing sector include guidelines for residential development, proposals for infill housing, and new housing. These proposals with consideration to the aforementioned strategies such as institutionalization, compact development and sustainable infrastructure. As a result, structurally safe, economical and sustainable housing is to be provided in Parachinar in order to improve the quality of life by 2040.

The institutionalization strategy focuses on the guidelines for future residential development which include permitted, permissible and prohibited uses to control urban sprawl and haphazard development. Effective regulation leads to efficient and effective delivery of better housing standards.

The compact development strategy focuses on the infill and new housing spatially distributed in Parachinar.

In 2021, the existing population of 52,729 resided in 5,239 housing units in Parachinar. The projected population for 2022 shows an increase of 4,440 people in 5 years, making a total population of 57,169 people. The housing backlog can therefore be calculated using the existing population, housing supply, and replacement demand (katcha and dilapidated and overcrowded.

The backlog calculation reveals a gap of 2966 units between the existing housing supply and demand for the year 2022.

Table 6-2: Housing Shortage 2022, Parachinar

Year	Projected Population	Projected Household Size	Projected Housing Demand	Projected Housing Supply	Backlog	Overcrowding + Dilapidated	Total Shortage
2022	57,169	6.87	8,324	6,050	2,274	1,864	4,138

Source: Calculated by Urban Unit and HP Consultants

Housing backlog is relatively average in case of Parachinar city, however, any housing unit with 4 walls is considered as basis for calculations in PBS. Generally, conditions and infrastructure vary from good to worse in existing housing units. Given the conflicting nature of the project area, most of the housing units are in dilapidating condition and keeping in view the projected household size of 6.87 (2022), are mostly overcrowded. The PBS survey shows that almost 214 houses are categorized as katcha housing units. In addition, the consultants have also calculated the overcrowding units which amount up to the total housing units i.e. 1,650 houses.

This 76% of the houses, which makes up total of 1,864 housing units are in urgent need of replacement to effectively accommodate the people and safeguard the social security as well as the lives of its inhabitants.

Similarly, the calculations have been done for the year 2040, shown in the table below:

Table 6-3: Housing Demand 2040, Parachinar

Year	Projected Population	Projected Household Size	Projected Housing Demand	Housing Supply	Backlog	Overcrowding + Dilapidated	Total Shortage
2040	76,481	5.30	14,428	10,157	4,271	2,984	7,255

Source: Calculated by Urban Unit and HP Consultants

The residential areas have been proposed with regards to the increasing population and need for housing for Parachinar. The housing demand of Parachinar urban center for a 20-year planning period can be fulfilled through compact development, which provides more efficient land use, increased density, , and affordability in the housing sector.

Table 6-4: Residential Zone Requirements

Existing area (sq. km.)	4.24 Sq. km
Existing area (in %)	12.46
Household size (Census, 2017)	7.38
Household size (Land Use Survey, 2021)	6.97
Household size rate of change	-1.43%
Estimated Household size, 2022	6.87
Existing number of houses	5,239

Recommended NRM standard	27% to 43%
Recommended residential area – min (sq. km.)	9.18
Recommended residential area – max (sq. km.)	14.62
Required (Recommended (min) – Existing Land Use)	4.95
Required (Recommended (max) – Existing Land Use)	10.39
Proposed area 2040 (sq. km.)	3.96
Estimated Household size, 2040	5.30
Proposed new housing units	14,428

Source: Recommended by Urban Unit and HP Consultants

The existing area for residential use is 4.24 sq.km. with a household size of 6.97 (land use survey, 2021) with 5,239 existing housing units. The proposed area required for 2040 is 3.96 sq.km. with an estimated household size of 5.30 and the proposed new housing units are 14,428. The projected household size for Parachinar city is lower than the national household size for KP because the household size rate of change for the previous 2 censuses is in negative. Moreover, the method to calculate the household size rate of change using 3 censuses could have been used for a better trend analysis, however, the similar data for Parachinar city is not available for year 1981. Thus, the consultants have used the same projected household size for year 2040 for future residential development.

The residential zones are proposed to be further categorized into new towns and infill development to cater the housing demand of Parachinar city.

Table 6-5: Categories in Proposed Residential Zone

Land Use Class	Categories	Area
Residential Zone	New Town	1.16
	Infill Zone	2.80

Source: Urban Unit and HP Consultants

6.1.1 Income Group Classification

Income Groups are often categorized according to their financial standing in a country. They are generally categorized in lower, middle, or upper strata/class depending on their housing conditions, lifestyle and net worth. It is noted that the minimum wage was increased from PKR 21,000 to PKR 25,000 per month for unskilled workers in Khyber Pakhtunkhwa on 01 July 2022 [1].

According to the HIS survey, 60% of the population in Parachinar is categorized as low-income, while 28% of the population is in the middle-income class and 12% belongs to high-income class. Table 6-6 shows the different income group percentages based on the monthly income.

Table 6-6: Household Income Groups based on Monthly Income

Percentage of Household Income Groups						
Monthly earning = Below Rs. 10,000	Monthly earning = Rs. 10,001 - Rs. 20,000	Monthly earning = Rs. 20,001 - Rs. 30,000	Monthly earning = Rs. 30,001 - Rs. 40,000	Monthly earning = Rs. 40,001 - Rs. 50,000	Monthly earning = Rs. 50,001 - Rs. 100,000	Monthly earning = Rs. 100,001 & above
3.1%	26.6%	30.3%	18.3%	9.2%	6.7%	5.8%

The above noted income groups have been used to segregate the housing demand into number of units to be provided for each class in Parachinar.

Table 6-7: Housing units for each income class

Types According to income level	**Population (%)**	**Housing units (2018)**	**Housing units (2022)**	**Housing units (2040)**
Low Income	60%	4680	4994	8657
Middle Income	28%	2184	2331	4040
High Income	12%	936	999	1731
Total	100%	7800	8324	14428

Source: Calculated by Urban Unit and HP Consultants

The housing units have also been calculated in terms of lot size (Marlas) for each income group.

Table 6-8: Marla wise percentage for each income group

Size category	Income class (%)	Income Groups
1-5 Marla Units	60%	Low Income Group
6-12 Marla Units	28%	Middle Income Group
12-30 Marla Units	12%	High Income Group
Total	100%	

Source: Calculated by Urban Unit and HP Consultants

Three types of housing units have been proposed in the new towns and infill development zones for each income group:

- low-income class: 1-2 Marla, 2.1-3 Marla and 3.1-5 Marla units.
- Middle Income: 5.1-6 Marla, and 6.1-12 Marla Units
- High Income: 12.1 - 20 Marla, and 20.1 - 30 Marla Units

The percentages allocated for each housing unit are provided in Table 6-9 below:

Table 6-9: Housing units required by 2040 in Parachinar

Income Group Class	Size category	Percentage	Housing units required in 2040	Area (Sq. Km.)
Low Income	1 - 2 Marla	3%	433	1.40
	2.1 - 3 Marla	27%	3,896	
	3.1 - 5 Marla	30%	4,328	
Total		60%	8,657	
Middle Income	5.1 - 6 Marla	18%	2,597	1.15
	6.1 - 12 Marla	10%	1,443	
Total		28%	4,040	
High Income	12.1 - 20 Marla	7%	1,010	1.41
	20.1 - 30 Marla	5%	721	
Total		12%	1,731	
Grand Total		**100%**	**14,428**	**3.96**

Source: Calculated by Urban Unit and HP Consultants

These percentages have been calculated from the existing percentage of the household income groups, and projected on the total housing units. For example, 60% of the 14,428 to acquire low income Marla wise housing units required in year 2040.

The residential density of the study area is 3419 housing units per sq.km by 2040. The KP Urban Policy, 2023 has been consulted to use densities for future residential development. According to the policy, the Parachinar urban area resides in the

southern zone of KP and its density targets for private housing schemes shall therefore be prescribed by LGE and RDD.

Farm Housing

Farmhouses located on agricultural land and designed to function around a farming lifestyle. Farm housing having an area of 0.35 sq.km is proposed on this Pewar Road to enjoy the nature and develop sense of community in the Parachinar Urban Center.

6.1.2 Rationale for Proposed Infill Development in Parachinar

The rationale for proposing the infill development in Parachinar is provided in Section 3.3.3. However, further explanation is provided in this section.

Infill development has been proposed around the city center and on the Southeast, Northeast and Southwest sides due to the availability of vacant land parcels within the existing built-up areas. Infill development encourages the usage of underutilized or vacant land in existing urban areas to increase density and place new development near existing resources and infrastructure. This helps cities like Parachinar be environmentally friendly and social sustainable.

The Infill housing has been provided to fit within an existing neighborhood without significantly altering its character or appearance and control the urban sprawl in the area. The total area categorized under vacant plots is 9.08 sq.km. out of which approximately 2.80 sq. km is proposed to be used for infill development.

6.1.3 Rationale for Proposed Residential Development in Parachinar

Proposed new zones and infill zones are based on the ground realities, tribal system, cultural norms, and traditions. The proposals are distributed such that all communities of the area are served and unidirectional growth of the city is avoided. The following parameters have been used to identify residential development zones in Parachinar.

Proximity to Existing Residential Area

Proximity to existing residential land provides infill zones and new residential areas with advantages such as community living which promotes social interaction and community integration by considering the mix of housing types.

Proximity to Primary Roads

Residential development often follows major transportation arteries due to the precedence of ribbon development. It is however recommended to prioritize infill development in such areas. In addition, these areas offer high visibility and accessibility, making them attractive for mixed use development.

The areas along the main Thall-Parachinar road have been proposed as new residential zones as these areas will be filled in the future. Therefore, a restrictive land use and zoning will not only contribute to the efficient use of land but aid in the urban regeneration of the area.

Proximity to Secondary Roads

Proximity to secondary roads is important they are often more accessible to people living farther from the main arteries. They are also less congested than major arteries and located in established neighborhoods.

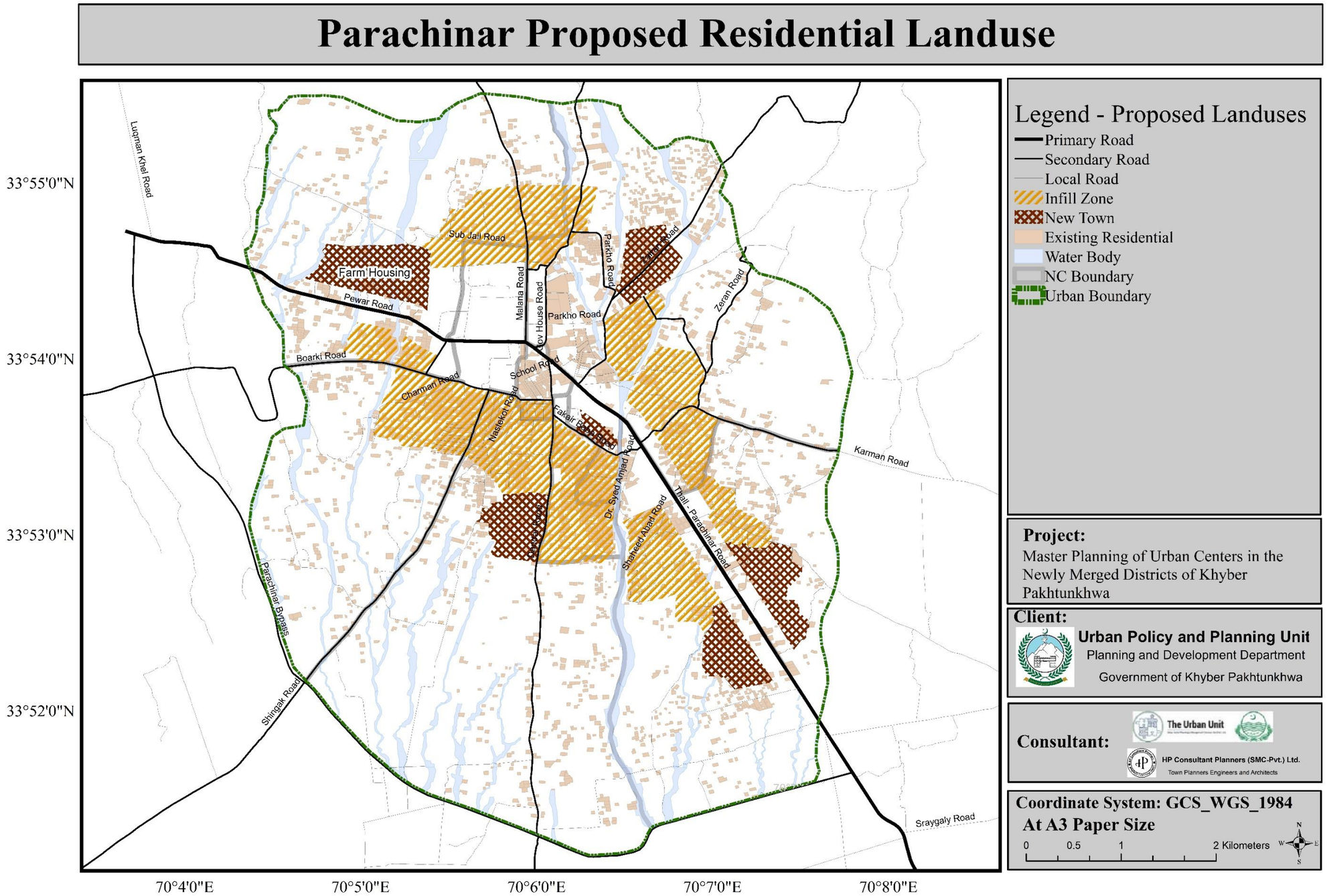
Proximity to Existing Commercial Land

Proximity to existing commercial land provides new residential areas with the advantage of lesser daily commuting and accessibility to public services and amenities.

Lands proximal to industrial areas

Proximity to industrial areas can play a diversifying role in new residential zones especially for low cost housing. New towns on lands proximal to industrial areas are proposed to provide ease in daily commuting for the lower income class. These zones will have higher percentages of low-income plots to accommodate more population under the low-income category.

Additionally, close proximity industrial areas provide industries a large pool of skilled labor and subsequently more job opportunities with influx of economic activity.



Map 16: Proposed Residential Zone

The land use division for New Residential Schemes in provided in the below Table. Note that this is in accordance with the KP Local Government Private Housing Schemes Management and Regulations, Rules 2020:

Table 6-10: Planning Standards for Private Housing Schemes

No	Land Use	Category D (up to 50 kanal)	Category C (50-100 kanal)	Category B (100-200 kanal)	Category A (200-500 kanal)	Mega Housing Scheme (above 500 kanal)
1.	Open Spaces	-	Min 05%	Min 07%	Min 07%	07% or above
2.	Graveyard	-	-	Min 02%	Min 02%	Min 02%
3.	Commercial	-	Max 01%	Max 05%	Max 05%	Max 10%
4.	Public Buildings	-	Min 02%	02% to 10%	03% to 10%	04% to 10%
5.	Size of Residential Plot	Max 01 kanal	Max 02 kanal	Max 02 kanal	Max 02 kanal	Max 02 kanal
6.	Internal Roads	25 ft Min	25 ft Min	Min 30 ft	Min 30 ft	Min 30 ft
7.	Site for Solid Waste	-	Min 05 marla	Min 10 marla	Min 01 kanal for 200 kanal and 10 marla for each additional 100 kanal up to 500 kanal	Min 04 kanal for 500 kanal and 02 kanal for each additional 500 kanal
8.	Grid Station Exclusive of Public Buildings	-	-	As per requirements of concerned dept./Agency	As per requirements of concerned dept./Agency	As per requirements of concerned dept./Agency
9.	Major Roads	Min 40 ft	Min 40 ft	Min 60 ft	Min 100 ft	Min 150 ft
10.	Service Area / Scheme Office		Min 05 marla	Min 10 marla	Min 10 marla	Min 01 kanal
11.	Low Cost Housing	-	-	-	Min 5%	Min 5%

It is recommended to implement these private housing scheme rules in Parachinar in order to prevent mushroom and unplanned growth of residential areas. These can be slightly amended given the area of land parcels proposed for residential land uses. As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repealed if Building Control Authority Notify any Land Use Classification Rules applicable in KP.

Table 6-11: Residential Area Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Detached/semi-detached dwellings, Mosques, Primary/high schools, Clinics/dispensaries, Social/cultural institutions, Local shopping areas/retail shops, Offices of professionals with adequate parking facilities, Parks and playgrounds, Apartment buildings, Graveyard or place of burial, horticultural nursery, Urban farm, Old age home or orphanage, Urban forest, Guest houses offices of TMAs/other tiers of local Govt.	Commercial offices and service, Shops of local character, Raising of poultry for non-commercial purposes, Day-care centre, Pre-schools, Rehabilitation centres for disabled, Primary and junior schools, Petrol pump, Gas filling station, Taxi/rickshaw stand.	Heavy, large and extensive industries: noxious, obnoxious and hazardous industries, Warehousing, storage go-downs of perishables, hazardous, inflammable goods, Workshops for buses, Slaughter-housing, wholesale mandis, Sewage treatment plant/disposal work, Water treatment plant, Solid waste dumping yards, Outdoor games stadium, Indoor games stadium, shooting range, Zoological garden, botanical garden, Bird sanctuary, Picnic hut, International conference centre, Sports training centre, reformatory and all uses not specifically permitted or permissible

Source: Urban Unit and HP Consultants

6.2 Commercial Zone

Parachinar is close to the Afghanistan border and a hub of commercial activity with a semi-rural characteristic which has recently been declared as an urban area.

6.2.1 Commercial Area Growth, Gaps and Regulations

Using the guidelines given in the NRM standards, the current commercial area gap has been calculated below:

Table 6-12: Commercial and Mixed-Use Zone Requirements

Existing area (in sq. km.)	0.38
Existing area (in %)	1.12%
NRM Standards	1% to 5%
Recommended commercial area – min (sq. km)	0.34
Recommended commercial area – max (sq. km)	1.7
Required (Recommended (min) – Existing Land Use)	-0.04
Required (Recommended (max) – Existing Land Use)	1.32
Proposed area 2040 (in sq.km.)	0.09

Source: Recommended by Urban Unit and HP Consultants

As per the land use survey (2021), there are 93.9 acres of commercial area in Parachinar urban center.

This suggests that Parachinar requires more commercial land to cater to the needs of the residents for the next 20 years. This is further demonstrated by the fact that the housing growth over the past five years, 2016-21 has been almost 50 percent.

Additionally, there is a need to regulate commercial areas by providing appropriate parking, loading/unloading facilities and better land uses to accommodate the commercial and mixed-use activities.

Mixed Use Development/Economic Corridor

Economic corridors/ Mixed-use development is a new form of urban development that can increase the economic growth of area. It provides various benefits, such as cost-saving infrastructure, increased tax revenue, property value, tax collections, and promotes tourism etc. it also strengthens infrastructure construction by establishing industrial clusters, thereby attracting investment and developing regional economy. Mixed-use zone having an area of 1.25 sq. km is suggested on both sides of the Thall Parachinar Road.

6.2.2 Strategy to Cope with Haphazard Commercialization

Haphazard commercialization results in acute parking problems, traffic congestion and adverse environmental impacts in the historical core & neighboring residential areas around commercial activities. To address this, it is recommended to formulate a strategy to meet the demand for commercial uses with minimal impact on the environment and quality of residential areas.

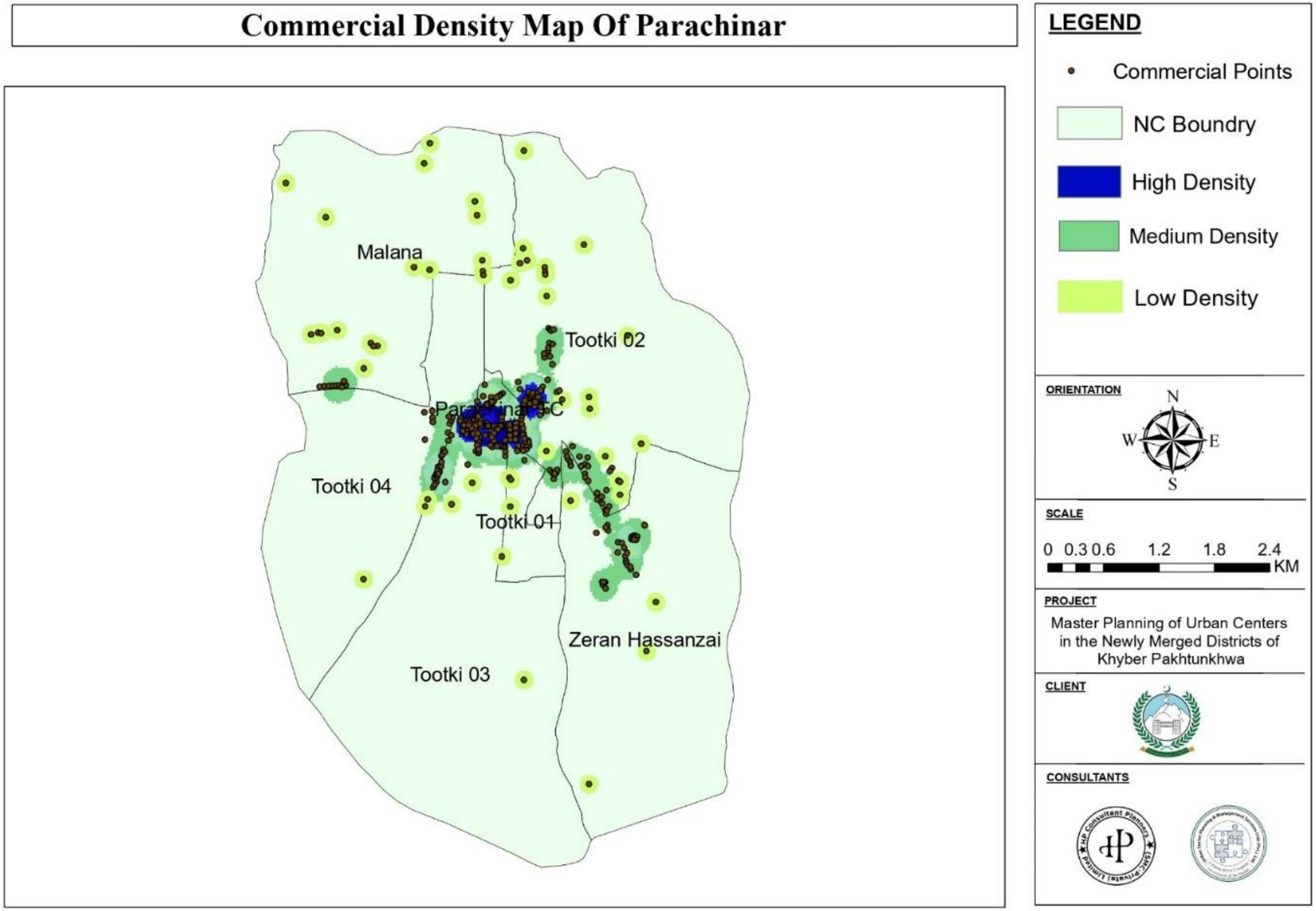
In addition, the commercialization strategy must ensure that no unplanned commercial areas are encouraged to emerge and flourish. For effective implementation, the strengthening of planning agencies in terms of trained staff and resources is required.

Commercialization along roads declared for this purpose should only be allowed if proponents meet the necessary parking demands and the provisions to manage the increased traffic load.

6.2.3 City Strategy

The provincial government and its line departments in the area should support the commercial activities of Parachinar and develop town-specific interventions (town-centre) for each of its seven neighbourhood councils. The Parachinar TC and Tootki 1 have the highest density and have seen the highest growth over the last decade.[7] Below map shows the commercial density of the study area.

[7] Year-Wise Housing Growth in Parachinar Urban Area, Field Survey 2022



Map 17: Commercial Density of Parachinar

Some of the strategies to be followed in the study area are mentioned in the table below.

Table 6-13: Strategies to be proposed in each Town of Parachinar

Town	Strategies	Justification
Tootki 4, Tootki 2, Zeran Hassanzai	Will function as sub commercial areas to share the burden of Main Bazaar in Parachinar in terms of retail commercial activities while servicing nearby commercial facilities.	Right now, the main bazaar in Parachinar TC has high commercial density and is focal for commercial activity in Parachinar. Tootki 2 and north area in Tootki 4 have medium density residential area with lesser presence of commercial activity. Small commercial markets can be made in these areas to promote polycentric development for daily access shops i.e., retail shops.
In all major arteries leading to Parachinar TC	Developing public transport infrastructure, while making public spaces walkable to reduce reliance on private vehicles.	Efficient public transport system is basis for any urban centric development. It enables easy accessibility to market for all. This also allows for controlling of emissions, resulting in better air quality, and making the study area environmentally friendly for the residents.
Commercial Areas of all NC	Implementing strict regulations and rules for sustainable commercial development, while creating awareness and support environment to ensure such practices	Increased housing demand in the area means that the commercial density is likely to increase in the future and as such following policies like mixed-used development and vertical commercial development are sustainable
Tootki 2, Tootki 4, Tootki 1	Setting the direction of new commercial area growth in line with that of residential growth	These areas are where the residential growth trend is, and as such we need to ensure commercial area is developed in line with the NRM standards
Major Parachinar and Tootki 1 Bazaars	Conducting regular traffic studies and implementing traffic management measures to prevent congestion and improve safety in commercial areas.	Parking demand and supply mismatch can lead to disintegration of commercial activity and disincentivize business growth as access to doing business decreases in the areas

Town	Strategies	Justification
CBD Parachinar	Tax Schemes to incentivize establishment of new commercial areas in the study area	This suggestion is withdrawn
Tootki 1 and Parachinar	Incentivizing vertical building design, especially in high density areas	High density areas today must move to a vertical development model to ensure sustainable land use practices. High density residential areas should be allowed higher FAR for future developments.

In addition to the above, the following strategies and practices must be adopted to allow for sustainable commercial development in all areas of Parachinar:

- Providing incentives and support for businesses to locate in designated commercial centres, such as tax breaks and grants for building improvements. (CBD Tax incentives)
- Strengthening planning agencies and increasing their capacity to effectively regulate and manage commercial development.
    - Strengthening of local government and provision of trained staff and resources to pursue and implement sustainable development plans
- Educating businesses and the public about the importance of sustainable and planned commercial development.
    - Encouraging sustainable expansion of commercial areas while preventing haphazard development.
    - Providing adequate parking spaces and managing increased traffic load.
    - Mandating vertical expansion of commercial areas to make efficient use of land.
    - Encouraging the use of environmentally friendly technologies and practices in commercial development.
    - Promoting mixed-use development to integrate commercial and residential areas.

6.2.4 Criteria for Declaring Roads as Economic/ Mixed Use Corridor

Economic corridors are meant to attract investments and generate economic activities in contiguous regions. Notably, the existence of an efficient transportation system plays an essential role in realizing this. Corridors are also critical components of property and sales tax revenue generation for local jurisdictions. Their success has a direct correlation with the success of municipalities as they can lead to promoting economic development in the nearby municipalities. Parachinar is close to the Afghanistan border and has significant potential to contribute to the national economy. Therefore, the economic corridor has been proposed based on the following Parameters.

- Prime Location of Parachinar

Parachinar is located at a prime location. It borders with Central Kurram Tehsil on the East, Nangarhar Province of Afghanistan on the North, Logar Province of Afghanistan on the North-West, Paktiya Province of Afghanistan on the West, Khost Province of Afghanistan on the South, Lower Kurram Tehsil on the South-East, and Central Kurram Tehsil on the East Side. This geographical location invites regional network integration, which can be boosted through an economic corridor. Pertinently, this location can prove to be a suitable route for trade entailing the exchange of goods and services in the region. Ultimately, this will support the business ventures in Parachinar and subsequently, will lead to enhancing people's well-being, promoting domestic peace, and improving regional economy.

- Corridor Along Major Thal-Parachinar Road

Economic Corridor has been proposed along the major Thall-Parachinar Road which will give a passageway to proposed logistics hub. The economic development often follows major transportation arteries because these areas offer high visibility and accessibility, making them attractive to businesses and consumers.

- Afghan Trade Transit Connectivity with Corridor

Afghan Trade Transit is an important route that will open trade for Pakistan for Middle East and will ease customs process with lesser time consumption. The existence of an economic corridor will improve infrastructural development and modernize transportation networks. It will also cause a shift from an agriculture-based economic structure to the emergence of an industrial-based economy in the region. Also, through

establishment of this corridor, a route to dry ports and export procession zones can be developed that will attract revenues for local residents of both countries.

6.2.5 Rationale for Future Commercial Development in Parachinar

The suitability of different land use parcels is based on different layers/ parameters which are discussed below.

Proximity to Primary Roads

Economic development often follows major transportation arteries as these areas offer high visibility and accessibility, making them attractive to businesses and consumers. The presence of transportation infrastructure such as roads, highways, and public transit increases the mobility of people and goods, which can stimulate economic growth and development.

Proximity to Secondary Roads

Commercial areas along Secondary roads are more affordable for small business development as the land is cheaper. Moreover, secondary roads being located in established neighborhoods provide businesses with opportunities to tap into existing communities and local customer bases.

Proximity to Existing Commercial Land

Proximity to existing commercial land can provide new commercial areas several advantages including market synergies, increased visibility, reduced competition, and eased development, which can help support economic growth and development.

Proximity to industrial areas

Proximity to industrial areas play a significant role in commercial area as their location can give businesses access to goods and services, a large pool of skilled labor, and major transportation arteries. Additionally, the presence of industrial activities in the area can generate increased demand for goods and services, creating synergies between commercial and industrial activities.

Lands proximal to residential areas

Proximity to residential areas is crucial for commercial area development as it offers access to a customer base and supports local economic growth. Nearby residential areas provide a steady flow of customers, as well as opportunities for businesses to

cater to local needs. Additionally, proximity can lead to the creation of walkable communities with easy access to goods, services, and employment.

Lands proximal to major transit points (bus stands, railway station, shopping malls etc.)

Proximity to transit points is beneficial for commercial area development as it offers businesses access to a larger customer base and improved transportation options. It also helps increase foot traffic and drive business growth. Additionally, transit-oriented development can encourage the creation of compact, walkable communities that support sustainable transportation and reduce dependence on personal vehicles.

Lands proximal to existing municipal infrastructure services

Proximity to municipal services is important as it provides businesses with access to essential infrastructure and services that support their operations. Access to municipal services such as water and sewer systems, waste management facilities, and emergency services help reduce costs and improve operational efficiency. Additionally, proximity to municipal services provide businesses with access to local government resources and support.

6.2.6 Future development Plans and Key Actions

In the case of Parachinar, the focus of future planning is on addressing the challenges of haphazard commercialization and promoting sustainable and planned commercial development. This can be achieved through a combination of regulatory measures, incentives, and support for businesses, as well as investments in infrastructure and other resources.

In the short term, implementing measures to regulate and manage commercial development in Parachinar should be prioritized. This includes strengthening planning agencies, developing and enforcing regulations and standards for commercial development, and providing incentives and support for businesses to locate in designated commercial centers. Additionally, traffic management measures should be implemented to address congestion and improve safety in commercial areas.

In the medium term, the focus should be on promoting sustainable and planned commercial development in Parachinar. This can include encouraging the use of environmentally friendly technologies and practices in commercial development,

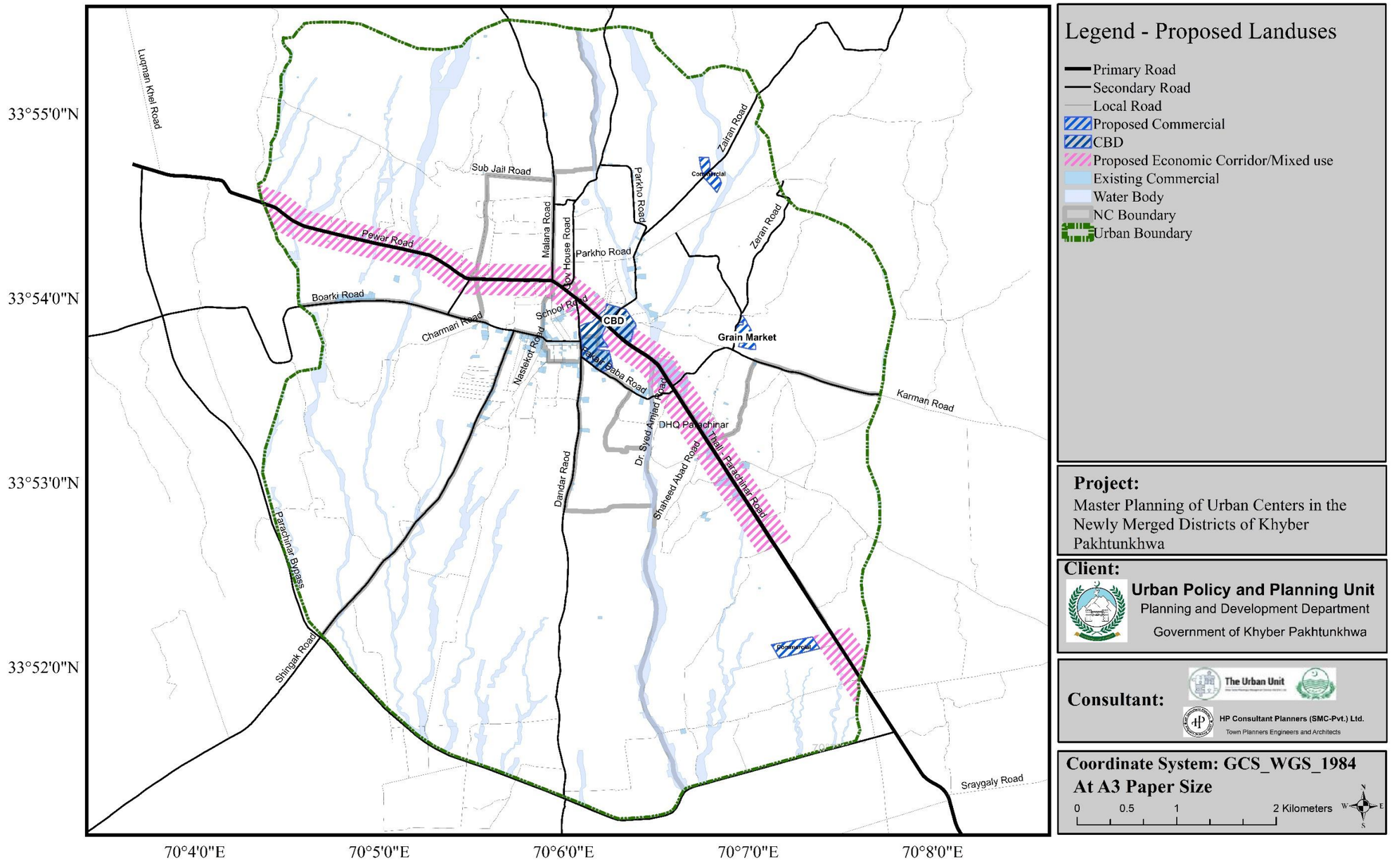
promoting mixed-use development to integrate commercial and residential areas, and investing in public transport infrastructure to reduce reliance on private vehicles. Regular assessments and evaluations of commercial development should be conducted to ensure compliance with regulations and address any issues.

The long-term goal should be to create a sustainable and vibrant commercial environment in Parachinar. This includes implementing a comprehensive zoning plan that clearly defines and separates commercial, residential, and industrial areas, and promotes the growth and development of commercial centers in Parachinar.

Investments in infrastructure, such as roads and public transportation, should be prioritized to support the growth of the commercial sector. Regular assessments and evaluations should continue to be conducted to ensure that the city's commercial development is meeting the needs of the community and supporting economic growth.

Map 18 illustrates the proposed commercial areas of Parachinar based on the suitability analysis and the organic commercial growth in the study area over time.

Parachinar Proposed Commercial Landuse



Legend - Proposed Landuses

- Primary Road
- Secondary Road
- Local Road
- Proposed Commercial
- CBD
- Proposed Economic Corridor/Mixed use
- Existing Commercial
- Water Body
- NC Boundary
- Urban Boundary

Project:
Master Planning of Urban Centers in the Newly Merged Districts of Khyber Pakhtunkhwa

Client:
Urban Policy and Planning Unit
Planning and Development Department
Government of Khyber Pakhtunkhwa

Consultant:
The Urban Unit
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 18: Proposed Commercial Zone

6.2.7 Short Term Plan (2020-2025)

In light of the above criteria for declaring roads as commercial/mixed use zone, the following sections of roads are proposed as commercial.

Parachinar-Thall Road to be declared commercial

Based on the existing trend observed in Parachinar where the commercial development organically occurs around major commercial arteries, Thall-Parachinar Road should be designated as a commercial corridor. Being located near major highways such as the TPR can help increase exposure and drive more customers to businesses. Additionally, proximity to primary roads can improve access for customers and employees, making it easier to reach businesses and reducing travel times. Improved access can also attract businesses and investment to the area, supporting economic growth and development.

6.2.8 Medium- and Long-Term Plan (2022-2040)

Urban Area Development Authority

Although the Tehsil administration is already in place, the urban area has been recently delineated and merged districts have become a part of the provincial government's jurisdiction. Therefore, formation of *Urban Areas Development Authority Kurram* under the Khyber Pakhtunkhwa Urban Areas Development Authorities Act, 2020 is eminent. The Authority must be responsible for the overall urban area with sole jurisdiction.

Extension of Parachinar Bazaar as Commercial Area

Parachinar bazaar has been the central area of the Tehsil and is characterized by its concentration of non-residential activities, high land values, administrative offices and presence of the commercial happenings.

Keeping in line with the organic demand and the historic value of the bazaar, the area surrounding Parachinar Bazaar to the left of the Parachinar-Thall Road has been zoned for future commercial development.

Formation of new areas in Zeran Hassanzai and Tootki 02 as commercial zones

New commercial areas have been proposed in Parachinar based on the existing commercial demands. Zeran Hassanzai commercial area will act as the commercial

market that will serve as the forward linkages for the industrial area proposed in Zeran Hassanzai, and the new residential proposed in the same Tehsil. This will also host activities for the warehousing and forward and backward linkages for Pak-Afghan trade through the study area.

Tootki 02 will serve as the forward linkage for infill housing proposed in Tootki 02, This will serve as the satellite for Parachinar TC's commercial and residential demand as well as feed in/from trade happening via the proposed commercial corridor (See Map 16 above).

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repealed if Building Control Authority Notify any Land Use Classification Rules applicable in KP.

The following guidelines for commercial areas are provided in Table 6-14:

Table 6-14: Commercial Zone Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Commercial buildings, Large Markets, departmental stores and Outlets, Large Public Squares and Parks Bakery or confectionary, Clinic or polyclinic, Courier service or logistics office, Private telephone exchange or cable operation or mobile franchise offices, Park,	Pedestrian friendly streetscape, Mixed- use buildings, Technical and vocational institution, Seasonal commercial fare site, Stadium; amusement park / play land, Bus terminal, Fuel Stations, Wholesale market, Second hand goods market, Coal, wood or Timber yard.	Dwellings except those of service apartment, essential operational, watch and ward personnel, Heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units, Hospitals/research laboratories treating contagious diseases, Poultry farms/dairy farms, Slaughter-houses, Sewage treatment/disposal sites, Agricultural uses, Storage of perishable and inflammable commodities,

Memorial and monument, Hotel or motel, Car showroom, Boutique or garment outlets or beauty parlour, Restaurant, Social welfare institutions such as community centre, art gallery and museum, Parking plaza or Parking site.		Quarrying of gravel, sand, clay and stone, Zoological garden, botanical garden, Bird sanctuary, Forensic science laboratory and all other activities which may cause nuisance and are noxious and obnoxious in nature.

Source: Urban Unit and HP Consultants

In conclusion, effective land use planning and the development of a comprehensive master plan for commercial and trade activities are crucial for the sustainable and prosperous growth of Parachinar region. By implementing zoning regulations, formulating sub-commercial areas, and providing incentives for businesses to locate in designated commercial centers, the local government can encourage sustainable and planned commercial development. Planned growth of commercial areas would allow for NCs other than Parachinar and Tootki 01 to share the burden of the main bazaar in Parachinar while making it easier to establish forward linkages for its products.

This Master Plan with its economic development strategy will help prevent haphazard commercialization and its negative impacts on the urban structure and environment. Additionally, institutional development and the creation of a data-driven ecosystem for the management and steering of commercial growth is crucial for Parachinar to capitalize on its strategic location and growing trade linkages with rest of the district and other neighboring districts.

6.3 Industrial Zone

Industrial zones are proposed with consideration to the locational requirements. The terrain is relatively flat and highly accessible by main roads, such as Thall-Parachinar-Road. Furthermore, the proposed industrial zones are segregated from the existing and proposed residential areas with an appropriate distance as per the NRM standards.

The proposals are made in light of the aforementioned strategies of institutionalization, economic development, environmental conservation and sustainable infrastructure. The proposed industrial zones will have several positive impacts on economic growth, reduced environmental impact, improved public health, and increased social responsibility and innovation.

Owning to its proximity to the border, the industrial products-related needs can be met through industry present in Peshawar through goods from Afghanistan under the Afghanistan Transit Trade. Heavy, medium and light industries can be categorized based on indicators such as capital investment, labor requirements and level of mechanization used in a particular industry. The categorization may be as described as per the table below.[8]

[8] Integrated Master Plan for Multan (2008-2028), NESPAK – *May 2012*

Table 6-15: Criteria and Enterprise categories for Industries

Enterprise Category	Criteria (Annual Sales Turnover)
Small Enterprise (SE)	Up to PKR 150 Million
Medium Enterprise (ME)	Above PKR 150 Million to PKR 800 Million
Start-up	A small enterprise or medium enterprise up to 5 years old will be considered as Start-up SE or Start-up ME.

Source: SMEDA

The next table defines the area required for Industrial cluster, Small Industrial Estate, Large Industrial Estate, SEZ and Regional I.E. According to SEZ Act of Pakistan

Table 6-16: Required Area for Industry

Name	Industrial Cluster	Small I. E.	Large I. E
Area Required	2 Acre	50 Acre	100 Acre

Source: SMEDA

This criterion is applied for the development of economic zones in this region. The calculations in Table 6-17 are done for the master plan proposals of industrial area in Parachinar:

Table 6-17: Industrial Zone Requirements

Existing area (in sq. km.)	0.03
Existing area (in %)	0.09%
NRM Standards	2% to 20%
Recommended industrial area – min (sq. km)	0.68
Recommended industrial area – max (sq. km)	6.8
Required (Recommended (min) – Existing Land Use)	0.65
Required (Recommended (max) – Existing Land Use)	6.77
Proposed area 2040 (in sq. km.)	0.7

Source: Recommended by Urban Unit and HP Consultants

6.3.1 Rationale for Proposed Industrial Area

According to the National Reference Manual (NRM), the following parameters are of primary importance for industrial planning in Parachinar urban area.

a) Location

- The industrial zone should be located on flat land to allow large plots and buildings with large spans.
- An area having no substantial natural vegetation.
- Industries should be on the downside of existing or proposed residential areas for the wind.

b) Accessibility

- The industrial zone should be located close to the primary and secondary roads.
- It should be at a distance of 220 feet (67 meters) from the middle of the highway.

c) Segregation

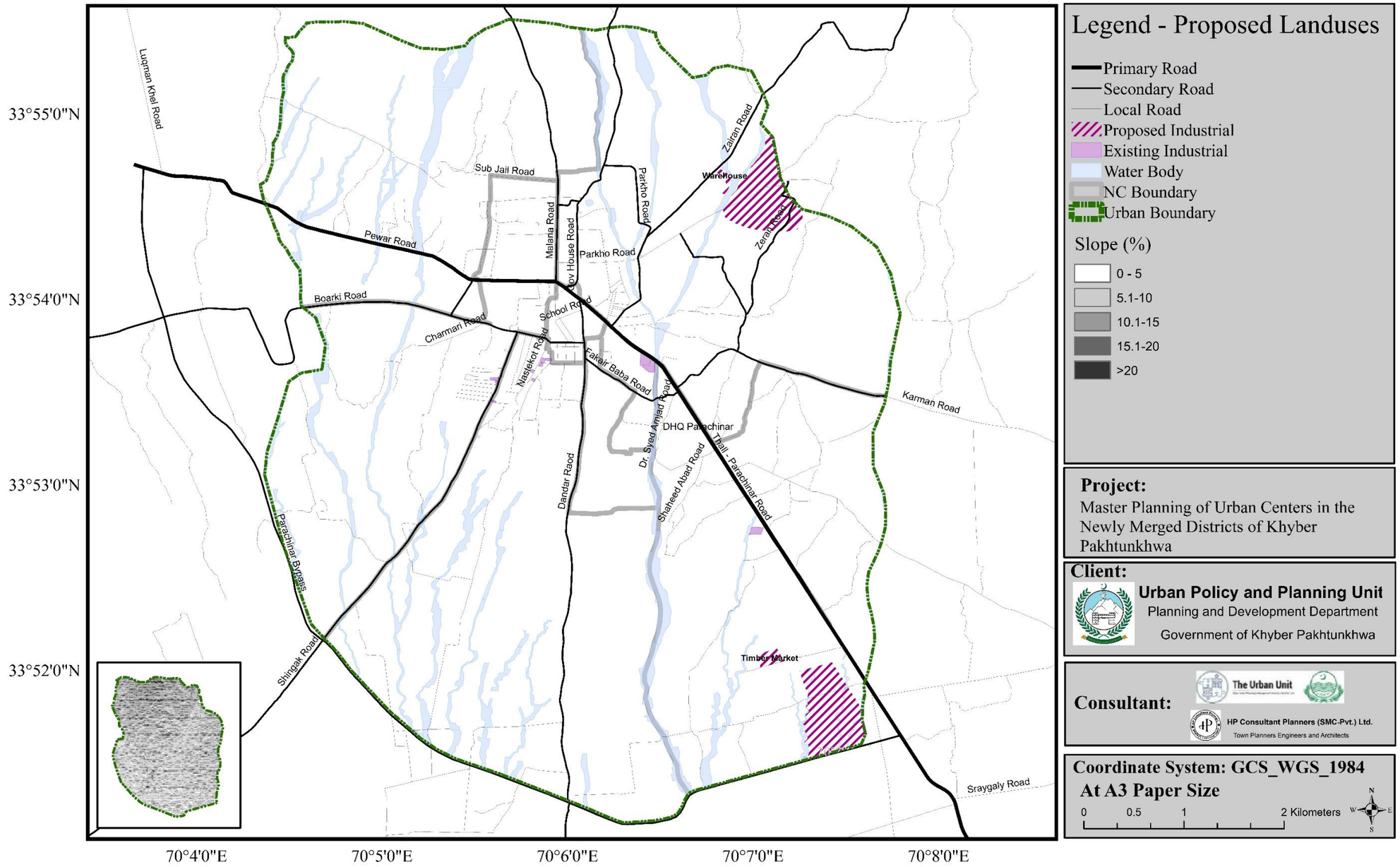
- The industrial estate should be separated from the existing and proposed residential area by at least 150 meters (medium size units of light industry and warehouse) or at least 500 meters (large units of light and general industry).

According to the land cover analysis (2021) in background studies report, open spaces contribute to almost 59% of the urban area of Parachinar. This implies reasonable opportunity for establishing an industrial zone as per the above noted criteria.

6.3.2 Industrial Planning

Given that the existing industrial development in the area has been unplanned and is concentrated at the center of the study area where all the urban development is, a large industrial zone has been proposed in the Zeran Hassanzai tehsil, alongside the Southeastern border of the Urban Area, and alongside the TRP. This location has been determined based on international best practices, the NRM Guidelines, and the local context. Timber market having an area 0.03 sq.km and warehouse having an area 0.01 sq.km are also proposed near Thall Parachinar road and Zairan road respectively.

Parachinar Proposed Industrial Landuse



Legend - Proposed Landuses

- Primary Road
- Secondary Road
- Local Road
- Proposed Industrial
- Existing Industrial
- Water Body
- NC Boundary
- Urban Boundary

Slope (%)

- 0 - 5
- 5.1-10
- 10.1-15
- 15.1-20
- >20

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Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 19: Proposed Industrial Zone

The proposed industrial zone is in accordance with the locational requirements of a relatively flat terrain and medium population density, high accessibility via Thall-Parachinar Road and Zairan Road, and segregation from the existing and proposed residential area with appropriate distances as per the NRM standards.

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. The development guidelines for industrial areas are below:

Table 6-18: Industrial Zone Development Guidelines

Permitted Uses	**Allied Permissible Uses**	**Prohibited Uses**
Small and Medium Scale Industries Processing Units Manufacturing Activities Warehouses storage or Go-down; Workshops Cold storage and Ice factory Petro chemicals, petroleum and gas products Loading and unloading space; Parking lot Industrial park or estate Police station, fire station and post office; bank or automated teller machine (ATM); Industrial research institute; Treatment or recycling plant;	Showrooms Mixed- used buildings Residence for workers Fuel stations and Oil depot; Restaurant; Hospital; Auto workshop, service garage and service station;	Private residential housing schemes Large health, recreational commercial and educational institutions The land use for storing, packing, pursing, cleaning, preparing, and manufacturing of blushing power, ammunition, fireworks, gun powder, Sutphin, mercury, gases, nitro-compounds, phosphorous, 'dynamite, explosives, bombs or any other obnoxious hazardous material shall not be permissible ln a declared industrial area.

Grid station; Vocational training institute		

Source: Urban Unit and HP Consultants

6.4 Educational Facilities

Educational facilities have been proposed as part of the institutionalization and economic development strategies described in this master plan. The proposed facilities will have several positive impacts on literacy rates and subsequent economic and social development.

6.4.1 Rationale for Proposed Educational Facilities

Demography, connectivity and environmental factors are major contributors in spatial policy making, especially for matters concerning optimal locations for the provision of public services to ensure service accessibility and making its coverage more efficient and equitable. For the establishment of new schools: flood zone proximity, earthquake zone proximity, air and water quality and influential factors.

6.4.1.1 Locational Criteria

A study on educational facilities' guidelines in Saudi Arabia revealed that a Primary or Elementary school should serve a neighborhood of 3600 residents, with a service buffer zone of 500 meters. In addition, it suggested an elementary school should be 500 meters away from another elementary school; 150 meters from the closest highway or main road; 75 meters from the nearest road intersection or gas station; 150 meters from power transmission lines and 500 meters from any power transmission plant; 150 m from factories and warehouses; 100 meters from water catchment areas; and the land slope must be less than 18%[9].

Transport and connectivity are another key factor impacting student participation rates in formal education. The findings of a study conducted by Canadian department of Public Policy showed that distance to school may act as a deterrent to attending by virtue of relocation costs, especially if the student is from a low-income family. Moreover, increased distance to an educational facility from an individual's residence

[9] Saad Al Quhtani (2022) Spatial distribution of public elementary schools: a case study of Najran, Saudi Arabia, Journal of Asian Architecture and Building Engineering

is associated with an access gap, leading to low student attendance accompanied with a high likelihood of dropping out[10]. Another study highlighted individuals residing more than 8 kilometers from an academic institution are 27 percent less likely to participate in post-compulsory education, compared to those who live less than 2 kilometers away.[11]

6.4.1.2 Population and Demographics

Population density is another key determinant in the establishment of new facilities as it is directly proportional to accessibility; Areas with a lower population density of school-age population have lower access while areas with a higher density of school-age population have higher access.

It is also noted that gender disparity in education in Parachinar is high, particularly at the higher education and secondary level. In case of district Kurram, both male and female literacy rates are very low with the overall literacy rate of Kurram District is 40.4%.

Table 6-19 shows all the population groups of age 10 and above by literacy, and sex. It implies that around 80% of the population have an education level of matric or lower, with the percentage of females being even lower. Furthermore, the education levels above intermediate are also low in the upper tehsil and the urban area of Upper Kurram tehsil/ Parachinar.

Table 6-19: Education level in tehsil Upper Kurram/ Parachinar

Level	Male	Female	Transgender
Below primary	60%	40%	0%
Primary	64%	36%	0%
Middle	72%	28%	0%
Matric	76%	24%	0%
Intermediate	69%	31%	0%
Graduate	64%	36%	0%

[10] Frenette, Marc. "Access to College and University: Does Distance to School Matter?" *Canadian Public Policy / Analyse de Politiques* 30, no. 4 (2004): 427–43. https://doi.org/10.2307/3552523.

[11] Dickerson, A., & McIntosh, S. (2013). The Impact of Distance to Nearest Education Institution on the Post-compulsory Education Participation Decision. *Urban Studies*, *50*(4), 742–758.

Master and above	73%	27%	0%
Diploma	89%	11%	0%
Others	38%	62%	0%

Source: Household Information Survey, 2021

Table 6-20: Education level in the Urban area of Upper Kurram/ Parachinar

Level	Male	Female	Transgender	Total
Below primary	54%	46%	0%	320
Primary	56%	44%	0%	482
Middle	61%	39%	0%	406
Matric	66%	34%	0%	480
Intermediate	58%	42%	0%	340
Graduate	58%	42%	0%	198
Master and above	60%	40%	0%	137
Diploma	93%	7%	0%	15
Others	76%	24%	0%	25

Source: Household Information Survey, 2021

Table 6-21: Government education institutes in urban center of Parachinar

Schools	Boys	Girls	Total	Gap
Primary	8	4	12	4
Middle	1	-	1	1
High	2	2	4	0
Higher Secondary	-	-	-	0
Total	11	6	17	5

Source: Household Information Survey, 2021

Table 6-22: Town-wise Number of Primary Schools and Gender Split

No.	Neighbourhood councils	Boys	Girls	Total	Pop 2022	Pop per school
1	Parachinar TC	-	1	1	5,502	2,982
2	Malana	2	-	2	7,532	4,083
3	Zeran Hassanzai	1	1	2	8,392	4,549
4	Tootki 01	1	1	2	8,841	4,792
5	Tootki 02	2	-	2	6,769	3,669

6	Tootki 03	1	1	2	7,507	4,070
7	Tootki 04	1	-	1	8,186	8,875
	Total	8	4	12	5,2729	4,764

Source: Land Use Survey, 2021

As per Table 6-21 and Table 6-22, the urban center of Parachinar is well served in terms of educational facilities. However, at least five primary schools will be required and need to be established by the end of 2040, as the population is expected to increase by approximately 20,000 people.

6.4.1.3 NRM Standards for Educational Facilities

The areas required for different level of educational facilities with respect to population, gender, and the NRM guideline are provided in Table 6-23:

Table 6-23: NRM standards for Schools

Population (2017)	**Projected Population (2040)**	**School level**	**Criteria for 1 school @ per Population[12]**	**Criteria for Required area @ per School[13] (Hectares)**	**Schools required by 2040**	**Required area in Hectare**
52,729	76,481	Primary	7,500	1	10	10
		Middle	3,900	1.5	20	30
		High	23,000	2.1	04	8.4
		Higher Secondary	30,000	5	03	15

Source: National Reference Manual, 1985

Table 6-24: NRM standards-based criteria for educational facilities

Level of Educational Facility	**Types**	**Population Served**	**Required Area Per School (Hectare)**
Primary	Boys Urban	7,500	1
	Girls Urban	8,200	
	Boys Rural	7,500	
	Girls Rural	10,200	

[12] National Reference Manual on Planning & Infrastructure Standards, Chapter 6,

[13] National Reference Manual on Planning & Infrastructure Standards, Chapter 6,

Middle	Boys Urban	3,900	1.5
	Girls Urban	15,000	
	Boys Rural	3,900	
	Girls Rural	17,000	
High	Boys Urban	23,000	2.1
	Girls Urban	30,000	
	Boys Rural	27,000	
	Girls Rural	31,000	
Colleges	Male Rural	200,000	8
	Male Urban	400,00	
	Female Rural	250,000	5
	Female Urban	750,000	

Source: National Reference Manual, 1985

6.4.2 Middle schools (Current status and proposed)

There is only Government Middle school for boys in the urban center of Parachinar. The allocational criteria recommended by NRM is that a boy's Middle school should serve a population of 3,900 people whereas a girl's middle should serve a population of 17,000 people. This indicates a deficiency of at least four middle schools, two each for boys and girls. In addition, 4-5 more schools will be required to meet the needs of 2040.

Table 6-25: Town-wise Number of Middle Schools and Gender Split

Neighbourhood councils	Boys	Girls	Total	Pop 2022	Pop per school
Parachinar TC	-	-	-	5,502	-
Malana	-	-	-	7,532	-
Zeran Hassanzai	-	-	-	8,392	-
Tootki 01	-	-	-	8,841	-
Tootki 02	1	-	1	6,769	7,339
Tootki 03	-	-	-	7,507	-
Tootki 04	-	-	-	8,186	-
Total	1	-	1	5,2729	-

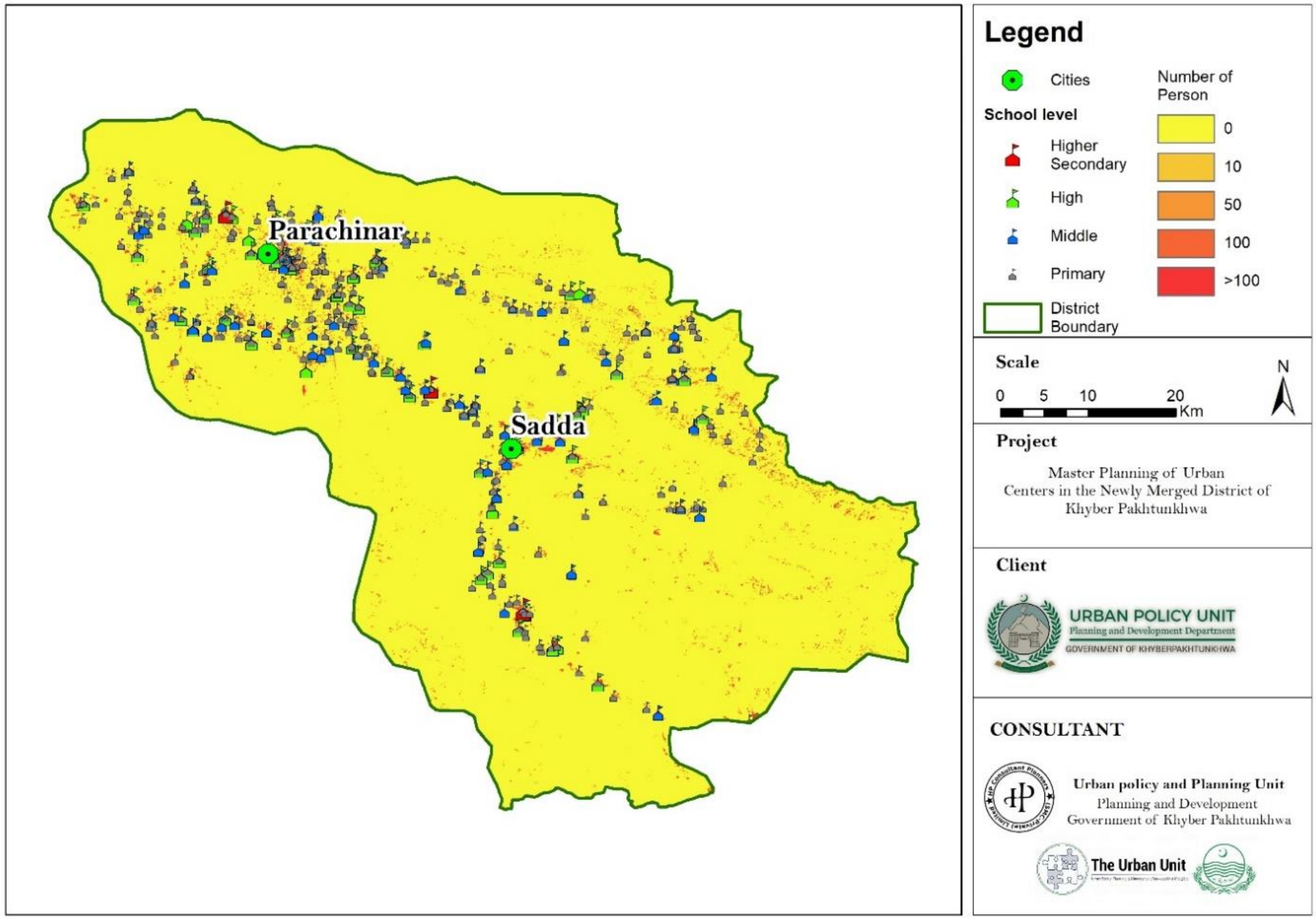
Source: National Reference Manual, 1985

6.4.3 High schools and Higher secondary schools (Current status and proposed)

There is a total of four high schools in Parachinar, of which two are for males and two are for females. There are no Higher secondary schools operating in the urban center of Parachinar.

The National Reference Manual recommends a 3-4 sections High School (Classes V-X) for a population of 23,000 in case of boys, and 31,000 in case of girls. These statistics imply that the number of high schools are sufficient for the current period. However, by 2040, at least one high school and one higher secondary school would be required for both males and females to meet the standards.

It should be noted that the standards set by the NRM during the 1980s are not compulsory to follow in current conditions and the educational needs can be updated through consultation with representatives of all sectors.



Map 20: Spatial Analysis of Educational Facilities in Parachinar

6.4.4 Technical and vocational centers for skills development:

A detailed inventory of technical and vocational institutes is not available for Parachinar urban center. However, as per the record of the local population, few yet inadequate technical and vocational centers are available.

It is therefore proposed that technical and vocational centers for skills development be established in each NC by the end of 2040. In addition to global best practices, the following table highlights NRM guidelines for optimal site location for the establishment of new facilities.

Table 6-26: Rationale for Educational Institutions based on NRM standards

Sr. No	Educational Institutions	Locational Guidelines
1	Primary School	Near to existing and planned housing schemes areas in which they will be serving. Located at walking distance from the houses. Commonly situated centrally in a residential area and away from the busy roads. Catchment area for urban schools 055-1km. Catchment area for rural schools 2.2kms.
2	Secondary School	Must have easy and good vehicular availability and safe walking access. Away from schools of opposite gender. Far away from the main busy roads which carrying fast and heavy traffic. Must situated on roads with favourable linkages to their catchment area. Catchment area for urban schools 1.25-2.45km. Catchment area for rural schools 5-10km.
3	Intermediate Colleges	Catchment area for urban school boys 2.75-4km. Catchment area for rural school boys 10-15km. Catchment area for urban school girls 3.25-5km.
4	Degree College	Large city.
5	University	Metropolitan city area.

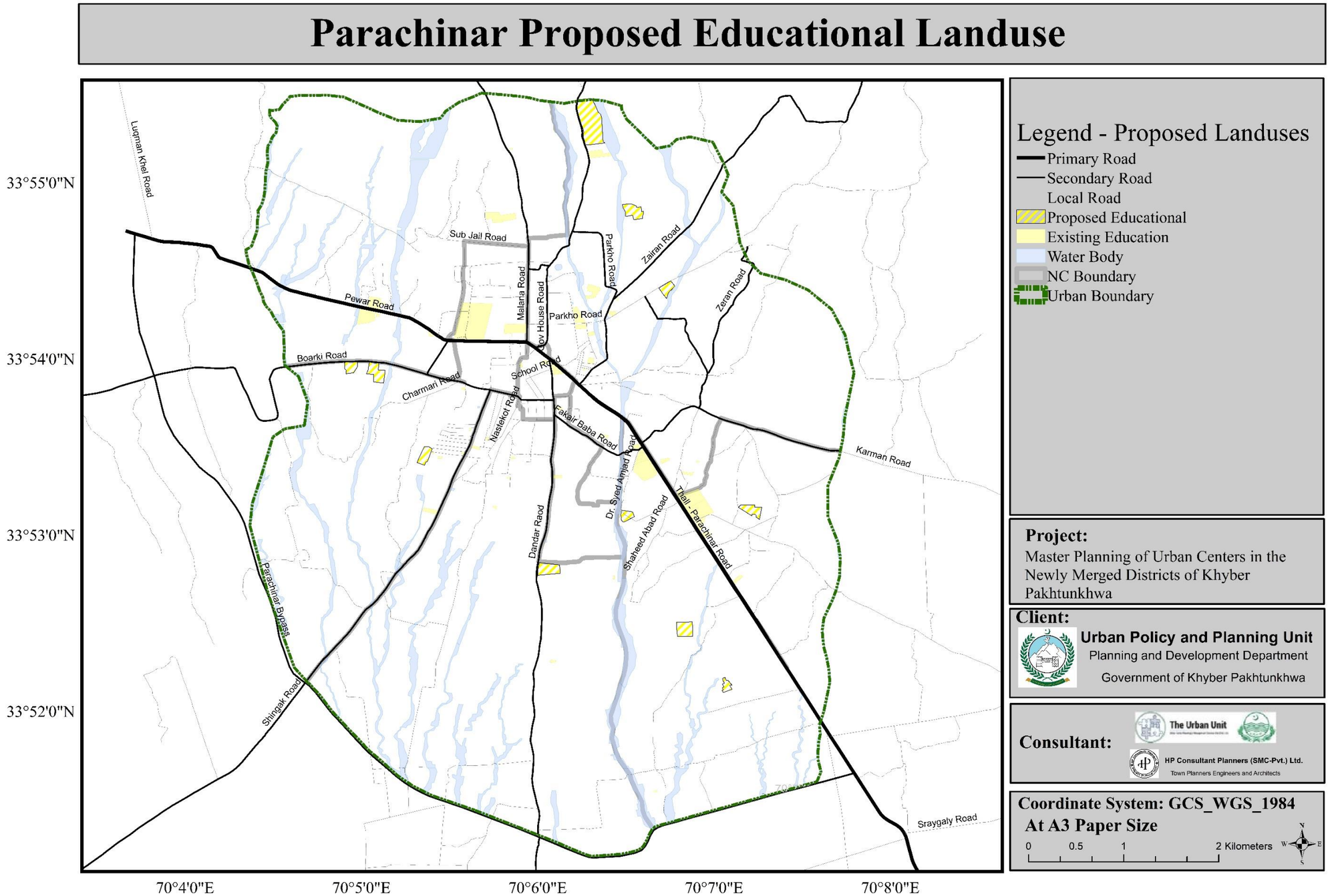
Source: National Reference Manual, 1985

University having an area 19.78 acre is proposed near Government College of Management Science Parachinar. It will serve the population of Parachinar and nearby areas. As the society is moving towards global dynamics, diversified fields of education will be a prerequisite. It could include upcoming need of the job market like; engineering, business, management, finance, media, IT and software, artificial intelligence, robotics etc.

6.4.5 Proposed Educational Sites

Based on the international best practices, NRM guidelines, and population growth trajectory in Parachinar, sites for additional schools have been identified. The following criteria have been used for site proposals:

- Based on the current need and areas, zones for educational sites have been recommended in those particular localities where the population is currently unserved.
- The future population projection for the year 2040 was the main determinant in site identification. In zones that having a population exceeding 3,000 people, a primary school is recommended, while zones with an aggregate population exceeding 20,000 have been marked suitable for establishing Elementary and Secondary [High and Higher Secondary] schools.
- Furthermore, it is ensured that educational zones, based on the future need, are proposed in residential sites – both current and future sites.



Map 21: Proposed Educational Facilities

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repeal if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for educational facilities are below:

Table 6-27: Educational Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Large Scale educational areas General education universities Scientific research institutes IT and Media institutes City Level libraries, book banks, data and information centres	Staff residences (teaching and non-teaching) Separate hostels for Boys and Girls Auditoriums, seminar halls, workshop spaces, Community facilities (Parks, Playgrounds, clinics, schools and neighbourhood commercial)	Large scale commercial, industrial activities Large scale Slaughterhouses, Large scale Workshop for servicing and repairs.

Source: Urban Unit and HP Consultants

6.5 Health Facilities

Accessible, equitable, and quality healthcare for all people is the vision of the Khyber Pakhtunkhwa government. However, few health facilities are currently available in the urban centers of Parachinar which do not fulfill the health requirement of the people.

Issue No. 1: Access to Health Facilities

Table 6-28 shows the total number of health facilities currently available in the urban center of Parachinar. Give that the current population of the urban center according to

the projection of Census 2017 is 52,729, a total of three health facilities is insufficient to serve the urban population.

Table 6-28: Town-wise Number of Health Facilities in Parachinar City

No.	Neighbourhood Council	CHC	CD	Hospital	MCHC
1	Parachinar TC	-	-	1	-
2	Malana	-	1	-	-
3	Zeran Hassanzai	-	1	-	-
4	Tootki 01	-	-	-	-
5	Tootki 02	-	-	-	-
6	Tootki 03	-	-	-	-
7	Tootki 04	-	-	-	-
	Total	**-**	**2**	**1**	**-**

Source: KP Tribal Districts Health Facilities Registry

The accessibility of health facilities, based on the household survey data findings, is shown below

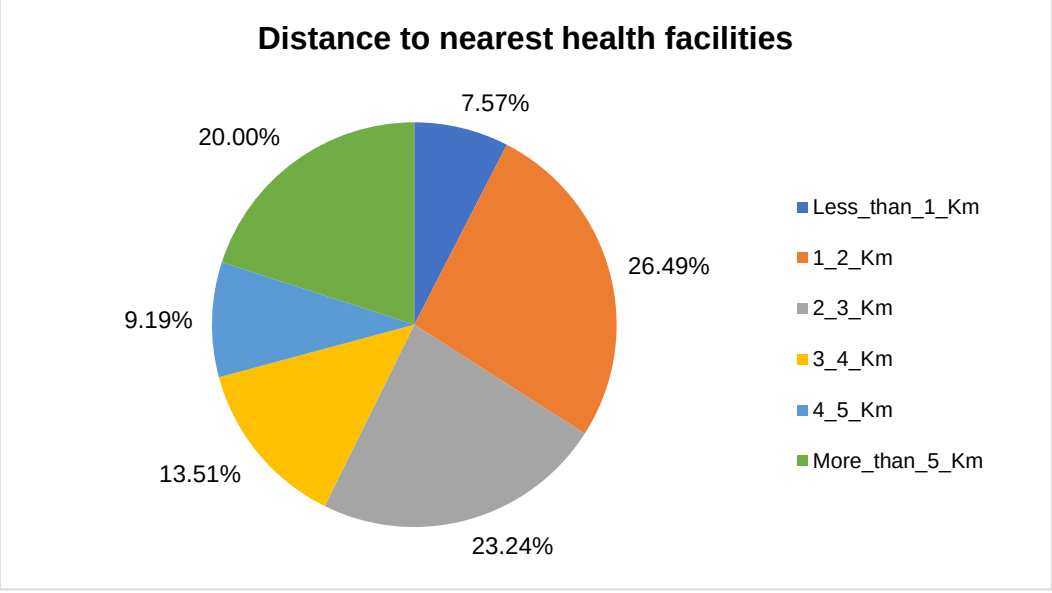


Figure 6-2: Distance to Nearest Health Facilities

The household Survey Conducted revealed that Health facilities available in Parachinar include BHU, CHC'S, DHQ, a few small hospitals, and private clinics. 23.24% of the total sample population confirmed that health facilities are available in the range of 2-3 km from their homes. Approximately 13% of the total sample

population reported that health facilities are available in the range of 3-4 km while almost 20.00% confirmed that health services are not available in the range of 5 km.

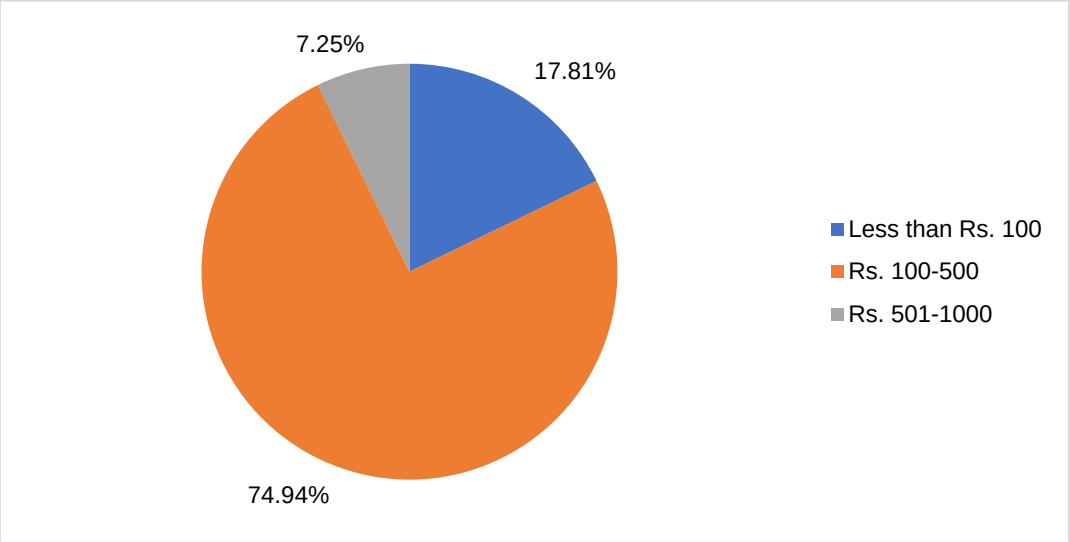


Figure 6-3: Cost Per Visit to A Health Facility

Source: HH Survey Conducted by the Consultant (The Urban Unit & HP Consultant)

The analysis of the household survey shows that 17.81% of the respondents spend less than 100 rupees on transport mode per visit to travel from home to the health facility. Approximately 74.94% of the respondents confirmed that they spend 100-500 rupees per visit while 7.25% of the respondents reported the amount in the range of 500-1000 rupees.

6.5.1 Rationale for Proposed Health Facilities

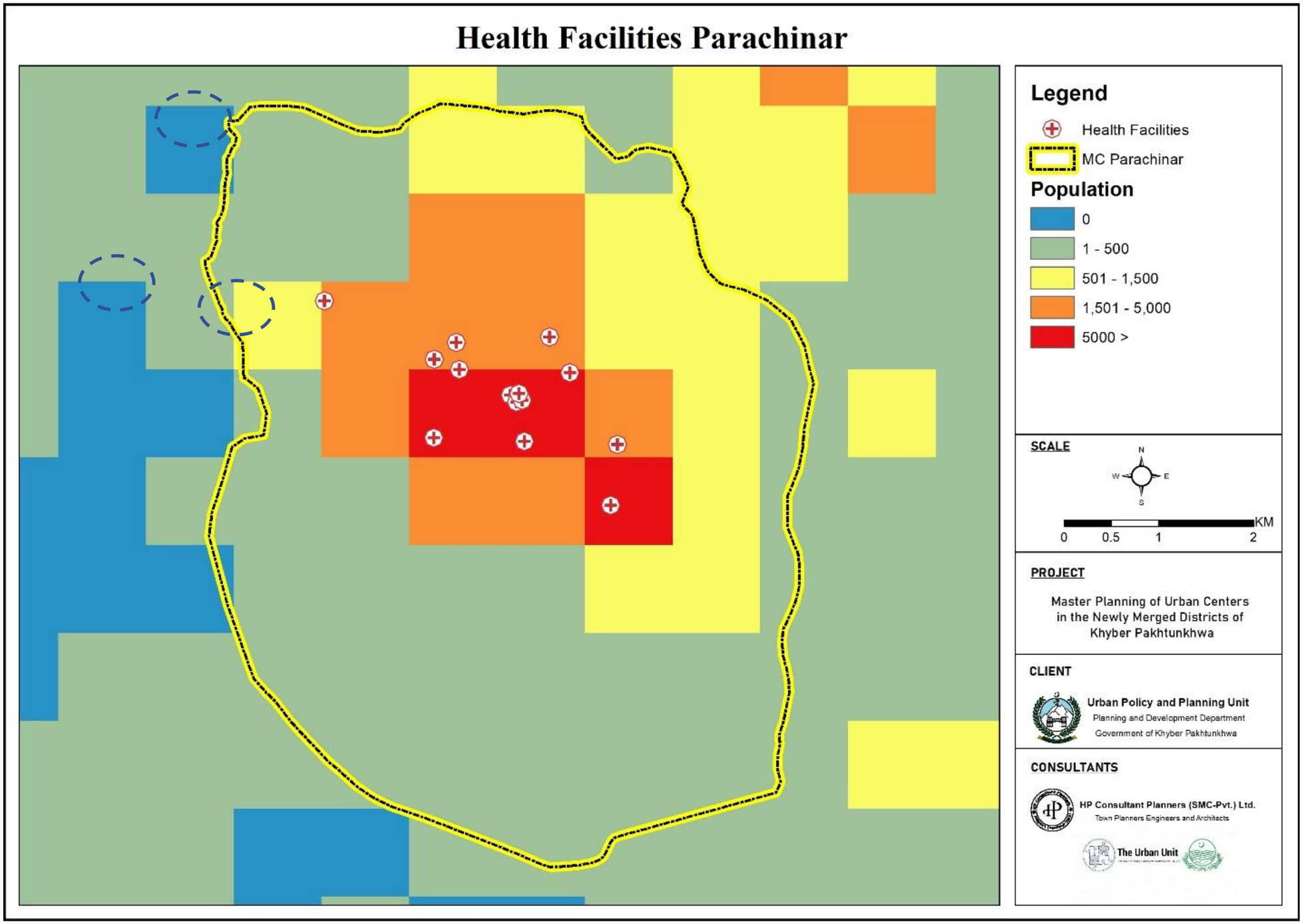
Factors considered for proposed health facilities sites are:

1. High population density areas
2. Proximity to other health facilities
3. Unserved existing and new residential areas
4. Proximity from road infrastructure

The Map below shows the distribution of health facilities, along with population densities of the region. A Hot spot analysis is done to identify the population clusters in the region and overlaying the existing health facilities on the map help to identify the unserved areas.

It can be seen that the health facilities are clustered in the center of the region. Most of the population is lying in the center and north of the region. Similarly, major facilities,

both private and public are located in town center while other populated areas such as the north of the region has limited or no health facilities, thus highlighting the gaps in the region. The blue dotted line indicates the unserved area.



Map 22: Distribution of health facilities and population density in Parachinar

Source: The Urban Unit & HP Consultants

The NRM guidelines have been consulted for the provision of new health facilities. Obtained parameters include certain guidelines for geographical distribution and plot sizes of the health facilities.

Table 6-29: Allocation criteria of health facilities as per NRM

Sr. No.	Type	Allocation criteria	Covered/Site area
1	Basic Health Unit (BHU)	10,000	1250 – 2500 m^2
2	Dispensary (Urban)	One per large school/factory	2 rooms
3	Community Hospital / Polyclinic	-	1 hectare
4	Tehsil Hospital	One per tehsil	2 hectares
5	District Headquarter Hospital	One per district	5-8 hectares
6	General Hospital	In large cities	3-7 hectares
7	Teaching Hospital	On provincial/regional basis	20-40 hectares
8	Specialized Hospital	In metropolitan cities	55-75 m2 / bed

Source: National Reference Manual on Planning and Infrastructure Standards

In addition, the following spatial factors have been considered when selecting a suitable site for constructing a new health facility:

- **Catchment:** Health facilities should be situated in the vicinity of dense areas or population built-up which includes both residential and commercial areas[14].
- **Complimentary Land Uses:** As per the NRM guidelines, health facilities should be located on a route which is adjacent to other facilities such as other health facilities, police station, ambulance and fire services. Numerous studies on site suitability for health facilities show that health facilities should be within proximity to each other[15].

[14] Zhou & Wu (2012). GIS-Based Multi-Criteria Analysis for Hospital Site Selection in Haidian District of Beijing.

[15] Sharmin and Neema (2013). Appropriate Locations of Hospitals in Dhaka City in Bangladesh.

- **Environmental factors:** As per the NRM, the health facilities should be located in pleasant surroundings among trees and plants, and there should be minimum environmental pollution including noise and dust.

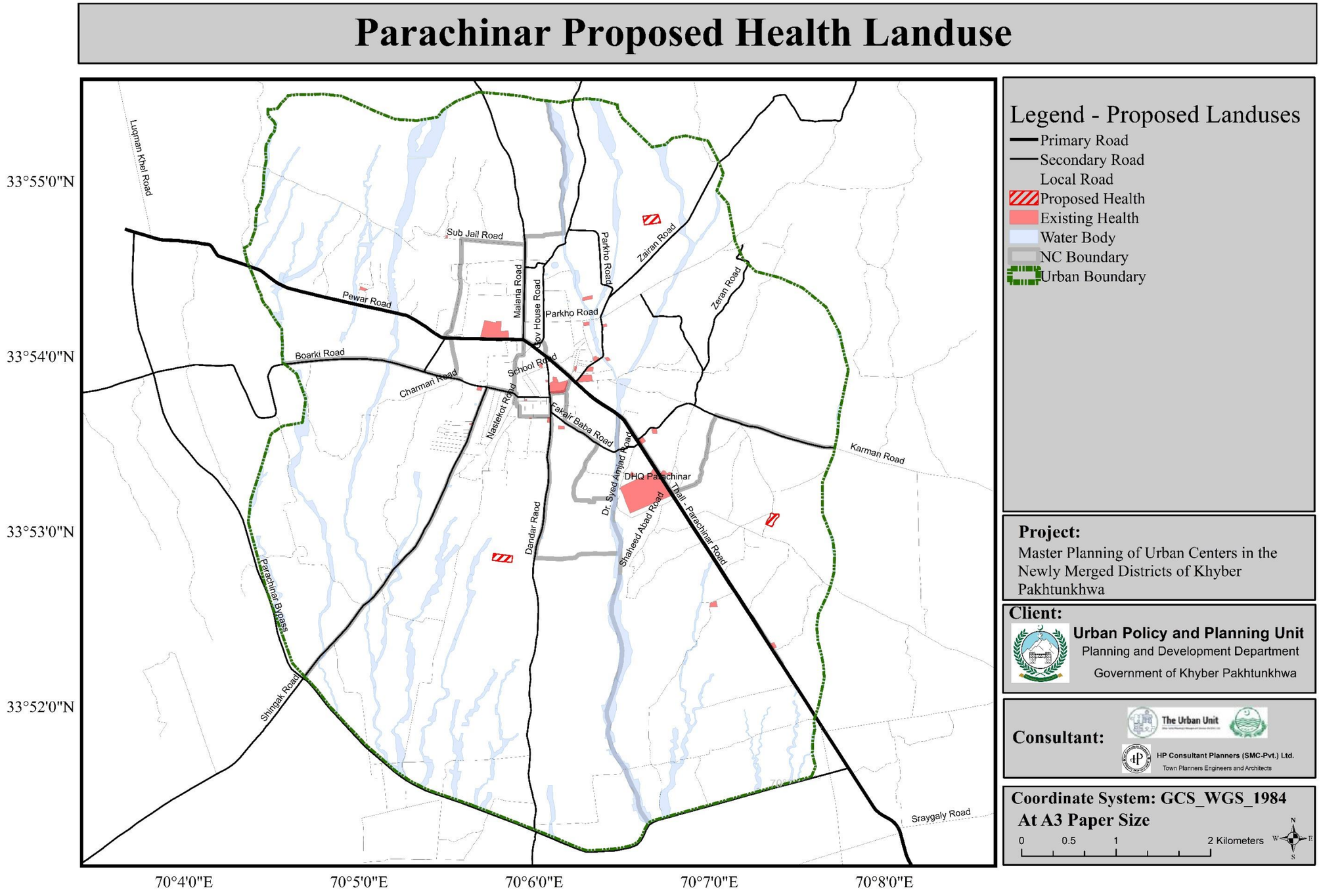
As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repeal if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for health facilities are below:

Table 6-30: Health Facilities Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Large Scale Health Institutions; Hospitals, Scientific research institutes, Clinics, Clinical Laboratory, BHUs and RHCs, Maternity Care Centres.	Staff residences, Community facilities (Parks, Playgrounds, schools and neighbourhood commercial), Banks or Automated Teller Machine (ATM), Departmental Store, Taxi or bus stand.	Large scale commercial, industrial activities Large scale Slaughterhouses, Large scale Workshop for servicing and repairs.

Source: Urban Unit and HP Consultants

The map below shows the areas identified for the construction of public or private health facilities. Mainly primary facilities are proposed to cater to the needs of population. In the long term, these facilities can be upgraded to secondary level facilities, depending on the health needs of the people in the region.



Map 23: Proposed Health Facilities

6.6 Connectivity and Accessibility

Cities today rely on transportation infrastructure to ensure economic viability and socio-economic sustainability. Transportation infrastructure influences housing patterns, land use, and economic and commercial hubs. Inadequate transportation management leads to traffic congestion, increased energy consumption, pollution, and traffic accidents.

All the major roads in Parachinar, including those to Malana Road, Shalozan road, and Pewar Road, are paved, although certain sections are not maintained regularly. As the Upper Kurram's central hub, Parachinar experiences heavy traffic, particularly in the business district. Afghanistan's western border is shared by Parachinar and Sadda. For Parachinar to develop into a thriving urban center, effective transportation infrastructure is required.

6.6.1 Mobility problems of Parachinar city

The current traffic conditions and congestion issues on Parachinar's roads are similar to those of other cities in the province. These include encroachments, inadequate parking, insufficient carriageway width, lack of traffic control devices, and lack of public transportation services.

The Household Information Survey (HIS) revealed that residents of Parachinar are dissatisfied with the current road mobility scenario as illustrated in **Figure 6-2**. The majority of respondents expressed concerns about traffic congestion, inadequate road infrastructure with poor safety conditions, and encroachment on road. According to 83% of respondents, road users and vehicle operators Parachinar have poor driving behavior resulting in accidents, road congestion, and delays. Parking issues were ranked as the worst by 82% of respondents. Similarly, 84% of respondents expressed dissatisfaction with the lack of roadside traffic signs.

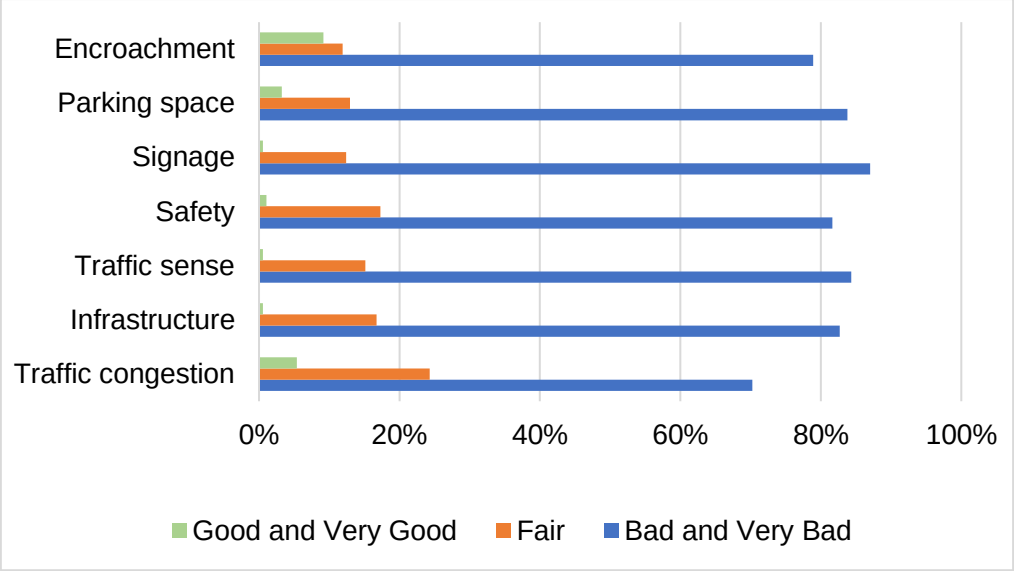


Figure 6-1: Traffic problems of Parachinar

6.6.1.1 Existing Public Transport Services

According to the Household Information Survey, 66% of respondents use public transportation to meet their daily travel needs.

Public transit interviews were conducted to determine the perception of the public transport users regarding the importance associated with service attributes and the degree of satisfaction associated with these attributes.

A qualitative assessment of both variables, i.e., *importance and satisfaction*, is shown in **Table 6-30** with color grading. To determine a cumulative impact of both variables, the weighted average score method was used with the varying score pertaining to the degree of importance and satisfaction. The weight to three level is assigned as:

- 3 (or 50%) for important and satisfied,
- 2 (or 33.33%) for Neutral in both cases and
- 1 (or 16.67%) for not important /not satisfied

The net score of both variables is shown (in descending order) against the respective attribute in the last column as shown in **Table 6-30**.

All except 10% of the respondents consider safety of life to be important and slightly over three fifths of them are satisfied with the prevailing public transport service. The attribute is at top with maximum net score of 5.37. Secondly, network coverage of existing public transport services, crowding, noise and waiting are considered extremely important by more than 80% of the respondents. However, the satisfactory

level to these parameters is extremely low that depicts a poor level of public transport service.

Table 6-31: Commuters perception of the Public Transport Service in the city

Travel Attributes	Importance			Travel Attri Satisfaction			Weighted Average Score		
	Important	Neutral	Not Importa	Satisfied	Neutral	Not Satisf	Importance	Satisfaction	Net Score
Safety of Life	90%	10%	0%	62%	23%	15%	2.90	2.46	5.37
Staff Behavior	75%	21%	4%	68%	18%	14%	2.70	2.54	5.24
Cleanliness of vehic	72%	25%	3%	52%	31%	17%	2.69	2.35	5.04
Crowding	86%	13%	1%	44%	30%	27%	2.85	2.17	5.01
Noise	85%	13%	3%	35%	31%	34%	2.82	2.01	4.83
Network Coverage	86%	13%	1%	39%	14%	46%	2.85	1.93	4.77
Journey Time	80%	15%	4%	31%	34%	35%	2.76	1.96	4.72
Cost of travel	73%	24%	3%	37%	24%	39%	2.70	1.97	4.68
Waiting Time	83%	10%	7%	27%	18%	55%	2.76	1.72	4.48

6.6.1.2 Poor Road Network

The road network in the formerly rural area is still unpaved. Streets and secondary roads in the urban jurisdiction are not well maintained and remain kacha having no shoulders, footpaths, drains, or metal surface. This causes major accessibility problems for the general public in terms of their accessibility to basic facilities like health and education.

6.6.1.3 Parking

Parachinar urban area does not have any government owned parking lot, also private parking lots are not designated with much prominence. There are certain open areas which are utilized as parking lots but cannot be named as proper parking lots. All the traffic coming into the city center, bazaar or passing through is parked on the street, which contributes to traffic flow issues.

6.6.1.4 Encroachments

The urban area of Parachinar has been grappling with several pressing challenges related to encroachments such as Shop faced extensions, Advertising and Boards, Illegal On street parking, Makeshift transport Stands and Street vendors. These encroachments lead to diverse mobility concerns such as hinderance to pedestrian movement, visual clutter, traffic disruptions and road safety. The location of encroachments in the urban area of Parachinar are illustrated in **Figure 6-3.**

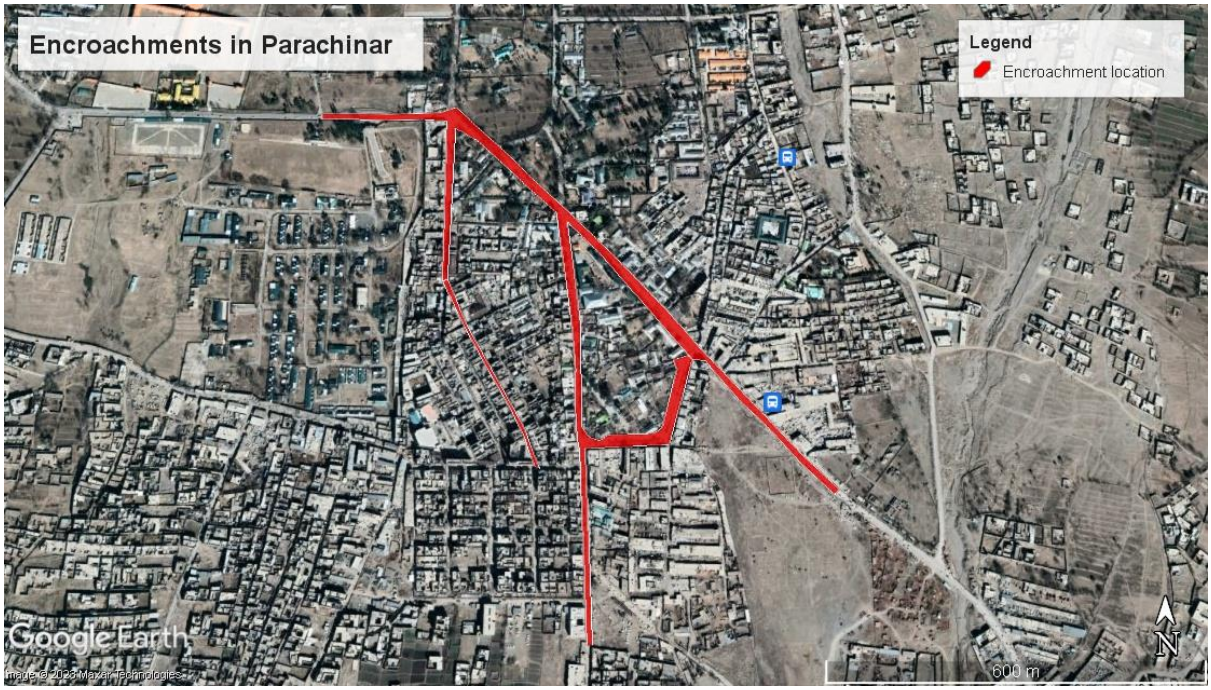


Figure 6-2: Encroachments in Parachinar Urban Area

6.6.2 Travel patterns

An Origin Destination survey was carried out to determine the patterns of traffic flow within the city. A Roadside Origin Destination Survey was carried out at five selected locations in Parachinar Urban Area as follows:

- Entry point Parachinar Urban Area from Peshawar
- Entry point Jail Road Punjabi Bazar (RP Chowk)
- Entry Point School Road (PA Chowk)
- Nazarbandi Chowk
- Dandar Road (Kashmir Chowk)

The results of the Roadside OD survey have already been elaborated in the Background Study and Situational Analysis. The Key findings of the travel pattern data of Parachinar are as follows:

- Most of the trips are generated at Malena NC (16.5%), Parachinar NC (13%). Tootki 3 (13%), Tootki 4(11.6%) and Dandar (11%).
- The destination for the majority of trips is Parachinar main Bazar (43.55%) followed by Parachinar NC (5.16%), Zeran (5.16%), and Dandar (3.87%).

- The purpose for most of the travels is Business/Job/Work which accounts for 46.25% (148) of the visits. While educational visits were 10% and health related visits were also 10%. Shopping accounted for 29.38% of the total trips.
- 64% of the respondents during the HIS informed that they spend up to Rs.500 on their daily commute.

6.6.3 Road Network of Parachinar

The road inventory of study area was created utilizing information gathered from the pertinent departments, road inventory survey, and on field observations. The main roads of Parachinar have been identified as follows:

Thall Parachinar road

This is the main road that connects Peshawar to Parachinar. This road is the only route from Peshawar to the Kurram District. The road is in poor condition and needs to be repaired in several patches. The road is predominantly a signal carriageway with unpaved shoulders.

Pewar Road

This road connects to the Thall-Parachinar Road and leads to Pewar village along the boundary of Parachinar City. The road is paved and has a moderate to low traffic volume.

Malana Road

This road connects the main Cantt area of Parachinar to Malana village. The road starts from RP Chowk near FC Bakery, passes through the District Courts, and terminates at Malana. There is little traffic on the road. The road is paved, but it needs to be repaired in several patches.

Zeran road

This road passes by the NADRA office in Parachinar and leads to Zeran village on the outskirts of the city. It has light to medium traffic flow. The road is paved and requires patch maintenance in some areas.

Dandar Road

This road connects the main bazaar to Boshehra village on Parachinar's eastern side. This road also provides connectivity to Thall Parachinar Road. The road is patched but needs to be repaired. The road's traffic flow is medium to low.

Punjabi Bazar road

This road connects RP Chowk to Parachinar's main commercial bazaar. The road then splits into two directions, one leading to Chargano Chowk and the other to the bazaar. The road is paved, with a low to moderate traffic flow.

Parachinar Bypass Road

Parachinar is served by a bypass road which travels along its urban boundary. This road provides an alternate route for trucks and passenger vehicles travelling west of Parachinar City and access Pewar Road.

The prominent attributes of the road Network of Urban Parachinar are shown in **Table 6-31**. Likewise **Figure 6-4** shows the road network of Parachinar as described above.

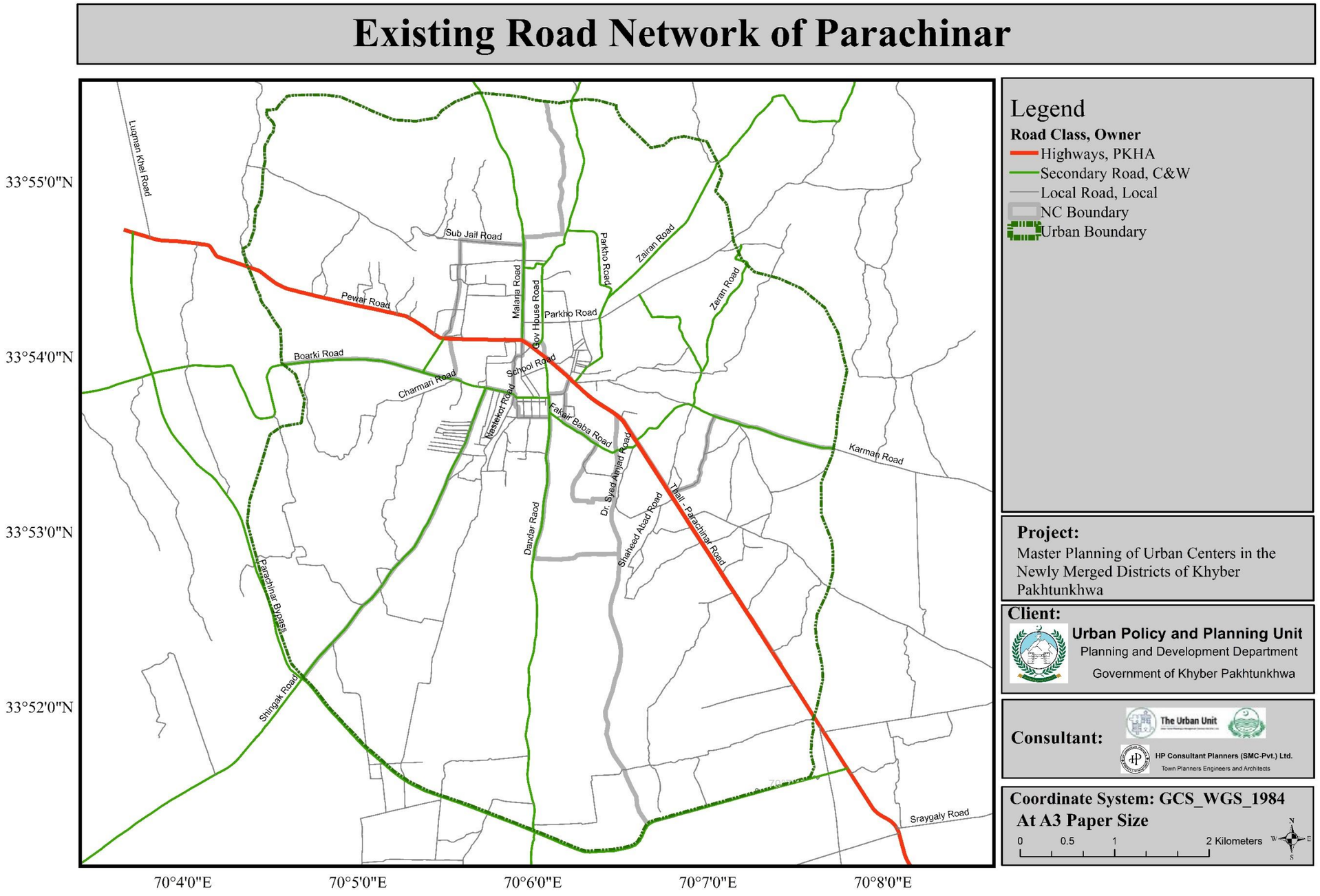
Table 6-32 Road Network Attributes

Road Name	No. of Lanes	Carriageway	Owner	ROW*	Class	Capacity (veh/hr)**	Length (Km)	Width*** (m)
Thall Parachinar Road	2	Single	PKHA	55ft	Primary	450-1800	10.29	6.5
Prewar Road	2	Single	C&W	55ft	Primary	900	3.12	6.5
Parachinar Bypass	2	Single	C&W	55ft	Secondary	1800	10.78	9
Malana Road	2	Single	C&W	55ft	Secondary	675	3.68	5.5
Zeran Road	1	Single	C&W	55ft	Secondary	450	5.27	4.7
Dandar Road	2	Single	C&W	55ft	Secondary	450	7.74	5.5
Punjabi Bazar Road	2	Single	Local	25ft	Local	450	17.7	5

**Right of Ways Quoted are nominal values for rural roads belonging to the respective owner. The ROW is variable in Urban Environments.*

***Capacity has been determined based on HCM formula C = 1800(N-1+Ps). The Value of P has been assumed to adjust for urban environment and cross-section reductions due to parking and stoppage.*

****C&W owned roads in rural settings have a typical cross section of 24 feet (16ft paved carriageway + 4ft shoulder and Utilities/Drainage on both side). Cross sections become variable in Urban Environments.*



Map 24: Road Network of Parachinar

6.6.4 Capacity/ Level of Service Analysis

Traffic count studies were conducted in Parachinar to collect traffic volume, which was subsequently utilized to determine the volume-to-capacity ratio and Level of Service for crucial road segments within the region. Using the data collected and following the guidelines of the Highway Capacity Manual (HCM) 2010, the level of service was assessed for the sections where traffic counts were performed. The Level of service results are illustrated in **Table 6-32.**

Table 6-33: Capacity and level of service for different sections

Road Section	V/C Ratio*	Level of Service
Entry Point to Parachinar Urban Area from Peshawar	1.72	F
Entry point towards Punjabi Bazar (RP Chowk)	0.86	C
Nazarbandi Chowk	0.76	B
Dandar Road (Kashmir Chowk)	0.75	B
Malana Road	0.57	A
Pewar Road	0.58	A

**Calculated using HCM Link Capacity Equation 1800*(N-1+Ps) and peak hour volumes*

The results show that Thall-Parachinar road is operating at LOS “F” during its peak hour with other roads are operating at an acceptable level of service. The volume-to-capacity ratios are illustrated in Section 6.6.6.1, where these roads are recommended for short term improvement.

6.6.5 Proposed Transportation Interventions

Parachinar is situated along Pewar Road and Thall Parachinar Road which are major east-west transport corridors. Both of these roads provide access to Afghanistan via Pewar and serves as international route. Likewise, Parachinar has a substantial industrial and agricultural base, producing goods such as soapstone, granite, peanuts, and pulses. These products are of export quality and are demanded all over Pakistan. It is therefore essential to develop Parachinar’s transportation network to not only facilitate the movement of the people, but also facilitate its agricultural and mining industries.

The Master Plan 2040 suggests short-, medium-, and long-term measures to develop future Parachinar road network. The short-term interventions are to be undertaken immediately, while the medium- and Long-term measures in this Plan are to be initiated over the next 5 to 15 years. These proposals are built on an analysis of the baseline data gathered from the field and secondary sources that have been detailed in the *background study*.

The relevant line departments such as Construction and Works (C&W), Local Government & Rural Development Department, The Transport Department, and Government of KP need to maintain balance between transportation demand and supply of mobility infrastructure in the Parachinar. The renovation of existing transportation infrastructure and its capacity enhancement is required to accommodate the projected population of 2040.

6.6.6 Short Term Interventions

Short-term measures are proposed to tackle the problems of relatively immediate nature that were identified during the field surveys. These should be implemented during the first five years of the plan.

6.6.6.1 Improvement of Road Network

The existing road network is inadequate to cope with the mobility requirements of Parachinar. This is indicated by the level of dissatisfaction with various road-related issues such as parking and congestion. These issues are bound to be aggravated with the increase in traffic. Besides, considering the other initiatives of the government and projects such as construction of an international route parallel to N5, Parachinar city is expected to experience enhanced motorized traffic and urban sprawl.

The traffic counts from the situational analysis were utilized to justify the proposed widenings and dualizations of Parachinar's Road. The link volumes and calculated vehicles per day (VPD) are summarized in the figure below. The obtained traffic data is also available in the Annexures.

Figure 6-3: Link Volumes

The figure below illustrates the volume to capacity ratios for the aforementioned roads. The V/C ratios were calculated based on the capacities of each road noted in Section 6.6.4.

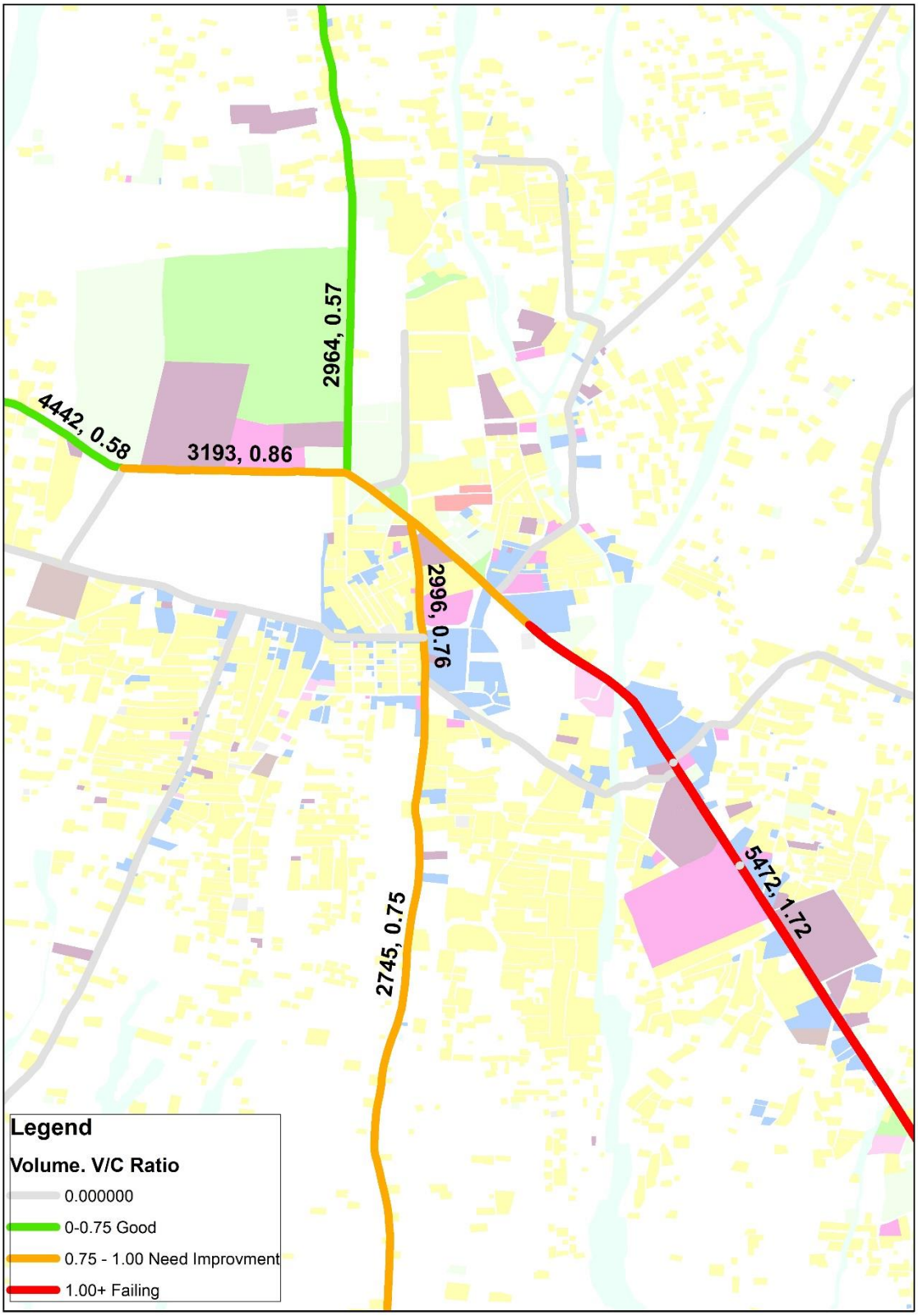


Figure 6-4: V/C Ratios of Key Roads

Consultation with the PKHA and C&W revealed that there is no specified threshold or criteria for undertaking road dualizations and improvements. Such initiatives are undertaken on an as needed basis. For the purposes of this master plan, the volume-to-capacity ratio of a given road is one determining factor for its recommended widening or dualization. A secondary reference is also used: the dualization threshold stipulated by the *Planning & Development Board of Punjab* of 8000 vehicles per day[16] (24 Hours). These criteria are applied for all those roads for which traffic volume data is available.

Given that the above noted VPDs are based on 12-Hour Traffic Counts, it is likely that the number of vehicles along roads such as Pewar Road may exceed 8000 during a 24-Hour period. This is also expected due to the continuation of traffic coming from Thall-Parachinar Road.

All other roads that do not meet the 8000 VPD threshold are recommended for widening to 50 Ft as they still exhibit substantial traffic volume and congestion issues which will aggravate with growth. All those secondary roads for which traffic counts are not available are recommended to be rehabilitated based on observation of their surface conditions.

In conclusion, the following road network improvement projects are recommended to be undertaken on an immediate basis:

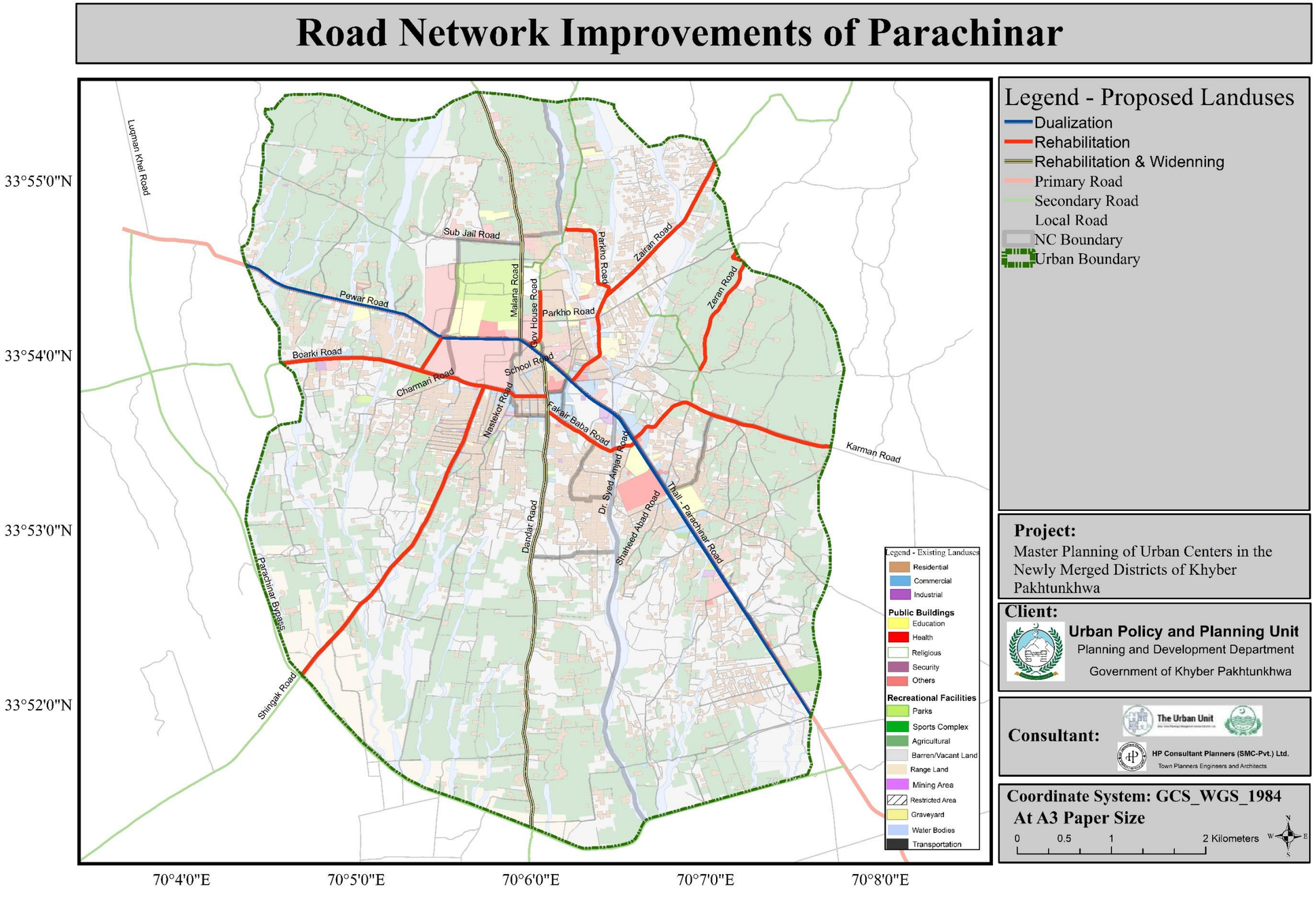
i. Dualization of Thall-Parachinar Road
ii. Dualization of Pewar Road
iii. Rehabilitation & Widening of Malana Road
iv. Rehabilitation & Widening of School Road
v. Rehabilitation of all other Secondary Roads including
    i. Governor House Road
    ii. Parkho Road
    iii. Zairan Road
    iv. Zeeran Road

[16] Planning and Development Board Strategic Interventions for Roads
https://pnd.punjab.gov.pk/system/files/Road.pdf

v. Karman Road
vi. Dr. Syed Amjad Road
vii. Fakir Baba Road
viii. Karakhel Road
ix. Shingak Road

The proposed short-term road improvements are illustrated in the below map.

Note that dualization effectively doubles the capacity of a given road. Therefore, all roads exhibiting a v/c ratio between 1.00 to 2.00 will be brought under 1.00, which is acceptable.



Map 25: Road Network Improvements (Short Term)

The proposed dualized roadways should have cross sections as discussed below:

A typical proposed cross-section of a proposed dual carriage way is shown in the figure below. Note that Sidewalks are recommended along the segments of the road passing through densely populated areas. However, sidewalks are not mandatory away from the urban environment.

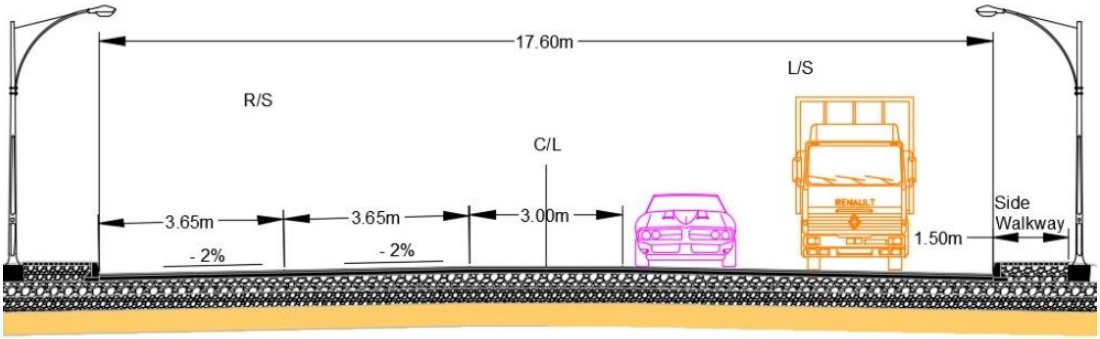


Figure 6-5: Proposed Typical Cross Section for Parachinar-Thall Road

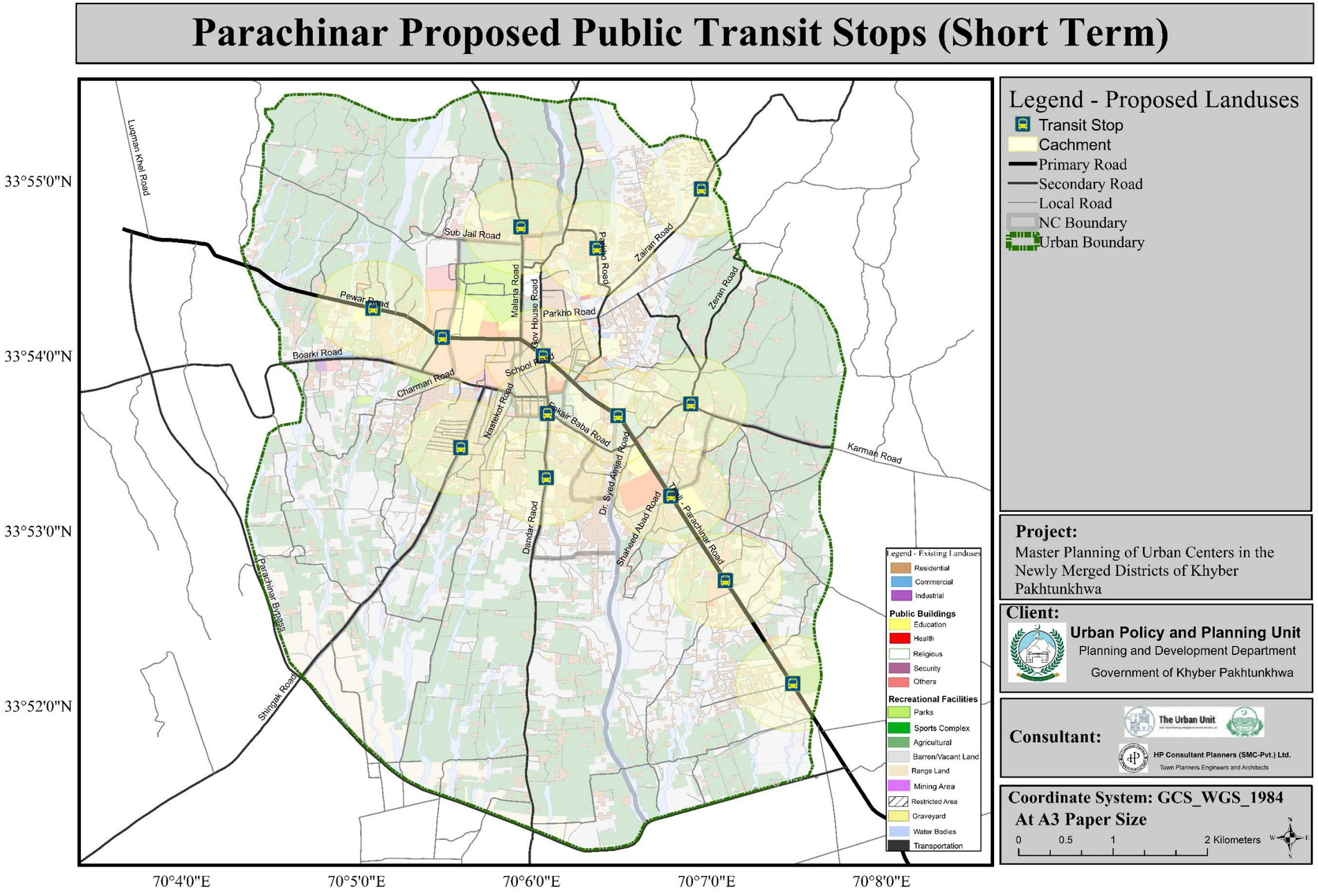
Construction of this dual carriage way is expected to not only facilitate passenger traffic but also provide the necessary space for large vehicles such as trucks and trailers to access Parachinar. Note that a detailed feasibility, prepared by the relevant implantation agency, is required during the preparation of the project concept form to determine the anticipated benefits and costs at the time of implementation.

6.6.6.2 Provision of Intra-City Public Transit Services

Opportunities may be explored to provide an intra-city bus service in Parachinar to facilitate pedestrians and provide alternative modes of mobility. These services may be implemented using small buses, coasters, or vans.

In short term, these services may be provided along the existing primary and secondary road network of Parachinar with services to the stops identified in the Figure below. The stops of been selected such that each have a catchment (service area) of 500 meters and provide access to prominent existing localities and land uses. The route planning and scheduling for these services will be determined by the relevant implementation line department.

The transit stops should be formally marked with sign posts or shelters on the roadside. As a best practice, it is preferable to situate a transit stop on the near-side (before the crossing) of the intersection.



Map 26: Proposed Short Term Public Transit Service Areas – Short Term:

6.6.6.3 Formalizing Public Transport (Intercity)

Parachinar's public transportation, like majority of the merged areas, is composed of privately-owned vehicles such as station wagons and HiAce vans. These modes of transport are preferable for the people of Parachinar as they offer door-to-door service with privacy for families.

While this type of public transport service is effective, it is still part of the informal economy. It is recommended that the Transportation Department begins regulating these services, following the models adopted by other administrative setups in KP such as Peshawar.

Issuing of Route Permits

The Transport Department would ensure compliance to Chapter 4 of the Khyber Pakhtunkhwa Motor Vehicles Ordinance, 1965 and develop a database of these transport vehicles via registrations.[17]

The registration mechanism shown in below figure has been obtained from the Punjab Transport Department and is provided as an example. The KP Transportation department operating in Parachinar is however encouraged to develop their own, registration process that conforms to the law of the land for the merged areas.

[17] KP Motor Vehicle Ordinance 1965 Ammended 2010 https://kpcode.kp.gov.pk/uploads/1965_19_THE_PROVINCIAL_MOTOR_VEHICLES_ORDINANCE_1965.pdf

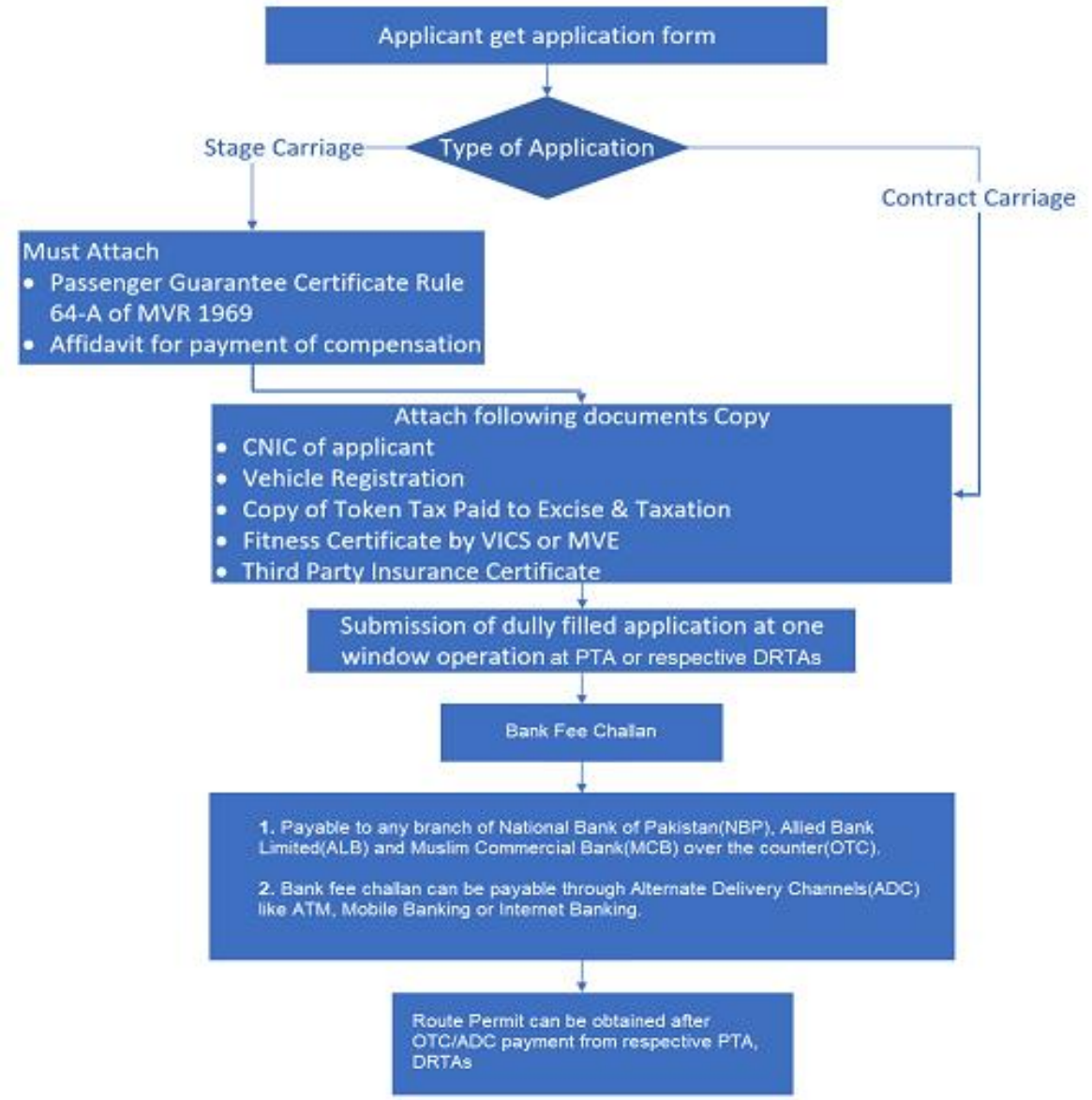


Figure 6-6: Route Permit Issuing Process to be adopted

Providing route permits to the transport operators is beneficial for the operators, regulator, and the users, in terms of ensuring safety and quality of service. Recall that the user interview survey did indicate strong emphasis on transport safety.

The data on transport vehicles gathered through this system will also help identify the most commercially demanded routes and allow the transport department and government to undertake other development initiatives along those routes.

The implementation of this system is recommended for the short-term horizon of this master plan and shall indefinitely continue to be in routine operation. A note on institutional capacity building is also provided at the end of this chapter to supplement this initiative.

6.6.6.3.1 Upgradation of Existing Transport Terminals

Transport terminals are a key segment of public transport systems. Proper terminals can improve passenger transportation network operation, adjust public transportation network layout, provide a passenger guidance system, and regulate the development of commercial forms. Currently there are several terminals in Parachinar main city as shown in the figure below. The majority of vehicles used are Station wagons, Cars, and Hiace Vans.

Figure 6-7: Existing Transport Terminal

As part of the short-term transportation plan, it is recommended to establish or designate the existing terminals in Parachinar as “Class C” stands that are managed by the district administration.

With the designation of Class C terminals, the administration can ensure that the following requisite facilities for

Passengers, Terminal Staff, and Vehicle Operators can be provided and maintained:

Passenger areas

- Ticketing and queuing
- Passenger waiting areas

- Passenger conveniences (drinking water facilities and toilets)
- Passenger circulation
- Boarding/Departing areas
- Facility entry
- Tourist information
- Security, including CCTV cameras
- Retail, concessions and lease space
- Dormitories and lodging (if required)
- Cloak room

Areas for terminal staff

- Revenue office
- Security and information
- Ticketing booth
- Resting room
- Staff conveniences (drinking water facilities and toilets)
- Canteen
- Maintenance staff (chairs and lockers)
- Control room (CCTV surveillance)

Areas for Vehicle Operators

- Canteen
- Resting areas
- Lodging areas (if required)
- Operator conveniences (drinking water facilities and toilets)

All above transportation terminal proposals are recommended to be implemented in the short term.

6.6.6.4 Parking Management

There are currently no designated off-street public parking spaces available in Parachinar Urban Center. Due to the absence of a proper parking lot facility in the Parachinar Urban Area, vehicles are parked on the main roads within the main Punjabi bazaar as well as in the surrounding areas along the main Parachinar road towards the bazar such as Chargano chowk, Dandar road, and Nazarbandi chowk.

Figure 6-8:L On street parking in Parachinar city Bazar

Most vehicles are parked on both sides of the road, especially during peak hours. Such parking behavior results in significant road congestion and delays.

A parking survey conducted on Jail Road during the situational analysis revealed a maximum hourly parking demand of 123 vehicles and average 6-hour demand of 76 vehicles. 4 other such locations were identified in Parachinar having similar parking supply and demand characteristics. These are Chargano chowk towards Punjabi Bazar Road, Dandar Road, Nazarbandi Chowk and main Parachinar Road. Based on these findings, it can be estimated that 300-500 spaces are required for the Parachinar Bazaar Area.

Two locations have been identified which can be used to provide up to 470 spaces in the central business areas. The parking capacities of these lots are calculated below and their locations are shown on the map.

Table 6-34: Proposed Parking Lots in Parachinar

Lots	Area (Kanals)	Spaces	Total Spaces
1	13.7	230	470
2	14.4	240	

Source: Calculated by Urban Unit and HP Consultants

*A typical car measures 17 ft in length (10 feet for the circulation) and 6 ft in width (3 ft each side for doors). The space needed for one car to park is therefore 27x12, or 324 SFt (325 Sqft). Example Calculation: Parking Lot – 1 (13.7 kanals): Parking Space for Lot-1 = 13.7 Kanal/325= 74596/325 = 230 vehicles.

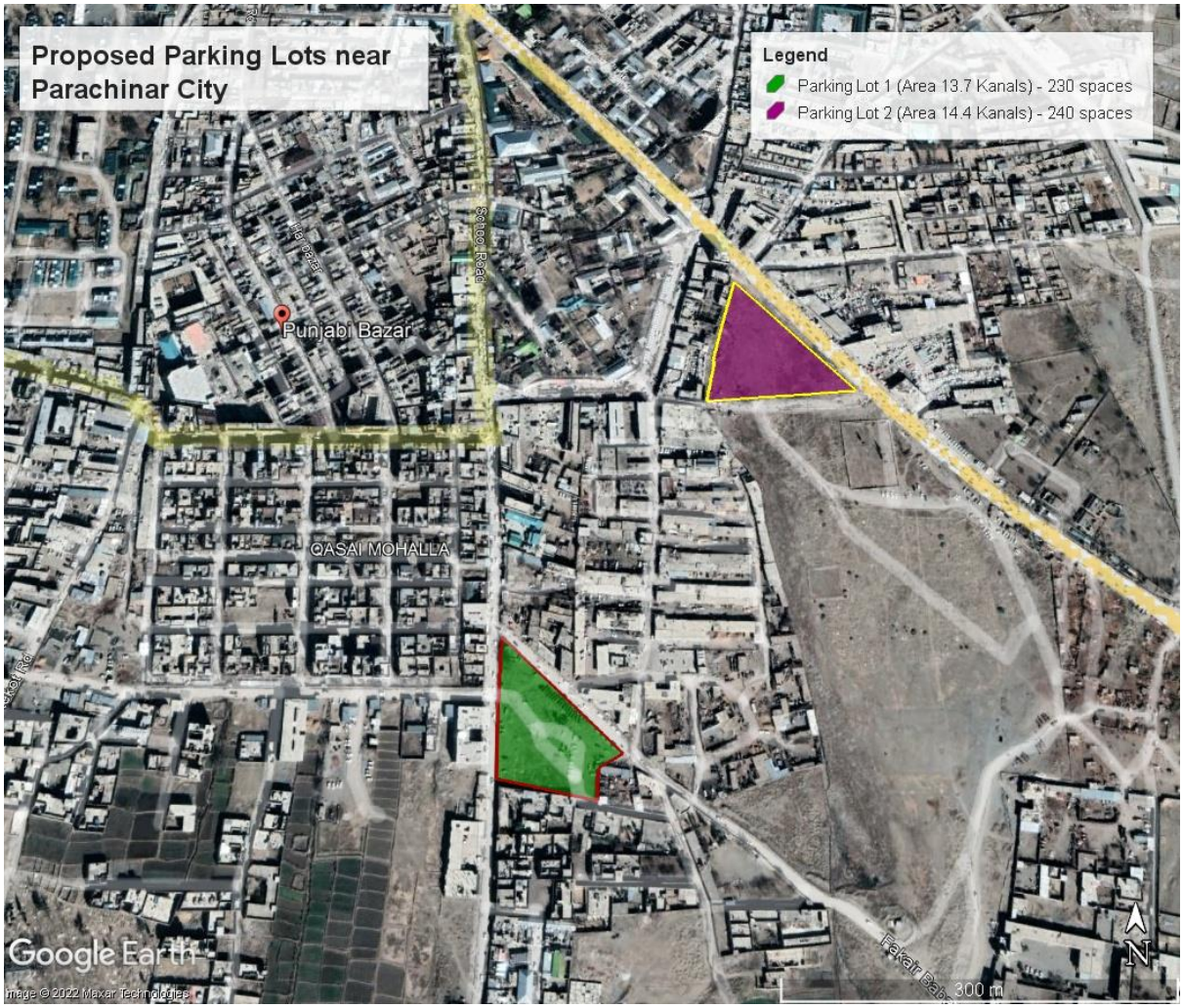


Figure 6-9: Proposed Parking Lots

6.6.6.5 Development of Logistics Hub

As per the proposed Land Use plan, an industrial zone is recommended near the southeastern end of the Urban Boundary adjacent to the existing Parachinar Bypass Road.

In this regard, a logistic hub to house truck traffic and handle containers is recommended in the vicinity of the proposed industrial zone.

An open area near the Check Post along Thall Parachinar Road is currently being used as a parking area for heavy trucks. This area may be converted into a Formal

Logistics Hub to support Parachinar's industrial base. It is also noted that there is no other logistics hub within the Parachinar Boundary or its immediate vicinity to support the local industry.

The proposed site of this Hub is shown in below figure.

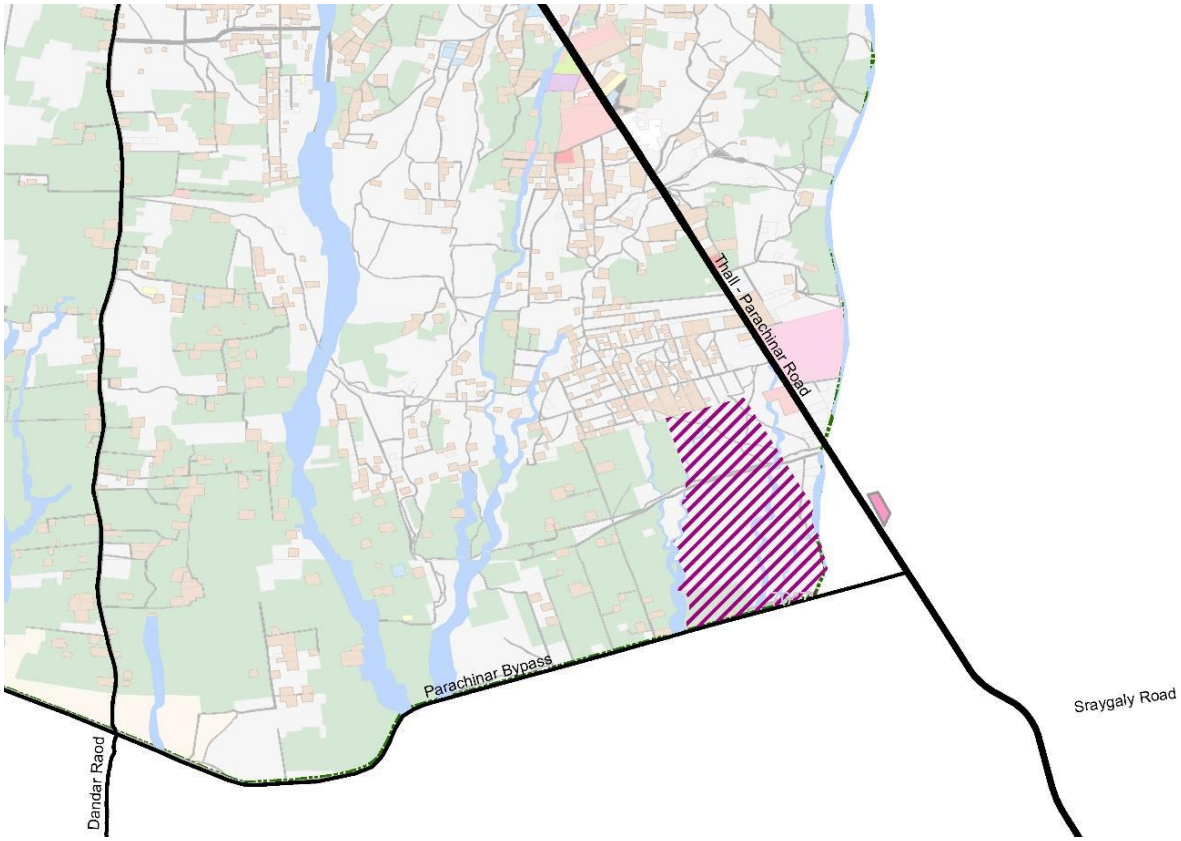


Figure 6-10: Proposed Logistic Hub

6.6.7 Medium- and Long-term Interventions

Long- and medium-term measures in this Plan are those that are to be initiated during next 5 to 20 years. These proposals are based on the future mobility patterns of Parachinar and the base line data gathered from the field or the secondary sources that have been discussed in detail in the background studies.

6.6.7.1 Future Travel Patterns

The Four step model has been used to predict the future travel demand of Parachinar;

- Trip Generation
- Trip Distribution
- Mode Choice
- Network Assignment

The key inputs for this analysis are:

1. Existing Road Network
2. Existing Land Uses
3. Proposed Land Use Plan

The following sections describe how the future travel demand is estimated for Parachinar

6.6.7.1.1 Trip Generation

Major Land Uses, existing and Proposed have been used to determine trips generated by each area of the City. For this analysis, the major land uses (150,000 sqft or greater) have been defined as Traffic Analysis Zones (TAZ). These are areas that will have a substantial number of inbound and outbound trips.

The TAZs defined for Parachinar are illustrated in the figure below.

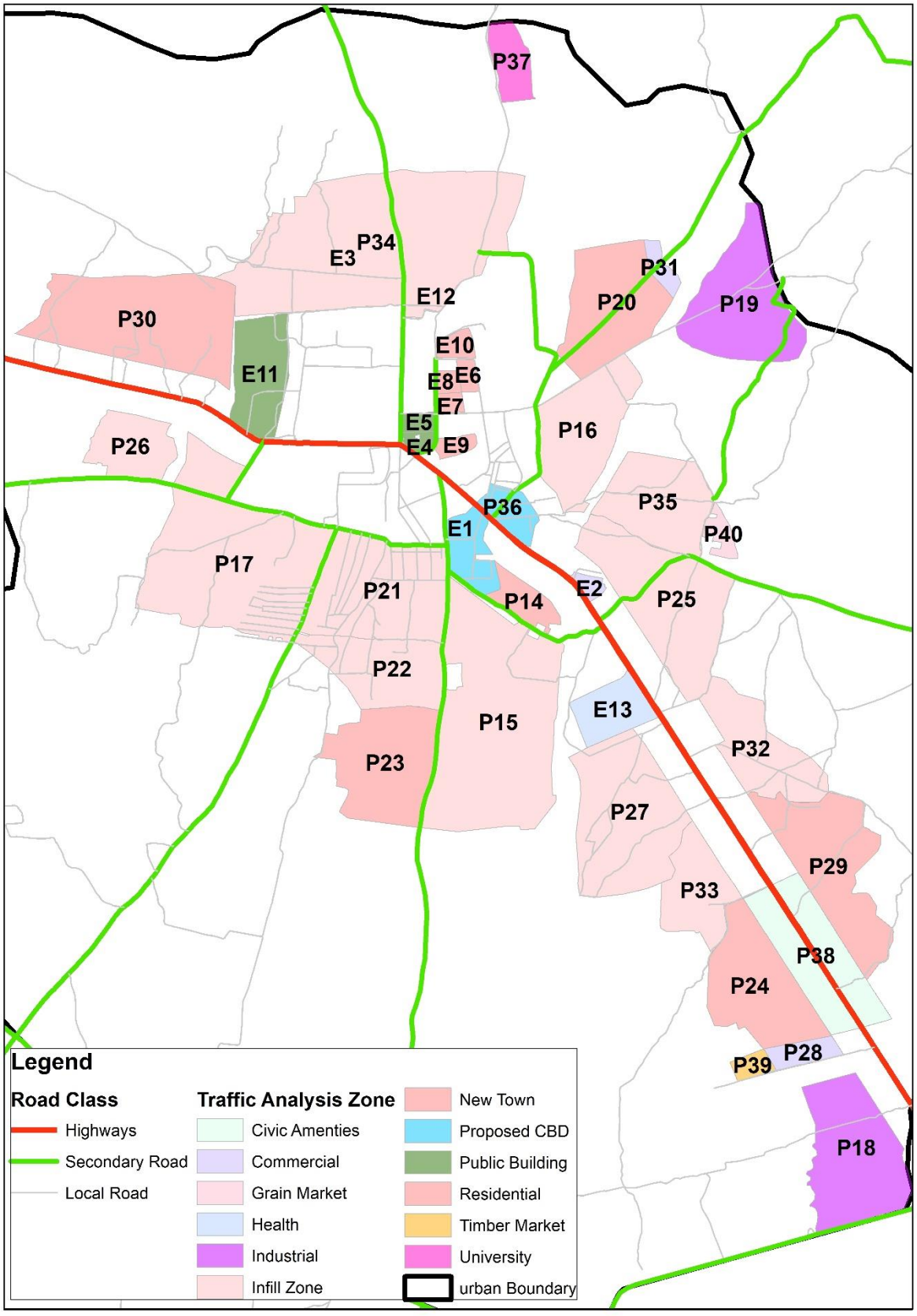


Figure 6-11: Traffic Analysis Zones

The ITE Trip Generation Manual 8th Edition has been used to estimate the peak hour trips to and from the major land uses in Parachinar based on the most appropriate unit and the relevant average trip rate.

Note the following considerations for trip generation:

- Educational facilities have not been considered as major trip generators as students are expected to commute to school via foot/bike/wagon. Moreover, proposed educational facilities are situated within neighborhoods which are expected to utilize the nearest facility. A school's traffic impact on the greater road network would therefore be negligible.
- Commercial Areas (including the proposed grains market) are approximated with the ITE Code 770 (Business Park) as the definition of Business Park includes restaurants, convenience stores, and retail. Moreover, the appropriate unit of measurement (Acres) is available in the trip generation manual.
- New Towns, Infill Zones, and Residential Zones use the ITE Code 210 (Single Detached Dwellings) for trip generation as the appropriate unit of measurement (Acres) is available in the trip generation manual.
- Industrial Zones use the ITE Code 130 (Industrial Park). The Proposed Timber Market also uses this code.
- Public Buildings use the ITE Code 730 (Government Office Building).
- Health Facilities (Hospitals) are based on the ITE Code 610 (Hospital) and the covered area of their buildings.
- The Proposed University and Civic Amenities are assumed to have 30% covered area of their total land space allocation based on measurement of existing similar facilities.
- The Proposed University trips have been estimated using ITE Code 540 (Community College) as it provides average trip rates based on area units.

The Table below summarizes the Trip generation assumptions obtained from the ITE Trip Generation Manual.

Table 6-35: Trip Generation Parameters

Zone	ITE Code	Unit	Rate	In	Out
Public Building	730	1000Sqft	1.21	31%	69%
Health	610	1000Sqft	1.46	47%	53%
Residential	210	Acres	2.73	66%	34%
Commercial	770	Acres	16.84	20%	80%
Education	530	1000Sqft	2.12	31%	69%
New Town	210	Acres	2.73	66%	34%
Infill Zone	210	Acres	2.73	66%	34%
Industrial	130	Acres	8.67	21%	79%
Proposed CBD	770	Acres	16.84	20%	80%
University	540	1000Sqft	3.09	50%	50%
Civic Amenities	730	1000Sqft	1.21	31%	69%
Timber Market	130	Acres	8.67	21%	79%
Grain Market	770	Acres	16.84	20%	80%

Source: ITE Trip Generation Manual

The table below summarizes the trip generation calculation for each land use category in Parachinar for the peak hour.

Table 6-36: Trip Generation

TAZ	Zone	Acres	Sqft	Type	ITE Code	ITE Units	ITE Units	Trip Rate	Trips	Trips In	Trips Out
1	Health	4	181169	Existing	610	1000Sqft	181	1.46	265	124	140
2	Commercial	4	188227	Existing	770	Acres	4	16.84	73	15	58
3	Public Building	4	176328	Existing	730	1000Sqft	176	1.21	213	66	147
4	Public Building	4	177497	Existing	730	1000Sqft	177	1.21	215	67	148
5	Public Building	5	205556	Existing	730	1000Sqft	206	1.21	249	77	172
6	Residential	4	184433	Existing	210	Acres	4	2.73	12	8	4
7	Residential	4	165474	Existing	210	Acres	4	2.73	10	7	4
8	Residential	4	169235	Existing	210	Acres	4	2.73	11	7	4
9	Residential	5	227430	Existing	210	Acres	5	2.73	14	9	5
10	Residential	7	294616	Existing	210	Acres	7	2.73	18	12	6
11	Public Building	6	280738	Existing	730	1000Sqft	281	1.21	340	105	234
12	Residential	4	170845	Existing	210	Acres	4	2.73	11	7	4
13	Health	28	200000	Existing	610	1000Sqft	200	1.46	292	137	155
14	New Town	17	729766	Proposed	210	Acres	17	2.73	46	30	16
15	Infill Zone	188	8205545	Proposed	210	Acres	188	2.73	514	339	175
16	Infill Zone	71	3092426	Proposed	210	Acres	71	2.73	194	128	66
17	Infill Zone	176	7675847	Proposed	210	Acres	176	2.73	481	318	164
18	Industrial	89	3879882	Proposed	130	Acres	89	8.67	772	162	610
19	Industrial	84	3637308	Proposed	130	Acres	84	8.67	724	152	572
20	New Town	76	3325944	Proposed	210	Acres	76	2.73	208	138	71
21	Infill Zone	98	4256511	Proposed	210	Acres	98	2.73	267	176	91
22	Infill Zone	60	2607531	Proposed	210	Acres	60	2.73	163	108	56
23	New Town	82	3550988	Proposed	210	Acres	82	2.73	223	147	76
24	New Town	76	3306676	Proposed	210	Acres	76	2.73	207	137	70
25	Infill Zone	103	4501481	Proposed	210	Acres	103	2.73	282	186	96
26	Infill Zone	35	1544333	Proposed	210	Acres	35	2.73	97	64	33
27	Infill Zone	108	4714884	Proposed	210	Acres	108	2.73	295	195	100
28	Commercial	12	522383	Proposed	770	Acres	12	16.84	202	40	162
29	New Town	89	3895666	Proposed	210	Acres	89	2.73	244	161	83
30	New Town	125	5447958	Proposed	210	Acres	125	2.73	341	225	116
31	Commercial	7	308292	Proposed	770	Acres	7	16.84	119	24	95
32	Infill Zone	59	2555102	Proposed	210	Acres	59	2.73	160	106	54
33	Infill Zone	44	1933907	Proposed	210	Acres	44	2.73	121	80	41
34	Infill Zone	241	10489867	Proposed	210	Acres	241	2.73	657	434	224
35	Infill Zone	64	2781786	Proposed	210	Acres	64	2.73	174	115	59
36	Proposed CBD	40	1740469	Proposed	770	Acres	40	16.84	673	135	538
37	University	20	261741*	Proposed	540	1000Sqft	262	3.09	809	404	404
38	Civic Amenities	76	831911*	Proposed	730	1000Sqft	832	1.21	1007	312	695
39	Timber Market	7	290932	Proposed	130	Acres	7	8.67	58	12	46
40	Grain Market	8	330239	Proposed	770	Acres	8	16.84	128	26	102
				Total					**10889**	**4995**	**5894**

**Based on 30% Covered area of land parcel*

The trip generation for each zone based on the above calculation is illustrated in the Figure below.

The sum value of all Trips Out for each Traffic Analysis Zone **(5894)** has been taken as the total number of induced vehicles in Parachinar's road network.

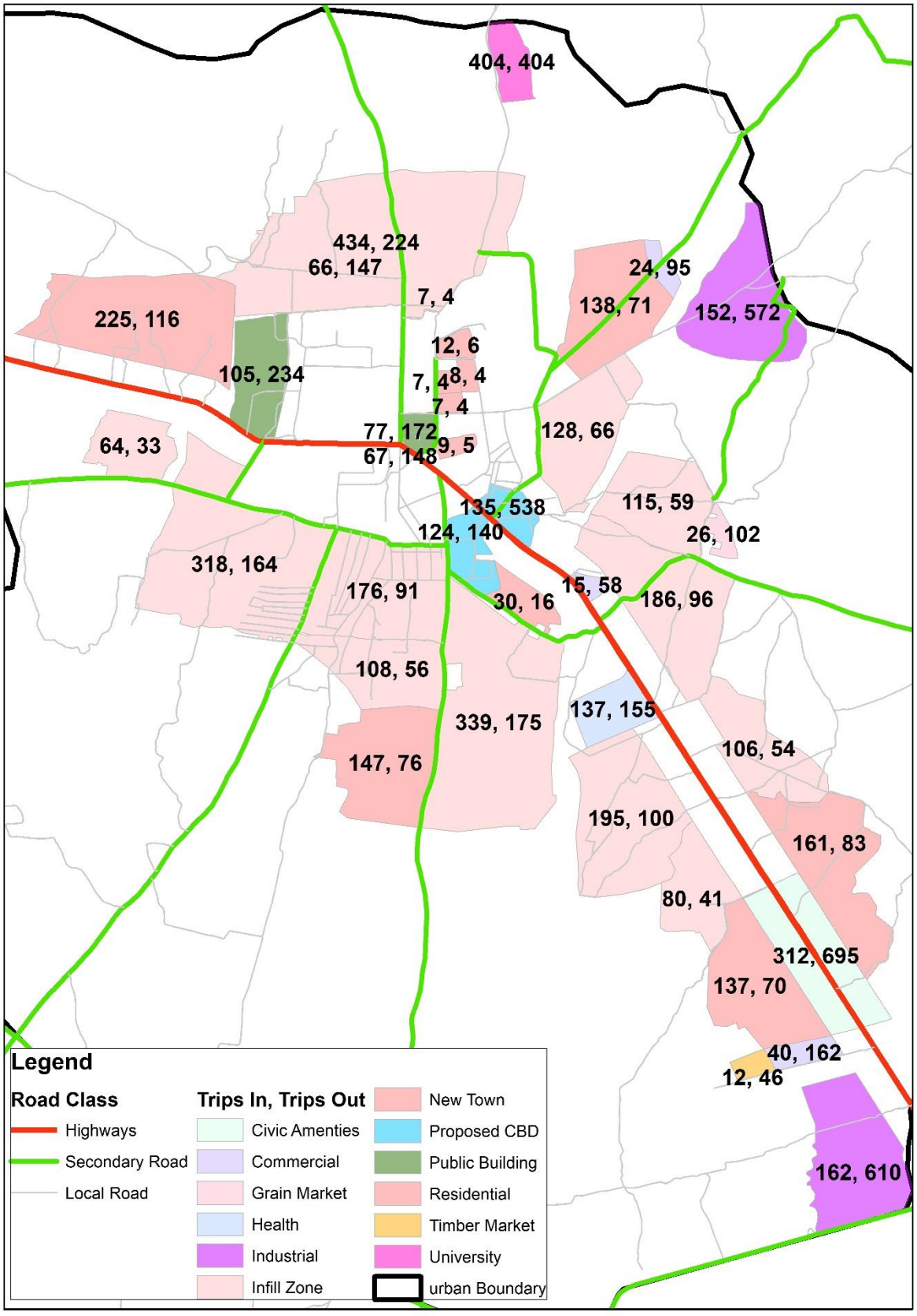


Figure 6-12: Trip Generation for Each Zone

6.6.7.1.2 Trip Distribution

An Origin Destination Matrix analysis was carried out to estimate the interaction between the existing proposed zones based on the trip generations and attractions calculated in the previous section.

While a 40x40 matrix was prepared to represent all origin and destination zones, the following assumptions were made for more logical trip distribution:

1. No Intra-Zonal Trips
2. No trips occur between residential zones
3. Sum of all interzonal trips should be approximately 5894 (Total Forecast vehicles in Road network).
4. The relative proportion of trips originating from a zone is considered to model skews in trip assignment caused be large trip generating zones.

Excel Random Number Generator was utilized to obtain the best estimate of trip distributions that meet the above-mentioned criteria. The result origin destination forecast matrix is shown in the Table Below.

These trips can be assigned to the road network along the routes generated during the network assignment process in the next section to predict the traffic loads on Parachinar's Road network.

Table 6-37: Origin Destination Forecast

TAZ	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Outs
1	0	3	4	7	6	4	3	6	7	1	4	5	5	7	3	2	1	5	2	7	4	6	6	2	5	3	4	7	5	4	0	5	2	3	5	0	6	2	1	6	**158**
2	0	0	3	2	2	0	0	1	3	0	3	1	3	3	3	3	2	2	0	0	0	2	0	2	1	1	2	3	1	2	2	2	2	0	0	0	0	3	2	0	**56**
3	1	0	0	8	6	5	0	4	5	4	0	4	0	7	4	5	3	1	1	10	10	2	5	8	1	7	8	8	7	3	8	10	0	3	10	4	2	5	10	4	**183**
4	9	10	8	0	9	6	3	6	5	1	9	8	0	0	10	4	0	6	10	3	8	2	3	9	10	9	4	1	2	3	10	10	1	3	8	9	4	8	8	8	**227**
5	3	11	11	9	0	10	7	10	0	10	5	11	6	8	8	1	2	4	0	0	9	4	5	5	2	1	10	2	4	10	5	8	0	2	2	5	2	10	10	1	**213**
6	0	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	**8**
7	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	**7**
8	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	**10**
9	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	1	**9**
10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	**6**
11	14	12	15	0	1	2	8	10	6	6	0	7	13	15	14	15	7	5	10	6	6	11	11	10	14	0	10	6	8	0	2	0	2	1	3	7	13	13	2	1	**286**
12	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	**7**
13	8	2	8	9	9	1	0	2	5	9	7	1	0	6	7	0	1	3	0	6	1	0	4	4	6	6	3	10	10	9	4	6	0	8	10	9	8	2	6	4	**194**
14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	0	**6**
15	0	11	6	3	9	0	0	0	0	0	11	0	1	0	0	0	0	6	9	0	0	0	0	0	0	0	0	3	0	0	6	0	0	0	0	8	8	5	5	2	**93**
16	2	3	3	4	1	0	0	0	0	0	2	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	4	4	0	4	4	**37**
17	0	6	2	3	6	0	0	0	0	0	4	0	6	0	0	0	0	10	11	0	0	0	0	0	0	0	0	7	0	0	10	0	0	0	0	7	2	6	4	3	**87**
18	23	10	28	22	21	20	33	17	10	15	12	1	14	37	26	19	38	0	22	35	16	1	19	9	11	3	38	1	4	23	27	37	14	3	36	27	20	12	9	30	**743**
19	33	32	27	14	35	20	12	26	25	2	3	29	4	12	22	26	3	6	0	18	2	10	24	0	18	15	6	15	27	13	1	15	18	28	29	19	36	24	4	11	**664**
20	0	1	1	3	4	0	0	0	0	0	1	0	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	3	3	0	0	**25**
21	0	3	1	1	5	0	0	0	0	0	0	0	5	0	0	0	0	4	1	0	0	0	0	0	0	0	0	5	0	0	4	0	0	0	0	2	5	2	2	0	**40**
22	0	3	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0	2	1	3	0	1	**20**
23	3	0	4	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	4	1	2	2	**26**
24	1	3	1	4	4	0	0	0	0	0	2	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	1	2	2	3	4	**34**
25	5	2	0	3	5	0	0	0	0	0	2	0	5	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	4	2	0	5	**43**
26	0	1	0	2	0	0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	1	1	**12**
27	3	5	4	0	4	0	0	0	0	0	5	0	3	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2	0	0	4	0	0	0	0	1	1	0	4	4	**44**
28	8	7	3	3	6	7	7	2	4	3	11	5	4	11	4	1	11	0	7	6	1	3	0	4	2	3	1	0	6	0	7	5	2	5	0	10	9	0	2	10	**180**
29	4	4	1	1	4	0	0	0	0	0	2	0	2	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	4	1	4	3	0	**41**
30	4	6	4	6	3	0	0	0	0	0	4	0	1	0	0	0	0	5	2	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	1	5	2	1	5	**61**
31	3	0	4	2	4	3	0	0	3	2	1	2	2	1	1	4	5	1	2	2	4	4	1	2	0	5	4	0	3	3	0	3	3	5	0	2	4	3	1	2	**91**
32	3	1	0	2	0	0	0	0	0	0	2	0	1	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	3	2	0	2	**24**
33	0	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	0	1	**10**
34	1	11	12	4	7	0	0	0	0	0	12	0	14	0	0	0	0	9	13	0	0	0	0	0	0	0	0	4	0	0	14	0	0	0	0	11	4	5	6	6	**133**
35	2	2	2	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	2	1	0	3	1	**21**
36	32	4	15	2	21	21	25	17	34	21	30	31	4	30	5	22	4	18	13	19	30	12	17	13	1	3	25	16	5	10	19	9	31	32	22	0	8	20	30	12	**683**
37	1	10	9	17	20	14	11	4	25	14	17	6	13	5	3	4	1	17	4	5	0	23	2	3	5	21	19	25	12	1	13	21	4	19	16	15	0	0	22	12	**433**
38	12	44	25	9	16	40	8	22	37	41	3	41	13	39	26	39	26	2	28	32	27	24	15	44	10	8	16	14	21	11	11	34	12	30	3	8	30	0	14	8	**843**
39	1	1	3	0	2	0	3	2	0	0	2	2	1	0	2	1	2	0	0	1	0	0	3	1	3	0	0	3	3	1	1	3	3	1	2	2	2	3	0	0	**54**
40	1	1	4	2	4	1	2	2	4	0	1	0	4	4	0	4	1	2	2	0	2	2	2	1	0	5	1	4	3	1	3	3	2	3	0	4	2	5	0	0	**82**
Ins	**179**	**213**	**213**	**145**	**221**	**154**	**122**	**131**	**173**	**129**	**160**	**154**	**135**	**185**	**138**	**150**	**107**	**125**	**161**	**150**	**120**	**106**	**117**	**117**	**89**	**90**	**151**	**159**	**121**	**94**	**183**	**171**	**96**	**146**	**146**	**177**	**199**	**150**	**163**	**154**	**5894**

Generated using =+RANDBETWEEN(0,X) where X is an upper limit based on number of zones that can access a zone and its total trip generation.

6.6.7.1.3 Mode Choice

It is assumed that the primary mode of travel in Parachinar is private Vehicle (Car).

6.6.7.1.4 Network Assignment

The ArcGIS network analyst was used to assign the trips occurring between each zone along the existing road network of Parachinar with the primary factor of impedance being total Travel Time (Based on Road Class).

Note that the ArcGIS is not a transportation modelling software and does not account for reduced level of service as more vehicles utilize a given route. It is therefore assumed that the route choices obtained in GIS are for equilibrium conditions as there are few viable alternative routes. The network analyst algorithm for trip assignment developed in GIS is shown below:

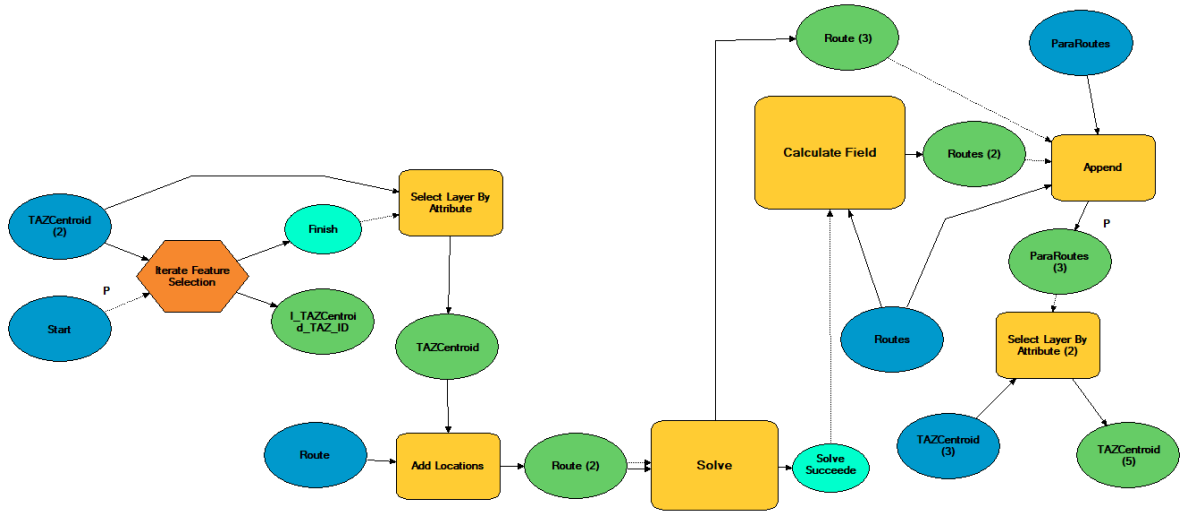


Figure 6-13: Network Assignment Model

A total of 248 routes were obtained for travel between the different zones via the existing road network. These are shown in the Figure Below. If 4000 trips are distributed evenly, the average added volume along each route would be approximately 16 vehicles.

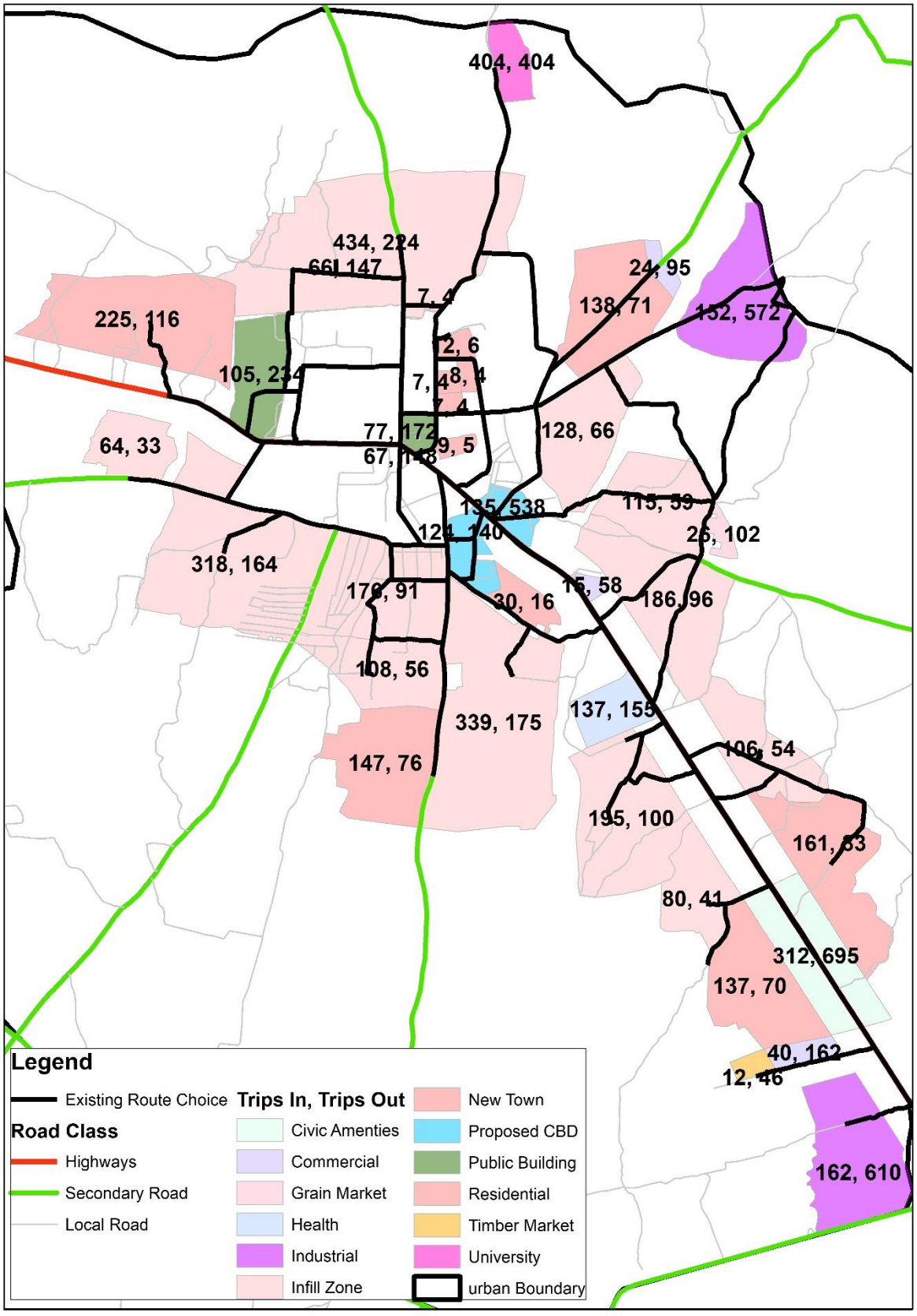


Figure 6-14: Route Assignment

As expected, the network assignment results show that Thall-Parachinar is the most utilized corridor. A high proportion of all trips occurring between the traffic analysis zones will involve the Thall-Parachinar Road.

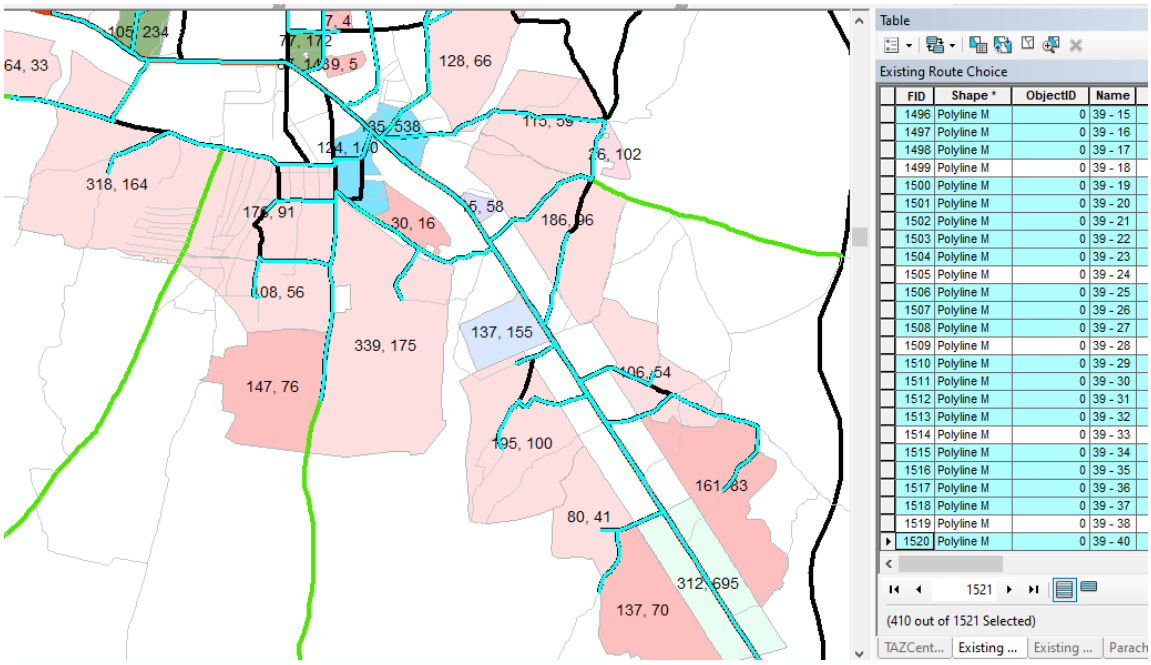


Figure 6-15: 50% of all routes utilize TPR

Given that each route utilizes the existing road network, every origin-destination pair will induce new peak hour traffic onto each road it passes through. Each generated route carries the number of trips assigned to it from the Origin Destination Matrix.

By intersecting each road in the network with the routes passing through it, we can estimate the total volume of traffic induced by the new land uses. By adding that additional peak hour volume to the existing peak hour volumes, we can predict the future volume to capacity ratios for each road in Parachinar's Network.

The Table below summarizes the effects of future traffic on each road while the following Figure illustrates the condition of Parachinar's future road network if no improvements are made. Note that this table also includes some local roads which are expected to be utilized by the vehicles.

Table 6-38: Future Volume to Capacity Ratios of Key Roads

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	Future V/C Ratio
Thall - Parachinar Road	2	6.5	50	1800	1924	1388	3312	1.84
Unnamed Local Road	1	2	30	330	0	154	154	0.47
Sub Jail Road	1	2.7	30	330	0	34	34	0.10
Pewar Road	2	6.5	50	900	523	1	524	0.58
Unnamed Local Road	1	4.5	30	330	0	159	159	0.48
Unnamed Local Road	1	3	30	330	0	159	159	0.48
Unnamed Local Road	1	3	30	330	0	254	254	0.77
Unnamed Local Road	1	3	30	330	0	150	150	0.45
Unnamed Local Road	1	3	30	330	0	866	866	2.62
Unnamed Local Road	1	2.7	30	330	0	56	56	0.17
Unnamed Local Road	1	2.7	30	330	0	56	56	0.17
Unnamed Local Road	1	2	30	330	0	34	34	0.10
Malana Road	2	5.5	40	675	388	276	664	0.98
Gov House Road	1	3.8	40	450	0	568	568	1.26
Unnamed Local Road	1	4	30	330	0	630	630	1.91
Unnamed Local Road	1	3	30	330	0	761	761	2.31
Parkho Road	1	4.5	30	330	0	429	429	1.30
Zairan Road	1	4.7	40	450	0	440	440	0.98
Boarki Road	2	5	40	450	0	97	97	0.22
Toori Qabristan Road	1	4.6	30	330	0	172	172	0.52
Unnamed Local Road	1	4	30	330	0	43	43	0.13
Stadium Road	1	3.5	40	450	0	138	138	0.31
Charmari Road	1	3.9	30	330	0	193	193	0.58
Unnamed Local Road	1	3.2	30	330	0	109	109	0.33
Unnamed Local Road	1	3.3	30	330	0	106	106	0.32

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	Future V/C Ratio
Unnamed Local Road	1	2	30	330	0	4	4	0.01
Unnamed Local Road	1	4	30	330	0	90	90	0.27
Unnamed Local Road	1	2.3	30	330	0	62	62	0.19
Unnamed Local Road	1	2.5	30	330	0	159	159	0.48
Shaheed Abad Road	1	4	30	330	0	194	194	0.59
Unnamed Local Road	1	2.2	30	330	0	63	63	0.19
Meerajan Colony Road	1	3	30	330	0	231	231	0.70
Imamia Colony Street	1	3.8	30	330	0	98	98	0.30
Unnamed Local Road	1	3.6	30	330	0	20	20	0.06
Unnamed Local Road	1	3.1	30	330	0	91	91	0.28
Bijlighar Colony Road	1	3.6	30	330	0	288	288	0.87
Parkho Road	1	4.5	40	450	0	348	348	0.77
Unnamed Local Road	1	4	30	330	0	370	370	1.12
Dandar Raod	2	5.5	40	450	339	251	590	1.31
Jail Road	2	5.5	30	330	0	14	14	0.04
Unnamed Local Road	2	5.5	30	330	0	14	14	0.04
Fakair Baba Road	1	3	40	450	0	338	338	0.75
School Road	2	5.5	40	450	340	287	627	1.39
Akbar Khan Road	1	4.5	30	330	0	553	553	1.68
Boarki - Imam Bargha Road	2	5	40	450	0	261	261	0.58
Karman Road	1	4.5	40	450	0	179	179	0.40
Unnamed Local Road	1	2.3	30	330	0	110	110	0.33
Unnamed Local Road	1	2.4	30	330	0	124	124	0.38
Unnamed Local Road	1	3	30	330	0	217	217	0.66
Zeran Road	1	3	40	450	0	62	62	0.14
Thall - Parachinar Road	2	6.5	50	450	389	581	970	2.16

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	Future V/C Ratio
Thall - Parachinar Road	1	2.95	50	450	772	1376	2148	4.77
Thall - Parachinar Road	1	2.86	50	450	772	994	1766	3.92

**Roads with the same name refer to different segments of the same road. Roads were divided into segments for better detailed analysis*
*** Capacity of each road is assumed based on HCM 2010 formula 1800*(N-1+P_S) and further reduced by 25-50% to account for congestion and road class.*
****Based on Traffic Count Data*
*****Based on trip generation, distribution, and route assignment*
******Existing Peak hour volume + Induced Volume*

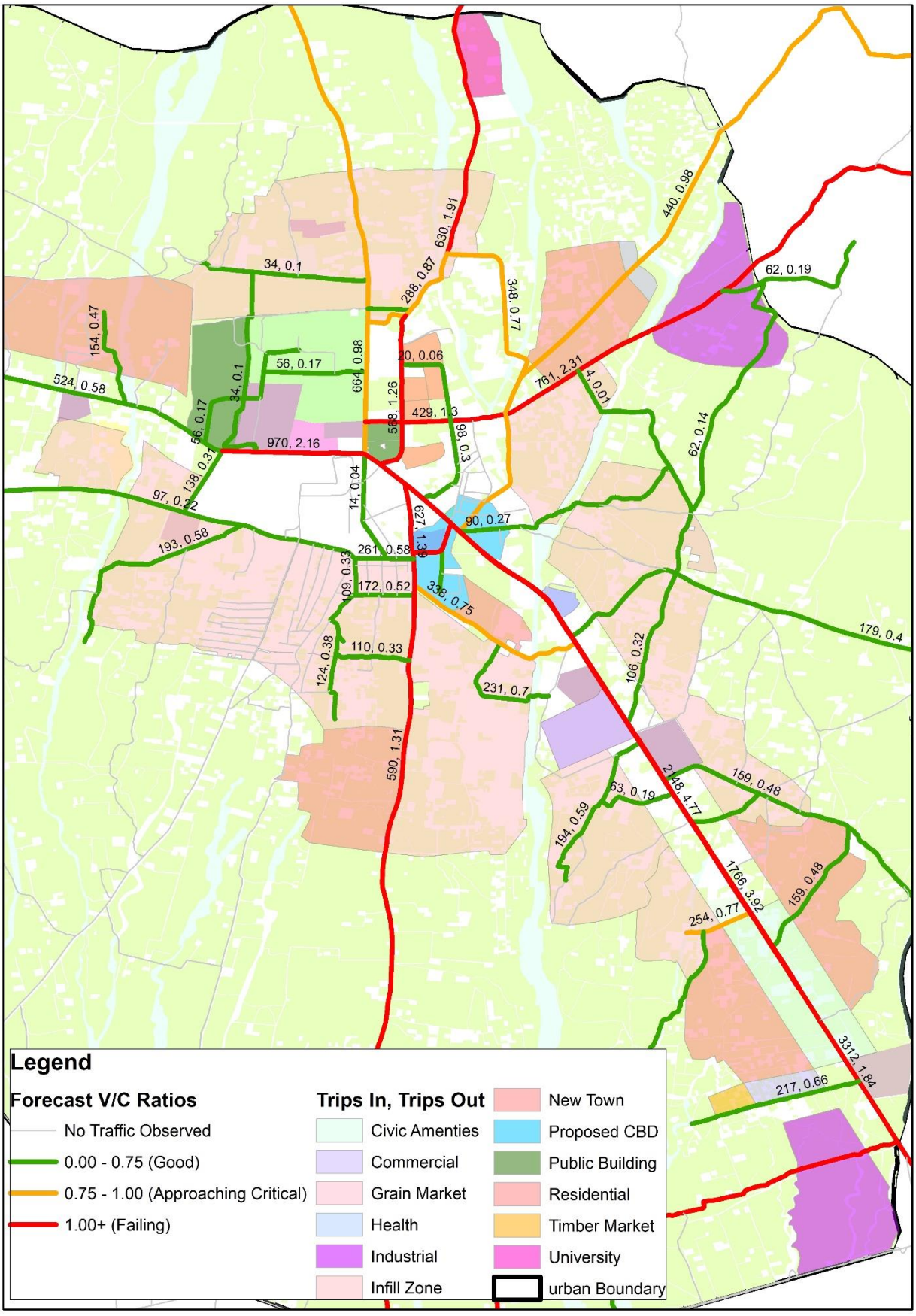


Figure 6-16: Future Peak Hour Volume to Capacity Ratios of Existing Road Network

The above analysis shows that Thall Parachinar road will be subject to the most amount of traffic as it is the only viable alternative between all existing and future land uses. If Thall-Parachinar Road is dualized as recommended in the Short-Term, there would be no capacity or Level of Service constraints during the peak hour as the HCM states a capacity of more than 4000 per hour vehicles for 4-lane divided roads.[18] Similarly, improving/Widening other roads as mentioned in the Short-Term plan may also enhance the capacity of the overall road network,

However, keeping this road and the sole trunk road and economic corridor is not sustainable as it is constantly subject to failure as the only throughway. The road network requires enhancement with redundancy and shorter paths to serve the new proposed land uses.

6.6.7.2 Road Network Proposals

Based on the above analysis, it is necessary to provide new routes that connect the proposed land uses which provide alternatives to the Thall-Parachinar Road. All road proposals shall be new construction unless specified otherwise.

Note that some of these road proposals coincide with existing local road alignments. In these cases, the proposal can also be treated as upgradation of these roads in terms of geometry.

The following criteria were employed for determining these new road alignments:

1. All proposed Land Uses should be served.
2. The number of new intersections forming between new roads and existing road network be minimized.
3. Intersections should be perpendicular (90 degrees).
4. Each Proposed route should be an alternate to the existing route choice.
5. Each Proposed alignment should connect to existing primary or secondary road network.
6. New Alignments shall be drawn along open spaces with minimal conflict with existing built up land uses.

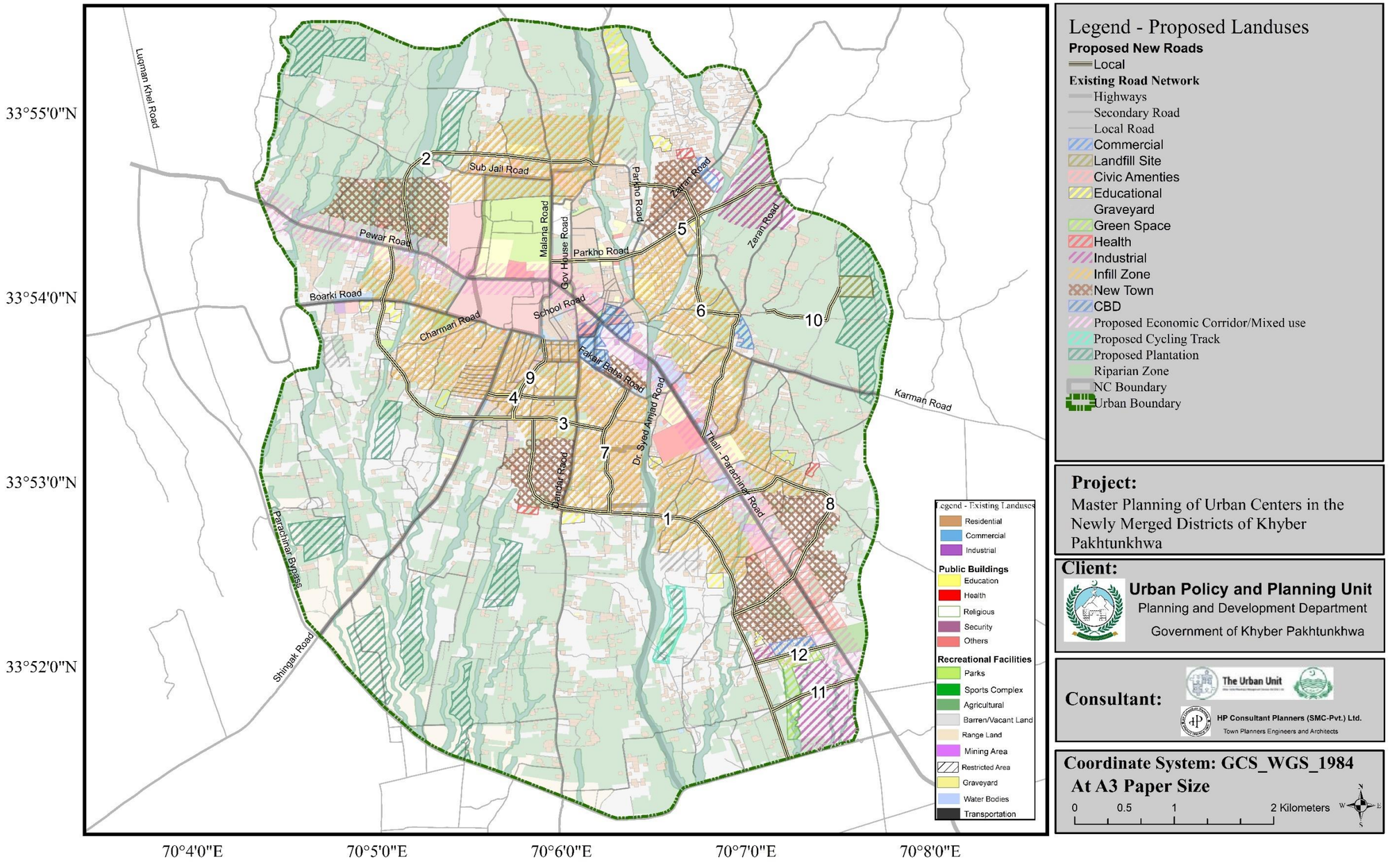
[18] HCM Manual 2000

12 new roads have been proposed in Parachinar to meet the expected demand in line with the aforementioned Criteria. These are summarized in the following Table and Illustrated in the Figure below. It is expected that the provision of these roads will provide relief to the Thall-Parachinar Road and other existing roads in the city that are exhibiting V/C ratios of greater than 1. Note that this future road network assumes the short-term improvements have been implemented.

Table 6-39: Proposed New Roads

No	Name	Type	Class	Length (km)	Width
1	Parachinar Bypass to Pewar Road	New	Local	7.4	46ft
2	Pewar Road to Parkho Road	New	Local	2.5	46ft
3	Road 1 to Meer Ajan Colony	New	Local	0.6	46ft
4	Shingak Road to Dandar Road	New	Local	0.7	46ft
5	Malana Road to Proposed Industrial Area	Upgrade	Local	2.2	46ft
6	Parkho Road to Thall Parachinar Road Via Zeeran Road	Upgrade	Local	3.3	46ft
7	Fakir Baba Road to Road 1	New	Local	1.3	46ft
8	Road 1 to Shenay Colony Via Grid Colony to Road 1	New	Local	2.86	46ft
9	NasteKot Road	Upgrade	Local	0.87	46ft
10	Land Fill Access	New	Local	0.8	24ft
11	Road 1 to TPR via Proposed Industrial Zone	New	Local	0.7	46ft
12	Road 1 to TPR Via Proposed Commercial Zone	New	Local		24ft

Proposed New Roads of Parachinar



Map 27: Proposed New Roads

The following figure illustrates the volume-to-capacity ratios after re-assignment of traffic to new roads.

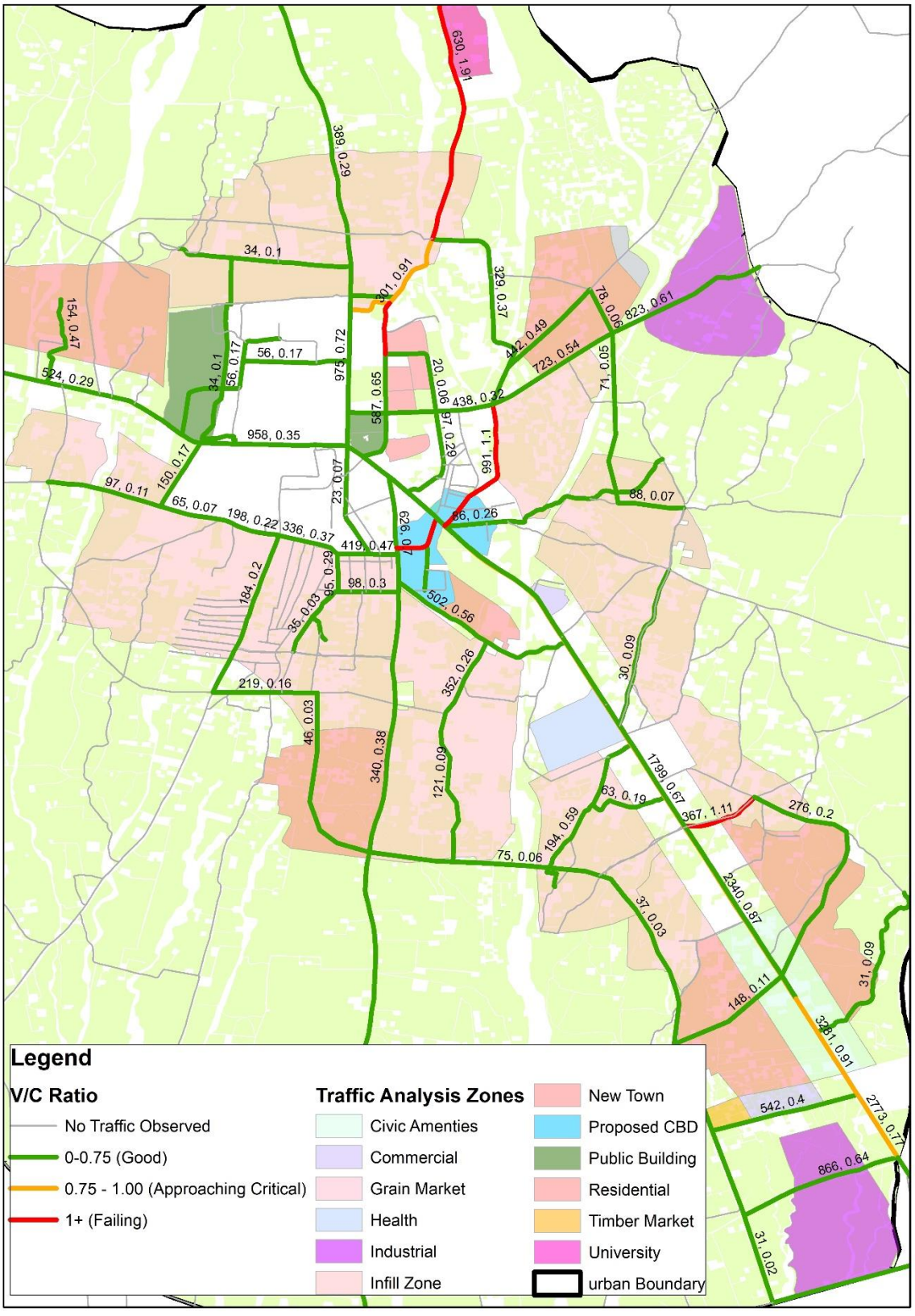


Figure 6-17: Future VC Ratios with New Roads

6.6.7.2.1 Other Long-Term Improvements

Due to the improved capacities of the new roads and the shorter travel time offered by the improved links, the model calculated several trips utilizing the new roads and an overall improved volume of capacity ratio for most links.

However, there are still some links, as shown in the previous figure" which may exhibit volume-to-capacity ratios of more than 1 due to the forecast volumes. These links are recommended for long term Widening/Improvement to increase their capacities and support the proposed land uses in their vicinities:

- Widening of Local Road Opposite Professors Colony
- Widening of Governor House Road North of Queens Cottage
- Improvement of Akbar Khan Road
- Widening of (Future) University Road

The Table below summarizes all the performance of all links after implementing all the proposed interventions. The following Figure Illustrates the overall road network improvement strategy for both the short term and long term.

Table 6-40: Road Network Performance After Improvements

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	V/C Ratio Before	Future V/C Ratio	Notes
Thall - Parachinar Road	2	6.5	50	3600	1924	1	1925	1.07	0.53	Dualized in Short Term
Unnamed Local Road	1	2.6	30	330	0	154	154	0.00	0.47	
Sub Jail Road	1	2.7	30	330	0	34	34	0.00	0.10	
Pewar Road	2	6.5	50	3600	523	1	524	0.29	0.15	Dualized in Short Term
Unnamed Local Road	1	2.7	30	330	0	56	56	0.00	0.17	
Unnamed Local Road	1	2.7	30	330	0	56	56	0.00	0.17	
Unnamed Local Road	1	2	30	330	0	34	34	0.00	0.10	
Malana Road	2	5.5	40	675	388	1	389	0.57	0.58	Widened in Short Term
Gov House Road	1	3.8	40	675	0	587	587	0.00	0.87	Widened in Short Term
Toori Qabristan Road	1	4.6	30	330	0	98	98	0.00	0.30	
Unnamed Local Road	1	4	30	330	0	150	150	0.00	0.45	
Stadium Road	1	3.5	40	450	0	150	150	0.00	0.33	
Unnamed Local Road	1	3.2	30	330	0	95	95	0.00	0.29	
Unnamed Local Road	1	3.3	30	330	0	30	30	0.00	0.09	
Unnamed Local Road	1	4	30	330	0	86	86	0.00	0.26	
Unnamed Local Road	1	2.5	30	450	0	367	367	0.00	0.82	Widen in Long Term
Shaheed Abad Road	1	4	30	330	0	194	194	0.00	0.59	
Unnamed Local Road	1	2.2	30	330	0	63	63	0.00	0.19	
Unnamed Local Road	1	2.2	30	330	0	31	31	0.00	0.09	
Imamia Colony Street	1	3.8	30	330	0	97	97	0.00	0.29	
Unnamed Local Road	1	3.6	30	330	0	20	20	0.00	0.06	
Unnamed Local Road	1	3.1	30	330	0	91	91	0.00	0.28	
Bijlighar Colony Road	1	3.6	30	330	0	301	301	0.00	0.91	
Parkho Road	1	4.5	40	450	0	329	329	0.00	0.73	
Unnamed Local Road	1	4	30	675	0	389	389	0.00	0.58	Widen in Long Term

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	V/C Ratio Before	Future V/C Ratio	Notes
Dandar Raod	2	5.5	40	450	339	1	340	0.75	0.76	
Jail Road	2	5.5	30	330	0	23	23	0.00	0.07	
Unnamed Local Road	2	5.5	30	330	0	23	23	0.00	0.07	
Fakair Baba Road	1	3	40	675	0	502	502	0.00	0.74	Widenned in Short Term
School Road	2	5.5	40	900	340	286	626	0.76	0.70	Widenned in Short Term
Akbar Khan Road	1	4.5	30	450	0	397	397	0.00	0.88	Widen in Long Term
Boarki - Imam Bargha Road	2	5	40	450	0	419	419	0.00	0.93	Widenned in Short Term
Thall - Parachinar Road	2	6.5	50	3600	389	569	958	0.53	0.27	Dualized in Short Term
Thall - Parachinar Road	1	2.95	50	3600	772	1568	2340	1.30	0.65	Dualized in Short Term
Thall - Parachinar Road	1	2.86	50	3600	772	1027	1799	1.00	0.50	Dualized in Short Term
Proposed Road 5	2	14	40	1350	0	823	823	0.00	0.61	Construct in Long Term
Proposed Road 7	2	14	40	1350	0	121	121	0.00	0.09	Construct in Long Term
Proposed Road 8	2	14	40	1350	0	148	148	0.00	0.11	Construct in Long Term
Proposed Road 9	2	14	40	1350	0	35	35	0.00	0.03	Construct in Long Term
Proposed Road 11	2	14	40	1350	0	866	866	0.00	0.64	Construct in Long Term
Proposed Road 12	2	14	40	1350	0	542	542	0.00	0.40	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	31	31	0.00	0.02	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	31	31	0.00	0.02	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	31	31	0.00	0.02	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	37	37	0.00	0.03	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	75	75	0.00	0.06	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	46	46	0.00	0.03	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	219	219	0.00	0.16	Construct in Long Term
Proposed Road 1	2	14	40	1350	0	219	219	0.00	0.16	Construct in Long Term
Proposed Road 9	2	14	40	1350	0	95	95	0.00	0.07	Construct in Long Term
Proposed Road 7	2	14	40	1350	0	352	352	0.00	0.26	Construct in Long Term

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	V/C Ratio Before	Future V/C Ratio	Notes
Proposed Road 5	2	14	40	1350	0	520	520	0.00	0.39	Construct in Long Term
Proposed Road 5	2	14	40	1350	0	432	432	0.00	0.32	Construct in Long Term
Proposed Road 5	2	14	40	1350	0	438	438	0.00	0.32	Construct in Long Term
Proposed Road 6	2	14	40	1350	0	78	78	0.00	0.06	Construct in Long Term
Proposed Road 6	2	14	40	1350	0	71	71	0.00	0.05	Construct in Long Term
Proposed Road 6	2	14	40	1350	0	88	88	0.00	0.07	Construct in Long Term
Proposed Road 6	2	14	40	1350	0	88	88	0.00	0.07	Construct in Long Term
Proposed Road 8	2	14	40	1350	0	276	276	0.00	0.20	Construct in Long Term
Proposed Road 8	2	14	40	1350	0	148	148	0.00	0.11	Construct in Long Term
Proposed Road 5	2	14	40	1350	0	723	723	0.00	0.54	Construct in Long Term
Dandar Road	2	5.5	40	450	339	1	340	0.75	0.76	Widened in Short Term
Dandar Road	2	5.5	40	450	339	1	340	0.75	0.76	Widened in Short Term
Dandar Road	2	5.5	40	450	339	1	340	0.75	0.76	Widened in Short Term
Shingak Road	2	6.2	40	450	0	184	184	0.00	0.41	Widened in Short Term
Parachinar Bypass	2	10	40	900	0	31	31	0.00	0.03	
Parachinar Bypass	2	10	40	900	0	31	31	0.00	0.03	
Dandar Road	2	5.5	40	450	339	1	340	0.75	0.76	Widened in Short Term
Unnamed Local Road	1	4	30	900	0	630	630	0.00	0.70	Widen in Long Term
Zairan Road	1	4.7	40	1350	0	991	991	0.00	0.73	Widened in Short Term
Zairan Road	1	4.7	40	900	0	442	442	0.00	0.49	Widened in Short Term
Malana Road	2	5.5	40	1350	388	587	975	0.57	0.72	Widened in Short Term
Boarki Road	2	5	40	450	0	97	97	0.00	0.22	Widened in Short Term
Boarki Road	2	5	40	450	0	65	65	0.00	0.14	Widened in Short Term
Boarki Road	2	5	40	450	0	336	336	0.00	0.75	Widened in Short Term
Boarki Road	2	5	40	450	0	198	198	0.00	0.44	Widened in Short Term
Thall - Parachinar Road	2	6.5	50	3600	1924	1357	3281	1.82	0.91	Dualized in Short Term

Road Name*	Lanes	Width (m)	Speed (km/hr)	Capacity (veh/hr)**	Existing Peak Hour Volume (veh)***	Induced Peak Hour Volume (veh)****	Future Total Peak Hour Volume (Veh)*****	V/C Ratio Before	Future V/C Ratio	Notes
Thall - Parachinar Road	2	6.5	50	3600	1924	849	2773	1.54	0.77	Dualized in Short Term
Thall - Parachinar Road	2	6.5	50	3600	1924	31	1955	1.09	0.54	Dualized in Short Term

**Roads with the same name refer to different segments of the same road. Roads were divided into segments for better detailed analysis*
*** Capacity of each road is assumed based on HCM 2010 formula 1800*(N-1+P_S) and further reduced by 25-50% to account for congestion and road class.*
****Based on Traffic Count Data*
*****Based on trip generation, distribution, and route assignment*
******Existing Peak hour volume + Induced Volume*

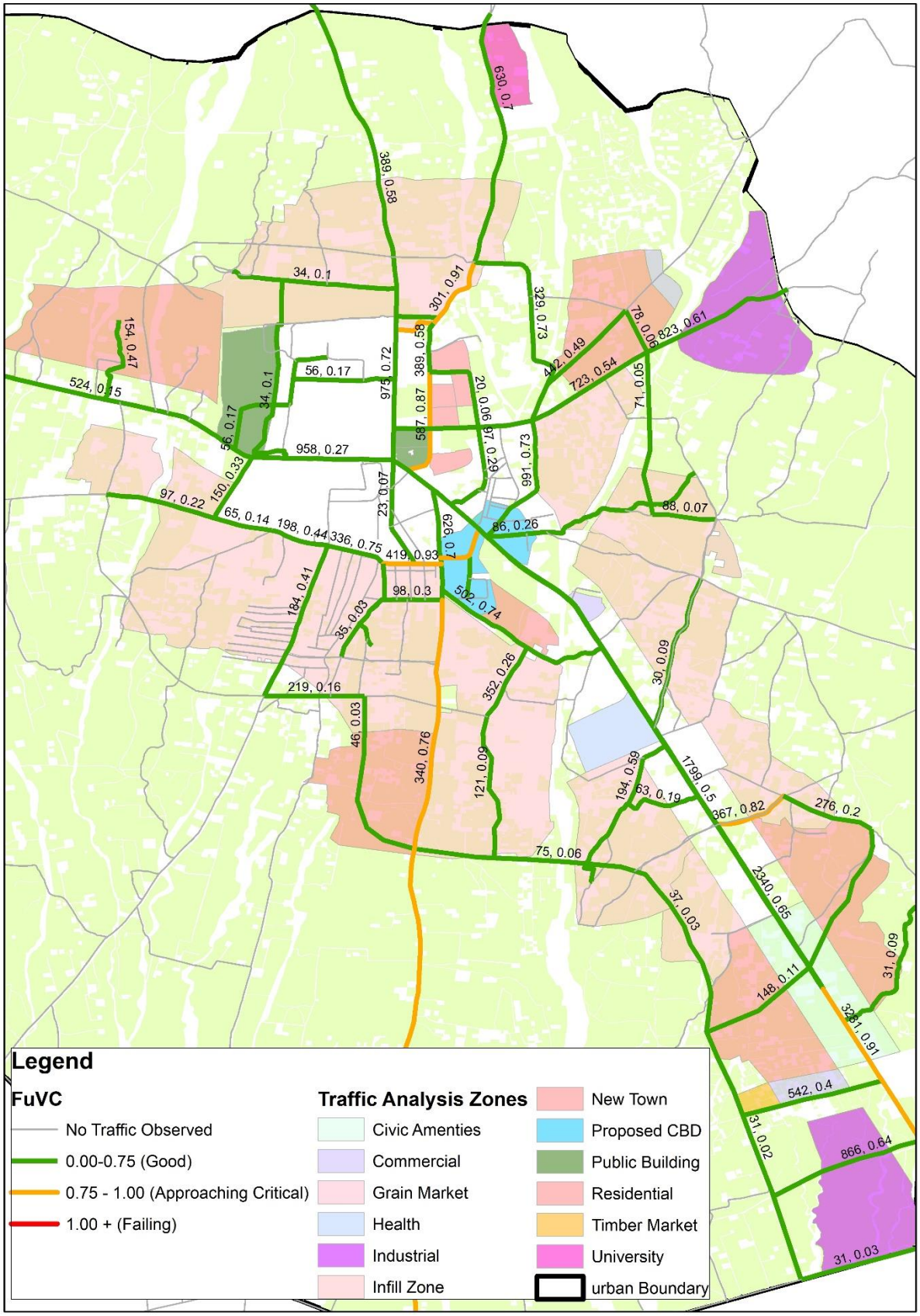
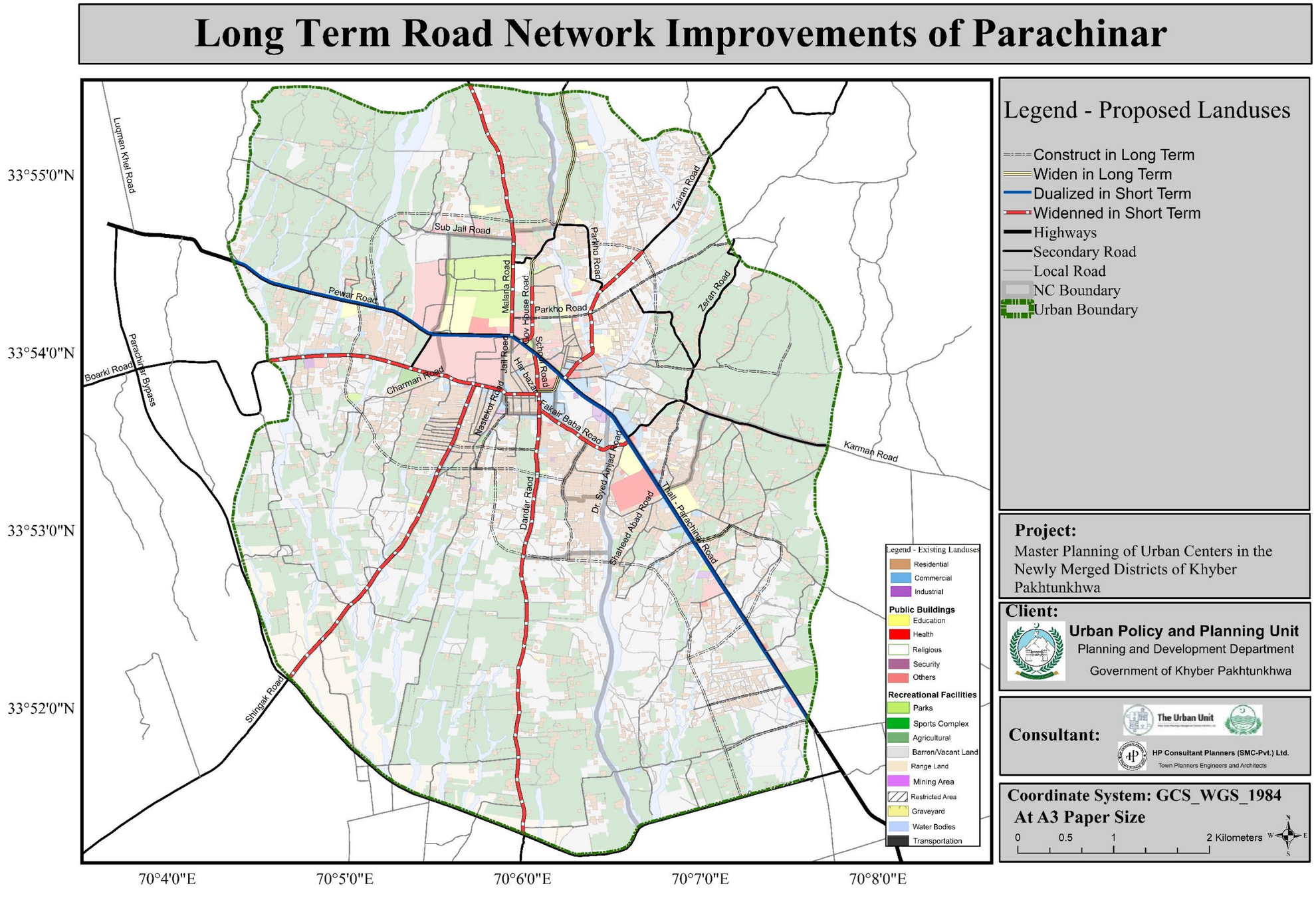


Figure 6-18: Road Network Performance After Improvements



Map 28: Overall Road Network Improvement Plan

6.6.7.2.2 Proposed Cross Sections of New Roads

The new roads are proposed to be two-lane single carriageways (3meter driveways + 2.5-meter shoulders with a total cross section of 16 meters. Sidewalks between 2.5 meters - 4.5 meters wide are to be provided on either side of the road. A typical cross-section for local roads in urban environments is shown in the figure below.

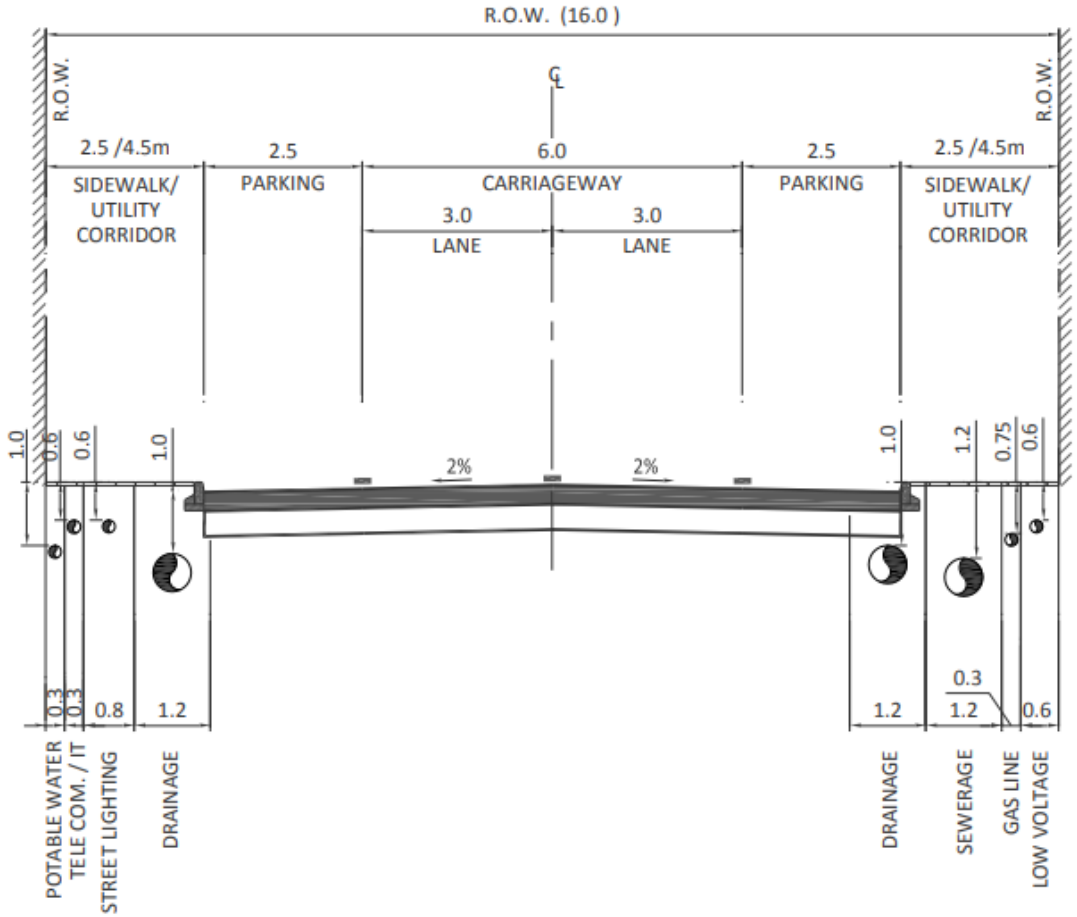


Figure 6-19: Typical Cross Section for Roads in Parachinar

Source: Geometric Design Guidelines (UPPU)

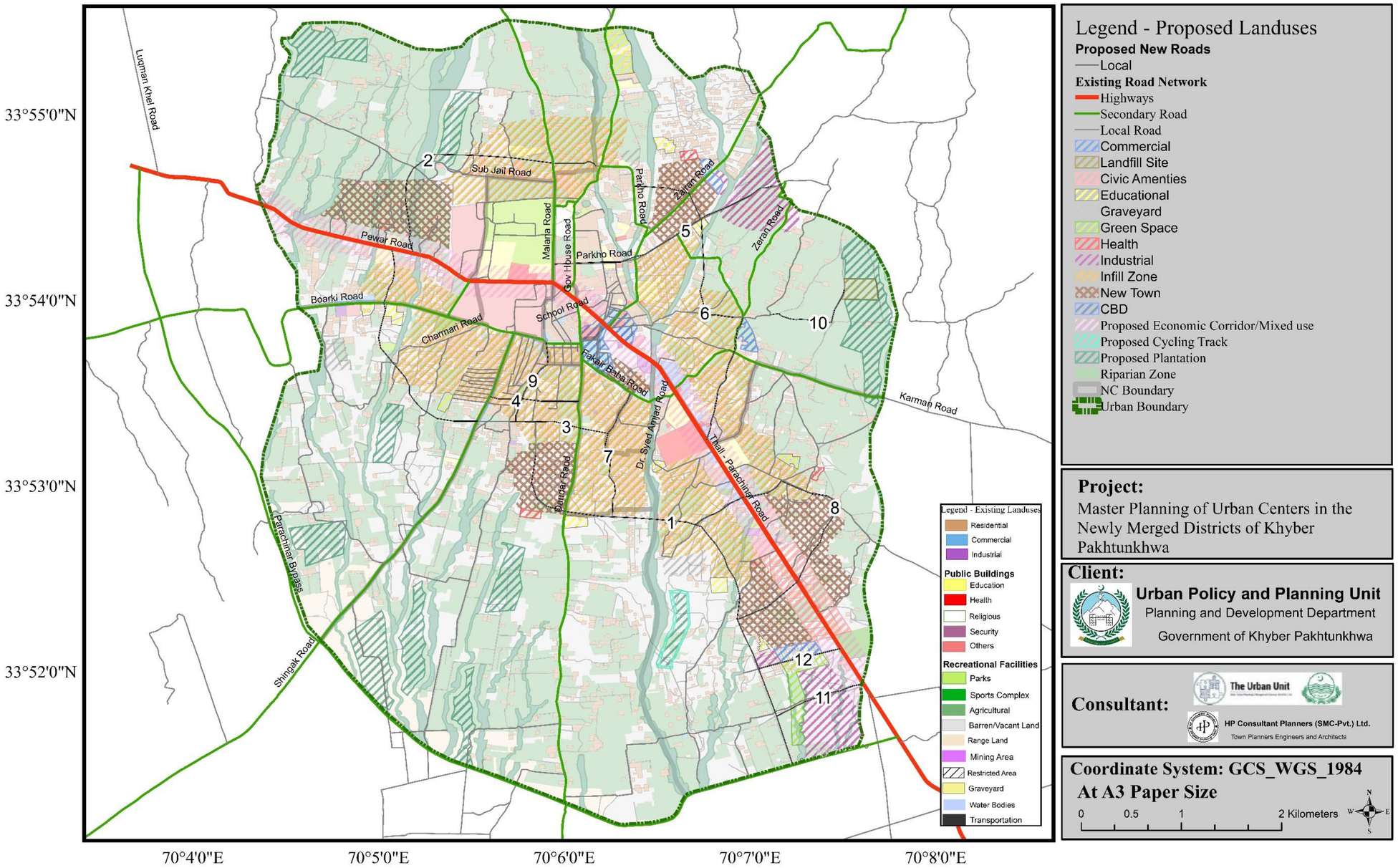
This typical cross section is based on the Khyber Pakhtunkhwa Geometric Design Guidelines published by the Urban Planning and Policy Unit of Khyber Pakhtunkhwa and can be obtained from https://urbanpolicyunit.gkp.pk/wp-content/uploads/2018/07/Interim-Report-3_GDM_KP_12-01-2018.pdf.

In terms of Right-of-ways, the minimum right of way to be acquired should be at minimum 16 meters based on the proposed cross-sections and the owning authorities' own standards. These however may be modified based on true availability of land during implementation.

6.6.7.3 Future Road Network

The future road network of Parachinar with Classification is shown in the Figure Below.

Future Road Network of Parachinar



Map 29: Future Road Network

6.6.7.4 Provision of Footpaths or Sidewalks

The lack of sidewalks on most urban roads in Parachinar forces pedestrians to use road spaces that are already crowded due to encroachments. It is therefore recommended that ample space be preserved for the provision of sidewalks in all future road extension or construction projects in Parachinar's City urban areas.

The construction of all sidewalks shows follow the following criteria:

- Sidewalks should blend with the surrounding streetscape.
- In populated areas, a ribbon sidewalk should be provided in the city.
- In heavily populated areas, a complete sidewalk should be provided on both sides.
- Sidewalks and tree strips should be at least 2.5 meters and in proportion to the width of the road and street.
- The Footpath should be wide enough for two people to pass each other comfortably, wheelchairs must be able to pass each other and turn around with sufficient space between them.
- At any pedestrian crossing, pedestrian ramps should be provided for on and off-street access, and separate ramps should be associated with each intersection.
- The detectable warning strip should be painted in a bright color that contrasts with the adjacent pavement.
- Permeable pavement should be used instead of impermeable pavement with proper storm-water protection where possible.

The Khyber Pakhtunkhwa Geometric Design Guidelines may be referred for more design parameters and criteria for sidewalks. https://urbanpolicyunit.gkp.pk/wp-content/uploads/2018/07/Interim-Report-3_GDM_KP_12-01-2018.pdf.

6.6.7.5 Traffic Management System

The field survey of the study area revealed that vehicular movement on the roads of Parachinar city is irregular with delays due to traffic congestion and irregular parking, particularly in the commercial areas. Furthermore, inadequate supply traffic mangers and infrastructure such traffic signs, pavement marking, sidewalks, pedestrian crossings and other traffic control devices has deteriorated urban environment on the roads of Parachinar.

It is therefore necessary to adopt a traffic Plan in accordance with regional developments. Continuous improvement in transport infrastructure is essentially required in order to mitigate the traffic congestion and its related problems. The integration of traffic management strategies will ensure economically viable, socially acceptable and environmentally friendly solutions of traffic issues in Parachinar.

While Traffic Signals are not recommended for the current traffic volumes, it is proposed that proposed a traffic police unit be deployed in the city to manage the traffic flow at select intersections. The officers should also enforce against encroachments and illegal on-street parking. the locations shown in the figure below be managed by a police officer during the peak periods. Special emphasis is given to Thall Parachinar Road's traffic flow as it has been proposed as an economic corridor.

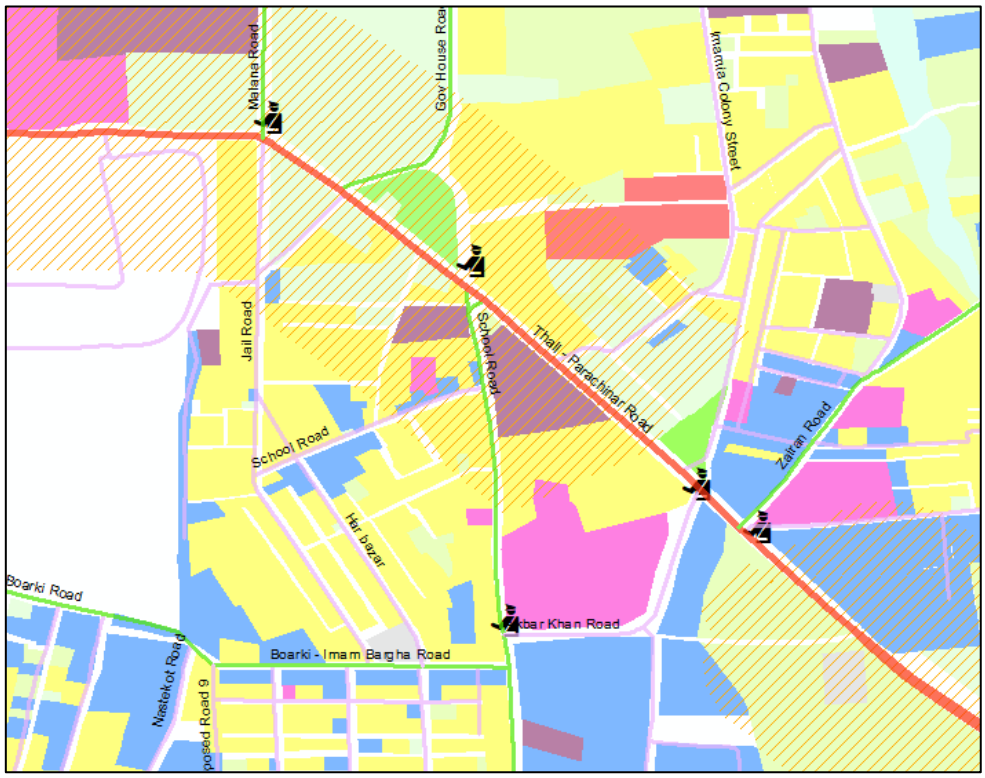


Figure 6-20: Traffic Management Plan

Signal Warrants as per the Ontario Traffic Manual have been applied to determine whether these locations should be considered for signalization based on current and future peak hour traffic volumes. The table below summarizes the results of the signal warrants at these 5 intersections under existing conditions and future build out conditions. The signal warrants are provided in the Annexure.

To conduct the signal warrant analyses the existing and future peak hour volumes have been utilized where available. Where junction counts were not available, the traffic flows have been estimated by extrapolating using adjacent intersections. The forecast traffic volumes from the transport model were utilized to predict the junction traffic demands. It is noted that peak hour volumes are discounted by 25% for each preceding and proceeding hour to obtain realistic hourly distribution for warrant purposes.

Although no intersection is recommended for signalization in the short term, it is therefore recommended that an independent traffic engineering study to evaluate the necessity of traffic signals in Parachinar be conducted. Such a study would also document pedestrian and collision data which are influential factors for signalization. Moreover, future development applications should include traffic impact assessments wherein specific intersections are analyzed for geometric and control improvements.

Table 6-41: Signal Warrant Calculations for Key Intersections

Sr	Major Road	Minor Road	Existing Major Volume	Existing Minor Volume	Signal Warranted Short Term	Future Major Volume	Future Minor Volume	Signal Warranted Long Term
1	Thall-Parachinar Road	School Road	605	344	No	958	626	No
2	Thall-Parachinar Road	Jail Road	570	416	No	958	975	Yes
3	Thall-Parachinar Road	Abrar Khan Road	791	202	No	958	397	No
4	Thall-Parachinar Road	Zairan Road	791	Not Recorded	No	958	991	No
5	Dandar Road	Imam Barga Road	343	73	No	626	419	No

In addition to the above, note how these traffic management locations coincide with the encroachment areas previously discussed in the “Issues” section and shown in the figure below. These police officers may also ensure that these corridors are free from encroachment for improved traffic flow.

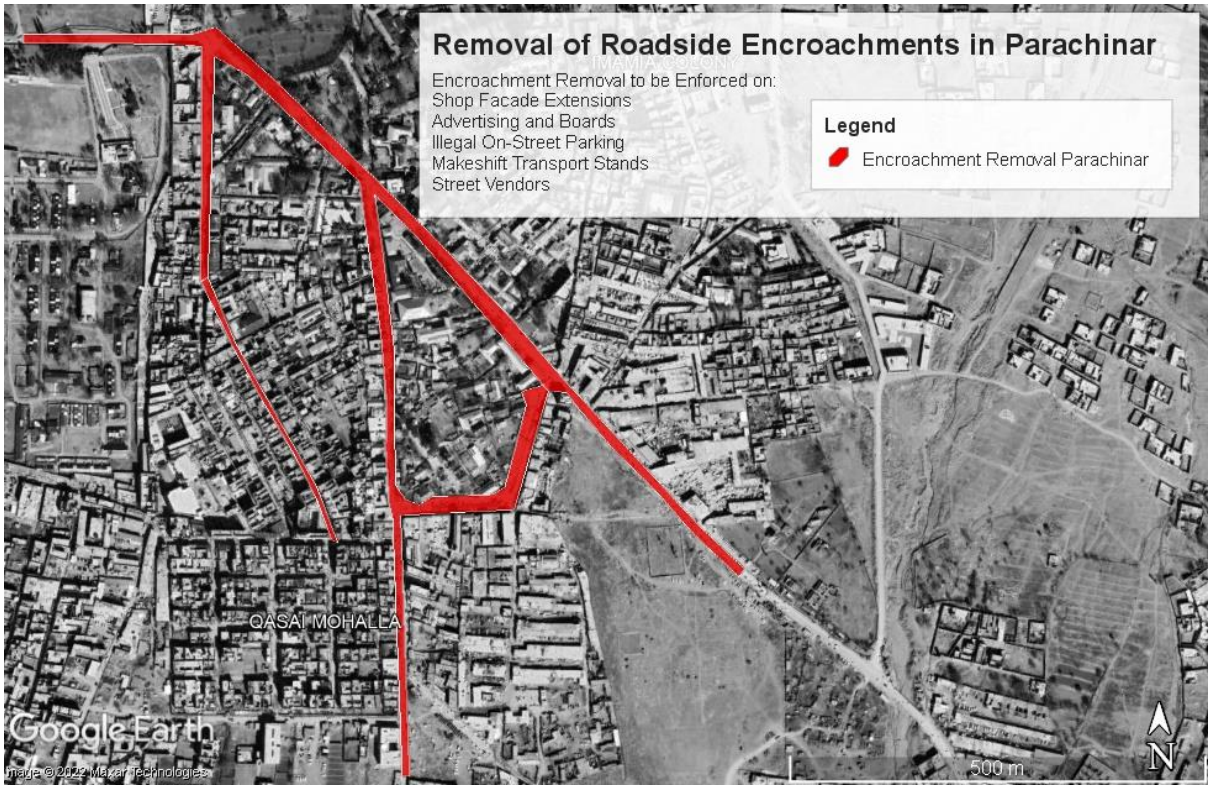


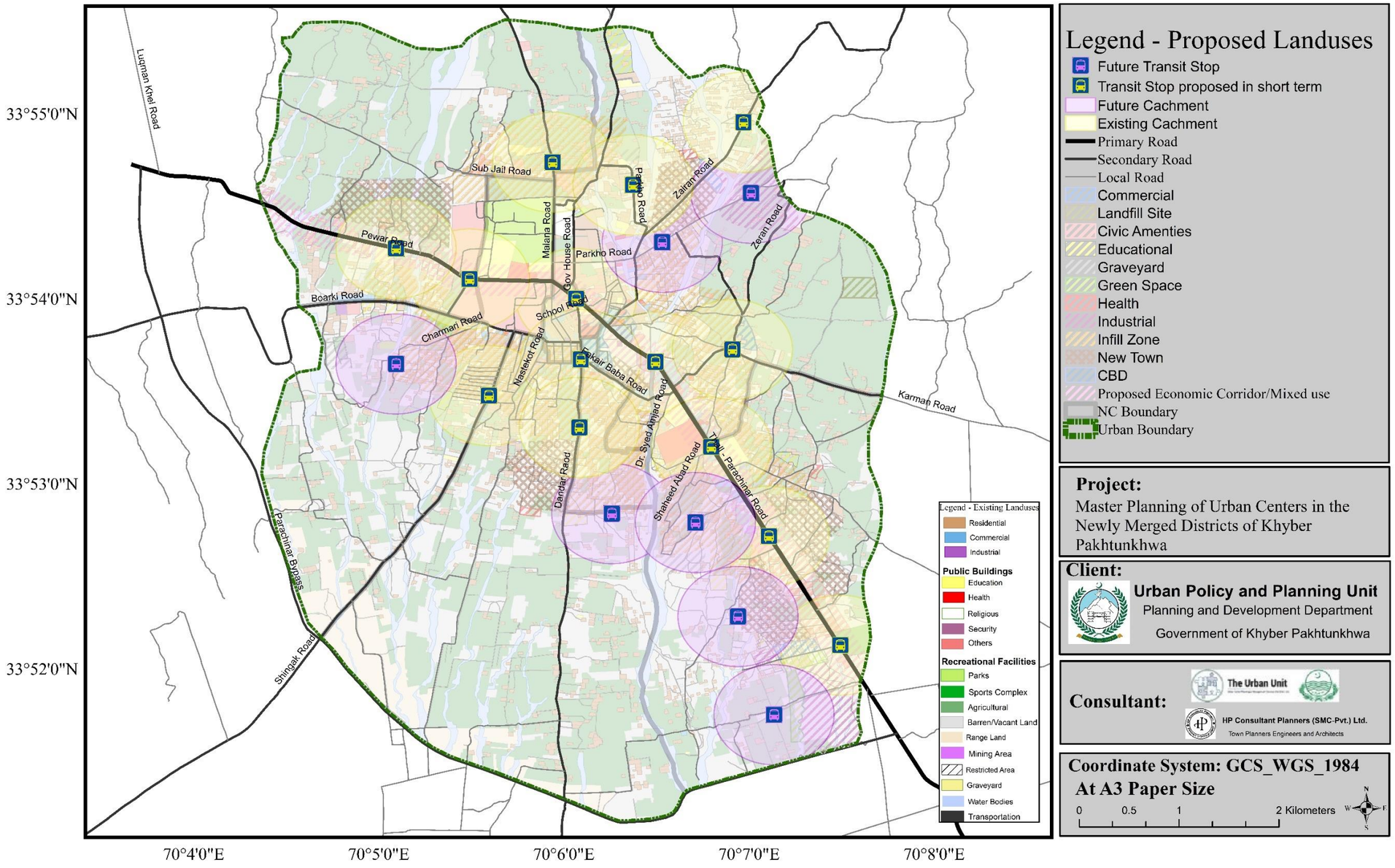
Figure 6-21: Removal of Encroachments

6.6.7.6 Enhanced Public Transit Services

Building upon the public transit service areas proposed in the short-term, a medium/long term public transit strategy is also provided to facilitate the future land use zones.

The figure below illustrates the locations of proposed transit stops to be provided in the future. Note that these stops follow the same criteria of a 500-meter service catchment and are situated along the new proposed secondary roads. They are also situated such that future land uses can be accommodated. The route planning and scheduling between all the proposed stops can be determined by the relevant implementation agency.

Parachinar Proposed Public Transit Stops (Medium-Long Term)



Map 30: Medium/Long Term Public Transit Stops

6.6.7.7 Bus Service for the Intracity Mobility

It is anticipated that the city will attract more international tourists if economic activity increases in near future. It will open up new opportunities for the city's social well-being and overall quality of life. It would therefore be necessary to provide better, more secure, and more comfortable intracity mobility services. As a result, it is proposed that bus services for high volume passenger transport be implemented.

The Household information survey revealed that about a significant number (16%) of the respondents reported to spend less Rs.100 on their daily travelling while almost double of this i.e., 48% spend between 100 to Rs. 500. It gives an impression of the general socio-economic status of the indigenous commuters that requires a cheaper source of bus transit.

It is recommended that the Bus service in Parachinar city should be provided by the transport department to support greater moving population in the years to come at reasonable rates. This service may be provided entirely by the public sector or via collaboration with the private transportation industry.

6.6.7.8 Provision of Infrastructure for Non-Motorized Transport

The provision of infrastructure only for motorized modes of transportation will not serve the problem; facilities for non-motorized road users are also required. For example, Sidewalks, pedestrian bridges, and bicycle lanes. However, these facilities are always vulnerable to encroachment; therefore, strict enforcement policies should be implemented to discourage vehicle parking in such spaces and the use of these areas for commercial purposes. School-age children, women, the elderly, and the disabled are particularly affected because they must cross busy roads during peak hours.

At a minimum, sidewalks should be provided along all new roads constructed in Parachinar, especially does alignments identified in **Section 6.6.7.2**.

It is also recommended that a pedestrian zone establishment study be undertaken in some bazar areas such as Har Bazaar / Punjabi Bazar in order to explore opportunities to establish pedestrian only zones.

6.6.7.9 Provision of Road Signage

Signage systems are visual information systems that include signs, arrows, maps, pictograms, color scheme systems, and a variety of typographic components. Signage systems differ from other kinds of informational display in that they are typically used to direct people's movements in the physical world.

Signage systems with different color, themes, material, shapes and form help to add color in the road environment and present a colorful view to the public. It was observed during the field studies that most of the *black spots* on the road network in Parachinar city can be eliminated by providing appropriate signage facilities.

Each newly constructed road and transportation facility is recommended to be supplemented by appropriate traffic and way finding signage. Examples of some road signs include:

- Distance Markers
- Way Finding Signs
- Posted Speed Limit Signs
- Populated Area Signs
- Transport Terminal Signs
- Tourist Attract Signs
- Road Hazards Signs (steep slopes, sharp turns, etc.)

Examples of the above-mentioned signs are shown in the figure below. Detailed specifications of the recommended signage in terms of colors, dimensions, and font size can be obtained from the ***Punjab Geometric Design Manual*** Available on the Urban Unit's publications webpage:

https://urbanunit.gov.pk/Download/publications/Files/8/2021/PGDM-Vol-2.pdf.

The ***Ontario Traffic manuals*** may also be referenced for signage dimensions via this link: https://inps.net/graphics/sites/default/files/pdf/MTO-Book-5.pdf

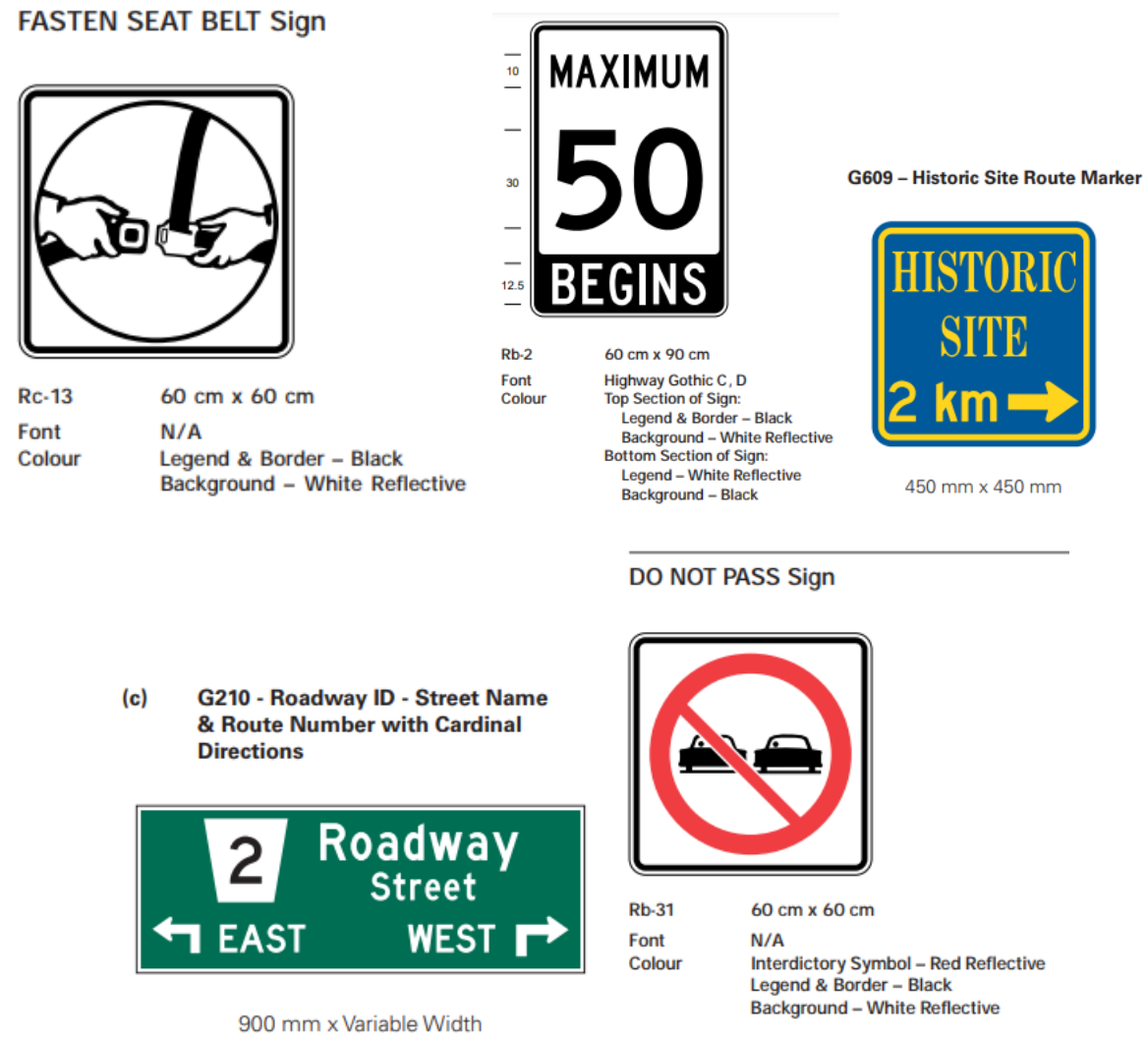


Figure 6-22: Example Road Side Signage

Signage is recommended to be written in both English and Urdu script to accommodate the local people of the region.

In terms of signage location, an independent study should be undertaken along the city's road network in order to determine the optimize sign installation points in the city as per the above-mentioned standards references.

6.7 Landfill Site

Three potential controlled landfill sites have been identified in Parachinar. The dumpsite area shall withstand the waste load of 25 years for Parachinar is 12 acres (5 Hectares). It is proposed that TMA should acquire this land on a priority basis to avoid open dumps in the area. This will help control illegal dumping of waste into drains and water bodies. Maps for Landfill suitability and identified land for potential disposal sites have been depicted in figures below:

Table 6-42: Area Calculation for Landfill in Parachinar

Area Required for Controlled Dumpsite		
Design Criteria	Waste Generation (t/d)	24
	Density (ton/cu.m)	0.6
	Depth of L.F (m)	15
District	Dimension	Value
Parachinar	Volume (cu.m)	365,000
	Area (m2)	48,667
	Area (Acres)	12
	Area (Hectares)	5

Source: Recommended by the Urban Unit and HP Consultants

6.7.1 Rationale for Proposed Landfill Site:

The following parameters have been considered to identify zones for a landfill site in Parachinar.

- **Airports:** If a landfill is located within a specified distance of an airport, the owner or operator must demonstrate that the Landfill will not present a bird hazard to aircraft. The minimum acceptable distance of the Landfill from the airport is 5 km.
- **Flood plains:** For landfills located on a 100-year flood plain, the owner or operator must demonstrate that the Landfill will not restrict the flow of a 100-year flood, reduce the storage capacity of the flood plain, or result in the washout of solid waste.
- **Wetlands:** New landfills and lateral expansions can only be located in wetlands with no practical alternative.
- **Fault areas:** New landfills and lateral expansions must not be located within 200 feet of a fault area.

- **Seismic zones:** New landfills and lateral expansions are restricted in areas susceptible to ground motion resulting from earthquakes.
- **Unstable areas**: Unless demonstrated otherwise, landfills must not be located in areas susceptible to natural or human-induced events or forces capable of impairing the integrity of landfill components. Examples of unstable areas are those with poor foundation conditions, areas susceptible to mass movements (landslides, rock falls, etc.), and areas with karst terrains (sinkholes).

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repeal if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for Landfill sites are below:

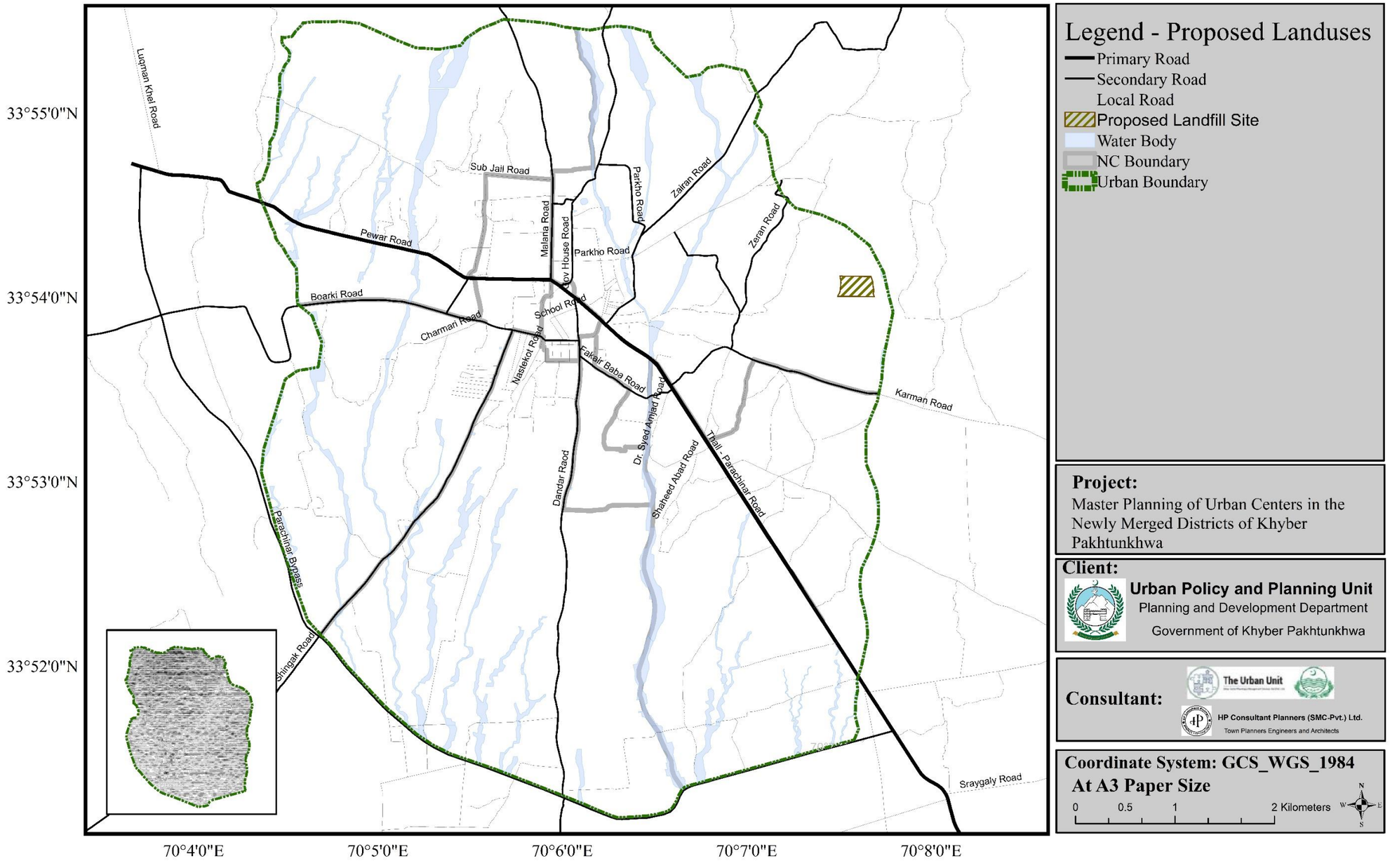
Table 6-43: Landfill Site Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Sewage treatment plant/disposal work, Water treatment plant, Solid waste dumping yards, Treatment or recycling plant, Petrol pump, Gas filling station, Grid station, Taxi/rickshaw stand, Parking lot.	Heavy, large and extensive industries, Loading/unloading facilities, Workshops for buses, Slaughter-housing, wholesale mandis, Public utilities, Servicing/repair of farm equipment and machinery, Industrial Park.	Residential housing schemes; private and public both, Mixed use apartment buildings. Large health, recreational commercial and educational institutions, Agriculture and horticulture, Dairy and poultry farming Recreational facilities.

		any other that are not in permitted or permissible uses

Source: Urban Unit and HP Consultants

Parachinar Proposed Landfill Site



Legend - Proposed Landuses

- Primary Road
- Secondary Road
- Local Road
- Proposed Landfill Site
- Water Body
- NC Boundary
- Urban Boundary

Project:
Master Planning of Urban Centers in the Newly Merged Districts of Khyber Pakhtunkhwa

Client:
Urban Policy and Planning Unit
Planning and Development Department
Government of Khyber Pakhtunkhwa

Consultant:
The Urban Unit
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 31: Proposed Landfill Site

6.8 Graveyard

Considering accessibility and planning standards, 05 areas for graveyards are designated in the periphery of the city. These graveyards are near the proposed zones of development for ease of access. The graveyards can be further divided according to the requirement of practiced religions in the town.

Table 6-44: Graveyard Requirement

Existing area (sq. km.)	0.05
Existing area (in %)	0.18
Recommended NRM standard	0.5% to 6%
Recommended graveyard area – min (sq. km.)	0.17
Recommended graveyard area – max (sq. km.)	2.04
Gap (Recommended (min) – Existing Land Use)	0.12
Gap (Recommended (max) – Existing Land Use)	1.99
Proposed area 2040 (sq. km.)	0.14

Source: Recommended by the Urban Unit and HP Consultants

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repeal if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for Graveyard sites are below:

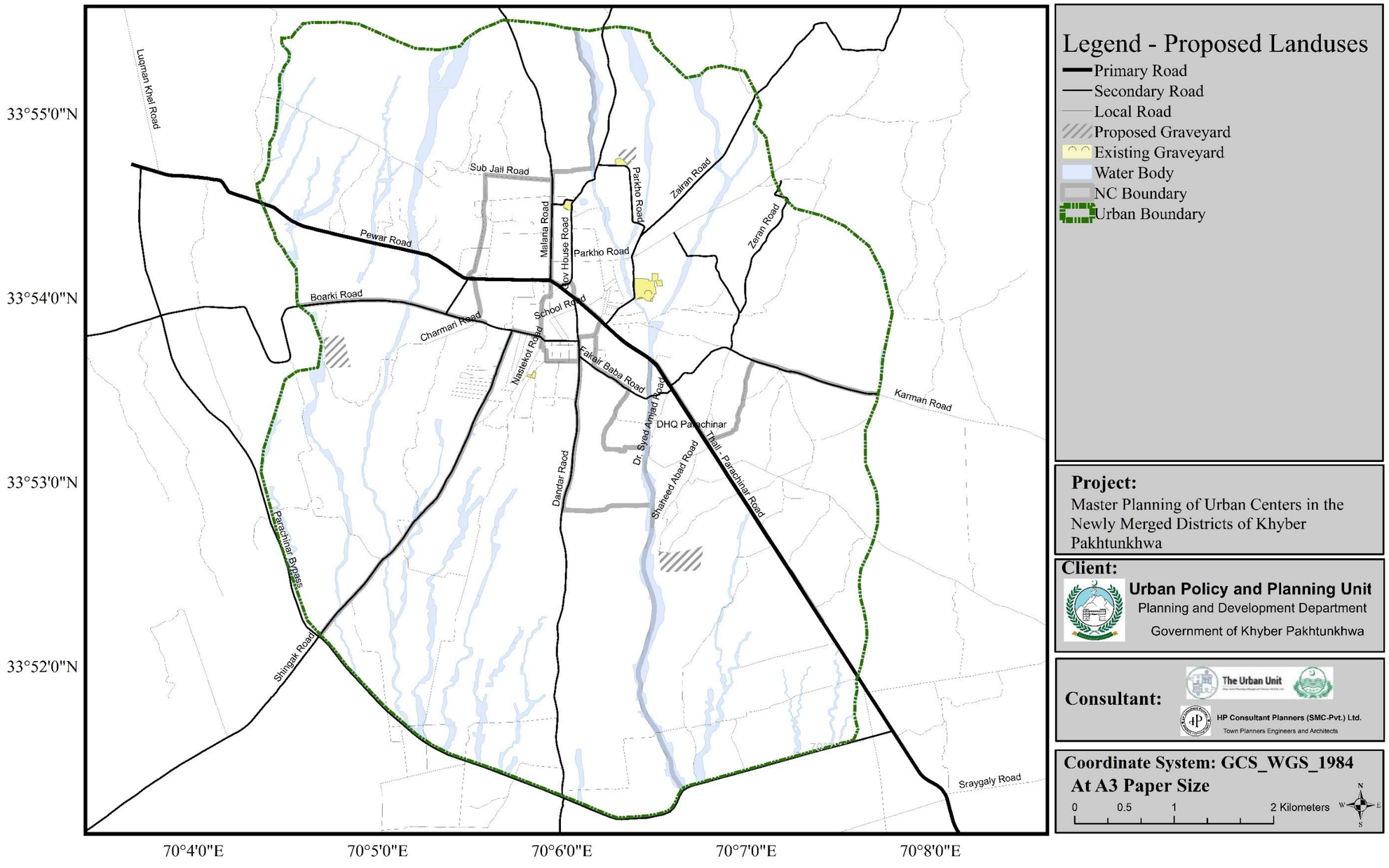
Table 6-45: Graveyard Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Administration buildings Religious building such as Mosques, Clinics/dispensaries,	residential for graveyard workers / caretakers Shops, Zoological garden,	Heavy, large and extensive industries: noxious, obnoxious and hazardous industries,

Local shopping areas Retail stores may also be included such as flower shop / horticulture; and convenience stores Petrol pump, Gas filling station Parking facilities	Botanical garden, Bird sanctuary,	Warehousing, storage go-downs of perishables, hazardous, inflammable goods, Sewage treatment plant/disposal work, Water treatment plant, Solid waste dumping yards, Research laboratories treating contagious diseases.

Source: Urban Unit and HP Consultants

Parachinar Proposed Graveyard Landuse



Legend - Proposed Landuses

- Primary Road
- Secondary Road
- Local Road
- Proposed Graveyard
- Existing Graveyard
- Water Body
- NC Boundary
- Urban Boundary

Project:
Master Planning of Urban Centers in the Newly Merged Districts of Khyber Pakhtunkhwa

Client:
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Consultant:
The Urban Unit
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 0.5 1 2 Kilometers

Map 32: Proposed Graveyard

6.9 Reserved Agriculture Area

The total Reserved Agriculture Area is 8.04 sq.km in Parachinar. The agriculture reserved area is multifaceted, encompassing environmental conservation, food security, economic sustainability, climate change resilience, and long-term planning. This strategic allocation aims to address the growing challenges associated with urbanization, population growth, and urban sprawl. The focus of this area will be on the agro-production of locally grown commodities, and all amenities and services will be offered to increase agricultural output within city limits. In this way, the city's spatial growth will be constrained, and the core of its agricultural activity will continue to stay in the vicinity of the city. Additionally, it will result in a healthy atmosphere and control the infrastructure network's spread.

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repealed if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for Reserved Agriculture Area is below:

Table 6-46: Reserved Agriculture Area Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Crop, Orchard, Pasture land livestock such as dairy or poultry farm Forest, Nursery or a green house, horticulture, Tube well,	Milk Chilling and Pasteurization Animal husbandry clinic; Country club, Zoological garden, Botanical garden, Bird sanctuary, Zoo or wildlife park, Grain market	Other than permitted and permissible

Existing rural settlement or village, place of worship or prayer; Agricultural machinery workshop; Farm house Storage activities of agricultural goods which are non-hazardous in nature.	Cattle market Fruit and vegetable market,	

Source: Urban Unit and HP Consultants

6.10 Livestock and Dairy Development Zone

A proposed Livestock and Dairy Development Zone spanning 2.17 sq. km. aims to foster animal and milk production. It is located on the eastern side of Parachinar, adjacent to Karman Road and Zeran Road in close proximity to Thall-Parachinar Road, this zone is envisioned to predominantly comprise cattle farms accommodating a diverse range of livestock, including cattle, buffaloes, sheep, goats, camels, and poultry. The farms will also include grazing and pasture areas. The zone will host dairy farms equipped with milk processing units. This zone is intended to not only boost livestock and dairy production but also create a holistic environment that supports the well-being of the animals and ensures the efficient processing and distribution of dairy products. Slaughter house having an area of 0.01 sq.km is proposed near the Zeran Road.

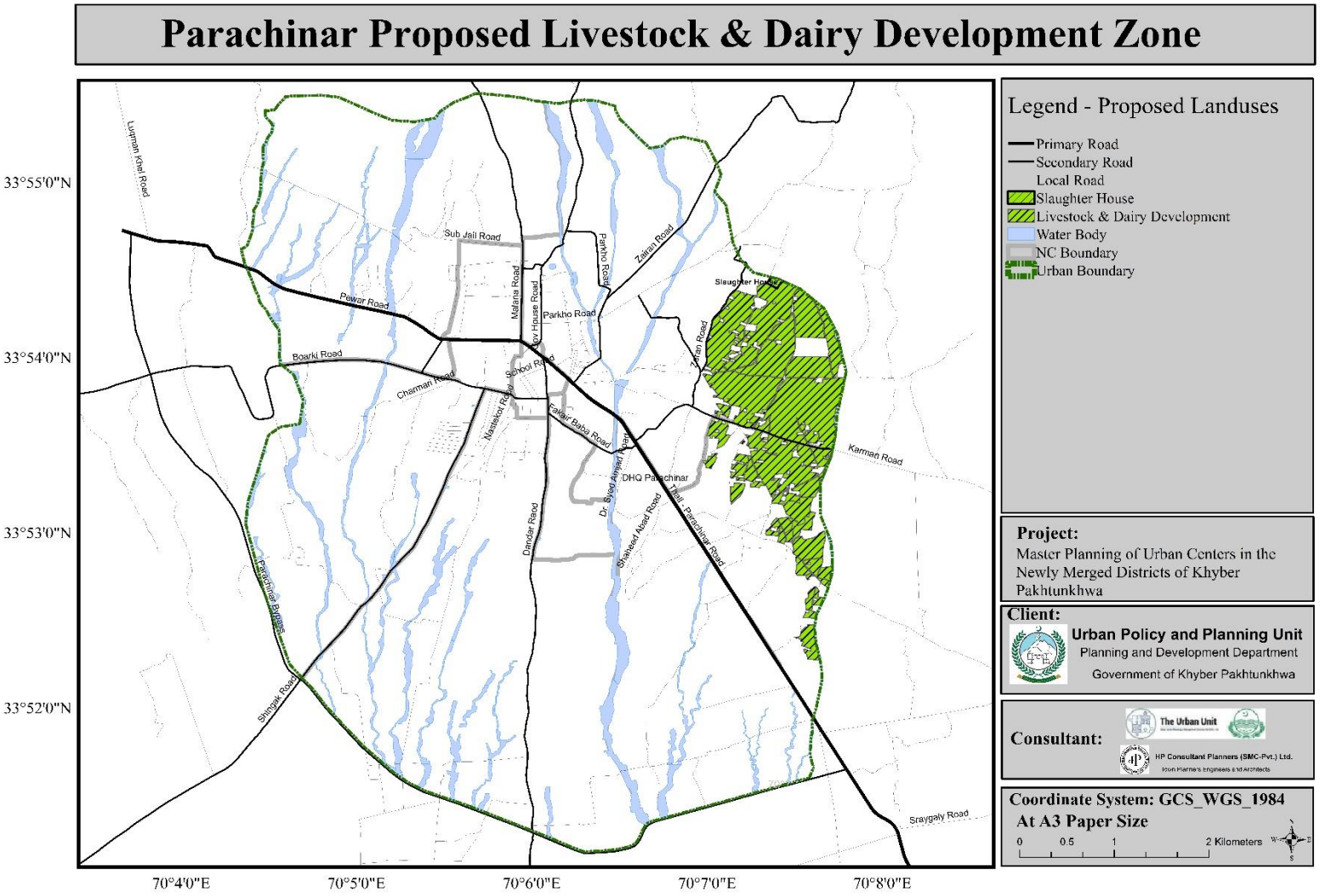
As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repealed if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for Livestock and Dairy Development Zone are below:

Table 6-47: Livestock and Dairy Development Zone Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Cattle Farms, Poultry Farms, Pasture and grazing lands, Slaughter Houses, Dairy production, Veterinary services,	Godowns Cold storage, Cattle Market Fuelling stations Residences of caretakers Related commercial activities Veterinary Hospital	Other than permitted and permissible

Veterinary education and training Grain Market		

Source: Urban Unit and HP Consultants



Map 33: Proposed Livestock and Dairy Development Zone

6.11 Civic Amenities Zone

The current expanse of public buildings covers 0.47 sq.km, and proposed civic amenities zone is spanning 0.2 sq.km. The existing public buildings are dispersed, posing challenges for convenient access therefore in future with the rising activities more space for different public offices and amenities will be required.

Civic Amenities Zone	
Existing area (in sq. km.)	0.47
Existing area (in %)	4.24%
NRM -Standards	3 %to 11%`
Recommended mixed use zone – min (sq. km)	1.02
Recommended mixed use zone – max (sq. km)	3.74
Required (Recommended (min) – Existing Land Use)	-0.42
Required (Recommended (max) – Existing Land Use)	2.30
Proposed area 2040 (in sq.km.)	0.2

A new Civic Amenities Zone has been proposed along Thal-Parachinar Road. This strategic location ensures easy accessibility for the public. This zone involves consolidating all dispersed public buildings into this designated zone, which will house essential entities such as the Government or Semi-Government offices like District Secretariat, Town Hall and other essential buildings.

This concerted effort aims to streamline public services, enhance accessibility, and provide a consolidated hub for administrative functions. The thoughtful relocation of these key offices to the Civic Services Zone is poised to improve operational efficiency and cater to the growing needs of the district, aligning with the vision for a more organized and accessible administrative setup.

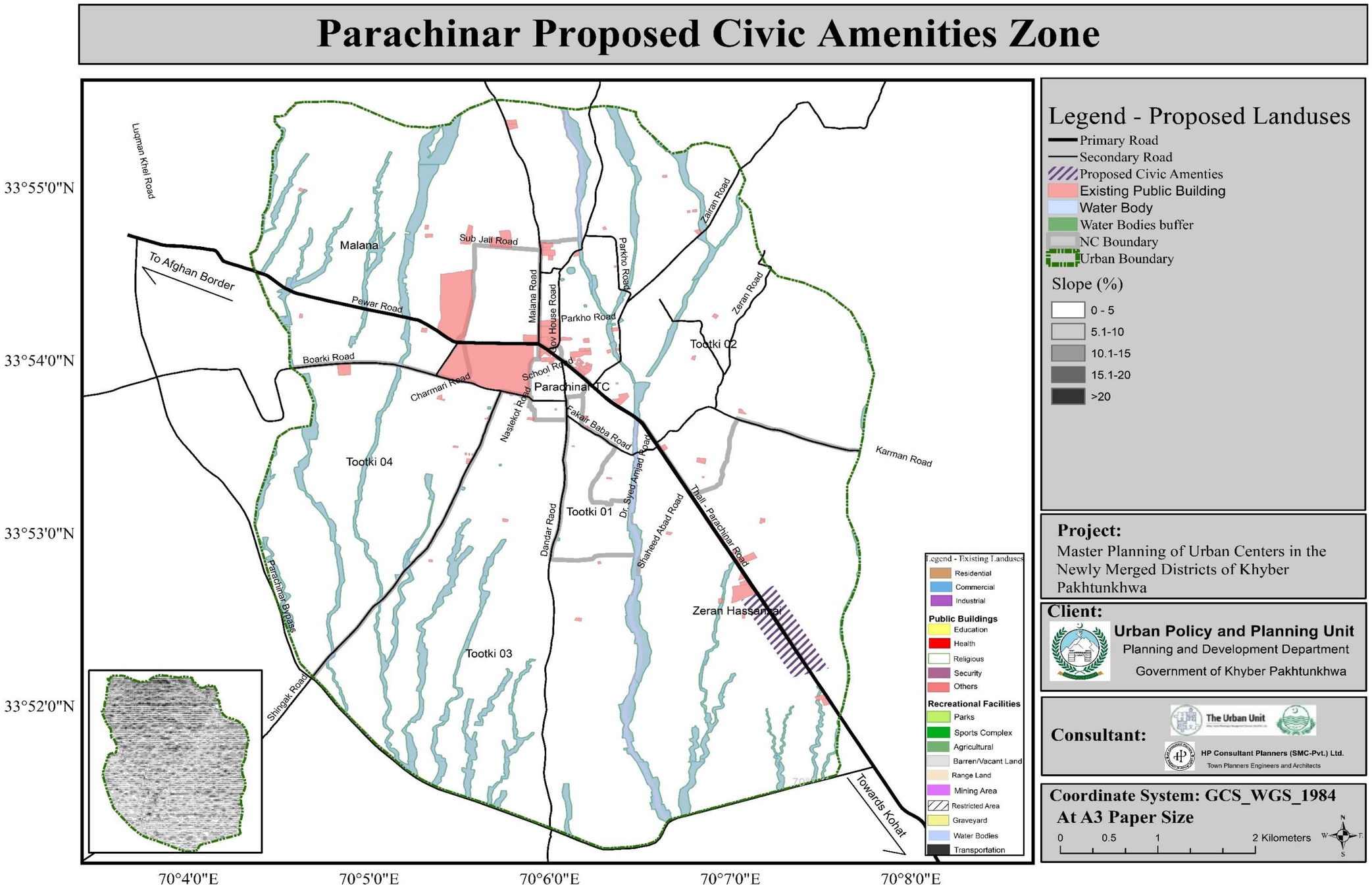
As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case

studies and suggest development guidelines specific to the study area. These development guidelines will be repealed if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for Civic Amenities Zone are below:

Table 6-48: Civic Amenities Zone Development Guidelines

Permitted Uses	**Allied Permissible Uses**	**Prohibited Uses**
Government or semi-government offices (District Secretariat, Town Hall etc. Social welfare institution such as community centre, art gallery, museum and auditorium Local and zonal municipal office Police station, fire station or post office Shelter home, Pannahgahh, Convention Centre	Employees Residences (for all grades) - Auditoriums, seminar halls, workshop spaces Community facilities Sports facilities Hotel or Motel, Guest house, Athletic club, gymnasium, fitness center or indoor sport facility, Research and development centers	Other than permitted and permissible

Source: Urban Unit and HP Consultants



Map 34: Proposed Civic Amenities Zone

6.12 Green Spaces

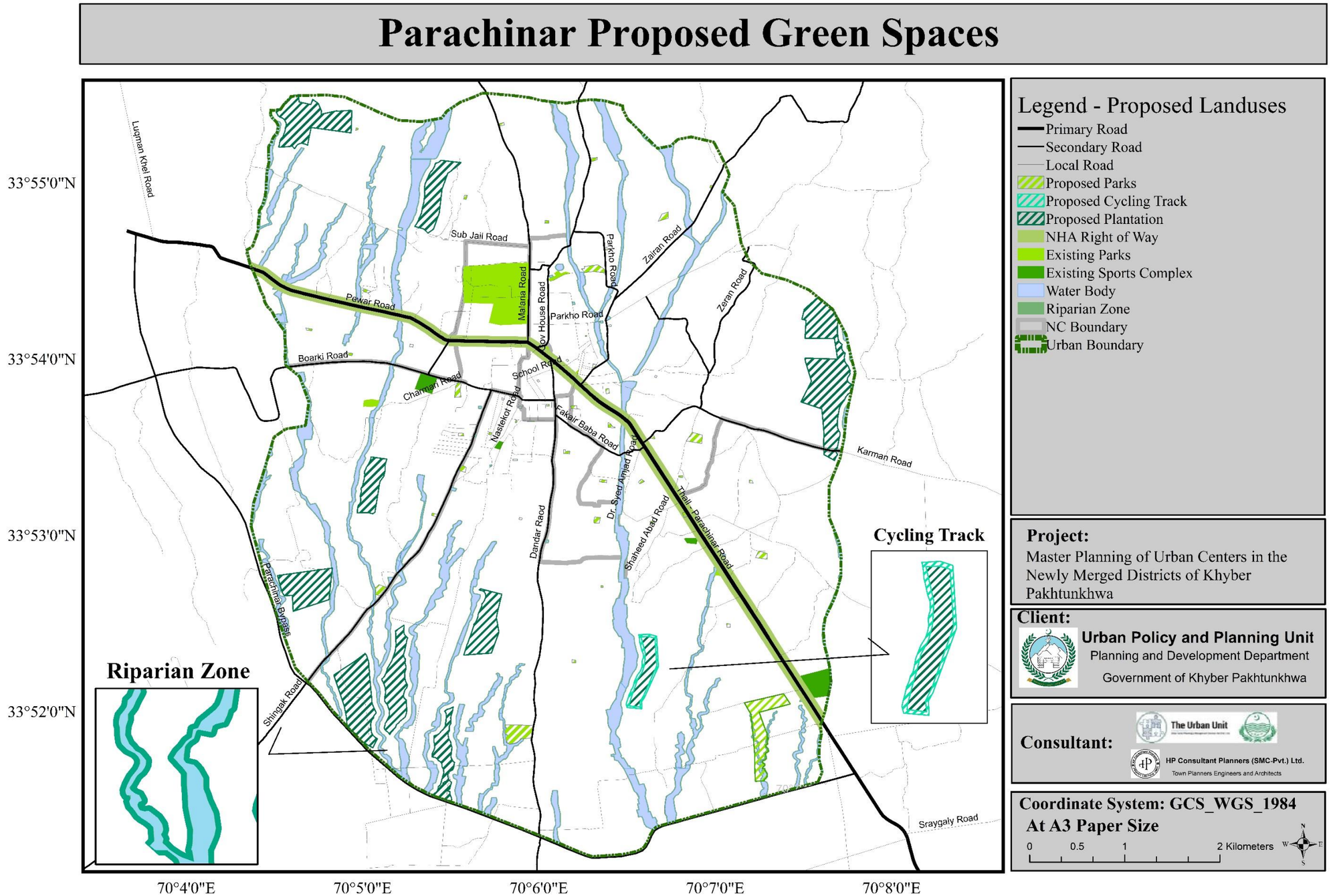
Green spaces are essential to each community as it improve community's natural environment, aesthetic, and recreational opportunities. These are mostly used for leisure activities including cycling, walking, working out, and playing. Parachinar urban center has parks and playgrounds; however, these are not adequate to serve the growing population. As per the Land Use Survey of Parachinar, out of the 34.03 sq. km parks and sports complex covers only 0.34 sq.km and 0.10 sq.km respectively.

The World Health Organization (WHO) advises all cities to provide each resident with a minimum of 9 sq. of urban green space[19]. Parachinar's proportion of green space falls below of the standard for cities around the globe. Therefore, dispersed green space having an area 5.87 Sq.km area is proposed to benefit the whole population.

A riparian buffer zone is a vegetated area near water bodies, it helps shade and partially protect the water body from the impact of adjacent land uses. It plays a key role in increasing water quality in associated streams, rivers, and lakes. It serves diverse purposes, for example, protection of surface waters from pollution, protection of structures from flooding or erosion, and preservation of riparian habitat. Therefore, riparian buffer is proposed along the water bodies of Parachinar.

Furthermore, green buffer along industrial area and main road i.e. Parachinar-Thall Road is proposed. Buffer zones surrounding industrial areas are established primarily to ensure that nearby residential communities are not adversely impacted by health and amenity issues that can be attributed to industrial emissions. Cycling track of 2 km is proposed along the proposed planation. The below map shows the proposed Green Spaces in Parachinar urban center.

19 Russo, Alessio, and Giuseppe Cirella. "Modern Compact Cities: How Much Greenery Do We Need?" *International Journal of Environmental Research and Public Health*, vol. 15, no. 10, 5 Oct. 2018, p. 2180, www.ncbi.nlm.nih.gov/pmc/articles/PMC6209905/, https://doi.org/10.3390/ijerph15102180.



Map 35: Proposed Civic Amenities Zone

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. These development guidelines will be repealed if Building Control Authority Notify any Land Use Classification Rules applicable in KP. The development guidelines for Green Spaces are below:

Table 6-49: Green Spaces Guidelines

Permitted Uses	Permissible Uses	Prohibited Uses
Bird sanctuary, botanical garden, park, memorial, monument or playground, forest, orchard, picnic hut, plant nursery, place of worship, joy land or play land, farm, recreational club or resort, shooting range, swimming pool library and zoological garden.	Building and structures ancillary to use permitted in open spaces and parks such as stand for vehicles on hire, taxis and scooters, bus and railway passenger terminals, facilities such as police post, fire post, post and telegraph office, commercial use of transit nature like cinema, circus and other shows, public assembly halls, restaurants and caravan parks, sports stadium, open air cinemas, subject to the coverage, height, FAR and set backs of this zone.	Any building or structure which is not required for open air recreation, dwelling unit except for watch and ward personnel and uses not specifically permitted therein.

Source: Urban Unit and HP Consultants

Chapter 7: **Way Forward**

The scenario mapping development plan for Parachinar has been developed keeping in view the land suitability analysis and planning approaches deemed suitable by the planning experts.

The proposed land use zones have been planned to promote compatibility and conformity along with the existing built up areas. These proposed zones will be catering to the future needs of the population of Parachinar including, housing, commercial, industrial and mixed-use zone whereas indirectly providing opportunities for employment with better living conditions and improving the quality of life of the residents.

In addition, detailed proposals have been made with reference to the proposed land use zones that lay out a way for the smooth implementation of the Master Plan.

These proposals are outlined in Volume II of the Task C: Draft Master Plan for Parachinar. The volume explores opportunities for future development to ensure sustainable growth, and development controls to ensure socially cohesive, economically viable, and environment-friendly development.