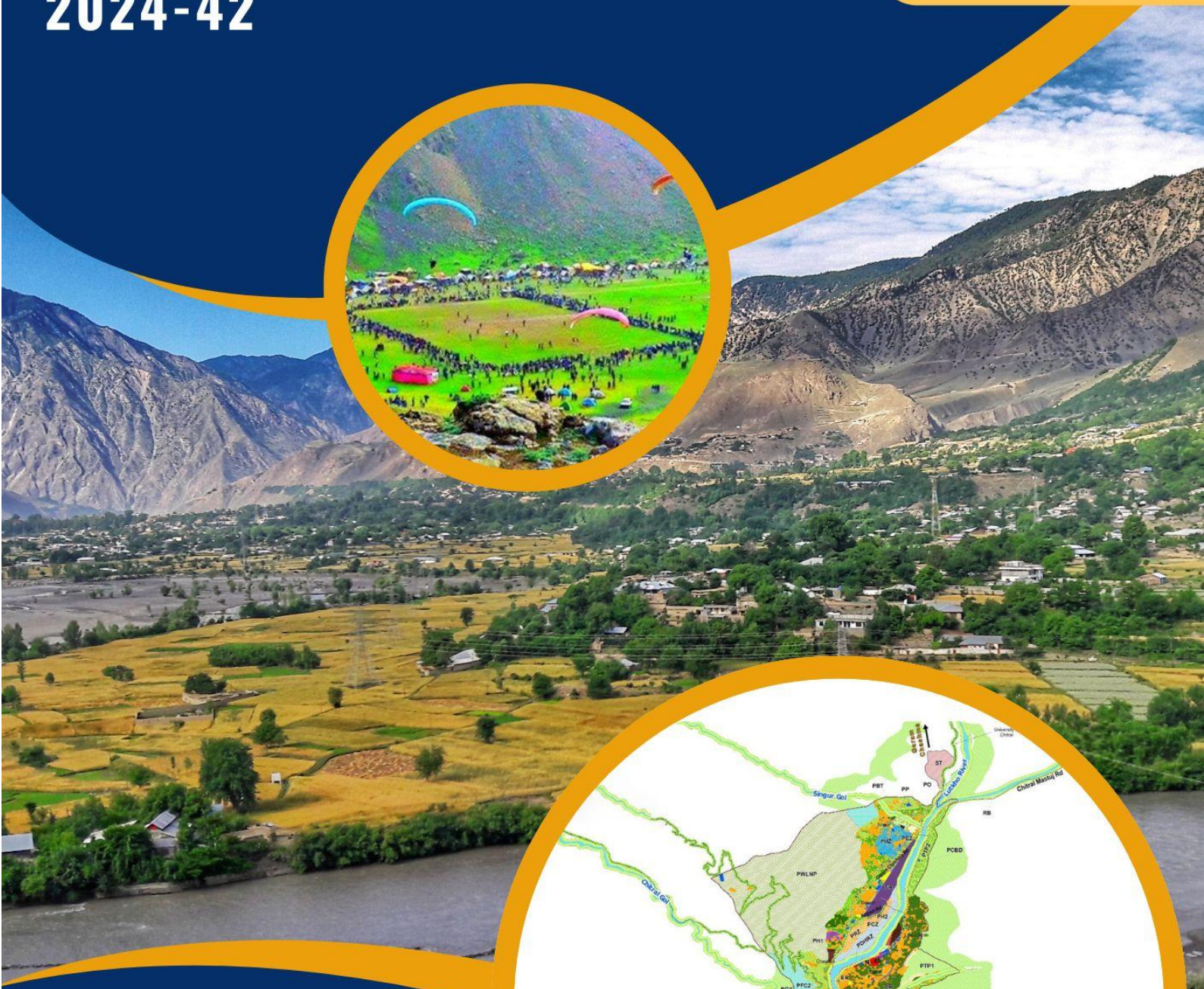
CHITRAL CITY MASTER PLAN, 2024-42

VOLUME I



MASTER PLAN PROJECT (MPP)
URBAN POLICY AND PLANNING UNIT

DECEMBER, 2024

URBAN POLICY UNIT
Planning and Development Department
GOVERNMENT OF KHYBERPAKHTUNKHWA

LUBCA

PEPAC PVT LTD & Associate

Reviewed by:

SHEHER SAAZ
Creating Places For People

EXTRAORDINARY

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REGISTERED NO. P.III

GAZETTE

KHYBER PAKHTUNKHWA

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PESHAWAR, WEDNESDAY, 26th FEBRUARY, 2025.

OFFICE OF THE DIRECTOR GENERAL LAND USE & BUILDING CONTROL AUTHORITY KHYBER PAKHTUNKHWA

NOTIFICATION

Dated Peshawar, the February 24, 2025

Notification No.Dir.(Planning)/LUBCA/General File/1-1/2024/ . In exercise of powers conferred under Section 4(e &f) of the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021 (Khyber Pakhtunkhwa Act No. XXXII of 2021), the Provincial Land Use and Building Control Council, under the chairmanship of the Chief Minister, Khyber Pakhtunkhwa, approved the Master Plan of Chitral City (2042)in its meeting held on December 06, 2024.

Efforts have been made to incorporate the Plans and Policies of other authorities notified by the government of Khyber Pakhtunkhwa and Local Government (s) after review and fulfilling planning criteria and considering the City's dynamics.

The Land Use Zoning provided in the Plan is based on the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021 and all relevant laws, rules, and regulations of the Provincial Land Use and Building Control Authority, Local Government Elections, and Rural Development Department.

The following main planning features have been adopted as part of the Chitral City Master Plan (CCMP), 2042:

The proposed geographical area of the CCMP is 29.75 sq. km, encompassing Five (05) Neighborhood Councils and Five (05) Village Councils. The total population of the study area is 50,507 persons (census, 2017), while the projected population for the project area is 84,485 persons, assuming a growth rate of 2.17% over the plan period (2042).

a) The Chitral City Master Plan consists of various existing and proposed land-use zones including Central Business District, Civic Zone, Mixed Land Use Zone, Educational and Health Zone, Recreational Zone, Livestock Zone, Residential Zone, Commercial Zone, Reserved Agriculture Zone, Industrial Zone, and Economic Zone etc.
b) The Sectoral Action Plans of the CCMP including zoning, intensification/densification and land management, future housing of all income groups, slum up gradation/informal settlements, health and education facilities, Quality of Life, WATSAN and Solid Waste Management (SWM), Transportation and Traffic Management as well as Parking Lots, Municipal Services, Environmental Management, Disaster Risk Reduction, Emergency Planning, Rural Urban Fringe and Regional Development, Tourism Development, Cultural and Heritage Conservation /preservation, Economic Development, Commercialization, Industrialization and investment attraction, Security Measures of

the city, Legal/Regulatory and Institutional Framework implementing Master Plan, and Behavioral Change Communication (BCC), shall be considered an integral part of the CCMP for implementation.

c) The Plan assesses the impact of urbanization on agriculture and basic services and suggests strategies to preserve the precious agriculture land and to upgrade/extend urban infrastructure to keep pace with urban growth.

d) The Plan proposes strategies for affordable housing, livelihood, and recreation facilities for all (both in the existing city and new areas).

e) It directs and consolidates urban development and future population and economic growth in identified urban centers which are planned to be self-sustainable and interconnected at the regional level according to a defined urban settlement hierarchy, within the district.

f) The Plan proposes strategies for urban regeneration/slum upgradation and to encourage mixed-used high-density vertical development at appropriate locations within the existing urban core and also in close proximity.

g) The Plan also enhances connectivity and transit mobility to support and complement mixed-use highrise development to reduce the financial & environmental costs of conventional commuting.

h) To manage unplanned development or sprawl over the agricultural land, the Plan proposed a planned extension of the urban boundaries and redesignation of the contiguous VCs into NCs to properly manage development in the peri-urban areas. Furthermore, it proposes designated residential zones considering the requirements of the city till 2042.

i) To harmonize landuse zoning, incompatible land uses shall be relocated; therefore, the existing industries having obnoxious effects shall be gradually shifted in the proposed Industrial Zones provided in the CCMP. Further, small industries like cottage industries having no major environmental impact may continue after approval from relevant departments. However, new industries shall be developed either in the Economic Zones or proposed Industrial Zone.

j) The Plan shall be reviewed periodically every five years, or as required by the Council/Authority in accordance with the Section 17(4) of the LU&BCA, 2021.

k) Any future development shall comply with the CCMP and the regulations established under the LU&BCA Act, 2021.

l) The Chitral City Master Plan shall be enforced with immediate effect and shall have overriding effect on any other approved plan upto the Land Use Zoning.

m) Any change in the proposed land use of an area or parcel of land shall be done as per section 18 & 19 of the Land Use and Building Control Act, 2021.

n) The CCMP document along with the Action Plans as approved by the Land Use and Building Control Council in its fourth meeting held on December 06, 2024 under the chairmanship of the Honorable Chief Minister, KP are attached at Annexure-A.

Sd/-
SECRETARY, LGE&RDD
KHYBER PAKHTUNKHWA

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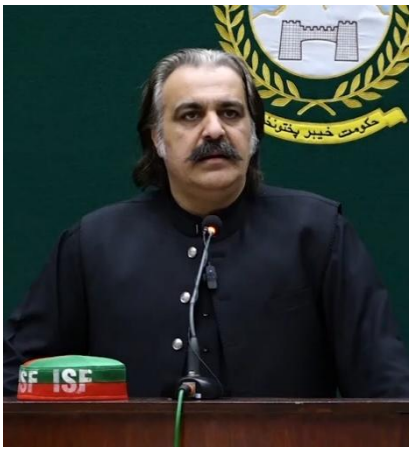
MESSAGE FROM CHIEF MINISTER KHYBER PAKHTUNKHWA



Khyber Pakhtunkhwa, the third most populated province of Pakistan, is experiencing rapid urbanization due to various factors. Lack of proper planning has resulted in overcrowding of urban centers coupled with traffic congestion, environmental pollution and ribbon development along main roads. Insufficient investment, lack of trained human resources and poor management of key infrastructure are the causes of weak coverage and low service quality. A significant proportion of the urban population continues to live in urban slums. The current provincial government has introduced a policy shift from "containing urbanization" to "managing urbanization", adopting an integrated approach that capitalizes on the potentials of a city and that can convert this constraint into an opportunity and transform the cities to be engines of economic growth.

The provincial government is aware of these challenges for which it has prioritized an innovative planning approach that would bridge the gap between urban and rural development. Through coordinated efforts, master plans and district land use plans for districts and urban centers across the province have been developed. These plans are designed to address core urban issues such as traffic congestion, non-affordable housing, transportation problems, unemployment, lack of education and healthcare facilities and environmental degradation. These plans provide clear and actionable road maps for decision-makers to guide them towards sustainable development, ensuring that both urban and rural areas can meet the needs of growing populations while safeguarding natural resources for future generations.

These achievements wouldn't have been possible without the dedicated and untiring efforts of the Urban Policy and Planning Unit of the Planning and Development Department, Khyber Pakhtunkhwa. I would like to extend my gratitude to all stakeholders, community members and local government officials whose contributions have been instrumental in shaping these comprehensive plans.

Looking ahead, these master plans stand as a testament to our government's unwavering commitment to fostering sustainable, inclusive and resilient urban development. Together, we will ensure that Khyber Pakhtunkhwa's cities and towns continue to thrive as hubs of economic activity, cultural heritage and community well-being, securing a prosperous future for all generations to come.

Ali Amin Gandapur
Chief Minister
Government of Khyber Pakhtunkhwa

MESSAGE FROM THE MINISTER LOCAL GOVERNMENT, ELECTIONS, AND RURAL DEVELOPMENT DEPARTMENT, GoKP

The Government of Khyber Pakhtunkhwa is committed to fostering a well-planned, resilient, and sustainable urban future for our cities. Recognizing the rapid pace of urbanization and its associated challenges, we have taken a proactive approach to urban planning and development that aligns with national priorities and international commitments, including the Sustainable Development Goals (SDGs).

Through the Master Plans for Cities, we are laying the foundation for balanced regional development, economic growth, and environmental sustainability. These plans will guide future investments in infrastructure, housing, transportation, and public services to ensure that our cities remain inclusive, competitive, and climate resilient. Our focus is to bridge the urban-rural divide by ensuring equitable resource allocation and extending modern infrastructure.

The Master Plans represent a vision for progress, prosperity, and sustainability. With strong political will, coordinated action, and community participation, we are determined to transform our cities into hubs of opportunity, innovation, and well-being for all.

The Urban Policy and Planning Unit of the Planning and Development department played a pivotal role in preparing these master plans. These master plans truly reflect the collaborative efforts of a wide range of stakeholders including provincial line departments, district administration, NGOs, local political leadership, and the public at large. I extend my sincere gratitude to UPU and all those who have contributed their expertise and efforts toward creating plans that will not only tackle present challenges but also lay the foundation for a sustainable urban future.

Mr. Arshad Ayub Khan
Minister Local Government
Khyber Pakhtunkhwa

MESSAGE FROM ADDITIONAL CHIEF SECRETARY, PLANNING & DEVELOPMENT DEPARTMENT, GOVERNMENT OF KHYBER PAKHTUNKHWA

The rapid urbanization across Khyber Pakhtunkhwa has created both opportunities and challenges. On the one hand, urbanization is transforming the socio-economic landscape of the province, while on the other, it has caused economic issues such as unplanned expansion, inadequate infrastructure, traffic congestion and increased pressure on public resources. To enhance the economic vitality of urbanization and reduce its negative impacts, there is an urgent need for structured and sustainable urban planning to fully realize the potential of our urban centers.

The formulation of master plans for the towns and cities is a crucial step toward achieving this goal. These plans will provide comprehensive frameworks to guide the planning of towns and cities, optimise land use, improve economic productivity and ensure the equitable distribution of resources. Sustainability remains a key priority in the plans emphasizing environmental protection while aligning resources to meet the growing needs of the urban population. The master plans will serve as structured guidelines for local authorities, district administrations and municipalities to systematically undertake and implement future development initiatives. These plans support the achievements of core urban needs such as housing for all, transportation and public facilities ensuring that cities evolve into resilient, liveable and economically viable centers that can meet the aspirations of residents.

The Urban Policy and Planning Unit (UPU) of the Planning and Development Department played a pivotal role in preparing these master plans. The plans truly reflect the collaborative efforts of a wide range of stakeholders, including line departments, district administration, NGOs, local political leadership and the community. I extend my sincere gratitude to UPU and all those who have contributed their expertise towards developing master plans that will not only tackle present challenges but would also lay the foundation for sustainable urban growth.

As we move forward with implementation, I am pleased to announce that the projects identified in these master plans shall be included in the upcoming Annual Development Programmes (ADPs) to ensure their timely execution and alignment with provincial priorities. I am confident that these master plans will serve as benchmarks for urban development. They are testament to the government's commitment to foster well-planned and thriving urban centers that support the prosperity and well-being of citizens for all times.

Mr. Ikram Ullah Khan
Additional Chief Secretary
Planning and Development Department
Government of Khyber Pakhtunkhwa

MESSAGE FROM THE SECRETARY LOCAL GOVERNMENT, KHYBER PAKHTUNKHWA

The Chitral Master Plan of 2024-2042 represents a significant milestone in our efforts to foster sustainable urban development and shape the future of the city. As Chitral continues to grow, there is an increasing need for structured, sustainable and visionary planning to accommodate rising population, promote economic growth and ensure equitable access of all citizens to essential services and resources.

At the Local Government Election & Rural Development (LGE&RD) Department, we are committed to undertaking initiatives that contribute to the overall prosperity of Khyber Pakhtunkhwa. The aim is to ensure that each part of the province shall benefit from development strategies. This master plan is a reflection of that vision, offering a comprehensive framework that addresses immediate urban challenges while laying the foundation for long-term, resilient growth.

The Chitral Master Plan of 2024-2042 has been designed to maintain an equilibrium between urban expansion and the preservation of valuable cultural heritage and environmental resources including prime agricultural land in the peri-urban limits. The plan will create investment and employment opportunities and will generate revenue for further development and enhance the overall quality of life for the people of Chitral. Moreover, it underscores the importance of collaboration among public institutions, stakeholders and residents in shaping an inclusive, sustainable and prosperous urban centers.

I would like to commend the Urban Policy & Planning Unit (UPPU) of the Planning and Development Department and all stakeholders for their dedication and hard work in developing this master plan. The successful implementation of the plan will not only transform Chitral but would also serve as a model for other cities throughout the province.

We resolve our commitment to fostering inclusive growth, ensuring that development opportunities are accessible to all and contributing to a brighter and more prosperous future for the people of Khyber Pakhtunkhwa.

Dr. Amber Ali Khan
Secretary LGE & RD Department
Government of Khyber Pakhtunkhwa

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ACKNOWLEDGMENTS

First of all, I am extremely grateful to almighty Allah who enable me and my team to successfully complete this gigantic work of the preparation of Master Plan of Chitral City. The preparation of the Chitral City Master Plan 2024-2042 has been a collaborative and dedicated effort aimed at ensuring the sustainable development of Chitral, the vibrant capital of Khyber Pakhtunkhwa. This report reflects the collective commitment of all stakeholders toward a rational, balanced, and systematic use of resources to address the city's unique challenges and guide its future growth and development. This Master Plan forms an integral part of the Government of Khyber Pakhtunkhwa broader initiative to promote sustainable urban development across the province. It addresses critical aspects of urban management, including housing, transportation, socio-economic development, and environmental sustainability, providing a comprehensive framework for sustainable growth of Chitral City.

I extend my sincere gratitude to the worth Additional Chief Secretary P & DD, Secretary, P & DD, Government of KP for entrusting me and my team with this significant initiative. Special thanks to my existing and former Executive Directors, UPU including Mr. Zubair Asghar Qurashi, Mr. Adeel Shah (current Secretary, P and DD), Mr. Inayatullah Waseem, Mr. Shah Mehmud, Mr. Abdul Basit, Mr. Ifthikhar, and Mr. Fazal Khaliq (current ED, UPU) for their insightful leadership and support throughout the planning process. I am also thankful to all my colleagues in UPU and MPP especially Dr. Muhammad whose expertise and efforts during the conceptualization, data collection, analysis, and review phases were instrumental in shaping this detailed master plan. I am deeply thankful to the officials of the District Administration, including Commissioner Chitral Division, Deputy Commissioner Chitral, and other key officials for their cooperation, guidance, and active involvement during the course plan making. Their local insights, support, and valuable feedback have greatly enriched the plan, ensuring its relevance to the unique context of Chitral.

Special recognition is due to PEPAC Pvt Ltd & Associates for their dedicated efforts in preparing this report. The team's technical expertise, unwavering commitment, and hard work were instrumental in successful completion of this master plan. I am also thankful to Mr. Khurram Farid, (Sheher Saaz Pvt. Ltd) and his team for reviewing various drafts of the CHITRAL MP. Their valuable inputs have greatly enhanced quality of the plan. Finally, I express my appreciation to everyone who contributed to this plan in various capacities. This Plan represents a shared vision for a sustainable, prosperous, and resilient future Chitral city.

As this master plan is the first of its kind and will not be free from errors, however, I am fully optimistic about the successful implementation of this plan. In due course of time the plan be reviewed and necessary changes will be made in future revisions. Together, let us work toward building a thriving and sustainable Chitral for generations to come.

Adnan Salim,
Project Director, Master Plan Project
Urban Policy Unit, P & DD

EXECUTIVE SUMMARY

Located in the north-west, Khyber Pakhtunkhwa (KP) is the third-largest province of Pakistan by population. It has an average annual growth rate of 2.89% that is relatively higher than the national average of 2.40% estimated by the Pakistan Bureau of Statistics in 2017 whilst the urban population stood at 5.7 million. The urban growth of KP has grown rapidly mainly due to socio-political situation of the province brought by the Afghan influx and the law-and-order situation in the districts that abut Afghanistan. Subsequently, the urban centres in KP, especially Chitral, are growing rapidly in haphazard and unplanned manner, mainly promoting ribbon development owing to lack of comprehensive planning initiatives by the Provincial and Local Governments.

Considering the challenging scenario, then Prime Minister of Pakistan (Mr. Imran Khan) has directed the provincial and local governments to prepare Master Plans of cities and towns that would inform and direct the urban growth, encourage high-density development while protecting the prime agricultural and environmentally significant land. The Urban Policy & Planning Unit of the Planning and Development Department, Government of KP has commissioned the preparation of Master Plans of Provincial, Divisional and District Headquarters of KP province. This initiative includes the preparation of Chitral City Master Plan 2042 that would inform and direct the future growth of Chitral city in a sustainable way to efficiently enhance its productivity and functioning whilst improving the quality of life of its residents. The PEPAC Pvt Ltd & Associates has been hired as the Consultant by UPPU to carry out the extensive exercise of the preparation of the Chitral City Master Plan 2042. The basic objective of the Chitral City Master Plan 2042 is to suggest sustainable, compact and environment friendly proposals for the future development of Chitral City.

Chitral city in Pakistan is situated in a unique and picturesque valley surrounded by high mountains, offering visitors a breathtaking natural environment. The rugged terrain is characterized by steep slopes, deep valleys, and narrow gorges, making it ideal for outdoor activities such as trekking and mountaineering. The area is rich in natural resources, including the Chitral River, which provides water for the local population, and dense forests home to various wildlife. Moreover, the Tirich Mir peak, the highest peak in the Hindu Kush range, is located nearby and attracts many mountaineering expeditions. However, it is worth noting that Chitral city is located in Seismic Zone-4, which corresponds to a high risk of seismic activity and severe damage. Chitral is a city in the Lower Chitral district consisting of 49,780 people in the year 2017 (census 2017), of which 26,320 are male, 23,456 are female, and four are transgender. The city's population was 30,622 in 1998, which grew with an average growth rate of 2.49% over the nineteen years.

The boundary adopted for the purpose of developing the master plan is greater than the existing city boundary. It comprises five neighborhood councils and five Village Councils (VCs), making the total area 29.75 km^2. The neighborhood councils form the existing urban boundary of the city. In contrast, the village councils construct the proposed boundary of the city, with the anticipation that these will be converted into neighborhood councils in the future, constituting the city boundary in 2042. The vacant area available within the neighborhood council is to be used for infill development. The village councils, excluding the hilly area and

built-up within, have been taken as “proposed areas” for future development and expansion of the existing city.

The study area's population and physical area exceed the municipal boundaries and urban population. In 2017, the population of the study area, i.e., neighborhood and village councils, as provided by the concerned local government, was 50,507, in which 21,829 lived in neighborhood councils (urban area), and 28,679 lived in village councils (proposed development area), respectively. The projected population for 2022 and 2042 is estimated to be 56,450 and 84,485, with growth rate of 2.47% and 1.83%, respectively.

The existing residential area is 1284.187 acres. To accommodate the future population, the consultant has discussed three housing scenarios. After careful consideration, it has been recommended that the best scenario for Chitral is 80% horizontal development and 20% vertical which will have many benefits, including efficient land use, improved access to amenities, and preservation of natural resources. The proposed residential zone for Chitral city 2042 covers over 358.72 acres all within the neighborhood councils in the form of infill residential land parcels. The selection of the area was based on the land suitability analysis, slope proximity to other uses like CBD, availability of vacant land, existing approved housing societies, and preserving prime agricultural land is crucial for Chitral i.e., Chitral is primarily an agrarian city.

Currently, Chitral has scattered commercial land use covering 149.32 acres, with its two Central Business Districts being Shahi Bazaar Chitral and Attaliq Bazaar. The proposed commercial proposals for Chitral include the creation of city-level Central Business District, covering a total area of 31.13 acres. The existing Shahi Bazar declared as CBD covers an extended area of 28.94 acres, to improve economic condition of Chitral. It is important to note that creating these commercial hubs can have several benefits for the city. First, these hubs can provide employment opportunities for local residents, stimulating economic growth and development in the area.

Currently, there are no Basic Healthcare unit (BHU), Rural Health centers (RHC), 1 District Headquarter (DHQ) located in the city of Chitral that comprises of 200 beds and 5 Surgeons. According to the requirement 2022 including existing gap, there should be 6 BHU, 2 MCH and 11 Civil Dispensary (CD). By 2042, the requirement further increases by 3 BHUs, 1 MCH and 6 CD. The consultant has identified two Health Zones covering 18.00 acres along Garam Chashma Road and Airport Road. The proposed area can be used for BHUs or CD or private clinics.

The study area currently has 14 primary schools, 7 middle schools, 3 high schools, 2 colleges. After the assessment of existing education, another 10 new primary schools, 5 new middle schools and 2 new high schools will be required in 2042. The consultant has given Education Zones covering 26.81 acres. Multiple schools, colleges, and other special education facilities can be provided in these zones. Additionally, the proposed plan includes the establishment of two civic and community facility zones, with a combined area of approximately 35.14 acres.

Based on the analysis of the current situation regarding the quality of drinking/groundwater, surface water, ambient air and noise, and soil quality, it is evident that there is a need to address the air quality at some locations. To mitigate the impact of human activities and climate change on the environment, the proposal suggests a set of measures aimed at promoting sustainable development practices. These measures include tree plantation and ecological corridors, green space preservation and green infrastructure, biodiversity protection, climate resilience planning, and collaborative efforts.

The key proposals in this regard include minimizing habitat destruction, reducing human-wildlife conflict, promoting wildlife-friendly urban planning, increasing public awareness, enforcing wildlife protection laws, supporting research and monitoring, establishing protected areas, regulating wildlife trade, strengthening enforcement efforts, encouraging sustainable use of wildlife, enhancing research and monitoring, engaging with local communities, promoting international cooperation, providing financial support, and raising public awareness.

The disaster profile of Chitral city highlights the urgent need for investment in disaster risk reduction and preparedness, including the development of early warning systems, evacuation plans, and improved infrastructure. These measures can help mitigate the impact of natural disasters and protect the lives and livelihoods of Chitral city's residents. For future development plans and proposals, the disaster profile of the city has been considered, and the proposals are formulated by keeping in view the disaster-prone areas. Additionally, new developments in these areas could include structures that are flood-resistant, such as houses on stilts, terracing, elevated parks, or raised pedestrian walkways. The proposals are given for flood protection.

In Chitral city, sewage and sanitation were improperly disposed of in open pits or lavatories, posing health risks. Agha Khan Foundation installed wells, springs, pipelines, distribution grids, and taps in over 100 villages with funding from KFW (German Bank). Sand filtration treated water, and 7400 latrines improved household sanitation. Water, sewerage, drainage, and sanitation issues are back. Nearly half the population lacks clean water and sanitation. Untreated and contaminated water in Chitral causes water-borne diseases.

The KFW-funded Agha Khan Foundation programme in 2006 rehabilitated, extended, and modernized 65 water supply systems (wells, springs, irrigation channels) in Chitral and built 40 new ones. Spring captures, supply pipelines, distribution grids, and taps were installed in 100 villages. 97 villages installed gravity-fed systems. Only 3 villages needed power-driven water pumps due to their location. No emergency power generators were purchased for these systems, which risked water supply due to frequent power outages. Gravel or sand filtration was installed in eight surface water systems. The court taps supplied most villagers, while the public taps supplied few. These programme measures provided 89,000 programme region residents with sufficient, high-quality drinking water (except for the villagers with pumping systems). In the rainy season, power failures cause two-month supply outages in pump-system villages. Pump system users had to use contaminated irrigation channels and dirty rivers, which increased water-borne disease, especially diarrhea.

Three scenarios have been proposed to manage the Solid waste within Chitral city. The analysis

of all scenarios suggests that Scenario 3 is the most suitable option for Chitral, keeping in view the analysis done. However, it's recommended to adopt and implement option 3 for sustainable waste management. Institutional arrangement and operational plan, business model would be key factors for the success of the proposed system. It's therefore necessary to review and develop an enabling environment for the implementation and success of the advanced treatment option.

Comprehensive mobility planning is based on land use and urban design proposals to increase accessibility and mobility of a city. To complement land use with a transportation network, proposals have been suggested to improve traffic and transportation in Chitral city. A balanced and well-planned roadway network is proposed with the removal of encroachments and, addition of footpaths to serve active traffic accessing the adjacent land with ease. Lane marking at 10 feet width, dedicated lane intended for bicyclists/ motorcyclists, cars, and public transport vehicles should reduce traffic speed, instil cautiousness in drivers' perception and improve mobility on primary roads. For pedestrian connectivity and walkability enhancement, a footpath network is proposed to improve access to the CBD and promote active transportation modes for easy access to abutting land use and public transport vehicles.

Footpaths shall be available on all primary and secondary roads for easy access to commercial markets, retail shops, plazas, educational centers, and banks. Moreover, well-planned public transportation with main minibus such as Coaster or Hiace shall be operational with fixed stops on all major corridors and serving the majority of passengers travelling to and from major commercial, industrial, and educational institutions. To efficiently manage parking demand for major commercial and industrial land use, existing vacant land on prime locations along Shahi Bazar Road and Chitral Dir Road (N-45) have been identified on the perimeter of the activity center.

Green spaces, including parks, gardens, and nature reserves, are crucial to the tourism industry as they offer tourists a peaceful and unique experience to escape from the urban hustle and bustle. They also serve as a showcase for the local flora and fauna, culture, and history, which can attract visitors interested in history and culture. In line with the Sustainable Development Goals (SDGS), proposals have been made to increase the availability of green spaces in the city. The current recreational area is 60.55 acres. In order to accommodate the future population and enhance the recreational opportunities in Chitral, the proposed plan includes the development of a duck hunting and recreational zone that spreads over 100.05 acres, which will include a Sports and Cultural Zone, Central Parks, Eco Park and Waterfront Park.

The consultant also proposed a Trail system that provides an opportunity for tourists to engage in outdoor activities such as hiking, cycling, and jogging, which can improve physical fitness and mental well-being. One of the proposed zones aims to use the Miyawaki technique, a highly effective method for rapidly creating forest cover, to plant native trees extensively throughout the city. The zone will encompass the Chitral River catchment area, open spaces, and the commercial and industrial zones. This will help to mitigate the harmful effects of air and noise pollution in the city. Additionally, it can have a positive impact on tourism by improving the city's aesthetic appeal and providing tourists with more opportunities for outdoor

recreation.

Chitral, a city with a rich cultural heritage dating back to 1500 BC, is known for its unique Kalasha Culture and several heritage sites, including the Shahi Mosque, Chitral Fort, Valleys, Graves, and Carvings, which are of significant historical and cultural value. Unfortunately, many of these structures have been neglected or destroyed, and there is a lack of appreciation and care for them. Despite these challenges, there are efforts to promote tourism and development in Chitral. Preserving and appreciating Chitral's cultural heritage is crucial not only for the city but also for the world at large. The conservation of local heritage faces numerous challenges, primarily due to the lack of awareness and absence of standardization and guidelines, archaeological inventories, and heritage management further hinder the preservation of these sites. To address these issues, efforts are being made to raise awareness, formulate guidelines, create an archaeological inventory, establish a heritage management program, secure financial resources, and build capacity. Collaboration between stakeholders is crucial for the success of preservation initiatives, which are crucial not only for Chitral but also for the world.

In conclusion, the Master Plan for Chitral City's development focuses on green economy, sustainability and livability, preserving its natural environment while aligning with Sustainable Development Goal 11. Volume I includes proposals for commercial and trade hubs, community facilities, environmental conservation, water supply and solid waste, transport mobility, recreational and open spaces, and safety and security to stimulate economic growth, provide employment opportunities and enhance the quality of life for its residents. The proposals aim to increase city density and reduce urban sprawl while protecting prime agricultural land, taking into account the existing spatial urban form and city structure characterized by a mix of formal and informal development patterns, with decentralized and dispersed arrangements of urban uses.

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List of Acronyms

AHP	Analytical Hierarchy Process
BHU	Basic Health Unit
CBD	Central Business District
CD	Civil Dispensary
CPEC	China-Pakistan Economic Corridor
CP	Cordon Point
DHQ	District Head Quarter Hospital
FGD	Focus Group Discussion
GoKP	Government of Khyber Pakhtunkhwa
KP	Khyber Pakhtunkhwa
MKT	Main Karakoram Thrust
MCH	Mother and Child Healthcare
MCDA	Multi-Criteria Decision Analysis
MCC	Manual Classified Count
NC	Neighborhood Council
NGO	Non-Governmental Organizations
NEQS	National Environmental Quality Standards
RHC	Rural Healthcare
SWOT	Strengths, Weaknesses, Opportunities and Threats
THQ	Tehsil Headquarter
TORs	Terms of Reference
TMA	Tehsil Municipal Authority
THQ	Tehsil Headquarter
TMC	Turning Movement Counts
UPPU	Urban Policy & Planning Unit
UN	United Nations
VC	Village Council
DMPR	Detailed Master Plan Report
MP	Master Plan

CHAPTER 1: PROJECT BACKGROUND AND INTRODUCTION

1.1. Project Scope

The Province of Khyber Pakhtunkhwa (KP) is located in the northwest region of Pakistan with an area of 101,741 km² km². it is the third most populous province, with a population of 35 million with 52% males and 48% females, comprising of 11.9% of Pakistan's total population. In 1998, its population was 17.7 million, showing an annual growth rate of 2.89%, which exceeds the national average of 2.40%. Factors such as a high fertility rate and both temporary and permanent internal migration have contributed to this population growth.

The province of Khyber Pakhtunkhwa is strategically located and has the third-largest provincial economy in Pakistan. The province contributes 10% of Pakistan's GDP and 20% in mining output. The major sectors contributing to the national and provincial economy are hydel electricity, mining, forestry and agriculture by generating sufficient revenue.

The urban centers in the Province of Khyber Pakhtunkhwa have been neglected in the past. This has resulted in unregulated urban growth, with less than optimal infrastructure, inefficient institutions and poor quality and outreach of civic services, which has led to low quality of life.

In Khyber Pakhtunkhwa the process of urban development is being carried out with no proper planning mechanism and is confronted with various basic hurdles. The urban areas of the province are lacking integrated urban planning that has resulted in tremendous strain on urban land, civic infrastructure and services. Lack of proper planning has been raising several issues in every urban center including divisional headquarters; such as urban sprawl, lack of institutional reforms, unregulated and unplanned growth, traffic congestion, air pollution, poor investment and weak management of key infrastructure.

Encroachment is one of the many serious issues in almost all cities and towns causing severe congestion on roads, bazaars and streets. Vendors and shopkeepers place products in front of their shops on footpaths and pavements. These encroachments on major sites of the cities need to be removed through effective enforcement. On the other hand, the trend of road-widening and constructing under/overhead passes is only a short-term plan to fix the problem. To overcome such problems there should be long term Master Plans that technically cover all aspects of urban planning in major cities under the supervision of a single government entity.

Another critical feature of our cities is the lack of proper city limits or boundaries. Our cities are continuously growing in all directions causing the emergence of slums and squatter settlements. The formation of slums is one of the biggest challenges faced by urban centers of Khyber Pakhtunkhwa. The slums are usually characterized with the lack of services, narrow streets, illiteracy, unemployment, high rates of poverty, and low socioeconomic status of its inhabitants. These slums are commonly seen as "breeding grounds" for social problems such as crime, drug addiction, alcoholism, high rates of mental illness and extremism.

For resolving issues in the urban areas of Khyber Pakhtunkhwa, the Urban Policy Unit has taken important steps to tackle the problems of inefficient land-use planning, lack of zoning

regulations, ineffective building bylaws, growth of urban sprawl, lack of institutional reforms, identification and up-gradation of slums, encroachment, lack of clear urban boundaries, unavailability of civic facilities and ineffective urban legislation & enforcement. The most significant initiative of the Urban Policy Unit is to prepare long term Master Plans for all the divisional and district headquarter cities of Khyber Pakhtunkhwa including the provincial capital Chitral, Divisional HQs Mardan, Abbottabad, Kohat, Mingora, Bannu and DI Khan and other major cities of KPK including NMDs. The Provincial Working Development Party (PDWP) has recently revised the ADP Scheme for the Master Planning with a total cost of Rs. 537.051 million. The Master Plan is vital for the integrated and sustainable urban development of the province.

The overall objective of the Master Plan is to ensure equity and social inclusion, economic productivity, quality of life, environmental sustainability and finally infrastructure provision. Collectively these objectives will create a perception of a prosperous city. Other important features of the study are building urban growth centers, high rise development areas within the cities and new expanding areas. The Master Plan is a futuristic plan containing the best model of urban planning in the world. Beside the seven divisional headquarters (Chitral, Mardan, Mingora, Abbottabad, Kohat, Bannu and DI Khan), the Project will also prepare Master Plans for major urban centers of NMDs of KP.

For the Chitral City Master Plan 2042, the services of the PEPAC Pvt Ltd & Associates consultant have been hired through a competitive bidding process. Chitral, the capital of Khyber Pakhtunkhwa in Pakistan, is the country's sixth-largest city. Situated in the central part of Khyber Pakhtunkhwa, Chitral lies in the Chitral Valley, predominantly inhabited by Pashtuns, the second-largest ethnic group in Pakistan. Located in the eastern part of the historic Khyber Pass within the Valley of Chitral, the city has a rich history dating back to at least 539 BCE, making it one of South Asia's oldest cities. Chitral holds the distinction of being the capital of the Gandhara civilization, solidifying its status as one of the country's oldest continuously inhabited cities.

This master plan was completed under the following TORs:

1.1.1 Land-use/land Suitability Analysis

a. Mapping of the historical growth trends of the city:

To understand the pattern and direction of the spatial growth of Chitral city, the consultants conducted extensive research on the historical urban growth trends and drivers of urban growth over the period of last twenty years. To identify trends and direction of spatial growth, the consultant used various sources for mapping the trends over the last 20-year period, including municipal records, population census, libraries and archives, aerial photographs, satellite images and other published and unpublished data and records. Latest GIS techniques were used for plotting historical growth trends on GIS maps of the city-region and articulating the drivers of urbanization and urban spatial growth.

b. Housing trends and needs assessment through projected population growth estimates:

The growth pattern and projected growth needs over the next 20 years need to be analyzed and mapped.

c. Density Maps

The conservation of prime agricultural land located around the city is another important aspect of the Chitral City Master Plan. Therefore, to reduce urban sprawl and horizontal development, there is a need to promote high-density mixed-use development. To achieve this objective, the MP devised policy guidelines for the establishment of high-density mixed-use development within the existing urban boundaries, including the future growth areas. he consultants carried out an extensive mapping exercise to show the existing and proposed high-density mixed-use development.

d. Land use Base map

For all kind of spatial planning including master plans the preparation of a comprehensive base map is a pre-requisite. Beside other mapping techniques the consultants also used open source satellite imageries (fresh and archives) to develop an up to date map of Chitral city including its surrounding areas in order to support suitability analysis of existing and proposed land uses for urban development and other ancillary uses. After preparation of land cover map then extensive field surveys were carried out to identify the specific use of each parcel of land. The consultants prepared Base map with the following details:

a. Counter lines drawn at counter interval of 5 meters.
b. Boundaries (District, Tehsil, City, Neighborhood, UC, Ward)
c. All major and minor streets, roads, railway lines and airports (including encroachments)
d. Water supply, sanitation, sewer, SNGPL and telephone networks
e. Water bodies (spring, streams, river and other water bodies)
f. Residential (planned and un-planned areas, sprawl, building heights – single, double or multi story, density)
g. Commercial and Mixed Areas (heights – single, double or multi story and type retail, wholesale and warehouses)
h. Industrial (all types)
i. Amenities (education, health, religious, banks, police stations, libraries, and community halls etc.)
j. Parks and playgrounds
k. Brown fields (for re-development)
l. Open spaces (agriculture all types, vacant, and graveyards etc.).
m. Land Management

e. Taxation and Revenue Generation

It is of key importance that urban planning and associated work should be sustainable over long time. To ensure that the entities (Land Use and Building Control Authority, Development Authorities and TMAs etc) responsible for implementation of the Chitral City Master Plan the consultant conducted a detailed study of the current urban taxation structure and sources including property tax, land tax, capital value tax, stamp duty and proposed suggestions for improvement. Implementation of the CHITRAL MP proposals regarding municipal taxation will increase revenue of LU&BCA and TMAs many folds and will ensure sustainability of these organizations.

f. Governance and Institutions

Good governance and efficient institutions are key to the successful implementation of policies and plans. To ensure the for implementation of the Chitral City Master Plan requires legal and institutional framework to be in place. The consultants objectively analysed and assessed the existing relevant laws/byelaws and institutional capacity of the relevant organization responsible for implementation and monitoring of the Master Plan. The consultant also proposed improvements in the existing laws & byelaws and institutional structures for better implementation of the Master Plan.

g. Land-use Regulations and Plans

Consultants are required to study and analyze all existing urban planning, development and environment-related national, provincial laws and regulations (byelaws) as well as the previous and existing plans to propose a viable solution for various issues of society in a proper manner in the local context. They will have to devise city-level planning and development standards and downward regulations, intensification or increased Floor Area Ratio (FAR) guidelines.

h. Environment

To reduce pollution and create a healthy living environment for the residents of Chitral city, the consultant studied various sources of air, noise, soil and water pollution. The consultants use state-of-the-art techniques and equipment for the identification of the level of air, water and noise pollution at various points of the city. The consultant carried out the following surveys:

a. Air quality survey at various points of the city, Water quality analysis (drinking water supply and water courses)
b. Soil contamination surveys
c. Soil and geological survey/data
d. Analysis of Noise level at various points of the city
e. Identification of environmentally sensitive areas

On the basis of scientific analysis of these surveys the consultant proposed various policy measures for enhancing environmental quality of the city.

i. Demography, livelihood and housing

The successful implementation of the master plan proposals mainly lies on accurate assessment of the city's demographic pattern, livelihood sources and housing conditions. For the purpose of analysis the consultants divided the city into various zones, calculated its population densities, identified major economic activities and studies housing and related facilities in each zone. Based on these assessments the consultant formulated proposals to revitalize the existing economic base and socioeconomic structure of the city. The consultant conducted the following surveys:

a) Housing surveys including house age, height, occupancy and condition surveys.
b) Accessibility surveys for emergencies and other vehicles
c) Household economic conditions/Livelihood surveys

The consultants also identified areas with lack of municipal services (slums) and formulated proposals for its rehabilitation/up-gradation.

j. Urban Transportation, Mobility & Accessibility

One of the major issue of Chitral city is traffic congestion and a lack of reliable public transport. To resolve the urban transport, mobility and accessibility issues of the city, the consultants thoroughly studied the existing traffic and transportation system of the city. To have a better understanding of the existing situation, the consultant conducted various transportation surveys, explored the possible constraints and available opportunities, and proposed viable solutions for easing traffic and transportation issues within the city the consultant conducted the following surveys:

i. Developed a detailed roads and parking inventory
ii. Origin, Destination, and Cordon Surveys
iii. Traffic counts at various roads and junctions of the city, and identified the bottleneck areas to determine road and junction capacities
iv. Conducted Public Transport User Interview Surveys and Household Interview Survey (HIS)
v. To improve internal accessibility in the city, the consultant carried out a comprehensive Traffic Signage Survey. The consultant also conducted a detailed study on the parking issues of the city and identified suitable areas for the development of on-street and Off-street parking lots.
vi. Through mobility surveys, the consultant devised strategies for the establishment of synergy between land-use and urban transport. Further, identified areas suitable for Transit Oriented Development (TOD)

k. Historical/Social/Cultural Heritage Development

To study and map all existing historical monuments/places, socio-cultural heritage of the city in order to propose appropriate guidelines for the development of these localities and to capitalize the cityscape to create social, cultural hubs and identify opportunities within and of the city.

l. Urban Design and Public Realm

Urban Design and Public Realm is an integral part of the master plan. Through various surveys and techniques, the consultant analysed the existing building lines, identified all public spaces, studied in detail vistas, sidewalks, street lighting, monuments, and parks, etc. and formulated actionable proposals for improvements. and identified potential areas for new parks, playgrounds and public open spaces. To make the city more attractive and beautify the consultants proposed various urban beautification projects.

m. Quality of Life

The Consultants are required to study the adequacy and location of existing facilities.
Diagnostic analysis for Quality-of-Life standards in the city are to carry out. Diagnostic analysis will include but not limited to the following:

a. Public spaces (parks, food outlets, libraries, public hall, sports courts/grounds) mapping and state of dilapidation.
b. Heritage sites mapping and their state of preservation as well as trends of encroachment and dilapidation
c. Civic facilities such as Public Toilets, Street Furniture, Streets Lights, Parking Lots and other amenities exist in the city neighborhoods.

n. Water Supply, Sanitation and Solid Waste Management

The consultants worked in close coordination with the concerned Water Supply and Sanitation Company for profiling of all Municipal Services, including the identification of new and existing sources of water supply (depletion rates of water and sub-soil aquifer data) and their mapping. Sanitation and solid waste management were assessed along with existing conditions of sources of water and their depletion rates, sub-soil aquifer data, and surface runoff calculations. Sewage flows were analyzed, and their mean calculation was conducted, while solid waste tonnage was determined alongside methods of collection and disposal (landfills capacity, usage, and locations). Consultants identified depressed areas in terms of services and facilities. Policy directions and an action plan were developed to generate funds for the construction, maintenance, and operation of public amenities at feasible locations.

o. Citizens Behaviour Communication (BCC)

BCC is the strategic use of communication approaches to promote changes in knowledge, attitudes, norms, beliefs and behaviours. The provision of physical infrastructure without associated BCC strategies may not be able to achieve the desirable goal of sustainable development. For development of the BCC strategies to ensure that the master plan will be sustainable for a long run the consultants conducted Perception and Behavioural Surveys of local population focusing on issues of urban responsibility using Knowledge, Attitude, and Practice (KAP) methodology based on a valid statistical sample. The purpose of the KAP surveys was to investigate the reasons for and incentives and disincentives of citizens to behave responsibly while utilizing municipal services especially their behaviour towards solid waste management, public transport usage (BRT), , use of public spaces and other social services.

p. National and international best practice (references)

The preparation and implementation of master plans in Pakistan, especially in Khyber Pakhtunkhwa, is not common. In the past, various types of spatial plans, including structure plans and master plans, were prepared for Chitral, but these plans were never implemented. Therefore, to prepare a rational, comprehensive master plan for Chitral review of the international best practices was included in the study Terms of Reference (ToRs). The consultants reviewed planning laws and master plans of various countries having similar socio-economic conditions to Pakistan, including India, Sri Lanka and Malaysia and based on the lessons learned, developed the CMP proposals. Studies for the fringe areas were specifically conducted to discourage sprawl and ensure conservation of prime agricultural land in the vicinity of Chitral city.

Task C – Master Plan Strategic Scenario Development/Mapping

a) Identified suitable land parcels based on multi-criteria analysis for various activities through viable projections for housing of all income groups, space required for commercial and industrial activities and another necessary components of the city.

b) Mapped existing Land use patterns and provided options for future development;

c) Identified areas having a potential for mixed-use development (residential, work, leisure, services, etc.)

d) Identified areas suitable for infilling, intensification and redevelopment

e) Mapped the natural ecosystem and environmental resources of chitral city

f) A map with a detailed inventory of existing features, including topographical and natural constraints, was developed,

g) Mapped all the wetlands, agricultural lands, aggregate resources, groundwater recharge areas, floodplains, fisheries, wildlife and environmental conservation areas.

h) Mapped the existing road and transportation network, including railways and airports.

Task D – Preparation of Master Plan Proposals (Action Plans)

For successful implementation of the Master Plan, the consultant developed detailed and comprehensive Master Plan proposals (action plans) for various sectors of the master plan, including the following:

i. Action Plan for zoning, intensification/densification and land management.
ii. Action Plan for future housing of all income groups.
iii. Action Plan for slum up gradation/informal settlements.
iv. Action plan for health facilities

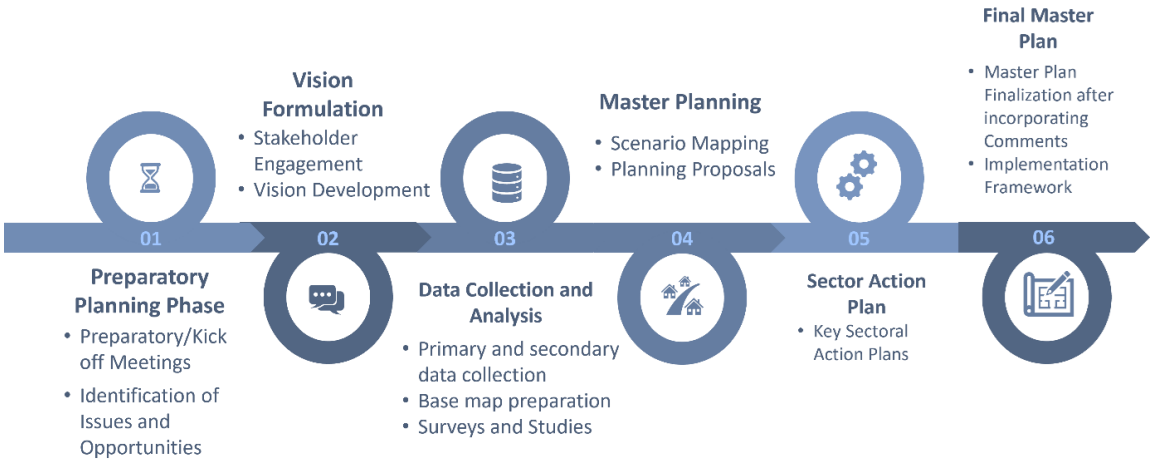
v. Action plan for educational facilities
vi. Action Plan for Quality of Life
vii. Action Plan for WATSAN and Solid Waste Management (SWM).
viii. Action Plan for Transportation and Traffic Management as well as Parking Lots
ix. Action Plan for Municipal Services.
x. Action Plan for Environmental Management, ii. Disaster Risk Reduction and iii. Emergency Planning.
xi. Action Plan for Rural Urban Fringe and Regional Development.
xii. Action Plan for Tourism Development, Cultural and Heritage Conservation /preservation
xiii. Action Plan for Economic Development, ii. Commercialization, iii. Industrialization and
iv. investment attraction.
xiv. Action Plan for Security Measures of the city
xv. Action Plan for Legal/Regulatory and Institutional Framework implementing MASTER PLAN
xvi. Action Plan for Behavioral Change Communication (BCC)Structure composition of the Report

The Master Plan report is structured into three volumes along with a separate detailed report:

Volume I: Master Plan – Offers a comprehensive overview of the core strategies, proposals, and planning framework for Chitral City.
Volume II: Scenario/Sectoral Maps – Presents a collection of maps illustrating zoning, infrastructure networks, environmental factors, and other key spatial elements essential for urban planning.
Volume III: Action Plans – Details implementation strategies, key initiatives, and step-by-step execution plans for proposed developments.
In addition, a separate Detailed Master Plan Report provides in-depth background studies, analyses, methodologies, and insights from Task C, along with relevant information from Task The Chitral City Master Plan was developed through the following Five (05) phases:

- Preparatory Planning Phase
- Vision Formulation
- Data Collection & Analysis
- Master Planning/zoning
- Action Plans

Figure 1: Master Plan Methodology - Chitral Study Area



Source: Devised by Consultant

1.1.2 Methodology for Data Collection

Data was gathered from both primary and secondary sources. For Primary data collection various surveys, including Household Information Survey (HIS), Traffic and Transportation Surveys, Environmental Surveys was conducted with a structured questionnaire for each survey, and data was collected by well-trained enumerators using Android-based software. The surveys conducted for the Chitral Master Plan encompassed various aspects, providing a comprehensive assessment of the city's socio-economic conditions, land use, transportation, and environmental factors. The details of each survey are as below:

- **Household Information Survey (HIS)**

A structured questionnaire was used to collect The Household Information through a structured questionnaire consisted of various aspect of the household, including household demographics, educational status, health status, employment and income, household facilities (availability and access), and access to and utilization of services and amenities (refer to the Inception Report for details). As per the Terms of Reference (ToR), data was collected from 1% of the total households, amounting to 2,360 households. The sample size was proportionally allocated to each Neighbourhood Council (NC) and Village Council (VC) to ensure a fair representation of the population. A systematic random sampling approach was used within each NC/VC, ensuring a 95% confidence interval with a 5% margin of error, making the sample more representative and statistically reliable.[1]

[1] Let there are N Neighborhood councils, where data should be collected from the field. Then N=N1+N2+N3+N4……Nh=∑Ni
A total of 'n' sample should be studied for analysis. The size of total sample is:
n=n1+n2+n3+……. nh=∑ni
The sample size of each Neighborhood Ccouncil is:
ni =n*Ni/N
Where: ni=sample selected from each NC, n=Total sample size, Ni=population of each NC and N=Total population of all NCs

- **Land Use Survey:** A GIS-based base map (1:2000 scale) was created by digitizing a raster map from Google's satellite imagery and dividing it into grids. Android-based software was used for the detailed land use survey, conducted by trained local surveyors. The survey documented land uses, administrative boundaries, contour lines (10-meter intervals), road networks, infrastructure, civic amenities, and brownfields. To ensure accuracy, the base map integrated historical maps and remote sensing imagery and was divided into sheets for ground truthing through on-site verification. Each built-up parcel was assessed for land use, building conditions, and stories, with spatial and attribute data processed in GIS labs for analysis.
- **Transportation Survey:** Various transportation surveys, including the Origin & Destination (O&D) Survey, Traffic Count Survey, Parking Inventory Survey, and Intersection Survey, were conducted across the city. The detailed methodology, maps, and questionnaires for each survey are provided in the Background Study and Analysis Report.

- **Environmental Survey:** Various environmental surveys, including drinking water quality, noise, air, and soil assessments, were conducted at multiple locations across the city with an EPA-approved laboratory. The detailed methodology, maps, and results of each survey are provided in the Background Study and Analysis Report.

i. Secondary Data Collection

Secondary data was gathered from both published and unpublished government departmental data and reports, Census data, government publications, public records, historical and statistical documents, business reports, journals, and research papers, among others.

1.2. Introduction

Chitral means 'four peaks' and refers to four insignificant mountains in the heart of the valley Kachura, Machalghur, Band-i-Nau, and Band-i-Sharr. These peaks are joined together by a network of ridges and gullies that run through the length of the valley[2]. Chitral is in Khyber Pakhtunkhwa province in the extreme north of the Khyber Pakhtunkhwa. Recently, Chitral is divided into two districts, namely Lower Chitral and Upper Chitral. The city is the capital of Lower Chitral, lies along river Chitral, surrounded by Hindus Kush ranges. The highest peak of the Hindu Kush is Tirich Mir, which at 25,289 feet (7,708 metres), rises in the north of the district. To north is Wakhan Corridor Afghanistan, a tiny area claimed by Pakistan that divides it from the Central Asian State Countries.[3] The world-famous Kalash valley lies toward the south linked with road through a beautiful village Ayun.

The terrain is rugged, with steep slopes, deep valleys, and narrow gorges. The city is situated on the banks of the Chitral River, which flows through the valley and is fed by several smaller streams and tributaries. The river is a major source of water for the local population and is also used for irrigation and hydroelectric power generation. The mountains surrounding the city are covered with dense forests, which provide a habitat for a variety of wildlife, including bears, wolves, and snow leopards. Overall, the topography of Chitral is diverse and fascinating, offering a range of outdoor activities and natural attractions for visitors to explore.

1.2.1. District Chitral

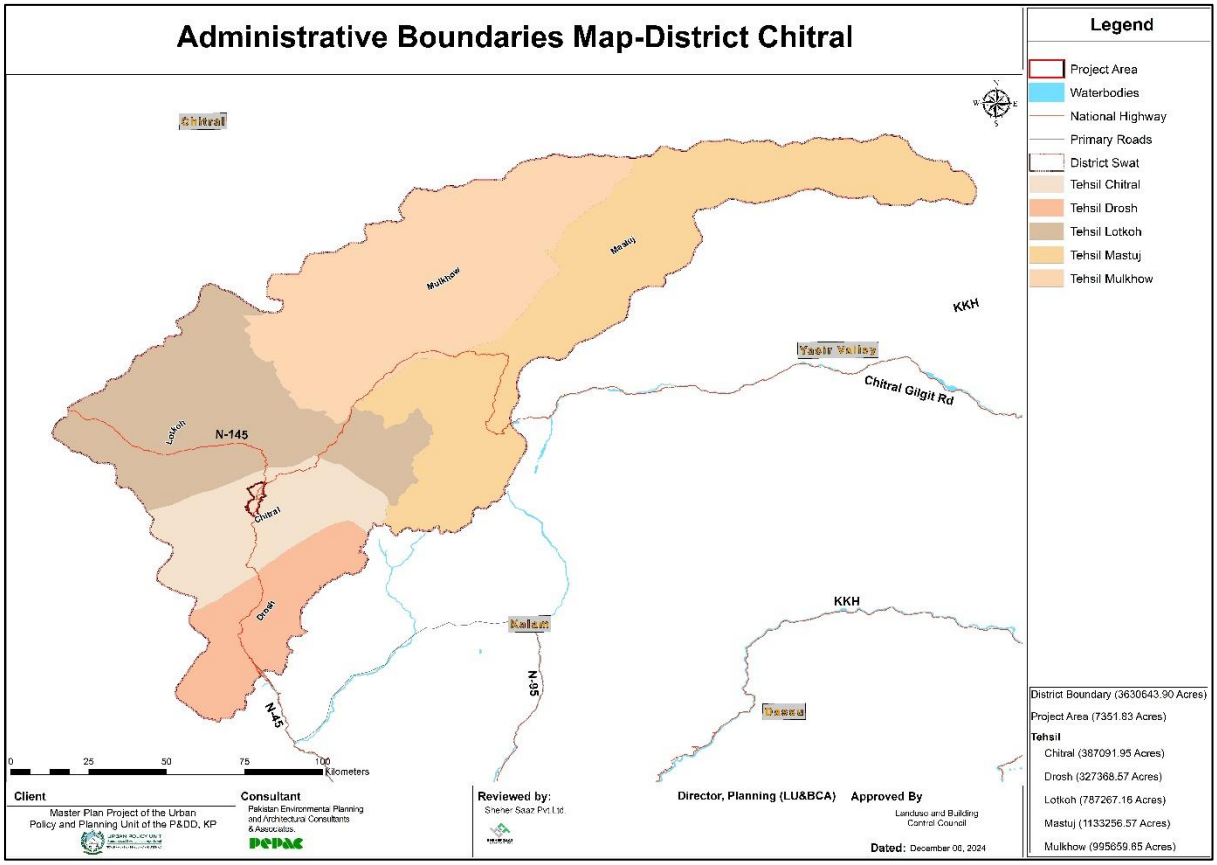
Chitral District, formerly the largest in Khyber Pakhtunkhwa, was split into Upper Chitral and Lower Chitral in 2018 for better governance. Spanning 14,850 sq. km, it borders Gilgit-Baltistan, Swat, Dir, Afghanistan, and the Wakhan Corridor.

As per the 2023 census, Upper Chitral has 195,528 residents over 8,392 sq. km (23.3 people/sq. km), with Booni as its capital. It comprises Mastuj and Torkhow-Mulkhow Tehsils. Lower Chitral, with 320,407 people over 6,458 sq. km (49.6 people/sq. km), has Chitral Town as its capital and includes Chitral and Drosh Tehsils.
The region's economy is mainly agrarian, with farming, livestock, and handicrafts as key livelihoods. Tourism also plays a vital role, though poor connectivity and limited industry hinder growth.

Education has improved but remains challenging, especially in remote areas. The University of Chitral serves as a higher education hub, while NGOs like the Agha Khan Development Network contribute to school development.

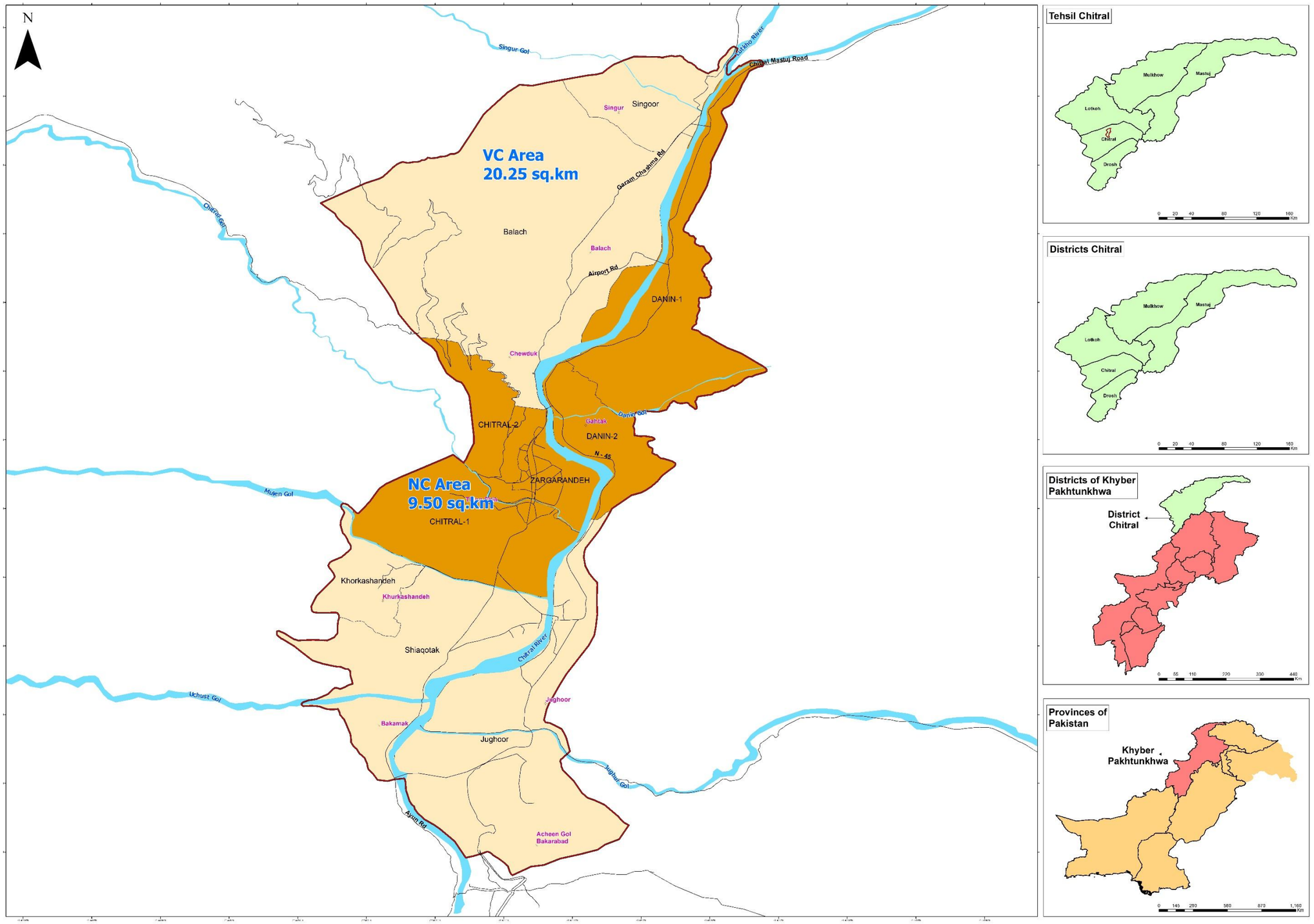
[2] https://pakistancircles.com/chitral-valley-in-p pakistan-world-heritage-site/
[3] Local Government, Election and Rural Development Department, Govt of KP.

Map 1: Administrative Boundaries- District Chitral



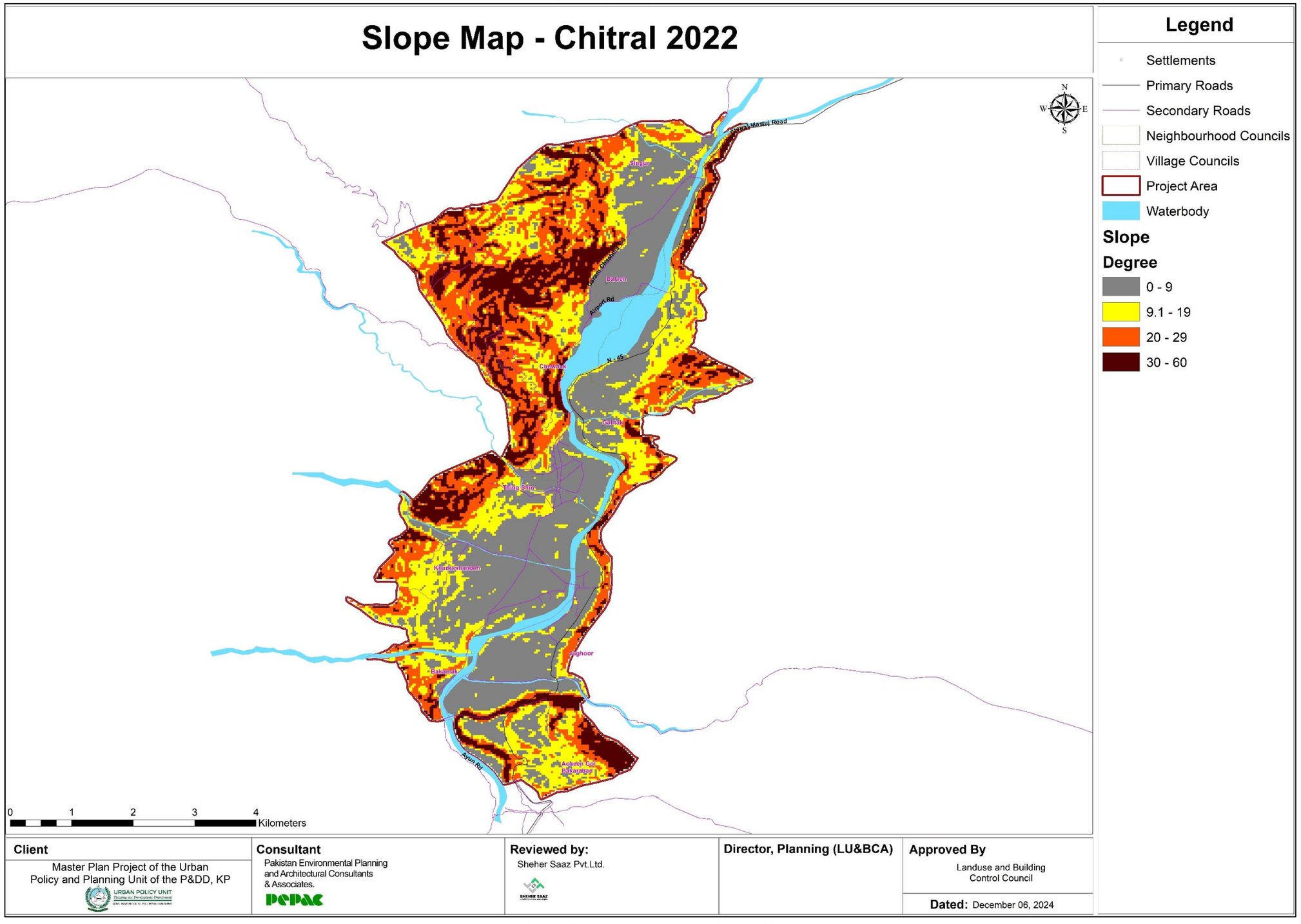
Source: Devised By Consultants

Map 2: Location Map of Study Area Chitral



Source: Devised By Consultants

Map 3: Slope Map –Chitral Study Area



Client	Consultant	Reviewed by:	Director, Planning (LU&BCA)	Approved By
Master Plan Project of the Urban Policy and Planning Unit of the P&DD, KP URBAN POLICY UNIT	Pakistan Environmental Planning and Architectural Consultants & Associates. PEPAC	Sheher Saaz Pvt.Ltd. SHEHER SAAZ		Landuse and Building Control Council **Dated:** December 06, 2024

Source: Developed by Consultant Using GIS

1.2.2. Geology

a. Tectonics

The Project area is part of the continental collision zones between the Eurasian and Indian plates. The intercontinental collision between the Eurasian and Indian plates has resulted in intense deformation with complex folding accompanied by a continental subduction process. The Indian plate is under-thrusted, and the Eurasian plate is upper-thrusted. Both the plates are separated by the Main Karakoram Thrust (MKT), which trends in a NE-SW direction, through Shishi valley, Rizhun Gol and passes through Harchin from Chitral district.

The Chitral district has three main mountain ranges: Hindu Kush, Karakoram, and Kohistan. The Hindu Kush and Karakoram ranges are located on the Eurasian plate while the Kohistan range is part of the Indian plate. The Indian plate is under-thrusted, and the Eurasian plate is upper-thrusted.

b. Lithology

The lithological content of the Asian Plate is determined by thick more or less metamorphic Palaeozoic to lower Mesozoic sedimentary series intruded by (Cretaceous to) Tertiary migmatites. The southern rim of this plate is basically formed by two tectonic units (Northwest unit & Central Unit), which are separated by a steeply north-dipping fault, the Reshun Fault. It is also bordered line between the palaeozoic sediments and the Cretaceous carbonates.

The rocks of the Chitral district are gneissic type and phyllite, well-bedded, medium to thick-bedded, medium to hard, and splintery. The granite body intrudes along the strike of the Wakhan formation which consists of slate, gneiss, and quartzite. Tirich Mir granite also has a similar origin and may have normal igneous contact with the Wakhan formation in the Project area.

1.2.3. Seismology

Chitral city is located in the Seismic Zone- 4 corresponding to PGA >0.32g which represents severe damage. The Northern Areas of Pakistan are extensive zones of high seismicity and contain several seismic-tectonic features generated by an integrated network of active faults.

Chitral has a dry Mediterranean climate with almost no rainfall during summers. In the winter the night-time temperature occasionally drops to −10 C. Winter snowfall in the town can be quite heavy with an accumulation of up to two feet being quite common, at higher elevations snowfall can reach as high as 20 meters (70 ft).

1.2.3.1. Project Area Profile

Chitral is an urban center of the lower Chitral district spread over an area of 9.5 sq. km. The study area, however, is 29.75 km^2 as it comprises of five Neighborhood Councils (NCs) and five Village Councils (VCs). The vacant area available within the neighborhood councils is to be used for infill development, and the village councils, excluding the built-up within, have

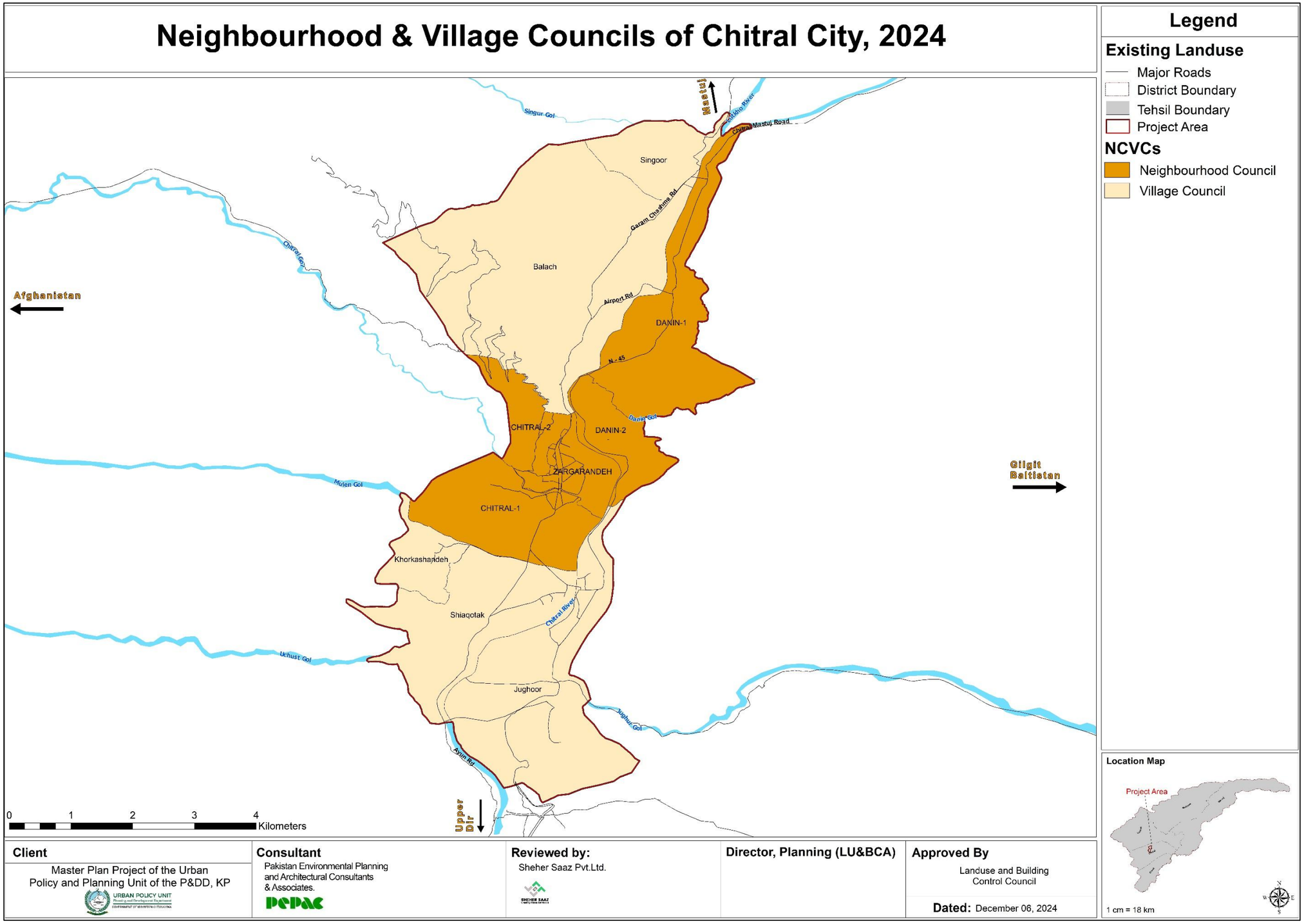
been taken as “proposed areas” for future development and expansion of the existing city. The map of existing urban boundary i.e., neighborhood councils and proposed city boundary i.e., village councils is attached below. The details of these administrative areas; NCs and VCs, are given below;

Table 1: Administrative Units of Chitral Study Area

Sr. No	Name of Administrative Units	Status	Area (acre)	Area (km2)	Population 2017
1	Chitral – 1	Neighborhood Council	672.62	2.73	5,044
2	Chitral – 2		287.27	1.16	7,985
3	Danin – 1		867.86	3.51	4,138
4	Danin – 2		315.3	1.28	3,625
5	Zargarandeh		205.09	0.83	1,037
Total of NCs			2348.26	9.51	21,829
6	Balach	Village Council	2279.95	9.24	3,291
7	Jughoor		1264.14	5.12	10,202
8	Khorkhasandeh		237.87	0.96	1,993
9	Shiaqotak		874.78	3.54	7,831
10	Singoor		346.89	1.4	5,361
Total of VCs			5003.58	20.26	28,678

Source: Secondary Data Collected from Field Surveys

Map 4: Administrative Boundary of Study Area Chitral



Source: Primary Data Collected from Field Surveys

1.2.4. Urban Growth Trends of Chitral city

Spatiotemporal analysis of land use was conducted from the sources for identifying variations in the state of land utilization over times. Irrespective of the region being conflict-ridden, the land use in the area has been modified over the decades and even though very little changes have occurred in the built-up area, the overall present rate of change has been unprecedented, with greater consequences than ever before.

Change detection process has been employed in determining this shift in development. It is an important process in monitoring patterns of physical growth and managing land which is the most precious natural resource. It has been useful for understanding the conversion of farmland to other uses and provides quantitative analysis of human interaction with the environment and the consequences.

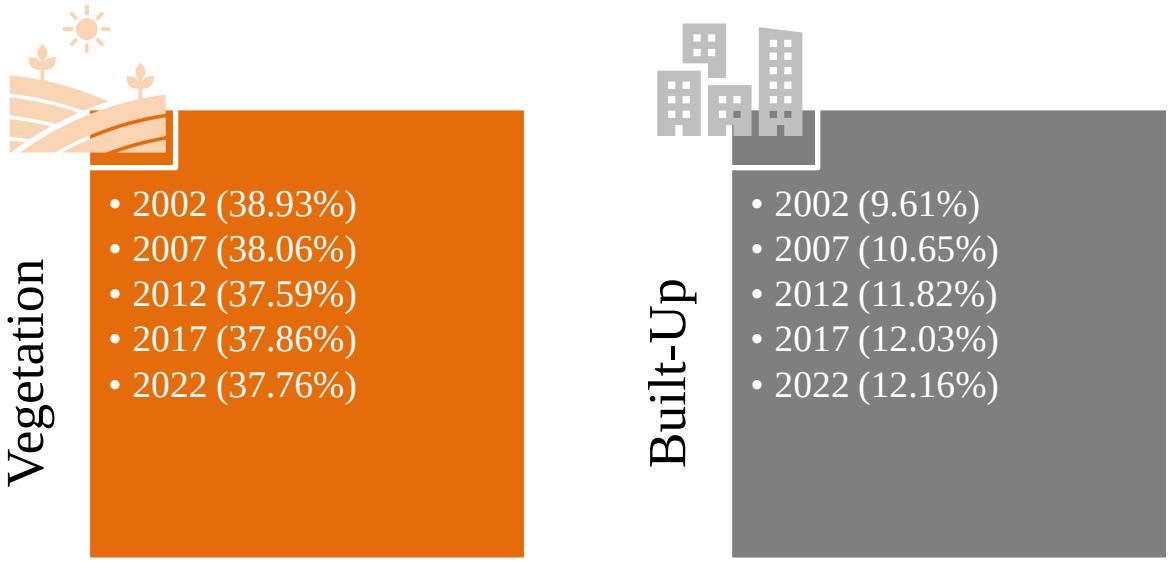
Since 1998, when Chitral was declared a Municipal Committee till 2022, the urban area of Chitral grew in different directions due to several reasons. The drivers of growth differ due to the changing situation in economic and physical development and therefore are not quantifiable. However, some drivers of urban growth in Chitral have been identified and are expounded below:

- **Natural Population Growth;** one driver of urban growth is the natural increase in population growth which had been determined to be 2.59% from 1998 to 2017 making the population of Chitral city 49,780 in 2017. In 1998, the population was 30,622, therefore in the course of 19 years, an additional amount of approximately 19,000 people occurred.
- **Growth Pole;** the urban structure of Chitral has had its bazar as a central trade zone and growth pole for the entire district on one hand and Chitral Fort as the centre of political power and now tourism on the other hand. This central bazar had been one of the reasons for urban growth in Chitral city as compared to other cities of Lower and Upper Chitral district.[4]
- **Migration;** another big driver of urban growth had been constant intra-regional migration to Chitral city from the high elevated areas of the district as over the years. Currently, urban Chitral has a migration rate of 0.12%. A large extent of permanent movement can be explained by worsening living conditions in those areas owing to the lack of resource, reduction or absence of labour and increase in natural hazards in those high elevated areas.
- **Presence of Education and Health Facilities;** in addition to the migration of illiterate and labour sector to Chitral city from different areas, educated and somewhat wealthy people from Upper Chitral district have also been migrating to Chitral city as it is now housing Chitral University and Chitral Airport for more education and employment opportunities.

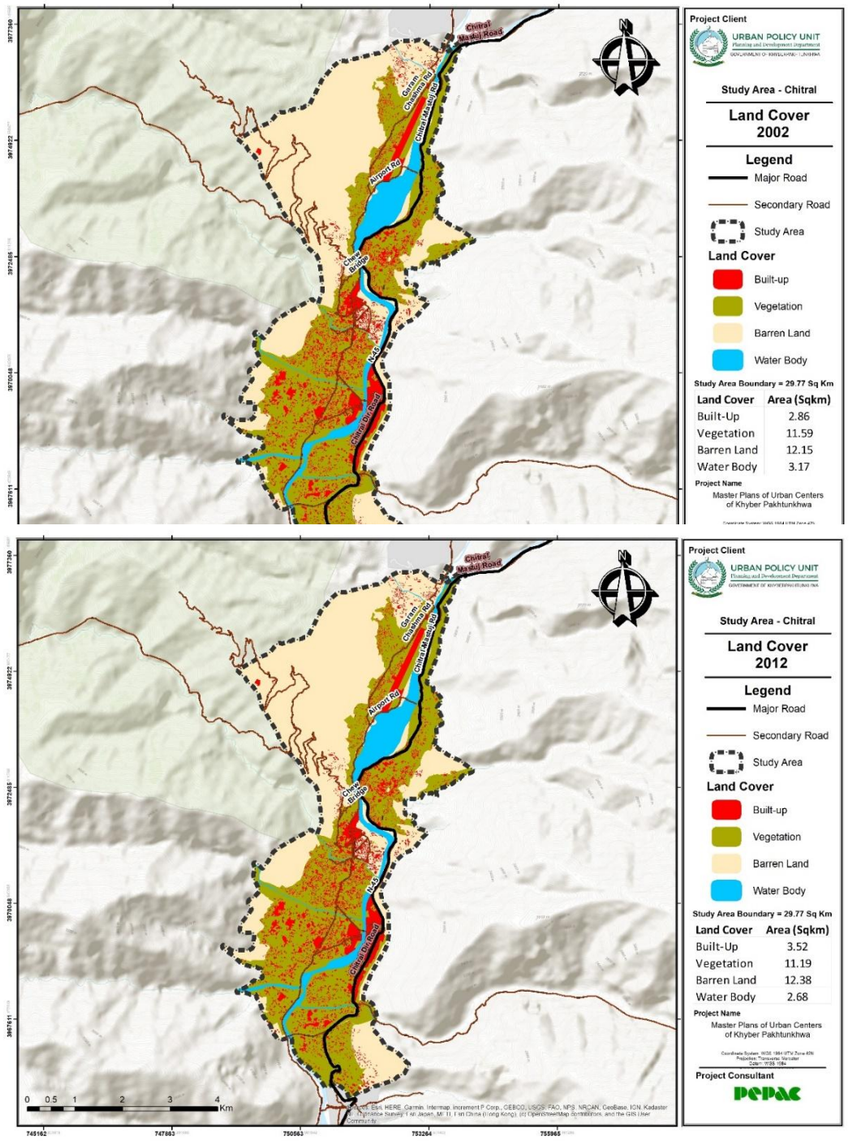
[4] Chitral - Urban development and traditional bazaar structures, Mountain societies in transition, Arnd Holdschlag, 2000

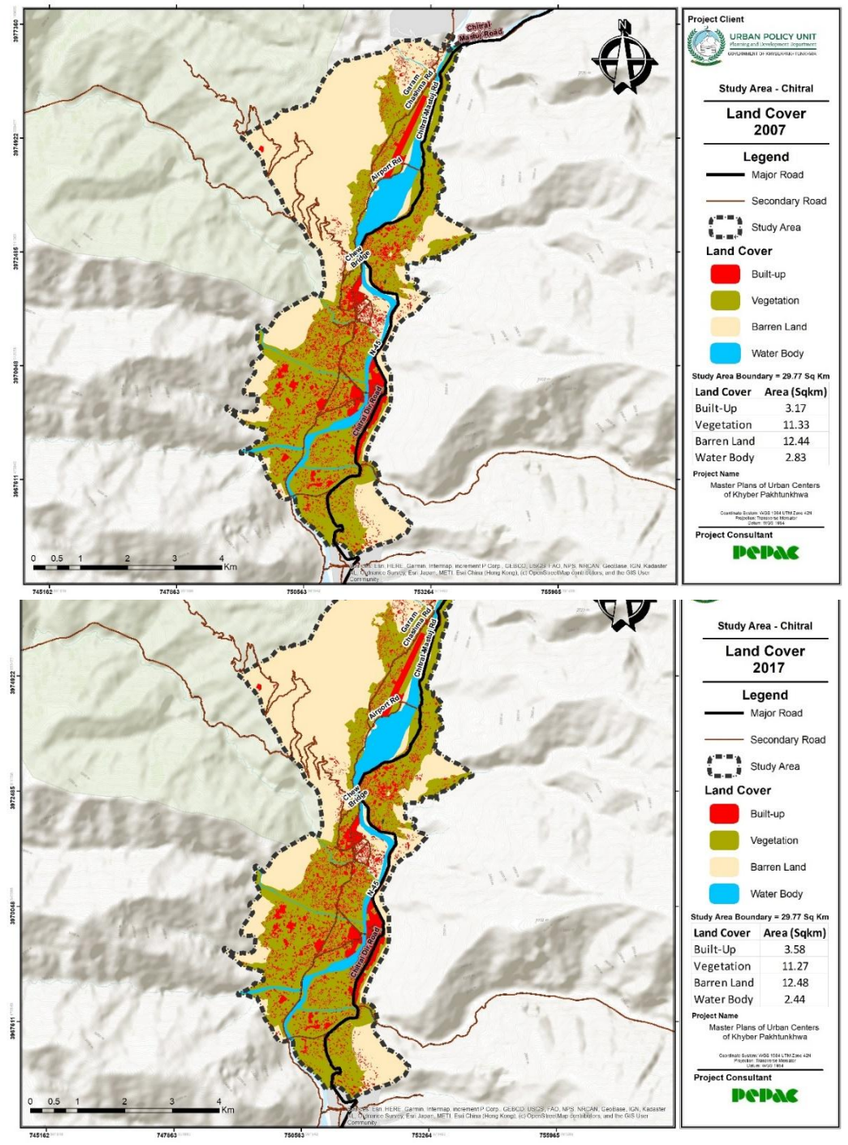
- **Urban Expansion;** the city has expanded with an average expansion rate of 5.25%. However, this increased urban growth had also led to detrimental impacts on Chitral town, for instance, the densely populated Chitral 1 and 2 and Zargarandeh had been suffering from inadequate drainage and sewerage disposal systems and the narrow roads had become inadequate for the growing motorized traffic.

It has been found that the vegetation cover in the study area are spread across 11.59 km^2 in 2002 which slightly reduce to 11.24 km^2 in the last two decades, whereas the urban built up area has expanded from 2.86 km^2 by 2002 to 3.62 km^2 during the same period. Geospatial analysis has been carried out utilizing spatiotemporal images of the Chitral for the last two decades with five-years intervals starting from 2002. Extraction from temporal imageries identifies the extent of vegetation cover and built-up area.



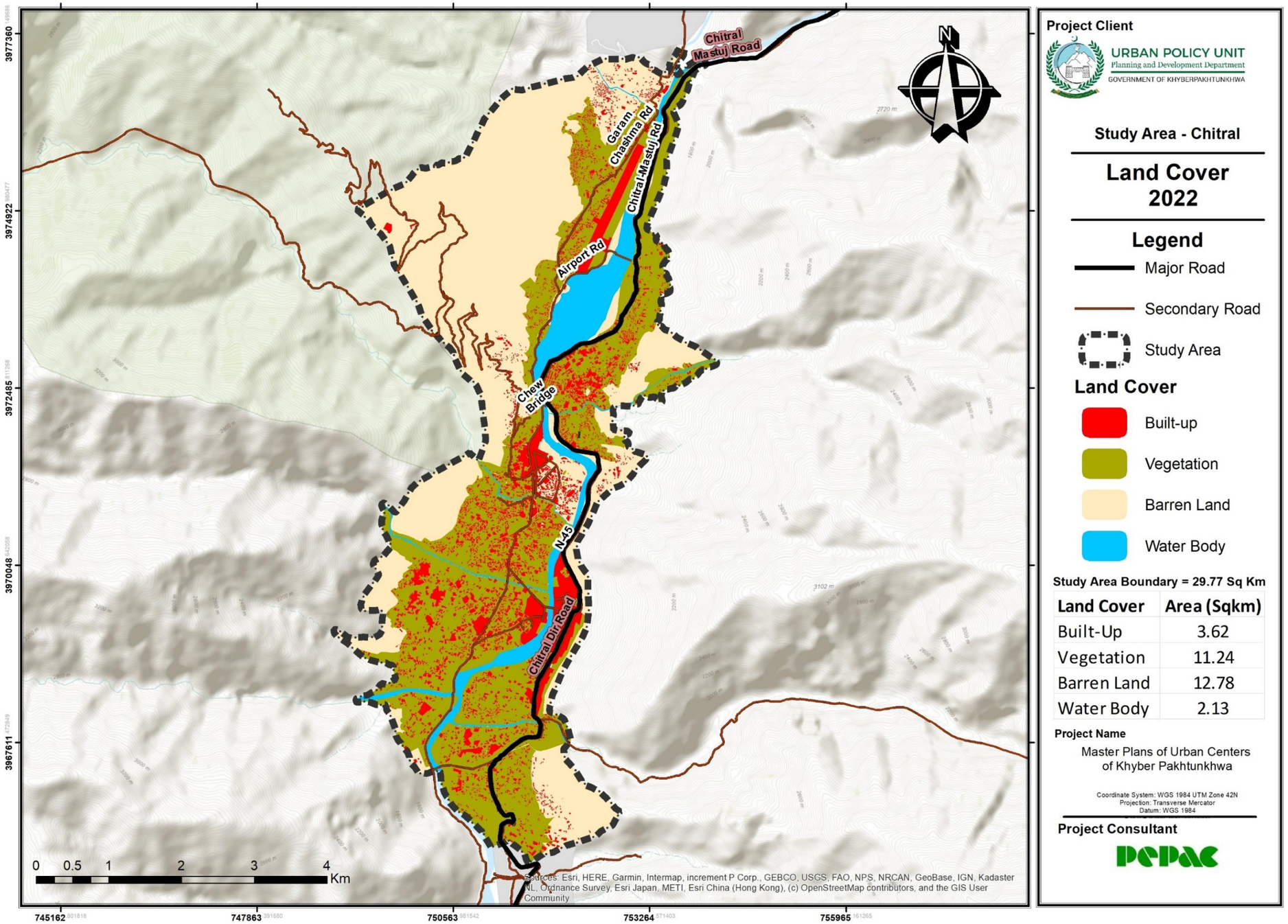
Map 5: Spatio-Temporal Land Cover Map 2002 to 2017





Source: Developed by Consultant Using GIS

Map 6: Spatio-Temporal Land Cover Analysis 2022



Source: Developed by Consultant Using GIS

1.3. Population Density

1.3.1. Density Criteria in KP Urban Policy (2022-2030)

Since every city and country has different populations and areas, each will have a distinct population density. There is no one scale that fits all criteria to define population density. However, population density has been divided into three classes, i.e., low, medium, and high based on the criteria given in KP Urban Policy 2022, according to which medium density is defined as 20,000 persons per square kilometer or 200 people per hectare. Therefore, low density refers to minimum number of people living in per unit area, which is being 100-200 people per hectare, and high refers to maximum number of people living in per unit area which is being 301-400 people per hectare. This should be noted, however, that the criteria adopted in KP Urban Policy is solely based on distance from transit areas and it does not take into account other socio-economic factors.

Table 2: Density Criteria Given in KP Urban Policy

Density Zone	Distance from Transit	Average Population Density
Mixed Use with High Density Residential (CBD)	< 400 metres	301-400 PPH
Mixed Use with Medium Density Residential	400 – 800 metres	201-300 PPH
Low Density Residential	> 800 metres	100 to 200 PPH

Source: KP Urban Policy, 2022-2030

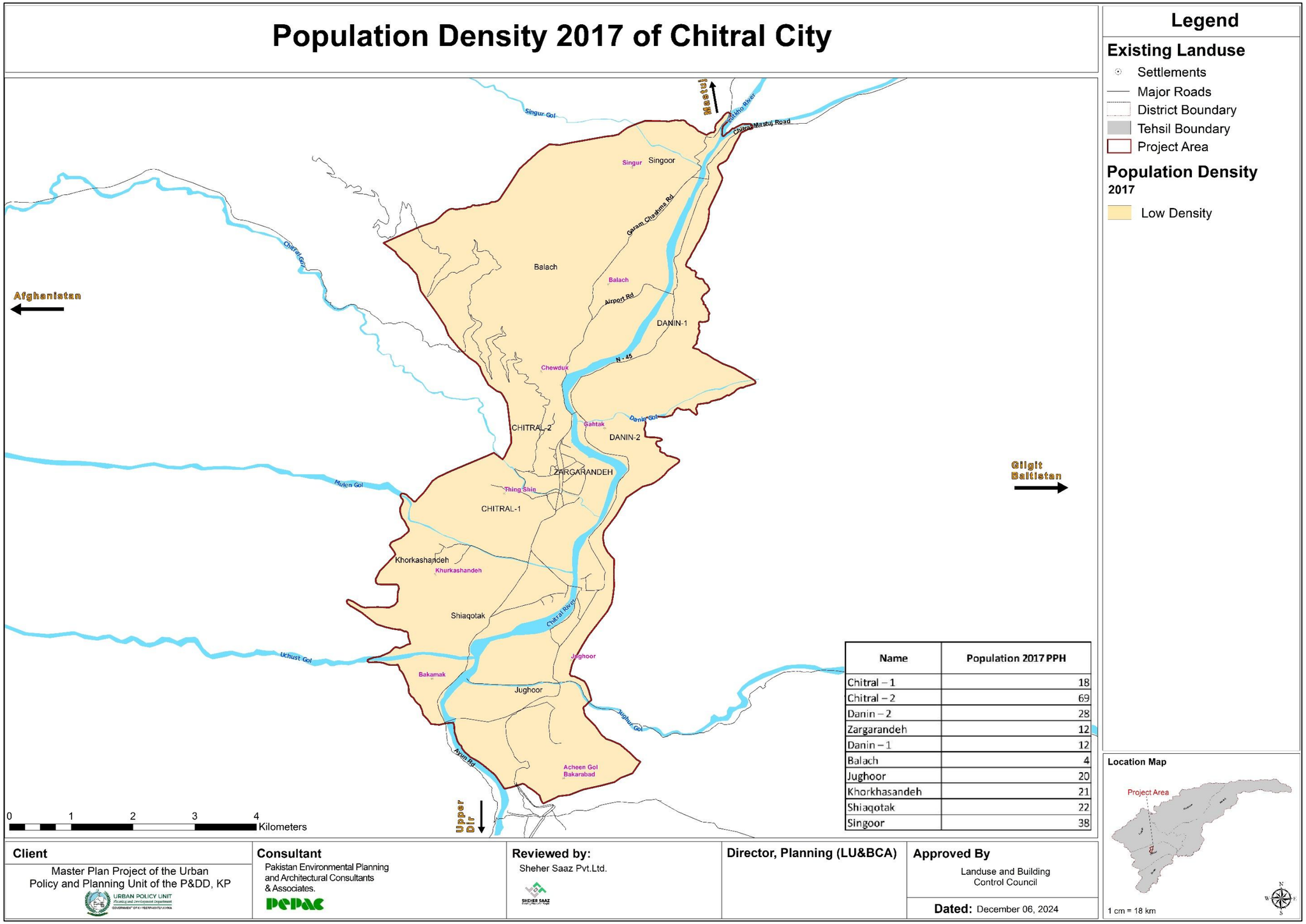
New York city has a population density of 10,852 per km^2, Delhi has population density of 10,000 per km^2, Lahore has population density of 6,300 per km^2 and Murree has population density of 539 per km^2. The average population density of Project Area Chitral City is 1,700 per km^2 which fall in the low-density criteria suggesting that average density of Chitral is low

1.3.2. Existing Population Density by NC/VC

The entire city falls in low density criteria; however, relative density calculation suggests that in neighbourhood councils, the relatively high-density neighbourhood councils include Chitral 2 NC with 69 people per hectare (PPH) while low density NCs include Zargarandeh and Danin – 1 NC with same 12 people per hectare (PPH). The remaining NCs have relatively average population density.

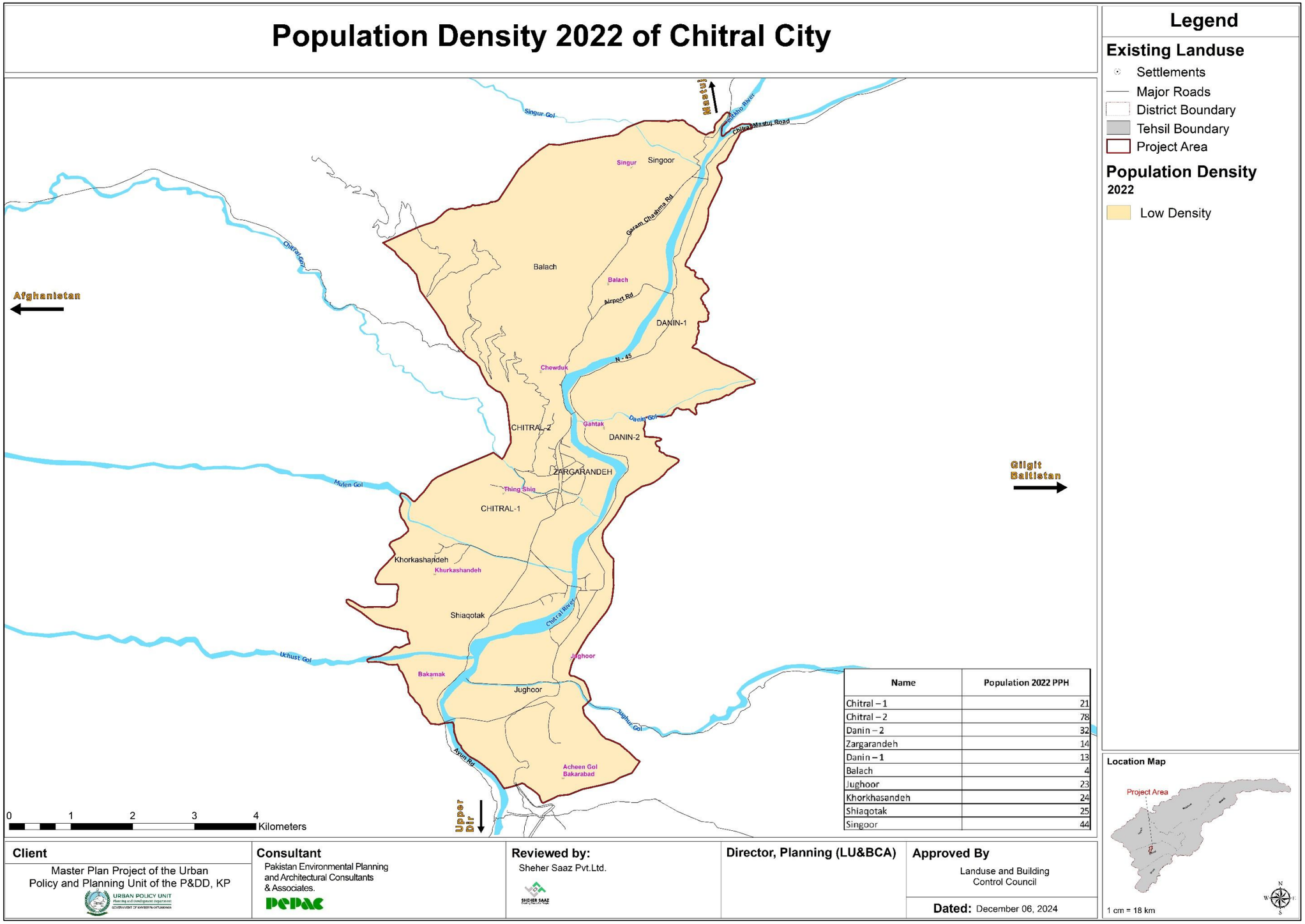
In regard to village councils, the VC with low population density is Singoor VC with 38 people per hectare (PPH) while Shiaqotak VC is calculated to have relatively high population density i.e., 22 people per hectare (PPH) which is considered to be low density according to the standards given in KP Urban Policy 2022-2030.

Map 7: Population Density Map (2017)- Chitral Study Area



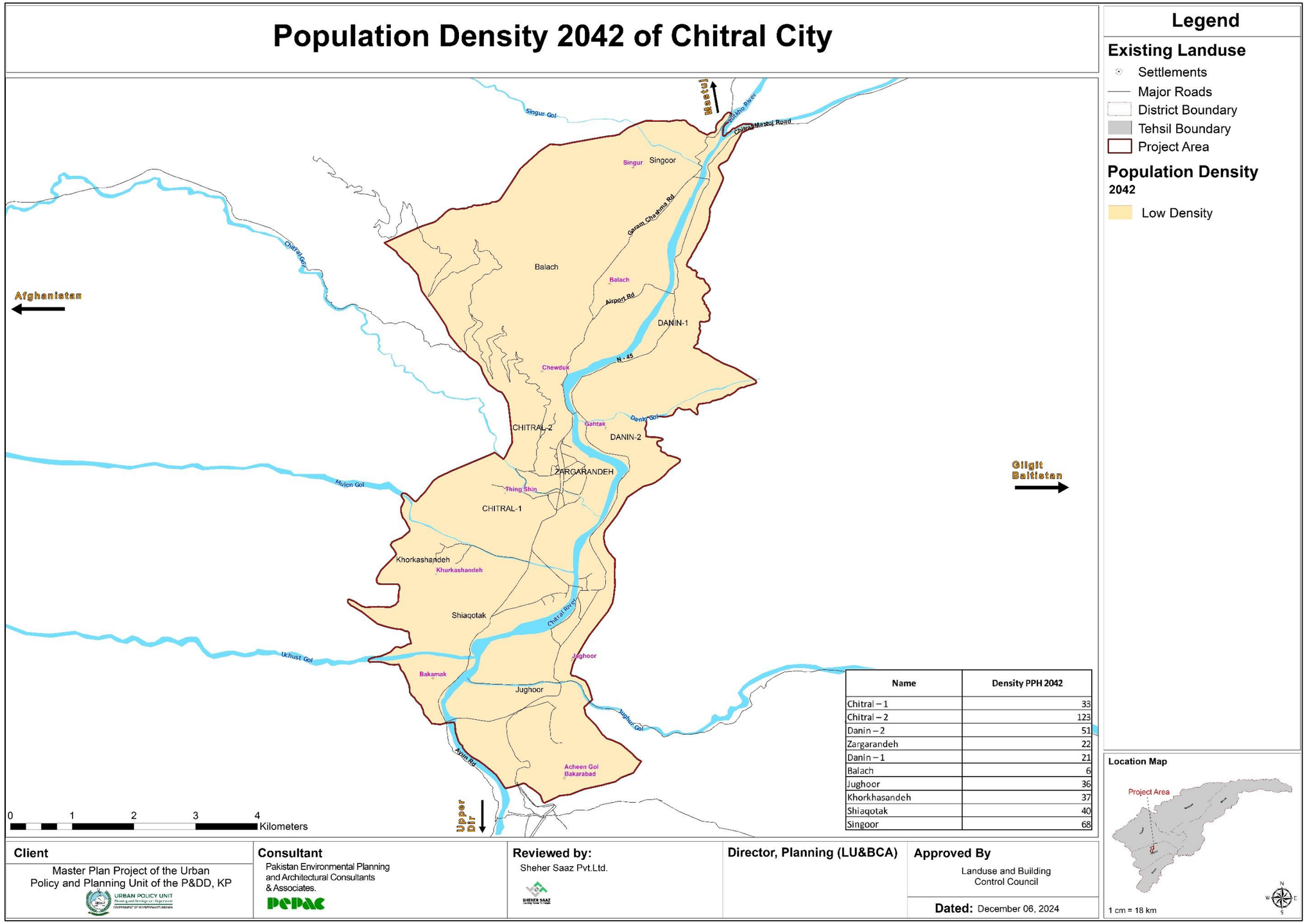
Source: Devised by Consultants

Map 8: Population Density Map (2022)- Chitral Study Area



Source: Devised by Consultants

Map 9: Population Density Map (2042)- Chitral Study Area



Name	Density PPH 2042
Chitral – 1	33
Chitral – 2	123
Danin – 2	51
Zargarandeh	22
Danin – 1	21
Balach	6
Jughoor	36
Khorkhasandeh	37
Shiaqotak	40
Singoor	68

Source: Devised by Consultants

1.4. Population Projection

Regarding population projection, there are several methods to calculate population projection and there are certain data requirements for each method or there are certain conditions that each method must fulfil to achieve the desired result i.e., projection. The population of the Chitral study region was projected using the average of three projection methods: geometric growth, exponential growth, and declining growth. According to the census of 2017, the population residing in Chitral city comes to a total of 49,780 residing in 7,063 households. However, since the study area consisted of neighborhood councils and village councils rather than MC, the existing population of neighborhood councils and village councils that fell within the study area boundary was used which was provided by the concerned local government. The population of all neighborhood and village councils turned out to be 21,829 and 28,679 respectively, making the total population of the study area 50,507 in 2017.

Table 3: Projected Population - Chitral City Study Area

Population Projection Method	Year					
	2017	2022	2027	2032	2037	2042
Geometric	50,507	57,395	65,223	74,119	84,227	95,714
Exponential	50,507	55,659	60,810	65,962	71,113	76,265
Declining	50,507	56,295	62,104	67,818	73,324	81,477
Average	**50,507**	**56,450**	**62,713**	**69,299**	**76,222**	**84,485**

Source: Devised by Consultant

Table 4: Growth Rate - Chitral City Study Area

Methods	Year						
Growth Rates	2017	2022	2027	2032	2037	2042	Average
Declining	2.59	2.19	1.98	1.78	1.57	1.38	**1.92**
Geometric	2.59	2.59	2.59	2.59	2.59	2.59	**2.59**
Exponential	2.59	2.62	1.96	1.78	1.63	1.51	**2.02**
Average	2.59	2.47	2.18	2.05	1.93	1.83	**2.17**

Source: Devised by Consultant

CHAPTER 2: COMPARATIVE ANALYSIS OF EXISTING LAND USE

2.1. Existing Land use Pattern

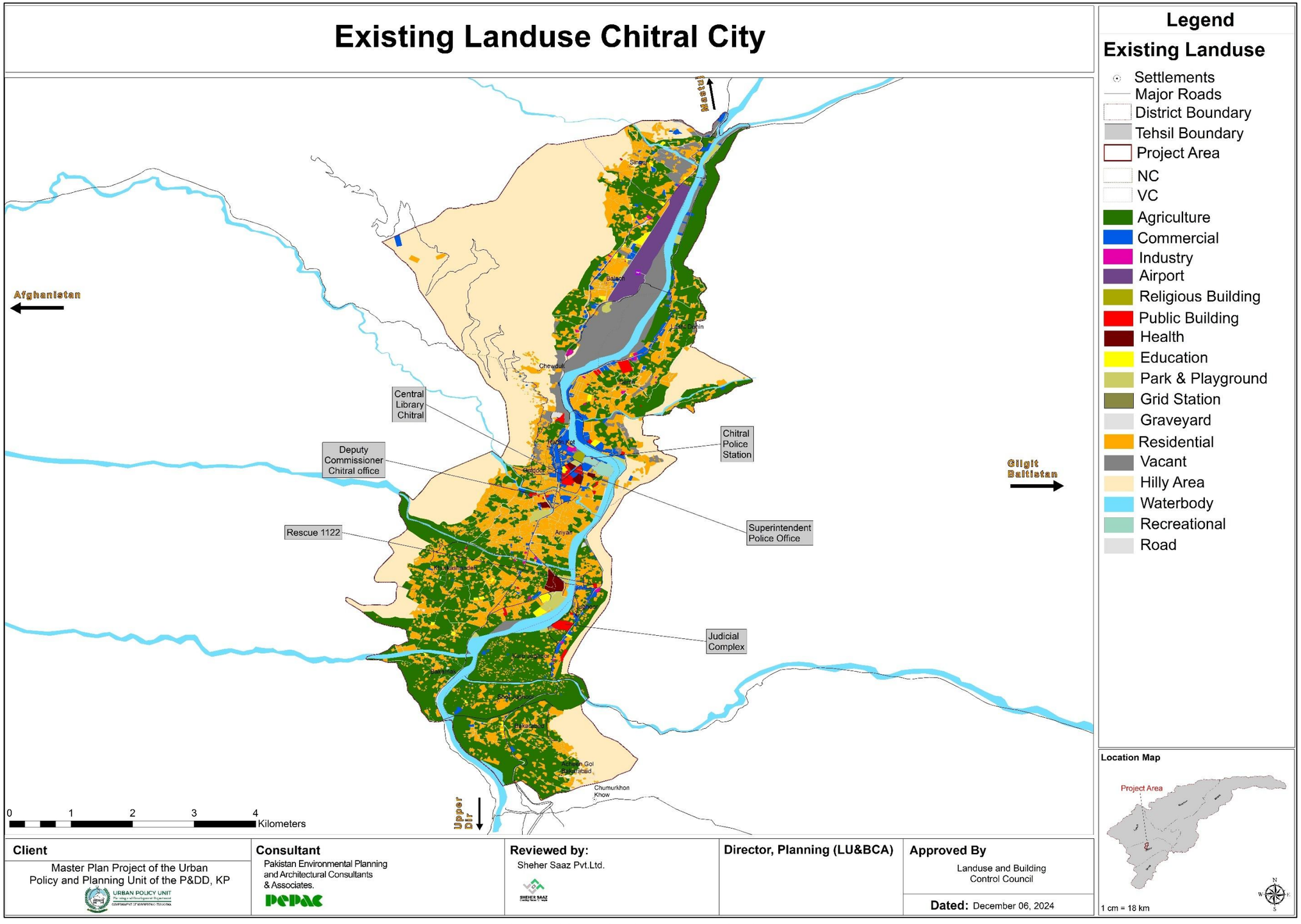
In accordance with the KP Land Use Act 2021, the major land use categories in Chitral City have been delineated, providing a comprehensive overview of the city's spatial organization. The following tables show the area, and the percentage of different land uses in line with Land Use and Building Control Act of KP 2020, in overall Project Area Chitral City and each NC and VC in 2022.

Table 5: Existing Land Use-Chitral Study Area

Main Category (As Per KP Land Use Act 2021)	Sub-Category	Area (Acre)	Area (Km^2)	Percentage (%)
Agriculture Area	**Agriculture**	**2,004.97**	**8.10**	**27.21%**
Arterial Connectivity	**Roads**	**222.61**	**0.90**	**3.03%**
Amenities	Air Strip	116.20	0.47	1.58%
	Grid station	1.29	0.01	0.02%
	Education	31.72	0.13	0.43%
	Graveyard	5.98	0.04	0.13%
	Health	23.29	0.09	0.32%
	Total	**181.98**	**0.74**	**2.48%**
Barren and Vacant	**Vacant**	**381.64**	**1.54**	**5.19%**
Commercial Area	Retail	57.54	0.23	0.78%
	Wholesale	27.4	0.11	0.37%
	Workshop	21.28	0.09	0.29%
	Other (hotels etc)	51.85	0.21	0.70%
	Total	**158.07**	**0.64**	**2.14%**
Concentrated Public Sector Area	Public Building	40.851871	0.17	0.56%
	Religious Building	13.487336	0.05	0.18%
	Total	**54.339207**	**0.22**	**0.74%**
Forest, Range Land and Other Related Areas	**Hilly Area**	**2,639.30**	**10.68**	**35.90%**
Industrial Area	**Industry**	**12.734989**	**0.05**	**0.17%**
Residential Area	Single Storey	1238.14	5.01	16.84%
	Double Storey	32.66	0.13	0.44%
	Triple Storey and above	3.06	0.01	0.04%
	Total	**1273.87**	**5.16**	**17.33%**
Recreational Area	Recreational	17.256952	0.07	0.23%
	Park& playground	49.478638	0.20	0.67%
	Total	**66.73559**	**0.27**	**0.91%**
Waterbodies	**Waterbody**	**359.98**	**1.46**	**4.90%**
Total		**7,351.83**	**29.75**	**100%**

Source: Primary Data Collected from Field Survey

Map 10: Existing Land Use Map – Chitral City



Source: Primary Data Collected from Field Survey

2.2. Comparison of Existing Land Use with NRM

A short comparison has been made using the NRM standards of a city consisting of a population 50,000 to 99,000. Chitral MC and the study area fall within the category of a small urban town as its population is less than 100,000.

Table 6: Land Use Comparison-Chitral Study Area

Sr. No.	Land Use	Area	Land Use	NRM Standards for city of 50,000 to 99,000 people
		(Km2)	Percentages (%)	
1	Residential	5.16	17.75%	27-43%
2	Commercial	0.604	2.08%	1-5%
3	Community Facilities (Health, Education, Mixed Use, Religious, Public etc)	1.72	5.92%	3-11%
4	Green/Recreational/ Open Spaces	0.27	0.93%	1-6%
5	Graveyard	0.04	0.14%	0.5-6%
7	Roads	0.9	3.10%	3-27%
8	Industry	0.05	0.17%	2-20%
9	Vacant/Reserved (agriculture hilly area, etc.)	20.32	69.91%	8% - 26%
Total		**29.06**	**100.00%**	

Source: Devised by Consultant

CHAPTER 3– RESIDENTIAL AND HOUSING

3.1. Existing Housing Situation

As per the census report of 2017, the total population of 49,780 people in Chitral city is accommodated in 6,860 housing units while the number of households stood at 7,063 with households' size of 6.95. Whereas the study area population of the Chitral was 50,507 people residing in 7,163 housing units. As per the projection, the study area has population of 56,450 residing in housing units 8,040 in 2022.

3.2. Existing Housing Societies

There are two housing societies which have been identified in the Study Area Chitral. The detail of these housing schemes are as follows:

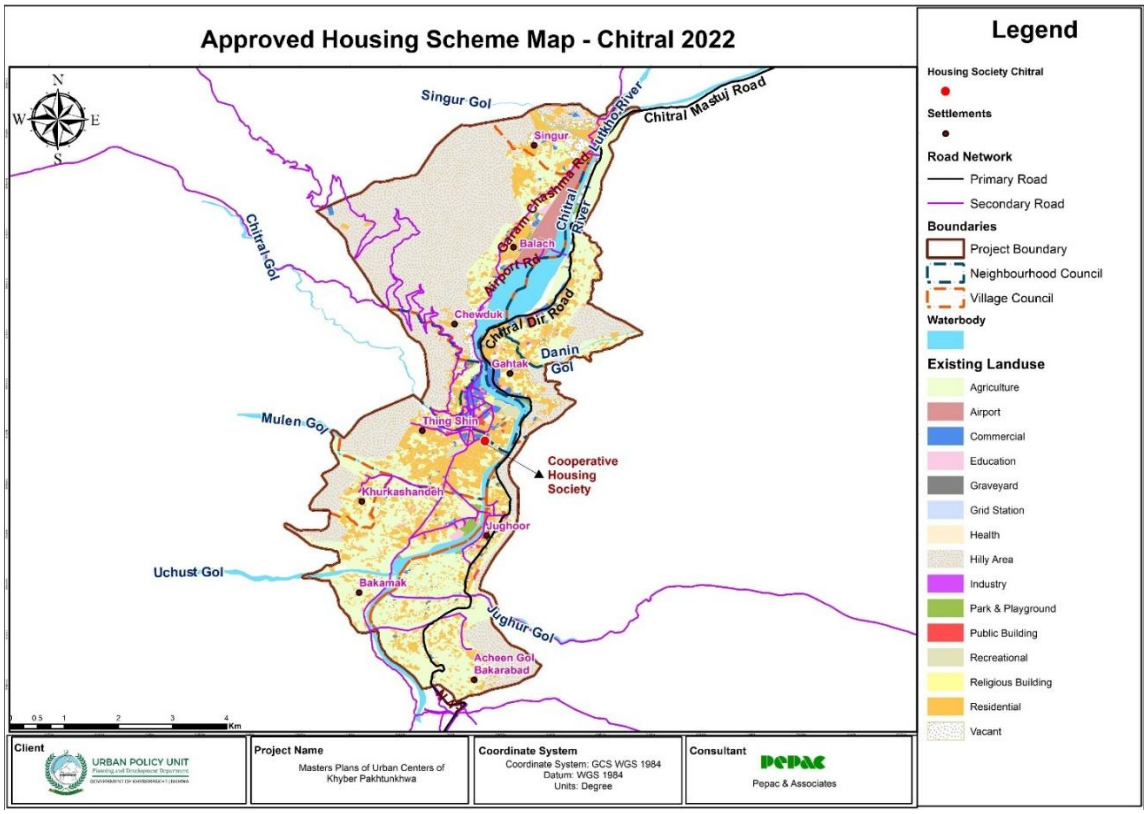
Table 7: Approved Housing Society – Chitral Study Area

Sr. No.	Name of Housing Scheme / Society	Location
1	Cooperative Housing Society Chitral Lower	Bypass Road

Source: Devised based on Secondary Data

The map of the existing housing scheme is as follows:

Map 11: Existing Housing Scheme – Chitral Study Area



Source: Secondary Data Modified using GIS

3.3. Housing Backlog

To assess the housing shortage of Chitral, the existing population of 2022 along with its housing units have been calculated from population projection and using average household size of Chitral. According to the census, the existing household size of NC and VC is 6.95 and 7.13.

Based on this information, the existing number of housing units has been determined by dividing the population by household size. From 2017 to 2022, the projected population shows an increase of approximately 5,943 people in 5 years, making the total population to be of 56,450 people with required housing units of 8,327.[5] The required housing units subtracted from existing housing units have provided the actual gap between what should have been the existing units in 2017 and 2022 (making them the required units). The calculations of housing backlog for Chitral are as follows:

Table 8: Housing Backlog – Chitral Study Area

Year	Population	Household size	Required Housing Units	Existing housing units	Backlog	Replacement Demand	Total Requirement
A1	B1	C1	D1	E1	F1	G1	H1
			B/C	Census 2017	D - E	E*22.4%	F + G
2017	50,507	6.95	7,267	7,163	104	1,605	1,709
2022	56,450	6.78	8,327	8,040	288	1,801	2,088

Source: Calculated by Consultant through Primary Data

3.4. Future Demand Estimation

Naturally, the demand for housing will increase in accordance with the increased population of Chitral. From the year 2022 to 2042, the population of Chitral is likely to increase by approximately 28,036 people. This growth will ultimately demand a higher number of housing units in the study area. The projected population in parallel to the required housing and household size in Chitral city is as follows:

Table 9: Future Population Increase – Chitral Study Area

Year	2027	2032	2037	2042
Population	62,713	69,299	76,222	84,485
Proposed Household Size (Using Previous Trends)	6.61	6.44	6.27	6.09
Increase in Population	6,263	6,587	6,922	8,264

Source: Calculated by Consultant through Population Projection and Household Size Trend

The calculations for the housing requirement for the year 2027 show that a population of 62,713 people and an estimated household size of 6.61, the requirement of new housing units for the additional population (from 2022 to 2027) would be 1,021. The calculations for the housing requirement for 2027 are as follows:

[5] (Population of 2022 – Population of 2017) / Average Household Size of Chitral City, the result is then added into the existing units of 2017 provided by census to determine the assumed existing units of 2022.

Table 10: Future Housing Demand Estimation for 2027 – Chitral Study Area

Projected Population	J		62,713
Increase in Population	L	Future Projection - Present Population	6,263
Estimated Household Size	K		6.61
Future Requirements Housing Units for 2027	O		948

Source: Calculated by Consultant

From year 2032 and onward, the housing requirement will be addressed in their respective timeframe. The future Demand Estimation of Chital city for 2032, 2037 and 2042 is as follows:

Table 11: Future Housing Demand Estimation Till 2042 –Chitral City Study Area

Year	Population	Proposed Household size	Increase in Population	Existing Housing Units	Housing Backlog	Replacement Demand	Future Requirement	Total Requirement
2027	62,713	6.61	6,263	9,084	2,088	2,035	948	3,036
2032	69,299	6.44	6,587	12,120	-	2,715	1,023	1,023
2037	76,222	6.27	6,922	13,143	-	2,944	1,105	1,105
2042	84,485	6.09	8,264	14,248	-	3,192	1,356	1,356

Source: Calculated by Consultant

Two different types of housing development will be carried out in Project Area Chitral City: in-fill development and development on land. Infill development will be carried out on the vacant area available in the Neighborhood Councils (NCs). While the vacant area within Village Councils (VCs) will be proposed for new development as housing proposals in the Project Area Chitral City.

3.5. Scenario Design and Construction

The consultant has proposed various scenarios for the master planning process of the Chitral Study area. To plan for future expansion, it is crucial to estimate the amount of land required to support it accurately. The scenarios are proposed on the basis of Land Sustainability Analysis, slope, and land demand. By analyzing these factors, it becomes possible to plan for the provision of necessary services such as water, sewage, and transportation.

3.5.1. Scenario – A

In the first scenario, vacant agricultural land available in all neighborhood councils (NC) VC (Balach); not prime agriculture land, is suggested for residential development. The proposed plan for residential development in Chitral involves utilizing around 275.35 land parcels in

Zargarandeh, Chitral-1 &2, Balach to meet the population's total residential needs.

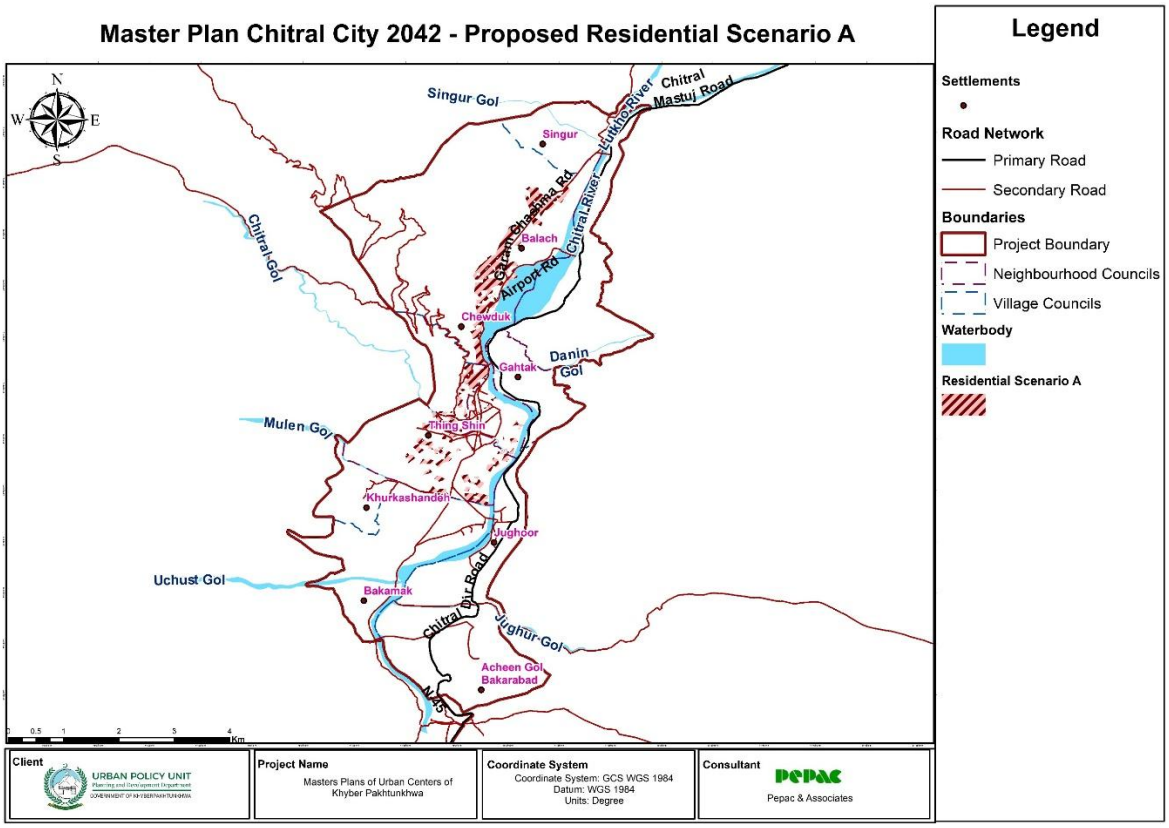
Similarly for commercial development, the first scenario carried out using Land Suitability Analysis covered 156.05 acres, based on the proposed criteria that takes into account the midpoint between the maximum and minimum land requirement for commercial use (which has been determined via standards given in NRM). Furthermore, the consultant proposed industrial development having an area of 199.41 acres has been allocated of which, area is proposed on the south side of Chitral near N-45 within study area boundary.

Table 12: Scenarios A – Chitral Study Area

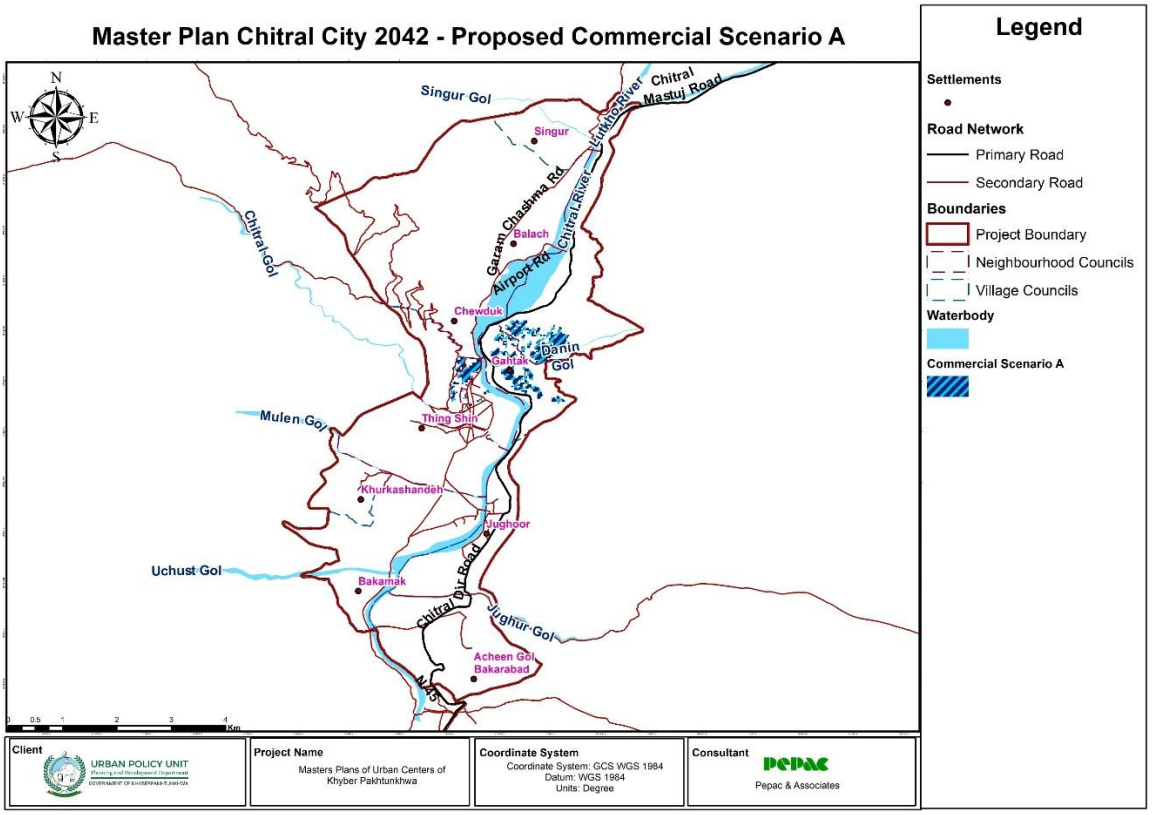
Sr. No.	Scenarios-A	Area
		Acres
2.	Residential	275.35
3.	Commercial	156.05
4.	Industry	199.411

Source: Calculated by consultant

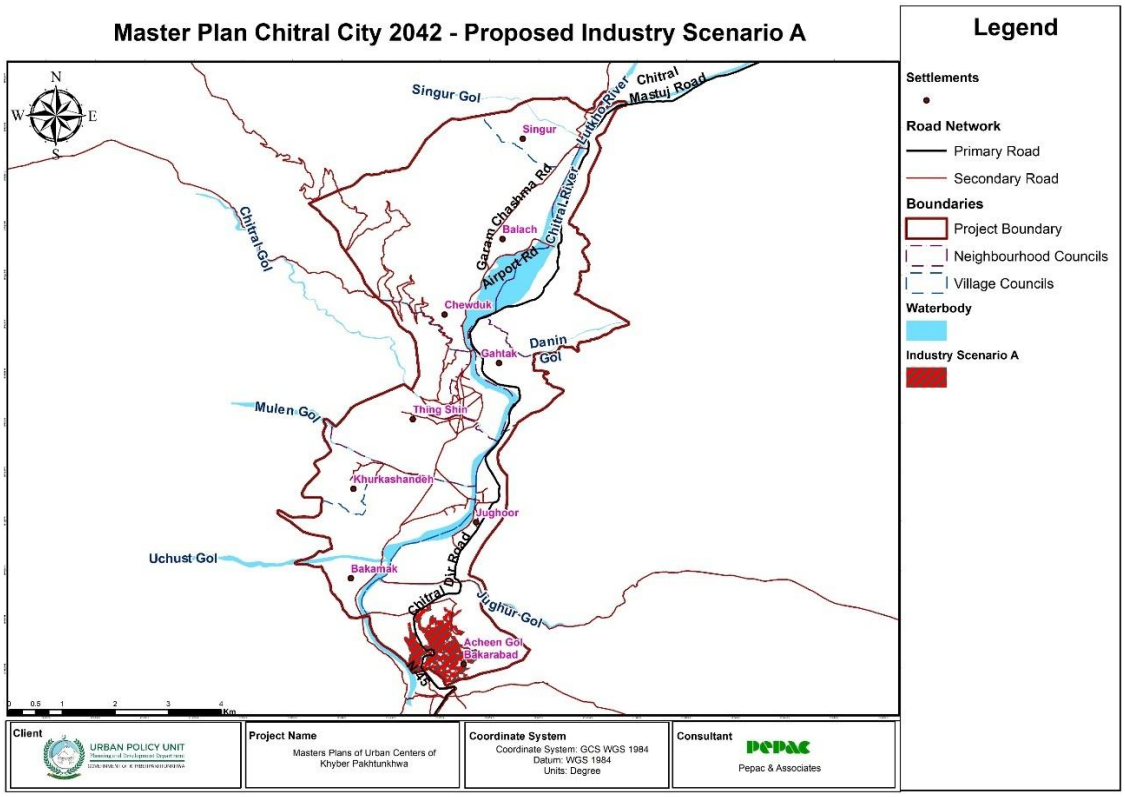
Map 12: Residential Scenario A- Chitral Study Area



Map 13: Commercial Scenario A- Chitral Study Area



Map 14: Industry Scenario A- Chitral Study Area



Source: Devised by Consultants

3.5.2. Scenario – B

The second scenario is proposed through model, slope and LSA also allocate efficient placement of land uses which are the demand for future and current population and are essential for sustainable city. In Scenario B, additional land uses are proposed in accordance with land demand need for future development works in Chitral.

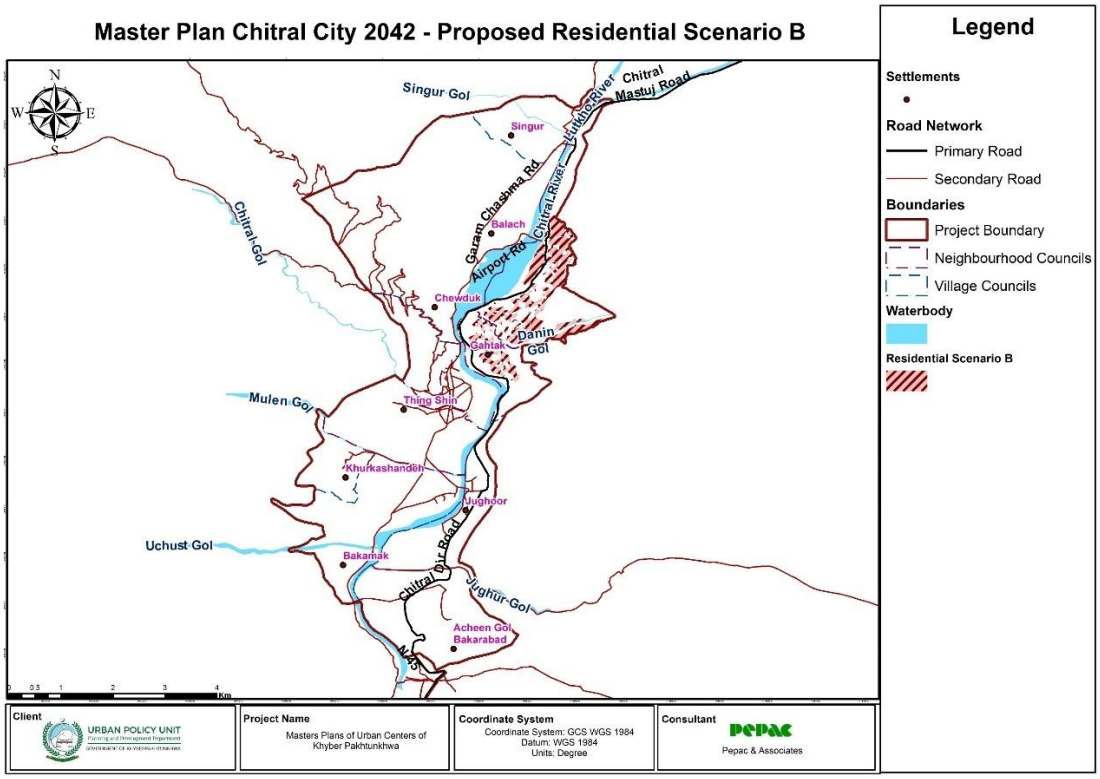
In scenario B, infill and residential area are identified as suitable areas for residential development due to their proximity to existing infrastructure and urban amenities. The area has already been developed to some extent and has the potential for further development to accommodate the projected increase in population. Around 304.91 acres of land is proposed in the form of infill land parcels in NCs (Zargarandeh, Danin-1 & 2). Since the land used in this scenario is vacant and agricultural parcels within the current urban boundary, it qualifies as Infill Residential. Additionally, approximately 125.45 acres of land in Jughoor VC are proposed for commercial zoning for trade and commerce purposes.

Table 13: Scenarios B – Chitral Study Area

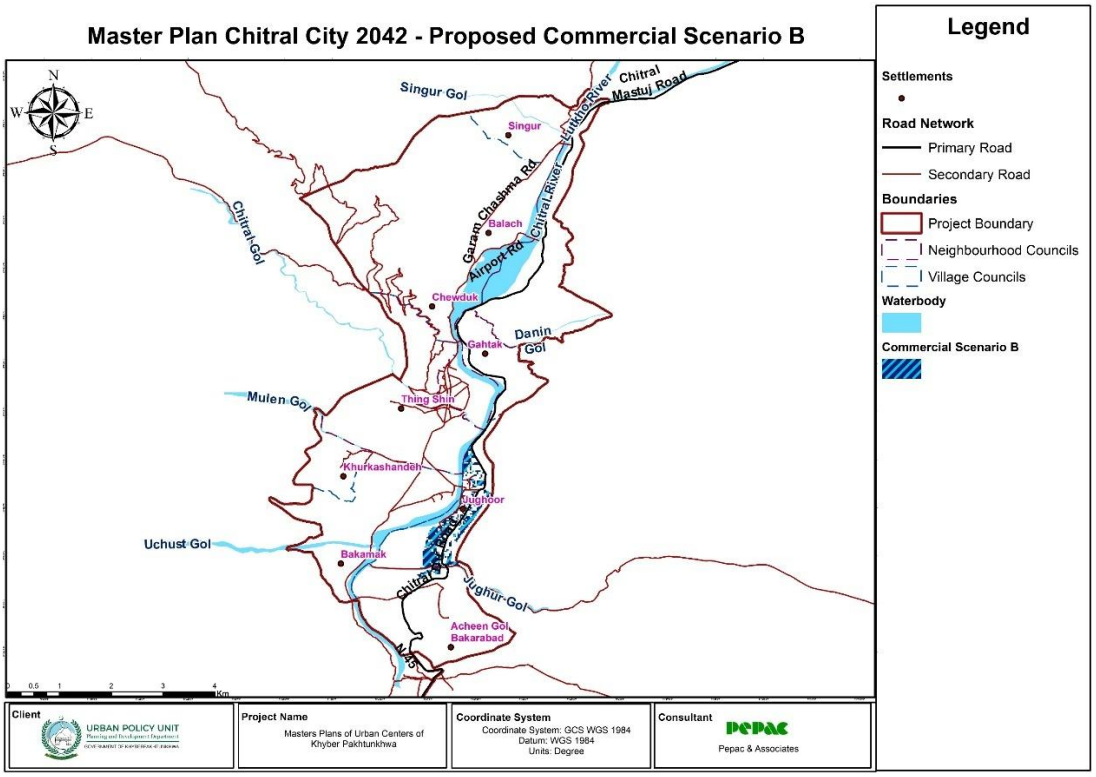
Sr. No.	Scenarios-B	Area Acres
1.	Residential	304.91
2.	Commercial	125.45
3.	Industry	209.27

Source: Calculated by consultant

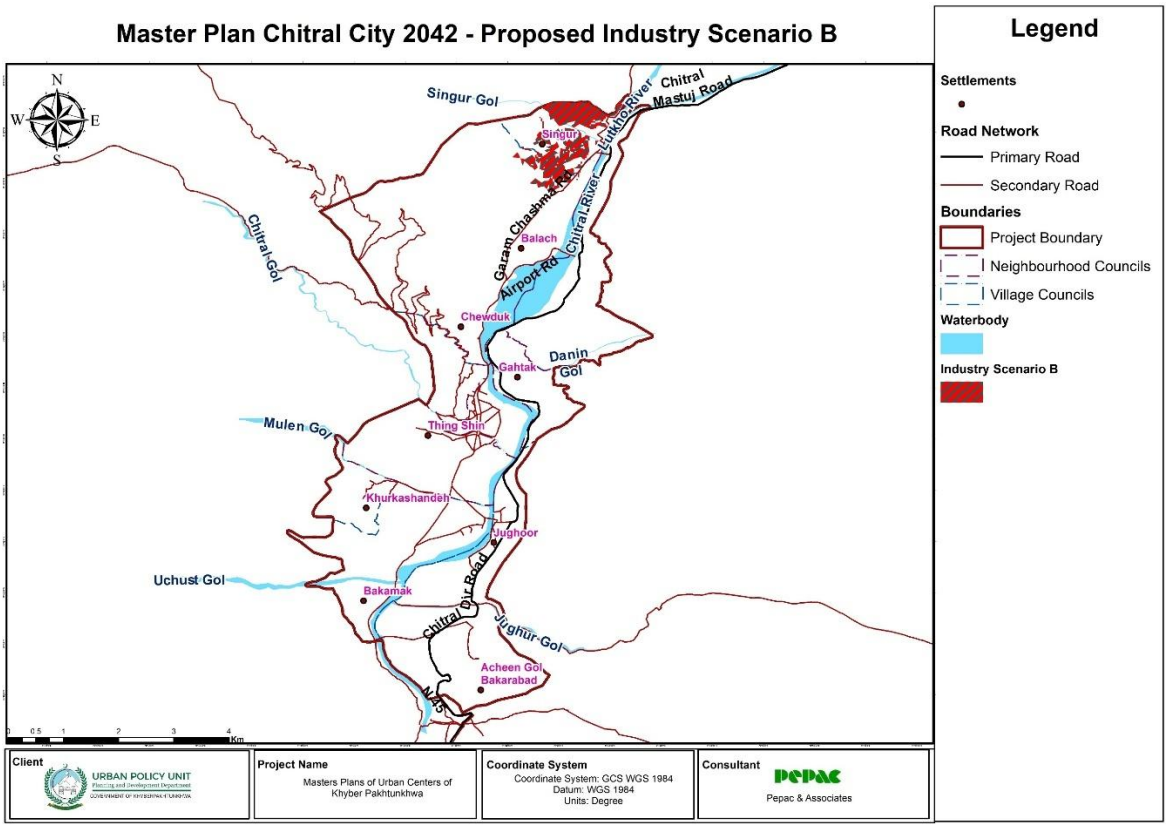
Map 15: Residential Scenario B- Chitral Study Area



Map 16: Commercial Scenario B- Chitral Study Area



Map 17: Industry Scenario-B



Source: Devised by Consultants

3.6. Proposed Housing

Among the three scenarios considered (explained in the Detailed Master Plan Report), the best

scenario has been selected for housing development in the Chitral study area. The selected scenario of housing for Chitral city is composed of 80% horizontal and 20% vertical development of housing units.

3.6.1. Categorization of Plots (Horizontal development) and Apartments (Vertical development)

According to the primary data, 39.41% of the survey's respondents live in the category of low /middle income housing (as per NRM standards), while the rest 60.59% lives in the category of high-income houses. While estimating future housing demand, these groups have been divided into low to middle-income housing and high-income housing based on their plot sizes. The circulating space of vertical development within apartment buildings would account for 20%. The additional mandatory spaces in vertical development (apartment) would account for 40% of the plot size, whereas the ground coverage of the built-up area would be 60% per plot. For the horizontal development, the different plot sizes from 3 Marla to 15 Marla have been given percentages followed compact development and existing trend of the plot sizes assessed from the primary survey. The following table shows percentages allotted each plot size and apartments for both vertical and horizontal development of Chitral City for selected Scenario;

Table 14: Categorization of Plots and Apartment Size for Housing Selected Scenario

Low- and Middle-Income Houses	**3 Marla (Single Housing Unit)**	8%	39.41%
	5 Marla (Single Housing Unit)	14.9%	
	7 Marla (Single Housing Unit)	10.5%	
	1 Bed	2%	
	2 Bed	3%	
	3 Bed	1%	
High Income Houses	**10 Marla (Single Housing Unit)**	23.3%	60.59 %
	15 Marla (Single Housing Unit)	23.3%	
	1 Bed	4%	
	2 Bed	4%	
	3 Bed	6%	

Source: Devised by Consultant

The total 4,703 units will be sub-divided into 80% single plot housing unit and 20% apartments, in which, the single housing storey units will account for horizontal expansion while G+3 apartments will promote vertical growth of the Chitral city. The rationale for apartments is to reduce urban sprawl and preserve prime agricultural land. Apartment buildings also offer room for tourists and can be used for any economic activity on the ground floor. The consultants also suggested using resilient materials e.g. wood, concrete and steel for construction in Chitral. The resilient construction material has increased the ability to deal with natural disaster. As, Japan have developed unique construction technology in coping with natural disaster. They used timber and clay as the main building material for house construction. The proposed apartments (G + 3) accounts for the development at human scale in which additional uses like elevators are not required.

Table 15: Housing Unit Requirement for Plots and Apartments for Selected Scenario

Single Plot Housing Units		Apartments	
Variables	**Calculations**	**Variables**	**Calculations**
80% of the total required units	3,762	20% of the total required units	941
Total Area Requirement (acres)	221.8	Total Area Requirement (acres)	11.4
Area Requirement (sq. km)	0.897	Area Requirement (sq. km)	0.046
Total Required Area till 2042 = 0.94 sq km			

Source: Calculated by Consultants

Table 16: Proposed Multi-storey Apartments-Chitral Study Area

	Categorization	Size of Apartment (sq ft)	Size of Apartment (Marla)	Units each floor	Area of Each Floor (Sq ft)	Area of Each Floor (Marla)	Additional area for circulating spaces within building (20%)	Total Area of Each apartment Building (Marla)	Additional mandatory spaces (40%)	Total Area (Marla)
	Low-income Housing									
1.	1 bedroom	720	2.6	4	2880	10.6	2.1	12.7	5.1	17.8
2.	2 bedrooms	1000	3.7	4	4000	14.7	2.9	17.6	7.1	24.7
3.	3 bedrooms	1400	5.1	4	5600	20.6	4.1	24.7	9.9	34.6
	High-income Housing									
4.	1 bedroom	1500	5.5	4	6000	22.0	8.8	30.9	12.3	43.2
5.	2 bedrooms	1600	5.9	4	6400	23.5	9.4	32.9	13.2	46.1
6.	3 bedrooms	1800	6.6	4	7200	26.4	10.6	37.0	14.8	51.8

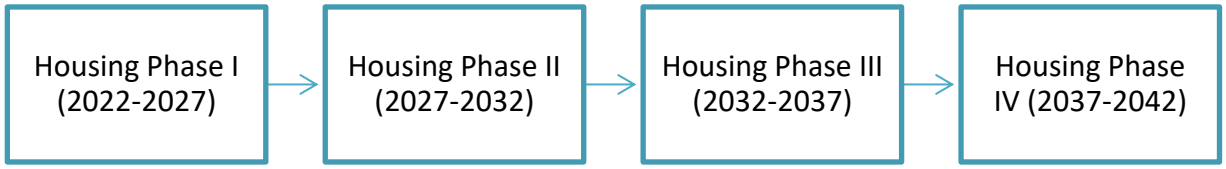
Source: Calculated by Consultants

The following is the phase wise division of housing requirement for Selected Scenario.

3.6.2. Phase wise Development

The timeline of the master plan is of 20 years (given the current year is 2022). This timeline is divided into four different phases to meet the housing requirement of each respective population increase. These phrases are as follows:

Figure 2: Phases for Housing Development - Chitral Study Area



Source: Devised by Consultant

1. **Phase – I (2022-2027)**

The total population to be accommodated in phase-I has been calculated through the increase in population from the year 2022 till 2027 and the housing backlog of the previous year. The total housing backlog to be accommodated in this phase turns out to be 288 units. Moreover, the total requirement till 2027 is identified to be 1,236 units for the increase population of 6,263 people. The overall calculations for total requirement and the accommodated population are mentioned in Table 17;

Table 17: Housing Demand Calculation (Till 2027 – Phase-I) – Chitral Study Area

Chitral – Housing Demand Calculation for City (Till 2027 – PHASE-I)		
Projections	**Calculations**	**Results**
Projected Population for 2027		62,713
Projected Population for 2022		56,450
Increase in Population	P (2027) – P (2022) =	6,263
Household Size from 2022 till 2027		6.61
Future Requirements Housing Units for 2027	6,748/6.61 =	948
Backlog carry forward		288
Total Requirement till 2027	948+288 =	1,236
Total Population to be accommodated till 2027	1,236*6.61	8,167

Source: Calculated by Consultant

Further calculations of area required for low-income housing units is given in the table below.

Table 18: Selected Scenario – Phase I -Area Calculation for Low/ Middle Income House

Housing Type	Percentage	Population	Housing Units	No. of Storeys	Housing units Accommodated in one apartment building	Area Required (Marla)	Area into Acres
1 bedroom	2%	163	25	4	16	27	0.2
2 bedrooms	3%	245	37	4	16	57	0.4
3 bedrooms	1%	82	12	4	16	27	0.2
3 Marla (single housing)	8%	653	99	1	1	297	1.9
5 Marla (single housing)	15%	1217	184	1	1	920	5.8
7 Marla (single housing)	11%	858	130	1	1	908	5.7
Total	39%	3218	487			2236	14.0

Source: Calculated by Consultant

Table 19: Selected Scenario – Area Calculation for High Income Houses – Phase I

Housing Type	Percentage	Population	Housing Units	Number of Storeys	Housing units Accommodated in one apartment building	Area Required (Marla)	Area into Acres
1 bedroom	4%	327	49	4	16	95	0.6
2 bedrooms	4%	327	49	4	16	102	0.6
3 bedrooms	6%	490	74	4	16	172	1.1
10 Marla (single housing unit)	23%	1903	288	1	1	2879	18.0
15 Marla (single housing unit)	23%	1903	288	1	1	4318	27.0
Total	-	4949	749			7565	47.3

Source: Calculated by Consultant

The results from Table 18 and Table 19 shows that the total area required for the provision of estimated housing units in phase-I is 61.3 acres including single storey housing units and multi storey apartments of different sizes. The overall area requirement of each phase based on the allocated percentages is mentioned below as follows;

Table 20: Phase Wise Areas for Housing Selected Scenario – Chitral Study Area

Selected Scenario (80% Horizontal and 20% Vertical Development)				
Phases	**Timeframe**	**Area (Acres)**		**Total Area**
		Single Plot Housing Unit	**Apartments**	
Phase – 1	2022-2027	58.26	3.00	61.26
Phase – 2	2027-2032	48.23	2.48	50.71
Phase – 3	2032-2037	52.06	2.68	54.74
Phase – 4	2037-2042	63.99	3.29	67.28
Total area Required		**222.54**	**11.45**	**234.00**

Source: Calculated by Consultant

3.6.3. Proposed Residential zone

The total area required is 234 acres, with 80% allocated for horizontal and 20% for vertical development. Infill development will utilize 377.66 acres of vacant land parcels over 1 acre within Neighborhood Councils (NCs). Parcels under 1 acre in NCs and Village Councils (VCs) are left undeveloped, allowing private owners flexibility in usage. Additionally, a 61.32-acre residential zone near the airport is proposed to enhance accessibility and optimize land use. Following are the zones proposed for selected scenario to accommodate incremental needs of housing of Chitral over the next twenty years;

Table 21:Zones for Selected Scenario -Chitral Study Area

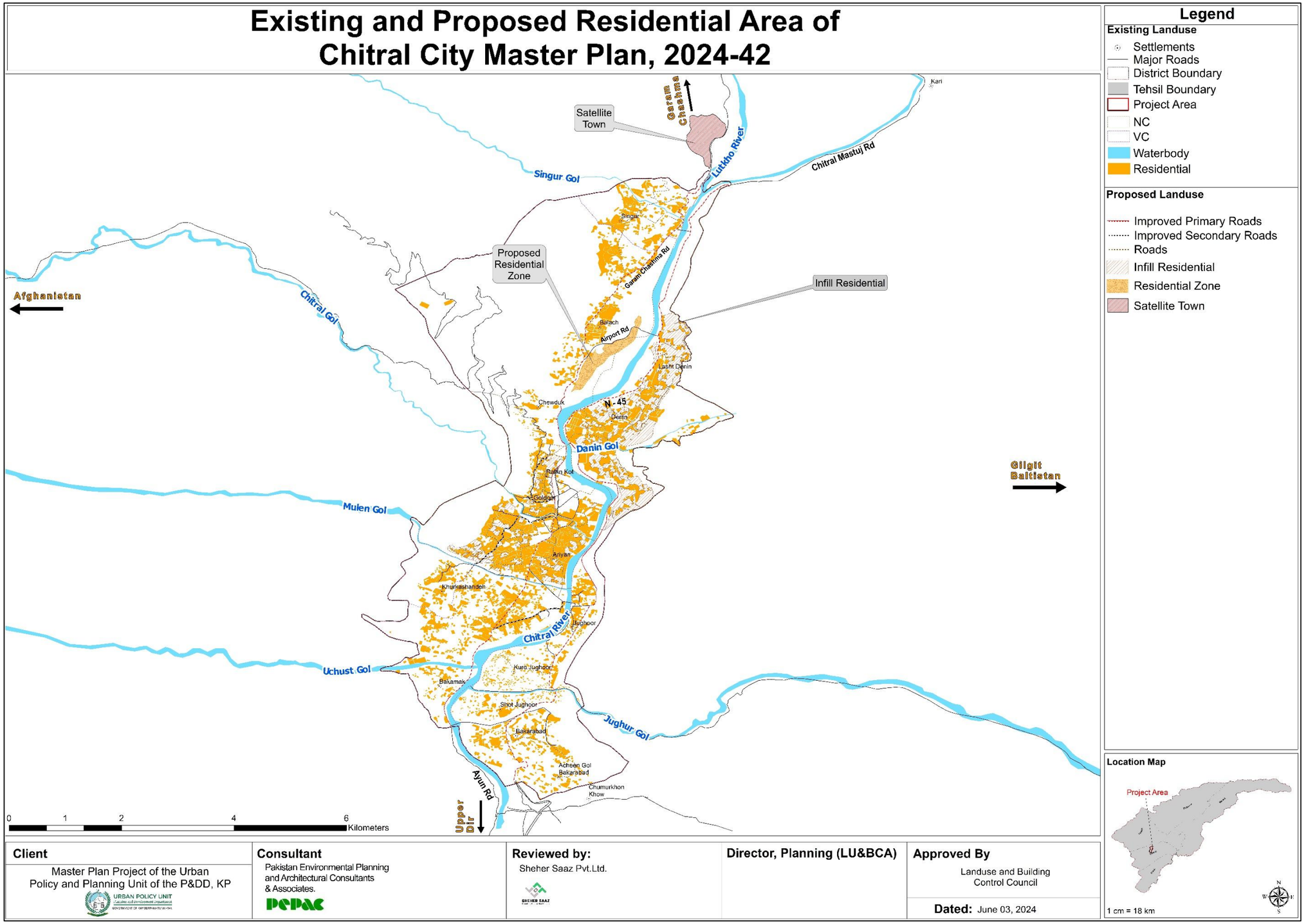
Infill zone	Area (Acres)
Infill Residential	358.72
Residential Zone	61.32
Total area	**420.04**

Source: Devised by Consultant

- **Proposed Satellite Town**

To address Chitral's growing population and tourist influx, a 75.55-acre Satellite Town is proposed near Chitral University, outside the city's boundary. This town will allocate 50-55% of its area for housing, catering to residents, employees, and tourists. Strategically located near the Balach area, it will provide essential amenities and convenient accommodation for visitors, addressing space constraints within the city and supporting sustainable growth.

Map 18: Proposed Residential Zone-Chitral Study Area



Source: Devised by Consultants

3.7. Zoning Regulations for Residential

Table 22: Permitted and Permitted on appeal Land uses for Residential

Permitted Land Uses	Permitted on appeal Land Uses
• Detached/semi-detached dwellings • Apartment buildings • Houses • Mosques • Primary/High Schools • Clinics/Dispensaries • Parks, open spaces • Local Convenience Shops • Parks and Playgrounds • Non-commercial vegetable gardens and nurseries • Urban Forest • Old age home or Orphanage	• Petrol pump, gas filling station • Community center • Taxi/rickshaw stand • Local Recreational Uses • Indoor Sports Facilities • Fire Station and Emergency offices • Swimming pools, fitness centers

Source: Devised by Consultants

CHAPTER 4: URBAN ECONOMY

4.1. Commerce and Trade

4.1.1. Existing Status

The existing commercial land use in Chitral is scattered over 158.07 acres, with Shahi Bazaar and Attaliq Bazaar serving as the two central business districts. Commercial areas in villages and neighborhoods mainly consist of general stores, hotels, restaurants, and filling stations, supporting local livelihoods.

4.1.2. Future Demand

From the year 2022 to 2042, the population of Chitral is likely to increase by approximately 28.036 people. The demand is determined by using the National Reference Manual (NRM) (Table. 10.4). According to the standard, 1 acre of land is recommended for every thousand people. Using total increase in population (2022-2042), commercial land requirement is calculated in Chitral city as follows:

Table 23: Future Demand of Commercial- Chitral Study Area

Population (2022)	Population (2042)	Increase in Population	Existing Commercial area	Requirement for increased population
56,450	84,485	28,036	158.07	28.36

Source: Calculated by Consultants

4.1.3. Proposals

The minimum requirement for commercial land use for a city like Chitral is 1%, which becomes approximately 66.74 acres with respect to the study area, and the maximum requirement is 5%, which becomes approximately 333.72 acres with respect to the total study area. The existing commercial area is approximately 1.14%. The total commercial area proposed is 41.30 acres. The Commercial cum Food Street, spanning 10.17 acres, is proposed to enhance economic activity, tourism, and social interaction in Chitral City. This vibrant zone will feature retail outlets, traditional food stalls, cafes, and restaurants, promoting local cuisine and cultural heritage. Designed as a pedestrian-friendly space, it will include wide walkways, seating areas, street lighting, and aesthetic landscaping. The following table shows the areas and locations of proposed commercial zones in Chitral city;

Table 24: Proposed Commercial Zones Area – Chitral Study Area

Existing Commercial Area	Proposed Zone	Proposed Zone Area (acres)
148.86	Central Business District	31.13
	Commercial Cum Food Street	10.17

Source: Calculated by Consultant

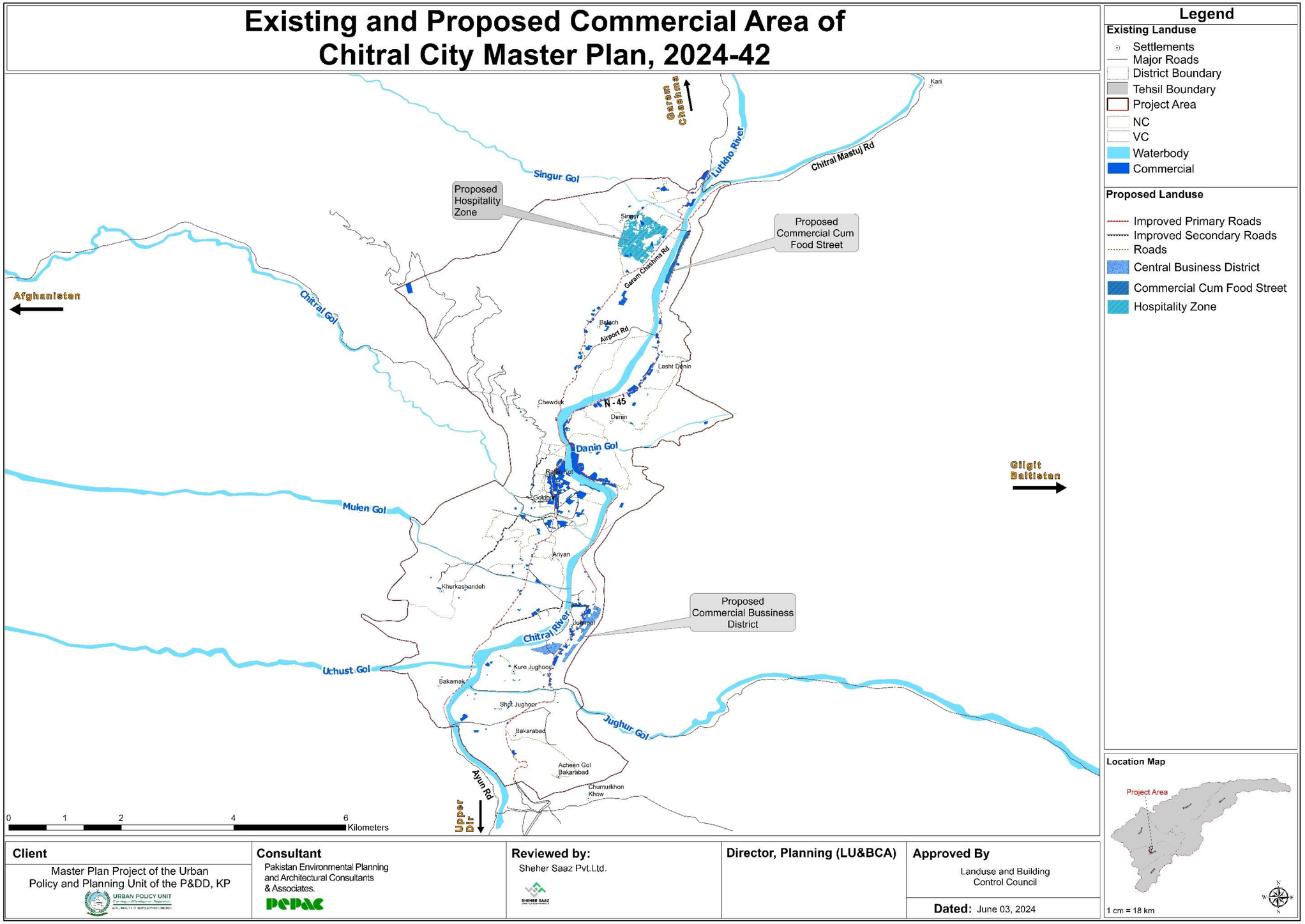
4.1.4. Zoning Regulations for Commerce and Trade Zone

Table 25: Regulations for Commerce and Trade Zone- Chitral Study Area

Land use Zone	Permitted Land Uses	Permitted on appeal Land Uses
Business and Trade Zone	• Wholesale/retail commercial markets and establishments • Restaurants/Hotels • Business and professional offices • Transportation Terminals • Recreational Uses • Public utilities and buildings • Approved parking provisions • Wholesale Dry Fruits shop • Cloth and handicraft shops (Wholesale/retail) • Car Showroom • Mosque • Fruit and vegetable market • Fish shops (Wholesale/retail) • Honey products shops (Wholesale/retail)	• Petrol and gas filling stations • Hospitals not treating contagious diseases or mental patients. • Restaurant • Hotel or motel • Hostel or guest house
Commercial Business District	• Shopping plazas, • Retail Dry Fruits shop • Shops and commercial centers, • Educational and research institutions (Colleges and Universities) • Public and religious buildings • Courier Service and Logistics offices • Auto workshop and service station, filling station • Printing press • Departmental stores • Pharmacies • Hardware stores • Private offices • Electronic shops • Mosque • Fresh Fish shops • Honey products shops	• Bakery or confectionery • Marriage Hall • Technical Vocation Institutions • Seasonal Commercial fare site • Recreational places, • Parks and open spaces, • Petrol filling stations, • Hospitals • Residences, • Bus terminals, • Cinemas, • Clinic or polyclinic • Service industries and firefighting arrangements governed by the building and space regulations

Source: Devised by Consultant

Map 19: Proposed Commercial Zone – Chitral Study Area



Source: Devised by Consultant

4.2. Industry Comprehensive Proposal

4.2.1. Existing Status

Chitral is presented with several growth opportunities, including the Lowari Tunnel, increased tourism, and CPEC. The proposed Chitral Economic Zone, having 40 acres, aims to attract public-private partnership projects to develop agriculture, tourism, and other sectors, creating employment opportunities and boosting the local and regional economies. Furthermore, CPEC can provide employment opportunities in various sectors in Chitral District, but the current functional industrial units lack female employment.

4.2.2. Agro-Industrial Processing and Trade Zone

A 49.99-acre industrial zone is proposed in Jughoor, south of Chitral's study area boundary, accounting for 2.8% of land use, in line with NRM standards for cities like Chitral. Located away from built-up areas to protect prime agricultural land, the zone is connected to the urban center via N-45. To ensure sustainable development, careful planning and management are emphasized. An Agro-Industrial Research Centre is also proposed to support innovation in agriculture and livestock, enhance crop yields, improve food security, and promote eco-friendly practices.

Table 26: Area of Proposed Industrial Zone– Chitral Study Area

Existing Area(acre)	Proposed Area(acre)	Total Area(acre)
12.8	49.99	79.89

Source: Calculated by Consultant

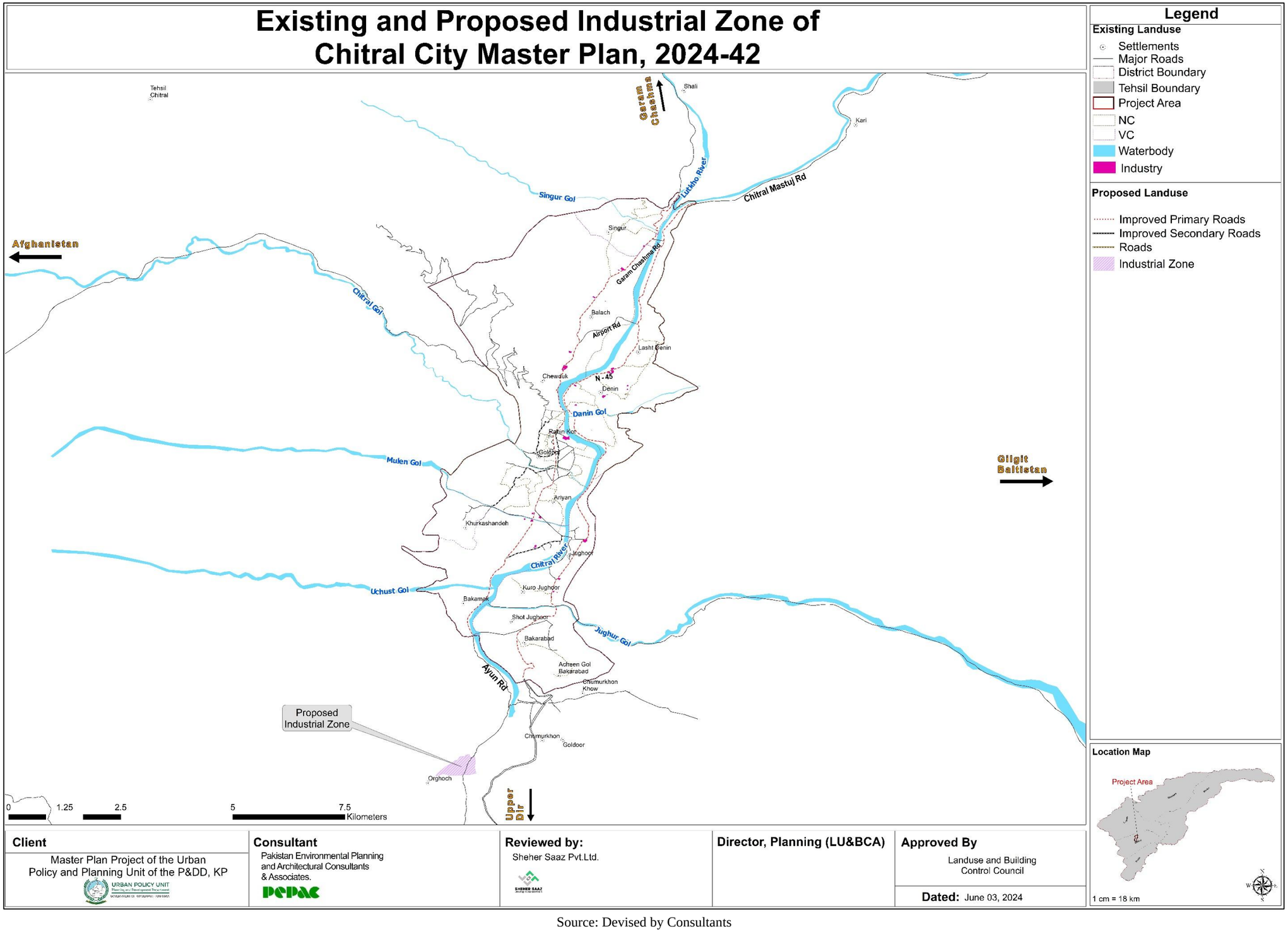
4.2.3. Zoning Regulations for Agro-based Industrial Zone

Table 27: Regulations for Agro-based Industrial Zone- Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Cottage Industrial Units • Warehouses and Storage • Agriculture (until the area is required for development) • Approved Parking • Loading and Unloading Provisions • Dwellings for watch and ward staff • Food processing unit • Agriculture research center • Cold storage, warehouses • Industrial research institute • Agro-business related • Livestock production • Mosque	• Banks • Bus and Truck Terminals • Railway passenger and freight terminals • Public Utilities and Buildings • Petrol and gas filling stations • Taxi stands • Grid station • Recreational facilities for employees. • Junk Yards • Auto-Mechanic Shops/Yards • Motor Bargains

Source: Devised by Consultant

Map 20: Agro-Industrial Processing and Trade Zone – Chitral Study Area



Source: Devised by Consultants

4.2.4. Hospitality and Tourism Zone

The hospitality and tourism sector are a vast sector that encompasses all commercial pursuits that either directly or indirectly support or are supported by travel and tourism. Keeping in view the importance of hospitality and tourism zone in Chitral, a zone of 72.79 acres has been proposed to promote tourism in Chitral. The zone can attract tourists and visitors, provide employment opportunities, generate revenue for the local economy, and stimulate the growth of related industries. The development of hotels, restaurants, and other tourism-related facilities in the zone can enhance the overall experience of tourists, leading to increased tourist satisfaction and repeat visits. The zone can also serve as a platform for promoting local culture and heritage, thus preserving and celebrating the unique identity of the region. The zone is located on the upper side of the study area boundary along Garam- Chashma Road. This zone will include the following facilities;

- Hotels & Resorts
- Tourist Facilitation Centers
- Restaurants & Catering
- Travel & Transportation
- Tourism
- Spas & Wellness
- Cruise Liners & Bus tours
- Events (Private, Business, Cultural & Sports)

4.2.5. Zoning Regulations for Hospitality and Tourism Zone

Table 28: Regulations for Hospitality and Tourism zone- Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Restaurant • Hotel or motel • Hostel or guest house • Bakery or confectionery • Parking plaza or parking site • Theater, auditorium • Cinema • Tours guide company • Mosque • Recreational places • Exhibition center • Retail and Souvenir Shops (for local selling products)	• Banks • Petrol filling stations • Hospitals • Parks and open spaces • Shopping plazas • Shops and commercial centers • Transport terminals • Service industries and firefighting • Departmental stores • Pharmacies • Stadium

Source: Devised by Consultant

CHAPTER 5: AGRICULTURE & PROTECTED ZONE

5.1. Agriculture Proposals

Chitral, Pakistan, is known for its fertile lands, river valleys, and wetlands, which support diverse ecosystems[8]. While much of the land has been converted for agriculture, the Chitral River, its watershed, and green spaces remain vital ecological assets.

To enhance agriculture, key goals include introducing modern farming techniques, high-quality seeds, and fertilizers, improving irrigation infrastructure, and promoting value-added products. Capacity-building programs, marketing networks, youth engagement, and sustainable farming practices are also essential. The government can further support urban agriculture by encouraging rooftop gardens, community gardens, and vertical farming through awareness campaigns and technical assistance[9].

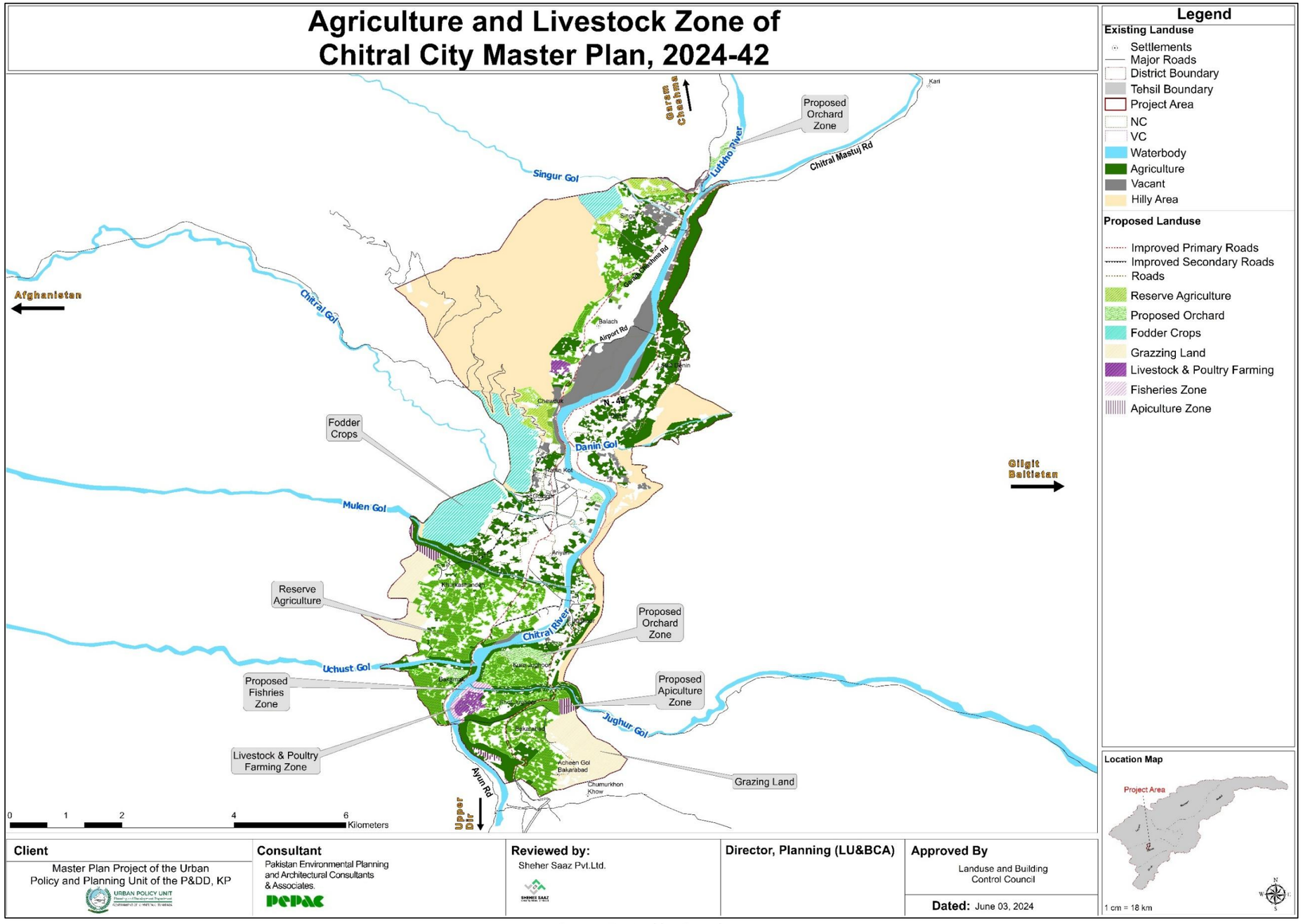
Chitral is renowned for apple and apricot production, with orchards playing a crucial role in maintaining fruit quality. They protect trees from pests and harsh weather while preserving traditional farming practices. Orchards also boost agro-tourism, attracting visitors to experience Chitral's scenic landscapes and fresh produce. Strengthening agriculture through modern methods and conservation efforts can ensure long-term sustainability and economic growth.

To enhance the agricultural economy and ensure sustainable livestock management in Chitral City, a Livestock Zone is proposed over an area of 39.27 acres. This zone will serve as a dedicated area for livestock breeding, veterinary services, fodder storage, and market linkages. Additionally, designated spaces for cattle and sheep farming, modern slaughterhouses, and dairy processing units will enhance the local supply chain.

Orchards have been proposed over an area of 65.76 acres. Sustainable irrigation methods such as rainwater harvesting and drip irrigation will be implemented to conserve water resources, while agroforestry practices will help prevent soil erosion. The orchards will serve as a hub for fruit processing, packaging, and market linkages, boosting local livelihoods. Additionally, recreational spaces with walkways and fruit-picking activities will be developed to attract eco-tourism, fostering economic growth while maintaining environmental sustainability

[8] https://www.ffc.com.pk/
[9] https://agrires.kp.gov.pk/

Map 21: Agricultural Area and Livestock Zones -Chitral Study Area



Source: Devised by Consultant

5.1.1. Thick Forestation

Out of the total area of Chitral, 60% of the area is covered by hilly mountains. Thick Forestation on hilly areas of Chitral has been proposed by the consultant. The proposed thick forests cover total area of 6250.54 acres which is proposed inside and along the study area boundary to create a buffer. Mountain forests provide diverse ecosystem services, delivering a range of both private and wider public benefits. These forests will influence both the quantity and quality of water supplies to mountain and lowland communities and industries. Moreover, recognizing the vital role of thick forestation in flood control, communities can promote forest conservation and restoration as a nature-based solution to build resilience against flooding and protect both people and the environment.

5.1.2. Agricultural Reserved Land

Agricultural reserve zone has been proposed in which agriculture will be recognized as the priority use. Farming will be encouraged, and non-agricultural uses will be restricted. The total area proposed for agricultural reserved land is 890.12 acres. Map 21 shows the Reserve Agriculture.

5.1.3. Proposed Fodder Crops

The inclusion of the Proposed Fodder Crops zone, spanning 388.38 acres, in the Chitral Master Plan is imperative for bolstering the agricultural sector and ensuring sustainable livestock management practices. This designated area is strategically allocated for the cultivation of crops specifically intended for animal feed. By dedicating a specific zone for fodder crop cultivation, the Master Plan aims to address the nutritional needs of livestock, ensuring their health and productivity. The cultivation of high-quality fodder such as alfalfa, oats, and sorghum will be facilitated in this zone, providing essential feed for cattle, sheep, goats, and other livestock species. Through targeted interventions and land management strategies, the Master Plan endeavors to optimize agricultural resources, promote livestock welfare, and strengthen the resilience of Chitral's agricultural sector.

5.1.4. Proposed Grazing Land Zone

In the Chitral Master Plan, the integration of the Proposed Grazing Land zone, covering 350.73 acres, underscores the commitment to sustainable land management and pastoral livelihoods. This designated area serves as a vital open space for livestock grazing activities, allowing animals to access fresh vegetation and maintain optimal health. Grazing lands play a crucial role in soil conservation, biodiversity preservation, and sustainable land use practices. By allocating a specific zone for grazing purposes, the Master Plan aims to protect and manage grazing resources effectively, supporting the livelihoods of local pastoral communities. Through the preservation of natural grazing areas, Chitral endeavors to uphold its cultural heritage, promote rural livelihoods, and ensure the long-term sustainability of its agricultural landscape.

5.1.5. Zoning Regulations for Agriculture and Protected Zone

Table 29: Regulations for Agriculture and Protected Zone- Chitral Study Area

Permitted Uses	Allied Permitted Uses	Prohibited Uses
• Develop land use for proposed agriculture in designated areas and prohibit the conversion of agricultural lands to non-agricultural uses. • Incentives for farmers to adopt modern technologies and improve their productivity. • Development of farmer's markets and direct marketing of agricultural products to consumers. • Agricultural research and development.	• Related land activities with respect to its rules and regulations • Agro-processing industries (e.g., food processing, textile manufacturing, etc.) • Renewable energy generation (e.g., solar panels on farms) • Rural tourism (e.g., farm stays, guided tours, etc.) • Forestry and agroforestry • Accommodation for farmers and labor in associations with MC.	• Conversion of agricultural land to non-agricultural uses, e.g. residential, commercial, or industrial development. • Use harmful agrochemicals or practices that degrade soil quality or pollute water sources. • Cultivation of crops or raising livestock that are not appropriate for the region or that require excessive amounts of water or other resources. • Any activities that are illegal or harmful to the environment or public health.

Source: Devised by Consultant

5.2. Aquaculture (Fish Farms)

5.2.1. Existing Status

Chitral city holds immense potential for revenue generation through fisheries. The Department of Fisheries is working towards the growth of fisheries by setting up fish farms in natural rivers and promoting tourism-focused excursion facilities. However, lack of funding has impeded private entrepreneurs' attempts to start fish farms. To boost income, it is essential to expand private farms and create a cold chain for fish transportation, particularly during the tourist season, when there is significant demand for trout and other fish.

At a ceremony held in Chitral in 2019, the Multi Year Humanitarian Program (MYHP) of the Food and Agricultural Organization of the United Nations (FAO) handed over two vertical flow fish incubators to the fisheries department[10]. The fish incubators were distributed in order to support and expand trout farming in the area using more advanced technology.

5.2.2. Proposal

In order to strengthen fish farming in Chitral, two zones for fisheries have been proposed covering total area of 26.81 acres. One of the zones is an extension of already existing vertical fish incubator in Jughoor VC, covering the area of 22 acres, inside the study area boundary. The other zone has been proposed outside the study area boundary. Visitors can enjoy watching

[10]Source through: https://www.fao.org/pakistan/news/detail-events/es/c/1207529

different bird species in their natural habitats and witness their unique behaviours, such as fishing, nesting and breeding. Moreover, the scenic view of the fish farms can also enhance the overall experience of visitors. Proper landscaping and aesthetic design of the area can create a visually appealing environment that visitors can enjoy while bird watching or engaging in other recreational activities. Following Map 22 show the locations of designated Fish Farms proposed in the Chitral City.

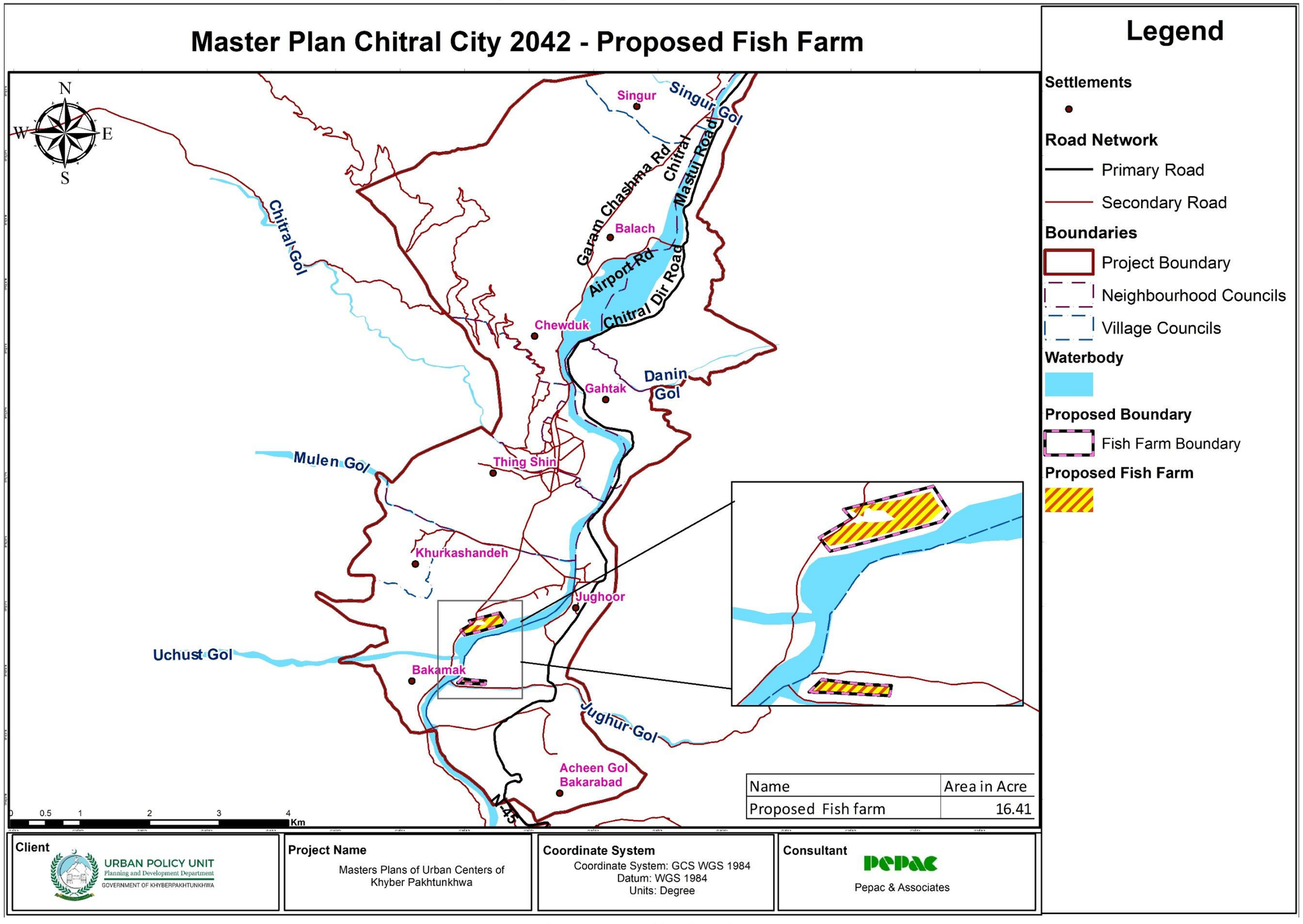
5.2.3. Zoning Regulations for Aquaculture (Fish Farm) Zone

Table 30: Regulations for Aquaculture (Fish Farm) Zone- Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Fish Farmhouses • Fish production • Fish farming • Fish Health Center • Aquatic Resource Development • Aquatic Veterinary Clinic • Mosque • Parks and open spaces	• Recreational places • Petrol filling stations • Hospitals • Transport terminals • Restaurants (offer live fish cooking), Dhaba • Local convenience shop • Hotels

Source: Devised by Consultant

Map 22: Proposed Fish Farms – Chitral Study Area



Source: Devised by Consultant

5.3. Apiculture (Honeybee Keeping)

5.3.1. Existing Status

In Chitral, keeping honeybees is a traditional and important activity. Honeybee colonies can survive in the area's natural scenery and diversified vegetation, which leads to the production of high-quality honey. In especially for small-scale farmers and rural households, honeybee rearing has provided the local communities with a source of income and employment. Additionally, it is a sustainable practice that promotes the pollination of regional crops and the preservation of the biodiversity of the area. Chitral's honey is well known for its distinctive flavor and therapeutic benefits. It is marketed both domestically and abroad, generating cash and opening up job prospects for the neighborhood. Additionally, the Small and Medium Enterprises Development Authority's report on the Chitral district profile highlights the investment potential in the honey beekeeping industry.[11]

5.3.2. Apiculture zone

An apiculture zone refers to an area designated for the production and cultivation of honeybees and their products, such as honey, beeswax, and pollen. The zone provides a platform for beekeepers to manage their hives, monitor their production, and implement best practices for the maintenance and sustainability of their bee colonies. The production of honey and other bee products in apiculture zones also contributes to the local economy by providing income for beekeepers and generating employment opportunities in related industries, such as honey processing and packaging.

The scenic splendour of Chitral where beekeeping is practiced, frequently draws tourists. By proposing an apiculture zone in Chitral, visitors would be able to see how honey is made and learn about the regional beekeeping tradition. This can provide visitors with a special and lasting experience and deepen their understanding of the value of bees and the environment. The apiculture zone may be able to generate capital through the sale of honey and other bee products, which would help the area's economy holistically. Additionally, apiculture zones promote biodiversity and the pollination of crops, benefiting the local environment and agriculture. In order to strengthen honeybee keeping in Chitral, the apiculture zone has been proposed covering a total area of 36 acres in Khorkashandeh and Jughoor. The Map 21 shows the locations of apiculture zones proposed in the Chitral Study Area.

5.3.3. Zoning Regulations for Apiculture (Honeybee Keeping) Zone

[11] District Chitral Profile, Prepared by SMEDA, 2009, source: smeda.org/phocadownload/Khyber_Pakhtunkhwa/Districts_Profile_Chitral.pdf

Table 31: Regulations for Apiculture Zone

Permitted Uses	Permitted on appeal Uses
• Bee keeping research center • Bee keeping training institute • Honey Storage Facility • Veterinary Clinic • Honey Production Plant • Bee keeping clusters • Flora park (flowering plants) • Mosque • Parks and open spaces	• Recreational places • Petrol filling stations • Hospitals • Transport terminals • Mosque • Local convenience shop

Source: Devised by Consultant

CHAPTER 6: SOCIAL INFRASTRUCTURE

6.1. Health Care Facilities

6.1.1. Existing Health Status

There is 1 DHQ located in the city of Chitral that comprises of 200 beds and 5 Surgeons. According to the WHO norm, there should be 10 doctors for every 10,000 people. The USA has 24 doctors per 10,000 people, the Russian Federation has 43, Pakistan has 7.4, Bangladesh has 5.8, and India has 624, but Chitral has only 1 doctor for 3500 people, which is ironic. The official reports in KP typically state that there is a staffing shortfall in the hospitals' Basic Health Units and Tehsil Headquarters (THQs). In Chitral, there are ten ambulances altogether[12].

Table 32: Existing number of health facilities and beds as compared to minimum requirements & standards-Chitral Study Area

Type of health facility and number of beds	Existing	Minimum Requirement	Standard
Basic Health Unit (BHU)	0	2	1 BHU for 25000 people
Rural Health Centre (RHC)	0	1	1 for 75000 people
District Head Quarter Hospital (DHQ Hospital)	1	1	1 for a District
Civil Dispensary	0	4	1 for 15000 people

Source: Devised by Consultant

Currently, there are no BHUs, RHCs in the study area.

6.1.2. Future Requirement of Healthcare Facilities in Chitral

The National Reference Manual's population requirement guidelines were amended to determine the city of Chitral's future healthcare needs according to the population. According to NRM standards, one Basic Health Unit is needed for every 25,000 people and one civil dispensary for every 15,000 people.

Table 33: Future requirements of health facilities in Chitral Study Area

Year	Population	Population Increase	Required		
			BHU (1/10000)	MCH (1/25000)	Dispensary (1/5000)
2017	50,507	-	5	2	10
2022	56,450	5,943	1	0	1
2027	62,713	6,263	1	0	1
2032	69,299	6,586	1	0	1
2037	76,222	6,923	1	0	1
2042	84,485	8,263	1	0	2
Total 2022-2042		28,035	3	1	6

Source: Devised by Consultant

[12] Khyber Pakhtunkhwa Open Data Portal, Lower Chitral, Health (2021) Accessed from (175.107.63.152/dataset?q=lower+chitral&sort=score+desc%2C+metadata_modified+desc&groups=health-and-public-safety&page=1) Accessed on 14 September 2022

As per the National Reference Manual, the size of DHQ should be 5-8 hectares but the size of DHQ Hospital Chitral is 4.41 hectares. So DHQ Hospital should be expanded area-wise.

Table 34: Health facility Standards according to NRM-Chitral Study Area

Sr. No	Health Institute Type	Number of proposed Facilities	Area Required by Each (acre)		Total Area Required for proposed facilities (Acre)	Total Area Required for proposed facilities (Acre)
			Minimum	Maximum	Minimum	Maximum
1	CD	6	0.02	0.05	0.12	0.3
2	BHU	3	0.3	0.6	0.9	1.8
3	RHC/MCH	1	2.47	2.47	2.47	2.47
4	DHQ	Exists	12.3	19.74	Additional Area	
					1.4	8.85

Source: Calculated by Consultant based on NRM Standards

6.1.3. Proposed Healthcare Zone

Chitral currently lacks Basic Health Units (BHUs), Rural Healthcare Centers (RHCs), and Civil Dispensaries (CDs), despite NRM standards requiring 5 BHUs, 1 RHC, and 10 CDs by 2022. By 2042, an additional 3 BHUs, 1 RHC, and 6 CDs will be needed. To address this, healthcare zones covering 25.20 acres are proposed across Village Councils for accessibility, with 18.0016 acres designated for immediate use. These zones will provide essential services, including BHUs, Mother and Child Healthcare (MCH) facilities, RHCs, and CDs, ensuring quality healthcare for the growing population.

Table 35: Area of Proposed Healthcare Zones – Chitral Study Area

Proposed Zones	Total Area (Acres)
Healthcare Zones	25.20

Source: Calculated by Consultant

6.1.4. Zoning Regulations for Health Zone

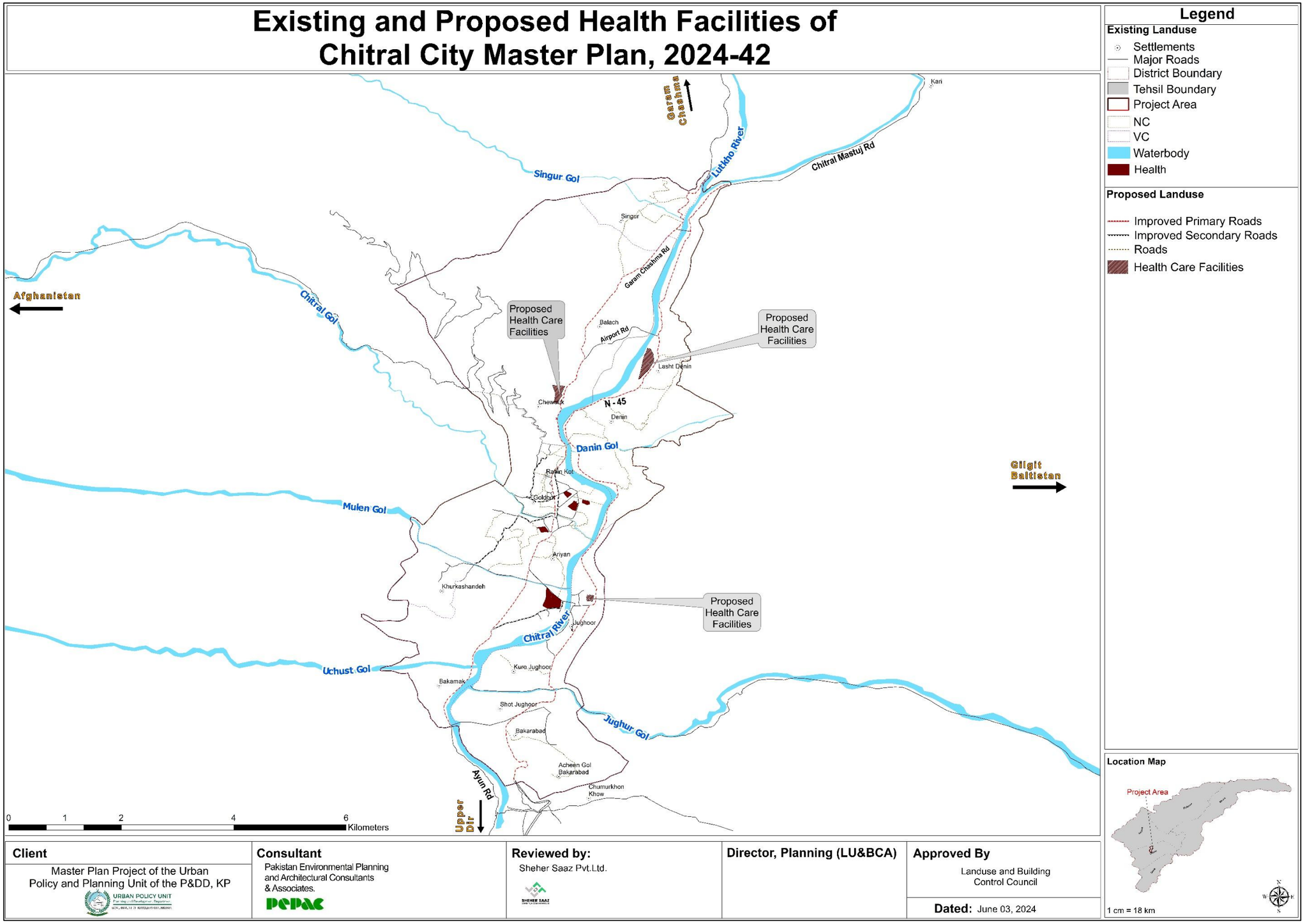
The permitted uses of the health area include staff residencies, hostels, community facilities, parking lots, and support facilities such as banks, petrol pumps, bus stops, clinics, and small green open spaces. However, large commercial activities and private housing are not allowed in this area as they are not considered appropriate land uses for health zone.

Table 36: Regulations for Health Zone- Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Dispensaries • Hospitals • THQ, DHQ • Staff Residencies • Student Hostels • Private Clinics • Waste Management Plant • Pharmacies • Research and Innovation Centers • Medical Institutes (Universities, colleges) • Parking lots • Mosque	• Support facilities (bus stops, parking lots, and small green open spaces) • Private Housing • Restaurant, café • Hotel, Guest House • Petrol Pump • Banks • Gymnasium • Commercial Activities

Source: Devised by Consultant

Map 23: Proposed Health Facilities – Chitral Study Area



Source: Devised by Consultant

6.2. Educational Facilities

6.2.1. Existing Education Status

Chitral has a literacy rate of 64.67%, which is higher than the average for Pakistani cities. It is a positive sign for Chitral, but it can be much higher if Chitral is provided with adequate and novel education facilities, services and infrastructure. There is 14 primary schools, 7 middle schools, 3 high schools and 2 colleges in the study area. According to the NRM standards, a primary school is required for a population of 7500. A middle school is required for a population of 17000 and a high school is required for a population of 74000. For a college, a population of 170,000-400,000 is required.

Table 37: Future Requirement of Educational facilities-Chitral Study Area

Year	Population	Population Increase	Required			
			Primary (1/3500)	Middle (1/7500)	High (1/15000)	College (1/25000)
2017 (Existing)	50,507		14	7	3	2
2022	56,450	5,943	2	1	0	0
2027	62,713	6,263	2	1	0	0
2032	69,299	6,586	2	1	0	0
2037	76,222	6,923	2	1	1	0
2042	84,485	8,263	2	1	1	0
Population Increase from 2022-2042		28,035	8	4	2	1

Source: Calculated by Consultant

Table 38: Area Requirement of Educational facilities

Education Institute Type	Area Required by One (acre)		No. of Educational Institutes (combined)										2022-2042	Total Area Req.
	Min	Max	2022	Area	2027	Area	2032	Area	2037	Area	2042	Area		
Primary	1.48	2.47	2	4.94	2	4.94	2	4.94	2	4.94	2	4.94	10	24.7
Middle	3.7	5.18	1	5.18	1	5.18	1	5.18	1	5.18	1	5.18	5	25.9
High	4.9	6.1	0	0	0	0	0	0	0	0	0	0	1	6.1
College	9.88	19.7	0	0	0	0	0	0	0	0	0	0	1	19.7

Source: Calculated by Consultant

6.2.2. Proposed Educational Zone

Chitral currently has 14 primary schools, 7 middle schools, 3 high schools, and 2 colleges. By 2042, an additional 8 primary, 4 middle, 2 high schools, and 1 college will be required to meet NRM standards. To address this, three educational zones covering 26.81 acres are proposed. These zones are strategically located in Village Councils for easy accessibility. In addition to

new schools, emphasis must be placed on improving education quality, teacher training, and resources, alongside integrating modern technology. Parental involvement and vocational training initiatives are also essential to equip students with practical skills and enhance economic opportunities, fostering a sustainable and prosperous future for Chitral. These points will be discussed in detail in Task D – Action Plan.

Table 39: Area of Proposed Educational Zones – Chitral Study Area

Proposed Zones	Total Area (Acres)
Educational Zones	**26.81**

Source: Calculated by Consultant

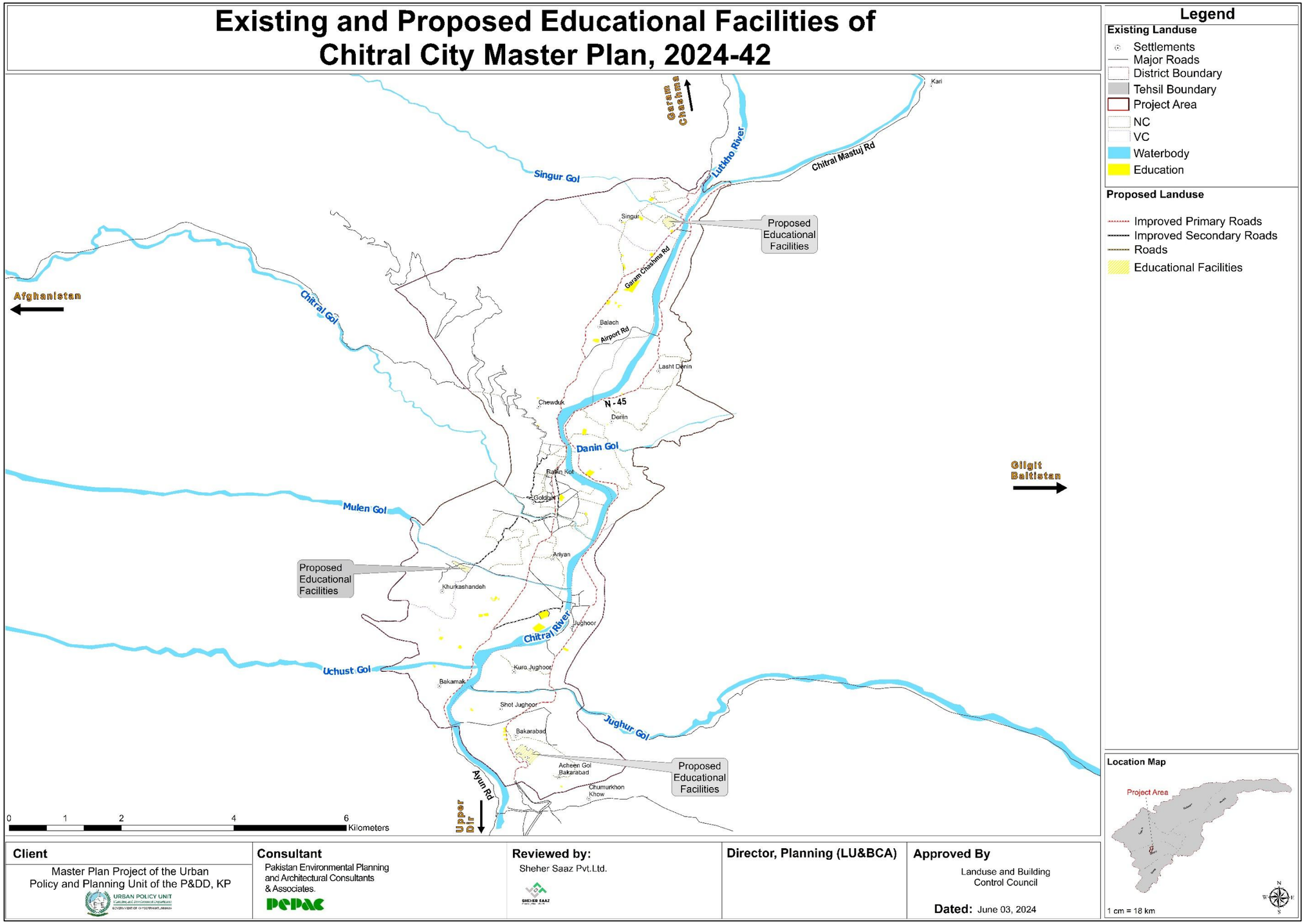
6.2.3. Zoning Regulations for Educational Zone

Table 40: Regulations for Educational Zone-Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Education related offices • Laboratory • Educational and Research Institutions • Schools • Day Cares • Colleges • Universities • Vocational Training institutes • Research centers • Offices of Social and Cultural Organizations • Religious Institutions like Madrassa • Parks, Memorials and Monuments • Public Utilities and Buildings • Libraries • Approved Parking Provisions	• Recreational Uses • Offices of Commercial Institutions • Restaurants • Theatre halls • Limited Retail Shopping • Community Facilities, Arts Councils and Auditoriums • Government Offices • Taxi Stands, Bus Halts

Source: Devised by Consultant

Map 24: Proposed Educational Zone – Chitral Study Area



Source: Devised by Consultant

6.3. Civic and Community Facilities

The purpose of a Civic Zone is to provide a designated area where people can participate in civic activities and communicate openly and easily with elected officials. In addition to fostering civic education, participation, and empowerment, a Civic Zone can act as a focal point for democracy, citizenship, and community involvement.

In light of the aforementioned reasons, a civic zone has been proposed, with the total area of 10.17 acres. The zones are located in Jughoor VC and along Garam Chashma Road in Balach and Singhoor. The proposed areas are important for sustainable development as mentioned in above model, aim to provide access to essential infrastructure and services for every citizen. Accessible civic facilities enable the delivery of services and improve the quality of life for citizens.

Table 41: Acres of Proposed Civic Zone – Chitral Study Area

Existing Civic & Community Facilities (acre)	Proposed Civic & Community Facilities Zone (acre)	Total Civic & Community Facilities Zone By 2042 (acre)
38.14	10.87	49.01

Source: Calculated by Consultant

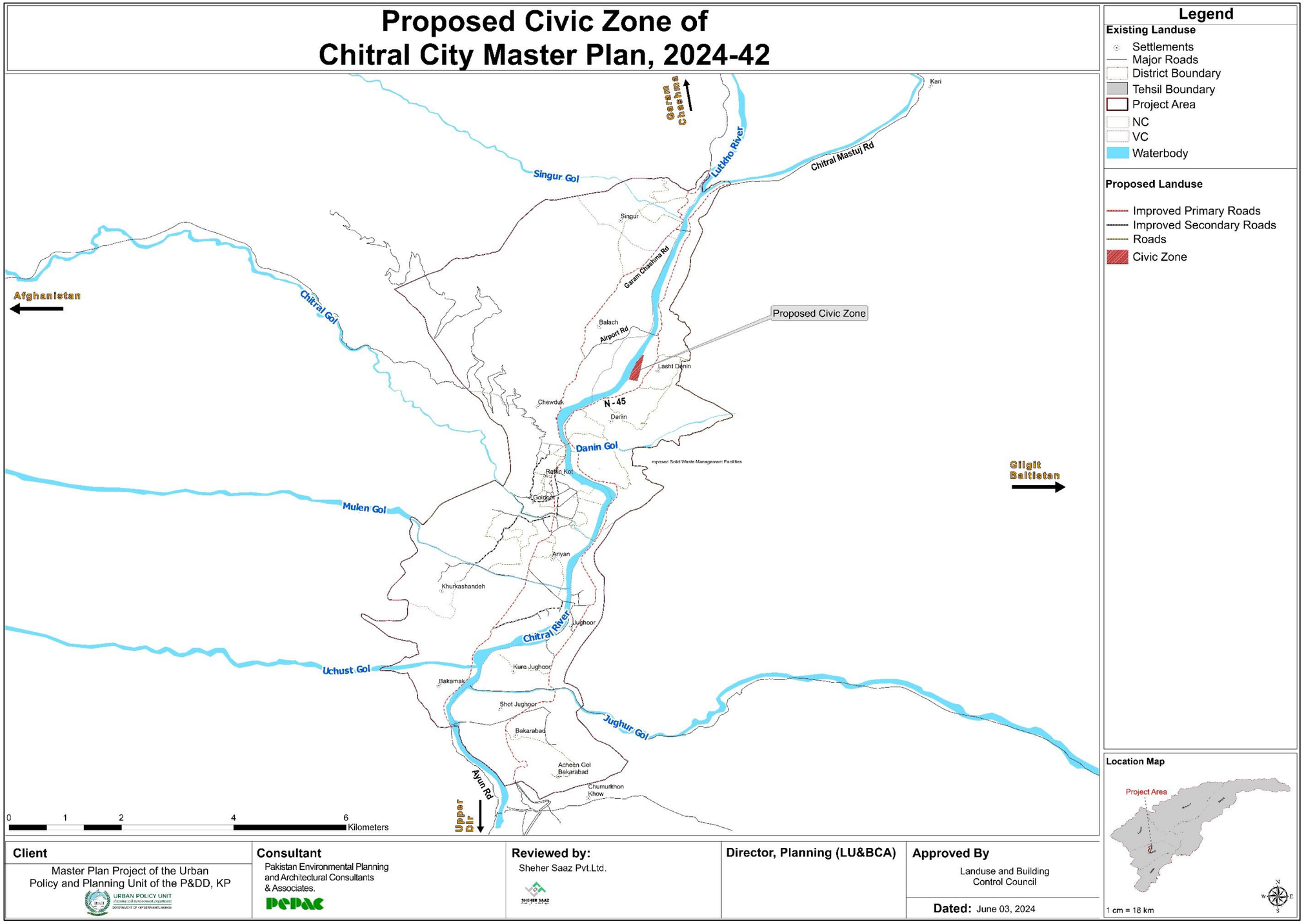
6.3.1. Zoning Regulations for Civic Zone

Table 42: Regulations for Civic Zone-Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Research centers • Offices of Social and Cultural Organizations • Parks • Public Utilities and Offices (electric supply,etc) • Post Office • Government Offices • Museum • Approved Parking Provisions • Emergency Facilities (fire station) • Libraries • Shelter home • Municipal office • Social welfare institutions • Police station • Mosque • Park, memorial and monument	• Vocational Training institutes • Recreational Uses • Offices of Commercial Institutions • Theatre halls • Arts Councils and Auditoriums • Convention Center • Restaurants • Limited Retail Shopping • Laboratory • Taxi Stands, Bus Halts

Source: Devised by Consultant

Map 25: Proposed Civic Zone – Chitral Study Area



Source: Devised by Consultant

CHAPTER 7: ENVIRONMENT & URBAN FORESTATION

7.1. Baseline Survey Results

The environmental baseline study of Chitral city assessed water, air, soil, and noise quality, revealing overall compliance with national and international standards. Groundwater and surface water met safety benchmarks, though future contamination risks from urbanization and industry require preventive actions. Air quality was within limits but may be impacted by transportation and industrial activities. Noise levels remained permissible across monitored locations. Soil analysis confirmed no contamination, with natural textures varying from silt loam to sandy loam. While current conditions are satisfactory, proactive measures and continuous monitoring are essential to mitigate future environmental threats. The detailed results of these surveys are mentioned in the Detailed Master Plan Report of Chitral City.

7.2. Environmental Proposals

7.2.1. Urban Forestation and Ecological Corridors

To accommodate Chitral's growing population and mitigate environmental impacts, a comprehensive urban forestation initiative is proposed. This includes extensive tree plantation along 134.6 km of primary and secondary roads, aiming to create green corridors and enhance the city's green cover. A total of 44,867 trees will be planted, following the National Highway Authority's guidelines to ensure tree species are suitable for local climate and soil conditions, promoting growth and sustainability. The initiative will reduce environmental impacts, improve air quality, provide shade, and offer habitats for wildlife. Additionally, rainwater harvesting is proposed to enhance water security. This effort aims to create a vibrant, sustainable, and eco-friendly urban environment.

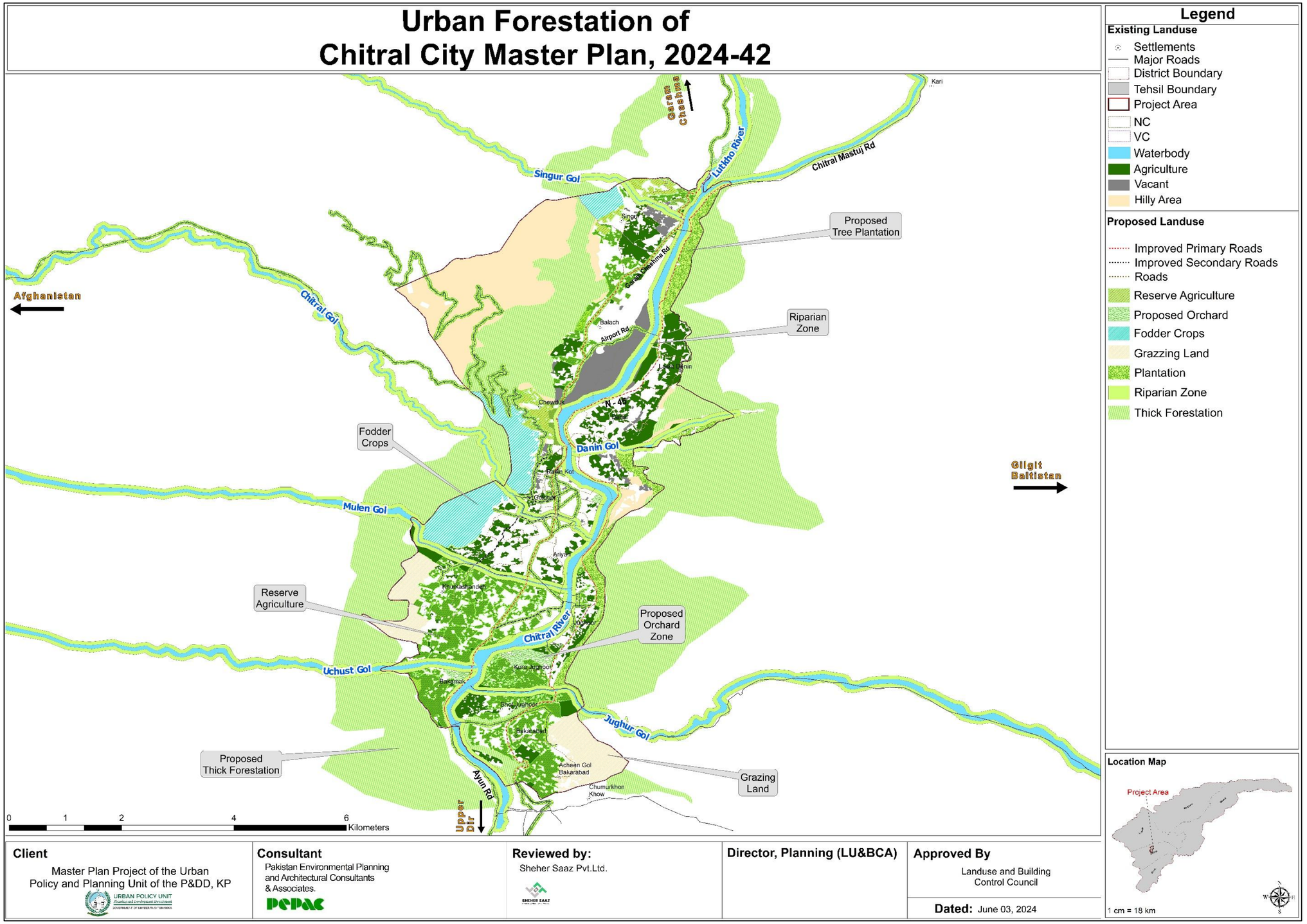
The area wise details of urban forestation zone are given in the table below;

Table 43: Proposed Urban Forestation Zone

Proposed Zones	Total Area (Acres)
Tree Plantation	2081.73
Thick Forestation	6250.54
Riparian	2790.54

Source: Devised by Consultants

Map 26: Proposed Urban Forestation Map of Chitral City



Source: Devised by Consultant

7.2.2. Wetlands

Wetlands in the Chitral valleys have been depleted for 4-5 decades, leading to potential climate change and damage to the fragile ecosystem. Chitral contains 20% of the total wetlands in the country, which is considered a major store of terrestrial carbon.

Major goals for wetlands protection include banning the destruction of wetlands for agriculture, maintaining water quality and preserving biodiversity, regulating land use, promoting community-based management, and saving peatlands to reduce the impact of climate change. Proposals to meet these goals include establishing protected areas, regulating land use, prohibiting wetland conversion, implementing best management practices, controlling invasive species, providing public education and outreach, and planting native trees and plants as buffer zones around wetlands.[13]

7.2.3. Wildlife

Wildlife conservation and protection is crucial not only for the survival of animals but also for maintaining a healthy environment. Conserving wildlife helps prevent flooding, fires, desertification, and droughts. In Chitral, the decline in local species is attributed to illegal hunting and deforestation, including the national animal Markhor. The main goal is to protect wildlife and prevent harm, including imposing a ban on hunting endangered species[14]. Proposed measures include prohibiting new developments in natural wildlife areas, penalizing illegal hunting, saving wildlife from harmful waste, stopping tree cutting and promoting alternative livelihoods for locals, and planting native trees and plants.[15]
A wildlife and Natural Park has been proposed covering an area of 1402.20 acres.

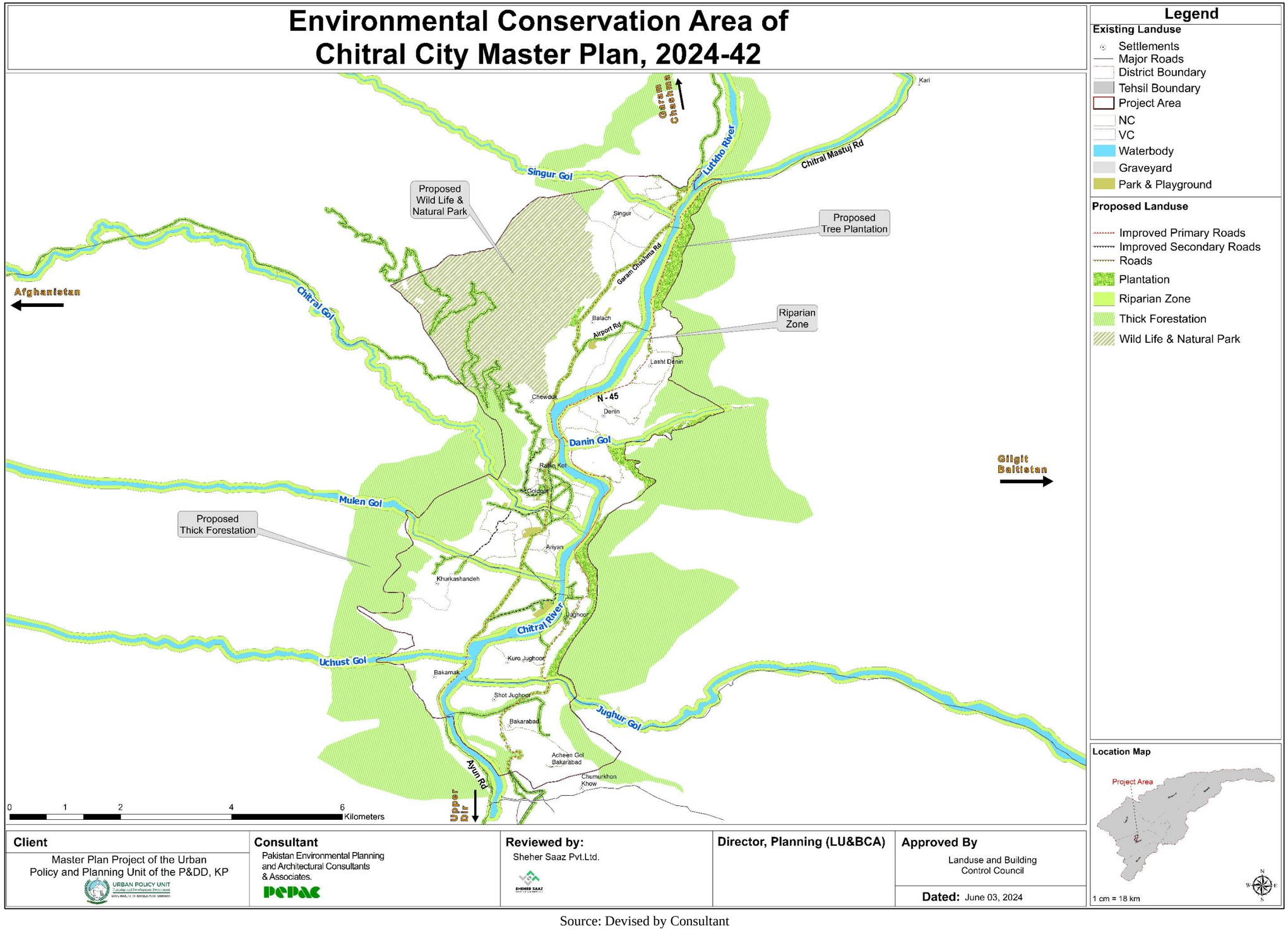
7.2.4. Environmental Conservation Areas and Floodplains

The Chitral district of Pakistan is home to many natural areas that are vital for conserving the region's biodiversity and wildlife. These areas include Chitral Gol National Park, Bumburet Wildlife Sanctuary, Chitral Wildlife Conservation Unit, Chitral Floodplain, and Kaghuzi Wildlife Sanctuary. Conservation of these areas and floodplains is essential for the protection of the region's unique ecosystem and biodiversity. The goals of conservation efforts are to conserve biodiversity, ecosystem services, promote sustainable resource management, protect habitats, raise awareness and educate the local communities, and reduce soil erosion. Proposed measures include the creation of protected areas, sustainable resource management, restoration of degraded habitats, soil and water conservation measures, and community involvement and education.[16] The communities about the importance of conservation is crucial for the long-term success of these efforts. The goal is to educate people about the value of biodiversity and ecosystem services and encourage them to participate in conservation efforts.

[13] https://www.dawn.com/news/1488469
[14] WWF-PAK
[15] https://en.wikipedia.org/
[16] https://www.worldwildlife.org/ecoregions/im0114

In a significant step towards environmental conservation and sustainable water management, 2.8 acres of land in Chitral city as a dedicated water recharge zone. This decision reflects the commitment to safeguarding the region's precious water resources and preserving its ecological balance. By designating this specific area for water recharge purposes, it is aimed to enhance the natural replenishment of groundwater, which plays a crucial role in maintaining local ecosystems and sustaining the needs of the community. This progressive move exemplifies the dedication to creating a greener and healthier Chitral city, where the well-being of both nature and its inhabitants is at the forefront of our development endeavors.

Map 27: Proposed Environmental Conservation Area Map of Chitral City



Source: Devised by Consultant

CHAPTER 8: PARKS & RECREATIONAL FACILITIES

8.1. Existing Status

The existing open and greenspaces in Chitral were identified during Land Use Survey under this project and an inventory was made of all such facilities on the basis of their major use. The inventory of existing parks and playgrounds are as follows:

Table 44: Existing Open/Green spaces –Chitral Study Area

Sr. No.	Facility Type	Number of Existing Facilities
1	Sports and Playgrounds (Cricket, Ground, Football Ground and Polo Ground)	17.26
2	Parks and Green Spaces	49.48
3	Total	66.74

Source: Calculated by Consultant through Land Use Survey

Levels of Service Facility Standards

The NRM standards depict the required size as well as the area of the playgrounds. However, it does not provide any standards for the parks. Moreover, the standards of playgrounds depict fixed area required for the certain population level and does not support increase or change in population except at 100,000 or 2,000,000 difference.

NRM standards have been used to calculate required area of parks and playgrounds including cricket ground, football ground, hockey stadiums and parks. As Chitral projected population till 2042 is under 100,000, NRM has propose community level playgrounds for the population around 100,000. Combined playground of 2.14 Ha is proposed in the NRM with the facilities of cricket, hockey and football ground. The following table summarises the provision of public facilities measured against the national standards modified according to our socio-cultural trends and demands;

Table 45: Level of Service Facility Standards by NRM

Sr. #	Facility Type	Area of Existing Facilities excluding polo ground	Area of Existing Facilities including polo ground	NRM Standards	Required Area
1	Combined Playgrounds	3.76	10.14	2.14 Ha for around 100,000 population	-

Source: Calculated by Consultant through NRM

The following table depicts the required number of facilities by Canadian Standards:

Table 46: Level of Service Facility Standards by Canadian Standards

Type of Facility	Existing	Standard (No./Pop)	Current Need (Based on the estimated population of 2022)			Future Need Estimation 2042	Additional Need
			Need per 50,000 population	Required no. of facilities	Existing Gap	Required no. of facilities	
Cricket Ground	5	1 / 100,000	0.5	0.06 ≈ 1	-	0.37 ≈ 1	-
Hockey Ground	0	1 / 100,000	0.5	0.06 ≈ 1	0.56 ≈ 1	0.37 ≈ 1	1
Football Field / Ground	3	1 / 50,000	1	0.06 ≈ 1	-	0.73 ≈ 1	-
Park	6	1 / 20,000	2.5	0.06≈ 3	-	1.84 ≈ 2	-

Source: Calculated by Consultant (Modified based on Canadian Standards)

As per Canadian standards, the required number of Hockey grounds for the existing population is approximately one, while no cricket and football ground is required for existing population. In parallel, around one hockey ground is required till 2042. While no cricket grounds are required for the population of 2042. Similarly, no additional parks are needed for the existing population and future population till 2042 as per standards.

8.2. Proposals

Chitral's proposed recreational zone spans 113.04 acres, exceeding the minimum requirement of 73.52 acres. This includes parks, playgrounds, a central park, and a Duck Hunting and Recreational Zone. These spaces promote physical activity, social interaction, and improved air and water quality.

Table 47: Area of Proposed Recreational Zone – Chitral Study Area

Proposed Zones	Area of Each Zone (acre)
Duck Hunting & Recreational Zone	100.05
Proposed Park	12.99
Total Area (Acres)	**113.04**

Source: Calculated by Consultant

8.3. Zoning Regulations for Parks and Recreational Facilities

The permitted uses in parks and recreational facilities include parks, playgrounds, amusement parks, public utilities, parking lot, and dwellings for staff. On the other hand, Restaurants and establishments selling eatables are permissible.

Table 48: Regulations for Parks and Recreational Zone- Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Recreational areas including parks, playgrounds and related uses. • Amusement Parks and Playlands • Youth hostels and clubs • Bus halts and car parking areas. • Dwellings for watch and ward staff. • Forest • Orchard • Zoological Garden • Swimming Pool • Picnic Hut • Shooting Range • Botanical Garden • Public utilities and municipal facilities • Gardens • Taxi and rickshaw stand • Stadium • Public utilities	• Bus halts and car parking areas • Restaurants and establishments selling eatables • Incidental recreational uses. • Graveyard • Adequate parking provisions

Source: Devised by Consultant

8.4. Sports and Culture Zone

Also, sports and cultural zone is designated for facilities and activities related to sports and cultural events. It can include spaces for sports fields, courts, and arenas, as well as cultural centers, museums, and theaters. The purpose of this zone is to provide opportunities for residents and visitors to engage in sports and cultural activities, promoting a healthy and diverse community. The planning and development of a sports and cultural zone can also have economic benefits, attracting tourism and creating job opportunities. Map 28 shows the location of the proposed sports and culture zone.

Table 49: Proposed Sports and Culture Zone – Chitral Study Area

Proposed Zone	Area of Each Zone (acre)
Sports & Cultural Zone	9.29

Source: Calculated by Consultant

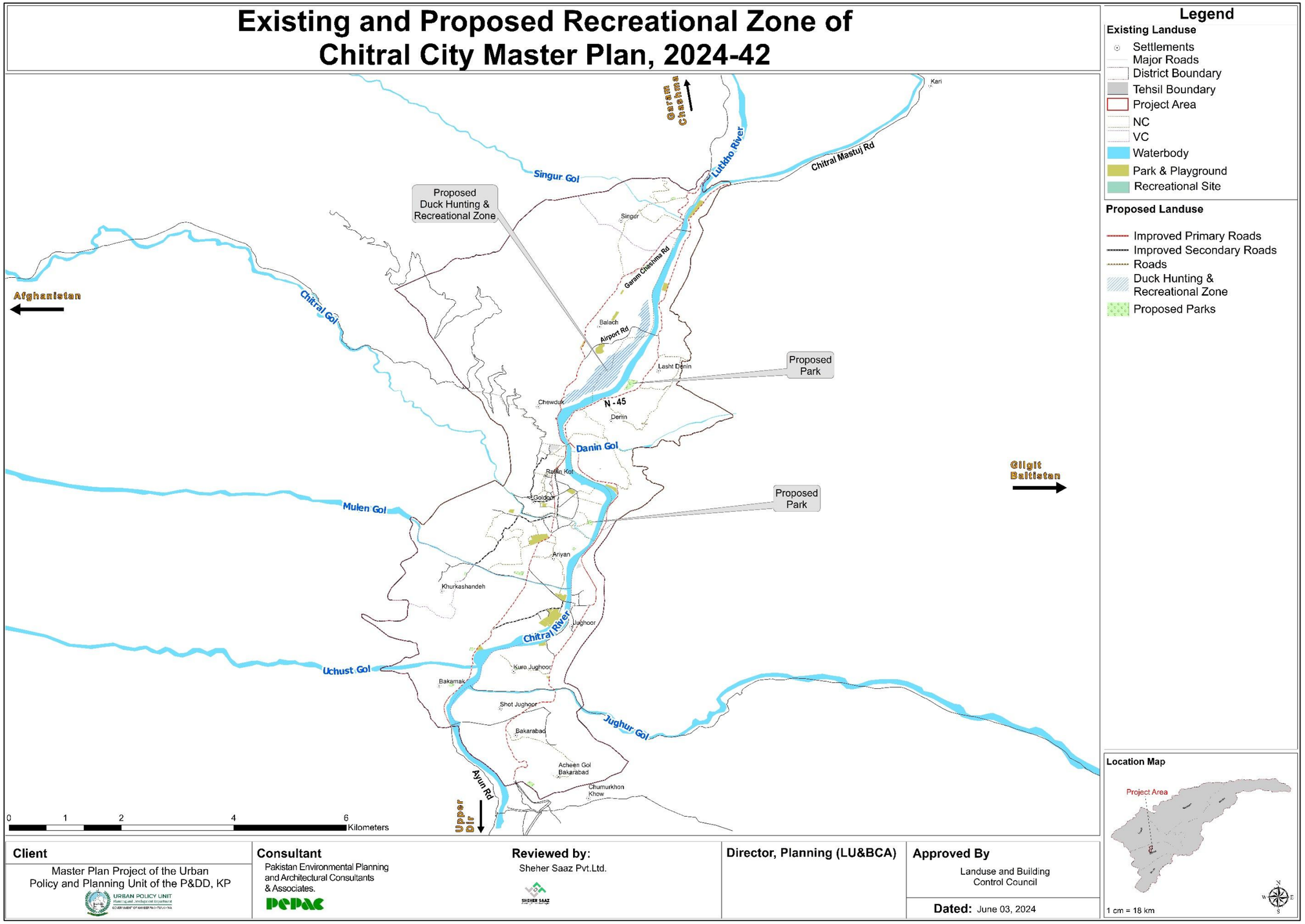
8.4.1. Regulations

Table 50: Regulations for Sports and Culture Zone - Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Sports fields and courts • Gymnasium • Stadium • Art Gallery, Convention Centers • Museum • Mosques • Sports Training Centers	• Bus halts and car parking areas • Restaurants and establishments selling eatables • Incidental recreational uses. • Youth hostels and clubs • Adequate parking provisions

Source: Devised by Consultants

Map 28: Proposed Recreational/Zone – Chitral Study Area



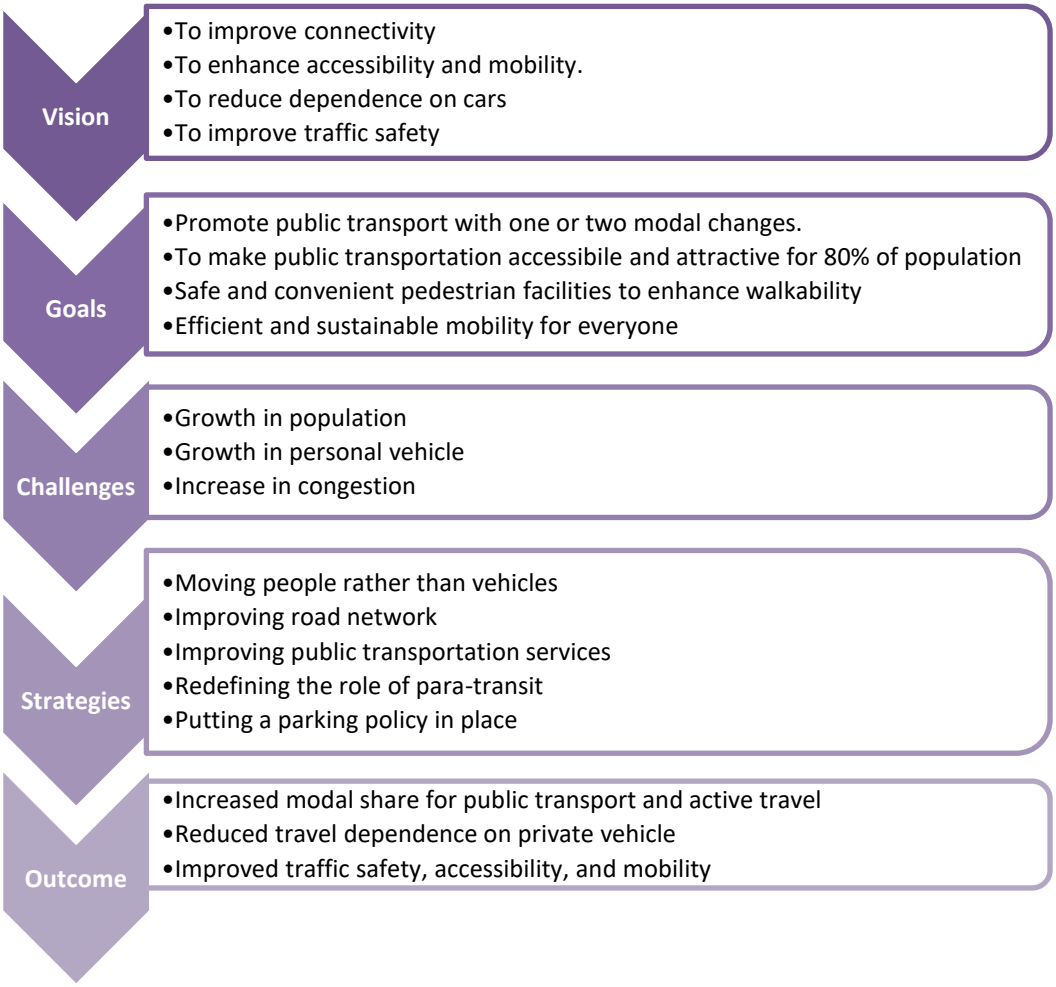
Source: Devised by Consultant

CHAPTER 9: TRANSPORTATION AND TRAFFIC MOBILITY - COMPREHENSIVE MOBILITY PLAN

9.1. Existing Conditions

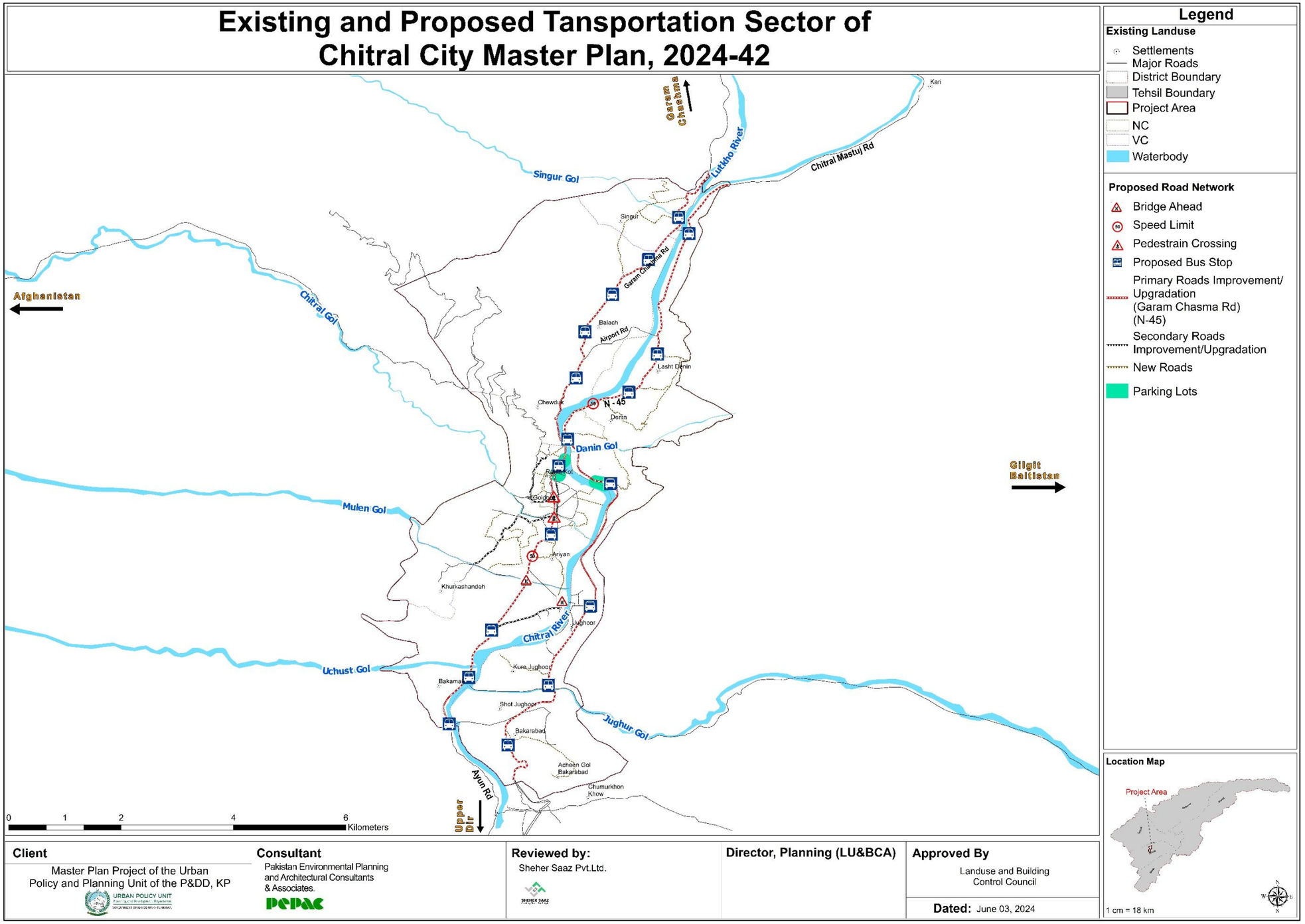
Chitral is experiencing increasing traffic congestion, particularly along major corridors such as Atani Road, Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45). Key intersections, including PIA Chowk, Attaliq Chowk, and Bypass Road, face severe bottlenecks during peak hours due to high traffic volumes, illegal on-street parking, and encroachments. The road network lacks essential infrastructure such as footpaths, traffic signals, and lane markings, leading to unregulated vehicle movement and unsafe pedestrian conditions. Public transport remains unstructured and inefficient, with no fixed routes or designated stops, forcing residents to rely on private vehicles. Additionally, weak traffic enforcement and the absence of a structured parking management system further exacerbate congestion. To address these challenges, a comprehensive approach has been proposed, focusing on road widening, intersection improvements, structured public transport routes, pedestrian-friendly infrastructure, and systematic parking management strategies to enhance mobility in Chitral.

Figure 3: Comprehensive Mobility Plan Approach



Source: Developed by Consultant

Map 29: Existing Transportation and Traffic Mobility Network – Comprehensive Mobility Plan



Source: Developed by Consultant

9.2. Proposed Interventions

The Comprehensive Mobility Plan for Chitral City aims to address these challenges by implementing a People-Centric Urban Transportation System. The proposed interventions are based on detailed studies, including Traffic Volume Counts, Level of Service (LOS) Analysis, Trip Generation Calculations, and Parking Demand Surveys. The details of these studies and calculations are provided in Draft Master Plan Report (DMPR) of the report. Below are the specific proposals:

9.2.1. Road Network Improvements

Existing Roads

The primary roads in Chitral, including Atani Road, Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45), serve as major corridors facilitating both intra-city and intercity connectivity. These roads experience significant traffic volumes, particularly near Shahi Bazar, Attaliq Chowk, and PIA Chowk, where commercial and administrative activities are concentrated. However, they lack essential infrastructure, such as footpaths, lane markings, and service lanes, which limits their ability to accommodate future traffic growth. Similarly, secondary roads, including Bypass Road, Degree College Road, Birmugh Lasht Road, Shahi Masjid Road, and Biron Shal Road, require substantial improvements to support multimodal transportation. The absence of proper pedestrian infrastructure and encroachments along these roads further constrains mobility. If suitable interventions are not introduced, traffic congestion, travel delays, and safety hazards will continue to worsen.

Proposed Improvements

Encroachment Removal: Illegal permanent and mobile encroachments along major commercial hubs such as Shahi Bazar, Attaliq Bazar, and Bypass Road will be cleared to restore the designed road capacity. This includes structures and stalls set up by shop owners, street vendors, and hawkers.

Footpath Provision: Dedicated pedestrian pathways will be constructed along primary and secondary roads, particularly in high-footfall areas such as Atani Road, Garam Chashma Road, and Chitral Dir Road (N-45) to ensure safe pedestrian movement.

Lane Markings: Clearly defined lane markings will be introduced throughout the road network to minimize weaving conflicts and improve traffic discipline. Lane widths will be standardized at 10 feet for secondary roads and 11 feet for primary roads to optimize capacity and regulate vehicle speeds.

Parking Management: On-street parking will be regulated, with paid parking being introduced along primary roads such as Shahi Bazar Road and Chitral Dir Road (N-45). Additionally, multi-story parking plazas will be developed near Ataliq Chowk and key commercial zones to accommodate increasing demand.

Public Transport Enhancement: Expansion of fixed-route public transport services, including Hiace and Suzuki wagons, will be prioritized to reduce reliance on private vehicles. New bus terminals and designated stops will be established on Atani Road and Garam Chashma Road to improve accessibility.

Traffic Law Enforcement: A strict enforcement framework will be implemented,

incorporating increased traffic police patrolling, installation of smart traffic cameras, and electronic ticketing for violations.

Missing Link Roads: Completion of key missing link roads, including those connecting Chitral Dir Road to outlying areas, will improve regional connectivity and reduce congestion within the city center.

Utility Relocation: To ensure unobstructed pedestrian and vehicular movement, all overhead utilities, including electricity, gas, sewerage, and water supply pipes, will be relocated underground, particularly along Shahi Bazar Road and Attaliq Chowk.

Access Control: Select sections of Chitral Dir Road and Atani Road will be converted into partially access-controlled roads, with designated entry and exit points via secondary link roads to streamline traffic flow and reduce congestion in high-density areas.

Road Widening: Expansion of primary roads such as Chitral Mastuj Road and Atani Road will accommodate future traffic demands, ensuring smoother traffic circulation and enhanced road capacity. The rationale and details are for these widened roads are provided in Draft Master Plan Report (DMPR).

9.2.2. Junction Geometry Improvements

Existing Conditions

Major intersections in Chitral, including PIA Chowk, Ataliq Chowk, Shahi Bazar Chowk, and Bypass Road, suffer from significant congestion, primarily due to illegal on-street parking, a lack of pedestrian facilities, and inefficient traffic management. Other critical junctions, such as Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45), also experience severe bottlenecks, especially during peak hours. These intersections currently operate at Level of Service (LOS) F, leading to extended travel delays, increased fuel consumption, and higher accident risks. Contributing factors include the absence of dedicated turning lanes, poor signal coordination, and unregulated pedestrian crossings.

Proposed Improvements

Signalization: Traffic signals will be installed at key intersections, including Ataliq Chowk and PIA Chowk, to regulate vehicle and pedestrian movement and improve traffic efficiency.

Lane Markings: Clearly defined lane markings, turning lanes, and directional arrows will be introduced across major roads and intersections, including Shahi Bazar Road and Chitral Dir Road (N-45), to enhance traffic discipline and reduce conflicts.

Pedestrian Crossings: Safe and accessible pedestrian crossings will be implemented at high-traffic intersections such as Bypass Road and Degree College Road, ensuring safer pedestrian movement.

Traffic Signage: Clear and visible directional, speed limit, and informational signage will be installed across the city to improve navigation and minimize confusion, particularly along primary corridors like Atani Road and Garam Chashma Road.

Additional Lanes: Approach and exit lanes will be added at major intersections to enhance capacity. Ataliq Chowk will have additional lanes to facilitate smoother traffic flow.

Slip Lanes: 60-foot slip lanes will be introduced at busy intersections to enable smoother turning movements and reduce delays.

Grade Separation: An underpass at Ataliq Chowk is proposed to accommodate increased

traffic demand and ensure uninterrupted movement along Shahi Bazar Road and Chitral Dir Road (N-45).
The feasibility of additional lanes, slip lanes, and grade-separated facilities was analyzed using SIDRA software, with detailed assessments available in Draft Master Plan Report (DMPR).

9.2.3. Public Transportation Improvements

Existing Conditions

Public transport in Chitral is currently limited to Hiace and Suzuki wagons, primarily operating on Atani Road, Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45). These vehicles lack fixed routes and designated stops, leading to inefficiencies and unreliable service. Additionally, public transport facilities in remote areas remain insufficient, forcing residents to rely heavily on private vehicles.

Proposed Improvements

Fixed Routes: Public transport vehicles, including Hiace wagons, Suzuki vans, and minibuses, will operate on fixed routes along major corridors such as Atani Road, Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45). Designated stops will be provided near key commercial and residential hubs to improve accessibility.
Policy Enforcement: Strict vehicle fitness certification, route permit enforcement, and parking regulations will be implemented to improve public transport quality. Additionally, high parking fees in congested areas will be introduced to discourage excessive private vehicle use.
Bus Services: Public transport bus services will be expanded along all primary roads, operating on structured routes to minimize congestion. New bus stops will be established at strategic locations, with the following proposed stops:

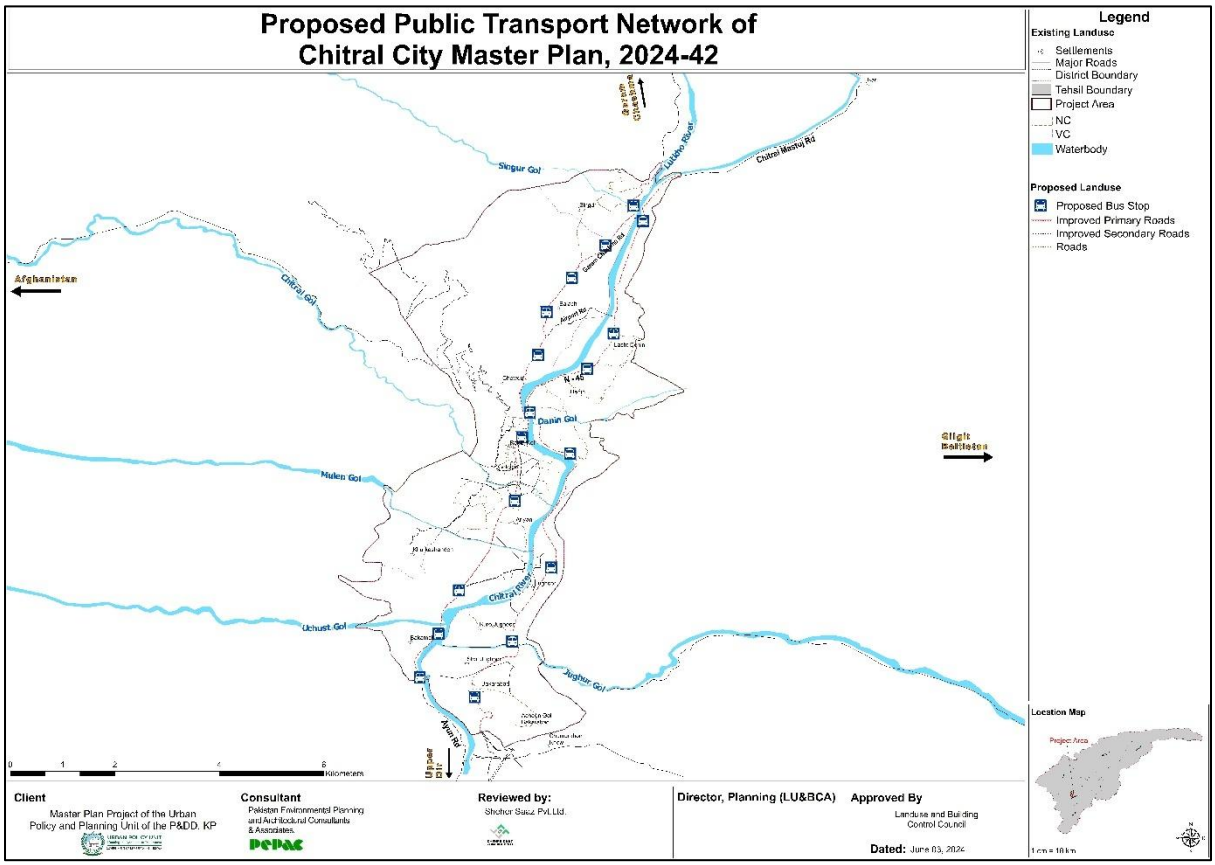
Table 51: Proposed Bus Stops Locations

Stop ID	Longitude	Latitude	Location
PBS-1	71.77	35.818	On Atani Road
PBS-2	71.773	35.825	On Atani Road
PBS-3	71.777	35.833	On Atani Road
PBS-4	71.786	35.848	On Atani Road
PBS-5	71.787	35.859	On Atani Road
PBS-6	71.79	35.873	On Garam Chashma Road
PBS-7	71.792	35.88	On Garam Chashma Road
PBS-8	71.796	35.886	On Garam Chashma Road
PBS-9	71.802	35.892	On Garam Chashma Road
PBS-10	71.807	35.899	On Garam Chashma Road
PBS-11	71.808	35.896	On Chitral Mastuj Road
PBS-12	71.803	35.877	On Chitral Dir Road
PBS-13	71.799	35.871	On Chitral Dir Road
PBS-14	71.789	35.863	On Chitral Dir Road
PBS-15	71.796	35.856	On Chitral Dir Road
PBS-16	71.792	35.836	On Chitral Dir Road
PBS-17	71.786	35.824	On Chitral Dir Road

PBS-18	71.779	35.814	On Chitral Dir Road

Public Transport Accessibility Expansion: A detailed network accessibility analysis has been conducted, ensuring that 85% of the population will have public transport access within a 10-minute walking distance once the proposed improvements are implemented.

Map 30: Proposed Public Transportation



9.2.4. Parking Management

Existing Conditions

The parking situation in Chitral presents a growing challenge due to poor management and lack of enforcement. On-street parking is common along Atani Road, Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45), particularly near Shahi Bazar and Attaliq Chowk, where vehicles frequently occupy road shoulders and pedestrian pathways, contributing to congestion. Illegal parking is widespread, with cars, motorcycles, and light freight vehicles parked haphazardly along major commercial corridors, further restricting road capacity.

Proposed Improvements

Time-Limited Parking: Maximum time limits will be imposed for parking in high-demand areas such as Shahi Bazar, Attaliq Bazar, and Bypass Road to prevent long-term vehicle occupancy and improve turnover rates.

Paid On-Street Parking: To regulate demand and discourage excessive on-street parking, paid parking zones will be introduced along Atani Road, Garam Chashma Road, and Chitral Dir Road (N-45).

Improved Signage: Standardized parking guidance signage will be installed at key locations to help drivers locate designated parking spaces efficiently, reducing unnecessary roadside stops.
Expansion of Existing Parking Facilities: To accommodate growing demand, existing vacant land near commercial centers will be converted into organized parking spaces.
Development of New Parking Plazas: To further ease congestion, new off-street parking plazas will be developed in high-traffic areas such as Shahi Bazar and Ataliq Chowk.
Smart Parking Systems: Advanced parking sensors and license plate recognition cameras will be installed for real-time monitoring and enforcement of parking regulations.
Integration with Public Transport: To reduce dependence on private vehicles, park-and-ride facilities will be developed near major bus terminals and public transport hubs, ensuring seamless connectivity for commuters.

9.2.5. Traffic Signage and Non-Motorized Transport

Existing Conditions

The traffic signage system in Chitral is insufficient and poorly maintained, with missing or faded directional, regulatory, and informational signs along key corridors such as Atani Road, Garam Chashma Road, Chitral Mastuj Road, and Chitral Dir Road (N-45). The absence of proper lane markings, stop signs, and speed limit signs contributes to traffic conflicts, making navigation difficult for both residents and visitors. Non-motorized transport (NMT) infrastructure is underdeveloped, with poorly maintained or absent footpaths, particularly in high-footfall areas such as Shahi Bazar and Attaliq Chowk. Pedestrian movement is further obstructed by illegal encroachments and street vendors, forcing pedestrians to share road space with vehicles, increasing safety risks. Cycling infrastructure is nonexistent, making it unsafe for cyclists to navigate through Chitral's roads. Despite its potential to reduce congestion and promote sustainable mobility, walking and cycling remain inconvenient and unsafe due to the lack of dedicated infrastructure.

Proposed Improvements

Traffic Signage: Comprehensive directional, informational, and regulatory signage will be installed at key intersections and along major corridors such as Atani Road, Chitral Mastuj Road, Garam Chashma Road, and Chitral Dir Road (N-45) to enhance navigation and regulate traffic flow. The proposed signage locations include:

Table 52: Proposed Traffic Signage in Chitral City

	
Signage Type: Directional Sign (U-Turn) **Coordinates:** 35.810982°N, 71.782167°E	**Signage Type:** Directional Sign (Left Turn) **Coordinates:** 35.821084°, 71.785941°E
	
Signage Type: Directional Sign (Right Turn) **Coordinates:** 35.836040°N, 71.791981°E	**Signage Type:** Informational Sign (Market Sign) **Coordinates:** 35.853668°, 71.786679°E
	
Signage Type: Directional Sign (Left Turn) **Coordinates:** 35.863263°N, 71.787672°E	**Signage Type:** Informational Sign(School Sign) **Coordinates:** 35.879750°N, 71.791358°E
	

Signage Type: Directional Sign (Right Turn) **Coordinates:** 35.905937°N, 71.811401°E	**Signage Type:** Informational Sign(School Sign) **Coordinates:** 35.886003°N, 71.795777°E
	
Signage Type: Directional Sign (Splitting Road Sign) **Coordinates:** 35.837151°N, 71.793246°E	**Signage Type:** Directional Sign (Speed Limit) **Coordinates:** 35.897295°N, 71.808497°E

Footpaths: Well-designed footpaths will be constructed along primary and secondary roads, particularly in high-footfall areas like Shahi Bazar, Ataliq Chowk, and Bypass Road, ensuring safe pedestrian movement and promoting walkability**.**

Pedestrian Crossings: Marked pedestrian crossings and refuge islands will be introduced at high-traffic intersections such as Attaliq Chowk and PIA Chowk to improve pedestrian safety.

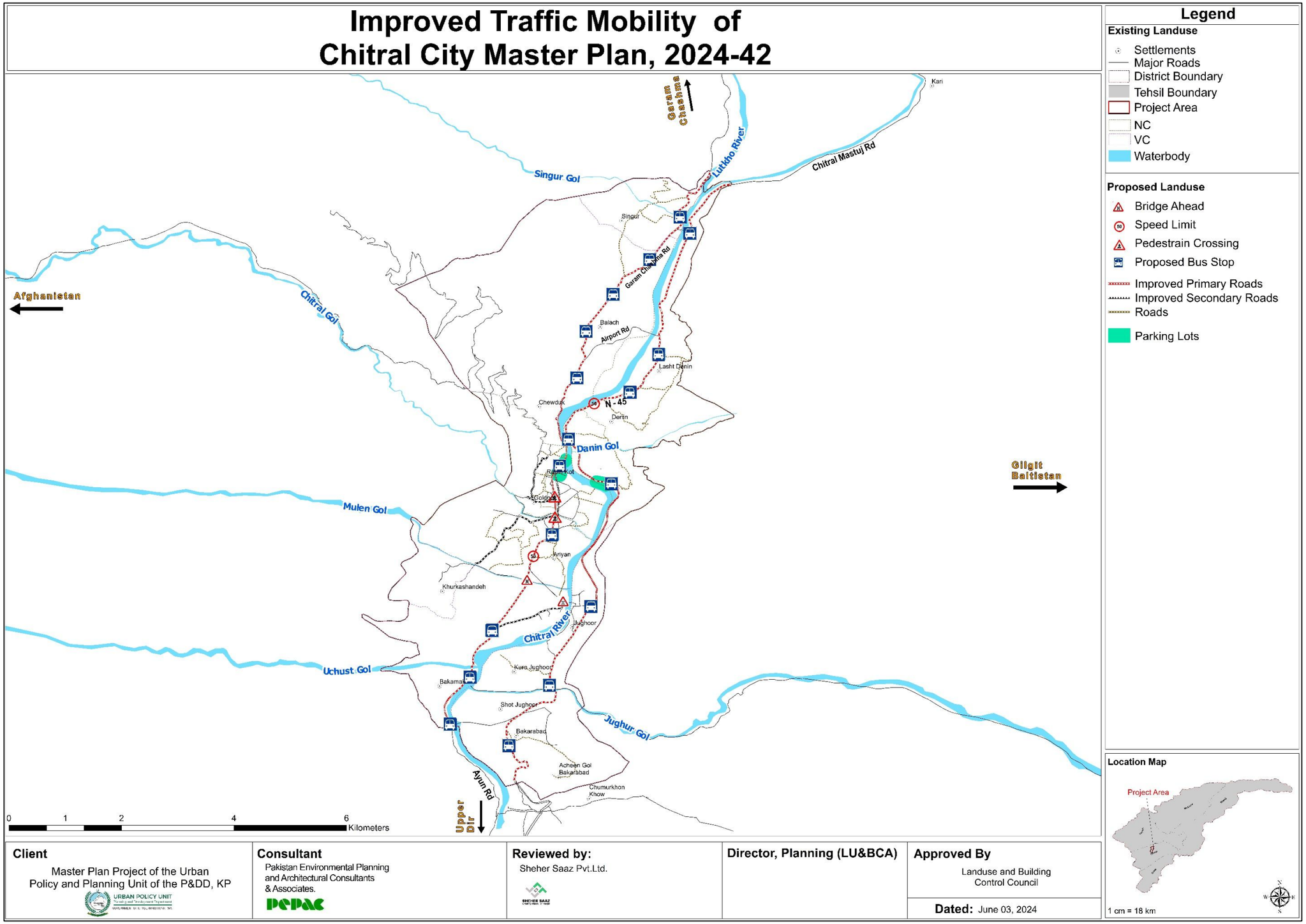
Encroachment Control: Strict removal of encroachments along footpaths and pedestrian zones will be enforced, ensuring unobstructed pedestrian access throughout commercial districts.

9.3. Improved Traffic Mobility

A comprehensive mobility strategy for Chitral integrates land use and urban design to improve accessibility and transportation efficiency. To align transportation planning with urban expansion, multiple improvements have been proposed. A balanced and well-planned roadway network is essential to enhance mobility, including widening primary roads, removing encroachments, and constructing footpaths to facilitate both motorized and non-motorized traffic. Service lanes along commercial corridors such as Atani Road, Shahi Bazar Road, and Chitral Dir Road (N-45) will improve access to adjacent land uses. Lane markings will be implemented to regulate traffic flow, with dedicated lanes for motorcycles, bicycles, private vehicles, and public transport to enhance safety and reduce conflicts. Pedestrian mobility will be improved by developing a network of footpaths along primary and secondary roads, increasing accessibility to commercial markets, educational institutions, and healthcare facilities. To streamline traffic movement, forced turns at minor intersections and designated U-turns at major junctions will be introduced to optimize traffic circulation. A structured public transport system will also be implemented, with fixed-route Hiace and Suzuki vans operating along major roads, while smaller feeder vehicles will provide last-mile connectivity. To efficiently manage parking demand, vacant land near commercial zones such as Ataliq Bazar and Shahi Bazar will be converted into parking plazas, reducing illegal on-street parking congestion. Additionally, a paid parking system will be introduced along high-traffic roads to

encourage public transport use. Lastly, to improve road safety and navigation, traffic signage will be installed at major roads and intersections, including speed limit signs, directional markers, and parking guidance signs. These interventions aim to create a sustainable, multimodal transportation network that reduces congestion, improves mobility, and enhances urban accessibility in Chitral.

Map 31: Improved Traffic Mobility of Chitral city



Source: Developed by Consultant

CHAPTER 10: WATER, SANITATION & SOLID WASTE

10.1. Existing Water Supply and Sanitation Situation

Water is essential for human survival, yet in Chitral, only 22% of residents are satisfied with the current water facilities, while 44% express dissatisfaction. Public water supply, managed by TMA, serves only 51.2% of people, with others relying on private tanks (24.1%), dug wells (17.1%), and alternative sources like springs (1.2%) and river water (4.1%). A 2006 KFW-funded program, executed by the Agha Khan Foundation, improved access by rehabilitating 65 water systems and constructing 40 new ones, benefiting 89,000 residents. However, villages with pump systems face frequent outages, forcing reliance on unsafe sources, increasing waterborne diseases.

10.1.1. Existing Water Supply Distribution System

The regulatory authority of water supply distribution system in Chitral is TMA. There are 6 surface water tanks within the study area. The water is supplied to nearest population through main distribution HDPE pipes with diameter of 3". The individual household connection is provided from the main distribution line through pipes of 2" or 1.5".

10.1.2. Existing Drainage System

A proper drainage system is essential for safe wastewater disposal, yet in Chitral, 47% of households lack drainage connections. Of the 53% with drainage, most rely on open drains, with only 3.53% using septic tanks or soakage pits, which still discharge into open fields and water bodies due to the absence of a sewerage system. Open drains, costly to construct, are often misused for garbage disposal and open defecation, causing blockages and an unhygienic environment. In 2006, open defecation was widespread, but a KFW-Agha Khan Foundation project installed 7,400 latrines, improving sanitation for 77% of the population. However, 25% of existing drains are clogged, and 40% need repairs.

10.2. Design Criteria of Water Supply and Sanitation services

This section provides the minimum design criteria and standards required for the water supply network, sewerage collection, disposal and treatment systems. Major aspects will include:

- To design water supply and sewerage systems, these can be operated with minimum operation and maintenance cost up to the planning horizon;
- Hydraulically the system should be capable of handling anticipated water demand and sewage load up to the planning horizon;
- The proposed wastewater treatment plant should deliver an effluent that will meet the National Environmental Quality Standard (NEQS) and WHO standards for reuse for irrigation purpose; and
- The entire system would be designed in a cost-effective manner.

The design criteria for the water supply and sanitation services in Chitral City focus on developing a cost-effective system with minimal operation and maintenance costs while ensuring compliance with National Environmental Quality Standards (NEQS) and WHO

guidelines. The planning considers long-term sustainability, efficiency, and affordability to meet the growing needs of the population.

The water supply system is designed with a 25-year planning horizon for civil works and 10 years for mechanical components. The projected population for the year 2042 is 84,485 persons, with a per capita water demand of 25 gallons per day (GPCD). Based on this, the estimated water requirement for the city will be 2.18 million gallons per day (MGD) by 2042. The primary source of water will be a well-distributed network of water tanks, strategically positioned based on hydraulic modeling and available land.

To ensure reliable supply, the system incorporates demand fluctuation factors, with a maximum daily demand of 1.5 times the average demand and a peak hourly demand set at 1.5 times the maximum daily demand. The network design also considers variations in usage throughout the day, fire emergency requirements, and night flow management. Maintaining a minimum pressure of 12 meters (40 feet) is essential to prevent negative pressure and guarantee a continuous water supply, even in emergencies.

The proposed tube wells will be spaced at an optimal 1,500 feet apart to ensure uniform groundwater extraction. Given efficiency and ease of maintenance, centrifugal (vertical turbine) pumps are recommended. Additionally, elevated water reservoirs (OHRs) will be incorporated to stabilize flow and pressure, with a storage capacity of one-tenth of the daily demand. This approach will help manage peak demands and mitigate supply interruptions caused by electricity outages.

Pipe materials under consideration include GI, HDPE, uPVC, AC, DI, MS, and GRP, selected based on durability, cost, and maintenance requirements. To optimize performance, flow velocities will be maintained between 0.5 – 2 meters per second in the distribution system and 0.3 – 1.5 meters per second in the transmission mains.

Overall, the proposed water supply system for Chitral City prioritizes efficiency, cost-effectiveness, and long-term sustainability. By incorporating well-planned demand forecasting, strategic tube well placements, adequate pressure management, and the use of durable materials, the system ensures a reliable and resilient water supply network aligned with PHED KPK guidelines. Further details are mentioned in the Detailed Master Plan Report of Chitral City.

10.3. Design Criteria Sewerage & Disposal System

i. Minimum Pipe Size

A minimum diameter for sanitary sewers is usually specified to avoid clogging by large objects. In conventional systems in the United States, the house connections are usually 6 inches in diameter, but smaller sizes have been used. As per PHED criteria, for conventional sewerage, the minimum diameter commonly specified for street sewers in many countries is 8-9 inches. In the simplified system, smaller sizes are recommended because, in the upper reaches of a system where flow is low, the use of smaller-diameter sewers results in greater depths off low and higher velocities and improve cleansing.

The minimum pipe size will be as below:

- RCC Pipe 9”
- Plastic Pipe 8”

ii. Peaking Factor

Multiply the average daily flow by the Peak factor to calculate the peak flow. Peak Factor depends upon the population; it decreases with increase in population. Following table has been provided in PHED KPK criteria to decide peak factor for calculating peak flow

Table 53: Variation in Peak Factors - Chitral.

Population	Peak Factor
5000	4.5
5000-10,000	4
10,000-25,000	3.5
25,000-50,000	3
50,000-100,000	2.5
More than 100,000	2

Source: Punjab Devolved Social Services Program (PHED KPK)

iii. Infiltration Rate

Infiltration rate into the sewerage depends upon size of the pipe line, rainfall in the area, situation of sub soil water table and others. The manufacturing of pipes under local situation does not meet the required norms and standards for jointing; the grooves are invariably not in the true form line and shape.

Accounting for the local situation, following criteria is suggested, which is in sequence with engineering practices:

- Above sub-soil water level 350 gallons/day/inch dia/mile
- Below sub-soil water level 700 gallons/day/inch dia/mile

A more rational approach is to relate infiltration with pie size / quantity of follow which is usually taken 10% of the flow. However, if plastic pipe is adopted, this allowance may be taken as zero.

iv. Wastewater Flow Estimation / Average Daily Flow

Normally about 80% to 90% of water supplied is received in sewers. As per standards and guidelines, the minimum per capita consumption shall be 17 gallons per day. The sewage quantity will be taken as 85% of average water consumption. The sewage quantity thus calculated will cover domestic & commercial use including infiltration. The average sewage flow in the design will be based on 80% of water consumption as above.

v. Trench Width

The trench widths for laying of pipes of various sizes in the network is shown in the

Table 54: Proposed Trench Width - Chitral

Pipe Diameter (mm)	Trench width (mm)
150	650
200	700

250	750
300	850
350	900
400	950
450	1050
500	1100
600	1250
700	1400

Source: Design Criteria as per Public Health & Engineering Department (PHED)

vi. Design Flow

Design flow is equal to the sum of peak flow and storm water allowance.

vii. Friction Formula and Minimum Gradients

Hydraulic design of pipes mainly concerns; resistance to flow in relation to available and required pressure/head and required and allowable velocity of flow.
Manning's formulae in the following form are the usual hydraulic tool:

$$V = 1 / n \times R\ 2 / 3 \times S\ 1 / 2$$

Where,

V = Velocity, ft/sec
R = Hydraulic Radius, D/4 (In case of circular x-section)
n = Friction co-efficient which is 0.013, when flowing full

The co-efficient of friction varies with internal surface of pipe, diameter of pipe and velocity. For the project area, Manning's formula will be practiced. The minimum adopted slopes to lay the sewer are mentioned in Table 83, given below:

Table 55: Minimum Slope Requirements

Size of Sewer (Inches)	Minimum Slope
9	0.00150
12	0.00095
15	0.00070
18	0.00054
21	0.00044
24	0.00037
27	0.00032
30	0.00028
33	0.000243
36	0.000215

Source: Design Criteria as per Public Health & Engineering Department (PHED)

viii. Velocity of Flow

Gravity sewer has been designed for a minimum velocity of 2.0 feet/sec and where falls are

available; the velocity may be increased with maximum velocity of 7 feet/sec, when running full.

The design velocity of flow in the sewerage system as per PHED criteria is:

- Minimum (in difficult situations) 2.0 feet/second,
- Desirable minimum 2.5 feet/second
- Maximum in hilly area 7.0 feet/second (for plastic pipes, may be more than this velocity)

ix. Minimum Cover over Sewer

Pipes will be laid at a depth to give a minimum cover of 3.0 ft over top of the pipe as per PHED criteria. Where minimum pipe cover is not available, the pipe shall be encased in cement concrete so as to provide adequate structural strength against load impacts. However, for a street where traffic load is not so significant and a shallow sewer is the requirement, this minimum cover shall be reduced to 2 ft.

The suggested cover over pipes is as under:

- Narrow streets with remote possibility of heavy traffic 2 ft
- Other locations 3 ft

x. Pipe Roughness Coefficient

The pipe roughness coefficient shall be as under:

RCC Pipes

- New Lines 0.013
- Old Lines 0.015

Plastic Pipes

- New Lines 0.009
- Old Lines 0.009

The roughness coefficient varies with the depth of flow whereas in the criteria it is stated to be constant. More practical approach is to vary the coefficient with the depth of flow.

Following are the recommendations for roughness coefficient:

- New Lines, RCC 0.013, when flowing full
- New Lines, Plastic 0.009, when flowing full
- Old Lines, RCC 0.015, when flowing full

xi. Class of Pipe

The applicable criteria will be as under:

Reinforced Cement Concrete: Pipes manufactured according to ASTM pipes Class II (C-76) are used locally. Higher classes are specified only for locations where excessive backfill and live loads are expected.

Plastic Pipe: Pipes manufactured as per applicable specifications i.e., polyethylene pipe shall be of high density and uPVC conforming to Class-B.

xii. Permissible Loads on Sewers

Permissible loads on different classes of sewers for various types of bedding are essentially

should be part of the criteria so as to provide guidance to engineers for selection of certain class of pipe for a particular situation and for a type of bedding. As per depth of laying pipeline and type of bedding, the class of pipe to be used will be decided.

xiii. Bedding for Sewers

Usually, above sub-soil water level and for sewers 9-12 inches diameter, sand bedding is adopted whereas for larger sewer sizes crushed stone bedding is used. The bedding is to be decided as per individual case taking into account the depth of sewer, traffic loads, soil condition, and class of pipe. Normally, following types of sewer bedding are in practice:

Type of Bedding	Load Factor
Shaped Bedding	1.5
Sand Bedding	1.7
Gravel Bedding	1.7
Crushed Stone Bedding	1.9

xiv. Jointing of Pipes

Usual practice for RCC sewer pipe jointing is either by bell and spigot or tongue and groove with rubber ring. This practice has successfully performed in the sewerage schemes since decades. Present practice of covering of joint with cement concrete is not favored.
The recommendation is as under:

a. RCC Pipes

Up to 24” dia Bell and Spigot with Rubber Ring Beyond 24” dia Tongue and Groove with Rubber Ring

b. Plastic Pipes

As per recommendation of the manufacturer/applicable specifications.

xv. Design Depth of Flow

Sewers will be designed to flow at 0.75 of full depth under peak flow conditions to provide requisite air gap under which condition the sewer will flow up to 90% capacity at peak flow. Thus, the design flow will be calculated by multiplying peak flow with a factor of 2.0.

xvi. Manholes

General

Manholes are an expensive component. They are now among the most familiar features of a sewer system, but they were not widely used in early sewers. They came into wide use with combined systems where they facilitated removal of grit. The criteria for manhole use have gradually become more conservative and have contributed significantly to the high cost of sewerage. The cost of manholes is a function of depth, spacing, and strength of design. The use of shallower depths is one way to reduce these costs.
Cement concrete manholes are usually adopted in the location and will be proposed for the project area. Following design criteria for manhole spacing is suggested: Not over 100' - For sewer up to 8" size.

Not over 200' - For sewers 12" size and above. Further details are provided in the Detailed Master Plan Report (DMPR) of Chitral City.

Material Selection

Pipe Materials

Selection of material is to be made not only on technical grounds but other considerations are to be kept in view so as to receive best value for the money. It is likely that on technical grounds, two options may be available and only one is to be identified which is suitable for a particular condition. For determination of suitable pipe material, a selection procedure is devised for the choice of material.

The type of pipes to be used for sewerage system depends upon the following factors:

a) Corrosion resistance
b) Capital cost
c) Local availability
d) Ease of installation
e) Efficiency of joints
f) Load sustaining ability
g) Useful life

Due to the strategic importance of pipelines and high capital investment involved, careful consideration is to be given in selection of pipe material so as to ensure reliable efficiency at appropriate cost. The selection procedure usually involves:

- Technical selection
- Operational considerations
- Structural design
- Cost comparison
- Implementation and monitoring

xvii. Sewage Pumping Station

Sewage pumping stations are provided for the following reasons:

1. To raise the hydraulic grade of sewers in the sewerage system
2. To dispose of the sewage in the receiving body
3. To introduce the sewage in WWTP

Commonly non-clogging centrifugal pumps are used. The impellers have two vanes so that waterways are large. Reciprocating and rotary pumps are not adopted to sewage pumping unless sewage is treated to remove suspended particles. Pumps are designed in positive suction to avoid priming. General design considerations for sewage pumping stations are as under:

1. The total Capacity of pumps should be equal to the peak sewage flow.
2. More than one pump should be provided.
3. One pump or one set of pumps should be for minimum flow. One for average flow and on set for peak sewage flow.
4. Standby pump should be provided. Capacity depends upon local conditions. Ideally capacity of standby pumps should be peak sewage flow. But according to PHED its capacity should be 50% of max. flow.

5. Electric power from two sources for the pumping station is recommended.
6. Pumps should be a self-priming type or should operate under positive suction head.
7. Each pump should have an individual intake.
8. The minimum size of suction should not be less than 4 inch.
9. Screens should be provided to remove particles 50mm or layer.
10. Two screens and two wet wells are preferable due to repair and maintenance.
11. Vents should be provided for wet and dry well.
12. The sump pump should be provided in dry well to pump out the leakage.
13. Size of the drywell should be adequate to accommodate all pumps.

xviii. Design Criteria for Sewage Treatment Facilities

General Design Basis

a) The process design of the wastewater treatment plants (WWTPs) shall be carried out at average sewage flows and pollution loads, whereas the hydraulic design of all the sewage conveyance and transfer components shall be carried out at peak flows.

b) WWTPs shall be designed primarily to bring the pH, BOD and TSS values of wastewater/sewage within the NEQS limits.

c) Economy of costs, capital as well as operational, maximum dependence upon local resources and efficient performance are kept in view while designing proposed sewage/sewage treatment facilities.

d) The process designs of component facilities are, primarily, based upon the design guidelines and methods, laid down in the following references:

[1] Mara D., (2004), Domestic Sewage Treatment in Developing Countries, Earthscan, UK & USA.

[2] Mara D., (1997) Design Manual for Waste Stabilization Ponds in India, Lagoon Technology International, Leeds, United Kingdom.

[3] Punjab Devolved Social Services Programme, (2008) Technical and Service Delivery Standards for Water Supply and Sanitation Sectors, Govt. of the Punjab, Lahore.

xix. Design Criteria for Key Wastewater Treatment Facilities

Based on past experience of similar sewage/wastewater treatment plants projects, qualitative and cost comparison of available Treatment Technologies is presented in following table**.**

Table 56: Qualitative and Quantitative Comparison of Available Treatment Technologies

Sr. No.	Parameter	Activated Sludge	Trickling Filter	Aerated Lagoons	Waste Stabilization Ponds
1	**Qualitative Comparison**				
a)	Area Requirement	Minimum	Moderate	Moderate	**Large**
b)	Process Mechanical Equipment	Yes	Yes	Yes	**No**
c)	Capital Construction Cost	High	High	High	**Moderate**

Sr. No.	Parameter	Activated Sludge	Trickling Filter	Aerated Lagoons	Waste Stabilization Ponds
d)	Operation and Maintenance Cost	High	Moderate	High	**Minimum**
e)	Process Energy Requirement	High	Moderate	High	**Nil**
f)	Operational Supervision &Control	High	High	High	**Minimum**
g)	Quantities of Sludge Produced	High	Moderate	High	**Minimum**
h)	Daily Waste Sludge Disposal	Yes	Yes	Yes	**No**
Cost Comparison					
a)	Capital Cost (Including Land Cost) - Million Rs.	11,550	10,164	9,240	**2,400**
b)	Annual Operation & Maintenance Cost – Million Rs.	570	456	460	**33**
c)	**Area Requirement - Acres**	**70**	**91**	**100**	**199**

Source: Desk Study by Consultant

To bring the pollution concentration of wastewater/sewage within National Environmental Quality Standards (NEQS) and to use for agricultural purposes as per WHO standards, treatment technology based on Waste Stabilization Pond systems are recommended for Sewage Treatment Plant (STPs) of Chitral City on basis of above given comparisons. Waste stabilization ponds (WSPs) are large earthen basins in which raw wastewater is treated entirely by natural processes involving algae and bacteria. They are amongst the most important methods of wastewater treatment in hot climates. However, since the oxidation rate is slow, large areas are required for their construction. Their specific advantages are simple operation and low operation & maintenance costs.

In view of the above technical discussion of treatment technologies, it is proposed to locate Waste Stabilization Ponds (WSP) in the outskirts of the city and near the water body.

a. Design Flows

The process design of the key sewage treatment facilities i.e., Anaerobic, Facultative and Maturation Ponds, will be designed on average sewage flows. In contrast, hydraulic design of sewage conveyance and transfer components i.e., Distribution Chamber, Inlet Channel, Outlet Channel and Overflow Channel, will be designed on peak flows.

b. Design Temperature

Design temperature plays a critical role in the design and performance of WSPs. Design temperature plays a critical role in design and performance of WSPs. Mean temperatures of Chitral are in the range of 1˚C – 35 ˚C.

c. Design Criteria for Anaerobic Ponds

Anaerobic ponds are provided for primary sewage treatment in the absence of oxygen. Anaerobic grow under such conditions and use organic matter to produce mainly biomass and Methane (CH4). Anaerobic ponds are generally employed for destabilization of high strength sewage and a good process control is required mainly for temperature and pH control. Anaerobic ponds are common in domestic sewage treatment and recommended for developing countries. Efficiencies comparable to Primary Settling Tanks (PSTs) may be achieved in Anaerobic Ponds at less operational costs.

Anaerobic ponds, primarily designed for BOD removal, receive such a high organic loading (usually >100 g BOD/m3d) that they contain no dissolved oxygen and no algae. Almost 50% BOD removal could be achieved in well-designed and well-maintained anaerobic ponds. Criteria for Anaerobic Ponds have been established keeping in view the international practices and Technical and Service Delivery Standards published by the Government of Punjab.

Anaerobic Ponds will be designed based on volumetric loading rate. The volumetric loading rate has been calculated by the relationships in Table 8. BOD removal in anaerobic ponds varies for different design temperatures.

Table 57: Permissible Volumetric Loading Rates and % BOD Removal at Corresponding Temperatures (Mara et al, 1997)

Temperature (°C)	Volumetric Loading (g/m day)	BOD Removal (%)	Adopted
< 10	100	40	-
10 – 20	20T – 100	2T + 20	√
20 – 25	10T + 100	2T + 20	-
> 25	350	70	

Source: Technical Studies of Water Resources in FATA, IUCN, 2019

Other Design Parameters/Criteria used for Anaerobic Ponds are presented in table as under:

Table 58: Other Design Parameters for Anaerobic Pond (Mara et al, 1997)

Parameter	Unit	Range	Adopted
Water Depth	m	2 - 5	5.0
Free Board	m	0.5 - 1	0.5
Length to Width Ratio	-	2 – 3:1	1.5-1.70
Hydraulic Retention Time (HRT)	Day	>1	1
Sludge Accumulation Rate	m3/capita/day	0.03 – 0.04	0.04

Side Slope	m	2 - 3	3.0

Source: Desk Study by Consultant

d. Design Criteria for Facultative Ponds

After primary treatment in Aerobic Ponds, sewage is carried to Facultative Ponds for secondary treatment.

Facultative Ponds are employed for medium organic loadings where a mutual relationship prevails between algae, which provide oxygen, and facultative bacteria, which provide nutrients for the algal growth. Organic matter is consumed primarily by facultative bacteria. Resulting effluent, thus, have very less BOD. Facultative ponds are provided after anaerobic ponds

Facultative ponds are designed for BOD removal on the basis of a relatively low surface loading (100 - 400 kg BOD/ha. d) to permit the development of a healthy algal population as the oxygen for BOD removal by the pond bacteria is mostly generated by algal photosynthesis. The facultative ponds will be designed based on surface loading rate. The surface loading rate will be calculated by the following relationships (Mara, 1997):

SLR= 350 [1.107-0.002T] (T-25)

Where:

SLR = Surface Loading rate in kg BOD/ha/day

Other Design Parameters/Criteria used for Facultative Ponds are presented in Table 10 as under:

Table 59: Other Design Parameters for Facultative Pond

Parameter	Unit	Range	Adopted
Water Depth	m	1 - 2	2.5
Free Board	m	0.5 - 1	0.5
Length to Width Ratio	-	>1.5	5.9-7.0
Hydraulic Retention Time (HRT)	Day		8
a) For Temp < 20 ºC	Day	> 5	-
b) For Temp > 20 ºC	Day	> 4	-
BOD Removal Efficiency	%	70 – 90	76.75
Side Slope	m	2 - 3	3.0

Source: Desk Study by Consultant

e. Design Criteria for Maturation Ponds

Maturation Ponds receive sewage from facultative ponds and are used to remove the excreted pathogens and very little BOD. Removal of fecal coliform can be estimated by following relationship

Ne = Ni / [{1+k.(HRTAP)} + {1+k.(HRTFP)} + {1+k.(HRTMP)}]

Where:

Ne = Fecal Coliform concentration in Effluent (FC/100ml)
Ni = Fecal Coliform concentration in Influent (FC/100ml)
k = Fecal Coliform Removal Rate (1/d)
HRTAP = Adopted Hydraulic Retention Time in Anaerobic Ponds
HRTFP = Adopted Hydraulic Retention Time in Facultative Ponds
HRTMP = Adopted Hydraulic Retention Time in Maturation Ponds

Other Design Parameters/Criteria used for Maturation Ponds are presented in Table 49 as under:

Table 60: Others Design Parameters for Maturation Pond

Parameter	Unit	Range	Adopted
Water Depth	m	1 – 1.5	**2.0**
Free Board	m	0.5 - 1	**0.5**
Length to Width Ratio	-	2 - 3	**1.0 - 1.20**
Hydraulic Retention Time (HRT)	Day	1	**1.0**
Side Slope	**m**	**2 - 3**	**3.0**

Source: Desk Study by Consultant

f. Design Criteria for Distribution Chamber (DC)

Design criteria for the Distribution Chamber is presented as follows:

- Distribution Chamber shall be designed at peak flow of each STP.
- The effective hydraulic capacity of the DC shall be such that hydraulic detention period at peak design flow is not less than 24 seconds. The least dimension of the DC in plan shall not be less than 10 ft.
- Minimum free board over the maximum hydraulic grade level (HGL) in the Distribution Chamber shall be 2 ft.

g. Inlet/Outlet Channel

Design criteria for the Inlet/Outlet Channels is presented as follows:

- Inlet and Outlet channels will be designed at peak design flow.
- Minimum flow velocity in channel shall not be less than 2.50 ft/s.
- Minimum free board over the maximum hydraulic grade level (HGL) in the Channels shall be 2.0 ft.

10.4. Water Supply and Sewerage Proposal

1. Water Supply

Water Supply demand of Chitral is being satisfactory fulfilled by tubewells without affecting groundwater aquifers. So, it is recommended to install tubwells in the vicinity of water stream

and also to look for reliable surface water from nearby dam or spring.

2. **Unit Demand**

The water supply and sanitation facility for each person must be continuous and sufficient for personal and domestic uses. These uses ordinarily include drinking, personal sanitation, washing of clothes, food preparation and personal and household hygiene. According to the World Health Organization (WHO), between 50 and 100 litres of water per person per day are needed to ensure that most basic needs are met and few health concerns arise. The current unit water demand as used by PHED for Chitral project area is 15 Gals/Capita/Day or 68 liter /capita/day. It is expected that in future Chitral city will get more developed and life style of people living in the city will be upgraded. In light of this assumption, per capita water demand of Chitral is increased to 25 Gals/capita/day. This demand will be used to calculate existing as well as future demand of Chitral project area.

Current Water Demand = 25 x 56,450

= 1,418,425 gallons per day

Design Flow for 2042

Average Design Flow = 84,485 x 25
= 2,180,600 gallons per day

Max. Design Flow = 2,180,600 x 1.5
= 3,270,900 gallons per day

Peak Design Flow = 3,270,900 x 1.5
= 4,906,350 gallons per day

10.4.1. Water Supply Proposal for 2022 Scenario

The existing water supplies have been checked against the current population demand and the gap has been identified. To overcome this gap a proposal to improve the existing water supplies has been prepared considering better unit demand and 100% serviceability to the existing population.

- **No. of Water Tanks for 2022 scenario**

The Water Tanks will be provided in Chitral city as per population density and based on natural topography. The source for these water tanks would be nearby passing nallah or spring. In case there is not enough water or due to climate changes water discharges reduces to a level to affect water availability to the residents of Chitral, tubewells along river chitral where strata favours to bore a tubewell, will be installed and water will be pumped to the water tanks in need of a additional water. The location of tubewells will be marked after proper survey and detailed investigation.

For the design of water tanks 12 hours storage capacity is considered for the capacity calculation of water tanks. Detail calculation for number of water tanks for the 2022 scenario has been shown below

Table 61: Number of Water Tanks for 2022 Scenario

Sr. No.	Name of Administration Unit	NC/VC	Area (Acre)	Area (sq.km)	Population 2022	Per Capita Water Demand (Gallons/ Capita / Day)	Avg. Water Demand (Gallons/Day)	Water Tank Capacity (6hrs of storage) (Gallons)	No. of Water Tank Capacity (x 50,000) (Gallons)
Existing Neighborhood Councils for 2022									
1	Chitral – 1	NC	674.60	2.73	8,442	25	211,046	105,523	3
2	Chitral – 2	NC	286.64	1.16	13,364	25	334,100	167,050	4
3	Danin – 2	NC	316.29	1.28	6,067	25	151,673	75,837	2
4	Zargarandeh	NC	205.10	0.83	1,736	25	43,389	21,695	1
5	Danin – 1	NC	867.34	3.51	6,926	25	173,138	86,569	2
Total of NCs			2,350	10	36,534		620,556	456,673	12
Existing Village Councils for 2022									
6	Balach	VC	2,283.25	9.24	5,508	25	137,699	68,849	2
7	Jughoor	VC	1,265.18	5.12	17,074	25	426,861	213,431	5
8	Khorkhasandeh	VC	237.22	0.96	3,336	25	83,389	41,695	1
9	Shiaqotak	VC	874.75	3.54	13,106	25	327,657	163,828	4
10	Singoor	VC	345.95	1.40	8,972	25	224,309	112,155	3
Total of VCs			5,006	20	32,610		47,997	203,815	15
Total							**2,113,261.5**	**1,056,630.7**	**27.0**

There are 6 existing water tanks operational in the Chitral project area. So, to meet the water demands of Chitral City, in the 2022 scenario, we need to install 27 – 6 = 21 new water tanks with capacity of each water tank not less than 50,000 gallons. Water Supply proposal for 2022 scenario is shown in**.**

10.4.2. Water Supply Proposal for 2042 Scenario

For future two residential zones have been proposed namely Infill and resettlement zone in Jughoor VC. It is predicted that all vacant lands available in NC will accommodate increase in population in NC areas. While further increase of population and increase of population of all VCs will be accommodated in their respected VCs.

In these residential zones private housing schemes will unlikely to develop. So, in this proposal only 100% of projected future population will be considered for water supply proposal.

No. of water tanks for 2042 scenario

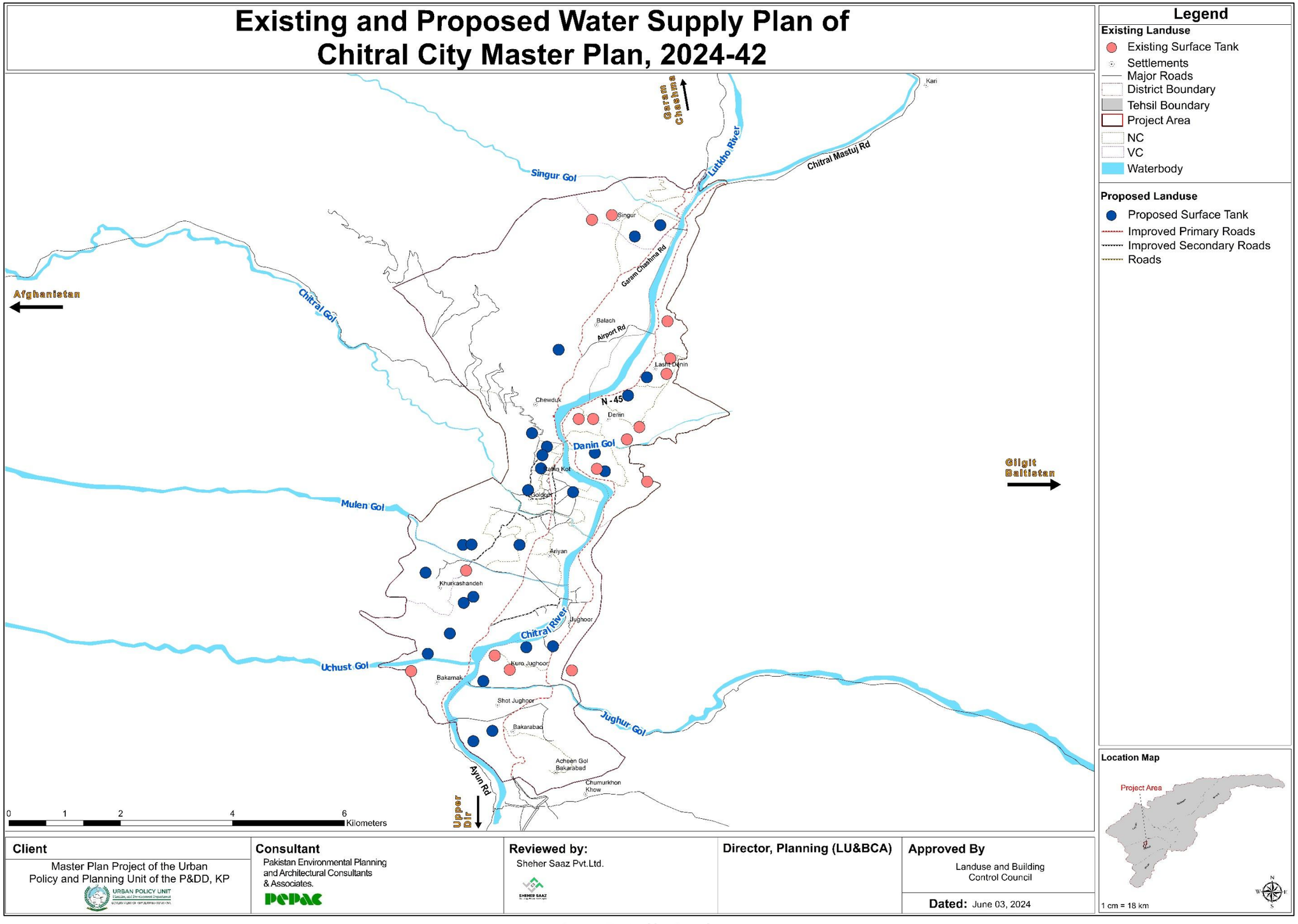
For the design of water tanks 12 hours storage capacity is considered for the capacity calculation of water tanks. Detail calculation for number of water tanks for the 2022 scenario has been shown below table**.**

Table 62: Number of Water Tanks for 2042 Scenario

Sr. No.	Name of Administration Unit	Area (Acre)	Population 2042	Per Capita Water Demand (Gallons/ Capita/ Day)	Avg. Water Demand (Gallons/Day)	Water Tank Capacity (12hrs of storage) (Gallons)	No. of Water Tank Capacity (x 50,000) (Gallons)
Existing Urban Boundary							
1	Infill	349.92	32,316	25	807,900	403,950	9
2	Jughoor VC	171.64	4,887	25	122,175	61,088	2
Total					**930,075.0**	**465,037.5**	**11.0**

In order to meet the future demand of water supply of Chitral project area further 11 water tanks need to be install in the proposed residential zones. Water Supply proposal for 2042 scenario is shown in Map 32 A comprehensive map combining both proposals have shown in **Error! Reference source not found.**.

Map 32:Water Supply Map for 2042 Scenario



Source: Devised by Consultants

10.5. Sewerage System

As currently no piped sewerage system exists in Chitral project area it is recommended to lay RCC pipes in the entire area and take all sewerage to a feasible treatment plant nearby water body before outfall.

- **Unit Flow**

Unit demand for sewerage is considered as 85% of unit water demand (25 gals/capita/day). So unit sewerage flow considered as 21 gals/capita/day.

- **Design Flow**

Current Sewerage Flow = 21 x 56,450
= 1,185,450 gallons per day
Proposed Average Design Flow = 84,485 x 21
= 1,774,185 gallons per day
Take 100% for stormwater and based on population peak factor of 2.0, the total design flow is:
Total Design Flow = 1,831,704 x 2.0 x 2.0
= 7,096,740 gallons per day
Sewage flows for 2022 scenario and 2042 scenarios has been calculated in Table 63 and Table 64.

Table 63:Sewage Flows for 2022 Scenario

Sr. No.	Name of Administration Unit	NC/ VC	Area (Acre)	Population 2022	Per Capita Wastewater Gen. (Gallons/Capita/ Day)	Avg. Wastewater Discharge (Gallons/ Day)	Peak Water Demand (P.F. = 2.0 + 100% Stormwater) (Gallons/ Day)	(Cusecs)
Existing Urban Boundary								
1	Chitral – 1	NC	674.60	8,442	21	177,278	709,114	1.32
2	Chitral – 2	NC	286.64	13,364	21	280,644	1,122,576	2.09
3	Danin – 2	NC	316.29	6,067	21	127,406	509,623	0.95
4	Zargarandeh	NC	205.10	1,736	21	36,447	145,787	0.27
5	Danin – 1	NC	867.34	6,926	21	145,436	581,743	1.08
Total of NCs			2,350	36,534		767,211	3,068,844	5.7
Proposed Urban Boundary for Year 2042								
6	Balach	VC	2,283.25	5,508	21	115,667	462,667	0.86
7	Jughoor	VC	1,265.18	17,074	21	358,564	1,434,255	2.67
8	Khorkhasandeh	VC	237.22	3,336	21	70,047	280,187	0.52
9	Shiaqotak	VC	874.75	13,106	21	275,232	1,100,926	2.05

10	Singoor	VC	345.95	8,972	21	188,420	753,680	1.40
Total of VCs			5,006	47,997		1,007,929	4,031,715	7.5
Total						**1,775,139.7**	**7,100,558.6**	**13.2**

Table 64: Sewage Flows for 2042 Scenario

Sr. No.	Name of Administration Unit	Area (Acre)	Population 2042	Per Capita Wastewater Gen. (Gallons/Capita / Day)	Avg. Wastewater Discharge (Gallons/Day)	Peak Water Demand (P.F. = 2.0 + 100% Stormwater) (Gallons/Day)	(Cusecs)
Proposed Residential Zones							
1	Infill	358.72	30,418	21	638,778	2,555,112	4.75
2	Jughoor VC	61.32	7,284	21	152,964	611,856	1.14
Total		482	420.04		791,742	3,166,968	5.9

Map for sewerage system proposal for 2042 scenario has been prepared and shown in Map 40**.**

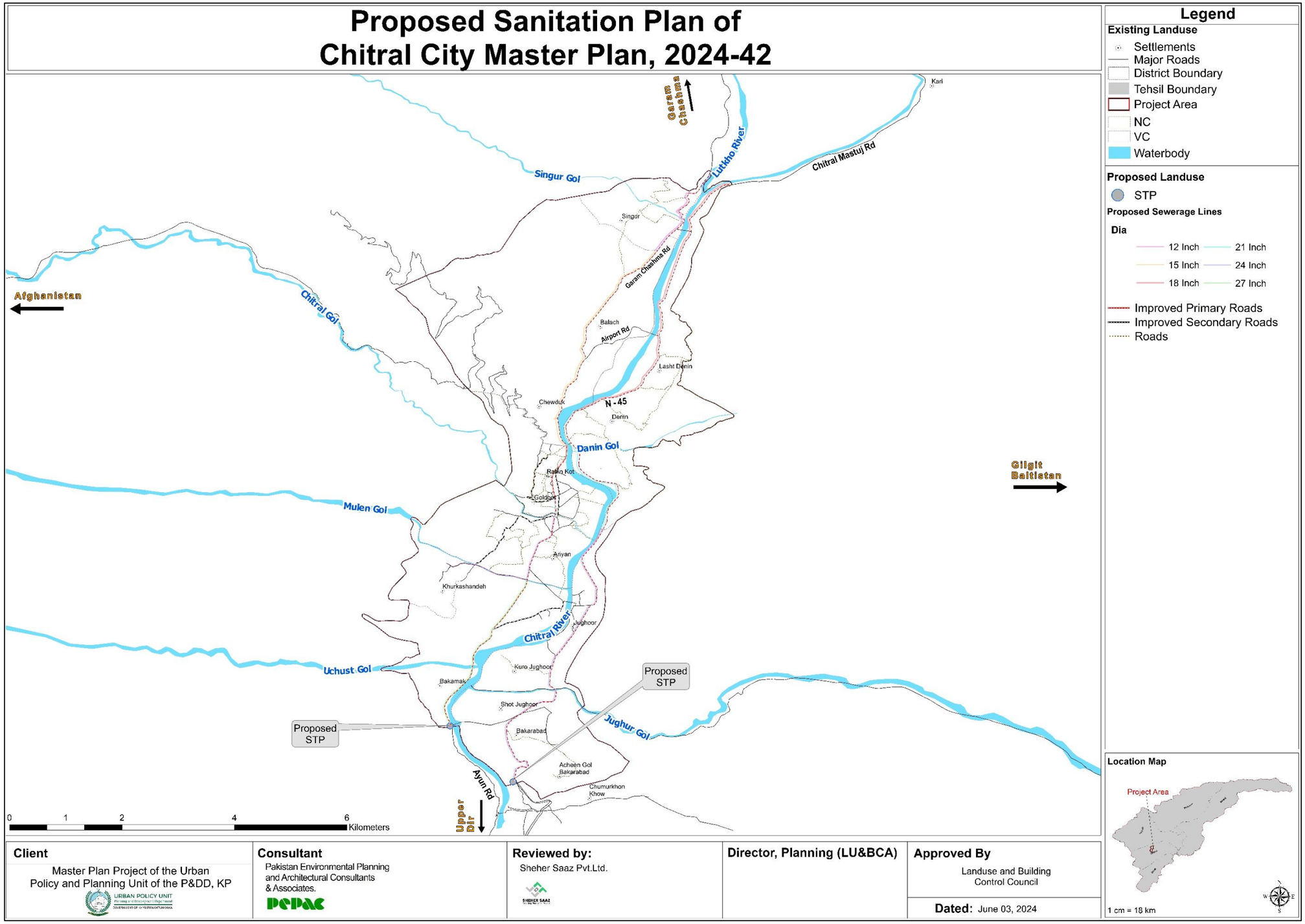
Wastewater Treatment Plant

Two wastewater treatment plants (WWTP) would be required for the whole Chitral City. Each having capacity of:

WWTP -1 Design Capacity = 2.5 cusecs

WWTP -2 Design Capacity = 2.0 cusecs

Map 33: Sewerage network of Chitral- Study Area



Source: Devised by Consultants

10.6. Solid Waste

10.6.1. Existing Situation and Analysis

Chitral faces serious solid waste management challenges due to the absence of a proper landfill site, limited resources, and low public awareness. Open dumping is widespread, causing environmental degradation and health risks for nearby communities. The increasing waste production, driven by urbanization and economic growth, further strains the inadequate waste management system.

Currently, Chitral has only one unmanaged dumping site, which is insufficient for the city's needs. Unlawful waste disposal near graveyards and agricultural fields worsens the problem. To ensure sustainable waste management, an integrated system (ISWM) and properly designated landfill sites, developed under legal land acquisition rules, are essential for efficient waste collection and disposal.

1. **Solid Waste Generation**

Waste generation encompasses activities in which materials no longer considered of value (refuse from households, farms, non-hazardous solid waste from industrial, commercial and institutional establishments including hospitals, market waste and garden waste as well as street sweepings) are either thrown away or gathered together for disposal. The current population along with waste generation are given below:

Table 65 - Solid Waste Generation

Sr. No.	Year	Rate of waste generation per capita/day (kg)	Population (2022)	Kg/day	Tons/day
1.	2022	0.3	56,450	17021.10	17.021

kg = kilogram.

** Waste Sector Inclusion in the Revised Nationally Determined Contributions of Pakistan, 2022. (ADB Publication)*

2. **Collection & Transportation**

The city currently has few vehicles for the transportation of waste from bins to dumping site having different capacities for waste collection and transportation. The condition of vehicles being observed were satisfactory. Equipment used for waste collection includes the collection bins, containers, arm roll trucks, trolleys, front blade tractors, front end loaders, water Bowsers, garbage dumpers. Below are the details of the Solid waste Generation & Disposal and Solid waste Coverage Detail for TMA Chitral.

The **table** below provides the audit findings that was conducted to assess the existing activities being conducted from an environmental and social safeguards perspective and the required corrective measures that will be implemented.

Table 66- Current Situation Findings of the city

Sr. No.	Component	Existing Practice and Issues
1	Waste Generation	• Solid waste generation in the tehsil is approximately 17.021 tons per day as per 2022 projection. • Due to shortage of required resources, TMA Chitral is not capable to serve the entire city.
2	Storage of waste at source	• Lack of public awareness, motivation, and education regarding waste management practices; • Poor civic sense and harmful littering habits; • Inadequate cooperation from households, trade, and commerce; • Inadequate availability of litter bins in the city; • Significant distances between community bins.;
3	Waste Collection	• People discard waste on the streets instead of utilizing communal waste containers, causing scattered waste to accumulate; • No waste segregation before final disposal; • Insufficient awareness and motivation among citizens to properly dispose of waste; • Existing equipment and machinery require maintenance and repair to function effectively; • Citizens have not been responsive enough in addressing these waste management issues.
4	Daily sweeping of streets	• The 100% manual sweeping system is not efficient in covering the entire TMA jurisdiction on a daily basis. • The manual attendance management system is inefficient and can lead to errors and inefficiencies
5	Communal Storage	• Shortage of waste containers • Inadequate financial resources leading to broken and poorly maintained bins • Lack of planning for waste storage depots or temporary storage locations • Difficulty accessing certain areas and narrow lanes which do not allow for sufficient space to place containers
6	Transportation	• Use of open vehicles for waste transport, which can lead to spillage and health hazards; • Inadequate funds to replace old vehicles, leading to inefficiencies and increased maintenance costs; • Lack of a scheduling system for lifting of waste containers, resulting in irregular collection and overflowing containers.
7	Disposal of Waste	• Lack of financial resources for a scientifically designedland fill site; • Absence of proper land for landfill and technical personals

10.6.2. Proposed Strategic Approach

1. The Strategy/Sectoral Plan

Having established the priorities, the next step of the Plan is to provide broad guidelines to suggest measures to manage the growing solid waste of the town. This has been determined after assessing the potentials and constraints in the existing solid waste management of the city. The plan is prepared with from year 2022 to year 2042.

The proposed action plans aim to identify gaps in existing municipal services and address the needs for incremental population growth. Additionally, the plans include provisions for capacity building to ensure effective operation and maintenance of municipal services.

2. Objectives of the waste management Plan

According to the developed vision, the following strategic objectives are to be achieved by 2042:

- Implement a comprehensive and sustainable approach to improve waste management, including the collection, storage, transfer, disposal, and treatment of all types of waste, including hazardous waste.
- Provide new, improved, economical, efficient, and cost-effective machinery and equipment for solid waste collection and transportation to ensure safe and effective transportation of waste to the dumping site. This includes primary and secondary collection.

3. Timeframe

Table 67 - Implementation Schedule

Tire 1	Improvement of Existing Solid Waste Management of The City
Tire 2	Provision of Solid Waste Management Resources for future solid waste management

Tire 1: Improvement of Existing Solid Waste Management of The City

Existing Solid Waste Management of the city require following corrective actions.

Sr. No.	Component	Required Corrective Action
1	Waste Storage	• Implement door-to-door collection to decrease littering on streets and improve waste collection efficiency. • Develop and implement effective behavior change communication programs to promote civic sense and encourage responsible waste disposal practices among citizens. • Consider removal of roadside communal bins to encourage citizens to use household bins and discourage illegal dumping.
2	Waste Segregation	• Develop segregation and materials recovery facilities to facilitate waste separation and recycling. • Establish a system for the conversion of organic waste into compost, reducing the amount of waste sent to landfills. • Encourage source segregation by raising awareness and providing incentives for households and businesses to separate their waste.
3	Waste Collection	• Conducting behavior change communication programs to encourage citizens to properly dispose of waste. Establishing a pool of collection vehicles for efficient waste collection; • Providing personal protective equipment (PPE) to all collection staff for their safety and well-being; Ensuring citizen accountability in daily door-to-door waste collection.
4	Streets Sweeping	• Implementing a comprehensive Door to Door collection system would reduce the need for daily sweeping of all streets, allowing for more efficient and effective cleaning schedules, with a maximum frequency of twice a week.
5	Communal Storage	• All unnecessary communal storage points in residential areas would be removed.Waste throwing in streets should be banned and penalize; • Commercial areas and institutions would have communal bins; • User charges would be levied to induce financial sustainability.
6	Waste Transportation	• Waste would be carried in fully covered vehicles, in order to avoid any littering and pollution;

		• Number of vehicles would be minimized, with transfer stations and larger hauling containers; • Environment friendly transfer facilities with dust & odor control.
7	Waste Disposal	• Landfill would be properly designed and operated; • Segregation, MRF and Composting facilities would enhance the useful life of Landfill;

Tier 2: Provision of Solid Waste Management Resources for future solid waste management

The future waste generation of the city can be calculated based on projected population (persons). Solid waste projections were made by considering the current rate of waste generation in Chitral city. Around 0.3 kg/capita/day standard was used to project the waste generation for the next 20 years in correlation with the rate of population growth. It is to get a glimpse of the future waste generation, disposal and management. The table below is showing the future estimations and projections, which are based on a compound method.

Table 68: SW Projection for 2022 - 2042

Year	Population	Per Capita Waste Generation Per Day (tons)	Per Capita Waste Generation Per Year (tons)
2022	56,450	17.021	6212.70
2027	62,713	18.855	6882.09
2032	69,299	20.814	7597.25
2037	76,222	22.906	8360.63
2042	85,485	25.136	9174.68

Source: Projection by Consultant

Table 69- Total Estimated HR Requirement

HR	Additional Requirements				
	2022	2027	2032	2037	2042
Sanitary Workers	56	63	71	79	87
Driver	3	6	8	11	15
Sanitary Supervisor	2	2	3	3	3
Sanitary Inspector	1	1	1	1	1

Table 70- Total Estimated Machinery Requirement

HR	Additional Requirements				
	2022	2027	2032	2037	2042
Containers 0.8 m3	12	19	23	29	35
Handcarts Tripping Trolley 0.25 m3	38	60	75	92	111
Mini Tipper 01 m3	10	15	19	23	28

Arm Roll Containers 5.0 m3	2	3	4	5	6
Garbage Compactor 8.0 m3	1	2	2	3	3

10.6.3. Disposal of Solid Waste Management

Transfer Stations

Currently, most waste collected by collection vehicles is taken to the dumping site directly. Smaller vehicles dump their waste at existing open collection points and this waste is lifted in bigger dump trucks etc. In order to improve the overall waste management system and urban environment, depending upon the waste generation rate, location of landfill and collection vehicles, a mini waste transfer stations can be proposed at suitable area.

Mini Transfer Station – Arm Roll vehicles containers of 5 m3 size, placed along a ramp in enclosures.

The primary reason for using a transfer station is to:

- Reduce the cost of transporting waste to disposal facilities
- Consolidating smaller loads from collection vehicles into larger transfer vehicles reduces hauling costs by enabling collection crews to spend less time traveling to and from distant disposal sites and more time collecting waste
- This also reduces fuel consumption and collection vehicle maintenance costs
- Produces less overall traffic, air emissions, and road wear

1. Landfill Site Requirement

A landfill requirement is calculated based on 2017 census, per capita waste generated and percentage of collection efficiency. Population Projection is calculated through following Model:

$$\textbf{Population Projection} = \text{Population } (1 + \text{Growth Rate})^{\text{No of Years / 100}}$$

Per capita waste generation criteria are given below:

Table 71: Waste Generation Estimation Criteria

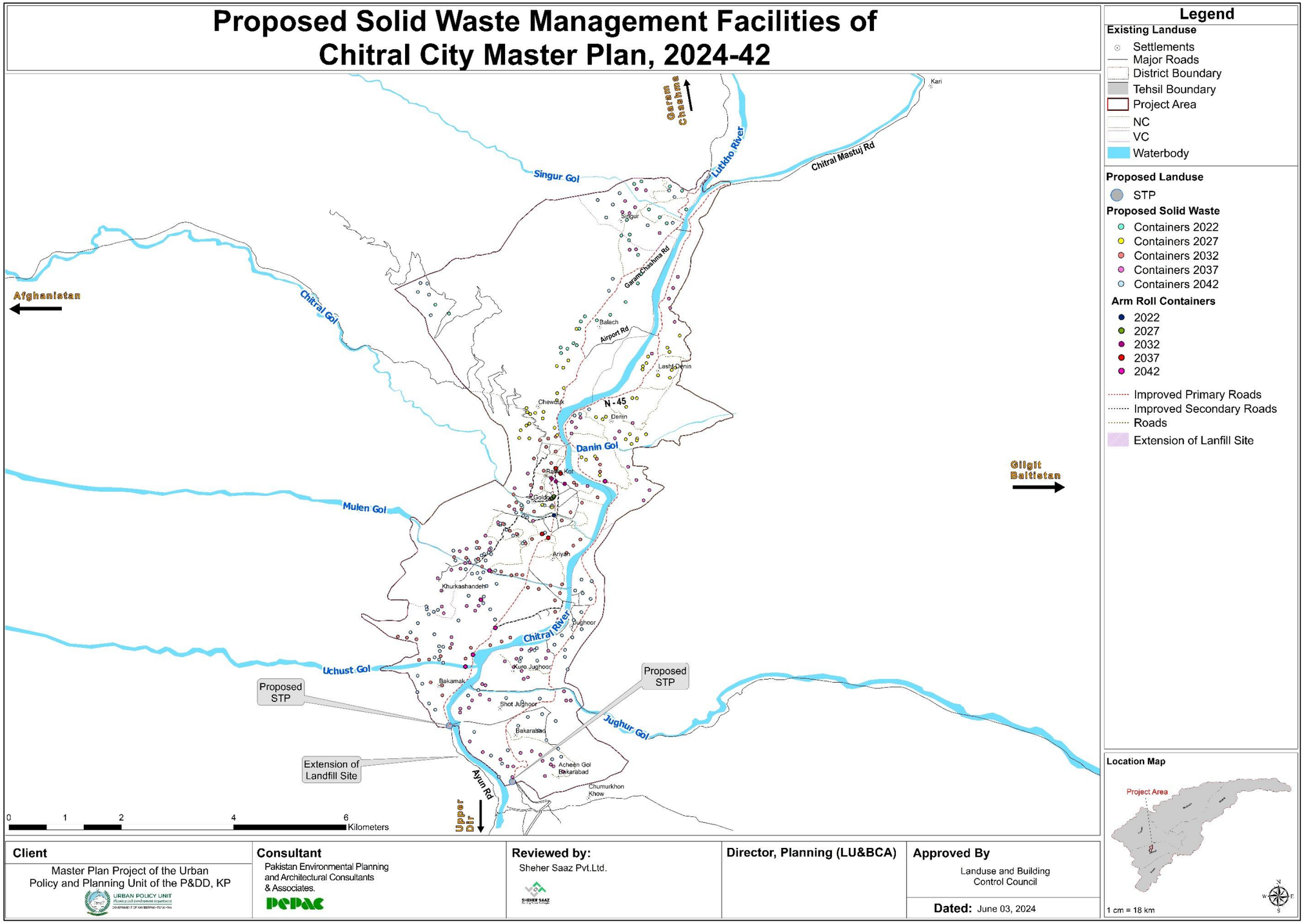
Criteria	Description
SWM Planning Horizon (2022-2032)	10 Years
Population	Projections based on 2017 Census
Per Capita Waste Generation	0.3 Kg/ca/person
Per Capita Waste Generation decrease after every 5 years	1%
Additional allowance (%)	25%
Loose waste density (kg/m^3)	500

For waste projection in the future, an annual decrease rate of 1 % is applied to currentwaste generation of 0.3 kg/ca/d. Chitral has a total waste generation rate of 17.021 tons per day in 2022. Keeping in view the infrastructure investment required for landfill, 10 years useful life of landfill is considered for design.

Table 72: Landfill Requirement Over the Year

Year	Population	Generation		Impact of 4Rs: reduction, reuse, recycling and recovery (20%)	Collection		Disposal			Landfill site requirement in acres
		Per Capita (Kg)	Total (Kgs)		Collection Efficiency %	Total Weight kg (W_T)	Total Volume, m3	Yearly volume m3	Accumulative volume m3	
a	b	c	d = bxc	e=dx0.8	f	g = exf/100	h : g/density	I : hx365	j	k = j/(10x4052)
2022	56,450	0.3000	17021.10	13616.88	35	4766	9.53	3479.11	3479.11	0.09
2027	62,713	0.2970	18855.05	15084.04	40	6034	12.07	4404.54	7883.65	0.19
2032	69,299	0.2940	20814.38	16651.51	45	7493	14.99	5470.02	13353.67	0.33
2037	76,222	0.2911	22905.85	18324.68	50	9162	18.32	6688.51	20042.18	0.49
2042	84,485	0.2882	25136.11	20108.89	55	11060	22.12	8073.72	28115.90	0.69

Map 34: Solid Waste Serviceability Map (2022-2042)



Source: Devised by Consultants

CHAPTER 11: COMPREHENSIVE PROPOSALS FOR FLOOD MANAGEMENT: BUILDING RESILIENCE

11.1. Affected Areas in the Aftermath of Floods

Heavy Monsoon in July 2015 resulted in a havoc flash flood in Chitral city. This flooding caused extensive losses, which resulted in multiple destructions including displacing more than 0.3 million residents[17]. In 2022, a major area of Chitral city was affected by extreme floods. Barenis Gol area of the Lower Chitral district recorded heavy flooding, which destroyed irrigation channels, water schemes, bridges, and agricultural lands[18].

In July 2023, Chitral experienced floods again that severely damaged the Chitral-Mastuj Road, disrupting the connection between Upper and Lower Chitral Districts. The flash floods have particularly impacted Denin 1 & 2 NC's. The unprecedented floods in Chitral have swept away centuries-old Chinar trees near the Shahi Qilla (fort) as iconic symbols of its fabled past. Illegal encroachments along the riverbed contributed to the Chitral River bursting its embankments, exacerbating the flood's destructive effects[19].

Figure 4: Blocked Chitral-Mastuj Road

Source: Retrieved from chitraltoday.net

11.2. Retaining Walls

The consultant suggested the construction of retaining walls along Chitral river to provide protection from flood. The primary material used to build retaining walls, which are intended to endure the power of floodwaters and provide effective flood control, is reinforced concrete (RCC). It is a proactive approach to mitigate flood risks, protect lives and property, and build more resilient communities to confront climate change patterns. The walls are an integral part of flood protection strategy, promoting safety, resilience, and sustainable development in

[17] National Disaster Management Authority, 2020.
[18] KP, Monsoon Contingency Plan, 2022
[19] https://chitraltoday.net/2023/07/22/floods-block-chitral-mastuj-road-at-three-points/ Accessed on: 25 July 2023

flood-prone areas.

11.3. Riparian Zone

The word riparian means pertaining to anything connected with or immediately adjacent to the banks of a stream or other body of water[20]. Natural vegetation that extends from the stream's edge through the riparian zone forms riparian buffers which have been proposed along the Chitral River. The proposed buffer is 50 meter wide covering total of 2790.54 acres. The proposed riparian buffer will act as a vegetative zone that prevents erosion, provides habitat and nutrient input into the river, and acts as a barrier to contaminants entering a river through runoff. Moreover, the proposed riparian zone would be used in agricultural, row crop, range, suburban, and urban settings.

The creation of this buffer strip calls for planting trees, bushes, and a nice, dense turf. It's crucial to do careful maintenance to maintain healthy plants. The species of plants and trees involved, the types of soil, and the climatic conditions will determine the need for routine maintenance (such as mowing, fertilising, liming, irrigating, pruning, weed/pest management, etc.). In Calgary, City of Canada, started a Project to preserve and protect their river areas in 2013[21].

[20] https://d38c6ppuviqmfp.cloudfront.net/content/publications/cbp_13019.pdf Accessed on: 25-7-2023
[21] https://www.calgary.ca/water/stormwater/riparian-areas.html Accessed on: 25-7-2023

CHAPTER 12: LAND MANAGEMENT

12.1. Existing Status

Land administration in Chitral, Pakistan faces several challenges due to unfavorable policies and practices, which have resulted in several land conflicts between the community and the government. The ambiguity surrounding the definition of terms such as "wastelands," "riverbeds," and "mountains" in a 1975 notification has further complicated the situation. Land management practices in Chitral District follow federal and provincial regulatory frameworks through various policies, rules, and laws. Chitral District has predominantly rangeland with traditional management systems until 1969, after which the government intervened and created a gap between state functionaries and community-based practices. While the KP government has initiated a computerization project for land records in 18 districts, Chitral is not included in the first two phases, potentially hindering better land management. The inclusion of Chitral in future phases is suggested to streamline land records and improve land management.

Land administration and governance in Pakistan is primarily the mandate of provincial Revenue and Estate Departments. These departments maintain land records, collect taxes related to land possession, and deal with land ownership rights in development projects. Revamping institutional frameworks for land administration, as seen in the example of the Georgian Agency for land registration, can lead to greater autonomy, reduced corruption, and increased revenue collection.

The Tehsildar, Registrar, and Patwari are responsible for different aspects of land administration and tax collection in Chitral, Pakistan. The Tehsildar visits the Patwar circle monthly to confirm mutation processes, which generate significant revenue taxes for the government. The Registrar handles property transfers in rural and urban areas, while the Patwari collects taxes from the PC they are appointed to. The taxes on land transactions in Chitral include Local Council Tax, Registration Fee, Mutation Fee, Capital Value Tax, and Agriculture Income Tax/Land Tax. The tax rates vary between 0-2% for different taxes and are subject to change annually

12.2. Problems in the Existing System of Chitral

1. The Chitral land administration is facing challenges due to unfavorable policies and practices, and modifications are needed to safeguard people's rights to land ownership.
2. Detailed regulations are required for urban land management, but there is no special initiative in this regard.
3. Lack of coordination among key line departments such as tax, development authority, patwaris, and local government is resulting in inadequate controls to monitor illegal developments.
4. The city lacks adequate administration and capacity building, as there is no development authority operational in the Study Area Chitral City.
5. There is no proper information system involving base maps, land use maps, and other land management record information, and the city lacks guidelines for defining and updating land use classifications.

6. The Revenue and Estate department's computerization of land records does not include District Chitral, and there are no reliable data sources that patwaris can use for land records.
7. There is overlap in the work divisions within institutions, and no separate domain covers building control and development operations.
8. The city level lacks the necessary technical staff, including town/urban planners, to assess, evaluate, and implement proposals and plans for land management.
9. Manual record-keeping in the field is prone to accuracy and timing issues, which delay official work and waste resources.
10. Territorial conflicts caused by incorrect boundary markings, inaccurate or fraudulent land records, and multiple registrations of different parties to the same parcel of land are major contributors to land disputes.

12.3. Recommendations

Following are some recommendations made by the consultant based on existing land management issues in Chitral;

- Create comprehensive rules for managing urban land, which includes developing and implementing new policy instruments to replace the current system. This could be done by establishing a task force made up of representatives from various departments, including urban planning, development authorities, and tax departments, to help develop these policies.
- Initiate training programs for technical and non-technical staff and create a coordination mechanism to ensure alignment and integration of various land administration policies being implemented at different lev.
- Establish a standardized digital information system that incorporates base maps, land use maps, and other relevant land management record information. This system can be developed in collaboration with local authorities and stakeholders to ensure it meets the specific needs of the city. The system can include protocols for demarcation and updating of land use categories, with clear guidelines and standards for data collection and maintenance.
- Strengthening enforcement mechanisms, such as by increasing penalties for illegal land occupations and encroachments, can act as a deterrent and discourage such activities.

CHAPTER 13: QUALITY OF LIFE

13.1. Existing Status

The World Health Organization (WHO) defines quality of life as an individual's purpose-aligned cultural and value system by which they live, relative to their aims, hopes, living standards, and interests, incorporating physical and psychological health, degree of independence, social liaisons, and surroundings. A primary survey conducted in Chitral city assessed the health, social well-being, perception of the environment, municipal services, street furniture, public facilities, and transportation services. The statistics indicate that over half of the population in Chitral, which amounts to 51.8%, are content with their current quality of life and have rated it as a "three". On the other hand, 29.4% of the population has given it a "one" rating, and 18.8% rated it as "two". While the physical health of most residents is in good condition, the mental health of the population is a cause for concern, with only 44% reporting good mental health. Social relationships are satisfactory for almost half of the population, but a significant portion, or 30%, are dissatisfied. Safety levels and living conditions are perceived as good by a majority of respondents, but parks and green spaces were rated poorly by 42.9% of participants. The transportation services, particularly parking facilities, are inadequate, with only 24% of respondents satisfied. Civic amenities like public toilets and bus stops lack basic amenities and street lighting, causing visibility issues for pedestrians and vulnerable road users.

13.2. General Proposals

1. Increase the number of public toilets and maintain them regularly.
2. Build more parks and green spaces with amenities like benches, picnic tables, and public restrooms.
3. Improve the lighting in streets and public areas to enhance safety for pedestrians and cyclists.
4. Establish more bus stops with basic amenities like seating, shade, and information displays.
5. Install street furniture such as benches, trash cans, and bicycle racks in strategic locations.
6. Create dedicated bike lanes and pedestrian walkways to improve safety and reduce traffic congestion.
7. Increase the number of public drinking fountains for people to stay hydrated.
8. Plant more trees and shrubs in public areas to provide shade, reduce air pollution, and create a more inviting atmosphere.
9. Create more public art installations and murals to beautify public spaces and add cultural value.
10. Increase the availability and accessibility of healthcare services in the city, including clinics and hospitals

CHAPTER 14: SAFETY AND SECURITY

Cities around the world continue to face issues of insecurity, instability, violence, and corruption, despite economic development and social prosperity. These issues are due to personal vulnerabilities, unsafe environments, and local hazards that contribute to safety and security concerns. Safety refers to reducing or preventing risks that arise from human, material, and environmental interactions, while security aims to eliminate hazards entirely and provide a safe living environment for all. In case of Chitral, below total shows police station have been identified during the land use survey in the city of Project Area Chitral City. The name and location of the police stations are as follows:

Table 73: Existing Police and Rescue Stations- Chitral Study Area

Sr. #	Name	Location
1	Chitral City Police Station	Fort Road, Chitral
2	Rescue 1122 Station	Jugoor, Chitral

Source: Primary Data Collected from Field Survey

Chitral can be categorised in the safe cities of Pakistan with relatively low crime rate. As per the development statistics KP 2021, the total murder in year 2019 were 4 which have been raised to 14 in year 2020. The jump increase in these statistics can be due to tribal conflict or negligence on the local security forces in the district which needs to be addressed immediately to avoid domino effect in the region.

14.1. Existing Status[22]

The crime of the city is one of the important indicators for urban safety. The analysis of primary survey has shown that 61.8% of the people believed that the crime rate in the Chitral city is not raising in the city in parallel to 38.2% with contradictory believe. While the data regarding increase in crime shows the major crime in the city comprises of theft (64.6%), robberies (27.7%), harassment (3.1%) and others. The primary survey stats provide positive image of Chitral in terms of gender safety for women. The majority (98.25) of the women feel safe while traveling alone to any commercial centre, work place or educational institute. Further, the performance of security forces is measured through several direct and indirect methods including interviews, observations, independent testing and behavioral analysis. According to the primary survey conducted, the satisfaction level of community in regard to police performance is good enough as 87.6% of the people are satisfied with the performance while 11.8% are unsatisfied

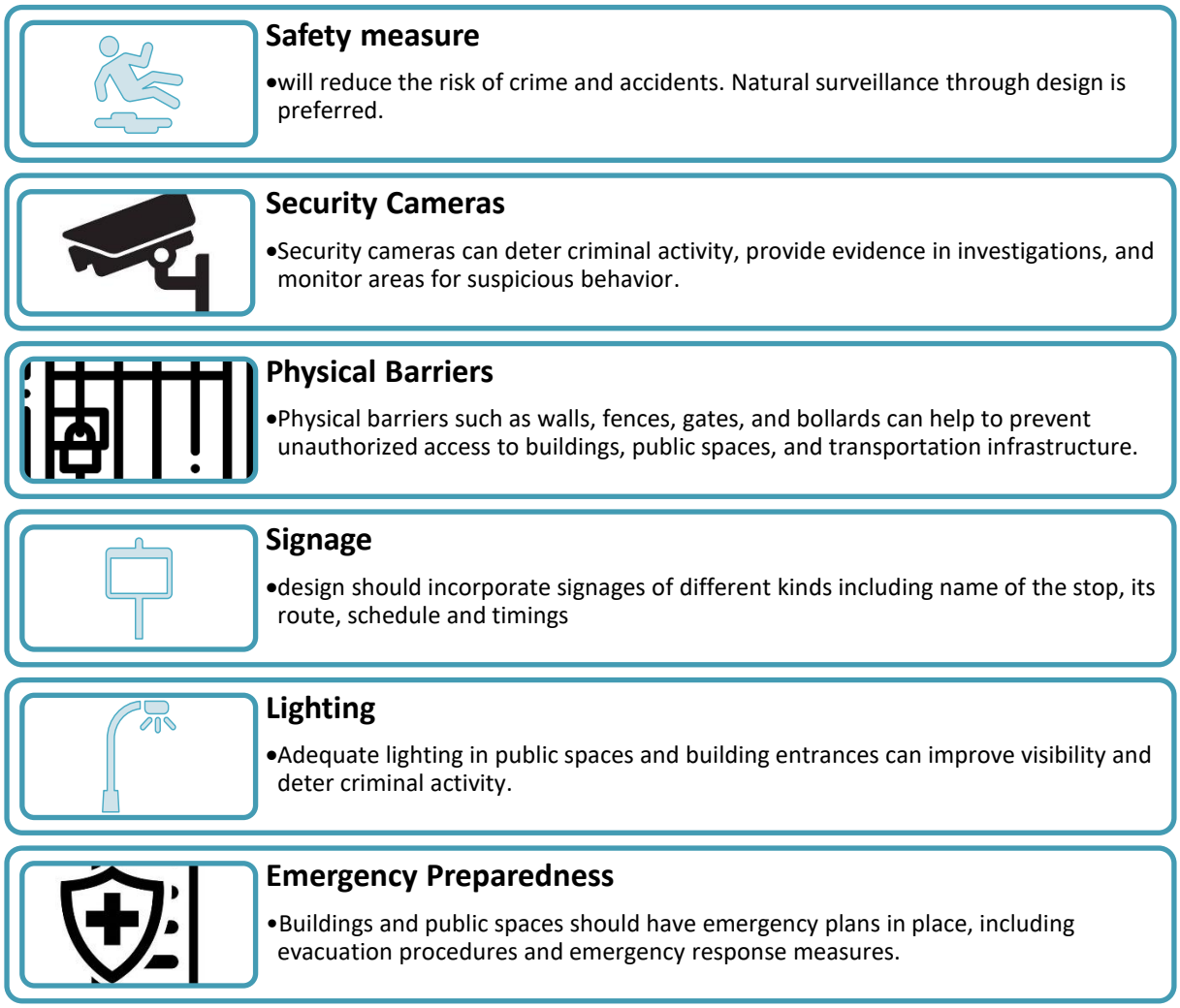
14.2. Proposals to improve security situation

Safety and security proposals are essential for maintaining a safe and secure environment in a community. safety and security proposals are crucial for maintaining a safe, secure, and prosperous society. By implementing effective safety and security measures, citizens can live in a community where they feel safe and protected, which can lead to social, economic, and

[22] Task B: Background Studies Report

political development. It is recommended to take a comprehensive approach to security by implementing multiple proposals that address different aspects of safety and security.

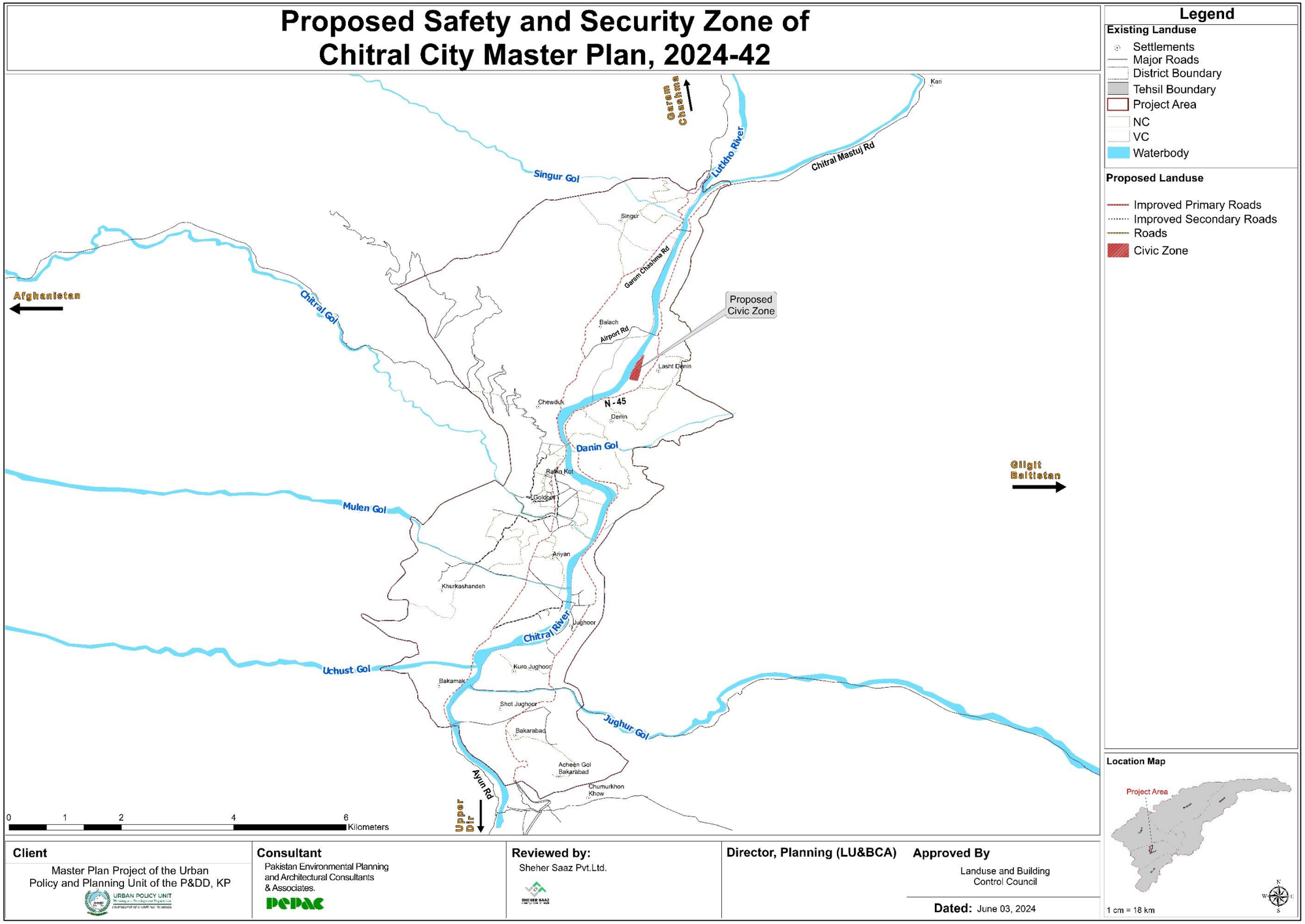
Figure 5: Proposals to Improve Security Situation- Chitral Study Area



Source: Devised by Consultants

To enhance the safety and security of the city and reduce the crime rate, establishing new police stations may not be necessary as the existing ones can be improved through capacity building measures. This can be achieved by hiring additional police officials, providing better training, and equipping them with high-quality equipment. Below Map 35 shows the location of Proposed Rescue Station 1122 and Police Station:

Map 35: Safety and Security Proposals- Chitral Study Area



Source: Devised by Consultants

CHAPTER 15: HISTORICAL/SOCIAL/CULTURAL HERITAGE DEVELOPMENT

15.1. Existing Status

Chitral is a city with a rich cultural heritage dating back to 1500 BC, and is known for its unique Kalasha Culture. The city is home to several heritage sites, including the Shahi Mosque, Chitral Fort, Valleys, Graves, and Carvings, which are of significant historical and cultural value. Unfortunately, many of these structures have been neglected or destroyed, and there is a lack of appreciation and care for them. For instance, the Jondhak rock-carving site in Chitral is facing continuous damage due to antimony mining and natural events such as land sliding, causing most of the engraved boulders to be crushed into pieces. Similarly, the gravesites, mostly belonging to the iron age and located in the lower Chitral Valley, are subjected to illegal digging by antique seekers.

One of the most important gravesites in Chitral is the Ayun gravesites, which consist of double chamber and simple graves. The grave goods found in these graves include storage jars, utensils, and copper bowls, while the jewelry includes lapis lazuli and terracotta beads, hairpins, and antimony rods made of copper. Similar gravesites can also be found in other areas of Chitral.

15.2. Potential Tourism Sites

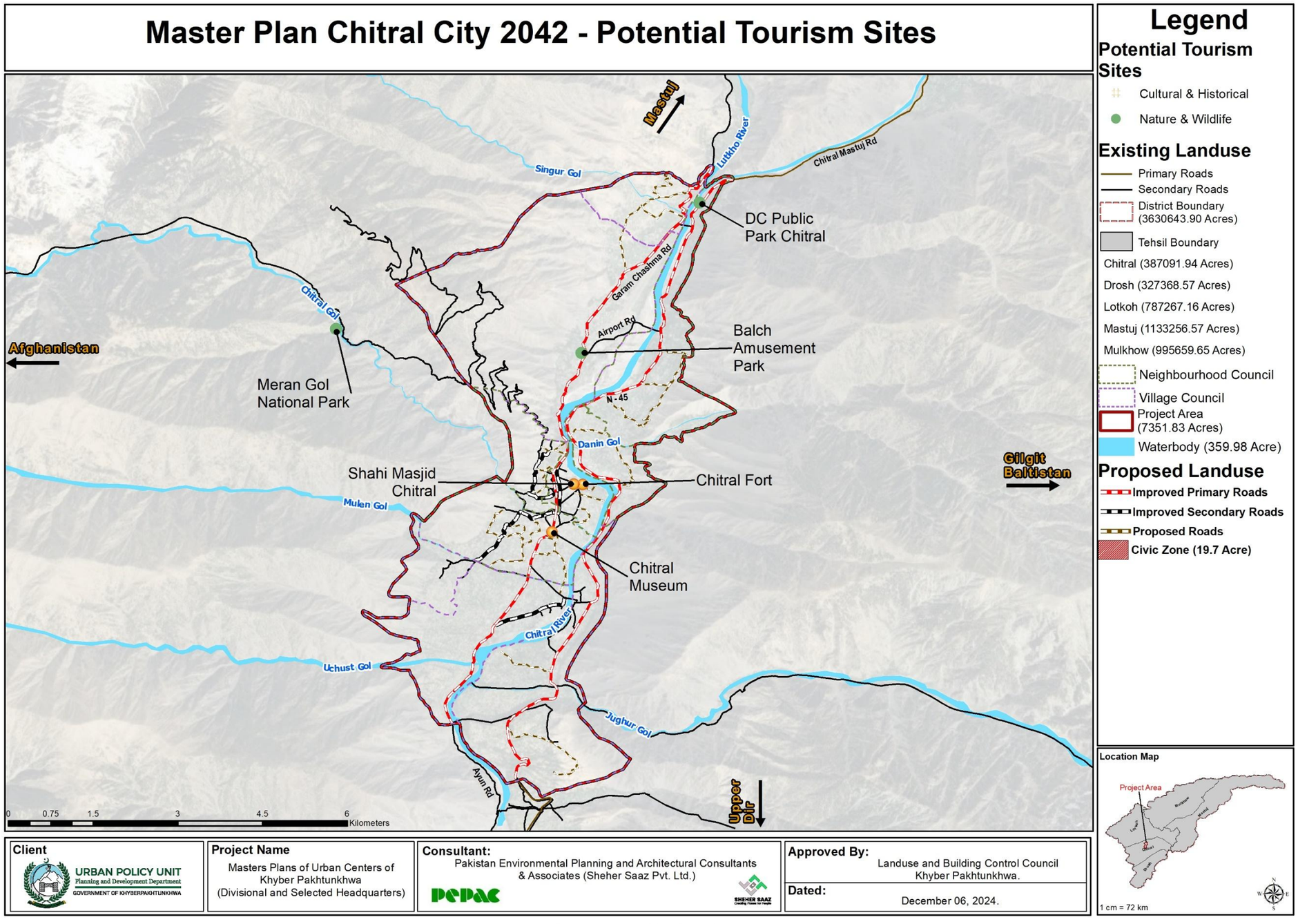
Chitral is famous for its Nature and Wildlife Tourism and Cultural and Historical Tourism Sites. The most important of tourist spot is the Chitral Fort, built in the 18th century by Rangha Khan, ruler of Swat. It is an architectural marvel built out of natural stone. The traditional Pashtun houses are also important places worth seeing in this region. Other places of cultural interest are Chitral Museum, Shahi Mosque. DC Public Park, Meren Gol National Park, Chumurkone Tek are Nature and Wildlife Tourism Sites in Chitral. Encompassing the captivating Chitral Gol River and its surrounding landscapes, Chitral Gol National Park offers an extraordinary blend of natural beauty and wildlife encounters. Additionally, Chumurkone Tek promises a rejuvenating experience, allowing travelers to connect with nature in its purest form.

Table 74: Potential Tourism Sites- Chitral

Sr No.	Potential Tourism Sites	
1.	Shahi Masjid	Cultural and Historical Tourism sites
2.	Chitral Fort	
3.	Chitral Museum	
4.	Chumurkone tek	Nature and Wildlife Tourism sites
5.	Meren Gol National Park	
6.	DC Public Park	
7.	Balach Amusement Park	

Source: Devised by Consultants

Map 36: Potential Tourism Sites- Chitral Study Area



Source: Devised by Consultants

15.3. Overall Proposals for Cultural Heritage

There are some proposals for the restoration and conservation of heritage and cultural buildings in Chitral:

Figure 6: Key Proposals for Cultural Heritage- Chitral Study Area

Source: Devised by Consultants

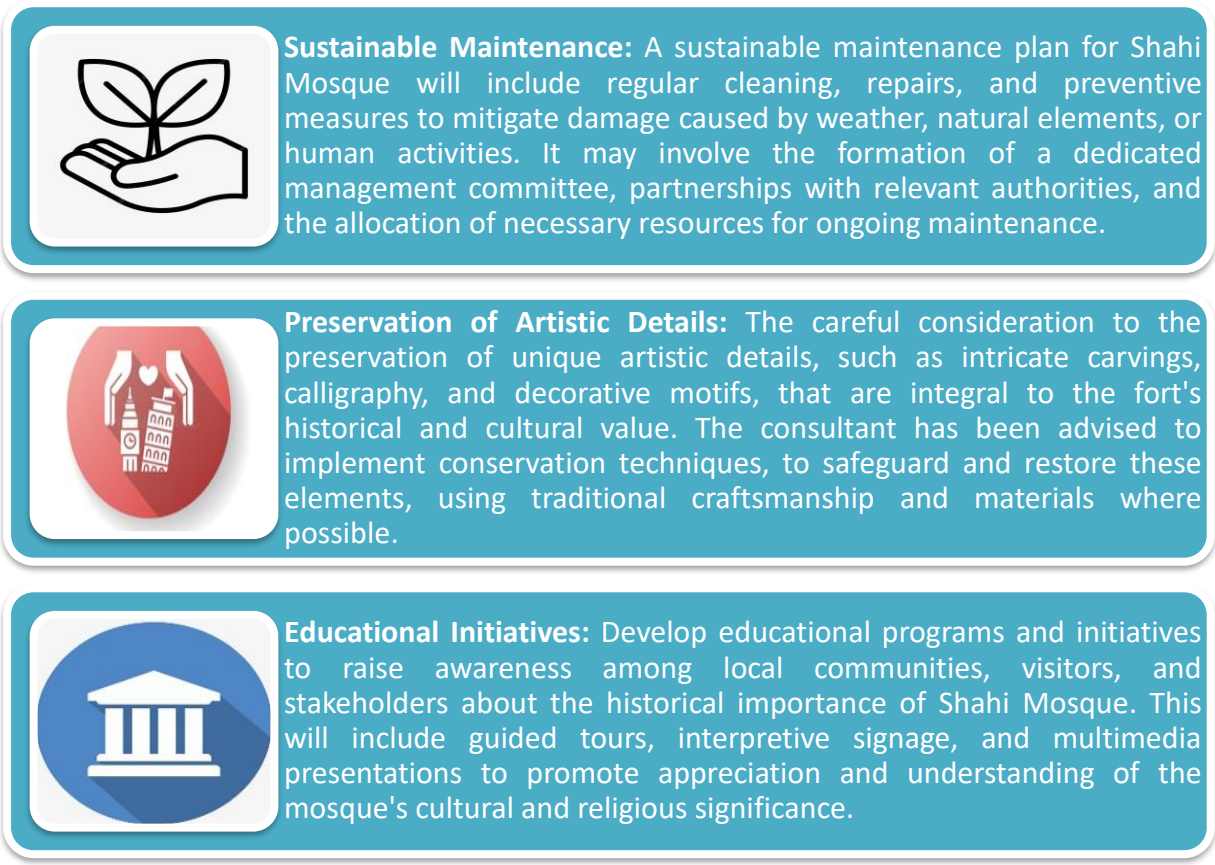
The preservation of Chitral's cultural and heritage sites is vital for maintaining the city's cultural, social, architectural, historical, and ethnographical significance. The proposals and proposals discussed above can provide a foundation for the restoration and conservation of these sites, while also increasing awareness and appreciation among the public. By working together, government agencies, NGOs, and private stakeholders can ensure that Chitral's cultural and heritage sites are protected for future generations to enjoy. It is our responsibility to ensure that these sites are maintained and preserved, not just for their cultural value but also for the economic benefits that tourism can bring to the region. The restoration and conservation of these sites will create opportunities for employment and economic growth while also promoting the unique cultural heritage of Chitral.

15.4. Key Proposals for Shahi Mosque

The preservation and conservation of Shahi Mosque are of utmost importance to safeguard the culture and history of Chitral for future generations. Some key proposals are given to ensure

its protection and maintenance.

Figure 7: Proposals for Shahi Mosque- Chitral Study Area



Source: Devised by Consultants

CHAPTER 16: CITIZEN BEHAVIOR

16.1. Existing Status

The assessment of citizens' behavior in a city is crucial for planning and policy development, as it provides valuable information on their experiences, behavior, well-being, engagement, and participation in the local society. This information is especially pertinent for evaluating the state of welfare of society and developing projects to improve the citizens' living conditions. For instance, in Chitral, a lack of knowledge about the types of solid waste generated in urban areas highlights the need for awareness campaigns and waste management infrastructure. The survey also found that citizens are aware of the importance of hygiene but lack awareness of the health risks associated with unhygienic practices. Moreover, the majority of respondents expressed a willingness to promote tourism in Chitral, indicating a potential for economic development.

16.2. General Proposals

Here are some proposals for citizens based on the current circumstances:

Figure 8: General Proposal for Citizen Behaviour- Chitral Study Area

Source: Devised by Consultants

CHAPTER 17: URBAN DESIGN

17.1. Existing Status

Urban design encompasses the arrangement and functions of cities, towns, or suburbs. The city of Chitral follows a linear urban pattern with locally available wood as the primary construction material but gradually cement and bricks are being used. Chitral has several popular urban design elements, including sports facilities, parks such as Balach Amusement Park and DC Public Park, and landmarks like Chitral Airport and Singur Bridge. These elements contribute to the city's social, cultural, economic, and environmental outcomes.

Chitral Polo Ground has poor to moderate street scape conditions and poor building conditions for façade and paint quality, while Balach Amusement Park lacks satisfactory street scape elements and has dilapidated buildings with poor green infrastructure. Shahi Bazar has poor conditions for most street scape and building elements, including pedestrian friendliness, seating elements, traffic flow, street furniture, greenery, safety/security, building façade, paint quality, quality of windows, signage, and green elements.

In Chitral, the Denin area suffers from congestion due to a high concentration of urban activities, resulting in poor street scape conditions with the exception of cleanliness, vitality, and coherence. Building conditions in Denin were found to be dilapidated but overall rated as mediocre due to material strength and structural stability. Moghlandeh neighborhood lacks pedestrian infrastructure and suffers from poor seating and security conditions. The majority of building elements in Moghlandeh are rated as mediocre, with good building façades but poor signage and greenery.

17.2. Principles to Adopt

The city's Vision for Sustainable Tourist Destination, given in Task A – Vision Report, sets out a vision "To Develop a Socio-Economically Sustainable Tourist Destination and Trade Hub Connecting with Central Asian Countries" that has good transport connectivity, with private cars limited to the edge of the city during daylight hours, and walkable and attractive spaces that support a range of activities, attracts tourists and increases the economic activities within the city. The primary data analysis carried out in Task B – Background Studies Report lists the following principles which are to be followed in order to achieve the aforementioned vision:

- Provide ample, accessible, and well-maintained pedestrian walkways and crossing areas to promote alternative modes of transportation.
- Provide seating options in high pedestrian traffic areas that are durable, accessible, and designed to enhance the character of the city.
- Regularly maintain public spaces and enforce responsible waste disposal to create a clean and well-maintained environment.
- Create a consistent design language and ensure new developments respect the existing character and context of the city.

- Implement design features and policies that prioritize safety and security, such as visible street lighting and crime prevention strategies.
- Encourage activity and social interaction in public spaces through the design and programming of public spaces.
- Promote green spaces, such as parks and street trees, to enhance the environmental quality of the city.
- Provide well-designed and well-maintained street furniture, such as benches and litter bins, to enhance the character and usability of public spaces.
- Design the street network to prioritize pedestrian, bicycle, and public transportation use and minimize negative impacts on the surrounding environment.
- Ensure that public spaces are designed to be safe and accessible for children through features such as playgrounds and inclusive design elements.

17.3. Proposals to Improve Design Façade of Chitral

17.3.1. Improving Building Facades

The city's current building facades are poorly designed and lack consistency, detracting from the city's overall appearance. The buildings appear outdated and unappealing, and many have inadequate lighting, which makes the city feel dark and gloomy at night. The problem is compounded by the lack of proper maintenance and upkeep, which further detracts from the city's appearance.

The proposed solution is to implement a comprehensive program for improving the façades of the buildings in Chitral. The program will involve the following key components:

- Building Bylaws Formulation: Develop Chitral specific building bylaws keeping in view its architectural and heritage significance in consideration to ensure that all new and existing buildings have aesthetically pleasing facades. This will be achieved by setting clear guidelines for the design and construction of building facades, including materials, colors, lighting, and other key design elements.
- Design Guidelines: In addition to the building bylaws, the city will also develop design guidelines for the improvement of existing building facades. These guidelines will provide recommendations on how to improve the appearance of buildings while also addressing functional issues such as lighting and ventilation.
- Incentives for Property Owners: Encourage property owners to improve their building facades, the city will provide financial incentives such as tax breaks or grants. This will help to offset the costs of the improvements and make it easier for property owners to take part in the program.
- Technical Assistance: The city will provide technical assistance to property owners who need help with the design and implementation of the building facade improvements. This will include access to architects, engineers, and contractors who can provide expert

guidance and support.

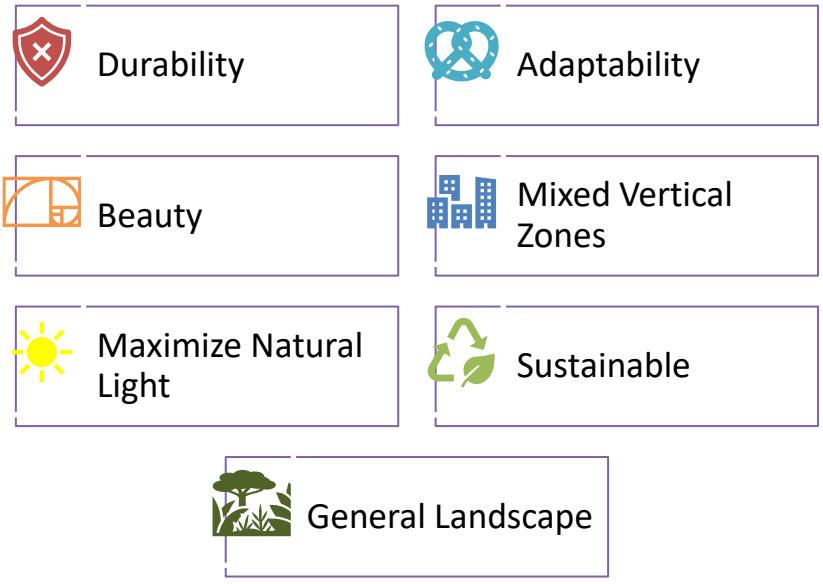
- Community Outreach and Education: Finally, the city will conduct a comprehensive outreach and education campaign to educate property owners, residents, and other stakeholders about the benefits of the program. This will help to build support for the initiative and encourage greater participation.

The implementation of this proposal is expected to result in a significant improvement in the appearance of Chitral's buildings, making the city more visually appealing and inviting. The program will also help to improve the functionality of the buildings, including lighting and ventilation, which will improve the overall quality of life in the city. In addition, the program will provide a boost to the local economy by creating job opportunities and encouraging investment in the city.

17.3.2. Improving Building Conditions

Following are some aspects that are proposed to be incorporated into new development and existing development to ensure that new development is sustainable and existing buildings' conditions are improved:

Figure 9: Proposals for Improving Building Conditions



Source: Devised by Consultants

- Durability: New buildings will use durable, energy-efficient materials like tempered glass, steel, stone, and pre-cast concrete to ensure long-lasting structures.
- Adaptability: Buildings will feature modular designs, making interior modifications easier and cost-effective while maintaining complex exterior elements for long-term flexibility.
- Beauty: Chitral's indigenous architecture, using mud, stone, and wood, will be preserved through maintenance, reinforcement of traditional features, integration of local art, and enhanced landscaping.
- Mixed Vertical Zones: Buildings will support multi-functional use on different levels, such as retail on the ground floor, offices or accommodations above, and rooftop

gardens, ensuring efficient space utilization.

- Maximize Natural Light: Strategic building orientation, large windows, skylights, reflective surfaces, and vegetation will enhance natural lighting while regulating temperature and reducing energy costs.
- Shedding Water: Buildings will manage rainwater through green roofs, rain gardens, swales, and underground storage, aligning with NEQS standards for sustainable water management.

- **General Landscaping Requirements**

Priority will be given to attractive landscape design in the following areas:

  - Entrances to the city through roads, airport, and waterways.
  - Focal points within the city
  - Front yards and exposed exterior side yards and building faces
  - Buffers and transitions between commercial and tourist sites
  - Parking areas of commercial and tourist sites

- **Landscape Design Style**

The preferred approach for landscape style is to group trees and shrubs to frame building frontage. Dense landscaping and/or berming will be used to screen parking areas that are not adequately screened by the building frontages. These landscape areas that are used for screening visually uninteresting building surfaces or parking areas will be coniferous planting for year-round protection.

- **Signage**

Building identification signs will include the name of the building. When signs are proposed on building facades, they must be on the front elevation and within a signed band illustrated in the architectural drawings and must be approved and consistent with the design plan. Freestanding identification signs may include the building address and ground mounted in a landscape setting. Materials and colours used on the sign will be consistent and compatible with the building design. Building signs must not dominate the streetscape by their size or height and may be internally or externally lit. For size details and approvals, refer to the building bylaws that are to be developed by the local government.

17.3.3. Proposal for Street Furniture

The city of Chitral has a rich cultural heritage and stunning natural beauty, making it a prime tourist destination. However, a lack of street furniture makes it difficult for tourists and residents to fully enjoy the city's amenities. To enhance the experience for both visitors and residents, we propose the installation of street furniture at various locations throughout the city.

Types of Street Furniture

The street furniture proposed for installation in Chitral will include benches, waste bins, and

bike racks. These functional and practical elements will serve to improve the comfort and convenience of residents and visitors, while also enhancing the overall aesthetic appeal of the city.

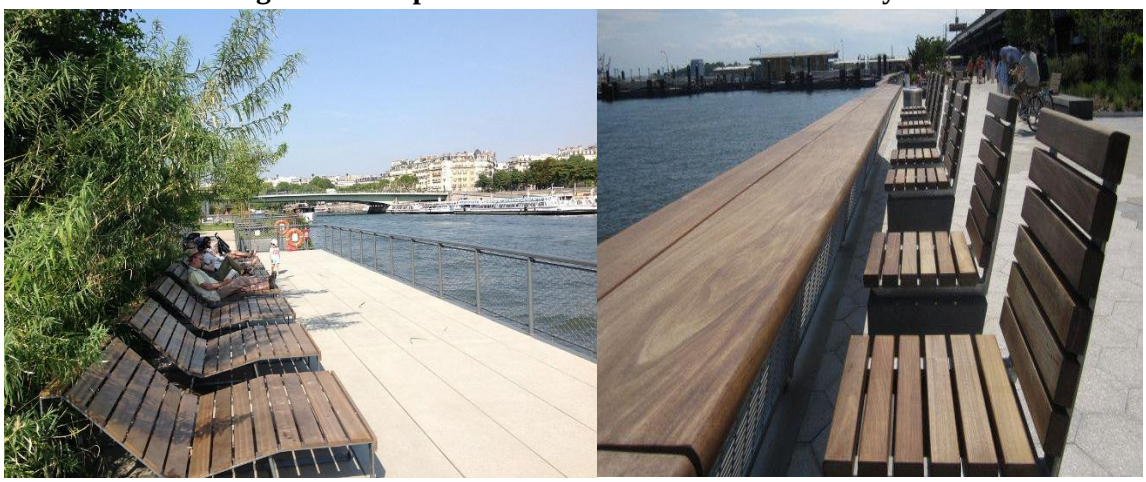
Design Considerations

The colour of the furniture should complement the existing colours and textures of the city, with neutral colours such as brown, grey, or green blending in well with the natural surroundings, and brighter colours used to add a pop of colour to the streetscape. The street furniture should be placed in strategic locations such as along pedestrian pathways, parks, and near public transportation hubs, with mathematical standards of placing one street furniture unit every 20 meters or 65 feet along primary and secondary roads. By taking these design considerations into account, the street furniture in Chitral can enhance the city's existing beauty and promote tourism, while also providing functional and comfortable amenities for the community.

Placement

In terms of the placement of street furniture in Chitral, it is recommended to position units along both sides of the river at a standard interval of 20 meters or 65 feet. Additionally, street furniture should also be placed in other high-traffic areas such as parks, public squares, and transportation areas, also spaced at 20 meters or 65 feet apart.

Figure 10: Proposed Bench Placement- Chitral Study Area



Source: Retrieved from google

Benefits for Tourism

The installation of street furniture will help to promote tourism in Chitral by providing visitors with the amenities they need to comfortably enjoy their time in the city. The provision of benches and bike racks, for example, will allow visitors to take a rest and store their bikes securely. This will encourage them to explore more of the city, promoting the local economy and increasing tourism.

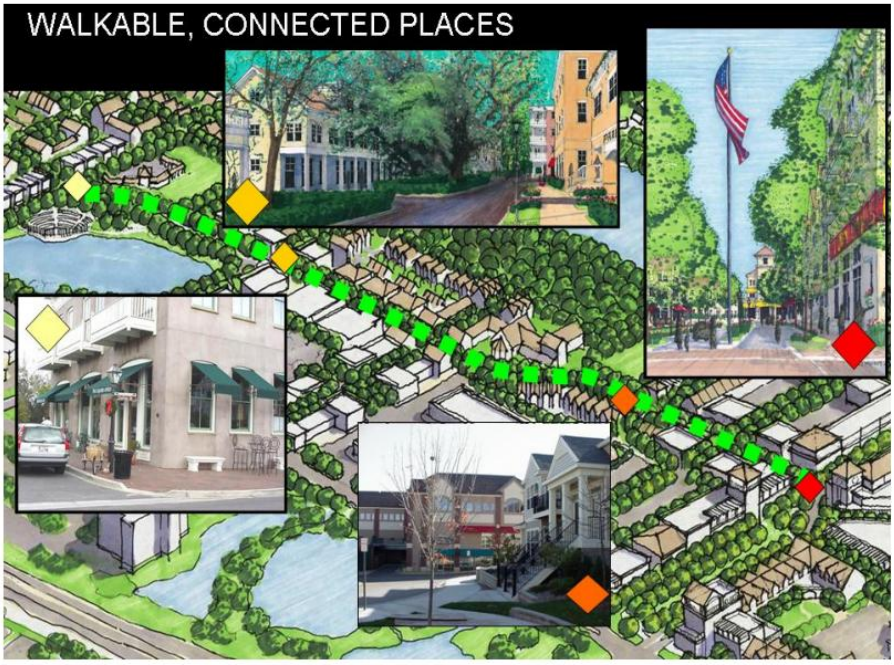
17.4. Proposals to Improve the Public Realm of Chitral

1. Walkability

The public realm of Chitral can be enhanced by incorporating its natural surroundings and topographical features into the design of streets and public spaces. This can be achieved by creating environments that seamlessly blend with the surrounding landscape, taking into account the area's hilly character and natural beauty. This can be done through the use of indigenous vegetation, traditional building materials and designs, and complementary street furniture and lighting. The placement of buildings can also play a crucial role in creating an inviting atmosphere for pedestrians and encouraging foot traffic. For example, by arranging structures in a way that enhances the unique features of the landscape and integrates with the surrounding environment, the streets and public spaces can become harmonious extensions of the surrounding natural beauty. In this way, Chitral can create public spaces that are not only functional and accessible, but also enhance the experience of its residents and visitors. Features of walkable streets and public places require the continuous presence of the following elements:

- Trees spaced close enough to provide a canopy.
- Buildings brought forward to address the street, creating an enclosure.
- Travel lanes for autos, bikes, and pedestrians.

Figure 11: Reference image of Walkable connected places- Chitral Study Area

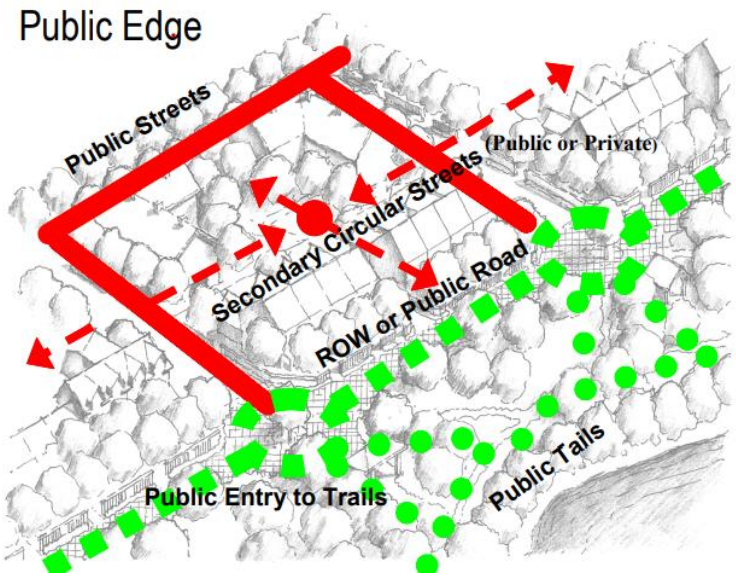


Source: Retrieved from google

2. Public Edge

The river and parks in Chitral will have clearly defined, continuous, and easily accessible pathways for pedestrians, which will be maintained by the city. These pathways will be well-lit and accessible to the public 24 hours a day. In some areas, adjacent roads may also serve as part of these pedestrian walkways. To enhance the public experience, buildings located along these pathways should have clear and accessible entrances facing the walkway.

Figure 12: Proposed Public Edge= Chitral Study Area



Source: Retrieved from Google

3. Range of Formal Public Spaces

There will be a range of public open spaces throughout the city, including but not limited to squares, parks, plazas, and greens strips. These places will be enclosed by building frontages and will be safe places for walking, relaxing, and gathering. These spaces will be heavily landscaped yet be designed for low maintenance.

4. Street Lighting

The regular interval for overhead and pedestrian lighting placement on all primary and secondary roads in Chitral will be determined based on industry standards and guidelines set by relevant government agencies. Typically, street lighting is placed at intervals of 50-100 meters, depending on the specific requirements of the road and surrounding area. This interval ensures that all road users have adequate lighting and visibility, improving the overall safety and comfort of the transportation network in Chitral.

5. Public Signage

All public traffic control\ directional\construction and temporary signage will include a design that is compatible with the building character or other site signage.

6. Trees

There will be trees planted at regular intervals i.e., minimum at a distance of 10 feet, within the planting strip of every street throughout the district. The tree species will comply with the flora identified in the Task B report of Chitral and replacement of dying, diseased, and stressed trees will be required.

Figure 13: Comparative Placement with or without Trees

Source: Retrieved from Google

17.5. Proposals to Improve Greenspaces (Parks and Playgrounds)

For each existing and proposed greenspace, the consultant has used prototypes developed by the City of Brandon and illustrated as guidelines to direct the future design and development of green spaces. International prototypes identify the key design attributes for each greenspace type and are intended to be flexible enough to allow for creative design expressions while establishing a minimum standard of development. The prototype illustrations depict how the main features of each greenspace could be physically organized on a site to achieve a design solution that is orderly and functional; the illustrations are not site-specific. For each classification, design guidelines address nine key components of greenspace design as described in the table below:

Table 75: Brandon's Greenspace Design Guideline Descriptions

Location	Describes the ideal location in the community where each greenspace type should be developed
Access	Describes the type of street each greenspace type should be located on and street frontage requirements.
Entrances	Describes the location of entrances and the relationship between pedestrian and vehicular entrances.
Pedestrian Circulation	Describes the requirements for internal pathway systems and established minimum width standards.
Vehicular Circulation	Describes the location of vehicular circulation system and features within each greenspace type
Buildings	Describes the function, type, and location of buildings in each greenspace type.
Landscaping	Describes the provisions for sun and shade areas, buffering, naturalization, etc.
Signage	Describes the requirements for greenspace identification signage and wayfinding.
Special Features & Functions	Describes the requirements to accommodate or provide special design elements or greenspace uses.

Source: Brandon's Greenspace Master Plan

Examples of some prototypes is given below:

- **Greenspace Type: Activity**

As a primary destination, the Activity Greenspace has a city wide or regional draw for major sporting activities/events, sports tourism or other special sports events that draw a large attendance. The greenspace should be located with frontage on an arterial road with views into and out of the site. Greenspace perimeters should have trees and a naturalized appearance. It should be in or proximate to institutional, commercial, or industrial areas with buffers provided for lit areas. The greenspace should be well organized with defined/clustered recreation/athletic facilities. A centrally located building should house public washrooms, concessions, storage, change rooms, etc. An internal pedestrian network should link all facilities and connect to the city-wide pedestrian system. The reference proposal is given in the form of an improvement of Balach Amusement Park.

Size: 15 hectares minimum

Table 76:Design Guideline Descriptions- Activity

Location	Off of/nearby to a major transportation artery; situated in commercial, industrial or open space areas; should not impact residential land uses
Access	Should have frontage on two streets; should have min. 50 m frontage on a major street; should be integrated into open space system and be accessible by a Connector Greenspace
Entrances	Should have at least two points of entry; (for vehicles and pedestrians); should be announced with signage
Pedestrian Circulation	Should have looped system connecting facilities
Vehicular Circulation	Parking should be on-site; parking lots should be landscaped, lit, and proximate to primary use areas; provide 'green' overflow parking areas
Facilities	Should provide community facility building with year-round washrooms, concession, meeting rooms, storage facilities; should provide dedicated sports facility structure; should provide outdoor gathering space/seating
Landscaping	Should screen adjacent land uses impacted by park activities; should 'naturalize' outlying areas; should provide shaded picnic/viewing areas and mass horticultural displays in key locations
Signage	Should provide signage for each facility
Special Features & Functions	Primary function is an athletic venue, but should be designed to accommodate multiple-uses, special events; ideally offers historic, cultural, natural, civic and/or heritage features.

Figure 14: Prototype of Activity Greenspace

Source: Brandon's Greenspace Master Plan

- **Greenspace Type: Celebration**

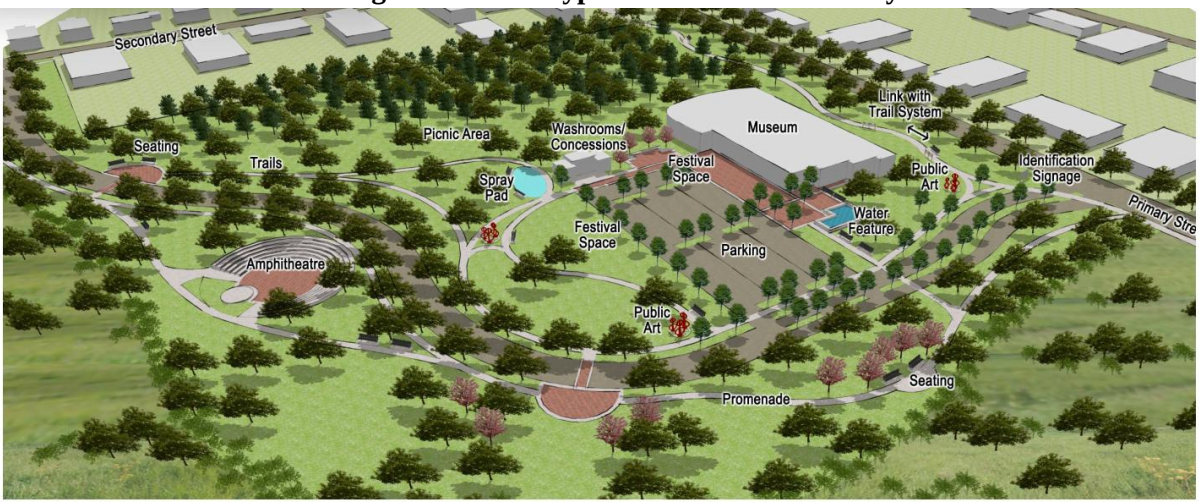
Celebration Greenspaces are defining features of the city. Their character should be monumental and urban. They support a wide variety of uses, activities and experiences and are integral to the economic well-being of the community. Celebration Greenspaces are designated as the spaces for special community, regional and national cultural events and, as such, offer both formal and informal event gathering spaces and support facilities. An internal pedestrian network should link all facilities within the greenspace and connect to the city-wide pedestrian system.

Size: 3 hectares minimum

Table 77:Design Guideline Descriptions- Celebrations

Location	High priority site, should be near canal or in the recreational zone identified
Access	Should maximize street frontage to elevate profile/visibility of greenspace; should be connected to main city/downtown
Entrances	Should be multiple, ample, wide and connected to the street; should connect with primary promenade/boardwalk
Pedestrian Circulation	Should have a hierarchy of pedestrian circulation features
Vehicular Circulation	Limit the location of parking (if provided) with majority of parking located a bit far from the greenspace
Facilities	Should provide amphitheatre, festival space and museum; may include washrooms, concessions or picnic facilities; should be oriented to preserve views to river if present
Landscaping	Should reinforce pedestrian circulation and provide shade
Signage	Should identify named facilities; ideally include interpretive signage for site/area
Special Features & Functions	Should enhance tourism and economic development with character unique to Sialkot; should accommodate special events/gatherings; should balance public use and wildlife habitat.

Figure 15: Prototype of Celebration Activity



Source: Brandon's Greenspace Master Plan

- **Greenspace Type: Leisure**

Leisure Greenspaces are the most common type of greenspaces in the City and are centrally located within each neighbourhood. They are intended to be the primary public space in a neighbourhood and provide the most direct access to greenspace. As passive recreation spaces, they offer casual and non-programmed park use/activities and the potential for ecological education close to one's own backyard. Leisure Greenspaces are within a short walking distance from all residential areas. Leisure Greenspaces are designed for neighbourhood gathering and events.

Size: 1 hectare minimum

Table 78 : Design Guideline Descriptions-Leisure

Location	Should be adjacent to residential area
Access	Should have connections to as many local streets as viable; minimum one street frontage
Entrances	Should be located to access as many residents as viable
Pedestrian Circulation	Should have primary internal path 3.0 m wide to link facilities; may provide secondary 2.5 m wide path
Vehicular Circulation	Not required; ideally provide on-street parking or on-site if demand warrants; minimize impact on site uses
Facilities	Should provide shelter, seating and play equipment; may include community gardens, spray pad and/or multi-use court
Landscaping	Should consist primarily of trees/turf; mass horticultural displays at key locations; 'naturalize' non-functional areas
Signage	Should identify named facilities, include interpretive and wayfinding features, and provide neighborhood information
Special Features & Functions	Should provide family facilities/play areas; group facilities when feasible/non conflicting; should allow for public sculpture/art

Recommendations for Improvement of Sports Grounds

- Maintenance: Regular maintenance of the grounds, including mowing the grass, checking for any damage to the turf and fixing it, and ensuring that the facilities are clean and hygienic.

- Lighting: Adequate lighting is crucial for sports grounds. The existing lighting system should be upgraded to ensure that games can be played even during low light conditions.
- Drainage: There should be a proper drainage system present on the grounds because it is essential for the longevity of the turf and to minimize disruptions to games due to weather conditions.
- Spectator seating: Provide comfortable and safe seating arrangements for spectators. This could include adding or upgrading bleachers or stands.
- Equipment: Ensure that all equipment, such as goalposts and markers, are in good condition and properly maintained.
- Parking: Adequate parking facilities should be available for spectators and players.
- Accessibility: Ensure that the grounds are easily accessible to all, including people with disabilities. This may involve adding ramps, railings, and other accessibility features.
- Gender Inclusivity: A portion of the sports ground should be cordoned off for females which provides a safe and secure environment for females so that they can practice and play without worrying about harassment.

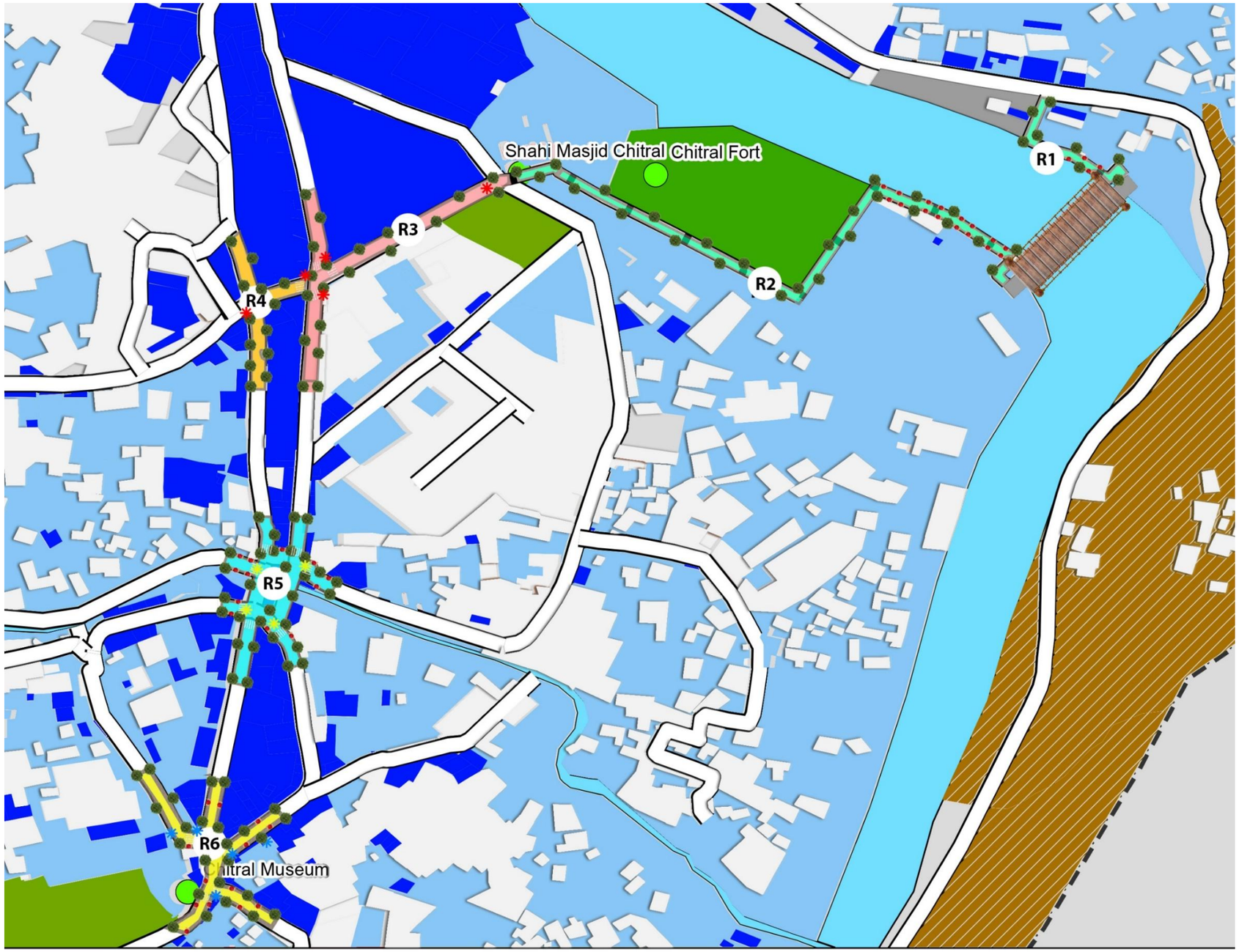
In regard to encouraging and improving sports facilities on the grounds, the following recommendations have been given:

- Multipurpose facilities: Add facilities that will be used for different sports including a running track, basketball court, tennis court, and football field.
- Equipment storage: Adequate storage facilities for sports equipment and gear should be provided to ensure that everything is kept organized and easily accessible.
- Refreshments: Private vendors should be allowed to set up refreshment stands or vending machines to provide players and spectators with snacks and drinks.
- First-aid facilities: The administration of the grounds or the caretaker should be present all the time and must have adequate first-aid facilities, including a well-stocked first-aid kit.
- Security: Ensure that the grounds are secure, with proper fencing and lighting, to prevent theft or damage to the facilities and equipment.
- Green initiatives: Implement green initiatives, including trees and shrubs along the boundary of the ground and solar-powered lighting, to reduce the carbon footprint of the facilities and promote sustainability.

17.6. Reference Proposal for Shahi Bazaar Chitral

Shahi Bazaar would benefit from a series of public realm improvements, which would enable the street to transition from a ‘highways’ focused to a ‘people’ focused space. These improvements would also enhance street character, seek to maximize street activity and transform Shahi Bazaar into an exemplar destination space. The adoption of shared space principles with pedestrian focused street design should be considered. A coordinated palette of paving, external lighting and street furniture should be used throughout the various projects to develop a cohesive streetscape. The figure shows a concept masterplan illustrating potential proposals. This also separates these into discrete project areas.

Figure 16: Reference Urban Design Proposal of Shahi Bazaar



Source: Devised by Consultants

17.7. Reference Proposal for Beautification for Ataliq Bazar

Ataliq Bazar, a vibrant and historically significant bazar within the study area, identify to undergo an innovative urban beautification effort with the goal of enhancing its appeal and creating an alluring destination for both locals and tourists. A key element is the carefully coordinated palette of street furniture, street lighting, and paved streets that is used throughout Ataliq Bazar to create a seamless and attractive environment. The use of locally produced materials and traditional design features will pay tribute to the region's cultural legacy and infuse the urban fabric with a feeling of identity and authenticity. The implementation of shared space principles, including pedestrian-focused street design that puts pedestrian comfort and safety first, is the main goal.

Figure 17: Reference Urban Beautification of Ataliq Bazar- Chitral Study Area

Source: Devised by Consultants

CHAPTER 18: OTHERS / SUPPLEMENTARY USES

18.1. Proposed Graveyards

Proposed graveyards have been designated at multiple locations within the Chitral study area, with a total area of 40.25 acres. The standard area requirement for graveyards is between 0.5% to 6% of the total land, making the minimum area required to be 26.71 acres. These proposed graveyards are crucial for providing a dignified resting place for the deceased and are an important part of community infrastructure. It is notable that the proposed graveyards have been given within residential areas, and in close proximity to roads, ensuring easy access for the community. This is an important consideration, as it is essential for families to have easy access to the graves of their loved ones. Proper planning and management are necessary to ensure the sustainable development of these graveyards, and it is important to consider the potential environmental and social impacts of such developments. The proposed graveyards must be developed and managed in a way that is respectful to the community and the environment.

Table 79: Proposed Graveyard Area-Chitral Study Area

Existing Graveyard (acre)	Proposed Graveyard (acre)	Total Graveyard (acre)
5.98	6.26	12.24

Source: Calculated by Consultant

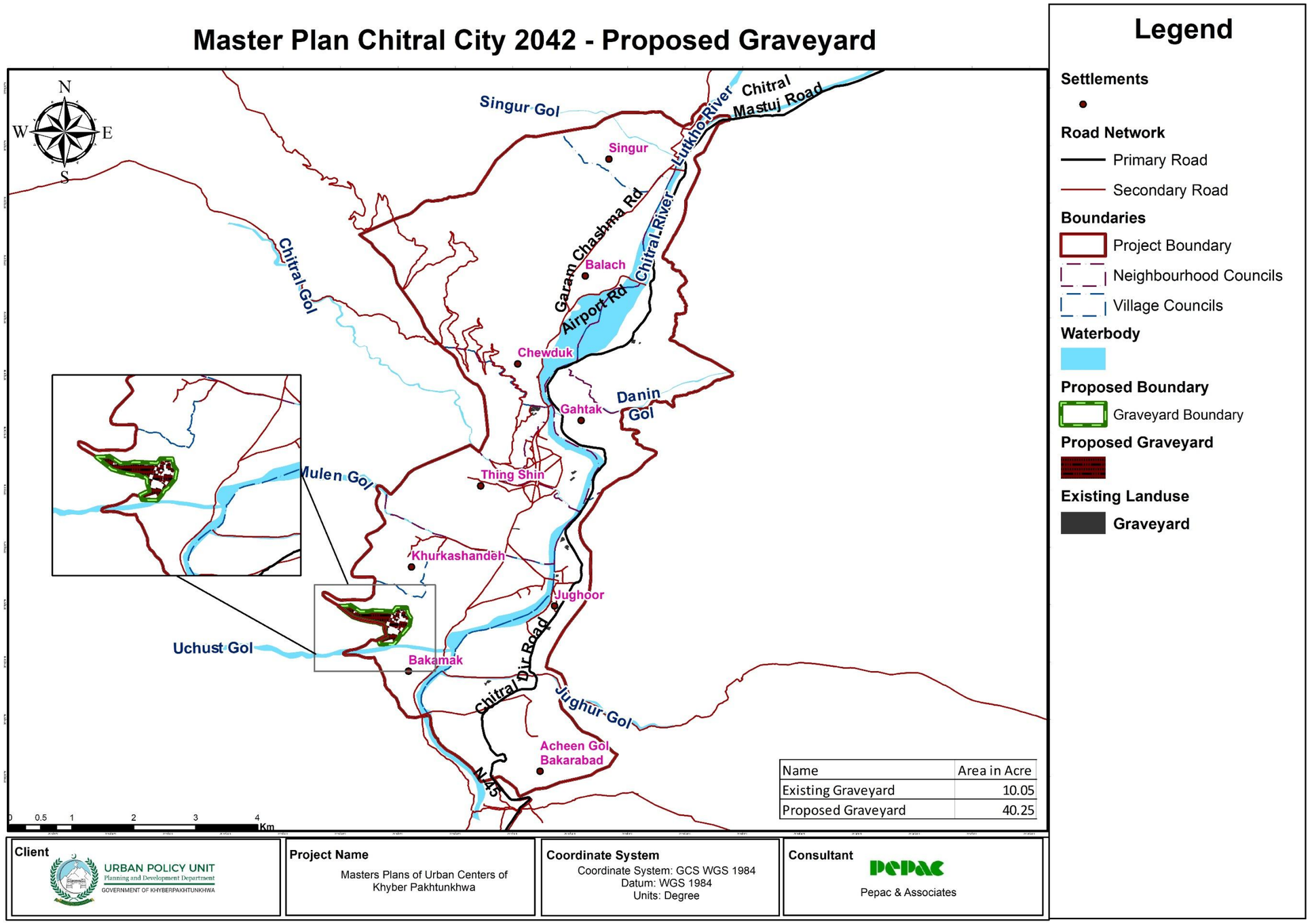
20.1.1. Regulations for Graveyard

Table 80: Regulations for Graveyard-Chitral Study Area

Permitted Uses	Permitted on appeal Uses
• Related activities including accommodation for caretaker • Mosque	• Other than permitted all are prohibited

Source: Devised by Consultant

Map 37: Proposed Graveyards - Chitral Study Area



Source: Devised by Consultants

CHAPTER 19– PROPOSED MASTER PLAN

19.1. Salient Features of Proposed Master Plan

Keeping in view the consequences of adopted master planning approach and overall city form, the proposed Master Plan for the development of Chitral city has been given based on New urbanism It involves intensification and densification. The former involves infill development of the vacant pockets within the neighbourhood councils. It will reduce development pressure on outlying areas, will assist in protecting the agriculture and hilly areas of Chitral city. The concept latter proposes densification around the proposed primary roads and other areas within the neighbourhood councils. To conserving the natural environment and prime agricultural land, this approach is intended to be sufficient to encourage a compact and sustainable development. The development of mixed land use in residential areas, helps communities achieve compactness and sustainability because it preserves undeveloped or environmentally sensitive land in the neighbourhood, provides opportunities for additional or different types of housing, promotes bicycle and pedestrian-friendly destinations, and improves a community's sense of place.

In addition to this, the principle of compact and vertical development (intensification of NC) has also been incorporated in proposed scenario with the purpose of increasing the urban density of the city and reducing urban sprawl, reducing energy consumption, and carbon footprint of each individual, building and vehicle. This incorporation will lead to complete preservation of prime agriculture land in the NC and in the study area as the project population of the next 20 years will be accommodated within the Neighborhood councils. The zones proposed using all concepts include Commercial, Industries, Residential, Agriculture, Urban Forest, Recreational, Hospitality and Tourism zone. Following are some zones proposed in Master Plan 2042 based on above mentioned model namely “Green-Economy” , which will be connected through a network of primary and secondary roads. In addition, design guidelines of all proposed zones will be provided in Tack D- Action Plan.

19.1.1. Residential Zone

A zone consisting of different types of residential units incorporating existing social classes and cultural aspects are present and proposed in the form of infill development all across the NCs where suitable vacant areas are present. The primary motivation for introducing vertical development is to increase the standard of living for most of the population and to stop the horizontal spread of cities. With positive environmental benefits, vertical development can elevate the standard of living for the country’s population and become an effective solution to decreasing informal settlements.

19.1.2. Recreational zone

A zone developed to be used for leisure purposes, to provide a range of recreational settings and activities and compatible land uses, to protect and enhance the natural environment for recreational purpose and to cater for the development of a wide range of uses and facilities within open spaces for the benefit of the community. The recreational zone includes amusement

park next to Balach amusement park, botanical parks, central park and waterfront park in study area.

19.1.3. Hospitality and Tourism Zone

As part of the comprehensive plan for the city, a Hospitality and Tourism Zone is proposed to be developed. The zone will be designed to cater to the needs of tourists and provide them with a comfortable and enjoyable experience. The Hospitality and Tourism Zone will include facilities such as hotels, resorts, restaurants, and cafes, as well as tourist attractions such as museums, art galleries, and historical sites. The zone will also feature recreational areas such as parks and beaches where tourists can relax and enjoy the natural beauty of the area. In addition, the Hospitality and Tourism Zone will create job opportunities for the local community and contribute to the economic development of the region. Overall, the development of the Hospitality and Tourism Zone will enhance the city's reputation as a desirable tourist destination and improve the quality of life for residents and visitors alike.

19.1.4. Sports and Cultural Zone

The proposed plan for the city includes the development of a Sports and Cultural Zone, which will serve as a hub for sports and cultural activities. This zone will be a recreational area that includes facilities for sports such as football, basketball, tennis, and swimming, as well as venues for cultural events such as concerts, exhibitions, and festivals. The Sports and Cultural Zone will be designed to cater to the needs and interests of people of all ages and backgrounds. In addition to sports facilities and cultural venues, the zone will also include parks, green spaces, and landscaped areas where people can relax and enjoy nature. This comprehensive approach to the development of the Sports and Cultural Zone will not only promote physical activity and cultural exchange but also contribute to the overall well-being of the community.

19.1.5. Commercial Zone

A zone dedicated for promotion of commercial activities including business, warehouses, shops, etc. The proposed commercial zone includes a central business district around Shahi Bazar, and Business and Trade Park close to N-45.

vi. Urban Forest Zone

A zone is proposed using Miyawaki technique, one of the most effective tree planting methods for creating forest cover quickly plant extensive native trees in the city along Chitral River catchment area, some open spaces and around the commercial and industrial zone to curb the impacts of air and noise pollution.

19.1.6. Conservation Zone

A zone is proposed to promote riparian heritage site. Due to the Chitral National Park on the northwestern side, it is crucial to minimize soil erosion. It preserves excellent water quality in streams and rivers in Chitral. Riparian land provides critical habitat for native plants and animals, including threatened species.

19.1.7. Buffer Zone

A buffer of 50 meter is proposed along the waterbody. To protect the natural habitat from human influence and pollutants.

19.1.8. Civic Zone

The civic zone includes the public and institutional building along with semi-public buildings of worship, private educational institutions, and private recreation etc. The study area has a specific civic zone along Chitral-Mastuj Road and near commercial activities which includes the public and institutional building along with semi-public buildings of worship, private educational institutions, and private recreation etc. A graveyard is proposed in Chitral to fulfill the requirement.

The proposed health and education facilities fulfill the requirement of increase population, ensuring that the existing needs of the community are met. The proposed areas are important for sustainable development as they aim to provide access to essential infrastructure and services for every citizen.

19.1.9. Agriculture Conservation Zone

By keeping in mind, the Goals for Sustainable Agriculture development and promotion in Chitral city, following proposals have been considered;

- Encouraging Conservation Practices and Tunnel Farming
- Promoting Integrated Pest Management
- Supporting Agroforestry
- Promoting Organic Agriculture
- Supporting Local Food Systems
- Investing in Sustainable Agriculture Research and Education
- Encouraging Agro ecology

19.1.10. Industrial Zone

The existing industries are present in the study area in dispersed form. The industrial zone area proposed outside the study area near the Chitral economic zone. The industries are productive enterprises or that produce or supply goods and services providing job opportunities for in the form of labors helping in economic development.

19.1.11. Sewage treatment Plants

These are proposed for cleaning and safe processed water. It can be turned wastewater into reusable water. It will preserve natural environment of Chitral study area.

viii. Security

Taking into consideration the security, recommendations are proposed for safety and security of the study area. Safety measures are also suggested for trails.

19.1.12. Check dam

The small barriers built across the direction of water flow on shallow rivers and streams for the purpose of water harvesting. It has social, ecological, economic and water resources benefits.

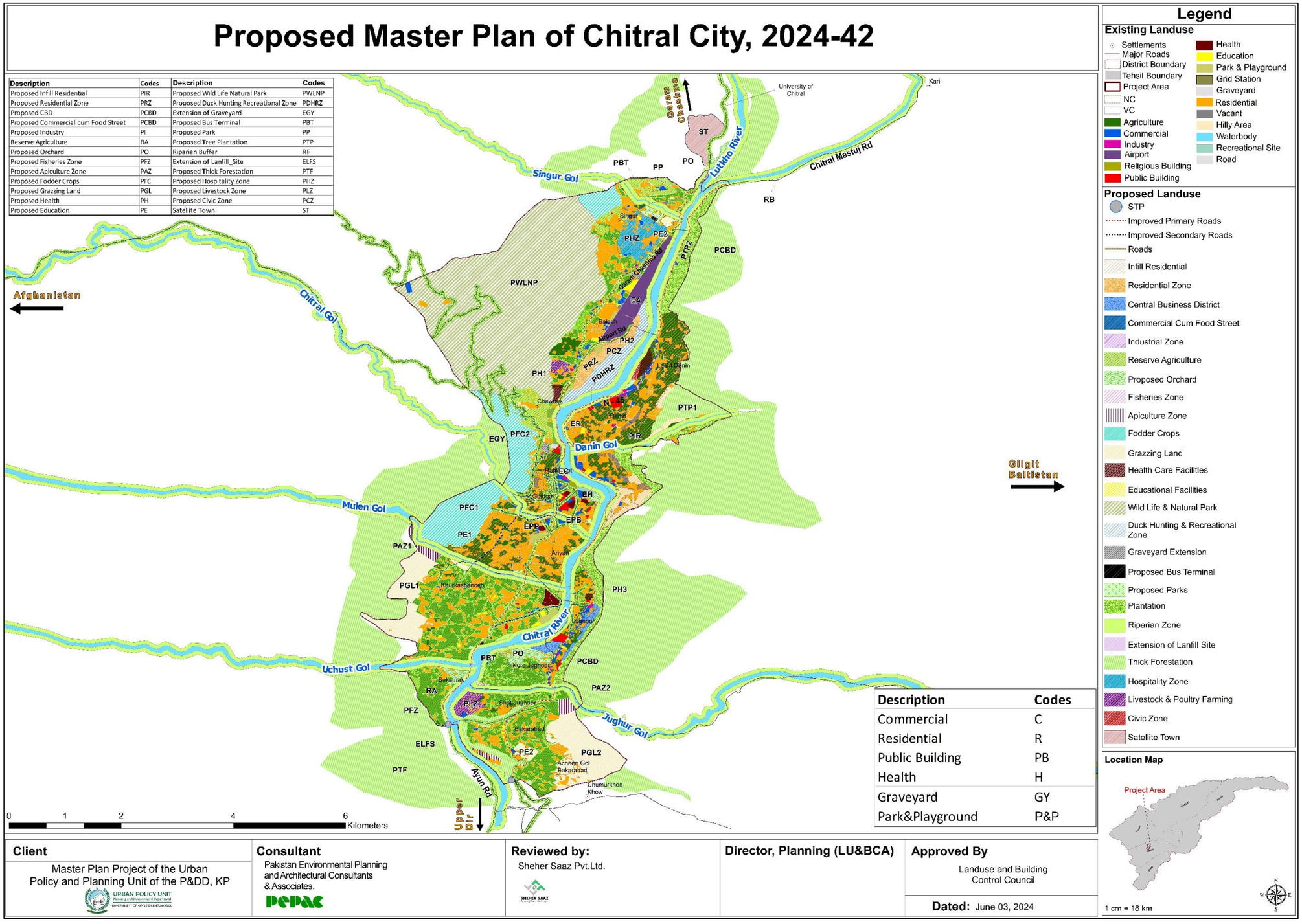
19.1.13. Trail System

The unpaved lane is proposed through a hilly area of study area. It protects habitat and provide corridors for people and wildlife. Trails provide opportunities walking, hiking, biking, and running with a majestic view of Hindu Kash mountain range.

19.1.14. Retaining Walls

In order to improve resilience, safety, and sustainable development in flood-prone areas to decrease flood risks and adapt to climate change patterns, the consultant has advised building reinforced concrete retaining walls along the Chitral river.

Map 38: Proposed Master Plan-Chitral Study Area



Source: Devised by Consultants

19.2. Implementation Framework for Proposed Master Plan

The Chitral Master Plan has been developed by considering various factors such as the LSA, existing resources, economic feasibility, and the chosen scenario based on the Green-Economic Model. For master plan implementation two distinguish timeframe intervals are proposed to make the masterplan implementation efficient and sustainable. Following are implementation phases for master plan.

Table 81: Implementation Strategy Master Plan of Chitral 2042

Sr. No	Time Period	Development Time Frame	Development Type	Population Served
1	2022-2032	Short/ Medium Term	Infill Development	14,053
2	2022-2042	Long Term	Infill Remaining Development	16,434

Source: Devised by Consultant

In light of the proposed scenarios, land suitability analysis and land demand calculation for all land uses and their allied facilities including health, education, parks as well as introduction of new roadways for connectivity; Master plan for Chitral Study Area is being proposed by the consulting team. It has been proposed that the focus should be on compact and sustainable development, therefore, all the residential development is to be occurred in all the NCs in the next two decades while no agriculture land in VCs will be used for residential development. However, different other uses have been proposed in VCs in order to fulfil the requirement of different uses in VCs.

a. Short/ medium Term Phase (2022 - 2032)

This phase will emphasize on infill development of vacant lots available in the study area boundary within the NCs areas. These vacant lot include under-utilized land parcels within the existing urban areas that are already developed. This will be considered as a means of sustainable land development close to the existing inner-city area. Thus, in infill development new buildings can be constructed on vacant or underused property or in between existing buildings. The infill development is somewhat possible in the following NCs. This short/medium term will cater for the population 14,053 for the interval of ten years ranging from 2022 to 2032. The following table will prove the NCs and VCs in which infill is proposed.

Table 82: Proposed Short/medium Term Development in NCs and VCs in Master Plan

Sr. No.	Name of Administrative Units	NCs/VCs
1.	Chitral – 1	NC
2.	Chitral – 2	NC
3.	Danin – 1	NC
4.	Danin – 2	NC
5.	Zargarandeh	NC

Source: Devised by Consultant

b. Long Term Phase (2022 – 2042)

This phase includes medium term development from the time fame of 2022 to 2042. In this phase new development over the vacant lots in VCs are proposed to cater for the spill over population. This phase will serve a population of around 16,434. The following NCs have potential for new development in the near future:

Table 83: Proposed Long Term Development in NCs in Master Plan

Sr. No	Name	NC/VC
1	Balach	VC
2	Jughoor	VC
3	Khorkhasandeh	VC
4	Shiaqotak	VC
5	Singoor	VC

Source: Devised by Consultant