MASTER PLAN OF KALAYA URBAN CENTER, DISTRICT ORAKZAI, 2024-42

VOLUME I

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URBAN POLICY AND
PLANNING UNIT
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URBAN POLICY UNIT
Planning and Development Department
GOVERNMENT OF KHYBERPAKHTUNKHWA

LUBCA

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

HP Consultant Planners (SMC-Private) Limited

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Urban Sector Planning and Management Sector Unit (Pvt.) Ltd. has prepared the Master plan of Kalaya. Maximum care and caution were observed while developing this document.

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MESSAGE FROM THE CHIEF MINISTER KHYBER PAKHTUNKHWA

Khyber Pakhtunkhwa, the third most populated province of Pakistan, is experiencing rapid urbanization due to various push and pull factors. Lack of proper planning has resulted in overcrowding of all major urban centers coupled with traffic congestion, environmental pollution and ribbon development along main roads. Insufficient investment in urban infrastructure, lack of trained human resource 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 dilapidated environment and 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 potential of cities 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, district land use plans for districts and master plans for urban centers across the province have been developed. These master plans are designed to address core urban issues such as traffic congestion, provision of affordable housing, traffic & 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 Master Plan Project, Urban Policy and Planning Unit (UPU) of the Planning and Development Department, Government of 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.

Mr. Ali Amin Gandapur
Chief Minister
Government of Khyber Pakhtunkhwa

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

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 (UPU) 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 LGE & RD Department
Government of Khyber Pakhtunkhwa

MESSAGE FROM THE ADDITIONAL CHIEF SECRETARY PLANNING AND 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 of 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 towards the planning of towns and cities, optimize land use, improving economic productivity and ensuring 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 a 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 the times.

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

MESSAGE FROM THE SECRETARY LOCAL GOVERNMENT DEPARTMENT GOVERNMENT OF KHYBER PAKHTUNKHWA

The Kalaya 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 Kalaya 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 undertake 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 a long-term resilient growth.

The Kalaya 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 Kalaya. 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 Kalaya 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

Acknowledgements

First of all, I am extremely grateful to almighty Allah who enable me and my team to successfully complete gigantic work of the preparation of Master Plan of Kalaya. The preparation of Kalaya Master Plan 2024-2042 has been a collaborative and dedicated effort aimed at ensuring the sustainable development of Kalaya, the vibrant urban center of District Khyber, Khyber Pakhtunkhwa. This report reflects the collective commitment of all stakeholders toward the rational, balanced, and systematic use of resources to address the city's challenges and guide its future growth and development. This master plan forms an integral part of Khyber Pakhtunkhwa's 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 Kalaya.

I extend my sincere gratitude to the Urban Policy & Planning Unit, P & D Department, Government of KP for entrusting 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 and Deputy Commissioner Kalaya District Khyber, 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 Kalaya.

Special recognition is due to Urban Unit Punjab 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. 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 Kalaya.

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 Kalaya 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, with the Newly Merged Districts (NMDs) accounting for 13% of the provincial population contributing around 4.6 million people. This extensive urban growth has been driven by the province's complex socio-political dynamics, including the influx of Afghan refugees and persistent law-and-order challenges in districts bordering Afghanistan. Subsequently, the urban centres in KP 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, the Prime Minister of Pakistan 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 (UPPU) of the Planning and Development Department, Government of KP commissioned the preparation of Master Plans of Provincial, Divisional and District Headquarters of KP province. This initiative includes the preparation of Kalaya Urban Center Master Plan 2042 that would inform and direct the future growth of Kalaya in a sustainable way to efficiently enhance its productivity and functioning whilst improving the quality of life of its residents. The Urban Unit and HP Consultants were in a joint venture hired as the Project Consultant by UPPU to carry out the extensive exercise of the preparation of the Kalaya Urban Center Master Plan 2042. The primary objective of the plan is to develop sustainable, compact, and environmentally sound proposals to guide Kalaya's future development. The plan serves as a strategic roadmap for the city's growth up to the year 2042, aiming to enhance productivity, improve quality of life, and ensure spatial equity for its residents.

The Kalaya Master Plan is intended to guide the city's future growth in a structured and environmentally responsible manner. Kalaya has a current built-up area of 5.87 sq. km and a total area of 53 sq. km. Its population stood at approximately 20,011 in 2022 and is projected to grow to 31,930 by 2040. The urban form is based on a multi-

nuclei development model, where each Neighborhood Council has its own commercial and public service hubs. However, the city has experienced scattered development, primarily along major roads, resulting in inefficient land use and infrastructure delivery. To counter these trends, the Master Plan adopts a compact development strategy that avoids urban sprawl and protects agricultural and forest land.

To accommodate projected population growth, the Master Plan proposes new residential areas supported by a detailed housing strategy. A total of 3,936 housing units are planned to meet demand by 2040. The housing strategy targets all income groups 72% of the proposed housing is reserved for low-income groups, 22% for middle-income, and 6% for high-income households. Residential development is planned around existing built-up areas through infill and redevelopment, minimizing infrastructure costs and maximizing land efficiency.

Commercial zones are strategically distributed near residential clusters and along major corridors such as Kalaya Road and Orakzai Agency Road to reduce travel time and promote self-sufficient neighborhoods. The plan proposes an economic corridor with mixed-use development to serve as the city's commercial spine. These commercial hubs will include marketplaces, retail spaces, and provisions for parking to support small and medium enterprises and facilitate local trade.

The proposed industrial development is tailored to Kalaya's local economy. Existing industrial activity is limited (0.004 sq. km), and the plan proposes two dedicated industrial zones one each in Kalaya NC and Jalaka Mela Feroz Khel NC based on accessibility and suitability. These zones are intended to promote clustering, efficient land use, and job creation. In addition, a timber market (0.38 sq. km) and warehousing area (0.03 sq. km) are proposed to support regional trade, particularly with cross-border connections.

In terms of social infrastructure, the Master Plan addresses significant gaps in health and education. Currently, Kalaya hosts a range of public and private schools, but the demand far exceeds the available capacity. Therefore, the plan proposes new educational facilities at all levels, including vocational centers and higher education institutions. Similarly, existing health infrastructure is inadequate for the growing population. The plan proposes new Basic Health Units (BHUs), clinics, and district-

level hospitals to ensure equitable healthcare access across all Neighborhood Councils. These proposals are aligned with National Reference Manual (NRM) standards.

Green space and environmental management are integral to the plan. A total of 2.04 sq. km is reserved for green spaces, parks, and recreational areas in accordance with World Health Organization (WHO) standards. In addition, 18.74 sq. km is designated as Reserved Agricultural Area to promote food security, environmental conservation, and sustainable land management.

The Kalaya Master Plan places a strong focus on mobility and transportation. It identifies the need for road network improvements, including the widening and dualization of Kalaya Road, the establishment of transit terminals in Kalaya and Mishti Mela, and the development of parking facilities. Non-motorized transport infrastructure, such as sidewalks and bicycle lanes, is also proposed. These measures aim to improve connectivity within and between neighborhoods, reduce congestion, and enhance accessibility.

Solid waste management and sanitation are also critical concerns. The plan proposes the establishment of a sanitary landfill site and includes measures to enhance drainage and sewerage systems throughout the city. This will ensure environmental health and support the city's sustainable growth.

A Civic Amenities Zone of 0.43 sq. km is proposed at a central location to house key public offices, community centers, and emergency services, ensuring easy access for all citizens. The area is located near the intersection of Kalaya Road and Orakzai Agency Road and is strategically placed between residential and commercial clusters.

Kalaya's topography is marked by a significant elevation gradient, with contour levels varying from 2019m to 1495m. This slope poses both opportunities and challenges in urban design, drainage, and infrastructure planning. The contour and land suitability maps developed using GIS and Multi-Criteria Analysis (MCA) have guided zoning and land allocation decisions.

The preparation of this Master Plan has been deeply participatory. Multiple stakeholder meetings focus group discussions, field surveys, and consultations with local elders, government officials, and NGOs have shaped the vision and objectives. The vision for Kalaya is:

"A peaceful city having all the basic infrastructure facilities with improved connectivity that provides favorable conditions for tourism industry while respecting the cultural norms and uplifting the life standard of the public through education, health, municipal services, and public awareness."

The implementation framework of the Master Plan includes an action plan covering 18 sectors, a proposed institutional structure, phased development strategies, and a cost estimate. This integrated approach is designed to support coordinated execution and monitoring, ensuring the plan's success by 2040. The Kalaya Master Plan thus offers a pragmatic yet visionary pathway to create a connected, inclusive, and resilient urban center for the people of Orakzai.

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Abbreviations

ADP	Annual Development Plans
BAU	Business as Usual
BHU	Basic Health Unit
CBD	Central Business District
CCTV	Closed-circuit Television
CHC	Community Health Center
CPTED	Crime Prevention Through Environmental Design
DRR	Disaster Risk Reduction
GDP	Gross Domestic Product
GIS	Geographic Information System
GoKP	Government of Khyber Pakhtunkhwa
HIS	Household Information Survey
LU&BC	Land use and Building Control Authority
MCHC	Mother and Child Health Center
MCA	Multi-Criteria Analysis
NC	Neighborhood Council
NGOs	Non-governmental Organizations
NMDs	Newly Merged Districts
NRM	National Reference Manual
OD	Origin Destination
PDWP	Provincial Working Development Party
QOL	Quality of Life
SDGs	Sustainable Development Goals
SMEDA	Small Medium Enterprise Development Authority
TMA	Tehsil Municipal Administration
UPPU	Urban Policy & Planning Unit
UTM	Universal Transverse Mercator
VPD	Vehicles Per Day

Definitions

- **Allied Permissible Use**: The land use, though not permitted, may be allowed by the authority subject to the payment of the fee.
- **Compact Development**: Dense urban development with minimal space between buildings.
- **Commercialization**: The process of introducing and promoting a product or service for profit.
- **Eco Sustainable**: It refers to actions and practices that maintain or enhance environmental well-being while ensuring the ability of future generations to do the same.
- **Infill Land**: Infill sites are tracts of empty or under-utilized land in urban and built-up areas. These sites are ripe with opportunity because of their location.
- **Leapfrog**: Urban development that skips over intermediate areas to expand outward.
- **New Town**: New Towns are cities or towns that are designed from scratch and built in a short period of time.
- **Permitted Use**: The Land use, which is allowed in each land use class.
- **Prohibited Use**: The land use, which is neither permitted nor permissible.
- **Range Land**: Rangeland is any *extensive area of land that is occupied by native herbaceous or shrubby vegetation* which is grazed by domestic or wild herbivores.
- **Revitalization**: Renewal and improvement of a place or community
- **Ribbon Development**: Linear urban development along transportation routes.
- **Sporadic Growth**: Sporadic growth refers to irregular or unpredictable patterns of expansion or development.
- **Sustainable**: Sustainability is the practice of meeting present needs without compromising the ability of future generations to meet their own.
- **Vacant Land**: Land that has no buildings on it and is not being used.

Project Introduction

Project Scope

The Province of Khyber Pakhtunkhwa (KP) is located in the northwest region of Pakistan with an area of 101,741 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.

KP has the third-largest provincial economy in Pakistan, contributing 10% to the country's overall GDP and 20% to its 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 centres 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 Peshawar, 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 (Peshawar, 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 Kalaya Master Plan 2042, the services of The Urban Unit and HP consultant have been hired through a competitive bidding process. Kalaya, the winter administrative capital of Orakzai District in Khyber Pakhtunkhwa, Pakistan, is a vital urban center known for its strategic location and cultural significance. Predominantly inhabited by Pashtuns, Kalaya serves as a commercial and governance hub, connecting various neighborhood councils and rural settlements through key road networks. The town features a mix of commercial, residential, educational, and health facilities, with its central business district anchored by Mishti Bazar and Kalaya Bazar, and essential institutions like the Agency Headquarter Hospital and Government Higher Secondary School.

Historically, Kalaya has played a significant role as a center of administration and defense, reflected in its old city fort and longstanding tribal traditions. Following the merger of FATA into Khyber Pakhtunkhwa, Kalaya's importance as a regional service and governance center has grown, making it a focal point for development and cultural heritage in Orakzai and the surrounding areas.

This master plan was completed under the following TORs:

Mapping of the Historical Growth Trends of the City

To analyze the pattern and direction of Kalaya's spatial growth over the past twenty years, the consultants conducted thorough research using a variety of sources including municipal records, population censuses, library and archival materials, aerial photographs, satellite images, and other published and unpublished data. Advanced GIS techniques were employed to map and visualize the historical growth trends of the city-region, enabling a clear understanding of the key drivers behind urbanization and spatial expansion in Kalaya.

Housing Trends and Needs Assessment through Projected Population Growth Estimates

The provision of housing for all is a basic objective of the Kalaya Master Plan, therefore, the growth pattern and projected growth needs over the next 20 years (2042) were properly analyzed and mapped.

Density Maps

To conserve the prime agricultural land surrounding Kalaya and curb urban sprawl and horizontal expansion, the Master Plan emphasizes promoting high-density mixed-use development. To support this goal, policy guidelines were formulated to encourage the establishment of such developments within the current urban boundaries as well as designated future growth areas. The consultants conducted a comprehensive mapping exercise to identify and illustrate both existing and proposed high-density mixed-use zones, ensuring a strategic approach to sustainable urban growth and agricultural land preservation.

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 Kalaya, 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)
c. All major and minor streets, roads, railway lines and airports (including encroachments)
d. Water supply, sanitation, sewer, and telephone networks
e. Water bodies (river and other water bodies)
f. Residential areas
g. Commercial and Mixed areas
h. Industrial areas
i. Amenities (education, health, religious, 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.).

Taxation and Revenue Generation

To ensure the long-term sustainability of urban planning and effective implementation of the Kalaya Master Plan, the consultants conducted a comprehensive review of the current urban taxation framework, including property tax, land tax, capital value tax, and stamp duty. They also proposed recommendations for enhancing these revenue sources. Strengthening municipal taxation as outlined in the PCMP proposals is expected to significantly boost the revenues of the Land Use and Building Control Authority (LU&BCA) and Tehsil Municipal Administrations (TMAs), thereby supporting the financial sustainability and operational effectiveness of these entities over time.

Governance and Institutions

To ensure good governance and effective implementation of the Kalaya City Master Plan, the consultants conducted an objective analysis and assessment of the existing relevant laws, byelaws, and the institutional capacity of the organizations responsible for executing and monitoring the plan. Based on this evaluation, they proposed necessary improvements to the current legal framework and institutional structures to enhance the efficiency and effectiveness of the Master Plan's implementation.

Land Use Regulations and Plans

The consultants also studied and analysed all existing urban planning, development and environment-related national, provincial laws and regulations (byelaws) and proposed a new set of zoning regulations for each land use zone. The consultants provide extensive input in formulation of Building Regulation 2024 and Housing Schemes Regulations 2024.

Environment

To reduce pollution and create healthy living environment for the residents of Kalaya, the consultant studied various sources of air, noise, soil and water pollution. The consultants use state of the art techniques and equipment for 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.

Demography, Livelihood and Housing

To ensure the successful implementation of the master plan proposals, an accurate understanding of Kalaya's demographic patterns, livelihood sources, and housing conditions is essential. For this purpose, the consultants divided the city into multiple zones, calculated population densities, identified key economic activities, and examined housing and related facilities within each zone. Based on these detailed assessments, the consultant developed proposals aimed at revitalizing the city's existing economic base and socioeconomic structure. To support this analysis, the consultant conducted a series of 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,
d) Identification of areas with lack of municipal services (slums) and formulation of proposals for its rehabilitation/up-gradation.

Urban Transportation, Mobility & Accessibility

One of the key challenges facing the Kalaya urban center is limited connectivity, both within the city and to surrounding rural areas. The main roads Orakzai Agency Road, Kalaya Road, and Kurez Road form the backbone of Kalaya's transportation network, linking the central business districts (Mishti Bazar and Kalaya Bazar) with adjacent neighborhoods and rural settlements. However, much of the development has occurred as ribbon development along these major roads, which, while providing accessibility, also results in unnecessarily long travel distances and higher infrastructure costs to address these connectivity and mobility issues, the consultant conducted the following surveys:

- Developed a detailed roads and parking inventory

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

Historical/Social/Culture Heritage Development

Kalaya, as an emerging urban center in Orakzai District, possesses a number of historical sites and socio-cultural heritage that reflect its unique local identity. Recognizing the importance of preserving this heritage, the Kalaya Master Plan undertook a comprehensive study and mapping of all existing historical monuments, cultural landmarks, and social traditions within the city. Based on this detailed assessment, the plan proposes appropriate guidelines aimed at conserving these heritage assets while integrating them into the urban fabric. The objective is to leverage Kalaya's cultural and historical resources to develop vibrant social and cultural hubs, creating new opportunities for community engagement and tourism within and around the city.

Urban Design and Public Realm

The consultants conducted an analysis of existing building lines, public spaces, sidewalks, street lighting, monuments, parks, and other urban elements to identify areas for improvement and opportunities for the formulation of guidelines for both existing and future developments within the city.

Quality of Life

The consultants are tasked with evaluating the adequacy and spatial distribution of existing facilities in Kalaya. As part of the diagnostic analysis for assessing quality-of-life standards, consultant will map and assess public spaces such as parks, food

outlets, libraries, public halls, and sports grounds while documenting their current condition. The analysis will also include mapping heritage sites, evaluating their preservation status, and identifying trends of encroachment or deterioration. Additionally, the availability and condition of civic amenities, including public toilets, street furniture, street lighting, parking lots, and other neighborhood facilities, will be reviewed to identify gaps and opportunities for improvement.

Water Supply, Sanitation and Solid Waste Management

The consultants will collaborate closely with the relevant Water Supply and Sanitation Company to comprehensively profile all municipal services. This includes identifying and mapping both existing and potential new sources of water supply, assessing depletion rates, analyzing sub-soil aquifer data, and evaluating surface runoff. They will also review the current state of sanitation and solid waste management, including calculations of sewage flows, average waste tonnage, and methods of collection and disposal, such as landfill capacities and locations. Additionally, the consultants are tasked with pinpointing areas that are underserved in terms of municipal services and facilities. Based on these findings, they will develop policy recommendations and an action plan to generate funding for the construction, maintenance, and operation of public amenities at optimal locations.

Citizens Behavior

Citizens behaviour involves the strategic use of communication tools to influence changes in knowledge, attitudes, social norms, beliefs, and behaviours. Simply providing physical infrastructure is often insufficient to achieve the goals of sustainable development without integrating effective Citizens Behaviour strategies. To ensure the long-term sustainability of the master plan, consultants conducted Perception and Behavioural Surveys using the Knowledge, Attitude, and Practice (KAP) methodology on a statistically valid sample of the local population. These surveys aimed to explore the underlying motivations, incentives, and barriers that affect citizen behaviour in relation to urban responsibilities particularly in areas such as solid waste management, use of public transport, public space utilization, and engagement with other municipal services.

National and International Best Practice (references)

The preparation and implantation of master plans in Pakistan, especially in Khyber Pakhtunkhwa is not common. In the past various types of spatial plans including structure plan and master plans were prepared but these plans were never implemented even in major urban settlements. Therefore, to prepare a rational comprehensive master plan for Kalaya, review of the international best practices was included the study TORs. The consultants analyzed planning laws and master plans from countries with socio-economic conditions comparable to Pakistan. The lessons drawn from this review were instrumental in shaping the proposals of the Kalaya Master Plan, particularly in formulating the Multi-Criteria Analysis (MCA) methodology used for identifying suitable sites for major zones. Additionally, targeted studies of fringe areas were conducted to discourage unplanned urban sprawl and promote the conservation of prime agricultural land within the influence area of the proposed master plan.

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 other necessary component of the city.
b. Mapped existing Land use pattern and provided options for future development;
c. Identified areas having a potential for mix use development (residential, work, leisure, services etc.)
d. Identified areas suitable for infilling, intensification and redevelopment
e. Mapped the natural eco-system and environmental resources of Kalaya city
f. A map with detail 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.

i. Prepared a detail inventory of the allied infrastructure of the Kalaya to support Master Plan proposals.

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 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 Kalaya 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 Kalaya.

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.

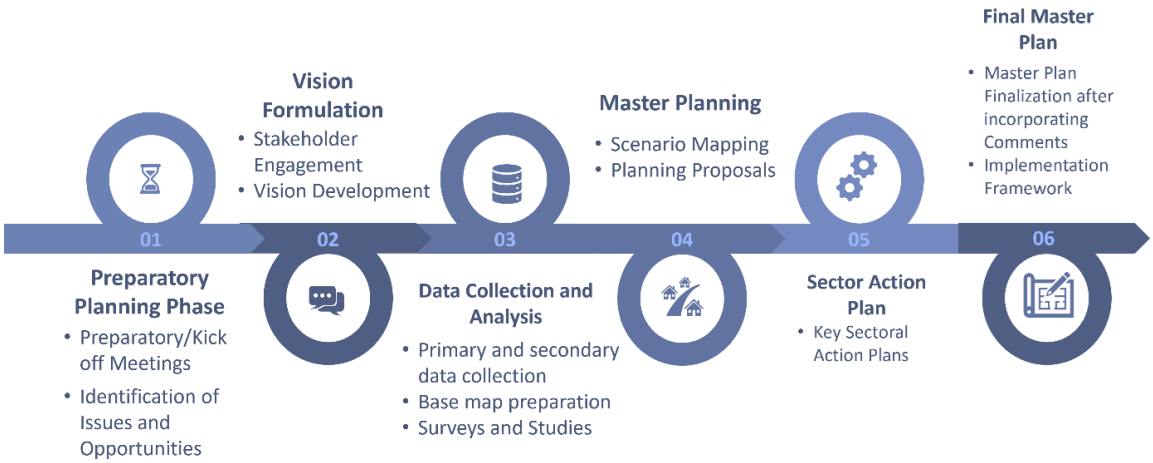
Volume III: Action Plans – Details implementation strategies, key initiatives, and step-by-step execution plans for proposed developments.

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 B.

The Kalaya Master Plan was developed through the following Five (05) phases:

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

Figure: Master Plan Methodology of Kalaya



Source: Devised by Consultant

Deliverables and Timelines

Sr. No	Deliverable	Timeline
1	**Inception Report** Submission of Inception Report incorporating contents and detailed methodology as well as a list of various surveys along with their questionnaires to be carried out for the MASTER PLAN preparation. The consultant has provided in the inception report a detailed work plan of all activities to enable UPU to properly monitor the activities of the consultants and ensure the completion of the project on time	At the end of 1st Month
2	**Task A: Report on Vision Development and Public Consultation** outlines the process of establishing project goals and objectives through stakeholder engagement. It documents consultations with public and private entities, including government agencies, political representatives, and the community. The report ensures an inclusive planning approach by incorporating technical insights, governance priorities, and public input, forming the foundation for a strategic and community-driven master plan for Kalaya.	At the end of 2nd Month
3	**Task B: Data Analysis and Background Studies** report was submitted, covering various surveys, secondary reports, relevant analyses, and associated maps. It included findings from socio-economic, land use, transportation, and environmental surveys, along with insights derived from secondary data sources. The report provided a comprehensive foundation for informed decision-making in the master planning process for Kalaya.	At the end of 5th Month

Sr. No	Deliverable	Timeline
4	**Task C: Master Plan & Scenario Maps** The Master Plan & Scenario Maps were prepared and presented to the client and relevant implementation agencies. Following feedback received from various forums, the consultant revised the plan and provided alternative solutions where necessary to ensure effective implementation at the local level.	At the end of 9th Month
5	**Task D: Formulation of Sector Wise Action Plans** The consultant prepares Draft Sectoral Action Plans, including preliminary designs and cost estimates, for review by the client and relevant implementation agencies. Based on feedback received from various forums, the plans will be revised, and alternative proposals will be provided where necessary to ensure feasibility and effectiveness.	At the end of 13th Month
6	**Task E: Final Master Plan** The Master Planning Process followed an inclusive, iterative approach, ensuring stakeholder participation. It began with data collection through surveys, GIS mapping, and socio-economic assessments. Zoning was defined to regulate land use, including special zones for flood-prone and heritage areas. Public hearing was conducted to ensure transparency and stakeholder input, while a technical review meeting refined proposals for feasibility and policy alignment. Finally, sector-wise action plans were developed to guide sustainable urban growth.	At the end of **15th** Month

Source: Master Plan Project TORs

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 Kalaya Master Plan encompassed various aspects, providing a comprehensive assessment of the area's socio-economic conditions, land use, transportation, and environmental factors. The details of each survey are as below:

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- **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 collection through various social and physical surveys was carried out for not less than 2% households. The data was collected throughout the urban center using the stratified random sampling techniques for developing a proper representative sample of the whole urban center.

- **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 (Volume III).

- **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 (Volume – III).

- **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.

Chapter 1. Existing Land Use Spatial Pattern and Urban Form of Kalaya

1.1. Overview

Kalaya Urban Area is located in the Lower Orakzai Tehsil of Orakzai District in Khyber Pakhtunkhwa. The original district headquarter was built in Kalaya in 1975 but could not be occupied due to some reasons and the present headquarter was built on Kohat-Thall road short of Hangu in 1989.[1] Lower Orakzai tehsil is bordered by Bara tehsil of Khyber District on the North, Dara Adam Khel tehsil on the East, Kohat tehsil on the South East, Hangu tehsil on the South and Central Kurram tehsil on the West. After the recent merger of FATA, Kalaya was declared as an urban area, which also includes Mishti Bazar and Jalaka Mela Feroz Khel. The total area of Kalaya urban area is 53 sq. km., out of which 5.87 sq. km. is built-up area. The total population of Kalaya in 2017 was 17,575 as per the Census 2017.

Kalaya, in recent years, hasn't gone through much urbanization and a majority of the area is covered by forest and agriculture, with only a small increase in built-up area. The shape of Kalaya is horizontally spread, resembling a tree branch. Kalaya is divided into three neighborhood councils. These three neighborhood councils include Mishti Bazar, Jalaka Mela Feroz Khel and Kalaya. The urban development within Kalaya is scattered throughout these neighborhoods' councils, each having small commercial centers within their boundaries. The major commercial center is located in the south-east side of Kalaya NC along with major public buildings, along the Agency main road which leads traffic from Kacha Pakha Kohat towards the Orakzai district. It is observed that there has been very small change in the built-up area throughout the 20-years period.

1.2. Existing Urban Form of Kalaya

The existing land-use pattern of Kalaya resembles the multi-nuclei land-use model. The multi-nuclei model of urban development consists of more than one urban center providing commercial as well as public facilities. This model was proposed by Harris and Ullman in 1945. Within the multi nuclei model, multiple commercial and urban

[1] Population Census Organization. (2000). 1998 Census Report of Orakzai Agency.

centers, provide services to multiple neighborhoods.[2] These services may include commercial, health, educational and administrational facilities. Like the multi-nuclei model, Kalaya has different commercial centers in the above-mentioned neighborhoods. The three neighborhood councils of Kalaya, including Mishti Bazar, Jalaka Mela Feroz Khel and Kalaya, all have their own small commercial centers, with facilities like health, education, institutional, commercial, and administrational and security facilities. Such centers tend to be located alongside Orakzai road and Kalaya road. These commercial centers also feature important public buildings, lsuch as the Agency Headquarters hospital in Mishti Bazar NC on Orakzai road, and Kalaya tehsil headquarters on Kalaya Road in Kalaya NC. Meanwhile, residential and mixed land-use is also scattered throughout Kalaya all three neighborhood councils. These characteristics of the urban form and distribution of urban development within Kalaya, relates the land-use of Kalaya with the Multi nuclei land-use model.

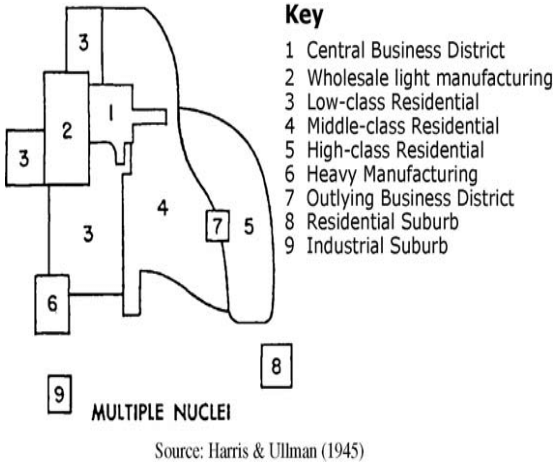


Figure 1-1: Multi Nuclei Land-use Model

1.2.1. Zone "A" in the South- West is the Cantonment Area

This zone represents the urban core of Kalaya where much of Kalaya's presently developed area is located. This zone is located at a central junction between the key roads within the Kalaya urban center, namely, the Orakzai Agency Road and Kalaya Sherazi Road. Thus, two branches of the Orakzai Agency road extend from this junction, one towards the northeastern direction, connecting Kalaya to major cities including Kohat and Peshawar, and the other towards a western direction. The Kalaya

https://www.wlwv.k12.or.us/cms/lib/OR01001812/Centricity/Domain/1839/Crash%20Course%20Review%20-%20Multiple%20Nuclei%20Model.pdf

Sherazi road is another key road which also extends towards an eastern direction from this zone.

This region contains some important buildings including Tehsil headquarters and headquarters of the Orakzai scouts. The area is a high-security zone, due to the presence of the cantonment area and the movement of people and vehicles is restricted. The security forces have constructed markets to generate revenue and have made significant contributions towards urban development. Furthermore, there are clusters of urban activity alongside the main Orakzai Agency Road, leading to this area. Here, the land uses along the road are mainly comprised of residential buildings and commercial markets.

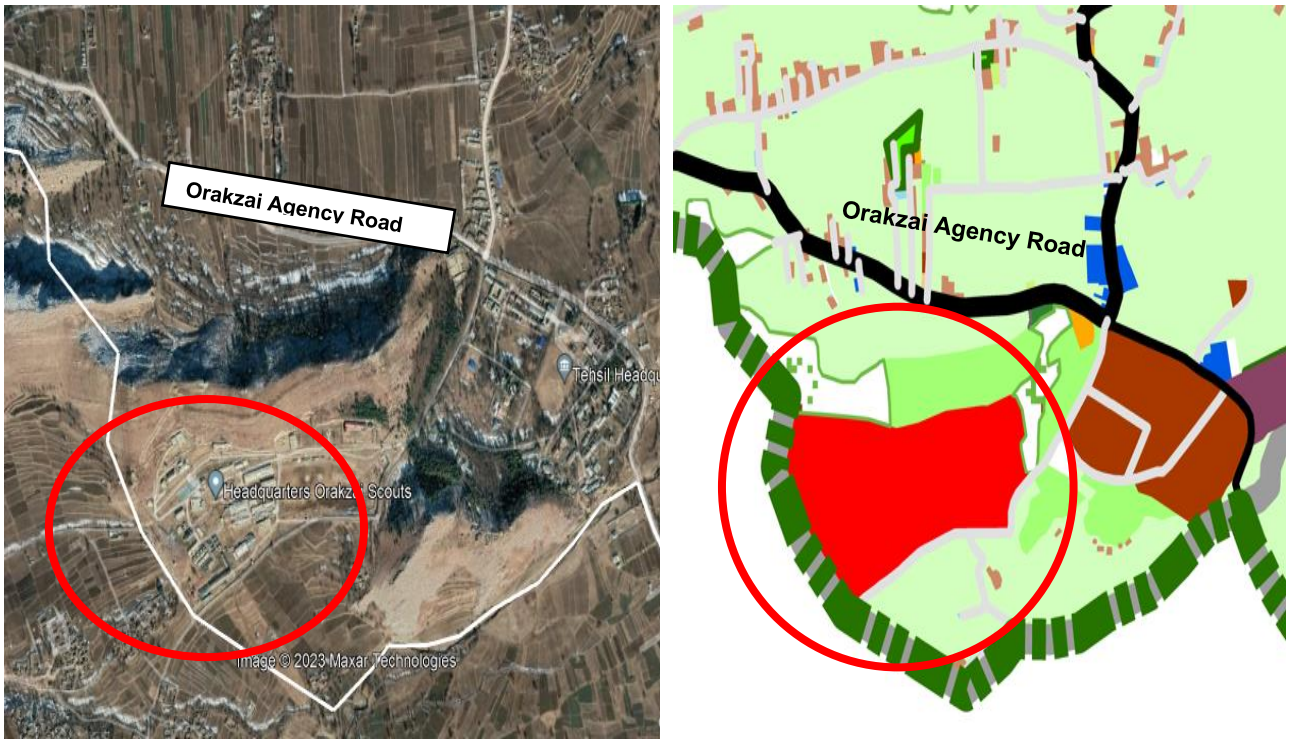


Figure 1-2: Zone A Cantonment Area

1.2.2. Zone "B" Mix Land Use Zone

These zones are comprised of small commercial centers, with facilities like health, education, intuitional, commercial, administrational, and many land uses relating to religious facilities, burial grounds and recreational activities, and security facilities on Orakzai Agency Road and Kalaya Road. Primarly, the urban form consists of ribbon development along Orakzai Agency Road, Kalaya Sherazi Road and Kalaya Road. The commercial area of Kalaya NC acts as the Central Business District of the Kalaya urban center. All three Neighborhood councils are developed on the basis of Multi

Nuclei land use having clusters of mixed land use including education, health, administration, commercial and recreational facilities. The roads converging on the city center, connect the town with the surrounding rural area. Orakzai Agency Road, Kalaya Sherazi Road, and Kalaya Road connect the urban center with the adjacent NC of Mishti Bazar, Jalaka Mela Feroz Khel, and the rural settlements on the outskirts of the urban center. The Orakzai Agency Road covers most of the residential area developed as ribbon development, although there are some commercial markets, public buildings, and educational institutes on this road as well.

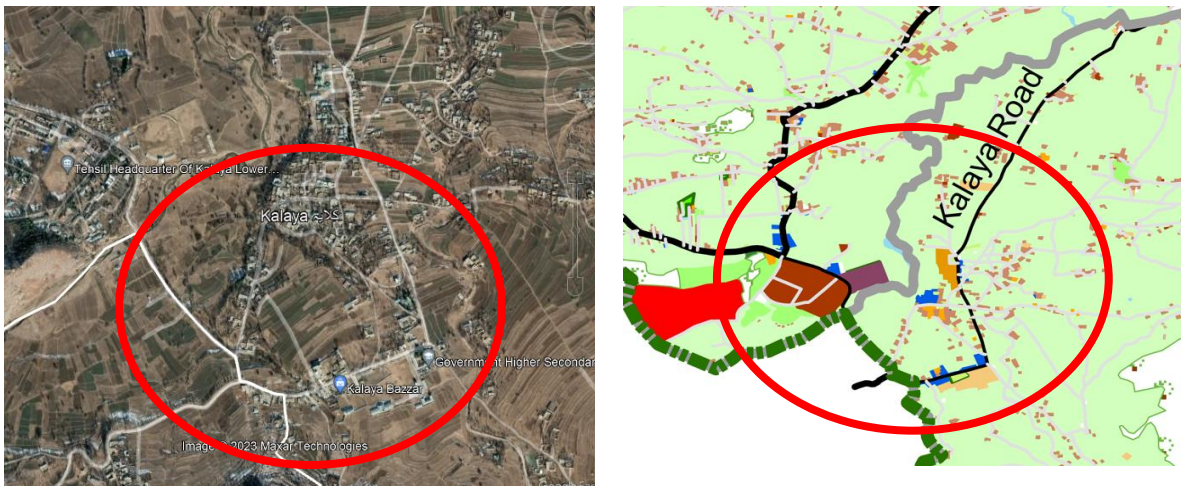


Figure 1-3: Zone B (Mix Land Use)

1.2.3. Zone "C" Old City Center/CBD

It is the main city center/marketplace, which lies at the western edge of the Kalaya urban center. Historically, this site had accommodated a fort used by rulers of this area. Zone C is a mixed land-use area, dominated by commercial and residential land uses including the main commercial and retail center. Mishti Bazar and Kalaya Bazar are the major CBDs that act as commercial hubs. These commercial city centers are connected via the Orakzai Agency Road and Kalaya Road. These city centers are also well connected with the neighboring small villages and serves the commercial needs of the Kalaya urban center. The prominent commercial places of this zone are: Mishti Bazar, Kalaya Bazar, Agency Headquarter Hospital, Tehsil Headquarter, Government Higher Secondary School, Mirazai Masjid and Imam Bargah. The building density in this area of the town is comparatively high with most of the buildings having 2 to 3 story height. Zone B and Zone C are two centers of gravity, which characterize Kalaya

as the premier town of Orakzai Agency and service center for a larger region. The Orakzai Agency Road leads throughout the urban center from the eastern to the western side of the urban center. This road also goes to the southern part of the Mishti Bazar NC along with Kalaya Road. The road is paved in patches but requires maintenance. The traffic flow of the road is medium to small. It has residential areas, public buildings, commercial buildings, and major agriculture land.

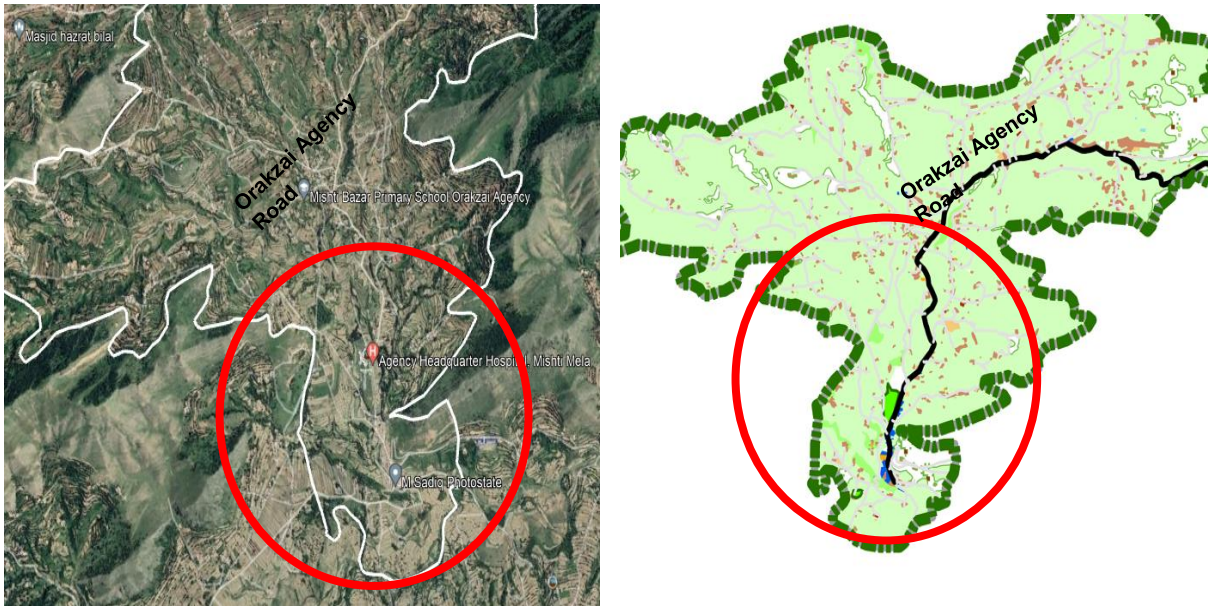


Figure 1-4: Zone C (Old City Center)

1.2.4. Zone "D" Residential Clusters

This zone accommodates residential buildings, scattered in medium and small size clusters in the southeastern part of the Kalaya urban center. This zone is served by several important roads of the center including, Orakzai Agency Road, Kalaya Road, and Kalaya Sherazi Road, etc. Some of the important residential areas of this zone are: Mishti Bazar, Khan Abad, Ali Khel, Feroz Khel, Syed Khalil, Bizoti, Sanghra Ahmed Khel, Sabzi Khel and Kalaya.

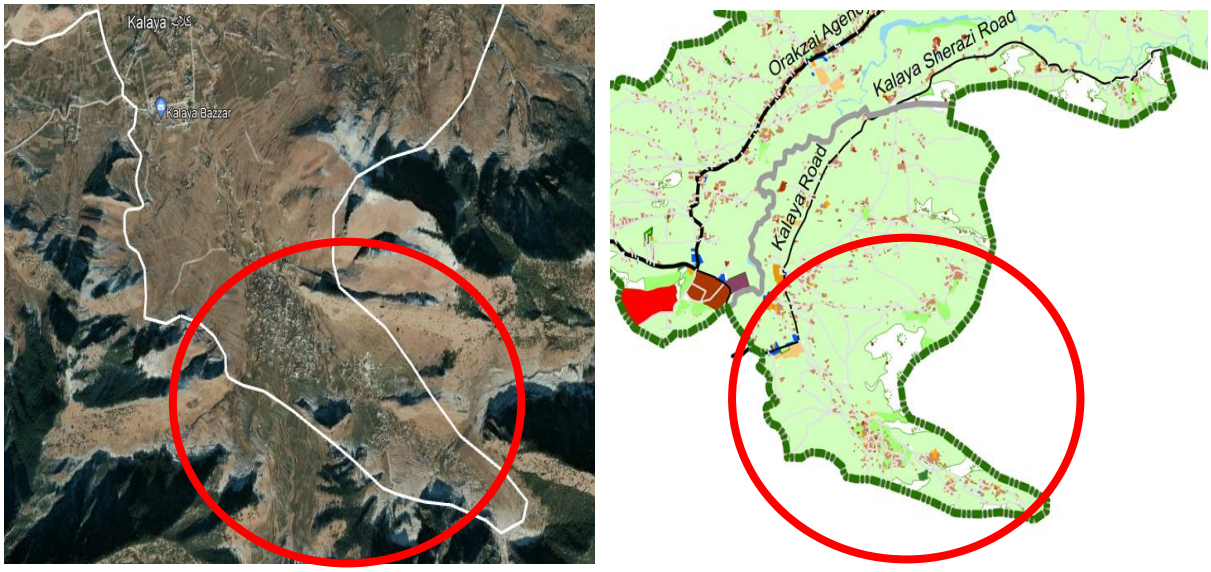


Figure 1-5: Zone D (Residential Cluster)

Other important places relating to educational, health, and community services in this area include: Tehsil Headquarters, Government Girls High School, Ziarat Panjtan Pak, Government High School Sabzi Khel, Ziarat Hazrat Abbas, Al Haider Public School.

The analysis of existing spatial patterns shows an urban pattern with the present market area in the center and the town radiating in east and west direction along major roads. In the southeast, public administration and security uses are concentrated whereas in the southwest; community facilities and residential areas are located, thus relating it to the Multi Nuclei model of Harris and Ullman.

1.3. Pros and Cons of Multi Nuclei Land Use Model

Table 1-1: Potential and Constrains of Multi Nuclei Land Use Model

Pros	Cons
Decentralized development	Higher air and noise pollution due to increased transportation
Greater mobility and accessibility	Class segregation based on income.
Growth based on historical & situational factors.	

The layout pattern of Kalaya also resembles linear development, also known as ribbon development, because of the physical structure and layout of Kalaya. The linear city was an urban plan for an elongated urban formation proposed by Arturo Soria y Mata in 1882. In this model, the city consists of a series of functionally specialized parallel sectors. In the linear development model, major development is located alongside the key roads as people tend to build houses, shops and factories near highways and roads for better business and transportation.

The concentration of development along the major roads of the Kalaya is visible. There are three main roads that pass through the Kalaya urban area and connect it to the neighboring areas (Orakzai Agency Road, Kalaya Road and Kurez Road). The main Orakzai Agency road passes horizontally through the urban area of Kalaya. The major commercial as welll as public facilities are also located on main Orakzai Road. Some major commercial as well as public facilities (such as health, education, institituional, security and administrational facilities) are located along Kalaya road, for example Kalaya headquarters, Kalaya sports complex and Kalaya public school are located on Kalaya road. Meanwhile, Kurez road is mostly responsible for connecting the exterior traffix to to the Kalaya inner urban area. Residential land-use along with mixed land-use can be seen throughout the urban area of Kalaya. Small pockets of industrial land-use can also been with commercial as well as residential areas.

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

Table 1-2: Potential and Constrains of Ribbon Development

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

In the future development plan of Kalaya, the uniqueness and prominence of the existing urban area needs to be maintained and enhanced. Kalaya urban boundary can accommodate future development as urbanization is in its initial stages. The

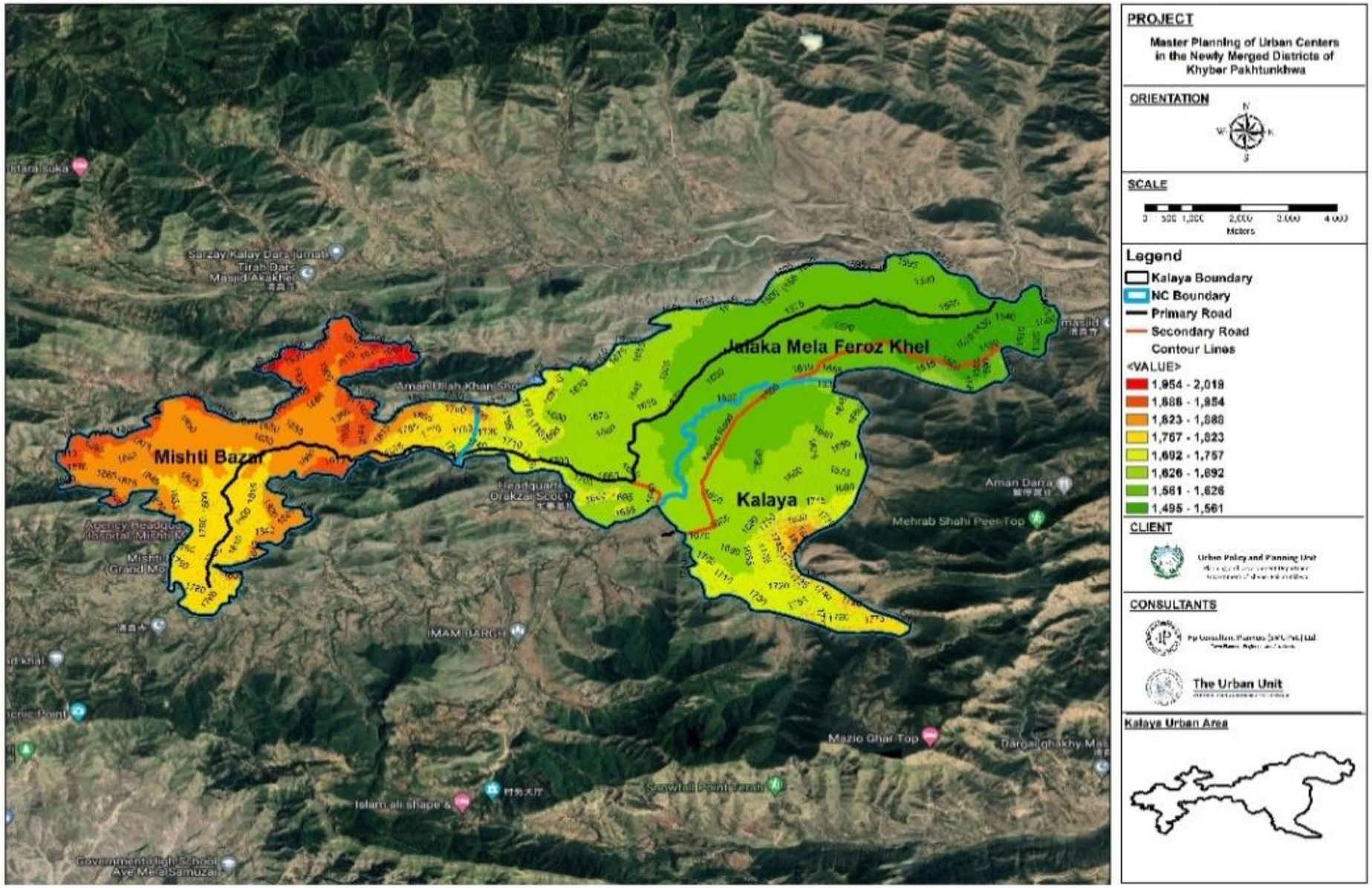
boundary of the urban boundary needs not to be extended in the plan period as more than 80% of the land is covered by agriculture.

New avenue of development has already begun in all three NC's which are growing but in order to avoid haphazard growth, a balanced approach needs to be adopted, along with appropriate regulatory mechanisms. In order to confine the future urban development of Kalaya urban center, it is suggested to mature the area within the urban boundary first by promoting planned compact development that is harmonized with the initial urbanization already underway in the area and planned urban governance which will lead to a better quality of life.

1.4. Contour Map of Kalaya Urban Center

The contour map is prepared with contour lines drawn at 5-meter contour interval. Generally, in Kalaya urban center, the slope is from West to East direction. In the below Map 3, it is observed that from sea level the highest point is at 2019 meters towards North and northwest in Mishti Bazar NC. Whereas the lowest point is at 1495 meters towards the East along primary road of Orakzai agency. Within the Kalaya urban area, difference in contour levels from West to East is maximum of 524 meters, which shows that terrain of Kalaya urban center has steep slope.

Kalaya Urban Area Contour Map (5 Meters Intervals)



Map 1: Kalaya Urban Area Contour Map

Source: Google Earth (2022), Resolution 1000 dpi

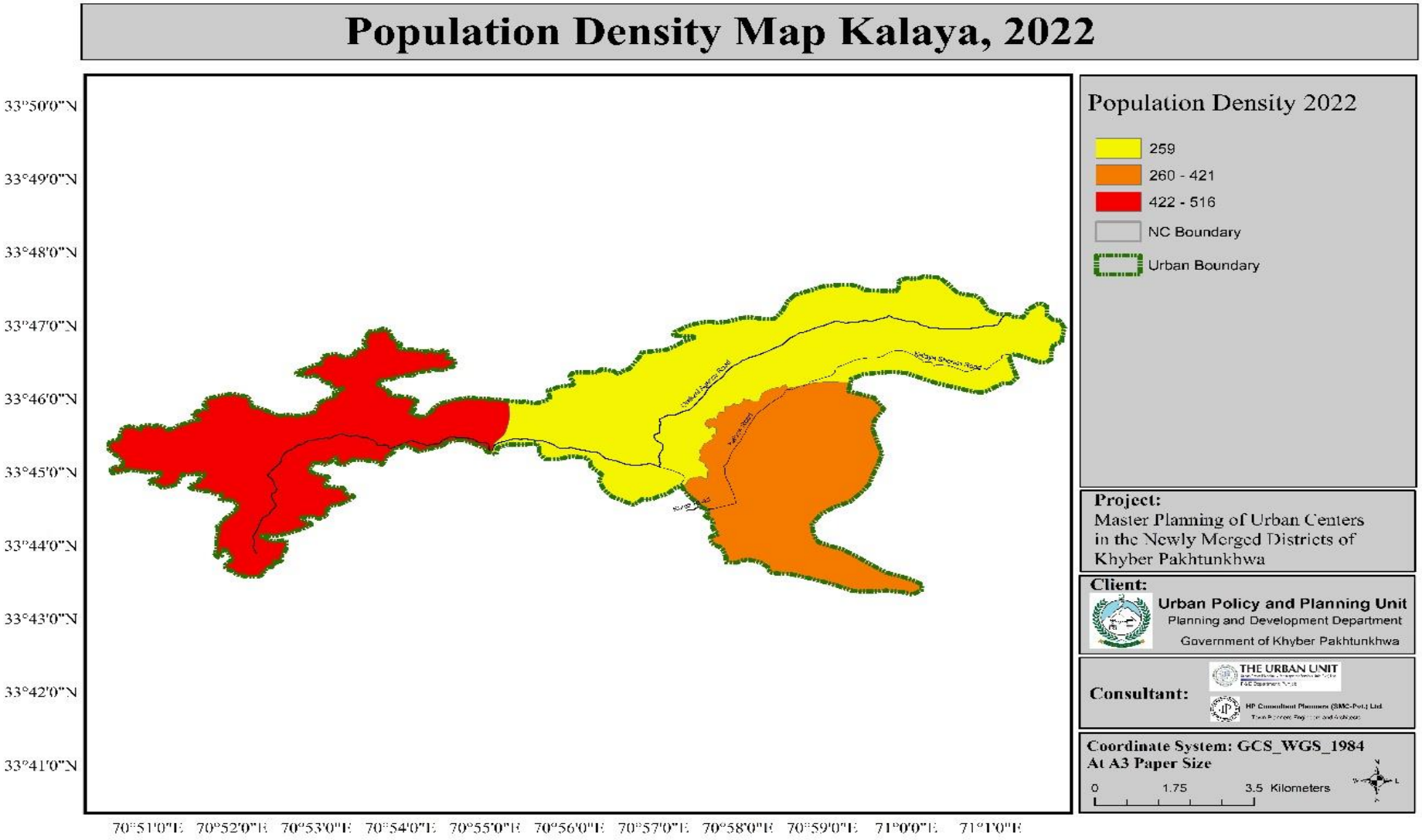
1.5. Population Density

According to a bureau of statistics report, 2017; the population of lower Orakzai is 107,303 and all declared rural, whereas in 2020 the Provincial Election Commissioner delimitation committee in respect of district Orakzai published a final list of village/ Neighborhood councils and declared three NC'S as urban center namely Mishti Bazar (NC-1), Jalaka Mela Feroz Khel (NC-2), and Kalaya (NC-3) which makes a total population of approximately 17575.

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

Neighborhood council	Population (2017)	Population (2022)	Area (Sq. km.)	Population Density (2017)	Population Density (2022)
Kalaya	4846	5518	13.1	369.9	421
Jalaka Mela	5323	6061	23.34	228.06	259
Mishti Bazar	7406	8432	16.32	453.79	516
Total	17575	20011	52.76	333	379

Source: The Urban Unit and HP Consultants



Map 2: Population Density Map, 2022

1.6. Existing Land Use Classification

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

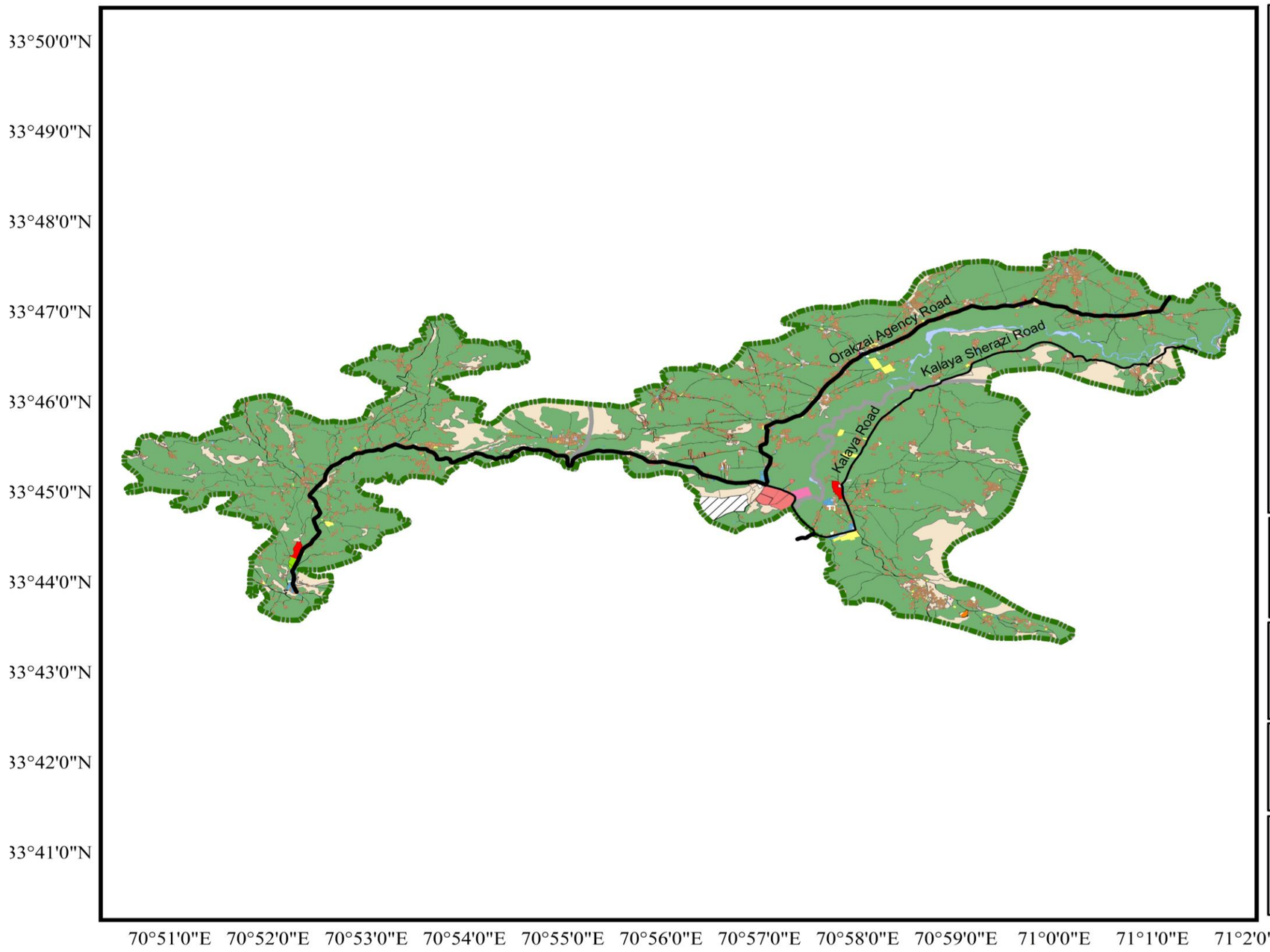
- Provincial Land use and Building Control Council,
- Land Use and Building Control Authority

The functions of Provincial land-use and Building Control Council includes approval of master plans and district land use plans. The Provincial Land-use and Building Control Authority shall perform the functions of supervision of development of district land use plans by district level committees and proposing planning standards to Provincial Land use and Building Control Councils for approval. The District Land use and Management Committee will perform the functions of preparing master plans and district land use plan with the help of the concerned local government. The local planning and enforcement will provide support to the District Land use and Management Committee. The existing land uses of Kalaya are categorized as per subsection (3) of section 15 of Land use and Building Control Act 2021, which are as follows:

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

The land use classification is explained in the KP Land use and Building Control Act 2021; however, no specific percentages are given under which certain land use or master plans shall be prepared. Thus, the consultants have prepared the existing and proposed land use base map Kalaya using NRM standards. Moreover, on the basis of existing land uses of Kalaya and current population, future population for 2040 is projected along with it proposed future land uses. The proposed land use map of Kalaya 2040 contains all the above-mentioned land uses calculated on the basis of existing land uses and projected land use proportion fill the gap and fulfill the future need of the people. This methodology and approach for proposed future land use allocation is further explained in detail in Chapter 3. The below table and map show the existing land use categories in Kalaya as per the Land Use and Building Control Act, 2021.

Existing Land Use of Kalaya



Legend

Primary Road — Secondary Road — Urban Boundry — NC Boundary

Land Uses	Area (Sq. Km)	Percentage
Residential	3.26	6.15%
Commercial	0.18	0.34%
Industrial	0.004	0.01%
Public Buildings		
Education	0.22	0.41%
Health	0.08	0.15%
Religious	0.10	0.20%
Security	0.0001	0.0002%
Others	0.23	0.43%
Recreational Facilities		
Parks	0.02	0.04%
Sports Complex	0.06	0.10%
Agricultural	41.04	77.51%
Barren/Vacant Land	0.21	0.39%
Range Land/Forest/Others	5.32	10.05%
Mining Area	0.02	0.04%
Restricted Area	0.29	0.54%
Graveyard	0.03	0.05%
Water Bodies	0.49	0.92%
Transportation	1.41	2.67%
Total	**52.95**	**100%**

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

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

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

Nominal Scale at A3 Paper Size

N W E S

0 1 2 4 Kilometers

Map 3: Existing Land Use Map of Kalaya

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

Table 1-4: Kalaya Existing Land Use Distribution

Land Use		Area (Sq. Km.)	Percentage %	NRM Standards	
Residential		3.26	6.15	Residential	26%-50%
Commercial		0.18	0.34	Commercial	0.5%-3%
Industrial		0.004	0.01	Industrial	3%-11%
Public Buildings	**Education**	0.22	0.41	Institutional	2%-21%
	Health	0.08	0.15		
	Religious	0.10	0.20		
	Security	0.0001	0.0002		
	Others	0.23	0.43		
Recreational Facilities	**Parks**	0.02	0.4	Recreational	0.5%-2%
	Sports Complex	0.06	0.10		
Agricultural		41.04	77.51	-	
Barren/Vacant Land		0.21	0.39	Vacant Land	7%-31%
Range Land/Forest		5.32	10.05	-	
Mining Area		0.02	0.04	-	
Restricted Area		0.29	0.54	-	
Graveyard		0.03	0.05	Graveyard	1%-4%
Water Bodies		0.49	0.92	-	
Transportation		1.41	2.67	Transportation	2%-18%
Total		**53**	**100**		

Source: Urban Unit & HP Consultant

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

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

1.6.1. Existing Land Use Classification in NCs

Kalaya is comprised of 3 neighborhood councils:

- Kalaya
- Mishti Bazar
- Jalaka Mela Feroz Khel

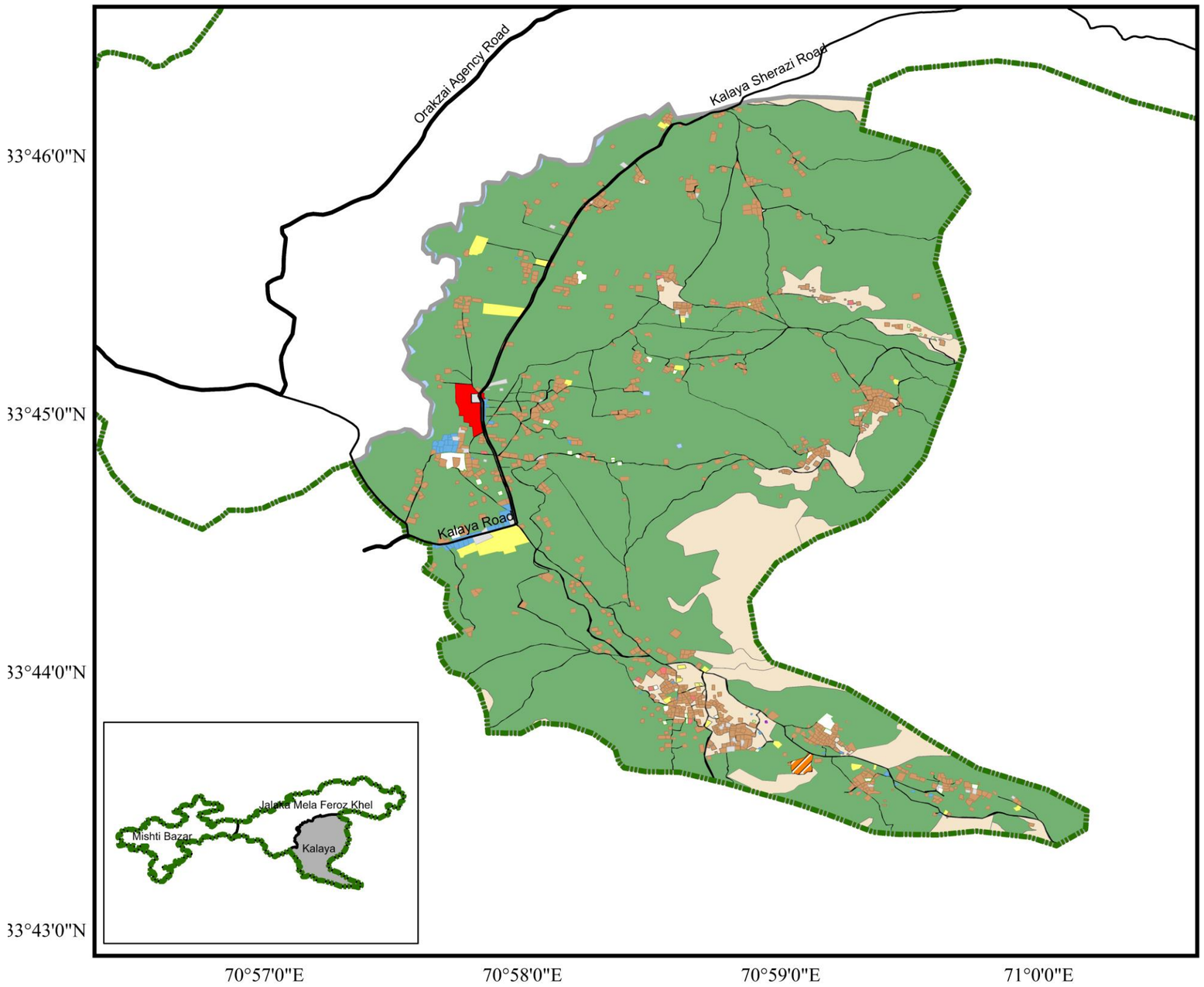
Table 1-3 and Maps 5 to 8 summarize the existing land usage in each NC in Kalaya.

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

Neighbourhood Council		Kalaya	Mishti Bazar	Jalaka Mela Feroz Khel
Population (People) 2017		4846	7406	5323
Census Blocks		5	6	3
Land Uses		Area (Sq. km)		
Residential		0.70	0.91	1.64
Commercial		0.05	0.05	0.08
Industry		0.0002	0.0003	0.003
Public Buildings	**Education**	0.10	0.03	0.09
	Health	0.037	0.038	0.005
	Religious	0.05	0.01	0.05
	Security	0.00	0.00	0.0001
	Others	0.01	0.01	0.21
Recreational Facilities	**Parks**	0.00	0.02	0.00
	Sports Complex	0.00	0.00	0.06
Agricultural		10.54	12.90	17.60
Barren/Vacant Land		0.03	0.03	0.15
Range Land/Forest		1.28	1.93	2.11
Mining Area		0.01	0.00	0.01

Restricted Area	0.00	0.00	0.29
Graveyard	0.001	0.00	0.02
Water Bodies	0.053	0.004	0.432
Transportation	0.28	0.45	0.68
Total	**13.14**	**16.39**	**23.41**

Existing Land Use of Kalaya (Kalaya NC)



Legend

Primary Road — Secondary Road — Urban Boundry — NC Boundary

Land Uses	Area (Sq. Km)	Percentage
Residential	0.70	5.34%
Commercial	0.05	0.36%
Industrial	0.0002	0.001%
Public Buildings		
Education	0.10	0.74%
Health	0.04	0.28%
Religious	0.05	0.38%
Security	0.00	0.00%
Others	0.01	0.07%
Recreational Facilities		
Parks	0.00	0.00%
Sports Complex	0.00	0.00%
Agricultural	10.54	80.19%
Barren/Vacant Land	0.03	0.25%
Range Land/Forest/Others	1.28	9.74%
Mining Area	0.01	0.11%
Restricted Area	0.00	0.00%
Graveyard	0.001	0.01%
Water Bodies	0.05	0.41%
Transportation	0.28	2.14%
Total	13.14	100.00%

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Planning and Development Department
Government of Khyber Pakhtunkhwa

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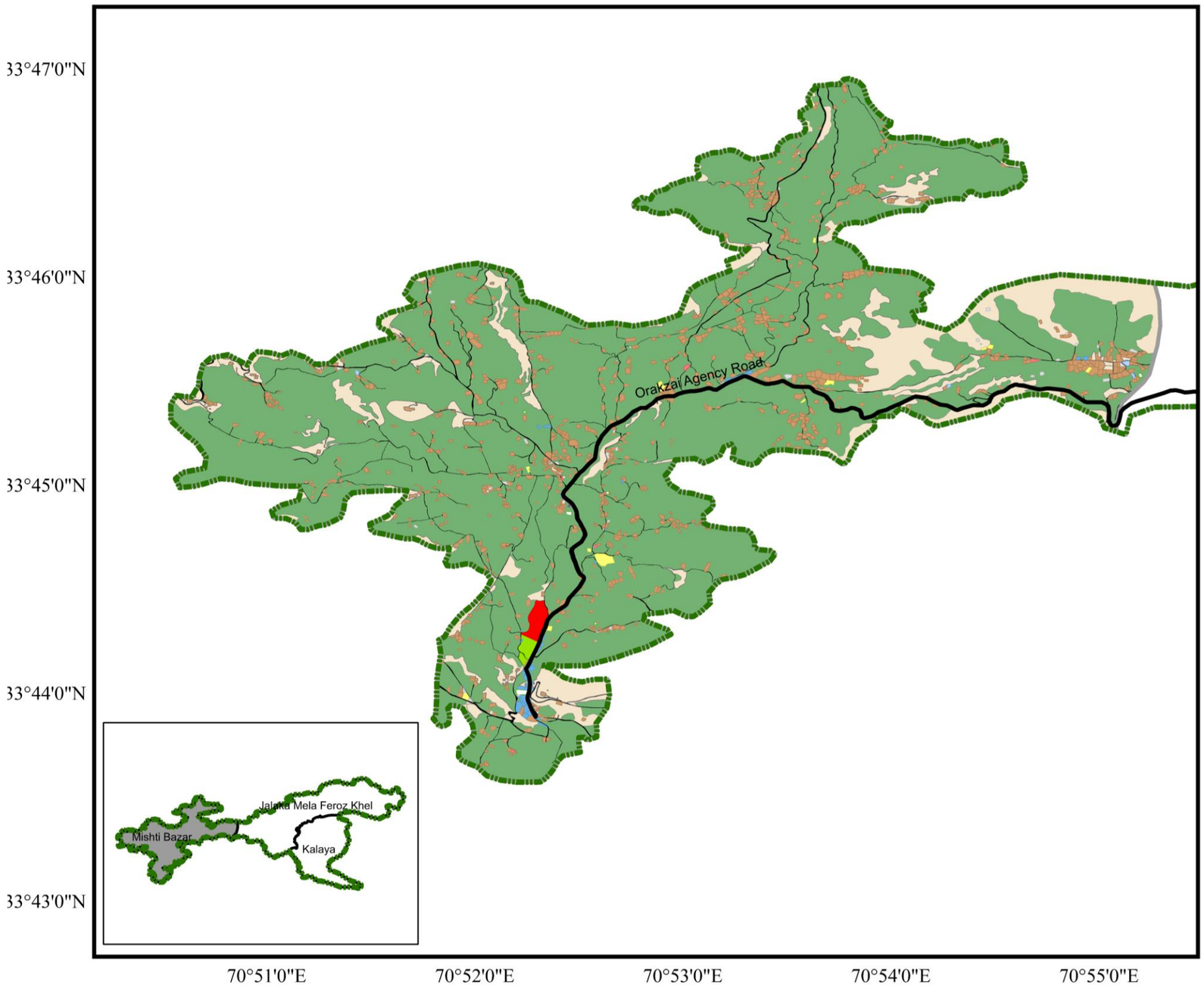
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Nominal Scale at A3 Paper Size

0 0.425 0.85 1.7 Kilometers

Map 4: Existing Land Use Map of Kalaya NC

Existing Land Use of Kalaya (Mishti Bazaar NC)



Legend

Primary Road — Secondary Road — Urban Boundry — NC Boundary

Land Uses	Area (Sq. Km)	Percentage
Residential	0.91	5.57%
Commercial	0.05	0.31%
Industrial	0.0003	0.002%
Public Buildings		
Education	0.03	0.17%
Health	0.04	0.23%
Religious	0.01	0.05%
Security	0.00	0.00%
Others	0.01	0.04%
Recreational Facilities		
Parks	0.02	0.13%
Sports Complex	0.00	0.00%
Agricultural	12.90	78.75%
Barren/Vacant Land	0.03	0.17%
Range Land/Forest/Others	1.93	11.78%
Mining Area	0.00	0.00%
Restricted Area	0.00	0.00%
Graveyard	0.00	0.00%
Water Bodies	0.00	0.02%
Transportation	0.45	2.78%
Total	16.39	100.00%

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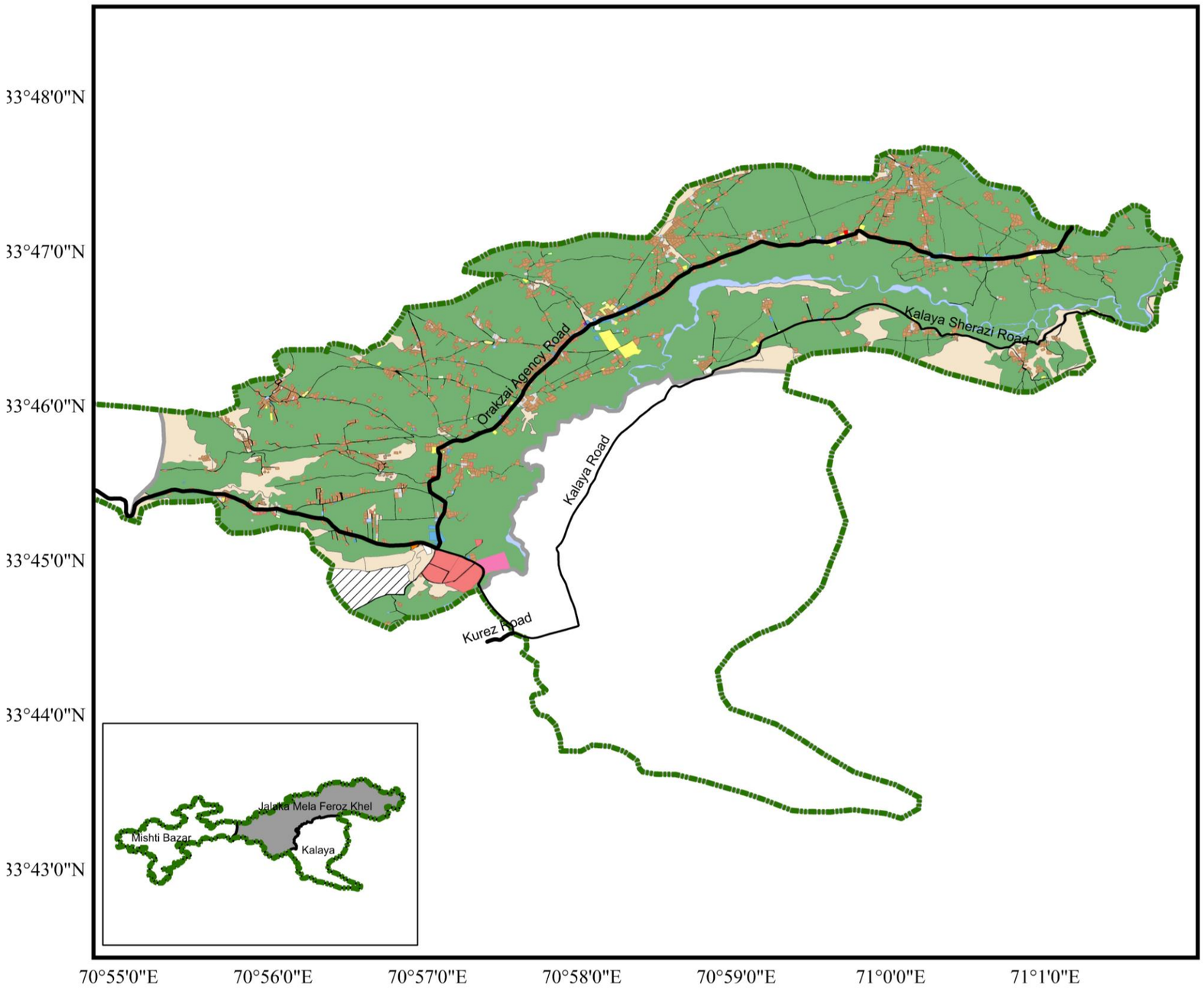
Nominal Scale at A3 Paper Size

0 0.5 1 2 Kilometers

Map 5: Existing Land Use Map of Mishti Bazaar NC

Existing Land Use of Kalaya (Jalaka Mela Feroze Khel NC)



Legend

Primary Road — Secondary Road — Urban Boundry — NC Boundary

Land Uses	Area (Sq. Km)	Percentage
Residential	1.64	7.00%
Commercial	0.08	0.35%
Industrial	0.003	0.01%
Public Buildings		
Education	0.09	0.40%
Health	0.00	0.02%
Religious	0.05	0.20%
Security	0.0001	0.0004%
Others	0.21	0.90%
Recreational Facilities		
Parks	0.00	0.00%
Sports Complex	0.06	0.24%
Agricultural	17.60	75.17%
Barren/Vacant Land	0.15	0.62%
Range Land/Forest/Others	2.11	9.00%
Mining Area	0.01	0.02%
Restricted Area	0.29	1.23%
Graveyard	0.02	0.10%
Water Bodies	0.43	1.84%
Transportation	0.68	2.89%
Total	23.41	100.00%

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Nominal Scale at A3 Paper Size

0 0.5 1 2 Kilometers

Map 6: Existing Land Use Map of Jalaka Mela Feroz Khe

Chapter 2. Multi Criteria Analysis

Urban development is based upon different benchmarks including the availability of resources, amenities, land use and other services. Availability of resources plays a vital role in the development of urban areas. Meanwhile, amenities and land use also define the current use of land and how it can be planned for the coming years. The scenario development approach is used to work out the future planning of the Kalaya Urban Center. These scenarios provide a way for the development of the project area which can be referred to as informed planning and development with exploring all the potentials, weaknesses, opportunities and constraints of Kalaya.

These scenario development and suitability analysis are prepared for different sectors including residential, commercial, industries, and landfill sites. Using the survey-based studies and analysis, as in the background studies and Analysis report, the suitable land for future development is worked out for the plan period. In this regard GIS is used as tool to prepare land suitability maps for different sectors. These land suitability maps are prepared according to the multi criteria analysis described as below.

Multi-criteria analysis (MCA) is a technique used to consider many different criteria when deciding about land suitability for different uses. For suitability analysis, an analytical hierarchy process was used which is a multi-criteria decision-making analysis. For carrying out multi-criteria analysis, all the layers were converted into a projected coordinate system. For this purpose, the layers were projected to Universal Transverse Mercator (UTM) zone 43N.

Furthermore, the constraint areas i.e., the areas where future development is constrained, are also defined as an input to the analysis for identifying suitable land for future development within Kalaya Thus, the constraint areas consist of the existing built up, water bodies and preserved agricultural land. The constraint areas and available land for future development are depicted in the figure below:

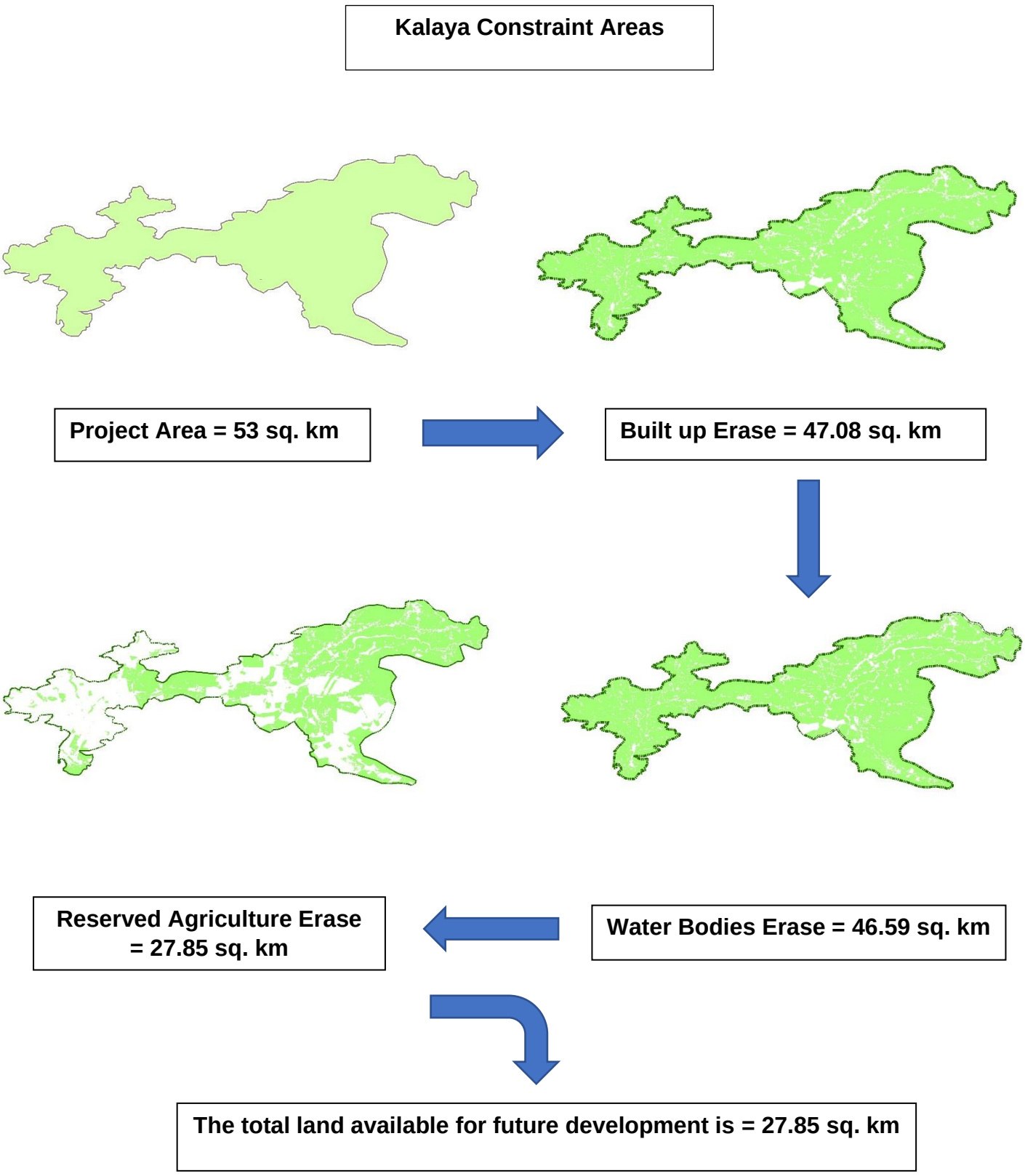


Figure 2-1: Constraint Areas in Kalaya Urban Center

following sectors:

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

These sectors have been described individually along with the criteria for land suitability analysis in the following sections:

2.1. Residential

The built-up area was identified from a detailed land use map of the area. Efforts were made so that the proposed residential area should not be too far away from the existing built-up area. For this purpose, the distance was calculated from the built-up area, and zones near the existing built-up area were given higher values.

A selection of suitable sites for residential purposes should aim to preserve agriculture land and identify suitable vacant, open and barren land for development. Thus, agricultural lands were assigned less values and open spaces was given the highest value.

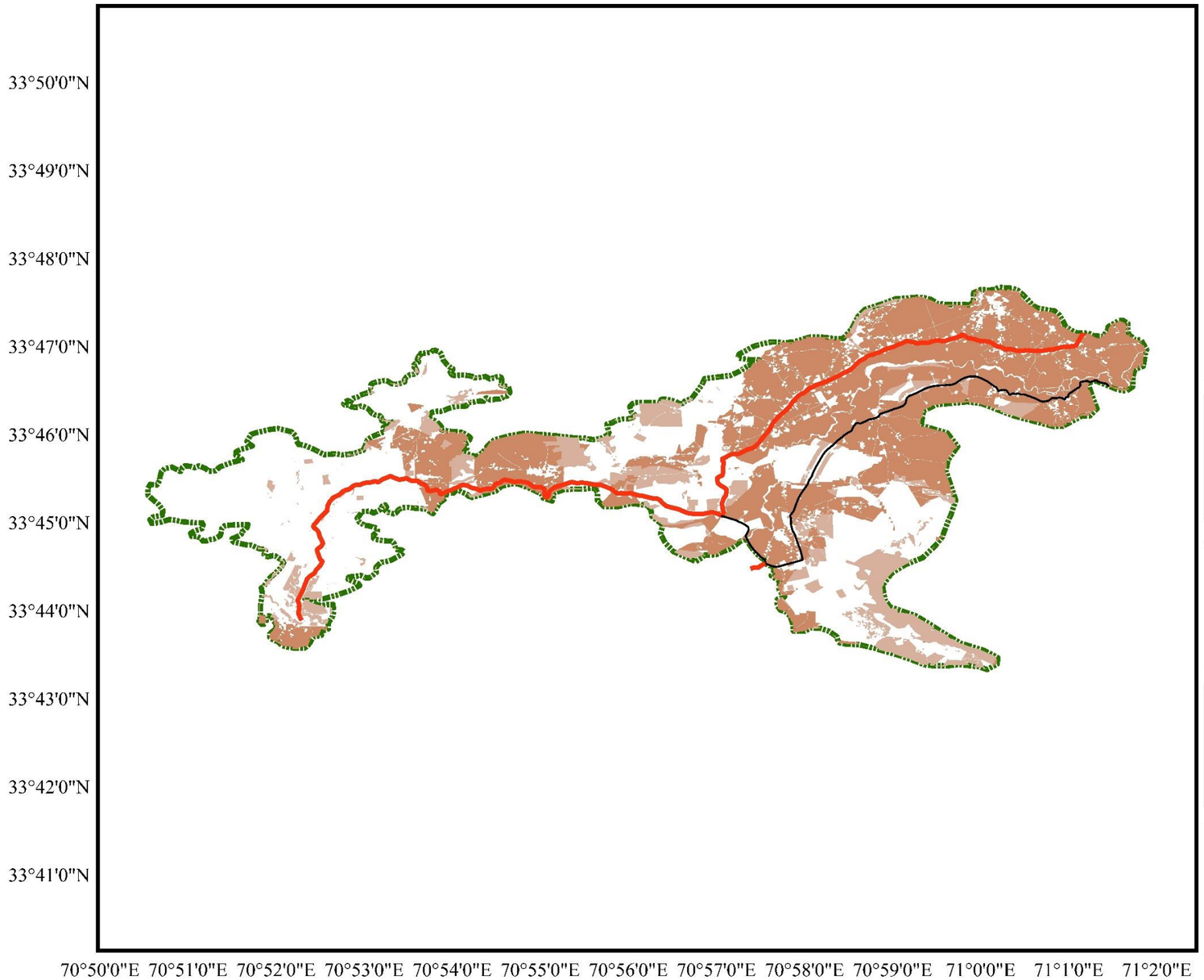
In addition, the existing built-up area, water bodies were also defined as restricted to avoid these land uses. Moreover, some other important layers are considered for the suitability analysis which is mentioned in the below table. Before assigning respective values to the various land uses, the vector-based land use was converted to a raster layer. The values assigned to different layers are based on the requirement of each land use, as shown in the table below:

Table 2-1: Multi Criteria Analysis for Residential Development

S. No	Parameters/Layers	Influence (Total = 100)	Classes (In meters/degree/PKR)	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	**Primary Road**	5	17-800	4
			801-1600	3
			1601-2400	2
			2401-3200	1
			Above 3200	0
2	**Secondary Road**	10	17-2000	4
			2001-4000	3
			4001-6000	2

			6001-8000	1
			Above 8000	0
3	**Land Cover**	20	Vacant Land	2
			Agriculture	1
4	**Land Value Rs. Per Marla**	15	30,000-40000	4
			40001-50000	3
			50001-60000	2
			60001-70000	1
			Above 70000	0
5	**Slope**	10	0 º - 2 º	4
			2.1 º - 4 º	3
			4.1 º - 6 º	2
			6.1 º - 8 º	1
			Above 8 º	0
6	**Existing Commercial**	10	0-500	3
			501-1000	4
			1001-1500	2
			1501-2000	1
			Above 2000	0
7	**Existing Industry**	10	0-2000	1
			2001-4000	3
			4001-6000	4
			6001-8000	2
			Above 8000	0
8	**Water Table**	10	24-50 ft	3
			51-100 ft	4
			101-150 ft	2
			151-200 ft	1
			Above 201 ft	0
9	**Water Bodies**	10	0-600	0
			601-1200	1
			1201-1800	2
			1801-2400	3
			Above 2000	4

Kalaya Residential Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	25.91	48.94%
Moderate Suitable	6.12	11.55%
High Suitable	20.92	39.51%
Total	**53**	**100%**

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THE URBAN UNIT
P&D Department, Punjab
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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 1 2 4 Kilometers

Map 7: Kalaya Urban Center: Suitability Map of Residential Development

2.2. Commercial

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

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

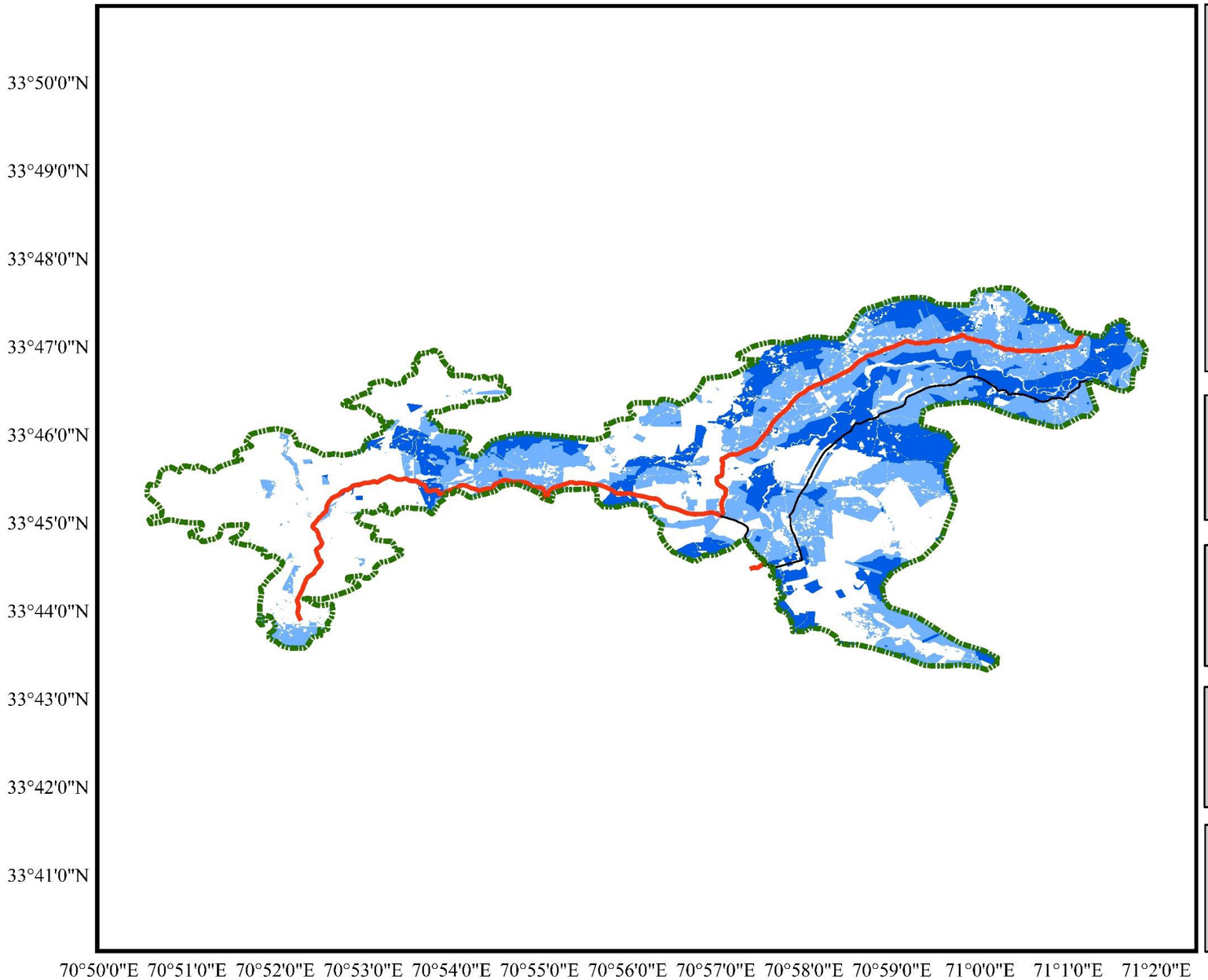
Similarly, the layer of existing built-up areas was reclassified. Areas within walking distance of existing built-up were given higher values and weightages while areas away from built-up areas were given lower values. The values assigned to different layers are based on the requirement of each land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

Table 2-2: Multi Criteria Analysis for Commercial Development

S. No	Parameters/Layers	Influence (Total = 100)	Classes (In meters/degree/PKR)	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	**Primary Road**	15	17-800	4
			801-1600	3
			1601-2400	2
			2401-3200	1
			Above 3200	0
2	**Secondary Road**	5	0-2000	4
			2001-4000	3
			4001-6000	2
			6001-8000	1
			Above 8000	0
3	**Land Cover**	20	Agriculture	1
			Vacant Land	2
4	**Land Value Rs. Per Marla**	10	30,000-40000	0
			40001-50000	1
			50001-60000	2
			60001-70000	3
			Above 70000	4
5	**Water Bodies**	10	0-600	0
			601-1200	1
			1201-1800	2
			1801-2400	3
			Above 2000	4
			0 -150	1

6	**Existing Built-up**	20	151 - 300	2
			301 - 450	4
			451 - 600	3
			601 - 900	0
7	**Slope**	5	0 º - 2 º	4
			2.1 º - 4 º	3
			4.1 º - 6 º	2
			6.1 º - 8 º	1
			Above 8 º	0
8	**Existing Commercial**	15	0-500	2
			501-1000	4
			1001-1500	3
			1501-2000	1
			Above 2000	0

Kalaya Commercial Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	26.39	49.85%
Moderate Suitable	16.48	31.12%
High Suitable	10.07	19.03%
Total	**53**	**100%**

Project:
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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 1 2 4 Kilometers

Map 8: Kalaya Urban Center: Suitability Map of Commercial Development

2.3. Industrial

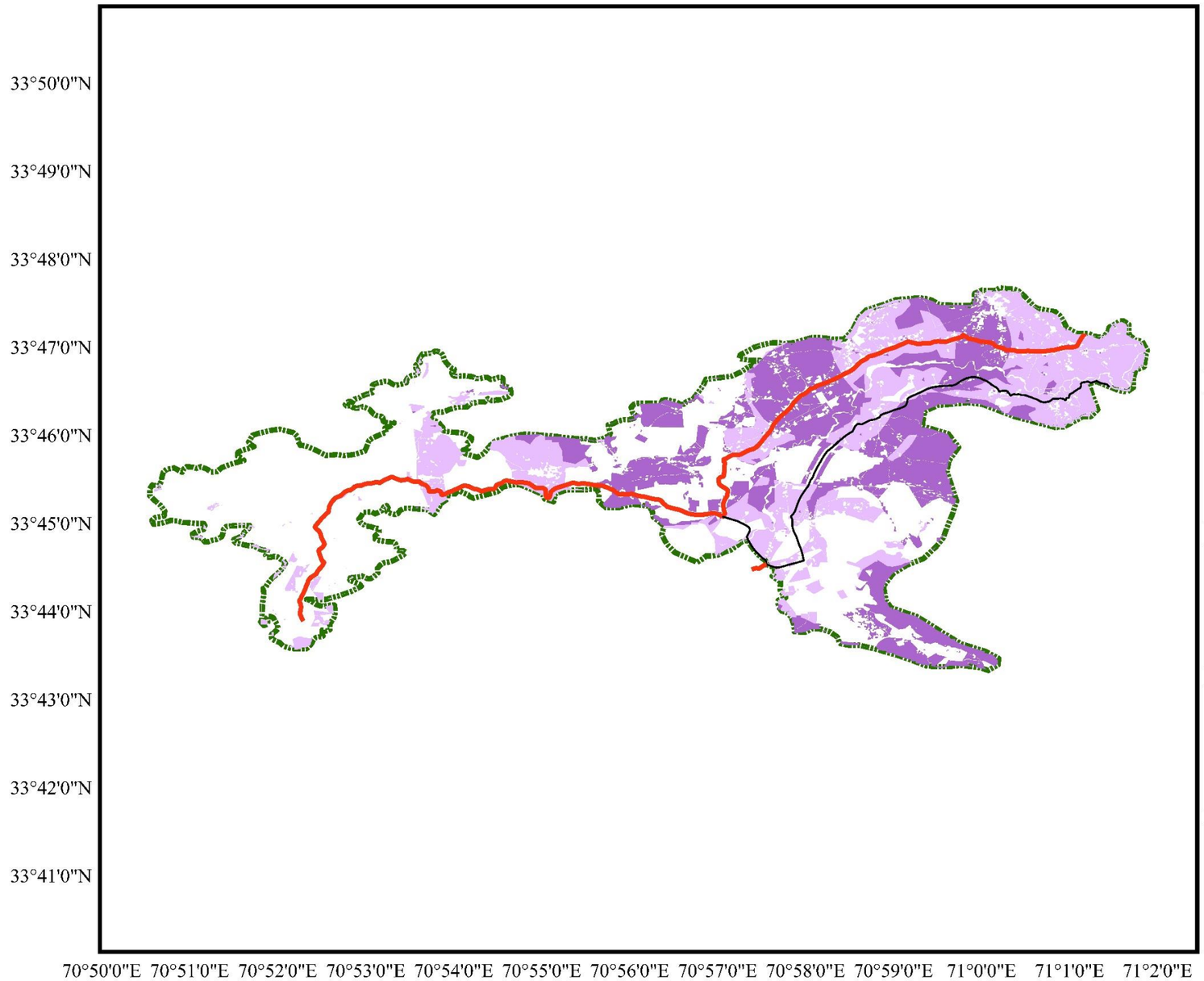
For the suitability of industrial areas, the areas near existing built-up were given lower values and those located away were given higher values to prevent existing residential areas from the environmental hazards of industrial activity. Furthermore, areas with proximity to primary roads were given a higher value (depicting higher suitability) in comparison to areas located further away. Thus, the layer of the primary road was reclassified into five classes. “0-2000” was given higher weightage whereas “Above 8001” was given low weightage. Overall, the layers in the table below are the important parameters for proposing a new site for industries. The values assigned to different layers are based on the requirement of industrial land use.

Table 2-3: Multi Criteria Analysis for Industrial Development

S. No	Parameters/Layers	Influence (Total = 100)	Classes (In meters/degree/PKR)	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	**Secondary Road**	15	0-2000	4
			2001-4000	3
			4001-6000	2
			6001-8000	1
			Above 8000	1
2	**Land Cover**	15	Agriculture	0
			Vacant Land	2
3	**Land Value Rs. Per Marla**	10	30,000-40000	4
			40001-50000	3
			50001-60000	2
			60001-70000	1
			Above 70000	0
4	**Existing Industry**	10	0 – 1000	4
			1001 – 2000	3
			2001 – 3000	2
			3001 – 4000	1
			Above 4000	0
5	**Water Bodies**	10	0-600	0
			601-1200	1
			1201-1800	2
			1801-2400	3
			Above 2400	4
6	**Existing Built-up**	20	0 -150	0
			151 - 300	1

			301 - 450	2
			451 - 600	3
			601 - 900	4
7	**Slope**	10	0 º - 2 º	4
			2.1 º - 4 º	3
			4.1 º - 6 º	2
			6.1 º - 8 º	1
			Above 8 º	0
8	**Water Table**	10	24-50 ft	2
			51-100 ft	3
			101-150 ft	4
			151-200 ft	1
			Above 201 ft	0

Kalaya Industry Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	28.09	53.05%
Moderate Suitable	12.76	24.10%
High Suitable	12.10	22.85%
Total	**53**	**100%**

Project:
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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 1 2 4 Kilometers

Map 9: Kalaya Urban Center: Suitability Map of Industrial Development

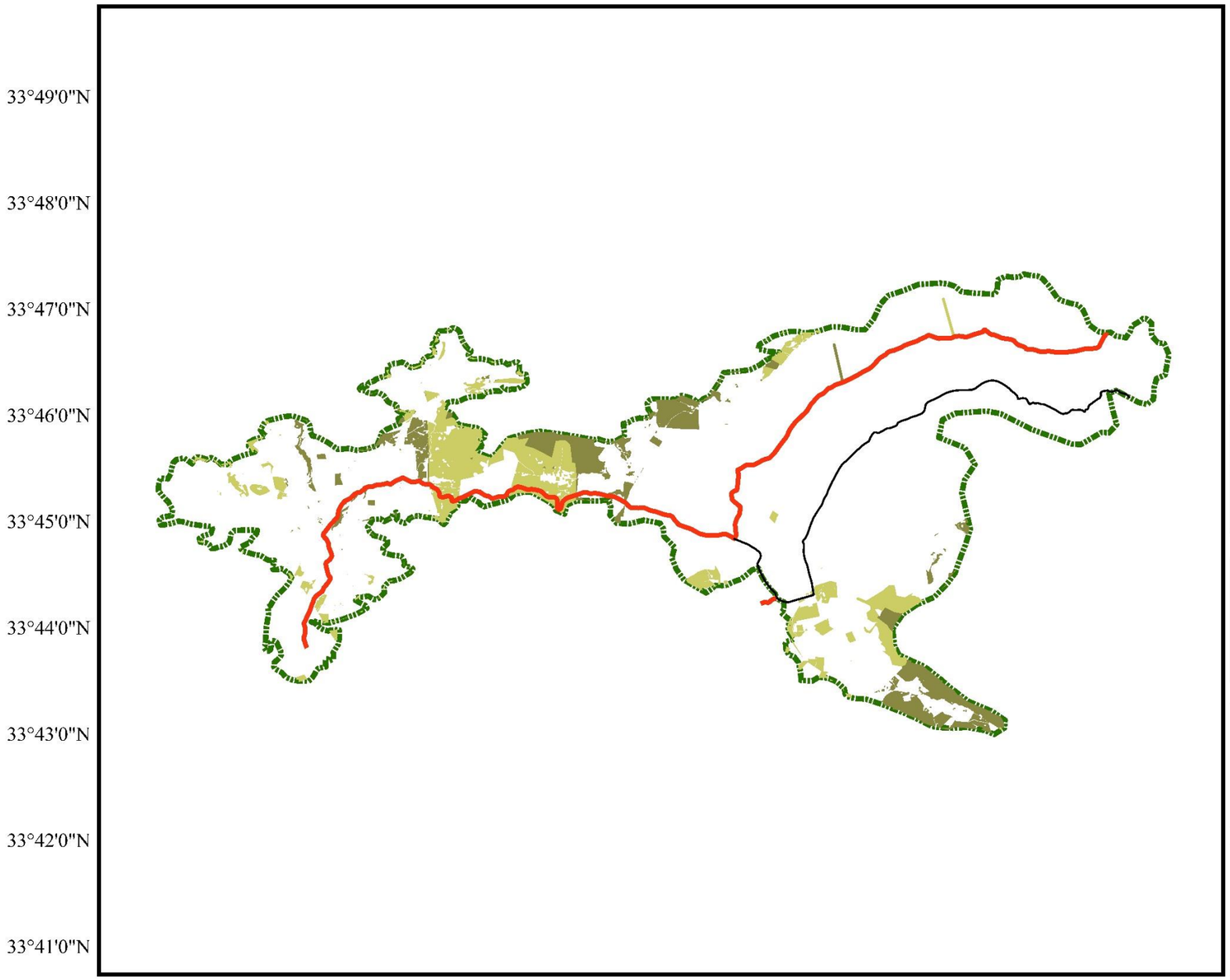
2.4. Landfill Site

In this sector, most of the influence to determine land suitability for landfill site, was given to secondary roads, land cover and existing built-up which is 15% of the total influence for the better result of the scenario as per requirements. Furthermore, the further considered values and layers with influence are shown in the table given below.

Table 2-4: Multi Criteria Analysis for Landfill site

S. No	Parameters/Layers	Influence (Total = 100)	Classes (In meters/degree/PKR)	Weights 0-1 = Least 2 = Moderate 3-4 = Highly
1	**Secondary road**	20	17-2000	0
			2001-4000	4
			4001-6000	3
			6001-8000	2
			8001-10071	1
2	**Land Cover**	20	Vacant Land	1
3	**Land Value Rs. Per Marla**	10	30,000-40000	4
			40001-50000	3
			50001-60000	2
			60001-70000	1
			Above 70000	0
4	**Slope**	20	0 - 2 º	0
			2.1 - 4 º	1
			4.1 - 6 º	4
			6.1 - 8 º	3
			Above 8º	2
5	**Water Table**	10	24-50 ft	0
			51-100 ft	1
			101-150 ft	2
			151-200 ft	3
			Above 201 ft	4
6	**Existing Built-up**	20	0 -500	0
			501 - 1000	1
			1001 - 1500	2
			1501 - 2000	3
			Above 2000	4

Kalaya Landfill Suitability Map



Legend

- Primary Road
- Secondary Road
- Urban Boundary

Land Uses	Area (Sq. Km)	Percentage
Least Suitable	46.26	87.36%
Moderate Suitable	3.90	7.37%
High Suitable	2.79	5.27%
Total	**53**	**100%**

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Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 1 2 4 Kilometers

Map 10: Kalaya Urban Center: Suitability Map of Landfill Site

Chapter 3. Approaches and Standards for Land Use Planning

3.1. Land Suitability

Land Suitability is an important aspect of land use planning, and as discussed in the preceding section, it tells us about the most viable locations for future development and expansion of various land uses, keeping in mind the topography, environment, demography, infrastructure, and existing urban dynamics of the project area. However, land suitability should not be seen as static and constant throughout the planning horizon. Indeed, a well-developed master plan will focus on improving the land suitability of the project area through interventions focusing on provision of infrastructure, holistic land use planning and development of planning guidelines and regulations. Thus, the consultant has adopted an approach where the existing land suitability analysis is seen as a starting point for improving the development conditions of Kalaya. In this regard, comprehensive strategy has been proposed for improving the water supply, sanitation, sewerage, and solid waste management infrastructure in Kalaya city (see Volume 2 of this report) and this will make future urban development possible in areas that are currently poorly served. Furthermore, the consultant has focused on developing a holistic land use plan based on the future needs of the area, and established planning standards including the guidelines provided in the National Reference Manual. Thus, the focus is on providing a mix of compatible land uses based on these planning standards. For example, separation between proposed industrial and residential land uses to prevent hazard risks and negative health outcomes, proximity of proposed commercial and residential uses to ensure the population is well served with commercial outlets and job opportunities, the relative proximity of proposed low-income housing near industrial area to reduce travel time and cost to the potential place of work – these examples illustrate the holistic approach to land use planning.

3.2. Land Allocation Standards – National Reference Manual

The project area is comprised of various land use zones with substantial uses of residential, commercial, industries and institutional. Furthermore, the National Reference Manual provides guidelines on the ideal mix of land uses, that is, the recommended percentage of land allocation for each land use, based on the population level of the city. Thus, the consultant has used the projected population 2040 as a basis for adopting the appropriate NRM guidelines on land use allocation. The same is shown in the table below:

Table 3-1: NRM Guidelines

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

3.3. Proposed Urban Form of Kalaya

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

- Central Business District / Commercial Zone
- Light Industry zone
- Infill Development Zone
- New Residential Towns
- Economic Corridor / Mixed Use Zones

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

3.3.1. Zone "A" Central Business District / Commercial Zone

This zone covers the proposed commercial zones in Kalaya urban center, in particular the central business district. Commercial zones are proposed throughout the urban center to give maximum benefits to residents across the project area. Proximity to primary roads, secondary roads, existing commercial land, industrial areas, residential areas, major transit points (bus stands, railway stations, shopping malls etc.) and existing municipal infrastructure services have been the important criteria for determining commercial development. The commercial centers are proposed along the industrial zones and residential zones to relate with the hybrid model as well as keeping in the view the need of easy accessibility. Furthermore, a main CBD is proposed in the heart of the Kalaya urban center, in close proximity to the existing Kalaya Bazar, the main Kalaya Road, and existing public buildings / institutional uses.

3.3.2. Zone "B" Light Industrial Zone

As per the National Reference Manual, parameters of location, accessibility and segregation are very significant for setting up new industries but in the case of the Kalaya urban area, these parameters are not fulfilled. Geographically, Kalaya has hilly terrain and setting up industrial estates need ample undulated land. A few parcels of land area are accessible but residential activities are in close proximity to these vacant land parcels concluding that industrial flourishment is difficult to attain. The economy of this area mostly depends upon agriculture and remittance. Furthermore, this region resists

realizing its industrial potential. Most industrial units here are small-scale and operate without established formal estate or other infrastructural facilities. Most of the people in urban areas of this region are either involved in agricultural activities or working as labour on daily wages. The proportion of industrial labour is very low due to the lack of industries. Furthermore, the industry needs infrastructure for an operation which is almost absent in the project area.

Hence, as there is a potential in this area for setting up industries therefore providing relevant facilities such as the allocation of industrial zones and corridors will encourage the productivity of this region. Thus, by encouraging small businesses in this region entrepreneurial culture needs to be developed. Moreover, it is also necessary to provide relevant skills and financial support to its residents.

The proposed industrial zones in the study area are located in NC Jalaka Mela Feroz Khel and in NC Kalaya. The industries are placed in the periphery of the Kalaya urban center in order to prevent congestion within the city and to alleviate the existing pressure there. Additionally, these industrial zones are also placed in the periphery to prevent environmental degradation and noise pollution within the city center and higher chances of availability of land. The adverse environmental effects of industrial uses are also to be mitigated through proposed green spaces acting as a buffer between industrial zones and other land uses, particularly, residential development.

3.3.3. Zone “C” Infill Housing Development

Infill housing refers to the development of new residential units on vacant or underutilized land within an already built-up urban area. It involves using available land within existing neighborhoods, often in spaces between existing buildings or on vacant lots, to create additional housing options. A neighborhood’s character or appearance is usually not greatly altered by the inclusion of infill housing within the area, and it is a useful tactic for limiting the local urban sprawl, and efficiently utilizing space within the extent of the existing built-up of the city. Some increased advantages of infill housing for areas like Kalaya are:

- People live in closer proximity to their workplaces;
- Increased dependence on walking and public transportation;

- Increased number of affordable housing units;
- Ability to utilize existing infrastructure like roads, transit, and parks;
- Ability to redevelop vacant or underused properties; and
- Creates mixed-use projects i.e., urban regeneration

To maximize benefits to residents, the proposed area for infill development has been placed around the city core and where vacant land is available keeping in view the proximity to civic services and amenities. The infill zones are mostly placed key roads, including Kalaya Road and Orakzai Agency Road, so as to provide good transportation connectivity, including access to transit networks and major roads. In this way, concentrating development near existing transportation infrastructure will enhance mobility options for local residents.

The land allocation percentage for infill housing and development can vary depending on several factors, including the specific goals and characteristics of the urban center, existing land use patterns and the overall development strategy. There is no universally prescribed percentage for land allocation to infill housing, as it is determined through careful planning and analysis.[2]

However, it is common for urban planning practices to encourage a significant portion of new housing development to occur through infill projects. The idea is to utilize existing urban land efficiently and promote compact, walkable neighborhoods. The specific land allocation percentage for infill housing can be influenced by factors such as:

Available Land:

The amount of vacant or underutilized land within the urban center plays a role in determining the land allocation percentage for infill housing. If there is limited available land, a higher percentage of development may be directed towards infill projects.

Revitalization Objectives:

Infill development is often used as a tool for urban revitalization and neighborhood renewal. In such cases, a higher land allocation percentage for infill housing may be

prioritized to promote economic development and improve the quality of existing urban areas.

Zoning and Land Use Policies:

Zoning regulations and land use policies can influence the allocation of land for different types of development. If the zoning code allows for higher densities or mixed-use development in certain areas, it can encourage more infill housing allocation.

Community Priorities:

Community input and preferences can also influence the land allocation percentage for infill housing. It is important to consider the needs and aspirations of the local community when determining the allocation of land for infill development.

3.3.4. Zone "D" Residential New Towns

It is not possible to just use infill development to meet the housing needs of Kalaya's urban center during the 20-year plan period. Although infill housing is a viable option for compact growth, it is suggested that the substantial unoccupied land that is already present inside the Kalaya urban area boundary be used for improved and planned housing schemes at various sites to accommodate all socioeconomic levels. For the aforementioned rationale, new housing schemes are proposed in various directions to meet the demand for housing. The new housing towns are recommended to be proposed in the periphery of the existing built up due to large residential lots available, privacy, environmental factor, and lower land cost. The placement of new residential towns shall also be mindful of the proximity to major highway and roads, employment centers i.e., commercial areas and industries, civic and social amenities.

The Khyber Pakhtunkhwa Local Government Private Housing Schemes Management & Regulation Regulations 2020 and Khyber Pakhtunkhwa Model Building Bye Laws 2017 would be followed in the development of these housing projects.

3.3.5. Zone “E” Mixed Use Zone/Economic Corridor

The consultants have proposed a linear mixed-use/economic corridor, along the Kalaya Road / Kalaya Sherazi Road to promote ribbon development efficiently and in a planned manner. This corridor features mixed land use, including public and private health and education facilities as well as economy-generating land uses. The economic corridor is also closely aligned with the proposed CBD and substantial residential development, in order to consolidate Kalaya’s existing initial urban development into a more matured urban center, with a recognizable and central urban core. Out of its socio-cultural legacy, the city's mixes of various layers and how they are kept together will enhance the existing quality of life for the people.

With the sector land use model in mind, proposals have been made for the Kalaya urban area to ensure that sector-based growth and development alongside transportation corridors is optimized. The proposed urban form of Kalaya urban emphasizes the CBD, and mix of uses that are conveniently located in the center of the city and are highly reachable, and thus, the proposed development is in accordance with the Sector Land Use model with slight variations.

Chapter 4. Scenario Development

Scenarios are possible future conditions of Kalaya that can be predicted using models and spatial data. It is a process to support decision-making that helps navigate the uncertainty of the future in the short and long term. Scenario development helps the authorities to respond dynamically to an unknown future of the Kalaya. It assists in thinking, in advance, about the many ways the future may unfold and how authorities can be responsive, resilient, and effective, as the future becomes reality.[3]

A scenario planning process in Kalaya begins with scanning the current reality, projected forecasts, and influential internal and external factors to produce a set of plausible potential futures (i.e., scenarios). It then develops a series of initiatives, projects, and policies (i.e., tactics) that may help support a preferred scenario, a component of a scenario, multiple scenarios, or all scenarios which indicate how a scenario component is likely to occur (i.e., tipping points or triggers) may be established to alert authorities that the likelihood of a scenario becoming a reality is higher, prompting them to act on appropriate tactics such as allocating funding and moving into implementation.[4]

Land use is the foundation of all urban development. Land use describes how a city currently uses its land and how it intends to use it for future development. Land development scenario has been used as a mean to represent the future development in Kalaya urban center. Overall, scenario of land use development pattern has been worked to understand the potentials and constraints in the development of the Kalaya urban area for the plan period. The consultants have proposed 3 scenarios to provide a better look at the future proposals for Kalaya city. The details of each are explained in the sections below:

4.1. Scenario A: Business as Usual (BAU)

The Business as Usual (BAU) scenario has been developed for the Kalaya urban center keeping in view the approach that “things won’t change” and grow as per convenience. This focuses on the identification of problems that exists in the Kalaya urban center

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

without any planning interventions. However, future projections have been made in the *Background Study Report* to forecast the effects of the current scenario for future years.

According to population census, the total population of the Kalaya Urban Area in 2017 was (17,575), and the average annual growth rate is 2.63%[5]. Accordingly, The future population is predicted based on the previous census reports and growth rate. The future population is projected for the year 2040 through the geometric growth method, is equal to 31,930. As the population increases, so will the demand for utilities, services, and housing and without any planning interventions, here will be lesser education and employment opportunities for future generations. The accommodation of the future population and provision of amenities and services will pose a great challenge for development authorities.

4.1.1. Sector Wise Problems and Future Projections

The existing problems and their impacts on each sector have been discussed in this section to foresee the future situation if no interventions have been taken place. The Business as Usual Scenario for each sector is given below to examine how they will unfold their respective dimensions in the future.

4.1.1.1. Residential

Housing is another important sector as housing, besides providing shelter and raising the quality of life is also known to be closely associated with the process of overall socio-economic development. This section focuses on the current problems of the housing sector, the future projections, and how the existing conditions will create more demand for housing as it will increase in the BAU Scenario.

In the current scenario of Kalaya, the weak structure of Local Government, overlapping of existing laws, land-use rules, and regulations and lack of disaster management has caused many social, environmental and economic issues which have directly affected the housing sector of Kalaya causing dilapidation, shortage and overcrowding of housing units. The quality of housing has deteriorated in the Kalaya urban center due to the poor

[5] Pakistan Bureau of Statistics, Census 2017

economic condition of people, weak building regulations, and lack of awareness regarding the modern construction methods of housing. Currently, as per the land use survey conducted by the consultants, 76.74% of the houses in Kalaya are Katcha, 5.44% are Pakka while 17.82% are Semi-Pakka houses. Furthermore, in terms of home ownership and tenure, 94.82% of respondents of the household survey, own their houses, 2.74% live in rental units, 0.61% live in government owned housing and 1.83% lives with relatives.

Table 4-1: Housing Structure

Structure type	Percentage
Katcha	76.74%
Pakka	5.44%
Semi-Pakka	17.82%
Grand Total	**100%**

Source: HIS Survey, Urban Unit and HP Consultants

As per the *Background Study* report the analysis shows that housing structures in Kalaya are not according to planning standards and the current situation of housing is highly unsatisfactory as more than two thirds of the housing stock is katcha. If the things go on usual business pattern, there will be no development in the housing infrastructure and eventually already subpar housing stock will continue to deteriorate, leading to a poor quality of life, and vulnerability to disaster events. This will have an enormous adverse impact on lives, economy, and infrastructure of the Kalaya urban center.

Owing to the cultural tradition of the area and due to privacy reasons, almost 90% of the total houses are single-story, as per the household survey data. As the prices are low in rural areas and tribal areas, therefore most of the houses are constructed single-story with a maximum height of 20-25 feet from the ground. Furthermore, parcel sizes of housing units are relatively large, with around two thirds of the housing stock having a plot size of greater than 10 Marla. The household survey shows that approximately 28% of the total sampled housing units are greater than 20 Marla. Moreover, 39% of the housing units have a size of between 10 Marla and 20 Marla while 34% of the total housing units are less than 10 Marla. In the BAU scenario, this type of low density

development pattern will continue, leading to inefficient utilization of available land and as a result, with increase in the population and housing demand, agriculture, forest land and range land may potentially be used to accommodate housing development. This will ultimately degrade the environment and perpetuate poor land utilization practices.

Table 4-2: Size of Housing Units

Size of housing units	Percentage
Less_than_5_Marlas	4.53%
5-10_Marlas	29.00%
11-20_Marlas	38.97%
Above_20_Marlas	27.49%
Grand Total	**100%**

On the other hand, as per the household survey, 43% of the population earns less than 20,000 PKR a month. The income level of residents of Kalaya is quite low on average, while the land ownership and area of housing units is relatively high, hence accommodating less population whilst utilizing significant land area. This situation will trigger the problems in the housing sector – particularly, there will be a backlog of prime developable land pressuring the utilization of resourceful agriculture and forest land for housing.

The BAU scenario should also account for the land requirement for housing or residential land use needed to accommodate the current and projected future population of the Kalaya urban center. The projection shows that the area required for 2040 is 0.81 sq.km for residential zones, with a projected household size of 8.11, to meet the projected housing demand of 3,936 units. More housing along with associated facilities are required to accommodate the future population.[6] Details for these projections and housing demand are provided in **Section 6.1: Residential Zone.**

Based on current housing conditions, the situation may worsen by 2040 if the BAU is adopted. It will not only widen the gap between the demand and supply but also trigger

[6] Background Study Report of Kalaya Urban Center

associated problems such as lack of water supply causing decreased water levels of the area, lack of sanitation services causing health and hygiene issues, and overcrowding, which will affect the living standards and livability of the urban center.

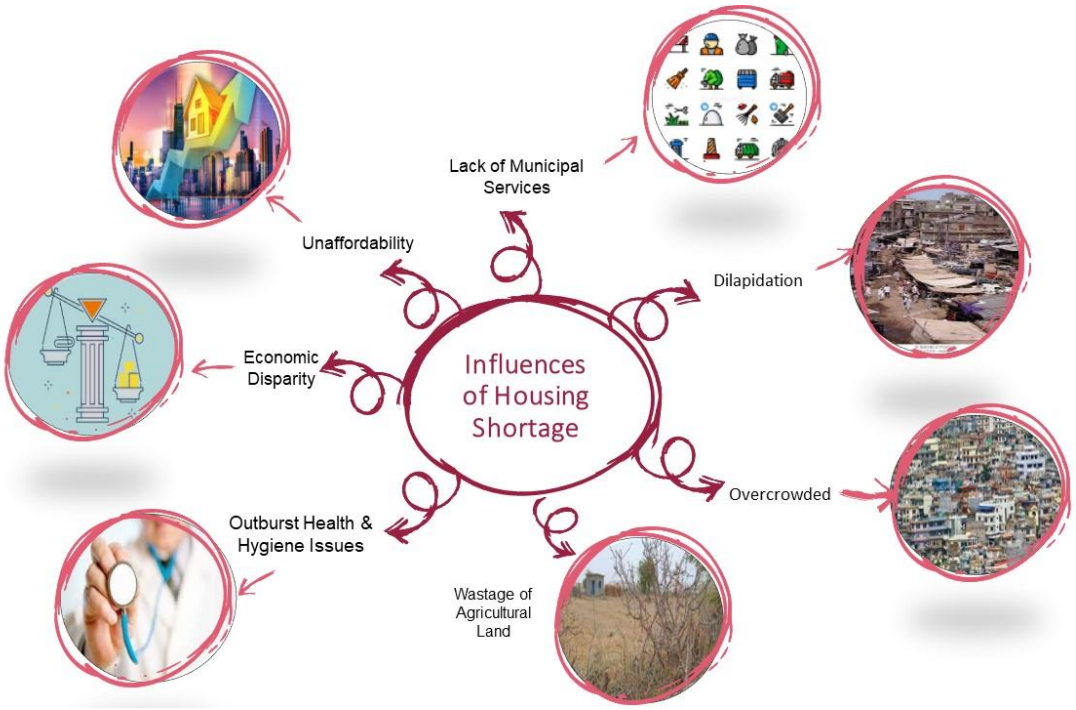


Figure 4-1: Impact of BAU Scenario - Residential

4.1.1.2. Commercial

The Kalaya urban center has been lacking in terms of economic development due to the illegal conversion of land, the absence of a robust tax collection system, the unavailability of electricity and gas supply to markets/bazaars, the non-availability of raw materials and the lack of infrastructure. If no interventions are made in the future, the area will not be stable enough to contribute to the overall national economy of the region or country.

Commercial land use presently (2022) occupies about 0.18 sq.km. of land, which is around 0.34% of the total area (53 sq.km.), and 2.34% of the total built-up area (7.7 sq.km.) in Kalaya. In 2017, the area under commercial land use was 0.17 sq. km of the built-up area, implying about 5.8% increase over the past 5 years. The projected population of Kalaya by 2040 is 31,930. According to the National Reference Manual Standards, a city of this population size, should have commercial area between 0.5-3

percent of the total land use, while the current commercial area is 0.34 percent, showing that there is a need for further commercial development in Kalaya. If the current situation continues and the required commercial area is not provided, there will be a lack of employment and entrepreneurship opportunities for locals, decreased marketability, less sale and purchase of commodities, reduced capital value - eventually resulting in low productivity of the area.

Furthermore, the existing commercial buildings are mostly in a condition of deterioration. The natural skyline of the area is not followed due to the absence of any design guidelines and standards. There are seemingly no by-laws that are mandated or enforced by the authorities. The presence of open sewage lines, lack of parking spaces, congestion, and encroachment by irregular parking, add to the unpleasant experience of the commercial areas. If no interventions take place in the future, it will affect the economy, trade, and visitor influx and ultimately degrade the overall commercial fabric of the area.

Meanwhile, the conversion of residential land use into various types of economic activities has also been observed, particularly along major roads of residential areas and arterial roads of the urban center. This conversion has preceded, both with and without official consent, largely in a haphazard manner. In the future, this will result in creating parking problems, a reduction in the traffic capacity of roads and the resultant increase in congestion, energy use, air and noise pollution, and burden on utility services.

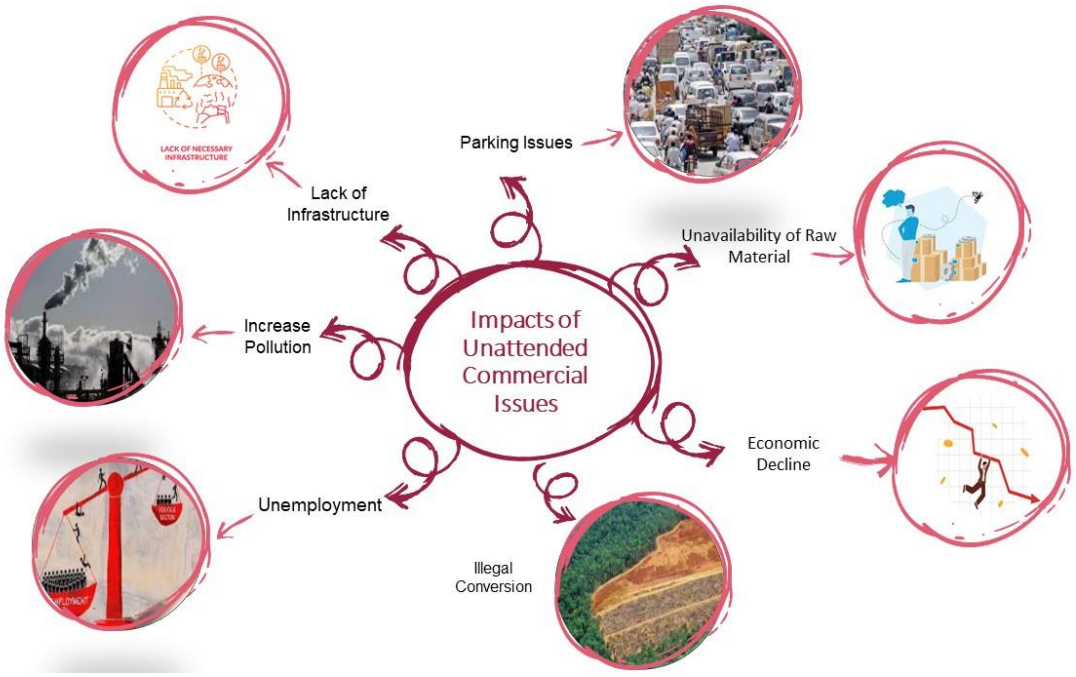


Figure 4-2*: *Impact of BAU Scenario - Commercial

4.1.1.3. Industry

The spatial growth of industry, particularly since the past 5 years after the merger has been on the rise. Industrial activities are one of the key sectors which contributes towards creating employment for the local community. The industrial opportunities thus, directly alleviate the lack of employment opportunities in the area. The industry of Kalaya majorly consists of mining, stone crush plants, block factories and furniture. The area has the potential for development of an agri-based industry and dry fruit and grain market, but this potential is not yet explored. The existing industrial development in the area is only about 0.02% of total land use, in the form of scattered parcels of industrial developments. This development of industrial activity is largely unplanned and has mostly happened relatively near to existing urban development, alongside major arteries.

Lack of power generation is a significant issue behind the low industrial productivity in Kalaya. If no interventions take place in the future, the area will further lose its industrial potential, resulting in a lower level of productivity and employment, lack of human capital development and revenue generation, higher costs of production and substandard products.

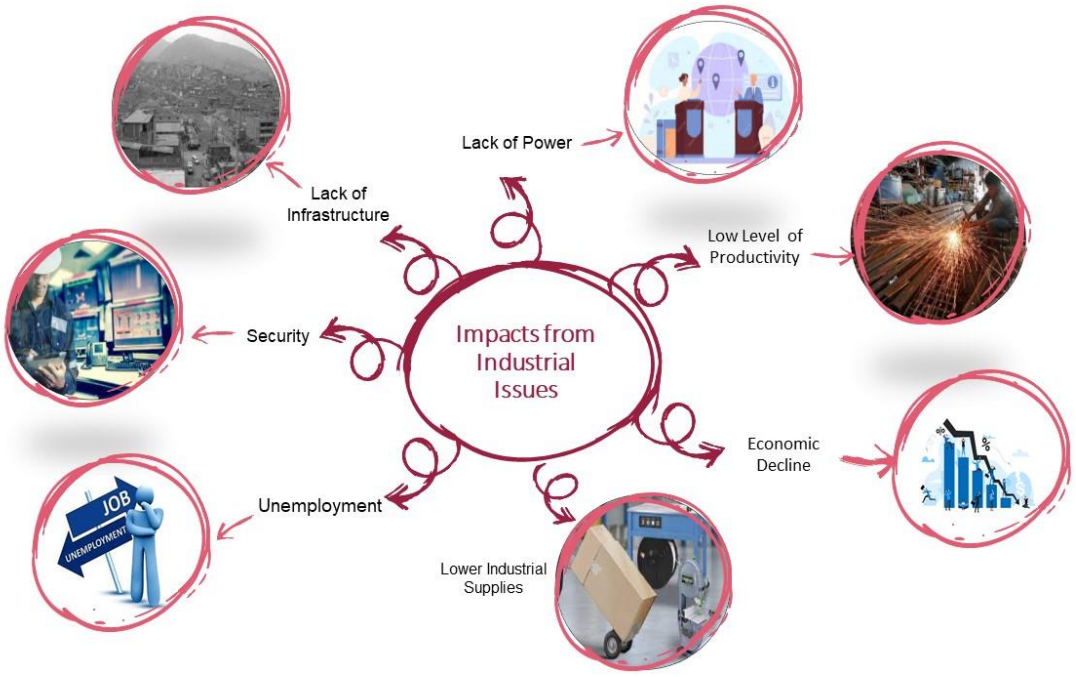


Figure 4-3: Impact of BAU Scenario - Industry

4.1.1.4. Education

The significant issues in Kalaya urban center are low literacy rate, higher gender disparity, substandard infrastructure, lack of Higher Secondary school for girls and a lack of vocational and training centers. A low literacy rate is likely to cause barriers to employment opportunities and earning potential. In turn, this will increase crime, poverty, lawlessness, social unrest and intolerance. It will threaten the future population in terms of economic and skill development.

The educational gender inequality in Kalaya has an impact on a family's socioeconomic position such as uneven access to education, job segregation, absence of legal protections and religious freedom, poor medical care, and lack of political representation. One of the major causes of gender inequality in Kalaya is the lack of awareness among women about their rights and their ability to achieve equality. This lack of awareness is often due to the prevailing cultural and social norms.

Several factors that contribute to poor infrastructure of education facilities in Kalaya are shortages of funds, insufficient provision of developmental resources and inefficiency of developmental labor as well as poor repair and maintenance.

The absence of vocational and training centers will create less knowledge and skillsets, poor job performance, an inability to participate internationally, lack of individual skills and areas of expertise.

By 2040, if these problems will not be addressed, the future generation of Kalaya will be not be adequately equipped to pursue a higher quality of life due to a substandard education system which may fail to raise the young population based on sound economic, social, political and moral grounds. This will also produce divergence in high-order life skills such as critical thinking, analysis, research, and creativity, shortened human capital, and result in low employability.

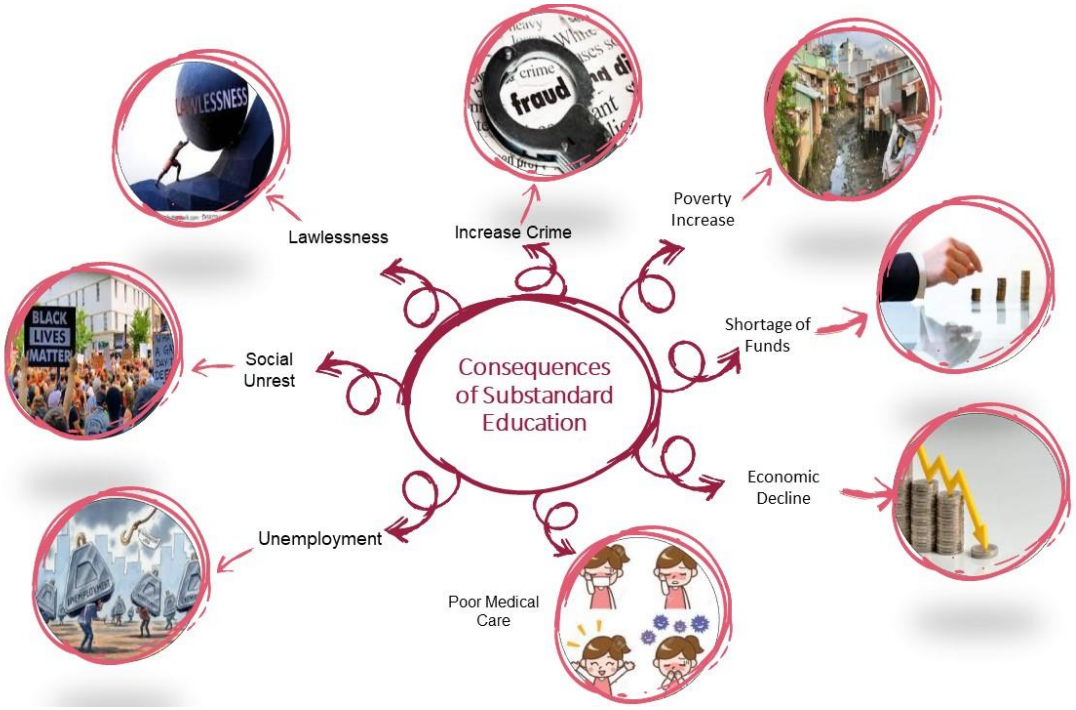


Figure 4-4: Impact of BAU Scenario – Education

4.1.1.5. Health

Accessible, equitable, and quality healthcare for all people is a foundational aspect of a decent life, but unfortunately, the people of Kalaya are facing unprecedented challenges in the health sector as currently, very few health facilities are available in Kalaya which do not fulfil the health requirement of the people. This creates problems of access to basic health facilities for the people such as insufficient health services, ignorance of personal hygiene, overcrowding, and improper community sanitation, which are the prevailing factors that cause acute challenges in the health sector.

The existing condition of the infrastructure is poor, which directly affects the quality of services. More than half of the population is not covered by the existing medical staff and facilities. The Orakzai district as a whole has 130 health facilities including eleven basic health units, ten community health centers, eighteen community dispensaries, and one mother and child health center. These are not enough to cater to the future population during the plan period.

Lack of accessibility is a major issue as well, as they locals want facilities to be provided close to residential areas, particularly because the road infrastructure and connectivity is also very poor. Potential health effects of low healthcare access include poor management of chronic disease, the increased burden due to preventable diseases and disability, and premature death.

Poor health outcomes will also adversely affect the local workforce as they won't be robust enough to work in labor intensive jobs and as many students may drop out of school due to poor health conditions. This will affect the productivity of the future workforce of Kalaya, as health disparities increase.

By 2040, if health services will not expand and are overlooked by the authorities, this will increase health disparity, lack of education, lack of workforce, less economic activities, increase premature death rates, and may also result in a failure of the authorities to mitigate a pandemic or emergency situation. As a result, inadequate, inaccessible, and/or poor medical care further exacerbates increasing healthcare costs.

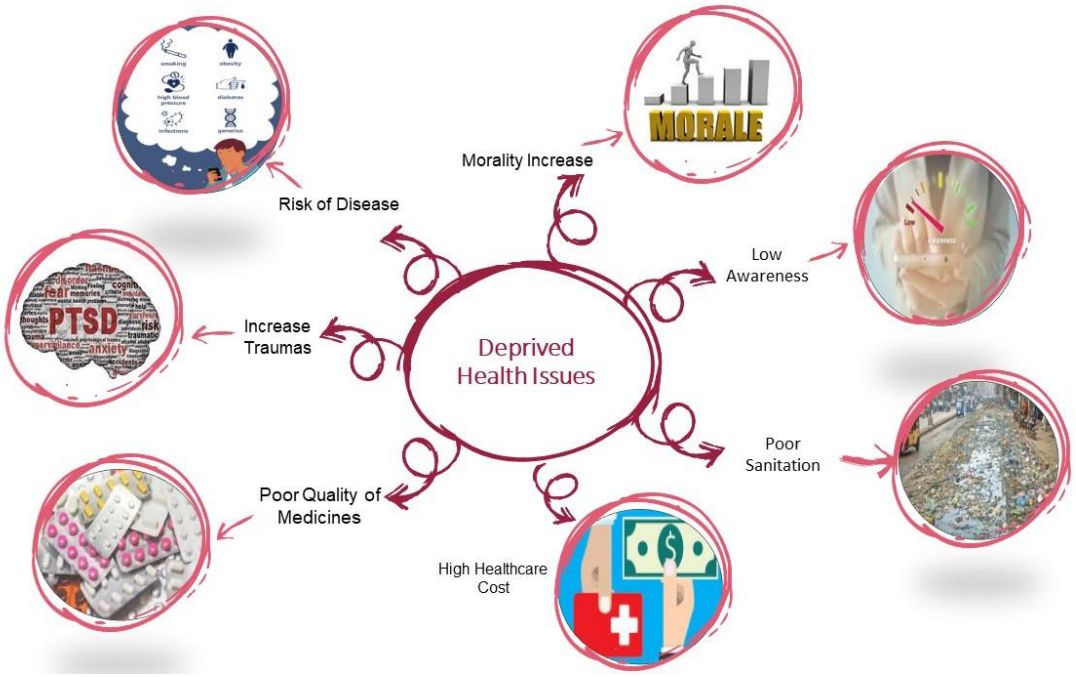


Figure 4-5: Impact of BAU Scenario - Health

4.1.1.6. Connectivity and Accessibility

This section represents the conditions of the transportation sector in the current scenario, highlighting the major problems such as poor infrastructure, lack of public transport, shortage of trained police staff, absence of parking spaces, limited pedestrian movement and congestion. This will affect mainly tourism and trade potential in the Kalaya urban center.

The poor infrastructure including unpaved primary and secondary roads lacking shoulders, footpaths, drains, or metal surfaces cause difficulties for the locals, traders and tourists in commuting. These problems are affecting the accessibility of basic health, education, and economic activities. If the road network remains in the same condition, there will be decline of tourist's influx which will adversely affect the economic growth and revenue generation of the urban center. Moreover, it will also burden the transport sector by damaging the vehicles and causing excess use of fuel. The increased combustion will also affect the cost of travel and environment of the urban center. Traffic congestion in

the city tends to increase travel costs and delay the travel time of the people which is making it impossible for outsiders to navigate within the city, eventually affecting the tourism of the city.

Traffic laws are implemented through untrained traffic police staff who are currently working without proper knowledge of traffic rules and regulations. This problem will result in unregulated traffic flow, and an increasing number of accidents due to the violation of traffic signals.

Currently, there are only informal public parking spaces available in the Kalaya urban center. All the traffic coming into the urban center or passing through, park their vehicles on streets or footpaths. The traffic is going to increase in future which will affect the traffic flow and pedestrian movement by creating traffic jams and road congestion, which shows there will ultimately be high demand for formal parking spaces for vehicles.

The roads of Kalaya are mainly deprived of basic traffic signage. Along the main roads of Kalaya, where much of the urban population is located, there is no provision of the required traffic signages. The absence of signages will complicate intersections and put pedestrians and vehicles at risk of injury, obstruct a driver's view or not allow drivers enough time to react during times of congestion and it will create a haphazard transportation system with no life security and increased travel time. The low-income population will be most affected by these problems as they are more vulnerable to suffering the effects of current transportation system.

Figure 4-6: Impact of BAU Scenario –Connectivity & Accessibility

4.1.1.7. Solid Waste Management

This section deals with the overall existing conditions of solid waste management in the Kalaya urban center such as lack of solid waste collection system, transportation and dumping of solid waste. In general, it is observed that solid waste is largely left unattended open areas and the residents of the area do not hesitate in throwing waste into open drains and in sewers which causes choking and overflowing of drains during rainy seasons. Furthermore, there is an absence of controlled dumping and a lack of funds and human resources to effectively manage a solid waste collection and disposal mechanism. An inefficient municipal solid waste management system will create serious negative environmental impacts including spread of infectious diseases, land and water pollution, obstruction of drains and loss of biodiversity.

The waste generation of the Kalaya urban center is estimated in the *Background Study* report showing that the current waste generation of the urban center is 7 tons per day, and 2,673 tons per year. By 2040, waste generation is expected to increase by 15 tons

per day and 5353 tons per year. On the contrary, a proper solid waste management system is not functional in the Kalaya urban center.

According to the household information survey, there is no mechanism of solid waste collection, transportation and dumping implemented by the TMA. Every neighborhood council has garbage dumps, locally called "Derans," where solid waste is disposed-off. TMA solid waste collection is limited to Kalaya Main Bazar and Head Quarter only, as the TMA is not serving the whole area which is causing a major service delivery problem in the urban center.

Solid waste heaps are visible and left unattended in open plots and on main roads while very little proportion is transported to the dumping area, if this problem remained unsolved in the long term, the urban center will become loaded with waste dumps, which will cause damage to the environment, air pollution, water pollution, the flora and fauna, quality of life, living standards of the community, the health of the community and will also diminish the tourism appeal of the area.

Another major issue is that residents of the area do not hesitate in throwing waste into open drains and in sewers which cause choking and overflowing of drains during monsoon season. If the local remains unaware of hygienic practices and socially responsible behavior, the urban infrastructure will further deteriorate. The blockage and overflow of the drains during monsoon season will cause major health issues such as spread of malaria and other waterborne diseases which will affect the livelihood of the urban center.

Due to the unavailability of proper solid waste management system the scenic beauty of the urban center is fading, and the heritage sites are also converting into garbage dumps, which is highly affecting the tourism sector. By 2040, if the proper solid waste management system is not implemented, it will contaminate the natural resources, clog and deteriorate the drainage infrastructure, cause viral outbreaks, increase air pollution ultimately degrading the eco system and natural environment of the urban center.

Figure 4-7: Impact of BAU Scenario – Solid Waste

4.2. Scenario B – Sectoral Development

This approach is focused on sector wise development in order to prevent urban expansion and mushroom growth in the urban center of Kalaya, in order to improve walkability, mixed-use development, and create a sense of community.

Different zoning and planning techniques have been used such as infill housing, new towns, commercial, industrial, a logistic center, and road network improvements to meet the area's long-term demands. This will contribute to the sustainability of Kalaya's economic growth and prosperity. The below maps show the detailed sector wise scenario:

The below sections show the detailed sector wise scenarios.

4.2.1. Residential

The intended residential zones are proposed by considering the growing population and the requirement for housing in Kalaya. The consultant has proposed a compact development approach in the study area, which will result in more effective use of land. The existing residential area is 3.26 sq.km i.e., 6.15% of the total urban area, with a total housing stock of 4,040 units, as per the land use survey conducted by the consultant. The

NRM standards suggests that residential land use should occupy around 26%-50% of an urban area with a population between 25,000 and 49,000. Accordingly, tthe consultant has estimated the required minimum and maximum recommended total residential areas i.e.,13.78 sq.km and 26.50 sq.km respectively based on NRM standards. The below table shows the existing housing statistics in Kalaya:

Table 4-3: Existing Housing Characteristics

Existing area (sq. km.)	3.26 Sq. km
Existing area (in %)	6.15%
Existing number of houses	4,040
Recommended NRM standard	26% to 50%
Recommended residential area – min (sq. km.)	13.78
Recommended residential area – max (sq. km.)	26.50
Required (Recommended (min) – Existing Land Use) sq. km.	10.52
Required (Recommended (max) – Existing Land Use) sq. km.	23.24

In Kalaya, both new housing towns and infill development are recommended, with a greater focus on the infill development as this works in concert with urban growth boundaries, which designate the limits of growth for urban areas and protects undeveloped land on the periphery of the city. This approach typically utilizes infrastructure and facilities that are already in existence and add new building stock that revitalizes the neighborhood and strengthens the local economy.

A total of 3,936 dwelling units with a range of incomes are required by the conclusion of the planned period. Detailed calculations of the housing requirements are provided in Section 6.1. The figure below demonstrates where housing may be proposed under this scenario:

Figure 4-8: ***Proposed*** Residential ***Zone***

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

Key Features	Rationale
Residential	
Infill housing in the center and on the upper side to fill the vacant parcels within existing residential areas.	Future housing development within existing residential area is highly feasible due to urban agglomeration dynamics, and will efficiently utilize existing space and promote denser urban form
New housing to be proposed on largely vacant land and along the main Kalaya Road	This will cater the need for new housing units and helps to overcome the housing shortage

4.2.2. Commercial

The commercial zones are proposed based on the growing population and the requirement for new commercial area. This allows businesses to identify new opportunities, enter new markets, and expand their products or services. The existing commercial area is 0.18 sq.km. The NRM suggests the commercial between within 0.5%-3% for an urban area with a population between 25,000 and 49,000. Accordingly, the

consultant has calculated the minimum and maximum recommended total commercial areas i.e., 0.27 sq.km and 1.59 sq.km respectively based on NRM standards.

Table 4-5: Existing Commercial Characteristics

Existing area (sq. km.)	0.18 Sq. km
Existing area (in %)	0.34 %
Recommended NRM standard	0.5% to 3%
Recommended commercial area – min (sq. km.)	0.27
Recommended commercial area – max (sq. km.)	1.59
Required Area [Recommended (min) – Existing Land Use]	0.09
Required [Recommended (max) – Existing Land Use]	1.41

Currently there are 46.95 acres of commercial land. The main bazaars in the region are in the Mishti Bazaar and Jalaka Mela Feroze Khel, and major commercial activities include retail including clothing, and general stores to name a few. Kalaya currently has a very low population growth because of the security in the area, thus the commercial area growth has been sporadic, indicating the need for further commercial growth.

Appropriate parking and logistic facilities and upgraded infrastructure needs to be provided to regulate the commercial areas and mixed-use activities. Thus, it is proposed that the main Kalaya Road be declared as an economic corridor to generate more commercial activities and to make this area economically sustainable and viable. Commercial areas are proposed along main roads keeping in mind the existing trends and statistics.

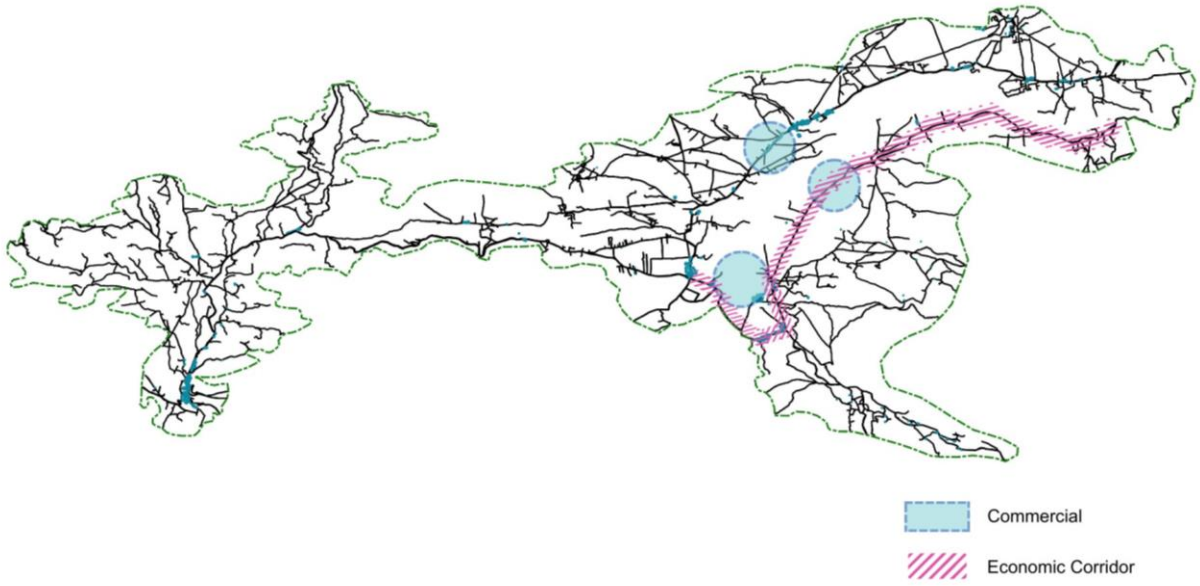


Figure 4-9: Proposed Commercial Zone

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

Key Features	Rationale
Commercial	
Main Kalaya road to be declared as main economic corridor.	This will provide connection between economic nodes or hubs along the main roads of Kalaya, and link the supply and demand sides of markets
Commercial centers to be proposed along main roads, alongside the infill housing and low-income housing	These high-visibility locations offer opportunities for infill development for local retail, housing, and social and cultural destinations.

4.2.3. Industry

The intended industrial zones are proposed based on the growing population and requirement of the study area. The existing industrial area is 0.004 sq.km. The NRM suggests the commercial standard within 3%-11% for an urban area with population between 25,000 and 49,000. Accordingly, the consultant has calculated the minimum and

maximum recommended total industrial areas i.e. 1.59 sq.km and 5.83 sq.km respectively, based on NRM standards.

Table 4-7: Existing Industrial Characteristics

Existing area (sq. km.)	0.004 Sq. km
Existing area (in %)	0.01
Recommended NRM standard	3% to 11%
Recommended industrial area – min (sq. km.)	1.59
Recommended industrial area – max (sq. km.)	5.83
Required (Recommended (min) – Existing Land Use) sq. km.	1.59
Required (Recommended (max) – Existing Land Use) sq. km.	5.83

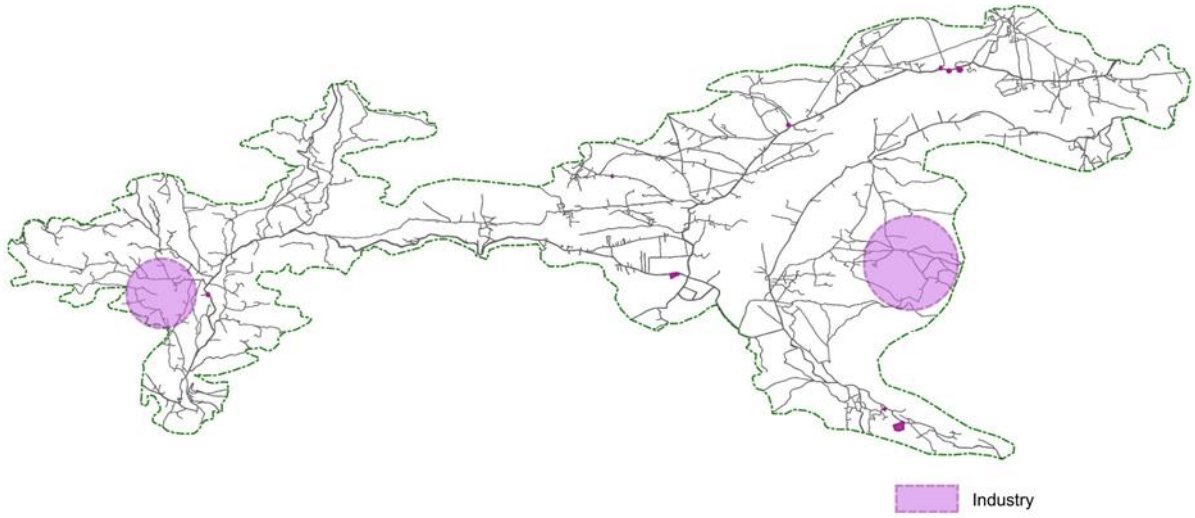


Figure 4-10: Proposed Industrial Zone

Kalaya needs more industrial land to cater to the needs of the area for the coming 20 years. The industrial area is proposed on the east and west sides because it will be easier to conduct trade externally and this area is relatively distant from residential activity. A logistics hub is also proposed in this scenario to support the industrial area with shipment and lodging facilities.

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

Key Features	Rationale

Industry	
Industry is proposed in the east and west side of Kalaya urban center side with a buffer alongside the main road	Improved connectivity across the wider region and proximity to main roads, will increase trade opportunities
A logistic hub is proposed near the industry	Logistic hub will help to ease the flow of goods across area as it will allow the urban center to connect with different freight types
Parking lots are proposed in the center and along the main economic corridor	This will help to reduce congestion, air and noise pollution in the city center caused by automobiles. Also, it will help to cater the parking problems.

4.3. Scenario C: Multi Nuclei Development

As Kalaya already has characteristics of the multiple nuclei model, thus, this approach provides realistic scenario for the urban development of this urban area, which leverages the existing urban development. This model is typically characterized by several nodes that act as regional centers for economic or residential activity within one larger area. However, our approach in this scenario is to promote a central urban core in the heart of the city where the main Central Business District and public life will be located, whilst also focusing upon the development of neighborhood centers to provide amenities to all residents. This approach will promote compact development to control urban sprawl in Kalaya.

4.3.1. Residential

The Residential zones are proposed based on the present and future demand of Kalya. Currently, there are 4,040 dwelling units spread throughout 3.26 square kilometers of residential development.

As per NRM standard, the minimum and maximum area requirements are 13.78 sq.km and 26.50 sq.km respectively. This translates to a housing requirement of 3,936 units by 2040.

Two forms of housing are suggested to fulfil these requirements: new development and infill development. In order to boost compactness and density, infill housing is suggested

within undeveloped lots within the current built-up area. The total proposed area for residential development is 0.82 Sq. km out of which 0.54 Sq.km is infill and 0.28 sq. km of land is allocated for new housing development. The proposed residential zones under Scenario C are depicted in the figure below:

Figure 4-11: Proposed Residential Zone

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

Key Features	Rationale
Infill housing adjacent to existing residential hubs – that is, in the center of city and along the main Kalaya Road and Orakzai Agency Road.	Future housing development within existing residential area is highly feasible due to urban agglomeration dynamics, and will efficiently utilize existing space and promote denser urban form
New housing to be proposed along main Kalaya Road and western end of Kalaya, along Orakzai Road	This will cater the need for new housing units and helps to overcome the housing shortage

4.3.2. Commercial

In line with the multi-nuclei approach, the commercial zones have been proposed to distribute the commercial activity and make it more accessible to its adjacent land uses.

This is preferable to concentrating the commercial uses into a singular large nucleus which has negative effects such as congestion.

In this scenario, the main Kalaya Road is proposed as a commercial corridor in order to constrain future haphazard and/or illegal commercial developments in its vicinity.

There are currently 0.18 sq.km of commercial spaces and 0.63 sq.km of mixed-use/institution land uses those houses facilities for health, education, the public buildings, masjid, hujras, and other institutions. Commercial areas have been proposed near residential and industrial zones to facilitate both communities.

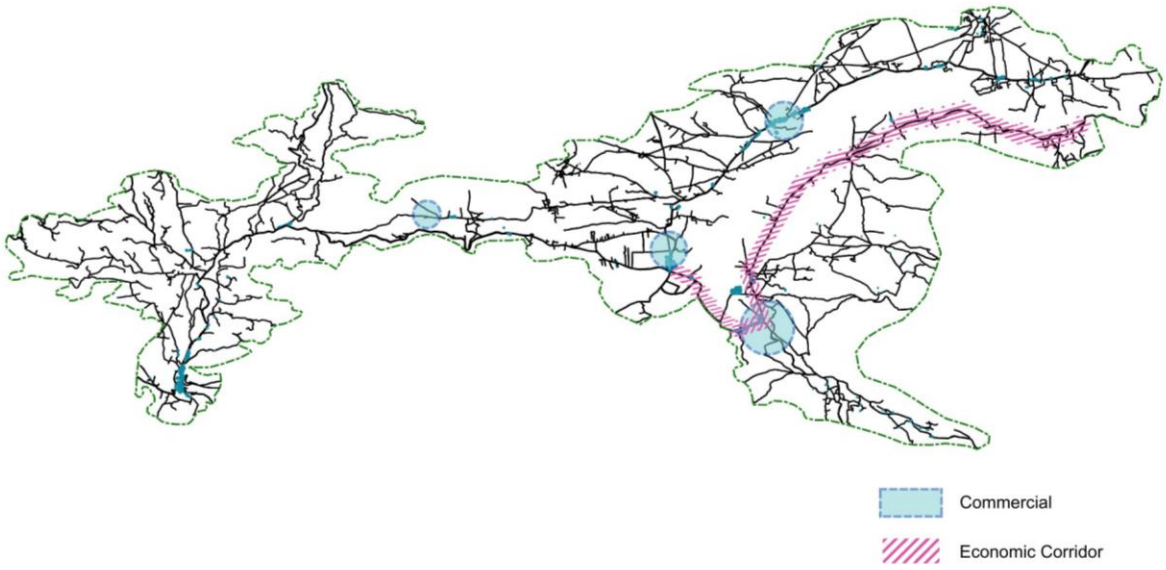


Figure 4-12: Proposed Commercial Zone

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

Key Features	Rationale
Central commercial area to be declared a CBD	It will provide a centralized and condensed space for businesses to operate because of concentration of office buildings, banks, and other businesses present in a CBD. However, a CBD also be home to retail stores, restaurants, and other forms of entertainment.
Commercial areas to be proposed alongside the infill housing and	This will sure residents across the urban area are well served in terms of retail and commercial opportunities, and will also provide small to medium size entrepreneurship opportunities

low-income housing.	

4.3.3. Industrial

Industrial area is to be proposed keeping in view the existing and future needs of the study area. Given that the existing industrial area is 0.004 sq. km and the NRM recommended land allocation for industrial areas is between 3%–11%, the required industrial area is between 1.59 and 5.83 sq.km. A total of 0.68 sq.km area has therefore been proposed to fulfill the industrial demand of the area.

The industrial areas are proposed in the upper North side near to the Orakzai Agency Road and on the Southern side, near to the existing mining and industrial activity. Both locations are feasible for daily commute and providing access to the wider region

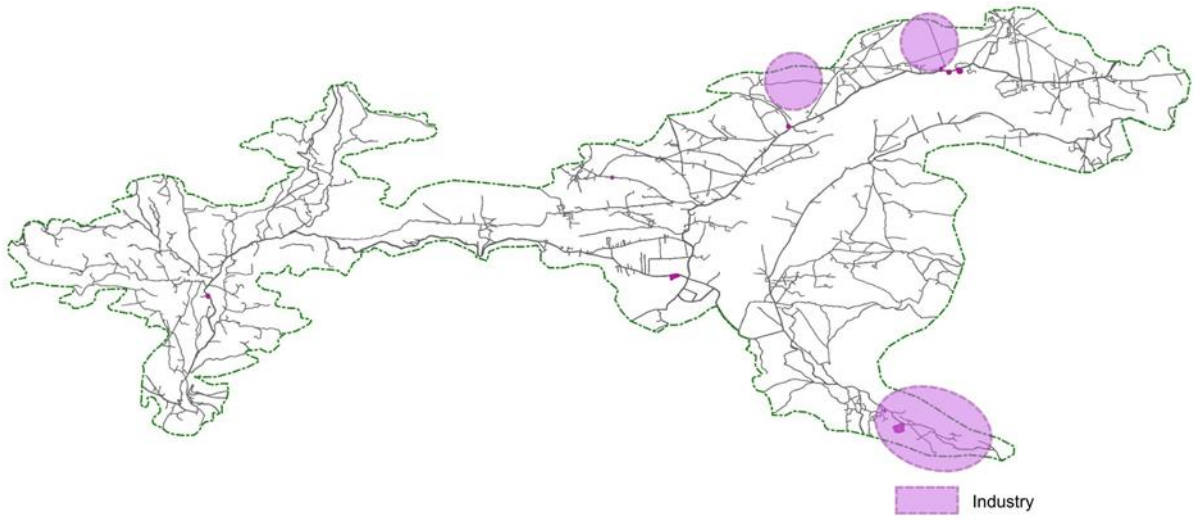


Figure 4-13: Proposed Industrial Zone

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

Key Features	Rationale
Industrial area to be proposed in the upper North side near to Orakzai Road and in the South, near to	The productivity of an area will increase through industrial development. Alongside to this with an appropriate buffer, low income housing is provided

existing mining and industrial activity	which also helps to aid to provide shelter to labor.

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

Chapter 5. Proposed Strategies of Scenario Development

The progressive features that are shared by the different scenarios are considered and undesirable outcomes have been avoided. The strategies for scenario development are proposed in line with the potentials and constraints of the Kalaya urban center and its existing urban form. The overall structure of the Kalaya urban center is in irregular shape with Orakzai Agency Road serving as the main arterial road running through the region. The Kalaya urban area, except the central core, has very scattered and irregular development. Thus, the strategies for scenario development seek to firstly, develop the central core as the heart of this city whilst also reconciling the existing scattered development, into well-developed urban settlements.

Viable Kalaya: Advancing Infrastructure, and Prosperity

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

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

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

In addition to economic and social development, Viable Kalaya prioritizes environmental sustainability, with a focus on reducing the carbon footprint of the city, protecting natural resources, and promoting ecological resilience. This involves investments in green infrastructure, such as renewable energy systems, green spaces, and sustainable

transportation, as well as policies and programs to encourage sustainable behavior among residents and businesses.

Overall, the goal of Viable Kalaya: Advancing Infrastructure, and Prosperity, is to create a resilient, livable, and sustainable urban environment that supports economic growth and prosperity for all residents, while safeguarding the planet for future generations.

5.1. Strategies

The strategies which are adopted in the scenario development of Kalaya urban center comprise of compact development, eco-tourism, environmental conservation, economic development, institutionalization, sustainable infrastructure and transportation.

The above-mentioned strategies provide a framework for scenario development, made by converging on the main key points of the vision, scenario statement and SWOT analysis of Kalaya urban center which help in identifying potential risks and opportunities, developing contingency plans, and improving the organization's ability to respond to changes in the future.

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

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

Environmental Conservation aims to protect and preserve the natural environment and its resources for the benefit of present and future generations The strategy of environmental conservation will resolve the issues of endangered biodiversity, climate change, depletion of natural resources, deforestation, absence of environmental

management plans and inadequate environmental monitoring and assessment, lack of greening strategy, fragile environmental state, deteriorating quality of air, water and land pollution, and lack of sustainable practices in environment sector of kalaya urban center.

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

Sustainable Infrastructure and Transportation aims to develop infrastructure and transportation systems that minimize negative impacts on the environment and promote sustainable economic growth. The strategy of sustainable infrastructure and transportation will resolve the issues of environmental degradation, climate change, public health, higher consumer costs, social equity, accessibility and mobility, lack of road infrastructure, education and awareness, dilapidated infrastructure, and inventory issues in the sectors of transportation, economy, housing, environment, water supply, sanitation, solid waste management, tourism, urban design and quality of life.

Institutionalization aims to establish a set of policies, procedures, and practices that ensure the long-term stability and sustainability of Kalaya urban center. This strategy will target the problems of institutional incapacity, frail governance, ineffective public services, limited economic growth, limited scalability, instability, inadequate service delivery, lack of policies, rules and regulations in the sectors of land use regulations, land management, governance and institutions, taxation and revenue.

Chapter 6. Proposed Master Plan of Kalaya

The progressive features of both sector and multi nuclei planning models are considered and undesirable outcomes have been avoided, however, there is an overall focusing on refining the existing multi-nuclei model already observed in Kalaya. The proposed Master Plan of Kalaya is provided in Map 13.

After observing trend of development along the main Kalaya Road and Orakzai Agency Road, the consultant has proposed future development to alleviate the pressure on the existing land uses. The areas beyond the main road are recommended to be reserved for future economic and development activities. Thus, proposed Kalaya Master Plan 2040 includes area along the main Kalaya Road to be proposed as an economic corridor.

The overall structure of the plan is in sectoral form, with the existing major road, serving as a main transportation corridor, with future development planned in clusters on either side of the road. Thus, this approach will unify and connect the existing scattered and clustered urban development, whilst duplicating this organic growth pattern. Furthermore, the intersection of this economic corridor/mixed use zone helps in forming different sectors. In 2022, the total area of Kalaya urban center is 53 sq. km out of which 5.87 sq. km is covered by a built-up area (including roads), serving a population of 20,011 persons with an average household size of 8.16. Keeping in view the city's population, existing urban form, economic activity and income class, the proposals are given below. Thus, the total extent of the proposed additional land use area, including livestock and dairy development, and green space proposals is 9.04 sq. km. for an estimated population of 31,930 by 2040. Furthermore, Kalaya urban center is not going to become densely populated during the planning horizon, clearly indicating that need of boundary extension is not required by 2040.

New residential town and infill development have been proposed to cater to the housing demands of Kalaya's increasing population. New housing is proposed along the main economic corridor looking at the ribbon development pattern, however, if planned in an organic form, the ribbon development can alleviate the pressures on the existing mushroom growth.

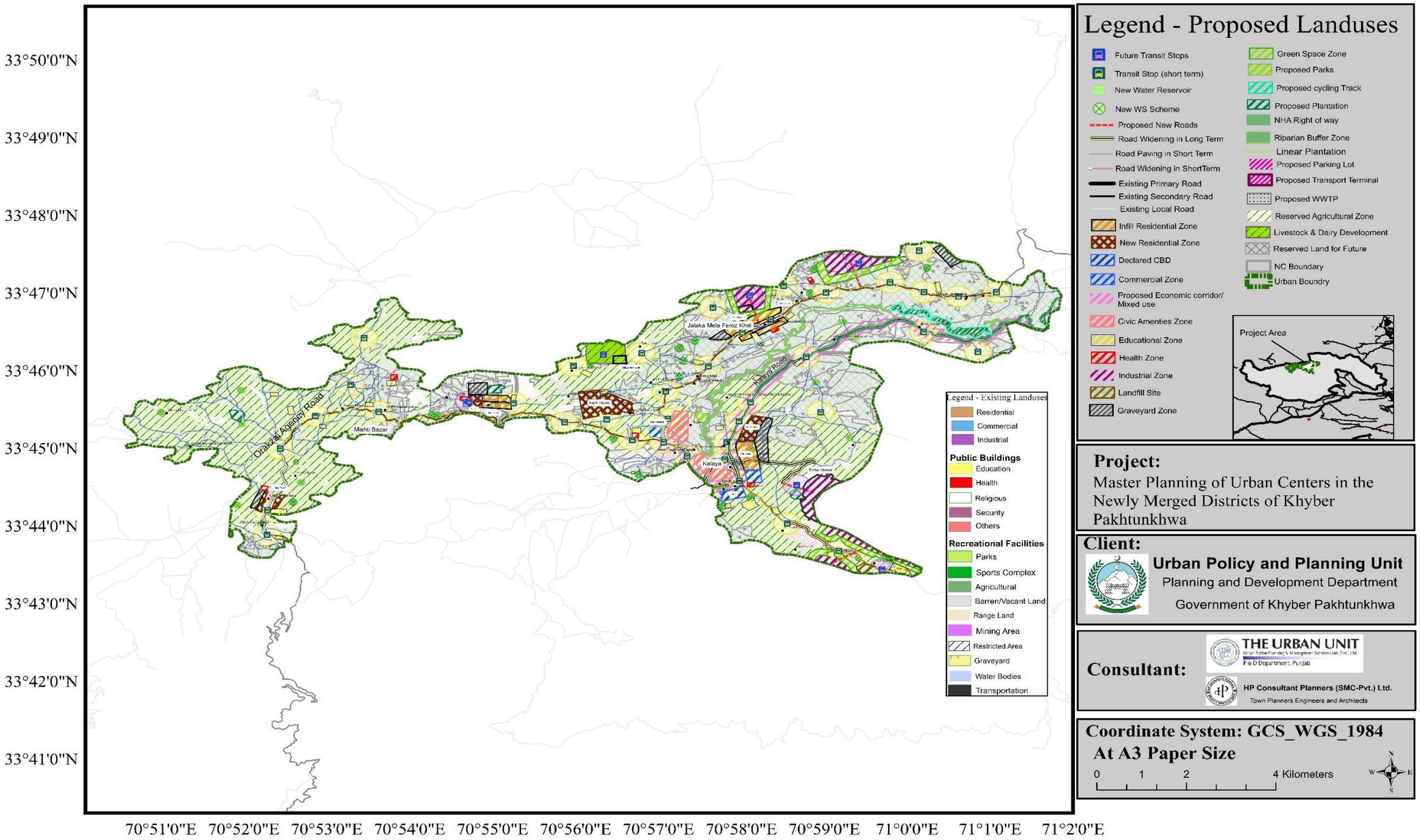
Table 6-1: Land Allocation for Proposed Land Uses in Kalaya City

Proposed Land Use (Recommended area is based on multiplying percentages with the total area which is 53.0 sq.km.)	NRM Standard (% for 25000-49000 population range)	Recommended Area – min (sq. km.)	Recommended Area – max (sq. km.)	Required (Recommended Area (min) – Existing Land Use) (Sq. km.)	Required (Recommended Area (max) – Existing Land Use) (sq.km)	Existing Land Use Area (sq. km.) (2021)	Proposed Area (sq. km.)
Residential Zone	26 to 50	13.78	26.50	10.52	23.24	3.26	**0.82**
Commercial Zone	0.5 to 3	0.27	1.59	0.09	1.41	0.18	**0.25**
Industry Zone	3 to 11	1.59	5.82	1.58	5.82	0.004	**1.59**
Civic Amenities (Institutional)	2 to 21	1.06	11.12	0.83	10.89	0.23	**0.43**
Economic Corridor/Mixed Use Zone							**1.25**
Graveyard	1 to 4	0.53	2.12	0.50	2.09	0.03	**0.50**
Reserved Agriculture	-	-	-	-	-	-	**18.74**
Livestock and Dairy Development Zone	-	-	-	-	-	-	**0.39**
Green Space (recreational open spaces)	0.5 to 2	0.26	1.06	0.24	1.04	0.02	**2.04**
Landfill	-	-	-	-	-	-	**0.05**
Reserved for future	-	-	-	-	-	-	**27.19**

Total available area for future development is 27.19 sq.km. The total proposed area is 9.04 sq. km which includes residential, commercial, mixed use/economic corridor, civic amenities, healthcare, education, livestock zone etc. Furthermore, around 18.0 sq. km area is allocated for the future permitted extension zone. 0.33 sq.km area is used for other amenities in residential zone

Adjacent agricultural land to contiguous build-up converts to other land uses, such as residential and commercial, because 100% of agricultural land cannot be maintained for use in agriculture due to future city expansion. However, by 2040, 18.74 square kilometers of agricultural land will be reserved as agriculture land. The proposed land uses do not include land reserved for agriculture and green space areas because these areas are protected and cannot be converted to other uses in the future. Green spaces are reserved as these spaces improve the livability of city as well as help to remove pollutants and improve air quality by absorbing harmful substances.

Kalaya Proposed Master Plan



Map 11: Proposed Master Plan of Kalaya

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

6.1. Residential Zone

One of the important features of the proposed master plan is the accommodation of all income housing groups with housing particularly suitable for respective income groups. The residential areas have been proposed keeping in mind the increasing population and housing needs of Kalaya.

Major proposals for the housing sector include the guidelines for residential development, proposals for infill housing, and new housing. These proposals are developed, keeping in mind the strategies mentioned above such as institutionalization, compact development, and sustainable infrastructure. As a result, structurally safe, economical, and sustainable housing will be provided in Kalaya, ultimately improving the quality of life by 2040.

The institutionalization strategy focuses on the guidelines for future residential development, including permitted, permissible, and prohibited uses to control urban sprawl and haphazard development. Effective regulation can lead to more efficient and effective delivery of better housing standards. The compact development strategy focuses on the infill and new housing spatially distributed in Kalaya in a suitable manner. conducted by the consultants in 2022 shows a household size of 8.15 in Kalaya.

In 2017, a population of 17,575 resided in 2,122 housing units in Kalaya. The projected population for 2022 shows an increase of 2,436 people in 5 year, making the total population to be of 20,011 people.

In order to estimate the current and future housing backlog, the urban area's existing and projected population, existing and projected housing supply, and replacement demand (katcha and dilapidated) can be utilized. Using Census data for this approach, the consultant estimated that there was a backlog (i.e., gap between demand and supply of housing) of 144 housing units in 2017, excluding the replacement demand (dilapidated and overcrowded units). However, the consultant has also estimated the current backlog and replacement demand for housing units for 2022, using data on housing supply from the land use survey, rather than the Census, as it is a more recent source of information. The total housing supply in Kalaya, as per the land use survey,

is 4041 units in 2021 and is estimated to increase to 4,214 units by 2022. This is quite a large increase in housing supply in a period of 5 years, and whilst there may be some discrepancy due to the different data sources i.e., land use survey and Census – this increase in housing supply can be substantiated with an analysis of the overall urban expansion and growth in built up area, particularly in residential areas. In the *Background Study* report, the consultant found that between 2016 and 2021, the residential area in Kalaya increased by 35.24%. As a result, we can see that housing supply has been increasing steadily, and will continue to do so, if the current growth trajectory persists.

However, while Kalaya is not projected to face a large housing backlog due to the steady housing supply, there is a large replacement demand in terms of dilapidated and overcrowded units, that need to be replaced and alleviated with new housing stock. The current housing stock, in 2021, has 76.7% katcha units and 17.8 % semi-pacca units. Thus, even though overall housing supply is increasing, the new additions to the housing stock are mostly in the form of katcha and semi pacca – that is, substandard housing units. Furthermore, overcrowding is also prevalent due to a large average household size. Thus, the consultant has calculated the total housing shortage for the years 2022, and 2040, shown below, which also includes the replacement demand (overcrowding and dilapidated units).

Table 6-2: Housing Shortage 2022, Kalaya

Year	Projected Population	Projected Household Size	Projected Housing Demand 2022	Projected Housing Supply	Backlog	Overcrowding + Dilapidated	Total Shortage 2022
2022	20,011	8.15	2,445	4,214	(1,758)	4054	2,296

Source: Calculated by Urban Unit and HP Consultants

Table 6-3: Housing Shortage 2040, Kalaya

Year	Projected Population	Projected Household Size	Projected Housing	Housing Supply	Backlog	Over crowding +	Total Shortage 2040

			Demand 2040			Dilapidated	
2040	31,930	8.11	3,936	8,996	(5,059)	8,656	3,596

Source: Calculated by Urban Unit and HP Consultants

The residential areas have been proposed keeping in mind the increasing population and need for housing for Kalaya. The housing demand of Kalaya urban center for the plan period of 20 years can be fulfilled through the compact development strategy which will eventually provide more efficient land use, increase density, reduce carbon footprint, and affordability in the housing sector.

Table 6-4: Residential Zone Requirements

Existing area (sq. km.)	3.26
Existing area (in %)	6.15%
Household size (Census, 2017)	8.16
Household size (Land Use Survey, 2021)	8.15
Household size rate of change	-0.03%
Estimated Household size, 2022	8.15
Existing number of houses (Land Use Survey, 2021)	4,040
Recommended NRM standard	26%-50%
Recommended residential area – min (sq. km.)	13.78
Recommended residential area – max (sq. km.)	26.50
Gap (Recommended (min) – Existing Land Use)	10.52
Gap (Recommended (max) – Existing Land Use)	23.24
Proposed area 2040 (sq. km.)	0.82
Estimated Household size, 2040	8.11
Proposed new housing units	3,936

Source: Recommended by Urban Unit and HP Consultants

The existing area for residential use is 3.26 sq. km. with a household size of 8.15 (land use survey, 2021) and 4,040 existing housing units. The proposed area required for 2040 is 0.82 sq. km. with an estimated household size of 8.11 and the proposed new housing units are 3,936. Additional 0.33 sq.km area is reserved for the other amenities

such as infrastructure, green spaces etc. in the residential zones. The projected household size for Kalaya is lower than the national household size for KP because the household size rate of change, observed in the previous two Census reports is in negative depicting a declining trend.

The residential zones are proposed to be further categorized into new towns and infill development to cater to the housing demand of Kalaya City. The two zones have been further divided into the following categories:

Table 6-5: Categories in Proposed Residential Zone

Land Use Class	Categories
Residential Zone	Infill Zone
	New Towns

Source: Urban Unit and HP Consultants

Both the land use zones have been further categorized into low, middle- and high-income zones according to the existing income classes in the project area. The details of the income group classification and calculations of marla-wise housing units are depicted in the section below:

6.1.1. Income Group Classification

Income Groups are often categorized with reference to their financial standing in a country. They are generally categorized in lower, middle or upper strata/class depending on their housing conditions, lifestyle and net worth. The minimum wage has been revised in Khyber Pakhtunkhwa, Pakistan with effect from 01 July 2022. The minimum wage has increased from PKR 21,000 to PKR 25,000 per month for unskilled workers.[1]

According to the HIS survey conducted in Kalaya, 72% of the population in Kalaya is categorized as low income, 22% of the population is middle-income class and 6% of the population belongs to high income class.

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

Percentage of Household Income Groups

Monthly earning = Below Rs. 10,000	Monthly earning = Rs. 10,001 - Rs. 20,000	Monthly earning = Rs. 20,001 - Rs. 30,000	Monthly earning = Rs. 30,001 - Rs. 40,000	Monthly earning = Rs. 40,001 - Rs. 50,000	Monthly earning = Rs. 50,001 - Rs. 100,000	Monthly earning = Rs. 100,001 & above
8.6%	41.3%	22.6%	15.1%	6.5%	4.8%	1.2%

The following table shows the different income group percentages based on the monthly income starting from monthly income below Rs. 10,000 to Rs 100,001 and above. The study shows that 8.6% of household income in Kalaya is below Rs. 10,000, 41.3% of the households are earning between Rs 10,001 to 20,000, 22.6 % of households earn between Rs 20,001 to 30,000, 15.1 % household income is between Rs 30,001 to 40,000, 6.5 % earns between Rs 40,001 to 50,000, while 4.8 % population is earning between Rs 50,001 to 100,000 and just 1.2% households are earning Rs 100,001 and above.

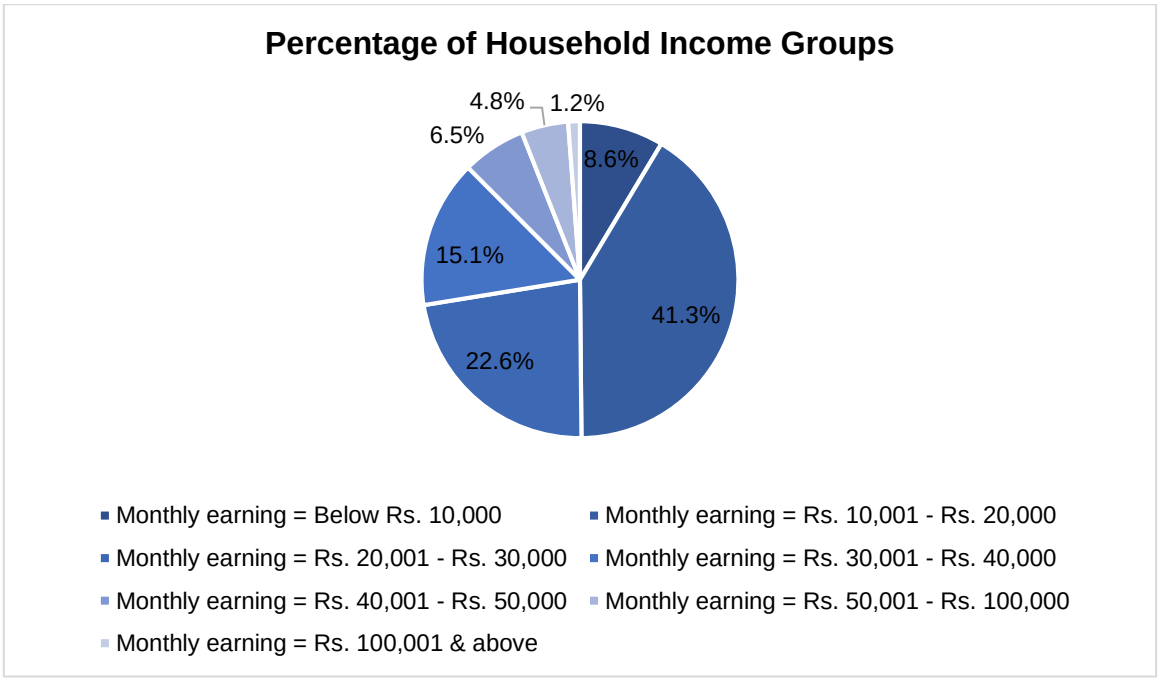


Figure 6-1: Household Income Calculated by HIS Survey

The consultants have used the HIS data for Monthly HH income to segregate the different income levels into low, medium, and high-income classes with housing units to be provided in each income group in Kalaya, in the table below:

Table 6-7: Housing Units for Each Income Group

Income Groups	Population (%)	Housing Units (2017)	Housing Units (2022)	Housing Units (2040)
Low Income HH	72%	1,592	1,768	2,834
Middle Income HH	22%	486	540	866
High Income HH	6%	133	147	236
Total	**100%**	**2,211**	**2,455**	**3,936**

Source: Calculated by Urban Unit and HP Consultants

Similarly, the consultants have further proposed segregation in the percentages for each income wise class to marla-wise housing units required for each income group.

Marla Wise Percentage for Each Income Group

Table 6-8: Housing Unit Size (Marla Wise) for Each Income Group (%)

Size category	Income class (%)	Income Groups
Up to 9 Marla Units	72%	Low-Income Group
9.1-17 Marla Units	22%	Middle-Income Group
17.1-30 Marla Units	6%	High-Income Group
Total	**100%**	

Source: Calculated by Urban Unit and HP Consultants

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

- Low Income class: Up to 9 Marla Units
- Middle Income class: 9.1 - 17 Marla Units
- High Income class: 17.1 - 30 Marla Units

The percentage allocated for each housing unit is given below:

Table 6-9: Housing Units Required by 2040 in Kalaya

Income Group Class	Size category	Percentage	Housing units required in 2040	Area in Marla	Area in sq. km.
Low Income Group	Up to 9 Marla	72%	2,834	14,957	0.38
Middle Income Group	9.1-17 Marla	22%	866	11,769	0.30
High Income Group	17.1-20 Marla	6%	236	5,510	0.13
Grand Total		**100%**	**3,936**	**32,236**	**0.81**

Source: Calculated by Urban Unit and HP Consultants

These percentages have been calculated from the existing percentage of the household income groups and projected on the total housing units i.e., 72% of the 3,936 to acquire up to 9 marla-wise housing units required in the year 2040 for low-income group.

Additionally, the consultants have consulted KP Urban Policy, 2023 to use densities for future residential development. However, according to the policy, the Kalaya urban area resides in the southern zone of KP and the density targets for private housing schemes in the North and South zones shall be prescribed by LGE and RDD.

6.1.2. Rationale for Proposed Infill Development in Kalaya

The rationale behind proposing the infill development in Kalaya is detailed out in Section 3.3.3., however, further explanation is given in this section.

The Infill development is one of the most sustainable approaches towards meeting the development needs of an established urban area. It caters to the challenges of urban sprawl, inner city deterioration, construction pollution and works on the principles of

urban recycling, compact development, and optimum use of trunk infrastructure. Infill development is proposed as per its principles is proposed around the city core. In case of Kalaya, infill development is proposed along the major roads – namely, the Orakzai Agency road and Kalaya Road, that run horizontally through the center of Kalaya. This ensures proximity to the civic services and amenities and providing mobility and access at the same time. Major Roads also emerge in the area providing transportation connectivity. Infill development in terms of brown field development is proposed so that not only vacant lots are utilized but also the infrastructure is salvaged.

The total area that can be categorized under vacant or barren plots in Kalaya is 0.2.1 sq. km. The consultants have proposed approximately 0.56 sq. km. to be used under infill zone, and whilst this comprises some currently vacant land parcels, it also includes the conversion of agricultural lands into infill development. In particular, agricultural lands, whose surroundings are already largely converted into built up area, are proposed for residential development, given that Kalaya is in a nascent stage of urbanization and some level of land use conversion will be necessary to accommodate its growth potential.

6.1.3. Rationale for Proposed Residential Development in Kalaya

Consultants have used various parameters to identify zones of residential development in Kalaya, keeping in view the compatibility of different land use parcels. These parameters are discussed below in detail.

- **Proximity to Existing Residential Area**

The proximity to established residential land offers numerous advantages for infill zones and new residential areas. It fosters the concept of community living, encouraging social interaction and community integration by incorporating a mix of housing types, including affordable housing options. This approach also supports the idea of residential infill development.

- **Proximity to Primary Roads**

Residential development often follows major transportation arteries because of precedence of ribbon development. However, consultants recommend prioritizing infill development in such areas. In addition, these areas offer high visibility and accessibility, making them attractive for mixed use development. The consultants recommend the areas proximal to existing residential development and proposed infill

development, as new residential zones as these expansion of residential development will naturally occur in these areas.

- **Proximity to Secondary Roads**

Proximity to secondary roads can be important for residential area development for several reasons. Secondary roads are at times more accessible to people living farther from the main arteries. They have less congestion compared to the major arteries increasing accessibility. Secondary roads are often located in established neighborhoods, providing better accessibility to people living in the area.

- **Proximity to Existing Commercial Land**

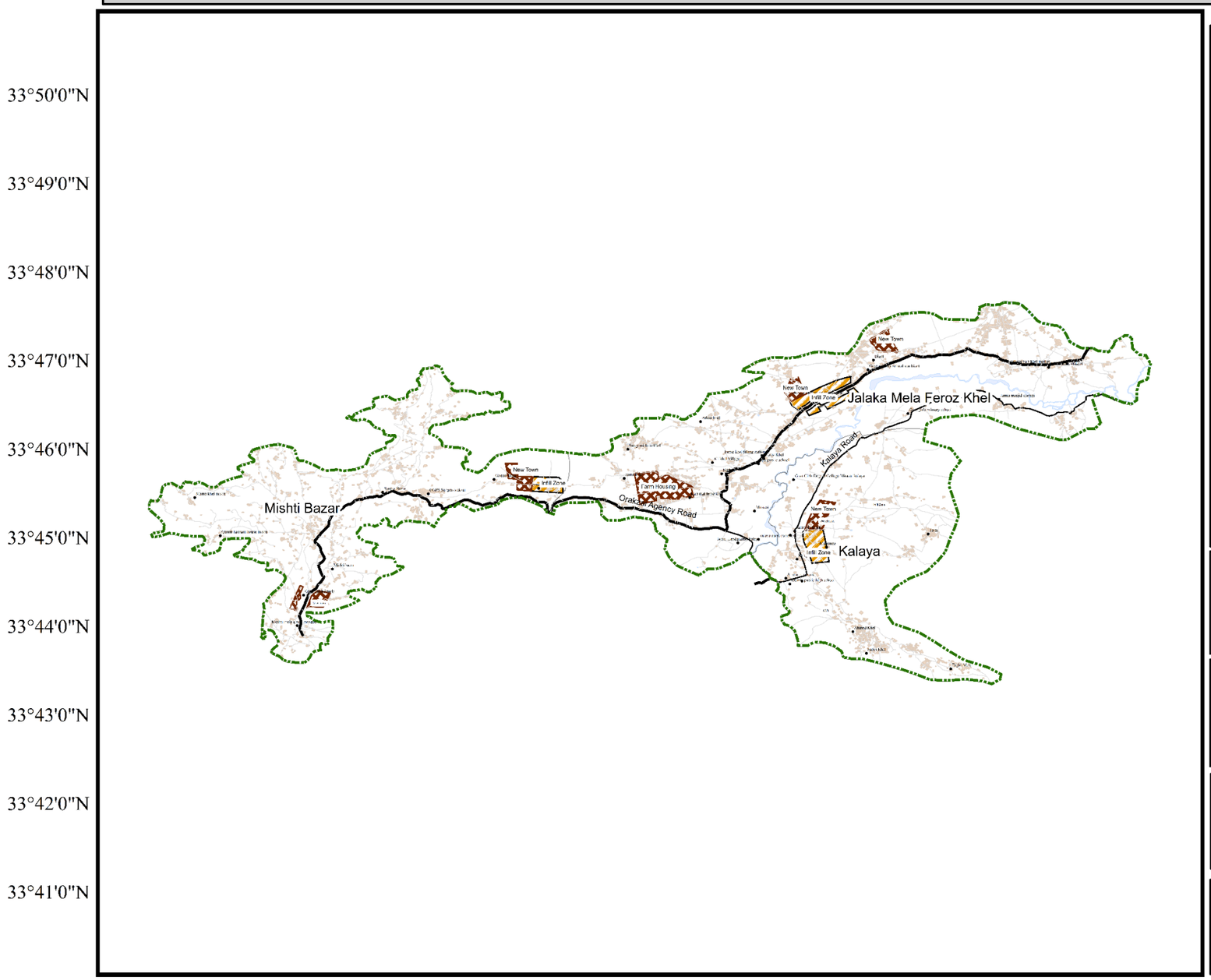
Proximity to existing commercial land can provide new residential areas with a number of advantages, including reduced daily commuting and accessibility to basic services and public amenities.

- **Lands Proximal to Industrial Areas**

Proximity to industrial areas can play a diversifying role in new residential zones. The main idea behind proposing residential new towns near to industrial area is for low cost housing. The consultants recommend providing new towns on lands proximal to industrial areas to provide ease in daily commuting for the lower income class. These zones will have higher percentages of low-income plots to accommodate more population under category of lower income level.

Additionally, being located near industrial areas will provide the industries a large pool of skilled labor and provide more job opportunities to the local community.

Kalaya Proposed Residential Zones



Legend - Proposed Landuses

- Existing Primary Road
- Existing Secondary Road
- Existing Local Roads
- Infill Residential Zone
- New Residential Zone
- Existing Residential
- Water Body
- NC Boundary
- Urban Boundary

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

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size
0 1 2 4 Kilometers

Map 12: Proposed Residential Landuse in Kalaya

6.1.4. Planning Standards for Residential Development

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

Table 6-10: Planning Standards for Private Housing Schemes

SR	Land Use	Category D (up to 50 kanal)	Category C (50-100 kanal)	Category B (100-200 kanal)	Category A (200-500 kanal)	Mega Housing Scheme (above 500 kanal)
1.	**Open Spaces**	-	Min 05%	Min 07%	Min 07%	07% or above
2.	**Graveyard**	-	-	Min 02%	Min 02%	Min 02%
3.	**Commercial**	-	Max 01%	Max 05%	Max 05%	Max 10%
4.	**Public Buildings**	-	Min 02%	02% to 10%	03% to 10%	04% to 10%
5.	**Size of Residential Plot**	Max 01 kanal	Max 02 kanal	Max 02 kanal	Max 02 kanal	Max 02 kanal
6.	**Internal Roads**	25 ft Min	25 ft Min	Min 30 ft	Min 30 ft	Min 30 ft
7.	**Site for Solid Waste**	-	Min 05 marla	Min 10 marla	Min 01 kanal for 200 kanal and 10 marla for each additional 100 kanal up to 500 kanal	Min 04 kanal for 500 kanal and 02 kanal for each additional 500 kanal
8.	**Grid Station Exclusive of Public Buildings**	-	-	As per requirements of concerned dept./Agency	As per requirements of concerned dept./Agency	As per requirements of concerned dept./Agency
9.	**Major Roads**	Min 40 ft	Min 40 ft	Min 60 ft	Min 100 ft	Min 150 ft
10.	**Service Area / Scheme Office**		Min 05 marla	Min 10 marla	Min 10 marla	Min 01 kanal
11.	**Low Cost Housing**	-	-	-	Min 5%	Min 5%

It is recommended to implement these private housing scheme rules in Kalaya in order to prevent mushroom and unplanned growth of residential areas. These can be slightly amended given the area of land parcels proposed for residential land uses. As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detailed planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggested development guidelines specific to the study area.

Table 6-11: Residential Area Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Detached/semi-detached dwellings, **Mosques,** **Primary/high schools,** **Clinics/dispensaries,** **Social/cultural institutions,** **Local shopping areas/retail shops,** **Offices of professionals with adequate parking facilities,** **Parks and playgrounds,** **Apartment buildings,** **Graveyard or place of burial, horticultural nursery,** **Urban farm,** **Old age home or orphanage,** **Urban forest,** **Guest houses offices of TMAs/other tiers of local Govt.**	Commercial offices and service, Shops of local character, Raising of poultry for non-commercial purposes, Day-care centre, Pre-schools, Rehabilitation centres for disabled, Primary and junior schools, Petrol pump, Gas filling station, Taxi/rickshaw stand.	Heavy, large and extensive industries: noxious, obnoxious and hazardous industries, Warehousing, storage go-downs of perishables, hazardous, inflammable goods, Workshops for buses, Slaughter-housing, wholesale mandis, Sewage treatment plant/disposal work, Water treatment plant, Solid waste dumping yards, Outdoor games stadium, Indoor games stadium, shooting range, Zoological garden, botanical garden, Bird sanctuary, Picnic hut, International conference centre,

		Sports training centre, reformatory and all uses not specifically permitted or permissible

Source: Recommended by Urban Unit and HP Consultants

6.2. Commercial Zone

This section focuses on the commercial activities being proposed within Kalaya.

6.2.1. Commercial Area Growth, Gaps and Regulations

The National Reference Manual on Planning and Infrastructure Standards (NRM) defines the land use proportions of towns centers in existing and new towns according to the international best practices and viability of sustainable development in future. Using the guidelines given in the NRM standards, the current commercial area gap has been calculated below:

Table 6-12: Commercial Zone Requirements

Existing area (in sq. km.)	0.18
Existing area (in %)	0.34%
NRM Standards	0.5%-3%
Recommended commercial area – min (sq. km)	0.27
Recommended commercial area – max (sq. km)	1.59
Gap (Recommended (min) – Existing Land Use)	0.09
Gap (Recommended (max) – Existing Land Use)	1.41
Proposed area 2040 (in sq.km.)	0.25

Source: Recommended by Urban Unit and HP Consultants

As per the land use survey (2022), currently there are 44.47 acres of commercial land, accounting to 0.34 percent of the total land use as shown in the table above. Kalaya currently has a very low population growth because of the security in the area, thus the commercial area growth has been sporadic. The main bazaars in the region are in the Mishti Bazaar and Jalaka Mela Feroze Khel, and major commercial activities include clothing, and general store to name a few. However, given that residential

areas have expanded rapidly in recent years, it is expected that Kalaya will need more commercial activity to cater to its population.

There is, however, a need to regulate commercial areas, by providing appropriate parking, loading/unloading facilities and better infrastructure and utility services at the commercial areas in Kalaya.

6.2.2. Mixed Use Development/Economic Corridor

Economic corridors/ Mixed-use development is a new form of urban development that can increase the economic growth of area. It provides various benefits, such as cost saving infrastructure, increased tax revenue, property value, tax collections, and promotes tourism etc. it also strengthens infrastructure construction by establishing industrial clusters, thereby attracting investment, and developing regional economy. Thus, mixed-use zone i.e., an economic corridor, having an area of 2.0 sq. km is suggested on both sides of the main Kalaya Road.

The economic corridor in Kalaya has been proposed based on the following parameter:

Strategic Location of Kalaya

Kalaya is located at strategic location, in close proximity to important cities that are commercial and economic hubs in the region, including Kohat, Hangu, and Peshawar. It is also relatively close to the border to Afghanistan and existing trade routes heading from Pakistan to Peshawar. This geographical location invites regional network integration, which can be boosted through an economic corridor. Pertinently, this location can prove to be a suitable route for trade entailing the exchange of goods and services in the region. Ultimately, this will support the business ventures in Kalaya and subsequently, will lead to enhancing people's well-being, promoting domestic peace, and improving regional economy.

Corridor Along main Kalaya Road

Economic Corridor has been proposed along the main Kalaya Road which will give a passageway to the CBD and urban core of the city. Economic development often

follows major transportation arteries because these areas offer high visibility and accessibility, making them attractive to businesses and consumers.

6.2.3. Strategy to Cope with Haphazard Commercialization

Haphazard commercialization results in acute parking problems, traffic congestion and adverse environmental impacts in the historical core & neighboring residential areas around commercial activities. Thus, there is a dire need for formulation of a coherent strategy capable of meeting the demand for commercial uses without affecting the environmental quality of residential areas. In addition to this, commercialization must ensure that no unplanned commercial areas are encouraged to emerge and flourish. For effective implementation, this in turn will require strengthening of planning agencies in terms of trained staff and resources.

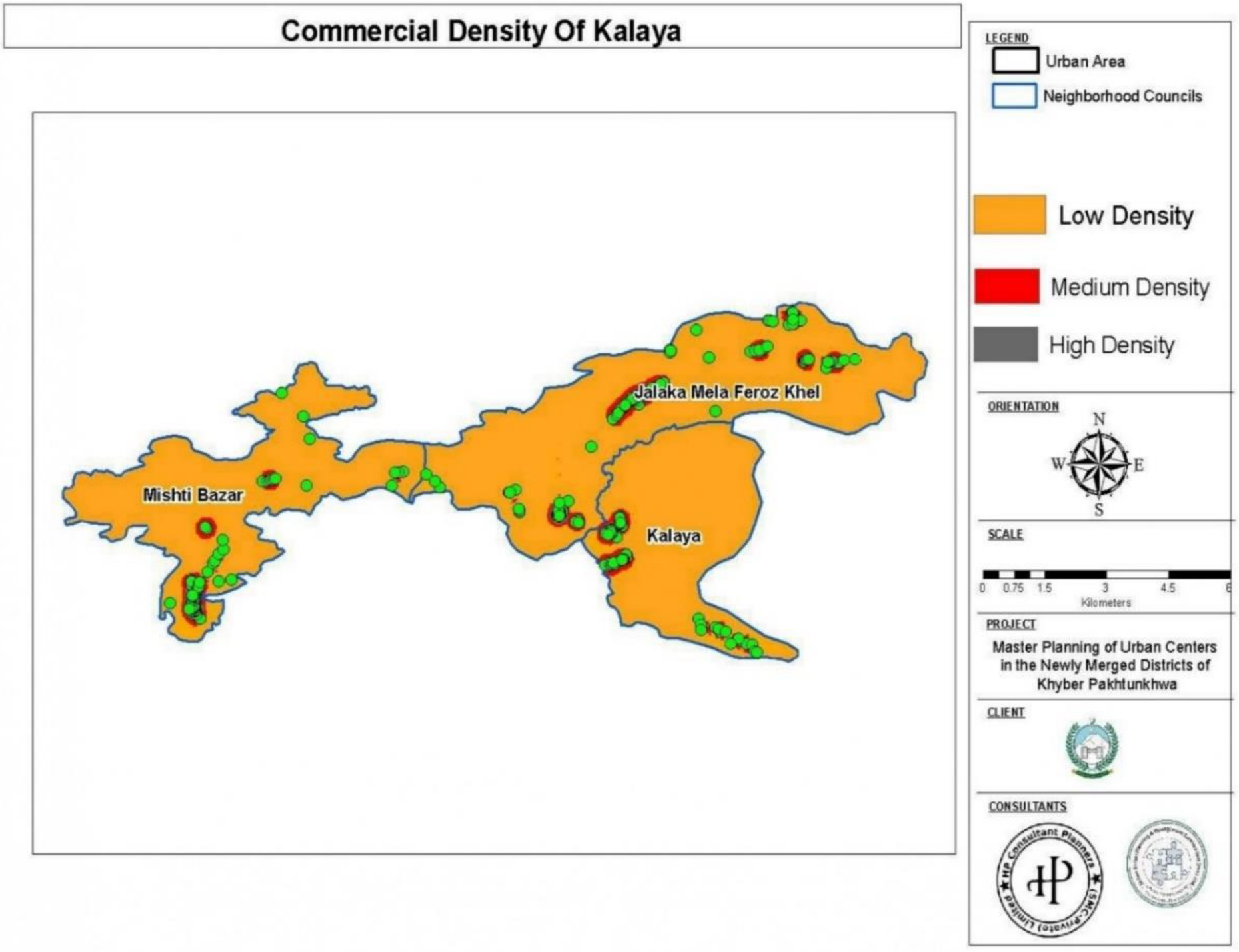
Further commercialization along roads declared for this purpose should only be allowed if proponents meet the necessary parking demands and the provisions to manage the increased traffic load. The detailed criterion for declaring roads is further detailed in Section 6.2.5

6.2.4. City Strategy - Safe and Sustainable Trade Centre

Historically, the newly merged areas of Orakzai district, particularly Kalaya has been neglected in terms of investment in growth and development. However, the merger in 2018, presents opportunities for the provincial government and its line departments to support the commercial activities of Kalaya and develop town-specific interventions (town-centre) for each of neighbourhood.

The Kalaya TC have the highest density and have seen the highest growth over the last decade. [7] The commercial density map below shows us that these are the areas with the highest commercial density as well, where commercial area has grown alongside thoroughfares.

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



Map 13: Commercial Density of Kalaya

For commercial development of the area, infrastructural facilities and utility delivery are of the utmost importance. One of the major issues due to which Kalaya is under-developed is the lack of electricity. The area has 23 hours of load shedding and have 1 hour of electricity due to which the population lags in development, and there is outward migration. Similarly, other utility services are absent, such as streetlights, parking lots, gas supply or sewage.

Thus, to go forward with the commercial development in Kalaya, it is important that following strategies are followed.

Table 6-13: Proposed Town Specific Commercial Development Strategies Kalaya

Strategies	Town
Will function as sub commercial areas to share the burden of Main Bazaar in Kalaya in terms of retail commercial activities while servicing nearby commercial facilities.	Jalaka Feroze Khel, Mishti Bazaar
Developing public transport infrastructure, while making public spaces walkable to reduce reliance on private vehicles.	In all major arteries leading to Kalaya TC
Implementing strict regulations and rules for sustainable commercial development, while creating awareness and support environment to ensure such practices	Commercial Areas of all NC
Setting the direction of new commercial area growth in line with that of residential growth	In all commercial areas
Conducting regular traffic studies and implementing traffic management measures to prevent congestion and improve safety in commercial areas.	Major Kalaya Bazaars
Tax Schemes to incentivize establishment of new commercial areas in the study area	CBD Kalaya
Incentivizing vertical building design, especially in high density areas	Kalaya Bazaars

Some other strategies, and practices that must be adopted to allow for sustainable commercial development at all areas are:

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

6.2.5. Criteria for Declaring Roads as Commercial

Commercial activity in a city or town, just like any other land-use such as residential, industrial, or institutional, needs to be regulated. Roads instead of being channels of movement become congested and undue load is put on infrastructure which is not designed to handle such activity. A holistic view of the city should be taken instead of only considering the concerned road in isolation

There are currently no defined rules or regulations that specify the criteria or framework for how a local government can declare a road as commercial in the Khyber Pakhtunkhwa (KP) province. This lack of clear guidance can give an opportunity to the local government of Kalaya to effectively regulate and manage commercial development in the city. To address this issue, it is recommended that the local

government of Kalaya develop its own tailored criteria and framework for declaring roads as commercial. This can be done by considering the unique needs and challenges of the city, as well as best practices and international standards for urban planning.

Once the criteria and framework have been developed, the local government can implement them to effectively regulate commercial development and prevent haphazard growth. Over time, the criteria and framework can be reviewed and improved to ensure that they continue to support sustainable and planned commercial growth in Kalaya.

To declare a road as commercial, the government may follow the below actions:

- Conduct a thorough analysis of the road's position in the city's road network, linkages served, and traffic situation. This will help determine the road's potential as a commercial area.
- Evaluate the existing and adjacent land-uses, as well as the proximity, condition, and potential of commercial centers in the area. This will help identify any potential conflicts or opportunities for commercial development.
- Examine the frequency and percentage of existing converted commercial properties on the road, as well as the availability of vacant undeveloped land in proximity to the road. This will help determine the potential demand for commercial development in the area.
- Consult with local businesses and community organizations to gather input and feedback on the potential for commercial development on the road.
- Based on the analysis and feedback, develop a plan for commercial development on the road that incorporates the guiding principles of encouraging capital investment and proper economic growth, while also addressing any potential issues or concerns.
- Implement regulations and standards for commercial development on the road, including requirements for parking, loading/unloading facilities, and building design.
- Provide support and incentives for businesses to locate in the commercial area, such as tax breaks and grants for building improvements.

- Monitor and evaluate the commercial development on the road regularly to ensure compliance with regulations and address any issues or concerns.

Overall, the process of declaring a road as commercial should be carefully planned and implemented in order to maximize the benefits of commercial development while minimizing any negative impacts on the surrounding area.

6.2.6. Rationale for Future Commercial Development in Kalaya

The best approach to planning future commercial spaces in Kalaya would be to use a combination of tools and methods, that consider a wider range of factors, such as accessibility, proximity to transportation networks and other amenities, and potential impact on the environment and residential areas. This can help identify potential locations for future commercial development and can provide a more comprehensive and holistic view of the city. Some of these parameters chosen by consultant, to suitability of different land use parcels are discussed in detail below.

- **Proximity to Primary Roads**

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

- **Proximity to Secondary Roads**

Proximity to secondary roads can be important for commercial area development for several reasons. Secondary roads are at times more accessible to people living farther from the main arteries. They have less congestion compared to the major arteries increasing accessibility and are more affordable for small business development as the land is cheaper. Secondary roads are often located in established neighborhoods, providing businesses with the opportunity to tap into existing communities and local customer bases.

- **Proximity to Existing Commercial Land**

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

- **Lands proximal to industrial areas**

Proximity to industrial areas can play a significant role in commercial area development by providing businesses with several key advantages. Being located near industrial areas can give businesses access to goods and services, a large pool of skilled labor, and major transportation arteries. Additionally, the presence of industrial activities in the area can generate increased demand for goods and services, creating synergies between commercial and industrial activities.

- **Lands proximal to residential areas**

Proximity to residential areas is crucial for commercial area development as it offers access to a customer base and supports local economic growth. Nearby residential areas provide a steady flow of customers, as well as opportunities for businesses to cater to local needs. Additionally, proximity can lead to the creation of walkable communities with easy access to goods, services, and employment.

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

Proximity to transit points is crucial for commercial area development, as it offers businesses access to a larger customer base and improved transportation options. Being located near transit points such as train or bus stations can provide easy access for customers and employees, helping to increase foot traffic and drive business growth. Additionally, transit-oriented development can encourage the creation of compact, walkable communities that support sustainable transportation and reduce dependence on personal vehicles.

- **Lands proximal to existing municipal infrastructure services**

Proximity to municipal services is important for commercial area development, as it provides businesses with access to essential infrastructure and services that support their operations. Being located near municipal services such as water and sewer systems, waste management facilities, and emergency services can help reduce costs and improve operational efficiency. Additionally, proximity to municipal services can also provide businesses with access to local government resources and support, helping to facilitate growth and development.

6.2.7. Future Development Plans and Key Actions

Future planning is the process of determining a vision for the future and creating a detailed strategy for achieving that vision. It involves identifying key goals and

objectives, developing strategies and action plans, and allocating resources to support the implementation of those plans.

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

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

In the medium term, the focus should be on promoting sustainable and planned commercial development in Kalaya. This can include encouraging the use of environmentally friendly technologies and practices in commercial development, promoting mixed-use development to integrate commercial and residential areas, and investing in public transport infrastructure to reduce reliance on private vehicles. Regular assessments and evaluations of commercial development should be conducted to ensure compliance with regulations and address any issues.

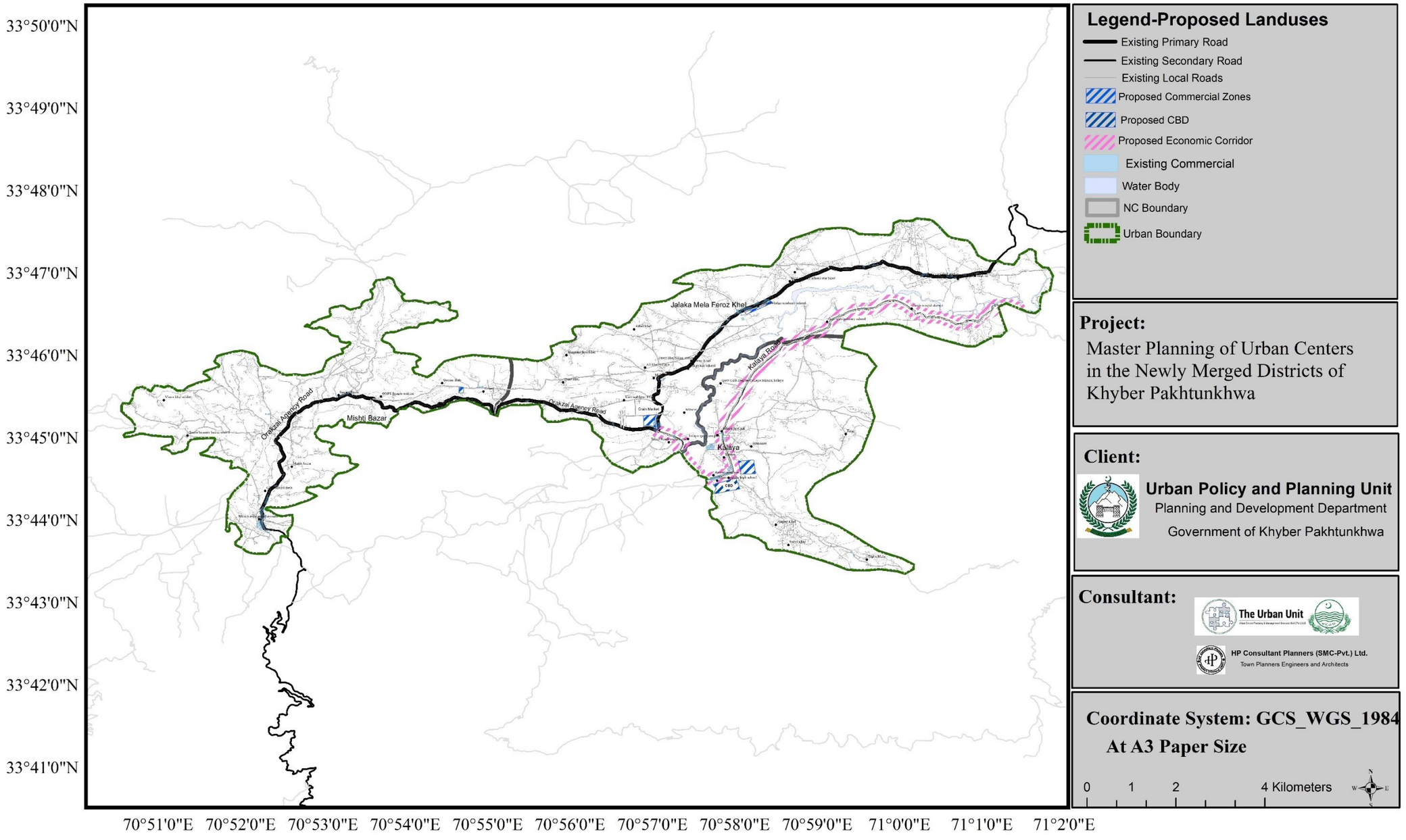
In the long term, the goal should be to create a sustainable and vibrant commercial environment in Kalaya. This can include implementing a comprehensive zoning plan that clearly defines and separates commercial, residential, and industrial areas, and promoting the growth and development of commercial centers in Kalaya. Investments in infrastructure, such as roads and public transportation, should be prioritized to support the growth of the commercial sector. Regular assessments and evaluations should continue to be conducted to ensure that the city's commercial development is meeting the needs of the community and supporting economic growth.

Major proposals for the commercial sector include the guidelines for commercial development, proposals for economic corridor (Kalaya-Sherazi Road from the East, leading to Kalaya Bazaar is declared as an economic corridor), urban area

development authority, and delineation of neighborhood commercial centers. These proposals are given keeping in view the strategies mentioned above such as institutionalization, economic development, and sustainable infrastructure.

The map below depicts the proposed commercial areas of Kalaya:

Kalaya Proposed Commercial Zones



Map 14: Proposed Commercial Land use in Kalaya

Keeping in line with the suitability analysis for the future development and the existing organic growth of the commercial area in the study area over time.

6.2.8. Short Term Plan (2020-2025)

- **Kalaya Road to be declared an Economic Corridor**

Keeping in view the existing trend observed in Kalaya, where the commercial development organically happens around the major commercial arteries, the major Kalaya Road should be declared as an economic corridor. Being located near major arterial roads such as Kalaya Road can help increase exposure and drive more customers to businesses. Additionally, proximity to primary roads can improve access for customers and employees, making it easier to reach businesses and reducing travel times. Improved access can also attract businesses and investment to the area, supporting economic growth and development.

- **Urban Area Development Authority**

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

6.2.9. Medium- and Long-Term Plan (2025-2040)

- **Delineation of Neighborhood Commercial Centers**

Historically, the core of commercial activity in Kalaya urban areas had been Kalaya bazar, Feroz khel bazar and Mishti mela bazar. These areas not only had the infrastructure support but was also encompassed by surrounding localities which had a larger share in population. Therefore, the existing commercial settlements of Kalaya, Mishti and Feroz Khel are delineated as Neighborhood Commercial Centers. This is in line with the organic commercial growth in the region.

- **Section of Kalaya bazar be declared commercial.**

The extension of already existing Kalaya Bazaar works to play a crucial role as a forward linkage for the proposed industrial area located to its east. This market serves as a hub for the exchange of goods and services between the industrial area and the surrounding communities, providing a vital link in the economic chain. By serving as a bridge between the industries and the local population, Kalaya Bazaar promotes sustainable economic growth and development for the region.

- **Section of Feroz Khel bazar be declared commercial.**

Feroz Khel Bazaar serves as an important commercial hub for the nearby industrial area and is conveniently located adjacent to a major artery, Orakzai Agency Road. This strategic location enables easy access for both industrial and residential customers, making the bazaar a hub for the exchange of goods and services in the region. By connecting the industrial area with the surrounding communities, Feroz Khel Bazaar supports the economic growth of the region and plays a crucial role in the local economy.

- **Section of Mishti bazar be declared commercial.**

Mishti Bazaar is also an organically market in the region, having been recently extended to meet the growing needs of the community. This bazaar has organically grown over time to become a hub for the exchange of goods and services, reflecting the needs and demands of the local population. To accommodate the growing needs of the community overtime, the consultant has proposed a buffer commercial zone, well-positioned to continue serving the region for many years to come. The organic growth of this bazaar is a testament to its importance to the local economy, proposing its extension ensures its continued relevance over the next two decades.

6.2.10. Planning Standards for Commercial Development

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detailed planning standards or development guidelines needs to be defined. Therefore, consultant has

reviewed the national and international case studies and suggest development guidelines specific to the study area. The guidelines for commercial areas are detailed below:

Table 6-14: Commercial Zone Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
1. **Commercial buildings** 2. **Large markets, departmental stores and outlets** 3. **Large public squares and parks** 4. **Bakery or confectionary;** 5. **Clinic or polyclinic;** 6. **Courier service or logistics office;** 7. **Private telephone exchange or cable operation or mobile franchise offices** 8. **Park, memorial and monument;** 9. **Hotel or motel** 10. **Car showroom;** 11. **Boutique or garment outlets or beauty parlor;** 12. **Restaurant;** 13. **Social welfare institutions such as**	1. Pedestrian friendly streetscape 2. Mixed- use buildings 3. Technical and vocational institution 4. Seasonal commercial fare site; 5. Stadium; amusement park / play land 6. Bus terminal 7. Fuel Stations 8. Wholesale market; 9. Second hand goods market; 10. Coal, wood or timber yard	1. Dwellings except those of service apartment, essential operational, watch and ward personnel, 2. Heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units, 3. Hospitals/research laboratories treating contagious diseases, 4. Poultry farms/dairy farms, 5. Slaughter-houses, 6. Sewage treatment/disposal sites, 7. Agricultural uses, 8. Storage of perishable and inflammable commodities, 9. Quarrying of gravel, sand, clay and stone, 10. Zoological garden, botanical garden,

community centre, art gallery and museum; 14. **Parking plaza or parking site**		11. Bird sanctuary, 12. Forensic science laboratory and all other activities which may cause nuisance and are noxious and obnoxious in nature.

Source: Urban Unit and HP Consultants

6.3. Industrial Zone

Industries plays a crucial role in overall economic development of area. The industrial zones are proposed keeping in line with the locational requirements. Similarly, the proposed zones are highly accessible by main roads, such as Orakzai Agency Road and Kalaya-Sherazi Road; and it is segregated from the existing and proposed residential area with appropriate distance in line with the NRM standards. These proposals are given keeping in view the strategies mentioned above such as institutionalization, economic development, environmental conservation and sustainable infrastructure. The proposed industrial zones will have a number of positive impacts on economic growth, reduced environmental impact, improved public health, increased social responsibility and innovation.

Industry has been proposed along the Orakzai Agency Road and Kalaya Road, the land for proposed industries is separate along which plantation has been proposed to reduce the effect of industrial pollution. Overall, the proposed sustainable industrial development will help to create more livable, sustainable, and equitable urban centers, benefiting both the environment and the people who live and work in them. Heavy, medium and light industries can be categorized in a variety of ways. The categorization may be done based on indicators such as capital investment, labour requirements and level of mechanization used in a particular industry. The categorization may be as follow.[8]

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

Table 6-15: Criteria and Enterprise categories for Industries

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

Source: SMEDA

The next table defines the area required for Industrial cluster, Small Industrial Estate, and Large Industrial Estate, according to the SEZ Act of Pakistan

Table 6-16: Required Area for Industry

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

Source: SEZ Act of Pakistan

This criterion must be applied for development of economic zones in this region. Following calculations are done for the master plan proposals of industrial area in Kalaya:

Table 6-17: Industrial Area Requirements

Existing area (sq. km)	0.004
Existing area (in %)	0.01%
NRM Standards	3%-11%
Recommended industrial area – min (sq. km)	1.59
Recommended industrial area – max (sq. km)	5.82
Required (Recommended (min) – Existing Land Use)	1.58
Required (Recommended (max) – Existing Land Use)	5.82
Proposed area 2040 (in sq. km)	1.59

Source: Urban Unit and HP Consultants

6.3.1. Rationale for Industrial Area

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

a) Location

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

b) Accessibility

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

c) Segregation

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

Although Kalaya can flourish as an industrial hub, but the major constraint lies in the land disputes that occur often. After the merger, land disputes have further increased due to the fact that proper government machinery has yet to be seen implemented with full authority. Moreover, sectarian clashes in past have also caused much unrest among the business community of Kalaya city.

6.3.2. Industrial Planning

The existing industrial development in the area has been unplanned and has mostly happened in the center of the study area where all the urban development is, and alongside major arteries, as can be seen in map below. However, keeping in line with the international best practices and the National Reference Manual for Infrastructure Standards, the consultant has proposed large industrial zones in Kalaya located near

the southern border of Kalaya in Kalaya NC, and near the northern border of Kalaya Jalak Mela Feroz Khel NC

This location has been determined based on international best practices, the NRM Guidelines, and the local context including slope, accessibility and segration from residential land uses. Furthermore, a timber market having an area 0.38 sq.km and warehouse having an area 0.03 sq.km are also proposed near the southern industrial zone in Kalaya NC and the northern industrial zone in Jalak Mela Feroz Khel NC, respectively.

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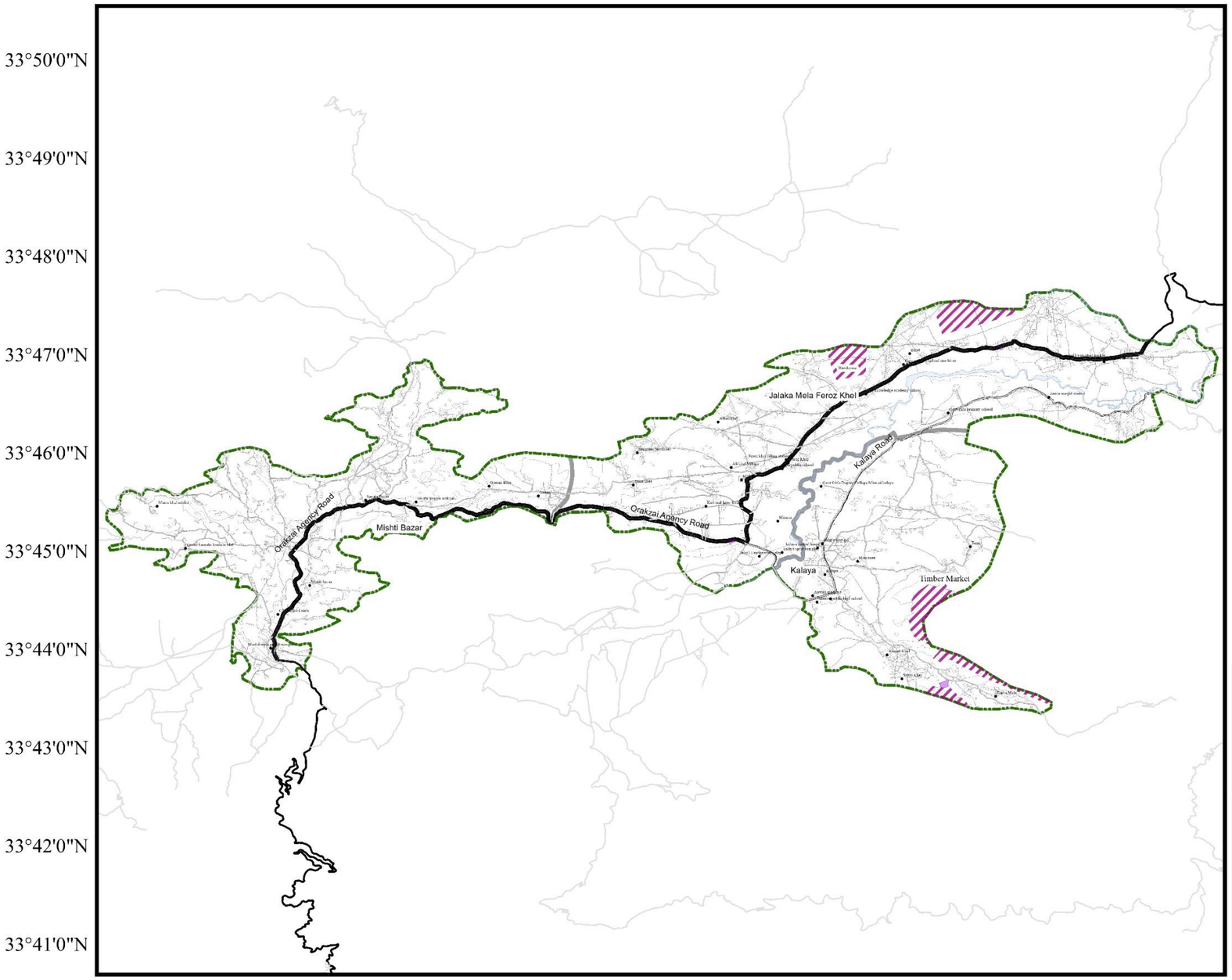
Kalaya Proposed Industrial Zones



Legend-Proposed Landuses

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

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

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size

N W E S

0 1 2 4 Kilometers

Map 15: Proposed Industrial Land use in Kalaya

6.3.3. Planning Standards for Industrial Development

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

Table 6-18: Industrial Area Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
1. **Small and Medium Scale Industries** 2. **Processing Units** 3. **Manufacturing Activities** 4. **Warehouses storage or Go-down;** 5. **Workshops** 6. **Cold storage and Ice factory** 7. **Petro chemicals, petroleum and gas products** 8. **Loading and unloading space;** 9. **Parking lot**	1. Showrooms 2. Mixed- used buildings 3. Residence for workers 4. Fuel stations and Oil depot; 5. Restaurant; 6. Hospital; 7. Auto workshop, service garage and service station;	1. Private residential housing schemes 2. Large health, recreational commercial and educational institutions 3. The land use for storing, packing, pursing, cleaning, preparing, and manufacturing of blushing power, ammunition, fireworks, gun powder, Sutphin, mercury, gases, nitro-

10. **Industrial park or estate** 11. **Police station, fire station and post office;** 12. **bank or automated teller machine (ATM);** 13. **Industrial research institute;** 14. **Treatment or recycling plant;** 15. **Grid station;** 16. **Vocational training institute**		compounds, phosphorous, 'dynamite, explosives, bombs or any other obnoxious hazardous material shall not be permissible In a declared industrial area.

Source: Urban Unit and HP Consultants

6.4. Educational Facilities

The consultants have proposed educational facilities keeping in view the strategies mentioned above such as institutionalization and economic development. The proposed educational facilities will have several positive impacts on economic growth, reduced literacy rate, and will lead to economic and social development.

6.4.1. Rationale for Proposed Educational Facilities

Demography, connectivity, and environmental factors have become major contributors in spatial policy making, especially for matters concerning optimal locations for the provision of public services to ensure service accessibility and making its coverage more efficient and equitable. For instance, several environmental factors come into play as far as establishment of new schools is concerned: flood zone proximity, earthquake zone proximity, air and water quality.

6.4.1.1. Locational Criteria

A study on educational facilities' guidelines in Saudi Arabia, suggests that Primary or an Elementary school should serve a neighborhood of 3600 residents, with a service

buffer zone of 500 meters. In addition to that, it lays other standards pertaining to geographical and environmental guidelines which includes: the elementary school should be 500 meters away from another elementary school; 150 meters from the closest highway or main road; 75 meters from the nearest road intersection or gas station; 150 meters from power transmission lines and 500 meters from any power transmission plant; 150 m from factories and warehouses; 100 meters from water catchment areas; and the land slope must be less than 18%[9].

Transport and connectivity are another key factor impacting student participation rates in formal education. Several studies have highlighted the importance of access of educational facility with student enrollment rates. The findings of one such study conducted by Canadian department of Public Policy shows that distance to school may act as a deterrent to attending by virtue of relocation costs, especially if the student is from a lower-income family. Moreover, increased distance to an educational facility from an individual's residence is associated with an access gap, leading to low student attendance accompanied with a high likelihood of dropping out.[10] Another study highlighted that as distance become very large, with the biggest effect suggesting that those individuals residing more than 8 kilometers distance from an academic institution are 27 percentage points less likely to participate in academic post-compulsory education, compared with those who live less than 2 kilometers distance.[11]

6.4.1.2. Population and Demographics

Lastly, as distance plays a key role in making academic institutions accessible, population density is another key determinant in the establishment of new facilities. Accessibility is directly proportional to population density, where areas with a lower population density of school-age population have lower access, and areas with a higher density of school-age population have higher access.

Education is the basic human right of every child legitimately assured by the Constitution of Pakistan, which requires the state to provide equal educational

[9] Saad Al Quhtani (2022) Spatial distribution of public elementary schools: a case study of Najran, Saudi Arabia, Journal of Asian Architecture and Building Engineering
[10] Frenette, Marc. "Access to College and University: Does Distance to School Matter?" *Canadian Public Policy / Analyse de Politiques* 30, no. 4 (2004): 427–43. https://doi.org/10.2307/3552523.
[11] Dickerson, A., & McIntosh, S. (2013). The Impact of Distance to Nearest Education Institution on the Post-compulsory Education Participation Decision. *Urban Studies*, *50*(4), 742–758.

opportunities to all without discrimination based on ethnic background, caste, sex, color, religion, and socioeconomic status. However, because of complex cultural issues, gender disparity is high particularly at the higher education and secondary level. In the case of Kalaya, district Orakzai the literacy rate is very low as well and furthermore, including both, the male and female literacy rate. Thus, the overall literacy rate of the Orakzai district is 37.4%.

The below table shows the male and female split (%) for the population aged 10 and that has achieved each given education level. Thus, for each education level, there is a higher proportion of male population who has attained that education level, as compared to the female population.

Table 6-19: Education level in tehsil Lower Orakzai/ Kalaya

Level	Male	Female	Transgender
Below primary	64%	36%	-
Primary	66%	34%	-
Middle	83%	17%	-
Matric	86%	14%	-
Intermediate	79%	21%	-
Graduate	75%	25%	-
Master and above	92%	8%	-
Diploma	88%	12%	-
Others	26%	74%	-

Furthermore, the tables below show the total number of educational facilitie available in Kalaya. While it is encouraging that there isn't a significant difference in the total number of schools available as well as the percentage of students enrolled at the primary school level, however, gap between males and females increases as the students proceed towards higher levels of schooling.

High school and higher secondary school education equip both male and female students as productive citizens. However, in the case of Kalaya, lower tehsil Orakzai, the enrolment of students starts declining from the middle level and widens at a high level, especially in female schools. Therefore, it is proposed that an awareness

campaign should be started to promote awareness regarding high school education, especially for female students, to address cultural barriers to female education.

Table 6-20: Government education institutes in urban center of Kalaya

Schools	Boys	Girls
Primary	40	34
Middle	2	4
Higher	3	3
Higher Secondary	1	-

Source: DEO Orakzai

Table 6-21: Town-wise Number of Primary Schools and Gender Split

Schools	Feroz Khel		Kalaya		Mishti bazar	
	Boys	Girls	Boys	Girls	Boys	Girls
Primary	16	14	12	13	12	7
Middle	-	1	1	2	1	1
Higher	2	1	-	1	1	1
Higher Secondary	-	-	1	-	-	-

Source: DEO Orakzai

6.4.1.3. NRM Standards for Educational Facilities

The area required for different level of educational facilities with respect to population can be observed in following table

Table 6-22: NRM Standards for Educational Facilities

Population (2017)	Projected Population (2040)	School level	Criteria for 1 school @ per Population[12]	Criteria for Required area @ per School[13] (Hectares)	Schools required by 2040	Required area in Hectare
63,728	146,506	Primary	7500	1	05	05

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

		Middle	3900	1.5	08	12
		High	23000	2.1	02	4.2
		Higher Secondary	30000	5	1	5

Table 6-23: NRM Standards for Types of Educational Facilities

Level of Educational Facility	Types	Population Served	Required Area Per School (Hectare)
Primary	Boys Urban	7,500	1
	Girls Urban	8,200	
	Boys Rural	7,500	
	Girls Rural	10,200	
Middle	Boys Urban	3,900	1.5
	Girls Urban	15,000	
	Boys Rural	3,900	
	Girls Rural	17,000	
High	Boys Urban	23,000	2.1
	Girls Urban	30,000	
	Boys Rural	27,000	
	Girls Rural	31,000	
Colleges	Male Rural	200,000	8
	Male Urban	400,00	
	Female Rural	250,000	5
	Female Urban	750,000	

6.4.2. Primary school (Current status and proposed)

The total number of Primary Schools in the Kalaya urban center is 74. Town-wise comparison is presented in the below table. The maximum numbers of schools (30) are in Jalaka Mela, of which 16 are for males and 14 are for females whereas Mishti bazar has the least number of primary schools. Moreover, the population has been used as a yardstick to gauge the adequacy of primary schools. The allocational criterion recommended by NRM is that a two-section primary school should serve a

population of 7,500[14] in the urban area. However, in the case of Kalaya, this population should be considered half of 7,500 as currently, only single-section primary schools are available in Kalaya.

Table 6-24: Town-wise Number of Primary Schools and Gender Split

S.no	Neighborhood councils	Boys	Girls	Total	Pop estimates 2022	Pop per school
1	Jalaka Mela	16	14	30	6061	202
2	Kalaya	12	13	25	5520	220
3	Mishti Bazar	12	7	19	8432	443

This yardstick implies that regarding a number of primary schools, the Kalaya urban center is well served and the schools are sufficient for the planning period.

6.4.3. Middle schools (Current status and proposed)

There are 6 Government Middle schools operating in the City, of which 2 are for boys and 4 are for girls. The allocational criteria recommended by NRM is that a boy's Middle school should serve a population of 3900 whereas a girl's middle school should serve a population of 17000. By taking these statistics, the girl's middle schools are sufficient for the current as well as a planning period. However, the boy's middle schools are deficient for both the current and planning period. Currently, there is a deficiency of at least two middle schools for boys. Similarly, 2-4 schools would be additionally required up to 2040.

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

S.no	Neighborhood councils	Boys	Girls	Total	Pop estimates 2022	Pop per school
1	Jalaka Mela	-	1	1	6061	6061
2	Kalaya	1	2	3	5520	1840
3	Mishti Bazar	1	1	2	8432	4216

The statistics in the above-cited table indicate that middle schools for boys are not sufficient for the current as well as planning period. However, the primary schools for

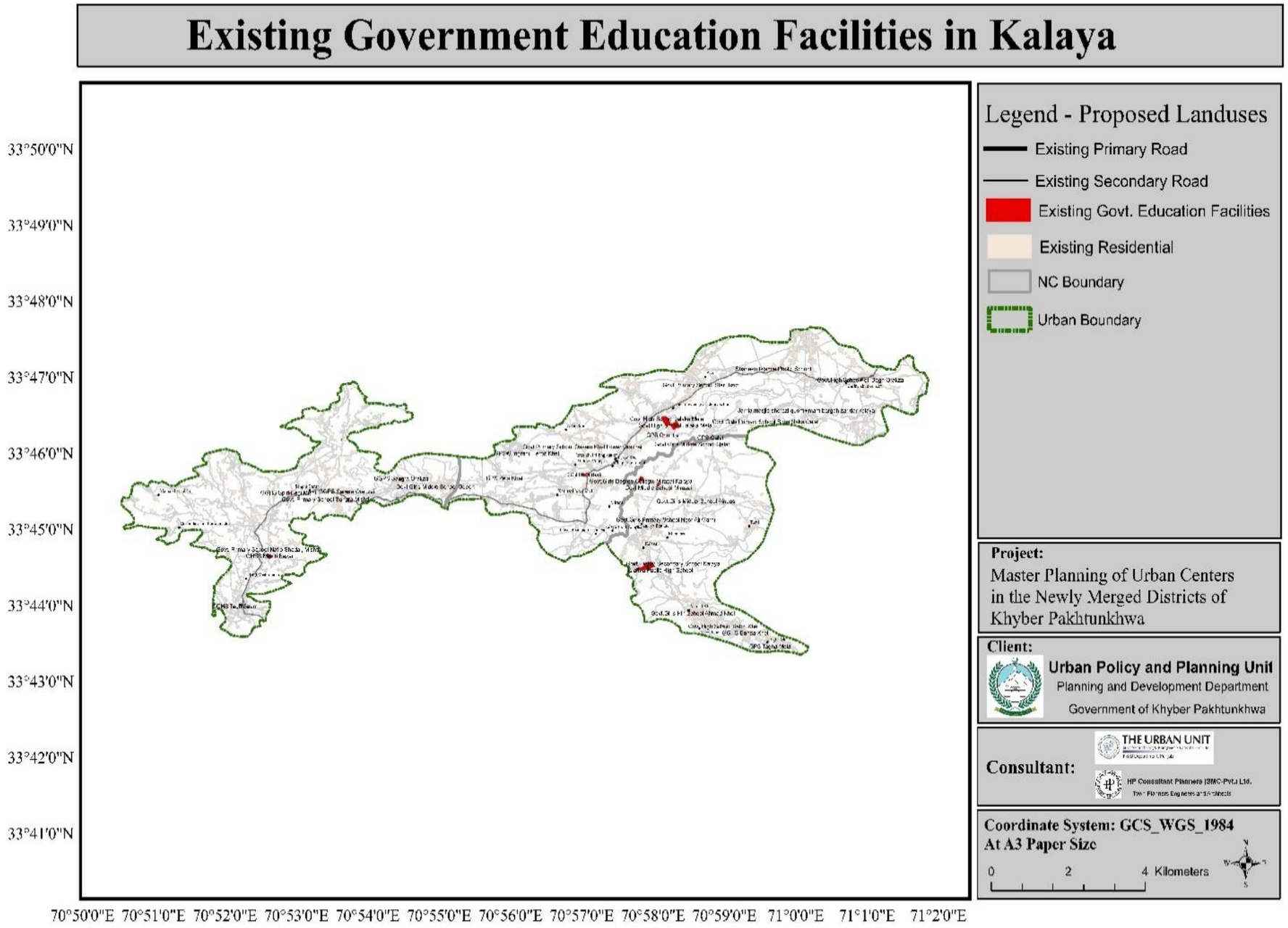
[14] National reference Manual on Planning and Infrastructure Standards, Government of Pakistan, Table 6.4, Page 109.

boys and girls are surplus for both the current and planning period. Therefore, it is suggested that some primary schools need to be upgraded to middle schools. In this regard, a survey should be conducted, and those primary need to be upgraded whose land is sufficient or capable of an extension.

6.4.4. High schools and Higher secondary schools (Current status and proposed)

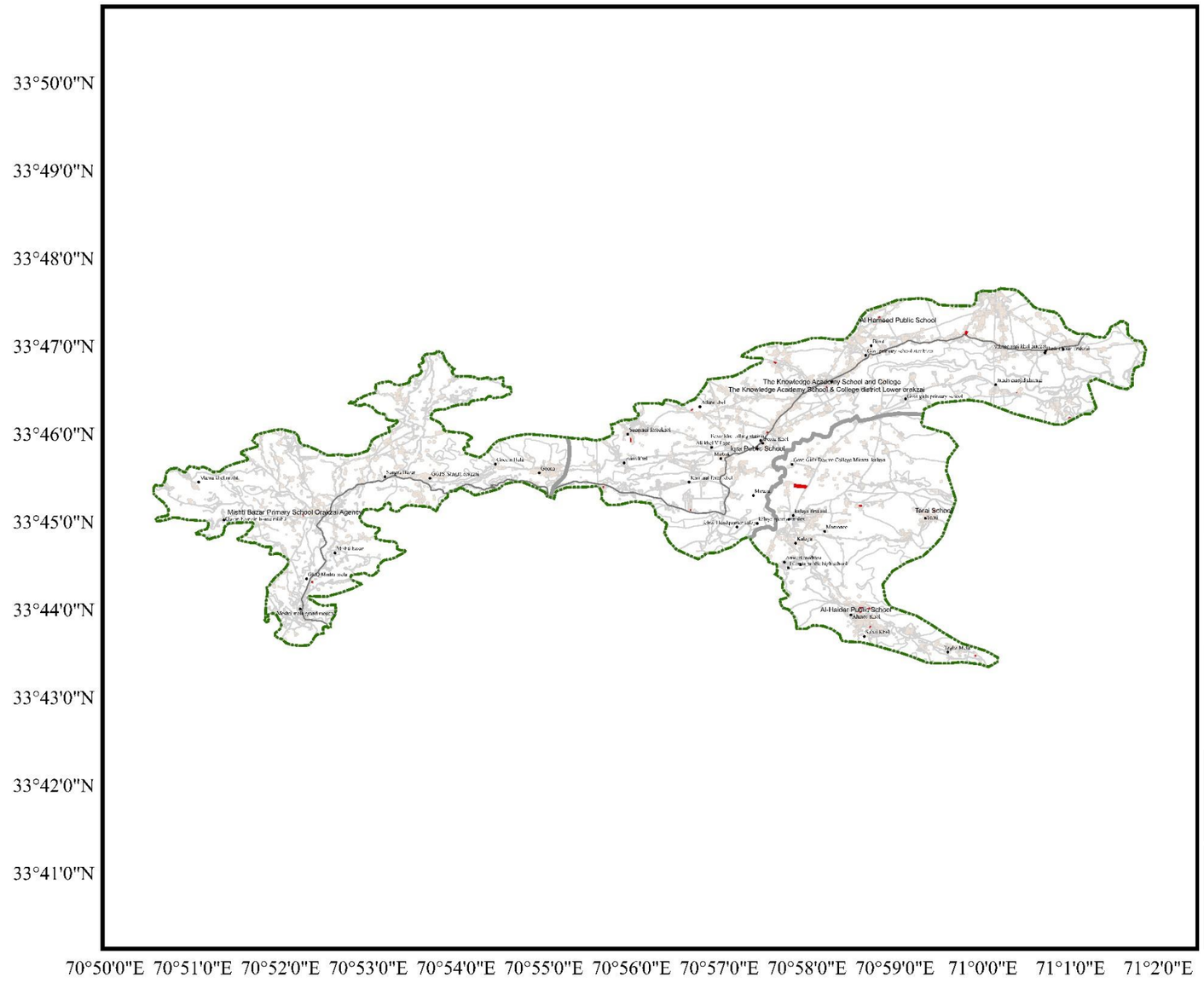
There are a total of six high schools, of which three are for males and three for females, whereas, just one higher secondary school is present for the whole urban area of Kalaya. The National Reference Manual recommends a 3-4 sections High School (Classes V-X) for a population of 23,000 in case of boys, and 31,000 in case of girls. These statistics imply that higher schools are sufficient for both boys and girls for the current period as well as current period, however, up to 2040, at least one higher secondary school is proposed for both males and females as currently, only one primary school serves the whole urban area of Kalaya.

The standards set by The NRM are outdated, therefore these standards can only be used as a reference but are not compulsory to follow in current conditions as most of the standards are not clear and confusing. For instance, the population criteria for middle schools are given only for just rural areas and there is a big difference between the population standards set for boys and girls. Similarly, allocational criteria for higher secondary schools have not been mentioned and the same is missing for colleges. Therefore, it is suggested that National Reference Manual needs to be updated through consultation with representatives of all sectors. The maps below shows the existing government and private education facilities in Kalaya.

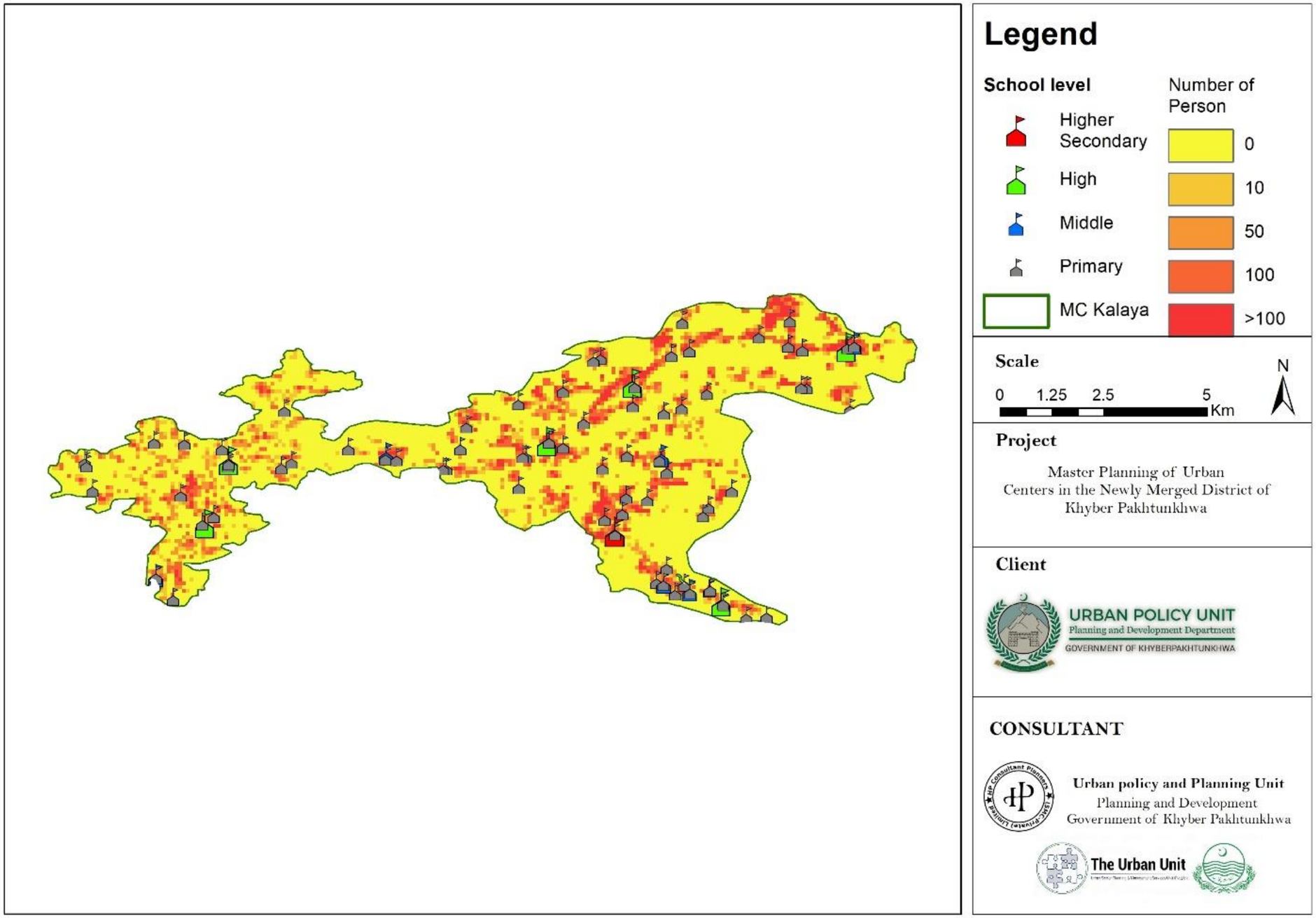


Map 16: Existing Government Education Facilities in Kalaya

Existing Private Education Facilities in Kalaya



Map 17: Existing Private Education Facilities in Kalaya



Map 18: Spatial Analysis of Educational Facilities in Kalaya

6.4.5. Technical and vocational centers for skills development:

A detailed inventory of technical and vocational institutes is not available for Kalaya, however, as per the record of the local population of Kalaya few technical and vocational centers are available which is not sufficient as there is a dire need for skilled laborers and technical persons to work in industries. Therefore, it is proposed that technical and vocational centers for skills development should be established.

Table 6-26: Locational Guidelines for Educational Intuitions based on NRM Standards

Sr. No	Educational Institutions	Locational Guidelines
1	**Primary School**	▪ Near to existing and planned housing schemes areas in which they will be serving. ▪ Located at walking distance from the houses. ▪ Commonly situated centrally in a residential area and away from the busy roads. ▪ Catchment area for urban schools 055-1km. ▪ Catchment area for rural schools 2.2kms.
2	**Secondary School**	▪ Must have easy and good vehicular availability and safe walking access. ▪ Away from schools of opposite gender. ▪ Far away from the main busy roads which carrying fast and heavy traffic. ▪ Must situated on roads with favorable linkages to their catchment area. ▪ Catchment area for urban schools 1.25-2.45km.

		▪ Catchment area for rural schools 5-10km.
3	**Intermediate Colleges**	▪ Catchment area for urban school boys 2.75-4km. ▪ Catchment area for rural school boys 10-15km. ▪ Catchment area for urban school girls 3.25-5km.
4	**Degree College**	Large city
5	**University**	Metropolitan city area.

6.4.6. Proposed Interventions in the Education Sector

Based on field visit and secondary data availability, the proposed projects are as follows

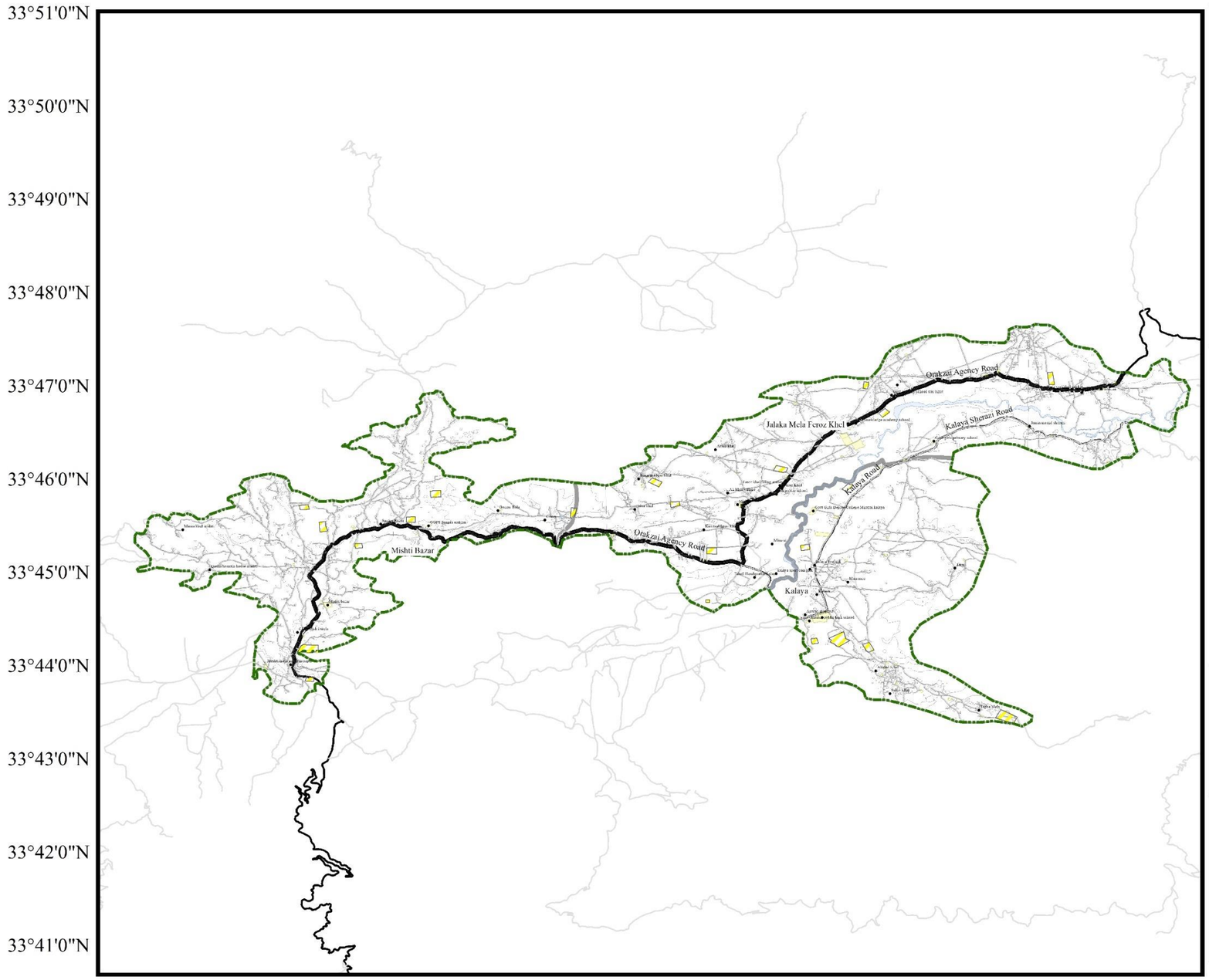
- In Kalaya, a single Higher Secondary School is not available for girls so there is need to construct a new higher secondary school or upgrade at least one existing high school into higher secondary level for girls
- Missing Infrastructure Project: There is need to allocate budget to construct the missing infrastructure (boundary wall and play grounds) in various schools of Kalaya.
- Solarization Project: There is need to construct solar system in various schools, where electricity is missing.
- Safe Drinking water and Sanitation Facility Project: In 159 Kalaya, various schools have issue of clean drinking water and toilet facility, so there is need to construct/ upgrade toilet facility and provide safe drinking water facility for faculty and students.

6.4.7. Proposed Educational Sites

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

- Firstly, based on the current need and unserved population areas, zones for educational sites have been recommended in those particular localities.
- The future population projection for the year 2040 was the main determinant in site identification. In zones that would have a population exceeding 3000 people, a primary school is recommended there. While zones with an aggregate population exceeding 20,000 have been marked suitable for the establishment of Elementary and Secondary [High and Higher Secondary] schools.
- Furthermore, it is ensured that educational zones, based on the future need, are proposed in residential sites – the current ones as well as the future sites

Kalaya Proposed Educational Zones



Legend-Proposed Landuses

- Existing Primary Road
- Existing Secondary Road
- Existing Local Roads
- Proposed Educational Zones
- Existing Education
- Existing Water Bodies
- NC Boundary
- Urban_Boundary

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size

N W E S

0 1 2 4 Kilometers

Map 19: Proposed Educational Facilities in Kalaya

6.4.8. Planning Standards for Educational Facilities

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

Table 6-27: Educational Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
1. **Large Scale educational areas** 2. **General education universities** 3. **Scientific research institutes** 4. **IT and Media institutes** 5. **City Level libraries, book banks, data and information centers**	1. Staff residences (teaching and non-teaching) 2. Separate hostels for Boys and Girls 3. Auditoriums, seminar halls, workshop spaces, 4. Community facilities (Parks, Playgrounds, clinics, schools and neighborhood commercial)	1. Private residential 2. Housing schemes 3. Large scale commercial, industrial activities

6.5. Health Facilities

Accessible, equitable, and quality healthcare for all people is the vision of the Khyber Pakhtunkhwa government but unfortunately, the people of Kalaya are facing unprecedented challenges in the health sector as currently few health facilities are currently available in the urban centers of Kalaya which do not fulfill the health requirement of the people.

6.5.1. Rationale for Proposed Health Facilities

Factors considered for proposed health facilities sites are:

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

6.5.1.1. Address Lack of Access to Health Facilities

The total number of health facilities currently available in the urban center of Kalaya is just 16. which is insufficient to serve the current and future population.

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

Sr.No	Neighborhood council (NC)	CHC	CD	BHU	Hospital	MCHC
1	Jalaka Mela	-	-	10	-	1
2	Kalaya	-	-	2	1	-
3	Mishti Bazar	-	-	1	1	-
	Total	-	-	13	2	1

Source: KP Tribal Districts Health Facilities Registry

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

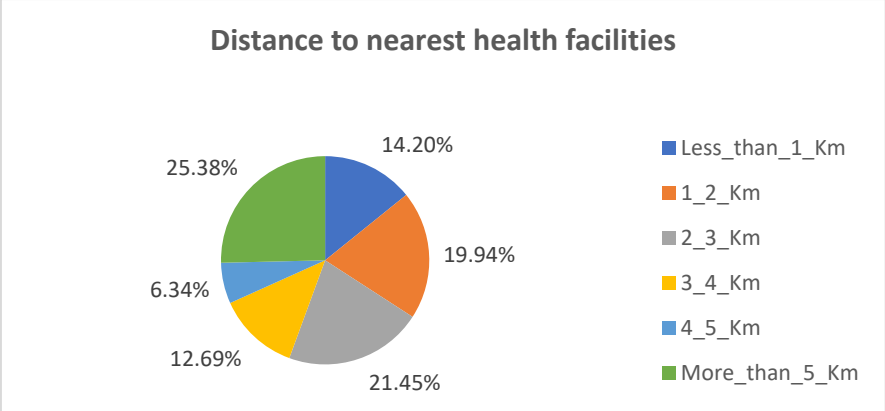


Figure 6-2: Town-wise accessibility of basic and specialized health facilities and their distance to home

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

Health facilities available in Kalaya includes BHU, CHC, a few small hospitals, and private clinics. 14.20% of the total sample population confirmed that health facilities are available in the range of 2-3 km from their homes. Approximately 13% of the total sample population reported that health facilities are available in the range of 3-4 km while almost 25.38% confirmed that health services are not available within 5 km.

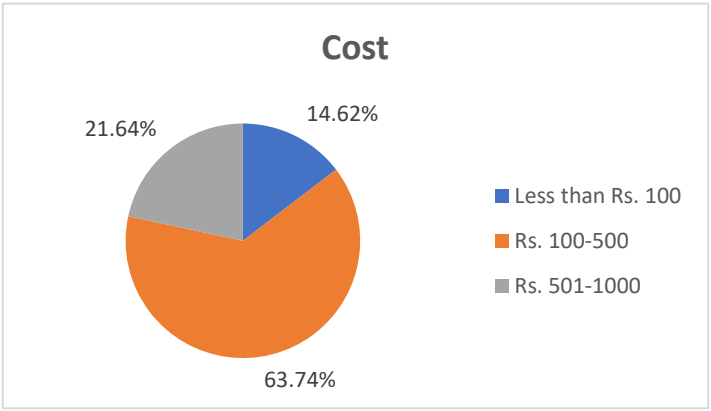


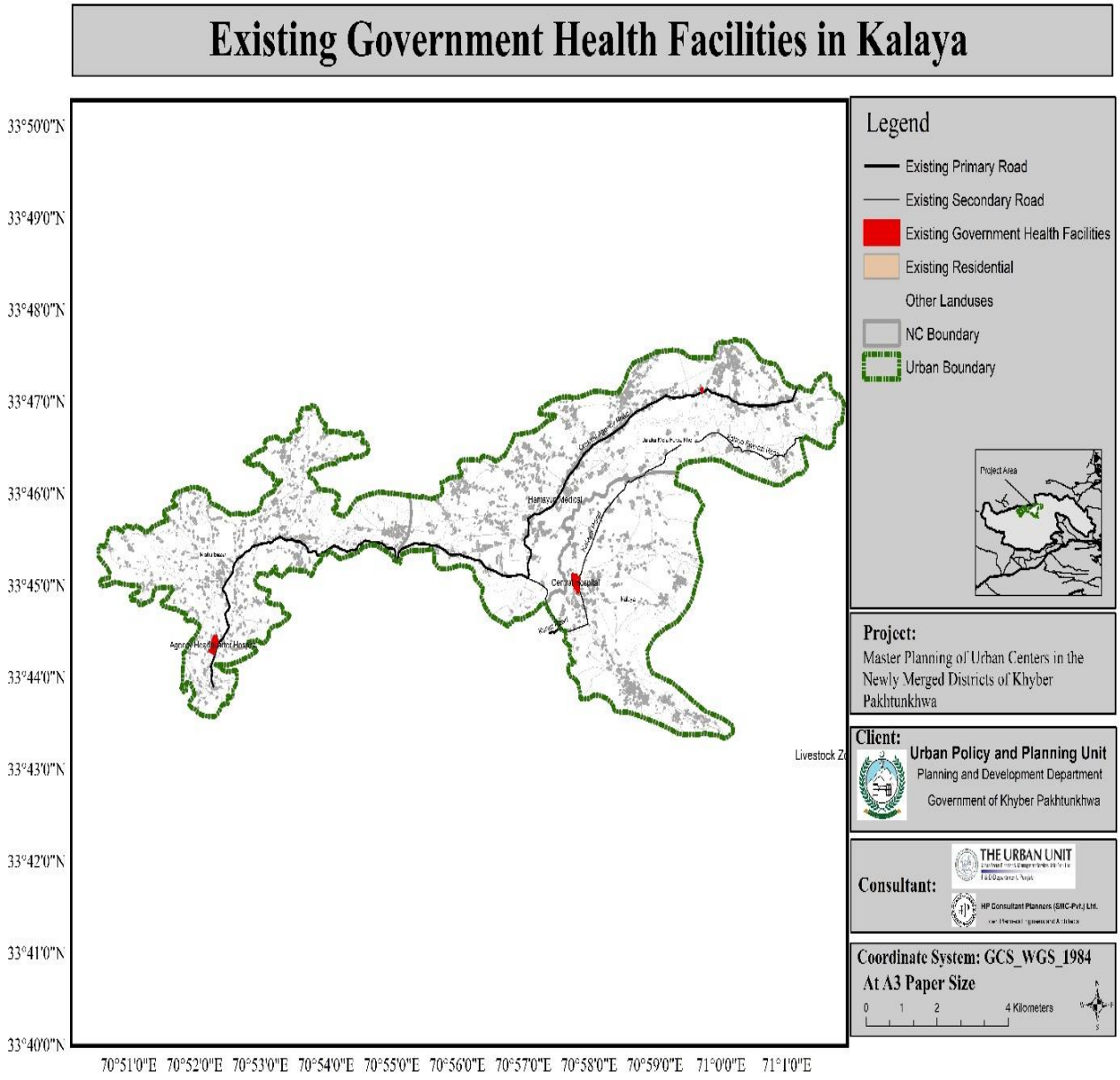
Figure 6-3: Cost per Visit to Health Facility

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

The analysis of the household survey shows that in terms of cost, 14.62% of the respondent spend less than 100 rupees on transport mode per visit to travel from home to the health facility. Approximately 63.74% of the respondent confirmed that they spend in the range of 100-500 rupees per visit while 21.64% of the respondents reported the amount in the range of 500-1000 rupees.

6.5.1.2. Spatial Spread of Government and Private Health Facilities

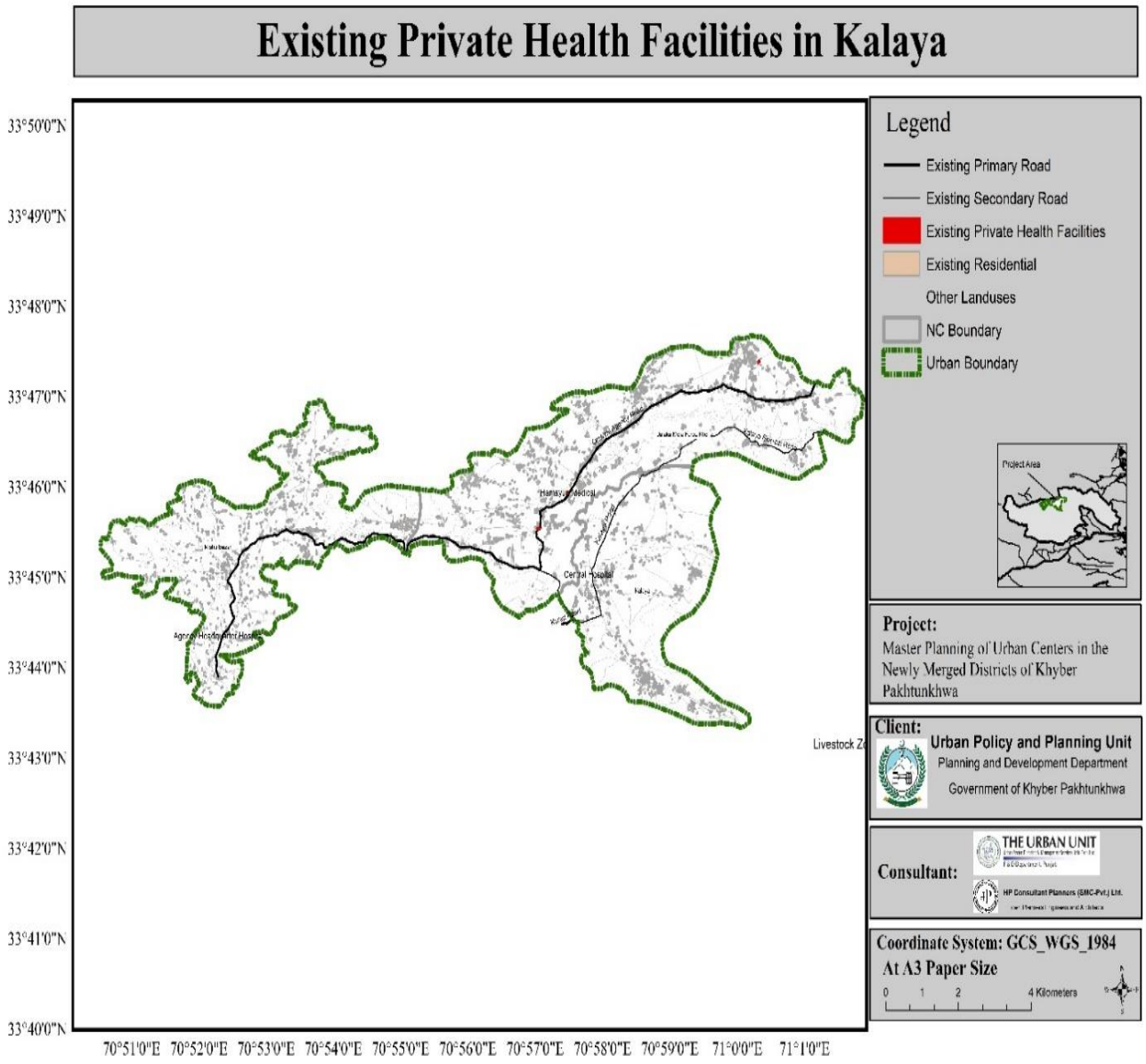
The maps below illustrate the existing government and private health facilities in Kalaya. A total of seven health facilities, both government and private, are located in Kalaya. The government health facilities include the Nursing Care Hospital, Central Hospital, and Agency Headquarters Hospital, situated in Kalaya NC and Mishti Bazaar. Another government health facility is present in Jalaka Mela Ferozkel.



Map 20: Existing Government Health Facilities in Kalaya

Source: Land Use Survey, 2021

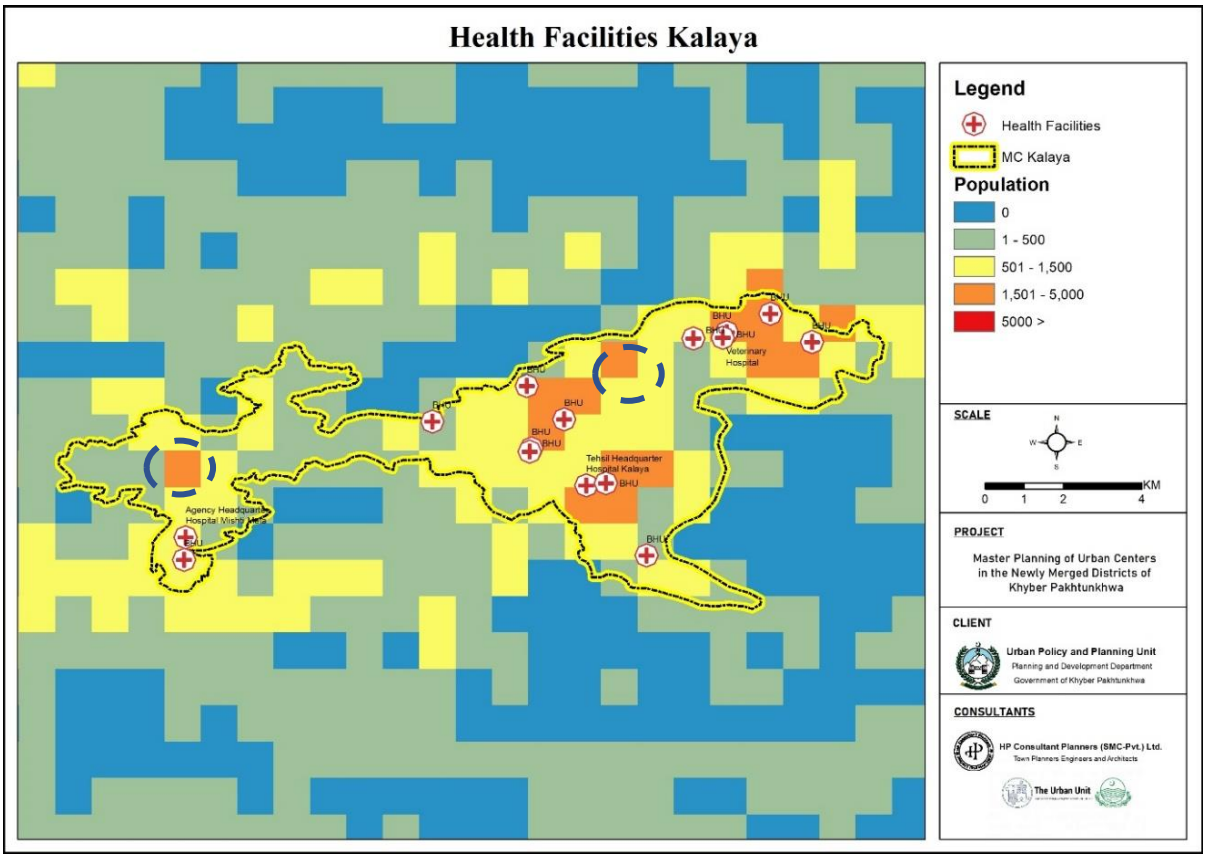
Additionally, there are three private health facilities in the area, including Humayun Medical Centre and two others located in Jalaka Mela Ferozkel. Three health facilities are proposed for Jalaka Mela Ferozkel and Mishti Bazaar. Establishing community dispensaries in the region is crucial to improving healthcare access. These dispensaries will help meet the local population's healthcare needs more effectively.



Source: Land Use Survey, 2021

6.5.1.3. Expanding Access to the Unserved Areas

In addition to this, the map below shows the distribution of health facilities, along with population densities of the region. Hot spot analysis is done to identify the population cluster in the region. By inserting a layer of health facilities on the map will help to identify the unserved areas where there is no health facility. It can be seen from the map that the health facilities are scattered all over the region. Most of the population is lying in the west of the region. However, there are some populations dense region which have limited or no health facilities, thus highlighting the gaps in the region. The blue dotted line indicates the unserved area.



Map 21: Distribution of health facilities and population density in Kalaya

Source: Analysis by the Consultant

6.5.1.4. NRM Standards for Health Facilities

For further location and siting of the new health facilities, the NRM guidelines have identified certain guidelines for geographical distribution and plot sizes of the health facilities which can be seen form the below table:

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

SR	Type	Allocation criteria	Covered/Site area
1	Dispensary (Urban)	One per large school/factory	2 rooms
2	Community Hospital / Polyclinic	-	1 hectare
3	Tehsil Hospital	One per tehsil	2 hectares
4	District Headquarter Hospital	One per district	5-8 hectares
5	General Hospital	In large cities	3-7 hectares
6	Teaching Hospital	On provincial/regional basis	20-40 hectares
7	Specialized Hospital	In metropolitan cities	55-75 m^2 / bed

Source: National Reference Manual on Planning and Infrastructure Standards

6.5.1.5. Spatial Factors for Site Suitability

Apart from this, there are other spatial factors which should be considered when selecting a suitable site for constructing a new health facility. Firstly, the aim of the health facilities is to provide preventive and curative healthcare services for the catchment population, therefore the facilities should be situated in the vicinity of dense areas or population built-up which includes both residential and commercial areas[15]. Secondly, as per the NRM guidelines, the health facilities should preferably be located on a route which is adjacent to other facilities. such as other health facilities, police station, ambulance and fire services etc. Numerous studies on site suitability for health facilities states that the health facilities should be in 100 - 200 m proximity from each other[16]. Furthermore, environmental factors should also be considered for site selection of health facilities. As per the NRM, the health facilities should be located in pleasant surroundings among trees and plants, and there should be minimum environmental pollution including noise and dust.

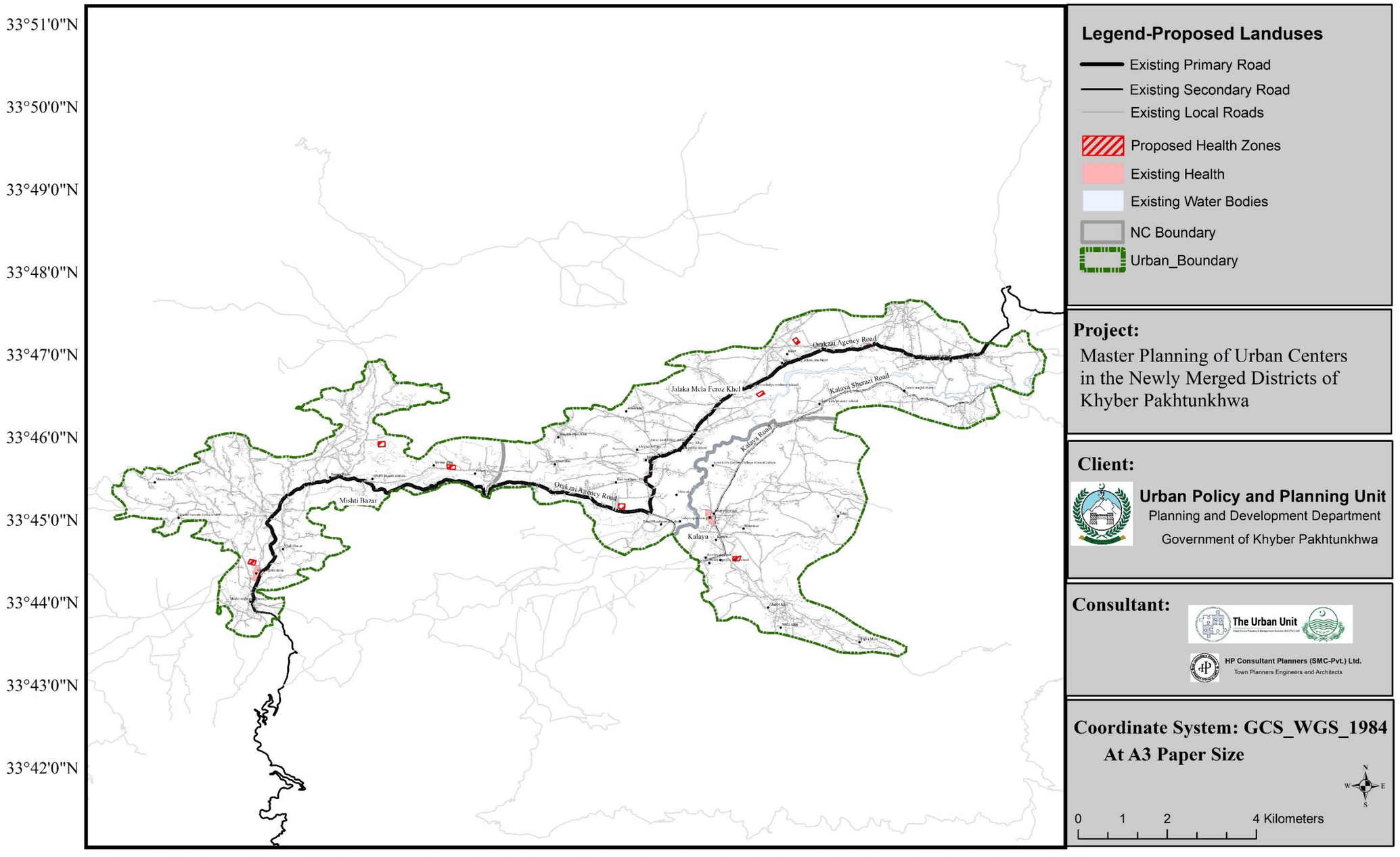
6.5.2. Proposed Health Facilities

The map below shows the areas identified for the construction of public or private health facilities. Mainly primary facilities are proposed to cater to the needs of

[15] Zhou & Wu (2012). GIS-Based Multi-Criteria Analysis for Hospital Site Selection in Haidian District of Beijing.
[16] Sharmin and Neema (2013). Appropriate Locations of Hospitals in Dhaka City in Bangladesh.

population. In long term, there facilities can be upgraded to secondary level facilities, depending on the health needs of the people in the region

Kalaya Proposed Health Zones



Map 22: Proposed Health Facilities in Kalaya

6.5.3. Planning Standards for Health Facilities

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

Table 6-30: Development Guidelines for Health Facilities

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

6.6. Connectivity and Accessibility

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

Major roads in Kalaya, including the Orakzai Agency Road, Kalaya Road, and Kalaya-Sherazi Road, are paved, although certain sections are not maintained regularly. As the Lower Orakzai's central hub, Kalaya experiences heavy traffic, particularly in the

business district. For Kalaya to develop into a thriving urban center, effective transportation infrastructure is required.

6.6.1. Mobility Problems in Kalaya

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

The Household Information Survey (HIS) revealed that residents of Kalaya are dissatisfied with the current road mobility scenario as illustrated in the figure below. The majority of respondents expressed concerns about road safety, lack of parking, lack of inadequate road infrastructure with poor safety conditions, and encroachment on roads. According to 73% of respondents, road users and vehicle operators in Kalaya have poor driving behavior and traffic sense resulting in accidents, road congestion, and delays. Parking issues were ranked as the worst by 79% of respondents. Similarly, 86% of respondents expressed dissatisfaction with the lack of roadside traffic signs.

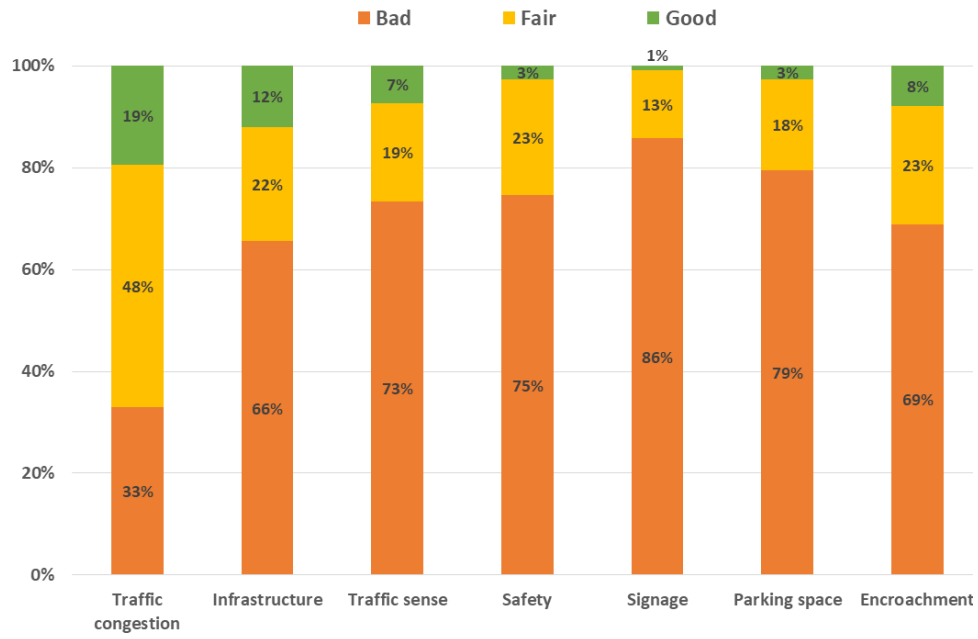


Figure 6-4: Traffic Problems of Kalaya

6.6.1.1. Existing Public Transport Services

According to the Household Information Survey, 81% of respondents use public transportation to meet their daily travel needs.

These are availed in the form of Bus services (34%), Taxi, Rickshaw or Qingqi 10%),Wagon and Suzuki Van (9%) and remaining is a combination of various modes.

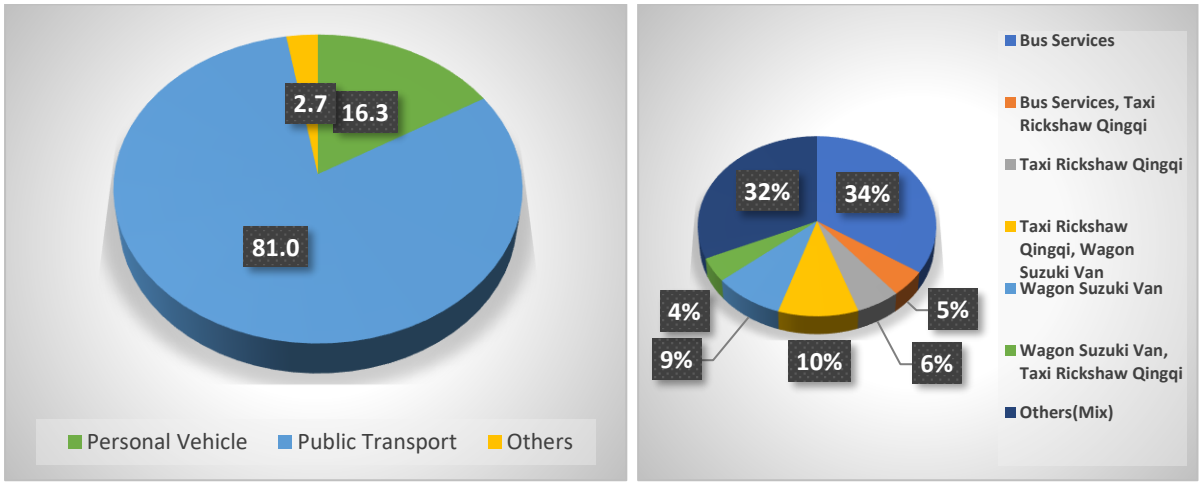


Figure 6-5: Modes of Public Transport in Kalaya

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

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

- 50% for important and satisfied,
- 33.33% for Neutral in both cases and
- 16.67% for not important /not satisfied

The net score of both variables is shown (in descending order) against the respective attribute in the last column as shown in the following table.

All except 3% of the respondents consider safety of life to be important and slightly over three fifths of them are satisfied with the prevailing public transport service. The attribute is at top with maximum net score of 5.17. Secondly, network coverage of

existing public transport services and waiting time are considered extremely important by more than 80% of the respondents. However, the satisfaction level to these parameters is low, as more than 50% of respondents are not satisfied with these parameters and this depicts a poor level of public transport service.

Table 6-31: Commuters Perception of the Public Transport Service

Travel Attributes	Importance			Satisfaction			Weighted average score		Net score
	Important	Neutral	Not Importan	Satisfied	Neutral	Not Satisfied	Importance	Satisfaction	
Network Coverage	97%	2%	2%	35%	14%	51%	2.95	1.85	4.80
Waiting Time	88%	11%	2%	18%	29%	52%	2.86	1.66	4.52
Journey Time	72%	23%	5%	34%	40%	26%	2.68	2.08	4.75
leanliness of vehic	45%	37%	18%	45%	38%	17%	2.26	2.28	4.54
Cost of travel	62%	28%	11%	40%	26%	34%	2.51	2.06	4.57
Staff Behaviour	57%	26%	17%	66%	31%	3%	2.40	2.63	5.03
Crowding	23%	66%	11%	52%	38%	9%	2.12	2.43	4.55
Noise	28%	60%	12%	52%	40%	8%	2.15	2.45	4.60
Safety of Life	97%	3%	0%	48%	25%	28%	2.97	2.20	5.17

6.6.1.2. Poor Road Network

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

6.6.1.3. Parking Supply

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

Figure 6-6: On-street Parking in Kalaya

Parking for cars is primarily done in places set aside for public transportation. These locations are present in Mishti Mela NC; a parking lot board is available in Kalaya NC, but no vehicles were parked there, making it ineffective as a parking lot.

6.6.1.4. Encroachments

The urban area of Kalaya has been grappling with several pressing challenges related to encroachments such as Shop faced extensions, Advertising and Boards, Illegal On street parking, Makeshift transport Stands and Street vendors. These encroachments lead to diverse mobility concerns such as hinderance to pedestrian movement, visual clutter, traffic disruptions and road safety.

6.6.1.5. Travel Patterns

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

- Entry point of Kalaya Urban Center from Kacha Pakha
- Kalaya NC Bazar Entry from Headquarter Chowk
- Kalaya NC Bazar Exit towards Urban Boundary
- Mishti Bazar Entry from Urban Boundary
- Mishti Bazar Exit towards DHQ

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

- Most of the trips are generated at Feroz Khel NC (36.5%), Kalaya NC (19.3%) and Mishti Khel NC (6.6%).

- The destination for the majority of trips is Mishti Bazar (16.4%) followed by Kalaya NC (14.81%), with other key destinations being Headquarter Chowk, Anjani, Bara, Feroz Khel, Peshawar and Tirah Maidan
- The purpose for most of the travels is public transit vehicles that are serving the public (14.77%), and passenger heading to business/job/work which accounts for 29% of the visits.
- Two thirds of the respondents during the HIS informed that they spend up to Rs.500 on their daily commute.

6.6.2. Road Network

Utilizing information gathered from different departments, a road inventory survey, and field observations, a road inventory for the area was created. The following are the important roads identified:

- **Orakzai District Main Road**

This road leads traffic from Kacha Pakha Kohat towards the Orakzai district. The road is paved in patches but much of this road is unpaved towards the Feroz khel and Mishti bazar area. Most of the travel and business to and from the district occurs through this route.

- **Kalaya/Headquarter Road**

This road leads traffic from Headquarter chowk towards Kalaya NC bazar. The road is paved and provided with footpaths as well. Along this road lies the main Kalaya NC bazar.

- **Local Roads**

Most of the urban area of Kalaya remained rural until delimited as urban in 2020, due to which most of the characteristics of the area are that of rural. Local roads in the urban jurisdiction are not well maintained and remain kacha having no shoulders, footpaths, drains, or metaled surfaces. This causes problems for the general public in terms of accessibility to basic facilities like health and education.

Figure 6-7: Unpaved Local road in Kalaya NC

There are several unnamed local roads in Kalaya. The condition of these locals vary from paved to unpaved and provide access to various clusters of neighborhoods scattered about Kalaya.

The prominent attributes of the road Network of Urban Kalaya are summarized in the table below. Likewise, the following figure shows the road network of Kalaya as described above.

Table 6-32 Road Network Attributes

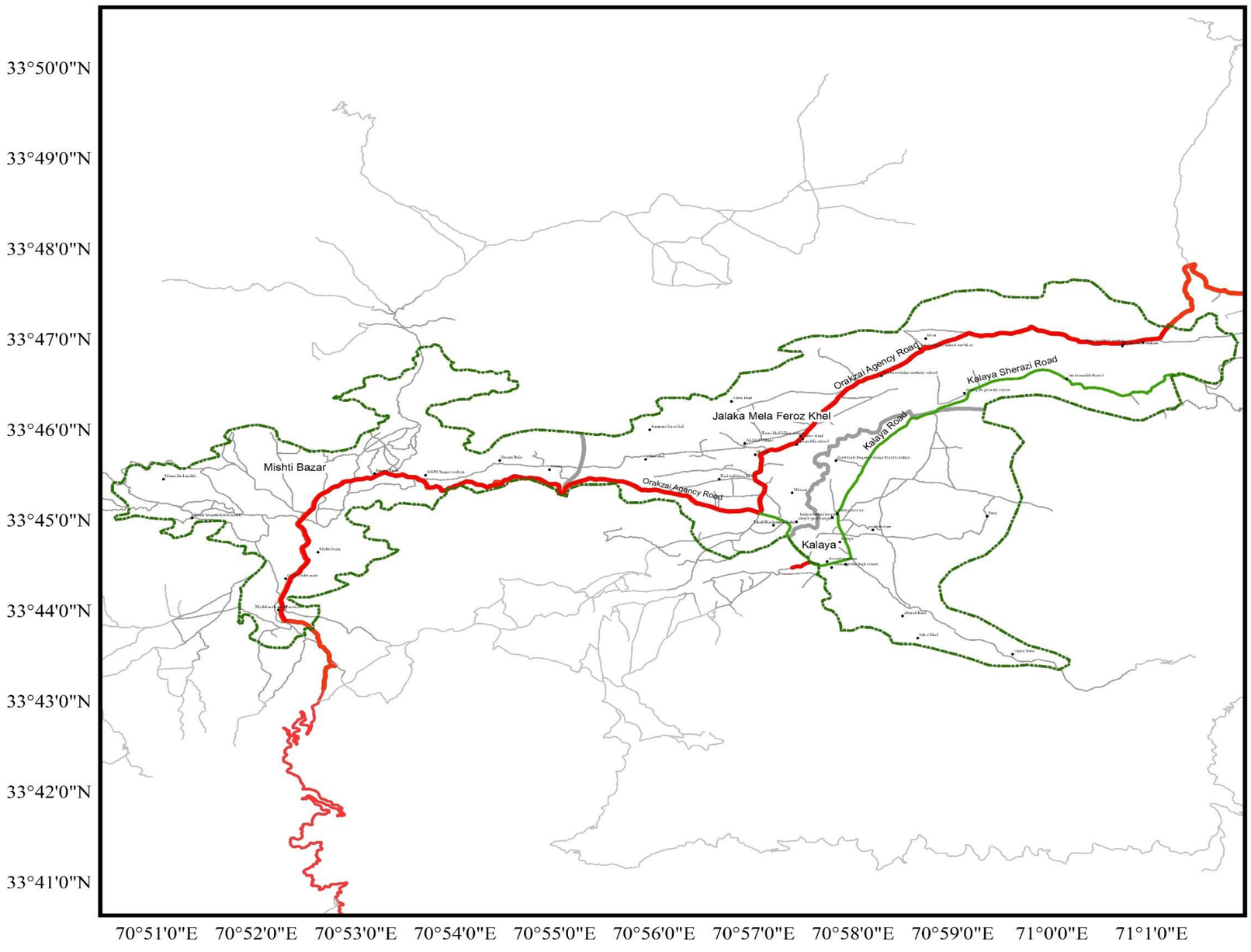
Road Name	Lanes	Carriageway	Owner	ROW*	Class	Capacity (veh/hr)**	Length (Km)	Width*** (m)
Orakzai District Main Road	2	Single	C&W	55ft	Secondary	900	21	5.3
Kalaya Road	1	Single	Local	25ft	Local	450	8	3.3

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

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

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

Existing Road Network of Kalaya



Legend-Proposed Landuses

- Highways, PKHA
- Secondary Road,C&W
- Local Road, Local
- NC Boundary
- Urban Boundary

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

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size

0 1 2 4 Kilometers

Map 23: Existing Road Network

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

6.6.3. Traffic Issues in Kalaya

During the vision formulation and community consultation of the Master Planning process, discussions were held with major civil societies of the area and the general public. From discussions with civil societies particularly traders it was concurred that mainly the roads in the area are unpaved which causes much difficulties for the traders in transportation of their goods to and from the market.

The vision developed for Kalaya showed that most stakeholders wanted to develop Kalaya as a tourist spot which can only be materialized if the roads in the area are paved and provide necessary connectivity to Kalaya for tourist purposes. Most of the stakeholders regarded the road network as poor and wanted better connectivity for Kalaya with the rest of the district and province. The discussions with general public on NC level shows that the roads are unpaved.

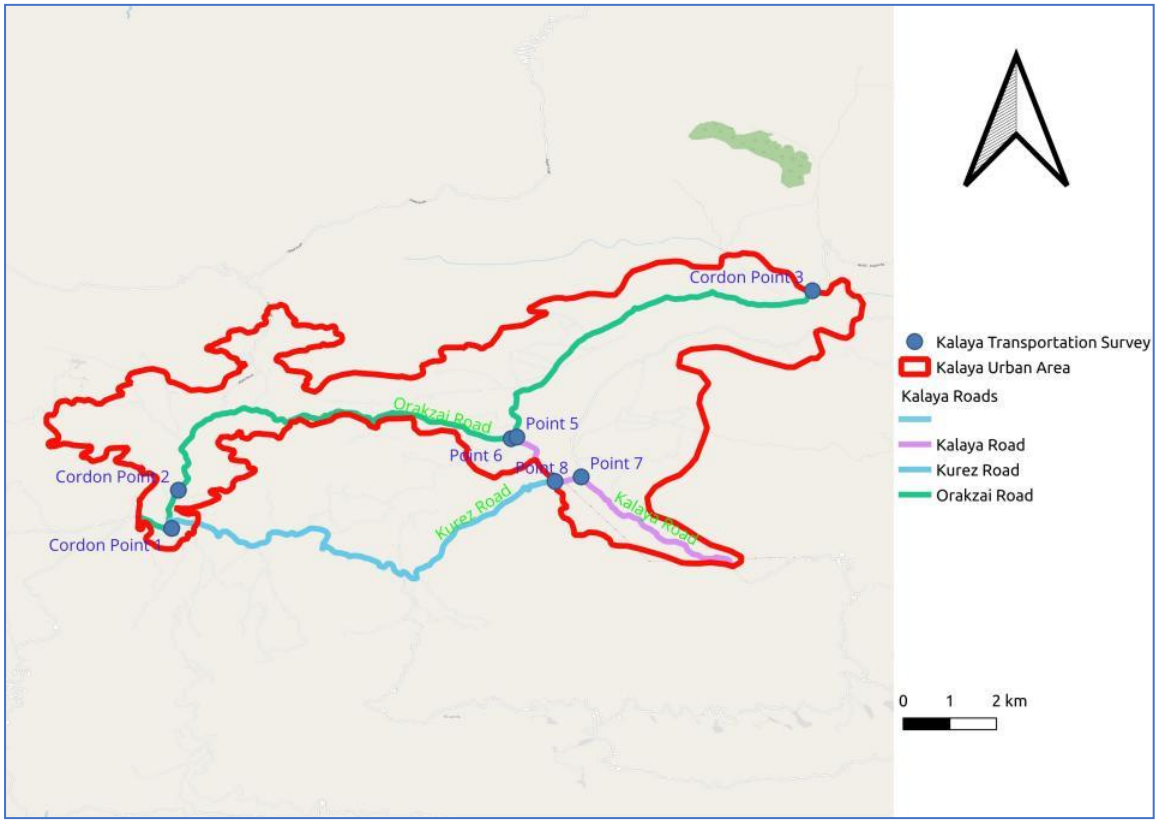
6.6.4. Data Collection and Analysis

In order to solve the existing problems, a comprehensive transportation survey plan was developed. For the purpose of transportation studies, Kalaya was divided into cordons. Since Kalaya is a small city with population less than 75000, three cordons were developed. The initial cordon would encompass the administrative boundary of the area and second and third cordons were developed by encircling the Bazaar area of Kalaya and Mishti Khel NCs where much of the commercial activity occurs. Cordon formation points were marked where traffic studies were to be conducted. Traffic counts were conducted at each point where the cordon lines cross a main road. Hence the points finalized for traffic counts were:

1. Entry point of Kalaya Urban Center from Kacha Pakha, (Cordon Point 3)
2. Headquarter Bazar Coming from Feroz Khel (Point 5)
3. Headquarter Bazar chowk towards Mishti Khel (Point 6)
4. Kalaya NC Bazar Entry from Headquarter Chowk (Point 8)

5. Kalaya NC Bazar Exit towards Urban Boundary (Point 7)
6. Mishti Bazar Entry from Urban Boundary (Cordon Point 1)
7. Mishti Bazar Exit towards DHQ (Cordon Point 2)

Roadside OD surveys were also conducted at 5 points i.e. point 1,4,5,6,7 as they were lying on the Cordon points for the Urban Area.



Map 24: Main Survey Points Chosen for Transportation Survey

6.6.4.1. On-Street Parking

Due to lack of a proper parking lot facility in Kalaya Urban Area, vehicles are parked along the main roads within the main bazaar areas. There is a total of 3 Commercial bazars within the Kalaya urban area namely; Feroz khel, Kalaya and Mishti Mela. On-street parking on Feroz khel and Kalaya is scarce since the traffic flow in these areas is less. As per the counting done in these two NCs it was identified that the maximum vehicles parked on street/road at one time was not more than 20. In Mishti Khel Bazar, cars parked on street were significant hence on street parking was conducted in the said area. License plate survey method was employed at 1-hour intervals. The total

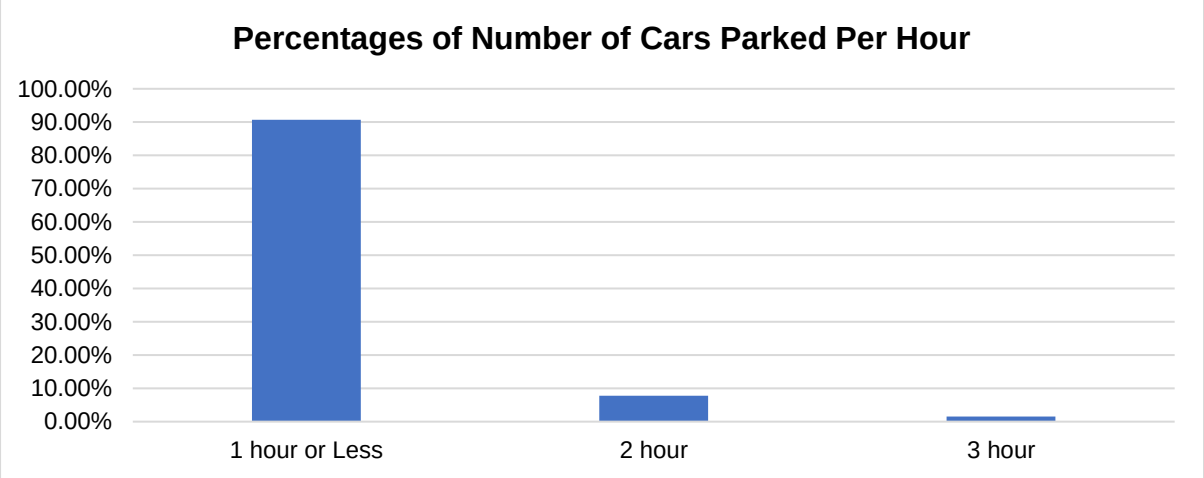
number of vehicles parked along the main Orakzai road of Mishti Khel Bazar is given in the table below.

Table 6-33: On Street Parking

Time	11:00AM-12:00PM	12:00PM-01:00PM	1:00PM-02:00PM	2:00PM-03:00PM	03:00PM-04:00PM	04:00PM-05:00PM
Number of Vehicles Parked	60	66	48	48	49	52

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

The vehicles parked along other side roads in other NCs like Kalaya and Feroz Khel are approximately 50. **Therefore, the maximum per hour on-street parking in Kalaya Urban Area can be approximated to be 100-110**. Most of the cars parked, 90.71% to be precise, are usually for a short period of time of 1 hour or less. 7.74% cars are parked for 2 hours, and 1.55% Parked for 3 hours.



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

Figure 6-8: Percentage (%) Vehicle/hr

6.6.4.2. Parking Lot Survey

Kalaya is a scarcely populated area with a small percentage of vehicle ownership. The open spaces as well as the on-street areas are large enough to cater for the parking of the vehicles. Although there are no government owned parking lots in the area. The main parking is done either on the streets as on street parking or at areas specified for public transport. As such no parking lots were identified, nor currently much need is felt for providing such parking spaces as traffic, parking load is very small in the

area. However, certain areas like Mishti Mela main bazar and the area near DHQ hospital requires parking lot facilities in order to facilitate the incoming traffic towards the hospital and bazar. Currently the area is deprived of parking lot facilities. Feroz Khel also does not have any parking lot facility. Kalaya as an NC had a small parking lot present but it was unoccupied. The traffic load on Kalaya main bazar was low and the on-street parking can cater quite well for the needs of the area.

6.6.4.3. Traffic Signage Survey (Signage relevant to public transport)

Traffic signage is one of the most important aspects of transportation system particularly in regards to catering for safety and human life protection on the roads. Most of the Kalaya Urban Area is deprived of proper Traffic signs, there are a few informatory signs placed at the main highway marking only important places. For Public Transport, such Informatory signs are a must in order to facilitate the public transport users. However, these signs are insufficient to cater for the whole of Public Transport. Similarly, there are no proper signs in order to indicate public transport stops. Public transport stops need to be marked with appropriate signage. Also, public transport terminals need to be developed and properly marked by signage for public transport user.

6.6.4.4. Origin Destination (OD) Survey

In additional to the Household Information Survey, a Roadside OD Survey was carried out at five selected locations in Kalaya Urban Area. The locations were entry point of Kalaya Urban Center from Kacha Pakha, Kalaya NC Bazar Entry from Headquarter Chowk, Kalaya NC Bazar Exit towards Urban Boundary, Mishti Bazar Entry from Urban Boundary, Mishti Bazar Exit towards DHQ.

The results of the Roadside OD Survey and the HIS survey are summarized as follows:

- The average occupancy of vehicles was 3.31.
- The vehicles interviewed consisted of 29.27% of Car/Jeep, 10.88% were Wagon/Suzuki Van, 26.68% Motorcycles/Scooter and 2.33% were Rickshaw/Qingqi/Loader.
- The study of Trip Generation and the origins of the trip coming into the Kalaya Urban area showed 18.91% of the trips started from Kalaya NC Bazar. 16.06%

of the trips started from Mishti Mela. Headquarter Chowk had 7.51% vehicles originated from this area, while 5.44% trips originated from Kohat outside the District.

- The trip attraction for Project area had 16.40% trips having their destination as Mishti bazar, 14.81% of the trips were going to Kalaya NC, 5.03% trips were going to Kohat district. Other main destinations identified were Headquarter Chowk, Anjani, Bara, Feroz Khel, Peshawar and Tirah Maidan.
- From the HIS Survey, most of the trips generated at FerozKhel NC (121), Kalaya NC (64) and Mishti Khel NC (22). The destination for majority of the trips was Kalaya Bazar (89 / 26.89%) followed by Kalaya NC (40/12.08%), Kohat (35 / 10.57%), and Feroz Khel Bazar (22/6.65%).
- The data shows that most of the visits in Kalaya Urban Center costs it's residents Rs.100-500, while 25.35% of the visits costs the residents Less than Rs. 100.

A Comparison of OD done at household level and at the Roadside level results shows similarities like destination for most of the travels are at the main commercial areas of each NC namely Kalaya, Mishti Mela and Feroz Khel as well as Kohat while origins for cordon points mostly is the same NC commercial area and the nearby villages although at the household level most of the travels began in their own NC with the origins being scattered across the whole Kalaya Urban area.

6.6.4.5. Traffic Count Study

For the purpose of traffic counts 7 different locations were selected. These points were located at the cordon points of the Urban Area and at the cordon points of the Main Commercial Areas. The traffic count was conducted for 12 hours. The peak hour volumes for each point (both directions) are shown in the Figure Below. Complete traffic Count data is available in the Annexure.

Figure 6-9: Peak hour Traffic Counts

6.6.4.6. Freight and logistics

As per the study conducted by United Nations Economic and Social Commission for Asia and the Pacific for the overall Asian Highway Network the Maximum Gross Weight (Tons) for Rigid Vehicle is 27.50 and for Articulated Vehicle/Road Train is 65.50 while Maximum Axle Load (tonnes) is 31.00 for Group Axles and 12.00 for Single Axle.

National Transport Research Centre, Government of Pakistan, Ministry of Communication have conducted a comprehensive study on Axle Load Survey on N5. The nearest station selected to the project Area of Kalaya Urban Area was at Iqbal Shaheen Toll Plaza. The total samples selected in the study were 1,410 and 2,418 trucks in Northbound and Southbound directions, respectively. Maximum load of 66.9, 54.5, 61.0, 70.5 and 94.6 Tons were observed for 2, 3, 4, 5, and 6 Axle trucks, respectively. Axle Load Statistics are given in the table below:

Table 6-34: Axle Load and Standard Deviation Comparison

Northbound (Towards Peshawar)						Southbound (Towards Kamra)				
Type of Truck	Sample Size	Gross Vehicle Weight (Tons)				Sample Size	Gross Vehicle Weight (Tons)			
		Ave	Min	Max	Standard Deviation		Ave	Min	Max	Standard Deviation
2-AXLE	372	21.61	1.14	35.55	4.89	927	21.41	1.17	66.91	4.54
3-AXLE	853	40.83	1.89	54.56	7.11	1370	42.54	1.75	53.11	4.03
4-AXLE	24	37.96	12.42	51.58	11.67	48	42.63	14.77	61.07	11.13
5-AXLE	12	55.24	38.95	65.56	8.30	13	58.19	49.39	70.5	6.58
6-AXLE	149	72.92	35.82	94.67	11.34	60	64.71	30.38	88.27	8.68
Total	1410					2418				

Source: National Transport Research Centre, Government of Pakistan

The Gross Vehicle Weight and as well as the loading on each axle is vital to estimate the effect of truck loading on the pavement structure. As per the study the axle wise average weight for each type of truck for Northbound and Southbound traffic is given in the table below. The second axle was loaded higher as compare to other axles in

almost all truck types. There is no weighing station in the Kalaya Urban Center or nearby area. Also, no NHA stations are present in order to obtain official data. Hence it will be useful to use the official published data of NHA as given above. This point being the nearest to Kalaya in the given data of the report and hence can be used to estimate the axle weight-age for the traffic in Kalaya Urban Center.

6.6.4.7. Network Capacity/ Level of Service

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

Table 6-35: Level of Service of Roads

Road Section	Level of Service
Entry to FerozKhel from Kacha Pakha (Cordon Point 3)	A
Entry point towards Mishti Mela Bazar from Urban Boundary (Cordon Point 1)	A
Entry point towards Mishti Mela Bazar DHQ (Cordon Point 2)	A
Entry point towards Kalaya Bazar from Headquarter Chowk (Point 8)	A
Entry point towards Mishti Mela Bazar DHQ (Point 7)	A

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

The results show that the area is mainly rural in nature. This nature of the area is mainly responsible for the LOS “A” for all the main points.

The figure below illustrates the volume to capacity ratios for the aforementioned roads.

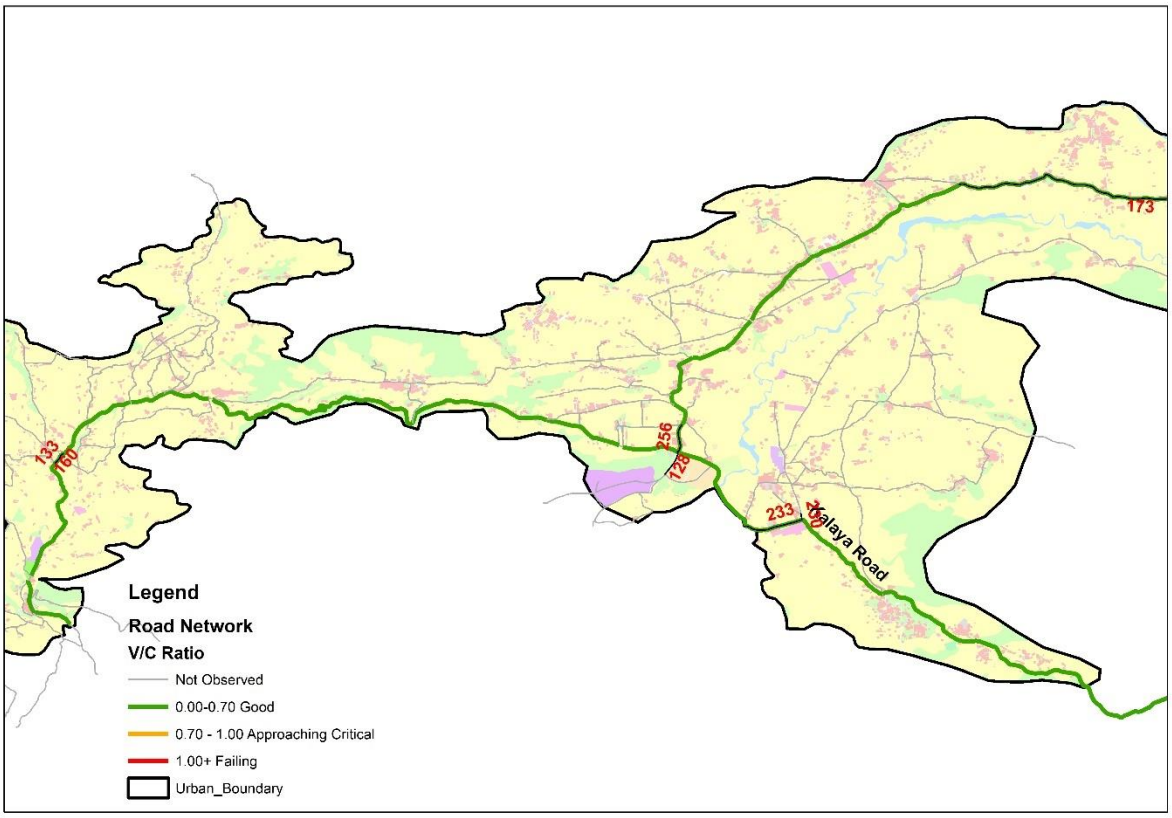


Figure 6-10: V/C Ratios of Key Roads

6.6.5. Proposed Transportation Interventions

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

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

6.6.5.1. Short Term Interventions

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

- **Widening of Roads and Allied Structures**

The existing road network is adequate to cope with the traffic demand as observed from the traffic count data, not because the road network is of standard but because the peak hour volumes are relatively low.The traffic counts from the situational analysis were utilized to justify the proposed widenings and dualizations of Kalaya's Roads.

Consultation with the PKHA and C&W revealed that there is no specified threshold or criteria for undertaking road widenings and improvements. Such initiatives are undertaken on an as needed basis. For the purposes of this master plan, the volume-to-capacity ratio of a given road is one determining factor for its recommended widening or dualization. A secondary reference is also used: the Widening threshold stipulated by the *Planning & Development Board of Punjab* of 800 vehicles per day[17] (24 Hours). These criteria are applied for all those roads for which traffic volume data is available.

All reported traffic volumes at each counted segment exceed 800 vehicles per day over a 12-hour period. While the observed Level of Service and Volume to Capacity ratios are adequate, it is still recommended to widen those roads exhibiting more than 800 vehicles per day. Moreover, there exist several unpaved tracks leading to dispersed settlements around Kalaya which may be paved.

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

Figure 6-11: Typical Road in Kalaya

The following roads of Kalaya are recommended for their carriageways to be widened to their appropriate specifications as per the Khyber Pakhtunkhwa Geometric Design Guidelines. A typical cross section for a local road in an Urban Setting is shown below.

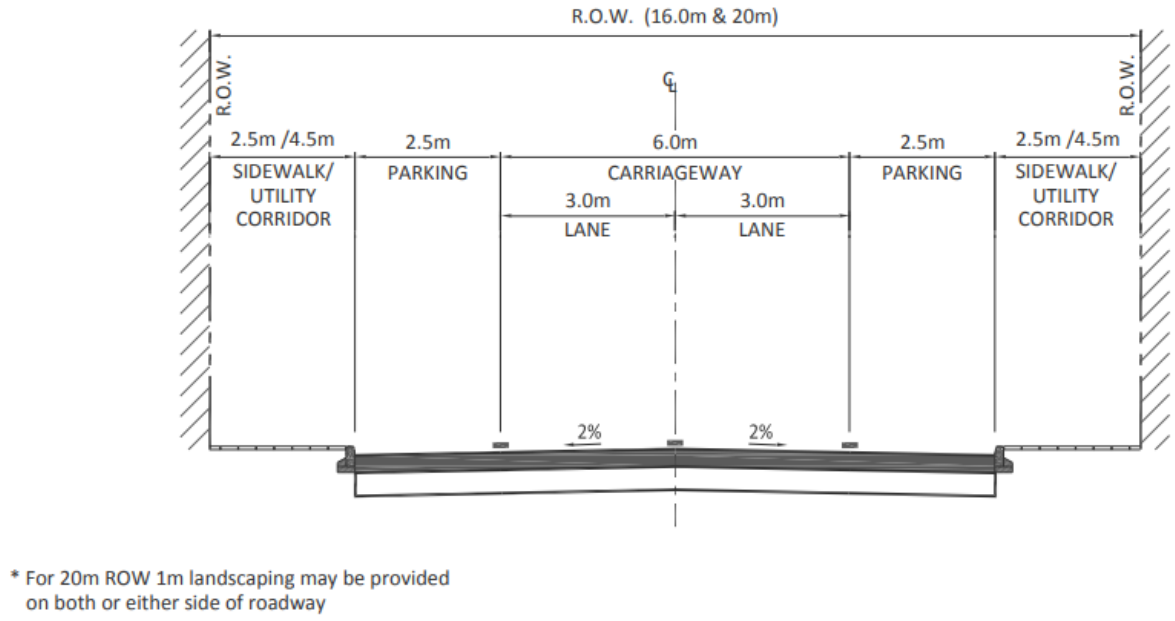


Figure 6-12: Proposed Typical Cross Section Urban Roads

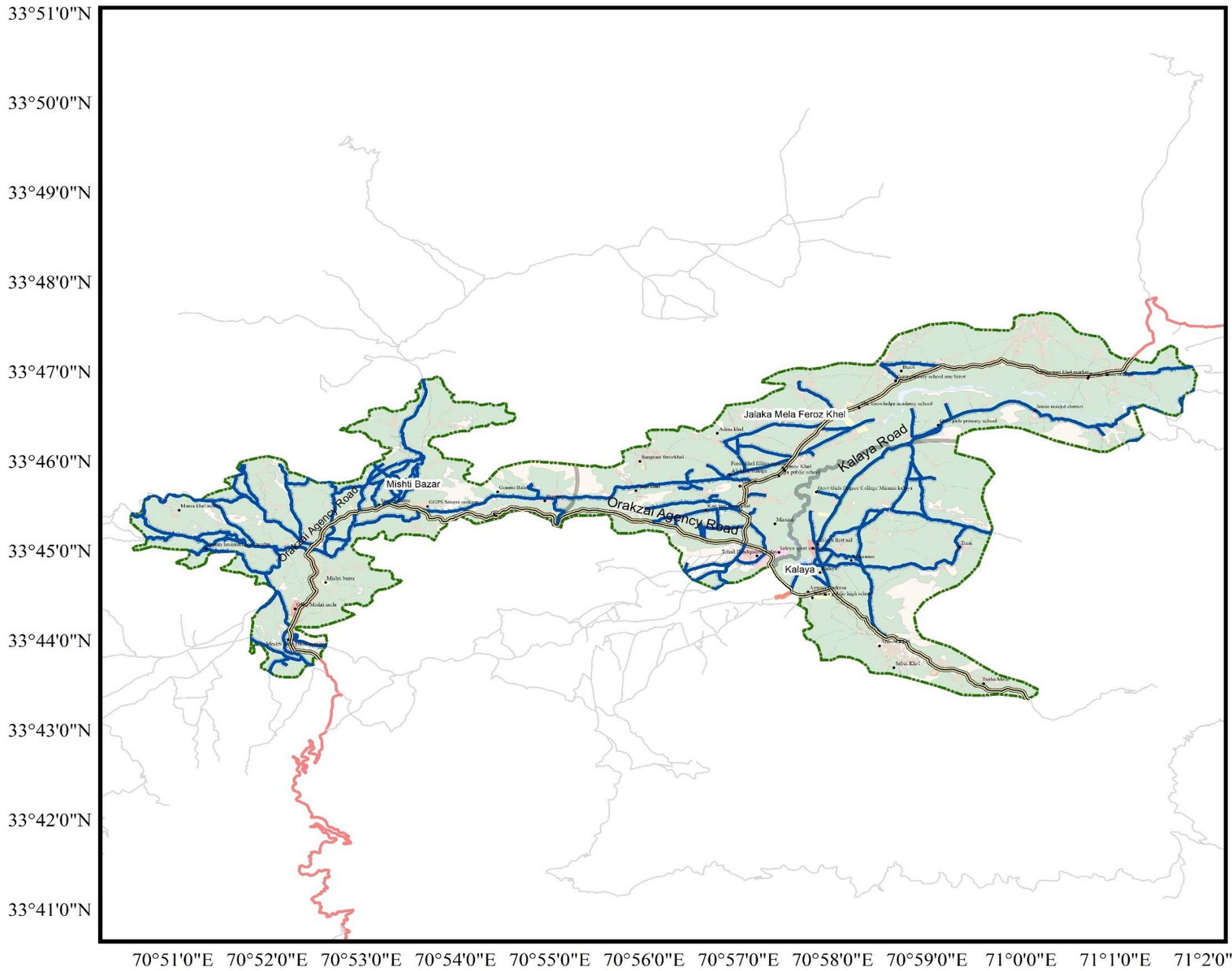
Source: Geometric Design Guidelines (UPPU)

The allied infrastructure such as signage and drainage should also be provided along the newly widened roadways.

- **Kalaya Road:** Paved and Widened to 50 ft;
- **Orakzai Road:** Widened to 50 ft; and
- Paving of **Access tracks/tertiary roads** to neighborhoods.

The roads proposed for widening and paving are illustrated in the following map.

Short Term Road Network Improvements of Kalaya



Legend - Proposed Landuses

- Paving
- Widening
- Existing Primary Road
- Existing Secondary Road
- Existing Local Roads
- NC Boundary
- Urban Boundary

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

Client:
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Consultant:
The Urban Unit
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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size

N W E S

0 1.25 2.5 5 Kilometers

Map 25: Road Network Improvements (Short Term)

These upgraded roads will reduce regional disparity and facilitate the suburban village councils. However, considering the mountainous terrain of the district, it is essential to initiate a detailed study to determine the best alignment considering all technical, economic, social and environmental parameters.

Both improved and existing roads shall be maintained by the relevant line departments such as Construction and Works (C&W), Local Government & Rural Development Department, Transport Department, and Government of KP.

While it is recommended to undertake the widening projects of Kalaya Road and Orakzai Road on a Short-Term Basis, the paving of tertiary access roads may be deferred over the next 15 years on an as needed basis.

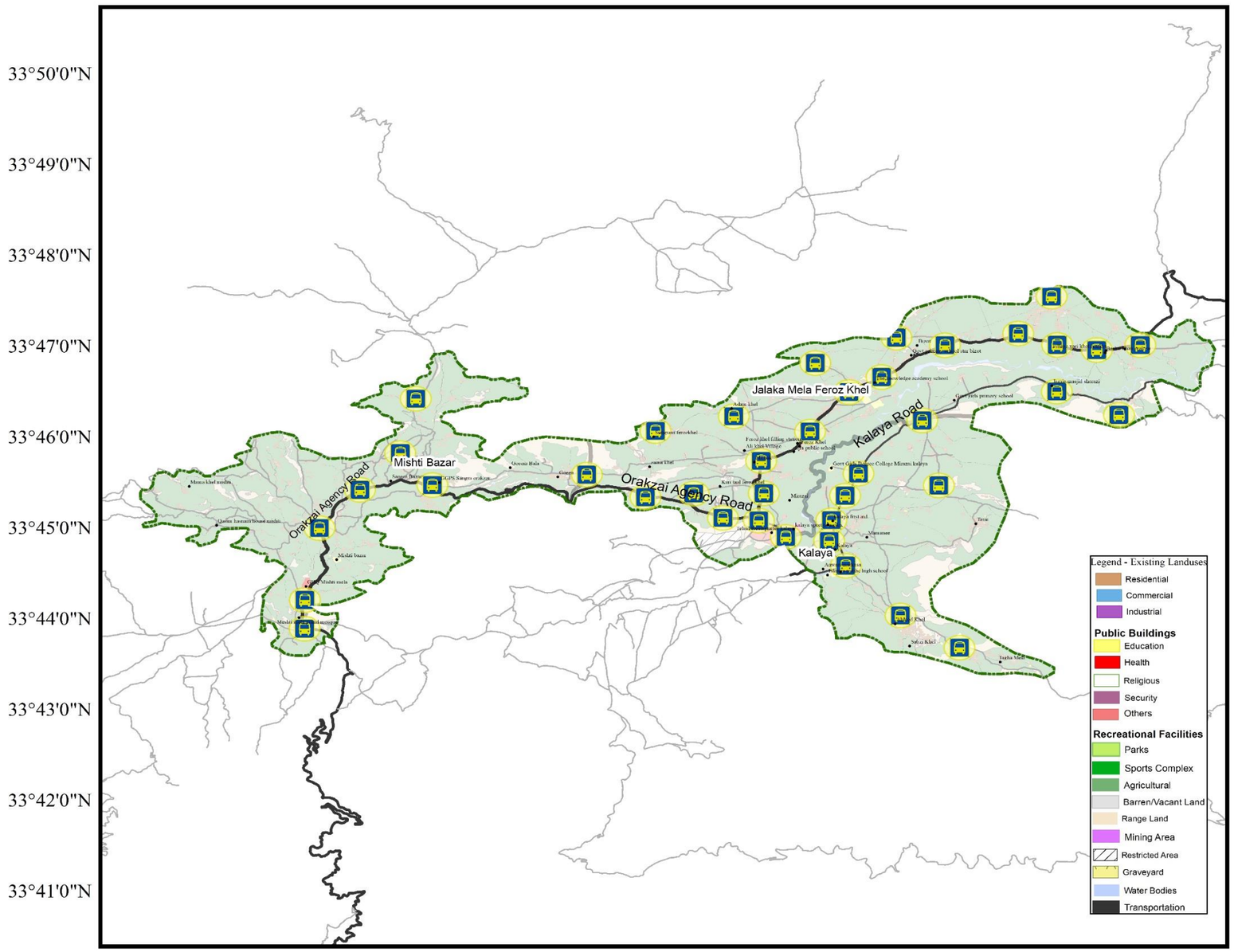
- **Provision of Intra-City Public Transit Services**

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

In short term, these services may be provided along the existing Secondary and local road network of Kalaya with services to the stops identified in the Figure below. The stops of been selected such that each have a catchment (service area) of 250 meters and provide access to prominent existing localities and land uses. 250 meters is considered to be a walk-friendly distance and accessible to a community within a 5-minute timeframe based on an average walk-speed of 1.2 meters/second.

The route planning and scheduling for these services will be determined by the relevant implementation line department. The transit stops should be marked with sign posts on the roadside. As a best practice, it is preferable to situate a transit stop on the near-side (before the crossing) of the intersection.

Kalaya Proposed Public Transit Stops (Short Term)



Legend-Proposed Landuses

- Transit Stop
- Catchment
- Existing Primary Road
- Existing Secondary Road
- Existing Local Roads
- NC Boundary
- Urban Boundary

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

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size

0 1 2 4 Kilometers

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

- **Provision of Designated Parking Spaces**

At present, all vehicles coming into the Kalaya Urban Center park on street. Due to lack of off-street parking facilities in Kalaya Urban Area, vehicles are parked along the main roads within the main bazaar areas. There are 3 Commercial bazars within the Kalaya urban area; Feroz khel, Kalaya and Mishti Mela.

On-street parking on Feroz khel and Kalaya is less frequent as the traffic flow in these areas is low. As per the counting done in these two NCs it was identified that the maximum vehicles parked on street/road at one time was not more than 20. In Mishti Khel Bazar, several cars park along Orakzai Road.

The open spaces and the on-street areas are large enough to cater for the parking demands of Kalaya. However, certain areas like Mishti Mela main bazar and the area near DHQ hospital requires parking lot facilities in order to facilitate the incoming traffic towards the hospital and bazar. Feroz Khel also does not have any parking lot facility.

Consequently, the following parking lands or spaces are proposed to be designated as formal off-street lots in Mishti Mela Bazaar:

1. **DHQ Hospital Parking in Mishti Mela (1.3 Acres)**: While the hospital has its own parking facilities within its premises, this proposed lot is for serving the commercial areas surrounding the hospital, including the transport terminal opposite the hospital. This lot is intended to provide off-street parking so that vehicles do not parking on-street and potentially hindering movement along Orakzai Road.

2. **Mishti Mela Bazaar Parking Lot 1 (1.2 Kanals)**: Two lots are proposed for Mishti Mela Bazar, one on the north end, and the other at its south end. The north lot can be approximately 1 kanal to allow road users to park their cars off the road and access the bazaar and the Grand Masjid by foot.

3. **Mishti Mela Bazaar Parking Lot 2 (1.5 Kanals)**: The south lot can be used by those patrons wanting to access the southern half of Mishti Mela Bazar. By formally designating these parking lots. On-street parking can be avoided and Orakzai Road can operate without hinderances caused by on-street parking.

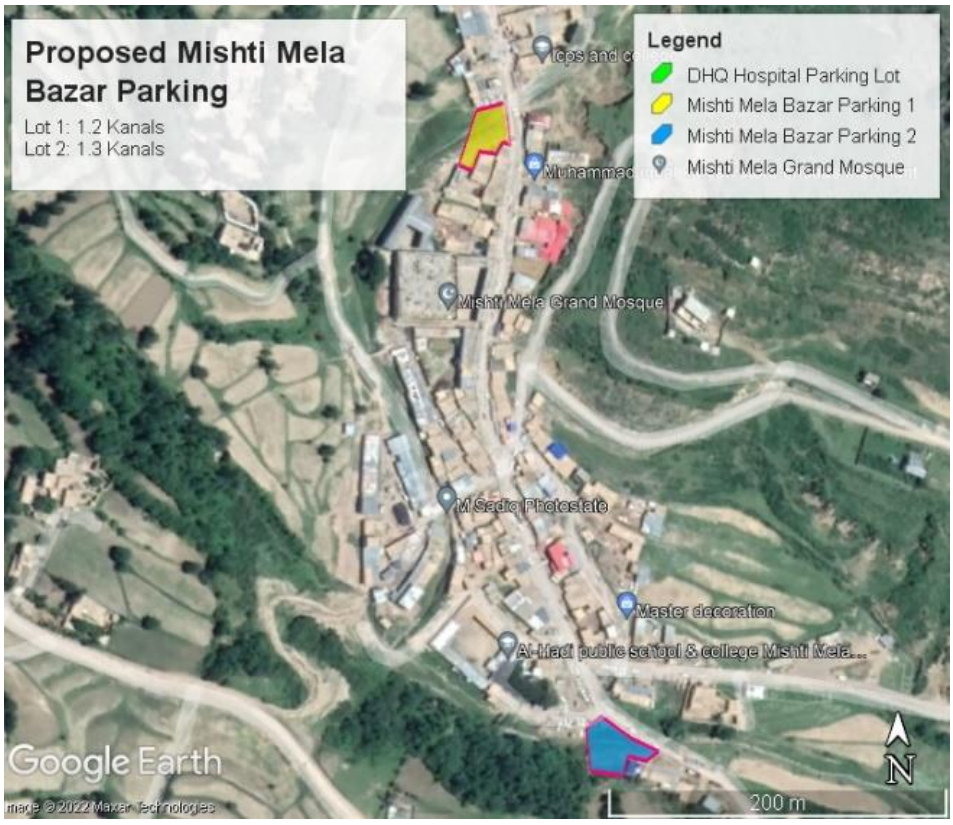


Figure 6-13: Proposed Parking Lots in Mishti Mela

The locations of the proposed parking lots are illustrated in **maps**.

In Kalaya Bazar, a 3 Kanal lot is proposed adjacent to the masjid in the bazaar. This lot would encourage off-street parking and pedestrian movement in the bazaar with minimal on-street parking.

Figure 6-14: Proposed Parking Lot in Kalaya Bazar

A parking lot is proposed in the vacant lot near the main masjid in the bazar. This 2 Kanal facility would help maintain traffic flow along Orakzai Road, especially during the Friday peak hour.

Map 27: Proposed Parking Lot in Feroz Khel

- **Formalizing Public Transit**

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

While this type of public transport service is effective, it is still part of the informal economy. It is recommended that the Transportation Department begins regulating these services, following the models adopted by the Punjab Transportation Department and its subsidiaries.

- **Issuing of Route Permits**

The Transport Department would ensure compliance to Chapter 4 of the Khyber Pakhtunkhwa Motor Vehicles Ordinance, 1965 and develop a database of these transport vehicles via registrations.[18]

The registration mechanism shown in below figure has been obtained from the Punjab Transport Department and is provided as an example. The KP Transportation

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

department operating in Kalaya is however encouraged to develop their own, registration process that conforms to the law of the land for the merged areas.

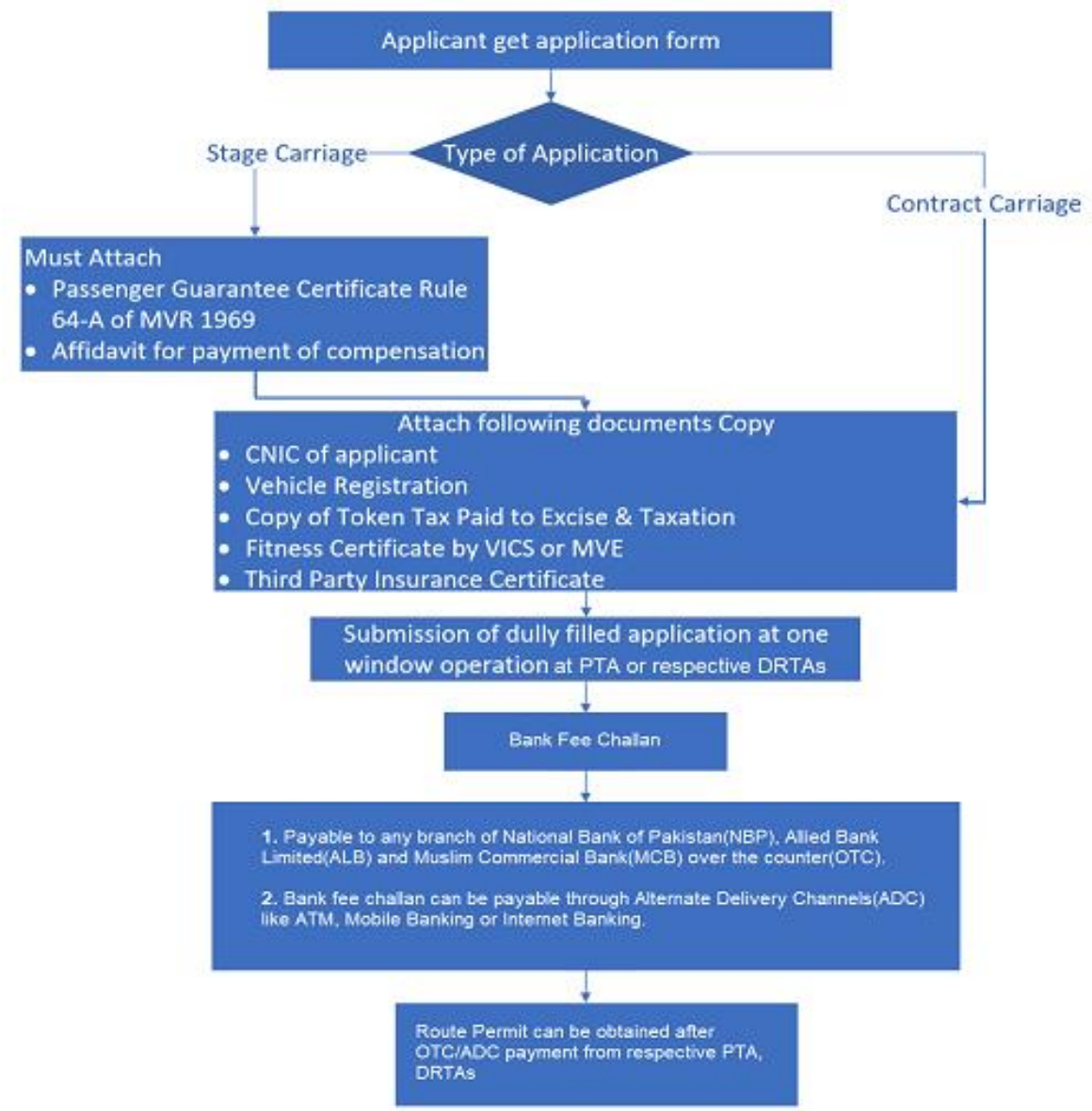


Figure 6-6: Route Permit Issuing Process to be adopted

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

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

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

- **Provision and Upgradation Transport Terminals**

Transportation terminals are a key element of transport systems which adjust the layout of public transportation networks, provide a passenger guidance system, and regulate the development of commercial forms. A small public transport terminal housing Toyota Hiaces and Station Wagons is present in Kalaya.

Figure 6-15: Kalaya Transport Terminal

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

In addition, based on the current development patterns, it is recommended to establish a new transportation terminal in Mishti Mela as this locality houses the DHQ Hospital and relatively densely populated. The proposed location for this terminal is shown in map below.

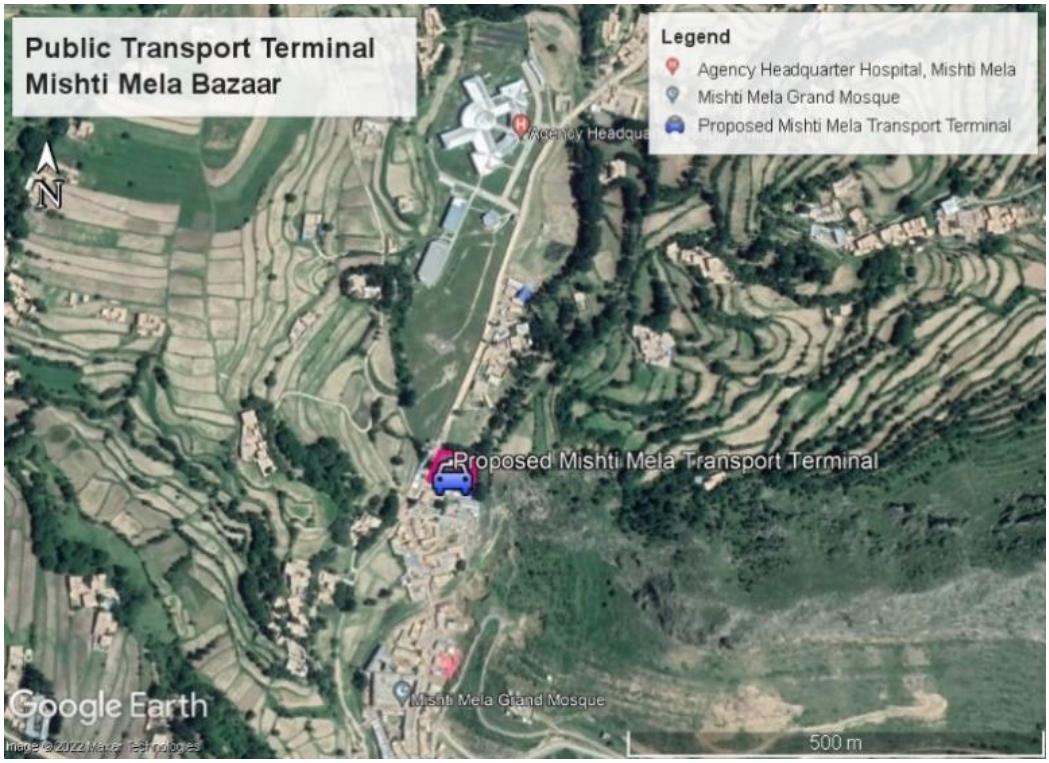


Figure 6-16: Proposed Terminal in Mishti Mela

With the designation of Class C terminals, the administration can ensure that the following requisite facilities for passengers, terminal staff, and vehicle operators can be provided and maintained:

Passenger areas

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

Areas for terminal staff

- Revenue office

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

Areas for Vehicle Operators

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

All above proposals are recommended to be implemented in the short term. For the medium and long term, Feroz Khel may also be considered for a transportation terminal, although it is only 3 kilometers from central Kalaya.

- **Summary of Short-Term Interventions**

Road Infrastructure

- Widening of Kalaya **Road** to 50 ft;
- Widening of Orakzai **Road:** to 50 ft; and

Parking

- Establishment of Parking Facilities in Kalaya, Mishti Mela, and Feroz Khel.

Public Transportation

- Implementation of Vehicle Route Permit Program
- Designation of in Kalaya Transportation Terminals as a Class C terminal.
- Construction of Mishti Mela Bazaar Transport Terminal

6.6.5.2. Medium- and Long-term Interventions

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

- **Future Travel Patterns**

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

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

The key inputs for this analysis are:

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

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

- **Trip Generation**

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

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

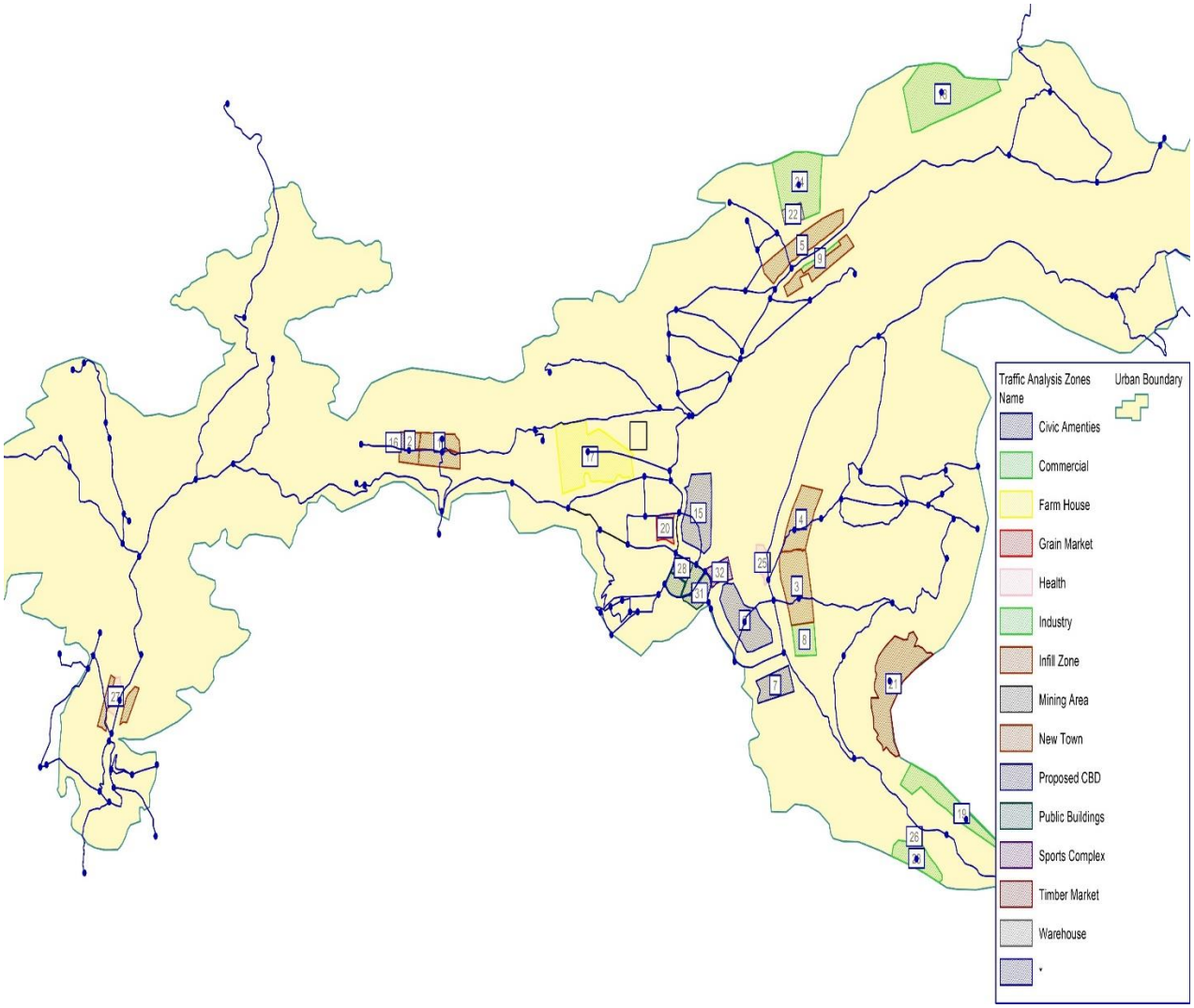


Figure 6-17: Traffic Analysis Zones

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

Note the following considerations for trip generation:

- The following area adjustments have been made to estimate the covered area of the facilities to be built upon the defined land uses. The trip generation shall therefore be based on the reduced land areas as follows:
    - Civic & Public Buildings: 25%
    - Health: 50%
    - Warehouse: 10%
    - Mining: 10%
    - Timber: 50%
    - Sports: 10%
    - Grain Market 10%
    - Farm House: 75%
- Educational facilities have not been considered as major trip generators as students are expected to commute to school via foot/bike/wagon. Moreover, proposed educational facilities are situated within neighborhoods which are expected to utilize the nearest facility. A school's traffic impact on the greater road network would therefore be negligible.
- Commercial Areas (including the proposed grains market) are approximated with the ITE Code 770 (Business Park) as the definition of Business Park includes restaurants, convenience stores, and retail. Moreover, the appropriate unit of measurement (Acres) is available in the trip generation manual.
- New Towns, Infill Zones, and Residential Zones use the ITE Code 210 (Single Detached Dwellings) for trip generation as the appropriate unit of measurement (Acres) is available in the trip generation manual.
- Industrial Zones use the ITE Code 130 (Industrial Park). The Proposed Timber Market also uses this code.
- Public Buildings use the ITE Code 730 (Government Office Building).
- Health Facilities (Hospitals) are based on the ITE Code 610 (Hospital) and the covered area of their buildings.

- Civic Amenities are assumed to have 25% covered area of their total land space allocation based on measurement of existing similar facilities.

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

Table 6-36: Trip Generation Parameters

Zone	ITE Code	Unit	Rate	In	Out
Public Buildings	730	1000Sqft	1.21	31%	69%
Health	610	1000Sqft	1.46	47%	53%
Farm House	210	Acres	2.73	66%	34%
Warehouse	130	Acres	8.67	21%	79%
Mining Area	130	Acres	8.67	21%	79%
Residential	210	Acres	2.73	66%	34%
Commercial	770	Acres	16.84	20%	80%
Education	530	1000Sqft	2.12	31%	69%
New Town	210	Acres	2.73	66%	34%
Infill Zone	210	Acres	2.73	66%	34%
Landfill Site	NA	Acres	0	21%	79%
Industry	130	Acres	8.67	21%	79%
Cantonment	770	Acres	16.84	20%	80%
Proposed CBD	770	Acres	16.84	20%	80%
University	540	1000Sqft	3.09	50%	50%
Sports Complex	730	1000Sqft	1.21	31%	69%
Civic Amenties	730	1000Sqft	1.21	31%	69%
Timber Market	130	Acres	8.67	21%	79%
Grain Market	770	Acres	16.84	20%	80%

Source: ITE Trip Generation Manual

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

Table 6-37: Trip Generation

TAZID	Zone	Acres	Sqft	Type	ITE Code	ITE Units	ITE Units	Trip Rate	In%	Out%	Trips	Trips In	Trips Out
1	Infill Zone	20	864657	P	210	Acres	20	2.73	0.66	0.34	55	37	19
2	New Town	10	448901	P	210	Acres	10	2.73	0.66	0.34	29	20	10
3	Infill Zone	59	2562870	P	210	Acres	59	2.73	0.66	0.34	161	107	55
4	New Town	44	1927400	P	210	Acres	44	2.73	0.66	0.34	121	80	42
5	Infill Zone	49	2147241	P	210	Acres	49	2.73	0.66	0.34	135	90	46
6	Civic Amenties	14	596982	P	730	1000Sqft	597	1.21	0.31	0.69	723	225	499
7	Proposed CBD	26	1116699	P	770	Acres	26	16.84	0.2	0.8	432	87	346
8	Commercial	21	921060	P	770	Acres	21	16.84	0.2	0.8	357	72	286
9	Commercial	6	267918	P	770	Acres	6	16.84	0.2	0.8	104	21	84
10	Infill Zone	27	1169491	P	210	Acres	27	2.73	0.66	0.34	74	49	26
11	Infill Zone	20	881037	P	210	Acres	20	2.73	0.66	0.34	56	37	20
12	New Town	8	356021	P	210	Acres	8	2.73	0.66	0.34	23	16	8
13	New Town	10	423104	P	210	Acres	10	2.73	0.66	0.34	27	18	10
14	New Town	8	363460	P	210	Acres	8	2.73	0.66	0.34	23	16	8
15	Civic Amenties	15	632967	P	730	1000Sqft	633	1.21	0.31	0.69	766	238	529
16	Health	2	75484	P	610	1000Sqft	75	1.46	0.47	0.53	111	53	59
17	Farm House	79	3441513	P	210	Acres	79	2.73	0.66	0.34	216	143	74
18	Industry	118	5145003	P	130	Acres	118	8.67	0.21	0.79	1025	216	810
19	Industry	68	2981438	P	130	Acres	68	8.67	0.21	0.79	594	125	470
20	Grain Market	6	281050	P	770	Acres	6	16.84	0.2	0.8	109	22	88
21	Timber Market	47	2038258	P	130	Acres	47	8.67	0.21	0.79	406	86	321
22	Warehouse	1	42457	P	130	Acres	1	8.67	0.21	0.79	9	2	8
23	Industry	30	1311358	P	130	Acres	30	8.67	0.21	0.79	262	56	207
24	Industry	75	3275459	P	130	Acres	75	8.67	0.21	0.79	652	137	516
25	Health	4	190949	E	610	1000Sqft	191	1.46	0.47	0.53	279	132	148
26	Mining Area	4	154263	E	130	Acres	4	8.67	0.21	0.79	31	7	25
27	Health	5	203932	E	610	1000Sqft	204	1.46	0.47	0.53	298	141	158
28	Public Buildings	3	116465	E	730	1000Sqft	116	1.21	0.31	0.69	141	44	98
29	Public Buildings	2	97383	E	730	1000Sqft	97	1.21	0.31	0.69	118	37	82
30	Public Buildings	2	104375	E	730	1000Sqft	104	1.21	0.31	0.69	127	40	88
31	Public Buildings	4	156967	E	730	1000Sqft	157	1.21	0.31	0.69	190	59	132
32	Sports Complex	1	59173	E	730	1000Sqft	59	1.21	0.31	0.69	72	23	50

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

The sum value of all Trips Out for each Traffic Analysis Zone **(5322)** has been taken as the total number of induced vehicles in Kalaya's road network.

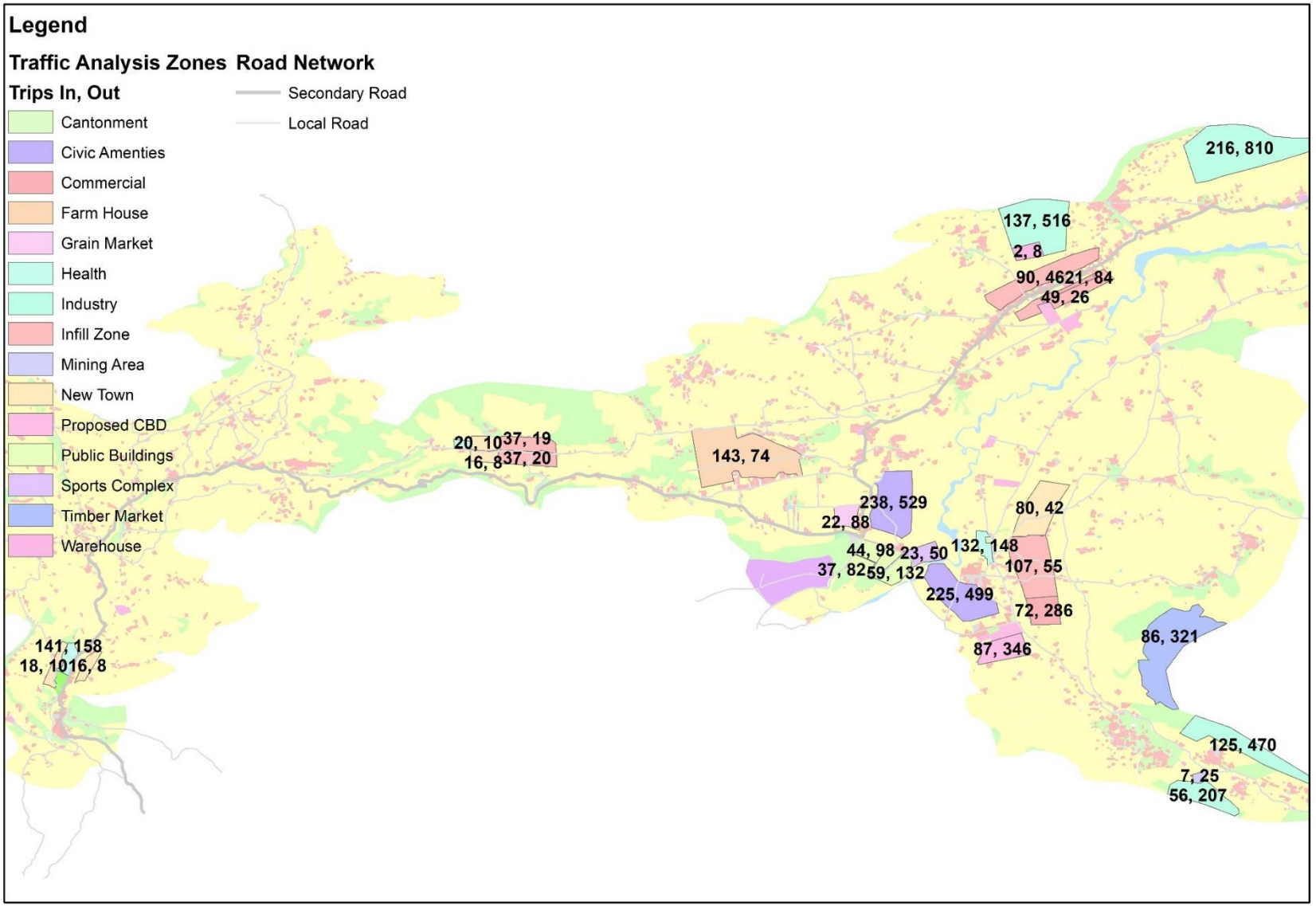


Figure 6-18: Trip Generation for Each Zone

- **Trip Distribution**

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

While a 32x32 matrix was prepared to represent all origin and destination zones, the following assumptions were made for more logical trip distribution:

1. No Intra-Zonal Trips
2. No trips occur between residential zones
3. Sum of productions for each zone should equal to “trips out” indicated in the trip generation table.
4. The relative proportion of trips originating from a zone is considered to model skews in trip assignment caused be large trip generating zones.

VISSUM’s trip distribution module was used to calculate the trip distribution matrix using a combined utility model and with production constraint parameters.

The result origin destination forecast matrix is shown below.

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

Table 6-38: Origin Destination Forecast

TAZ		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	SUM
1	Infill Zone	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	4	5	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	**19**
2	New Town	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**
3	Infill Zone	0	0	0	0	0	13	5	4	0	0	0	0	0	0	7	0	2	0	2	1	4	0	1	0	8	0	0	2	1	2	3	1	**55**
4	New Town	0	0	0	0	0	12	4	3	0	0	0	0	0	0	4	0	1	0	1	0	2	0	1	0	7	0	0	1	1	1	2	1	**42**
5	Infill Zone	0	0	0	0	0	3	1	1	2	0	0	0	0	0	9	0	5	4	0	1	0	0	0	15	1	0	0	1	1	1	1	1	**46**
6	Civic Amenties	1	1	50	38	5	0	42	34	1	2	2	0	0	0	82	1	27	0	15	8	21	0	8	4	62	1	0	19	14	18	28	11	**499**
7	Proposed CBD	1	0	34	22	2	72	0	22	0	1	1	0	0	0	44	1	14	0	13	5	10	0	7	2	41	1	0	11	8	11	17	6	**346**
8	Commercial	0	0	26	19	2	60	23	0	0	1	1	0	0	0	32	0	10	0	12	3	13	0	6	1	35	1	0	8	6	8	14	5	**286**
9	Commercial	0	0	1	0	14	4	1	1	0	8	0	0	0	0	12	0	6	5	0	1	0	0	0	21	1	0	0	2	1	1	2	1	**84**
10	Infill Zone	0	0	0	0	0	2	0	0	1	0	0	0	0	0	5	0	3	2	0	0	0	0	0	8	1	0	0	1	1	1	1	0	**26**
11	Infill Zone	0	0	0	0	0	2	0	0	0	0	0	0	0	0	4	4	5	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	**20**
12	New Town	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**8**
13	New Town	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	**10**
14	New Town	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	**8**
15	Civic Amenties	4	2	30	17	19	98	30	22	4	10	4	1	0	0	0	4	78	2	6	12	6	0	3	17	37	0	0	26	22	24	34	14	**529**
16	Health	9	3	1	0	1	3	1	1	0	1	9	3	0	0	7	0	10	0	0	1	0	0	0	1	1	0	1	2	1	1	1	1	**59**
17	Farm House	2	1	3	1	3	9	3	2	1	1	2	1	0	0	22	2	0	0	0	2	0	0	0	2	3	0	0	4	3	3	4	2	**74**
18	Industry	2	1	5	2	235	18	5	3	49	115	2	1	0	0	73	2	35	0	1	6	1	4	0	206	6	0	0	10	7	8	9	4	**810**
19	Industry	0	0	38	20	1	81	42	36	0	1	0	0	0	0	26	0	7	0	0	3	37	0	80	1	47	10	0	8	5	8	14	4	**470**
20	Grain Market	1	0	5	3	2	14	4	3	1	1	1	0	0	0	17	1	10	0	1	0	1	0	0	2	6	0	0	3	3	3	5	2	**88**
21	Timber Market	0	0	48	19	1	73	21	27	0	0	0	0	0	0	18	0	5	0	24	2	0	0	12	1	42	2	0	5	3	5	10	3	**321**
22	Warehouse	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	**8**
23	Industry	0	0	14	8	0	31	16	14	0	0	0	0	0	0	10	0	3	0	59	1	14	0	0	0	18	3	0	3	2	3	5	2	**207**
24	Industry	3	1	6	3	145	23	6	4	31	73	3	1	0	0	80	2	40	30	1	7	1	3	0	0	7	0	0	12	8	10	10	5	**516**
25	Health	0	0	16	12	1	33	13	11	0	0	0	0	0	0	17	0	5	0	5	2	6	0	2	1	0	0	0	4	3	4	7	2	**148**
26	Mining Area	0	0	2	1	0	3	2	2	0	0	0	0	0	0	1	0	0	0	6	0	2	0	3	0	2	0	0	0	0	0	1	0	**25**
27	Health	6	2	0	0	0	1	0	0	0	0	6	2	68	50	4	6	6	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	**158**
28	Public Buildings	1	0	6	3	2	17	6	4	0	1	1	0	0	0	20	1	10	0	1	2	1	0	1	2	7	0	0	0	3	2	5	2	**98**
29	Public Buildings	1	0	4	2	2	14	4	3	0	1	1	0	0	0	18	1	8	0	1	2	1	0	0	1	5	0	0	3	0	3	4	2	**82**
30	Public Buildings	1	0	6	3	2	16	5	4	0	1	1	0	0	0	18	0	8	0	1	2	1	0	1	1	7	0	0	2	3	0	4	1	**88**
31	Public Buildings	1	0	10	6	2	25	9	7	0	1	1	0	0	0	25	1	9	0	2	2	2	0	1	2	12	0	0	5	4	4	0	2	**132**
32	Sports Complex	0	0	3	2	1	9	3	2	0	0	0	0	0	0	10	0	4	0	1	1	1	0	0	1	4	0	0	2	2	1	2	0	**50**

- **Mode Choice**

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

- **Network Assignment**

VISSUM's *Private Transport Assignment Procedure* was used to assign the trips occurring between each zone along the existing road network of Kalaya with the primary factor of impedance being total Travel Time (Based on Road Class and Speed).

An equilibrium assignment method was used to assign vehicles to different roads such that average delay or impedance is relatively equal for all road users.

The network assignment results show that the Orakzai District Main Road will be the most utilized roadway during the peak hour due to the presence of Industrial and Residential Land Uses along its corridor. Its 2-lane cross section would however be able to accommodate this traffic with a maximum V/C Ratio of 0.9.

This road will also face capacity and congestion issues in the vicinity of the Central business district where there is a significant presence of Public Buildings, Civic Amenities and Commercial Areas.

Kalaya Headquarter Road and the local roads intersecting with it will also be subject to volume to capacity ratios above 1 in the vicinity of the Headquarter and Central Business District.

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

Table 6-39: Future Volume to Capacity Ratios of Key Roads

Name	LENGTH	NUM of LANES	CAPPRT	V0PRT	Peak Hour Volume	V/C Ratio
Kalaya Road	0.594km	1	450	70km/h	690	1.533333
Kalaya Road	0.594km	1	450	70km/h	663	1.473333
Kalaya Road	0.068km	1	450	70km/h	589	1.308889
Kalaya Road	0.068km	1	450	70km/h	588	1.306667
Kalaya Road	0.305km	1	450	70km/h	674	1.497778
Unnamed Local Road	0.044km	1	450	70km/h	513	1.14
Unnamed Local Road	0.305km	1	450	70km/h	647	1.437778
Unnamed Local Road	0.481km	2	450	80km/h	644	1.431111
Unnamed Local Road	0.481km	2	450	80km/h	550	1.222222
Unnamed Local Road	0.351km	1	450	70km/h	455	1.011111
Unnamed Local Road	1.290km	1	450	70km/h	580	1.288889

*Roads with the same name refer to different segments of the same road. Roads were divided into segments for better detailed analysis

** Capacity of each road is assumed based on HCM 2010 formula 1800*(N-1+P_S) and further reduced by 25-50% to account for congestion and road class.

***Based on Traffic Count Data

****Based on trip generation, distribution, and route assignment

*****Existing Peak hour volume + Induced Volume

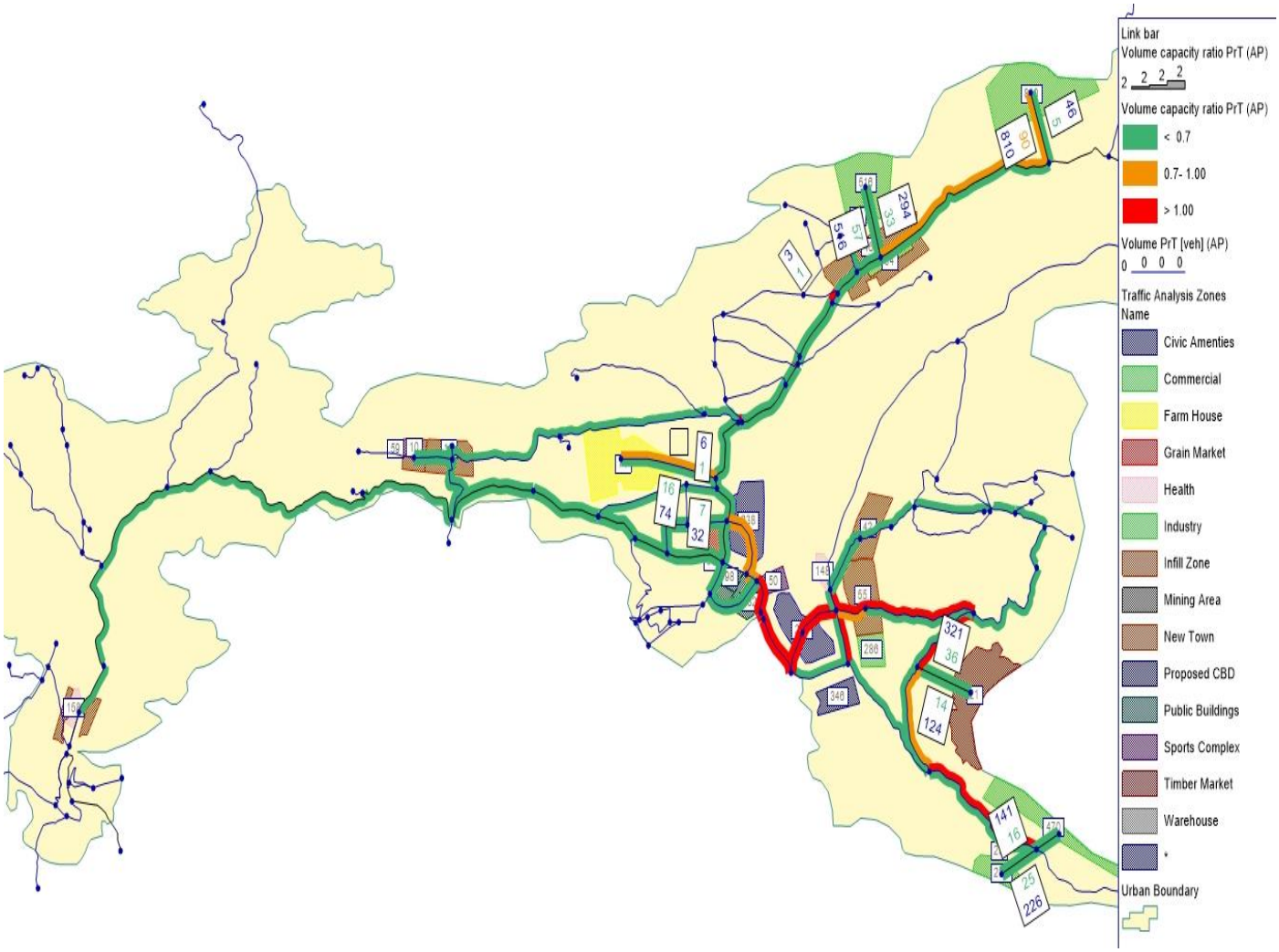


Figure 6-19: Future Peak Hour Volume to Capacity Ratios of Existing Road Network

The above analysis shows that the roads in the vicinity of the center business district/tehsil headquarter may be subject to congestion in the long term during the peak hour. This is mainly due to their existing single lane cross sections which cause them to have a low capacity, approximately 450 Vehicles/Hour.

It is therefore recommended that the roads highlighted in red in the previous figure be widened to include an additional lane and have a total cross section of 50ft.

6.6.6. Road Network Proposals

Based on the above analysis, it is necessary to widen the highlighted roads in the long term to accommodate for the additional traffic induced by the proposed land uses.

In addition, new links to provided to provide access to new land uses situated near the Urban Boundary of Kalaya

1. Industrial Zone 1 (North)
2. Industrial Zone 2 (North)
3. Industrial Zone 3 (South)
4. Industrial Zone 4 (South)
5. Timber Market (South)

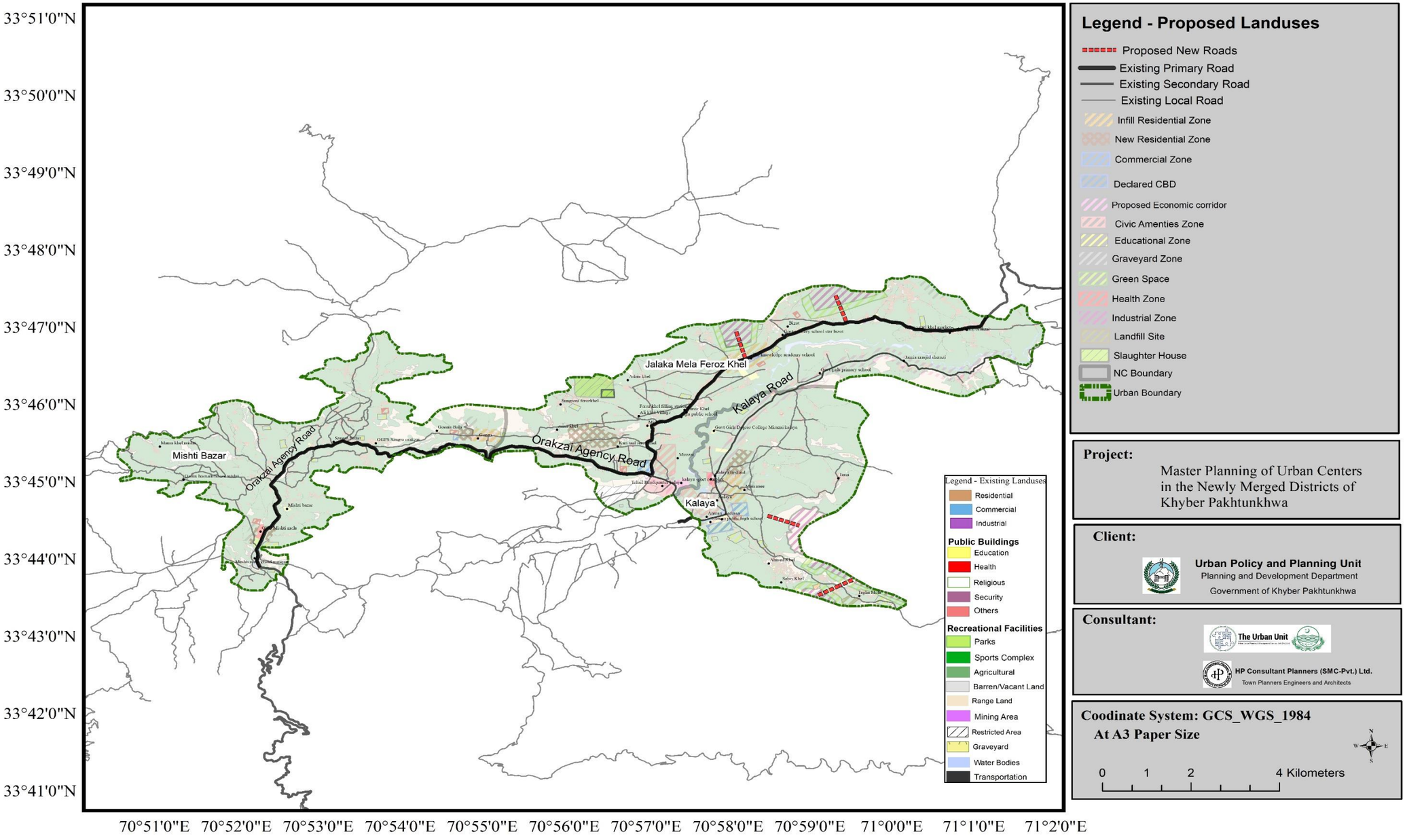
The following figure illustrates the proposed long-term improvements and the subsequent volume-to-capacity ratios after re-assignment of traffic to new roads.

Due to the improved capacities of the new roads and the shorter travel time offered by the improved links, the model calculated several trips utilizing the new roads and an overall improved volume of capacity ratio for most links. No link exhibits a V/C ratio of more than 1 under the improved conditions.

It should also be noted that alleviation of traffic congestion in urban areas has positive environmental impacts in terms of reduced emissions caused by idling. The provision of the additional links will therefore reduce the carbon footprint of vehicles as the overall network delay would be reduced.

Furthermore, the right-of-way and improved cross-sections of the new/improved roads provide opportunities for adding greenspaces and plantation along their lengths. Further details of addition of greenspaces are provided in the Environmental Management Section of Volume II of the Kalaya Master Plan.

Proposed New Roads of Kalaya



Map 28: Proposed New Roads

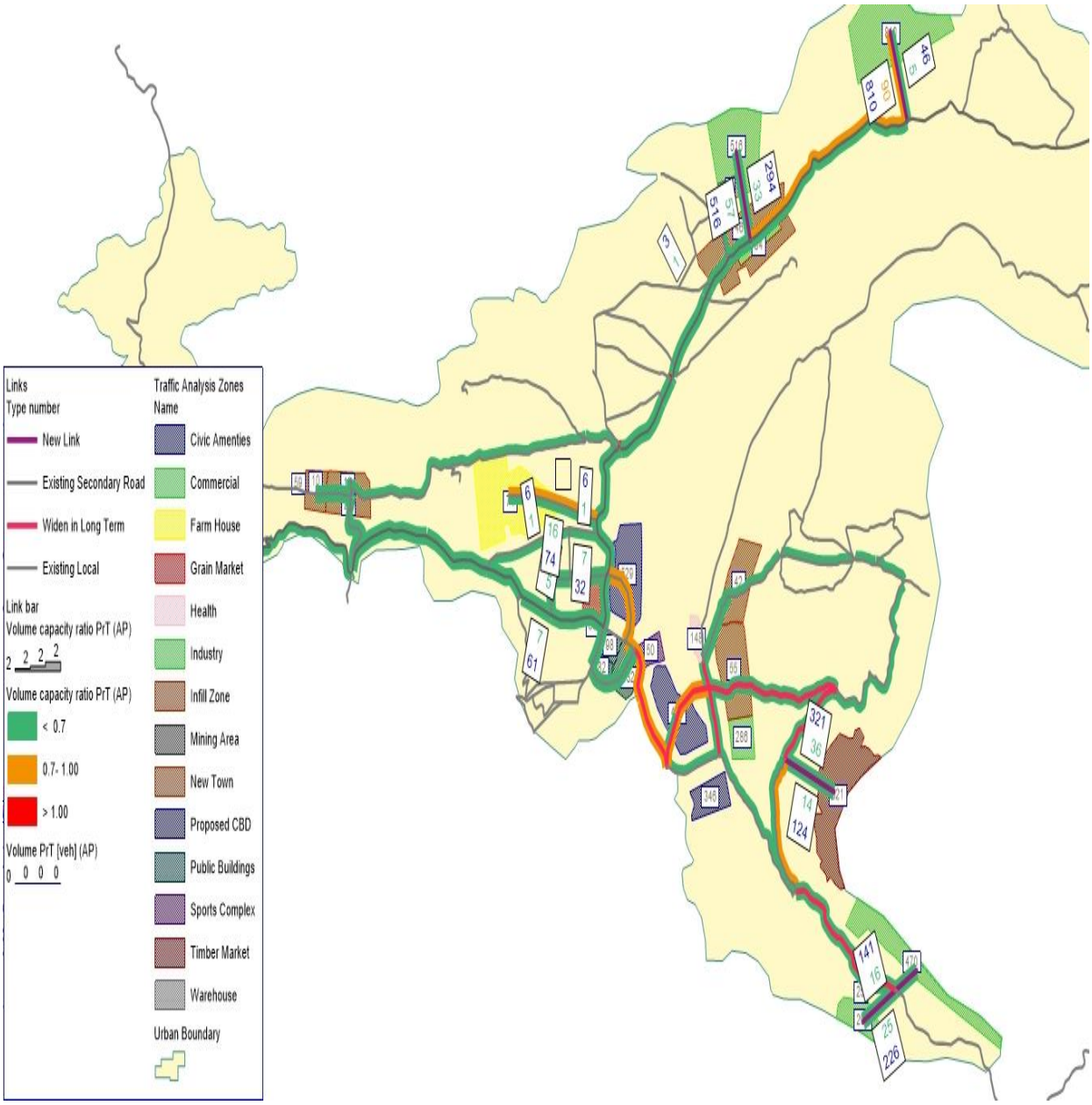
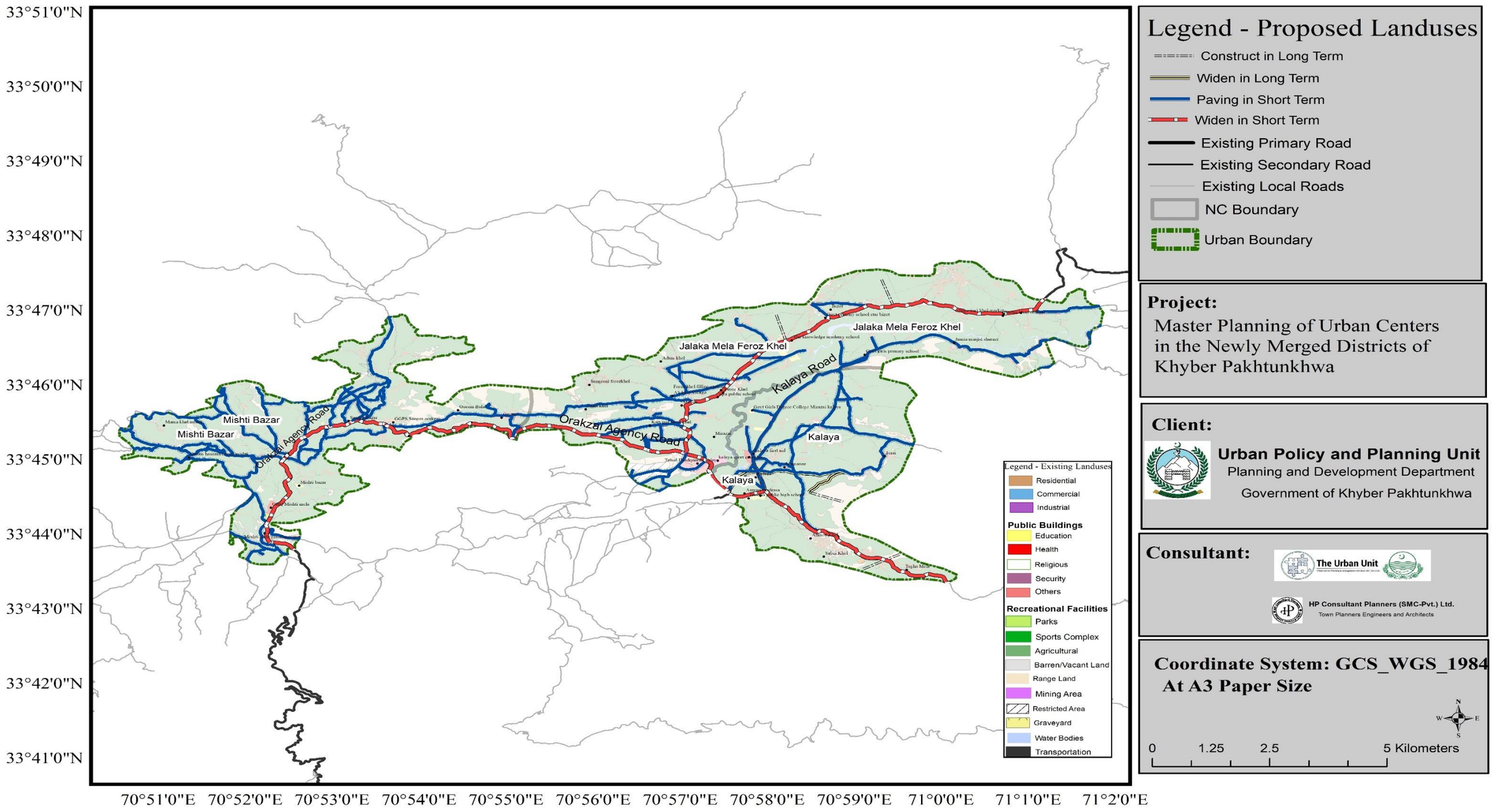


Figure 6-20: Future VC Ratios with New Roads

Long Term Road Network Improvements of Kalaya



Legend - Proposed Landuses

- Construct in Long Term
- Widen in Long Term
- Paving in Short Term
- Widen in Short Term
- Existing Primary Road
- Existing Secondary Road
- Existing Local Roads
- NC Boundary
- Urban Boundary

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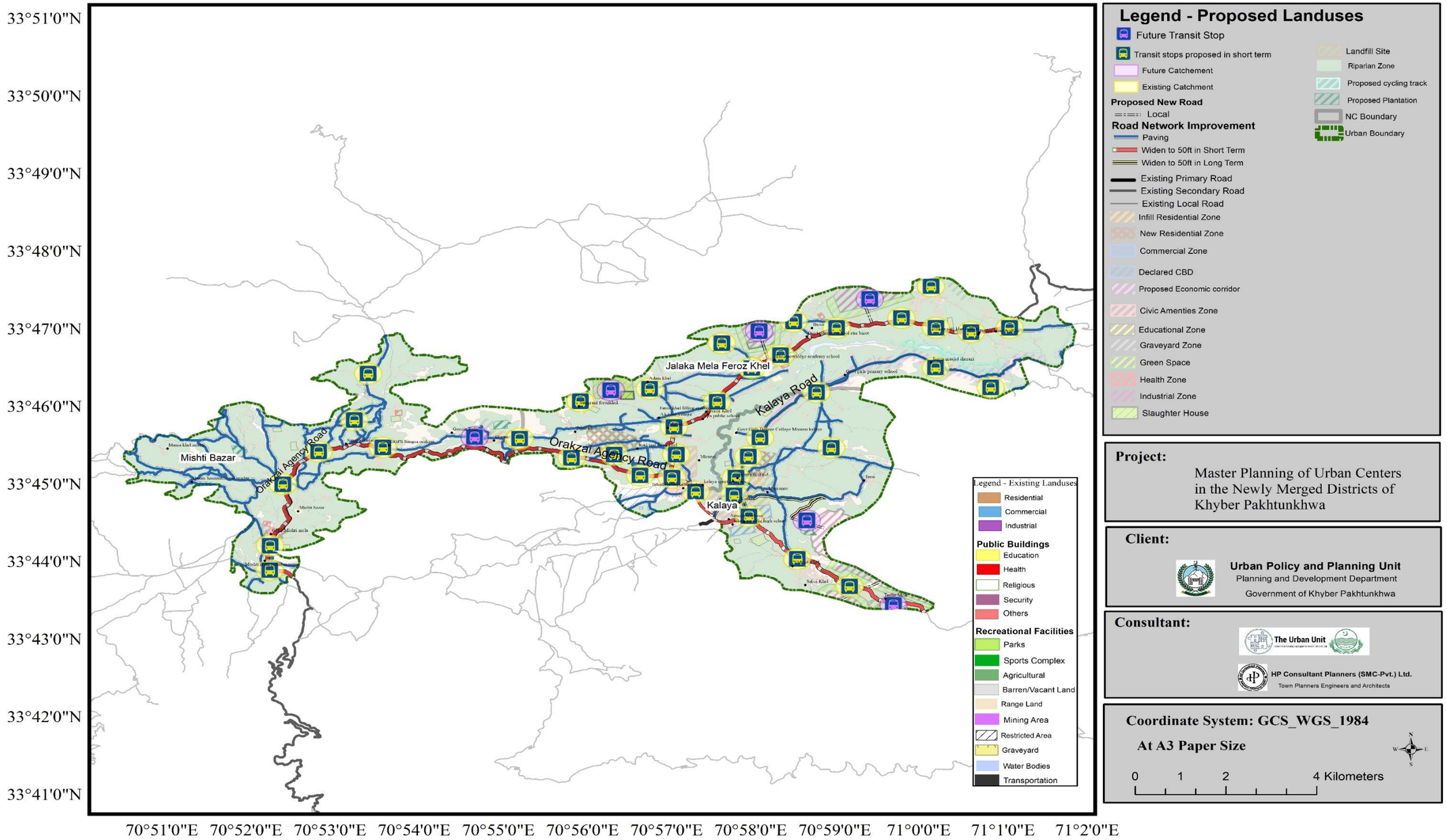
The Urban Unit
HP Consultant Planners (SMC-Pvt.) Ltd.
Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size

0 1.25 2.5 5 Kilometers

Map 29 Long Term Road Network Improvement Plan

Overall Road Network Plan of Kalaya



Map 30: Overall Road Network Improvement Plan

- **Proposed Cross Sections of New and Widened Roads**

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

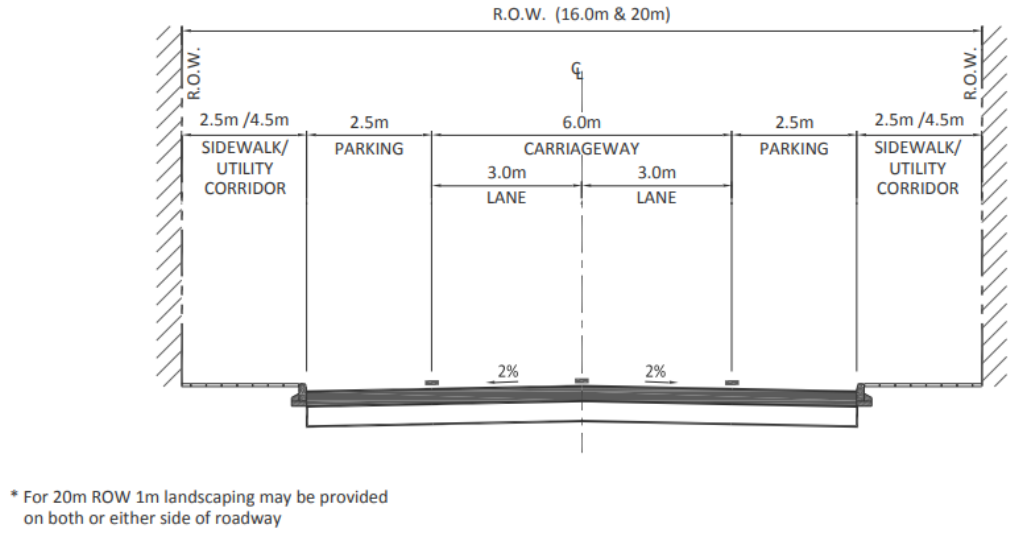


Figure 6-21: Typical Cross Section for Roads in Kalaya

Source: Geometric Design Guidelines (UPPU)

This typical cross section is based on the Khyber Pakhtunkhwa Geometric Design Guidelines published by the Urban Planning and Policy Unit of Khyber Pakhtunkhwa[19]

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

[19] https://urbanpolicyunit.gkp.pk/wp-content/uploads/2018/07/Interim-Report-3_GDM_KP_12-01-2018.pdf.

- **Provision of Footpaths or Sidewalks**

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

The construction of all sidewalks shows follow the following criteria:

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

The Khyber Pakhtunkhwa Geometric Design Guidelines may be referred for more design parameters and criteria for sidewalks.[20] The Khyber Pakhtunkhwa Pedestrian Policy & Design Guidelines are also to be considered during the design phase of each road. The metrics, parameters, and criteria outlined in the policy document should be implemented to ensure equitable right-of-way for all road users, especially

20 https://urbanpolicyunit.gkp.pk/wp-content/uploads/2018/07/Interim-Report-3_GDM_KP_12-01-2018.pdf

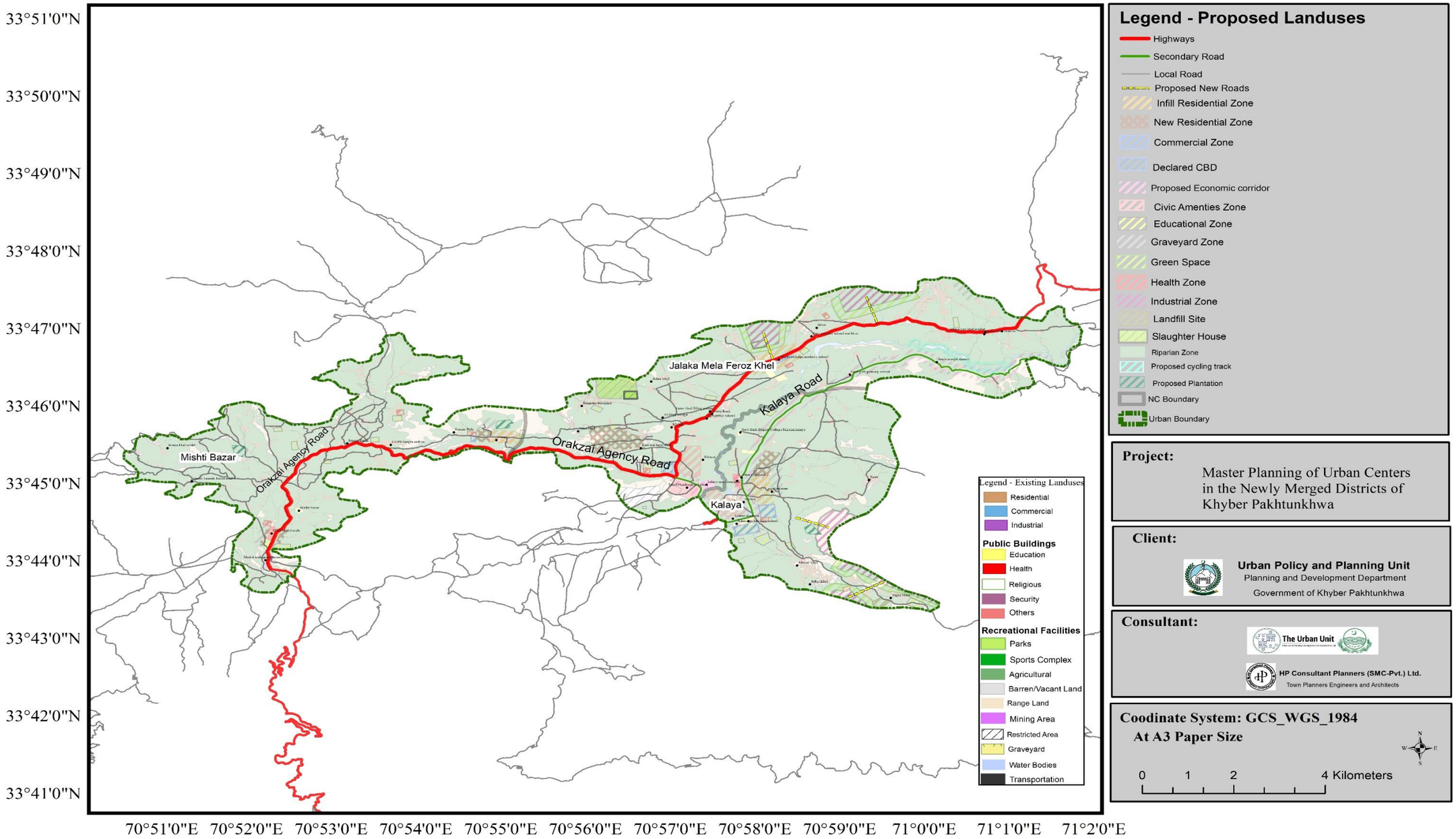
pedestrians. The guideline is available on the Urban Planning and Policy Unit's website.[21]

- **Future Road Network**

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

[21] https://urbanpolicyunit.gkp.pk/wp-content/uploads/2017/05/Pedestrian-Policy-Design-Guidelines_Final.pdf

Future Road Network of Kalaya



Map 31: Future Road Network

- **Traffic Management System**

The field survey of the study area revealed that vehicular movement on the roads of Kalaya city is irregular with minimal delay. At the same time, not serious traffic implication is foreseen over the long term in Kalaya.

As the population of Kalaya increases, a traffic Plan may be prepared in accordance with regional developments. Continuous monitoring of transport infrastructure is required in order to mitigate the traffic congestion and its related problems that may occur in the future.

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

In order to maintain the flow of traffic as Kalaya develops, it is necessary to employ the provisions and conditions of the *Khyber Pakhtunkhwa Land Use & Building Control Act.*[22] This implies that all future development applications should be subject to *Traffic Impact Assessments* which document a development's adherence to by-laws in terms of building setback, parking supply, sightlines, and traffic generation. Any negative mobility impacts of future developments would therefore be corrected proactively.

As Traffic impact study guidelines specific to Khyber Pakhtunkhwa do not exist, it is recommended that the relevant planning agencies in Kalaya or District Orakzai develop their own guidelines for developers to refer to for their applications. An example guideline is provided on the following link[23]

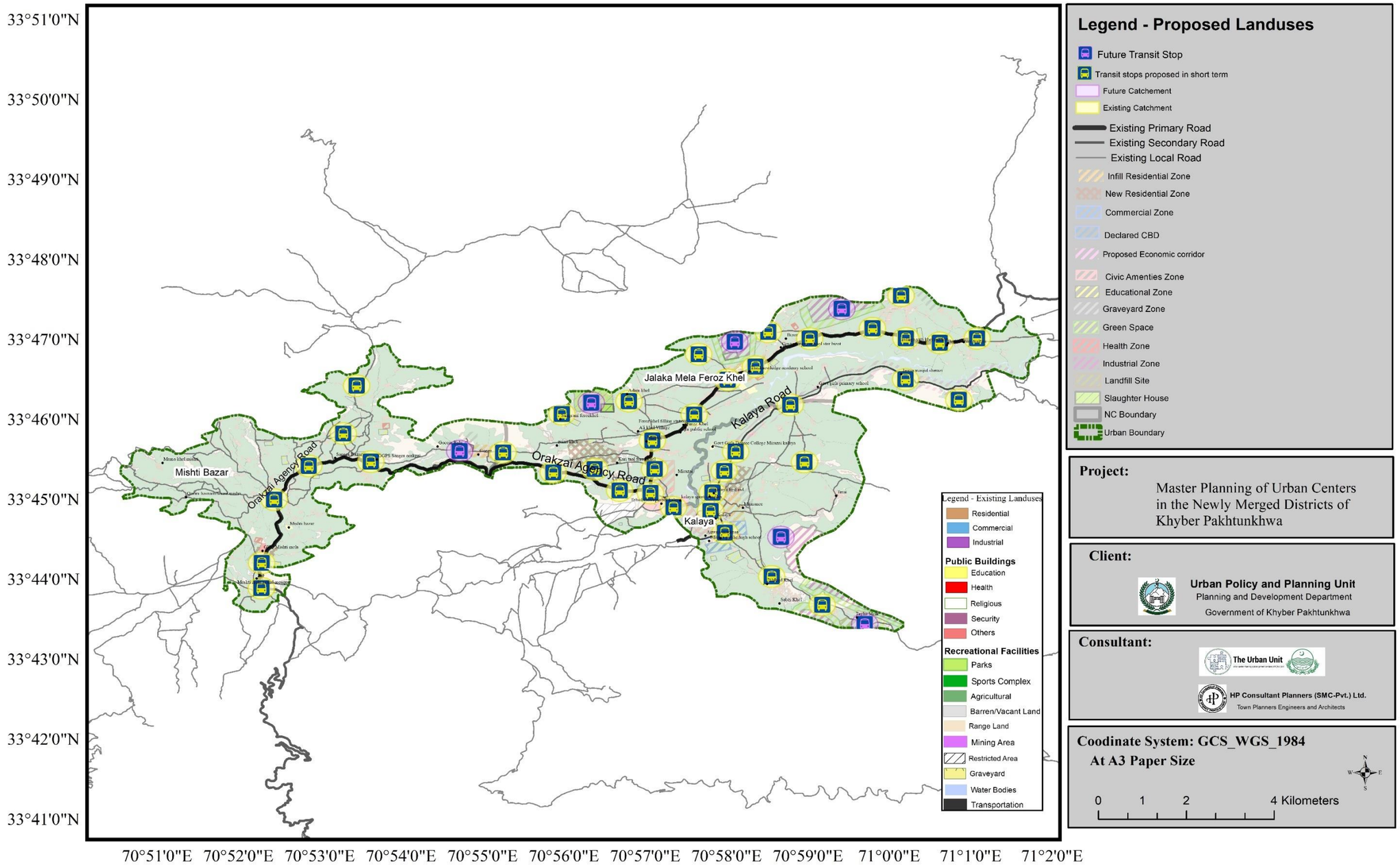
- **Enhanced Public Transit Services**

[22] https://kpcode.kp.gov.pk/uploads/THE_KHYBER_PAKHTUNKHWA_LAND_USE_AND_BUILDING_CONTROL_ACT_2021.pdf
[23] https://mda.punjab.gov.pk/system/files/NRB.pdf

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

The figure below illustrates the locations of proposed transit stops to be provided in the future. Note that these stops follow the same criteria of a 250-meter service catchment and are situated along the new proposed secondary roads. They are also situated such that future land uses can be accommodated. The route planning and scheduling between all the proposed stops can be determined by the relevant implementation agency.

Kalaya Public Transit Stops (Medium-Long Term)



Map 32: Medium/Long Term Public Transit Stops

- **Bus Service for the Intracity Mobility**

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

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

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

- **Provision of Infrastructure for Non-Motorized Transport**

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

At a minimum, sidewalks should be provided along all new roads and existing widened roads in Kalaya, especially those alignments identified in the Road Network Proposals Section.

- **Provision of Road Signage**

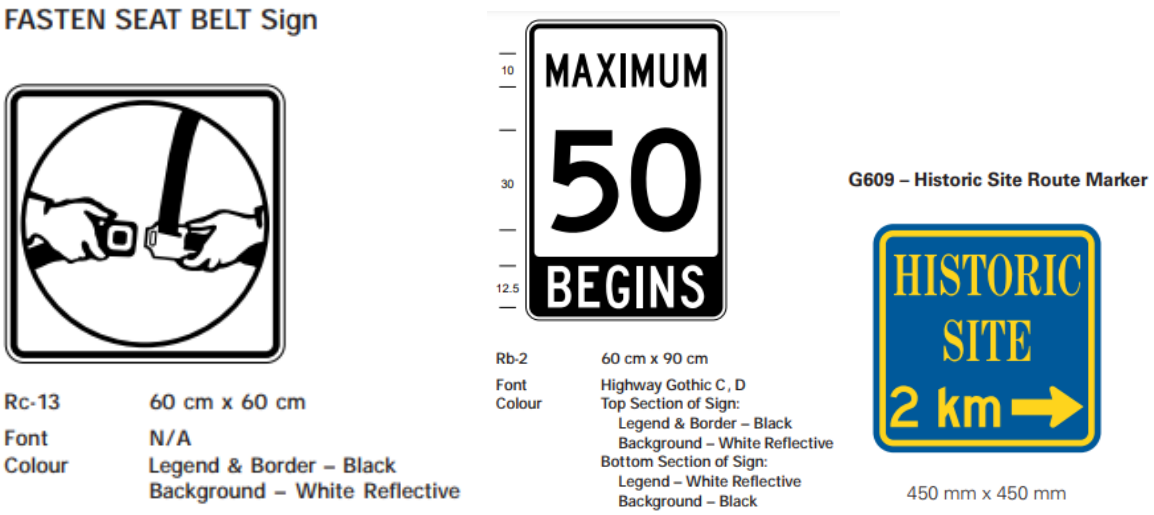
Signage systems are visual information systems that include signs, arrows, maps, pictograms, color scheme systems, and a variety of typographic components. Signage systems differ from other kinds of informational display in that they are typically used to direct people's movements in the physical world.

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

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

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

Examples of the above-mentioned signs are shown in the figure below. Detailed specifications of the recommended signage in terms of colors, dimensions, and font size can be obtained from the ***Punjab Geometric Design Manual*** Available on the Urban Unit's publications webpage[24]. The ***Ontario Traffic manuals*** may also be referenced for signage dimensions[25]



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

[25] https://inps.net/graphics/sites/default/files/pdf/MTO-Book-5.pdf

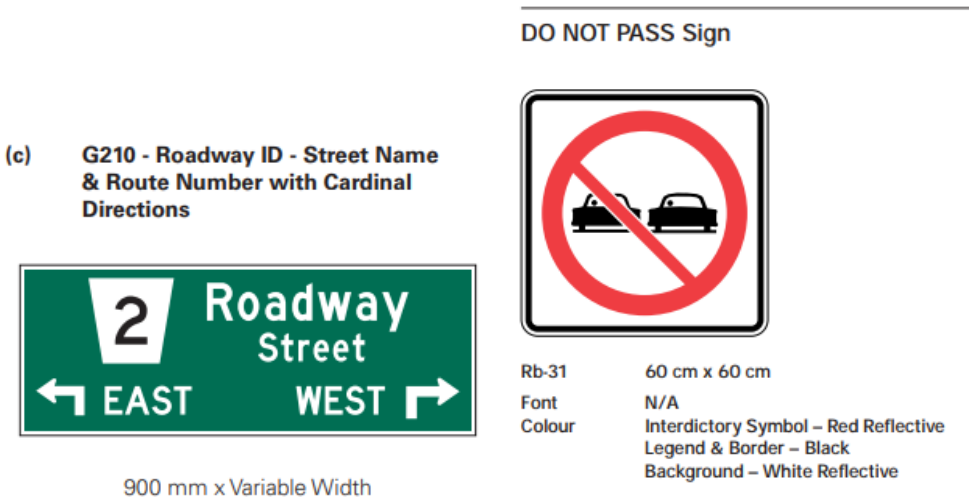


Figure 6-22: Example Road Side Signage

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

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

6.7. Landfill Site

In Kalaya, 1 potential controlled landfill sites has been identified on the basis of GIS analysis. The dumpsite area required to with stand the waste load of 25 years for whole Kalaya is 4 acres (1.6 Hectares). It is proposed that TMA should acquire land on priority basis to avoid open dumps in the area. This will help control illegal dumping of waste into drains and water bodies.

Table 6-40: Area Calculation for Landfill in Kalaya

Area Required for Controlled Dumpsite		
Design Criteria	Waste Generation (t/d)	8
	Density (ton/cu.m)	0.6
	Depth of L.F (m)	15
District	Dimension	Value
Kalaya	Volume (cu.m)	121,667
	Area (m2)	16,222
	Area (Acres)	4
	Area (Hectares)	3.5

6.7.1. Rationale for the Proposed Landfill Site:

Consultants have utilized various parameters to identify suitable zones for a landfill site in Kalaya. The selection is based on the following criteria:

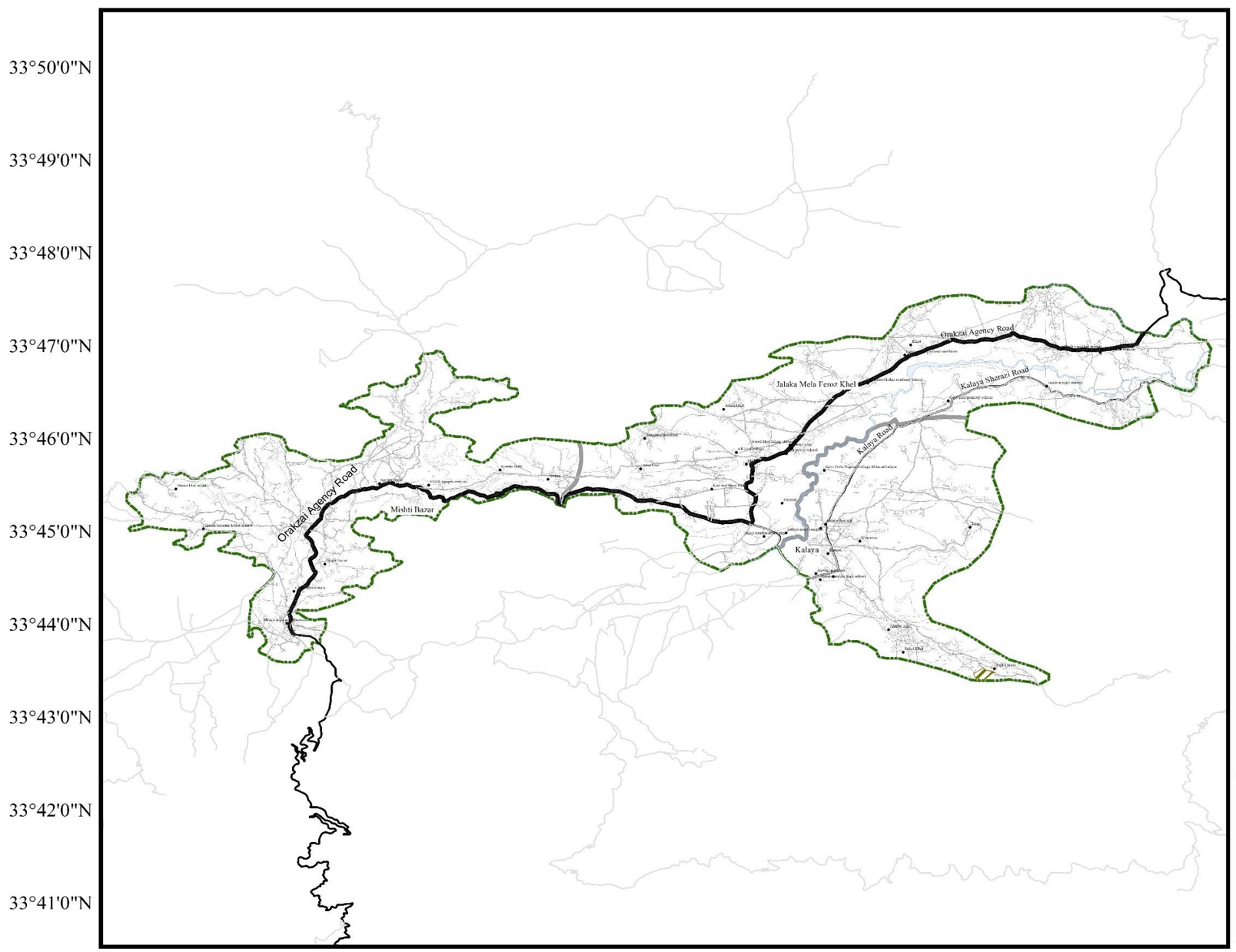
- **Airports:** The landfill site must be located at a minimum distance of 5 km from the airport to ensure that it does not pose a bird hazard to aircraft. The owner or operator of the landfill needs to demonstrate that the site will not endanger aviation safety.
- **Flood plains:** If the landfill is situated on a 100-year flood plain, measures must be taken to ensure that it does not impede the flow of a 100-year flood, reduce the flood plain's storage capacity, or result in the washout of solid waste. The owner

or operator must demonstrate that the landfill site is designed to mitigate flood-related risks.

- **Wetlands:** New landfills and expansions are only permitted in wetlands when there are no practical alternative locations available. This ensures that wetlands, which are environmentally sensitive areas, are protected, and their ecological functions are not compromised.
- **Fault areas:** Landfills, both new ones and expansions, must not be located within 200 feet of a fault area. This criterion is in place to minimize the risk of potential geological hazards associated with fault zones.
- **Seismic zones:** Areas prone to ground motion resulting from earthquakes are restricted for new landfills and expansions. This precautionary measure aims to avoid the potential risks and impacts that seismic activities can pose to the integrity of the landfill and surrounding environment.
- **Unstable areas:** Landfills should not be located in areas vulnerable to natural or human-induced events or forces that could compromise the integrity of the landfill components. Such areas include those with poor foundation conditions, susceptibility to mass movements (such as landslides and rockfalls), and regions with karst terrains (characterized by sinkholes). Unless proven otherwise, these unstable areas are not suitable for landfill sites.

By considering these parameters, the consultants aim to identify a landfill site that minimizes potential risks and ensures the safe and environmentally responsible disposal of waste in Kalaya.

Kalaya Proposed Landfill Site



Legend-Proposed Landuses

- Existing Primary Road
- Existing Secondary Road
- Existing Local Roads
- Proposed Landfill Site
- Existing Water Bodies
- NC Boundary
- Urban Boundary

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

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size

N W E S

0 1 2 4 Kilometers

Map 33: Proposed Landfill Site

6.7.2. Planning Standards for Landfill Site

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. The development guidelines for Landfill sites are below:

Table 6-41: Development Guidelines for Landfill Site

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Sewage treatment plant/disposal work, **Water treatment plant,** **Solid waste dumping yards,** **Treatment or recycling plant.**	Heavy, large and extensive industries, Loading/unloading facilities, Workshops for buses, Slaughter-housing, wholesale mandis, Public utilities, Servicing/repair of farm equipment and machinery, Industrial Park.	Residential housing schemes; private and public both, Mixed use apartment buildings. Large health, recreational commercial and educational institutions, Agriculture and horticulture, Dairy and poultry farming Recreational facilities. any other that are not in permitted or permissible uses

Source: Urban Unit and HP Consultants

6.8. Graveyard

6.8.1. Rationale for Proposed Graveyard Sites

Considering accessibility and planning standards, areas for graveyards are designated in the periphery of the city, yet these graveyards are near the proposed zones of development so accessibility is not an issue. This can be further divided according to the requirement of practiced religions in the town.

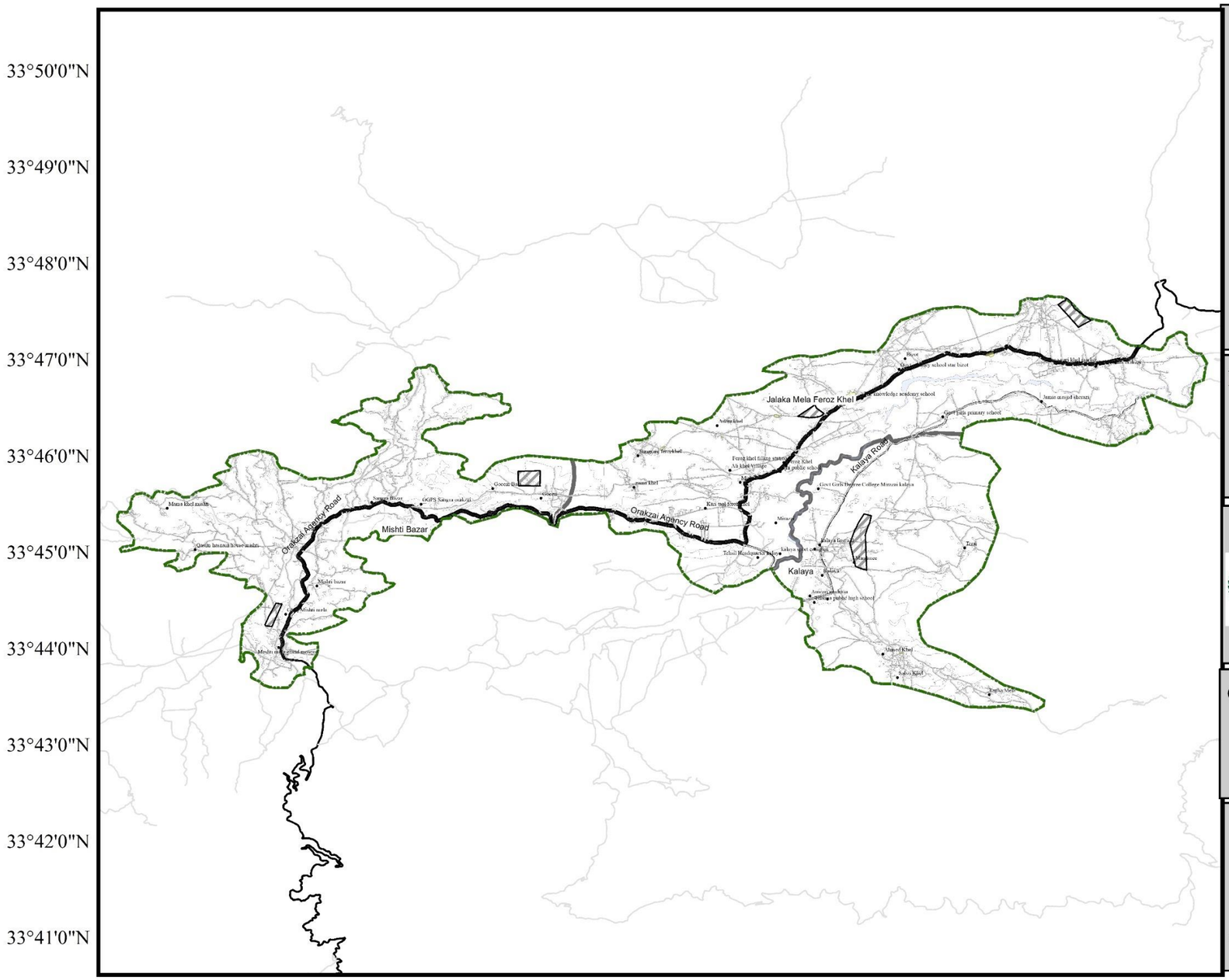
Table 6-42: Graveyard Requirement

Existing area (sq. km.)	0.03 sq. km
Existing area (in %)	0.05%
Recommended NRM standard	1% to 4%
Recommended graveyard area – min (sq. km.)	0.53
Recommended graveyard area – max (sq. km.)	2.12
Gap (Recommended (min) – Existing Land Use)	0.50
Gap (Recommended (max) – Existing Land Use)	2.09
Proposed area 2040 (sq. km.)	0.50

Source: Recommended by the Urban Unit and HP Consultant

According to these requirements, the proposed sites for graveyards are depicted in the map below

Kalaya Proposed Graveyard Zones



Legend-Proposed Landuses

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

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Town Planners Engineers and Architects

Coordinate System: GCS_WGS_1984
At A3 Paper Size

N W E S

0 1 2 4 Kilometers

Map 34: Proposed Graveyard Sites in Kalaya

6.8.2. Planning Standards for Graveyard Sites

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Table 6-43: Graveyard Development Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Administration buildings **Religious building such as Mosques,** **Clinics/dispensaries,** **Local shopping areas** **Retail stores may also be included such as flower shop / horticulture; and convenience stores** **Petrol pump,** **Gas filling station** **Parking facilities**	Residential for graveyard workers / caretakers Shops, Zoological garden, Botanical garden, Bird sanctuary,	Heavy, large and extensive industries: noxious, obnoxious and hazardous industries, Warehousing, storage go-downs of perishables, hazardous, inflammable goods, Sewage treatment plant/disposal work, Water treatment plant, Solid waste dumping yards, Research laboratories treating contagious diseases.

Source: Urban Unit and HP Consultants

6.9. Civic Amenities Zone

6.9.1. Rationale for Proposed Civic Amenities Zone

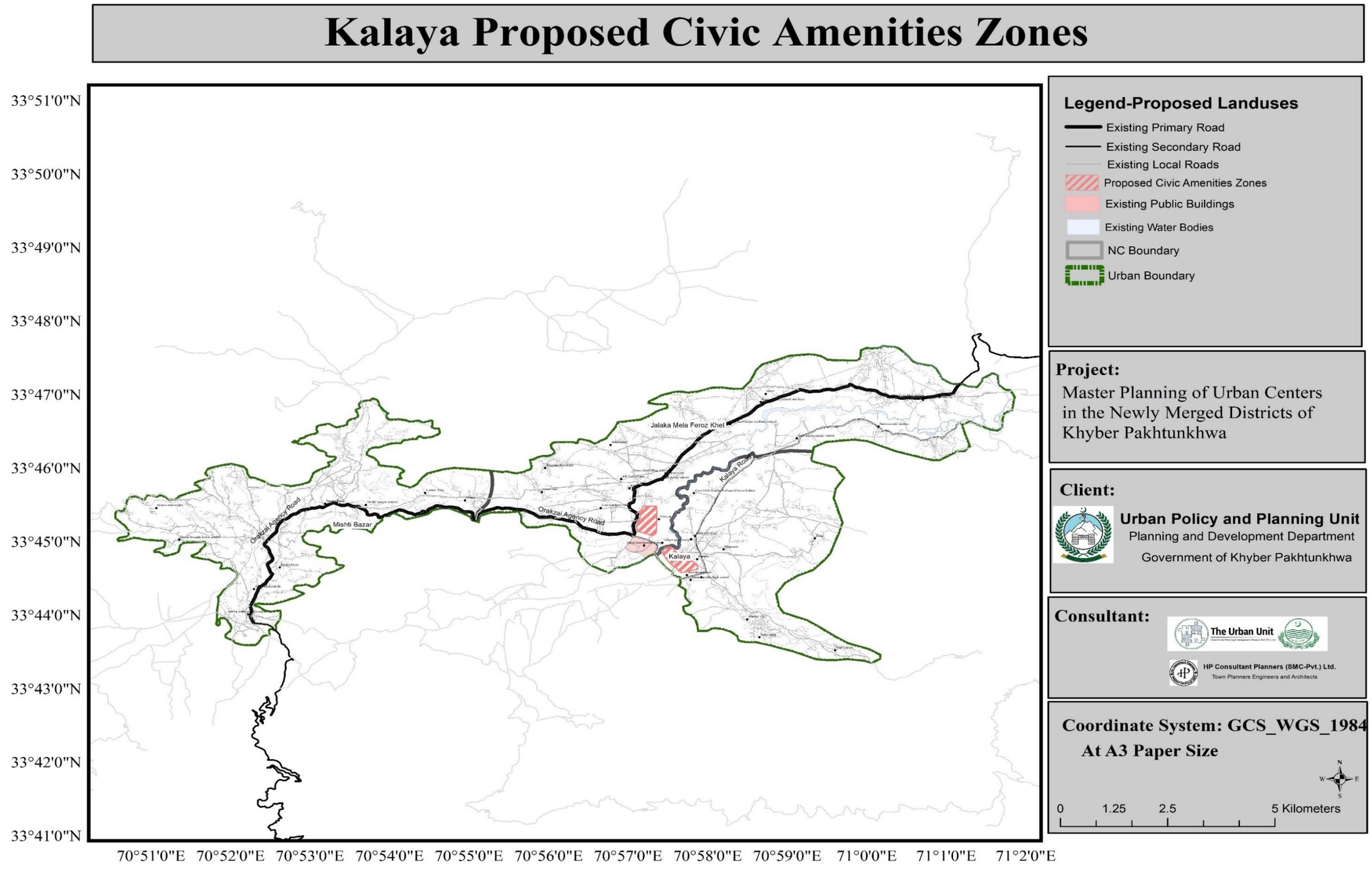
The current expanse of public buildings covers 0.63 square kilometers, and proposed civic amenities zone spans 0.43 square kilometers. The existing public buildings are dispersed, posing challenges for convenient access and Kalaya is also a district

headquarter, therefore in future with the rising activities more space for different public offices and amenities will be required.

Existing area (sq. km.)	0.63 sq. km
Existing area (in %)	1.2%
Recommended NRM standard	2% to 21%
Recommended civic amenities area – min (sq. km.)	1.06
Recommended civic amenities area – max (sq. km.)	11.12
Gap (Recommended (min) – Existing Land Use)	0.43
Gap (Recommended (max) – Existing Land Use)	10.49
Proposed area 2040 (sq. km.)	0.43

In light of this foresight, a new Civic Amenities Zone has been earmarked at the junction of Kalaya Road, and Orakzai Agency Road. Positioned in close proximity to existing public building as well as residential and commercial areas, this strategic location ensures easy accessibility for the public. This zone involves consolidating all dispersed public buildings into this designated zone, which will house essential entities such as the Government or semi-government offices like District Secretariat, Town Hall, and other essential structures.

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



Map 35: Proposed Civic Amenities in Kalaya

6.9.2. Planning Standards for Civic Amenities Development

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detail planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggest development guidelines specific to the study area. The development guidelines for Civic Amenities Zone are below:

Table 6-44: Civic Amenities Zone Guidelines

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Government or semi-government offices (District Secretariat, Town Hall etc. **Social welfare institution such as community center, art gallery, museum and auditorium** **Local and zonal municipal office** **Police station, fire station or post office** **Shelter home, Pannahgahh,** **Convention center**	Hotel or Motel, Guest house, Athletic club, gymnasium, fitness center or indoor sport facility, Research and development Centres	Other than permitted and permissible

Source: Urban Unit and HP Consultants

6.10. Green Spaces

6.10.1. Rational for Proposed Green Spaces

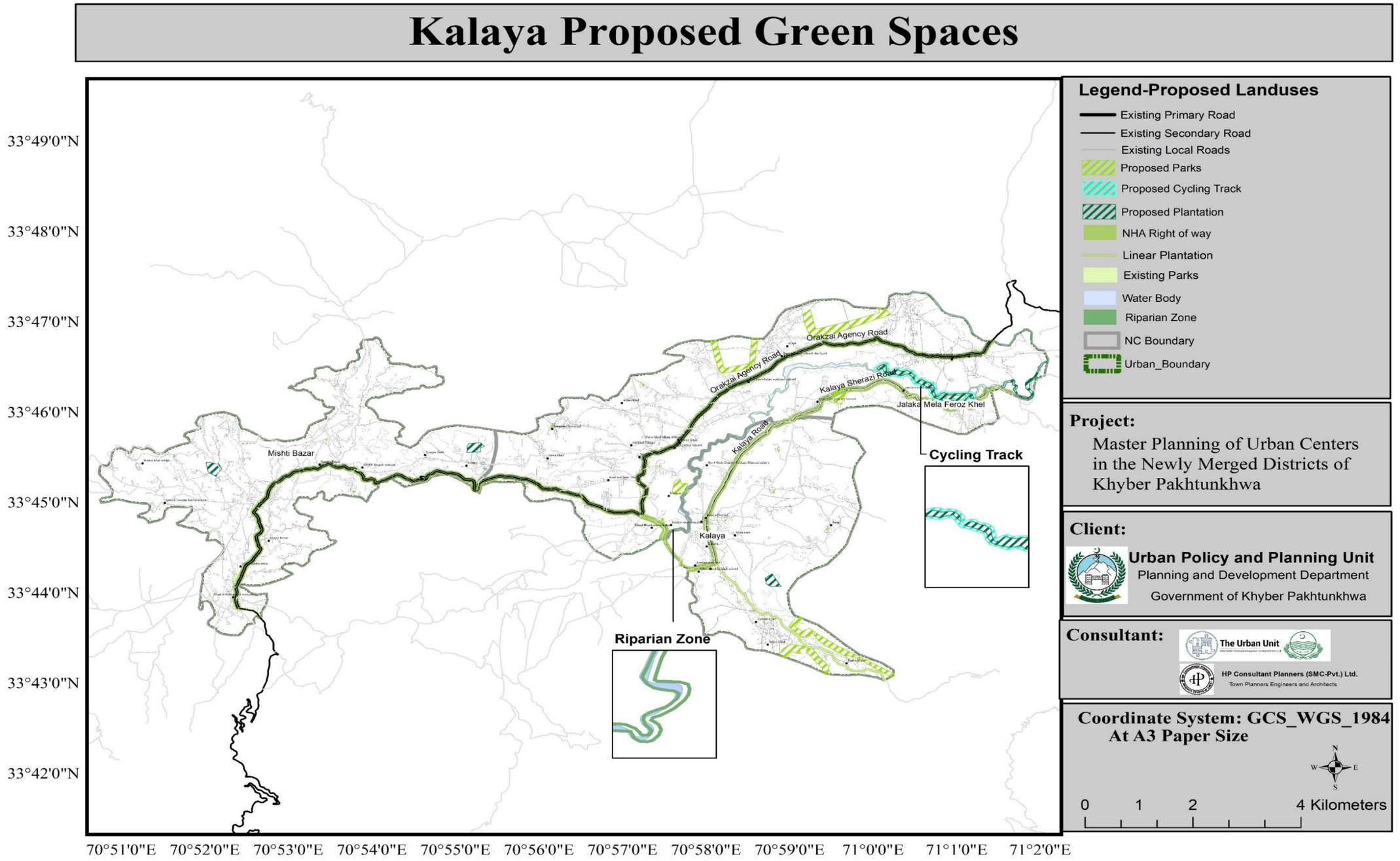
Green spaces are essential to each community as it improve community's natural environment, aesthetic, and recreational opportunities. These are mostly used for leisure activities including cycling, walking, working out, and playing. Kalaya urban center has parks and playgrounds; however, these are not adequate to serve the growing population. As per the Land Use Survey of Kalaya, out of the 53 sq. km, green

and opens spaces such as parks and sports complex cover only 0.02 sq.km and 0.06 sq.km respectively.

The World Health Organization (WHO) advises all cities to provide each resident with a minimum of 9 sq.m of urban green space. Kalaya's proportion of green space falls below of the standard for cities around the globe. Therefore, various types of green spaces having a total area 2.04 Sq.km area is proposed to benefit the whole population.

This also includes a green buffer along the water bodies, industrial areas, and main roads i.e. Orakzai Agency Road and Kalaya Road area proposed. Buffer zones surrounding industrial areas are established primarily to ensure that nearby residential communities are not adversely impacted by health and amenity issues that can be attributed to industrial emissions.

Buffer strips along water bodies serve diverse purposes, for example, protection of surface waters from pollution, protection of structures from flooding or erosion, and preservation of riparian habitat. The below map shows the proposed Green Spaces in Kalaya urban center.



Map 36: Proposed Green Spaces in Kalaya

6.10.2. Planning Standards for Green Space Development

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detailed planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggested development guidelines specific to the study area. The development guidelines for Green Spaces are below:

Table 6-45: Guidelines for Green Space Development

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

Source: Urban Unit and HP Consultants

6.11. Livestock & Dairy Development Zone

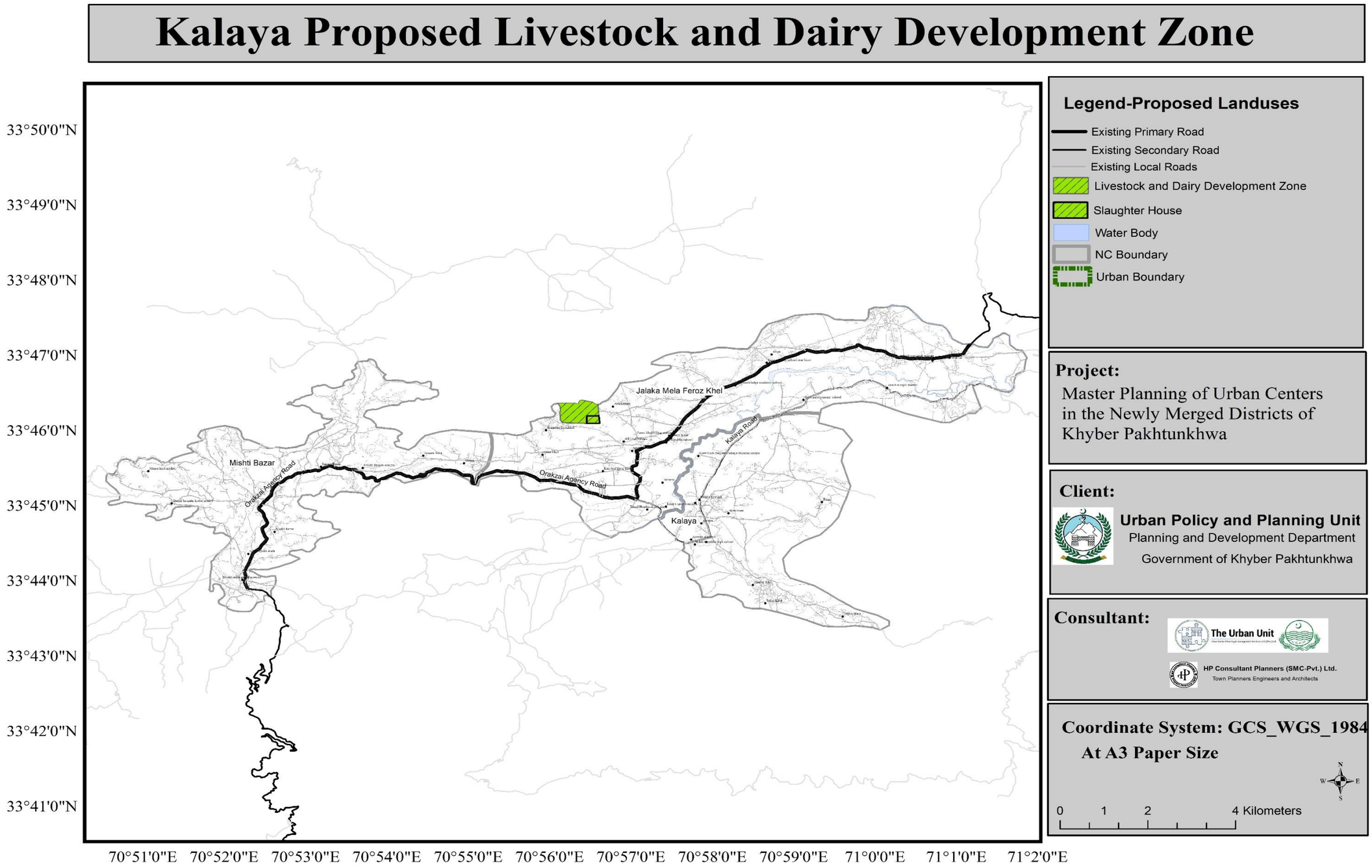
6.11.1. Rational for Proposed Livestock and Dairy Development Zone

A proposed Livestock and Dairy Development Zone spanning 0.38 sq. km. aims to foster animal and milk production. Positioned on the northern side of Kalaya, near to Orakzai Agency Road, this zone is envisioned to predominantly comprise cattle farms accommodating a diverse range of livestock, including cattle, buffaloes, sheep, goats,

camels, and poultry. The farms will be surrounded by expansive grazing and pasture areas.

In addition to cattle farms, the zone will host dairy farms equipped with state-of-the-art milk processing units. To further enhance the overall infrastructure, it can include the potential establishment of a new veterinary hospital and college within the area. This initiative aims to address the health needs of livestock while concurrently contributing to the education and training of veterinarians.

The dairy segment of the zone is designed to incorporate essential facilities such as a cattle market, a center for artificial reproduction, a slaughterhouse, a milk collection facility, a chiller storage unit, a biogas plant, and other necessary amenities. This zone is intended to not only boost livestock and dairy production but also create a holistic environment that supports the well-being of the animals and ensures the efficient processing and distribution of dairy products.



Map 37: Proposed Livestock and Dairy Development Zone in Kalaya

6.11.2. Planning Standards for Livestock and Dairy Zone Development

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detailed planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggested development guidelines specific to the study area. The development guidelines for Livestock and Dairy Development Zone are below:

Table 6-46: Guidelines for Livestock and Dairy Zone Development

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Cattle Farms, **Poultry Farms,** **Pasture and grazing lands,** **Slaughterhouse,** **Dairy production,** **Veterinary services,** **Veterinary education and training** **Grain Market**	Go downs, Cold storage, Cattle Market	Other than permitted and permissible

Source: Urban Unit and HP Consultants

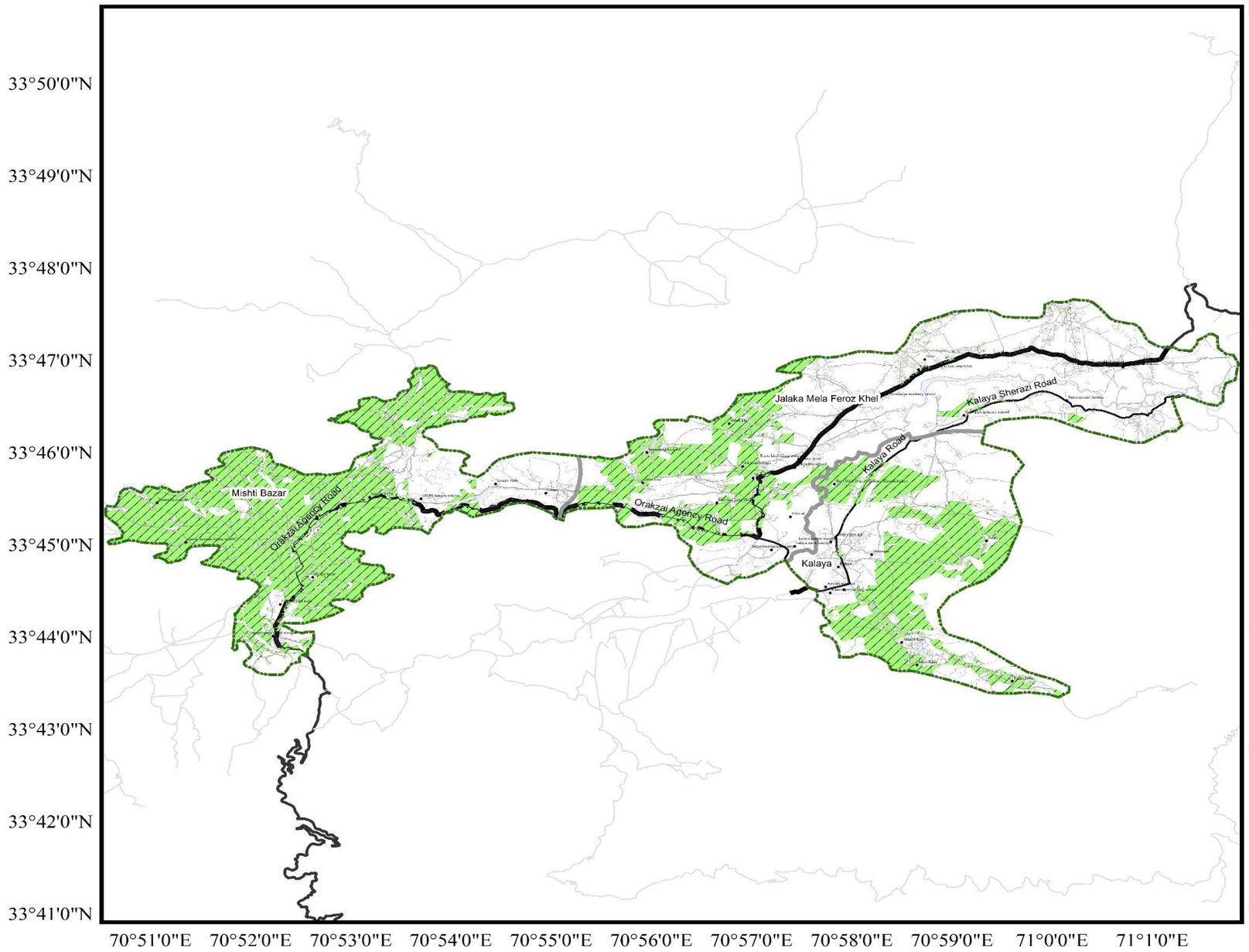
6.12. Reserved Agriculture Area

6.12.1. Rational for Reserved Agriculture Area

The total reserved agriculture area is 18.74 sq.km. The Agriculture Reserved Area is multifaceted, encompassing environmental conservation, food security, economic sustainability, climate change resilience, and long-term planning. This strategic allocation ensures a harmonious balance between urban development and the preservation of vital agricultural resources, contributing to a resilient, sustainable, and thriving community. This strategic allocation aims to address the growing challenges associated with urbanization, population growth, and urban sprawl. The focus of this area will be on the agro-production of locally grown commodities, and all amenities and services will be offered to increase agricultural output within city limits. In this way,

the city's spatial growth will be constrained, and the core of its agricultural activity will continue to stay in the vicinity of the city. Additionally, it will result in a healthy atmosphere and control the infrastructure network's spread. The existing settlements in the periphery of the city development will also benefit and not be displaced from their place of livelihood.

Kalaya Reserved Agricultural Zone



Legend - Proposed Landuses

- Primary Road
- Secondary Road
- Local Road
- Reserved Agricultural
- Existing Water Bodies
- NC Boundary
- Urban Boundary

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

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

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

Coordinate System: GCS_WGS_1984
At A3 Paper Size

0 1 2 4 Kilometers

Map 38: Proposed Reserved Agriculture Zone

6.12.2. Planning Standards for Reserved Agriculture Area

As per Khyber Pakhtunkhwa Urban Policy 2022–30, Land Use Building Control and Zoning Regulation needs to be defined by the Khyber Pakhtunkhwa Land Use and Building Control Authority. The authority defines the term permitted and permissible land use in the Khyber Pakhtunkhwa Land Use and Building Control Act, 2021. The permission for Permissible land uses, may be allowed by the District Planning and Design Committee subject to the payment of the fee. However, the detailed planning standards or development guidelines needs to be defined. Therefore, consultant has reviewed the national and international case studies and suggested development guidelines specific to the study area. The development guidelines for Reserved Agriculture Area is below:

Table 6-47: Guidelines for Reserved Agriculture Area

Permitted Uses	Allied Permissible Uses	Prohibited Uses
Crop, **Orchard,** **Pasture land** **Forest,** **Nursery or a green house, horticulture,** **Tube well,** **Existing rural settlement or village,** **Agricultural machinery workshop;** **Farm house** **Storage activities of agricultural goods which are non-hazardous in nature.**	Country club, Zoological garden, Botanical garden, Bird sanctuary, Zoo or wildlife park, Fruit and vegetable market,	Other than permitted and permissible

Source: Urban Unit and HP Consultants

Chapter 7. Way Forward

The Kalaya Master Plan provides a visionary roadmap for guiding the city's transformation into a resilient, inclusive, and sustainable urban center. Building on this framework, a scenario-based development strategy has been designed for Kalaya, rooted in land suitability analysis and evidence-based planning principles. The proposed land use zones aim to ensure compatibility with existing built-up areas while responding proactively to the future needs of the city's growing population. These zones accommodate housing, commercial, industrial, and mixed-use developments, while indirectly generating employment, improving access to services, and elevating the overall quality of life for residents.

To further consolidate the urban transformation process, a set of integrated sectoral action plans has been developed. These plans address critical development gaps across key domains—transportation, governance, economy, housing, environment, and social services—while aligning with the provincial development vision and Sustainable Development Goals (SDGs). The following sector-wise summaries outline the strategic priorities and implementation mechanisms envisioned:

- **Transportation Action Plan:** The plan focuses on improved mobility through road dualization, terminal upgrades, and rehabilitation of the main roads. Key implementation includes the regulation of route permits, removal of encroachments, structured parking, and signage installation. Long-term success hinges on building institutional capacity within local transport authorities and phased execution based on congestion and demand analyses.
- **Rural-Urban Fringe Development:** Focusing on peri-urban zones, this plan leverages strategic zoning for agriculture, livestock, and mixed land use. The implementation includes legal enforcement through KP Land Use Act 2021, coordinated urban-rural policy alignment, and the creation of reserved green belts.
- **Economic Development:** This plan promotes investment attraction through SEZ incentives and job training schemes. Implementation includes establishment of a Development Authority, tax incentives for investors, traffic mitigation in bazaars, and pre-feasibility studies for 10 high-impact sectors.
- **Disaster Risk Reduction (DRR):** The DRR strategy incorporates early warning systems, community preparedness, and climate-resilient infrastructure.

Implementation includes GIS-based risk zoning, capacity-building drills for emergency services, and integration of DRR in land use policy.

- **Zoning and Land Management:** This action plan emphasizes digital land record management, zoning regulation enforcement, and land-use planning. Implementation involves the digitization of Kalaya land records, formulation of zoning by-laws, and training of revenue staff in coordination with the Board of Revenue.
- **Education:** The plan aims to bridge existing gaps through provision of new schools, especially for girls, and facility upgrades in underserved localities. Implementation strategies include GIS-based school planning, hiring trained educators, and partnerships with NGOs for community-based schooling.
- **Governance and Institutional Framework:** This plan seeks institutional strengthening via one-window cells, and inter-agency coordination. Implementation involves assigning dedicated staff in TMA offices, stakeholder training programs, and local representation in planning councils.
- **Environmental Action Plan:** This includes air quality management, urban forestry, and noise control. Implementation projects involve setting up PM2.5/PM10 monitoring stations, roadside plantation, and urban parks. Environmentally sensitive areas will be protected through regulatory zoning, while awareness campaigns will address pollution at the community level.
- **Health:** The health action plan proposes developing health facilities to meeting the population demand, recruitment of specialist staff, and ensuring equitable access to healthcare facilities.
- **Housing:** To address housing deficit, this plan proposes areas for infill development and housing allocation for all-income groups. Implementation is phased based on demand forecasting.
- **Quality of Life (QoL):** The QoL plan targets improved urban aesthetics, civic engagement, and public amenities. Key actions include establishing parks, sports complex, and enhancing walkability, supported with monitoring KPIs focused on citizen satisfaction and public space usability.
- **Security Measures:** Security enhancement will be pursued through smart surveillance, CPTED (Crime Prevention Through Environmental Design), and community policing by proposals such as installation of CCTVs, enhancing street

lighting, improving signage, and controlling entry points to sensitive areas to reduce crime opportunities and deploying trained rapid response units.

- **Tourism and Heritage:** The tourism action plan proposes the preservation and promotion of iconic sites such as Kalaya Darbar , Samana Fort , Gulistan Fort and Sarghari Fort. The strategy involves site-specific restoration, and eco-tourism initiatives. Implementation will require collaboration with the archaeology department, phased investment in visitor infrastructure, and awareness campaigns to engage locals as tourism facilitators.
- **Behavior Change Communication (BCC):** The BCC action plan addresses civic behavior on waste disposal, public space usage, and engagement with municipal services. It proposes multi-level communication interventions via print, digital, and face-to-face formats. Implementation includes SOPs for outreach, partnerships with schools and community groups, and ongoing monitoring to adapt strategies based on behavioral response and feedback.
- **Slum Upgradation:** This plan promotes integrated redevelopment of informal settlements through basic infrastructure, water and sanitation, and public spaces. Implementation follows a revitalization zone strategy, aligning with SDGs. Local councils will lead resident engagement and monitor progress.

The sectoral action plans outlined above represent a comprehensive roadmap for guiding Parachinar's transformation into a dynamic, resilient, and well-managed urban center. Their successful implementation will depend on strong interdepartmental coordination, continuous capacity building, and community-led participation. Institutional mechanisms such as the Urban Development Authority, local TMAs, and district planning units must be empowered with technical resources, legal mandates, and financial allocations to drive the process. Importantly, progress should be anchored in results-based monitoring systems, aligned with KP’s development priorities and national SDGs. By operationalizing these strategies with commitment and coherence, Kalaya is poised to emerge as a model for sustainable urban regeneration in the newly merged districts of Khyber Pakhtunkhwa.