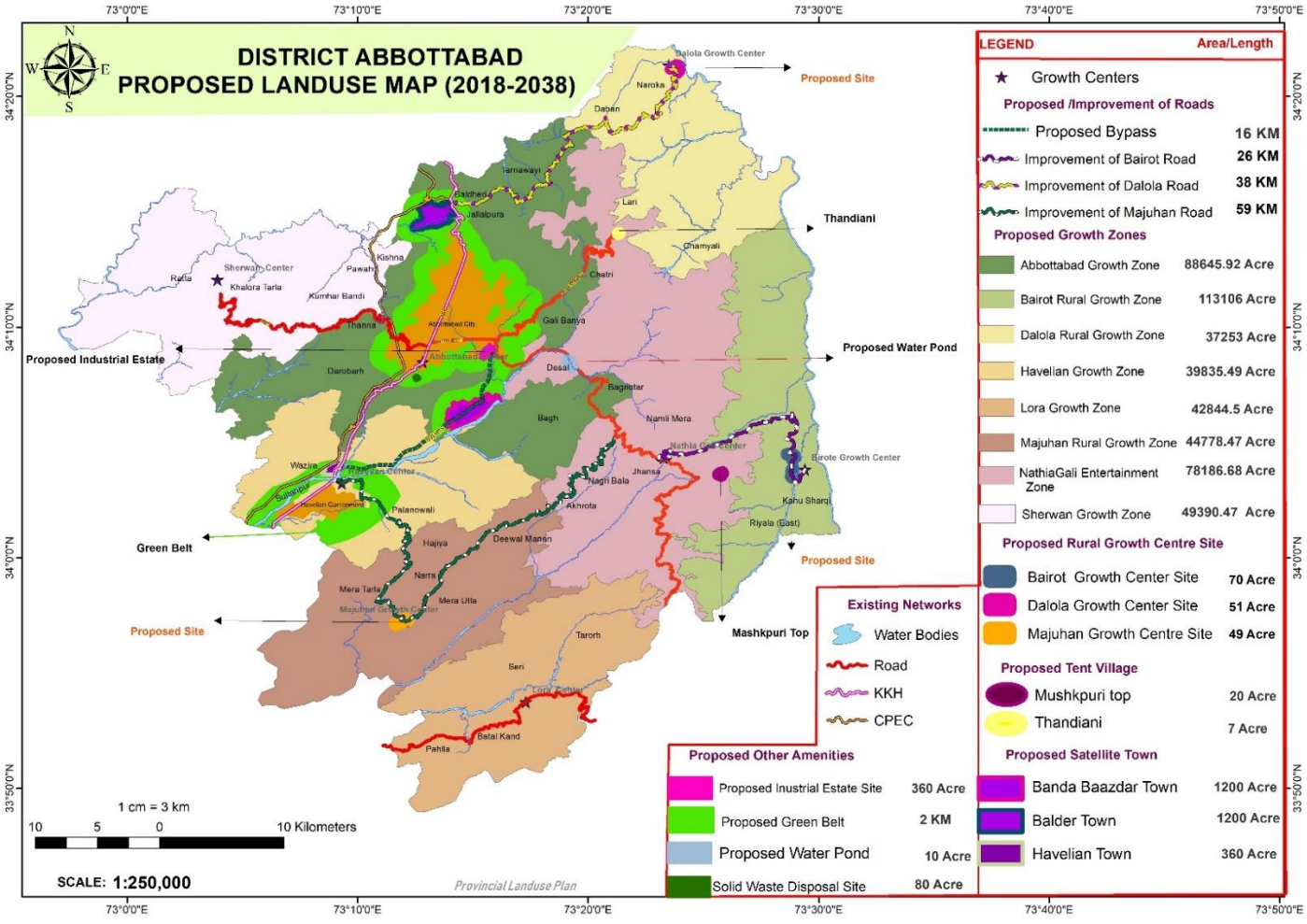
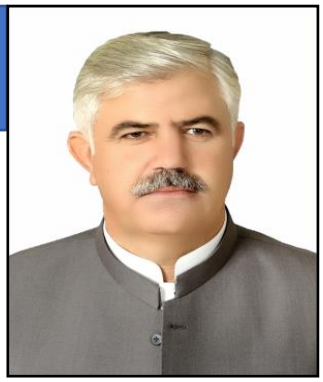
Urban Policy and Planning Unit – Provincial Land Use Plan (PLUP)

Planning and Development Department
Government of Khyber Pakhtunkhwa

Final Land Use Plan of District Abbottabad



MESSAGE FROM CHIEF MINISTER KHYBER PAKHTUNKHWA



The process of allocating land among competing and frequently conflicting land uses is referred to as land use planning. This process aims to promote the rational and orderly use of land in an environmentally friendly manner to enable the sustained growth of human settlements.

Cities and towns would be in disarray without an appropriate land-use plan, and the traffic movement would not be effective. Industrial facilities would contaminate streams, residential areas, and the air. Urban sprawl would hinder the cities from functioning as they ought to, thus the economy would stagnate, causing future generations to be unable to benefit from the land due to resource wastage and environmental harm. There is a rising consciousness of human impact on the environment in today's society, reminding us that every change we make has an environmental impact. We are becoming more cognizant of how we live, work, and interact to maintain a sustainably able environment.

Land use planning is not a stand-alone idea. Visualizing land-use planning as a vital element in the process of promoting national development is important. Given the existing economic, financial, and technical resources and expertise, this approach aims to take these into account as well as identify and satisfy the population's fundamental social and human needs.

There are requirements that must be addressed for everyone such as housing, employment, education, leisure activities, transportation, and access to essential amenities like clean water, power, and healthcare. The goal of social planning and policy is to meet the population's fundamental social requirements. Economic planning and strategies aim to guarantee that the nation has a strong economic foundation, which generates income to fund government operations and pay for the delivery of services to the general public while also guaranteeing that there are jobs available for the labor force of the nation.

Within a conceptual and physical framework, land-use planning aims to meet the needs of housing for the population, but it cannot be constructed in a swamp, an area that is hazardous to the health and safety of the residents or other citizens, or an area which is ill suited for housing development due to its terrain, vulnerability to natural disasters or other hazards, or its incapability to physically endorse the building.

The master plans of cities and towns in Khyber Pakhtunkhwa were made independently from their respective rural areas in a disjointed and fragmented endeavor. Recognizing the circumstances, the present administration chose to implement development using an integrated and comprehensive district-level planning method across the province. The six districts of Peshawar, Nowshera, Charsadda, Mardan, Swabi, and Abbottabad have land use plans prepared, and work is ongoing on the province's remaining districts.

The Provincial Land Use and Building Control Act 2021, passed by the provincial government to standardize the approval and implementation systems for land use plans, which had previously been inadequate. For the purpose of reviewing and authorizing future infrastructure projects, the Provincial Land Use and Building Control Act established the Provincial Land Use and Building Control Council. Additionally, district-level land use plans provide explicit methods for their implementation. Land use plans of the districts of Peshawar, Nowshera, Charsadda, Mardan, Swabi, and Abbottabad were granted approval by the Provincial Land Use and Building Control Council.

I appreciate and acknowledge all stakeholders who provided their input during the preparation of these district land use plans. I would also like to extend my gratitude to the concerned team of the provincial land use plan, UPPU, P&D Department for their dedicated efforts to complete these six land use plans.

Mahmood Khan
CHIEF MINISTER

MESSAGE FROM ADDITIONAL CHIEF SECRETARY KHYBER PAKHTUNKHWA

In order to relieve pressure on mega cities, the Provincial Land Use Plan is intended to serve as a policy document for the integrated, coordinated, and systematic planning and even deployment of development programs and employment opportunities to rural and suburban communities close to their residences. As potential touchstones to benefit rural areas and small towns, it aims to build a hierarchy of settlements and developments made up of satellite, intermediate, secondary, and industrial towns. The plan will aim to maximize provincial revenue, raise overall activity, balance the distribution of infrastructure and services, and enhance per capita income while simultaneously maximizing the utilization of human and physical resources. Furthermore, it will serve as a guideline to the nation-building departments and agencies, including local government entities and TMAs, for carrying out integrated and coherent development projects through systematic and structured techniques.

Khyber Pakhtunkhwa has led the way in creating comprehensive land-use strategies. Based on the findings of studies and consultations with key stakeholders, this document serves as a roadmap for the sector plans that will be carried out with careful integration among sectors. District land use planning involves a variety of stakeholders at various stages of the planning process, including the Planning and Development Department, Local Government, Elections and Rural Development Department, and other key stakeholders. District land use planning is optimistic, based on the anticipated variations in the decades ahead, producing later ledgers in the plan at appropriate stages, and engaging stakeholders to identify their timely needs.

The proposed District Land Use Plan will serve as a major planning document for the allocation of land for future development initiatives. This will help fulfill human needs in a more effective manner and also ensure protection of the natural environment.

I wish to record my appreciation for the initiative of preparing the district land use plans of District Peshawar, Charsadda, Mardan, Nowshera, Swabi and Abbottabad and am optimistic for its implementation.

Shahab Ali Shah
ACS. P&DD

Acknowledgments

Provincial Land Use Plan is extremely thankful to the planning & Development Department, Government of KP for assigning this important and prestigious study. The Land Use Plan of District Abottabad is a component plan of Provincial Land Use Strategy for Khyber Pakhtunkhwa. The plan at work is an in-depth study encapsulating all sectors of physical, socio-cultural, environment and economy in spatial context. The plan also takes into account issues and constraints related to land use planning in the district and accordingly suggests a more harmonized, balanced and sustainable use of land and other natural resources.

The project team of the Provincial Land Use Plan is greatly indebted to the Additional Chief Secretary P & D Department, Secretary P & D Department and Executive Director of the Urban Policy & Planning Unit for spearheading the project. Without their continuous support, it wasn't possible at all to continue and successfully complete this District Land Use Plan. They have been the Project's sole custodian during project upheavals, and the project team is highly indebted to his patronage of the project.

It is worth, mentioning here that Khyber-Pakhtunkhwa is the first province in Pakistan taking this initiative of preparing District Land Use Plans of the 36 districts of Khyber Pakhtunkhwa including merged districts. We also deeply acknowledge the continuous support, cooperation, and omnipresence of sectoral experts of the Urban Policy and Planning Unit and the technical section of the Provincial Land Use Plan of their valuable inputs during the conceptualization, data collection, analysis, planning and review stages, which are truly praiseworthy.

Special thanks are due to the officials of the district line departments and all other stakeholders for their active involvement, cooperation and coordination during the preparation of this District Land Use Plan. we are also extremely thankful to those who help and facilitated various surveys by providing the required information.

Finally, but certainly not least, the dedicated efforts that the Project Manager, Mr. Naseer Ahmad, has put forth are commendable. He works around the clock to get the plans to the point where they were approved, leaving no stone unturned in the process.

Hope that these dedicated efforts of the whole team will bring prosperity and peace to the District Abottabad. Despite of our best efforts, if any error or omissions are detected or if there are suggestions for further improvements of this Plan, the same would be forwarded to the District Land Use Planning and Management Committee at District level for their inclusions in the updated versions of the Plan.

Project Manager
Provincial Land Use Plan

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ABBREVIATIONS AND ACRONYMS

Term	Description
ADB	Asian Development Bank
ADP	Annual Development Program
BHU	Basic Health Unit
Cantt	Cantonment
CIDA	Canadian International Development Agency
dB	Decibels (Unit of Sound)
EPA	Environmental Protection Agency
GIS	Geographical Information System
GT Road	Grand Trunk Road
HHs	Households
Kms	Kilometers
KPK	Khyber Pakhtunkhwa
DLUP	District Land Use Plan
M1	Motorway Islamabad-Peshawar Section
MC	Municipal Corporation/Committee
NRM	National Reference Manual
MCC	Manual Classified Count
O-D Survey	Origin-Destination Survey
OFWM	On-Going Water Management
PCU	Passenger Car Unit
PEPA	Pakistan Environmental Protection Agency
PHA	Provincial Housing Authority
ppm	Particles per Million
PVDA	Peshawar Valley Development Authority
R^2	Coefficient of Determination used in Regression Analysis
ROW	Right of Way
SME	Small and Medium Enterprises
SMEIDA	Small and Medium Industrial Development Authority
UC	Union Council
WHO	World Health Organization

Chapter 1

Theoretical Background and Project

Introduction

1. INTRODUCTION TO LAND-USE PLANNING

The land is a scarce resource increasingly affected by the competition of mutually exclusive uses. Fertile land in rural areas become scarce due to population growth, pollution, erosion and desertification, effects of climate change and urbanization. On the remaining land, local, national and international users with different socioeconomic status and power compete to achieve food security, economic growth, energy supply, nature conservation, and other objectives. Land Use Planning can help to find a balance among these competing and sometimes contradictory uses.

Today, persistent population growth, climate change, erosion and desertification as well as urbanization increase the pressure on fertile land and other natural resources. At the same time, competition for limited available agricultural areas increases due to growing demand on national and international markets for food, fodder, raw material and biomass for industrial and energy use. The extreme increase in land sales and land leases in developing countries illustrates that the global competition for scarce land resources has gained a new dimension. State actors and private investors from developed countries and newly industrialized countries capture huge agricultural areas – generally with access to ample water – in developing countries through purchase or long-term leases to grow food, agro-fuel or other cash crops for export. In general, quick benefits from large investments in industries, mining, agro-industries etc. for the sake of increasing GDPs create pressure to rural land uses with less economic contributions leading to an often-irreversible conversion of traditional land uses. In addition, agricultural funds investing in agricultural lands have become a current trend product in financial markets, thus participating in the rising value of land, which was already valuable due to its growing scarcity. The scarce resource land increasingly becomes a venture. Accordingly, there is a high demand for concepts and tools that help find a balance among the interests of all stakeholders. Land use planning has proven to be such an approach.

1.1 Outcomes and Lesson Learnt from Phase-I

Land Use Plan was envisaged as a policy document for an integrated, coordinated, systematic planning and uniform spread of development activities. It also aimed at generating employment for the rural and sub-urban population reducing rural-urban migration. It would help in establishing hierarchy of settlements and development of satellite, intermediate, secondary and industrial towns as focal points for future to cater for the rural areas and small towns.

The main outcomes from the Provincial Land Use Plan, are:

- It provides broad framework for District Spatial Plans and to resolve inter-district planning issues.
- It establishes a planned hierarchy of settlements and an integrated and systematic growth of trunk infrastructure and services in the province.
- It provides guidelines for the emerging developments corridors.
- It suggests parameters for reducing migration to big urban centers.
- It determines a need for new towns at feasible location.
- It provides guidelines for the proper development of rural areas.

- It provides a broad guideline to the nation building departments/ agencies for undertaking integrated and coherent development programs at the provincial level.

To initiate the process of Land Use Plan Preparation of the 5 Districts, the Housing Department, Government of KPK through a press notification on September 16, 2010 invited Consultants to submit technical/financial proposals. Based on our proposal through open competition, Izhar-ESC-Lalazar Consultants were selected and awarded the Project.

The approach adopted by Consultants to complete the task had three broad components:

1. Preparation of Base Maps

For preparation of base maps, the Consultants acquired satellite images and digitized them using GIS software (ArcGIS). The relevant data from topo sheets was superimposed on the digitized map. Ground verification was then done using GPS. The base map was thus finalized.

2. Preparation of District Studies Reports

Concurrently, District Studies Report was prepared which included twenty-one different sectors as shown in Figure 1.1. These sectors were covered under four broad categories, i.e. Physical Context (Climate, Geology, Environment, Floods, Water Logging and Salinity), Social Context (Demography, Housing, Education, Health, Industry, Trade and Commerce and Recreation), Physical Infrastructure (Water/ Sewerage /Drainage, Traffic and Transport, Power Development, Telecommunication and Postal Services), and District Resources (Agriculture, Livestock and Fisheries, Water Resources, Fuel and Minerals and Forestry).

3. Preparation of Land Use Plans

Using the information given in the Base map and Studies Report, Land Use Plan was prepared, incorporating Land Use Distribution, Hierarchy of settlements, Land Use strategy, traffic and transportation, and zoning and Land Use policy.

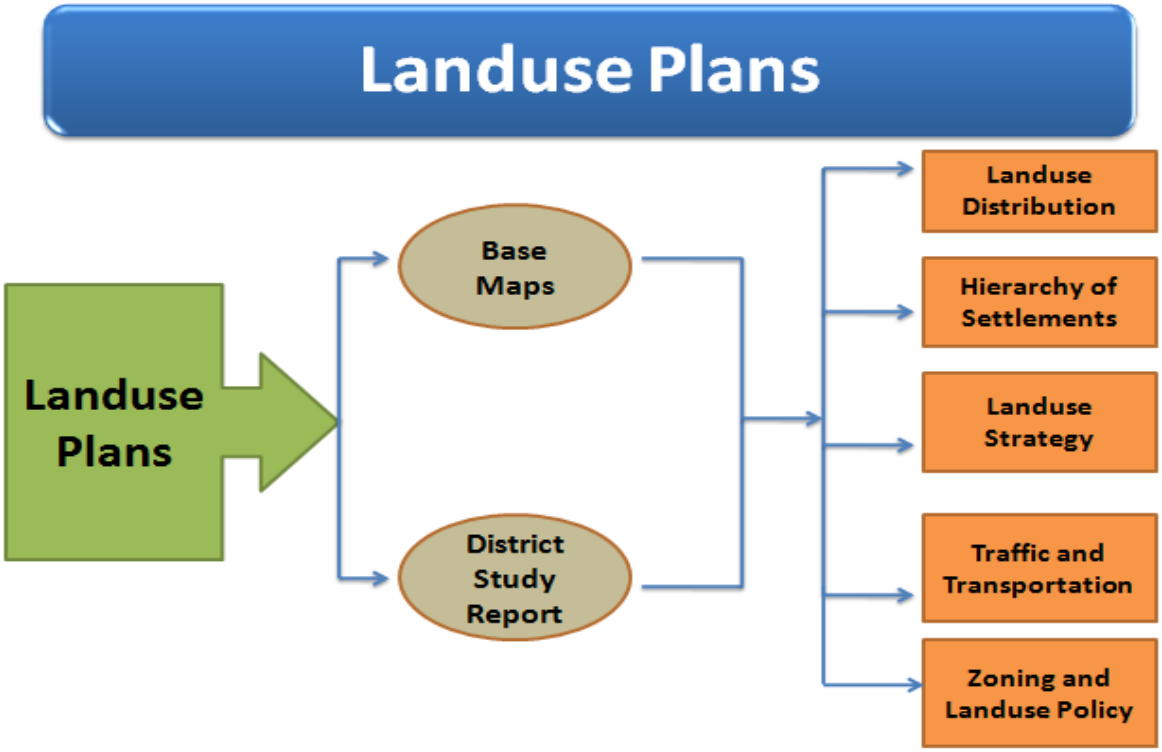


Figure 1-1:Land Use Plans Approach in Phase-I

1.2 Review of existing planning system in KPK Pakistan.

Soon after independence, Pakistan formulated five years plans to get a quick economic development. The purpose of the five-year plans was to provide shelters for internally displace people as well as people who came from India and decides to live in Pakistan during partition.
The planning system shows a little bit complex situation in Pakistan especially in Khyber Pakhtunkhwa, due to lack of relevant literature and implementable practices in planning system to address the problem associated with public at grass roots levels.

The developmental plans (Master Plan, Structure Plan, Local Plan) practices are poor and only limited to Peshawar city. Two spatial development plans were prepared for Peshawar - a Master Plan (GoNWFP, 1965) and a Structure Plan (GoNWFP, 1986) for the proper development of the city. They were not effective because none of them were approved. The first plan instead of suggesting measures to stop harmful urban sprawl, concentrated on speedy provision of necessary infrastructures and services. Hence the unauthorized urban sprawl continued throughout the plan period 1965-85.

The Structure plan prepared in 1986 for the period 1986-2001 attempted to abate many shortcomings of the previous 1965-86 Master plan for the city. It pointed out, “there is no significant program of development of any scale, which could provide housing for lower income families.” As a result, much of the urban growth of Peshawar had been piecemeal and of poor construction, and also occurred in a haphazard and uncontrolled manner. Provision of necessary infrastructure in these areas was becoming

significantly difficult and expensive (GoNWFP, 1986; P. 12). The plan designated 6 growth zones and 11 local planning units in Peshawar urban area and proposed the development of local plans urgently for critical districts, where rapid growth was taking place. It also identified the problems of the private land development control particularly in terms of layout of the plots and building densities. The Plan emphasized the locational influence of public services provision rather than on detailed controls. It stressed on ensuring potential flexibility, ease of implementation and costs as well as benefits.

The implementing agency of the Plan failed in getting its approval. Hence many good proposals for the development of the city could not be implemented and the city continued to expand in its own fashion towards its peripheries in the absence of planning control. While, it is imperative to investigate the reasons for non-implementation of these plans; it is also necessary to prepare and implement a new spatial development plan to ensure food security, conserve water resources, control urban sprawl, promote the best land use, have judicious distribution of urban infrastructure and services and their smooth management.

In the past, Master Plans of Cities/Towns in Khyber Pakhtunkhwa were prepared in isolation from their hinterland, which was a piecemeal and isolated effort, and thus did not achieve the desired results. The Provincial Government, taking cognizance of the situation, decided to carry out development of all areas of the province by adopting an integrated and holistic Land Use Planning approach. [1]

1.3 Role of Provincial/District Land Use Plan in Development Realm

The PLUP is a pioneer in starting such kind of initiative for preparation of land-use plan at the province to envisage a policy document for line departments and other development authorities (ADA)/TMA's including public sector development. This initiative is the sensitization of contradiction amongst the different land uses (such as development of agriculture land for residential purposes) and hap-hazard growth taking place in the province. To cope with these problems and suitably manage these competing land uses it is essential to give direction for growth development in major cities and towns through proper policy guidelines. To ensure planned and integrated growth the PLUP will focus on provincial level major Infrastructures, such as major corridors, major education and health Institutions, major canals/irrigation/energy projects, major economic activities and major services/population centers. PLUP will provide a framework for managing urbanization in the province especially in divisional headquarters (Peshawar, Mardan, Abbottabad, Kohat, Mingora, Bannu, DI khan) to combat rural-urban disparity and ensure spatial equity. It will identify dominant social, cultural, physical, economic, and environmental potentials in the province and will do their broad zoning into protected, production, settlements, and infrastructure land use zones. The proposed land use plan will also deal with the development and connectivity/interdependencies within these broad land uses.

[1]The Pakistan Development Review: An Assessment of Pakistan's Urban Policies, 1947–1997, MOHAMMAD A. QADEER

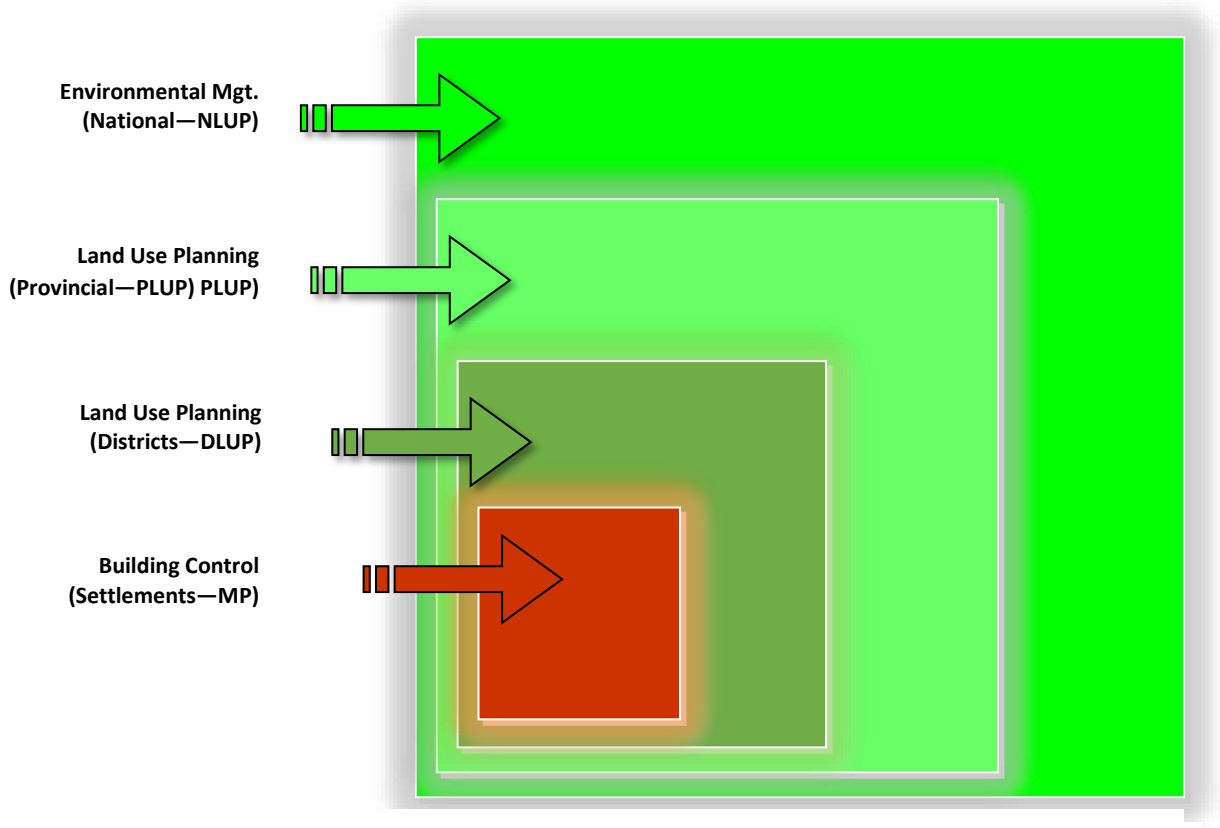


Figure 1-2:Integrated Framework for Land Use and Master Planning in Pakistan

1.4 Planning Methodology and DLUP Abbottabad Approach

In the most simplistic form of land use planning process may well be divided into four steps, namely; Surveys (data collection), Analyses, Stakeholder Consultation, and Land Use Plan:

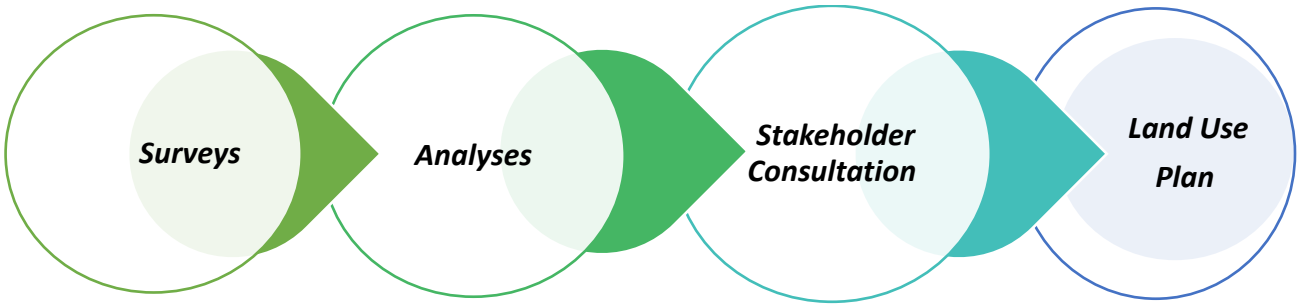


Figure 1-3:Planning Approch for Dlup Abbottabad

Surfing through the previous district study reports and district land use plans reveals that huge data sets have been collected but unfortunately, the analyses and the logical land use planning outcomes have been deficient and even nonexistent in some cases. Before analyzing the specific project objectives and their degree of achievement, it is also pertinent to mention that the formulation of district land use plans should not be an aristocratic professional's output rather it should follow a broad-based stakeholder's approach. In this regard, the approach followed by 'Working Group on Integrated Land Use Planning' of German Foundation for Technical Cooperation (GTZ) may leads us in a better way by suggesting planning as a dialogue approach towards land use planning (GTZ, 1999):

> *"Land use planning (LUP) is an iterative process based on the dialogue amongst all stakeholders aiming at the negotiation and decision for a sustainable form of land use in rural areas as well as initiating and monitoring its implementation".*

Addressing the objective of balanced urbanization, urban sprawl/growth management, and balanced hierarchy of settlements in the districts/province, the study will make use of rank size rule, rank mobility index, primacy index, Ekistics Logarithmic Scale (ELS), Mandal's/Christaller's/Aurousseau's/Rosir's and statistical hierarchies at the districts and provincial level. Moreover, the study will make use of following mentioned planning tools and techniques to analyze the land use dynamics in the Abbottabad district:

- ***Settlements Demographic Analysis (SDA);*** the technique will mostly use secondary data sources and will generate two possible outputs; firstly, settlements ranking order and secondly, the primacy index of settlement.
- ***Settlements Functional Analysis (SFA);*** the technique will require both primary and secondary data sources and the output of this exercise will be functional matrix of settlements.
- ***Settlements Problems Analysis (SPrA);*** the technique will make use of both primary and secondary data to explore the prevailing patterns of urban problems in different types and sizes of cities in the study area.
- ***Settlements Potential Analysis (SPtA);*** the technique will study and explore the primary, secondary and tertiary level potentials found in different types and sizes of cities in the study area. The technique will make use of both primary and secondary data to explore settlements potentials.
- ***Settlements Distance Analysis (SDA);*** the technique mainly requires secondary data sources and will produce distance matrix for the research.
- ***Settlements Next Opportunity Analysis (SNOA);*** the technique will rely on the previously used data in different technique and this analysis will culminate into the next opportunity matrix.
- ***Settlements Accessibility Analysis (SAA);*** the technique will use primary as well as secondary data sources to be used for contemporary accessibility models and will produce isolines for settlements under study.

- ***Settlements/Land Use Locational Evaluation (SLE);*** the technique in question will use majority of the above-mentioned techniques to suggest the optimal locations/sites for the lognormal or rank-size distribution of urban settlements in District Abbottabad.

Figure 1-4:Planning tools and techniques

Having more balanced, sustainable and efficient system of urban settlements and their consequent demands for land vouch for sustainable land use planning and management. Since, most of the land use demands emerge from human/urban settlements therefore, a more sustainable and efficient urban settlements system is quite instrumental in land use planning and management practice. Conventionally, urban settlements are arranged in hierarchical order with limited interaction and connectivity amongst heterogeneous settlements, diagrammed as under:

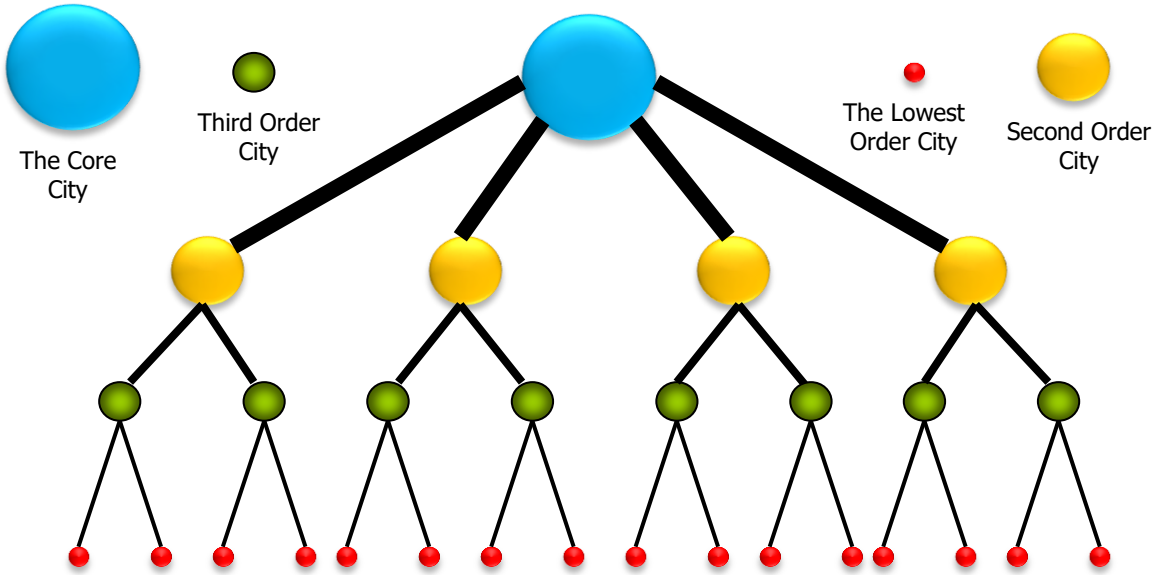


Figure 1-5: Hierarchy of Settlements

However, over the years with the advancements in the means of communication and lesser dependency on distance decay theory, a new model of urban settlements evolved and is known as networking system of human settlements, exhibited as under. In the current exercise of developing land use plan for Abbottabad a more fused approach has been adopted which includes the good points of both these systems and better adopts to Information and Communication Technologies (ICT) in land use planning and managem

As the new approach will focus on the networking systems nodes (Settlements) and edges

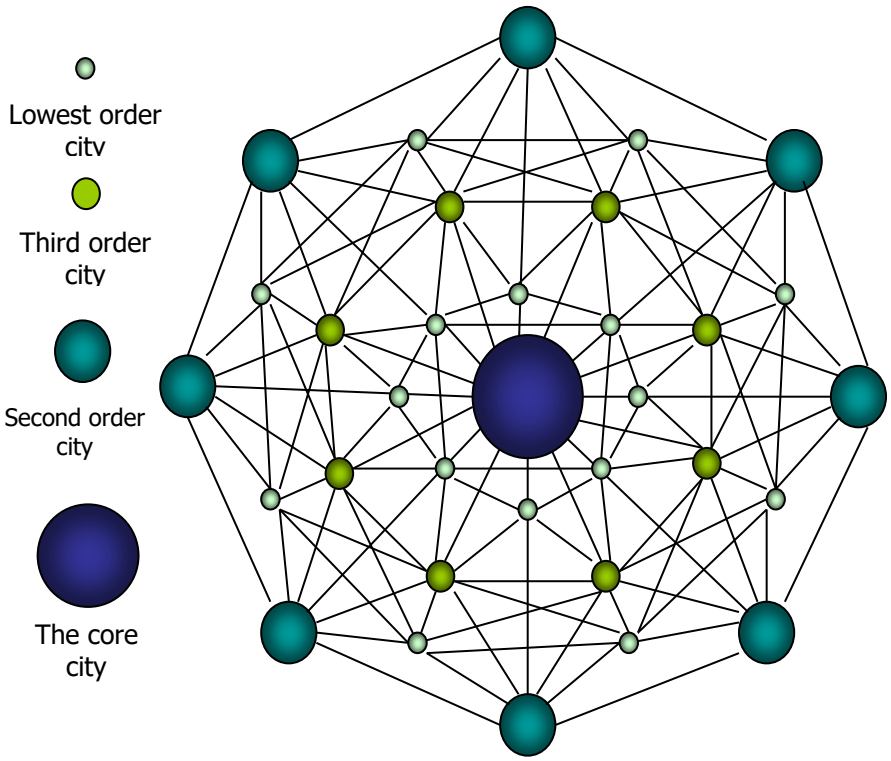


Figure 1-6:Advance Hierarchy of Settlements

(linkages/connectivity) with the following objectives:

- To provide broad guidelines to the nation building department, agencies for undertaking multi-sector, multi-year integrated and coherent development program for the district.
- To provide framework for the management of urbanization and urban growth in the district (the scope includes village levels to city levels).
- To initiate a process for appropriate and compatible land use planning practice in the district.
- To establish a district level land use development/change control mechanism.
- To classify land of the district and to allocate land for the development of amenities.
- To conserve the prime agriculture land of the district from non-agriculture uses through carrying capacity analyses to ensure food security and environmental management.

Focusing on the above-mentioned objectives the District Land Use Plan for Abbottabad would suggest an efficient use of land for many different uses and functions of society. The plan envisages and classify functions at district level into four main categories, namely; living (residential land uses), working (production land uses), Communicating (Infrastructure), and Conserving (Protected land use and Areas of Outstanding Natural Beauty—AONBs).

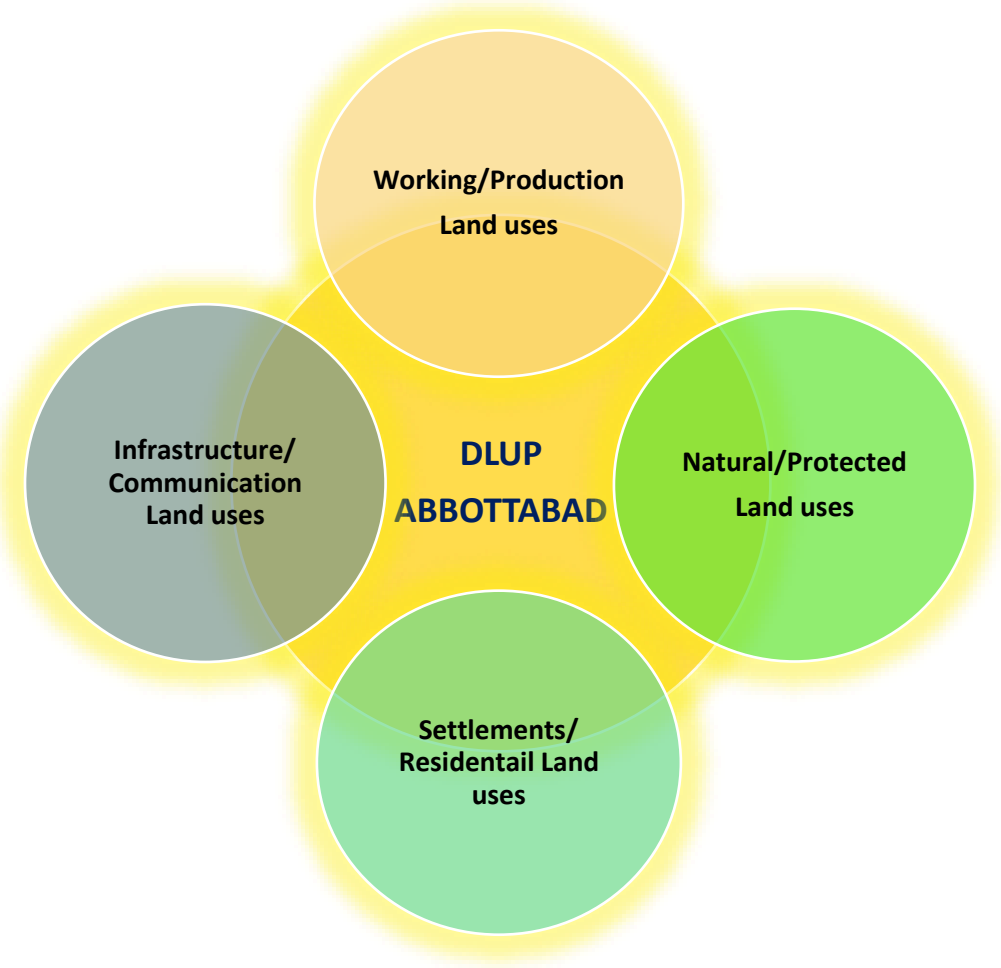


Figure 1-7:Division in four main categories of Land Use

Accordingly, the proposed land use plan will quantify the requirements of all four major types of land uses and will suggest their effective usage for the next 20 years plan period i.e., 2018 to 2038.

Chapter 2

Physiography and Geology

Locational Characteristics

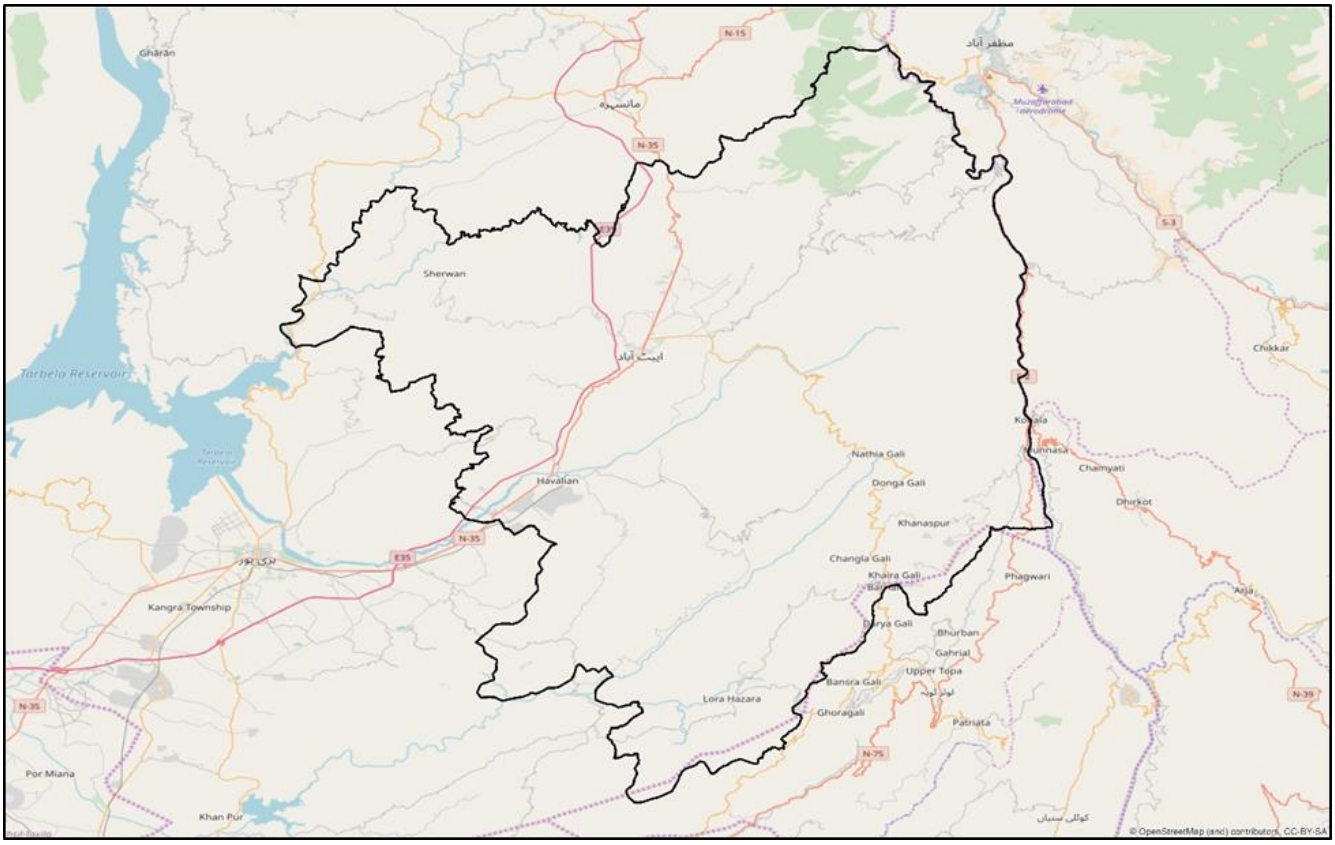
2. PHYSIOGRAPHY AND GEOLOGY

2.1 Location and Physical Features

District Abbottabad located on the Eastern Border of the Khyber Pakhtunkhwa between 33°-50’ to 34°-23’ North latitudes and 72°-35’ to 73°-31’ East longitudes. It is bounded by Mansehra to the North, District Haripur to the West and South-West, Kashmir on the East, District Rawalpindi on the South and Islamabad on the South-East. River Jhelum is on the Eastern side and River Kunhar is on the North-East of District Abbottabad.

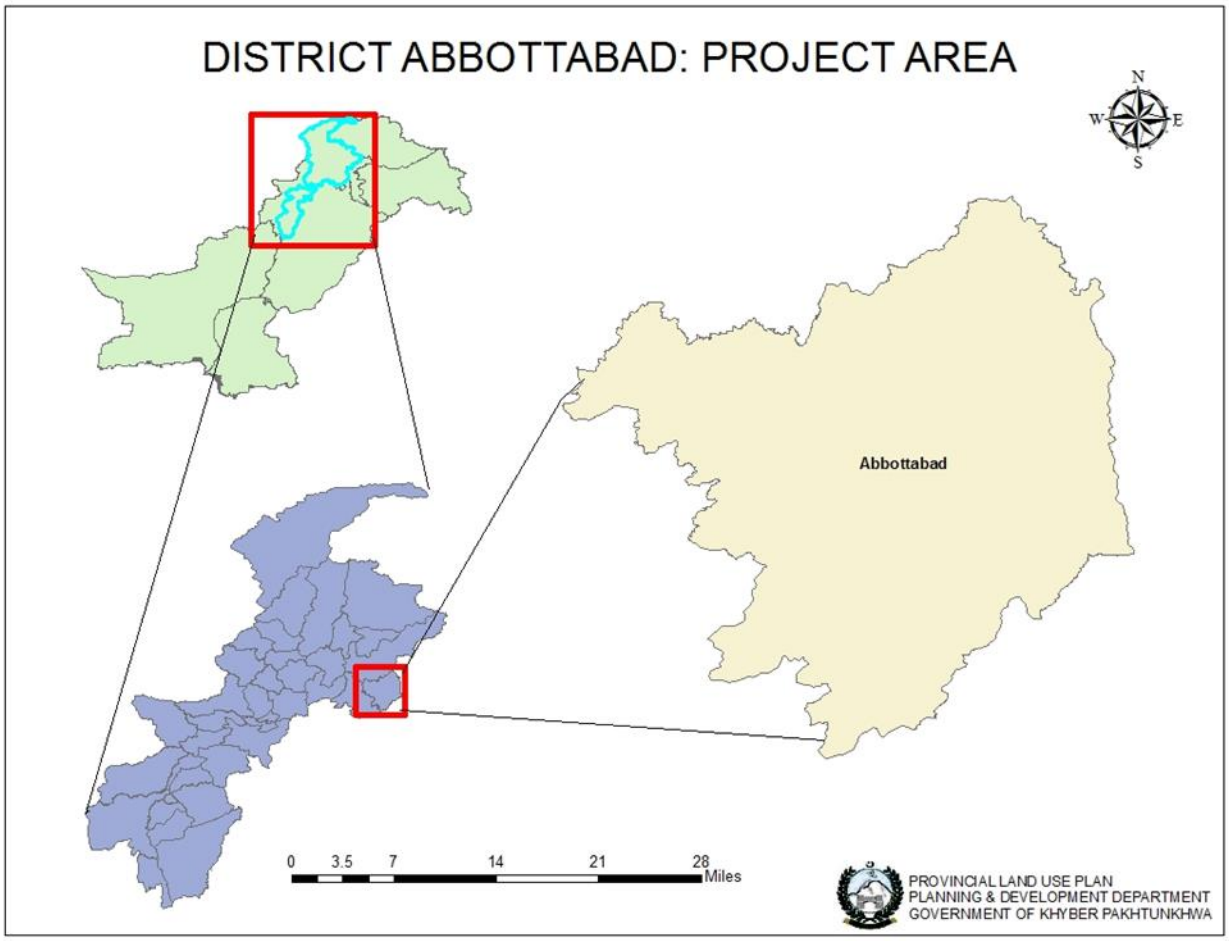
Spread over an area of 1,969 sq. km (178,401 ha), District Abbottabad is in predominantly mountainous terrain. These mountains form part of the lesser Himalayas and dominate the landscape. The Donga Gali range hugs the right banks of the Kunhar and Jhelum rivers, entering the district from the north. The mountains gradually give way to a series of valleys. On the northern border of the district, a series of low-lying hills forms a barrier to the Mangal tract in Mansehra. To the south of these hills lies the Rash plain, covering an area of 6 square km.

Locational map of the District Abbottabad is represented in the below figure in which it can be noted the surrounding features and their contribution in the existence.



MAP 2-1: Location of District Abbottabad

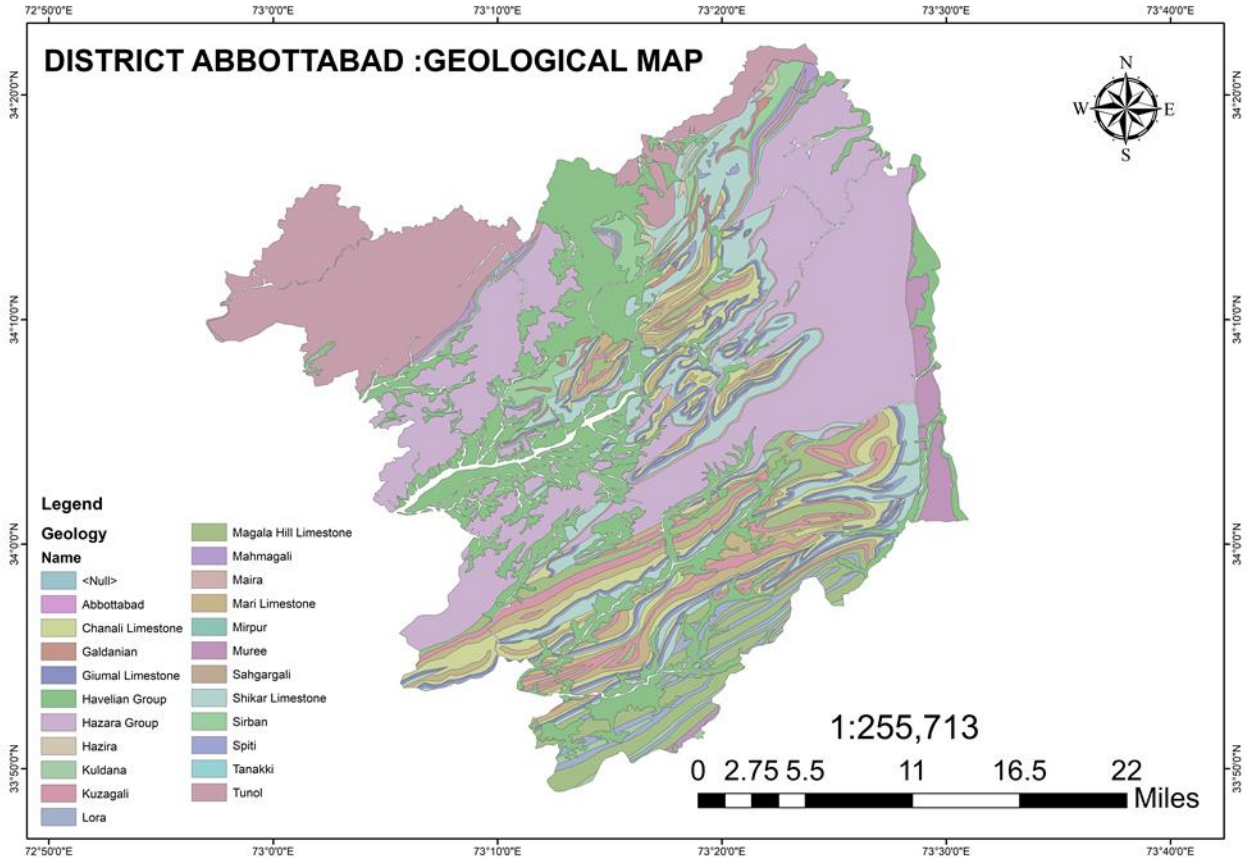
The purpose of below map is to highlight the physical location of District Abbottabad with respect to the province and then Pakistan.



MAP 2-2: Abbottabad Location in the Context of KP

2.2 Geological Setting2

The geological formation of the District Hazara (Including Abbottabad) range in age from Precambrian to Quaternary and include sedimentary, igneous and metamorphic rocks and unconsolidated material. Furthermore, the geology of District Abbottabad is described in Table 2-1 Geological map is defined the characteristics and nature of soil in the district. It is important for the development in the project area (District Abbottabad) it is shown in Map 2.3.



MAP 2-3: Geological map of District Abbottabad

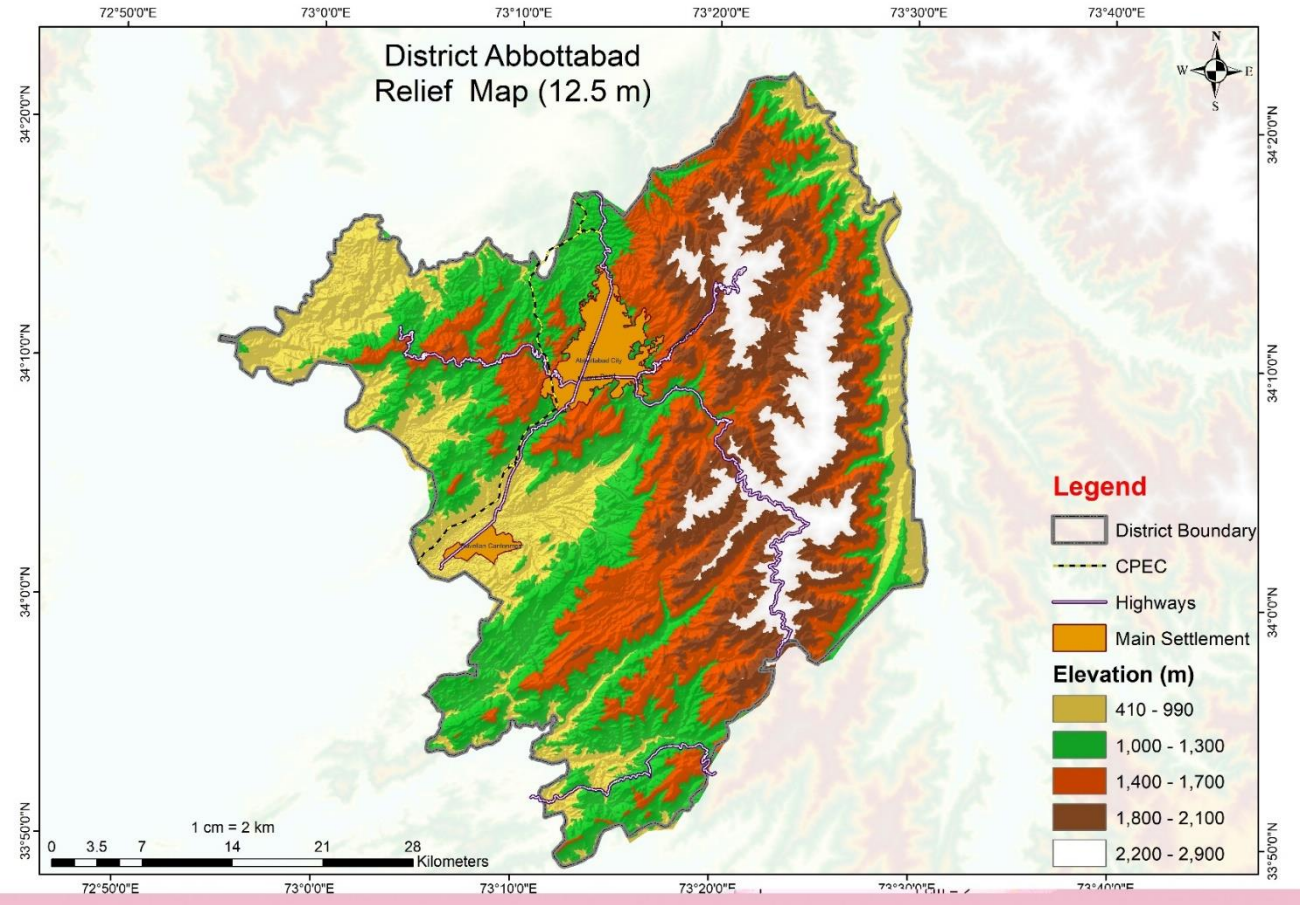
[2] Calkins, J. A., Offield, T. W., Abdullah, S. K., & Ali, S. T. (1975). Geology of the Southern Himalaya In Hazara, Pakistan and Adjacent Areas. Washington: U.S Government Printing Office.

Table 2–1: Geological Groups in District Abbottabad

Havelian Group			Middle	Pleistocene	Quaternary	Cenozoic	Aluvial and other deposits. Gravels, loess, clay and older alluvium.
Rawalpindi Group	Murree Formation		Burdigalian	Miocene	Neogene		Greenish grey sandstones and purple shales with reworked fossils.
			Aquitanian				
Galis Group	Kuldana Formation		Lutetian	Eocene	Paleogene		Red, purple variegated gypsiferous shales and marls.
	Lora Formation		Ypresian				Chalky marls and thin bedded limestones.
	Margala Hill Limestone						Grey thickly bedded limestone.
	Kuzagali Shale		Thanetian	Paleocene			Buff khaki splintery shales.
	Mari Limestone		Selandian				Grey nodular limestone with laterite.
			Danian				
Hothla Group	Chanali Limestone		Coniacian	Upper	Cretaceous	Mesozoic	Thinly bedded grey limestone.
			Turonian				
			Cenomaian				
	Giumal Sandstone		Albian	Lower			Hard grey calcareous sandstone weathering pale brown.
	Spiti Shale		Hauterivian				Black arenaceous shales with laterite.
			Valanginian				
			Berriasian				
Thandiani Group	Sikhar Limestone		Oxfordian	Upper	Jurassic		Grey arenaceous oolitic and dolomitic limestone.
	Maira Formation		Toarcian	Lower			Quartzites shales marls and limestone.
Abbottabad Group	Hazira Formation				Triassic		Pale sandstone and siltstones.
					Permian		
	Galdanian Formation						Haematitic sandstones, mudstones and volcanic.
				Pennsylvanian	Carboniferous		
	Sirban Formation			Mississippian		Paleozoic	Greenish grey dolomites with chert bands.
				Upper	Devonian		
	Kakul Formation	Mirpur			Devonian		Conglomerates, purple shales, sandstones, orthoquartzites, quarzitic dolomites and variegated, calcareous and sandy shales.
		Mahmdagali					
		Sangargali			Silurian		
		Tanakki					
Tanol Formation					Ordovician		Light grey to yellowish and sometimes faintly reddish quartzites.
Hazara Group					Cambrian		Low grade slates silty shales sub-grey wacke sandstones with intercalations of gypsum calcareous shales and algal limestone.

2.2.1 Elevation (Relief map with resolution 12.5 meters)

The average elevation of peaks in the district ranges from 2,500 m to 2,700 m. The Donga Gali range has several offshoots that vary in elevation from 2,500 m to 2,700 m. Several spurs project on either side of this range, with those towards the west varying in elevation from 600 m to 1,500 m. The elevation of the central region, a major surface area varies from less than 600 m near Shah Maqsood to 2,979 m at Miranjani. The Dhund Haro originates near Kuldana and flows down to the North of Lora village. The highest point of the Dhund Haro watershed is 1,725 m near Lora.[3] The elevation of District Abbottabad is shown in Map 2-4.



MAP 2-4: Relief Map/Topographic Map of District Abbottabad

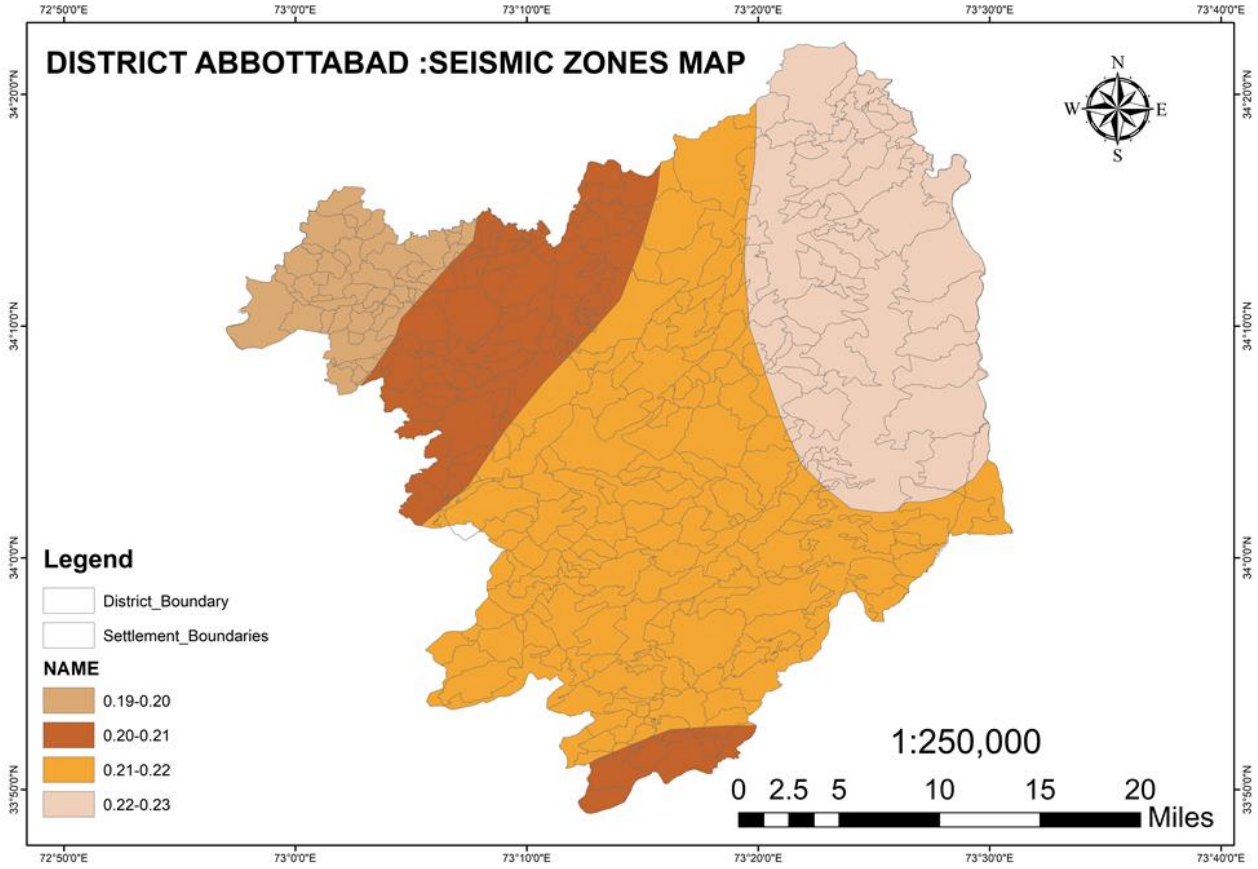
2.2.2 Seismographic Conditions

On October 8, 2005, at 8:50 PST, a magnitude 7.6 earthquake occurred in Pakistan, Afghanistan, and India. But it greatly effects district Abbottabad and Azad Kashmir. The earthquake epicenter was located 100 kilometers north-northeast of Islamabad, along with a fault associated with the Indian subcontinent moving northward at a rate of about 40 mm/yr. and colliding with the Eurasian continent. Tremors were felt across a wide swath of South Asia, from central Afghanistan to western Bangladesh. As on 27th October, more than 1,000 aftershocks were recorded in the India-Pakistan Kashmir region, ranging from magnitude 5.0 to 6.0.[4]

Earthquakes happen along an extremely active thrust fault framework in the locale. Earthquakes along active faults in Pakistan and adjacent faults in India and Afghanistan are the direct result of the Indian sub-continent

[3] IUCN, Sarhad Programme. (2004). *Abbottabad—State of the Environment and Development.* Karachi: Rosette Printers.
[4] Asian Development Bank (ADB)-World Bank (WB) Islamabad, Pakistan, 2005. Preliminary Damage and Needs Assessment-Pakistan 2005 Earthquake", Report No. ADB-WB 2005

moving northward and colliding with the Eurasian continent at a rate of about 5cm/year[5]. Before this collision, this plate was moving with the highest rate of 20 cm/year (Kumar et al., 2007). This major tectonic impact is initiating elevate that prepares the most noteworthy mountain tops on the planet incorporating the Himalayan, the Karakoram, the Pamir and the Hindu Kush ranges.[6] The seismic zones are show in Map 2-5, below.



MAP 2-5: Seismic zones map of district abbottabad

[5] Sitharama T.G., Kolathayar S, Seismic Hazard Analysis of India Using Areal Sources, Journal of Asian Sci.2013,647-653

[6] Quershi, M. A., Ahmad, H., Shah, A. U., & Khan, S. A. (2014). An Earthquake Risk Assessment Study of Khyber Pakhtunkhwa Province Pakistan. First International Conference on Emerging Trends in Engineering, Management and Scineces. Peshawar.

2.2.3 Fault Lines

District Abbottabad is a part of the geological set-up of the Khyber Pakhtunkhwa Province that can transmit earthquake waves. Major faults that may affect District Abbottabad are the Main Mantle Thrust (MMT), the Main Boundary Thrust (MBT), and Oghi Shear Zone Mansehra, Jehlum Boundary Thrust Fault Line, Darband Fault Tarbela, Khairabad Fault, Kalabagh Fault and other small-scale faults common in Khyber Pakhtunkhwa.[7] Whereas, the main fault lines which go through District Abbottabad are; Nathia Gali Thrust and Panjal Thrust, these fault lines are shown in Map 2-6 below.

Nathia Gali Thrust

Coward and colleagues in 1988[8] divided Himalayas into two zones.

- ***Internal Zone (hinterland):*** Internal zone composed of crystalline rocks in Narran, upper Kashmir, upper Hazara, and Swat.
- ***External Zone (foreland):*** The external zone consists of successions of stratified rocks in Kohat, Kala-Chitta, and Margala. The boundary between northern internal zone and the southern external zone is Nathia Gali Khairabad thrust.

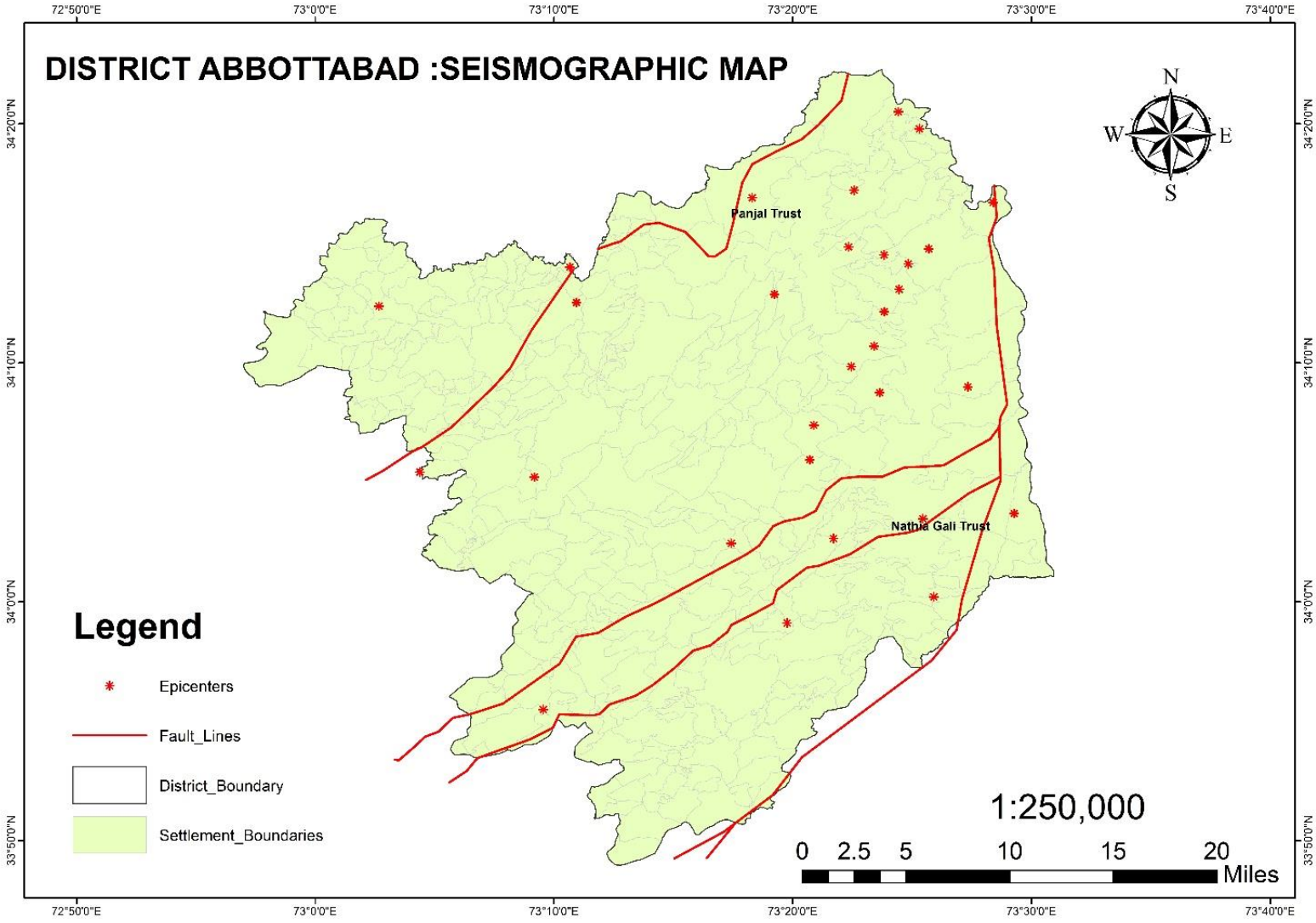
Panjal Thrust

The Panjal thrust is one of the major tectonics' scars of the Lesser Himalayan domain in Kashmir. Its type section is located in the Panjal range from where it extends Northwards along the Eastern flank of the Hazara Kashmir syntaxis and terminates at its apex. The Panjal thrust demarcates two zones, the Tethyan and Himalayan. The Pir Panjal Range in Kashmir is the type section of the thrust along which the Permo-Triassic sequence is thrust over by the meta sediments of the Salkhala series of Precambrian age. The Panjal thrust was regarded as an analog of the Main Central Thrust (MCT) in the NW Himalaya.[9]

[7] NDMA. (2007). *Abbottabad District Disaster Risk Management Plan.* Islamabad: Instant Print System (Pvt.) Ltd.

[8] Treloar, P.J., Coward, M.P., Chambers, A.F., Izatt, C.N. and Jackson, K.C., (1992) Thrust geometries, interferences and rotations and their Northwest Himalaya. In: McClay, K.R. (ed.), Thrust Tectonics. Chapman and Hall, London, UK, pp. 325 – 342.

[9] Akhwanzada Muneeb. (2018, March 31). Feild Report of Abbottabad and Galiyaat areas. Retrieved from Scribd: https://www.scribd.com/doc/148934253/Feild-Report-of-Abbottabad-and-Galiyaat-areas.



MAP 2-6: Fault Lines Map of District Abbottabad

Chapter 2

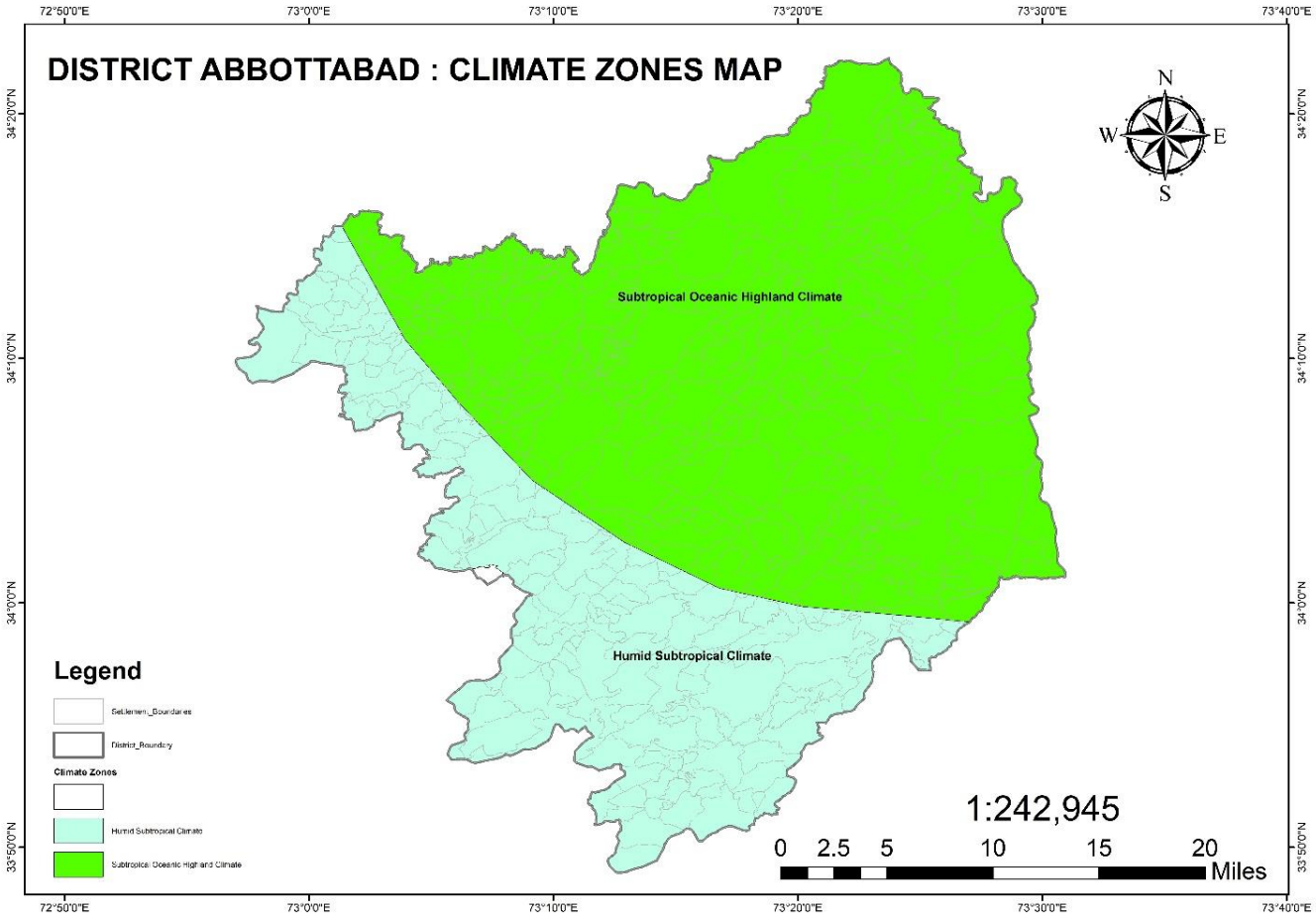
Physiography and Geology

Climatic Characteristics

2.3 Climate

The climate of Abbottabad is mild, and generally warm and temperate. District Abbottabad has a significant rainfall. Even in the driest month there is a lot of rain. The average annual temperature in Abbottabad is 17 °C. The average annual rainfall is 1260 mm. According to the Köppen-Geiger climate classification the climate of District Abbottabad is Humid Subtropical Climate (Cwa) and Subtropical Oceanic Highland Climate (Cwb). The climate classification is also shown in Map 2-7.

A detailed picture of mean temperatures, rainfall and humidity recorded at the Kakul weather station during the period 1997–2016 has been described below, whereas, Table 2-2 shows the complete climatological profile of District Abbottabad for the year of 2016. The maximum average temperature recorded is 33.7°C in the month of June, while the minimum average recorded temperature is 2.4°C in January. Total rainfall is 1262 mm for the year 2016, with an average of 105.1 mm per month. Average relative humidity is 61 percent.



MAP 2-7: Climate Zones Map of District Abbottabad[10]

[10] Zifan, A. (2018, November 08). Climate of Pakistan. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Climate_of_Pakistan

Table 2–2: Climatological Profile for District Abbottabad 2018[11]

Parameters/ Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Temp. (°C)	7.5	9.3	13.6	18.1	22.8	27.3	25.8	24.4	23.2	19.3	14.3	10	17.2
Min. Temp. (°C)	2.4	4.1	8.1	12.3	16.5	21	20.9	20	17.8	13	8.1	4.5	12.3
Max. Temp. (°C)	12.7	14.5	19.2	24	29.1	33.7	30.8	28.9	28.6	25.7	20.5	15.5	23.6
Rainfall (mm)	77	104	123	99	69	76	252	244	98	43	29	48	105.1
Humidity (%)	66	60	67.5	59	48	54	74	75	70	58	51	49	61
Avg. Wind Speed (knots)	0.45	0.5	0.35	1.2	0.7	0.55	0.65	0.75	0.6	0.35	0.2	0.1	0.09
Prevailing Wind	NW	SE	NW	NW	NW	NW	SE	SE	SW	SE	SE	SE	NW

2.3.1 Temperature

Owing to the area's mountainous terrain, Abbottabad's summer starts a little late and is relatively mild. Temperatures begin to rise in the month of June and July, the maximum temperatures recorded for the year 2018 are 33.7°C and 30.8°C respectively. Winters, meanwhile, are comparatively severe, with heavy snowfall in the higher elevations causing the snowline to drop. Temperatures are lowest during the months of January and February, which are 2.4°c and 4.1°c respectively. In January, which is by far the coldest month, maximum, minimum and average temperatures stand at 23.6°C, 12.3°C and 17.2°C respectively. The temperature during the year 2018 has been shown in the graph.

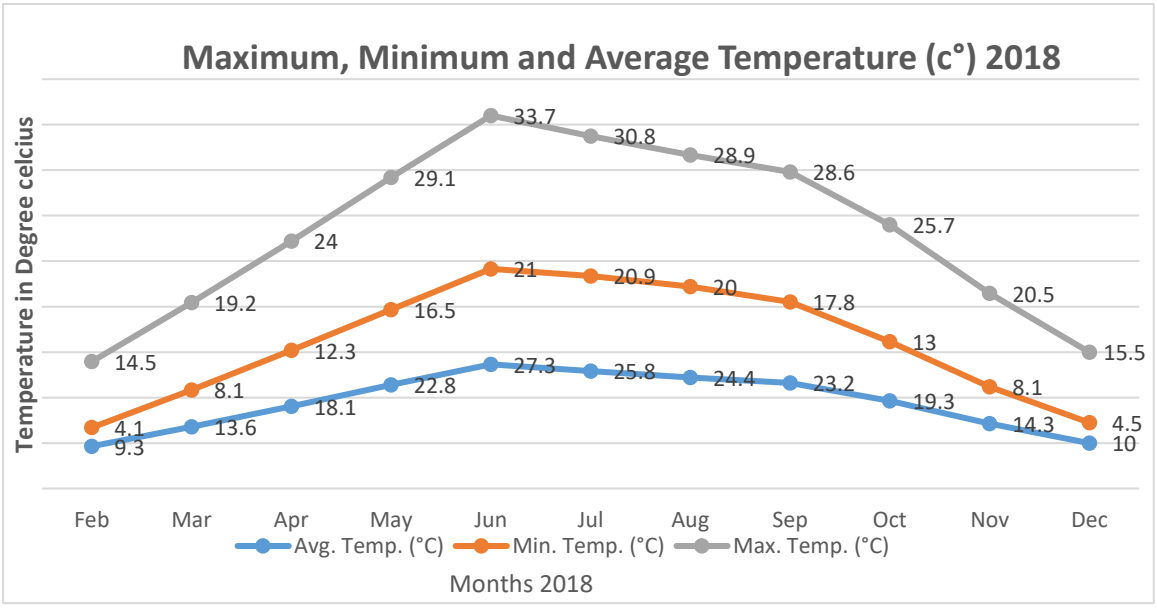


Figure 2-1:Maximum, Minimum and Average Temperature (c°) 2016

[11] Pakistan Meteorological Department, 2017

Historical Perspective of Monthly Average Temperature (2016-1997)

The minimum temperature of Abbottabad has increased to 14.79 percent since 1997 which was reported 7.2, while very less change has been noticed in the maximum temperature as in 1997 it was reported 25.4 and in 2016 the reported maximum temperature was 25.1. The maximum temperature reported noted between the years of 1997 - 2016 was 26.1 in 2002 and minimum reported was in 2008 at 4.45. The details are given below in Table 2-3 and shown in Figure 2-3.

Table 2–3: Historical Perspective Monthly Average Temperature (c°) 1997-2016[12]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	7.2	8.25	11.9	15.9	18.8	23.6	25.4	23.2	22.4	15.6	11.9	7.8	16
1998	6.8	7.65	10.9	17.7	21.9	24.2	25.2	24.5	22.8	19.2	15.6	12.1	17.4
1999	7.15	10.1	12.9	19.6	23.8	25.1	25.3	23.5	22.7	18.8	13.2	11.3	17.8
2000	7.65	6.9	12.5	19.8	26.2	24.1	24.3	23.7	21.4	19.1	13.3	9.35	17.4
2001	7.9	9.85	13.7	17.6	23.5	23.8	24.2	23.9	20.8	16.2	11.2	8.85	16.8
2002	7.5	8.4	14.3	18.8	24	25.8	26.1	24.2	20.9	19	14.8	9.65	17.8
2003	9.1	8.25	12	17.7	20.1	24.4	24.9	24.2	22.3	18.4	12.7	9.2	16.9
2004	7.25	10	17	19.6	22.7	24.9	25.6	24	23	16.2	13.9	9.7	17.8
2005	5.65	6	12.5	16.8	19.6	24	24.7	24.3	23.2	18.1	12.5	9.05	16.4
2006	6.35	12.4	12.5	17.7	25.1	23.9	25.2	23.6	22	18.9	12.5	7.6	17.3
2007	7.3	8.9	11.4	20.3	22.5	24.1	24.1	24.8	22	18.2	14.8	7.9	17.2
2008	4.45	7.4	16	16.6	22.6	24.4	24.5	23.8	21.7	19.2	13.6	10	17
2009	8.2	8.95	12.8	16.1	22	24.4	25.8	25.1	22.6	17.6	12.9	9.15	17.1
2010	9.65	7.9	16	19.5	21.5	23.6	24.5	23.8	21.6	18.4	13.9	9.5	17.5
2011	6.9	7.4	12.8	15.4	23.5	24.1	24.1	24	22	17.5	13.6	9.05	16.7
2012	5.55	6.25	11.8	16.8	21	25.2	26.5	24.6	21.8	16.7	12.4	8.15	16.4
2013	6.8	9.65	13.7	16.8	21.9	24.6	25.2	23.9	22.1	19.1	12	9.15	17.1
2014	7.1	7.85	10.7	16.1	20.4	24.2	25.3	24.6	22	17.9	12.7	9.45	16.5
2015	8.35	9.25	12.1	17.1	21.2	22.7	24.6	24.3	21.4	17.7	12.1	8.8	16.6
2016	8.45	10	13.5	17.3	23.9	25.1	25.4	24.3	23.1	19.3	14.3	11.8	18

[12] Pakistan Meteorological Department, 2017

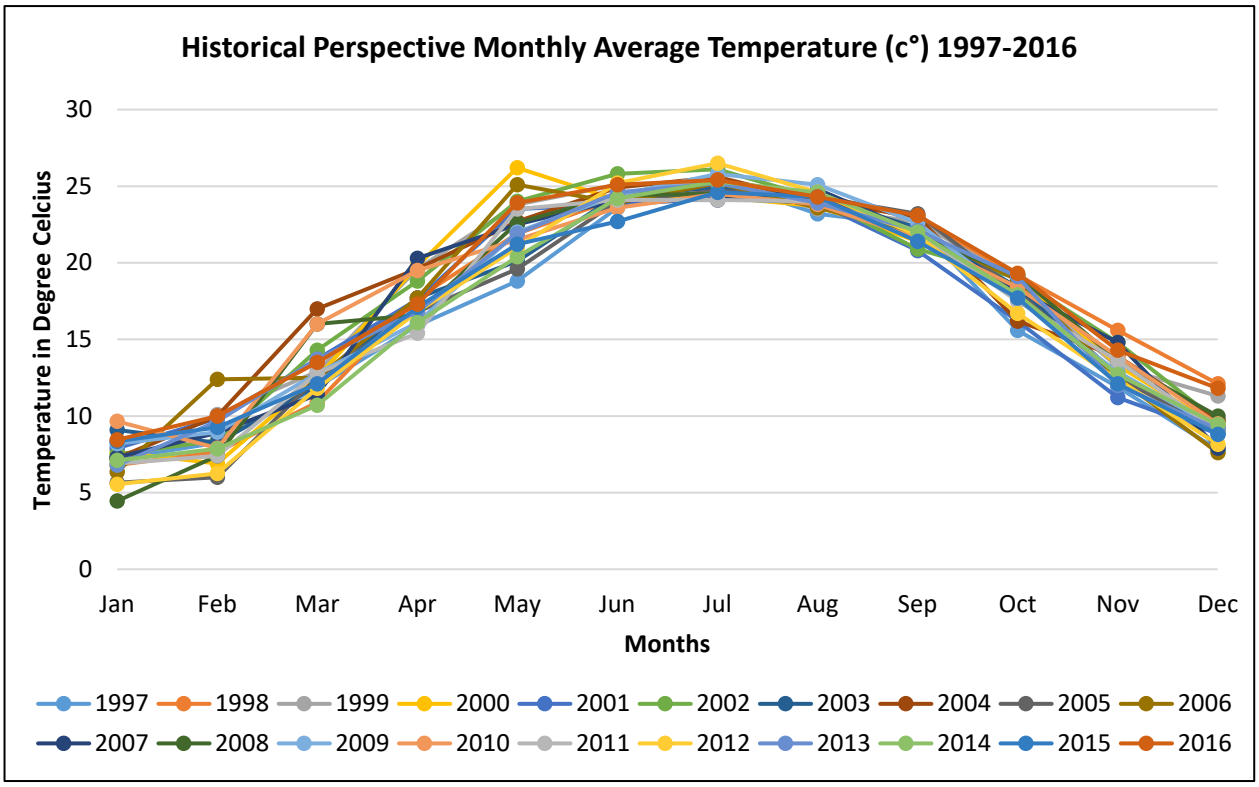


Figure 2-2:Historical Perspective Monthly Average Temperature (c°) 1997-2016

2.3.2 Rainfall

District Abbottabad lies within the active monsoon zone, with 57 % of rain received during the June-September period and the remaining 43 percent unevenly distributed throughout the year. In 2016, a total of 1156.9mm of rain was recorded at Kakul, the distribution of rainfall is shown in Figure 2-4.

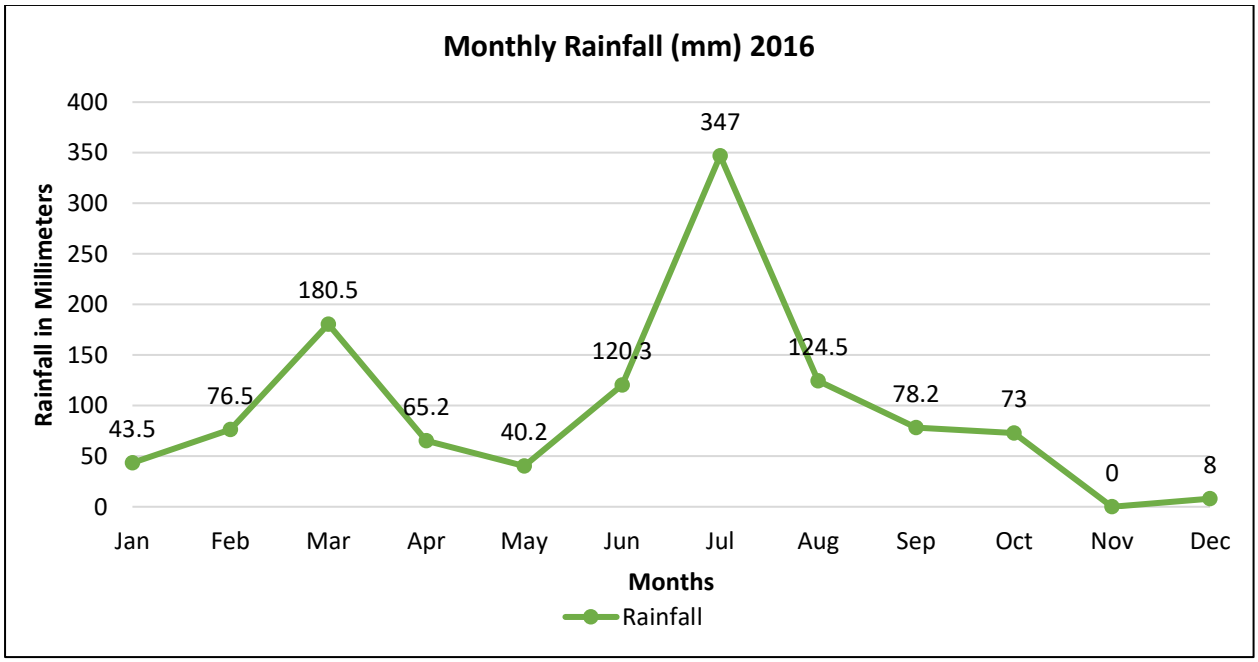
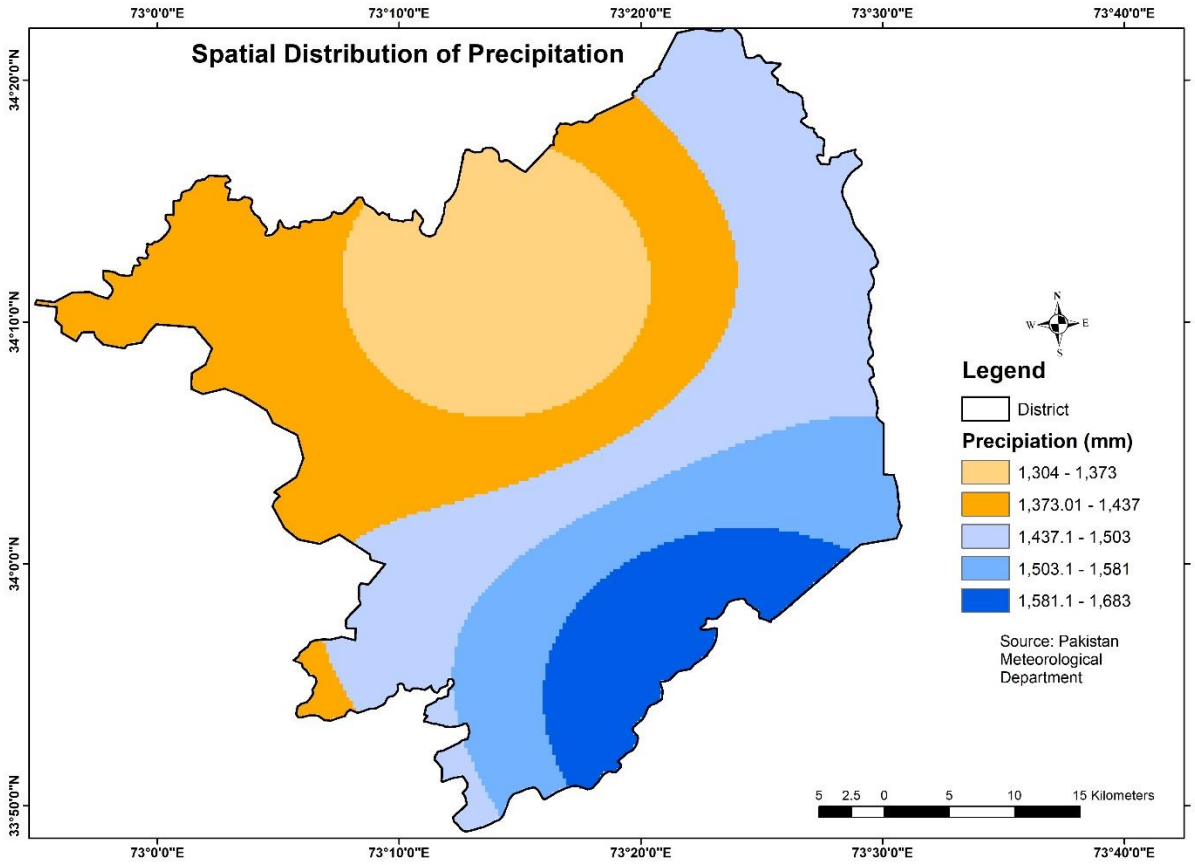


Figure 2-3:Monthly Rainfall (mm) 2016

Historical Perspective of Monthly Rainfall (2016-1997)

In the last 20 year the maximum annual rainfall was recorded in the year of 2015, 1573-millimeter rainfall. On the other hand, the minimum annual rainfall was recorded in the year of 2001, 940-millimeter rain was recorded. The annual rainfall has been variant in the last two decades, showing rise and fall in the years. It can be clearly visible from the map 2-5 of Spatial Distribution of Precipitation. So the rainfall is high in high altitude area and the rainfall decreases as the altitude decrease towards west side.



MAP 2-5: Spatial Distribution of Precipitation

Table 2–4: Historical Perspective of Monthly Rainfall (mm) 1997-2016[13]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	34	27.3	119	155	114.9	219.1	225.1	413.1	69.1	136.2	35.1	15.6	1563.5
1998	64.5	204	111.2	222.5	55.7	82.2	185.8	211.6	97.7	45.7	0.5	0	1281.4
1999	121.9	45.9	104	19.8	37.3	29.9	250.7	237.1	149.5	14.3	93.6	0	1104
2000	87	58.5	70.4	10.8	26.9	99.8	287.6	288.5	130.9	29.6	2	50.2	1142.2
2001	0.5	8.8	100.1	95.6	46.7	242.9	201.6	161.1	33	10.1	36.1	3.5	940

[13] Pakistan Meteorological Department, 2017

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2002	63.1	90.7	76.1	47.6	29.9	83.1	166.3	301.4	127.2	28.9	1	22.3	1037.6
2003	30.9	282	198.6	119.2	90.3	121.4	285.5	158.9	105.5	7.5	27.2	86.4	1513.4
2004	108.3	45.9	13.4	134	65.4	89.6	209.7	221.5	71.7	124.1	40.5	47.2	1171.3
2005	117	196.1	186.5	64.7	68.4	45.3	198.1	146.3	41.4	79.3	21.5	0	1164.6
2006	125.5	78.5	61.5	74.7	61.7	68.1	329.7	191.5	62	37	84.6	171.9	1346.7
2007	2.1	85.8	179.2	41.1	65.6	135.1	294.6	180.4	155.2	0	19.3	35.7	1194.1
2008	200	67.8	20.3	131	45.1	248.7	269.1	161.6	39.5	36.1	77	111.5	1407.7
2009	74.2	99.5	85.6	207.8	34.5	78.9	152.5	177.8	48.8	23.8	34.7	8.2	1026.3
2010	20.2	214.4	53.5	49.6	85.6	59.1	389.2	140.5	120	15.9	2	24.4	1174.4
2011	23.9	218.3	138.2	120.7	20.8	83	189.2	266.5	88	63.3	16.4	9	1237.3
2012	26	77.3	107.2	214.3	42.8	45.7	146.4	299.8	173	33	5.3	74	1244.8
2013	7.6	180.2	105.1	110.3	91.2	165.3	231.7	444.9	179.9	21.5	12.1	0.1	1549.9
2014	21.6	85.4	316.1	76.5	152.4	88	189.7	165.8	213.2	49.2	19	0	1376.9
2015	24	104.8	177.6	204.1	87	116.1	344.6	138.4	94	187	50.4	45.2	1573.2
2016	43.5	76.5	180.5	65.2	40.2	120.3	347	124.5	78.2	73	0	8	11 56.9

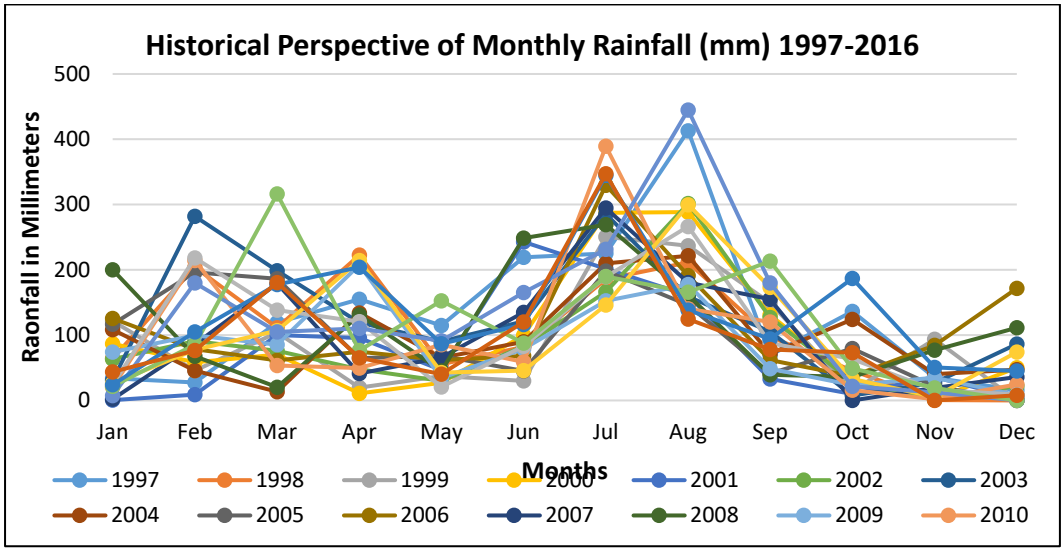


Figure 2-4:Historical Perspective Monthly Total Rain (mm) 1997-2016

2.3.3 Humidity

The District Abbottabad experiences relatively high humidity throughout the year. During the year 2016 average humidity stood at 61 percent. Humidity is highest between July to September, coinciding with the peak rainfall period, as shown in the Figure 2-6.

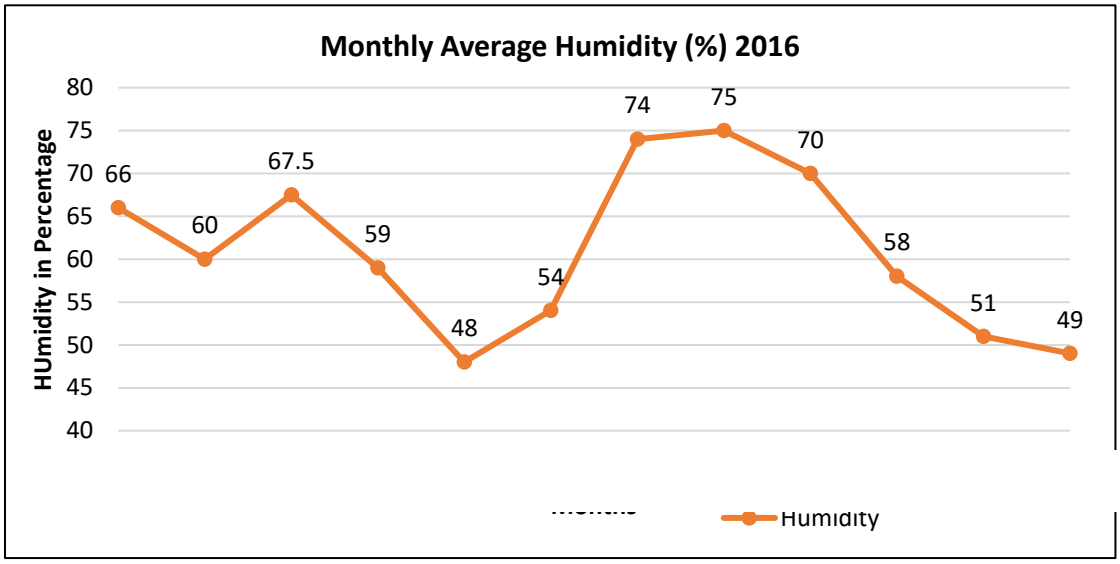


Figure 2-5:Monthly Average Humidity (%) 2016

Historical Record of Monthly Average Humidity of District Abbottabad (1997-2016)

The minimum recorded humidity of district Abbottabad was 50% in 1997 and the maximum reported humidity was 78%, while in the year of 2016 the rate of minimum humidity has been decreased to 48% while the maximum recorded humidity has been decreased to 74 %. Maximum and minimum precipitation rate reported between the years 1997-2016 was 83 % and 37% respectively , the details are given below in Table 2-5 and illustrated in Figure 2-7.

Table 2–5: Historical Perspective Monthly Average Humidity (%) 1997-2016[14]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997	50	48	57	66	50.5	54	72	77.5	71	72	59	64	61.8
1998	63	64	57.5	56	47.5	37	71	74	71	60	47	36	57
1999	69	58	54	43	40.5	39	67	76	73	56	63	44	56.9
2000	60	60	54	40	41	50	74	78.5	72	54	55	53	57.6
2001	48	47	47	55	42.5	66	79	78	56	52	50.5	54	56.3
2002	55	62	54	50	40	45	55	76	67	58	50	57	55.8
2003	50	69	61.5	58	47.5	48	75	77	75	53	52.5	62	60.7
2004	73	58	50.5	57	44.5	52	63	74	64	65	59.5	61	60.1
2005	72	77	71.5	50	52	45	74	75	69	55	51.5	42	61.2
2006	68	59	62	48	42.5	49	73	83	68	62	71	69	62.9
2007	52	72	65	52	49	56	76	76.5	74	47	49.5	65	61.2

[14] Pakistan Meteorological Department, 2017

2008	65	56	47.5	61	50	69	78	79.5	66	61	53.5	57	62
2009	70	65	59	62	42.5	42	60	76	67	54	56	58	59.3
2010	52	71	54.5	55	50	50	69	81	73	64	57	52	60.7
2011	57	76	54	60	47	52	73	81.5	75	66	63.5	62	63.9
2012	65	67	56.5	66	48	41	56	75	76	64	61	63	61.5
2013	61	67	60	63	48	56	72	81	73	69	62.5	58	64.2
2014	57	67	75.5	57	56	48	69	74	73	69	61	49	63
2015	55	66	69	65	51	54	78	77	65	64	69.5	63	64.7
2016	66	60	67.5	59	48	54	74	75	70	58	51	49	61

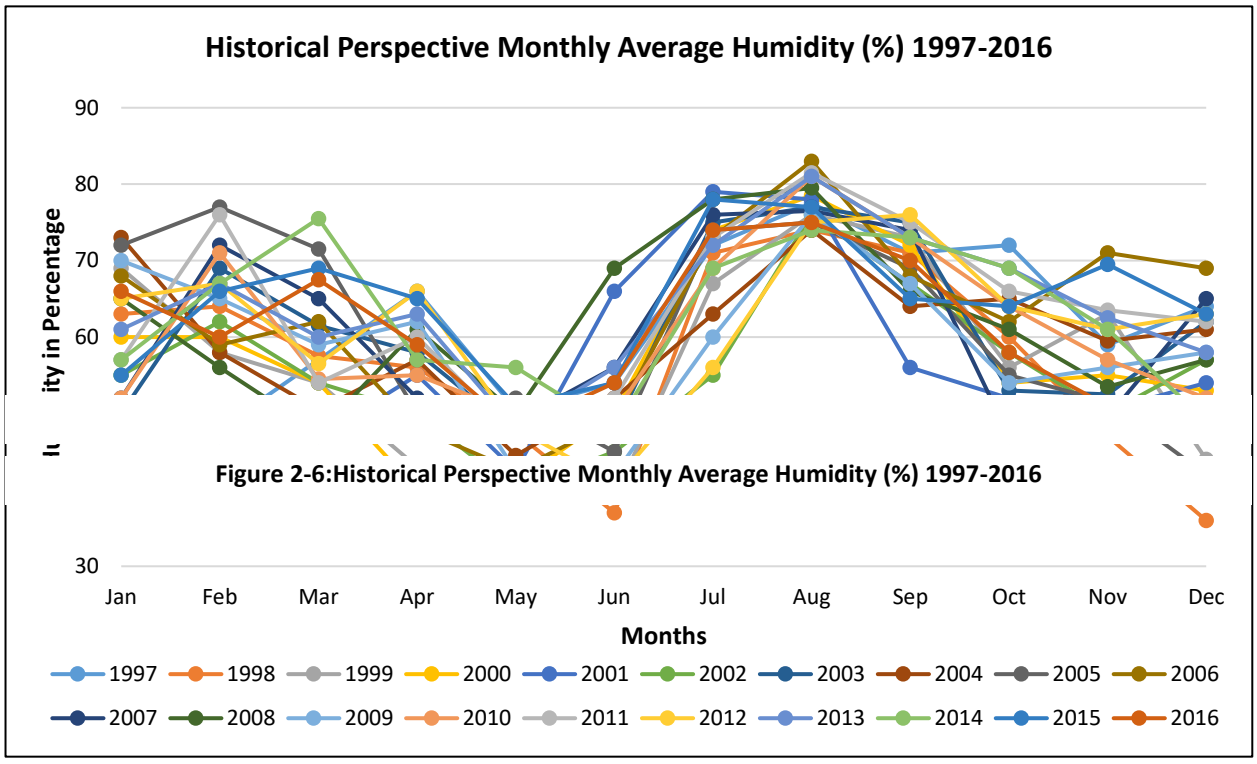


Figure 2-6:Historical Perspective Monthly Average Humidity (%) 1997-2016

2.3.4 Wind

The winds in District Abbottabad are mostly calm throughout the year. The data collected from Meteorological Station Kakul shows that in the year of 2016 the maximum average speed was 1.2 knots in the month of April and the minimum average speed was 0.1 knots during the month of December. The prevailing direction of the wind during January to June was North-West, while during the remaining year it was South-East. A detail of month-wise wind speed and wind direction is given in Table 2-6.

Table 2–6: Monthly Wind Speed and Direction 2016[15]

Months	At 8:00 AM		At 5:00 PM		Daily Average Speed
	Speed (knots)	Direction	Speed (knots)	Direction	
Jan	0.1	N45W	0.8	NW	0.45
Feb	0	Calm	1	SE	0.5
Mar	0.1	N45W	0.6	NW	0.35
Apr	1.2	S45W	1.2	NW	1.2

[15] Pakistan Meteorological Department, 2017

Months	At 8:00 AM		At 5:00 PM		Daily Average Speed
	Speed (knots)	Direction	Speed (knots)	Direction	
May	0.2	N18W	1.2	NW	0.7
Jun	0	Calm	1.1	NW	0.55
Jul	0.3	S45E	1	SE	0.65
Aug	0	Calm	1.5	SE	0.75
Sep	0.1	N45W	1.1	SW	0.6
Oct	0.1	N45W	0.6	SE	0.35
Nov	0.1	N45W	0.3	SE	0.2
Dec	0	Calm	0.2	SE	0.1

Historical Perspective of Monthly Average Wind Speed

July proves to be the windiest month in the historical perspective— with an average speed of 0.9 in the last 20 years from 1997-2016. Whereas, November proves to be the calmest month in the last 20 years. The detail of monthly average wind speed is given in the Table 2-7, below.

Table 2–7: Historical Perspective of Monthly Average Wind Speed (knots) 1997-2016 [16]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	0.3	0.5	0.75	0.15	0.2	0.1	0.3	0.25	0.3	0.35	0.15	0.1
1998	0.15	0.2	0.65	0.45	0.05	0.3	0.75	0.3	0.55	0.25	0.05	0
1999	0.3	0.45	0.75	0.35	0.35	0.65	0.25	0.45	0.15	0.05	0	0.15
2000	0.45	0.25	0.4	0.65	0.95	0.8	0.7	0.9	0.7	0.55	0.5	0.65
2001	0.8	0.95	1.1	0.95	0.9	0.75	0.9	0.9	1	0.65	0.4	0.5
2002	0.85	0.8	1	1	1.35	1.25	4.65	0.9	1	0.75	0.75	0.75
2003	0.9	1.3	1.05	0.15	1.45	0.9	1	1.05	0.9	0.95	0.65	0.75
2004	0.9	1	1.1	0.85	1.15	0.95	0.75	0.85	0.55	0.95	0.6	0.9
2005	0.75	0.55	1	1.15	1.2	0.5	0.8	0.9	0.8	0.7	0.7	0.7
2006	0.85	0.75	0.75	0.7	0.85	0.9	0.75	0.5	0.85	0.75	0.45	0.65
2007	1	0.8	1.1	0.85	1.05	1.1	0.95	1	0.6	0.45	0.25	0.45
2008	0.8	0.95	0.85	0.85	0.9	0.75	0.75	0.85	0.75	0.6	0.4	0.3
2009	1	0.9	1.05	0.85	0.85	1	0.75	0.65	0.85	0.2	0.4	0.25
2010	0.45	0.65	0.75	0.65	0.95	0.65	0.45	0.6	0.85	0.35	0.15	0.05
2011	0.2	0.15	0.4	0.55	0.4	0.45	0.35	0.55	0.35	0.2	0.1	0.15
2012	0.15	0.65	0.95	0.45	0.6	0.65	0.55	0.6	0.15	0.55	0.45	0.3
2013	0.45	0.65	0.8	0.65	0.9	0.8	0.65	0.55	0.6	0.6	0.45	0.5
2014	0.4	0.7	0.65	0.8	0.7	0.9	0.65	0.5	0.75	0.45	0.1	0.3
2015	0.35	0.35	0.65	0.75	0.6	0.85	0.45	0.8	0.7	0.7	0.2	0.2
2016	0.45	0.5	0.35	0.65	0.7	0.55	0.65	0.75	0.6	0.35	0.2	0.1
Monthly Average	0.6	0.7	0.8	0.7	0.8	0.7	0.9	0.7	0.7	0.5	0.3	0.4

Historical Perspective of Month-wise Prevailing Winds:

The prevailing wind direction throughout the year keeps changing from North-West to South-West and from South-West to South-East. From December to June the prevailing wind direction remains West

[16] Pakistan Meteorological Department, 2017

bound, while from July to November the dominate direction is East bound. The detail picture of prevailing wind during the last 2 decades has been presented in the Table 2-8.

Table 2–8: Historical Perspective of Month-wise Prevailing Wind 1997-2016[17]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	S30W	S5W	S24W	S18W	S66W	N27W	S22W	S	S	S2W	S	E
1998	S18W	S16W	S21W	S12W	Calm	S26W	S11W	S14W	S29W	S34W	S	Calm
1999	S22W	S51W	S39W	S45W	N72W	S40W	S53W	S18W	S72W	W	Calm	S27W
2000	S58W	S18W	S23W	S46W	S41W	S28W	S13W	S24E	S03W	S21E	S14E	S09W
2001	S13E	S8W	S45W	N83W	N30W	S52E	S34E	S25E	S38E	S35E	N54E	S22W
2002	S14E	S37W	N21W	S80W	N60W	S88W	S83W	S14E	S18E	S44E	S11E	S21W
2003	S19E	N89W	S13W	S62W	N27E	N40W	S1E	S5E	S37E	S43E	S42W	S47W
2004	N88W	S69W	S27W	N85W	S11E	S45W	N23W	S28E	S23E	S21E	S41E	S73W
2005	S54W	N55W	S56W	S07W	N67W	N64W	S07W	S35E	S20E	S67E	S35E	S33W
2006	N80W	N80W	N72W	N52W	N41W	N49W	S36E	S28E	S31E	S27E	S17E	S88W
2007	S11W	S79W	S04E	S01E	N66W	S75W	S29E	S38E	S34E	S03E	S38E	S18W
2008	N70W	N62W	S59W	S22W	S84W	S08E	S23E	S34E	S32E	S41E	S45E	N45W
2009	N51W	N64W	N87W	N74W	N48W	N25W	N83W	S24W	N45W	Calm	S	Calm
2010	S10E	N52W	N79W	N22W	N48W	N47W	W	S51E	S	S45E	S45E	Calm
2011	N45W	S45E	S18E	S45E	S45W	N45W	N45W	S53E	S45E	S45E	S45E	S45E
2012	S45E	S18E	S49E	N45W	N45W	N52W	N45W	N45W	S62E	S37E	S45E	S45E
2013	S45E	S45E	N72W	S45E	N34W	N70W	S37E	N45E	S68E	S45E	Calm	Calm
2014	N52E	S45E	N63W	S56W	S	S18E	S	S45E	S13E	S79W	N45W	S45E
2015	N12W	S23W	S45E	S38E	N38W	N45E	S45E	S45E	S37E	N50E	N45E	N45W
2016	N22W	S45E	NW	N77W	N72W	N27W	S15E	S25E	S45W	S18E	S45E	S45E
Prevailing Wind	NW	SW	SW	SW	NW	NW	SE	SE	SE	SE	SE	SW

[17] Pakistan Meteorological Department, 2017

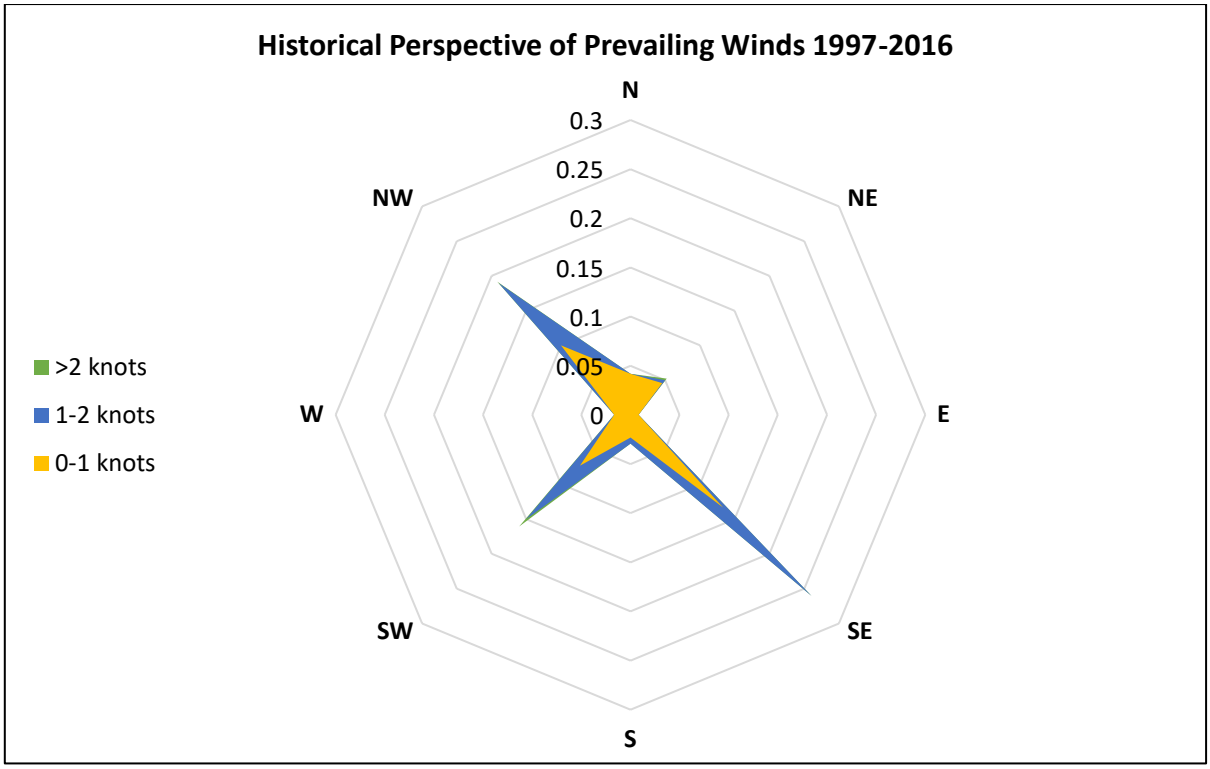


Figure 2-7:Historical Perspective of Prevailing Winds 1997-2016

2.4 Hydrology and Water Resources

2.4.1 Water Resources

The water resources of District Abbottabad consist of rivers, small streams, small dams and khattas/khwars. The main natural sources for irrigation in District Abbottabad are khattas/Khwars, mountain springs, tube wells, dug wells, the details are given in Table 2-9 and shown in Map 2-8. The main source of water in the rivers is rainfall and melting of snow which vary from season to season. District Abbottabad has a great potential for harvesting rain water run off through modern harvesting techniques.

i. Rivers

The main rivers of District Abbottabad are Haro, Dor, Siran and Kunhar. These rivers sprout countless tributaries, some of which are permanent (known as a katha) while others experience seasonal flows (known as kassi). The details of each river are as under[18]:

Haro River
Haro River originates at the southern end of the Dongagali range and flows through the district. The total catchment area of Haro River Basin is 853 Square Kilometers. The major natural drains that contribute to the flow of River Haro are Samandur Katha, Nadi Haro, Ruppar Katha, Lelianda Kacha and Nillan Nalla.

Dor River
Dor River which originates at the northern end of the Nathiagali range. The catchment area of Dor River Basin is 160 Sq.Km. The watershed primarily comprises of vegetative land cover and steep slopes. The Dor River is a combination of five natural drains, which combines at two different locations and contributes in the flow. Dor River Joins River Indus at downstream side of District Haripur, which further flows towards Tarbela Dam.

Siran River
It originates from District Mansehra and passes through District Abbottabad and crossing through north western part of district Haripur drains directly into Tarbela Reservoir. Uppermost reaches of the Siran watershed receive snow from December to February, which melts down completely by the mid of March. The elevation of the Siran watershed ranges are between 834m to 4199m and terrain comprise of two valleys namely Pakhli and Chattar, which are surrounded by moderate to steeply sloping mountains, the catchment area of Siran river is 2797 sq. Km.

Kunhar River
River Kunhar originates from the Lulusar Lake in the Kaghan valley. It passes through Jalkhand, Bata Kundi, Naran, Kaghan, Kawai, Balakot, and Gari Habibullah and finally joins the Jhelum River at Rara. Kunhar River is 166 kilometers long; the catchment area of Kunhar River is 163 Sq.km. It has a drainage area of 2535 km^2, with elevation ranging from 600 to 5000 m. The water of the Kunhar River is mostly used for irrigation, municipal use, power generation, and recreation. Since no industries are in the basin, most of the water of the Kunhar Basin (about 98 percent) is used for agriculture and the rest for domestic use.

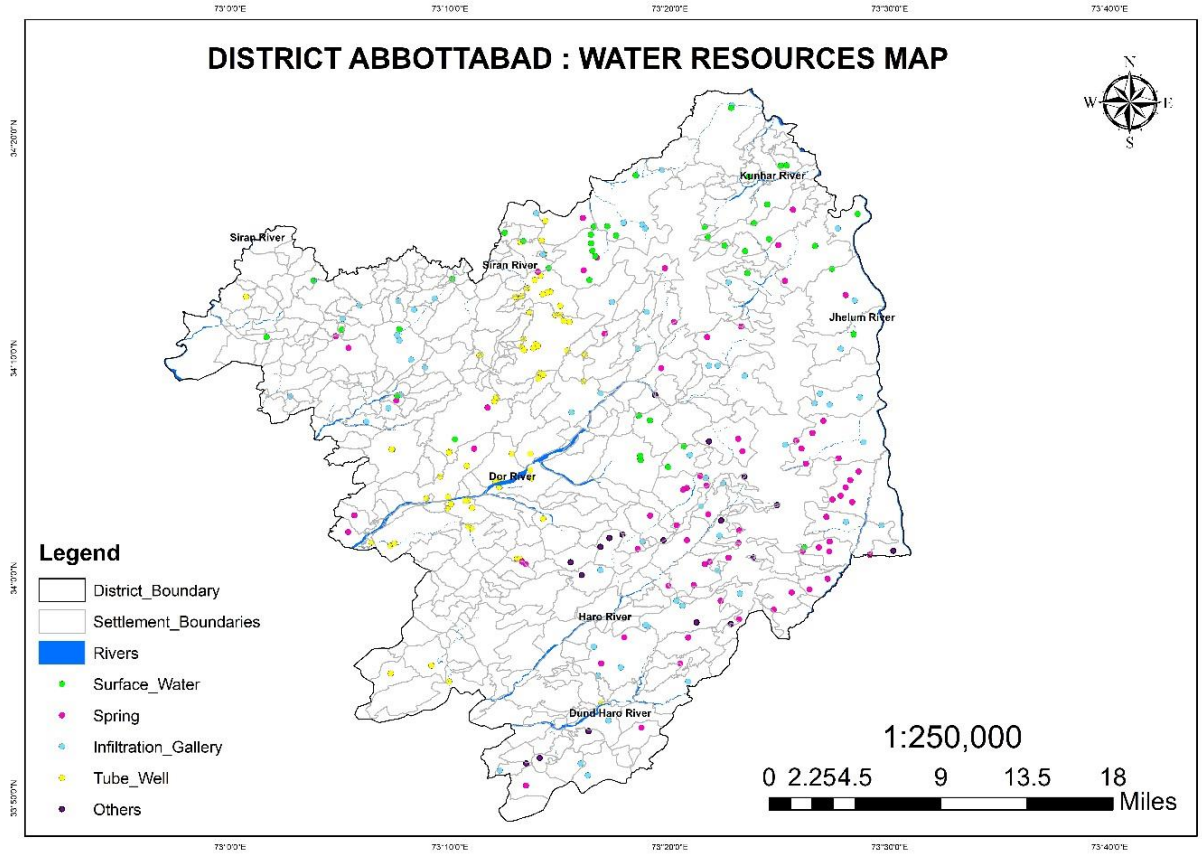
[18] IUCN, Sarhad Programme. (2004). Abbottabad—State of the Environment and Development. Karachi: Rosette Printers.

Table 2–9: River Discharge in Abbottabad District in Cusecs[19]

River	Low	Med	High	Very High	Historical / Year
Siran River	5000	15000	30000	45000	55181 / 1992
Haro River	5000	8000	25000	40000	82876 / 1992
Kunhar River	10000	20000	40000	55000	92000 / 1992
Dor	5000	15000	25000	45000	75970 / 1992

Table 2–10:Tehsil-Wise Details of Water Resources Other Than Rivers

Tehsil	Surface Water	Spring	Infiltration Gallery	Tube Well	Others
Abbottabad	45	64	58	44	11
Havelian	0	11	10	40	8
Total	45	75	68	84	19



MAP 2-8: Water Resources Map of District Abbottabad

[19] Irrigation Department KP, 2018

ii. Dam

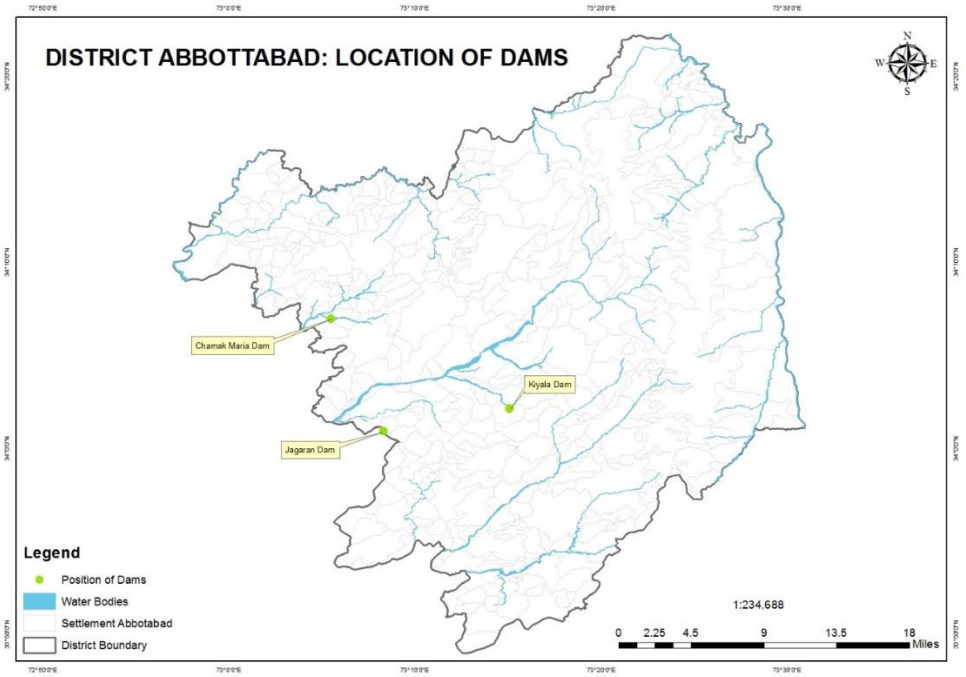
There are two small/Check Dams in District Abbottabad, Kiayala Dam and Jhangra Dam in Havilian. Kiyala Dam have a gross storage of 1023 AF and Jhangra Dam have a gross storage of 1329 AF and there is no power generation or power generation capacity in these small dams. Another small Dam is under construction in Chamak Maira. The total Cultivable Command Area (CCA) of these three dams will be 7800 Acres. The location of these dams is shown in Map 2-9, below.

Table 2–11:Dams in District Abbottabad

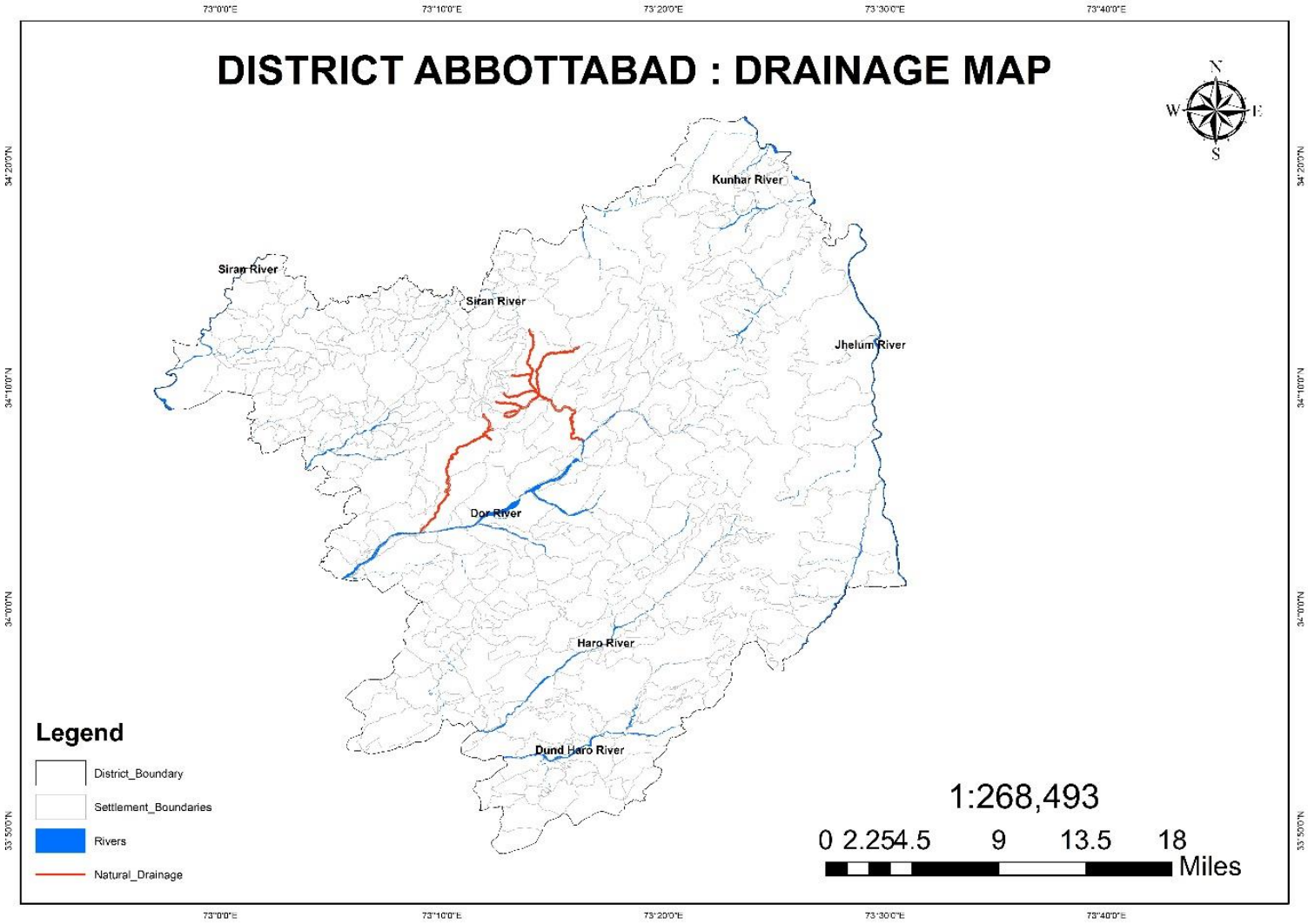
Name of Dam	Water Reservoir Capacity				Power Generation	Sedimentation Load of River (Acre ft/sq. miles/ Year)	Status
	Gross Storage (AF)	Live Storage (AF)	Dead Storage (AF)	Land Irrigated (CCA) Acres			
Kiyala Dam	1023	876	147	3000	Nil	3.5	Operational
Jhangra Dam	1329	999	330	1800	Nil	2.87	Operational
Chamak Maira Dam		1300		3000	Nil		Under Construction

iii. Drainage

The district is drained by perennial streams, dry streams and nullahs. There is almost no manmade drainage system in Abbottabad. The central region, a major surface area, is drained by the Dor River. The Water and Sanitation Company Abbottabad has identified a few natural drains in the main urban area of Tehsil Abbottabad, the layout of these drains has been shown in the Map 2-10, below.



MAP 2-9: Dams Map of District Abbottabad



MAP 2-10: Drainage Map of District Abbottabad

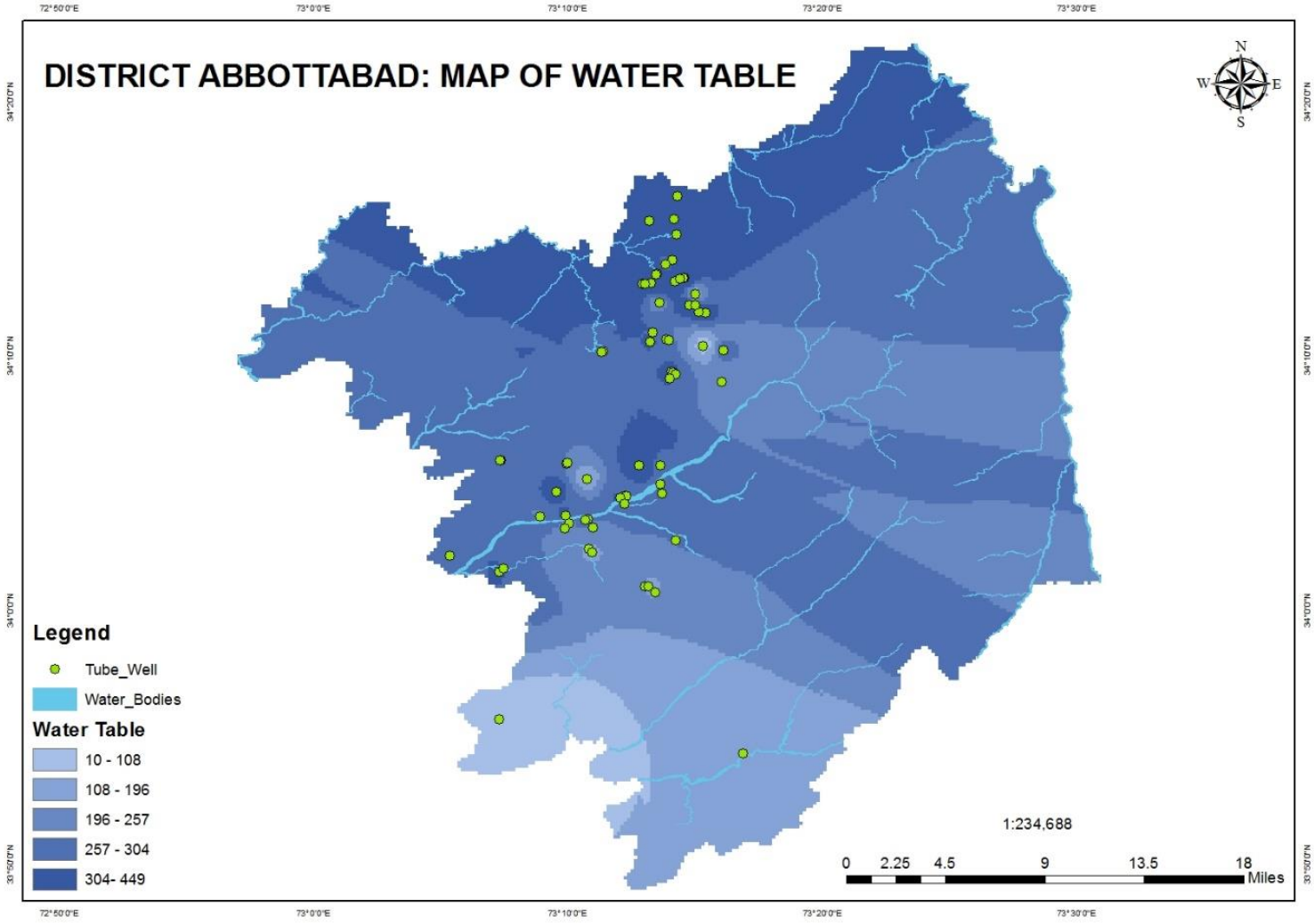
2.4.2 Water Table

The water table in District Abbottabad is varies at different location, mainly because of its mountainous terrain. Water tables can become elevated when they receive more water than they drain off. This can be from unusually high amounts of rain or excess water from higher elevations. In District Abbottabad the water from rain or snow melting drains off due to steep slopes and is not absorbed by the ground. Thus, the ground water is not recharged properly which results in a lower level of water table. Some factor which affects the water table are discussed below:

Factors that Affect Water Table

- The current climate in a region affects the height of the water table. High levels of rainfall will raise the table, as will humidity in the summer. This makes it easier to access groundwater, but also makes it harder for the ground to absorb additional water. Areas with high water tables become prone to flooding due to oversaturation of the land.
- The soil's composition will also help to determine the level of the water table in a region. For example, soil that contains a lot of clay will not absorb much water. This results in a low water table, as water must travel further down to find suitable soil to accumulate. Similarly, rocky areas and regions with compacted soil usually have low water tables.
- How we treat the land can have an effect on water table. Usually, human activity leads to the table lowering. Ground clearing, which is often followed by construction work, changes the topology of the land. This often leads to soil erosion. Of course, concrete over land also prevents soil from absorbing water, which causes it to flow to other areas.
- Irrigation for agriculture also lowers the water table. Particularly heavy use of such techniques may make the irrigation systems themselves useless until the groundwater replenishes. Combine this with a dry climate, and the negative effects this would have on crop growth can be seen

From the Map-2-11, it is shown that the highest maximum water table is 10 m and it is lowest recorded water table is 449 m. Through this map, we can develop the social amenities in the Land use plan of District Abbottabad. .



MAP 2-11: Water Table Map of District Abbottabad

2.4.3 Soil Classification

According to the classification of Soil Survey of Pakistan the soil in District Abbottabad has been classified into four major types, these four types are then again classified into further types. The soil classification is given below in detail:

i. Residuum and Colluvium

This types of soil and subsoil which form as a result of long weathering over carbonated rocks and bedrock is called Residuum. Colluvium are the loose, unconsolidated sediments that have been deposited at the base of hill slopes either by rain wash, sheet wash, slow continuous downslope creep, or a variable combination of these processes.

ii. Alluvial Soils

The loose, unconsolidated soil or sediment that has been eroded, reshaped by water in some form, and red posited in a non-marine setting is called Alluvium.

iii. Piedmont Alluvium Mixed with Water Reworked Loess

The landform that created at the foot of mountains by debris deposited by shifting of streams course is called Piedmont. A piedmont having an alluvial character is known as a Piedmont Alluvium. Water Reworked Loess are the silty or loamy material that has been entrained, transported, and deposited by the wind and later reworked by water.

iv. Water Reworked Loess Plains

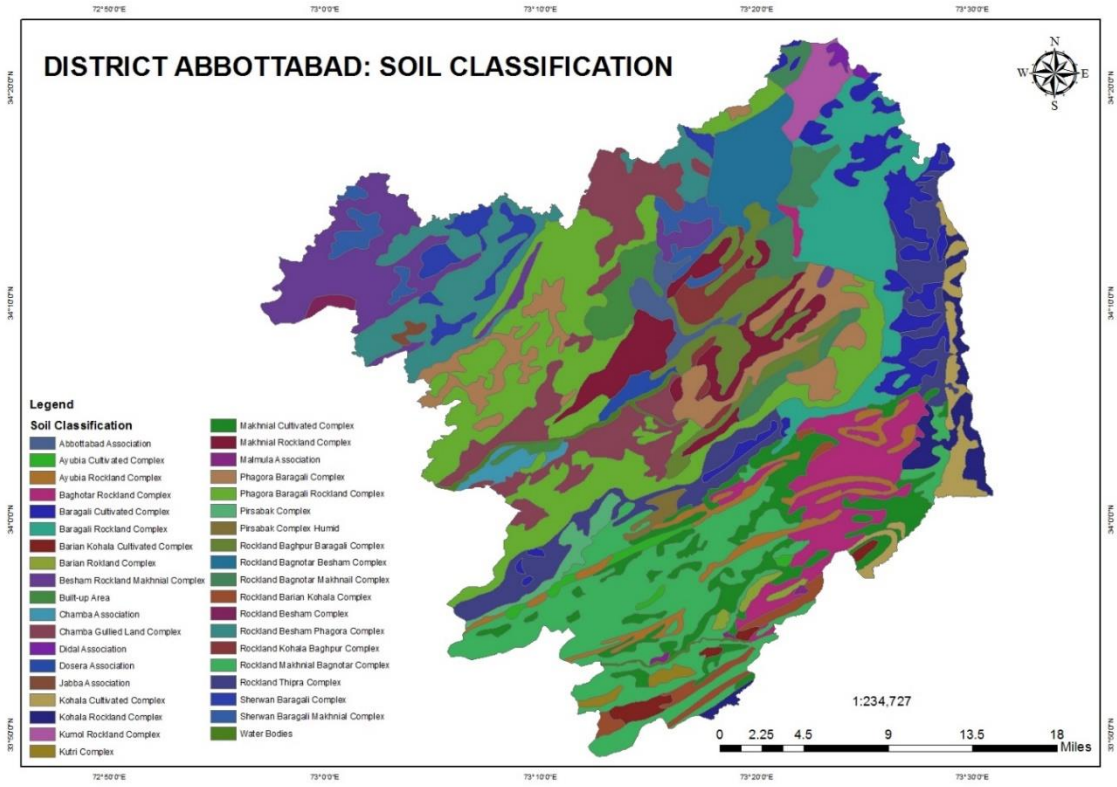
Water Reworked Loess are the un stratified recent geologically deposits of silty or loamy material that is usually buff or yellowish brown in color and is chiefly deposited by the wind and then reworked by water. Loess is a sedimentary deposit composed largely of silt-size grains that are loosely cemented by calcium carbonate.

Table 2–12:Soils and Landforms Classification of District Abbottabad

Classes	Sub-Classes	Formation
Residuum and Colluvium	Limestone	Rockland Bagnotar Makhnail Complex
		Makhnial Rockland Complex
		Rockland Kohala Baghpur Complex
		Baghotar Rockland Complex
		Makhnial Cultivated Complex
		Rockland Makhnial Bagnotar Complex
	Limestone, Sandstones and Shales	Rockland Bagnotar Besham Complex
		Kumol Rockland Complex
		Rockland Baghpur Baragali Complex
	Sandstones, Limestone and Phylites	Besham Rockland Makhnial Complex
		Sherwan Baragali Makhnial Complex
	Calcareous Red Shales and Sandstones	Kohala Cultivated Complex
		Kohala Rockland Complex
	Sandstones and Quartzites	Rockland Besham Complex
	Sandstones, Shales and Phylites	Sherwan Baragali Complex
		Rockland Besham Phagora Complex
	Shales, Slates and Phylites	Phagora Baragali Rockland Complex
		Phagora Baragali Complex
	Marls	Barian Rokland Complex
	Marls and Calcareous Red Shales	Barian Kohala Cultivated Complex

Classes	Sub-Classes	Formation
		Rockland Barian Kohala Complex
	Slates and Shales	Ayubia Cultivated Complex
		Ayubia Rockland Complex
		Baragali Cultivated Complex
		Baragali Rockland Complex
		Rockland Thipra Complex
Alluvial Soils	Dolomites, Limestones and Slates	Didal Association
	Calcareous Sedimentary Rocks	Malmula Association
Piedmont Alluvium Mixed with Water Reworked Loess		Jabba Association
		Chamba Association
		Chamba Gullied Land Complex
		Abbottabad Association
Water Reworked Loess Plains		Dosera Association
		Pirsabak Complex
		Pirsabak Complex Humid
		Kutri Complex

Soil taxonomy is used by farmers, builders, engineers, agricultural extension agents, homeowners, community planners and the government. Knowledge of soil classification helps to predict soil behavior. Soil behavior helps predict soil performance for growing agricultural crops. County extension agents provide soil survey maps of local soil classifications to help farmers make decisions about crops to grow in particular areas. Thus the soil classification map is developed to observe and changes in the soil characteristics.



MAP 2-12: Soil and Land Forms Map of District Abbottabad

2.4.4 Sediment Load of Rivers and its Effects

Sediment load is a geologic term referring to the solid matter carried by a stream of water. Erosion and bed shear stress continually remove mineral material from the bed and banks of the stream channel, adding this material to the regular flow of water. The amount of solid load that a stream can carry, or stream capacity, is measured in Acre ft./sq.mile/year, passing at a given location by WAPDA. Stream capacity is dependent upon the stream's velocity, the amount of water flow, and the gradation.

Mineral materials of many different shapes and particle sizes erode and contribute to overall sediment load. Differences in the size of those materials determine how they will be transported downstream. Sediment load is broken into three types: dissolved load, suspended load, and bed load. WAPDA has been monitoring the discharge and sediment load of rivers at various stations since 1962. This type of information is useful not only for watershed management but also for public health, irrigation, hydel power generation and fisheries.

The sediment load at the two operational dams in District Abbottabad is given in the Table 2-13, below:

Table 2–13:Sedimentation Load of Dams in District Abbottabad

Name of Dam	Sedimentation Load of River (Acre ft/sq. miles/ Year)
Kiyala Dam	3.5
Jhangra Dam	2.87

It has been found that rock and soil erosion in catchment regions (sediment load) accelerate the siltation problem in dams/reservoirs, which cause negative effects on storage capacity, water quality and, subsequently, reduce power and irrigation capability. In recent decades it has been realized that river dynamic conditions are greatly influenced by human activities that have been led to considerable changes of water quality, water discharge, and sediment load. Sediment production in mountainous regions has been discussed to be additionally dependent on factors including tectonics and seismic activity, recurring earthquakes, mean elevation of the basin, glaciated area, proportion of solid precipitation, and basin lithology. The occurrence and intensity of sediment transport also has been reported to be dependent on the hydro climatic and geomorphologic characteristics of the basin, together with the availability of sediment within the catchment area. For this reason, total sediment yields are often based purely on suspended load data. [20]

2.4.5 Water Quality Study

Government of Khyber Pakhtunkhwa carried out a project of "Updation of Revised Environmental Profile of Khyber Pakhtunkhwa". The objective was to document the current state of the environment. Jers Engineering Consultants (JEC) undertook this assignment for EPA. The scope of work of this assignment was to collect both, primary and secondary data. For primary data five parameters were selected for drinking and surface water. JEC assigned the task of collection and testing of samples to SUPARCO.

Drinking Water Quality

[20] Sabir, M. A., Shafiq-Ur-Rehman, S., Umar, M., Waseem, A., Farooq, M., & Khan, A. R. (2013). *The Impact of Suspended Sediment Load on Reservoir Siltation and Energy Production: A Case Study of the Indus River and Its Tributaries*. Polish Journal of Environmental Studies, 219-225.

In District Abbottabad drinking water samples were collected from Sixty-one various locations. The Mean results of these water samples is given in the Table 2-14 and are shown in Map 2-13.

Table 2–14:Mean Results of Drinking Water Samples from District Abbottabad

Sr. No	Parameters	Results				Standard Deviation	NEQs
		Units	Min	Max	Average		
1	pH	Power of hydrogen	6.62	8.31	7.49	0.39	6.5 – 8.5
2	TDS	mg/l	31.00	591.00	294.21	129.16	< 1000
3	Temp	°C	9.50	21.20	16.53	2.40	-
4	Electrical Conductivity	µS/cm	90.0	1,180	595.29	243.65	-
5	Taste	-	Acceptable	Acceptable	-	-	Acceptable
6	Odor	-	Acceptable	Acceptable	-	-	Acceptable
7	Color	TCU	<15	<15	-	-	< 15
8	Turbidity	NTU	0.09	30.10	1.58	4.13	> 5
9	NH_4	mg/l	0.03	0.15	0.08	0.04	-
10	NO_2	mg/l	0.01	0.05	0.02	0.01	< 3
11	NO_3	mg/l	1.10	35.10	5.72	5.64	≤ 50
12	Ca Hardness	mg/l	72.00	765.00	393.53	162.41	< 500
13	Chlorides	mg/l	0.60	45.00	13.66	9.72	< 250
14	Sulphates	mg/l	6.00	68.00	16.22	13.36	-
15	Iodine	mg/l	0.11	0.59	0.40	0.13	-
16	TOC	mg/l	0.11	0.27	0.19	0.05	-
17	Fluoride	mg/l	0.01	0.18	0.06	0.05	≤ 1.5
18	As	mg/l	0.0008	0.19	0.01	0.02	≤ 0.05
19	Fe	mg/l	0.27	1.58	0.82	0.33	-
20	Mg	mg/l	4.05	38.23	14.86	8.45	-
21	Mn	mg/l	0.0001	0.67	0.12	0.18	≤ 0.5
22	Na	mg/l	1.26	14.08	6.81	3.41	-
23	K	mg/l	0.16	4.52	1.90	0.94	-
24	TC	MPN/100ml	-	405.00	65.15	90.41	0
25	FC	MPN/100ml	-	92.00	15.60	24.97	0

Total dissolved solids (TDS), Turbidity, Nitrogen Dioxide (NO_2), Nitrate (NO_3), Fluoride and Chlorides at all sampling locations of District Abbottabad were within the NEQs limit. The Mean value of Calcium (Ca) Hardness was within the limit of NEQs but at some location the level was exceeding the NEQs limits. No Health impacts are related to Slightly High Values. The mean value of Arsenic (As) concentration in District Abbottabad was within the NEQs limits except Gohar Ayyub Town. The Total Count (TC) and Fecal Coliform (FC) are exceeding the NEQs in major area of District Abbottabad.

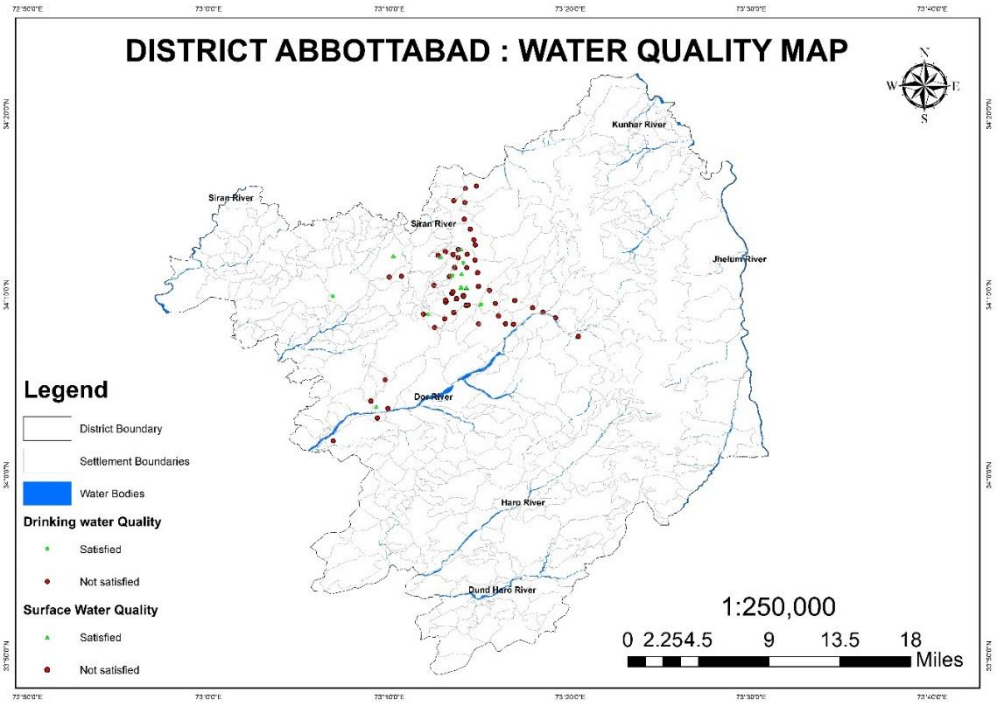
Surface Water Quality

In District Abbottabad surface water samples were collected from various locations. The Mean results of these water samples is given in the Table 2-15below and are shown in Map 2-13.

Table 2–15:Mean Results of Surface Water Samples from District Abbottabad

Sr. No	Parameters	Results			Average	Standard Deviation
		Units	Min	Max		
1	DO	mg/l	3.80	7.20	3.80	1.15
2	TDS	mg/l	6.00	404.00	6.00	98.71
3	TSS	mg/l	8.00	511.00	8.00	137.36
4	TOC	mg/l	0.20	35.00	0.20	8.40
5	Detergents	mg/l	0.10	1.00	0.10	0.34
6	Chlorine	mg/l	-	-	-	-
7	Na	mg/l	2.00	122.00	2.00	26.75
8	K	mg/l	0.20	2.80	0.20	0.65
9	Phosphate	mg/l	0.20	15.60	0.20	3.96
10	TC	Count	46.00	8,000.00	46.00	1,980.41
11	FC	Count	14.00	6,000.00	14.00	1,485.63
12	Temp	°C	7.20	19.10	7.20	2.97
13	pH	-	7.62	229.00	7.62	55.26
14	Conductivity	µS/cm	11.87	800.00	11.87	196.64
15	Total Pesticides	µg/l	ND	ND	ND	-

Currently, Pakistan has no standards for stream. Therefore, the values given above cannot be compared with our National Standards.[21] Mostly, the parameter of the interest that is helpful in determining the health of a surface water source is Dissolved Oxygen (DO). The generally accepted limit for DO is 4 mg/l. Low DO levels affects flora and fauna in the water. Low levels create stress on the aquatic life. It can be seen in Table 2-15 that the average and minimum value of DO is 3.80 mg/l, which is alarming. Kunj Kehal and Rehmat Abad, near CMH are two locations which falls short in Dissolved Oxyg



MAP 2-13: Water Quality Map of District Abbottabad

[21] Environmental Protection Agency, Govt. of KP. (2017). Environmental Profile of Khyber Pakhtunkhwa (KP).

2.4.6 Ground Water Recharge Locations

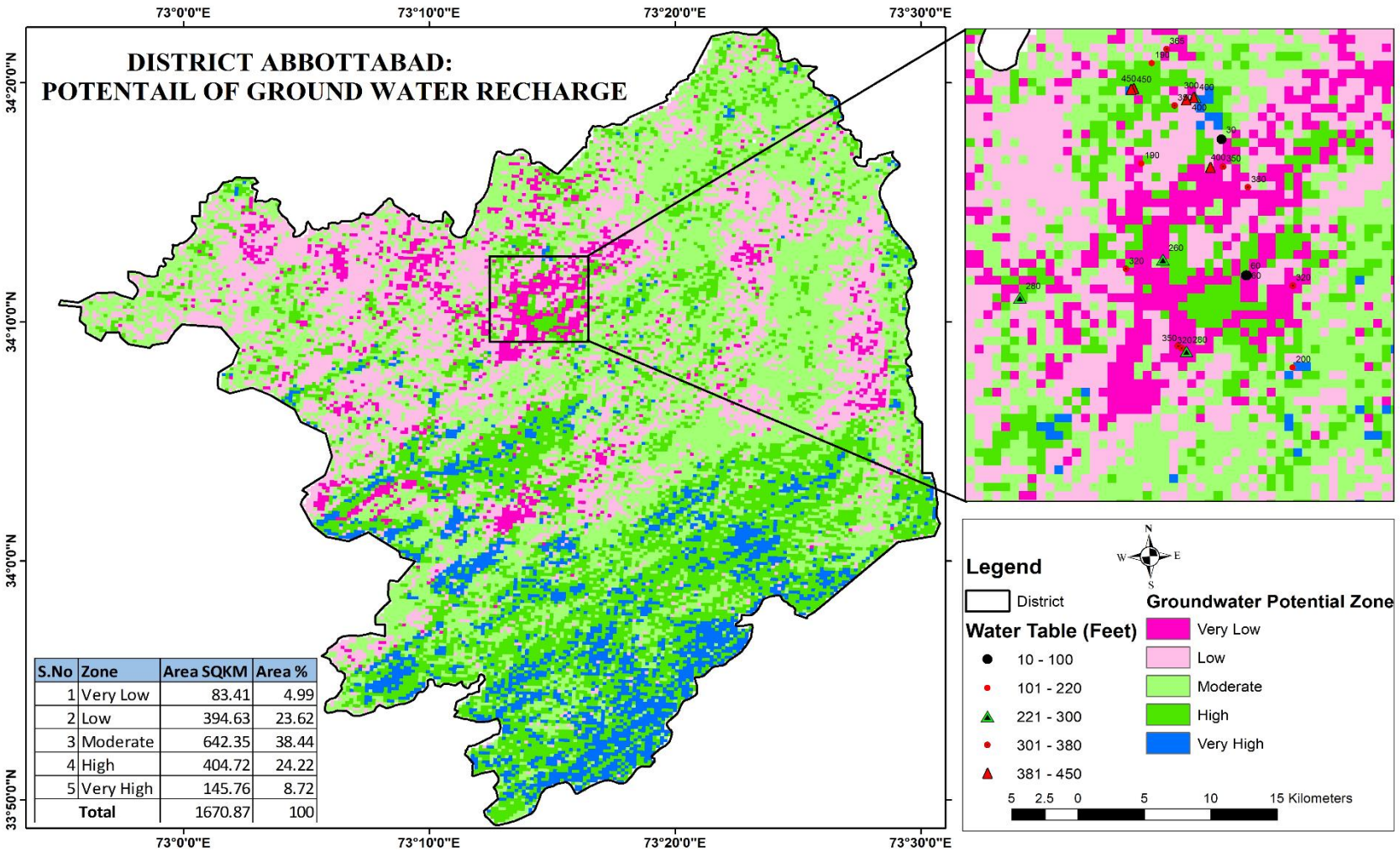
Groundwater recharge is hydrologic process, where water moves downward from surface water to groundwater. Recharge is the primary method through which water enters an aquifer. Groundwater is recharged naturally drained by rain and snow melt and to a smaller extent by surface water. Recharge may be hindered somewhat by human activities including paving, development, or logging. These activities can result in loss of topsoil resulting in reduced water infiltration, enhanced surface runoff and reduction in recharge. Use of ground waters, especially for irrigation, may also lower the water tables. Groundwater recharge is an important process for sustainable groundwater management, since the volume-rate abstracted from an aquifer in the long term should be less than or equal to the volume-rate that is recharged.

The efficient groundwater utilization, planning and management, is inconceivable without the proper recognition of potential zones. A total of seven influence factors were used in the present study, viz. slope, drainage density, geology, rainfall, soil, land use/land cover and lineament density. The weight and score of each influencing factor is computed using multi influence factor (MIF) techniques. Within each influencing factor the subclasses were assigned a weightage of (A) (major effect) and (B) (minor effect) depending upon their effectiveness to the recharge of aquifers and groundwater potentiality. The combined weightage of both major and minor effects (A + B) was considered for computing the relative effect which was used to compute the score of each subclass within each influencing factor. The thematic layers were then integrated with weighted overlay using ArcGIS 10.2.1 and groundwater potential zone were delineated. The delineated groundwater potential zones were classified into five categories quality wise i.e., (1) very high, (2) high, (3) moderate (4) low and very low and likewise quantitatively i.e. 5,4,3,2 and 1.

The method used to identify the ground water recharge location is weighted overlay analysis, where the weights of different influencing parameters like slop in degree, drainage density in Sq.km, Geology, Rainfall, soil, Land Cover/Land Use and lineament (underground Geology) are computed using multi influencing factor (MIF) techniques. This technique is used to delineate water potential zones. MIF technique is proved feasible to understand the factors determining the groundwater potentiality. So, in combination of these techniques one map generated as shown in Map 2-14 showing ground water potential of district Abbottabad

Table 2–16:Weight Distribution of Influencing Parameters for Identification of Ground Water Recharge Locations

Influencing Parameters	Sub Classes Within Influencing Parameter	Groundwater Prospects (Qualitative Rank)	Proposed Weight of Each Influencing Factor	Groundwater Prospects (Quantitative Score/Rank)
Slope in Degree	00-15	Very High	16	5
	16-30	High		4
	31-45	Moderate		3
	46-60	Low		2
	61+	Very Low		1
Drainage Density in sq. km	00-0.39	Very High	16	5
	0.4-1.1	High		4
	1.11-1.83	Moderate		3
	1.84-2.93	Low		2
	2.94-5.6	Very Low		1
Geology	-	Very High	12	5
		High		4
		Moderate		3
		Low		2
		Very Low		1
Rainfall	1581.1-1683	Very High	16	5
	1503.1-1581	High		4
	1437.1-1503	Moderate		3
	1373.01-1437	Low		2
	1304-1373	Very Low		1
Soil	Lithic	High	6	4
	Sandy	Low		2
	Stony	Low		2
Land use/ Land cover (Nature)	Water Body	Very High	25	5
	Agriculture	Very High		5
	Forest	High		4
	Rangeland/Shrubs	Moderate		3
	Settlements/Roads	Low		2
	Barren Land	Very Low		1
Lineament Density in Km/sq.km	1.22-1.91	Very High	9	5
	0.93-1.21	High		4
	0.68-0.92	Moderate		3
	0.41-0.67	Low		2
	0-0.4	Very Low		1



S.No	Zone	Area SQKM	Area %
1	Very Low	83.41	4.99
2	Low	394.63	23.62
3	Moderate	642.35	38.44
4	High	404.72	24.22
5	Very High	145.76	8.72
Total		1670.87	100

MAP 2-14: Ground Water Recharge Location Map of District Abbottabad

2.4.7 Review of Projects

Ongoing Projects

- Construction of Small Dam at Kiyala, District Abbottabad.
- Construction of Flood protection works/ irrigation channels and bridges on Water Channels and drainage system in Tehsil Havelian District Abbottabad.
- Construction of Flood Protection works / Water Channels in Lower Galiyat Areas District Abbottabad.
- Construction of Flood Protection Works in U.C Banda Pir Khan, Baldheri, Jhangi, Salhad, Pawa Chamhad, Kuthiala, Pind Kagroo Khan, Jarral, Sherwan and Havelian Urban.
- Improvement / Construction of Irrigation Facilities and Flood Protection Works in District Abbottabad.

New Projects

- F/S of Nakai Dam, District Nowshera and construction of Chamak Maira Dam District Abbottabad.

2.4.8 Constraints

1. Ecological Rehabilitation related to water facilities in the Abbottabad faced many constraints reflected in the long and troublesome history encompassing the water channels and continuous political and legitimate debates. The challenges include the reluctance of many interested parties to confront several crucial facts. These incorporate that the water is in scarce the numerous natural and physical changes that have happened in the water bodies, the nearness of numerous approach and legitimate mandates that have autonomous and official directives that have independent and conflicting objectives and the inherent uncertainly regarding future socioeconomics, climate, biological and other changes and the consequent inability to plan for them in a comprehensive manner.
2. The executives of the water and physical appropriation of the water bodies are divided in Abbottabad. One result of this is choices are regularly issue and not composed with related choices made by other management companies.
3. Acute water shortage has been reported in Abbottabad city for last couple of years while on the other side, local municipality and public health department failed to redress the major problem and local residents are running pillar to post to get drop of water from some of installed hand pumps. Along with the shortage of water the parameter required for good health in Abbottabad water has storage of measurement like dissolved oxygen is 3.8mg/l but it minimum measurement should be 4.0mg/l.
4. The Public Health Engineering Department (PHED) and Tehsil Municipal Administration (TMA) have failed to provide clean drinking water to the residents of Kehal, Malikpura and Kunj in Abbottabad city. From the observation it was noticed that water from the natural springs wasted there is no reservoir capacity or underserved to save and treat that water. The other big challenge is overtaking of water is much more high than the discharge rate of it.
5. The water planning isn't to date, just as the usually assignment, has not been focused on the supply of water, the authorities presumes that water planning can't be effective in the event that it isn't coordinated into national wide planning. Planning of the Abbottabad is required to meet

open approach vision viewing the encompassing water biological system just as giving a dependable water foundation.

2.4.9 Recommendations

1. Detailed implementation plans about water facility in Abbottabad should be developed for the priority of scientific challenges identified. These plans should be based on a comprehensive view of current understanding, a futuristic view of technology, and a realistic view of cost-effective strategies. The agencies with substantial roles in hydrologic science research and measurements need to make certain that these efforts are led by stewards with effective authority and organizational support.
2. New activities ought to be propelled in hydrologic training and education that lead investigate researchers, general society, and government and different organizations to end up partners of an intersect for the water assets of a world.
3. Research on overall hydrology linkages of district ought to be expanded to address issues of groundwater recharge, evaporation, basin scale water balance, water and different pathways, and ecosystem reactions.
4. Water resources management should be an integral, visible component of the whole country water cycle research initiative and should help guide the evolution of new initiatives within the country.
5. The identification of the limits to predictability of hydrologic variables should be among the guiding scientific challenges of the national water policy. The dependence of these limits on space and time scales, the sources of variability, and the effects of interactions among terrestrial, and atmospheric, components on variability need to be addressed in the context of predictability.

A more uncertain and variable water future will require water planning and management that is anticipatory as well as adaptive. It will require plans and operations that include suites of techniques and technologies designed to manage a highly variable and uncertain waterscape. Most important, the future of Abbottabad will require planning and management that specifically acknowledge and take into account that there is not enough water to meet all desired of the city.

Chapter 2

Physiography and Geology

Environment

2.5 Environment

This section describes the environmental conditions particularly the parameters of water, air, and noise and land pollution in Abbottabad. Pollution is explained as any substance introduced into the environment that adversely affects the usefulness of resources.

To take relative measurements of potential polluting parameters in District Abbottabad, the spot values of pollution indicators have been considered and compared with the permissible standards. The main city center has expanded rapidly from last decades and in now facing multidimensional environmental problems which includes, unhygienic water, air and noise pollution, rapid deforestation and disposal of solid waste without recycling.

According to Environmental Profile of Khyber Pakhtunkhwa, 2017, the main sources of air and water pollution in District Abbottabad and its impact on environment are inscribed as under:

2.5.1 Air Pollution

In District Abbottabad air samples were collected from Thirty-Five various locations. These samples were then tested, upon analysis of the results of the tests it was found that:

The Carbon Monoxide (CO), Nitrogen Oxide (NO) and Sulphur Dioxide (NO_2) concentration were within

the limit of National Environment Quality Standards (NEQs) at all sampling points in District Abbottabad. The mean Nitrogen Dioxide (NO_2) concentration of all sampling locations was also found within the NEQs limit but at two locations it exceeded and that locations are namely; Sabzi Mandi and Fawara Chowk. The level of Particulate Matter ($PM_{2.5}$) at all sampling locations in Abbottabad City was exceeded NEQs. The polluted locations are shown in Map 2-15.

Impacts of Nitrogen Dioxide
Nitrogen dioxide is a nasty-smelling gas. Some nitrogen dioxide is formed naturally in the atmosphere by lightning and some is produced by plants, soil and water. Nitrogen Dioxide gas react to form smog and acid rain as well as being central to the formation of fine particles (PM) and ground level ozone, both of which are associated with adverse health effects.

Impacts of Particulate Matter$_{2.5}$
Particulate matter is the sum of all solid and liquid particles suspended in air many of which are hazardous. This complex mixture includes both organic and inorganic particles, such as dust, pollen, soot, smoke, and liquid droplets.

2.5.2 Water Pollution

In District Abbottabad, drinking water samples were collected from Six-One various location and surface water samples were collected from sixteen various locations. These samples were then tested, upon analysis of the results of the tests it was found that:

The mean value of Total Dissolved Solids (TDS) at all sampling location of Abbottabad City were within NEQs limit. The mean value of Turbidity at all sampling location was also within the NEQs. The Nitrogen Dioxide (NO_2) and Nitrate (NO_3) concentration were within the limit of NEQs as well as were the mean value of Chlorides and Fluoride concentration.

The mean value of Arsenic concentration (As) of Abbottabad City was within the NEQs except one location and that location is “Gohar Ayub Town”. The mean value of Calcium hardness (Ca) was

within the limit of NEQs but at some location the level is exceeding the NEQs. No Health impacts are related to these slightly high values. The Total Count (TC) and Fecal Coliform (FC) is exceeding the NEQs in major area of Abbottabad City. It requires attention of water distribution agency in the area. The polluted locations are shown in Map 2-15

Impacts of Arsenic Concentration
Arsenic Concentrations poses a serious threat to human health. It is necessary to remove any traces found in drinking water as soon as it is discovered. Being exposed to arsenic in drinking water can cause significant skin changes, such as thickening and pigmentation. These symptoms tend to appear gradually but can manifest rapidly if exposure to arsenic-contaminated water is not halted.

Impacts of Fecal Coliform
Fecal Coliform is a facultative anaerobic, rod-shaped, gram-negative, non- bacterium. They originate from animal digestive tracts, animal waste, and other natural and man-made decomposition processes.

The presence of fecal contamination is an indicator that a potential health risk exists for individuals exposed to this water. Fecal coliform bacteria may occur in ambient water as a result of the overflow of domestic sewage or nonpoint sources of human and animal waste.

2.5.3 Soil Pollution

In District Abbottabad, air samples were collected from twenty various locations. These samples were then tested, on the parameters are given below:

SAR, PH, Cr, Pb, Hg, Ca, Mg, Boron, Nitrogen, Na, K, P and Pesticides in the areas of Jinnah Abad, Gohar Ayub town, Mirpur, Comsats Abbottabad, Gohar abad, Mangal, Kaghan, colony, Bagnotar, Hassan town, Nawa Sheher, Havelia Cant, Thandyani chowk, Langra, Chuna, Banda thonda, Balheri Maira, Banda saib khan, thanda chuha, Puha de bandi, and Qamar Bandi. The concentration of all parameters are in the limits of NEQs. But it is not enough, it is need to be careful and should take the concrete steps to control the increase of soil pollution in the district.the polluted area by the soil pollution is shown in the map 2-15:

2.5.4 Noise Pollution

In District Abbottabad, Noise samples were collected from 35 various locations. These samples were then tested, upon analysis of the results of the tests it was notice that:

The mean noise level of Abbottabad city is within the NEQs except few locations. Noise level is highest at homo and lowest at complex. The location where the noise exceeding NEQs are sabzimandi, Mansehra road, Cantt plaza, Jhugian, Harno, Havelian Cantt, Qalandrabad, Pine view road, Kala pul islamkot, Abbottabad Adda, Tanchi Chowk, Kala Pul Jhugian, and Narian. Kalan bazar and Batya Bazar are the points where noise level is at lowest level. The locational map of the noise pollution trageted area is shown in the map 2-15:

2.5.5 Industrial Pollutant Areas

There is a Small Industrial Estate in District Abbottabad, which have 64 industries, which includes 25 marbles and 7 other chemicals factories. Small Industrial Estate Abbottabad located on Abbottabad Mandian G.T Road. The emission of these industries contributes to different type of pollution such as Air, Water and Noise. Marbles factories' wastes contain injurious chemicals which directly effects

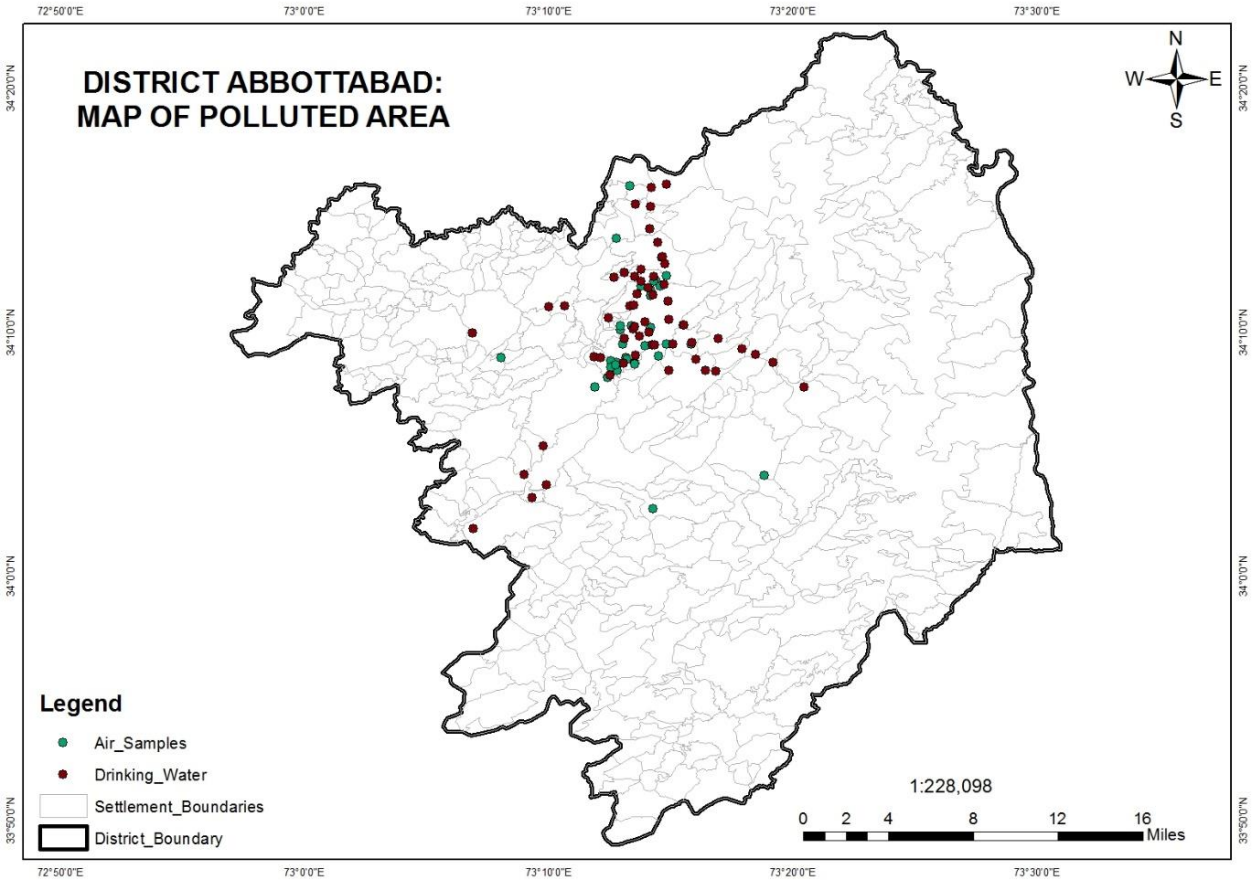
waterways and pollute the nearby environment for dwellings. The industrial pollutant areas are shown in Map 2-16.

2.5.6 Sensitive Areas

Pakistan Environmental Protection Agency has published the "Guidelines for Sensitive and Critical Areas" in October 1997. The objective of these guidelines is to provide guidance to project proponents and other stakeholders in the environmental assessment process, so that the proposed projects are planned and sited in a way that protects the value of sensitive and critical areas.

The protected areas are broadly categorized into two groups, ecosystems (including wildlife reserves, national parks and game reserve) and archaeological sites (including cultural heritage, monuments and buildings)

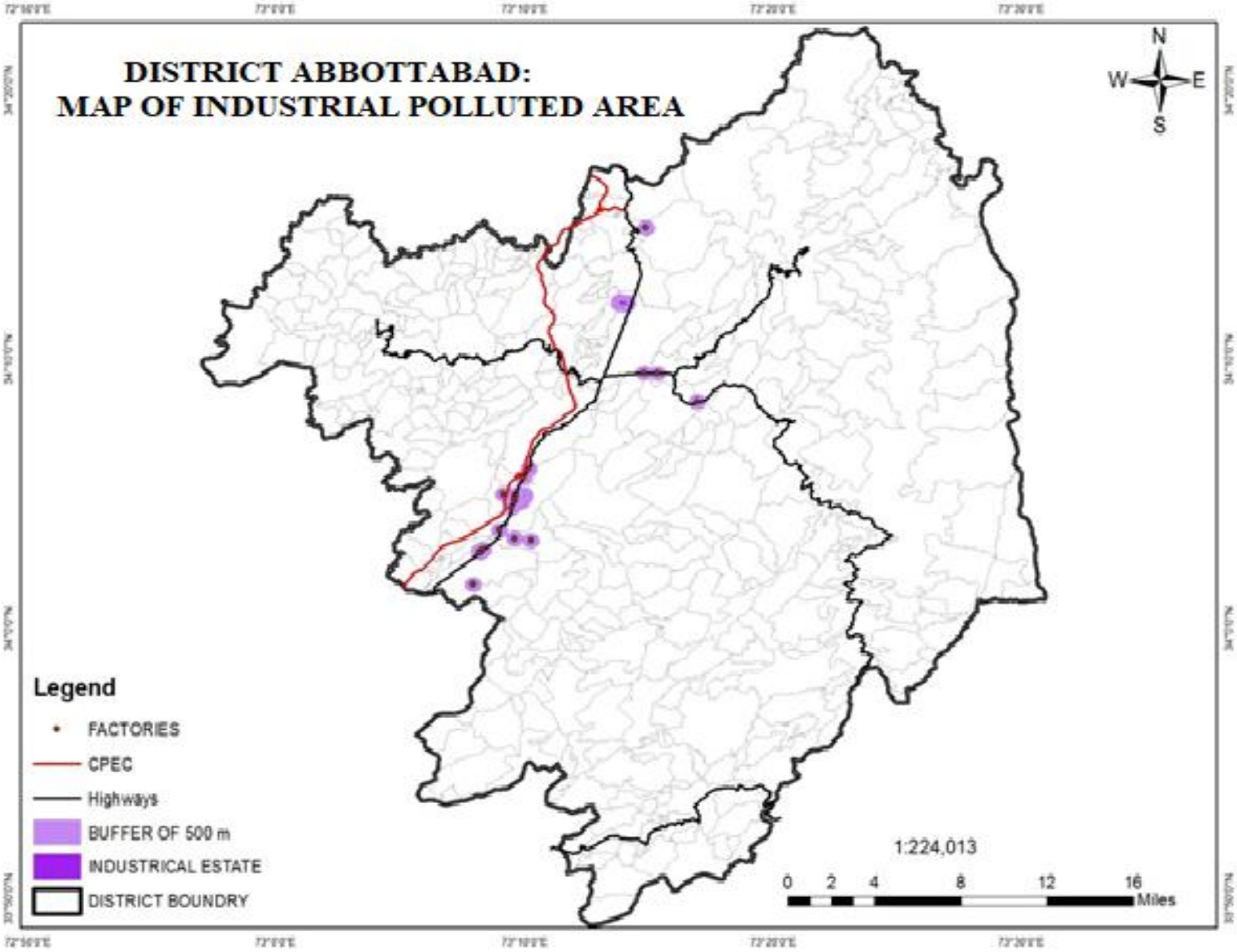
In District Abbottabad there are some of sensitive/protected areas, namely Ayubia National Park, Qalandarabad Game Reserve and some other places. The location of the sensitive areas is shown in



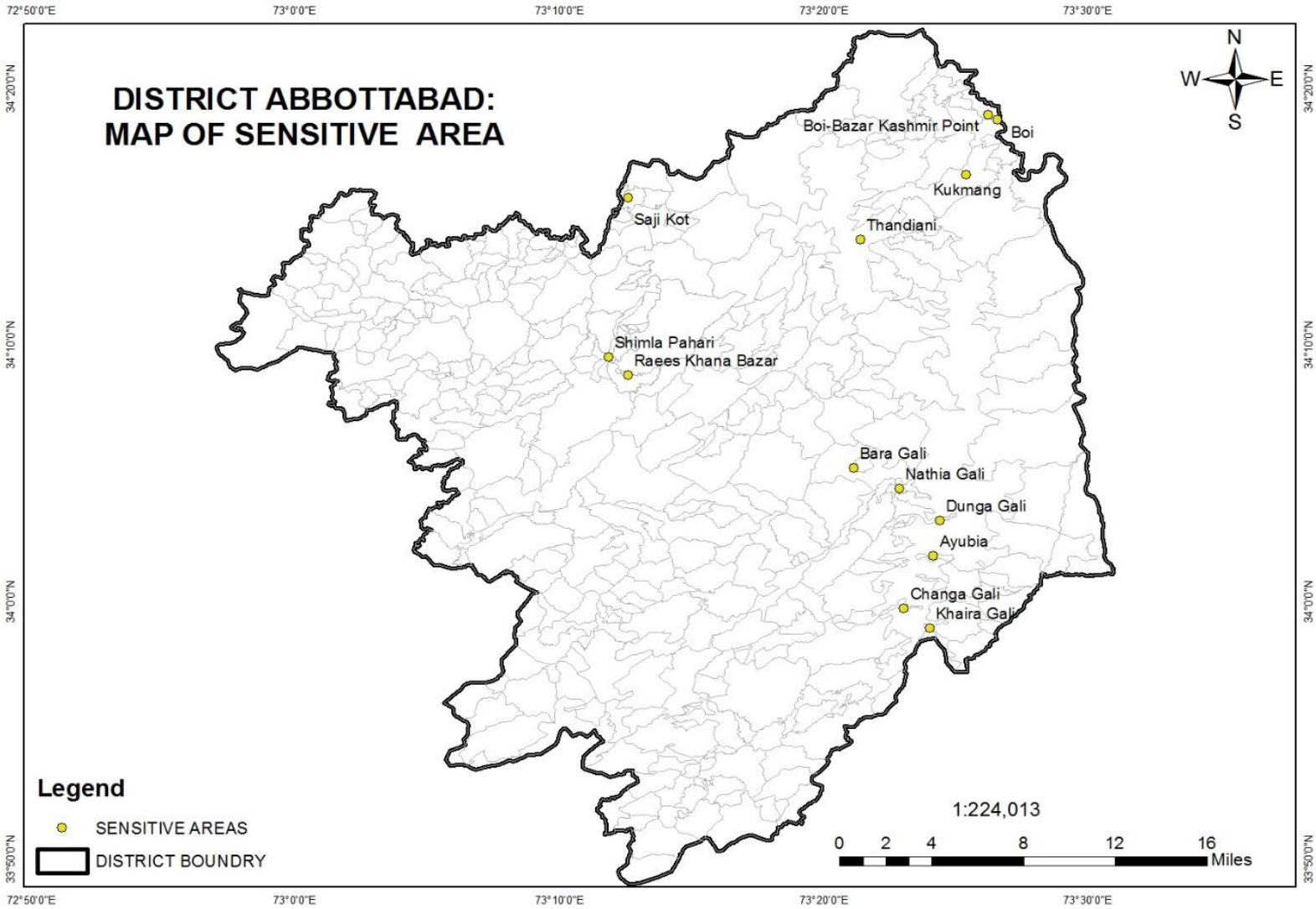
Map

MAP 2-15: Polluted Areas Map of District Abbottabad

Note: Above map is showing the results of air samples and drinking samples collected in the District Abbottabad by the environmental protection authority.



MAP 2-16: Industrial Pollutants Area Map of District Abbottabad



MAP 2-17: Sensitive's Areas Map of District Abbottabad

2.5.7 Existing Laws and Policies

Khyber Pakhtunkhwa Environmental Protection Act, 2014; Following are Eighteen Amendment the Khyber Pakhtunkhwa EPA noted that proper procedures are required for implementing the environmental policy and pollution control protocols, accordingly to Khyber Pakhtunkhwa environmental act was enacted in 2014. The silent features of the act are:

- The act provides for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development in Khyber Pakhtunkhwa
- Ensure enforcement of the Khyber Pakhtunkhwa Environmental quality standards
- Establish standard for the quality of the ambient air, water and land, by notification
- Establish the system and procedure for survey, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the cost of cleaning up pollution and rehabilitating the environment in various sectors
- Carry out and conduct environmental monitoring and implementation of environmental approvals in this act
- Issue licenses for the consignment, handling transport, treatment, disposal, storage, handling or otherwise dealing with hazards substances
- Certifying laboratories as approved laboratories for conducting test and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purpose of this act
- Identify the needs for the initial legislation in various sectors of the environment Provide guidance and technical assistance to the relevant federal and provincial government agencies in the management of nature and environmental incidents and disasters
- Render advice and assistance in environment matters including such information and data available with it as may be required for carrying out the purposes of this act
- Promote public education and awareness of environmental issues through mass media and other means including seminars and workshops
- Enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business
- Take all necessary measures for protecting quality of environment
- Co-ordinate actions of States, officers and other authorities under this Act
- Plan and execute a province wise program for prevention, control and abatement of environmental pollution
- Lay down standards for discharge of environmental pollutants
- Restrict area in which any industries, operations or processes may not be carried out subject to certain safeguard
- Penalties are prescribed for the transgressing protection Act and its related Amendments,
- If anyone or a company break the rules, so he/she have to takes all responsibility of the effects of Environmental pollution and he/she will also be punished by government.

2.5.8 Review of Projects

New Projects

- Establishment of EPA offices at Abbottabad.

2.5.9 Constraints

The major environmental constraints, there are hospitals, markets, restaurants, and small industries which may be responsible for the worst Environment due to the mismanagement of the above places. The AMC alone discharges 18,000 gal/hrs.[22] of waste which bypasses the hospital's own treatment plant and is discharged directly into the Banda khair Ali Khan stream. Alarmingly, this stream is used by area residents for irrigation as well as drinking.

Even in Nathiagali, where the GDA is responsible for overall environmental management, waste water disposal is left up to individual households and hotel owners, with the result that untreated sewage and garbage is allowed to flow down hillsides, posing a threat to the health of the population and seriously undermining the tourist appeal of the area. Medical waste and toxic waste from business cannot treated separately during collection and disposal. Remaining waste such as torn plastic bags, tires and cloth which scavengers are unable to sell is used as fuel and ends up producing harmful emissions.

Burning, a common method of waste disposal, also produces toxic gas emissions which pollutes the fresh air of District Abbottabad and seriously affects the health of local habitation. At Salhad site, most of the garbage is burnt which is added in to air in the form of smoke and fog. One area of concern is the vehicle battery cleaning and repair industry operating in Abbottabad city. Approximately 30 such units cause lead contamination in the surrounding streams and rivers.

Air pollution in District Abbottabad is caused by small factories like flour and marbles and crush plants to extract mines and minerals, but more particularly by vehicular emissions are entered for tourist purpose. As a result, the outdoor air quality in Abbottabad has deteriorated significantly. Deforestation contributes in this, the cutting of pine trees are for land levelling for construction also alarming. These hills are with their pine trees not only add to the beauty of the city but also help to maintain the climatic conditions.

Environmental issues in District Abbottabad includes deforestation, air pollution, water pollution, noise pollution, land pollution, climate change, pesticide misuse, soil erosion, natural disasters and desertification. These are serious environmental problems that Abbottabad is facing, and they are getting worse as the District's economy expands and the population grows.

2.5.10 Recommendation

1. In District Abbottabad, Plantation should place near all mine and mineral deposit sites in the buffer of 500 meters, which should have the ability to absorb most of smoke and dust particles arise from deposit points.
2. The small industrial estate is located in the populated area, which is caused by air, noise and groundwater pollution in the local area. In the presence of this estate, it may affect the health of residents and the surrounding area. This small industrial estate should place outside the city with the provision of transportation.

[22] Abbottabad State of the Environment and Development page 66

3. One of the main reason of air pollution is deforestation in District Abbottabad. The afforestation should plan in most of the District that supports the local climate and increases the beauty of the city. It may be possible to increase the productivity in the agriculture sector and reduce the consequences of natural hazards.
4. The afforestation will prevent the area by soil erosion and earthquakes. As after the 2005 earthquakes in District Abbottabad, it is important to place more plantation in the hazard-prone area to prevent the environment for a disturbance.
5. As discussed in the constraint, the Salhad waste disposal site has a lot of garbage in tons on daily basis but most of the garbage were start decomposition on site may increase the odor concentration in area and some are burnt. It is recommended that an environmental friendly plant will place and operate properly.
6. The noise exceeding areas according to NEQs are sabzi mandi, Mansehra Road, Cantt plaza, Jhugian, Harno, Havelian Cantt, Qalandrabad, Pine view road, Kala pul islamkot, Abbottabad Adda, Tanchi Chowk, and Kala Pul Jhugian. The noise pollution should control by placing noise-producing industries and traffic far from residential areas. There should be noise limit board is placed near sensitive areas.
7. The Fecal Coliform (FC) is exceeded in the major area of Abbottabad city which can be controlled by boiling water, treating with chlorine, UV disinfection. Local bodies of District Abbottabad should maintain the public water supply will typically monitor and treat for fecal coliforms.

Chapter 2

Physiography and Geology

Forest Cover

2.6 Forests

Pakistan has very low forest cover of 4.29[23] percent of the total area, but its great variety reflects the country's great physiographic and climatic contrasts. Pakistan's forest and woodland types include: littoral and swamp forests; tropical dry deciduous forests; tropical thorn forests; sub-tropical broad-leaved evergreen forests, sub-tropical pine forests, Himalayan moist temperate forests, Himalayan dry temperate forests, sub-alpine forests and alpine scrub. Coniferous forests predominate in District Abbottabad. Man-made plantations are an important wood source in Pakistan. These fall into four categories: irrigated plantations, farmland trees, linear planting and miscellaneous planting.

The Khyber Pakhtunkhwa Province has around 42 percent of Pakistan's forests. More than 75 percent of which is found in arid and semi-arid areas as tropical thorn vegetation, mainly comprising bushes and small trees, while the rest is in sub-tropical and temperate zones in the foothills and high mountains respectively comprising predominantly coniferous forests with only 0.03 ha of forest per capita compared to the world average of 1 ha. [24]

Abbottabad district covers just 1.8 percent of the total land area of the KPK but accounts for 5.4 percent of the province's forest resources (KfW2000). Official statistics for forest cover in the District are at variance with estimates provided by other agencies. According to an inventory carried out by KfW, Abbottabad 's forests cover 36,394.6 ha, amounting to 21.4 percent of the district's total area, while official figures show the district's forested area to be slightly higher, at 36,441 ha.

2.6.1 Distribution of Forest Land and Type in Abbottabad

Food and Agriculture Organization (FAO) has defined Forest as land with tree crown cover (or Equivalent Stocking level) of more than 10 percent and area of more than 0.5 hectare. The trees should be able to reach a minimum height of 5 m at maturity.

2.6.2 General Forest type in Abbottabad

Forests in the District consist of three major forest types:

Moist Temperate Forest; Moist Temperate forests occur in lower Kaghan valley, Hazara, Neelam and Jhelum valleys of Azad Kashmir at an elevation of 1500 to 3000m. It is found in gentle slopes with deep soil especially on cool northern aspects. Main species are comprised of Deodar, Kail, Fir Spruce, Quercus, Alnus, Acer Aesculus and Prunus species.

Sub-Tropical Chir Pine Forest; These are open, inflammable pine forests, often without shrub layer. This forest type is found between 800 to 1700m elevations in western Himalaya within the range of South-West summer monsoon. It is found in Lower Dir, Swat, Hazara, AJK and in the foothills of Murree. Main species is Chir Pine.

Sub-Tropical Broad-Leaved Evergreen Forests; These are xerophytic forest with thorny and small-leaved evergreen species. This type occurs in foothills and lower slopes of Himalayas, Salt, Kala chitta

[23] Development statistics of KP,2018

[24] PAKISTAN FORESTRY OUTLOOK STUDY by Office of the Inspector General of Forests
Ministry of Environment, Government of Pakistan, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
REGIONAL OFFICE FOR ASIA AND THE PACIFIC
Bangkok, 2009

Sulaiman Ranges. The typical species of this forest type are; Olea Ferruginea, Acacia Modesta, Dodonaea, Viscosa. Pistacia Integerrima and Zizyphus species etc.

There are three most common forest in District Abbottabad and the distribution of these forests are represented in the Map-2-17

Table 2–17:Forest area in Abbottabad

Forest Type	Area (ha)	percentage
Moist Temperate	46,899	26.33
Sub-Tropical Chir Leaved	16,416	9.2
Sub-Tropical Broad Leaved	3,858	2.1
Sub Total	67,173	37.6

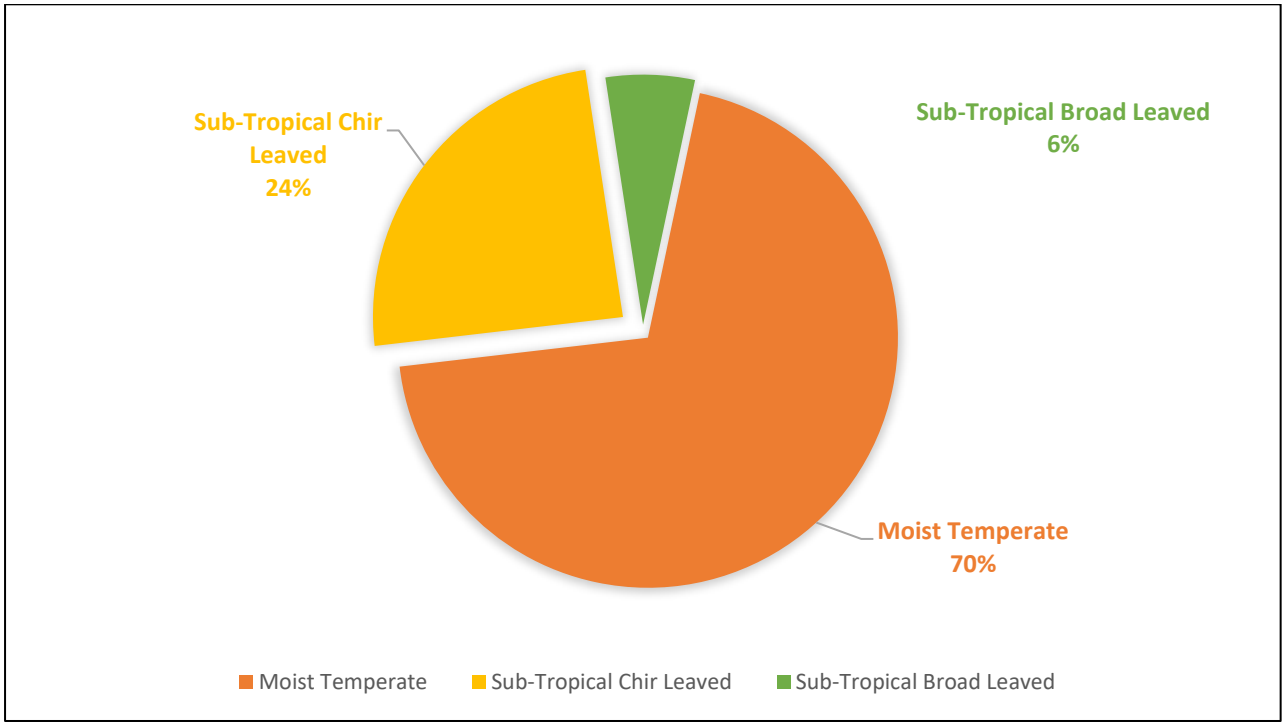
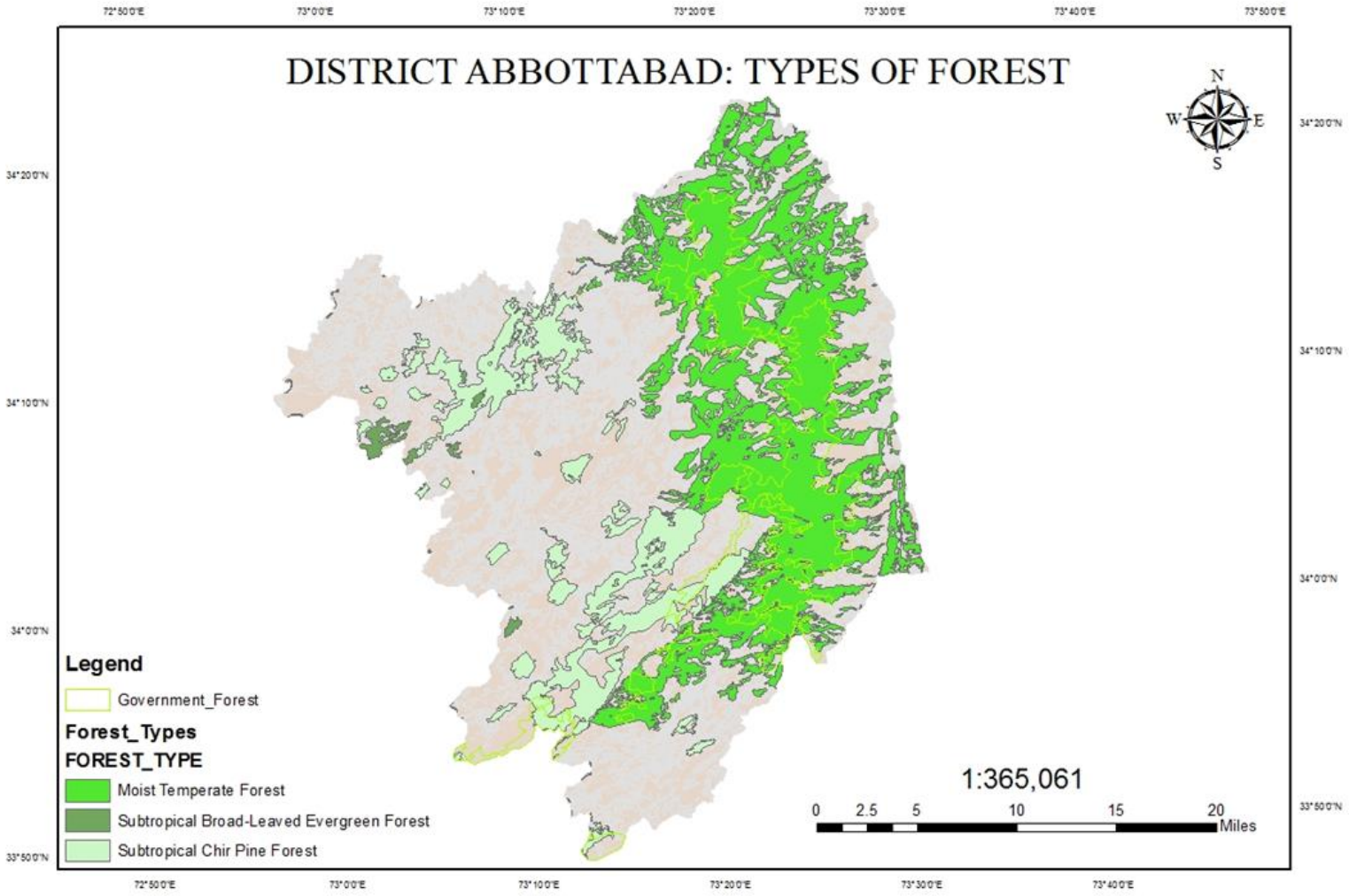


Figure 2-8:Forest area in Abbottabad



MAP 2-18: Types of Forests in District Abbottabad

2.6.3 Distribution of Forest Land in Abbottabad

More detailed and legal classification of forest in the province also exist which are described below i.e. Reserved Forests; Protected Forests, Unclassed Forests, Resumed Lands, Guzara & Community Forests.

The distribution of forest land has been shown in the following table. The total contribution of Abbottabad Forest of whole is just 4.29 % where major forests are reserved forest (16.55 %), Unclassed Forest (26.75 %), Guzara forest (2.95 %), Private plantation (4.00%) and miscellaneous (0.25 %).

Table 2–18:Distribution of Forest Land (2016-2017) in Acres

Forest Type	Khyber Pakhtunkhwa	District Abbottabad	Percentage
Reserved Forest	232,157	38428	16.55
Protected Forest	1,163,276	0	0.00
Resumed Forest	90,271	0	0.00
Unclassed Forest	259,960	69530	26.75
Section 38[2]	19,183	0	0.00
Communal	122,944	0	0.00
Guzara Forest	688,123	20291	2.95
Private plantation	1767567	70703	4.00
Miscellaneous	307,080	758	0.25
Total	4,650,561	199710	4.29

Table 2–19:Billion Tree Afforestation Project

Billion Tree Afforestation Project Activities, Northern Forest Region II,						
Plantations Activities of Gallies Forest Division 2016-17, (Phase-III Spring)						
S.No	**Sub Division/Range**	**Location Name**	**Activity Name & Type**	**X Coordinate**	**Y Coordinate**	**Area by GPS ha**
1	Abbottabad	Sarban 4	Departmental Plantation	3222132	1106194	60.97
2		Sarban 5	Departmental Plantation	3221277	1105400	42.56
3		Banda Qazi	Departmental Plantation	3220629	1113121	50
4		Bagh Dara	Departmental Plantation	3210252	1105768	28.41
5		Thana	Departmental Plantation	3218317	1109516	20.97
6		Solan Bala	Departmental Plantation	3217509	1116096	51.66
7		Dubather Danah	Departmental Plantation	3220692	1112962	48.73
	Total					**303.3**
9	Donga Gali	Taen	Departmental Plantation	3237679	1085519	24.11
9		Khoshikot	Departmental Plantation	3242784	1091190	31.33
10		Dhara	Departmental Plantation	3242744	1095209	19.57
11		Batnara	Departmental Plantation	3237984	1090704	51.22
	Total					**126.23**
12	Bagnother	Samandar Khata	Departmental Plantation	3236359	1099823	5.53
13		Palkot	Departmental Plantation	3238481	1110618	83.39
14		Kunkala	Departmental Plantation	3246595	1106198	71.72
15		Jaster	Departmental Sowing	3237196	1103654	12.70
16		Chamcotli	Departmental Plantation	3238576	1102959	6.86
	Total					**180.19**
17	Thandiani	Akhora	Departmental Plantation	3228289	1124320	52
	Total					**52.00**
18	Baren Gali	Jahfar Jandrol	Departmental Plantation	3234833	1113734	94
	Total					**94**
	G Total					**755.73**

2.6.4 Afforestation

Afforestation is the plantation of trees on an area that has lacked forest cover for a very long time or has never been forested. The most recent project done for afforestation is billion tree tsunami afforestation projects, the details are given below:

Billion Tree Tsunami Afforestation Project; The Billion Tree Tsunami[25] was launched in 2014, by the government of Khyber Pakhtunkhwa (KPK), Pakistan, as a response to the challenge of global warming. Pakistan's Billion Tree Tsunami restores 350,000 hectares of forests and degraded land to surpass its Bonn Challenge commitment.[26] The project aims at improving the ecosystems of classified forests, as well as privately owned waste and farmlands, and therefore entails working in

[25] http://103.240.220.71/btt/

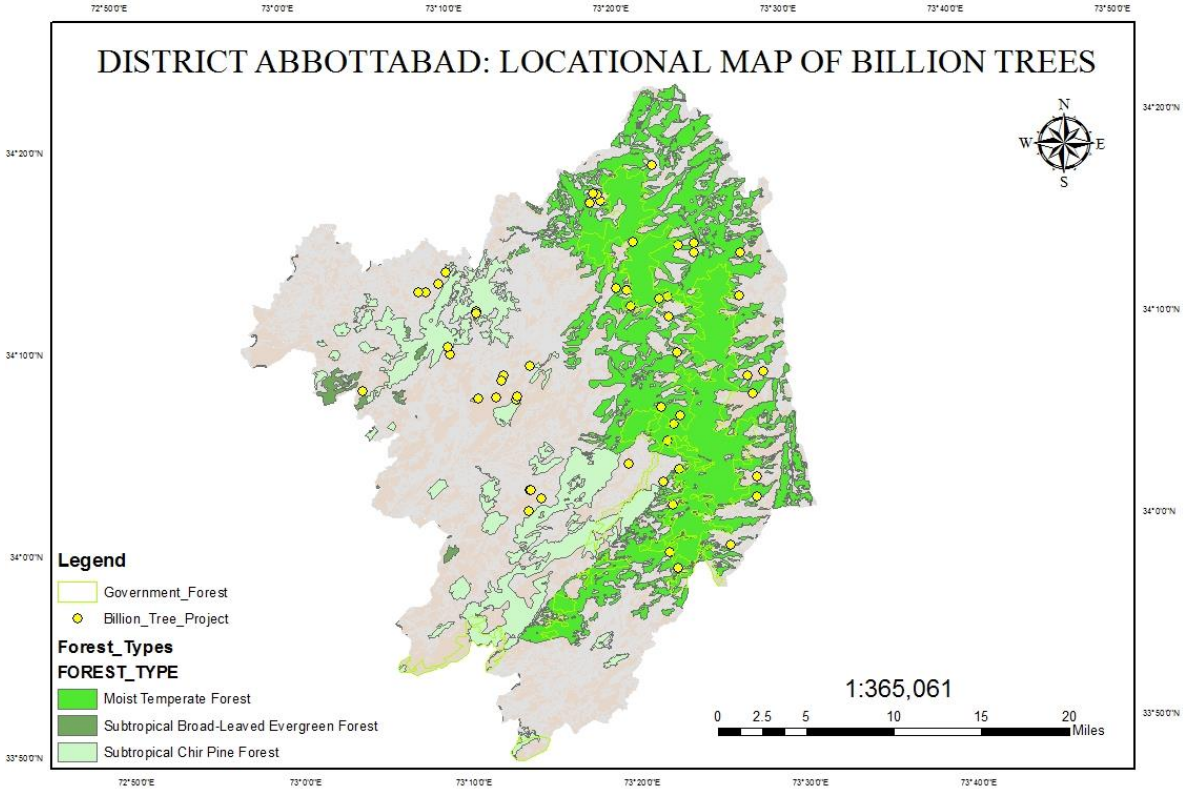
[26] https://www.iucn.org/news/forests/201708/pakistanpercentE2percent80percent99s-billion-tree-tsunami-restores-350000-hectares-forests-and-degraded-land-surpass-bonn-challenge-commitment

close collaboration with concerned communities and stakeholders to ensure their meaningful participation through effectuating project promotion and extension services.[27]

The Billion Tree Tsunami Project is driven by the Government of Khyber Pakhtunkhwa's vision of green growth which ties in the needs for sustainable forestry development, generating green jobs, gender empowerment, preserving Pakistan's natural capital while also addressing the global issue of climate change.[28] The locational map of billion trees are shown in the map 2-19. The data regarding billion tree afforestation plantation is shown in the table and is also in table 2-19. The total area of district Abbottabad under cultivation in Billion Tree Tsunami is 303 ha as shown in the table.

The Main purpose of this Project;

- Increase Area of forests by 2% through converting 30,000 ha Additional Land into forest annually.
- Increase Density (Area of forest having canopy cover below 50% and 7% degraded forest by closure against Grazing and Fire.
- Launch "Billion Trees Afforestation" campaign to involve Local Communities in sacred pursuit of greening Khyber Pakhtunkhwa.
- Establish rules for Reducing Emissions from Deforestation and forest Degradation (REDD) + to assign Carbon value to forest and institute REDD + a tool to promote conservation.
- Conserve Khyber Pakhtunkhwa Forests as valued Natural asset.



MAP 2-8: Locational map of Billion trees afforestation in District Abbottabad

[27] http://few.kp.gov.pk/page/about_billion_tree_tsunami_afforestation_project
[28] http://103.240.220.71/btt/

2.6.5 Comparison of Forests with Other Districts of KP

The comparative picture of forests in Abbottabad District in relation with Hazara Division is described in the following given table:

Table 2–20: Comparison of Forests in Abbottabad District with Greater Hazara Region (2015-2016)

Forest Type	KPK	Hazara Region	Abbottabad	Contributing (%) of Abbottabad with KP
Reserved Forest	232,157	157631	38428	16.55
Protected Forest	1,163,276	221466	0	0.00
Resumed Land	90,271	35866	0	0.00
Unclassed Forest	259,960	245242	69530	26.75
Section 38[2]	19,183	349	0	0.00
Communal	122,944	0	0	0.00
Guzara Forest	688,123	648992	20291	2.95
Private plantation	1767567	335838	70703	4.00
Miscellaneous	307,080	2923	758	0.25
Total	4,650,561	1648307	199710	4.29

Source: Forest Department, KPK, 2018

The Comparison of forests in Abbottabad District in relation with Provincial settings shows a relatively better condition in case of reserved and unclassed forests.

2.6.6 Economic Effect of Forests on District/Provincial Economy—Past and the Present

The revenue earned by the forest departments in Pakistan averaged around Rs. 845. from the year 2000 to 2016 showing a steady rise remained below average within 2000 to 2006. Afterwards, the revenue showed an increase and remained above average from 2007 to 2013, but after that the revenues again went below average till to date as shown in the table below:

Table 2–21:Economic Effect of Forests on District/Provincial Economy—Past and the Present

Year	Timber Produced		Revenue Realized	
	000 Cubic Meter	000 Cubic Feet	Revenue (Millions)	Revenue (Ratio to average)
2000-01	184.6	6519	350.429	0.72
2001-02	222.4	7854	318.312	0.66
2002-03	237.7	8392	348.352	0.72
2003-04	247.7	8747	352.335	0.73
2004-05	246.6	8709	331.506	0.68
2005-06	47.5	1677	342.629	0.71
2006-07	46.9	1656	558.813	1.15
2007-08	49.8	1759	539.243	1.11
2008-09	46.4	1640	584.771	1.21
2009-10	61.2	2161	640.742	1.32
2010-11	45.5	1606	749.821	1.55

2011-12	39.5	1395	874.75	1.80
2012-13	37.5	136	704.515	1.45
2013-14	37.5	1326	484.89	1.00
2014-15	15.8	526	355.596	0.73
2015-16	44.4	1480	223.194	0.46
Total	**1611**	**55583**	**485**	**1.00**

2.6.7 Impact of deforestation on the environment in Abbottabad District

Deforestation has many negative impacts on the environment, from above one of the most dangerous and unsettling effects of deforestation is the loss of animal and plant species due to their loss of habitat as Seventy percent of Earth's land animals and plants live in forests, and many cannot survive the deforestation that destroys their homes[29]. In addition to the loss of habitat, the lack of trees also allows a greater amount of Greenhouse Gases to be released into the atmosphere. The trees also help control the level of water in the atmosphere by helping to regulate the water cycle. With fewer trees left, due to deforestation, there is less water in the air to be returned to the soil.

Other effects of deforestation include:

- Deforestation exposes the soil to the forces of wind and water especially on the foothills of the mountains. The upper layer of the soil is eroded away and leaves behind infertile coarse sand. With heavy rainfall, the water gushes down the mountains carrying with its large quantities of silt and limestone.
- With no trees to hold the soil together and slow down the water flow. The surface run off may cause heavy floods.
- Cutting of trees disturbs the natural environment. The natural habitat is destroyed which results in the extinction of several valuable species and the wild life also gets disturbed.
- With less vegetation, there is less evapotranspiration. The climate changes, there is less rainfall, which may result in lower crop yields.

In District Abbottabad, area cover under forests is 60393 acers, which is 4.29 percent of the forest resources of the province. The study areas have enough natural resources, but these natural resources are depleting very rapidly as the forest of Abbottabad 27.41 % has been decline since 1998, as described in the following table and the figure:

Table 2–22:The Forest Cover in Abbottabad District (1998-2017)

Year	Area (Acres)	%age
1998	83201	58
2017	60393	42
Total	143594	100

[29] https://www.nationalgeographic.com/environment/global-warming/deforestation/

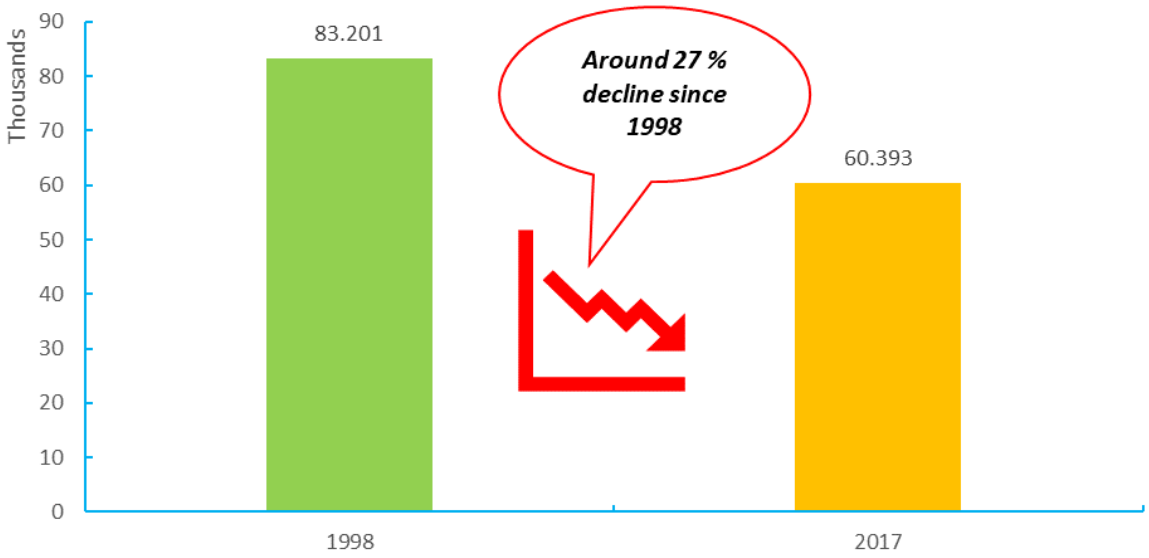


Figure 2-9:The Forest Cover in Abbottabad District (1998-2017)

2.6.8 Existing Policies

The Existing Policies and legislative provisions dealing with forests in the province vis-à-vis Pakistan are as under:

National Forest Policy 2015; The National Forest policy 2015 provides a framework for Expansion, protection and sustainable use of national forests, protected areas, natural habitats and watersheds for restoring ecological functions, improving livelihoods and human health in line with the national priorities and international agreements.

Objectives; In line with the Federal functions of national policy, planning and implementation of international agreements, specific objectives of the National Forest Policy include:

- Promoting ecological, social and cultural functions of forests through sustainable management and use of forest produce including wood and non-wood forest products.
- Implementing a national level mass afforestation program to expand and maintain optimum forest cover.
- Maximizing forest areas by investing in available communal lands/ shamilat, and Guzara forests and urban forestry.
- Facilitating and harmonizing inter-provincial movement, trade and commerce of wood and non-wood forest products through the Federal Forestry Board.
- Enhancing role and contribution of forests in reducing carbon emissions and enhancing forest carbon pools.
- Facilitating implementation of international conventions and agreements related to Forestry, Wetlands, Biodiversity and Climate Change.
- Promoting standardized and harmonized scientific forest planning, research and education including for community-based management.

2.6.9 Review of Projects

New Projects

Billion Tree Afforestation Project in Khyber Pakhtunkhwa Phase-III

2.6.10 Constraints

The constraints related to forest decline in the Abbottabad District may be attributed to the following factors:

- In rural areas, where natural gas is not freely available, nearly 90 % of households depend on firewood for cooking. From September to March each year, an estimated 30 kg of wood is used daily in each household, amounting to a monthly consumption of 3.3 million kg. Between April and August, households use some 5 kg of wood daily, totaling 550,620 kg per month (Gul, sector paper, 'Energy'). Based on this estimate, the total annual firewood requirement in rural areas stands at 25.85 million kg. With a growing population and inadequate availability of gas, this demand is likely to exert excessive pressure on natural resources in coming years, leading to a large-scale forest depletion.
- The planet has been affected in current times with the greenhouse gasses which is detrimental to maintaining life and sustainable environment on earth. Pakistan is a very small contributor in greenhouse effect, Pakistan contributes only 0.2 % greenhouse gases of the whole world.
- The deforestation is also causing Soil erosion which ultimately leading the barren land.
- Many wonderful species of plants and animals have been lost, and many others remain endangered.
- Some 60 shops were constructed along the Pine View Road, felling several mature camphor trees in the process. Plans for a huge plaza were approved by the cantonment board authorities. The destruction of Abbottabad cantonment's green belts and ravines continued too.
- Another constraint is the Climate change where plants absorb Carbon Dioxide CO2 (a greenhouse gas) from the atmosphere and uses it to produce food (carbohydrates, fats, and proteins that make up trees). In return, it gives off Oxygen. Destroying the forests mean CO2 will remain in the atmosphere and in addition, destroyed vegetation will give off more CO2 stored in them as they decompose. This will alter the climate of that region.

2.6.11 Recommendation

- As the deforestation is happening in Abbottabad at a very high rate, the rangeland is Abbottabad which is about 25.3 % should be used for afforestation (fruit orchard and tree plantation which will increase the scenic beauty of the area and in wide range it will contribute to reduce climate change and global warming).
- The Government should plant more renewable and sustainable energy resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat to reduce the use of wood for the daily use.
- The forest land in Abbottabad should be preserved to deal with the arising environmental problems.

Chapter 3

Demography and Settlement Pattern

Demographic Characteristics

3. DEMOGRAPHY AND SETTLEMENT PATTERN

3.1 Population

3.1.1 Demographic Setting—District Province vis-à-vis Abbottabad

According to the census of Pakistan the growth rates of the Province and District Abbottabad (from 1951 to 2017) are given in Table 3-1 and the Figure 3-1. It is clear from the table that in case of the province, except for the period 1961-72, the growth rate has been consistently declining. It was 3.6 percent during 1961-72, declined to 3.3 percent during 1972-81, and declined further to 2.8 percent during 1981-98. In case of District Abbottabad, the growth rate has been highest during 1961-72 i.e., 3.4%, declined to 2.5 percent during 1972-81 and 1.82 percent during 1981-1998 while a slight increase of 0.38 percent occur during 1998-2017. The major reason of declining of growth rate of district Abbottabad is due to the Mansehra, in October 1976, was given the status of a full-fledged district, which was one of the Tehsil of district Abbottabad. Subsequently in July 1991, tehsil Haripur was separated from Abbottabad and made a district. Overall, the growth rate of the district is lagging the province's growth rate except for the time 1951-1961 when it was minutely above the province's growth rate.

Table 3–1: Past Population Growth Trends in District Abbottabad and KPK

Inter-Censual Period	Average Annual Growth Rate (%)	
	KPK Province	Abottabad District
1951-1961	2.30%	2.34%
1961-1972	3.60%	3.40%
1972-1981	3.30%	2.50%
1981-1998	2.80%	1.82%
1998-2017	2.89%	2.20%

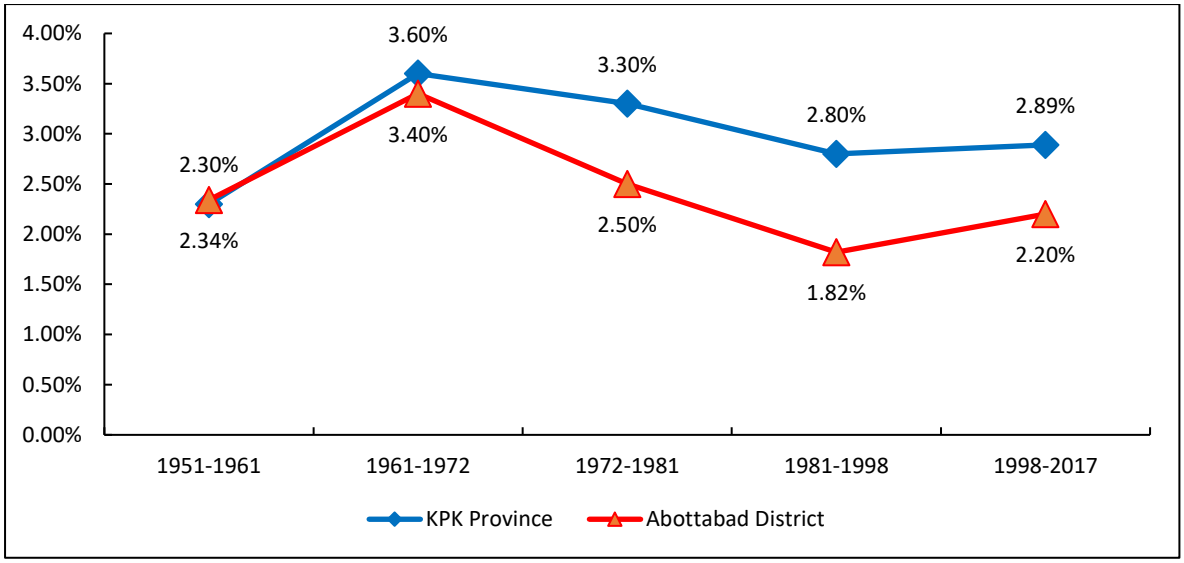


Figure 3-1:Past Population Growth Trends in District Abbottabad and KPK

Demographic Settings—Rural Urban Split

Growth variation within urban and rural dichotomy in the district from 1951 to 2017 are given in Figure 3-2. It is clear from the figure that urban growth shows an increase of 0.97% from 2.99% in 1951-1961 to 3.96% in 1961-1972. During the period from 1972-1998 the growth rate decline 1.06% from 3.96% to 2.90%, while a slight increase of 0.4% occur from 1998-2017.

Rural growth variation shows a tremendous increase of 2.75% from 0.79% in 1951 to 3.54% in 1961. After 1961 the growth rate smoothly declines up to 1.27 till 1998 while a slight increase of 0.66 occur from 1998 to 2017.

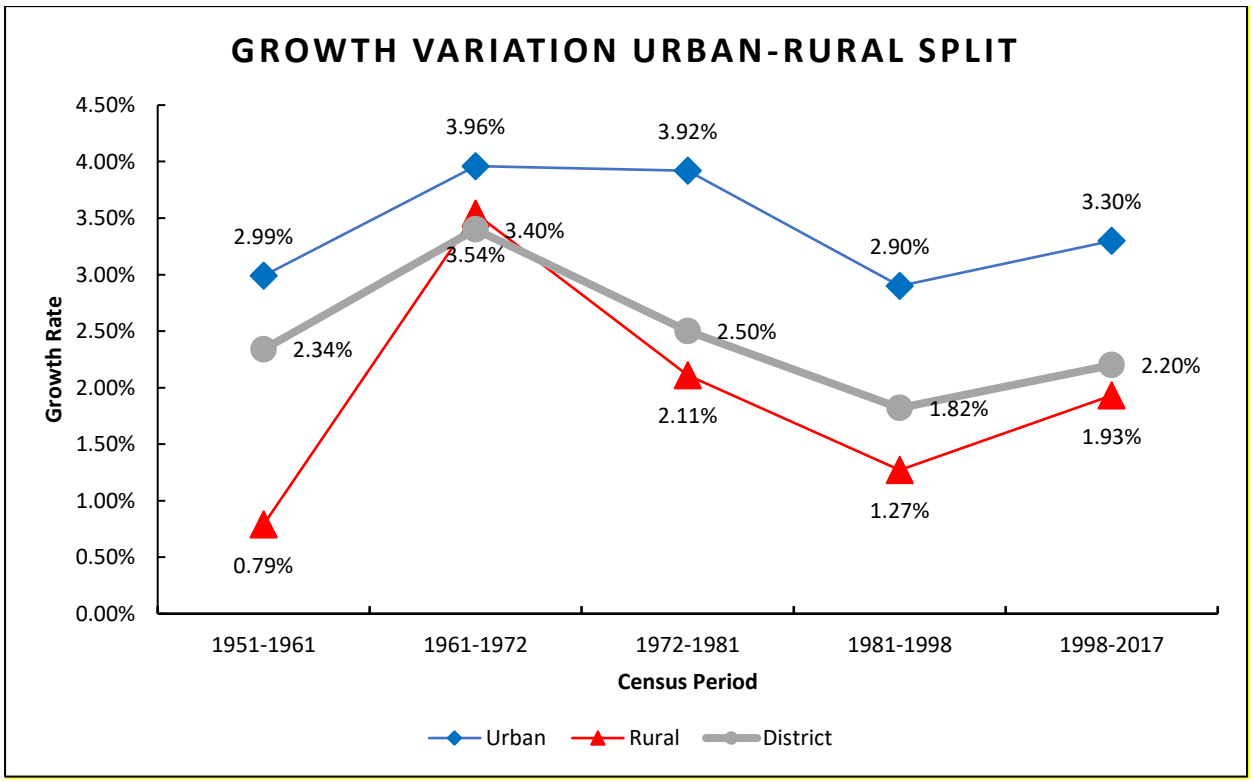


Figure 3-2:Demographic Settings—Rural Urban Split

Between 1951 and 1998, Abbottabad's population grew from 337343 to 880666, amounting to a cumulative growth of 261% and an annual average growth rate of 3.75%. In comparison, the population of the province during the same period grew by a cumulative 285.2% with an annual growth rate of 6.1. Between the 1998 and 2017 census periods, the average annual growth rate for the district is 1.82% as compared with the 2.81%, which is average annual growth for the province.

Table 3–2: Population Distribution in District Abbottabad

Year	Urban District		Rural District		District Total
	Population	Urban %	Population	Rural %	
1951	33285	9.9	304058	90.1	337343
1961	44702	12.0	329201	88.0	373903
1972	68569	12.4	482575	87.6	551144
1981	96966	14.3	582362	85.7	679328
1998	157904	17.9	722762	82.1	880666
2017	293137	22.0	1039775	78.0	1332912

According to the 2017 census, Abbottabad's urban population stands at 293137 (21.9% of the total population) while the rural population is 1039775 (78.1% of the total). In 1998, for instance, the urban population stood at 17.9% of the total population of the district while in 2017 this figure goes as high as 21.9%, amounting to an average annual urbanization growth rate of 0.23%. The urban population of the province rose from 18.5% in 1998 to 18.8% in 2017, amounting to an average annual urbanization growth rate of only 0.02%. This points to a critical area of overlap between sustainable development and demographic trends, where burgeoning population exerts increasing pressure on an already fragile rural economy, leading the rural to urban migration. This trends in urban areas creates serious threats to sustainable development.

At current position the district has been passing through 'S-Curve' urbanization period which is a slow pace urbanization, but it is expected that from now on the district will move into 'J-Curve' urbanization period which is a very high pace urbanization trend therefore, the district needs immediate efforts to focus on balanced and distributed urbanization policy and to promote and develop more urban centers in the district.

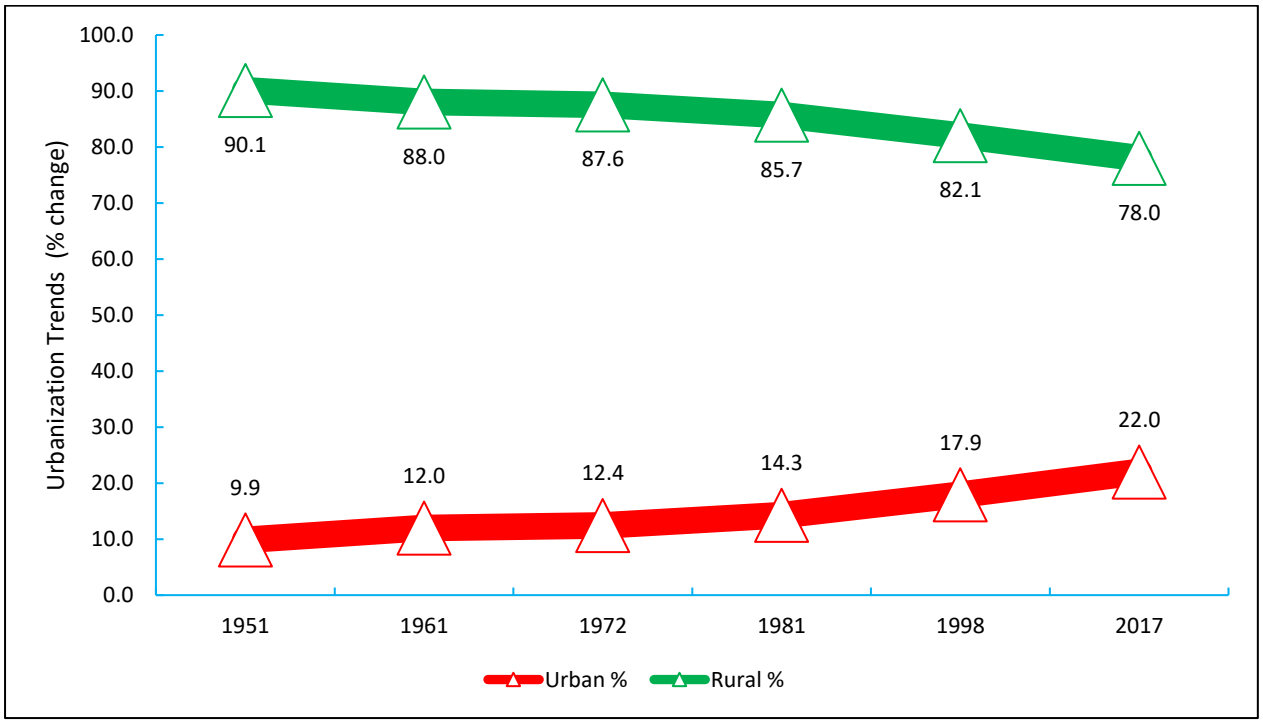


Figure 3-3:Urbanization Trend in District Abbottabad

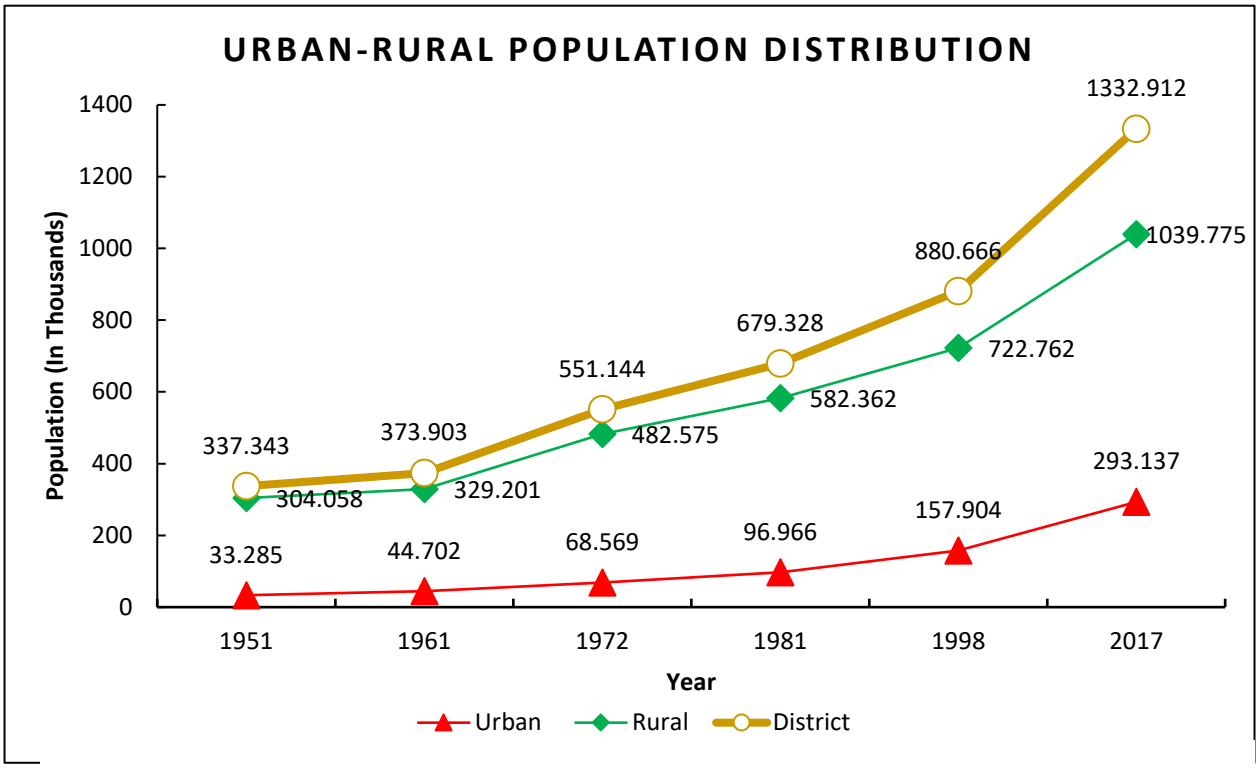
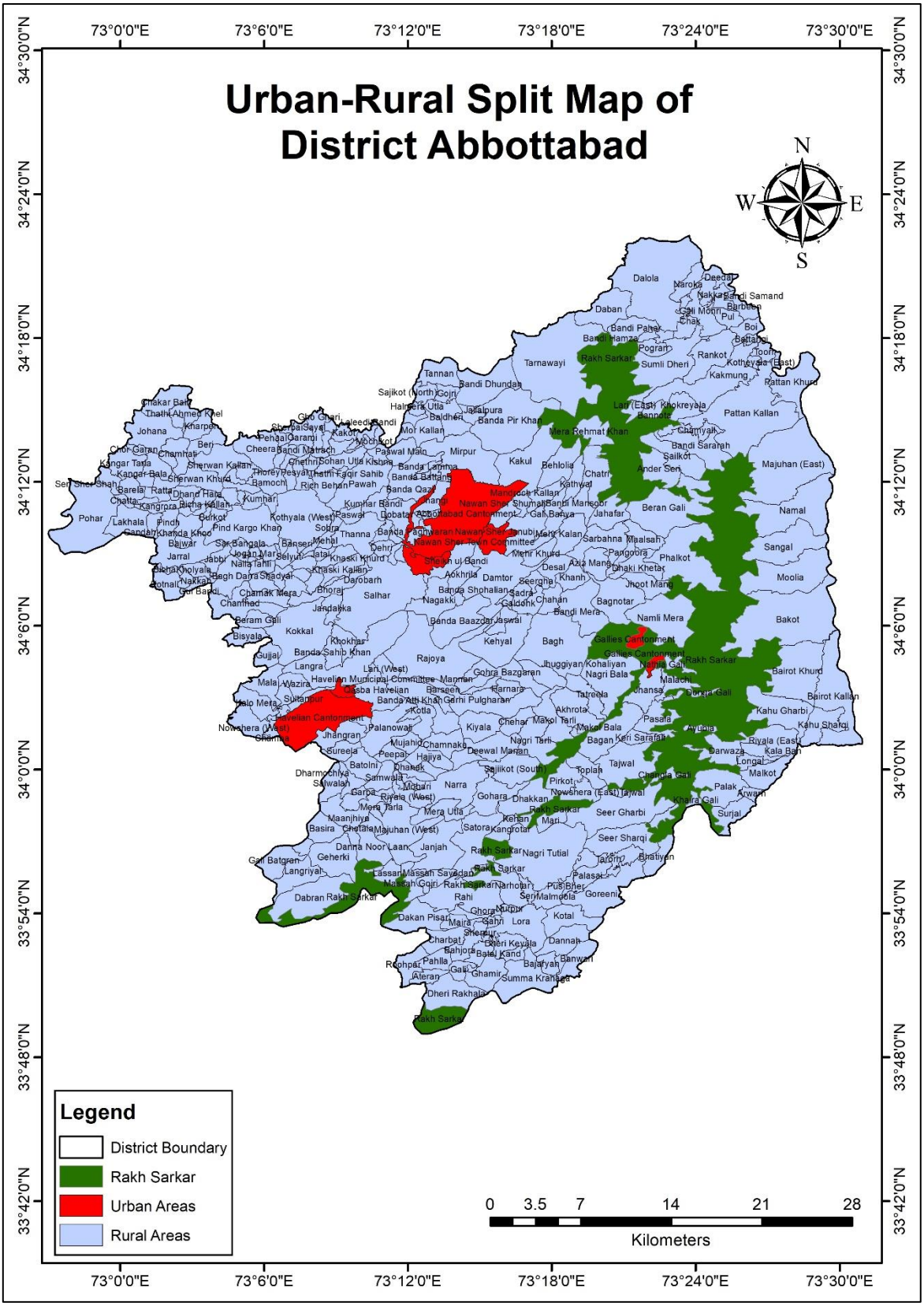


Figure 3-4:Comparison of Urban and Rural Population



MAP 3-1: Urban-Rural Split Map of District Abbottabad

Note: The above map shows the distribution of area in to urban and rural sector.

3.1.2 Demographic Setting—Age Gender Distribution:

A district where more than 40% of the population is below the age of 15 years is a "youthful population district" (MSU 2000). Abbottabad exceeds this benchmark, with 43% of its population below the age of 15 years and a massive 66% below 25 years of age. With a predominantly youthful population, more and more individuals will enter the job market in the coming years.

Viewed in tandem with the increase in population density and household size, as well as urbanization, this is cause for concern because it points to the intensifying pressure that will invariably be exerted on natural resources, public services and facilities. The fact that 43% of the population is below the age of 15 years exacerbates the situation from the point of view of economic dependency and future demand. The high proportion of young people reflects the recent population growth that has taken place, mostly in rural areas. Figures for the province show the population below the age of 25 years is higher 66%, but the population under 15 years is lower as 43%. For both the province and the district, these trends carry ominous implications for employment and service delivery soon. The relatively greater resources and reach of the province, combined with lower population density and relatively lower urbanization, mean that the district is more vulnerable to the negative impact of such trends.

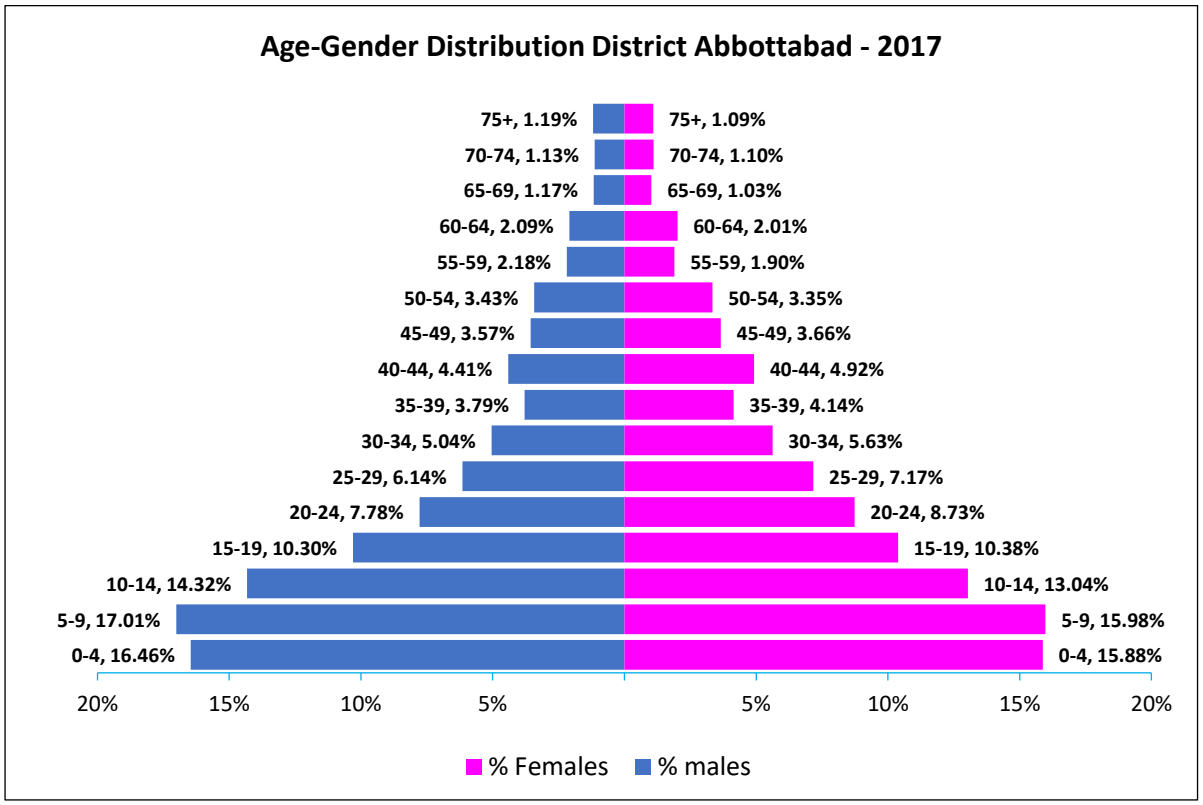


Figure 3-5:Age-Gender Distribution in District Abbottabad

3.1.3 Demographic Setting—Migration Influx

There are two main causes of population growth in any larger geographical region, namely; natural increase and the net migration. Migration again have many forms and types, but the study only works out the net migration, considering the net value of in-migration and out-migration

Estimates of the magnitude of migration during 1998-2017 of District Abbottabad have been calculated by the following method. National growth rate during 1998-2017 was used to estimate expected population in the District Abbottabad in 2017, had there been no inward or outward movement data from both urban and rural parts of the District, assuming uniform natural increase. When these figures are compared with actual population as recorded in 2017 census, the difference is in the contribution of net migration. Migration is never unidirectional, but there is no way (short of migration census) to assess inward and outward movements separately. But the net migration figure is a robust assumption.

The overall District growth rate during the period 1998-2017 was 2.20%. Using this growth rate, the population of District Abbottabad in 2017 is calculated to be 13,31,614. The actual 2017 census population of the District was 13,32,912, implying a net in-migration of 1298. The additional population during 1998-2017 was calculated 450,948. The table shows that the contribution of migration factor is quite trivial compared to net natural population increase. Some obvious reasons for this low migration rate can be attributed to the analysis unit i.e., district—which is a mix of rural and urban settlements; and secondly the region itself is experiencing outmigration due to greater migration pulls from more specialized urban centers at the provincial and national levels.

Table 3–3: District Population – Migration Vs Natural increase

Categories	**Estimated Population**
2017 Census Population	1332912
2017 (using District G.R@2.20% during 1998-2017)	1331614
1998 Census Population	880666
Total Additional Population (1998-2017)	**452246 (100 %)**
Net Migration	**1298 (0.29 %)**
Net Natural Increase	**450948 (99.71 %)**

3.1.4 Demographic Setting—Density Pattern

Even more alarming than the population growth trends in Abbottabad is its spiraling population density figures, which highlight the demographic dilemma that confronts the district. For the period 2017, population density in Abbottabad is estimated at 677.6 persons/ km2, compared to 409.59 persons/km2 in the province (Table 3.4). Although Abbottabad's population growth rate between 1951 and 1998 (2.4%) lags behind both provincial and national figures during the same period, population density in the district causes many of the same problems as population growth elsewhere. In an area of 1,967 Sq.km, the population density increased from 377 persons/km2 in 1981 to 677.6 persons/km2 in 2017, amounting to an average annual increase of 2.2%. In contrast, population density in the province increased from 148.43 persons/km2 in 1981 to 409.59 persons/km2 in 2017 (GoNWFP 2001b).

Even though the average annual provincial increase in density stands at 4.8%, overall population density in the province is still only 63.1% of that of the district, indicating the extent to which population exerts pressure on the area and its already Fragile resource base. Overall, Abbottabad district ranks fifth highest in terms of population density, behind the primarily urban districts of Bannu, Charsadda, Mardan and Peshawar. Density, however, is only one of the constraining pressures exercised by demographic variables and should be viewed in the light of urbanization trends as well as the relative age profile of the district.

Table 3–4: Population Density (Sq. Km) in District Abbottabad & KP

year	Population Density (persons/Sq. Km)	
	KPK Province	District Abbottabad
1981	148.43	377
1998	238	447.7
2017	409.59	677.6
2018	421.31	693.19
2023	485.1	785.45
2028	558.55	893.79
2033	643.13	1021.42
2038	740.51	1172.22

This study calculates the current and future density patterns at the Growth Zones and Settlements levels for the district are given in Table 3-5 and Table 3-6, these patterns are also shown in Map 3-2:

Table 3–5: Density Patterns at Settlements Levels in District Abbottabad

Sr. No.	Villages	Growth Rate (%) 1981-2017	Density (Person/ Sq.km) 2018	Density (Person/ Sq.km) 2023	Density (Person/ Sq.km) 2038
1	Abbottabad Cantonment	4.6	24	29.3	35.6
2	Abbottabad Municipal Committee	2.06	85.4	103.9	126.4
3	Akhrota	1.21	2.4	2.5	3
4	Ander Seri	0.17	1.5	1.5	1.6
5	Aokhrila	2.37	4.4	4.9	7
6	Arwarh	0.71	1.8	1.9	2.1
7	Ateran	0.94	1.7	1.8	2.1
8	Ayubia	2.77	3.8	4.4	0.3
9	Aziz Mang	1.21	2.7	2.9	3.4
10	Bagan	1.85	3.2	3.5	4.7
11	Bagh	1.6	3.4	3.6	4.6
12	Bagh Darra	2.29	1.7	1.9	2.7
13	Baghati	1.96	3.2	3.6	4.7
14	Bagla	3.13	0.8	0.9	1.4
15	Bagnotar	0.51	2.1	2.2	2.3
16	Bahjora	1.41	1.3	1.4	1.8
17	Bairot Kallan	2.07	4.7	5.3	7.2
18	Bairot Khurd	1.36	2.2	2.4	2.9
19	Bajaryan	-0.05	0.2	0.2	0.2
20	Bajwar	-3.49	0.1	0.1	0.1
21	Bakot	1.9	2.9	3.2	4.3
22	Baldheri	4.55	8.7	10.9	21.3
23	Bamochi	0.57	0.7	0.8	0.9
24	Banda Amlok	4.61	11.8	14.8	29.1
25	Banda Atti Khan	1.81	2.4	2.6	3.4
26	Banda Baazdar	2.14	2.4	2.7	3.7
27	Banda Battang	2.39	6.3	7.1	10.1
28	Banda Faiz Ullah Khan	1.24	19.7	20.9	25.1
29	Banda Ghazzan	3.49	25.6	30.4	50.8
30	Banda Jaggiyan	0.54	2	2.1	2.3
31	Banda Khair Ali Khan	1.52	4	4.4	5.5
32	Banda Lamma	1.43	4.5	4.9	6
33	Banda Noor Ahmad	2.39	53.4	60.1	85.7
34	Banda Paghwaran	2.33	24.1	27	38.1
35	Banda Pir Khan	1.61	3.1	3.3	4.2

36	Banda Qazi	4.14	5.3	6.5	11.9
37	Banda Sahib Khan	5.93	7.6	10.1	23.9
38	Banda Sher Khan	2.01	9.4	10.4	13.9
39	Banda Shohalian	0.5	2.6	2.7	2.9
40	Bandi Dhundan	3.59	7.5	8.9	14.9
41	Bandi Hamza	1.03	1.6	1.7	2
42	Bandi Mansoor	0.63	2.3	2.4	2.6
43	Bandi Matrach	-0.31	1.3	1.3	1.2
44	Bandi Mera	1.92	3.8	4.2	5.5
45	Bandi Nakra	2.79	1.3	1.5	2.3
46	Bandi Pahar	0.79	1.1	1.2	1.3
47	Bandi Samand	0.56	1.9	1.9	2.1
48	Bandi Sararah	2.3	2.7	3	4.2
49	Bannota	2.69	3.7	4.2	6.3
50	Banseri	1.47	3.9	4.2	5.3
51	Banwari	1.33	3.1	3.3	4
52	Barbeen	0.75	2.7	2.7	2.7
53	Barela	0.17	0.5	0.5	0.6
54	Barseen	1.46	3.5	3.7	4.6
55	Basira	-2.04	0.4	0.3	0.2
56	Batal Kand	1.53	2.6	2.9	3.6
57	Batolni	0.87	1.9	2	2.2
58	Battangi	0.31	1.9	1.9	2
59	Bayen Gojri	1.5	1.2	1.3	1.7
60	Bayen Noora	0.17	3.3	3.4	3.5
61	Behlolia	1.8	2.9	3.1	4.1
62	Beram Gali	0.65	2	2.1	2.3
63	Beran Gali	0.98	2.6	2.8	3.2
64	Beri	0.43	0.7	0.7	0.8
65	Bhateel	-0.4	4.4	4.4	4.1
66	Bhatiyan	1.55	3	3.3	4.1
67	Bhoraj	1.58	2.4	2.6	3.3
68	Bicha	1.74	2.5	2.7	3.5
69	Bicha Kallan	0.15	1	1	1.1
70	Bicha Khurd	-0.51	1	1	0.9
71	Bisyala	1.37	1.5	1.6	1.9
72	Boi	1.26	1.5	1.6	2
73	Botiyala	0.98	1.2	1.3	1.5
74	Burkot	-1.55	0.5	0.5	0.4
75	Buzargall	-0.44	0.5	0.5	0.5
76	Chahan	1.7	4	4.3	5.6
77	Chahar	0	0	0	0
78	Chak	0.75	1.4	1.5	1.7
79	Chakar Bain	-0.03	0.4	0.4	0.4

80	Chamak Mera	2	4.3	4.8	6.4
81	Chamba	1.53	6	6.4	8.1
82	Chamhad	2	0.9	1	1.3
83	Chamhati	-1.49	0.7	0.7	0.5
84	Chamnaka	1.47	2.1	2.3	2.9
85	Chamyali	1.46	1.9	2	2.5
86	Chandoo Mera	1.75	4.3	4.7	6.1
87	Changa Gali	2.06	0.2	0.2	0.2
88	Charbat	1.15	0.9	0.9	1.1
89	Chatri	1.27	2.4	2.6	3.2
90	Chatta	6.14	1.1	1.5	3.6
91	Cheera	0.5	1.2	1.3	1.4
92	Chehar	2.94	3.9	4.5	7
93	Chethri	1.03	1.9	2	2.4
94	Chor Garan	-0.74	0.9	0.8	0.7
95	Chotala	1.58	3.1	3.4	4.3
96	Daban	2.5	2	2.3	3.3
97	Dabran	0.29	1.1	1.1	1.1
98	Dakan Pisar	1.46	1.7	1.9	2.3
99	Dalola	1.74	3.1	3.4	4.4
100	Damtor	2.21	3.4	3.8	5.2
101	Danna Noor Laan	1.22	1.9	2	2.4
102	Dannah	0.68	2.6	2.7	2.9
103	Darhni Mera	2.68	2	2.3	3.4
104	Darobarh	1.75	3.2	3.5	4.6
105	Darwaza	1.86	3.6	4	5.3
106	Deedal	2.13	4.5	5	6.9
107	Deewal Manan	1.86	3.5	3.8	5.1
108	Dehri	2.35	3.9	4.3	6.2
109	Desal	1.31	5.4	5.7	7
110	Dhaki Khetar	2.14	5.2	5.7	7.9
111	Dhakkan	1.6	2.1	2.3	2.9
112	Dhanak	2.7	1.7	2	3
113	Dhand Hara	2.11	2.3	2.5	3.5
114	Dharmochiya	1.25	1.8	1.9	2.3
115	Dheri Keyala	1.62	1.4	1.6	2
116	Dheri Rakhala	0.69	1.7	1.8	2.1
117	Dobatar	2.21	5.5	6.2	8.6
118	Donga Gali	-0.76	0.5	0.5	0.4
119	Faqeer Muhammad	0.52	2.7	2.7	3
120	Fateh Bandi	1.78	0.6	0.7	0.9
121	Gaheli	1.38	2.1	2.2	2.7
122	Gahri	1.85	6.4	7	9.2
123	Galdohk	1.57	3.3	3.6	4.5

124	Gali	2.55	1.4	2	3
125	Gali Banya	1.98	4.3	4.7	6.3
126	Gali Batgran	2.48	1.1	1.2	1.8
127	Gali Mohri	-0.15	0.8	0.8	0.8
128	Gallies Cantonment	3.72	1.3	1.5	1.8
129	Gandah	2.09	2.9	3.3	4.4
130	Garami	1.36	1.5	1.6	1.9
131	Garba	1.47	1.3	1.4	1.8
132	Garhi Pulgharan	1.99	2.5	2.7	3.7
133	Geherki	1.55	1.2	1.3	1.6
134	Ghamir	1.65	3.2	3.5	4.5
135	Gho Ghari	4.24	1.5	1.8	3.4
136	Ghora	1.27	4.6	4.9	5.9
137	Gohara	1.38	1.3	1.4	1.7
138	Gohra Bazgaran	1.19	1.6	1.7	2
139	Gojri	4.28	10.1	12.5	23.4
140	Goreeni	1.15	2.9	3.1	3.9
141	Gujjal	0.71	1.3	1.4	1.5
142	Gul Bandi	0.69	2.5	2.6	2.9
143	Gup	1.2	2	2.1	2.5
144	Hajiya	1.58	3.1	3.4	4.3
145	Hall	-3.04	1.1	1	0.6
146	Halmera Tarla	0.77	2.8	3	3.3
147	Halmera Utla	1.67	2.1	2.2	2.9
148	Harnara	1.43	3	3.2	4
149	Havelian Cantonment	2.5	8.9	10.8	13.2
150	Havelian Municipal Committee	1.79	50.5	61.5	74.8
151	Jabbi	0.86	1.8	1.9	2.1
152	Jahafar	1	1.7	1.8	2
153	Jallalpura	3.64	10.6	12.6	21.6
154	Jandakka	3.59	3.5	4.2	7.1
155	Janjah	-0.69	1.1	1	0.9
156	Jarral	0.63	1.5	1.5	1.7
157	Jaswal	1.24	1.4	1.5	1.8
158	Jatal	1.03	1.1	1.2	1.4
159	Jhangi	4.93	17.9	22.7	46.8
160	Jhangran	1.43	4.7	5.1	6.3
161	Jhansa	1.34	4.1	4.4	5.3
162	Jhoot Mang	3.56	4.4	5.3	8.9
163	Jhuggiyan Kohaliyan	1.84	1.6	1.8	2.3
164	Jogan Mar	1.29	3.1	3.3	4.1
165	Johana	0.2	0.8	0.8	0.8
166	Kahu Gharbi	1.56	2.3	2.5	3.2
167	Kahu Sharqi	1.76	5.2	5.7	7.4

168	Kakmung	0.23	2.7	2.7	2.8
169	Kakot	1.6	2.3	2.5	3.1
170	Kakul	1.92	2.7	3	4
171	Kala Ban	1.32	1.9	2	2.4
172	Kalabat	-1.95	0.3	0.3	0.2
173	Kalar Khateer	0.62	2.9	3	3.3
174	Kalo Mera	1.5	1.6	1.7	2.2
175	Kamila	1.25	1.4	1.4	1.7
176	Kangar Bala	-0.51	1	1	0.9
177	Kangar Tarla	-1.87	0.6	0.5	0.4
178	Kangrora	0.92	2.4	2.5	2.9
179	Kangrotar	0.93	1.4	1.5	1.7
180	Karrach	-0.22	2.5	2.5	2.4
181	Kashmir	2.07	3.6	4	5.4
182	Kathwal	1.13	3.2	3.3	3.9
183	Kehan	1.05	1.4	1.4	1.7
184	Kehyal	1.01	2.2	2.3	2.7
185	Keri Sarafali	2.71	5	5.7	8.6
186	Khaira Gali	-1.31	0.3	0.3	0.3
187	Khalora Tarla	-0.55	1	1	0.9
188	Khalora Utla	0.38	1.6	1.6	1.7
189	Khanda Khoo	0.38	1	1	1.1
190	Khanh	1.1	3.3	3.5	4.2
191	Khani Thathara	1.8	0.9	1	1.3
192	Kharper	-0.38	0.7	0.7	0.6
193	Khaski Kallan	0.13	1.8	1.8	1.9
194	Khaski Khurd	1.79	2.5	2.7	3.6
195	Khokhar	1.87	7.8	8.5	11.2
196	Khokreyala	0.77	1.4	1.5	1.7
197	Kholyala	1.52	2.3	2.5	3.1
198	Kishna	1.73	1.8	2	2.6
199	Kiyala	0.89	2.3	2.4	2.7
200	Kokkal	1.85	2.6	2.9	3.8
201	Kotal	2.21	2.9	3.2	4.4
202	Kotheyala (East)	0.34	2.8	2.8	3
203	Kothyala (West)	1.53	3.3	3.5	4.4
204	Kotla	0.89	1.6	1.7	1.9
205	Kotnali	0.56	1.7	1.7	1.8
206	Kumhar	0.97	1.8	1.9	2.2
207	Kumhar Bandi	2.14	3.2	3.5	4.9
208	Lakhala	0.75	1.7	1.7	1.9
209	Laleedi Bandi	0.71	2	2.1	2.3
210	Langra	4.57	5	6.2	12.1
211	Langriyal	0.96	2	2.1	2.4

212	Lari (East)	3.22	3.2	3.7	6
213	Lari (West)	0.75	2.6	2.7	3
214	Lassan	0.99	1.6	1.7	1.9
215	Lassan	1.945	3.3	3.7	4.90
216	Longal	2.54	6.9	7.9	11.5
217	Lora	2.63	3.1	3.5	5.1
218	Maalsah	-0.58	2.2	2.2	2
219	Maanjhiya	-1.28	0.4	0.4	0.3
220	Maira	0.67	0.5	0.5	0.5
221	Majuhan (East)	2.14	2.4	2.6	3.6
222	Majuhan (West)	0.35	1.5	1.5	1.6
223	Makhadbi	1.83	2	2.2	2.9
224	Makol Bala	1.65	5.3	5.8	7.4
225	Makol Tarli	1.87	2.1	2.3	3
226	Mala	2.36	1.4	1.5	2.2
227	Malachi	0.34	9.1	9.2	9.7
228	Malkot	0.66	4.5	4.7	5.2
229	Malmoola	1.86	1.5	1.6	2.2
230	Mandroch Kallan	2.84	2.5	2.8	4.3
231	Mandroch Khurd	2.51	5	5.7	8.2
232	Mannan	0.51	1.4	1.4	1.6
233	Mari	1.64	2.1	2.3	2.9
234	Massah Gojri	1	1.8	1.9	2.2
235	Massah Sayedan	1.03	0.9	1	1.1
236	Mehal	1.77	2.5	2.7	3.5
237	Mehr Kalan	1.24	1.9	2.1	2.5
238	Mehr Khurd	2.05	3.1	3.4	4.7
239	Mera Rehmat Khan	0.49	1.2	1.2	1.3
240	Mera Tarla	1.51	3.5	3.8	4.7
241	Mera Utla	-2.55	0.9	0.8	0.5
242	Mirpur	4.36	13.7	17	32.2
243	Mochikot	0.24	2.7	2.8	2.9
244	Mohari	2.34	2.2	2.5	3.5
245	Mohri Badhbhen	3.94	1.1	1.4	2.4
246	Moolia	1.25	2.3	2.4	2.9
247	Mor Kallan	2.88	4	4.6	7.1
248	Mujahid	1.05	2.3	2.4	2.8
249	Nagakki	0.63	2	2	2.2
250	Nagri Bala	1.46	4.6	5	6.2
251	Nagri Tarli	2.06	2.5	2.8	3.8
252	Nagri Tutial	1.57	2.9	3.1	3.9
253	Nakka	-1.62	1.3	1.2	0.9
254	Nakkah	1.46	1.7	1.9	2.3
255	Nalla	-1.22	3.1	2.9	2.4

256	Namal	2.29	2.5	2.8	4
257	Namli Mera	0.82	2.9	3.1	3.5
258	Narhotar	1.89	2.7	3	4
259	Naroka	2.47	4	4.5	6.5
260	Narra	3.24	2.4	2.8	4.5
261	Natiha Gali	6.36	0.4	0.6	1.4
262	Nawan Sher Janubi	3.02	3.8	4.4	6.9
263	Nawan Sher Shumali	4.34	2.8	3.4	6.5
264	Nawan Sher Town Committee	3.14	40	48.7	59.3
265	Nowshera (East)	1.85	1.4	1.5	2
266	Nowshera (West)	2.35	5.2	5.9	8.3
267	Nurpur	0.5	3.1	3.2	3.4
268	Pahlla	1.37	3.8	4	4.9
269	Palak	0.77	3.4	3.5	3.9
270	Palanowali	2.05	2.6	2.8	3.8
271	Palasai	1.46	1.2	1.3	1.6
272	Pandoo Thana	1.81	5.7	6.2	8.1
273	Pangoora	1.47	3.6	3.8	4.8
274	Pasala	1.89	4.5	5	6.6
275	Paswal	2.76	3.5	4	6
276	Paswal Main	2.24	2.4	2.7	3.7
277	Patheri Saidan	0	0	0	0
278	Pattan Kallan	1.73	2.4	2.6	3.3
279	Pattan Khurd	1.23	1.8	1.9	2.3
280	Pawah	2.11	2.6	2.9	4
281	Peepal	1.65	2.8	3.1	3.9
282	Pehaal	1.41	2.6	2.8	3.5
283	Pesyal	-0.09	1.2	1.2	1.2
284	Phalkot	0.85	2.6	2.7	3.1
285	Pind Kargo Khan	0.94	3.2	3.4	3.9
286	Pindh	-0.41	0.7	0.7	0.6
287	Pirkot	1.64	2.7	2.9	3.7
288	Pogran	1	0.9	1	1.1
289	Pohar	0.34	0.2	0.2	0.2
290	Pul	-0.23	1	1	0.9
291	Pus Bher	2.01	2.9	3.2	4.3
292	Qasba Abbottabad	2.97	9.5	11	12.7
293	Qasba Havelian	2.31	5.3	6	8.4
294	Rahi	1.98	2.5	2.7	3.6
295	Rajoya	2.13	2.9	3.2	4.5
296	Rankot	-0.48	1.7	1.6	1.5
297	Ratta	0.82	0.7	0.7	0.8
298	Rich Behan	1.19	2.8	3	3.6
299	Riyala (East)	1.72	3.9	4.2	5.4

300	Riyala (West)	1.95	2	2.2	3
301	Roohpar	1.89	2.1	23	3
302	Sadra	1.59	1.1	1.2	1.5
303	Sailkot	1.7	4	4.3	5.5
304	Sajiikot (South)	1.37	2.4	2.5	3.1
305	Sajikot (North)	2.95	6.7	7.7	8.9
306	Salhar	2.92	6.4	7.4	11.4
307	Salwalah	-1.18	0.7	0.7	0.6
308	Samwala	0.76	4.1	4.3	4.8
309	Sangal	1.59	2.3	2.5	3.2
310	Sar Bangala	-1.61	0.2	0.2	0.2
311	Sarbahna	1.02	2.7	2.8	3.3
312	Satora	1.15	1.7	1.8	2.2
313	Sayal	0.68	1.6	1.6	1.8
314	Seer Gharbi	1.79	3.1	3.4	4.5
315	Seer Sharqi	1.91	2.5	2.7	3.6
316	Seergha	1.26	2	2.1	2.5
317	Selyut	1.84	2.4	2.7	3.5
318	Seri	1.11	1.9	2	2.4
319	Seri Sher Shah	0.22	0.4	0.4	0.5
320	Shadyal	0.89	1.1	1.2	1.4
321	Sheikh ul Bandi	2.51	12.9	14.6	21.2
322	Sherbai	-2.28	0.6	0.5	0.4
323	Sherpur	2.46	1.2	1.4	2
324	Sherwan Kallan	0.82	0.7	0.7	0.8
325	Sherwan Khurd	0.94	2.1	2.2	2.5
326	Sobra	2.51	4.4	5	7.2
327	Sohan Tarli	-0.21	2.3	2.3	2.2
328	Sohan Utla	0.41	1.1	1.1	1.2
329	Sultanpur	2.97	2.7	3.1	4.8
330	Sumli Dheri	0.63	1.6	1.6	1.8
331	Summa Krahaga	1.36	1.4	1.5	1.8
332	Sureela	2.03	2.3	2.5	3.4
333	Surgaal	1.55	3.4	3.7	4.6
334	Surjal	0.85	3.1	3.3	3.7
335	Tahli	1.95	3.1	3.4	4.6
336	Tajwal	1.58	3.4	3.7	4.6
337	Talhaar	2.1	4.2	4.7	6.3
338	Tannan	4.11	6.2	7.6	13.9
339	Tarnawayi	1.06	1.6	1.7	2
340	Tarorh	0.72	3	3.1	3.5
341	Tath Karam Shah	1.37	1.9	2	2.5
342	Tatreela	0.68	3.3	3.4	3.7
343	Thanna	1.9	1.5	1.8	2.4

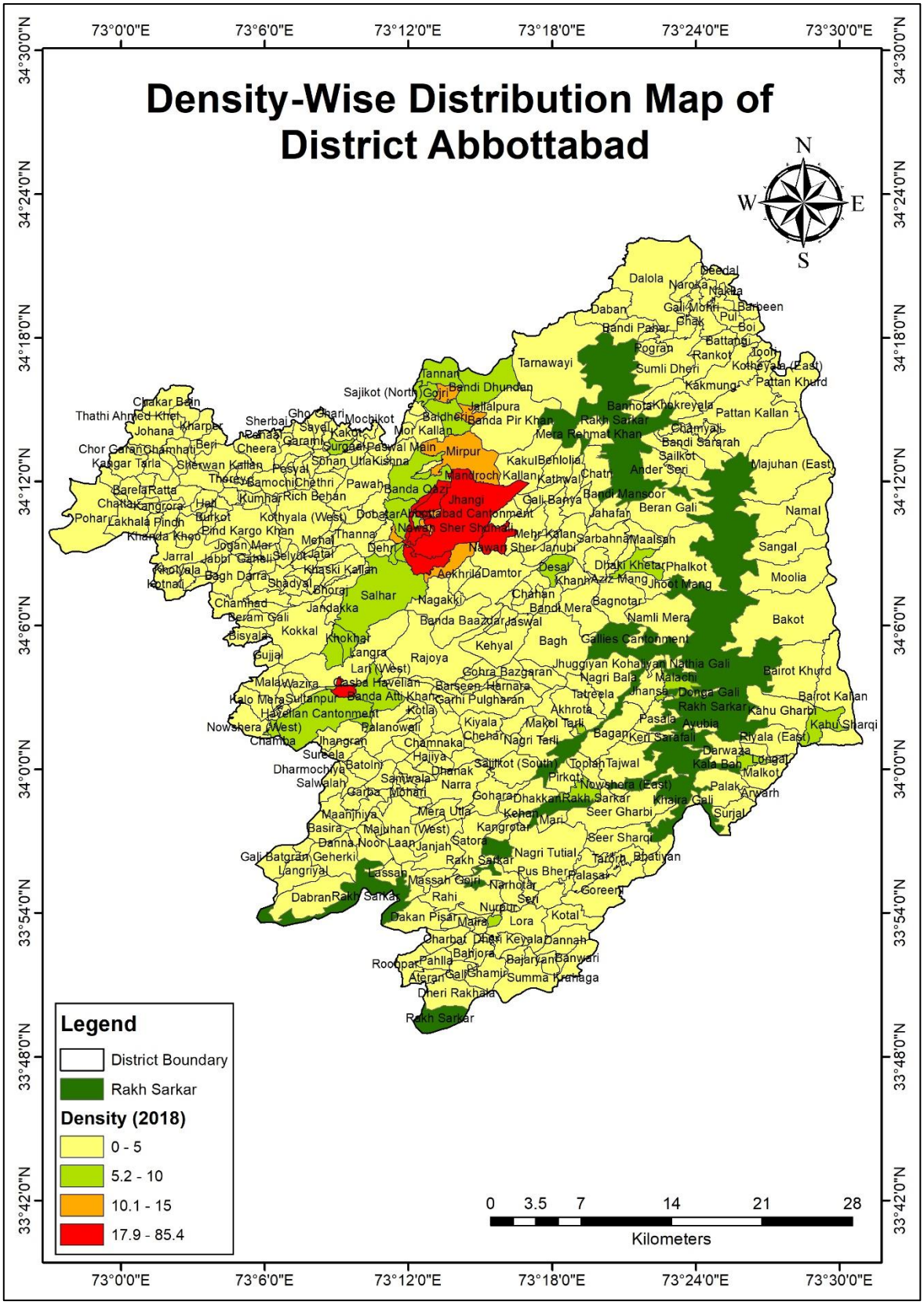
344	Thathi Ahmed Khel	1.13	2.2	2.3	2.7
345	Thathi Faqir Sahib	1.93	0.8	0.9	1.2
346	Theth Ochaahar	1.9	1.7	1.9	2.5
347	Thorey	-0.42	1.8	1.8	1.7
348	Todoo	2.52	5	5.7	8.2
349	Toori	-0.58	1.7	1.6	1.5
350	Toplah	2.4	3.1	3.5	4.9
351	Tarorh	0.72	3	3.1	3.5
352	Talhaar	2.1	4.2	4.7	6.3
353	Wazira	2.6	2	2.3	3.4

Table 3-5 shows the real image on the ground by the calculation of growth rate of all urban and rural settlements in District Abbottabad. Then on the basis of growth rate 2018, 2023 and 2038 densities of all these settlements are calculated.

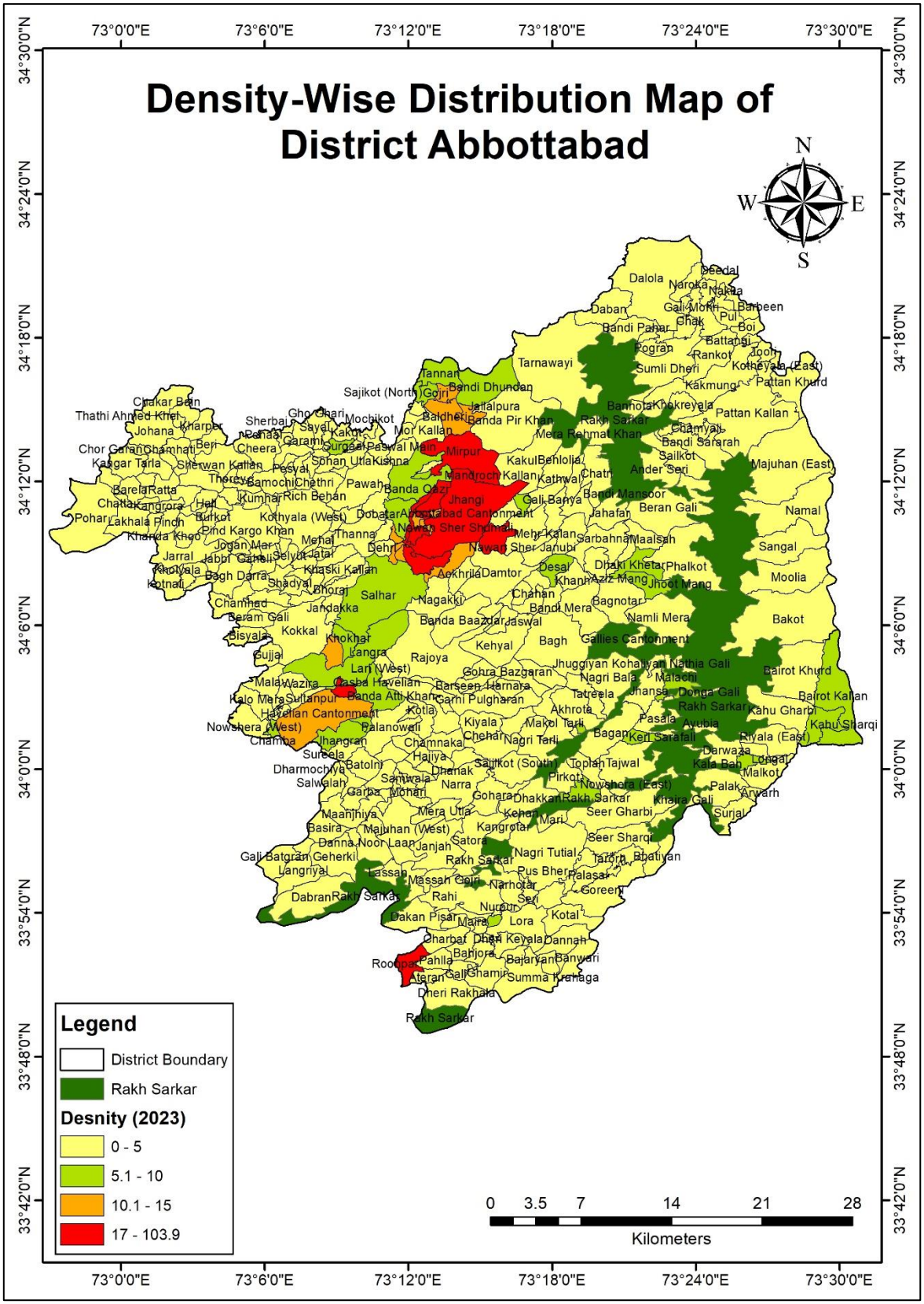
For the land use planning of district Abbottabad, whole district is divided in to eight zones that whole urban and rural areas will be the part of it for better planning.

Table 3–6: Density Patterns at Growth Zones Level in District Abbottabad

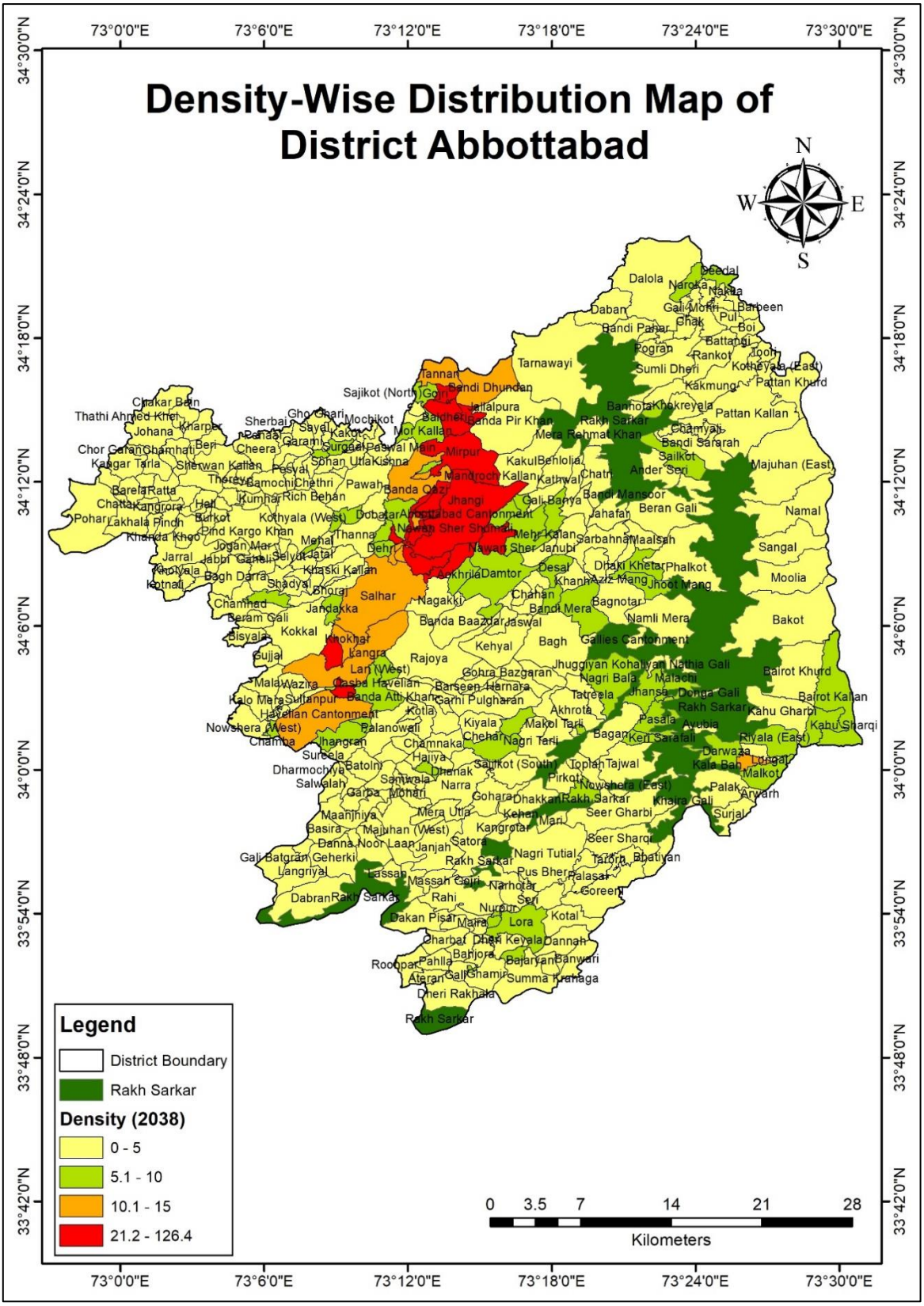
Sr. No.	Zones	Growth Rate (%) 1981-2017	Density (Person/ Sq.km) 2018	Density (Person/ Sq.km) 2023	Density (Person/ Sq.km) 2038
1	Abbottabad Growth Zone	2.16	7.93	9.22	13.04
2	Birote Growth Zone	1.55	3.29	3.58	4.6
3	Havelian Growth Zone	2.21	5.16	6.06	8.37
4	Lora Growth Zone	1.54	2.29	3.12	3.18
5	Majuhan Growth Zone	1.11	1.88	2.02	2.55
6	Nathia Gali Entertainment Zone	1.52	3.05	3.3	4.05
7	Sherwan Growth Zone	0.68	1.79	1.9	2.31
8	Tarnawayi Growth Zone	1.04	2.35	2.52	3.2



MAP 3-2: Density-Wise Distribution Map of District Abbottabad (2018)



MAP 3-3: Density-Wise Distribution Map of District Abbottabad (2023)



MAP 3-4: Density-Wise Distribution Map of District Abbottabad (2038)

Note: The purpose of density wise distribution is to show the number of people per Sq.km on the projection value of 2038. In the map, the light yellow colour represents the low density area and the red colour represent the high density area.

Demographic Setting—Population Projections

As per study requirement, population of District Abbottabad has been projected for 20 years using exponential population growth model which is a robust technique for population forecasting. The formula of exponential growth model as well as the population projected are given as under:

$$P_n = P_0 \times (1+r/100)^t$$

Where,

P_n =Population of desired year

P_0 = Population of base year

r = Population growth rate

t = Time

Table 3–7: Population Forecasts for the Plan Period (2018-2038)

Period	Projected Population		
	Urban	Rural	District
2017	293137	1039775	1332912
2018	302387	1061121	1363508
2023	367900	1177077	1544977
2028	447607	1310485	1758092
2033	544583	1464552	2009135
2038	662570	1643179	2305749

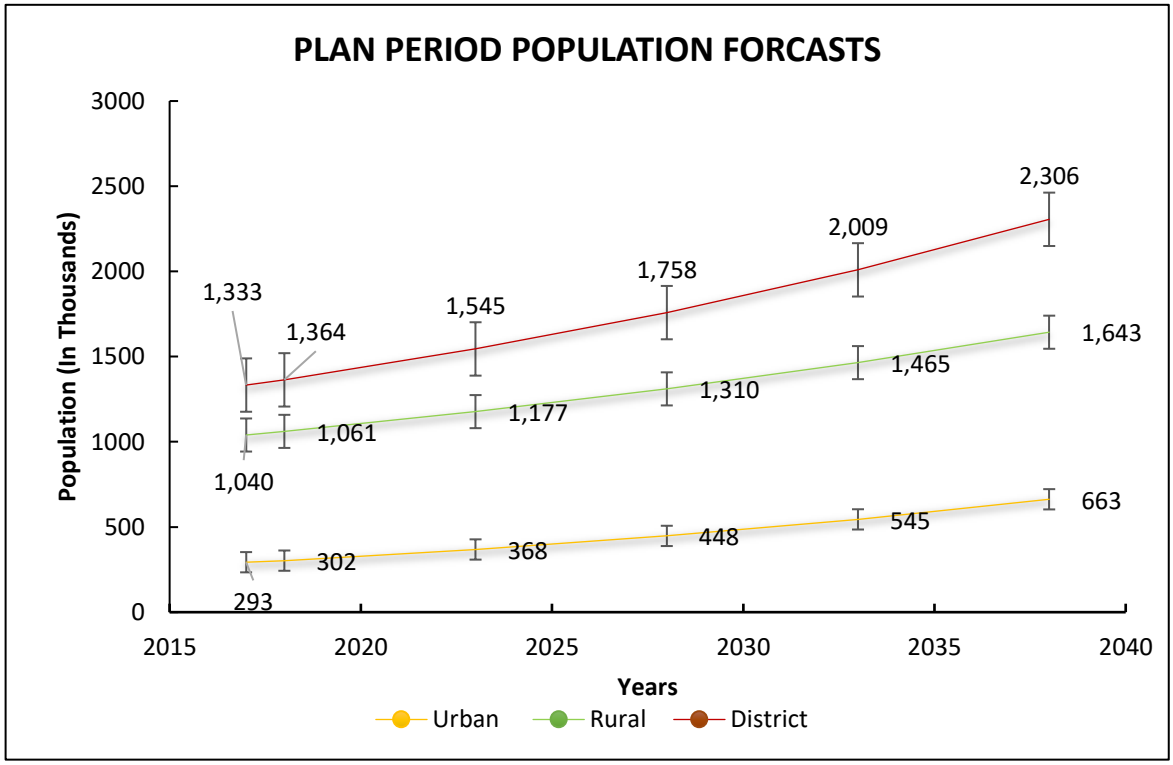


Figure 3-6:Population Forecasting for Planned Period

Settlement wise population of the district in the year 1981, 1998 and 2017 and the inter census growth rates during these periods were calculated. From 1998 and 2017 an average growth rate for each settlement is calculated and with the help of these growth rate per settlement population is projected. To find out the forecasted population of the district and urban-rural spilt, settlement wise forecasted population is added.

According to 2017 census report population of district Abbottabad is roundabout 1.3 million which consist of 21.9% urban population and 78.1% rural. District population will increase into 1.5 million in the next five years with an additional population of 181469 while an increase of 760772 populations will be occur from 2023 to 2038, with 38.7% additional Urban population and 61.3% additional rural population. Settlement wise projected population for both urban and rural settlements are estimated as following:

Table 3–8: Population Projections at the Settlements Level (Urban) in District Abbottabad

Urban Settlements	G. Rate (%) (1998-2017)	1998	2017	2018	2023	2028	2033	2038
Abbottabad Cant.	4.634	58492	138311	144720	181504	227638	285497	358064
Abbottabad MC	2.063	47609	70180	71628	79329	87858	97304	107765
Havelian Cantt	2.522	19609	31474	32268	36546	41393	46882	53098
Havelian M.C	0.164	16305	16821	16849	16987	17127	17268	17410
Murre Gallies Cantt	3.716	307	614	637	764	917	1101	1321
Nawan Shehr TC	3.137	19871	35737	36858	43014	50199	58583	68367
Total	**2.706**	**162193**	**293137**	**302387**	**367900**	**447607**	**544583**	**662570**

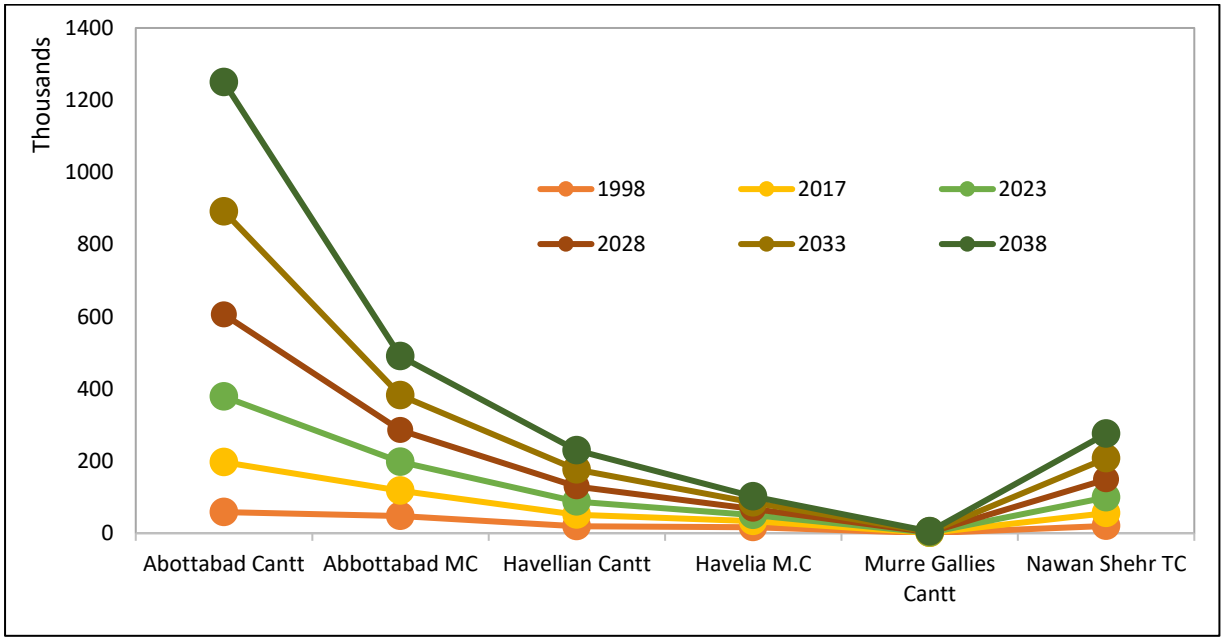


Figure 3-7:Urban Areas Forecasted Population Comparison

Analyzing the current urban settlements which is only six in numbers that constitutes 0.293 million populations and around 22 %t of the district population, have also been assessed using Zip's Law or Rank Size Rule. The Zip's Law suggest a standardized hierarchy of settlements within a given region (district

Abbottabad). The comparative picture of existing hierarchy of urban settlements in Abbottabad in comparison with Zip's Law indicates that in 1998 only one urban settlement was not corresponding to Zip's Law, whereas, in 2017 4 out of 6 settlements were not corresponding to Zip's Law—indicating lopsided and unbalanced urbanization pattern in the district:

Figure3-8: Application of Zip's Law on Urban Settlements in Abbottabad District

Urban Settlements	Population 1998	Population 1998 as per Zip's Law	Population 2017	Population 2017 as per Zip's Law
Abbottabad Cantt	58492	58492	138311	138311
Abbottabad MC	47609	29246	70180	69156
Nawan Shehr TC	19871	19497	35737	46104
Havelian Cantt	19609	14623	31474	34578
Havelian M.C	16305	11698	16821	27662
Murre Gallies Cantt	307	9749	614	23052

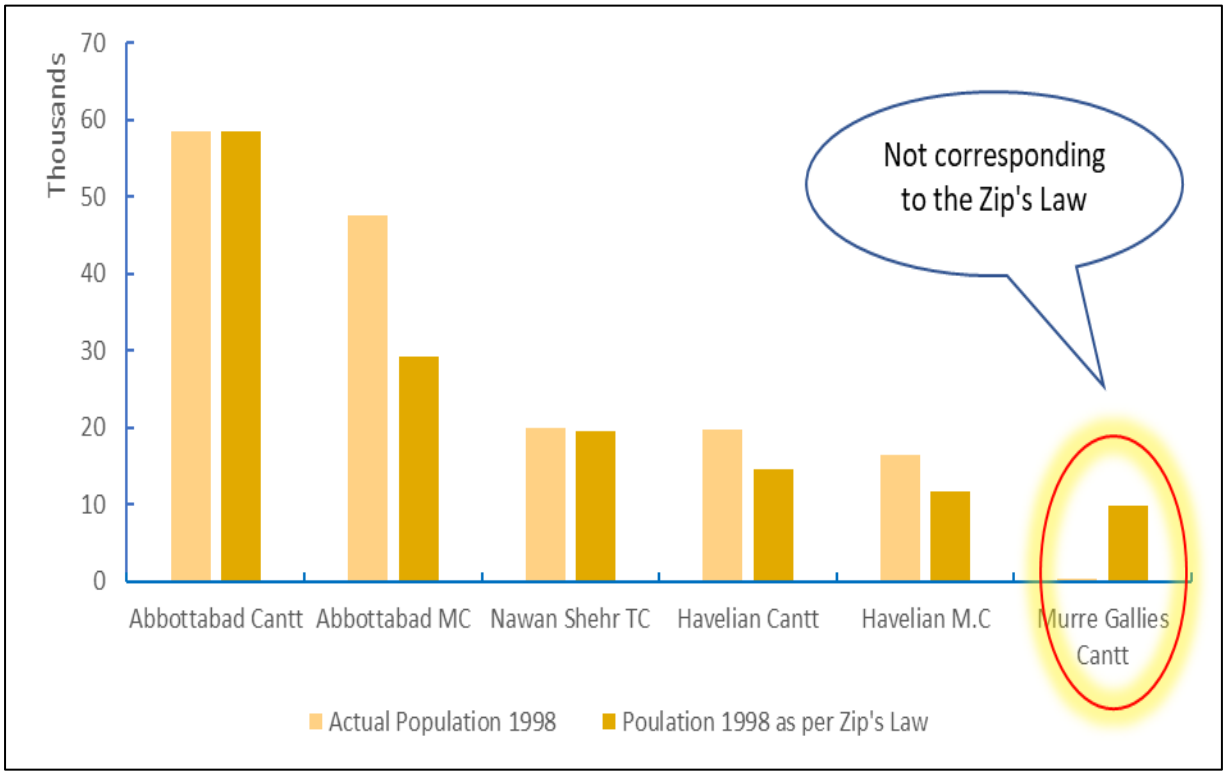


Figure 3-9:Application of Zip's Law on 1998 Population in Abbottabad District

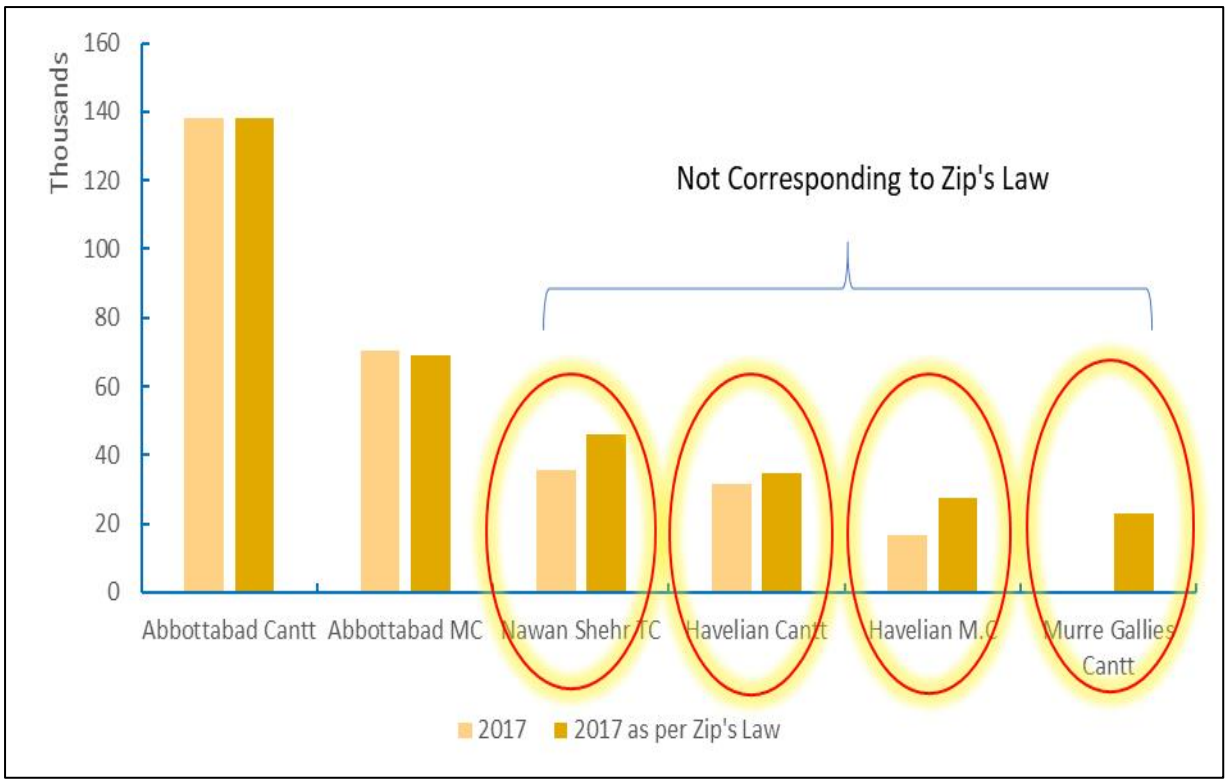


Figure 3-10:Application of Zip's Law on 2017 Population in Abbottabad District

Table 3–9: Population Projection at the Settlements Level (Rural) in District Abbottabad

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
1	Ateran	0.94	800	808	847	976
2	Dheri Rakhala	0.965	3381	3414	3582	4137
3	Gali	2.55	830	851	965	1408
4	Ghamir	1.655	3664	3725	4044	5173
5	Kashmir	2.07	187	191	212	288
6	Pahlla	1.37	2493	2527	2705	3317
7	Roohpar	1.89	1587	1617	1776	2351
8	Battal Kund	1.53	1265	1284	1385	1739
9	Bhajoora	1.41	828	840	901	1111
10	Charbat	1.15	791	800	847	1006
11	Dakan Pisar	1.455	3188	3234	3476	4317
12	Maira	0.665	230	232	240	265
13	Rahi	1.975	6103	6224	6863	9202
14	Sher Pur	2.465	225	231	261	376
15	Goreeni	1.51	6961	7066	7616	9537
16	Kotal	2.215	3477	3554	3965	5507
17	Palasai	1.46	722	733	788	979
18	Bagla	3.135	127	131	153	244
19	Bajarian	-0.045	92	92	92	92
20	Banwari	1.325	2604	2639	2819	3435
21	Dannah	0.68	3101	3122	3230	3575
22	Summa Krahaga	1.36	2949	2989	3198	3916
23	Dheri Keyala	1.62	3155	3206	3474	4421
24	Gahri	1.85	1042	1061	1163	1531
25	Ghora	1.275	191	193	206	248
26	Lora	2.635	6654	6829	7777	11488
27	Narhotar	1.895	3483	3549	3898	5166
28	Nurpur	0.505	496	499	512	552
29	Seri	1.11	650	657	694	819
30	That Karam Shah	1.365	199	202	216	264
31	Nagri Tutial	1.57	12623	12821	13860	17509
32	Chehr	2.94	2586	2662	3077	4753
33	Dewal Manal	1.86	4315	4395	4819	6353
34	Makol Tarli	1.87	2434	2480	2721	3593
35	Nagri Tarli	2.06	3366	3435	3804	5165
36	Saji Kot	1.37	3296	3341	3576	4387
37	Dabran	0.295	2316	2323	2357	2463
38	Gali Batgran	2.485	1212	1242	1404	2028
39	Geherki	1.55	2153	2186	2361	2974

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
40	Langriyal	0.965	3092	3122	3276	3783
41	Basira	-2.035	393	385	347	254
42	Chotala	1.58	428	435	470	594
43	Danna Noor Laan	1.215	3054	3091	3283	3935
44	Faqir Mohd	0.525	566	569	584	631
45	Lassan	0.99	864	873	917	1063
46	Maanjhiya	-1.28	495	489	458	377
47	Garba	1.47	968	982	1056	1314
48	Majuhan	0.355	3513	3525	3588	3783
49	Massah Gojri	0.995	1504	1519	1596	1851
50	Massah Sayedan	1.035	554	560	590	689
51	Mera Tarla	1.515	536	544	586	734
52	Chamnaka	1.47	1981	2010	2162	2691
53	Chandoo Mera	1.75	1339	1362	1485	1927
54	Dhanak	2.705	838	861	984	1467
55	Hajiya	1.575	2492	2531	2737	3459
56	Karrach	-0.225	522	521	515	497
57	Mohari	2.34	558	571	641	907
58	Riyala	1.95	1213	1237	1362	1819
59	Samwala	0.765	2658	2678	2782	3119
60	Dharmochiya	1.25	812	822	875	1055
61	Gohara	1.385	1689	1712	1834	2255
62	Mera Utla	-2.55	972	947	832	564
63	Mohribadhbhen	3.94	546	568	689	1230
64	Narra	3.245	5432	5608	6579	10621
65	Dhakkan	1.595	3300	3353	3629	4601
66	Janjah	-0.69	738	733	708	639
67	Kangrotar	0.925	1233	1244	1303	1495
68	Kehan	1.05	251	254	268	313
69	Mari	1.64	1053	1070	1161	1482
70	Satora	1.155	3490	3530	3739	4442
71	Garhi Phulgharan	1.985	5885	6002	6622	8892
72	Gohra Bazgaran	1.19	2616	2647	2808	3354
73	Harnara	1.435	1642	1666	1789	2215
74	Kiyala	0.895	2852	2878	3009	3439
75	Mannan	0.515	334	336	345	372
76	Rajoya	2.135	13368	13653	15174	20831
77	Thathi Ochaahar	1.905	685	698	767	1018
78	Arwar	0.71	473	476	493	548
79	Darwaza	1.86	3851	3923	4302	5671

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
80	Palak	0.77	5963	6009	6244	7006
81	Surjal (Malikabad)	0.85	2988	3013	3143	3569
82	Kala Ban	1.32	791	801	855	1041
83	Longal	2.54	2667	2735	3100	4516
84	Malkot	0.66	5088	5122	5293	5842
85	Riyala (Palak)	1.715	5016	5102	5555	7169
86	Bairot Kalan	2.07	14764	15070	16696	22703
87	Kahu Sharqi	1.76	6337	6449	7037	9142
88	Bairot Khurd	1.355	6659	6749	7219	8835
89	Kahu Gharbi	1.56	5467	5552	5999	7568
90	Bakot	1.905	17466	17799	19560	25959
91	Moolia	1.245	7137	7226	7687	9255
92	Sangal	1.585	5606	5695	6161	7800
93	Majuhan	2.14	12293	12556	13958	19176
94	Namal	2.29	8631	8829	9887	13885
95	Bhatiyan	1.55	2596	2636	2847	3586
96	Seer Sharqi	1.91	5474	5579	6133	8146
97	Tarorh	0.72	3345	3369	3492	3889
98	Pus Bher	2.01	625	638	705	951
99	Malmoola	1.855	1052	1072	1175	1548
100	Seer Gharbi	1.795	11076	11275	12324	16094
101	Nowshera	2.35	3604	3689	4143	5870
102	Pirkot	1.64	2303	2341	2539	3240
103	Tajwal	1.58	8406	8539	9235	11683
104	Toplah	2.4	2509	2569	2892	4128
105	Bagan	1.85	6084	6197	6792	8942
106	Jhansa	1.34	4885	4950	5291	6460
107	Lassan (N)	1.945	543	554	610	815
108	Keri Sarafali	-0.04	2427	2493	2421	4257
109	Malachi	0.345	5658	5678	5777	6083
110	Pasala	1.89	4776	4866	5344	7076
111	Akhrota	1.21	3631	3675	3903	4675
112	Makol Bala	1.65	414	421	457	584
113	Nagri Bala	1.46	10395	10547	11340	14093
114	Tatreela	0.68	2795	2814	2911	3222
115	Bagh	1.595	10028	10188	11027	13982
116	Jhuggiyan Kohaliyan	1.84	2773	2824	3094	4066
117	Kehyal	1.015	5218	5271	5544	6451
118	Dhaki Khetar	2.145	4814	4917	5467	7517
119	Namli Mera	0.82	8386	8455	8807	9954

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
120	Jhoot Mang	3.56	3588	3716	4426	7480
121	Pangoora	1.47	1063	1079	1161	1446
122	Bagnotar	0.515	4158	4179	4288	4631
123	Bandi Mera	1.925	7470	7614	8376	11150
124	Chahan	1.7	2234	2272	2472	3182
125	Aziz Mang	1.205	2162	2188	2323	2780
126	Desal	1.31	3859	3910	4173	5073
127	Khanh	1.095	2402	2428	2564	3018
128	Mehr Khurd	2.045	2060	2102	2326	3151
129	Sadra	1.585	419	426	461	584
130	Seergha	1.26	749	758	807	973
131	Sarbahna	1.02	4577	4624	4865	5664
132	Maalsah	-0.585	1823	1812	1760	1612
133	Phalkot	0.85	9069	9146	9541	10832
134	Ander Seri	0.17	1826	1829	1845	1893
135	Beran Gali	0.975	9434	9526	10000	11567
136	Jahafar	-0.65	1807	1825	1737	2227
137	Banda Pir Khan	1.605	12513	12714	13768	17482
138	Bandi Dhundan	3.52	15251	15788	18769	31535
139	Tarnawayi	1.06	10723	10837	11424	13381
140	Bandi Saman	0.56	577	580	596	648
141	Barbeen	0.075	1338	1339	1344	1359
142	Batangi	0.315	278	279	283	297
143	Boi	1.265	861	872	929	1121
144	Deedal	2.125	2048	2092	2324	3186
145	Nakka	-1.62	705	694	640	501
146	Pul	-0.235	537	536	530	512
147	Ran Kot	-0.48	2991	2977	2906	2704
148	Tori	-0.58	643	639	621	569
149	Bandi Hamza	1.035	356	360	379	442
150	Bandi Pahar	0.79	1380	1391	1447	1628
151	Chak	0.745	931	938	973	1088
152	Gali Mohri	-0.15	930	929	922	901
153	Phogran	1.005	481	486	511	594
154	Sumli Dheri	0.635	4471	4499	4644	5106
155	Daban	2.58	3275	3359	3815	5591
156	Dalola	1.74	18730	19056	20773	26908
157	Naroka	2.47	2557	2620	2960	4268
158	Pattan Kalan	1.725	14584	14836	16161	20888
159	Bandi Sararah	2.3	4213	4310	4829	6791

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
160	Banota	2.695	1078	1107	1264	1884
161	Chamyali	1.455	1060	1075	1156	1436
162	Khokhriala	0.775	1096	1104	1147	1288
163	Larri	0.745	861	867	900	1006
164	Sial Kot	1.695	5833	5932	6452	8302
165	Kakmung	-0.48	8543	8563	8300	8965
166	Kotheyala	0.335	502	504	512	539
167	Pattan Khurd	1.225	3072	3110	3305	3966
168	Barkot	-1.55	261	257	238	188
169	Haal	-3.04	119	115	99	63
170	Khalora Tarla	-0.545	299	297	289	266
171	Khalora Utla	0.375	326	327	333	352
172	Pind Kargo Khan	0.94	8370	8449	8854	10188
173	Gandah (Habibabad)	2.085	1372	1401	1553	2116
174	Kangrora	0.915	1111	1121	1173	1345
175	Khanda Khoh	0.38	572	574	585	619
176	Lakhala	0.745	1811	1824	1893	2116
177	Pind	-0.415	371	369	361	340
178	Bandi Nikra	2.785	181	186	213	321
179	Bareela	0.175	329	330	333	342
180	Bashah Kalan	0.15	443	444	447	456
181	Bashah Khurd	-0.515	248	247	241	223
182	Chahar	-54.4		0	0	0
183	Chatta	6.14	181	192	259	633
184	Dhand Hara	2.105	1124	1148	1274	1741
185	Kangar Bala	-0.515	614	611	595	551
186	Pohar	0.34	653	655	666	701
187	Rata	0.82	464	468	488	551
188	Seri Sher Shah	0.225	196	196	198	204
189	Bamochi	0.57	1551	1560	1605	1748
190	Bhateel	-0.4	951	947	928	874
191	Kalar Khaitar	0.615	292	294	303	332
192	Kumhar (Amir Abad)	0.97	1261	1273	1336	1544
193	Shaheed Abad	0.5	1736	1745	1789	1927
194	Sherwan Kalan	0.82	1170	1180	1229	1389
195	Sherwan Khurd	0.94	2006	2025	2122	2443
196	Thorey	-0.42	647	644	631	592
197	Beri	0.425	559	561	573	611
198	Chakarh Bain	-0.03	484	484	483	480
199	Chamhati	-1.49	559	551	511	408

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
200	Chorgran (Ahmad Khan)	-0.735	226	224	216	193
201	Johana	0.2	1348	1351	1365	1407
202	Kamila	1.245	235	238	253	304
203	Kangar Tarla	-1.865	586	575	523	394
204	Kalabat	-1.945	76	75	68	51
205	Kharper	-0.385	464	462	453	428
206	Thathi Ahmed Khan	1.135	1110	1123	1188	1407
207	Banda Jaghian	0.54	350	352	362	392
208	Chatrhi		554	560	362	687
209	Rich Behan	1.19	2292	2319		2938
210	Sohan Utla	0.405	792	795	2460	862
211	Sohan Tarli	-0.21	308	307	811	295
212	Thathi Faqir Sahib		424	432	304	633
213	Kumhar Bandi	2.145	1919	1960		2996
214	Kishna	1.725	668	680	741	957
215	Laleedi Bandi	0.715	594	598	620	689
216	Mochi Kot (Shah Kot)	0.24	822	824	834	864
217	Paswal Mian	2.24	1581	1616	1805	2516
218	Pawah	2.105	5971	6097	6766	9248
219	Bandi Matrach	-0.31	610	608	599	572
220	Bazurgal	-0.445	80	80	78	72
221	Garamri	1.355	805	816	873	1069
222	Go Garhi	4.24	229	239	294	549
223	Kakot	1.6	1032	1049	1136	1442
224	Pandoo Thana	1.81	1926	1961	2145	2807
225	Pasial	-0.085	246	246	245	242
226	Patheri Seydan	-53.405	0	0	0	0
227	Peshail	1.415	724	734	787	971
228	Sargal	1.555	578	587	634	799
229	Sher Bai	-2.275	85	83	74	53
230	Sial	0.675	925	931	963	1065
231	Talhaar	2.095	575	587	651	888
232	Gaheli	1.385	289	293	314	386
233	Gup	1.195	121	122	129	154
234	Jogan Mar	1.29	847	858	915	1110
235	Kothyala	1.535	9943	10096	10895	13691
236	Mukhdabi	1.83	355	361	395	518
237	Nallah	-1.22	234	231	217	181
238	Paswal	2.76	1398	1437	1647	2477
239	Salyut	1.835	825	840	920	1209

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
240	Sobra	2.505	759	778	880	1275
241	Tahli	1.95	162	165	182	242
242	Todoo	2.515	98	100	113	164
243	Bachah Sani	1.735	444	452	493	638
244	Bhajwar	-3.495	22	21	18	11
245	Gul Bandi	0.69	619	623	645	715
246	Jabbi	0.86	878	886	925	1051
247	Jarral	0.63	2746	2763	2851	3133
248	Kholyala	1.525	1439	1461	1576	1978
249	Kot Nali	0.555	1298	1305	1342	1459
250	Nakhey	1.455	506	513	551	684
251	Baghati	1.955	860	877	966	1291
252	Bain Gojri	1.505	638	648	698	873
253	Bain Noora	0.175	735	736	742	763
254	Banseri	1.47	559	567	610	759
255	Bhoraj	1.58	2582	2623	2837	3589
256	Botiala	0.975	404	408	428	494
257	Darobarh	1.75	322	328	358	464
258	Jatal	1.03	347	351	369	429
259	Khaski Kalan	0.125	1476	1478	1487	1514
260	Khaski Khurd	1.795	1323	1347	1472	1923
261	Mehal	1.775	579	589	643	838
262	Thanna	1.905	2609	2659	2922	3878
263	Bagh Darah	2.285	2160	2209	2473	3471
264	Beram Gali	0.65	1092	1099	1135	1251
265	Bisala	1.37	1047	1061	1136	1394
266	Chamak Mera	2	2525	2576	2844	3828
267	Chamhad	1.995	1469	1498	1654	2225
268	Fateh Bandi	1.785	281	286	312	408
269	Khani That Hiara	1.805	326	332	363	475
270	Sar Bangala	-1.61	67	66	61	48
271	Shadial	0.89	484	488	510	582
272	Banda Baazdad	2.14	4727	4828	6632	7373
273	Jaswal	1.24	657	665	800	851
274	Nagakki	0.625	3263	3283	3605	3719
275	Aokhrila	2.37	2792	2858	4061	4566
276	Banda Shohalian	0.505	508	511	551	565
277	Damtor	2.215	13007	13295	18467	20605
278	Galdohk	1.57	1912	1942	2453	2652
279	Nawan Sher Janubi	3.02	7951	8191	12799	14852

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
280	Nawan Sher Shumali	4.335	6798	7093	13406	16575
281	Behlolia	1.805	3406	3467	3791	4958
282	Kakul	1.925	8197	8355	9191	12233
283	Mandroch Kalan	2.84	1794	1845	2122	3230
284	Mandroch Khurd	2.51	1527	1565	1772	2571
285	Khokhar	1.865	4619	4705	5160	6808
286	Salhar	2.92	31399	32316	37318	57466
287	Mir Pur	4.355	46206	48218	59673	113104
288	Gojri	4.275	3724	3883	4787	8970
289	Halmera Tarla	0.775	1039	1047	1088	1222
290	Halmera Utla	1.675	412	419	455	584
291	Saji Kot	2.95	3105	3197	3697	5718
292	Tannan	4.105	6729	7005	8566	15663
293	Baldheri	4.55	10619	11102	13868	27031
294	Jallalpura	3.645	4992	5174	6188	10587
295	Mor Kalan	2.88	3454	3553	4095	6270
296	Banda Amlok	4.615	1830	1914	2398	4718
297	Banda Khair Ali Khan	1.52	1430	1452	1566	1964
298	Banda Lamma	1.43	757	768	825	1021
299	Banda Noor Ahmed	2.39	1252	1282	1443	2057
300	Banda Phagwarian	2.33	5547	5676	6369	8997
301	Banda Qazi	4.135	12064	12563	15384	28251
302	Banda Sher Khan	2.005	1113	1135	1253	1687
303	Dehri	2.35	1328	1359	1526	2162
304	Dobatar	2.215	5283	5400	6025	8368
305	Banda Batang	2.39	745	763	859	1224
306	Banda Faizullah	1.235	621	629	669	804
307	Banda Ghazan	3.49	1361	1408	1671	2796
308	Jhangi	4.935	18037	18927	24082	49601
309	Bandi Mansoor	0.625	1770	1781	1837	2017
310	Chatri	1.275	3413	3457	3683	4454
311	Gali Banya	1.98	3333	3399	3749	5031
312	Kathwal	1.125	1985	2007	2122	2510
313	Mera Rehmat Khan	0.485	1223	1229	1259	1354
314	Mehr Kalan	1.24	2109	2135	2271	2731
315	Sheikhul Bandi	2.505	26158	26813	30344	43980
316	Banda Sahib Khan	5.925	4275	4528	6038	14318
317	Langra	4.565	20023	20937	26173	51128
318	Lari	3.22	1448	1495	1752	2819
319	Gujjal	0.715	791	797	826	919

Sr. No.	Villages	Growth Rate % (1998-2017)	Population 2017	Population 2018	Population 2023	Population 2038
320	Jandakka	3.59	1663	1723	2055	3488
321	Kokkal	1.845	8962	9127	10001	13156
322	Darooni Mera	2.685	631	648	965	1102
323	Qasba Havelian	2.305	15627	15987	22501	25217
324	Mala	2.36	1211	1240	1759	1977
325	Sultanpur	2.975	2598	2675	4152	4807
326	Wazira	2.595	1215	1247	1831	2081
327	Chamba	1.535	2872	2916	3665	3955
328	Jhangran	1.435	9506	9642	11940	12822
329	Kalo Mera	1.505	1447	1469	1838	1981
330	Nowshera (Jhangran)	1.85	1993	2030	2673	2930
331	Banda Atti Khan	1.81	4054	4127	4514	5908
332	Barseen	1.455	1348	1368	1470	1825
333	Batolni	0.865	1686	1701	1776	2021
334	Kotla	0.895	1517	1531	1601	1830
335	Mugahid	1.055	1243	1256	1324	1549
336	Palanowali	2.045	5377	5487	6071	8226
337	Peepal	1.655	419	426	462	592
338	Salwalah	-1.18	601	594	560	469
339	Sureela	2.03	1288	1314	1453	1965

In line with the above-quantified population distribution pattern at the level of the urban and rural settlement in the district, the same is also quantified using administrative spatial units such as Patwar Circles (PCs), Union Councils (UCs), and Planning Zones (PZs) for the district analysis. However, at present only UCs and PZs level population distribution is exhibited as under, respectively.

Table 3–10: Population Distribution Pattern at UC Level in District Abbottabad

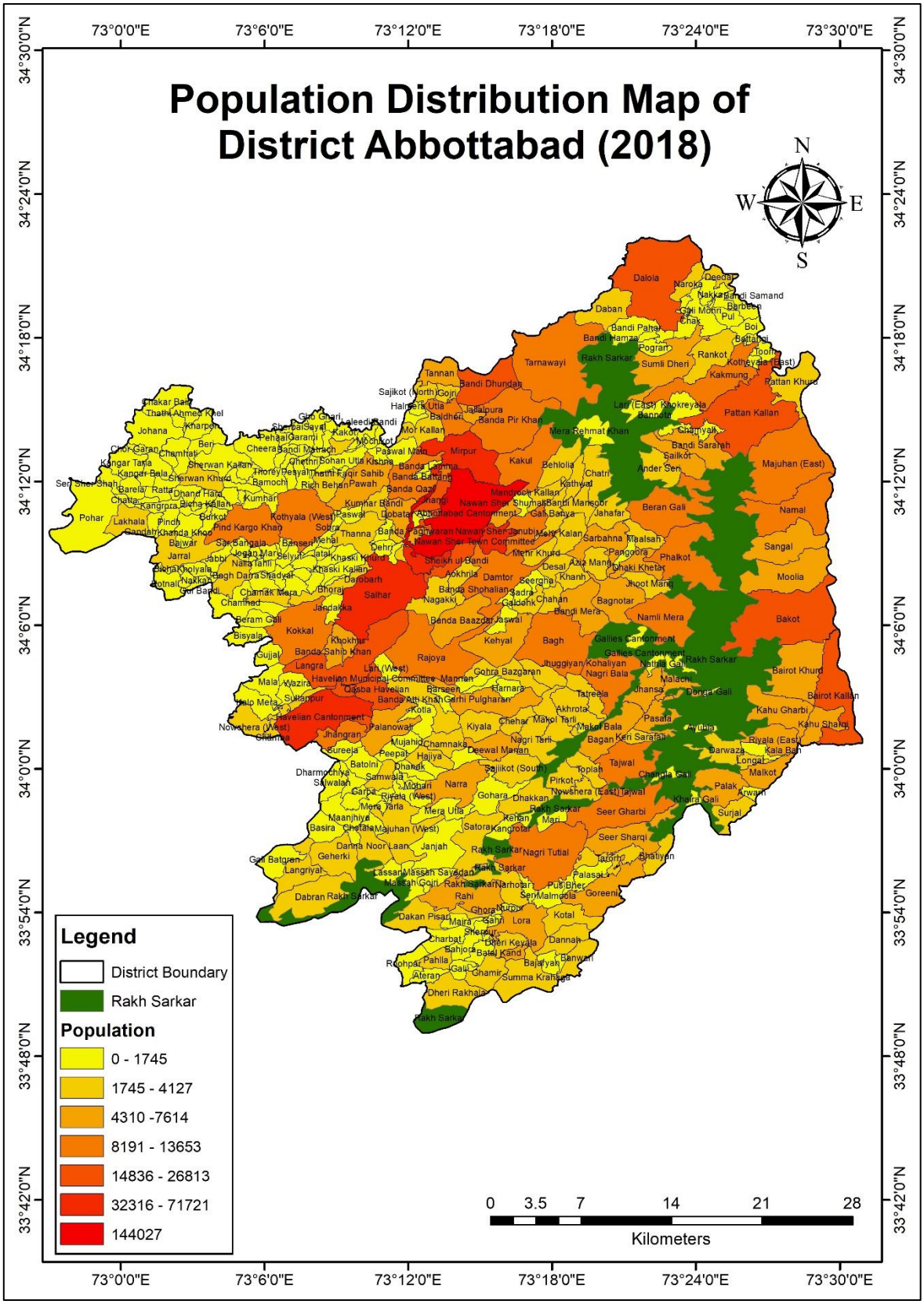
Sr. No.	Union Council	Growth Rate (1998-2017) ppa	Population 2017	Population 2018	Population 2023	Population 2038
1	Phallah	1.58	25572	25978	28104	35666
2	Gorini	1.46	20033	20326	21861	27285
3	Lora	1.53	15870	16196	17940	24489
4	Dewal Manal	2.02	15997	16313	17997	24251
5	Langrial	0.63	14573	14715	15457	18102
6	Majuhan	1.35	19488	19723	20959	25312
7	Nara	1.17	18704	19019	20742	27642
8	Garhi Phulgran	1.44	27382	27880	30514	40121
9	Palak	1.30	26837	27181	28985	35362
10	Berote	1.69	33227	33820	36951	48248

Sr. No.	Union Council	Growth Rate (1998-2017) ppa	Population 2017	Population 2018	Population 2023	Population 2038
11	Bakot	1.58	30209	30720	33408	43014
12	Namal	2.22	20924	21385	23845	33061
13	Seer Sharqi	1.39	11415	11584	12472	15621
14	Seer Gharbi	1.89	12753	12985	14204	18593
15	Tajwal	1.99	16822	17138	18809	24921
16	Nathia Gali	1.22	24373	24738	26235	33633
17	Nagri Bala	1.25	17235	17457	18611	22574
18	Bagh	1.48	18019	18283	19665	24499
19	Namli Mera	2.00	17851	18167	19861	26397
20	Bagnotar	1.38	13862	14065	15136	18963
21	Sir Bhanna	1.36	16228	16436	17519	21243
22	Phal Kot	0.13	10892	10958	11029	12444
23	Biran Gali	0.17	13067	13180	13582	15687
24	Banda Pir Khan	2.06	38487	39339	43961	62398
25	Boi	0.37	18527	18611	19049	20656
26	Dalola	2.26	24562	25035	27548	36767
27	Pattan Kalan	1.63	28725	29231	31909	41595
28	Kokmang	0.36	12117	12177	12117	13470
29	Pind Kargo Khan	-2.04	19045	19211	20092	23316
30	Sherwan	0.01	15261	15312	15576	16532
31	Pawa	-1.33	24090	24461	23544	33606
32	Kothiala	1.60	15031	15281	16607	21407
33	Jarral	0.49	7952	8024	8401	9669
34	Chamhad	1.30	21885	22226	24020	30497
35	Dhamtore	1.52	26866	27382	36569	40331
36	Kakol	2.74	29673	30516	43081	54419
37	Salhad	2.39	36018	37021	42478	64274
38	Mir Pur	4.36	46206	48218	59673	113104
39	Baldheri	3.25	80280	83598	102417	189149
40	Jhangi	2.70	51368	53276	64070	113650
41	Kuthwal	1.12	13833	14008	14921	18097
42	Sheikh-Ul-Bandi	2.51	26158	26813	30344	43980
43	Langra	3.31	37162	38607	46845	85828
44	Jhangra	2.14	37100	37854	51324	56872
45	Bandi Atti Khan	1.18	17533	17804	19231	24385

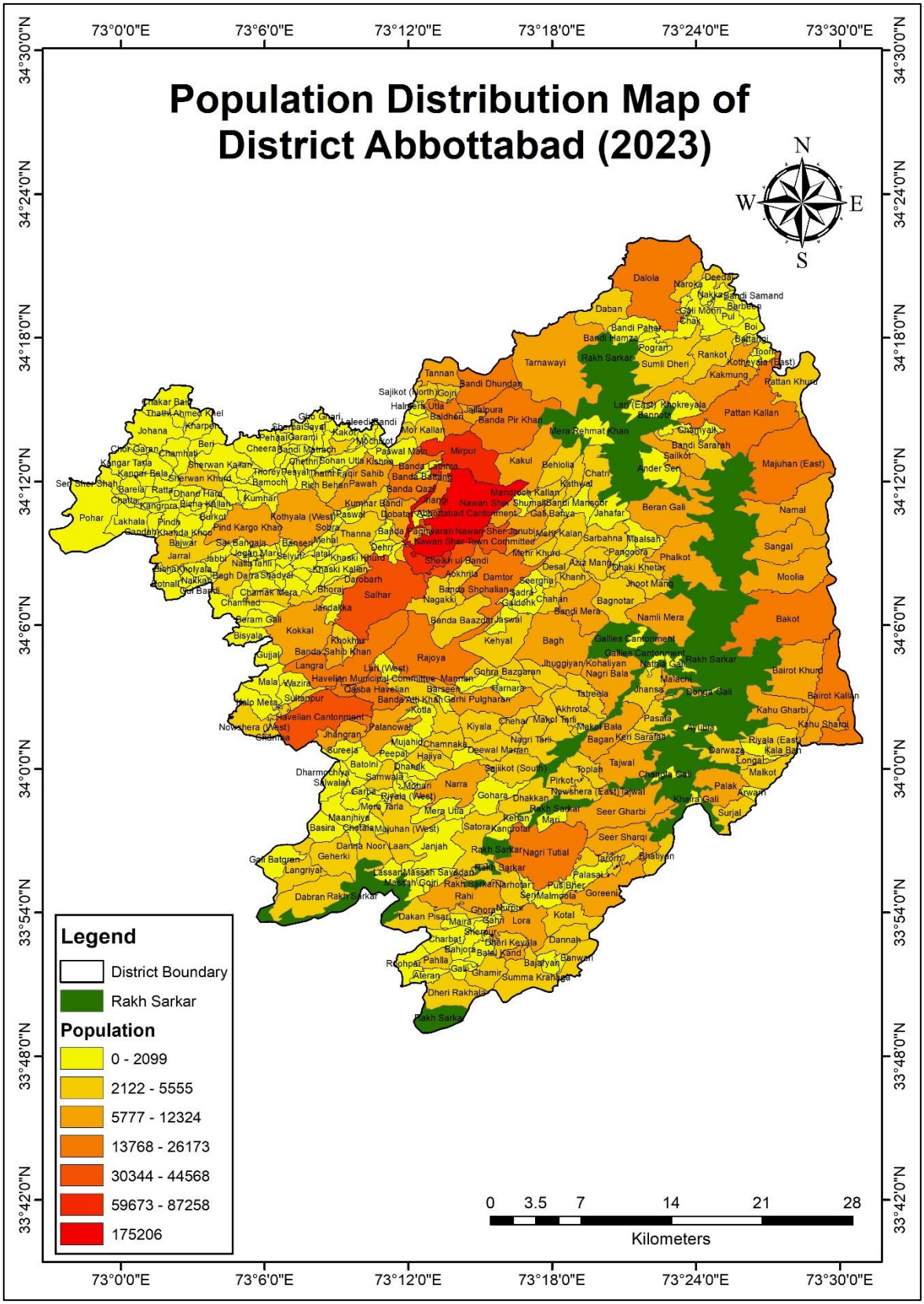
Table 3.11 shows the population projection at the planning zones level. These levels are created for the better future planning of physical, social and economic sectors in District Abbottabad. There are three zones having high population growth rate selected as the rural growth zones: Birote, Majuhan and Tarnawayi rural growth zones

Table 3–11: Population Distribution Pattern at Growth Zones Levels in Abbottabad District

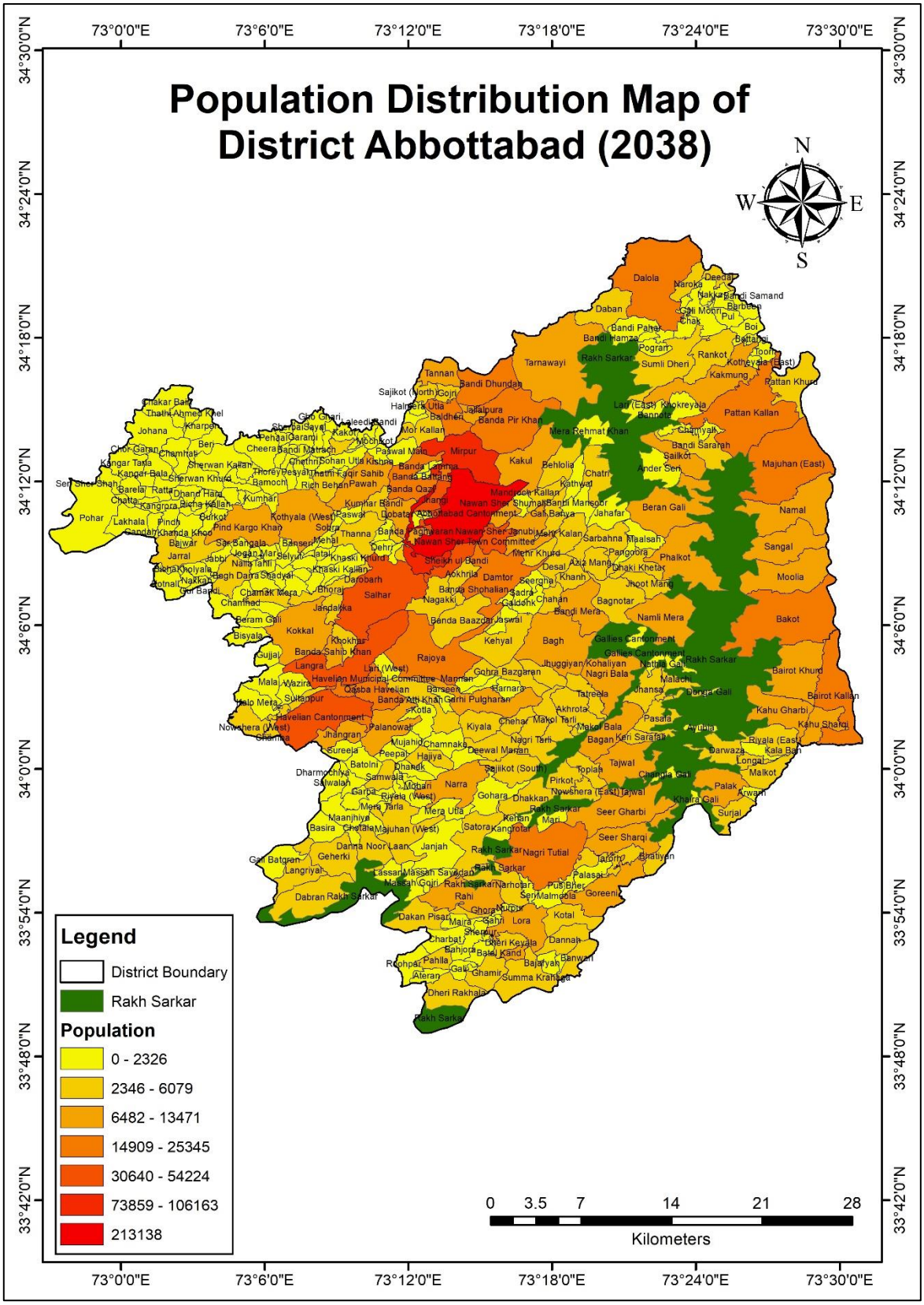
Sr. No.	Zones	Population 2018	Population 2023	Population 2038
1	Abbottabad Growth Zone	550255	654352	779611
2	Birote Growth Zone	113106	123189	134246
3	Havelian Growth Zone	143882	168315	197674
4	Lora Growth Zone	88306	95969	104346
5	Majuhan Growth Zone	97650	106014	114922
6	Nathia Gali Entertainment Zone	163627	175710	189550
7	Sherwan Growth Zone	82289	87101	92398
8	Tarnawayi Growth Zone	124393	134946	146758



MAP 3-5 : Population Distribution Map of District Abbottabad (2018)



MAP 3-6: Population Distribution Map of District Abbottabad (2023)



MAP 3-7: Population Distribution Map of District Abbottabad (2038)

Chapter 3

Demography and Settlement Pattern

Housing Characteristics

3.2 Housing Conditions and Demands

The human population is a key factor in determining the needs of any activity or work, whether housing, economic, communication and recreational demand etc. The project considers four general types of land use, namely: living, working, communicating, and leisure spaces. As a result, this section analyzes housing needs for current and future district populations. The main factors behind the planning and management of residential needs are to consider rural urban distribution and its dependency, density standards and the current status of citizens in the district. Therefore, this study not only estimates the total housing demand in the district, but also the specific needs of the rural and urban settlements and also calculates the residential land use requirements for the rural and urban settlements in the district.

Table 3–12: Total Housing Units Requires

Sr.No	Household Size	Population	Dwelling units
1981[30]	6.04	679328	193516
1998[31]	6.50	880666	135575
2017[32]	6.0	1332912	216534
2018	6.0	1363508	227251
2023	6.0	1544977	257496
2028	6.0	1758092	293015
2033	6.0	2009135	334856
2038	6.0	2305749	384292

3.2.1 Existing Housing Stock

Abbottabad is facing acute housing shortage as the population is increasing day by day and it is going to increase even more. To tackle the housing backlog, there is an immediate need to increase the housing stock. The details of existing housing stock as per 1998 census and 2017 development statistics is given in the following table, the housing is categorized as Katcha, Pacca and Semi Pacca based on construction of the outer wall as given below;

- Pucca House: (Backed bricks/blocks/Stones)
- Semi Pacca House: (Unbaked bricks/Earth Bound)
- Katcha House: (wood/bamboo etc.)

According to 1998, the housing stock in the District was **135575**, in which 15.98 % was in urban vicinity and 84.02 %in rural. The total housing of urban area was distributed into 1362 Katcha, 18856 Pacca and 1443 Semi Pacca houses vice versa the housing in rural vicinity was categorized into 31709 Pacca, 70050 Katcha and 12155 Semi Pacca houses. Urban housing has been increased from 10.6 % in 1998 to 20.9% in 2017and rural housing units has been increased from 79.1% to 89.4% in 2017.The detail of which is shown in the following tables and the figures:

[30] Pakistan Population census 1981
[31] Pakistan population Census 1998
[32] Pakistan Population Census 2017

Table 3–13: Distribution of dwelling units in urban and rural areas

Year	1998[33]				2017[34]
	Katcha	Pacca	Semi Pacca	Dwelling unit	Dwelling
Urban	1362	18856	1443	21661	45165
Rural	31709	70052	12153	113914	171369
Total	**33071**	**88908**	**13596**	**135575**	**216534**

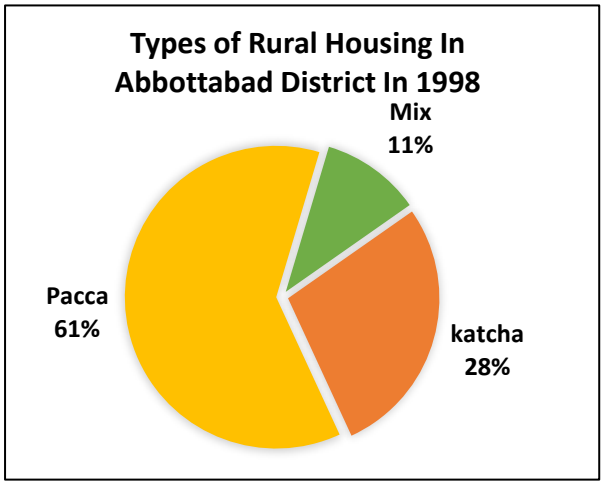


Figure 3-11:Urban Housing Conditions in District Abbottabad (1998)

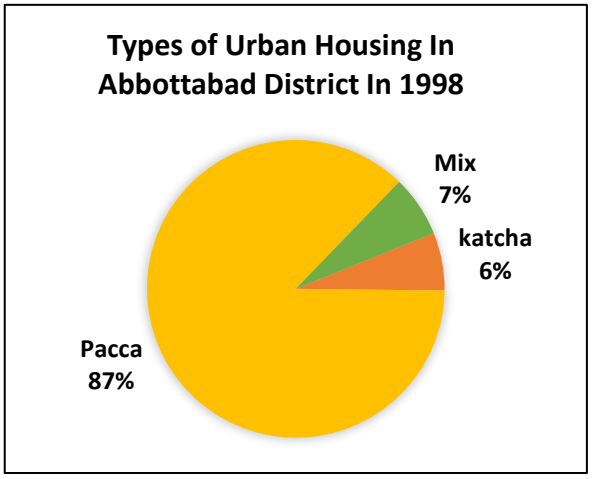


Figure 3-12:Rural Housing Conditions in District Abbottabad

3.2.2 Housing Shortage/backlog current and plan period (20 years)

The main feature that needs to be considered for assessing housing backlog include population, existing number of families, household size and the current housing stock. The current (2018) population of District Abbottabad as calculated in previous Chapter is given in table. The Table shows required number of Houses (assuming family size of 6), and the existing housing stock the difference between the two is the current housing shortage. Based on statistics in the table below, the current housing backlog in District Abbottabad is about 10717.

Table 3–14: Current Housing Backlog in District ABBOTTABAD

Category	Population	Housing Units required	Housing stock(Units)	Housing backlog
Urban	**302,387**	50398	45165	5233
Rural	**1,061,121**	176854	171369	5485
Total	**1,363,508**	227251	**216,534**	**10,717**

[33] Pakistan Census 1998

[34]

3.2.3 Household and Residential Densities

Enumerating total housing stock in 2017 census as 216534 dwelling units and with a district area of 1,967 sq.km, the resultant population density of the district turns out to be around 678 persons per sq.km. The overall household density in District Abbottabad is 113 houses per square km. However, assuming household size of 6 persons and the total District area is 1967 sq.km, the overall population densities and the household densities for the past and future timings are calculated in the following table and the figure:

Table 3–15:Population and Household Densities in Abbottabad District

Year	Population	District Area (sq.km)	Population Density (persons/sq.km)	Assumed HH Density @ 6 persons/HH
1951	337343	1967	172	29
1961	373903	1967	190	32
1972	551144	1967	280	47
1981	679328	1967	345	58
1998	880666	1967	448	75
2017	1332912	1967	678	113
2018	1363508	1967	693	116
2023	1544977	1967	785	131
2028	1758092	1967	894	149
2033	2009135	1967	1021	170
2038	2305749	1967	1172	195

3.2.4 District Housing Demand: Rural Vs Urban (2018-2038)

The main facets that need to be considered for assessing housing demand and the backlog include population, existing number of families, household size and the current housing stock. The current (2018) population of District Abbottabad is calculated as 1363508 and the available housing stock in 2018 was 216534 dwelling units. Assuming standard housing requirement as per 6 persons per household the net housing demand in the year 2023 turns out to be 10717 dwelling units.

As the population is increasing the demand for housing is also increasing. it is estimated that the additional housing demand for the district Abbottabad during the period 2018-2023 *(including the current housing backlog of 10717 dwelling units*) will be around 30558 dwelling units, while that in the 15 years, the additional housing demand will 126795 dwelling units for the year of 2038. Altogether, the net housing demand for the next 20 years will be 157353 dwelling units in the district.

Table 3–16:NET HOUSING DEMAND IN DISTIRCT Abbottabad

Category	Additional Housing Demand		Current Back log	Infill development	Net Housing DEMAND (2018-23)	Net Housing DEMAND (2023/38)
	2018-2023	2023-2038				
Urban	10919	49112	5233	10,404	**5,748**	**49,112**
Rural	19326	77684	5485	0	**24,811**	**77,684**
Total	**30245**	**126795**	**10,717**	**10,404**	**30,558**	**126,795**

3.2.5 Housing Units and Residential Area Demand—Rural Urban Split

As seen in previous section, the housing dwelling units' demand in the district over the next 20 years is 157040. Total demand during 2018-2023 is 30245 which has been split into 36 % for urban and 64 % rural, resulting in housing demand of 10919 and 19326 for urban and rural area respectively. Similarly, total housing demand for 2023-2038 is 126795 which have been split into 39% urban and 61% rural, resulting in housing demand of 49112 and 77684 respectively.

Table 3–17:Housing Dwelling Units Demand with Urban-Rural Split

Year	Additional Population (2018-38)			Housing Demand		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
2018-2023	65513	115956	181469	10919	19326	30245
2023-2038	294670	466102	760772	49112	77684	126795
Total	**360183**	**582058**	**942241**	60031	97010	157040

3.2.6 Area Required for Net Housing Demand

On the basis of calculation, 9256 acres or 37.94 Sq.km are required to fulfil the net housing demand in District Abbottabad, in which 19.4% for 2018-2023 and 80.6% for 2023-2038. The land for housing units in urban area are 3227 acres is 34.8% and 6029 acres with 65.2% in rural area.

Two satellites towns are proposed of size 1200 acres each satellite town and one town ship in Havelian tehsil of 236 acres and 591 acres for vertical development in 2018-2038. While the 6029 acres' land will have utilized in rural growth centres form 2018-2038.

Table 3–18:Age Required for Net Housing Demand

Time Period	Area Acres		
	Urban	Rural	Total
2018-2023	338	1459	1798
2023-2038	2889	4570	7459
TOTAL	3227	6029	9256

3.2.7 Existing Housing Scheme in Public and Private Sector.

There is only one approved Housing schemes that comes under the jurisdiction of Abbottabad Development Authority by the name of Abbottabad Town ship scheme having the area of 1521 Kanal with 26 filled plots and 1571 vacant plots. Others towns in Abbottabad are not approved or under approval process of TMA and belongs to private sectors. One more town ship is proposed at Havelian tehsil. GDA has 6 existing towns and five proposed towns are shown the table below:

Table 3–19:Status of housing schemes in District Abbottabad

Sr. No	Name of housing society	Total area	Authority	Status
1	Hill Town(Mumtaz town)	600 kanals	TMA Abbottabad	Existing
2	Muhammad Town	252Kanals	TMA Abbottabad	Existing
3	University town	225k-12 M	TMA Abbottabad	Existing
4	Feroz Town	192K-17M	TMA Abbottabad	Existing
5	Shimla town	180K-1M	TMA Abbottabad	Existing
6	Gohar town	172K-4M	TMA Abbottabad	Existing
7	Abbottabad town ship	1521 K	ADA Abbottabad	Existing
7	Nathiagali town	2319.6K	GDA	Existing
8	Dungagali town	490K	GDA	Existing
9	Gorhadhaka khanspur town	1959.44K	GDA	Existing
10	Changlagali town	1390.32	GDA	Existing
11	Khairagali town	1355.12K	GDA	Existing
12	Ayubia	1618.48K	GDA	Existing
13	Dhanna lora town	180K	GDA	Proposed
14	Mari town	666.4K	GDA	Proposed
15	Jhansa town	976.4K	GDA	Proposed
16	Juster town	522.4K	GDA	Proposed
17	Dhanna-lothran town	120.8K	GDA	Proposed
18	Havelian town	-	TMA Havelian	Proposed

3.2.8 Slums

There are 14 slums area in District Abbottabad. The first four sites which include Nulla Mahallah, Mahalla Nizami, Mahalla Darokhel and Mahallah Jamaludin mentioned in the below table belong to Malak Pura UC which is situated along Shimla Road. All the mentioned sites are residential communities that are suffering from identical problems. These problems include lack of proper sanitation measures, unplanned settlements, dilapidated housing condition, lack of basic Services, high residential and population densities, lack of open spaces, and prevailed poverty. City UC which includes the site named Kunj is situated on General Bus Stand Road facing the same problem mentioned above.

The sites of Chardi, Mahallah Faroq-eazam, Upper Kehal and Naiabadi are situated in the Kehal UC on the Link Road. All the mentioned sites are residential communities that are suffering from identical problems. These problems include lack of proper sanitation measures, unplanned settlements, dilapidated housing condition, lack of basic Services, high residential & population densities, and lack of open spaces etc. Chardi site depicted a better picture when come across the buildings structures and poor drainage system. However, sanitation and solid waste management is the bench mark, mostly drain are in the middle narrow street and partially covered.

The sites of Rahmatabad on Music Squad Road, Garga on Bilal Town Road, Sheikh Dherai on Police Post Road, Narryan on Galyat Road and Nilor situated on Raza Khan Road are all included in Cantonment area. The situation is comparatively better in these areas as compared to the areas administer by MC Abbottabad. But again, the improper sanitation and solid waste management are among the major problems in these sites. People were satisfied with the drinking water quality in Garga, Sheikh Dherai, Narryan and Nilor.

Table 3–20: Names of slums and UCs[35]

S. No	Name of Slum Area	Union Council S. No
1	Nulla Mahallah	Malak Pura
2	Mahalla Nizami	
3	Mahalla Darokhel	
4	Mahallah Jamaludin	
5	Kunj	City
6	Chardi	Kehal
7	Mahallah Faroq-e-azam	
8	Upper Kehal	
9	Naiabadi	
10	Rahmat abad	Cantt.
11	Garga	
12	Sheikh Dherai	
13	Narryan	
14	Nilor	

3.2.9 Assessment of national/provincial policy regarding housing and its implementation.

Housing is a basic and fundamental human need, yet millions are caught in the struggle to have a roof over their head in Pakistan. Realizing the gravity of the problem and appreciating the fact that housing is not only a social need but a productive sector of economy, the Government directed Ministry of Housing and Works to formulate a viable and effective housing policy and submit its recommendations. A Housing Advisory Board of nearly 40 members, half of them from private sector was constituted. It included all stakeholders comprising of builders, constructors, development agencies, bankers, and town planners, Provincial Governments, HBFC (House Building Finance Corporation and State Bank etc. The Board functioned as an honorary body with no financial support from the Government.

The objective is to create affordability, specially, for the middle- and low-income groups. One of the corner stones of the Policy is to ensure development of housing for the poor and needy and housing for the majority rural population through the use of different instruments like free land, cross-subsidy and concessionary finance, etc.

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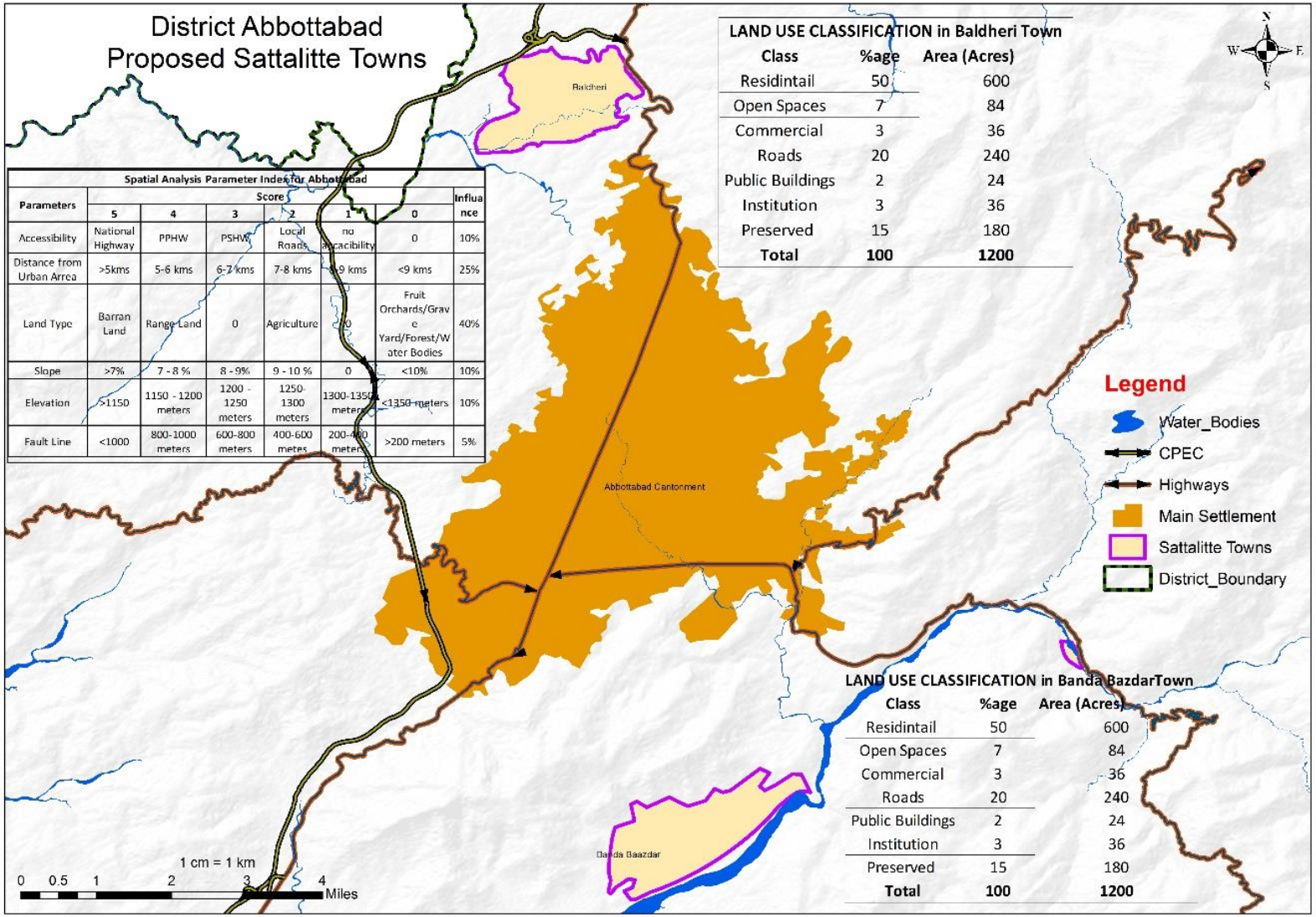
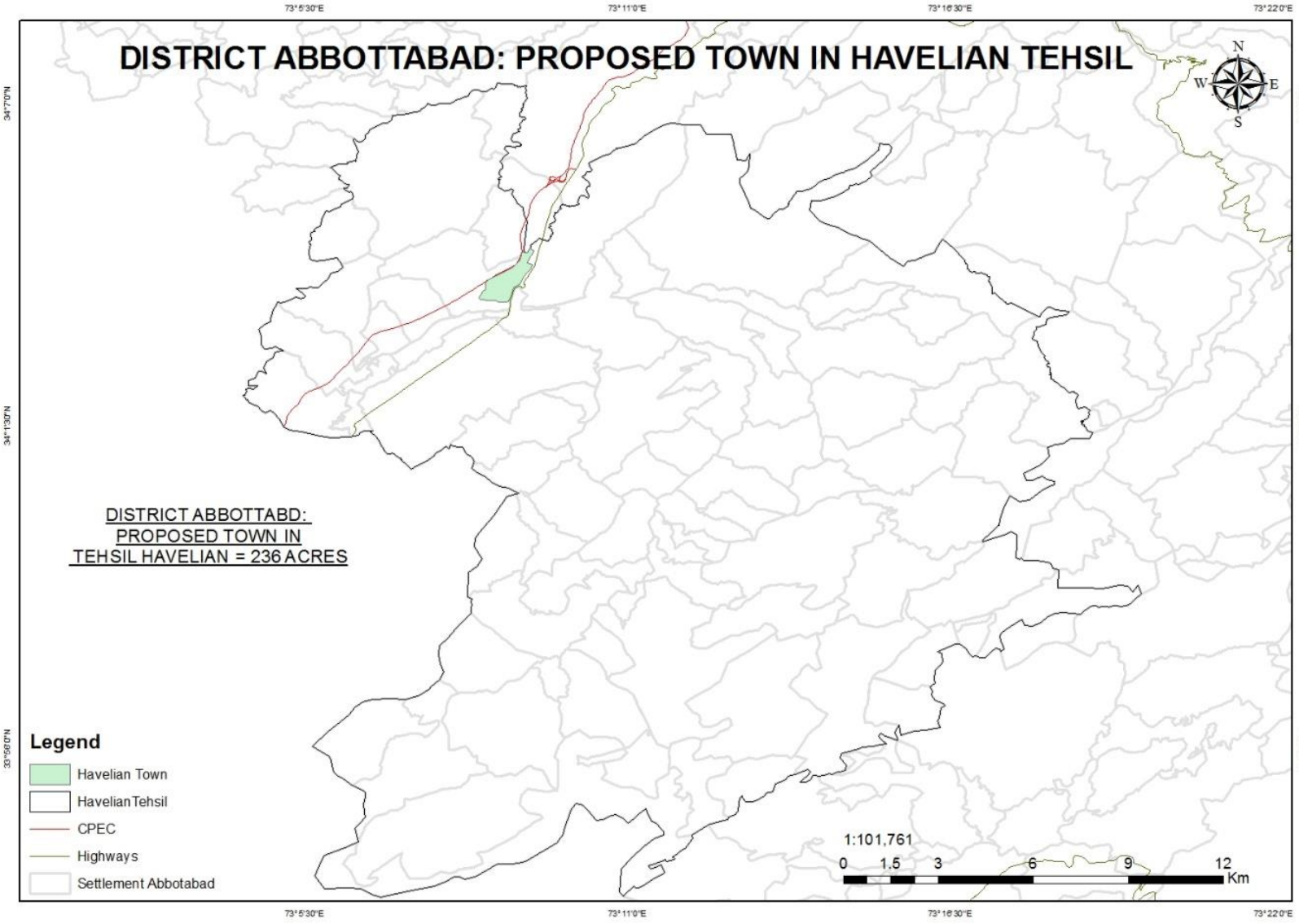


MAP 3-8: proposed satellite Towns



MAP 3-9: proposed Town in Havelian Tehsil

3.2.10 Constraints and recommendations.

1. As there were no approved plans to guide the city planners and other professionals. The building and zoning regulations, which were outdated, could not be updated and brought in line with the realities on the ground.
2. The development of slums is also directly linked with the lack of plans and their implementation. The beneficiaries of this lack of planning and building and zoning regulations are the land and building mafias in District Abbottabad during last few years.

Recommendations

1. To upgrade existing towns and cities with better city planning through improvement of infrastructure, creation of employment opportunities and affordable housing under a phased programme, giving higher attention to those cities and towns, which are comparatively more productive and efficient and require lower investments.
2. Development of a comprehensive land information system using modern technology i.e. computerization, remote sensing techniques, GIS mapping, satellite imageries, aerial mosaics, etc. to record correct and up to date information regarding inventory and land classification, settlement patterns, land values and land availability on all land in urban and rural areas, shall be made a mandatory requirement at all levels of governance.
3. In master plans /structural plans/outline development plans, plots earmarked for low-income housing shall be cross subsidized and disposed of at affordable rates.
4. In all Government housing schemes, adequate plots for low-income people shall be reserved to offer them at affordable prices. In addition, private developers will also be encouraged to develop low-cost housing schemes.
5. Development of master plans/structural plans/outline development/plans shall be a mandatory requirement for all urban and rural areas.
6. A countrywide programme shall be undertaken for development of satellite, intermediate, secondary and industrial towns as employment centers of the future, specially, for the rural population and to further reduce migration to urban centers.
7. Naya Pakistan housing scheme may play a major role in the development of district Abbottabad and in the upgradation of its inadequate situation in the coming year.
8. Survey should conduct to collect the information about the existing stock and their present situation and unapproved housing schemes should regulate under the concerned development authority.

3.3 URBANIZATION AND HIERARCHY OF HUMAN SETTLEMENTS

3.3.1 Urbanization

Urbanization is the physical growth of rural or natural land into urban areas as a result of population in migration to an existing urban area. It may be defined as movement of people from urban to rural area with the population growth equating to urban migration. The growth may be high birth rate or due to the migration of rural population toward urban. To study the urbanization of an area refers to the way in which the society is adopting toward the modern change.

Cities have enormous potential for improving people lives, but inadequate urban management often base on inadequate perceptions and information can turned opportunity into disaster. The future in urban if the cities are developed as their engines of growth and sustainable development. As per the analysis the urbanization can be defined as, it is not about simple increasing the number of urban residence or expending the area of cities. More importantly, its about a complete change from rural to urban style in terms of industry structure, employment, living environment and social security.

Pakistan, various kinds of plans are prepared and notified having the objective to advocate the welfare and sustainability of urban growth. But most of these plans are prepared for cities in Punjab and Sindh, being the larger provinces. No such plan has yet been prepared or prepared but not notified or implemented in Khyber Pakhtunkhwa. Whereas, the urbanization trend in Khyber Pakhtunkhwa is increasing rapidly. In the previous census period and will more expect to increase in the coming two decades. But unfortunately, no proper planning has been done to the urbanization trend is also changing in District Abbottabad, same as the other major cities of the province.

According to the census of 1952, only 9.9 percent of the population lived in urban areas.

Whereas according to the census of 2017 the population of urban areas increased more than twice and became 22 percent. The urbanization trend in District Abbottabad from 1951 to2017 is shown in Figure 3-13.

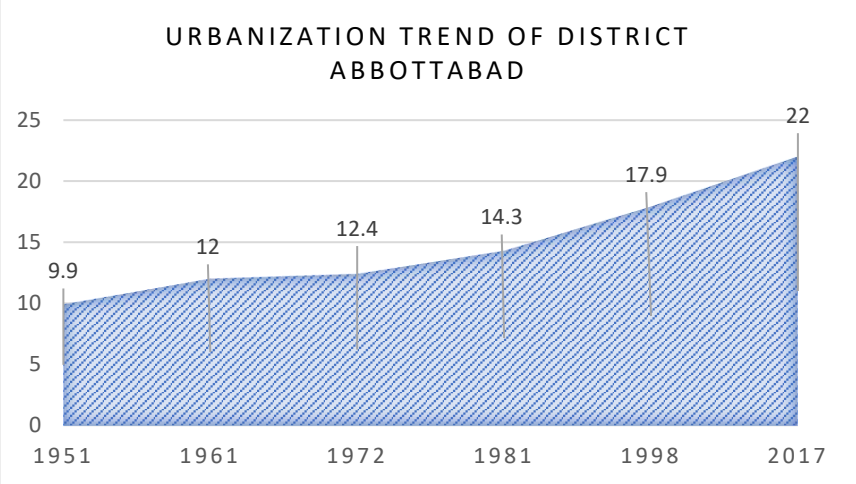


Figure 3-13:Urbanization Trend in District Abbottabad

3.3.2 Causes of Urbanization

The phenomenal increase in urbanization in District Abbottabad may be attributed to four major causes which include higher rate of urban population growth, influx of in and out migration,

Industrialization and commercialization (Trade and commerce, Development of modern marketing and method of exchanges change.

Urbanization can take place by virtue of natural reasons such as the greater birth rate as compared to the death rate and immigration from rural areas. Pull factors such as the education, jobs, health, entrainment, housing and some reasons for any forever urban growth. Push factors such as poverty lack of cultivable land and institutional facilities also push masses in villages to migrate towards the cities and urban areas.

A relatively higher rate of urban population growth is attributable chiefly to rural-urban migration in District Abbottabad. Rural-urban migration occurs due to various socio-economic push and pulls factors operating in the migrant-sending and receiving areas respectively. The economic factor plays the dominant role in pushing people from the rural area to urban areas. Lack of education and health services, oppressive social set up, of the population in the rural area are additional contributing push factors. On the other end, the urban centers offer relatively better access to social services and a wider choice of avenues of employment than the rural area. The urban society is more cosmopolitan than the rural, and that reinforces its pulls-attraction to the rural masses. Thus, the rural-urban migration stream keeps flowing and expanding with time leading to a continuous and past rise in the urbanity level.[36]

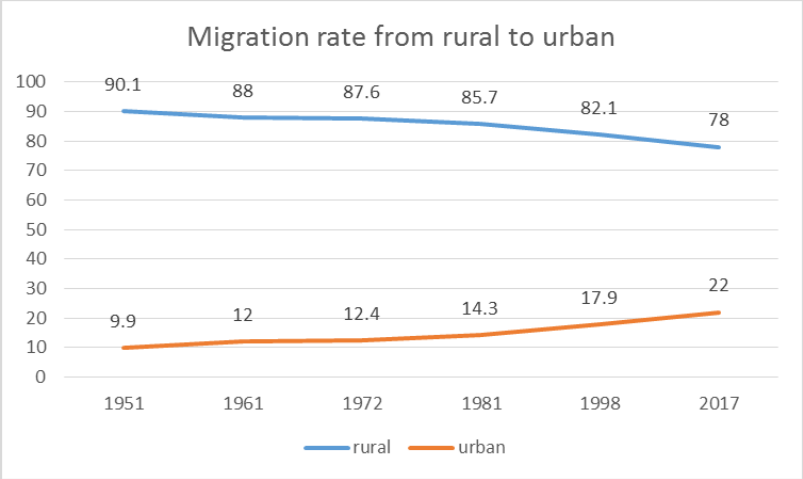


Figure 3-14:Migration trend rural to urban areas

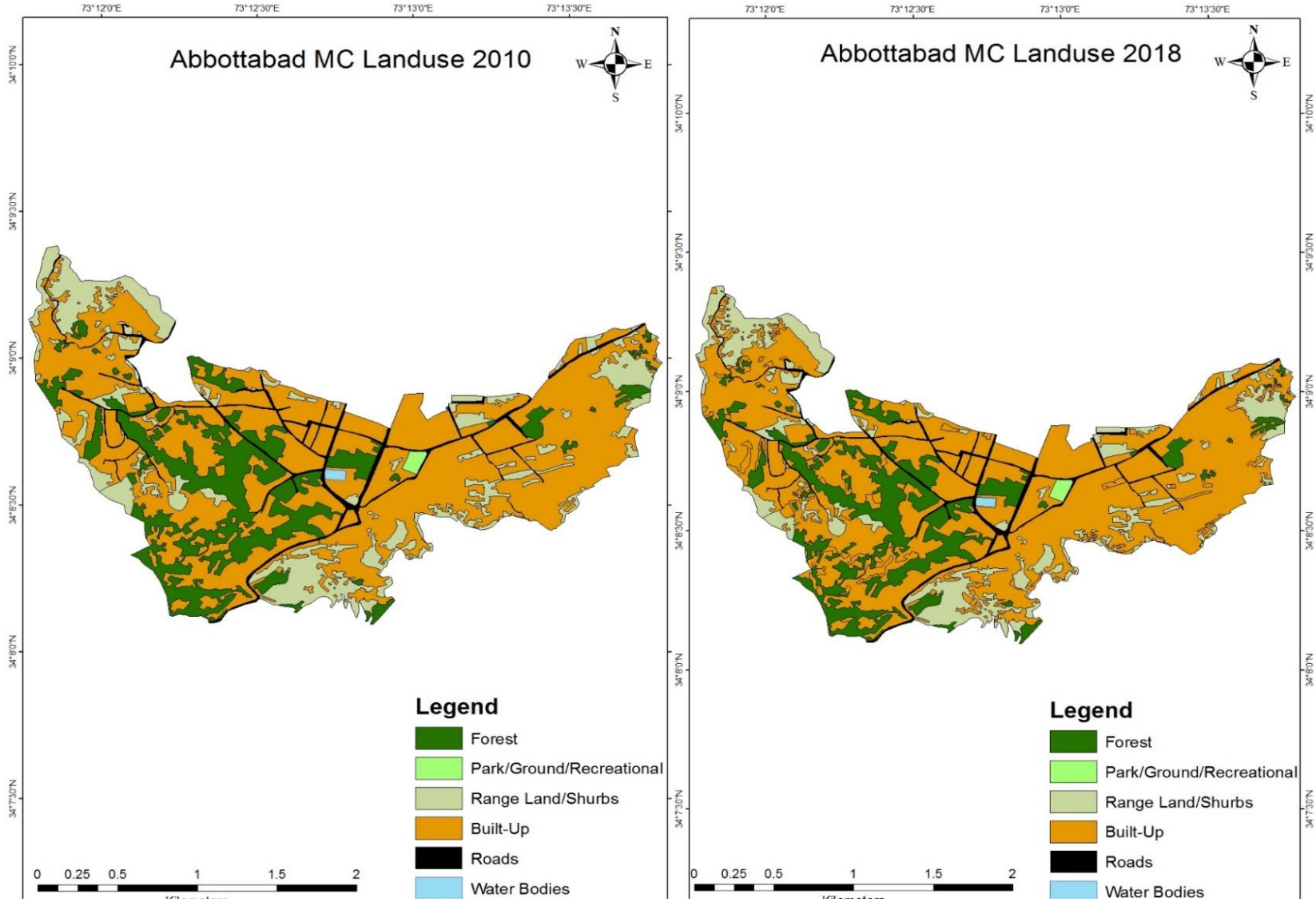
3.3.3 Urban Sprawl

Urban sprawl, is defined as the rapid expansion of the geographic extent of cities and towns, often characterized by low-density residential housing, single-use zoning, and increased reliance on the private automobile for transportation. Urban sprawl is caused in part by the need to accommodate a rising urban population; however, in many metropolitan areas it results from a desire for increased living space and other residential amenities. Urban sprawl has been correlated with increased energy use, pollution, and traffic congestion and a decline in community distinctiveness and cohesiveness. In the case of District Abbottabad, the urban sprawl may be increase due to the Poor housing quality and affordability, Water and Sanitation, Transportation, Health, Education, and Land Use Management.

[36](Rahim, Zeb, & Shaukat, 2007)

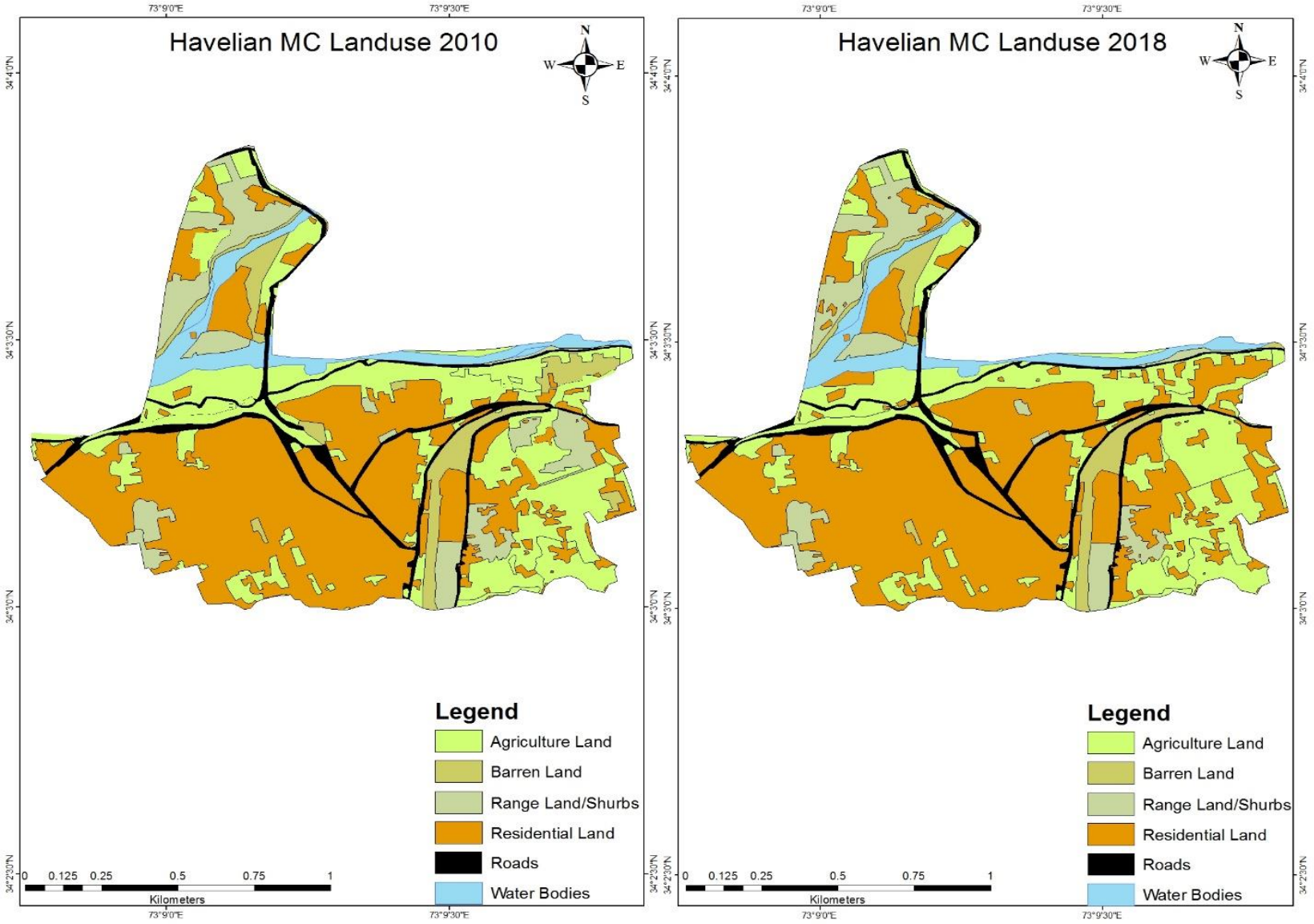
To record the sprawl in District Abbottabad, two MCs of Abbottabad and Havelian were selected and the satellite images of 2010 and 2018 were taken from Google earth of these two MCs and with the help of geographic information system (GIS) the change detection was analyzed. By comparing the 2010 historical satellite imaginaries with the up-to-date imageries of Abbottabad MC, it was quite visible that forest land is reduced from 150.96 acre in 2010 to 133.82 acres in 2018 while built-up area is increased from 153.15 acre to 155.34 acres, range land is declined from 144.15 acres to 123.12 acres. But it is important to note that no change is occurred in the land uses of recreational, roads and waters during eight years

In the case of the Havelian MC, it was quite visible that forest land was increased from 13.31 acre in 2010 to 18.89 acres in 2018 while built-up area is increased from 156.78 acre to 172.77 acres, range land is declined from 34.98 acres to 27.34 acres. While the roads and water bodies are changed with +.28 and .52 increase and decrease respectively. The graphical representation of these two MCs are shown below in Map 3-10 and Map 3-11.



MAP 3-10: Change of land use of Abbottabad MC (2010-2018)

Results of change deduction method in Havelian MC (2010-2018)



MAP 3-11: Change of land use of Havelian MC (2010-2018)

3.3.4 Urban Density

The total area of District Abbottabad is about 486056.3 acres (1967 sq. km), out of which about 12240.93 acres (50.34 sq. km) is categorized as urban. Around 2.51% of the total area is urban in District Abbottabad. Whereas the total population living in these urban areas is 302387, thus the density of the total urban area of District Abbottabad is 24.7%. The Table 3-21 below depicts the detail of each urban area in District Abbottabad.

Table 3–21: Detail of Urban Population and Density in District Abbottabad

Urban Areas	Area (Acres)[37]	Population	Density
Abbottabad MC	840.01	71720	85.38
Nawanshehr TC	915.28	36632	40.02
Havelian TC	339.81	17122	50.39
Abbottabad Cantt.	5984.04	143781	24.03
Havelian Cantt.	3650.77	32495	8.9
Murre Gallies Cantt.	511.02	637	1.25
Total	**12240.93**	**302387**	**24.7**

3.3.5 Growth Direction

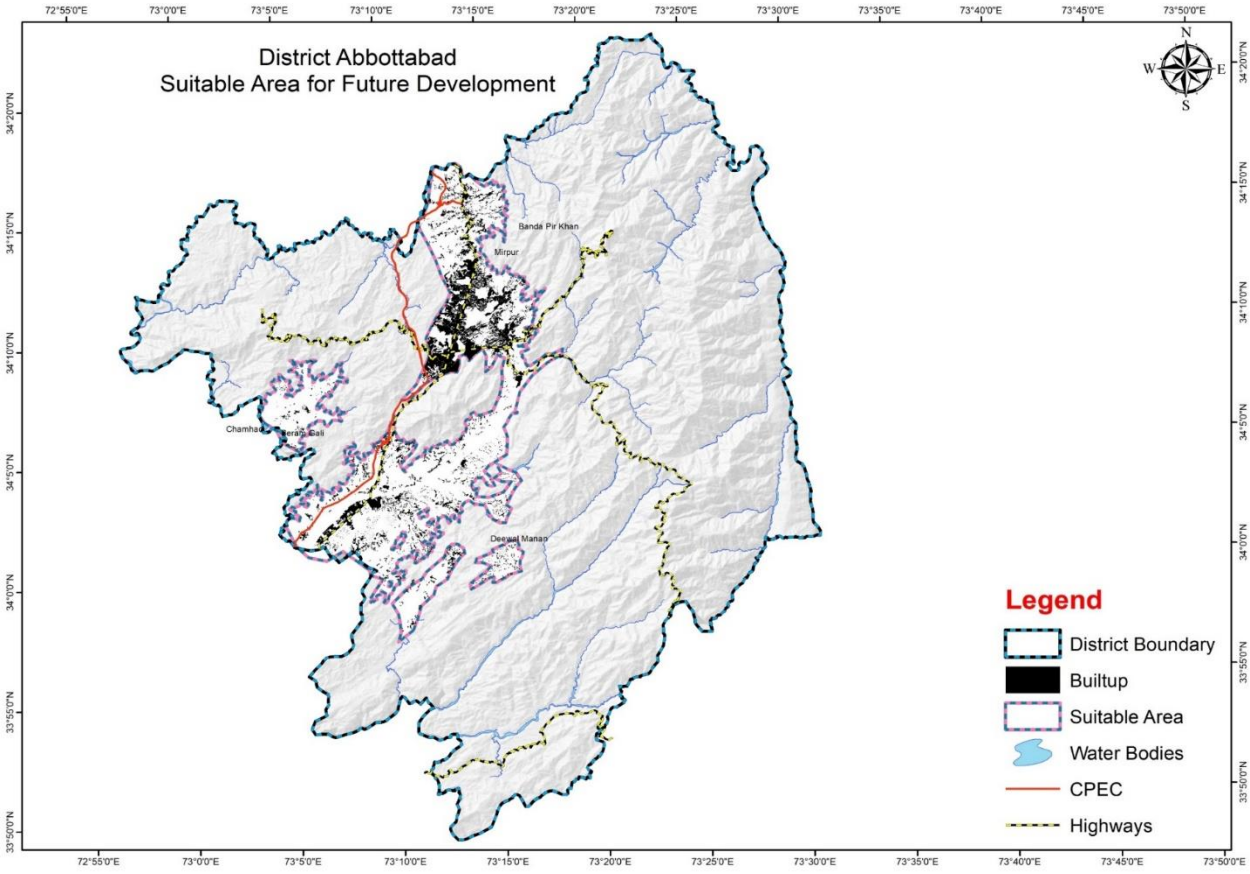
The urban area of District Abbottabad, like all other urban areas, needs to expand to cater for the future population. Besides, currently most of the social facilities, institutions and amenity areas are concentrated in the existing urban area; provision has to be made for similar facilities in the Peri-urban area which is likely to be urbanized over the next 20 years i.e. the duration of plan period. The expansion however needs to be guided in the right directions because of the following reasons:

- Urbanization has far-reaching effects on agricultural lands. The process of urbanization usually triggers growth of urban housing, other physical infrastructure, and open spaces of city-specific land-use forms such as recreational areas/stadiums, and public facilities etc. which further diminish cropland around the cities. There is a huge responsibility on Government as well as on civil society to preserve this valuable natural gift i.e. agricultural land.

- Agricultural land may be divided into two classes in the District Abbottabad: one case is agricultural areas which are irrigated and productive; highly valuable not recommended for Land Use change and in second case agricultural areas which are though productive, but are rain-fed; Land Use may be changed for future urbanization. The map 3-12 shows the total flat area in the urban area of District Abbottabad This area is calculated by apply different quires in geometric information system (GIS) software. The main purpose of developing this map to show the flat area will use for different proposals in future as in

[37] Population Census 1998, Pakistan.

the below map it is observed that suitable area is surrounded by KKH (Karakoram Highway) and Abbottabad Murree Road. It is also best place to propose such facilities which will greatly supported by these transportation networks. From the below map most of the growth direction is towards the west-south and south site.



MAP 3-12: Suitable area for future development

3.3.6 Proposed Urban Boundary

The future urban area, includes future housing (including vertical building zone), Industrial Zone, City level Parks and Stadiums, Town Center, commercial roads and New Roads etc. As the city's population continues to spiral upward, Urban Abbottabad, already home to about millions of people, has no choice but to build up.

Table 3–22: Future urban area required in district abbottabad

URBAN AREAS	Existing density (PERSON/Acres)	Additional population (2018-2038)	future area required (Acres)
Abbottabad MC	85.38	85428	1000.56
nawa shahar TC	40.02	43633	1090.28
havalian TC	50.39	20395	404.74
abbottabad Cantt	24.03	171263	7127.05
havalian Cantt	8.9	38705	4348.88
Murre Gallies Cantt	1.25	759	607.2
TOTAL	**24.7**	**360183**	**14578.71**

Existing population of Abbottabad urban area is 302387, having an area of 49.5. Sq.km. Current population density of the urban area is 24.7 person per acres. In the next two decades' additional urban population of 360183 will be added. To cater the demand of the additional population 58.9 sq. km area will be added to the existing urban area. Table3-22 show future urban area calculation of Abbottabad.

3.3.7 Settlements to be urbanized up to 2038

The criterion for envisaged urbanization by the year 2039 is not entirely density-based, but also stems from the proposed Land Use strategy. Future densities will be driven by the proposed Land Uses in a particular direction, even if the current densities over there are relatively lower than elsewhere, but expansion in that direction otherwise is desirable. Thus, the proposed trunk infrastructure in a particular direction, future housing, new commercial & industrial areas, health, education & recreational areas, major road network etc. will attract population there, resulting in enhanced densities.

3.3.8 Hierarchy of Settlements

The overall objective of establishing hierarchy of settlements is to describe and understand the existing structure and network of settlements (cities, towns and villages) in District Abbottabad. This will be the key consideration in the formulation of new centers, strategies and projects within the District. Structure of the hierarchy is determined by demographic pattern, functions and role of the settlements.

3.3.8.1 Objectives of Hierarchy of Settlements

- To identify new urban centers.
- To control the urbanization and direct dependency of smaller settlement on large urban center through new centers.
- Accommodate and promote the development of linkages and infrastructure servicing of these Settlements.

- Accommodate and promote proper planning and sustainable development in their environments.
- Promote the role of these Settlements as economic, social and cultural centers for the surrounding areas.
- Promote growth in smaller towns to allow for balanced and coordinated development throughout the District.
- Promote linkages between larger and smaller towns in order to distribute the resulting influence throughout the District.
- Promote the strengthening of towns as employment and service centers and as attractive residential centers for shifting people from large urban center.

3.3.8.2 Hierarchy of Settlements and Land Use Planning

For Land Use planning, it is important to determine the hierarchy of settlements. It helps to achieve objectives of the project in order to set out a clear order of preference for the location of new urban centers. The city having higher threshold population will need higher order services to serve its own population as well as its threshold populations and a town having moderate threshold population will provide moderate level services. For example, Abbottabad City being the divisional headquarter and the populous city of its division, has or need higher order facilities than Havelian Town.

For determining the hierarchy of settlements in District Abbottabad the following parameters were used and scoring has been done for it.

1. **Population:**

Demographic pattern is one of the most important factor in identification of settlement pattern. The other parameter like health, education, administrative setup closely defends on Threshold population which again give the emphasis toward the population. The score for the population is selected as 1:10000 its means that ten thousand populations has obtained one score. For example, Abbottabad MC has a population of 71,720 will have a score of 7.17 while Mirpur village has a population of 48,218 will get a score of 4.82.

Population	Score
Ten Thousand	1

2. **Population Growth:**

As it is known that the population growth is a major foundation for the projection of services So it is selected as the major parameter. Growth rate or the percentage change increase in population per year of district Abbottabad is 2.40% which is exactly equal to national growth rate. For growth wise analysis, growth rate of each settlement is calculated and classes have been set to analyze it (as shown in the table). After calculating the growth rate of each settlement, it is observed that the settlement wise growth rate starts from –less than 0% and goes greater than 4%.

For analysis the growth rate is divided into four classes and for each class a score has been assigned as shown in the table. According to these classes 39 settlements are observed having a negative growth rate, 220 settlements having slow growth rate, 76 settlements are growing with the moderate rate while 15 settlements are growing rapidly. Rapid growing settlements have to tackle more addition population in the plan period as compared to moderate and slow growing settlements while settlements fall in declining category will not need or very few new services in the future.

Table 3–23: Parameters for Growth-Wise Distribution of Settlements

Category	Growth Rate	Number	Scoring
Declining	x<0%	39	0

Slow	0.08≤x≤2%	220	0.5
Moderate	2≤x≤4%	76	1
Rapid	x≥4%	15	1.5

3. Population Density:

Density play a pivotal role in the hierarchy of settlement it shows the population area ratio of the settlement. A settlement having a high density will get a high score and lower density will have a less score. Settlements wise population density in District Abbottabad range from greater than 0 to more than 15 persons per acres.

For detail analysis of density in the Abbottabad context it is divided into four class and each class have a score for identifying the hierarchy like low category settlement gets 0.5 and very high density category get score 2 as shown in the table below.

Table 3–24: Parameters for Density-Wise Distribution of Settlements

Category	Density (Persons/Acres)	Number	Score
Low	0<x<5	311	0.5
Moderate	5≤x<10	24	1
High	10≤x<15	5	1.5
Very High	x≥15	10	2

4. Administrative status:

Administrative status is the authoritative role of government in case settlement of any area of the respective district for example core settlement Abbottabad city will have high level administration setup (MC) while the secondary settlement like Havalian have a small administration setup (havelian TMA) and the territory settlements limited to only water and sanitation services. Abbottabad is classified into 4 class for scoring purpose as given in the table below.

Table 3–25: Administrative Status

Administrative Status	Settlements	Scoring
City or MC	2	2
Tahsil Corporation	1	1.5
Large village/@Population		1
Small village		0.5

5. Health facility:

Vertical hierarchy is the basic feature in allocating health institutes. Hospital need high threshold population and will high spare of influence would be located in large centers there for the score of hospital be more as compared to RHC or BHU whose threshold population is less and will also smaller spare of influence. Health statistics in district Abbottabad and his score is presented in the following table.

Table 3–26: Health Institutes

Health Institution	Numbers	Score
Dispensary	47	0.5
BHU	55	1
RHC	4	1.5
Hospital	9	2

6. Education institutes:

Education plays a vital role in the development of the community. As in the case of District Abbottabad, the condition of the education is at the acceptable level. There are 1484 primary school, 387 are middle, 280 are high and 119 are high secondary & college with the score of .5, 1, 1.5, and 2 respectively.

Table 3–27: Education Institutes

Education Institutes	Numbers	Score
Primary	1484	0.5
Middle	387	1
High	280	1.5
High Secondary/College	119	2

7. Analysis:

A settlement hierarchy is a chart used to model the relationship between various human population centers based on their size, population, and available services. To really understand this however, we need to first break down the term ''settlement hierarchy'' itself. On the bottom of hierarchy, you have the settlement with the lowest population and therefore the lowest number of expected services. In general, however, we expect these to be the most commonly occurring settlements since they require less effort to sustain.

The score for each Settlement; of all the seven parameters was then added, and based on aggregate score, ranking was done. The lowest score calculated in the analysis is 0 while the highest score is 46.17. The hierarchy is divided into five ranks. The primate settlement is Abbottabad MC and Abbottabad Cantt which mutually formed Abbottabad city having a score range from 30 to 47. The score for secondary settlement starts from 15 to 30 and vice versa the territory and quarterly settlement as shown in the table below.

Settlement wise scoring and analysis of hierarchy of settlement is shown in the annexure.

Table 3–28: Settlements Hiereachy

Settlements Hierarchy	Score Range(x)
CITY	$30 \leq x < 47$
TOWN/Growth Center	$15 \leq x < 30$
VILLAGE	$1 \leq x < 15$
BANDA	$0 \leq x < 1$
ISOLATED PLACE	$0 < x$

3.3.9 Conclusions:

At the conclusion Abbottabad is the primate city of District Abbottabad. In other word the disproportionately of Abbottabad urban area is larger than any other town or settlement in the hierarchy. The sheer size and activities of Abbottabad MC form a strong full factor bringing additional residents to the city and causing the primate city to become even large and more disproportional to smaller settlements.

3.3.10 Land Use Distribution of District Abbottabad

The city of Abbottabad is a mega city of the province. District Abbottabad still has predominantly rural characteristics, where agriculture and allied sectors occupy around two third (14.05%) of the land mass, followed by the Residential land (4.93%), fruit orchards (0.01%), parks/playground (0.18%) roads (0.18%) forests (34.50%) and others (48.94%).

The area and their percentages are given in Table 3-29. The distribution is graphically illustrated in Figure 4-1.

Table 3–29 : Existing Land Use Distribution of District Abbottabad

Class	Area	Percentage
Forest	586.51	34.50
Built-Up Area	83.8	4.93
Agriculture Land	238.8	14.05
Roads	3.1	0.18
Range Land	737.6	43.39
Barren Land	20.59	1.21
Water Bodies	22.28	1.31
Parks/Play Ground	2.98	0.18
Health	0.45	0.03
Vacant Land	2.48	0.15
Grave Yard	0.17	0.01
Education	0.96	0.06
Orchards	0.11	0.01
Total	**1699**	**100**

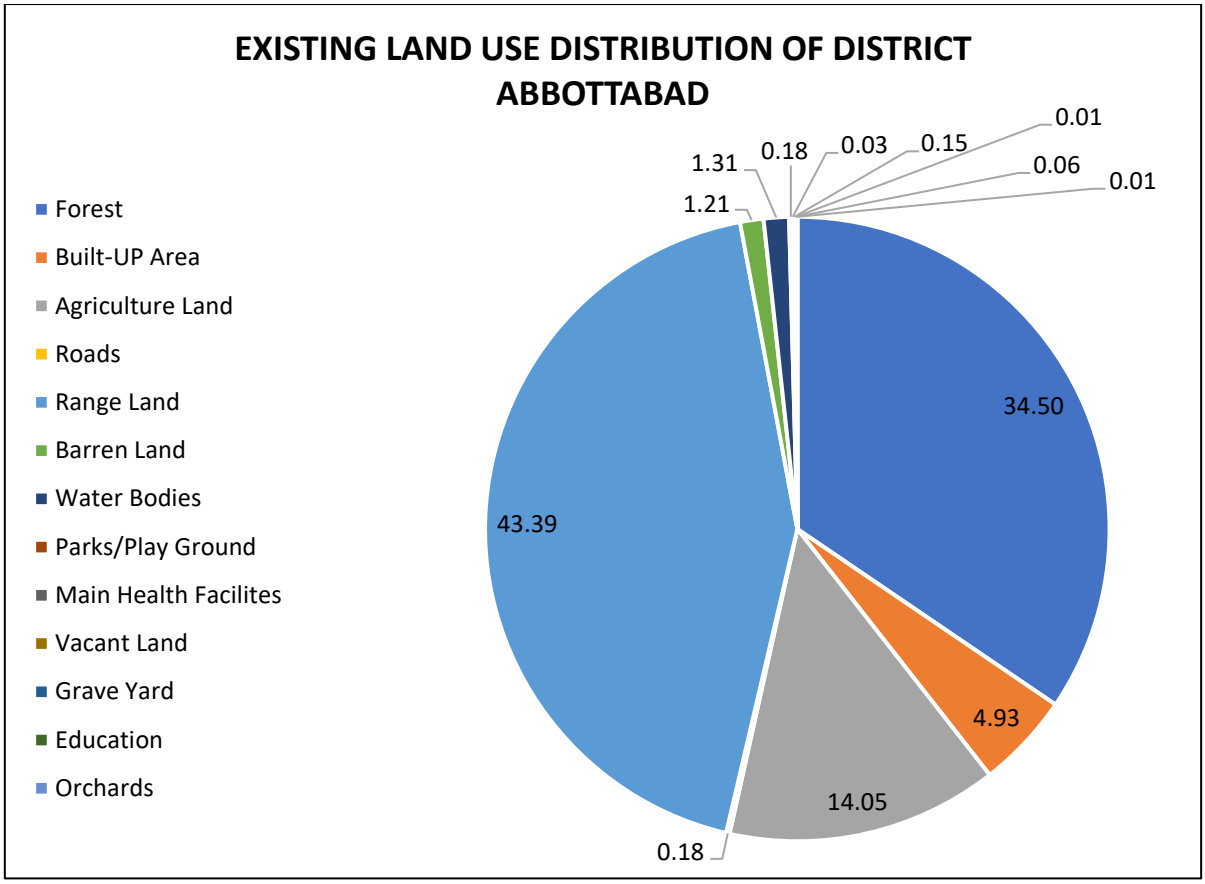
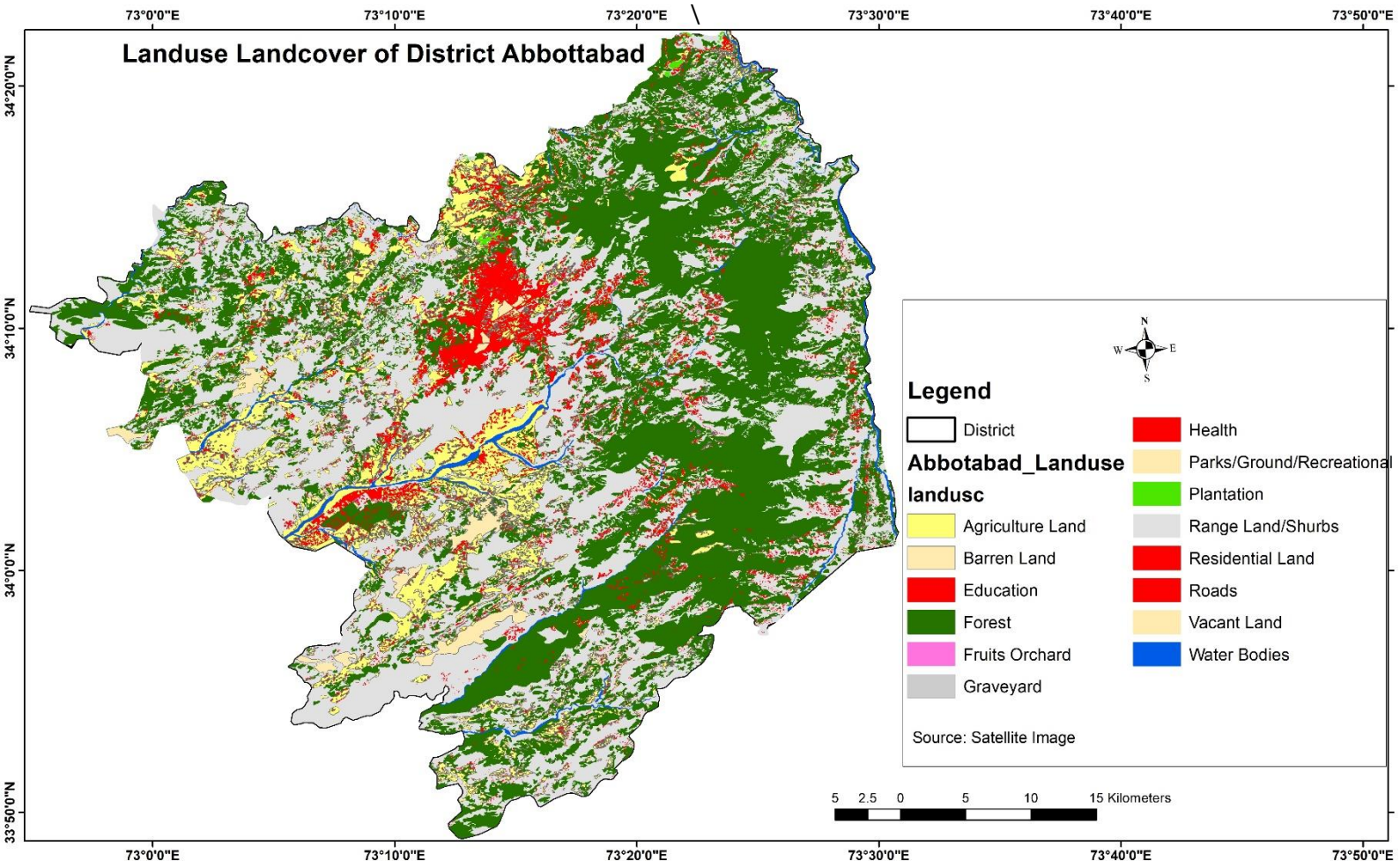


Figure 3-15:Existing Land Use Distribution of District Abbottabad



MAP 3-13: Existing landuse plan of District Abbottabad

3.3.11 Land Use Distribution of Tehsil Abbottabad

Total area of Tehsil Abbottabad is 984 sq km, or about 58 % of the total District area. The existing land use distribution in given in Table 3-30 and shown in Figure 3-16.

Table 3–30: Existing Land Use Distribution of Tehsil Abbottabad

Class	Area (sq km)	Percentage
Forest	416.25	42.30
Built-Up Area	51.35	5.22
Agriculture Land	107.06	10.88
Roads	2.05	0.21
Range Land	387.48	39.37
Barren Land	2.15	0.22
Water Bodies	11.79	1.20
Parks/Play Ground	2.79	0.28
Health	0.45	0.05
Vacant Land	1.6	0.16
Grave Yard	0.14	0.01
Education	0.95	0.10
Orchards	0.09	0.01
Total	**984.15**	**100**

As the above table 3-30 and the adjacent graph shows that the distribution of landuse in tehsil Abbottabad with the percentage. By the calculation and analysis, it can be observed that the major landuse is forest (42.30%) which is following by range land (39. 37%).Build up area is approximately 2.5% in which residential, counted. The graveyard and orchard are with less percentage 0.01.

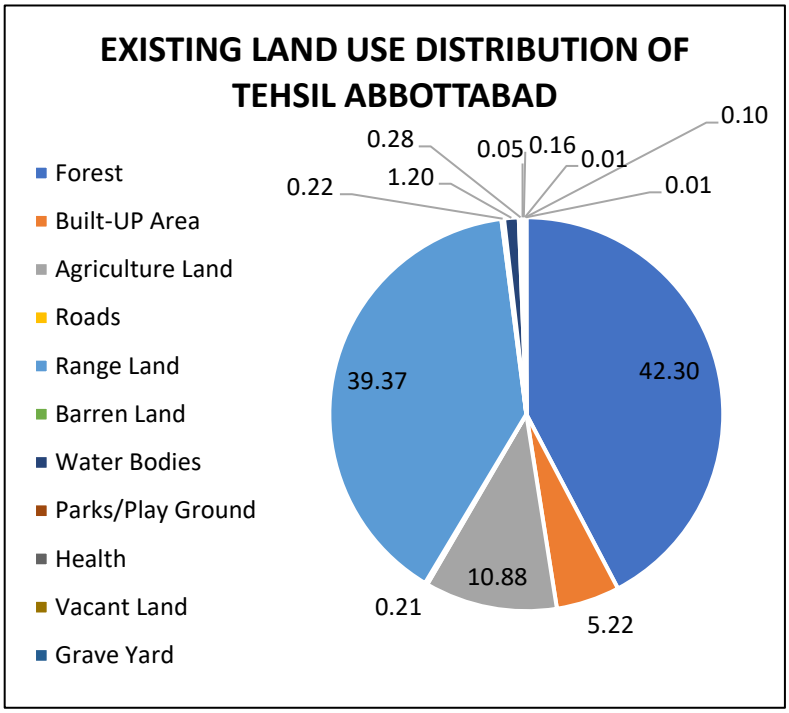
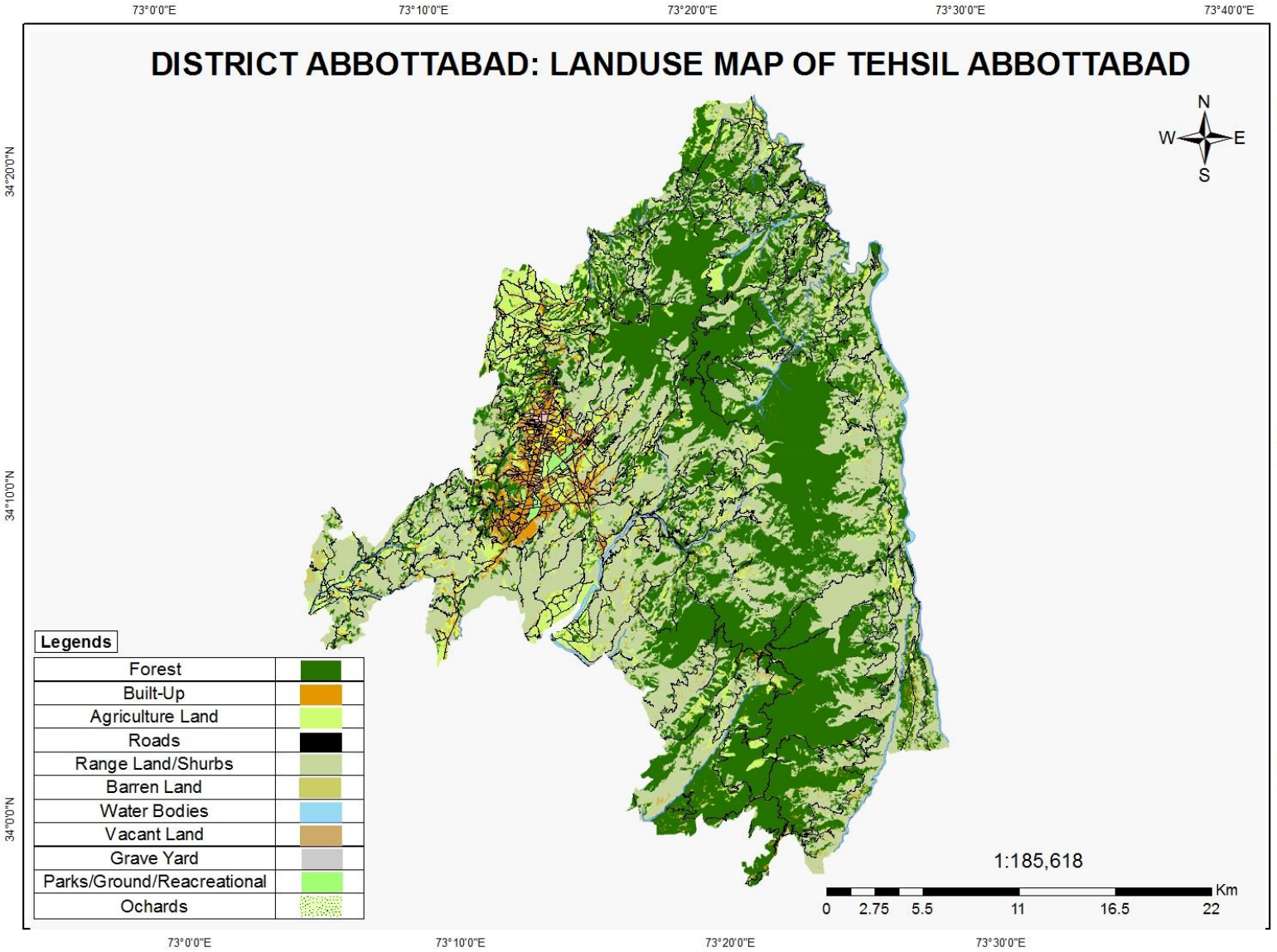


Figure 3-16:Existing Land Use Area of Tehsil Abbottabad



MAP 3-13: Land use map of Tehsil Abbottabad

3.3.12 Land Use Distribution of Tehsil Havelian

Total area of Tehsil Abbottabad is 342 sq km, or about 20.13 % of the total District area. The existing land use distribution in given in Table 3-31 and shown in Figure 3-17.

Table 3–31: Existing Land Use Distribution in Tehsil Havelian

Class	Area (sq km)	Percentage
Forest	48.89	14.28
Built-Up Area	17.74	5.18
Agriculture Land	81.84	23.90
Roads	0.54	0.16
Range Land	168.65	49.24
Barren Land	17.53	5.12
Water Bodies	6.19	1.81
Parks/Play Ground	0.19	0.06
Vacant Land	0.84	0.24
Grave Yard	0.03	0.01
Education	0.01	0.00
Orchards	0.02	0.01
Total	342	100.00

As the above table 3-30, and the adjacent graph shows that the distribution of landuse in tehsil Abbottabad with the percentage. By the calculation and analysis it can be observed that the major landuse is Range land (49.24%) which is following by agriculture land (23.90%).Build up area is approximately 5.18% in which residential counted. The education is with less percentage 0.01.

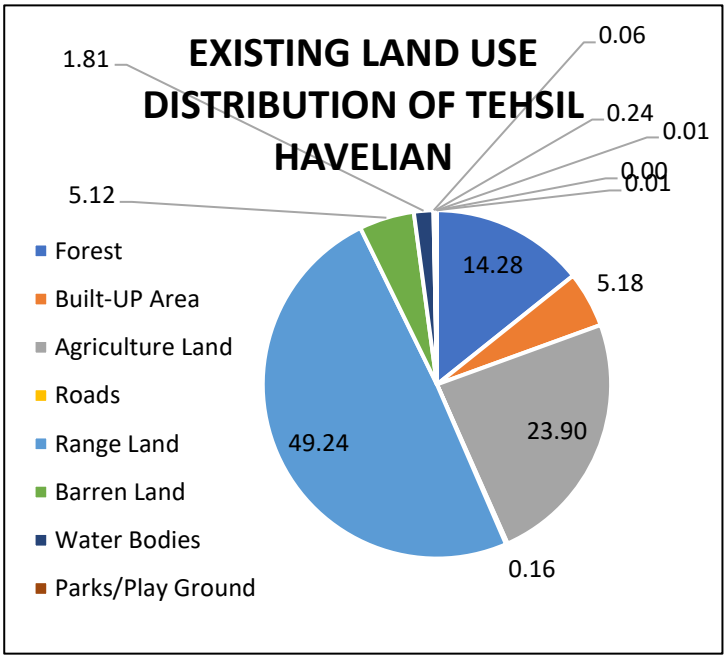
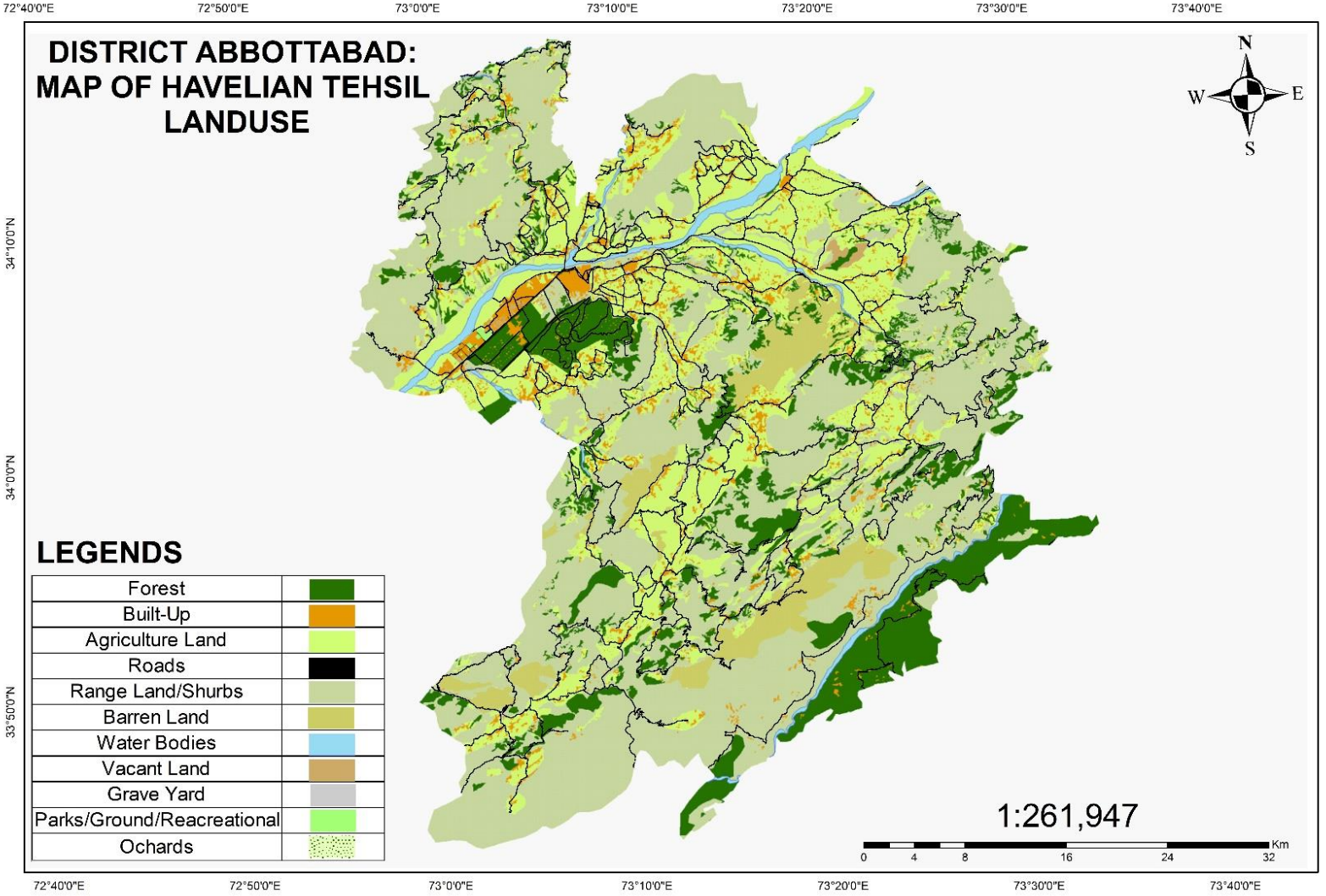


Figure 3-17:Existing Land Use Area of Tehsil Havelian



MAP 3-14: Land Use Map of Tehsil Havelian

3.3.13 Land Use Distribution of Tehsil Sherwan

Total area of Tehsil Sherwan is 200 sq km, or about 11.77 % of the total District area. The existing land use distribution in given in Table 3-32 and shown in Figure 3-18.

Table 3–32: Existing Land Use Distribution of Tehsil Sherwan

Class	Area (sq km)	Percentage
Forest	58.21	29.12
Built-Up Area	6.95	3.48
Agriculture Land	31.99	16.00
Roads	0.44	0.22
Range Land	99.40	49.73
Barren Land	0.68	0.34
Water Bodies	2.17	1.09
Vacant Land	0.04	0.02
Orchards	0.01	0.01
Total	200	100

As the above table 4.9, and the adjacent graph shows that the distribution of landuse in tehsil Abbottabad with the percentage. By the calculation and analysis, it can be observed that the major landuse is Range land (49.73%) which is following by Forest (29. 12%).Build up area is approximately 3.48% in which residential counted. The orchard is with less percentage 0.01.

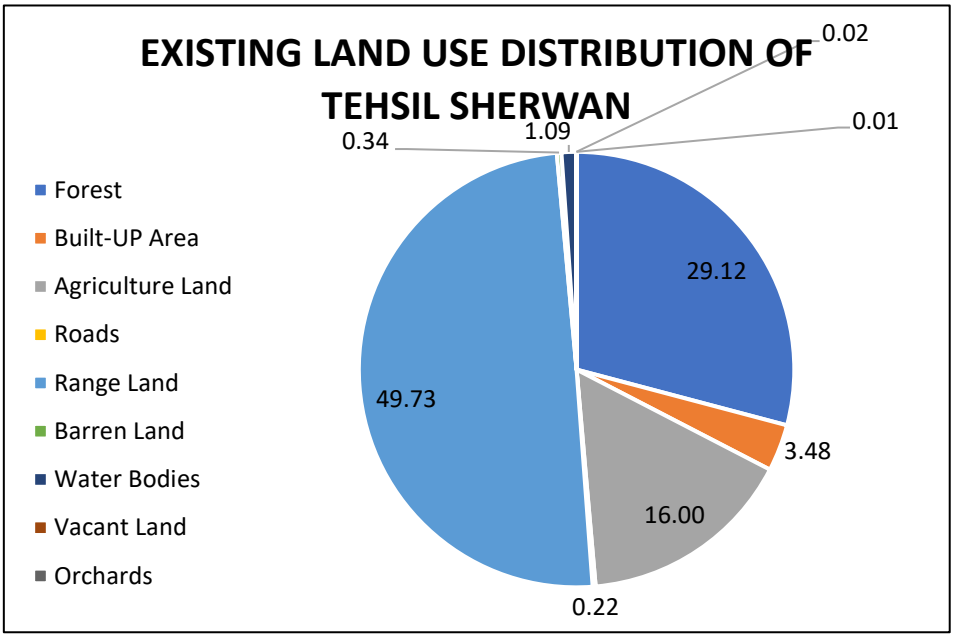
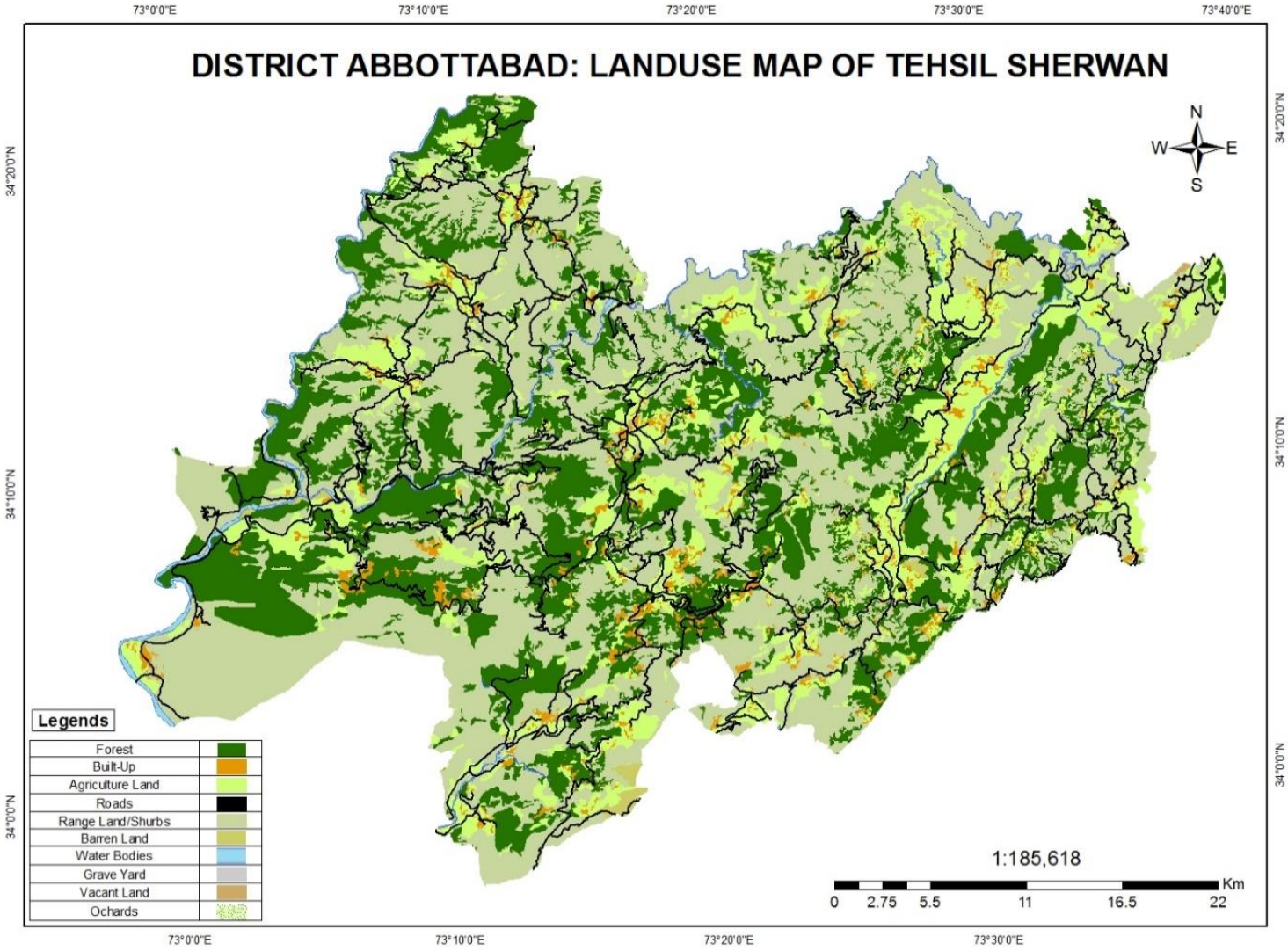


Figure 3-18:Existing Land Use Distribution of Tehsil Sherwan



MAP 3-15: Land Use Map of Tehsil Sherwan

3.3.14 Land Use Distribution of Tehsil Lora

Total area of Tehsil Lora is 173 sq km, or about 10.18 % of the total District area. The existing land use distribution in given in Table 3-33 and shown in Figure 3-19.

Table 3–33: Existing Land Use Distribution of Tehsil Lora

Class	Area (Sq Km)	Percentage
Forest	63.16	36
Built-Up Area	7.80	4
Agriculture Land	17.93	10
Roads	0.03	0
Range Land	82.08	47
Barren Land	0.24	0
Water Bodies	2.14	1
Total	173	100

As the above table 3-32, and the adjacent graph shows that the distribution of landuse in tehsil Abbottabad with the percentage. By the calculation and analysis, it can be observed that the major landuse is Range land (47%) which is following by Forest (36%).Build up area is approximately 3.48% in which residential counted. The barren land is with less percentage 0.

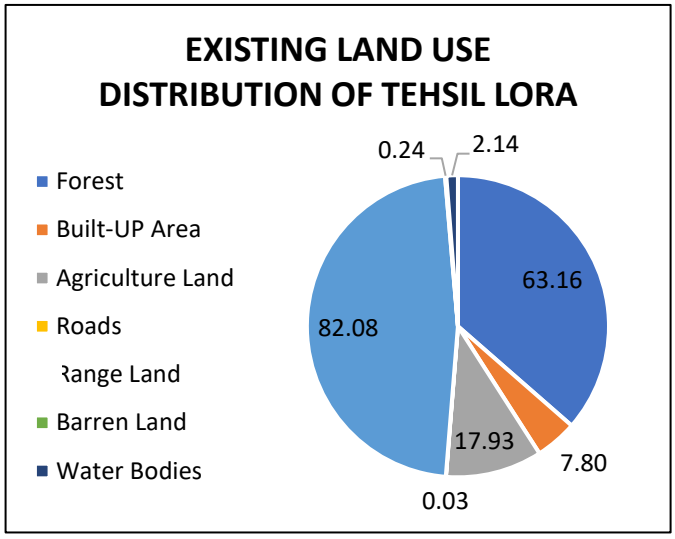
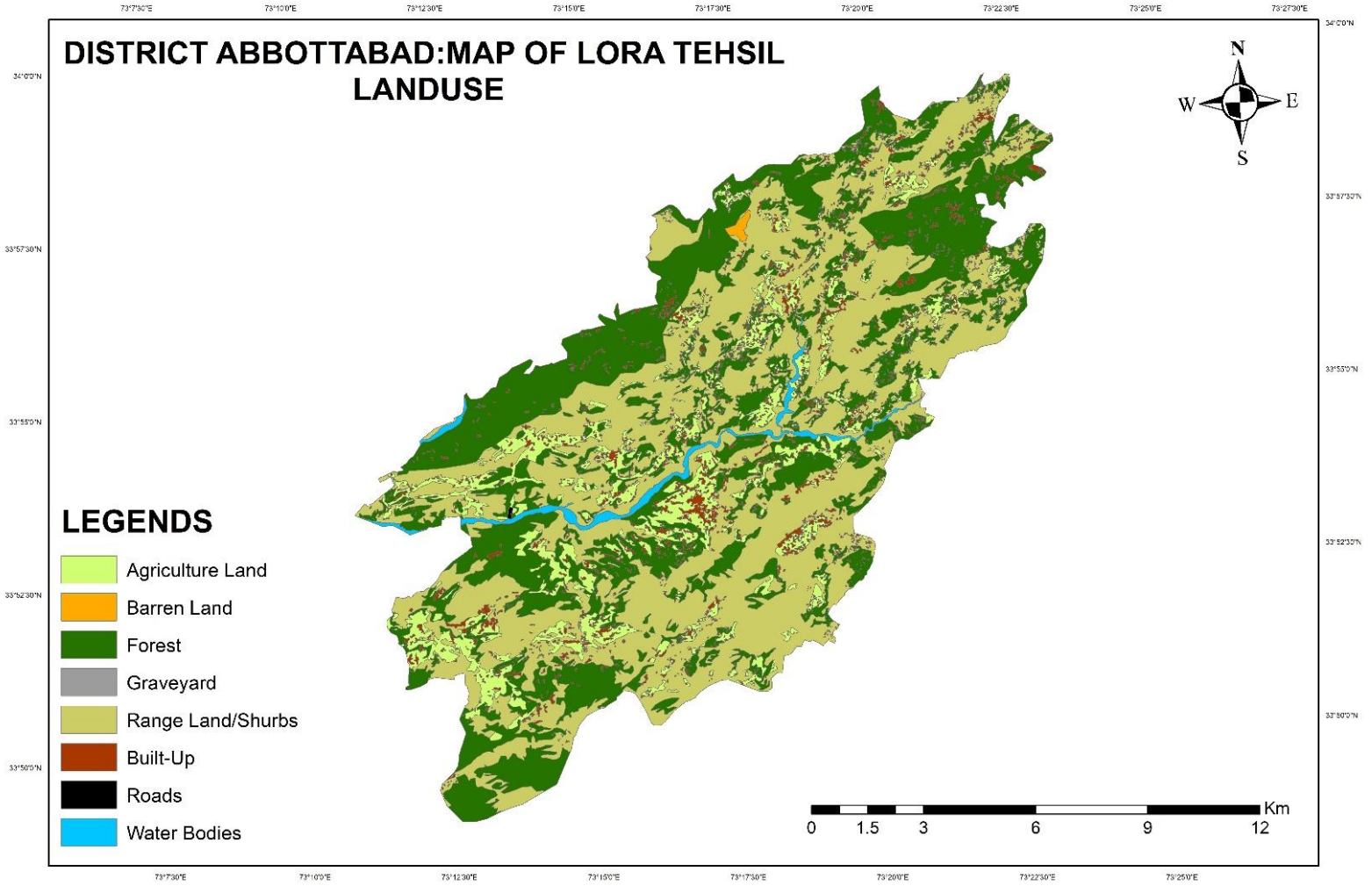


Figure 3-19:Existing landuse distribution of Tehsil Lora



MAP 3-16: Land Use Map of Tehsil Lora

The Satellite towns are proposed on the basis of population projection and backlogs of the existing facilities in district Abbottabad.

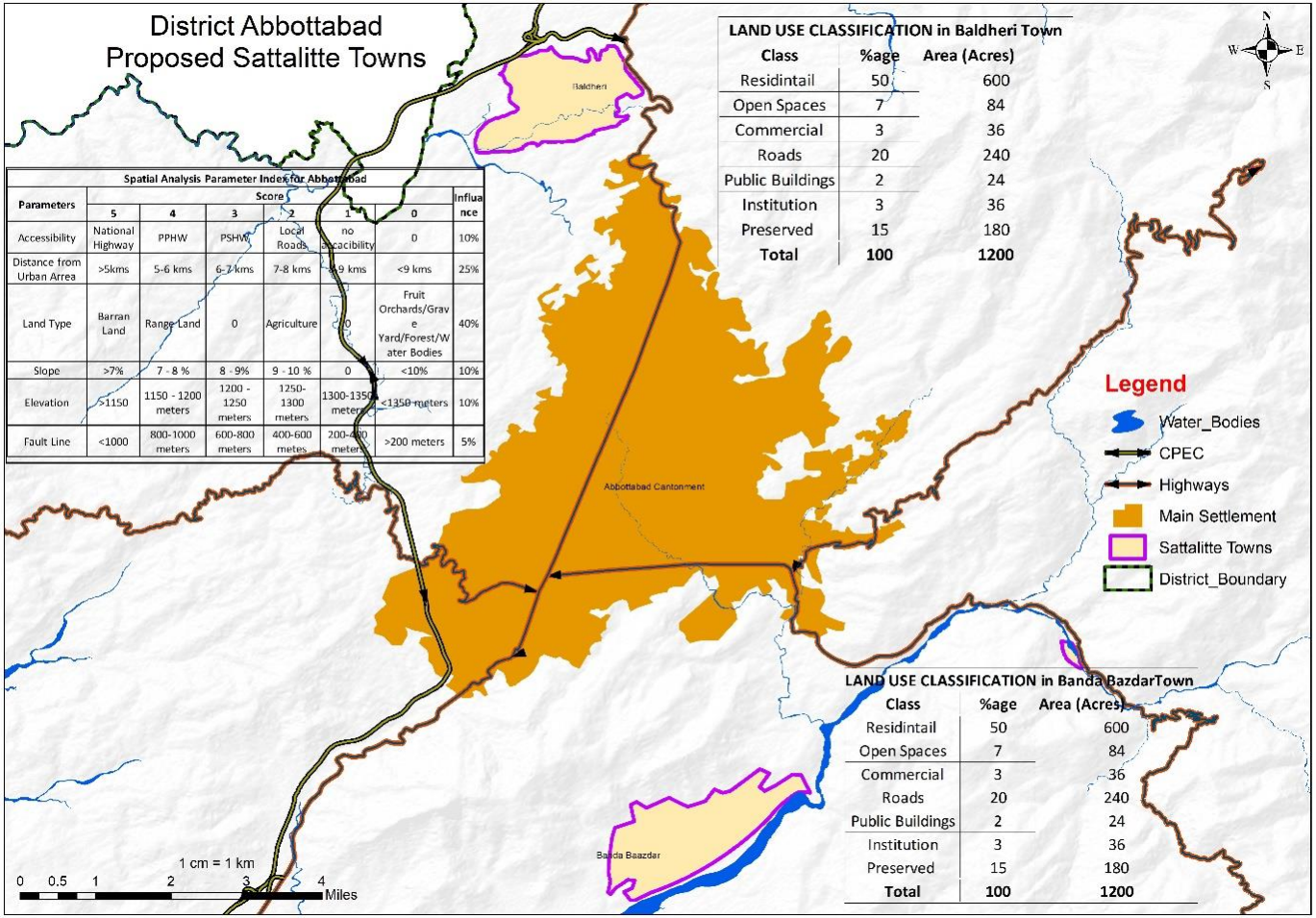
Baldheri Town: This town is proposed on the upper side of the tehsil Abbottabad in the northeast side. Total covered area is 1200 acres for the population of 36000 upto 2038. The below table shows the perecentage distribution of all landuse in this satellite town.

Banda Bazdar town: This town is proposed on the lower side of the tehsil Abbottabad to support this town a by-pass is also proposed with the length of 16km approximately, town area is 1200 acres.

SETTELITE TOWNS:

The Satellite towns are proposed on the basis of population projection and backlogs of the existing facilities in district Abbottabad.

1) **Baldheri Town**: This town is proposed on the upper side of the tehsil Abbottabad in the northeast side. Total covered area is 1200 acres for the population of 36000 upto 2038. The below table shows the perecentage distribution of all landuse in this satellite town.
2) **Banda Bazdar town:** This town is proposed on the lower side of the tehsil Abbottabad to support this town a by-pass is also proposed with the length of 16km approximately, town area is 1200 acres and the distribution of major landuses are shown in the table in the map.



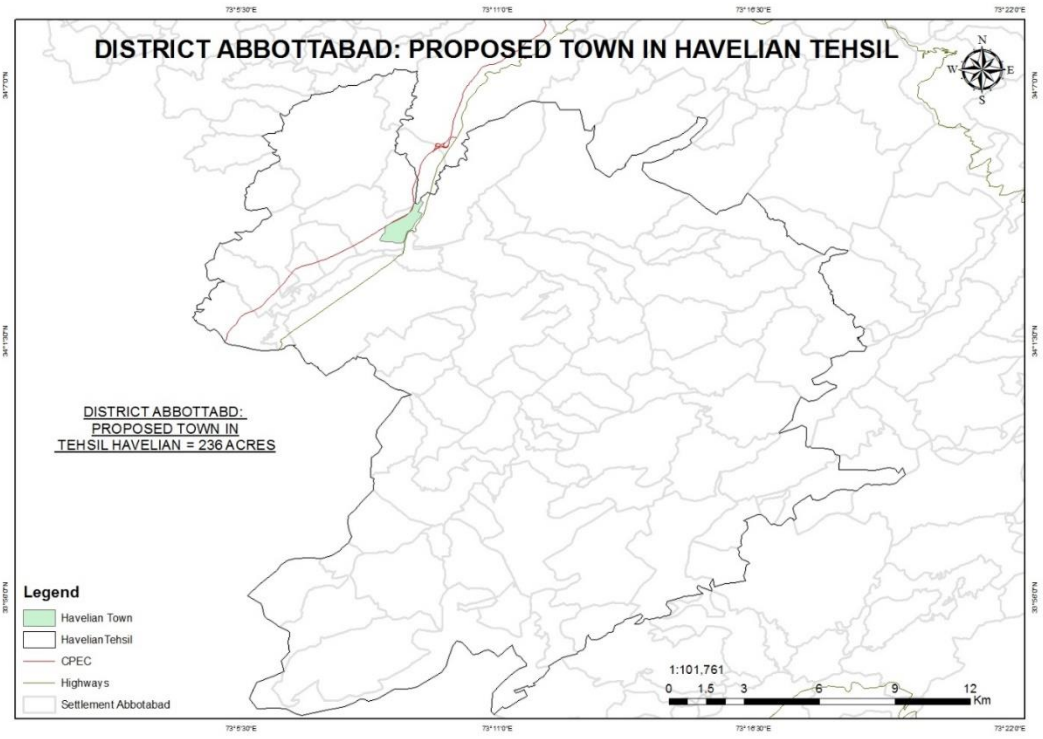
MAP 3-17: Proposed Sattelite Towns

HAVELAIN TOWN

Havelian Town (2018-2038): The total Population of the district Abbottabad is 1363508 in 2018 and it will be 2305749 in 2038. To facilitate, the growing population two satellite towns are proposed but they are not enough for such a large population, so also to stop the future migration, new town is proposed in tehsil Havelian with the 236.04 Acres. The distribution of major land use in this township are show in below table. As a developing country, it is proposed 45% for Residential which is also a major land use. And it is followed by roads with 27%, community Amenities with 8.5%, commercial with 3%, open spaces with 7%, vacant plots and future extension with 7%, so that the sum of all land uses is 100%.

Table 3–34: Havelian Municipal Committee

Category	percentage	population	Area
RESIDENTAIL	45	20395	106.22
COMMERCIAL	3	20395	7.08
EDUCATIONAL, HEALTH, AND OTHER COMMU NITIES FACILITIES	8.5	20395	20.06
ROADS/STREETS	27	20395	63.73
OPEN SPACES	7	20395	16.52
OTHERS INCLUDING GRAVE YARDS EQUIVALENT RESERVES	2.5	20395	5.90
VACANT/ Future extension	7	20395	16.52
TOTAL	100	_	236.04



MAP 3-18: Proposed town in Havelian tehsil

Bairot Rural Growth Centers: To explain the proposed facilities, first it's important to discuss about the existing facilities because the proposed facilities are projected to obtain the social amenities in the rural growth centers. Rural growth centers are selected on the basis of high population. It is estimated this rural will obtain the status of urban due to its haphazard growth. To control the growth and provide the sufficient facilities in future, it is selected as a growth center. By analyzing the existing situation of bairot zone it is recorded that there are 8 BHU, 2 Dispensaries, 1 hospital and no RHC's to facilitate the existing population of this area. As the existing amenities of education, there are 75 primary schools, 10 middle schools, 8 high schools, 2 boys' high secondary schools and 50 primary schools, 6 middle schools, 4 high schools but there is no high secondary school for girls and no recreational facilities in Bairot Rural Growth zone. Total Area of the bairot rural growth zone is 37634 acres with the existing population of 113106, there are 4 union councils and 8 patwar circle.

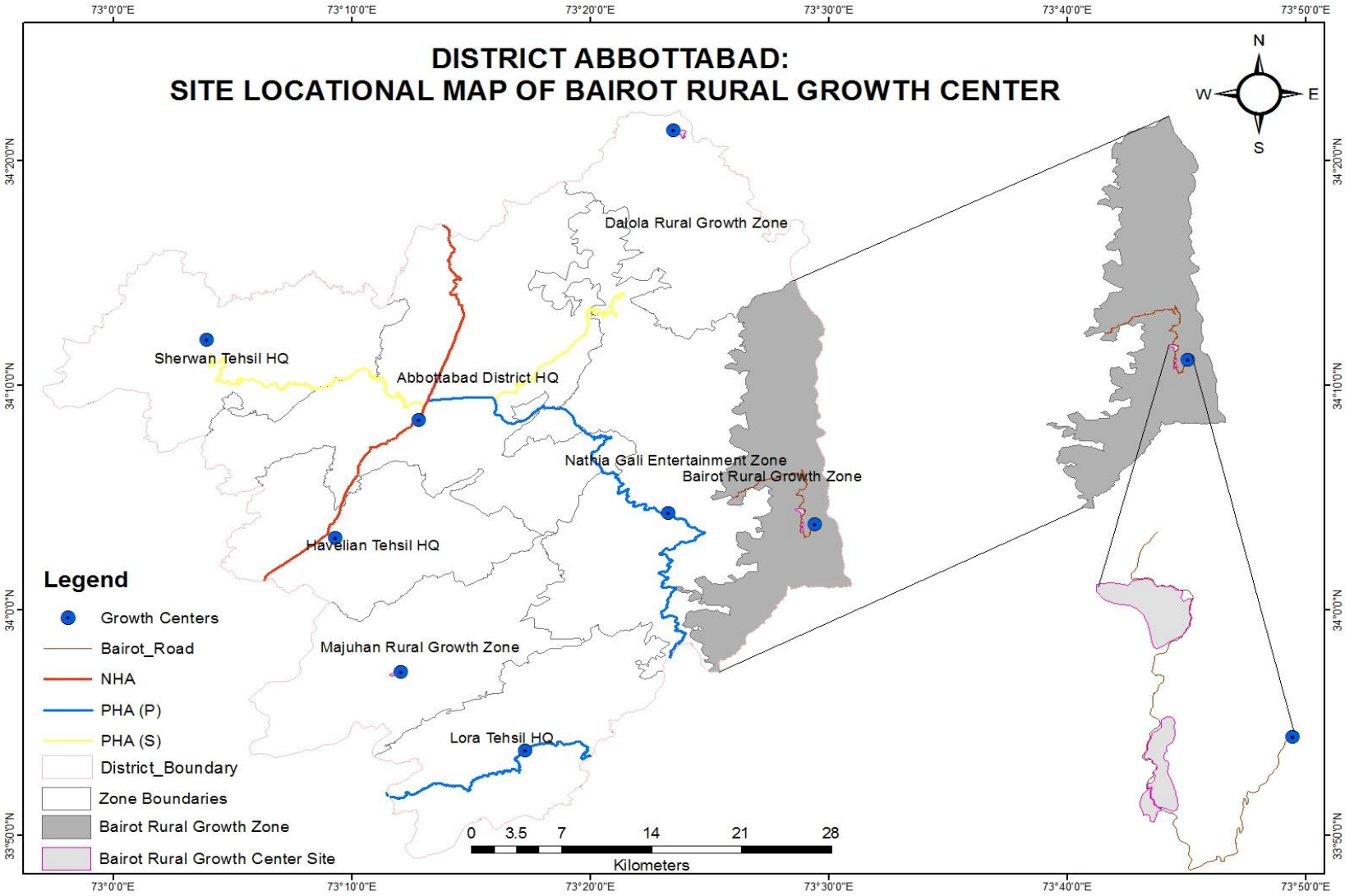
Proposed Amenities for Bairot rural growth center: From population projection of bairot rural growth zone , it is calculated that following facilities are required to upgrade this rural growth zone, the detail of their required amenities are represented in below table, total land required for development will be 70.5 Acre in which 46 acre for housing, sector and 24 acres for other amenities are shown in given table, which support 782 houses of 4692 residence and with the density of 102 person/acre

Map 3-20 shown the location site for bairot rural growth center, it is mostly hilly area but by apply modern town planning techniques sites are selected for future growth

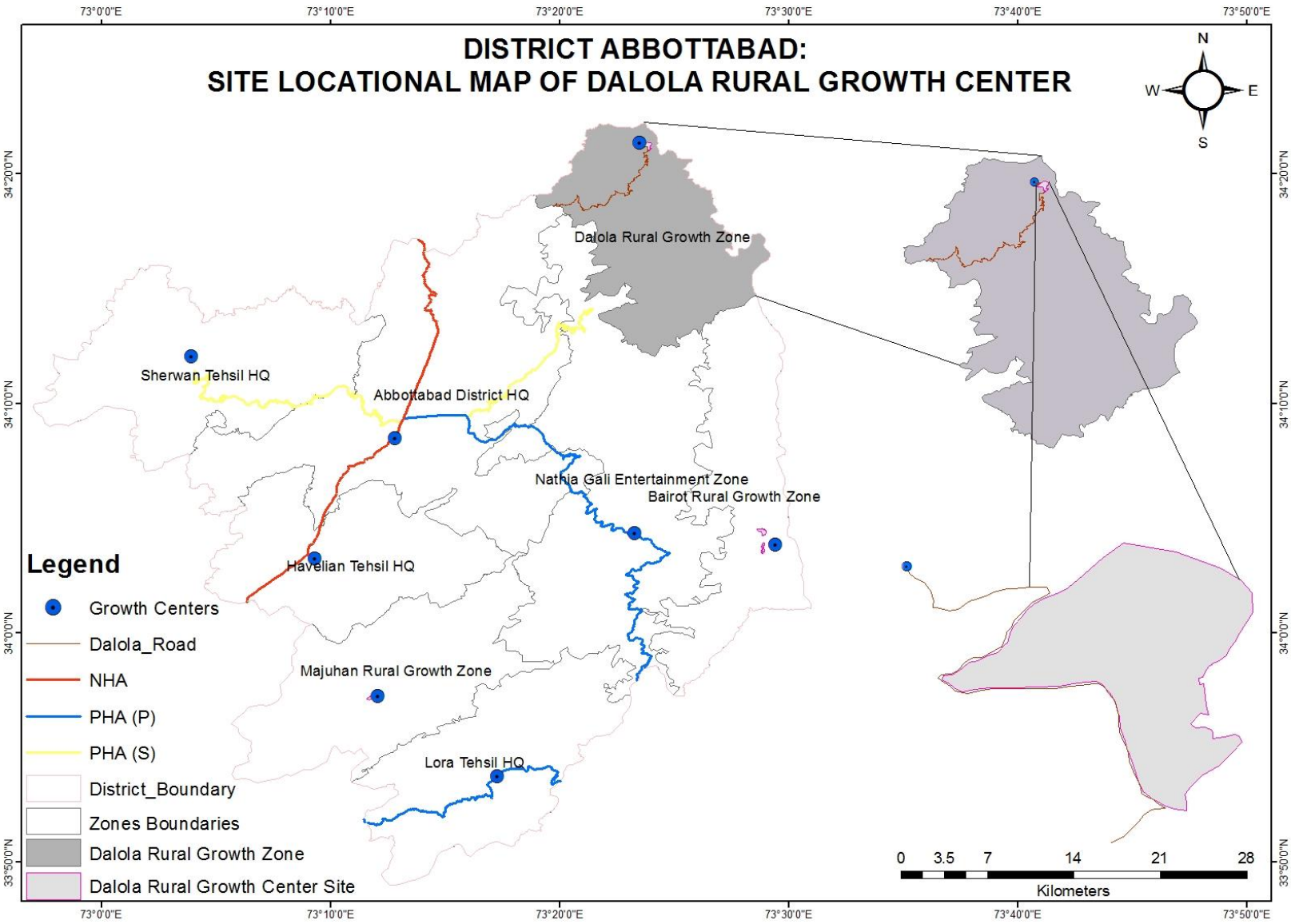
Majuhan Rural Growth Center: Rural growth centers are selected on the base of high population. It is estimated this rural will obtain the status of urban due to its haphazard growth. Firstly, it is important to discuss about the existing facilities because the proposed facilities are projected from the proposed facilities to obtain the social amenities in the rural growth centers. To control the growth and provide the sufficient future facilities, it is selected as a growth center. By analyzing the existing situation of Majuhan zone it is recorded that there are 5 BHU, 6 Dispensaries, 1 hospital and 1 RHC's to facilitate the existing population of this area. As the existing amenities of education there are 60 primary schools, 10 middle schools, 6 high schools, 2 higher secondary schools for boys and for girls there are 65 primary schools, 7 middle schools, 3 high schools but there is no high secondary school for girls. There are also no recreational facilities in Majuhan Rural Growth Zone. Total Area of the Majuhan rural growth zone is 37997 acres with the existing population of 97650, there are 4 union councils and 7 patwar circles.

Proposed Amenities for Majuhan Rural Growth Center: population projection of Majuhan rural growth zone, it is calculated that following facilities are required to upgrade this rural growth zone, the detail of their required amenities are given in below table. Total land required for development will be 49 Acre in which 25 acres for housing sector and 24 acres for other amenities are shown in given table, which will support 425 houses of 2754 residence and with the density of 102 persons/acre.

GRWOTH CENTERS:



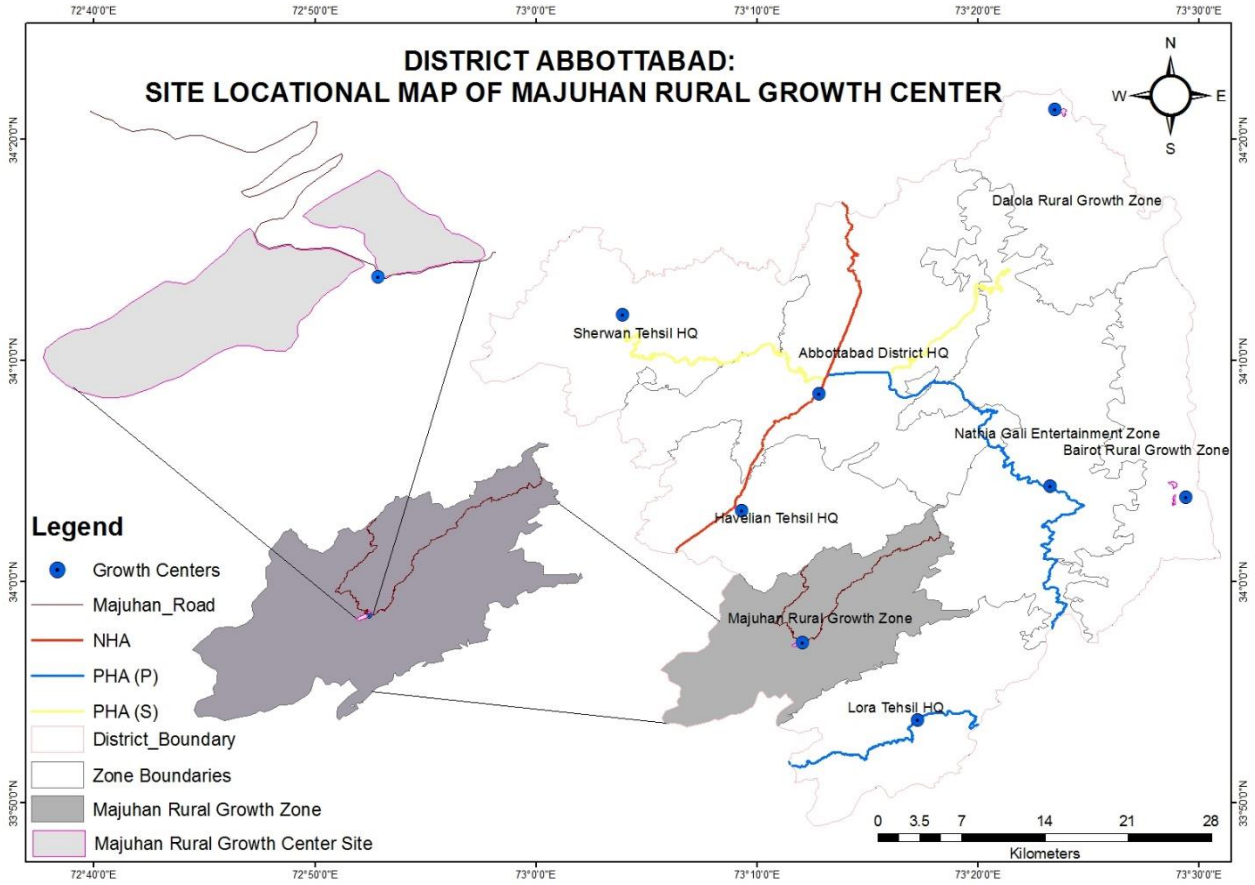
MAP 3-19: Site Locational map of Bairot Rural Growth center



MAP 3-20: Site locational map of Dalola Rural Growth Center

Dalola Rural Growth Center: To control the growth and provide the sufficient future facilities, it is selected as a growth center. By analyzing the existing situation of Dalola zone it is recorded that there are 6 BHU, 5 Dispensaries, 1 hospital and 0 RHC's to facilitate the existing population of this area. As the existing amenities of education there are 50 primary schools, 10 middle schools, 5 high schools, 2' high secondary schools for boys and 54 primary schools, 6 middle schools, 1 high school but there is no high secondary school for girls and no recreational facilities in Dalola Rural Growth Zone. Total Area of the Dalola rural growth zone is 37253 acres with the existing population of 124393, there are 4 union councils, 6 patwar circle.

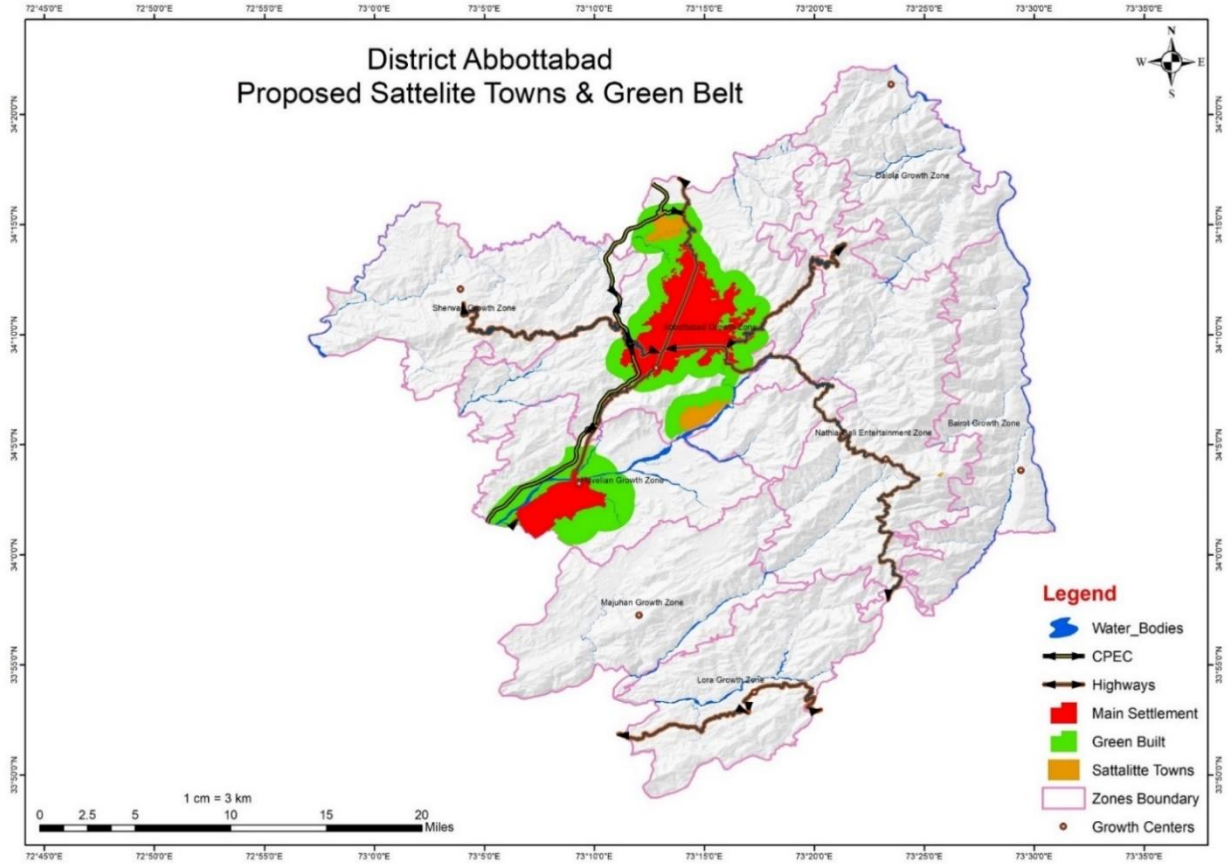
Proposed Amenities for Dalola Rural Growth Center: population projection of Dalola rural growth zone , it is calculated that following facilities are required to upgrade this rural growth zone, the detail of their required amenities are represented in below table, total land required for development will be 51 Acre in which 27 acre for housing, sector and 24 acres for other amenities are shown in given table, which will support 459 houses of 2754 residence and with the density of 102 person/acre



MAP 3-21: Sie locational map of Majuhan Rural Growth Center

GREEN BELTS

Green Belt: It is amajor part of the landuse zone in landuse planning to retain areas by haphazard unplanned growth. To stop the growth of cities 2km green belt is proposed around the existing as well as major proposed infrastructure. The aim of green belt to stop the growth of urban areas to the unwanted direction. All around the existing city and proposed towns 2 km green belt is proposed to stop the unplanned development and urbanization.



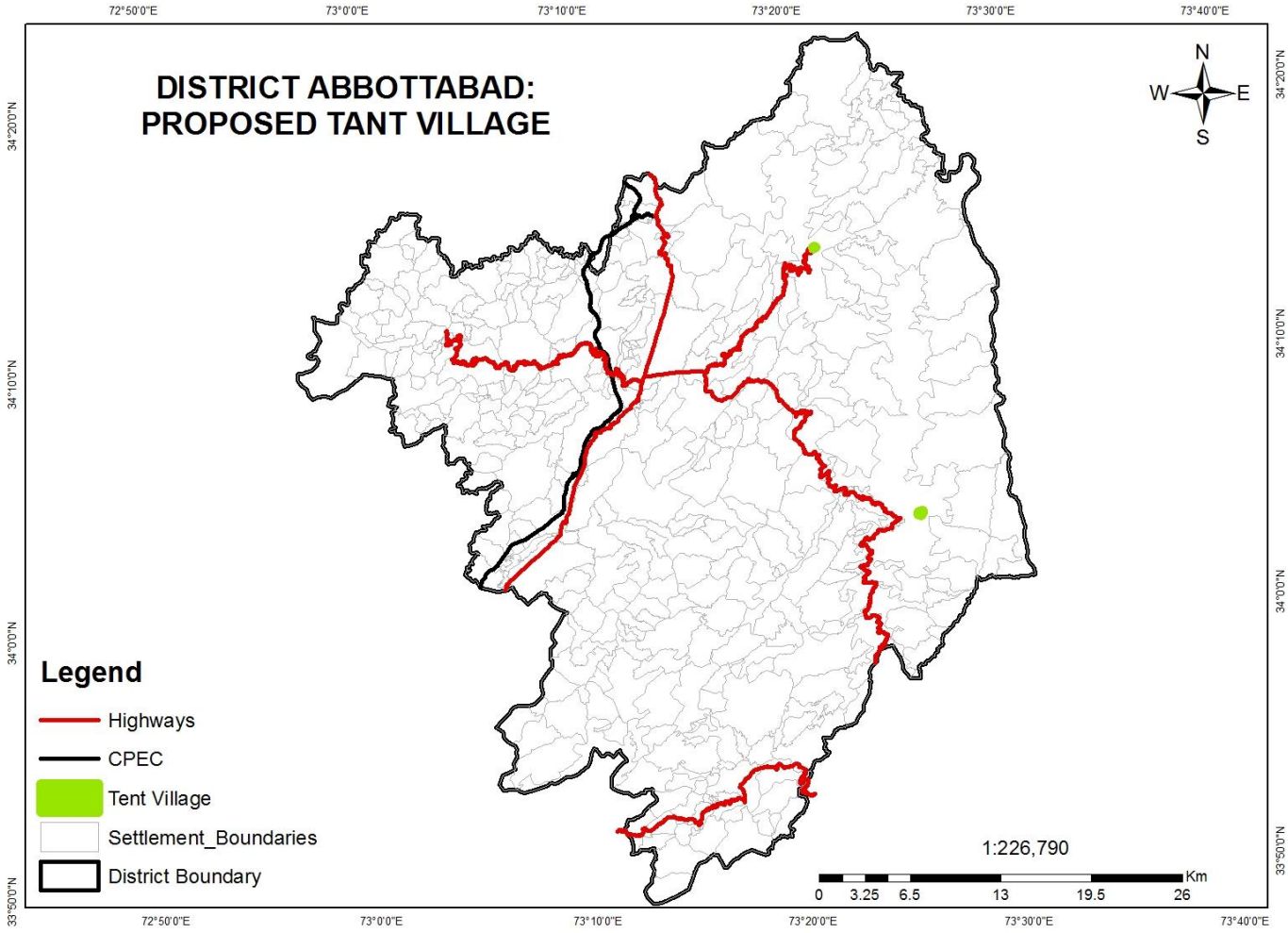
MAP 3-22: Proposed Sattalite Towns and Geen belts

PROPOSED TENT VILLAGES

Proposed Tent Village: Tent village is proposed for the purpose to facilitate the locals and as well as other visitors to take the advice of specific facilities in particular village. As we know that Abbottabad has potential to attract the tourist, two locations are selected for tent village mashpori top and another one is thandyani, the purpose of these tent village for the camping in particular season. These tent villages are also near to the community that the people are able to come down and buy amenities, total area of these tent village are 26 acres, thandyani village has 6-acre area and Mushkpori tent village has 20-acre area. These sites are selected on the basis of future extension, parking and other facilities such as

Mushkpori top is also attract point, snowfall area, near to road and also having hiking track.

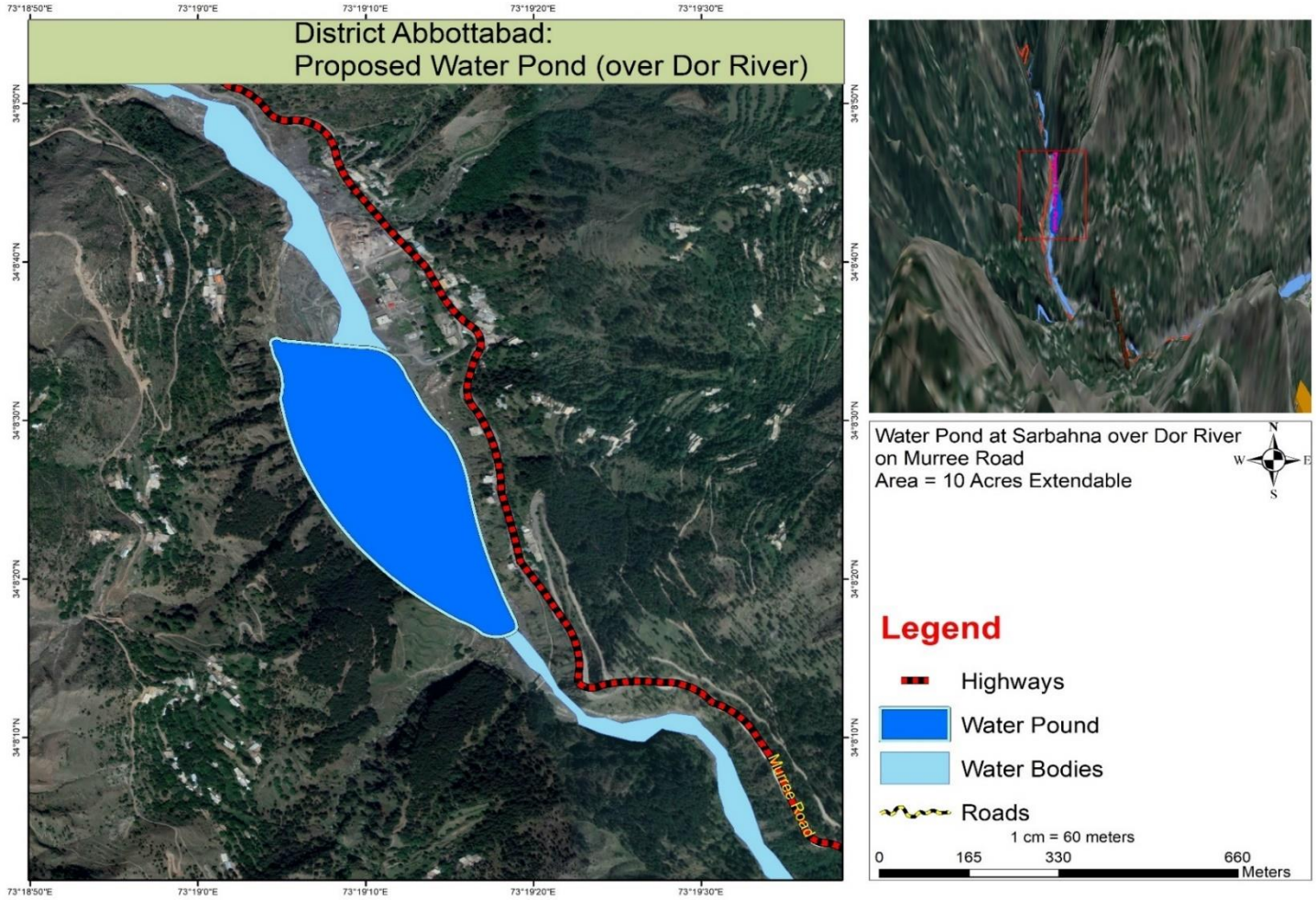
Thandiani also attract tourist due its natural beauty andit is also area of snowfall near to road tourist visit to thandyani in the season of snowfall.



MAP 3-23: Proposed Tant villages

PROPOSED POND SITE

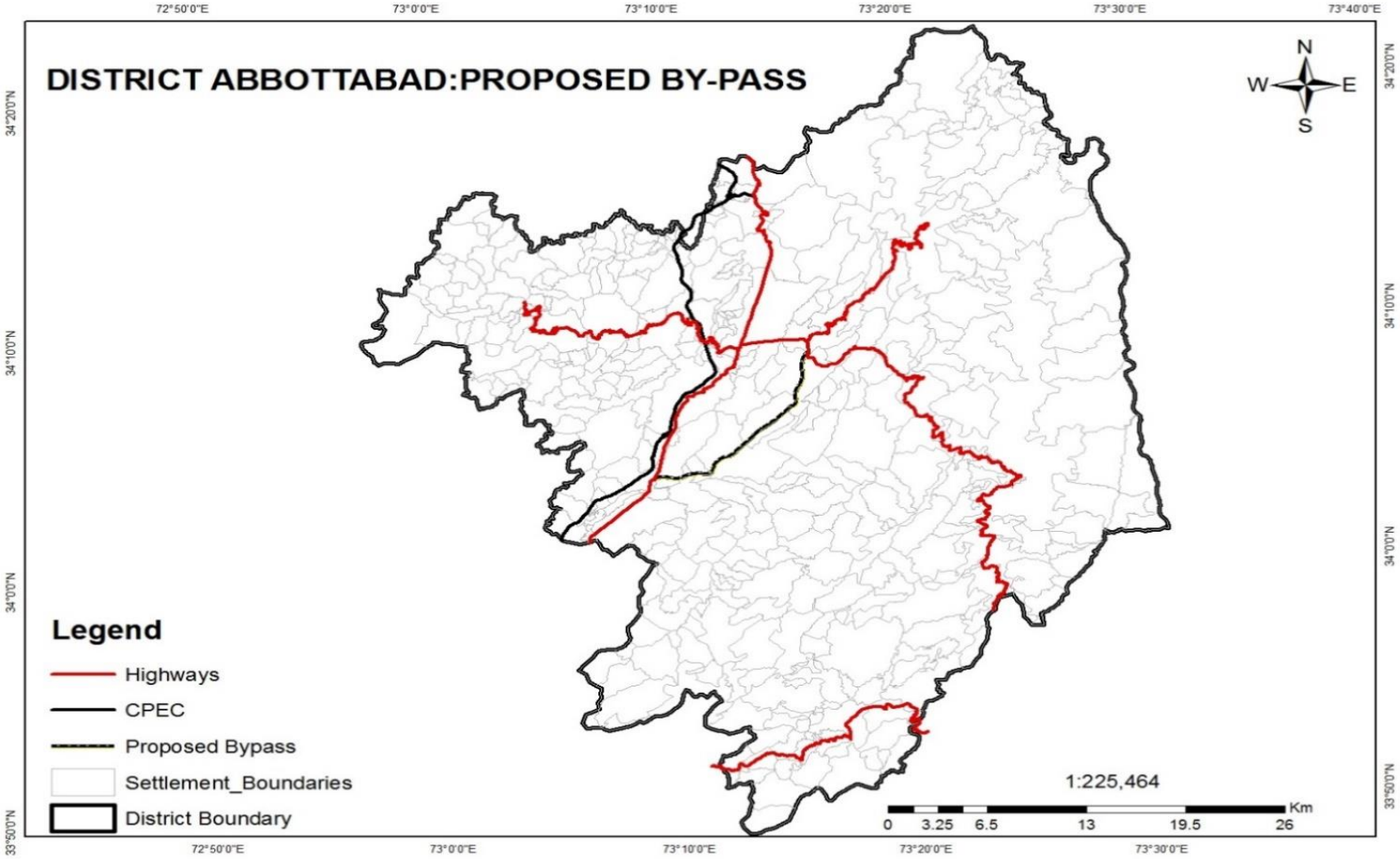
The selected site is 12 km away from the main city and contains the hotels and some extant of the existing recreational facilities in the surrounding. The site has the potential of commercial activities and the people already are attracted to this site. So 10 Arce pond is proposed to upgrade this site. which support mainly by the boating. Through this proposal income will generate in the region.



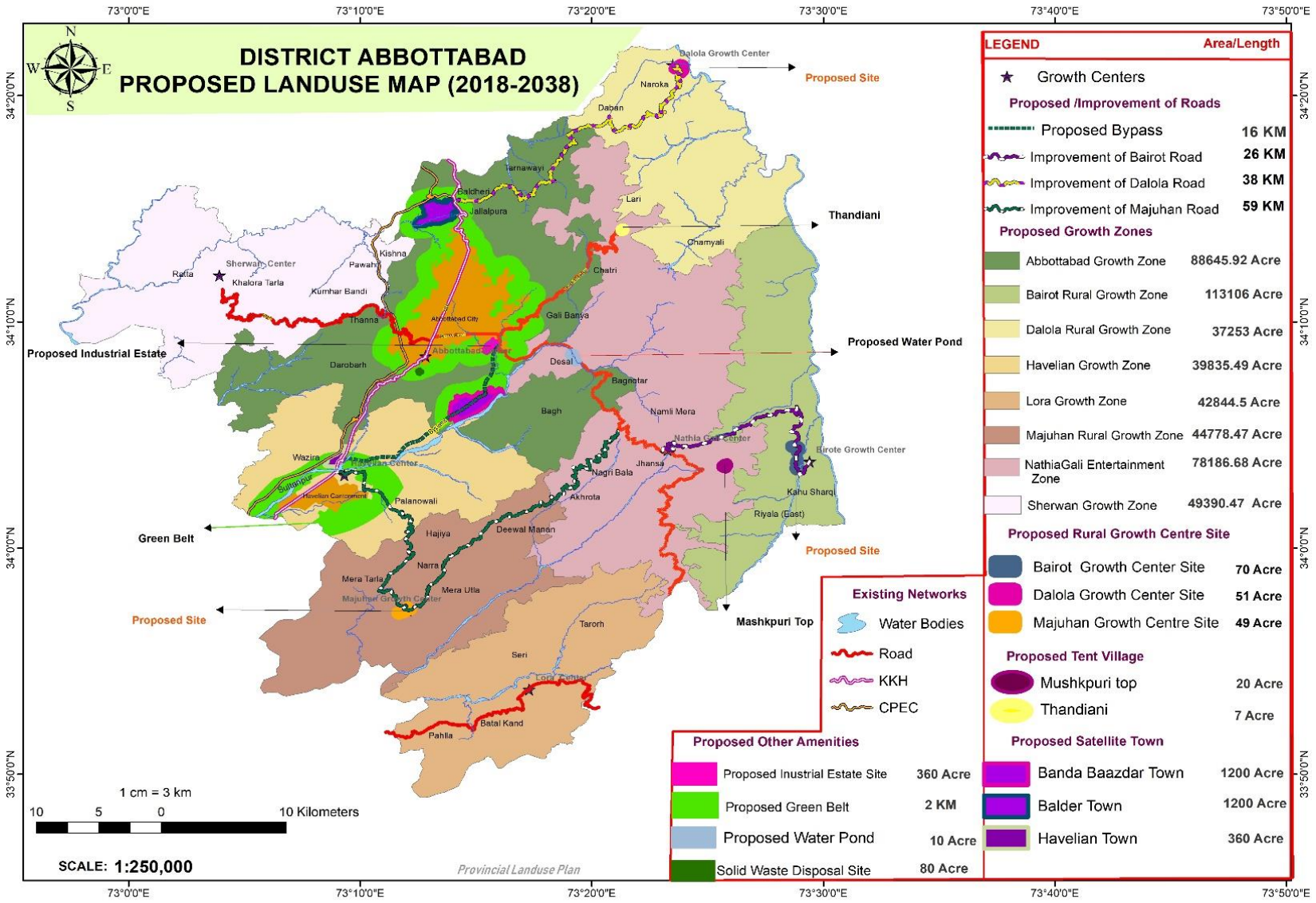
MAP 3-24: Proposed Water Pond

PROPOSED BY PASS ROAD

Abbottabad city is continuously facing the traffic congestion especially on KKH and Abbottabad Murree road. To reduce the congestion on these roads a bypass is proposed to facilitate users. For this 16 km long bypass is proposed which will also support the satellite towns and rural growth zones.



MAP 3-25: Proposed By-pass



MAP 3-26: final proposed map of district abbottabad

Chapter 4

Production Land Uses and Economy

Agricultural Land Uses

4. PRODUCTION LAND USES AND ECONOMY

4.1 Agriculture in Abbottabad

Abbottabad's economy depends heavily on natural resources and subsistence agriculture. Which is the most important feature of this report. In the meantime, only a moderately small percentage of land in the district is under cultivation. Despite the importance of agriculture and the lack of cultivatable land, the public sector has taken no measures for irrigation. Consequently, the total cultivable land is decreasing drastically as the total cultivated land has decreased. In general, for analysis purpose the land in the district may be divided into three main Classes[38].

a. Temperate Open Valleys
b. Temperate Hill Tracts
c. Cold Mountain Tracts

The Temperate Open Valley; This is the Rash Plain area. The Temperate Hill Tracts are situated to the West, South West and South of this Plain area. To the North East, East and Southeast, the cold mountains gradually ascending in height to the Mushkpuri peak. This area is denoted as the Galliyat. The Temperate open valleys receive ample rainfall which is used for irrigation purpose, though it needs to be developed.

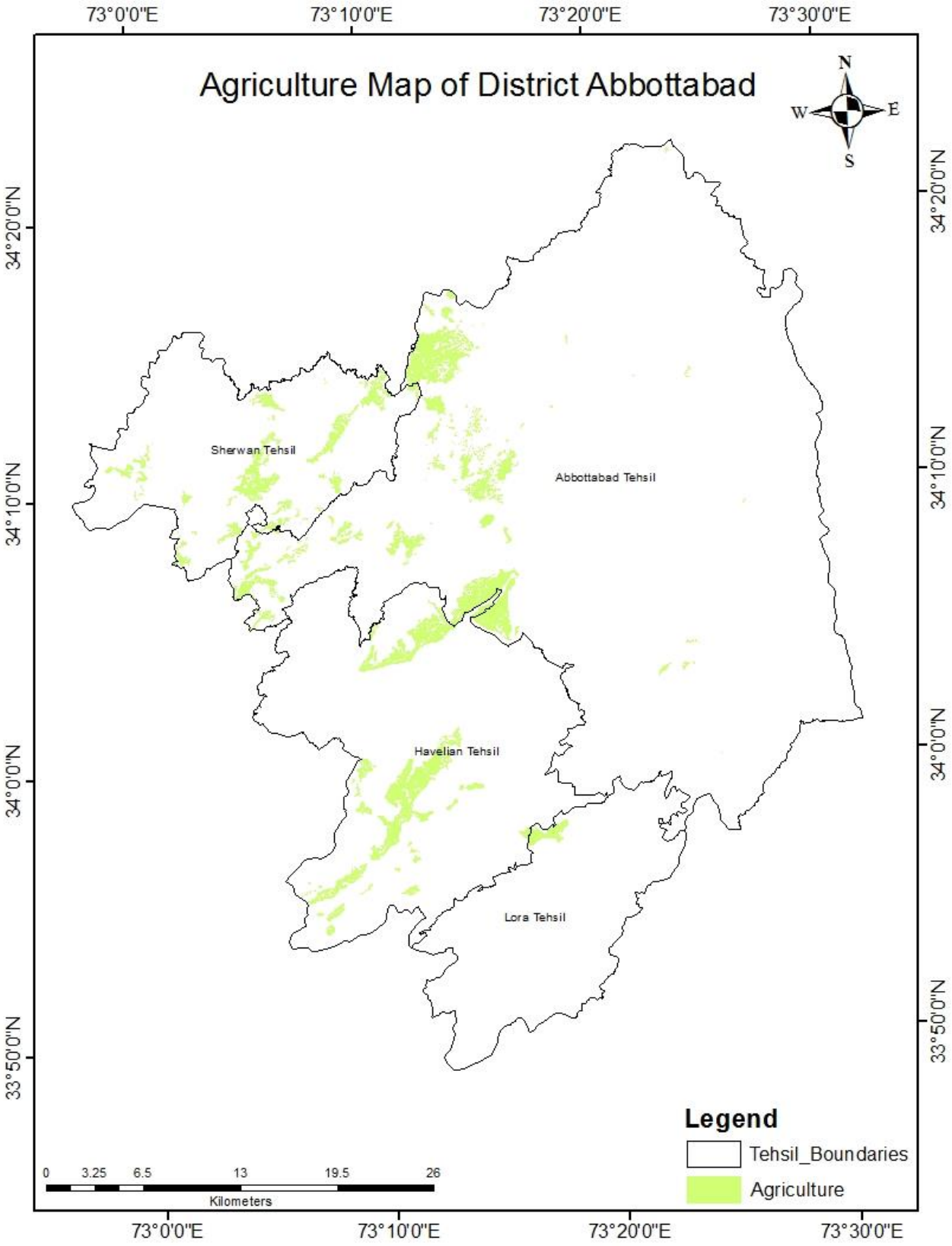
The Temperate Hill Tracts: This is rain fed area and like the plains area receive sufficient rainfall. Water Harvesting and subsequent Conservation Irrigation can lead to a manifold increase and intensification in agriculture and horticulture production. Both the temperate valleys and the Hill Tracts faced cold winters and occasional light snowfall in January and February. The Kharif crop is certain but in Rabbi season some maize crop yields available for both human and animal consumption. Most of the area is under range land is mostly use for grazing purpose Grazing is ample, and grasses are harvested before the advent of winter.

The Cold Mountain Tracts: The Cold Mountains Tracts face severe and prolonged winters and temperate summers. Precipitation is increasing in late summer with monsoon rains and heavy snowfall in winter. Maize and some rices are grown in this area. The Maize crop sometimes effect from the hailstones. Land owner are small in numbers and due to population pressure, many of the male members seek employment in the larger cities of the country. Most the population are working as labor in Middle East. Villages are usually surrounded by agricultural land. The Balakot Union Council area is Rice growing, though the rough Mountain Rice is of inferior quality. Some Barley and inferior Pulses are also grown. Fruit and vegetables are grown in a very small extent.

4.1.1 Agricultural Land Utilization

As the major proportion of the population of district Abbottabad (78 %) living in rural areas, which is pushing tremendous pressure on the agriculture sector of Abbottabad. With the rise of population, the cultivated area in District Abbottabad is declining. The total agricultural reported area of district Abbottabad is around 178,000 ha. The un-cultivated area in the district has increased drastically from 64 percent to 73 percent since 1998. So, Now the uncultivated land of district Abbottabad is 131113 ha.

[38] https://www.scribd.com/document/305893332/CHAPTER-2-Agriculture



MAP 4-1: Agriculture Land in District Abbottabad

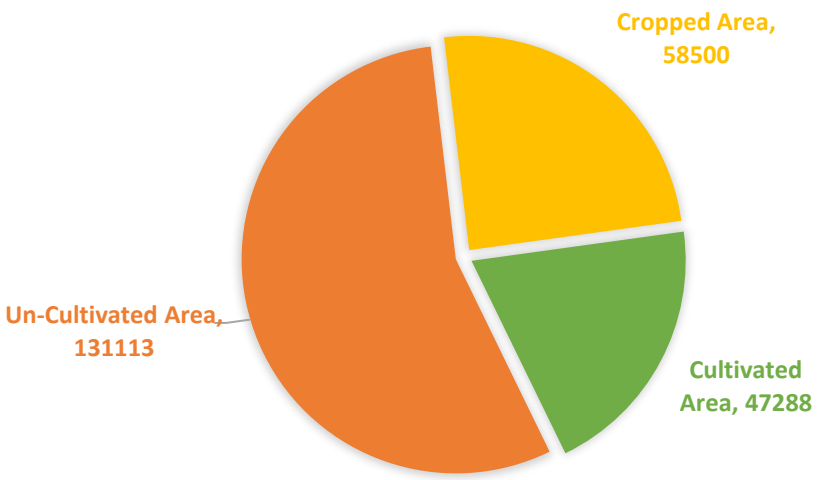


Figure 4-1:Agriculture Land in District Abbottabad

There is total 178401 hectares (ha) area reported by the agriculture department as shown in the following table wherein the cultivated area is sub divided into three sections, the first section shows total cultivated area which is 47288 ha. In the second section Net Sown area which is 43600 ha and the third section is 3688 ha is shown for the year of 2015-16. The Cropped area is also divided in two sections, the first section shows total cropped area which is 58500 ha and second section shows the area sown more than once which is 14900 ha. Than the Un-cultivated area is also divided into four sections. The first section shows the total un-cultivated area which is 131113 ha out of which 20500 ha is Culturable waste, about 54593 ha area is reserved for Forest and 56020 ha is not available for cultivation also for the year of 2015-16.

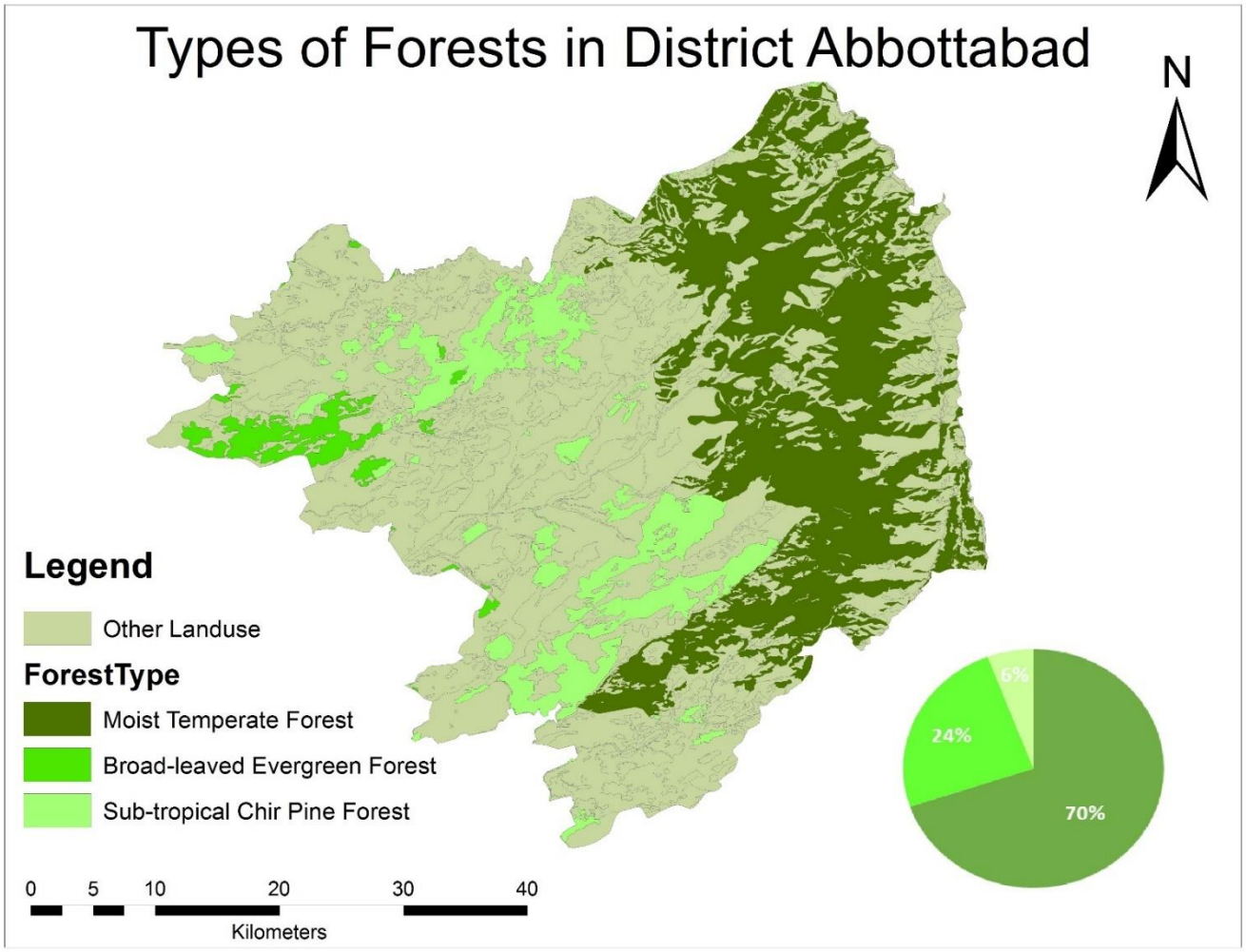
Table 4–1: Cultivated, un-cultivated and cropped area in District Abbottabad

Time		**2013-14**	**2014-15**	**2015-16**
Total Reported Area		178401	178401	178401
Cultivated Area	**Total**	**47288**	**47288**	**47288**
	Net Sown	43600	43600	43600
	Current fallow	3688	3688	3688
Cropped Area	**Total**	**58500**	**58500**	**58500**
	Area Sown More than Once	14900	14900	14900
Un-Cultivated Area	**Total**	**131113**	**131113**	**131113**
	Culturable waste	20500	20500	20500
	Forest	54593	54593	54593
	Non-Available for cultivation	56020	56020	56020

4.1.2 Forest Area

Out of the total area of 178401 hectares (30 percent 54593 ha) area is covered by forest in district Abbottabad. The study areas have enough natural resources, but these natural resources are depleting very rapidly. The present study shows that most of the population living especially near the mountain range is poor, illiterate and having no other means of income generation. Therefore, they cut forests trees for the fuel and timber not only to fulfill their domestic needs but also on commercial scale. Because there are no other alternatives of fuel wood in the area, people mostly depend upon the forest for fuel wood.

Agriculture is the backbone of the local economy in the area. The forest trees near the agriculture area are cut down to a greater extent and which ultimately increased the soil erosion and flooding. People of the area and free grazing land is available to the livestock of that area without any jurisdiction.



MAP 4-2: Types of forest in District Abbottabad

4.1.3 Range Land as given in Land Use Plan

Rangelands are grasslands, shrub lands, woodlands, wetlands, and deserts that are grazed by domestic livestock or wild animals. The area of range land as given in the land use map is 54926 ha which make 31.87% of the total area of Abbottabad. Types of rangelands include large areas of almost-flat land, desert grasslands and area of land covered with bushes. Rangelands do not include forests, barren desert, farmland, or land covered by solid rock, concrete and/or glaciers. Rangelands are distinguished from grassy land because they grow mostly native vegetation, rather than plants established by humans. Rangelands are also managed mostly with practices such as managed livestock, grazing and prescribed fire rather than more intensive agricultural practices of seeding, irrigation, and the use of fertilizers.

4.1.4 Eroded Areas

Around 16 million hectares of land, which amounts to 20 percent of the total area of Pakistan, is affected directly or indirectly by soil erosion. Out of the total eroded area, 11.2[39] million hectares are affected by water only. A huge amount of rainwater is lost annually due to run-off in the Potohar region. This occurs due to various reasons, including high intensity and short spell of rainfalls and lack of awareness among professionals and farmers about watershed management and rainwater harvesting techniques. This loss of water also leads to loss of fertile soil, which increases flood severity in lowland areas and results in silting in dams, rivers and ponds, thereby decreasing their storage capacity.

The mountain ridges and terraces lying on the western and eastern boundaries of the district are severely eroded because of landslides, landslips, rock falls and debris flows[40]. Inceptisols and chromudertic soils are the most common soil types found in the district. The inceptisols form level, productive basin plains, while the chromudertic soils form piedmonts and undulated, dissected gullied lands. The soils of Ayubia and Bagnotar range from humid to sub humid tropical continental.

The main factors contributing to erosion are environmental, socio-economic and Politico-institutional. There is extensive rainfall during the summer monsoon. This results in numerous hill torrents. This in turn causes flash flooding. Thus, the major risk of erosion is in summer. The period between May to August provides a window of maximum rainfall, with minimum crop cover due to harvest of wheat and planting of maize. In many parts of the district, due to misuse of land and the unscientific management of various soil classes aggravates erosion. Deforestation and over grazing on fragile mountain slopes are a major contributor. Farming often does not follow the contour and land use is often inappropriate. Since tenants till most of the land, they do not go in for expensive conservation practices. They have meager resources and avoid sinking capital into the land. Land sliding, stream bank erosion, gullying, sheet wash, splash and rill erosion is in evidence. Fertile topsoil is constantly being lost, leading to siltation lower down. Deforestation on the Western and Southeastern sides of the district have made more excessive erosion. Reduction of the Forest canopy on the East is also causing problems. To overcome the ongoing soil degradation and erosion process following are some suggestive measures:

- Conservational Irrigation {Sprinkler, bubbler, drip, reticulation (sub soil)
- Small-scale Dams
- Proper land use according to capability
- Bunds to control surface runoff

[39] https://dailytimes.com.pk/45211/20-of-pakistans-land-affected-by-erosion/
[40] Abbottabad state of environmental development (Soed)

- Reforestation and stratification

4.1.5 Agricultural Production Profile of the District

There are two cropping seasons in district Abbottabad: Rabi and Kharif. Rabi crops are sown in October-November and harvested in October-November. Wheat, Barley and Rape seed and Mustard are the principal crop of Rabi season. Besides wheat, Rabi fodders are also grown during this season. Main Rabi fodders are Barley, Mustard and Shaftal. Maize is the only crop grown in Kharif Season. Some vegetables are also bring grown on the area of 122 hectares. 669 hectares of area is used to grow fruits in Abbottabad. The cropping pattern in the district is inscribed as below:

Crops. there are four Majors crops that are yield in District Abbottabad i.e. Maize in the Kharif season where 2015-16 total area occupied by maize was 14603 hectares and its production is 22301 tons, which has been reduced about 1 percent in the past two years, while Wheat, Barley, Rape seed and Mustard in the Rabbi season, during 2015-16 the total area occupied by wheat is 14719 hectares and its production was 25858 tons with an increase in both area and production in comparison with 2014-15. In 2015-16 there was no production of barley; however, in the year 2014-15 barley production was 269 tons cultivated on the area of 193 hectares and in 2015-16 total cultivated area for rape seed and mustard was 61 hectares and 25 tons had been produced. It was slightly increased in both the area and production since 2014-15. The detailed statistics are given the following table 4-2.

Table 4–2 Main Crops in Abbottabad District (Ton)

Time	Indicators	Kharif crops	Rabi crops		
		Maize	Wheat	Barley	Rape seed and Mustard
2013-14	Area (ha)	15013	14469	185	37
	Production (Ton)	22492	23612	259	29
	Yield per Hectare in Kg	1498	1632	1400	784
2014-15	Area (ha)	15007	14469	193	60
	Production (Ton)	23268	23832	269	24
	Yield per Hectare in Kg	1550	1647	1394	400
2015-16	Area (ha)	14603	14719	0	61
	Production (Ton)	22301	25858	0	25
	Yield per Hectare in Kg	1527	1757	0	410

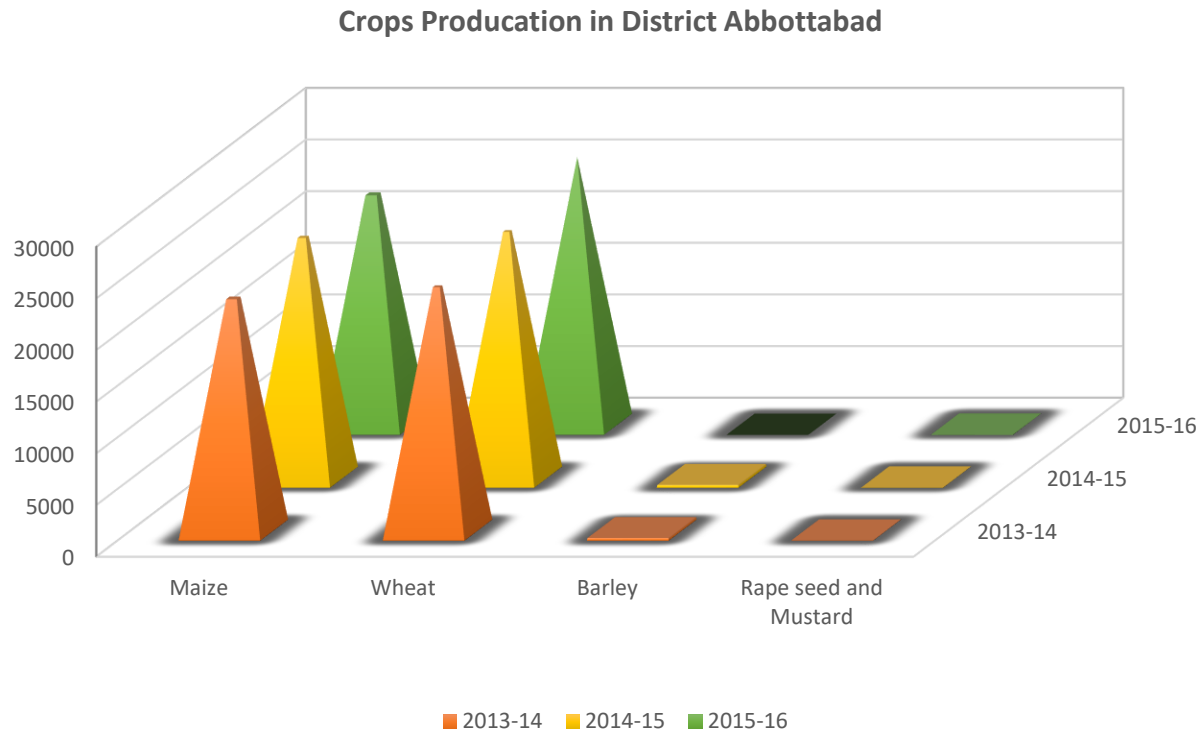


Figure 4-2:Crop Producation in District Abbottabad

Fodders; it is a type of animal feed, is any agricultural foodstuff used specifically to feed domesticated livestock, such as cattle, rabbits, sheep, horses, chickens and pigs. "Fodder" refers particularly to food given to the animals (including plants cut and carried to them). Fodder is also called provender and includes hay, straw, silage, compressed and pelleted feeds, oils and mixed rations, and sprouted grains and legumes (such as bean sprouts, fresh malt, or spent malt). Common Kharif fodders of the district are Maize, Mung, Mash and sorghum while that of Rabi fodders are Barley, Masoor, Mustard, Peas and Shaftal. According to the crop statistic 2010, the total area occupied by the fodders was 907 acers.

Table 4–3: Fodders (area in hectares)

Table 4.7: Fodders (area in hectares)				
Kharif	**Rabi**	**Total**	**Irrigated**	**Un-irrigated**
493	414	907	26	881

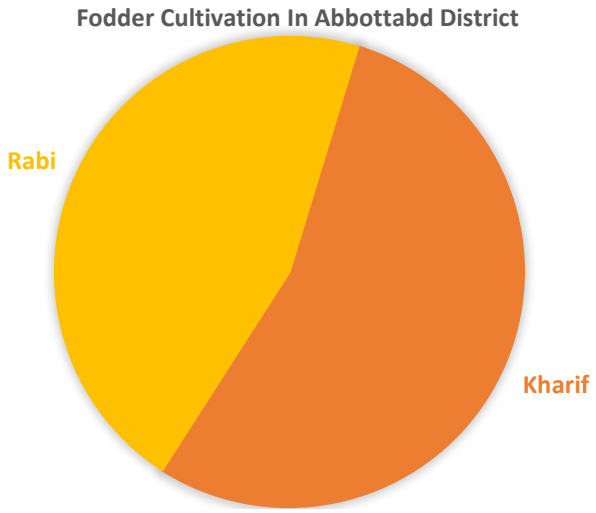


Figure 4-3:Fodder Cultivation In Abbottabad District

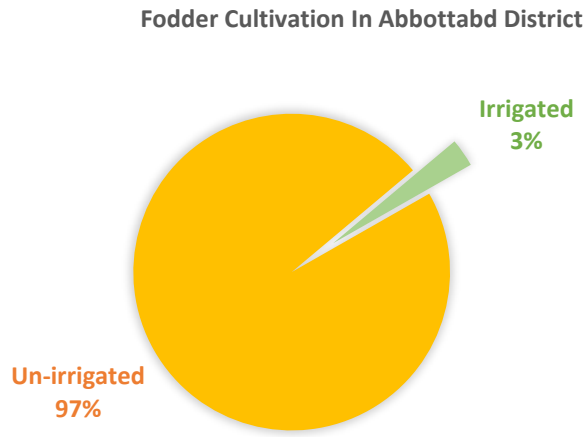


Figure 4-4:Fodder Cultivation in Abbottabad District

According to the (ATLAS 2012, FAO) the distributions of fodders by types are as follows, 530 tons of Sorghum was cultivated on the area of 845 hectares and the yield per hectare was 0.63 per kg. The second most cultivated fodder was Peas with the production of 19 tons on the area of 27 hectares with yield per hectare of 0.7 per kg. The third and mostly cultivated fodder is Moong with production of 4 tons on the area of 12 hectares, forth is Mash with the production of 3 tons of the area of 6 hectares and Masoor is also cultivated on the area of 1 hectare with the production of 1 ton with the highest yield per hectare in the district.

The details of Fodders distribution are given the following figure and the table:

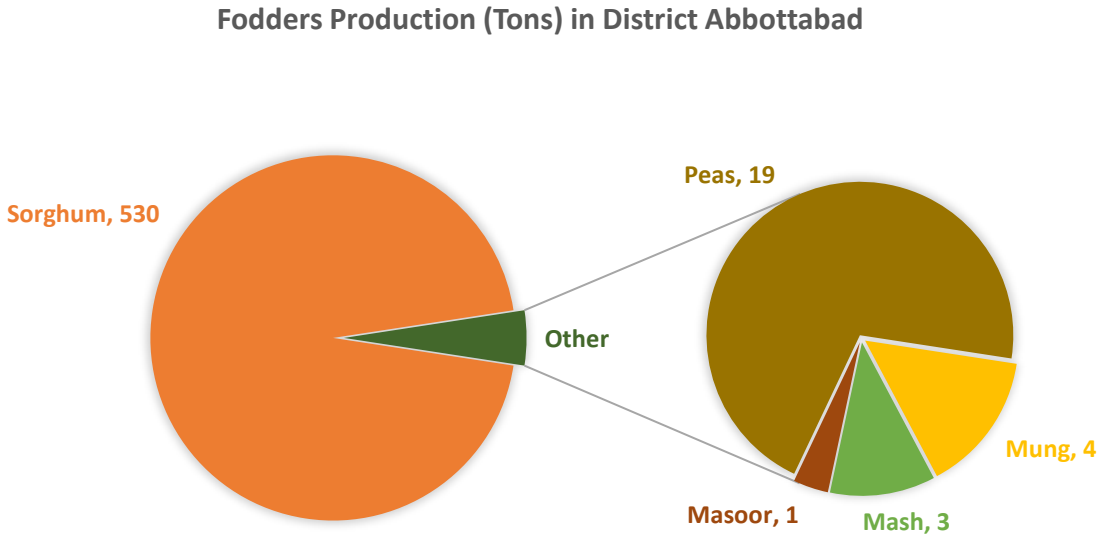


Figure 4-5:Fodders Production (Tons) in District Abbottabad

Table 4–4: Fodder Cultivation and Production in Abbottabad District

Crops	Area (ha)	Production (ton)	Yield per Hectare in Kg
Sorghum	845	530	0.63
Mung	12	4	0.33
Mash	6	3	0.5
Masoor	1	1	1
Peas	27	19	0.7

Vegetables: Vegetables are used for their fresh edible portions. Vegetables are also grown due to persistent demand from nearby towns. These include spinach, cauliflower, potato, turnip, carrot, radish, tomato, pumpkin, bitter guard, potato, ladyfinger, eggplant, etc. During 2015-16 vegetables cultivated in Rabi season occupied 60 hectares and 845 tons of vegetable was produced, while in Kharif season 435 tons of vegetables were cultivated on the area of 57 hectares. The total area and production both were increased in comparison of previous years as given in details in the graph and the table below.

Table 4–5: Distribution of Area, production and Yield by Vegetables in District Abbottabad

Year	Characteristics	Rabi Vegetables	Kharif Vegetables	Total
2014-15	**Area**	62	60	122
	Production	876	363	1239

	Yield per Hectare in KG	14129	6050	20179
2015-16	**Area**	60	57	117
	Production	845	435	1280
	Yield per Hectare in KG	14083	7632	21715
2016-17	**Area**	18	52	70
	Production	264	5068	5332
	Yield per Hectare in KG	14.6667	97.4615	112.128

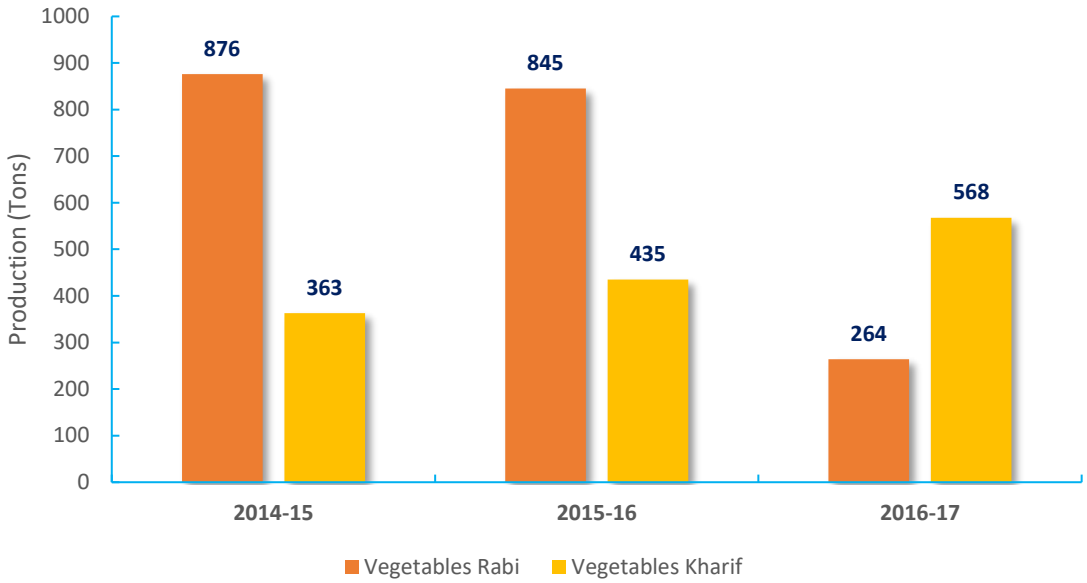


Figure 4-6:Vegetable Production (Tons) in Abbottabad District

There are a total of 13 Vegetables which are cultivated in the district in both Rabi and Kharif season, the highest cultivated Vegetable in the season of Kharif vegetables for the District in 2017 was Arm. According to the crop reporting service with the production of 86 tons on the area of 16 hectares with yield per hectare of 5kg, the second mostly cultivated vegetable in the season is Lady finger with the 82 tons on the area of 5 hectares. Other cultivated vegetables in Kharif season includes Tinda, Brinjal, Pumpkin and Tomato. While the highest cultivate vegetable in kharif Rabi season was Turnip with the production of 83 tons on the area of 4 hectares with the highest yield per hectare of 21 kg in the whole District, other cultivated vegetables includes Spinach, Tomato, Cauliflower, Cabbage, Peas and Radish. The Details are given in figure below:

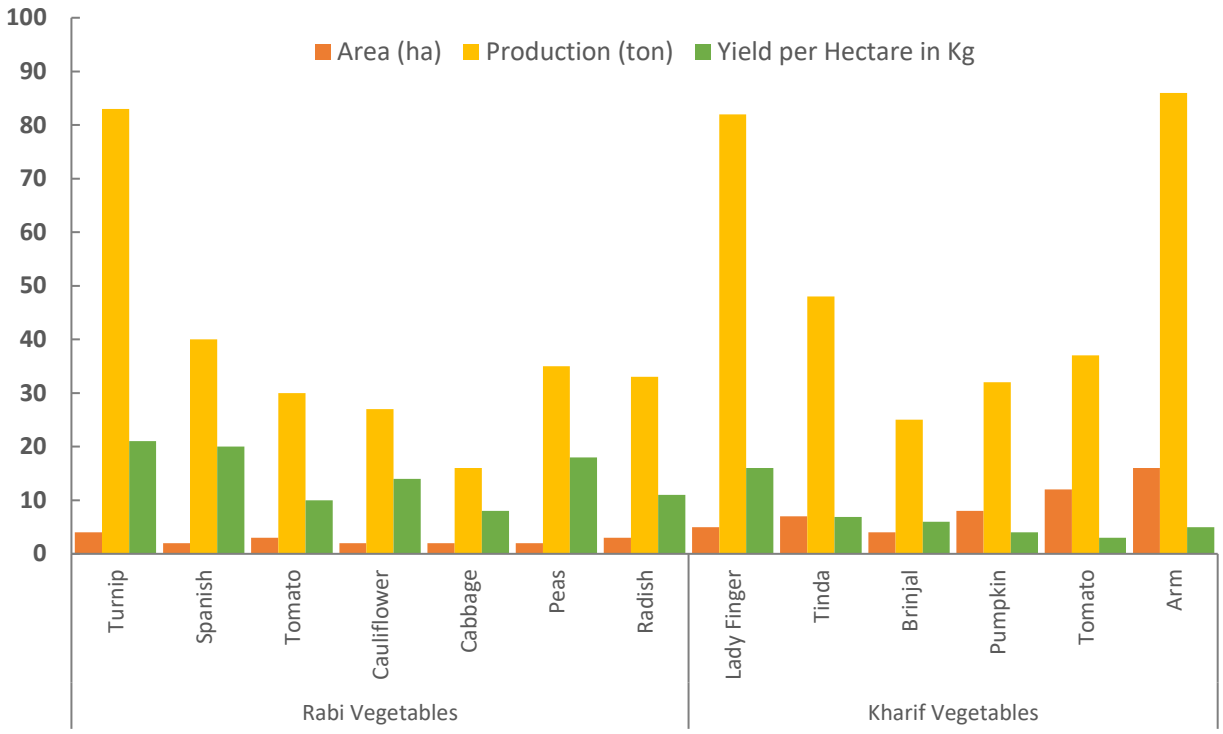


Figure 4-7:Distribution of Vegetable Cultivation, production and Yield in Abbottabad District

Table 4–6: Distribution of Vegetable Cultivation, production and Yield in Abbottabad District

Crops		Area (ha)	Production (ton)	Yield per Hectare in Kg
Rabi Vegetables	Turnip	4	83	21
	Spanish	2	40	20
	Tomato	3	30	10
	Cauliflower	2	27	14
	Cabbage	2	16	8
	Peas	2	35	18
	Radish	3	33	11
Kharif Vegetables	Lady Finger	5	82	16
	Tinda	7	48	6.87
	Brinjal	4	25	6
	Pumpkin	8	32	4
	Tomato	12	37	3
	Arm	16	86	5

Fruits: Mostly grown fruits in Abbottabad are apple, apricot, pomegranate, persimmon, figs, grapes, plum, walnut, pear and peach. Fruits in Abbottabad are only grown in Kharif season, the total area occupied by fruits are 695 hectares and 5723 tons of fruit produced.

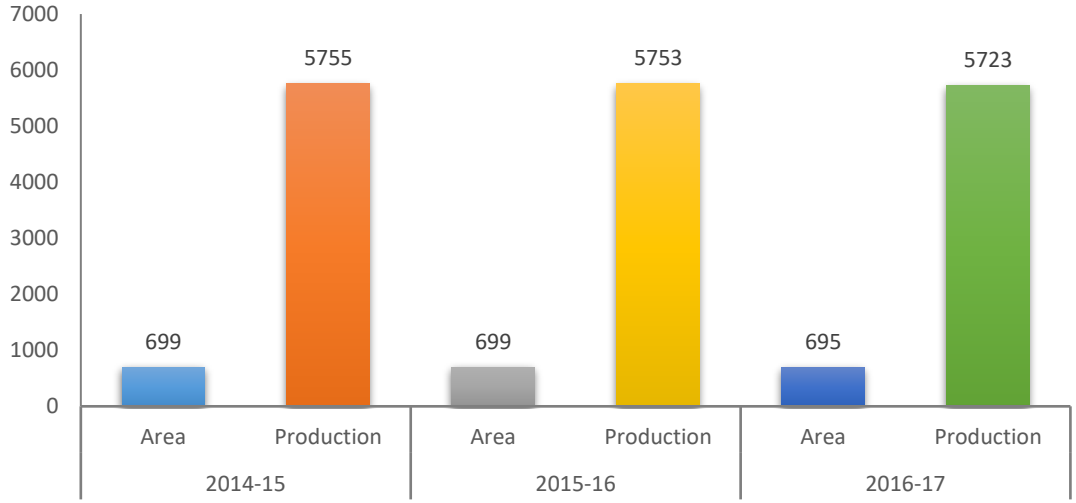


Figure 4-8:Cultivation Area (ha) and Fruit Production (Ton) in Abbottabad District

A comprehensive fruit production details in terms of area coverage, fruit production with seasonal differences during last three years are given in the following table:

Table 4–7: Distribution of Area by Fruits in District Abbottabad (Hectares)

Fruits		Rabi Fruits	Kharif Fruits	Total
2014-15	**Area**	0	699	699
	Production	0	5755	5755
	Yield per Hectares in KG	0	8233	8233
2015-16	**Area**	0	699	699
	Production	0	5753	5753
	Yield per Hectares in KG	0	8230	8230
2016-17	**Area**	0	695	695
	Production	0	5723	5723
	Yield per Hectares in KG	0	8235	8235

According to the crop reporting services, in 2017 district Abbottabad the highest Cultivated fruit in the was Apple with the production of 4797 tons on the area of 572 hectares. The second mostly produced fruit is Plum with the cultivation of 378 tons on the area of 45 hectares. Other fruits produced in the district are Apricot, Figs, Pear, Peach, Pomegranate, Walnut, Persimmon and Grapes.

The details are given in the following table.

Table 4–8: Distribution of Fruits Cultivation, Production and Yield in Abbottabad District

Fruits	Area (ha)	Production (ton)	Yield per Hectare in Kg
Apricot	11	76	6.9
Apple	572	4797	8.3
Figs	4	19	4.7
Pear	3	28	9.3
Peach	19	166	8.7
Plum	45	378	8.4
Pomegranate	10	43	4.3
Walnut	15	91	6
Persimmon	14	119	8.5
Grapes	2	6	3

4..1.6 Water Management Issues

The biggest water management issue is the growing scarcity of irrigation and drinking water in District Abbottabad. A large part of agricultural area in District Abbottabad is rain-fed, due to which farmers face many problems. Monsoon rains usually start in the month of July lasting till September. This is followed by a dry spell lasting for about two months. The average annual rainfall in the Abbottabad District is 2673 mm and the climatic division of Abbottabad lies is the sub-humid division of the subtropical continental highlands. This is characterized by rainfall from both monsoon (July to October) and western disturbances (January to April), giving a twin peak type distribution with the maximum precipitation occurring in July to October. November and December are the driest months with less than 30 mm rainfall. The Galliyat area of Abbottabad District receives about 89 rainy days a year.

Related to water management and the consequent agricultural activity some other issues are:

- Shrinking water resources
- High water losses in irrigation system
- Over exploitation of groundwater
- Limiting/diminishing energy resources
- Low agricultural productivity

4.1.7 Types of Irrigation

The total Reported area of District Abbottabad is 178401 ha. Out of total 26.5% area is for cultivation. Agriculture is the mainstay of the district's economy, but the sector operates at a subsistence level. Out of total the 43680ha land is under cultivation, only 12.6 percent is irrigated. The remaining 38180 ha of farmland depends exclusively on rain. As a result, per-hectare yields is low and local demand for cereal crops such as maize and wheat is meeting through imports. Barring apples and potatoes, the district has few horticultural outputs.

Table 4–9: Type of Irrigation Use for Agriculture in District Abbottabad

Year			2013-14	2014-15	2015-16
Irrigated	Total		5500	5500	5500
	Canals	Govt	4960	4960	4960
		Private	0	0	0
	Tanks		30	30	30
	Tube wells		400	400	400
	wells		60	60	60
	Left pump		50	50	50
Un-Irrigated	Barani		38180	38180	38180

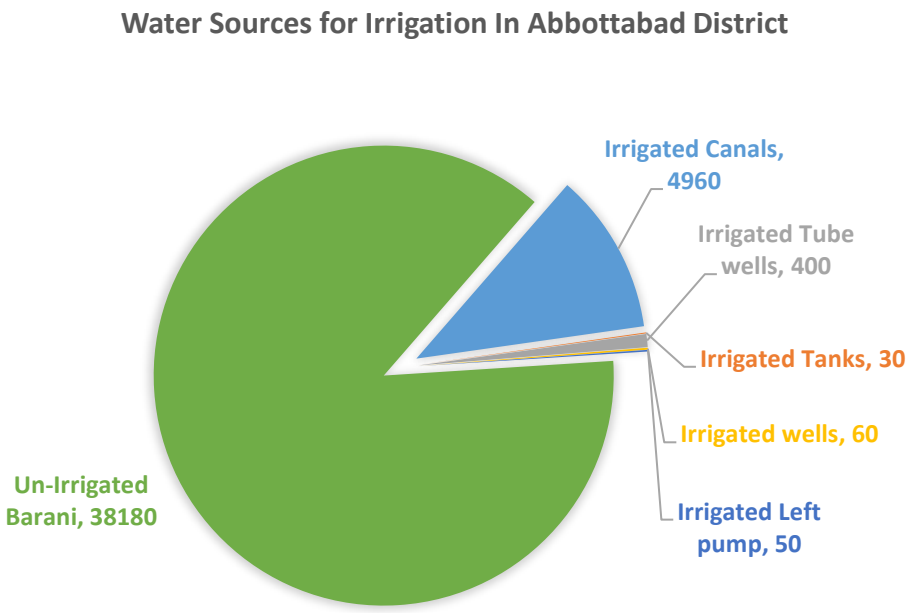


Figure 4-9:Sources of Irregation in District Abbottabad

4.1.8 Agricultural Employment

Most of the people in rural area are farmers in profession. They are engaged either directly or indirectly in agriculture. Agriculture is the major source of employment in rural area. Like other parts of Pakistan, the share of agriculture in employment has decreased over the year. Still it is larger than any other sector of the economy. As described in the 1998 district census report of the Abbottabad approximately (26.63 percent) of the rural population are employed as labor force. According to the district census reports 1998 of Khyber Pakhtunkhwa the total Labor force involved in the district in various industries are 304778. Out of which 230645 containing both sexes are working in rural areas.

Table 4-10 shows labor force in rural areas of the district.

Table 4–10: Division of Labor Force in Rural and Urban Areas in Abbottabad District

Labor Force (All Areas)	Labor force (Rural Areas)		
Both sexes	Both sexes	Male	Female
304778	230645	226332	4313

Agriculture labor is of three types i.e. family labor, casual hired labor and permanent hired labor. Small and marginal farms generally use family labor only. On large farms, the relative importance of family labor declines owing to:

- The need to supervise work done by hired labor,
- Consideration of social status, and
- Alternative employment opportunities for family members by their better education.

Therefore, large farmers usually hire labor to cultivate their land and perform domestic activities, in most of the casual hired labor was mainly used in land preparation, sowing, hoeing/weeding, harvesting and picking of vegetables/fruits.

The problem of underemployment in agriculture is due to surplus labor. Farm size decreases over time due to division of land holdings or heirship. Many of small farmers doesn't have enough land to fully employ their labor hours. This leads to underemployment in agriculture. Measuring the level and trends of working hour is important to calculate the level of underemployment. The level of engagement of agricultural labor is linked with the farm size.

4.1.9 Impact of urbanization and settlement growth on agriculture

Out of the total population of the Abbottabad (1332912[41] people), around 78 percent (1039775 people) of the population dwells in the rural area which is putting intense pressure on agriculture sector. Conversion of agricultural land to nonagricultural uses is probably more intensive in Khyber Pakhtunkhwa than other provinces of the country. A prominent feature of this global trend of urbanization is forced displacement triggered by armed conflict, violence, political instability or slow and sudden onset disasters or a combination of these factors. To accommodate the natural population growth of the region and the influx of the people from the other areas, more and more agricultural land is being converted to nonagricultural uses. Land conversion is a process by which land is converted from agricultural to urban

[41] Census report of District Abbottabad 2017

uses. There is a dispute on whether agricultural land fringing should be maintained or converted to other uses. This debate can be revealed from both the pro-ruralist and the pro-urbanist perspectives. Only proper planning can manage or stop that trend through various planning proposals.

In the pro- ruralist's view; land conversion has negative impacts, the loss of prime agricultural land reduced agricultural jobs and devastate the investment in irrigation infrastructure. Consequently, it will affect agricultural production and intimidate the food security. Pro-ruralists, conclude that agricultural land is reserved to maintain food production.

The pro-urbanites; The pro-urbanites argue that land conversion is a logical outcome of urban growth. The decrease of agricultural production, they suggest, that it can be resolved by intensification and technological development.

Irrespective of the views of both urbanite's and the ruralite's, the present trend is the decline in agricultural activity (cultivation) in the district. The total area available for cultivation in the year 1997-1998 was reported 63372 hectares, but it reduced to (47288 hectare) in 2015-2016, showing a decline of around 25.38 percent in a period of 18 to 19 years. The comparison shows that the agriculture sector is in decline as 16084 hectares of the area was reduced from the agriculture sector indicating a depreciation in the agricultural land at the rate of 893 hectares each year.

Table 4–11: Total Cultivated area in Abbottabad District

Year	Total Reported Area	Cultivated Area		
		Total Cultivated Area	Net Sown	Current Fallow
1997-98[42]	178401	63372	52472	10900
2015-16[43]	178401	47288	43680	3608
Difference	0	16084	8792	7292

[42] Source: District Census Report of Abbottabad, 1998, Table 1.2, Page 4.
[43] Source: Khyber Pakhtunkhwa Development Statistics, 2017, Table 43, Page 51.

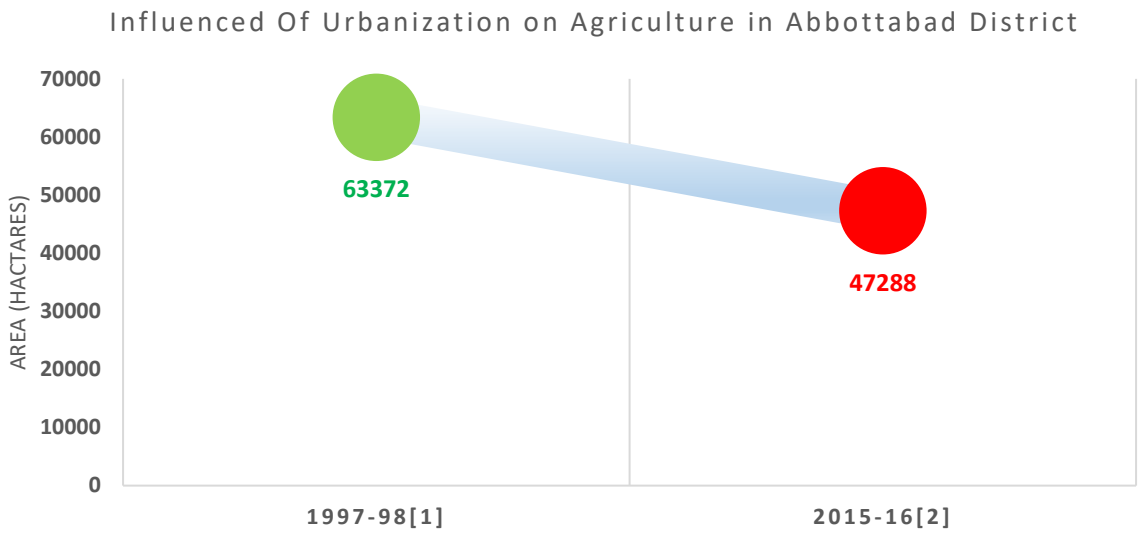


Figure 4-10:Influenced of Urbanization on Agriculture in District Abbottabad

There are several reasons because of which the decline in the agriculture land is taking place, the most major reason for the decline is the Lack of irrigation facilities. As Agriculture sector depends upon the rain water in district so, shortage of irrigation facilities causes a serious limitation in the expansion of crop area in Abbottabad. The lower water supplies in water course of the agriculture fields is the serious problems of farm sector. The second major problem is land reforms and Uneconomic Land Holdings. Due to increase in no of population and division of land under the law of inheritance, landholdings are subdivided repeatedly. The result is that very large number of farmers has less than 2 hectares of area. Moreover, holdings are scattered. It is difficult to use modern machinery on small pieces of land. Land reforms have been implemented against the will of people. There is an urgent need to conduct a proper land reform for improving agricultural growth. Due to this problem agricultural production cannot increase to the required level. Other reasons include the trend of Industries, many fertile lands turned barren. These unemployed workers are not being absorbed in the other sectors of the economy, reason being the global recession.

In view of the continuous neglect of the agriculture sector in the past and realizing its importance for future growth, the Chief Minister, Khyber Pakhtunkhwa, constituted a committee under the supervision Minister for Agriculture, Livestock and Cooperatives Department and Chief Secretary Khyber Pakhtunkhwa. Secretary Agriculture and private sector stake-holders are also the members of the said committee. The committee was tasked to suggest immediate policy measures which should have positive impact on the farming community. The Committee came up with a comprehensive policy document for medium and long-term interventions, including the following aspects:

- Food security/self sufficiency
- Poverty reduction
- Integration & Improvement of services delivery system

- Capitalizing on the comparative advantage
- Strengthening public private partnership
- Participation of farming community in decision making
  - Conservation of water resources
  - Providing relief in tax regime
  - Gender Mainstreaming.

4.1.10 Issues and Constraints in Agricultural Sector

Based on preceding discussions on the agricultural sector in Abbottabad district the following issues and constraints are given

- One of the major concerns of Abbottabad is the increasing rate of un-cultivated area in the district. Most of the easily cultivable land within the District is already cultivated. However, a great potential exists for increasing this production intensively and extensively.
- There is a deficient and deteriorating system of irrigation in Abbottabad district causing the decline in the farm area.
- Lack of access to extension services as there exists a huge communication gap between well qualified experts (extension workers) and subsistence farmers. Even the farmers don't know about the extension department and workers because these experts are not reluctant to go into the farmer's community.
- Burdon of agriculture loans on the farmers as they are entrapped in agriculture loans as their agriculture production is not enough to support their family and to payback their loans.
- Adherence to the old traditional farming as most of the farmers are still sticking to the old traditions. Small holdings of land and poverty they are unable to acquire and use modern technology—leading to yields which are lower than that of other provinces of the country.
- SCARP Project have reclaimed most parts of the district successfully, but still other parts of the district need agricultural land reclamation.
- Due to lack of agricultural education and methods of modern research, the farmers of the locality cannot control the various diseases of crops and attacks of pests and insects.
- Most of the farmers don't know the cropping patterns well i.e. to grow exhaustive crops vs restorative crops so no mechanism has been adopted to eradicate the soil erosion and even after harvesting nothing is done to improve or restore the soil fertility, resultantly, the fertility of soil is decreasing day by day.

4.1.11 Recommendations for Agriculture Sector

- A total of 11.49 percent is represented as cultivable waste, while 2.02 percent lies fallow. Thus, 13.51 percent of available land is presently not being used for agriculture. A total of 24.48 percent of the Districts land is under cultivation. However, out of this figure only 8.34 percent is sown twice. This too is producing dismally due to a variety of reasons elaborated elsewhere. Thus, 16.14 percent of the land is under-utilized which can be used for cultivation.

- If there is proper mode of Irrigation, Soil Conservation and Proper Plant Nutrition, along with provision of quality inputs in the shape of seed and root stock will give a tremendous boost to agricultural and horticultural production in the district. Much revenue and employment can be generated through this Sector alone.
- More and more multinational companies should be encouraged in the district so that the farmers can get the best price.
- On farm training regarding new technology should be regulated.
- Competition among the farmers for best production should be encouraged.
- In rain-fed area those farmers who have made their own tube wells, their water canals should be concreted to decrease their water loses and fuel consumption and increase their profitability.
- The water storage capacity is decreasing due to sedimentation. To increase production to meet food requirements of the locality, additional water must be provided. The additional water reservoirs may therefore be started immediately.
- Various plant diseases damage a large part of our crops. But our procedures should be simplified, and various marketing facilities should be provided to the cultivators. Farmers have no effective control over them. Therefore, preventive and narrative measures should be taken.
- As most of the villages of the district is located on a distant from the main markets, so the transportation system should be improved through roads.
- Interest free loans should be provided to the poor farmers and modern machinery and equipment should be provided to them.
- They should provide modern machinery and equipment, i.e. for farming and cropping.
- Annual Development Plan's projects or donor funded programs in the different field of agriculture should be included in Budget.

Chapter 4

Production Land Uses and Economy

Livestock Industry

4.2 Livestock Sector

Most farm households in the district practices small-scale mixed farming, where byproducts of the livestock sector serve as important household inputs. The manure is the primary source of fertilizer, dung cakes are used as fuel, and animals are employed for draught purpose. Besides being a source of cash income, the milk, dairy products, meat and eggs also meet some of the protein requirements of the household.

The livestock sector contributes 30.9% of the total agricultural income in the province and complements the agricultural incomes of small and landless families. More than 70% of the families own livestock. More than 15 million animal and around 22 million poultry in the province, livestock is a significant supplement to the families covering nutritional and cash requirements[44]. Modern, large-scale livestock management systems have not been adopted on any substantial scale. For example, it is estimated that only 9% of buffaloes are managed on a commercial scale. Production is dependent on rangeland grazing. Based on geophysical conditions, there are two systems of production and farming:

- Livestock farming in mountainous regions where seasonal crop production is patchy, and households keep five or six goats, one or two buffaloes and a few cattle
- Livestock farming in semi-hilly areas and plains. In these areas, households keep a larger number of animals and a small amount of feed is grown locally.

Similarly, the production of milk is also divided into two categories:

- small-scale milk production which serves the family's own subsistence needs and
- commercial milk production in the peri-urban areas of Abbottabad and Hevellian, which has developed rapidly in response to the burgeoning urban demand for milk.

The condition of backyard poultry production has been a prominent feature of the district's rural economy for some time. In 1996, the poultry population of the district stood at 622,649, comprising 3.8% of the population for the province as a whole[45]. Abbottabad and Mansehra district has been evolved as nucleus for the Pakistan poultry industry. Among the two districts, 60 breeder farms, 200 broiler farms, one-layer breeder farm, six-layer farms, two hatcheries and a feed mill are in operation, with a combined capacity more than 0.8 million birds.

4.2.1 Characterization of livestock in District Abbottabad

In 1996, 115,805 head of cattle, 133,463 buffaloes and 222,472 goats were in the district, along with 32,217 sheep. In comparison with districts such as Kohat, Mardan, Peshawar and Swat, Abbottabad's total livestock population in 1996 (562,011) was second only to Kohat (617,975). The potential for dairy development is evident from these numbers, particularly in the case of cattle and goats. Now it has been seen about 6 % of the total increase in the livestock sector since 1996. In the following table we can see that some of the livestock species are less than the reported in 1996 i.e. cattle 3.7 %; total heads of cattle were (111415), buffalo 21.63 %, the total number of buffalo are (104582), sheep 59.31 %, total number of sheep were (13109), horses 89.2 %, the reported number of horses were (935), mules 91%; reported

[44] integrated development strategy 2014-2018
[45] GoNWFP 2001a

numbers were (1079), asses 73.43, total assets were (9930), but increase in the number of some species were also noted i.e. the number of goats were increased up to 9.2%, the reported number of goats were (245060), Domestic Poultry 19.46 %; reported number were (773095), camels 96.62 % and the reported number were 712.

Table 4–12: Livestock Population in 1996-2016 in Abbottabad District

Species	Nos. in 1996[46]	Nos. in 2006[47]
Cattle	115805	111415
Buffalo	133463	104582
Sheep	32217	13109
Goat	222472	245060
Camels	24	712
Horses	8661	935
Mules	11991	1079
Asses	37378	9930
Domestic Poultry	622649	773095
Total	**1184660**	**1259917**

[46] Pakistan Livestock Census 1996
[47] Pakistan Livestock Census 2006

4.2.2 Economic potential of livestock

Livestock farming is also a dominant occupation of the farming community with more than 15 million animals and about 22 million poultry birds are counted in the Province. However, this occupation is mostly to supplement family nutritional and cash requirement. The capitalist trend in this sector is still lacking results in weak & non-descriptive breeds with low level of milk and meat productivity. The livestock sector in Khyber Pakhtunkhwa, despite having great potential for poverty alleviation, has not developed on commercial lines because of paucity of funds, capacity and technology constraints. While the share of livestock sector has been increased to Rs0.6 billion or 45 per cent of Rs1.35 billion total provincial agriculture budgets, it not enough to care of the development needs of the sector.

In the livestock research sub-sector, for five ongoing projects, Rs. 236 million has been set aside while for six new projects Rs. 325 million has been earmarked. Apart from the provincial ADP, the livestock sector in the province has been allocated Rs 5.2 billion in the federal budget as well. More than 90 per cent livestock is owned by small farmers who need animal progeny and guidance but there is specific project for them. Around 15 % of the milk produced is wasted during collection process causing a loss of billions of rupees to farmers. But despite this, neither of public nor the private sectors have made any worthwhile investment for establishing a proper milk collection/preservation system, chilling tanks and milk processing plants. Some Non-Governmental Organizations are also working for improvement of the socio-economic status of the livestock farmers and development of the Livestock sector in general in Abbottabad district.

Details is as under:

Commercial poultry farmers: There are around 60 broiler breeder farms, 200 broiler farms, one-layer breeder farm, six-layer breeder farms and 2 hatcheries operate in the district, along with a feed mill. The absence of investment limits feed output, however, only 10% of feed requirements are met through indigenous production. Despite the importance of the poultry sector to the district economy, no rational production and marketing inputs have been provided on a district-wise basis to enable more effective planning. Meanwhile, traditional channels of marketing are exploitative and discourage entry.

Animal Husbandry and Veterinary Facilities; During 1998–99, a total of 43 animal health service units (3 veterinary hospitals, 13 dispensaries and 27 basic treatment centers) were operating in the district, up 13% from the previous year. In addition, the district is served by four slaughterhouses and three inseminations sub-centers. Almost all the staff of the livestock and dairy development (L&DD) department, along with 123 male and female farmers from Abbottabad and Haripur districts, have been provided training in livestock management and production extension by the Animal Husbandry In-service Training Institute. This initiative aside, livestock and poultry extension services are in general patchy and erratic, characterized by a top-down approach that sees farmers as passive recipients. Extension is also marred by a narrow veterinary perspective, and unsatisfactory breeding and health services, at least in part because of the limited outreach capabilities of the concerned departments. These problems will need to be tackled if small-scale interventions through project.

The available facilities of veterinary institutions are summarized below

Veterinary Hospitals; the District Head Quarters Hospital includes a Principal Veterinary Officers (1 No), Senior Veterinary Officer (1 No), Veterinary Supervisor (1 No), Veterinary Assistants (2 No.) and Class-IV staff (2 No's). The Facilities include:

- Treatment of sick animals
- Vaccination of animals and poultry
- Artificial Insemination
- Disease diagnostic facility.

Facilities at other veterinary hospitals are almost same as above except disease diagnostic facilities

Veterinary Dispensaries; As per policy of the department, the staff distribution in a dispensary includes one Veterinary Assistant and two Class-IV staff. The treatment facilities include:

- Vaccination
- Artificial Insemination services (depending on livestock population and demand).

- **Veterinary Centers;** as per policy of the Department, the staff distribution in a Veterinary Centre includes one Veterinary Assistant One Class-IV staff. The facilities include:

- Treatment
- Vaccination

There are total of 43 facilities reported in the latest development statistic. out of total 3 are hospitals reported, 13 dispensaries and 27 centers. The total number of animals treated in the year 2015/16 were 73729 as compared to 58434 and 77017 for the years 2013/14 and 2014/15, respectively. The total number of animals protected from diseases declined as compared to previous years. Where the total number of animals protected in 2015/16 were 73373 compared to 91890 in the year 2013/14, whereas, the number of birds protected during last three years witnessed a progressive improvement as the number of birds protected in the year 2015/16 were 315963 compared to 171908 in the year 2013/14, as given in the following table and the figures:

Table 4–13: Veterinary Institution and their Performance in Abbottabad District

Year	Total	Hospitals	Dispensaries	Centers	No. of Animals Treated	No. of Animals Protected	No. of Birds Protected
2013-14	43	3	13	27	58434	91890	171908
2014-15	43	3	13	27	77017	76359	279646
2015-16[48]	43	3	14	26	73729	73373	315963

[48] Livestock and dairy development department Abbottabad

In a Veterinary hospital, treatment, vaccination and artificial insemination of animals are available round the clock. In case of emergency, patients in field are also visited/inspected. Beside the above, conduction of field days, delivering of extension messages, vaccination against contagious diseases and introduction of improved quality multicut fodder crops like in the circle. In veterinary dispensaries the services provided include treatment, vaccination and artificial insemination. In case of emergency patients in field are also visited/inspected. Beside the above, conduction of field days, delivering of extension messages, vaccination against contagious diseases and introduction of improved quality multicut fodder crops like in the circle. Similarly, services available at veterinary centers include treatment and vaccination of animals. However, all activities performed in hospital and dispensaries are not possible as veterinary centers provide the basic veterinary health facilities at local level.

4.2.3 Fishery[49]

An estimated 117 km of rivers and streams run through the district, in addition to countless springs. The fisheries potential of these resources is yet to be systematically analyzed. In 1998–99, the district produced 0.74 tons of fish, marking a 56%. The cash value of Abbottabad's fisheries output for the period 1998–99 is said to be Rs 50,050 but this figure needs to be reexamined since the total provincial fisheries output during the same period is valued at Rs 40.397 million. Only two water bodies in the district have been the subject of limn logical analysis. The first of these is the Thandiani stream at Kalapani, which is rich in nutrients and offers an environment that is favorable for pisciculture, especially trout farming. This stream ranks high on the habitat quality index.

4.2.4 Institutional Arrangements of Livestock in Abbottabad KPK

At provincial level, the Department is headed by Secretary Agriculture & Livestock Department. Director General (L&DD), who reports to the Secretary, looks after the Department at operational level. At District level, the affairs of the Livestock Department are looked after by District Livestock Officer, who reports to the Director-General. Under the District Livestock Officer, there are several officials including Principal Veterinary Officer (BS 19), Senior Veterinary Officer (BS 18) and Veterinary Officer (BS 17). Below them is the support staff as shown in the organogram. Basically, the Department comprises of two wings:

Institutes of Extension Wing of the Livestock & Dairy Development Department; this wing comprises of Veterinary Institutes such as hospitals/dispensaries/centers and mobile veterinary clinic, and

Institutes of Research Wing of the Livestock & Dairy Development Department; It comprises of Veterinary Research Institute and Livestock Research & Development; Veterinary Research Institute, Khyber Pakhtunkhwa, has regional setup with no specific veterinary Research and Diagnostic facility at District level; and Veterinary Research Institute, Livestock Research and Development also has no sub offices at regional level.

The constraints and limitations of livestock in Abbottabad district can be attributed to following reasons:

[49] District Profile ABBOTTABAD 2009

- One of the major limitations that we faced was lack of availability of statistical secondary data about livestock industry, even in this study most of the data is from 2006 livestock statistics because there are no updated census reports and published statistics.
- Crops grown specifically as animal feed and by-products from agriculture intended for human consumption together fulfil the nutritional needs of just one fourth of the district's livestock population, while a mere 10% of poultry feed requirements are met locally. This severe shortage of animal feed serves as an indictment of interventions undertaken so far in the livestock sector.
- Authorities responsible for developing forests and agriculture have generally paid little or no attention to fodder production and the development of grazing land. The agriculture department focuses on cereal crops, and that too on varieties yielding minimal crop residues, while the forest department with its timber orientation manages rangelands without a programme component geared towards supporting livestock feed requirements. This absence of coordination between green-sector government departments is a recurring problem which must be addressed in all future development planning.
- The broader involvement of stakeholders and local communities is also absent. Development projects and NGOs have attempted to fill this gap, but the forest department often comes into conflict with area residents over their fuel and forage requirements. In this connection, the forest department needs to work with local communities to arrive at amicable solutions by agreeing to mutually beneficial trade-offs.

Chapter 4

Production Land Uses and Economy

Production and Industry

4.3 Industry

Industrialization plays a vital role in the economic development of a District and country, currently Pakistan being a developing country, wants to achieve a higher standard of living for its people. Industrial development is necessary for modernization of agriculture, Development of Science and Technology, Capital Formation, Reduction of Poverty and Unemployment and for Improving standard of living.

4.3.1 Industrial Employment and Distribution by Type

The existing state of Industry in District Abbottabad indicates that there are only few small-scale industries, but no medium and large-scale industries are available. Medium and large-scale industries carry great potential to contribute to the national income and in reducing unemployment in the district and make improve the living standard of the locality if they are given proper attention and assistance from the concerned authorities. A small industrial estate is established at Mirpur, only few km away from Abbottabad city. There are total of 88 industrial units in district Abbottabad, out of which 63 Nos are in the small industrial estate with 506 employments while 25 are outside, having 247 employments:

Table 4–14: Number of Industry in District Abbottabad

Particulars	**Total No. of Units**	**Employment**
Total No. of Units in Small Industrial Estate.	57	506
Total No. of Units Outside Small Industrial Estate.	28	247
Total	**85**	**753**

4.3.2 Heavy, Medium and Light Industrial Zones/Estates

Industries can be categorized in different ways, such as based on capital investment, labor force employed, and on the extent and magnitude of pollution produced. In this chapter, industries in District Abbottabad have been categorized based on labor force and investment.

There is a total of 85 industrial units in Abbottabad, out of total no 7 are closed, 3 are under construction and 78 are operational. These 85 running units include Marble and Tile (Construction sector), employing 753 persons total, which is 26 percent of the total industrial labor in the district. Based on above criteria, the industrial units in District Abbottabad are categorized, but there are no medium or heavy units in district Abbottabad.

Table 4–15: Category wise Industries in District Abbottabad

Categories	**No. of Employees**	**Nature of Industry**	**No. of Industrial Unit**	**No. of Employees**
Heavy	More than 500	-	0	0
Medium	100-499	-	0	0
Small	Less than 100	Furniture	85	753
		Flour Mills		
		Tiles and Marbles		
		Pipes		
		Bottles and Water Tank		
		Others		

4.3.3 Industrial Growth Pattern-Historical Perspective

The number of total industrial units in Khyber Pakhtunkhwa has been increasing since the year 2009 to 2016, except the year 2013-14 when there was a decline from 2365 in 2012-13 to 2222 in 2013-14. However, this is the total number of industrial units which include running as well as closed units. The following table also provides historical data for District Abbottabad giving total number of units, running units and closed units in the past. In District Abbottabad, the running units have generally been on the increase since the year 2009-10. The following table presents total, running and closed units as absolute numbers as well in form of percentage of provincial total.

Table 4–16: Total Number of Registered Industrial Units Running & Closed

Year	Khyber Pakhtunkhwa			District Abbottabad			District versus Province (%)		
	Total	Running	Closed	Total	Running	Closed	Total	Running	Closed
2009-10	2239	1701	538	96	55	41	4.29	3.23	7.62
2010-11	2252	1766	486	95	53	42	4.22	3	8.64
2011-12	2299	1821	478	95	52	43	4.13	0.27	9
2012-13	2365	1889	476	95	52	43	4.02	2.75	9.03
2013-14	2222	1888	334	113	65	48	5.09	3.44	14.37
2014-15	2626	2163	363	66	53	13	2.51	2.45	3.58
2015-16	2548	2222	362	91	78	13	3.57	3.51	3.59

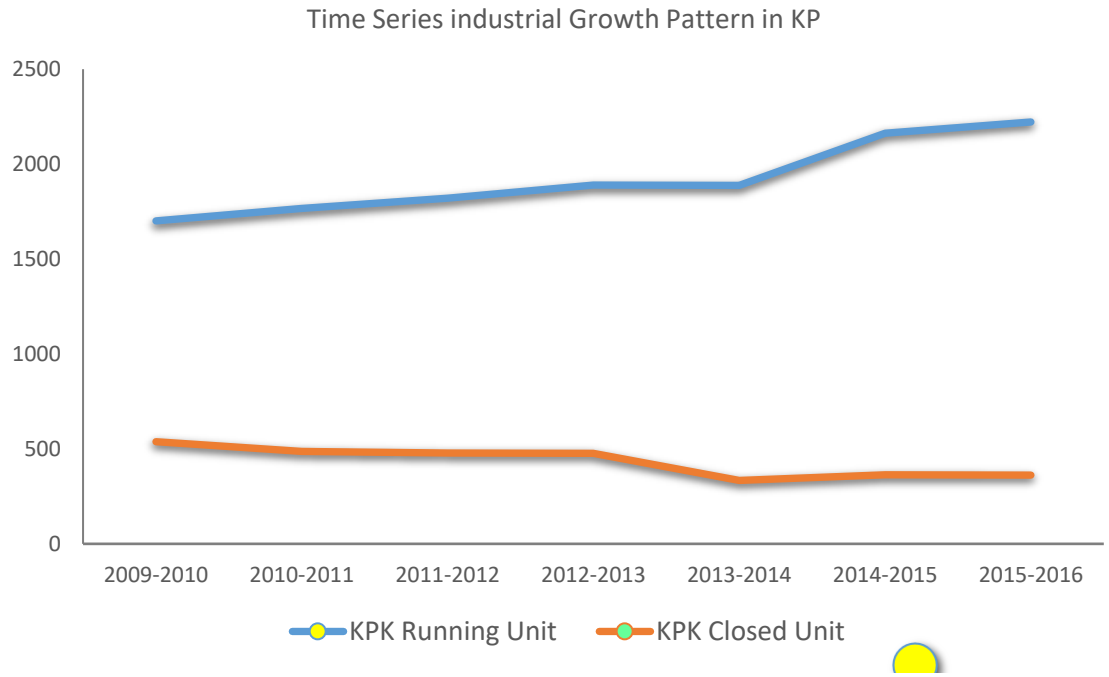


Figure 4-11:Time Series industrial Growth Pattern in KP

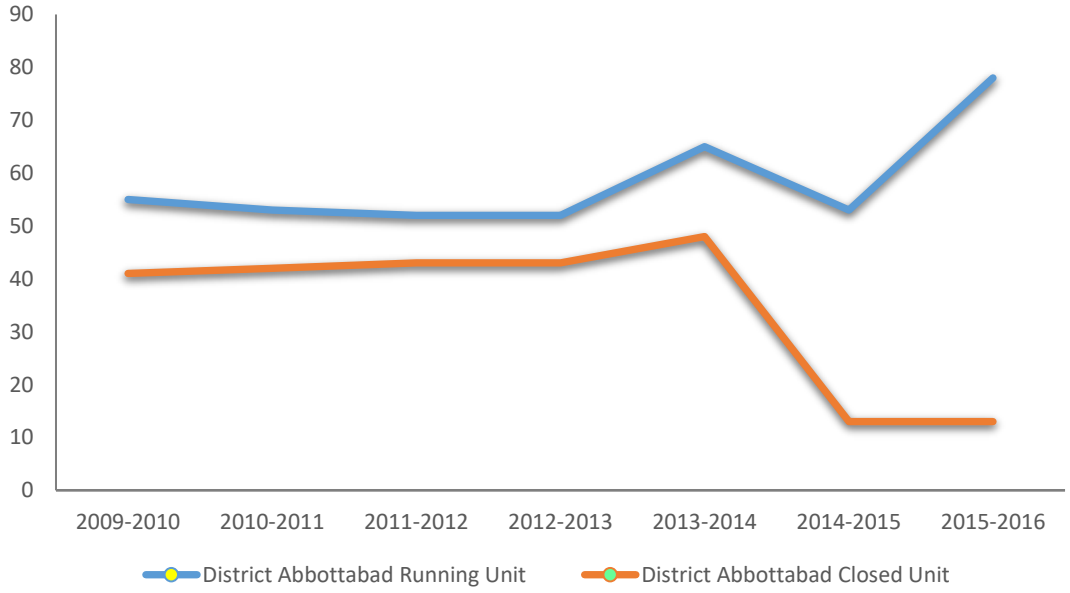


Figure 4-12:Industrial Growth in District Abbottabad

The following summary table indicates the industrial split in the Abbottabad district and indicates larger concentration of furniture, flour and marble industry within the meagre toll of industries. Since both industries are based on locally available raw material except flour mills. Therefore, initially to promote industrial base of the district, there is a need to promote those industries which uses locally available raw material and afterwards the endogenous local demand-based industries may also be encouraged. Considering the factors of capital intensive and labor-intensive industries in the district again furniture and marble industries turn out to be the most feasible industries in the district.

Table 4–17: Industrial Units and employment in District Abbottabad

Nature of Units	Investment (Millions)	Number of Units	Employment	investment/labor (M)	Labor/ Industry
Furniture	11.24	11	92	0.12	8
Flour Mills	137.073	19	199	0.69	10
Tiles & Marbles	41.093	25	226	0.18	9
Pipes	8.729	6	35	0.25	6
Bottles & Water Tank	4.76	3	29	0.16	10
Others	68.605	21	172	0.40	8
Total	**271.5**	85	**753**	**0.30**	**9**

4.3.4 Future Industrial Area Requirement

The industrial area requirement in District Abbottabad has been calculated based on additional population for the first 5 years of plan period (2018-2023) and subsequent 15 years (2023-2038). The anticipated industrial labor force in these periods was calculated based on 5 percent participation rate and industrial area by applying the standard of 50 industrial workers per acre. The results are presented in the Table below. Over the entire plan period; 942 acres would be required which includes 181 acres in the short-term (2018-2023) and 761 acres in the long-term period (2023-2038).

Future Industrial Area Requirements

Table 4–18: Futural Inductrial Area Requirment

Parameters	Short-Term Plan Period (2018-2023)	Long-Term Plan Period (2023-2038)	Total (2018-2038)
Additional Population	181469	760772	942241
Industrial labor force 5%	9073.45	38038.6	47112.05
Industrial Area Required	181.469	760.772	942.241

The current industrial area gap has been calculated as below:

District Population (2018)	=	1363508[50]
Industrial Labor Force (@5% of above)	=	47112.05
Industrial area required (@50 workers per acre)	=	1394 acres
Current Industrial area in the District	=	27 acres
Industrial area deficiency (1393.21 – 27)	=	**1336.5 acres**

It is clear from the above that till the end of plan period, the total industrial area requirement would include 1336.5 acres to meet the current deficiency, and 942 acres to meet the future requirement. The total would be thus 1336.5 + 942 = **2279 acres**.

4.3.5 Institutional Arrangements and Industrial Policies at Work

Some of the salient features of industrial reforms as outlined in the Industrial Policy Khyber Pakhtunkhwa, 2005 are gathered as following:

- Five years' exemption from property tax in the Industrial Estates and for new industries
- Exemption from labor inspections after compliance of labor laws.
- Exemption from Education in case for establishment of Industrial Units
- A new tiered-policy for ESSI contributions.
- Formation of Industrial Facilitation Council and Committee.
- 25 percent rebate in electricity consumption for a period of three years to new selected Industries.
- Exempt the Industrial Units in the Industrial Estates of the Province from the imposition of provincial property tax for a period of five years. Similarly, all new units that will be set up will also be exempted from payment of property tax for a period of five years.
- All arrears due from the industries waived off.
- To provide a healthy and conducive environment to the industries, it has been decided to do away with the unnecessary labor inspections. Any Industrial Unit which ensures compliance of the labor laws (by filling a proforma to be provided by the Directorate of Labor) will be exempted from labor inspections for a period of three years. Further exemptions can also be obtained in the same manner. The units will, however, provide their production figures and other details to the Directorate of Industries and Labor every year.
- To facilitate the industries and reduce the number of taxes, the provincial government has decided to exempt the Industrial Units from the payment Education Cess which is recovered by the Worker's Children Education Board.
- To provide further relief to the industries, it has been decided to introduce a tiered system for collection of the ESSI Cess.
- The Provincial Government decided in principle, to provide up to 25% rebate for a period of three years in electricity consumption to selected new industries.
- The eligibility for the rebate will be determined by a high-level committee having representation from the private sector.

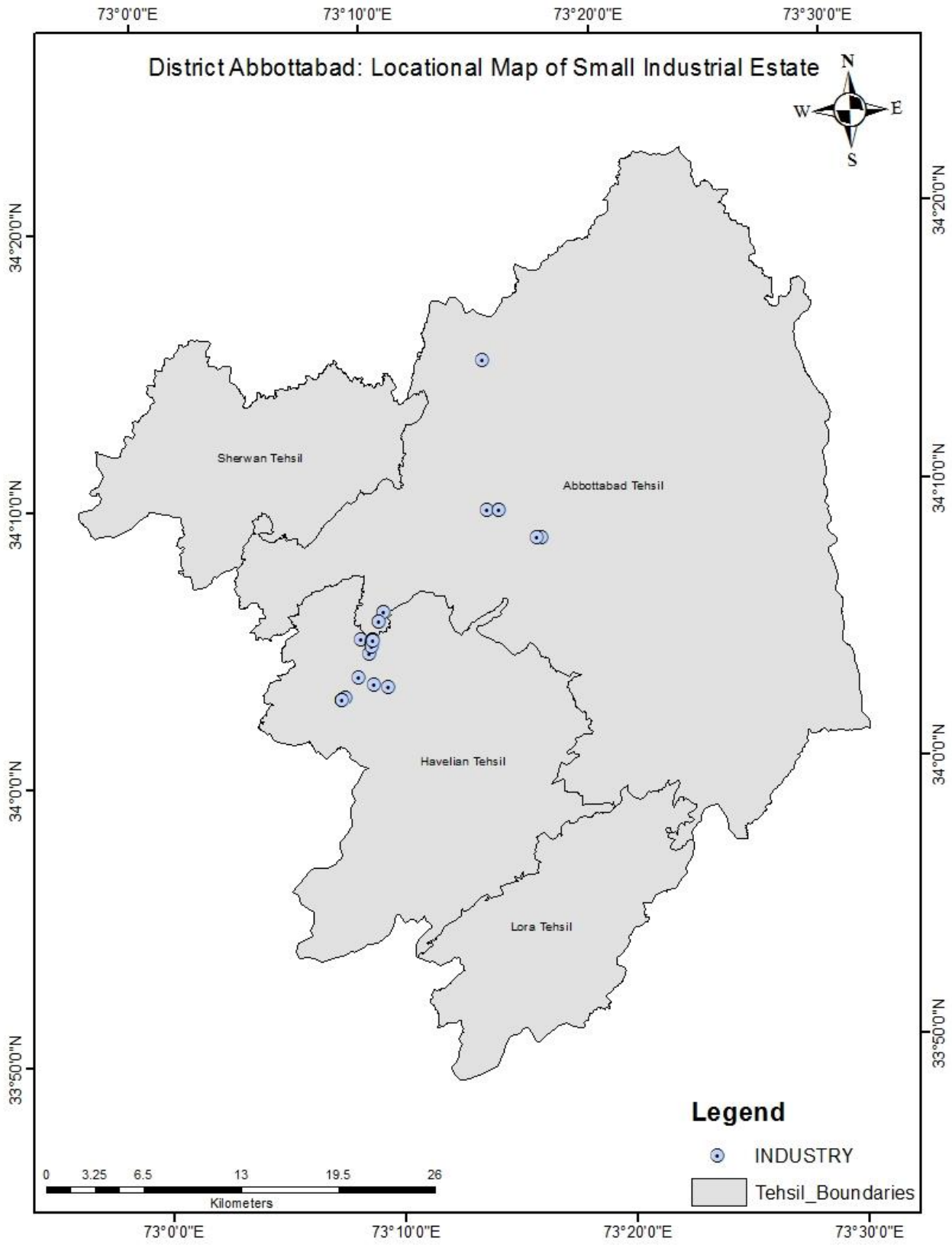
4.3.6 Salient features of the policy are explained below:

- To rehabilitate the sick industrial units by taking necessary remedial measures.
- To encourage setting up those industries which have comparative cost advantage and markets, such industries based on local raw material, skilled labor, local and export markets.
- To create more jobs by facilitating small and medium enterprises (SMES) to grow and flourish by providing business support services (BSS) including necessary finances.
- To create more special economic zones (SEZS) to attract local and foreign investors to set up industries.
- To improve infrastructure facilities in the existing industrial estates.
- To make available cheaper energy through available resources.
- To strive for social development and economic prosperity of people, especially the poor and under privileged masses.
- To provide opportunities for large scale employment through private sector.
- To develop human capital to meet the needs of industry.
- To utilize natural resources for sustainable industrial development.
- To set up industries based on local raw material and skilled labor to achieve comparable cost advantage and attract investment.

Some of the ongoing projects and programs[51] related to industrial development and growth in the district includes:

- Establishment of handcraft development center in Havelian Abbottabad.
- Establishment of small industrial estate Abbottabad-II.

[51] ADP 2017-2018



MAP 4-3: Location Map of Small Industrial Estate of District Abbottabad

Apart from locational disadvantages, high cost of working capital coupled with some other reasons are apparently responsible for rendering most of the Abbottabad industrial units to carry out operations much lower than their operational capacity. High cost of financing/working capital and difficulties in obtaining improved technology, especially modern imported technology on the part of Abbottabad industrialists are some of the main reasons for carry out operations below their manufacturing capacity.
The locational disadvantage makes the Abbottabad-based industrialists to bear greater transportation cost to transport the imported raw material from the Karachi seaport. This results not only in raising the overall cost of production in addition to reducing the competitive value of the Abbottabad products against the goods manufactured in Punjab and other parts of the country, the locational disadvantage has also been hampering products of the Province to access to bigger markets of the country.
There is only one planned small industrial estate in District Abbottabad and there is no medium and heavy industries in the District.

Therefore, there is a need of proper Industrial management system for each industry type. Some of the potential Industries for the district are Cement base, Brick Plant, Cosmetics, Beverages, Feed and Fertilizer, Garments and Textile, Leather, Meat process and Milk Based, Poultry farm, Mining, Pharmacy, Power generation, Metal work and Industry for preservation of Fruits to reduce the fruit loss.

4.3.7 Constraints and Recommendations

Apart from different constraints, high cost of working capital coupled with some other reasons, are apparently responsible for rendering most of the Abbottabad industrial units to carry out operations much lower than their operational capacity. High cost of financing/working capital and difficulties in obtaining improved technology, especially modern imported technology on the part of Abbottabad industrialists are some of the main reasons for carry out operations below their manufacturing capacity.

The present location makes the Abbottabad-based industrialists to bear greater transportation cost to transport the imported raw material from the Karachi seaport. This results not only in raising the overall cost of production in addition to reducing the competitive value of the Abbottabad products against the goods manufactured in Punjab and other parts of the country. The non feasible location is also one of the disadvantages that hampering products of the Province to access to bigger markets of the country.

There is only single planned small industrial estate in District Abbottabad; and none for medium and heavy industries in the district. Therefore, there is a need of proper Industrial management system for each industry type. Some of the potential Industries for the district are Cement base, Brick Plant, Cosmetics, Beverages, Feed and Fertilizer, Garments and Textile, Leather, Meat process and Milk Based, Poultry farm, Mining, Pharmacy, Power generation, Metal work and Industry for preservation of Fruits to reduce the fruit loss.

To improve the condition of small and large industries in district Abbottabad may be:

The efforts to create a successful system of industrial assistance in Abbottabad is to improve the manufacturing performance of smaller companies will recognize the importance of creating a coherent system and not just increasing the number of assistance facilities and service providers.

A district system of assistance in industry sector can only be successful if it is supported by and responsive to the customer base, and manufacturers will only support it if they believe the advice they get is high quality. With the long-term objective in mind of providing access to assistance for any manufacturer who wants it, the emphasis must remain on ensuring that high-quality assistance is provided.

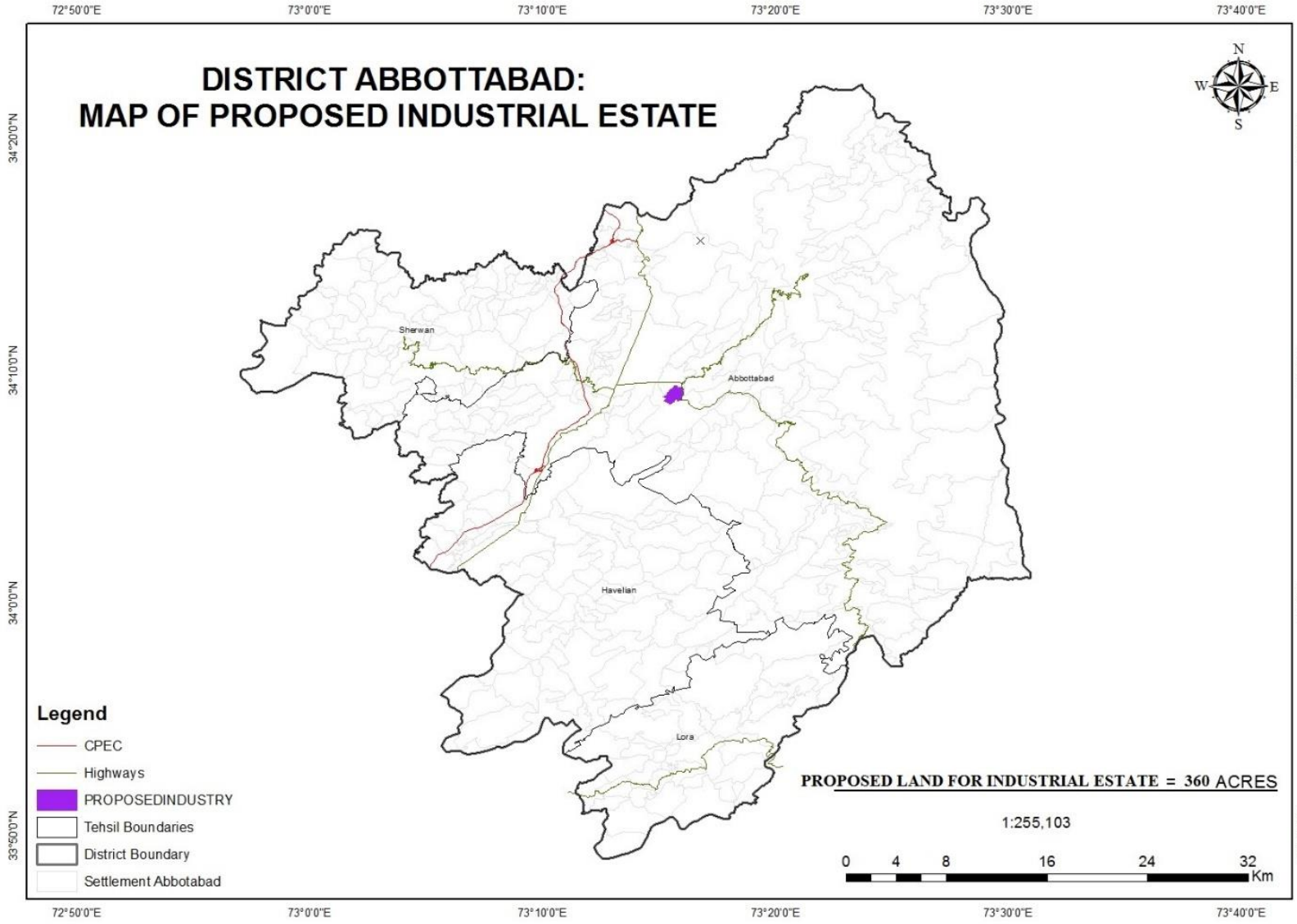
The federal role must be to provide a stable funding environment in Abbottabad district, to facilitate learning among local and regional providers, to nurture new providers in areas with unmet needs, and to provide services that are best done at the national level.

Facilitate cooperation among in the district level programs by convening workshops and conferences and creating electronic linkages. Such cooperation should encourage sharing of problems and solutions of industrialist of the Abbottabad region.

The role of the concerned agencies in the district is to ensure the development of a cohesive system of assistance in the area represented. The genesis of such a system begins with identification of the problems whose solutions are crucial to regional industrial success, followed by development of relevant strategies and plans for addressing those issues.

Land-use Plan of the district about financial support should recognize different needs, abilities, and capacity to apply funds effectively. It should focus on spending modest amounts wisely, with flexibility in the amount of funds for which an organization must apply.

A proper infrastructure on the main routes of the Abbottabad district will to help significantly improvement in the manufacturing competitiveness of smaller companies must have consistent support and visibility in the political process that go beyond partisan politics.



MAP 4-4: Proposed Industrial Estate in district Abbottabad

Chapter 4

Production Land Uses and Economy

Trade and Commerce

4.4 Trade and Commerce

Abbottabad city is well known throughout Pakistan for its pleasant weather, high-standard educational institutions and for hosting the Pakistan Military Academy in Kakul. It remains a popular hill station attracting hundreds of thousands of tourists every year. The economy is largely based on tourism. It is known for its shady gardens, church bells and wide streets in the old Cantonment which evoke the British colonial era. The Karakoram Highway, which traces one of the paths of the ancient Silk Road, starts from Hasanabdal on the N5 and heads north passing through the city, eventually reaching Khunjerab Pass. The Karakorum Highway is a major attraction itself for its views. The Karakoram, Himalayas and the Hindu Kush ranges can be approached from Abbottabad, and it continues to be a transit city for tourists, serving as a base for visiting nearby places, such as Hunza, Gilgit, Skardu and Indus Kohistan of the Karakoram Range. The district contains many important commercial and shopping centers in the city to cater the needs of the permanent residents and of those who come to the hill station on temporary visit during the summer. The most renowned shops are Isaji Co., General Merchants, Fancy cloth House and Afghan cloth House. Jamal ji building, Hakim ji building and cantonment building are important commercial/industrial centers.

4.4.1 Trading Goods and Commodities

At international level, Grapes, Apple, Oranges, Melon, and Pomegranate are imported, mainly from Kabul while Abbottabad's exports to foreign countries include Potatoes, Onion, Egg Plant, Cabbage, Oranges, Tomatoes, and Bitter gourd.

At national level, in-coming commodities from other parts of the Country (Punjab & Sindh) include different fruits and vegetables. Out-going goods to different parts of the Country also include different fruits and vegetables coming from the rural hinterland of the district as well as from Mansehra.

At regional level, commodities brought to Abbottabad include variety of fruit such as pomegranates from Peshawar (Peshawar receives pomegranates from Kabul Afghanistan) and Guava from Kohat city etc. These are mainly brought from Peshawar. The goods sent from Abbottabad to other parts also more or less the same as discussed above. The details are shown in the following table:

Table 4–19: Trade and Commerce Linkages of Abbottabad at International, National and Regional Level

Level	In-coming commodities	Out-going commodities
International	Pulp, Grapes, Apple, Orange, Melon, Pomegranate (Kabul), vegetable seeds (USA, Japan, India & France)	Potatoes, Onion, Egg Plant, Cabbage, Orange [Kin], Peach, Pomegranate (Kabul) Tomatoes, Bitter Gourd (Dubai) Goats imported from Punjab and exported to Iran and Afghanistan.

National	Tomato, Turnip etc. (Punjab) Banana (Sindh) Apple, Pomegranate, Gur from Mardan/Charsada Melon (Quetta) Carrot (Lahore) Livestock (Lahore, Okara, Bahawalpur, Multan, Bhakkar, Sialkot, Sahiwal, Faisalabad, Attock, and Rawalpindi).	Grapes, Apple, Orange, Japan Fruit [Amluk], Melon, Lady Finger, Bitter Gourd, Gur
Regional	Pomegranate (Kabul, Afghanistan) Guava (Kohat), apple cherry grapes and dry fruits from Gilgit Hunza	Potatoes, Onion, Egg Plant, Cabbage, peach
Sub-regional/local	-------	Mango, Plum, Banana, Potatoes, Apple, Tomatoes, Carrot

4.4.2 Services Area of Commerce and Trade Centers in Abbottabad

Trade and Commerce in Khyber Pakhtunkhwa is a major income and employment-generating sector, and a large proportion of male population of all ages directly or indirectly depends on small scale commerce and trade. Abbottabad is known as the educational city of Khyber Pakhtunkhwa, a medium sized trade and commerce center and plays a vital role in the economy of the province in the sectors of education and tourism. The district has gained a keen interest due to CPEC (China-Pakistan Economic Corridor) route which will pass through the city connecting all major cities of Pakistan. Currently When analyzed according to population, a little over 44 % of Abbottabad's workers are self-employed while almost 52% of the labor force works in the autonomous, government and private sectors. Some popular tourist and commercial hubs in and around Abbottabad include:

- Ayubia National Park
- Bara Gali
- Dor River Valley (at Harnoi/Harnol)
- Dunga Gali
- Harnoi
- Ilyasi Mosque
- Nathia Gali
- Shimla Hill
- Thandiani
- Kukmang
- Raees Khana Bazar
- Kunhar River Spot-Boi
- Boi Bazar-Kashmir-Point
- Aliabad
- Amir Abad
- Baghdara

- Bilal town
- Satori
- Sikander abad
- Chamba

4.4.3 Distribution of Dry Ports and Exports Processing Zone:

Although Abbottabad is a city as well as divisional headquarter, but Hevelian is the trade center due to railway station, connected with Punjab/Peshawar and other part of the country through railway line. Unlikely since long time the port is not operational in a manner to cope up with demands of goods due to lack of management facilities as well as socio-political problems such as terrorism and deprived law and order situation of the province of KPK.

To meet the demand of containerized future freight traffic in connection with Pak-China Economic Corridor, the dry port will be established at Hevelian by utilizing the railway land, railhead facilities, high speed / capacity stock, and potential of well-established off-dock terminal for handling bonded import / export containers. Pakistan Railway network exist up to Havelian Railway Station situated at more than 680 Km. from Khunjerab (China border). The station is part of Pak-China economic corridor. Initially it will act as Dry Port / container terminal for goods traffic coming through road from China through KKH. Transshipment arrangement will be provided at Havelian for loading / unloading on railway wagons Havelian District, Haripur.

Trade of the district Abbottabad is mostly with the Punjab province due to better cultural and language connectivity. Very little trade take place with Peshawar and other districts of Khyber Pakhtunkhwa. The district exports mostly timber, skin, soapstone, pulses and tobacco. The significant imports are wheat, tea, industrial goods and sugar.

4.4.5 Labor Force and Employment Patterns in Abbottabad District

Abbottabad district is poorly positioned in terms of employment opportunities while the workforce by and large lacks the skills required in today's market. The main sources of employment in the district are agriculture, construction, trade, transport, and the seasonal hotel and restaurant business. With few manufacturing industries in operation and meager prospects for agricultural expansion, the economic future of the district is not promising. The challenge for Abbottabad lies in developing enterprise, creating employment opportunities and diversifying the rural economy to encompass productive, value-added activities.

The labor force participation rate indicates the supply of labor in the economy and the proportion of people in the labor force of the country. It also shows the working capacity of labors and job market trends. indicator is helpful in assessing the labor market behavior for different segments of population, especially for youth. In Pakistan labor force participation rate is estimated based on Crude Activity Rate (CAR) and the Refined Activity Rate (RAR). As is evident from that labor force participation rate has slightly decreased from 32.9 % in 2012 to 32.3 percent in 2014-15. Female labor force participation rate increased from 15.6 % in 2012-13 to 15.8 percent in 2014. While, labor force participation rate decreased from 49.3 % in 2012-13 to 48.1 % in 2014 15. Women in the workforce can be a major driver of the economic growth. This increasing participation of women in paid work shows the sincere and committed efforts by the government to reduce the gender gap in labor force participation rate. It also shows that women are

getting better opportunities of obtaining technical and professional education and therefore getting more jobs. Comparison of rural and urban participation rates reveals that labor force participation rate is higher in rural areas as compared to urban areas because of agrarian economy. As agriculture is treated as a family occupation in rural areas, therefore, the female labor force participation in rural areas is higher as compared to urban areas.

Table 4–20: Percentage of Population by Economic Categories

Economic Category	All Areas			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Economically active	19.99	39.03	0.91	18 78	37.92	0.61	25.52	43 .47	2.53
Economically inactive	80.01	60.97	99,09	81.22	62.08	99.39	74.48	56.53	97.47
Children < 10 Yrs.	28.41	29.30	27.51	29.47	31.13	27.89	23.55	44.58	25.51
Domestic workers	36.69	2.16	71.33	37.74	2.43	71.27	31.91	0.87	71.66
Students	11.07	21.96	0.16	10.44	21.29	0.14	13.92	24.62	0.23
All others	3.85	7.59	0.09	3.57	7.23	0.10	5.l0	9.02	0.07
Labor force	27.92	55.21	1.25	26.63	55.06	0.84	33.38	55.74	3.40
Un-employment rate	31.14	31.84	1.05	30.43	30.92	1.33	33.54	35.04	0 69

4.4.6 Constraints and recommendations:

The constraints and limitations of livestock in Abbottabad district can be attributed to following reasons:

- One of the major limitations that we faced was lack of availability of statistical secondary data about livestock industry, even in this study most of the data is from 2006 livestock statistics because there are no updated census reports and published statistics.
- Crops grown specifically as animal feed and by-products from agriculture intended for human consumption together fulfil the nutritional needs of just one fourth of the district's livestock population, while a mere 10% of poultry feed requirements are met locally. This severe shortage of animal feed serves as an indictment of interventions undertaken so far in the livestock sector.
- Authorities responsible for developing forests and agriculture have generally paid little or no attention to fodder production and the development of grazing land. The agriculture department focuses on cereal crops, and that too on varieties yielding minimal crop residues, while the forest department with its timber orientation manages rangelands without a programme component geared towards supporting livestock feed requirements. This

absence of coordination between green-sector government departments is a recurring problem which must be addressed in all future development planning.

- The broader involvement of stakeholders and local communities is also absent. Development projects and NGOs have attempted to fill this gap, but the forest department often comes into conflict with area residents over their fuel and forage requirements. In this connection, the forest department needs to work with local communities to arrive at amicable solutions by agreeing to mutually beneficial trade-offs.

Chapter 4

Production Land Uses and Economy

Mines and Minerals

4.5 Mines and Minerals in Abbottabad District

Abbottabad is blessed with many natural resources. One of the natural resources is mines. According to joint report of International Union for the Conservation of Nature and Natural Resources (IUCN) and Sustainable Development Policy Institute (SDPI) quarrying and mining is carried out in 108 villages, covering 4.8 % of the total land area of District Abbottabad. The mining sector in Abbottabad is characterized by considerable variations in output over relatively short periods of time. Both underground and open pit methods are used, with scant regard to the environmental and public health impact of these operations. Oversight is practically nonexistent and safety measures are ignored. Operations in this sector are undertaken without adequate information or training, and with blatant disregard for the law. Environmental impact assessments (EIAs) are rarely conducted for new projects, while the licensing system is heavily biased in favor of commercial considerations. The mining sector in its current state faces several challenges, with the environmental impact of extractive processes emerging as a key concern along with the working conditions of miners. Linked to these issues is the effect of mining operations on the communities who reside near mine areas.

Table 4–21: Mineral production in Abbottabad (2005-08)

Mineral	Years (tons) 2005-06	Years (tons) 2006-07	Years (tons) 2007-08
Limestone	132,412	217,750	436,750
Soapstone	51,123	29,260	17,985
Feldspar	---	---	3,250
Magnesite	7,234	---	3,150
Fire clay	3,413	8,120	2,240
Laterite	5,116	3,770	1,970
Phosphate	5,972	---	658
Gypsum	---	---	580
Dolomite	4,895	1,148	420
Barite	1,210	405	240
Marble	1,532	---	200
Coal	---	110	130
Iron ore	---	30	---
Shale clay	---	195	---
Total	212,950	260,788	467,573

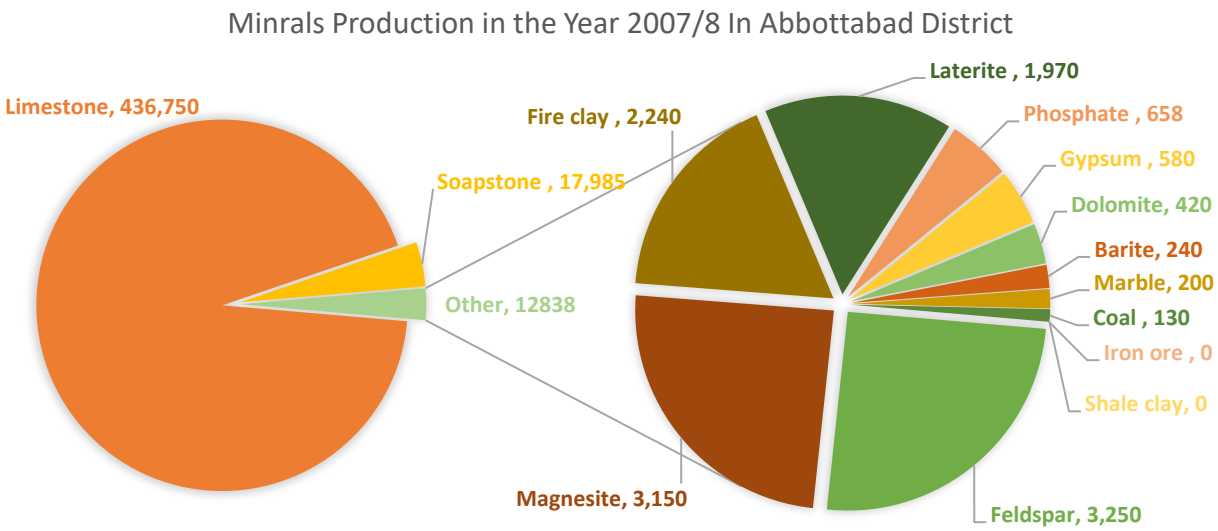


Figure 4-13:Minerals Production in District Abbottabad

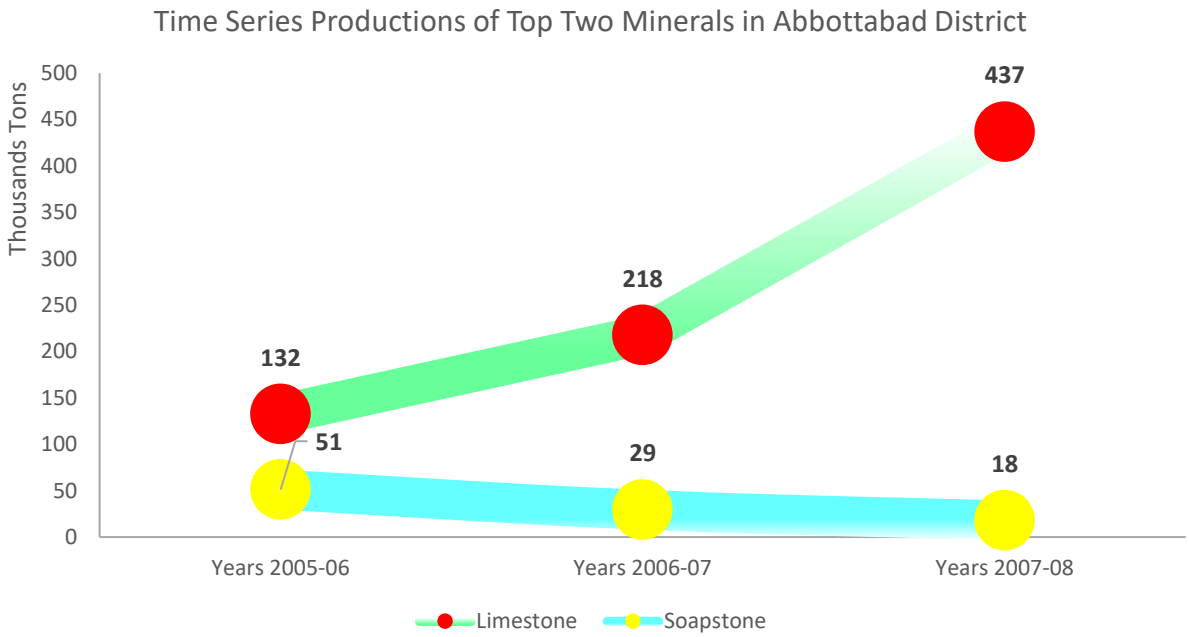


Figure 4-14:Top Two Minerals in District Abbottabad

A variety of minerals are extracted in the district and most of them have a wide range of industrial uses. These include dimension stone, industrial rock minerals, metallic minerals, fuel/energy minerals and ordinary stone. Yet in recent years most of the mining activity has focused on one or two minerals. Limestone is the most commonly extracted mineral in the district. In 2005-06, it accounted for 62.1% of

the district's overall mineral production. By 2007-08, however, limestone was the single most important mineral in the district, accounting for 93.4% of total production[52].

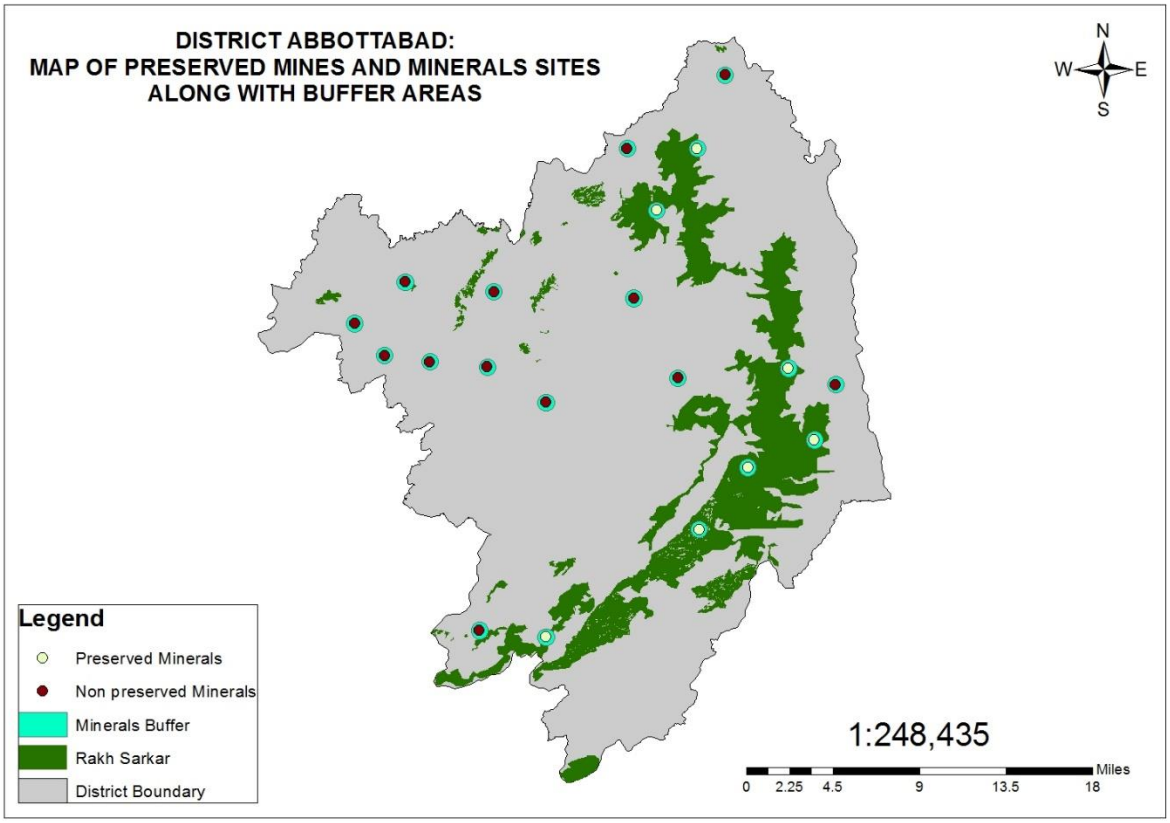
Soapstone is the district's second most important mineral, with total production in 2005-06 recorded at 51,123 tons, accounting for 24% of the mining output of the entire district. Production declined dramatically in subsequent years, falling to as little as 17,985 tons in 2007-08, or just 3.85% of total production. The situation with other minerals is similar, with production falling in recent years and, in some cases, ceasing altogether. While mineral production has seen a dramatic decline, significant reserves have been identified across the district and remain unexplored or only partially explored. The mountains from Kakul and Mirpur to Mansehra are rich in sandstone, limestone, dolomite and siltstone, as well as phosphate minerals. Around 9 million tons of phosphate reserves were reported in the district after the Sarhad Development Authority carried out exploratory work in 1993 in the areas of Lagarband and Tarnawi. In Kakul, deposits of 0.51 million tons were reported[53].

Magnesite minerals also occur in the area around the village of Kumhar, where the Pakistan Industrial Development Corporation leased 144,628 acres of land for 30 years in 1972-73 (IUCN 2004). Additional reserves of 2.7 million tons were identified after exploration work was carried out by the Corporation with the assistance of Japanese experts. The district carries large deposits of granite in varying shades and textures. Two prospecting licenses have been issued for marble and one mining license has been granted for granite. Exploration of marble is at an advanced stage, but granite leases are inactive. There are large reserves of phosphate in the district, with more than 30 prospecting and mining licenses issued between 1995 and 2008 in some 21 villages. In 2006, coal reserves were also identified, the largest of which are in the north-eastern Galiyat area. Bentonite clay is dig out in the southern and south-eastern part of the district, there is no metallic, gas or gemstones which are mined /exploited in this District. Minor minerals i.e., sand, bajri and gravel are also extracted from small streams and rivers banks.

However, Workers in the mining sector are among the poorest of the district's communities. A survey conducted for this study reveals that most miners live below the poverty line. Most are uneducated, and a large proportion work for daily wages with no health or employment benefits. Given the district's mineral wealth, mining has the potential to serve as a key component in a diversified economy. But the trade-off between economic benefits and environmental damage needs to be carefully examined which is practically impossible in the current situation. The sector needs to be utilize in such a manner to reduce the hazardous exploration of mines and other natural resources. It will reduce the negative impacts on the environment and can play a vital role in boosting the economy of the district as well as-the region. However, their lack of research study regarding the economic potential of the district.

Close to 20 types of minerals are excavated in Abbottabad district. Together, these resources possess the potential to generate significant income for the district and to create employment opportunities. Mines offer much-needed opportunities for employment to the poorest members of the community. In a district burdened with high unemployment at 31 percent (ERRA 2007), mining and quarrying can provide a welcome boost to a rural economy that revolves around subsistence agriculture and wage labor. Part of the income generated by the sector can also be diverted to mitigate the environmental damage that is caused by mining operations.

[52] (GoNWFP 2009).
[53] (IUCN 2004).



MAP 4-5 Preserved Mines and minerals Map of district Abbottabad

4.5.1 Existing extraction practices of mines/minerals and their impact on environment

Both underground and open-pit mining practices are employed in Abbottabad (IUCN 2004). The techniques in use are crude and outdated. The mineral extraction process has a serious and dangerous impact on human health and the environment. The loss of flora and fauna, an increase in noise and dust pollution, land degradation, and the contamination of water bodies are just a few such adverse effects. The following figure and the tables provide the minerals extractions process and the wastes generated therein together with their environmental impacts:

Table 4–22: Physical, chemical and biological impacts of Mining on the Environment

Environmental impacts		Cause
WATER	Turbidity	Suspended solids from creation of infrastructure, mine dewatering and surface run-off
	Groundwater contamination (degradation of potable water resources); surface water contamination (rivers, streams, springs); acute and chronic bio-toxicity (fish kills, growth and reproduction defects)	Acid rock drainage from surface waste, ore stockpiles, open pits and underground working; deliberate or accidental release of process chemicals (cyanide); spills or leakage of other materials (mineral oil lubricants, petroleum and derivatives, cleaning agents)
	Eutrophication	Nitrates derived from wash-down of explosive residues
	Oxygen consumption	Presence of inorganic and organic chemicals that consume oxygen during changes in chemical speciation or during degradation
	Lowering of water table	Dewatering of mine working; hydrological and hydro-geological disruption of aquifers
	Contamination of rivers and estuaries	Erosion, dispersion of solid waste
SOIL	On- and off-site contamination	Wind and water erosion; dispersion of metal-bearing solids (wastes, run-off, mine ore); transfer from contaminated waters to soil components (clay minerals, organic matter)
	Land sterilization, destruction of vegetative cover (including rare and endangered species)	Disposal of contaminated or inert waste; open-pit mining; footprint of processing plant and associated infrastructure
	Inhibition of vegetative regeneration	Surface and sub-soil contamination; soil acidification by acid waters
	Aesthetic impact	Lack of vegetation; high-profile waste disposal sites; open pits; severe topographical disruption (re-routing of rivers); transient and regular noise
AIR	Dust	Creation of infrastructure; wind erosion; dispersion of fine solids (tailings); crushing; movement of site vehicles; surface blasting
	Contaminant emissions	Mineral processing operations (particularly Sulphur dioxide); localized occurrence of process chemicals or degradation products (hydrogen cyanide from cyanide-contaminated gold ore tailings)
	Noise	Creation of infrastructure; blasting; operation of heavy plants

There are also occupational health hazards that affect mine workers directly, and dangers posed to the health, safety and livelihoods of local communities. Mineral extraction activity generates different risks for different minerals. In the case of Abbottabad district, these effects have not been properly studied. The environmental impact and toxicity of some of the minerals excavated in Abbottabad are as follows:

Limestone; extraction generates significant revenues for the district. It is produced in two forms, quick lime (calcium oxide) and slaked lime (calcium hydroxide). Because of its non-toxic nature, the environmental impact of limestone extraction is difficult to measure. But when used in acid soil, it can change the pH of the soil, affecting flora and fauna. Quarrying also destroys the landscape.

Barite; (barium sulphate) is another important mineral extracted in Abbottabad, although currently these mines are inactive. Barium salts are water soluble and so have a more harmful effect than barium sulphate, which is not soluble. Like lime, barite is not highly toxic in nature but has a dangerous physical effect on aquatic ecosystems if discharged into water bodies.

Silica; sand is another important mineral extracted in the district, also available in the form of quartz. Although it is non-toxic, inhalation of fine particles of silica can cause lung cancer. In comparison to other minerals, silica is environment-friendly and recent research has shown that it may help to reduce toxicity in the biosphere.

Coal; is a plant derivative but contains other elements such as Sulphur, nitrogen and small concentrations of heavy metals which can cause environmental damage[54]

4.5.2 Review of existing laws, policies, and regulations

National mineral policy 2013; the Federal and Provincial Governments of Pakistan are conscious of their responsibility for creating a favorable environment for an effective and vibrant mineral sector in Pakistan. The Federal and Provincial Governments are also cognizant of the need to keep pace with the changing international investment climate, and the important objectives which need to be satisfied to secure foreign and local private risk capital investment into the mineral sector. The broad goals are to enhance the contribution of the mineral sector to the GDP by efficient and sustainable development of mineral resources through private sector investment for the benefit of the people of Pakistan. To achieve this goal, the National Mineral Policy – aims to achieve the following:

- Enhancement and sustenance of revenue flow to the Provincial and Federal Governments.
- Creation of an investment-friendly climate to enhance international competitiveness;
- Optimization of exploration, development and exploitation of minerals;
- Mitigation of adverse environmental effects of mineral development;
- Generation of mass scale employment and socio-economic uplift through enhanced skills, sustainable mineral development, technology transfer and regional infrastructure development
- Administrative restructuring of relevant federal and provincial mineral sectors
- Generation of geological data, development of a national cadaster and provision of online accessibility to such data; and
- Ensuring safe mining operations and safety and security of investor.

[54] Mining and Quarrying by INTERNATIONAL UNION FOR CONSERVATION OF NATURE

4.5.3 Khyber Pakhtunkhwa Mineral Policy 2016;

the core Policy Principals of Khyber Pakhtunkhwa Mineral policy 2016 are given as under:

- To establish an internationally competitive, stable and conducive business climate to attract and sustain local and foreign investment for a steady increase in mineral production by lawful means;
- To give preference to integrated mining operations with linkages to upstream and downstream mining and processing related activities;
- To formulate a fiscal and regulatory regime that ensures fair value for Khyber Pakhtunkhwa while offering equitable rewards to private investors in minerals;
- To encourage and facilitate mining by legal means and prevent all illegal mining activities without fear or favor, and to frame stringent laws to deal with illegal mining activities.
- To ensure predictable mechanisms for the evaluation of competing land, water and other resource-use options;
- To eliminate and mitigate adverse social conditions and environmental degradation attributed to mining and related activities;
- To support and enable artisanal and small-scale mining activities that create employment, generate revenues and help reduce poverty, especially in rural areas;
- To ensure equitable distribution of benefits from mining and related activities to meet current and future public needs;
- To establish an effective and transparent administration and management of the mineral sector;
- Give preference to local value addition and processing of indigenous minerals.

4.5.4 Constraints and Recommendations

Constraints; the current practice of mines exploration is taking place in hazardous manner, disturbing the surrounding eco-system services and community livelihood. The following are the key constraint of mining sector:

- Mine workers in Abbottabad are marginalized and excluded from the mainstream, working in unsafe conditions without access to basic health and safety equipment.
- Mine workers and communities residing near mined areas have no way to influence decision making on issues that directly affect their livelihoods, health and living conditions.
- There is general and widespread lack of awareness concerning the impact of mining activities on human health and on the environment. This is the case among workers, mine operators and local communities.
- Although the Directorate was established to streamline management of the sector, institutional coordination remains poor. Coordination and cooperation with other provincial departments and ministries is also lacking.
- Very few government officials are concerned about the environmental impact of mining operations.
- There are no specific allocations for the development of mining in Abbottabad district, or to mitigate its impact.

4.5.5 Recommendations;

in pursuance of the above limitations and constraints following recommendations holds value for promotions and development of mining sector in Abbottabad District:

- Negotiating some degree of power for the district government about oversight, compliance and revenue sharing.
- Preparation of district level master plan for mining with focus on addressing critical issues of health hazards, worker welfare, training and enforcement of the EIA regime and responsible mining practices.
- Evaluating pollution impacts such as water contamination, dangerous emissions, noise and dust, as well as habitat destruction
- Formulation and enforcement of policy for efficient extraction, control of whole sale destruction of mined areas, maximization of recovery and minimization of harmful impacts.
- Evaluating the establishment of industrial units based on indigenous mineral resources, to alleviate poverty and generate employment.

Chapter 5

Communication and Infrastructure Land Uses

Roads Infrastructure

5. COMMUNICATION AND INFRASTRUCTURE LAND USES

5.1 COMMUNICATION

5.1.1 Road Network

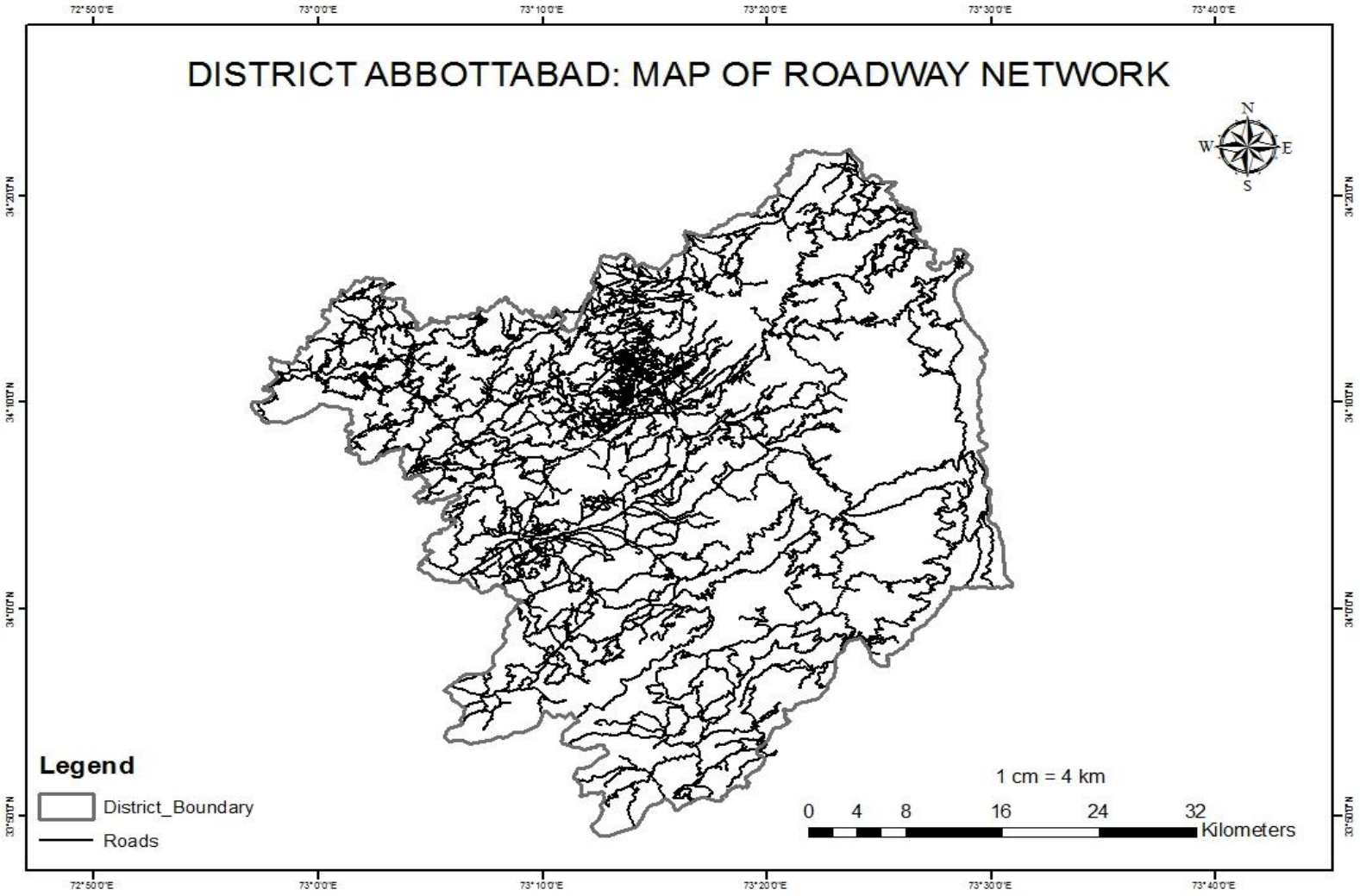
Communications networks are a fundamental prerequisite for economic activity to take place. Abbottabad once served as the provincial summer capital as well as the headquarters of the Hazara division. As a result, the district is relatively well served in terms of roads and communications infrastructure.

The Abbottabad city has become one of the worst cities of the country known for frequent traffic jams that stretch for hours. The main Abbottabad town and its extensions towards north are bisected by Mansehra Road, which is part of the international Karakoram Highway, commonly known as KKH. Abbottabad, not too long ago, was considered as a city with most disciplined traffic regulated by the most dedicated and trained traffic police officials. Unfortunately, that is not the case anymore. After the earthquake of 2005 demography of Abbottabad changed considerably and after influx of people who migrated from Malakand, South and North Waziristan, followed by military operations, the demographic changes multiplied, hence increase in local population and vehicular traffic. Main KKH is passing through out Hazara Division, therefore density of traffic is usually heavy traffic and approximately 25000 vehicles use main KKH on daily basis.

Much of the infrastructure development in the district was carried out by the now-defunct communications and works department, which was responsible for the construction and maintenance of secondary and access roads as well as bridges. Following the devolution of local government, these responsibilities have passed to the NHA, and the works and services department.

While in operation, the communications and works department constructed 46 major and minor roads with a combined span of 420 km, as well as 29 bridges. In all, it completed 45 projects (totaling 364 km of roads) and constructed the Abbottabad–Murree Road up to Barrian (58 km), which has now been handed over to the NHA. It also built and maintained several hundred culverts and drainage structures which the responsibility of the works and services department are now. As far back as 1987, the communications and works department proposed the construction of an Abbottabad bypass to deal with the congestion caused by traffic on the Karakoram highway[55.] While the existing layout of the major and minor roads in District Abbottabad are shown in the below map:

[55] IUCN, Sarhad Programme. (2004). Abbottabad—State of the Environment and Development. Karachi: Rosette Printers.



MAP 5-1 Road Network Map of District Abbottabad

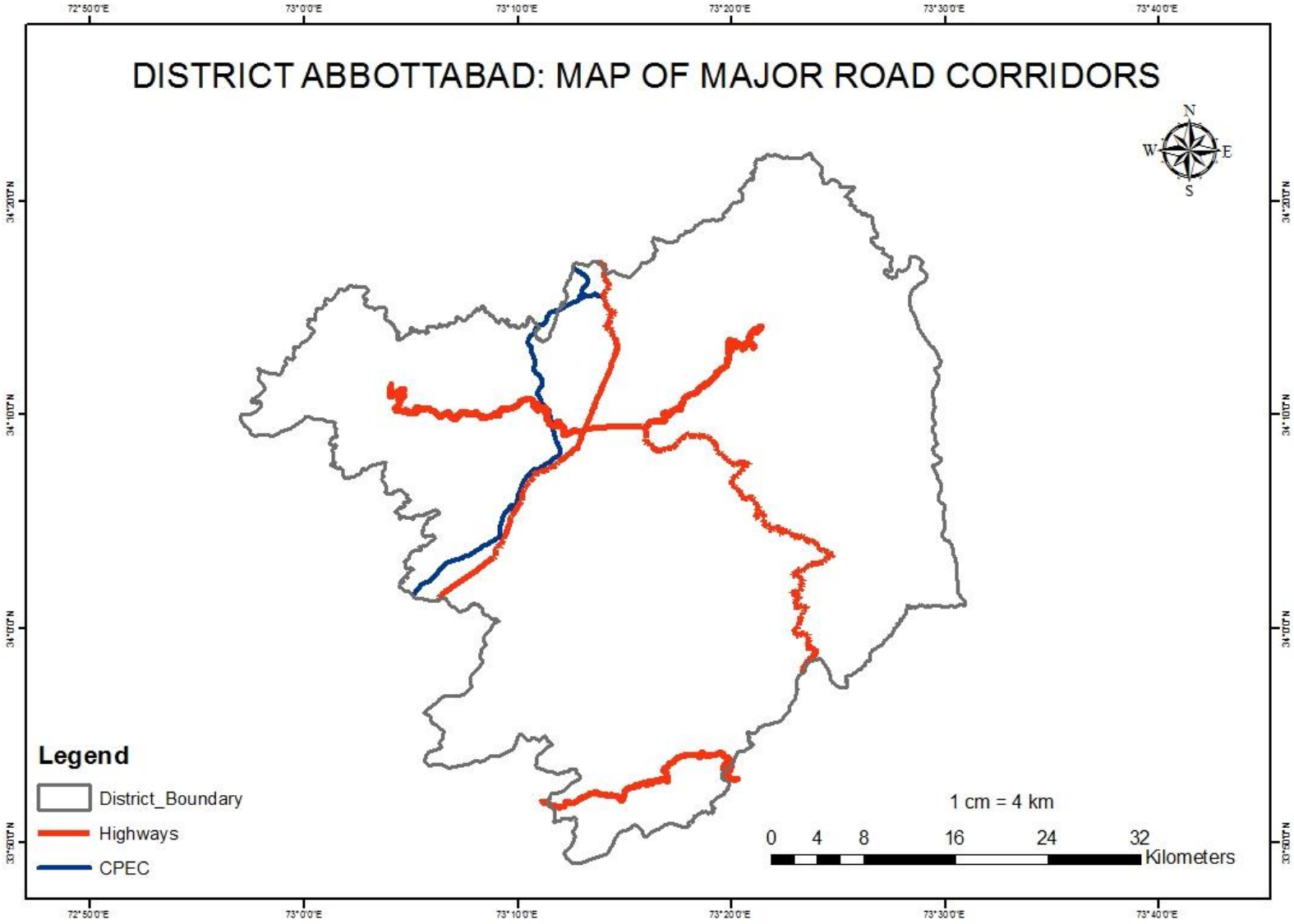
Identification of major transport corridors:

Major local roads in Abbottabad District are marked in the following map which extends up to several hundred kilometers of road length. Moreover, the district is served with and well-connected through highways with the regional and national cities and towns as well as with other major communication networks such as KKH and CPEC routes. All these major highways are described and mapped in the following highway network maps:

Karakoram highway; The Karakoram highway (National Highway 35) starts at the Chamba bridge on the Haripur–Abbottabad border and extends up to the Abbottabad–Mansehra border at Lodhi Abad. Its length within Abbottabad is 46 km. This highway plays a crucial role in the life of the district, connecting many of its secondary roads to the national roads network.

Murree – Abbottabad Road; the second highway is the Murree – Abbottabad Road, which enters the district at the border village of Barrian and joins the Karakoram highway inside the Abbottabad cantonment. Its length within the district is 58 km.

China Pakistan Economic Corridor—CPEC; China–Pakistan Economic Corridor is a collection of infrastructure projects that are currently under construction throughout Pakistan. CPEC is intended to rapidly modernize Pakistani infrastructure and strengthen its economy by the construction of modern transportation networks, numerous energy projects, and special economic zones. The Karakoram Highway between Rawalpindi and the Chinese border will be completely reconstructed and overhauled.



MAP 5-2: MAJOR TRANSPORT CORRIDOR in District Abbottabad

ANNUAL DEVELOPMENT PLANS, PLANNED AND IN PROGRESS

Table 5–1:Ongoing Programme (IN MILLION RS/-)

Code	Name	Cost		Exp. Up to June 2016	Allocation for 2016-17				TF Beyond 2016-17
		Local	Foreign		Local			Foreign	
					Cap	Rev	Total		
140630	F/S, Design and Construction of Barthan to Kasala Bara Road, District Abbottabad (8 kms)	80	0.000	34.000	5.000	0.000	5.000	0.000	41.000
140782	F/S, Design, Construction, Improvement and Black Topping of Roads in Galyat Region, Abbottabad	324.287	0.000	27.000	15.000	0.000	15.000	0.000	282.287
140785	Improvement and Blacktopping of Butti to Lower Surjal and Dana - 10 KM, District Abbottabad.	65.478	0.000	0.000	2.000	0.000	2.000	0.000	63.478
140880	PPC/ Imp/ Rehab/ Widening of a) Maira Kalan Village road b) Parr Nakkar to Kahala Kai Surmalagali Helipad road, c) Jaster Village road, d) Noormang Village road and e) GGMS Tharyati road, Abbottabad	50	0.000	5.000	5.000	0.000	5.000	0.000	40.000
140881	F/S, Design, BT and Extention fo road from Sujal Kot to Thesi (8 Km), Abbottabad.	80	0.000	15.000	5.000	0.000	5.000	0.000	60.000
140882	F/S, Design and Construction of Bridge Bari Naichan Mangal, Abbottabad.	49.04	0.000	5.219	15.000	0.000	15.000	0.000	28.821
140883	F/S, Design & BT of roads a) Nakka Galli Khuthialla to Mubaraka b) Chaitri to Sher Bai Mangal Bridge viz Bandi Matrach c) Gramry Including Siyal Sargal UC Pawa, District Abbottabad.	228.89	0.000	5.502	10.000	0.000	10.000	0.000	213.388
140884	F/S, design and Construction of a) Arro Kas Summa to Lora via Banwari b) Improvement/Wiidening & BT of Tajwal to Bagan Road c) Garhi – Chanali road via Seri, Abbottabad	180.78	0.000	15.740	5.000	0.000	5.000	0.000	160.040
140981	Construction/ Improvement / Rehabilitation/ Widening of 16 different roads (20 Km) in PK-44, Abbottabad	220	0.000	15.000	5.000	0.000	5.000	0.000	200.000
140982	F/S, Design and Construction/Rehabilitation of Bandi Attai Khan Road to Havelian (6 Km) Abbottabad.	66	0.000	44.950	5.000	0.000	5.000	0.000	16.050
150861	Construciton of RCC Bridge at a) Guldok Dhamtor District Abbottabad. b) Beer Banda Nabi Road, Mera Muzaffar road,Lower islamkot road,Booji road,Mirpura road,Blolia / Dana road,Dna mara Mandroch,Mandroch kalan Faqeer Bandi road District Abbottabad.	200	0.000	22.500	10.000	0.000	10.000	0.000	167.500
150862	Reh/Imp/BT/PCC of Boi Talkandi via Pall Mohri Sahran Sambli (R/W), Bangra Chowk to Kaner Kass Malkot U/C Plack Vill with drain, Banni Jandala to Ander Kot drwaza via cham U/C Plack Dist. Abbottabad	70	0.000	0.000	5.000	0.000	5.000	0.000	65.000

150863	Imp & Reconstn of road from Pind Kargoo to Jarral Kotnali with link to Gul Band U/C Jarral, Totani to Pawa, Gujar Mor via Pullah di Bandi U/C Pawa, Sherwan Bazar to Shaheed Abad with link to Athora & Bambochi Distt Abbottabad	100	0.000	10.000	10.000	0.000	10.000	0.000	80.000
150864	Construction/Rehabilitation of road from BHU tajwal to nawansher, Machana to Batangi, Serrian to Keri Raiki, Taror, Shakra to Choprra Nawansher Pirkot, to Tupla road Kala Ban, Shukka Kas road, Abbottabad.	700	0.000	7.500	20.000	0.000	20.000	20.000 0.000	672.500
150887	F/S and Design of road i/c 3 bridges alng right bank of River Jehlum from Phalair to Kohala (35-km) District Abbottabad.	50	0.000	0.000	10.000	0.000	10.000	0.000	40.000
150951	Imp/Reh/PCC from main road to Sari Darwaza via Loongal vill U/c Plack, Moolia to Kala Ban Aliabad Pakhoo Nakar U/C Bakote, Maina road Numbal U/C Pattan Main road Numbal Rata Thapala to Majoot U/C Numbal Distt Abbottabad	70	0.000	0.000	5.000	0.000	5.000	0.000	65.000
150953	Imp & Reconstn of road from Sherwan to Thathi UC Sherwan & road from Civiil Hospital to Ratian via Thandara with link to Sari Sher shah and BandiNikian U/C Pind Kargoo Distt Abbottabad	100	0.000	10.000	5.000	0.000	5.000	0.000	85.000
151070	Rehabilitation of Link Road Sarban Chowk to Dhobi Ghat Chowk Murree Road, Abbottabad.	42.36	0.000	12.500	20.000	0.000	20.000	0.000	9.860
151073	Construction of Sawar Lalai to Boi Road (3 KM), Abbottabad.	30	0.000	0.000	5.000	0.000	5.000	0.000	25.000
140619	Widening / Dualization of Muree Chowk - Thandiani Chowk and Nawasher Link Road District Abbottabad	983.904	0.000	357.000	50.000	0.000	50.000	0.000	576.904

Table 5–2:NEW PROJECTS

Code	Name	Cost		Exp. Up to June 2016	Allocation for 2016-17				TF Beyond 2016-17
		Local	Foreign		Local			Foreign	
					Cap	Rev	Total		
160625	F/S and Design of Qalandarabad bypass road (4 Km), District Abbottabad	10.000	0.000	0.000	10.000	0.000	10.000	0.000	0.000
160628	F/S, Design and Construction & Supervision of bypass road from Ayub Bridge Havellian (N-35) to Dhamtour at Abbotabad (18.325 Km)	1201.299	0.000	0.000	40.000	0.000	40.000	0.000	1161.299

5.1.2 Railway Network

Although Abbottabad is a district as well as divisional headquarter, Havellian is the trade center due to railway station connected with Punjab/ Peshawar and other parts of the country through railway line. District Abbottabad because of its hilly and mountainous terrain lacks a first-rate rail network. However,

the main city and towns are linked with metaled and rail communication that exists only up to Havellian and relates to Rawalpindi, (through Taxila The condition of Havellian railway station neither has changed since it was made in 1911, nor it is maintained now so the condition of its infrastructure is getting worse, but in future there are plans of extending the railway line up to the Khunjrab so the condition might get better then.

Pakistan Railways (PR) is a national state-owned rail transport service of Pakistan, head-quartered in Lahore. It is administered by the federal government under the Ministry of Railways. Pakistan Railways provides an important mode of transportation throughout Pakistan. It is commonly referred to as the "life line of the country", by aiding in large scale movement of people and freight throughout Pakistan. The organization is in loss and has stopped all freight and many passenger services as a cost-cutting measure. Despite, it has potential to provide affordable passenger transport services for comparatively longer travelling and freight services throughout the country. Pakistan Railways has two-gauge rail tracks i.e., Broad Gauge and Meter Gauge. The gauge wise length of railway routes and tracks as on 30th June 2011 is as under:

Table 5–3:Railway Routes and Tracks in Pakistan

Gauge Type	Route Kilometers	Track Kilometers
Broad Gauge	7,479	11,343
Meter Gauge	312	412
Total	7,791	11,755

Right of Way (ROW) of Broad-Gauge line is 22’ and that of Meter Gauge is 20’. ROW for double Broad-Gauge line is 38’. ROW at bottom may vary according to the height of track at ratio 1 to 2 ft. Pakistan Railways has a large network of over 1212 Railway Stations located throughout country, including operative and closed.

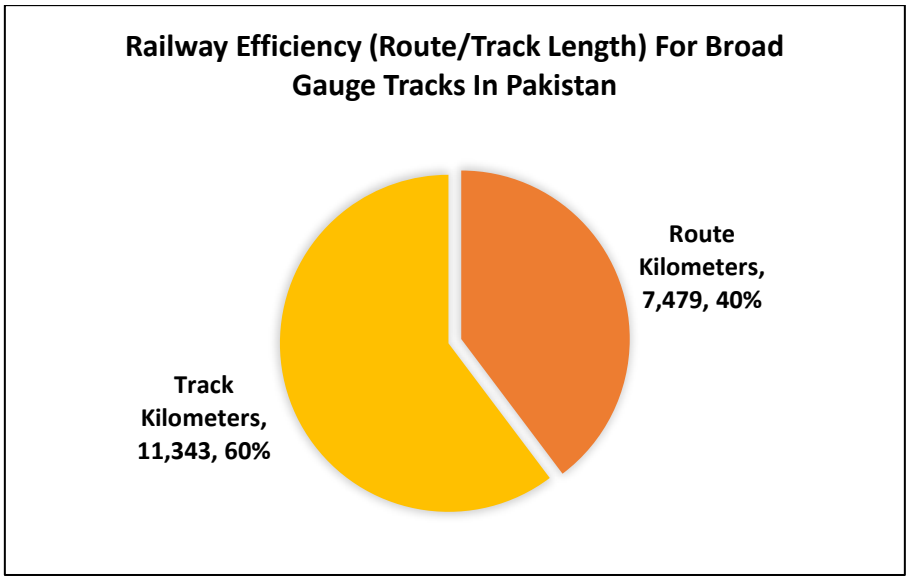


Figure 5-1:Railway Efficiency (Route/Track Length) For Broad Gauge Tracks in Pakistan

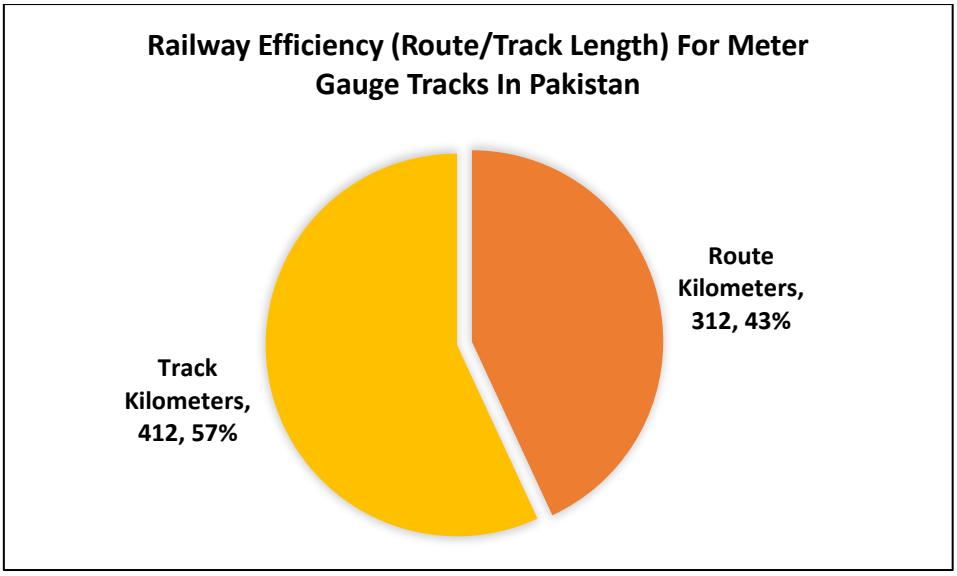


Figure 5-2:Railway Efficiency (Route/Track Length) For Meter Gauge Tracks in Pakistan

Rail Network in District Abbottabad

The length of total railway line in the District Abbottabad is only 5.1 Km entering from Jhangra UC leading to the only station in the district 'Station Havelian'. Only two up and two down economy class trains go through Havelian railway station. Two trains leave and arrive at Havelian station daily, namely; Hazara Express (11UP) and Havelian passenger (267UP). About 300 passengers per day arrive and leave by these two train services. The income can be increased from this current condition. It's the only station in Hazara but due to lack of facilities only 300 passengers per day arrive and leave the station. The detail on overall passenger flow from Havelian Railway Station is given below:

Table 5–4:Monthly Passengers Travelling Details in 2017

Months	268DN Railways	12DN Outsource Train	Total
January	2820	6940	9760
February	2236	7100	9336
March	2940	7461	10401
April	3315	6780	10095
May	2680	7262	9942
June	2074	7157	9231
July	4936	6711	11647
August	3315	7617	10932
September	4447	7049	11496
October	3572	6928	10500
November	3015	7285	10300
December	4058	7346	11404
Total	**39408**	**85636**	**125044**

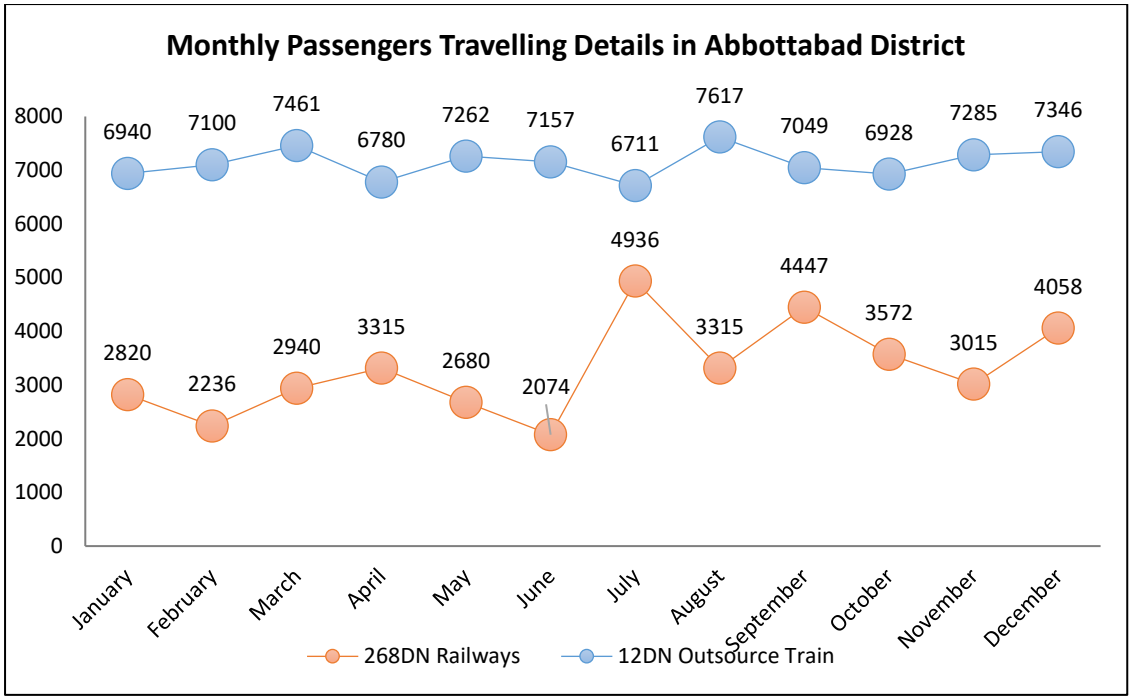


Figure 5-3:Monthly passengers travelling details in Abbottabad District

RAILWAY STATIONS IN ABBOTTABAD DISTRICT

There is only one (Class B) Railway station that come in the boundary of the District called Havelian railway station. Despite being old, Havelian railway station is still lacking many facilities like facilities for tourists etc. as the Hazara is famous for his mountains and other natural views. The facilities that are available at Havelian rail station are:

- Waiting Rooms for gents and ladies
- Shelter
- Benches
- Toilets
- Drinking Water coolers
- Passengers' amenities

Traveling Facilities at the Havelian Station includes:

- Advance Reservations for (Up to one month) seats and birth of economy class.
- Senior citizen quota only in 267UP Havelian passenger train.
- The facilities during traveling are food items, beverages and other junk foods and sleeping bunks are also available.

Under CPEC project railway link is also being upgraded and dry port at Baldher Railway Station is being developed. The proposed rail link is a part of railway Public Sector Development Program (PSDP) year 2017-18. The length of rail link from Havellian to khunjerab is 682 kilometers and the project includes construction of railway stations, sub-stations, parking facilities and related infrastructure and the installation of signals and safety systems. The actual cost of the project would be work out after a detailed feasibility study and design of the project. To maximize the international trade potential between China, Pakistan and beyond, it is considered imperative to provide access to the Arabian Sea. The long-term vision

predicts connectivity of proposed Havelian-Khunjrab rail link with Gwadar through ML-and onwards from Jacobabad to Khuzdar, Besima, Panjgur, Hoshab and Turbat under the CPEC[56].

CONSTRAINTS

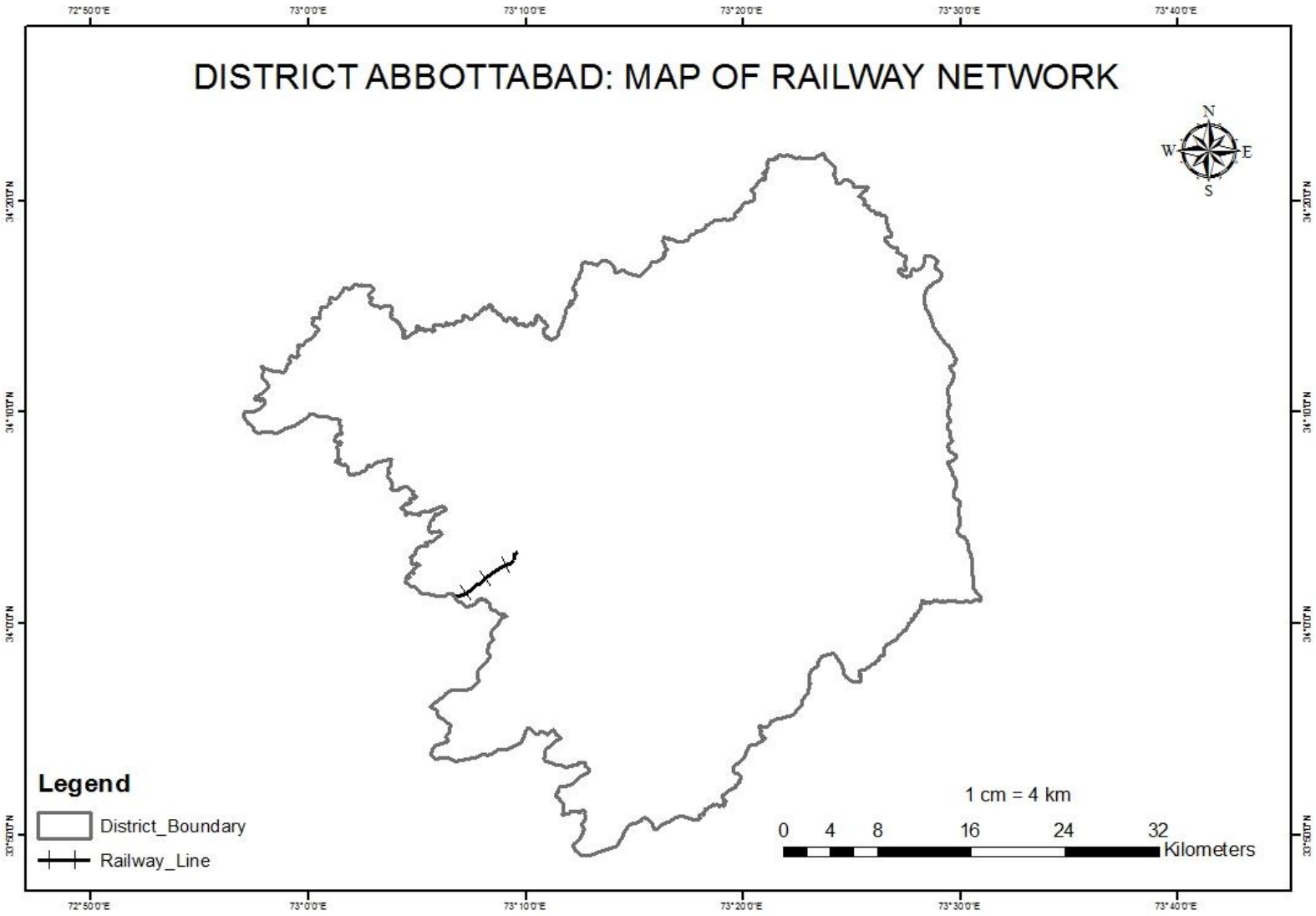
Some of the common issues and constraints related to transport sector in general and railways in particular are as under:

- Transport sector has remained neglected in the province of Khyber Pakhtunkhwa due to traditionally low priority attention given to it. The low commitment and priority of the Government over the years is implicit in the scant resource allocations for transport sector.
- System of District Regional Transport Authorities has not only adversely affected service delivery but also was wasteful of public resources in terms of unrealized potential revenue.
- The organization is too large to be managed efficiently and effectively to deliver services professionally on commercial lines.
- The organization is financially bankrupt and is unable to maintain its routine operations and services.
- Spillage during revenue collections has ever been uncontrollable phenomenon in this organization.
- Ghost employment is found highest in Public Relation as compared to any other organization of the country.
- Red tapeism in the department is the major root cause behind poor performance and delivery of services.

RECOMMENDATION

- High priority may be assigned to development of Transport, to balance it out with investment on road network improvement. The level of investment on transport may be increased at least from 0.05 percent to 5 percent.
- Immediate restructuring of District Regional Transport Authorities may be carried out, with addition of transport professionals to deliver the services efficiently.
- Traffic/ Transport Research & Planning Agency may be established at provincial level, to work on intra city and intercity transport demand, route network analysis, passenger's volume, number & type of vehicles required, etc.
- Immediate departmental restructuring, to transform it into a real corporate body to deliver the services on commercial lines, as PRACS (Pakistan Railways Advisory and Consultancy Services Limited) established in 1976 has proved success of the corporate approach.
- PR to develop & maintain the tracks/ infrastructures only, and allow commercial operators & freight companies from private sector to operate.
- Freight and Passenger Trains may run on PR's network with their own rolling stock under a contract with PR to purchase track access.
- Private sector may also be invited to operate dry ports, locomotive maintenance and passenger ticketing and provision of services through management contracts.

[56] Feasibility study of CPEC



MAP 5-1: Railway Map of Abbottabad

2.1.3 Telecommunication, Postal services and Telegraphs

Telecommunication is communication at a distance by technological means, particularly via electrical signals or electromagnetic waves. The word often used in its plural form, telecommunications, because it involves many different technologies. Telecommunication is the transmission of signs, signals, messages, words, writings, images and sounds or information of any nature by wire, radio, optical or other electromagnetic systems. Telecommunication occurs when the exchange of information between communication participants includes the use of technology.

The process for planning and developing telecom services must be in line with land use planning strategies, so that regulations related to radio frequency engineering standards can be used as illustrative planning tool that coincides with the underlying zoning. This is accomplished by identifying existing tower locations and signal coverage conditions, its implications and a series of evaluations founded on land use principals and engineering practices. The result is a planning tool that offers strategies to reduce superfluous tower infrastructure by improving the efforts to merge wireless deployment to minimizing tower proliferation by increasing shared sites.

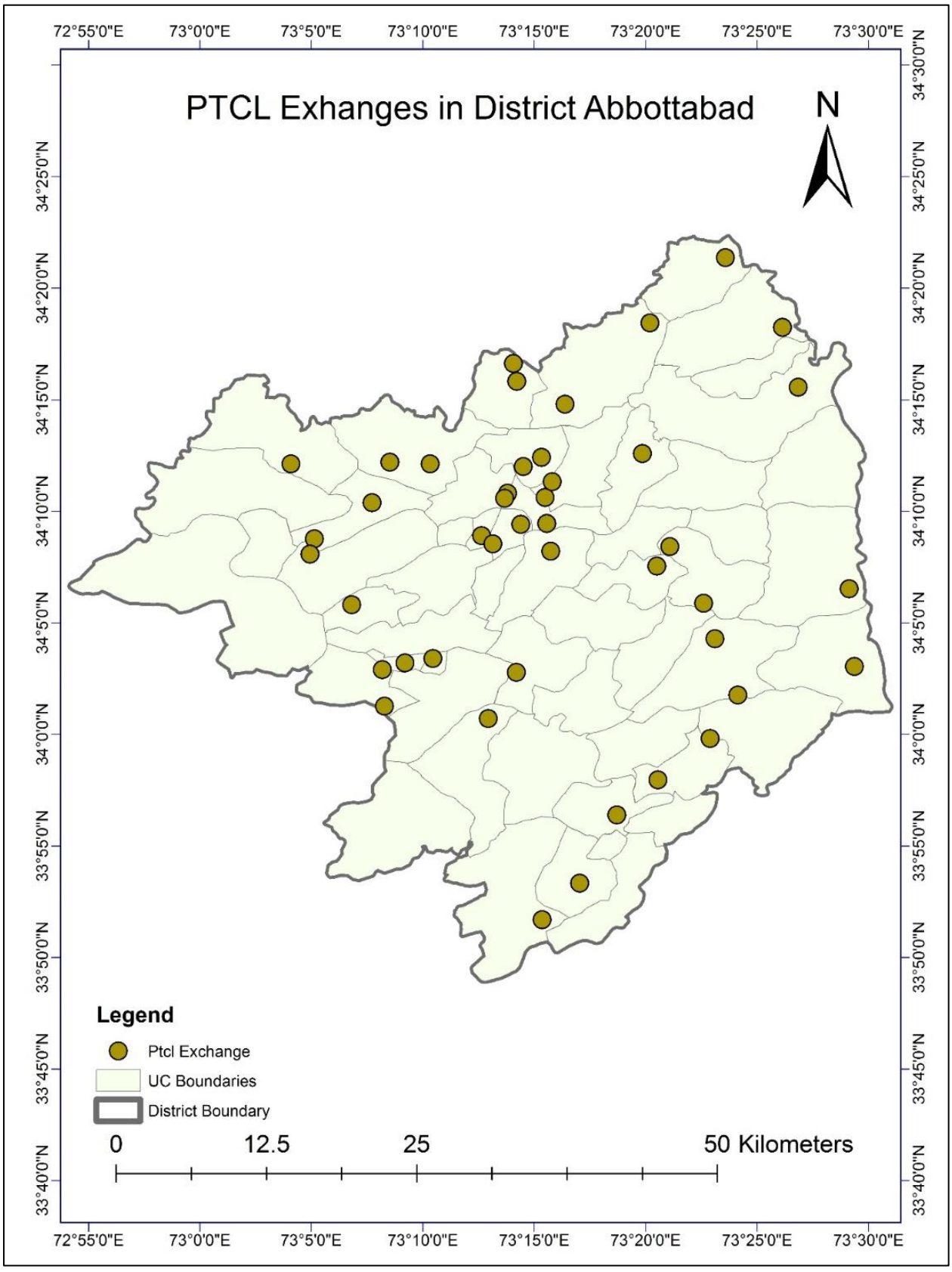
National Telecommunication Policy

Telecommunication sector in Pakistan has undergone major changes when Government of Pakistan announced Telecom Deregulation Policy in July 2003 and Cellular Mobile Policy in January 2004. Both these policies envisaged to increase service choice, increase competition and provide coverage to un-served and underserved areas. With the announcement of Telecom Deregulation Policy, exclusivity of PTCL in basic telephone has been abolished and by issuing more cellular licenses, competition in cellular market has been introduced.

All the segments of telecom sector are now open for private entry. Major foreign investment has been made in the mobile sector after award of more cellular mobile licenses through open auction. Also, large investments have been made under the first phase of fixed telephony services licensing including Local Loop (LL) and Long Distance International (LDI) and Wireless Local Loop (WLL). In this regard, PTA has issued 12 LDI and 84 LL licenses. The fore-mentioned services are still considered to be most lucrative for investment with the commencement of second phase of licensing. Under Pakistan Telecom Reorganization Act, in 1996 Pakistan Telecommunication Company was split into two companies i.e. Pakistan Telecommunication Corporation Limited (PTCL) and National Telecommunication Corporation (NTC).

PTCL provides telephony services nation-wide and is the backbone for country's telecommunication infrastructure despite arrival of a dozen other telecommunication companies. It operates around 2000 telephone exchanges across the country, providing the largest fixed line network. Data and backbone services such as GSM, CDMA, Broadband Internet, IPTV, wholesale is an increasing part of its business. Originally fully owned by the Government of Pakistan, this holding has since 2006 been reduced to 62 percent, when 26 percent of shares and control was sold to Etisalat, a Dubai based Company and the remaining 12 percent to the public.

NTC has a definite mandate to provide basic telecommunication services to its designated customers, which include Federal and Provincial Governments, their departments, autonomous organizations and defense services throughout the country. NTC is making committed efforts to provide state-of-the-art communication solutions using third generation Internet Protocol Voice and Data Networking.



MAP 5-2: Map of Telecommunication services in the District Abbottabad

Telecommunication Services in Abbottabad District

There are total of 416 telephone exchanges in Khyber Pakhtunkhwa, of which 31 (or about 7.45 percent) are in District Abbottabad. The number of telephone connections in the Province are 292610, of which 23596 connections nearing about 8 percent are in the District Abbottabad.

Table 5–5: Number of Exchanges and telephone connections

Area	No. of Exchanges (2015-16)	Telephone Connections (2015-16)
Khyber Pakhtunkhwa	416	292610
Abbottabad	31	23596

Broadband Connections; the term broadband commonly refers to high-speed Internet access that is always on and faster than the traditional dial-up access. It is different from the dial-up services in different ways such as

- Broadband service provides higher-speed of data transmission. It allows more content to be carried through the transmission "pipeline."
- Broadband provides access to the highest quality Internet services—streaming media, VoIP (Internet phone), gaming, and interactive services. Many of these current and newly-developing services require the transfer of large amounts of data that may not be technically feasible with dial-up service. Therefore, broadband service may be increasingly necessary to access the full range of services and opportunities that the Internet can offer.
- Broadband is always on. It does not block phone lines and there is no need to reconnect to network after logging off.

In District Abbottabad the number of broadband connections is increasing day after day the current number of broadband connections in District Abbottabad is 9520 approx.

Private Sector in Telecommunications; the total mobile subscribers in Pakistan increased to 98 million at the end of December 2009. In Khyber Pakhtunkhwa, the number in the same time was around 10 million, i.e. around 10.3 percent of the national total. District-wise break-up could not be accessed.

Table 5–6: Number of Mobile Operators in Khyber Pakhtunkhwa[57]

Operator	Subscribers	Percentage
Mobilink	3,266,717	32
Ufone	2,071,866	20
Zong	1,336,537	13
Instaphone	105	0
Telenor	2,452,433	24
Warid	1,217,159	12
Total	10,344,817	100

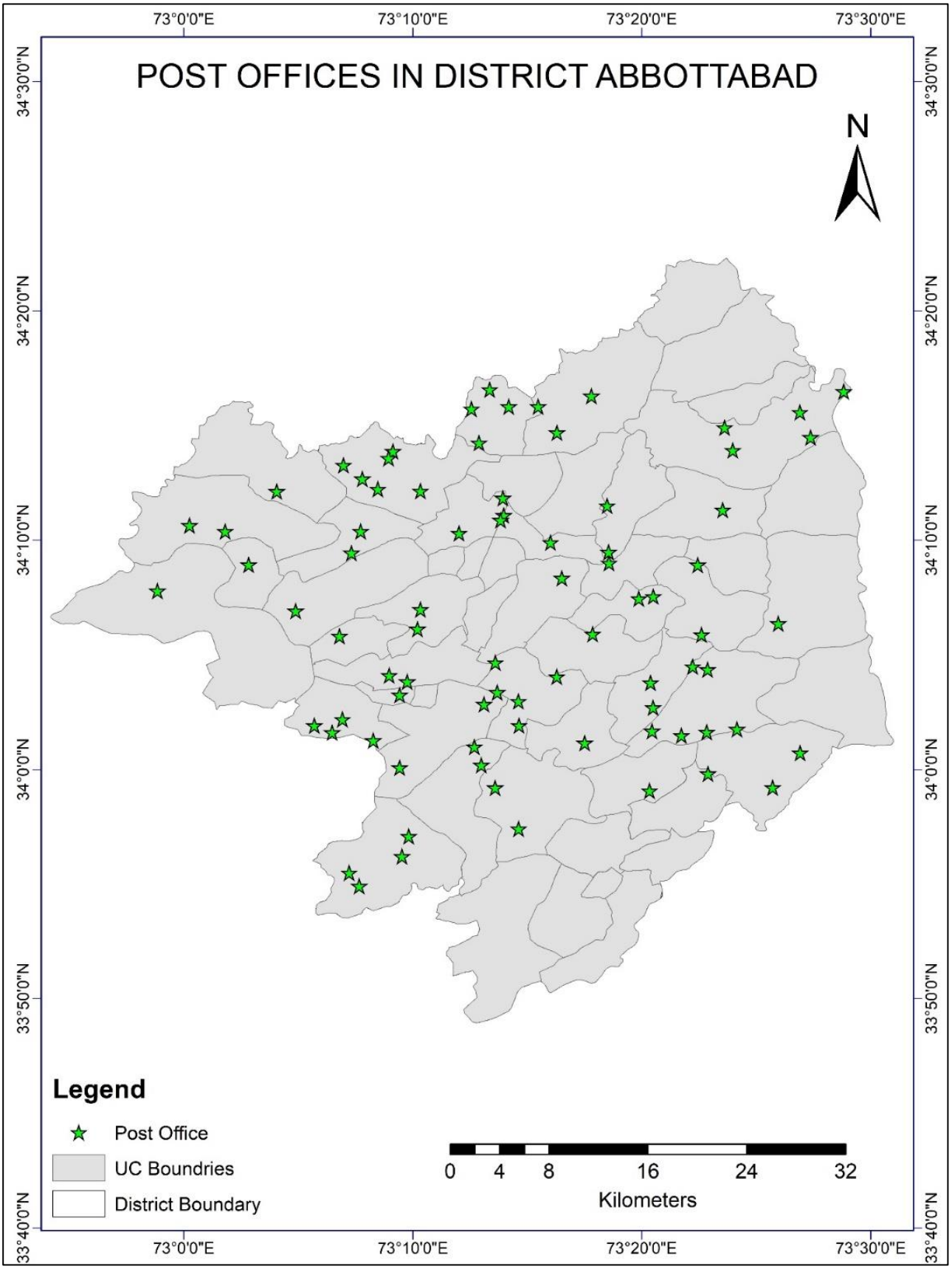
[57] Telecommunication department District Abbotabad.

5.1.4 Postal Services

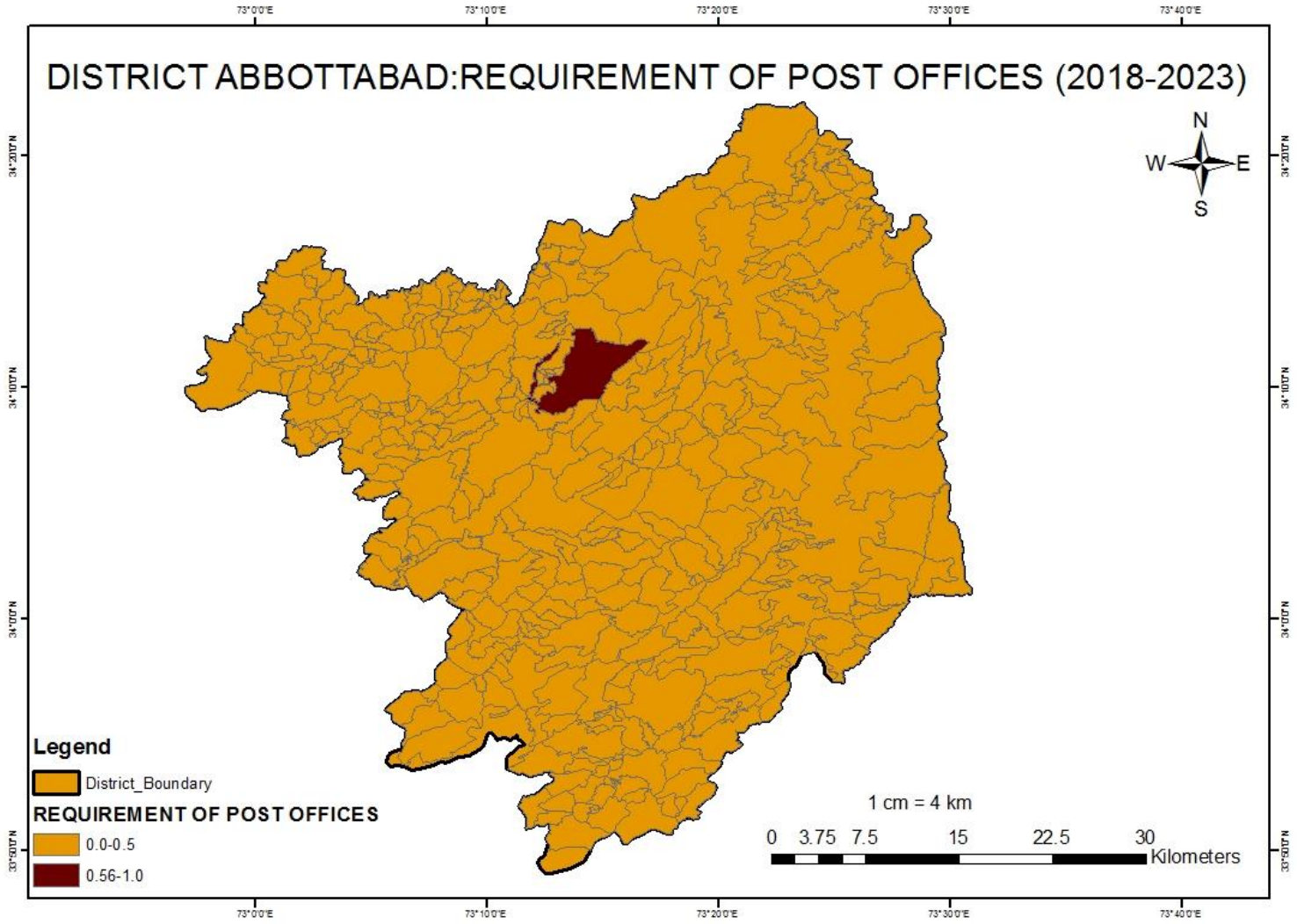
Pakistan Post Office is one of the oldest government departments in the Sub-Continent. It is providing postal services in every nook and corner of the country through a network of around 13,000 post offices. Pakistan Post is providing delivery services to about 20 million households and businesses as community service without any cost considerations. An autonomous High-Powered Postal Services Management Board has been established through Pakistan Postal Services Management Board Ordinance, 2002. The executive management of postal and allied services below the Directorate General is done at three levels – the Circle Level, the Regional Level and Divisional / District Level. Each Circle is headed by a Postmaster General and its territorial jurisdiction extends to a province. In carrying out their responsibilities, the Postmasters General are assisted by the Regional Deputy Postmasters General and Unit Officers at operational level.

Pakistan Post has a broad and varied role to play beyond provision of communication link for individuals and businesses. Keeping pace with the changing communications market, Pakistan Post is emphasizing in the use of new communication and information technologies to move beyond what is traditionally regarded as a its core postal business. Pakistan post is committed to make secure and timely delivery of mail, money and material at the doorsteps of the customers at affordable cost. In addition to its traditional role, the Pakistan Post also performs agency functions on behalf of Federal and Provincial governments, which inter-alias include Saving Bank, Postal Life Insurance, Collection of Taxes, Collection of Electricity, Water, Sui Gas and Telephone bills.

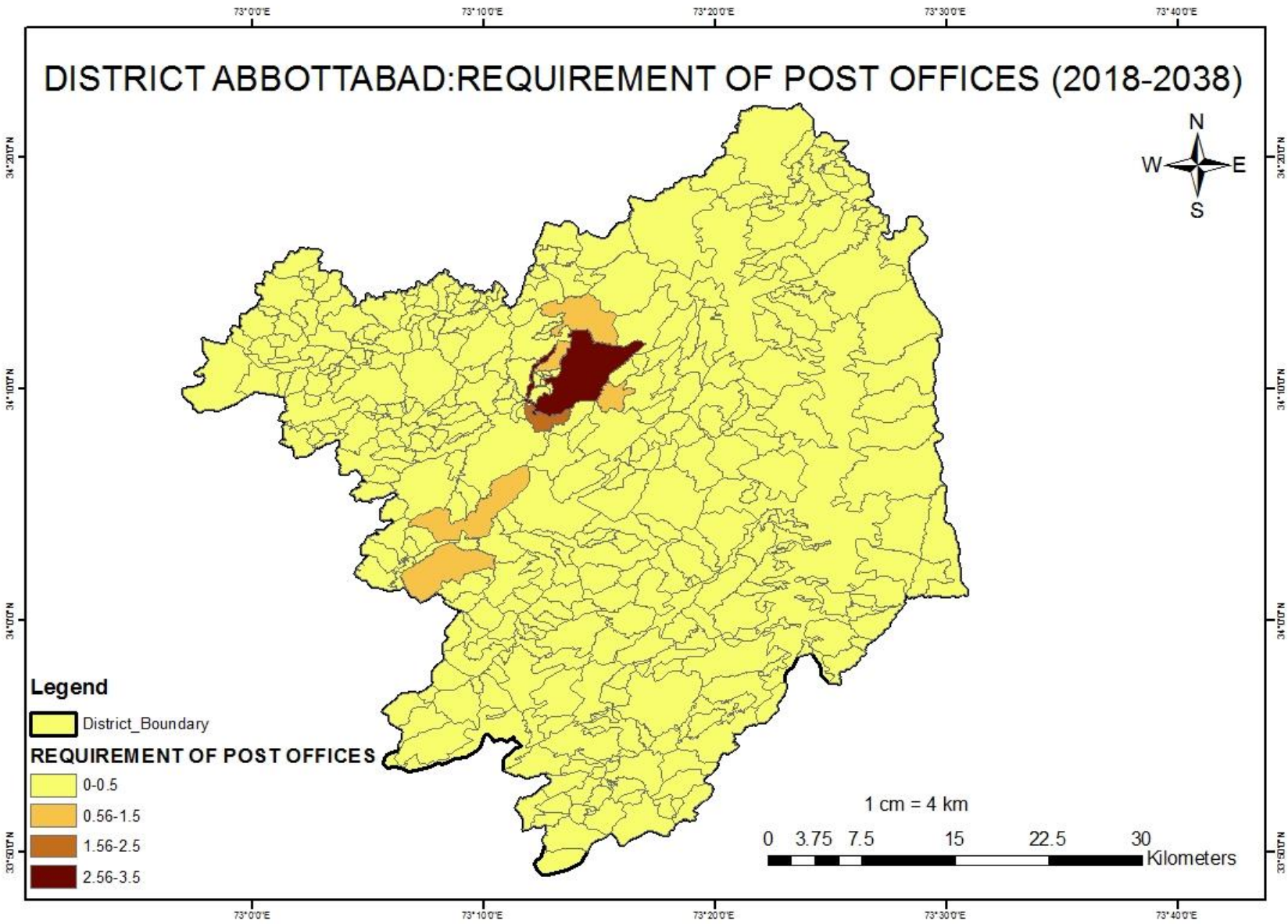
Pakistan Post is also providing a universal postal service network in harmony with the Universal Postal Union (UPU) strategy to ensure secure and timely delivery of mail, money and material at affordable cost through utilization of people, process and technology and innovative product offerings.



MAP 5-3: Post Offices in Abbottabad



MAP 5-4: Proposed Post offices (2018-2023)



MAP 5-5: Proposed Post offices (2023-2038)

Constraints and Recommendations in Telecommunication

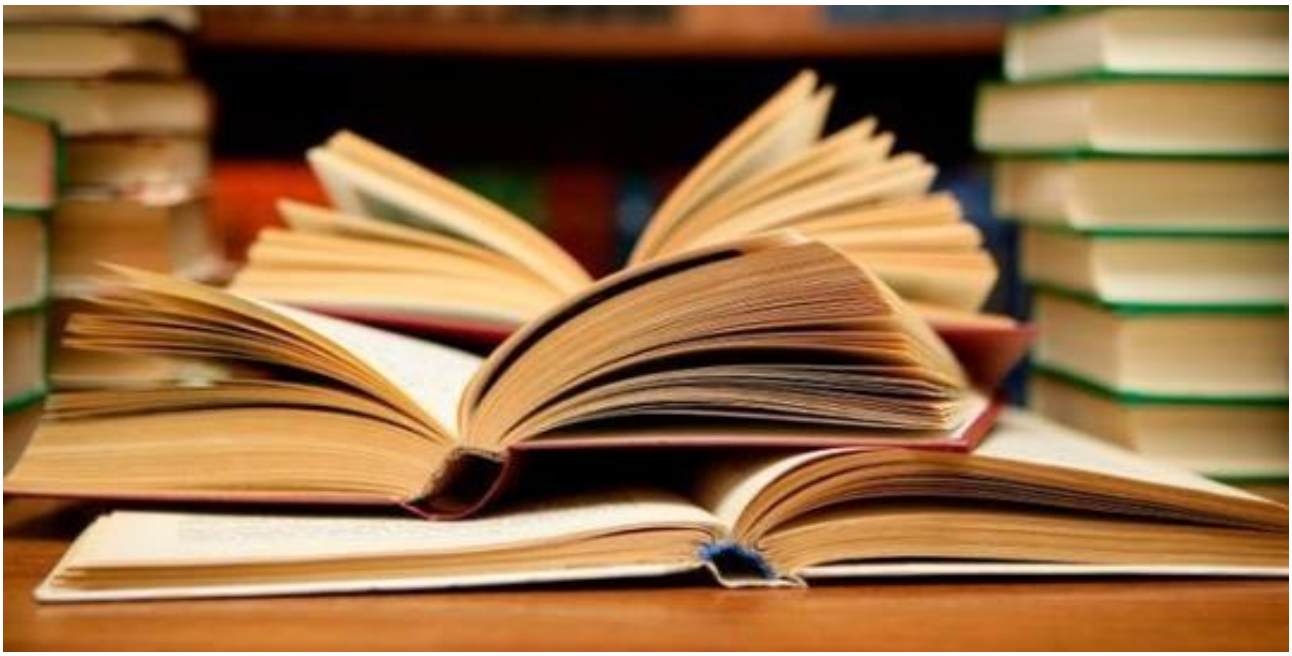
Some of the notable constraints and deficiencies in the telecommunication sector are:

- Most of the remote areas of Abbottabad lack telephone connections.
- During and after rain there is a break in connectivity, which should be improved and need to be supervised properly.
- Telecom organizations should continually monitor usage. For example, voice and data utilization studies can help identify opportunities to upgrade to equipment with greater capacity and lower maintenance and operation costs or consolidate vendors to reduce costs
- Telecom Enterprises must monitor and resolve discontinued service to ensure that the organization is not billed for discontinued or unused equipment.
- Proper maintenance of telephone lines is needed and also need to be properly arranged from pole to the end user.

Similarly, some of the notable constraints regarding postal service in Abbottabad are:

- There is very a smaller number of postal services in the remote areas of Abbottabad
- The number of post offices should be increased as existing POs are insufficient for the people.
- The post offices not only handle postal services but also act as money transfer institutions and as money banks.
- There must be at least one post office in every union council for timely collecting and dispatching of mails and allied facilities.

Educational Land Uses



5.2 Educational Land Uses

Education is a fundamental human right and every child is entitled to it. It is critical to our development as individuals and as societies, and it helps cover the way to a successful and productive future. When we ensure that children have access to a quality education that is rooted in gender equality, we will create a ripple effect of opportunity that impacts generation to come. Accordingly, that important sector of the society and the economy needs to be spaced and placed somewhere in the district—generating the demand for educational land uses in the district. The constitution of Islamic republic of Pakistan, 1973 lays down that "state shall be responsible for eradication of illiteracy and provision of free and compulsory education up to secondary level, within minimum possible time"[58].

5.2.1 Literacy Ratio

A person was treated as literate in 1998 Census if he could read newspaper or a journal of same standard and could write a simple letter in any language. The literacy is measured as the ratio, in percentages, of literate population to corresponding population aged 10 and over. The literacy ration in District Abbottabad was increased from 27.97 percent in 1981, to 56.61 percent in 1998. The literacy ratio for male is 74.25 percent as against 39.11 percent for female. The ratio is much higher in urban as compared to rural areas both for male and female. The literacy ratio of rural and urban areas for the year 1981 and 1998 is given in Table 5-7 and graphically represented in Figure 5-4.

Table 5–7:Literacy Ratio in District Abbottabad[59]

Area	Literacy in 1981			Literacy in 1998		
	Total	Male	Female	Total	Male	Female
District	27.97	43.48	11.23	56.61	74.25	39.11
Urban	53.87	63.32	39.02	76.73	85.59	64.71
Rural	23.32	39.16	7.34	51.85	71.33	34.18

[58] Article 37-B, Constitution of Pakistan.
[59] District Abbottabad Census Report-1998

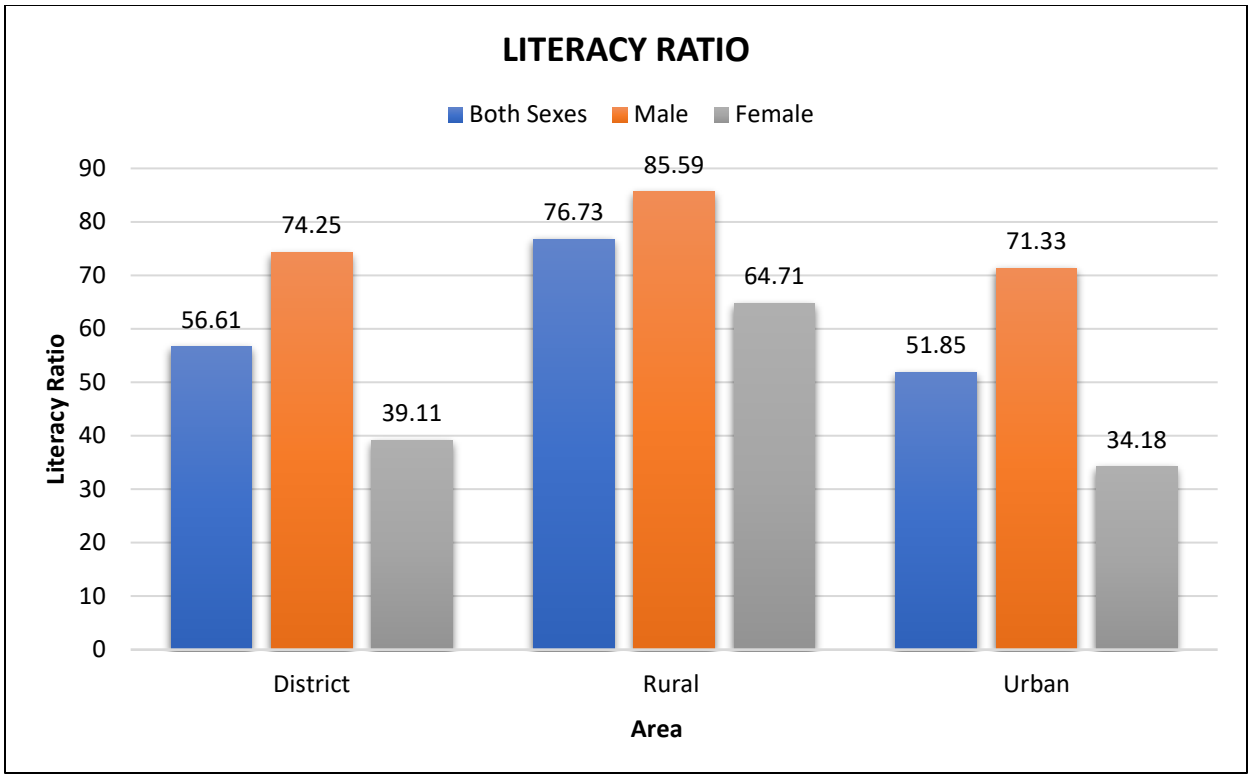


Figure 5-4:Literacy Ratio in District Abbottabad

5.2.2 Educational Institutes[60]

Vertical hierarchy is a basic feature in the delivery of formal education. It may be visualized as a pyramid, its base comprising of many hundreds of primary schools, while at the top may be a few universities providing specialized education to much lesser number of post graduate students. Specialized institutions such as universities are virtually limited to metropolitan cities. According to National Reference Manual for Planning & Infrastructure Standards[61], a unit at each level is fed by a catchment comprising 3-7 facilities of the next lower level. The next lower level in case of universities is degree colleges. The total number of education institutes in District Abbottabad is 2168 (private and public), which consist of 1484 primary schools, 387 middle schools, 280 high schools and 119 high secondary schools. While the number of degree colleges is 10 and number of post graduate college is 3 and universities. The detail distribution is given in Table 5-8 and graphically represented in Figure 5-5, below.

[60] Source: Independent Monitoring Unit, Elementary and Secondary Education, KP (2019)
And (private schools' source)
And Development statistic of Khyber Pakhtunkhwa, page 109-110, Number of Government Degree Colleges in Khyber Pakhtunkhwa.

[61] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Section 6.1.2, Page 102.

Table 5–8: Educational Institutes in District Abbottabad[62]

Institutions	Number			
	Total	Male	Female	Private
Primary	1359	796	563	125
Middle	387	85	81	221
High	280	71	46	163
Higher Secondary	119	15	11	93
Degree Colleges	10	3	7	-
Post Graduate College	4	2	2	-
Universities	-	-	-	-

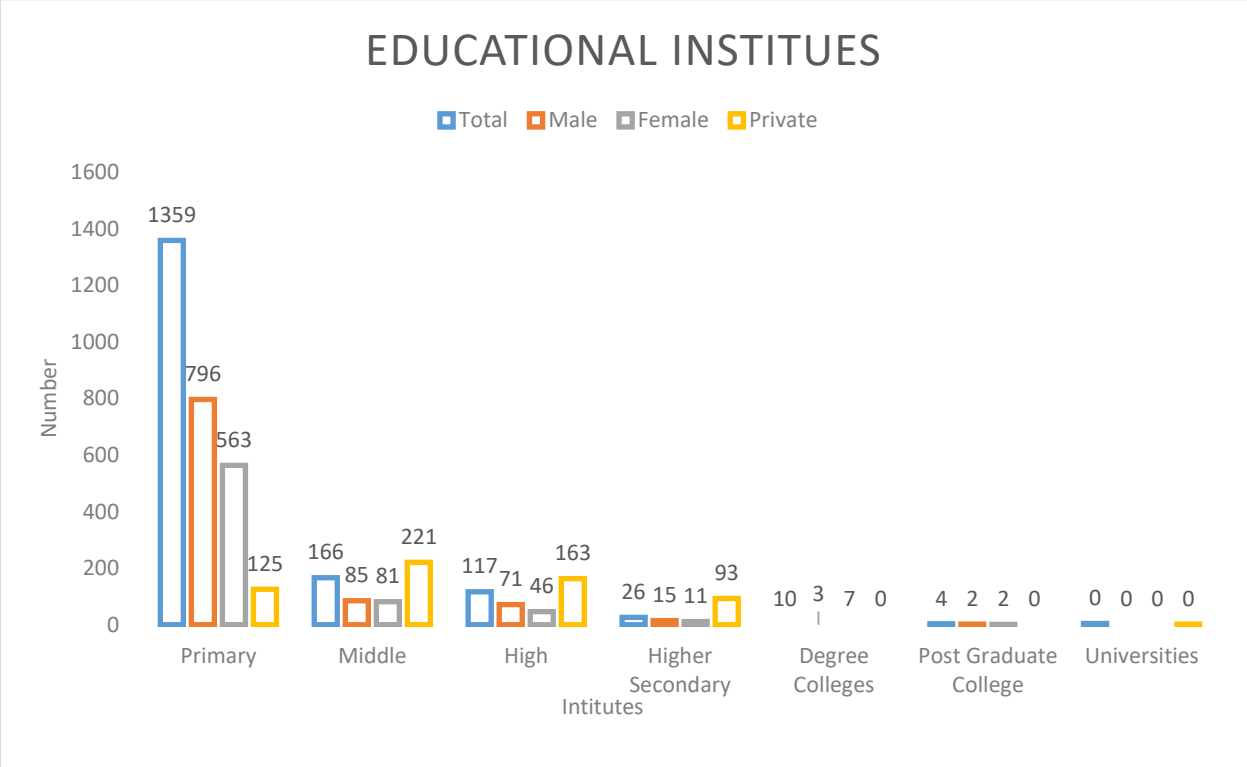


Figure 5-5:Educational Institutes in District Abbottabad

Enrolment Rate[63]

Total number of enrolled students in District Abbottabad is 187262. Out of these 122013 students are enrolled in primary schools, 36095 in middle schools, 19313 in high schools and 2429 in higher secondary schools. While the total enrollment in degree colleges and post graduate college are 6910

[62] Development statistics report 2018.

[63] Source: Development statistic of Khyber Pakhtunkhwa, page 111-117, District Wise Enrolment in Primary, Middle, High, High Secondary Schools, Degree Colleges and Post Graduate Colleges.

and 2087 respectively. The detail of enrolment rate in District Abbottabad is given in Table 5-9 and shown in the Figure 5-6:

Table 5–9: Students Enrollment Rate in District Abbottabad

Institutions	Enrolment		
	Total	Male	Female
Primary	122013	74191	47822
Middle	36095	19076	17019
High	19313	11512	7801
Higher Secondary	2429	967	1462
Degree Colleges	6910	3532	3378
Post Graduate College	2087	396	1718
Universities	2226	1552	674

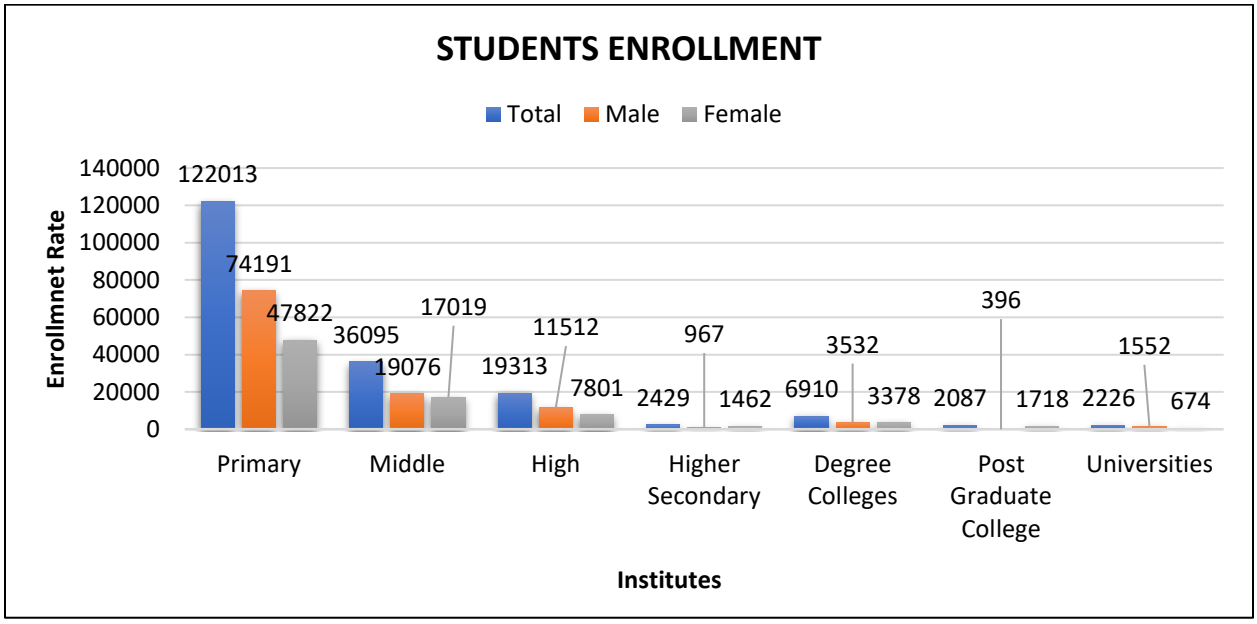


Figure 5-6:Students Enrollment Rate in District Abbottabad

5.2.3 Teaching Staff

Existing number of teaching staff in District Abbottabad is 15592 out of total 3848 staff are in primary schools, 979 in middle schools, 1623 in high schools and 596 in high secondary schools. while 876 are under service in private primary schools. 2098 teachers are engaged in middle schools, 3009 staff are in high school and 2563 are in collages. The detail of which are shown in the following figure:

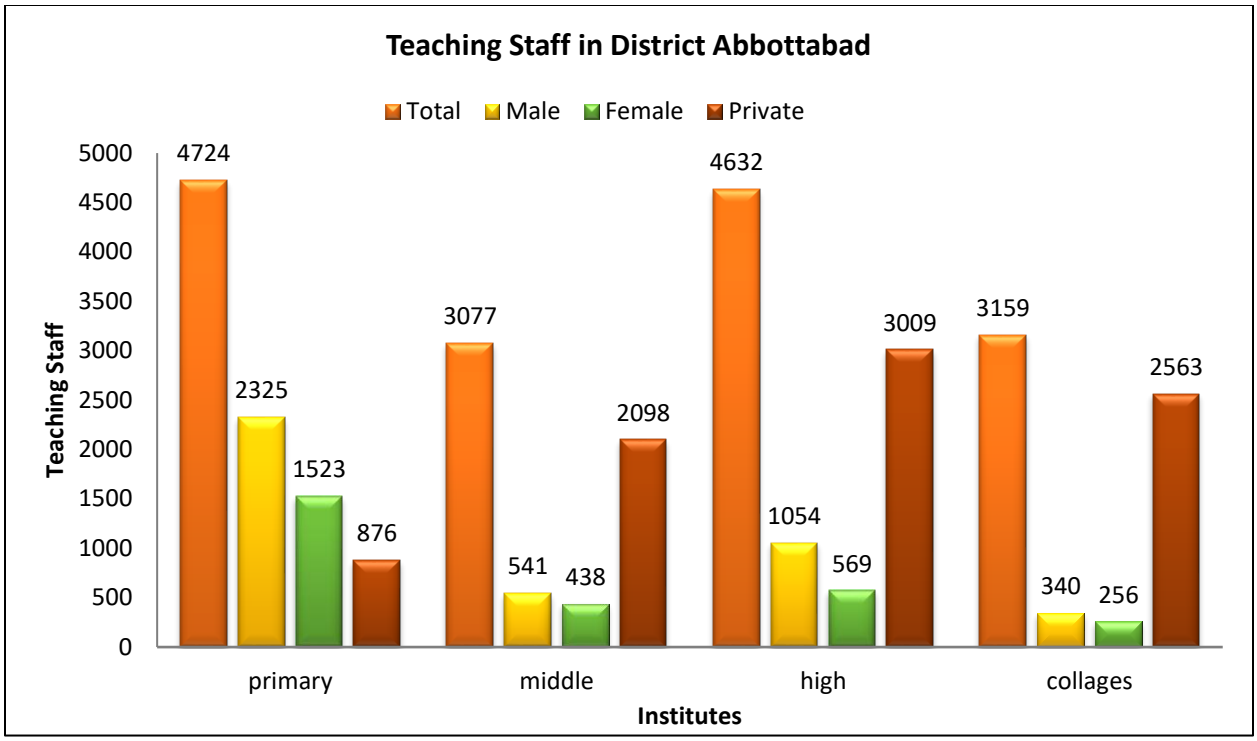


Figure 5-7:Teaching Staff in District Abbottabad

5.2.4 Participation Rates[64]

Participation Rate is defined as the total enrolment, divided by the population of the age-group, which corresponds to a specific level of education. Participation rate is calculated by only that part of the enrolment which corresponds to the age-group of the level considered. The age-group of the population eligible for primary stage education is 5-9 years. At primary level, the participation rate in District Abbottabad for both sexes is around 67.01% (78.54% for males & 54.59% for females). At middle level the participation rates in the same order are around 33.45, 34.26 and 32.58. At high schools, the overall participation rate is 29.36, while for males and females it is 34.34 and 24.18 % respectively:

[64] Source: Development Statistic of Khyber Pakhtunkhwa, page no 135, District wise participation rate (%) of primary, middle, high level in Khyber Pakhtunkhwa for the year 2015-2016.

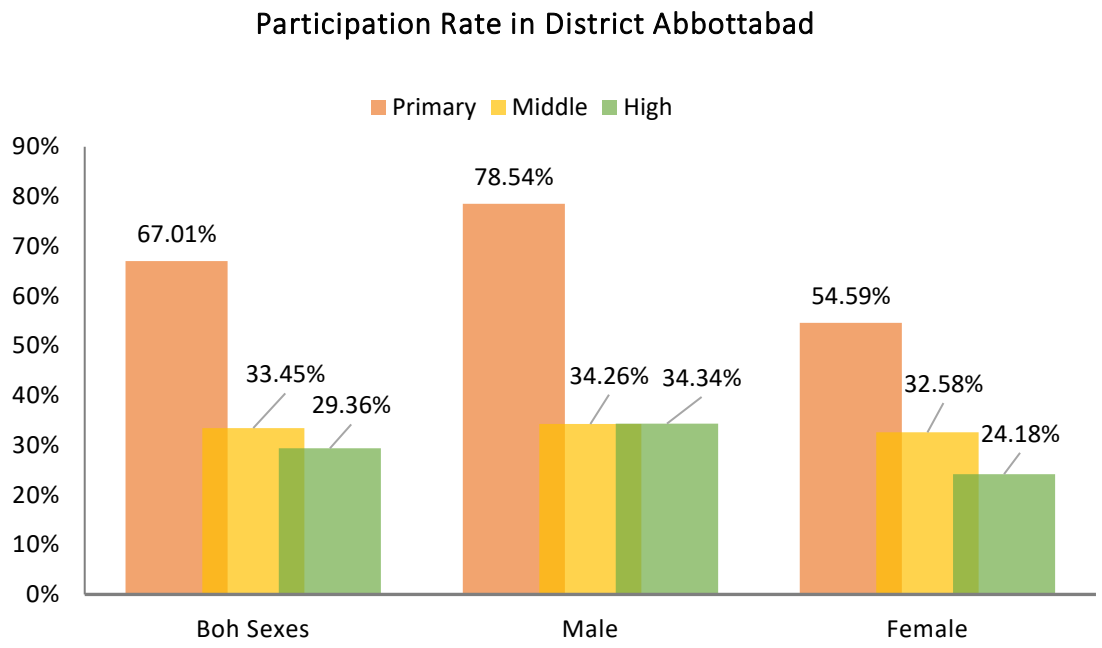


Figure 5-8:Participation Rate in District Abbottabad

5.2.5 Teacher Student Ratio

Teacher to student ratio of district Abbottabad show that at primary level one teacher is available for 31.1 students while at middle level the ratio increases to 36.8 students per teacher. The ratio at high school is 11.8 students per teacher. The following table gives enrolment teaching staff and ratio of education institute hierarchy.

Table 5–10: Teachers-Students Ratio of District Abbottabad[65]

Institution	Enrolment	Teaching Staff	Ratio
Primary	122013	3848	31.1
Middle	36095	979	36.8
High	19313	1623	11.8
High Secondary	2429	596	4.0

[65] Teacher student ratio is calculated by dividing No of students / No of teachers.

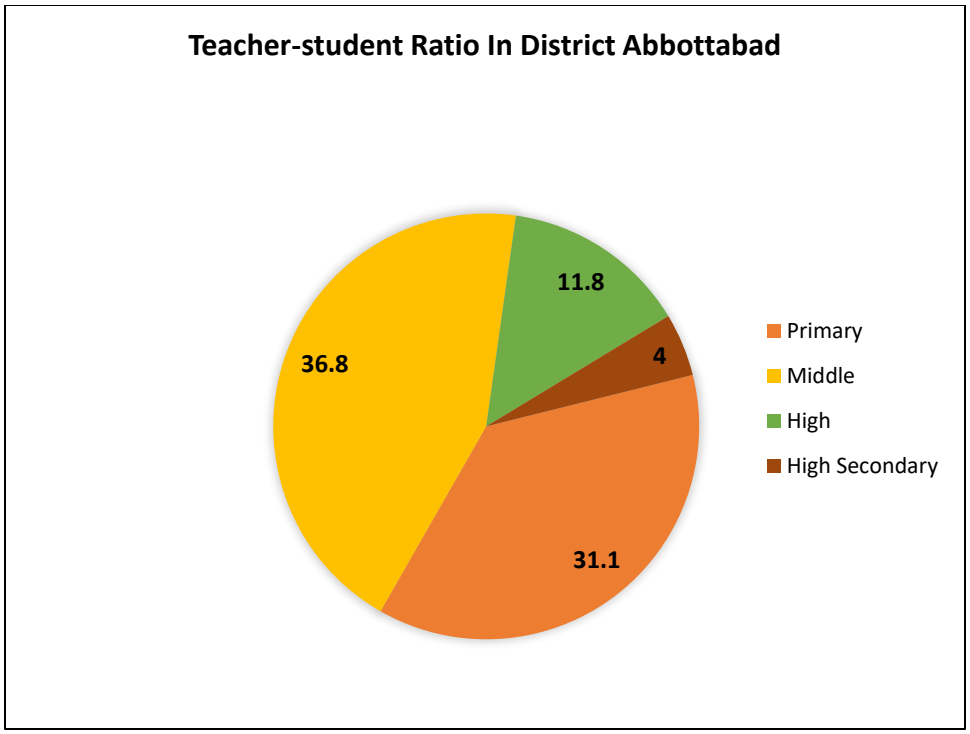


Figure 5-9:Teacher Student Ratio in District Abbottabad

5.2.6 Land Use Requirements for Education Sector in Abbottabad District

Short Term Education Plan (2019-2024*)*: It is estimated that during the short-term plan, the District Abbottabad requires 73 additional primary schools for boys and 56 primary schools for girls, 30 middle schools for boys and 7 middle schools for girls, 12 high schools for boys and 11 high schools for girls, 5 additional high secondary schools for boys and 3 for girls during short term plan. It is envisaged that primary and secondary schools will form part of the residentiary use. Their location has been broadly identified in terms of corridors, but exact location and space requirements, especially for primary schools will be governed by the detailed planning and designing of the relevant areas.

Table 5–11: Additional Primary School Required in Short Term Plan (2018-2023)[66]

District Area	Population 2018	Population 2023	Additional Population (2018-2023)	1 Boys P/S per 7500 pop urban (Rural 1 P/S per 1800 pop	Land required @ 2 Acre/ P/S Urban (Rural 1 Acre/ PS)	1 girls P/S per 8200 pop Urban (Rural 2400 pop)	Land required @ 2 Acre Urban @1 Acre Rural
Urban	302,387	367,900	65,513	9	18	8	16
Rural	1,061,121	1,177,077	115,956	64	64	48	48
Total	1,363,508	1,544,977	181,469	73	82	56	64

Table 5–12 : Additional Middle School Required in Short Term Plan (2018-2023)[67]

District Area	Population 2018	Population 2023	Additional Population (2018-2023)	1 boys M/S per 12000 pop urban (Rural 1 M/S per 3900 pop)	Land required @ 2 Acre / M/S	1 girls M/S /17000 pop Rural	Land required @ 2 Acre
Urban	302,387	367,900	65,513	0	0	0	0
Rural	1,061,121	1,177,077	115,956	30	60	7	14
Total	1,363,508	1,544,977	181,469	30	60	7	14

Table 5–13: Additional High Schools Required in Short Term Plan (2018-2023)[68]

District Area	Population 2018	Population 2023	Additional Population (2018-2023)	1 boys H/S per 23000 pop urban (Rural 12400 pop)	Land required @ 4 Acre / H/S urban (Rural 5Acre/ H/S	1 girls H/S /31000 pop urban (Rural 12400 pop)	Land required @ 4 Acre Urban (5 Acre Rural)
Urban	302,387	367,900	65,513	3	12	2	8
Rural	1,061,121	1,177,077	115,956	9	45	9	45
Total	1,363,508	1,544,977	181,469	12	57	11	53

[66] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

[67] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

[68] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

Table 5–14: Additional High Secondary Schools Required in Short Term Plan (2018-2023)[69]

District Area	Population 2018		Population 2023	Additional Population (2018-2023)	1 boys H/S per 50000 pop urban (Rural 30000 pop)	Land required @ 10 Acre / H/S	1 girls H/S /100000 pop urban (Rural 70000 pop)	Land required @ 10 Acre/ H/S
Urban	302,387		367,900	65,513	1	10	1	10
Rural	1,061,121		1,177,077	115,956	4	40	2	20
Total	1,363,508		1,544,977	181,469	5	50	3	30

Table 5–15: Additional collages Required in Short Term Plan (2018-2023)[70]

District Area	Population 2018	Population 2023	Additional Population (2018-2023)	1 boys collage per 270000 pop urban (Rural 260000 pop)	Land required @ 15 Acre / collage	1 girls collage /430000 pop urban (Rural 2500000 pop)	Land required @ 15Acre/ collage
Urban	302,387	367,900	65,513	0	0	0	0
Rural	1,061,121	1,177,077	115,956	0	0	0	0
Total	1,363,508	1,544,977	181,469	0	0	0	0

Long-Term Education Plan (2023-2038*);* It is estimated that during the Long-term plan, the District Abbottabad requires 298 additional primary schools for boys and 230 school for girls, 120 middle schools for boys and 27 middle schools for girls, 51 high schools for boys and 48 high schools for girls, 32 secondary schools and 5 colleges. Tables below give requirements for urban as well as rural areas of District Abbottabad.

[69] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

[70] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

Table 5–16: Additional Primary School Required in Long Term Plan (2023-2038)[71]

District Area	Population 2023	Population 2038	Additional Population (2023-2038)	1 boys P/S per 7500 pop urban (Rural 1 P/S per 1800 pop	Land required @ 2 Acre/ P/S Urban (Rural 1 Acre/ PS)	1 girls P/S per 8200 pop Urban(Rural 2400 pop)	Land required @ 2 Acre Urban @1 Acre Rural
Urban	367,900	662,570	294,670	39	78	36	72
Rural	1,177,077	1,643,179	466,102	259	259	194	194
Total	1,544,977	2,305,749	760,772	298	337	230	266

Table 5–17: Additional Middle School Required in Long Term Plan (2023-2038)[72]

District Area	Population 2023	Population 2038	Additional Population (2023-2038)	1 boys M/S per 12000 pop urban (Rural 1 M/S per 3900 pop)	Land required @ 2 Acre / M/S	1 girls M/S /17000 pop Rural	Land required @ 2 Acre
Urban	367,900	662,570	294,670	0	0	0	0
Rural	1,177,077	1,643,179	466,102	120	240	27	54
Total	1,544,977	2,305,749	760,772	120	240	27	54

Table 5–18:Additional High School Required in Long Term Plan (2024-2039)[73]

District Area	Population 2023	Population 2038	Additional Population (2023-2038)	1 boys H/S per 23000 pop urban (Rural 12400 pop)	Land required @ 4 Acre / H/S urban (Rural 5Acre/ H/S	1 girls H/S /31000 pop urban (Rural 12400 pop)	Land required @ 4 Acre Urban (5 Acre Rural)
Urban	367,900	662,570	294,670	13	52	10	40
Rural	1,177,077	1,643,179	466,102	38	190	38	190
Total	1,544,977	2,305,749	760,772	51	242	48	230

[71] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

[72] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

[73] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

Table 5–19: Additional High Secondary School Required in Long Term Plan (2023-2038)[74]

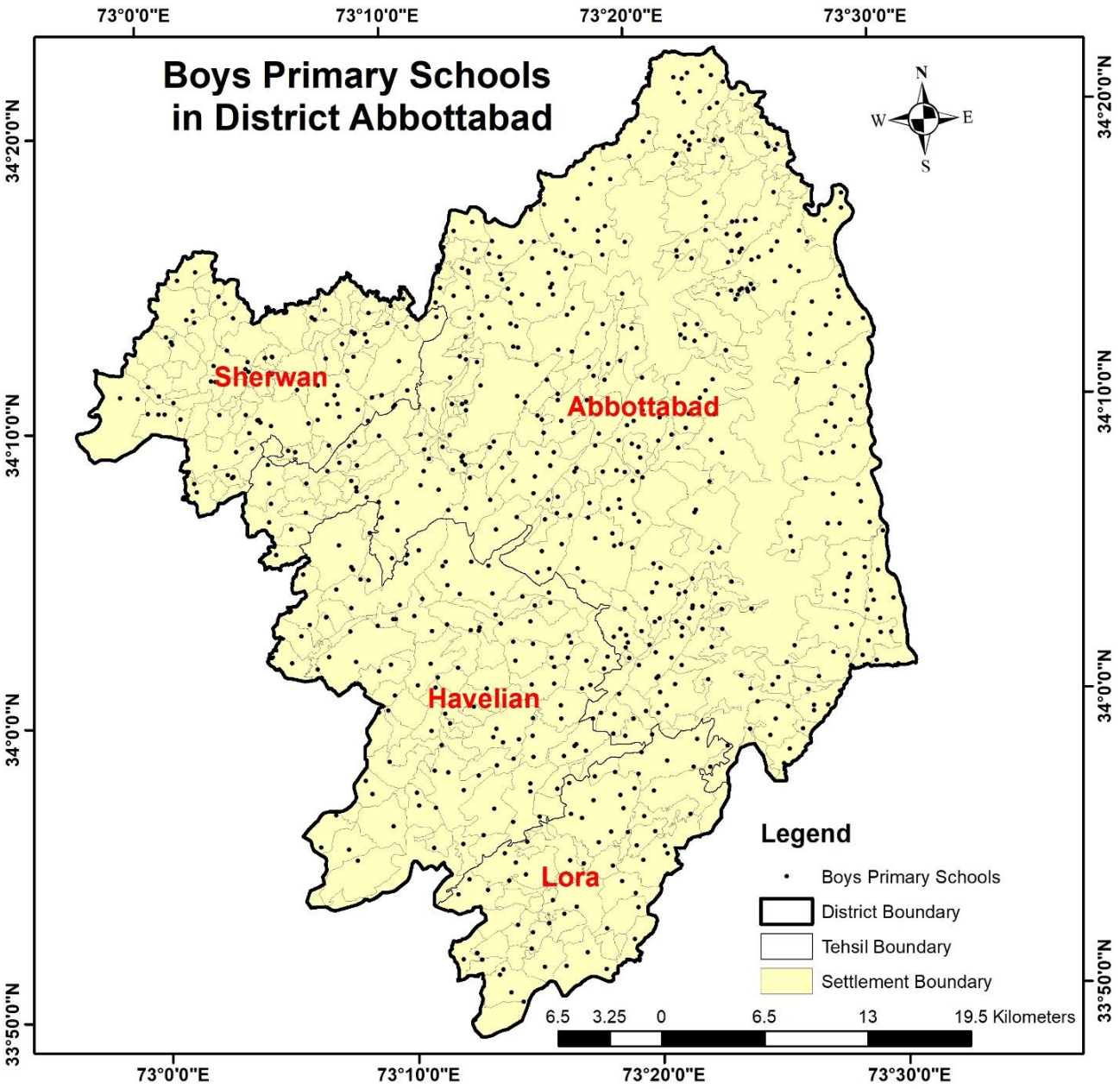
District Area	Population 2023	Population 2038	Additional Population (2023-2038)	1 boys H/S per 50000 pop urban (Rural 30000 pop)	Land required @ 10 Acre / H/S	1 girls H/S /100000 pop urban (Rural 70000 pop)	Land required @ 10 Acre/ H/S
Urban	367,900	662,570	294,670	6	60	3	30
Rural	1,177,077	1,643,179	466,102	16	160	7	70
Total	1,544,977	2,305,749	760,772	22	220	10	100

Table 5–20: Additional Collage Required in Long Term Plan (2023-2038)[75]

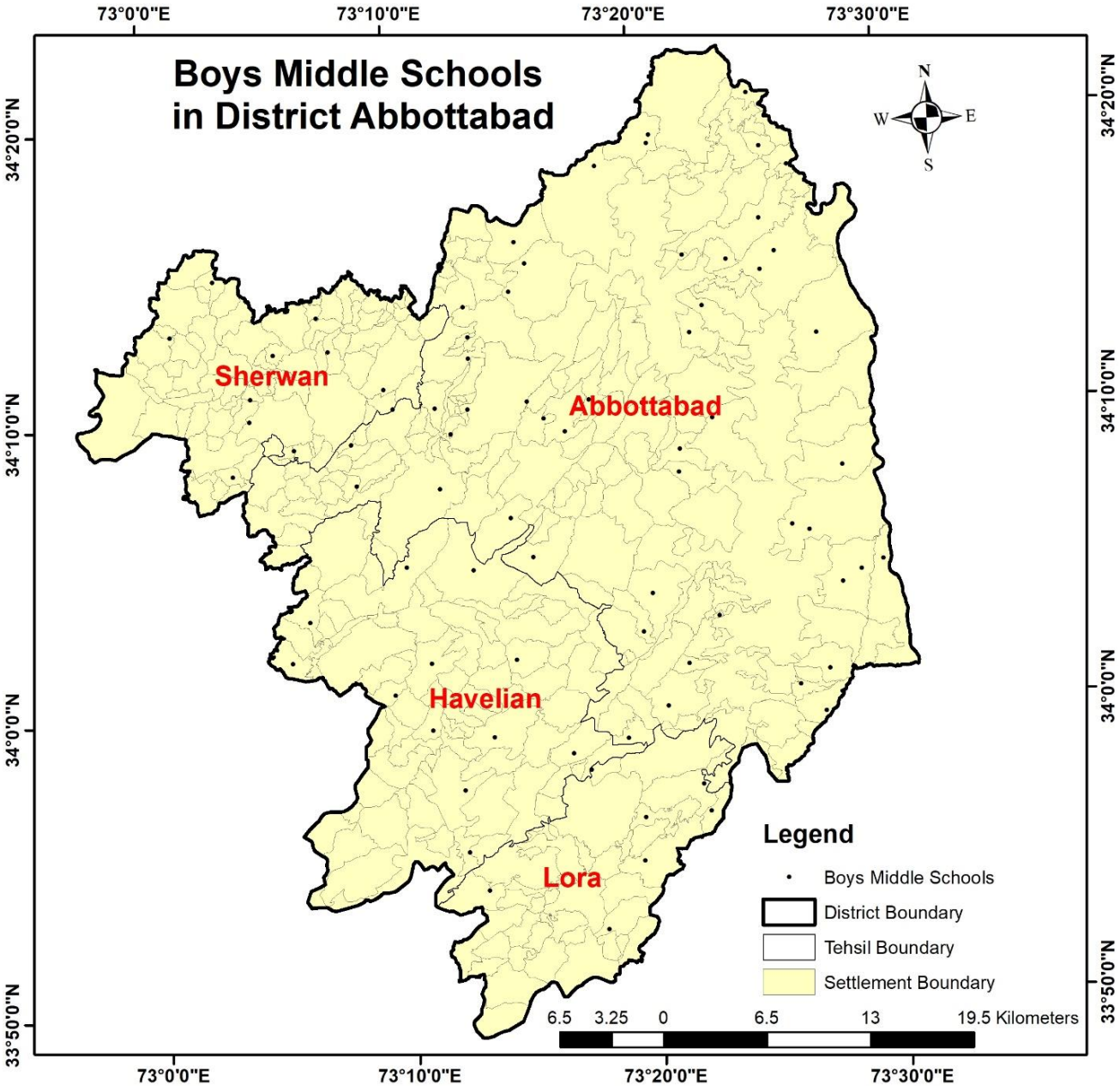
District Area	Population 2023	Population 2038	Additional Population (2023-2038)	1 boys collage per 270000 pop urban (Rural 260000 pop)	Land required @ 15 Acre / collage	1 girls collage /430000 pop urban (Rural 2500000 pop)	Land required @ 15Acre/ collage
Urban	367,900	662,570	294,670	1	15	1	15
Rural	1,177,077	1,643,179	466,102	2	30	1	15
Total	1,544,977	2,305,749	760,772	3	45	2	30

[74] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.

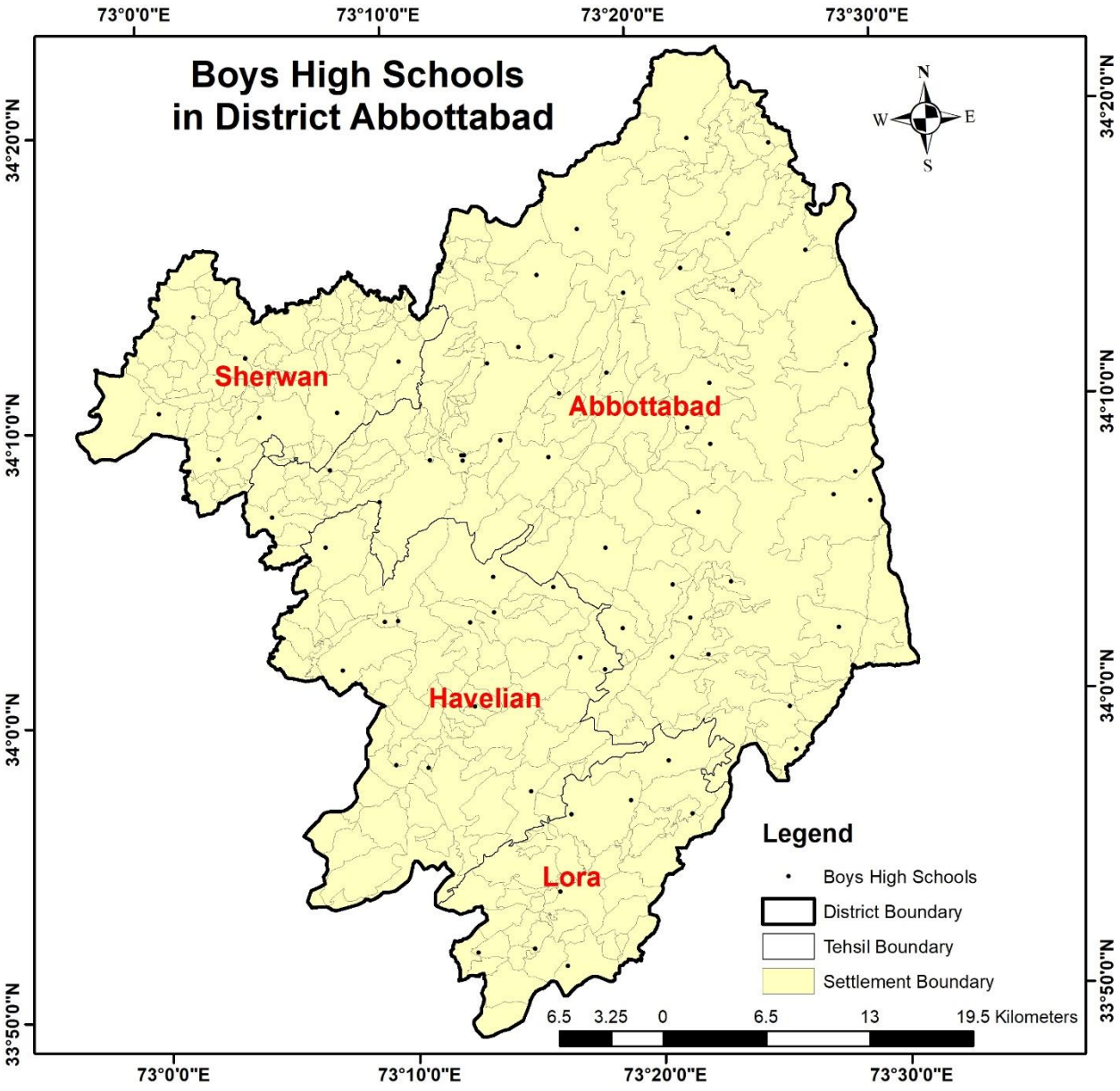
[75] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 109, Table 6.4.



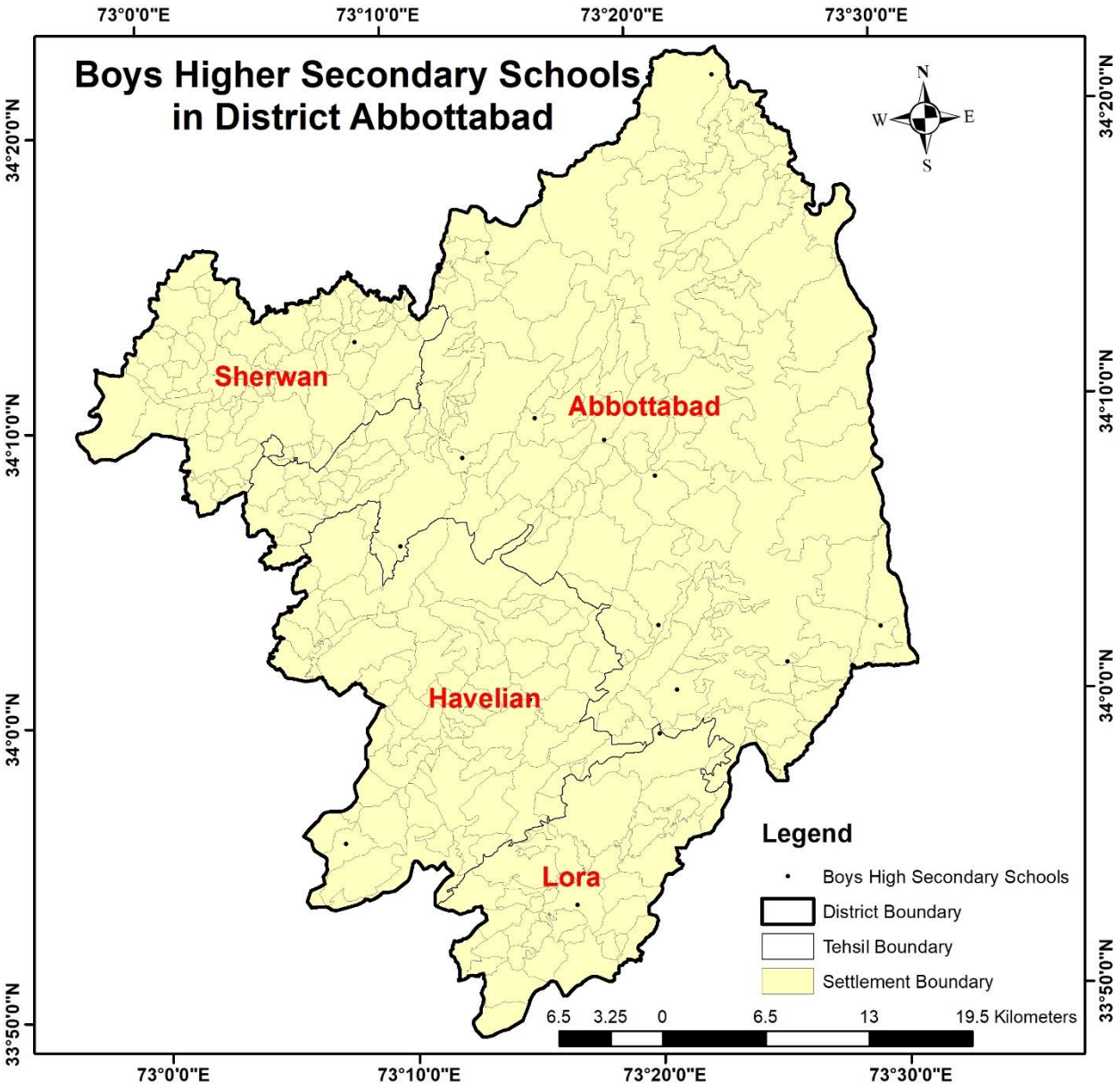
MAP 5-6: Govt Boys Primary Schools in District Abbottabad



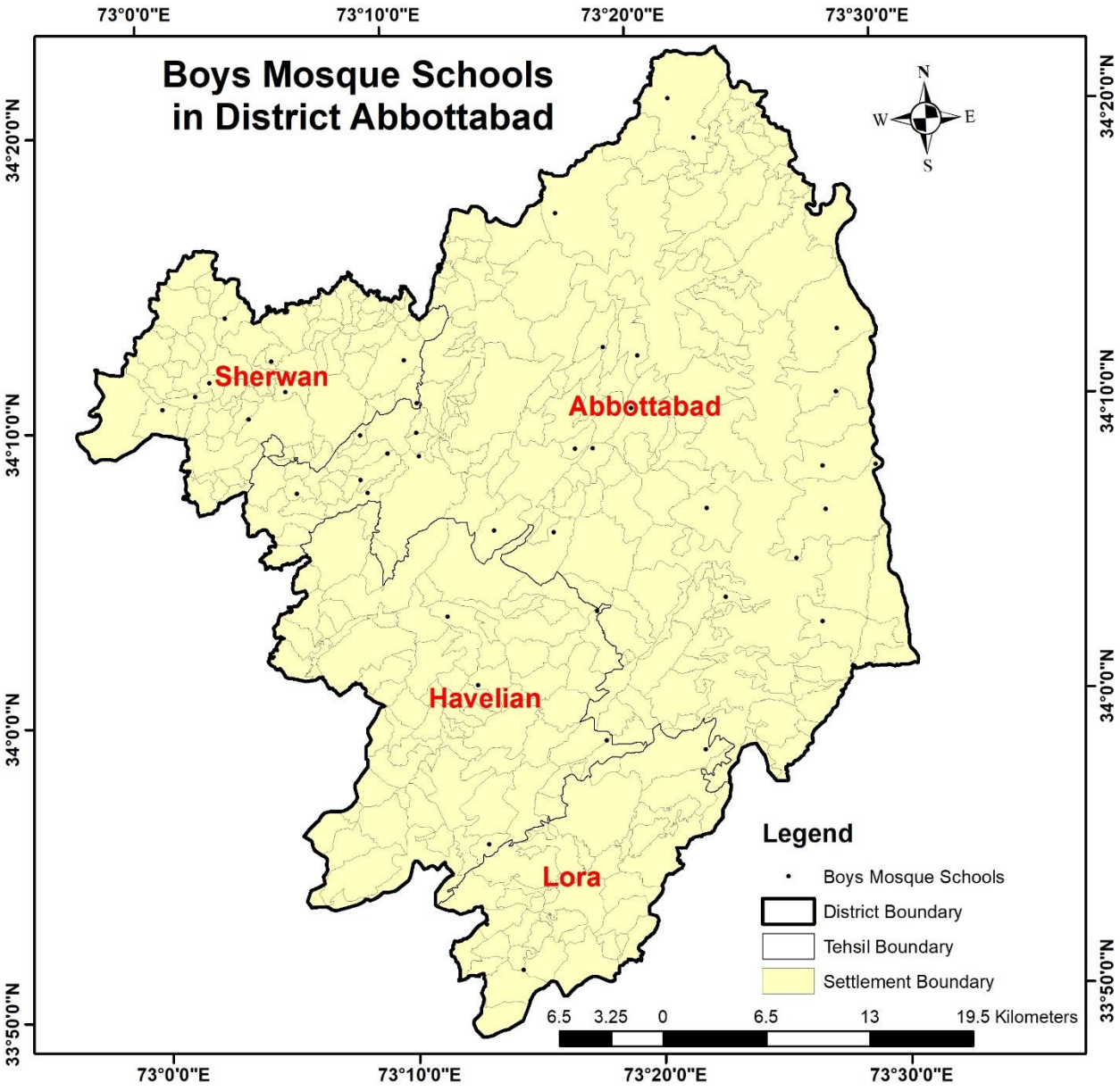
MAP 5-7: Govt Boys Middle Schools in District Abbottabad



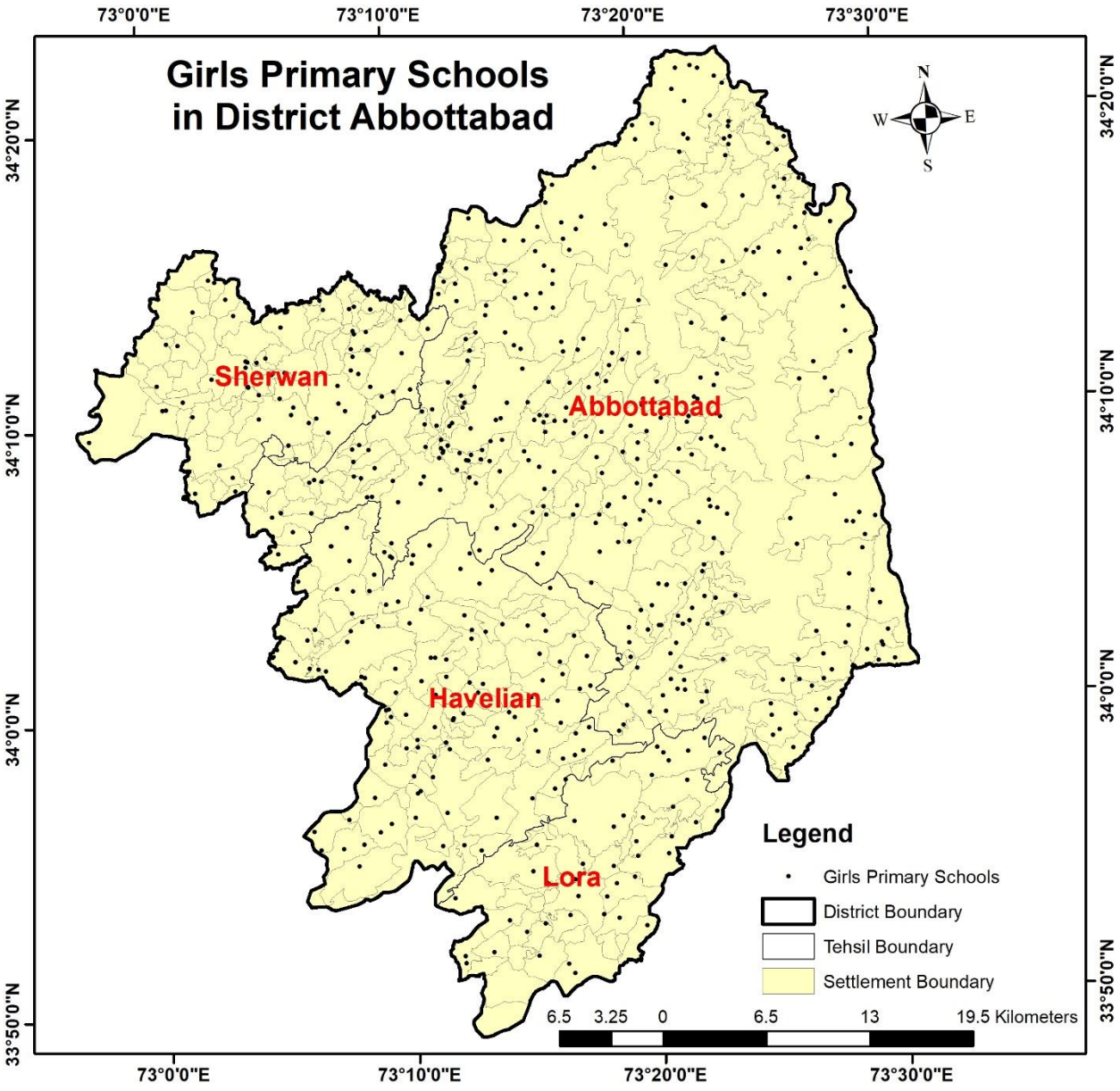
MAP 5-8: Govt Boys High Schools in District Abbottabad



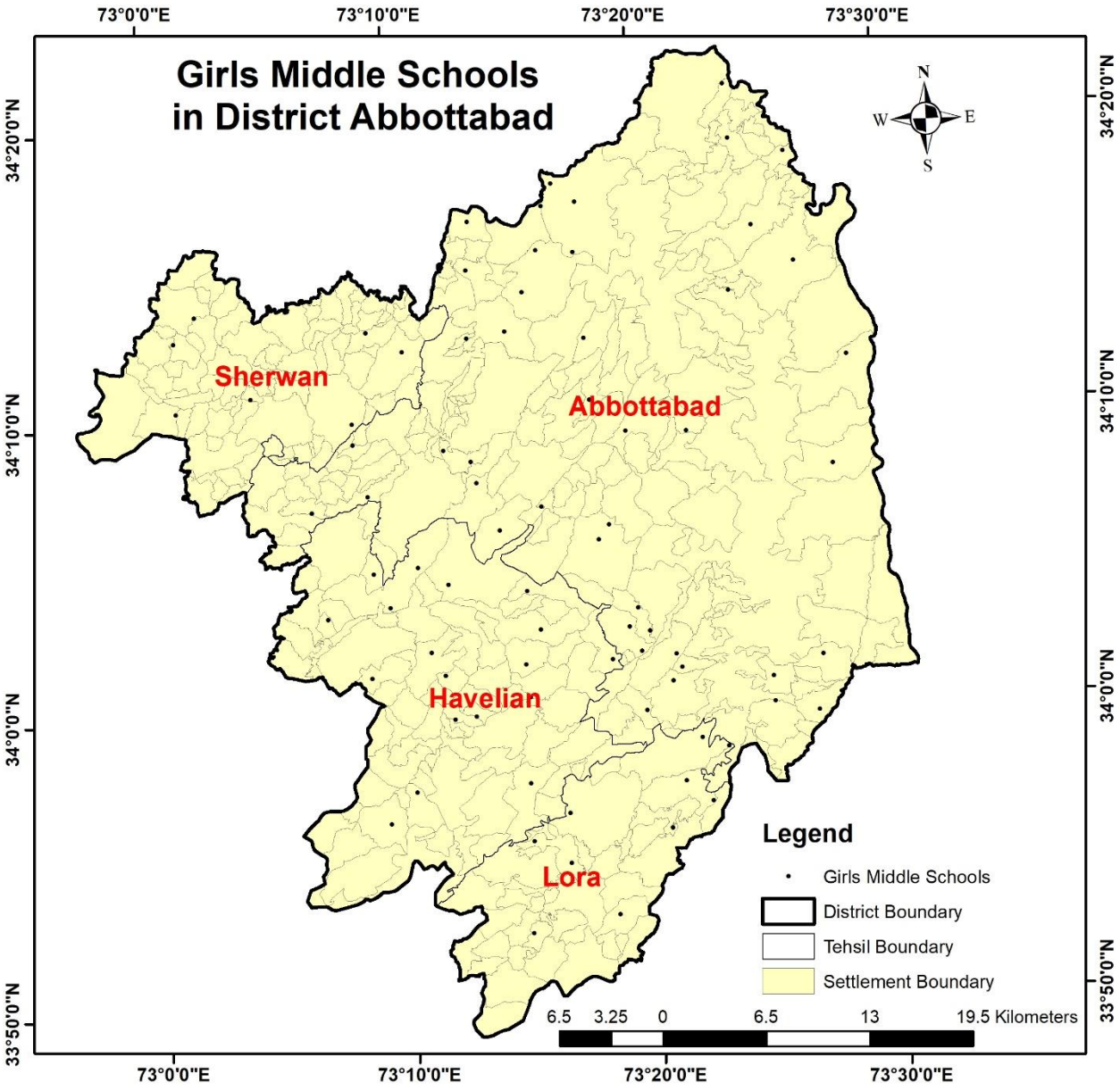
MAP 5-9: Govt Boys High Secondary Schools in District Abbottabad



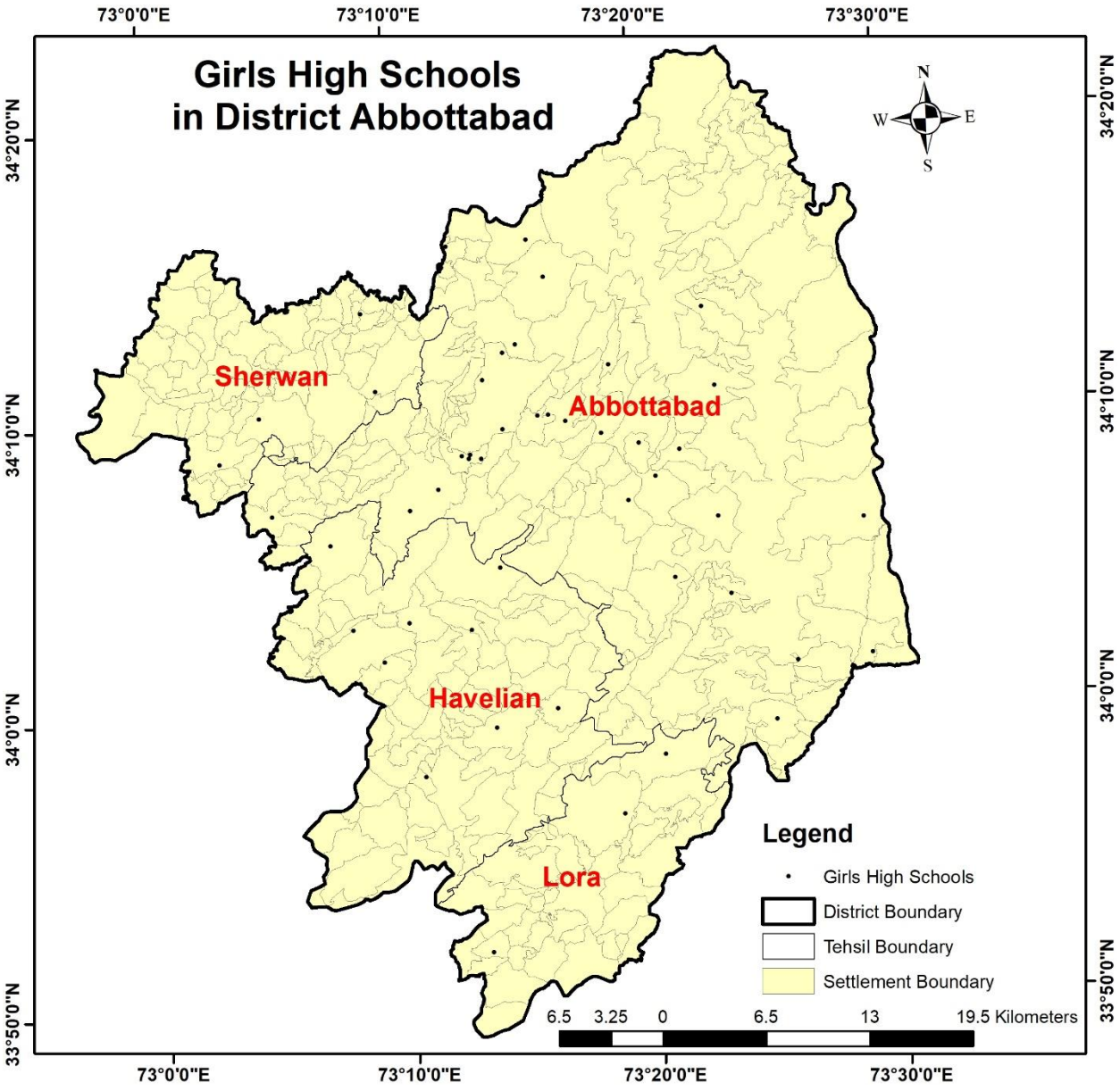
MAP 5-10: Boys Mosque Schools in District Abbottabad



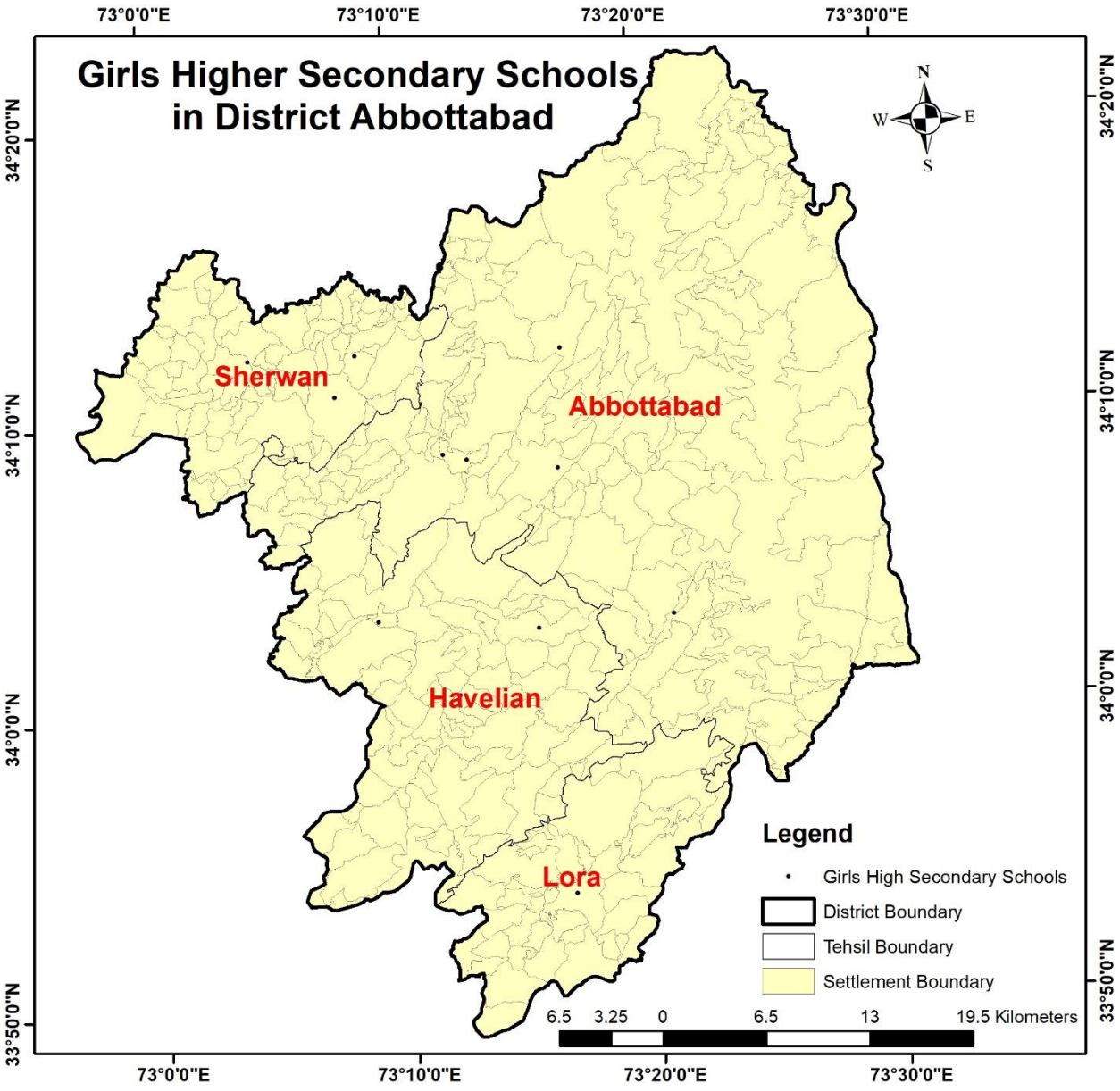
MAP 5-11: Govt Girls Primary Schools in District Abbottabad



MAP 5-12: Govt Girls Middle Schools in District Abbottabad



MAP 5-13: Govt Girls High School In District Abbottabad



MAP 5-14:Govt Girls High Secondary Schools In District Abbottabad

5.2.7 Education Policies at Work

The National Educational Policy 1998-2010 was formulated keeping in view the prevailing problems in the society. Millennium Development Goals (MDGs) and Education for All (EFAs) are the international policy concerns announced in 2000, which were to be properly reflected in the policy. As such, the Ministry of Education has taken in hand an exercise to review the National Educational Policy (1998-2010) for its updating to bring it in line with the current needs of the Country. The salient features of the National Educational policy are as below:

Literacy and Non-Formal Education; the Policy calls for eradication of illiteracy through formal and informal means for expansion of basic education through involvement of community. Functional literacy and income generation skills will be provided to rural women of 15 to 25 age group and basic educational facilities will be provided to working children. Functional literacy will be imparted to adolescents (10-14 years) who missed out the chance of primary education.

Elementary Education; Gross enrolment ratio at primary level will be increased and Compulsory Primary Education Act will be promulgated and enforced in a phased manner. Full utilization of existing capacity at the basic level has been ensured by providing for introduction of double shift in existing school of basics education. Quality of primary education will be improved through revising curricula, imparting in-service training to the teachers, raising entry qualifications for teachers from matriculation to intermediate, revising teacher training curricula, improving management and supervision system and reforming the existing examination and assessment system. A system of continuous evaluation will be adopted to ensure attainment of minimum learning competencies for improving quality of education.

Secondary Education; one model secondary school will be set up at each district level. A definite vocation or a career will be introduced at secondary level. It would be ensured that all the boys and girls, desirous of entering secondary education, become enrolled in secondary schools. Curriculum for secondary and higher secondary will be revised and multiple textbooks will be introduced. The base for technical and vocational education shall be broadened through introduction of a stream of matriculation (Technical) on pilot basis and establishment of vocational high schools. Multiple textbooks shall be introduced at secondary school level.

Teacher Education; to increase the effectiveness of the system by institutionalizing in-service training of teachers, teacher trainers and educational administrators through school clustering and other techniques. To upgrade the quality of pre-service teacher training Programs by introducing parallel Programs of longer duration at post-secondary and post-degree levels i.e. introduction of programs of FA/F.Sc. education and BA/B.Sc. education.

Technical and Vocational Education; to develop opportunities for technical and vocational education in the country for producing trained manpower, commensurate with the needs of industry and economic development goals. To improve the quality of technical education so as to enhance the chances of employment of Technical and vocational Education (TVE) graduates by moving from a static, supply-based system to a demand-driven system.

Higher Education; access to higher education shall be expanded. Merit shall be the only criterion for entry into higher education. Access to higher education, therefore, shall be based on entrance tests. Reputed degree colleges shall be given autonomy and degree awarding status. Degree colleges shall have the

option to affiliate with any recognized Pakistani university or degree awarding institution for examination and award of degrees. To attract highly talented qualified teachers, the university staff will be paid at higher rates than usual grades. Split Ph.D. programs shall be launched in collaboration with reputed foreign universities.

Information Technology; computers shall be introduced in secondary schools in a phased manner. School curricula shall be revised to include recent developments in information technology, such as software development, the Information Super Highway designing Web Pages, etc

Library and Documentation Services; school, college and university libraries shall be equipped with the latest reading materials/services. Internet connection with computer shall be given to each library. Mobile library services for semi-urban and remote rural areas shall be introduced.

Private Sector in Education; private sector shall be encouraged in education. There shall be regulatory bodies at the national and provincial levels to regulate activities and smooth functioning of privately-managed schools and institutions of higher education through proper rules and regulations. A reasonable tax rebate shall be granted on the expenditure incurred on the setting-up of educational facilities by the private sector. Matching grants shall be provided for establishing educational institutions by the private sector in the rural areas or poor urban areas through Education Foundations. Existing institutions of higher learning shall be allowed to negotiate for financial assistance with donor agencies in collaboration with the Ministry of Education.

Innovative Programs; the National Education Testing Service will be established to design and administer standardized tests for admission to professional institutions. Qualifying these tests will become a compulsory requirement for entry to professional education. This mechanism is expected to check the incidence of malpractice in examinations. Likewise, standardized tests shall be introduced for admission to general education in universities.

Implementation Monitoring and Evaluation; a comprehensive monitoring and evaluation system has been envisaged from grass-roots to the highest level. The District Education Authority will be established in each district to ensure public participation in monitoring and implementation. The education Ministers at the Federal and Provincial levels will oversee monitoring committees, responsible for implementation at their levels. The Prime Minister and Provincial Chief Ministers will be the Chief of National and Provincial Education Councils respectively which will ensure achievements of targets. Existing EMIS at Federal and Provincial levels shall be strengthened to make them responsive to the need of Monitoring and Evaluation System (MES).

5.2.8 Review of Projects

Some of the on-going programs related to education in Abbottabad District includes:

- Construction of building for GGDC at District Abbottabad (functional in rented building)
- Re-Construction of building of GCMS (Boys) Abbottabad.

Rehabilitation of building directorate of curriculum and teaching education, Abbottabad

New Projects

- F/S and Establishment of Home Economics Colleges (one each at Abbottabad and Nowshera).

5.2.9 Constraints and Recommendations

Some of the notable constraints related to education sector in Abbottabad District includes:

- Because of unavailability of educational institutions in some areas of Abbottabad, some of the population do not have access thus they are not getting even primary education.
- Many schools in Abbottabad are without basic facilities and do not meet the basic standards to provide education. 32.58 percent are without water, 53.05 percent without electricity, 26.47 percent without boundary walls and 18.15 percent without toilets[76].Only 16 percent of primary schools, 36 percent of middle schools and 64 percent of High schools are with basic facilities[77].

Correspondingly, some of the relevant recommendations to improve the education sector are:

- The gap between the educational policy and our Education system shall be minimized.
- There are 211 vacant posts at the primary level, 150 at middle level, 225 at high level and 142 at Higher Secondary level, which should be fulfilled[78].
- New area should be allocated for the new institutions for the upcoming population and for the present population according to national standards.
- New Education plans and policies should be made to improve the quality of education and decrease the drop-out rate.

5.2.10 Proposed locations of Future Educational Institutions:

Primary schools should obviously be within existing or planned housing areas which they will be serving. These should be within easy walking distance of houses, away from the busy roads. Secondary schools should have good access by car and safe access by foot. These should not be located along busy roads carrying fast traffic. Primary and secondary schools are residentiary uses and their exact location can be marked at the detailed planning stage of proposed housing areas. Higher Educational institutions such as degree and post graduate colleges/universities may be located in the proposed Civic Zone, which will accommodate higher level educational institutions. Following are the proposed guide lines for location of educational institutions:

[76] ESED, Government of Khyber Pakhtunkhwa

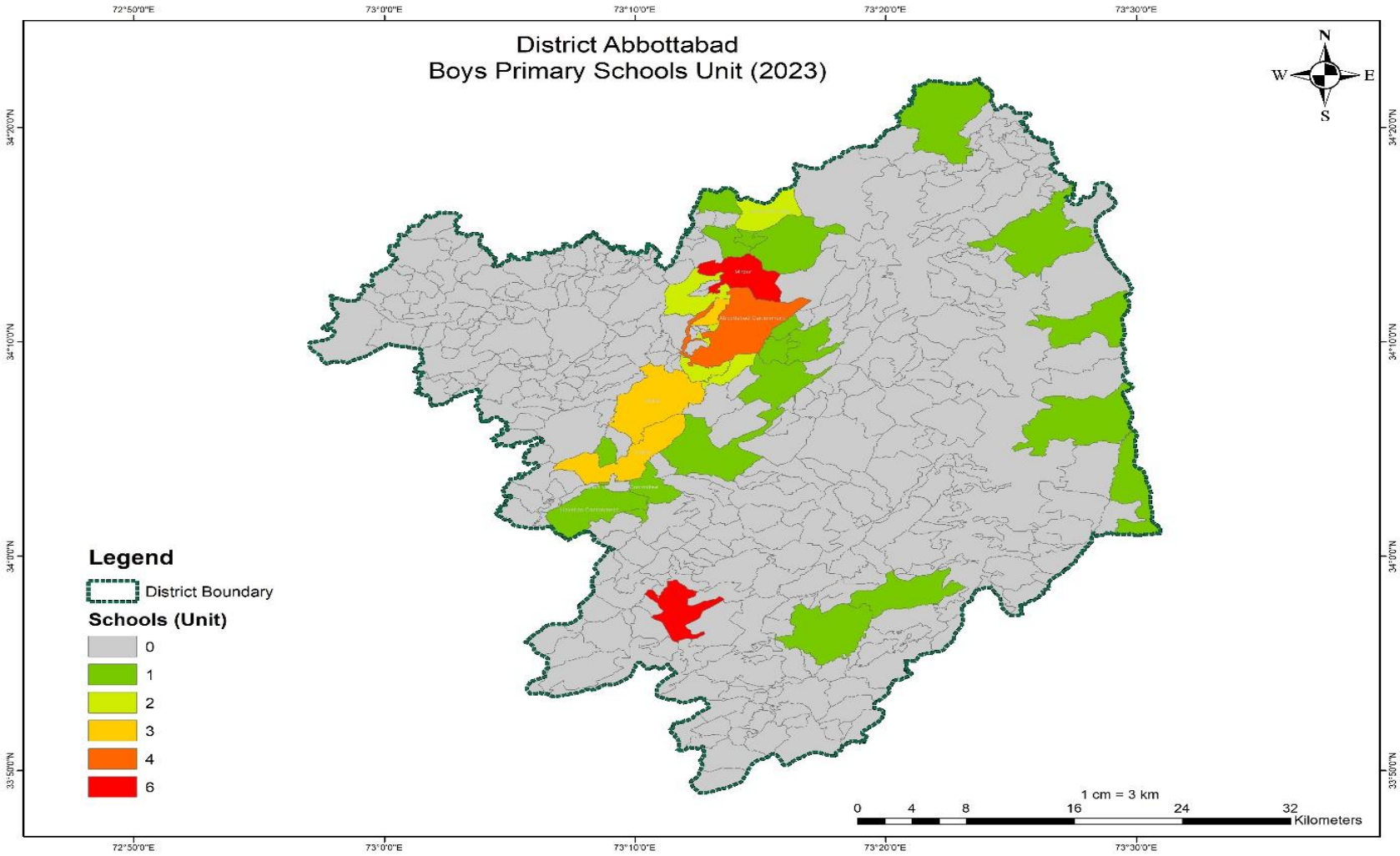
[77] ESED, Government of Khyber Pakhtunkhwa

[78] http://www.kpese.gov.pk/SchoolStatistics.html

Table 5–21: Locational Guidelines for Educational Institutions[79].

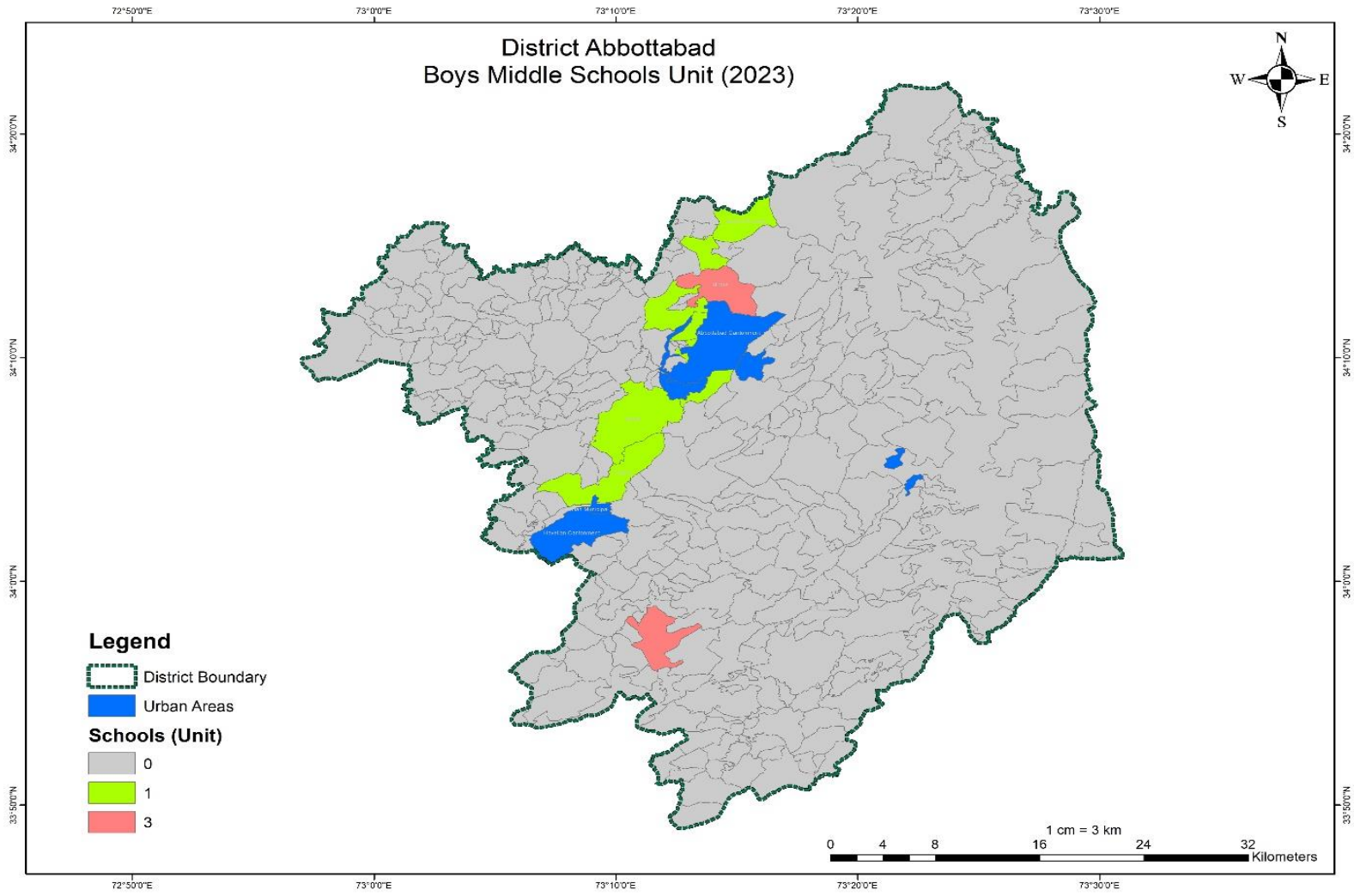
Sr. No.	Educational Institutions	Locational Guidelines
1.	Primary School	• Close to existing or planned housing areas which they will be serving. • Within easy walking distance of houses. • Generally located centrally in a residential mohalla, away from the busy roads. • Catchment area for urban schools: 0.5-1 km. • Catchment area for rural schools: 2.2 kms.
2.	Secondary School	• Should have good vehicular access and safe access by foot. • Away from schools of opposite gender. • Away from major busy roads carrying fast traffic. • Be located on roads with good linkages to their catchment area. • Catchment area for urban schools: 1.25-2.45 km. • Catchment area for rural schools: 5-10 kms.
3.	Inter College	• Catchment area for urban schools-Boys: 2.75-4 km. • Catchment area for rural schools-Boys: 10-15 kms. • Catchment area for urban schools-Girls: 3.25-5 km
4.	Degree College	Large city.
5	University	Metropolitan City surroundings.

[79] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual (NRM), Chapter 6, Section 6.1 (adapted).



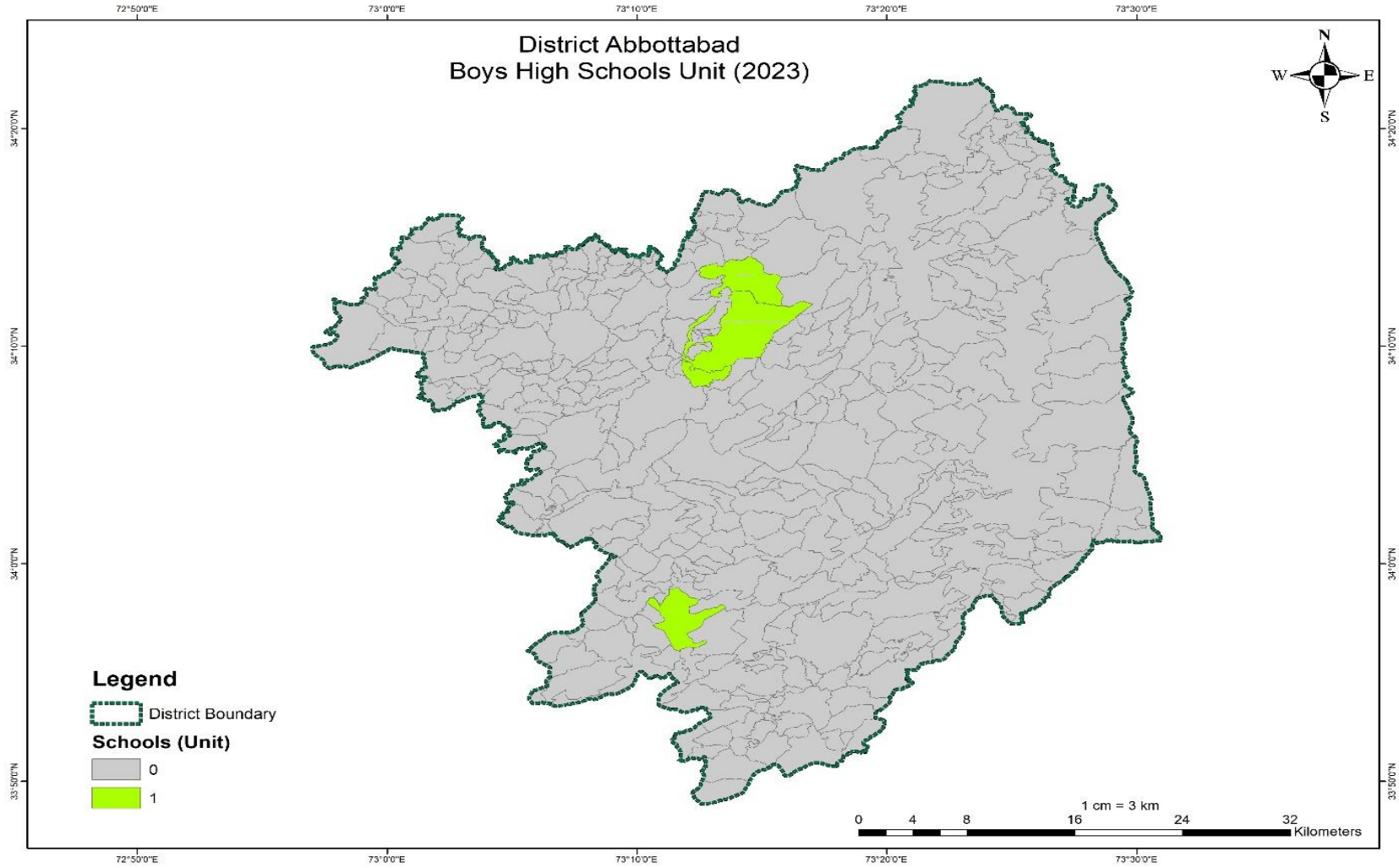
MAP 5-15: Required Boys Primary Schools For next five years (2018-2023)

Map shows the requirement of boys primary schools which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much primary Schools will be required where, legends of Map below are good representation of the explanation.



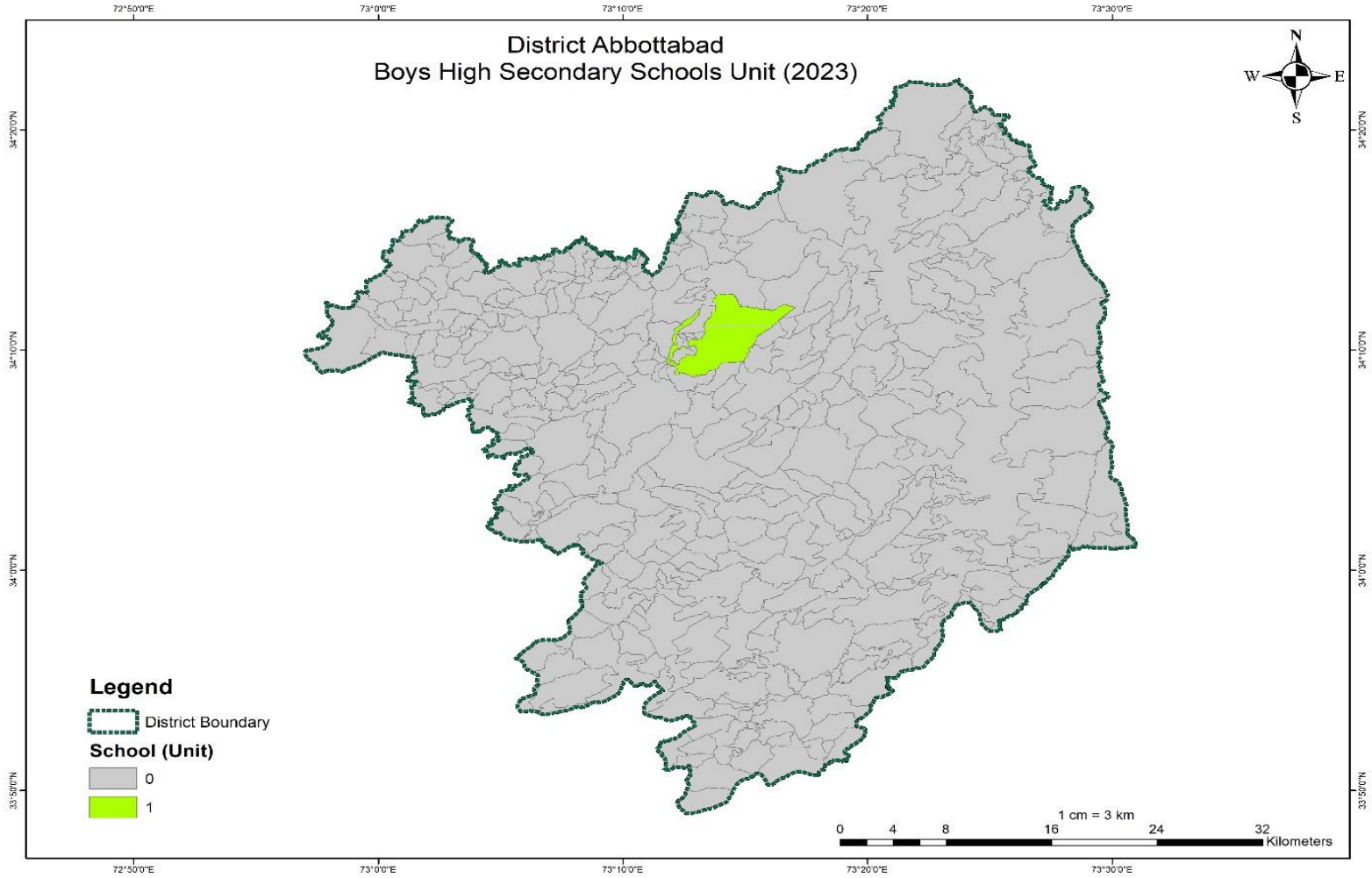
MAP 5-16: Requirement of Middle Schools for boys (2018-2023)

Map shows the requirement of boys Middle schools which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much Middle Schools will be required where, legends of Map below are good representation of the explanation.



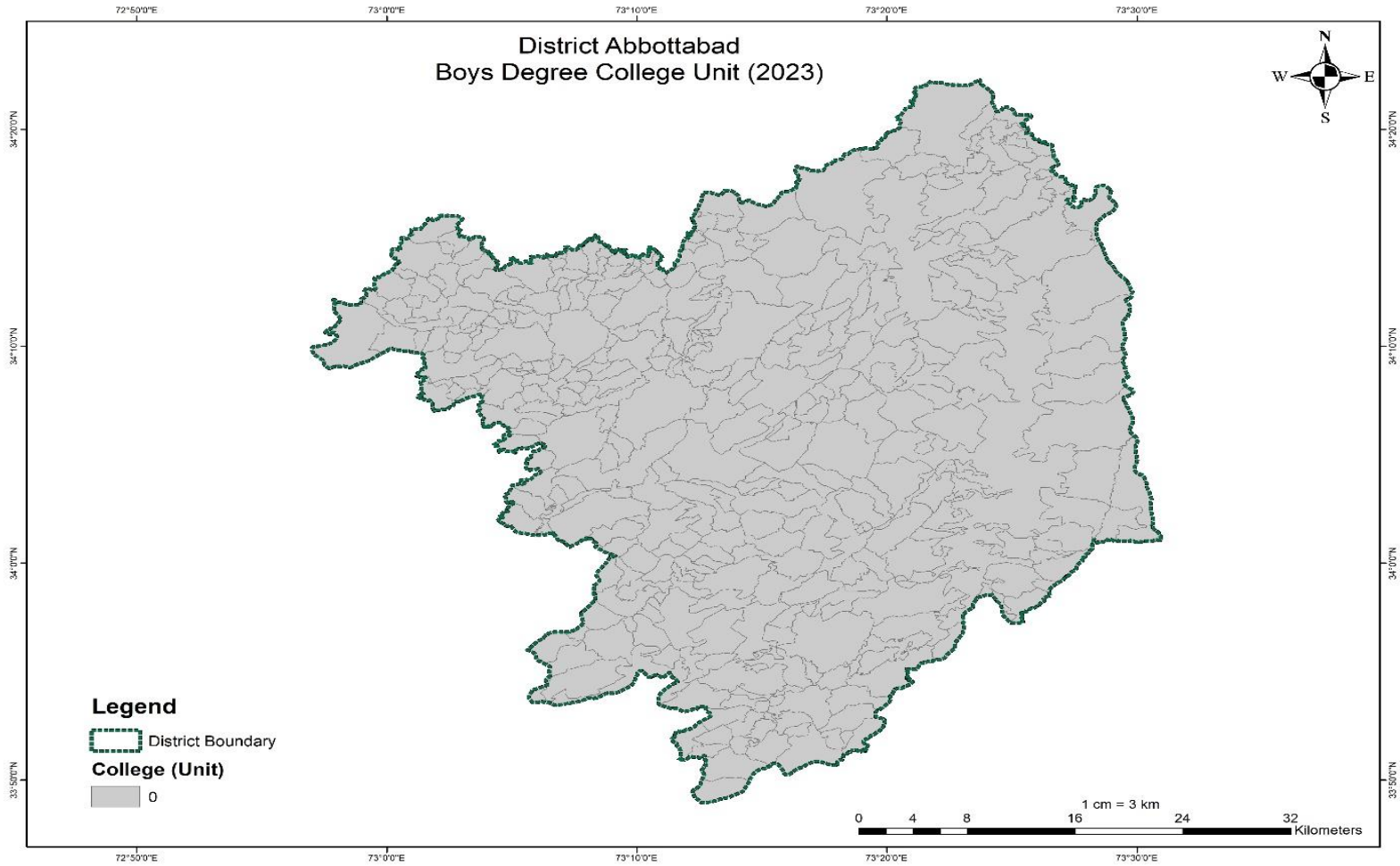
MAP 5-17: Requirement of high schools for boys (2018-2023)

Map shows the requirement of boy's high schools which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much High Schools will be required where, legends of Map below are good representation of the explanation.



MAP 5-18: Requirement of boy's high secondary schools (2018-2023)

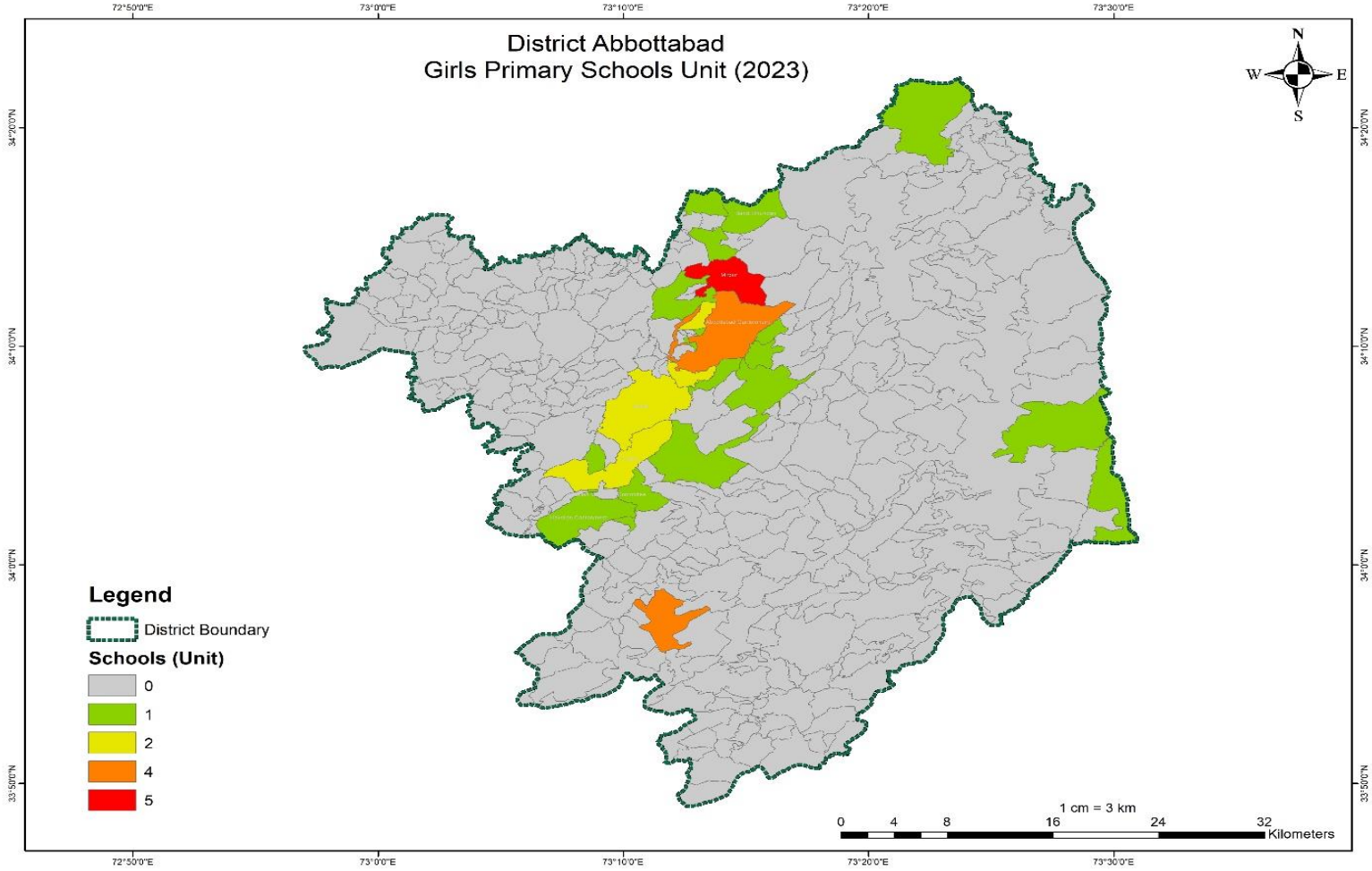
Map shows the requirement of boys high secondary schools which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much High Secondry Schools will be required where, legends of Map below are good representation of the explanation.



MAP 5-19: Requirement of boy's degree college (2018-2023)

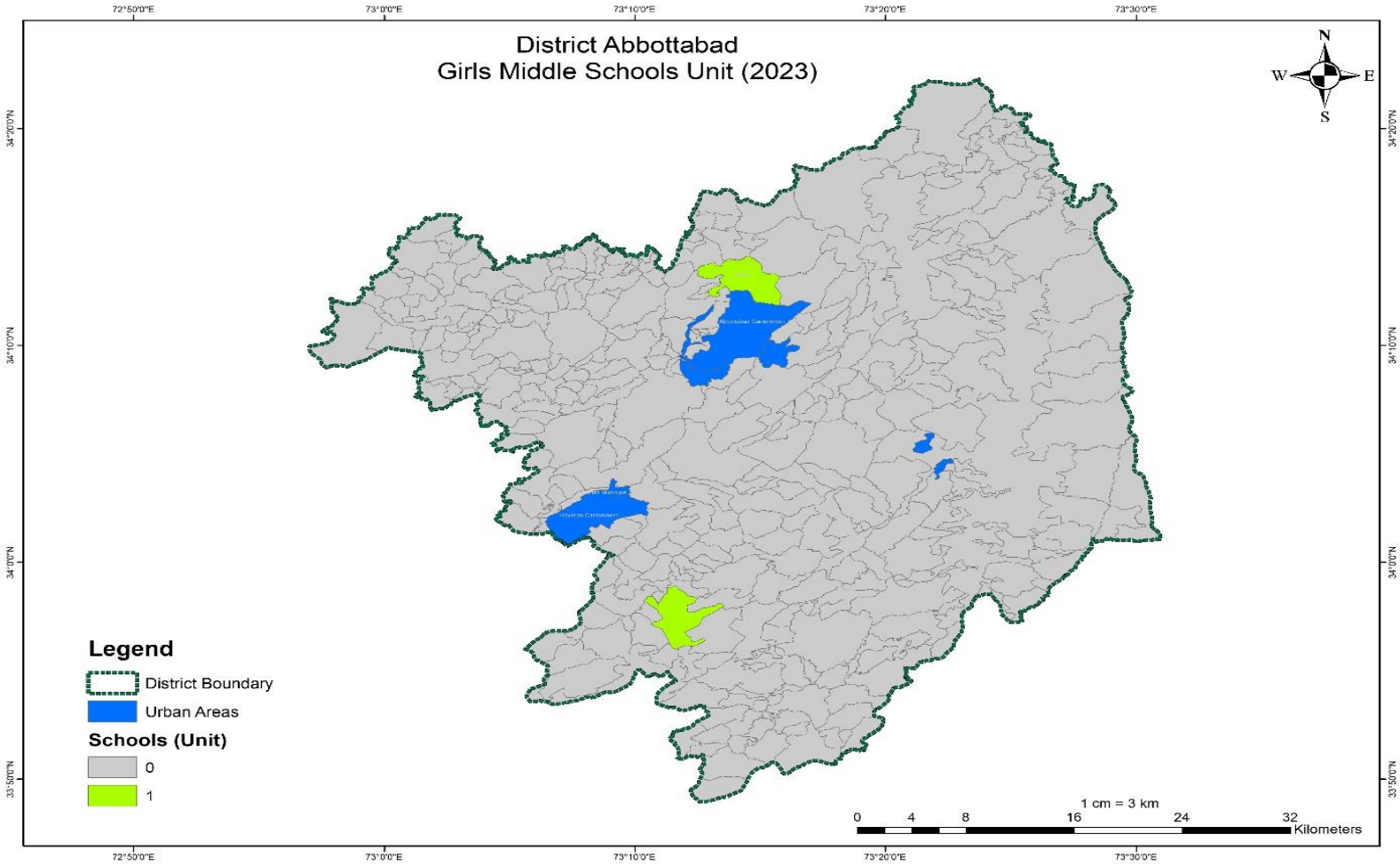
Map shows the requirement of boys Degree College which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much Degree College will be required where, legends of Map below are good representation of the explanation. But as shown in the above map no Degree colleges will require in the District Abbottabad.

Required Education Institution for Girls in short term plan (2018-2023):



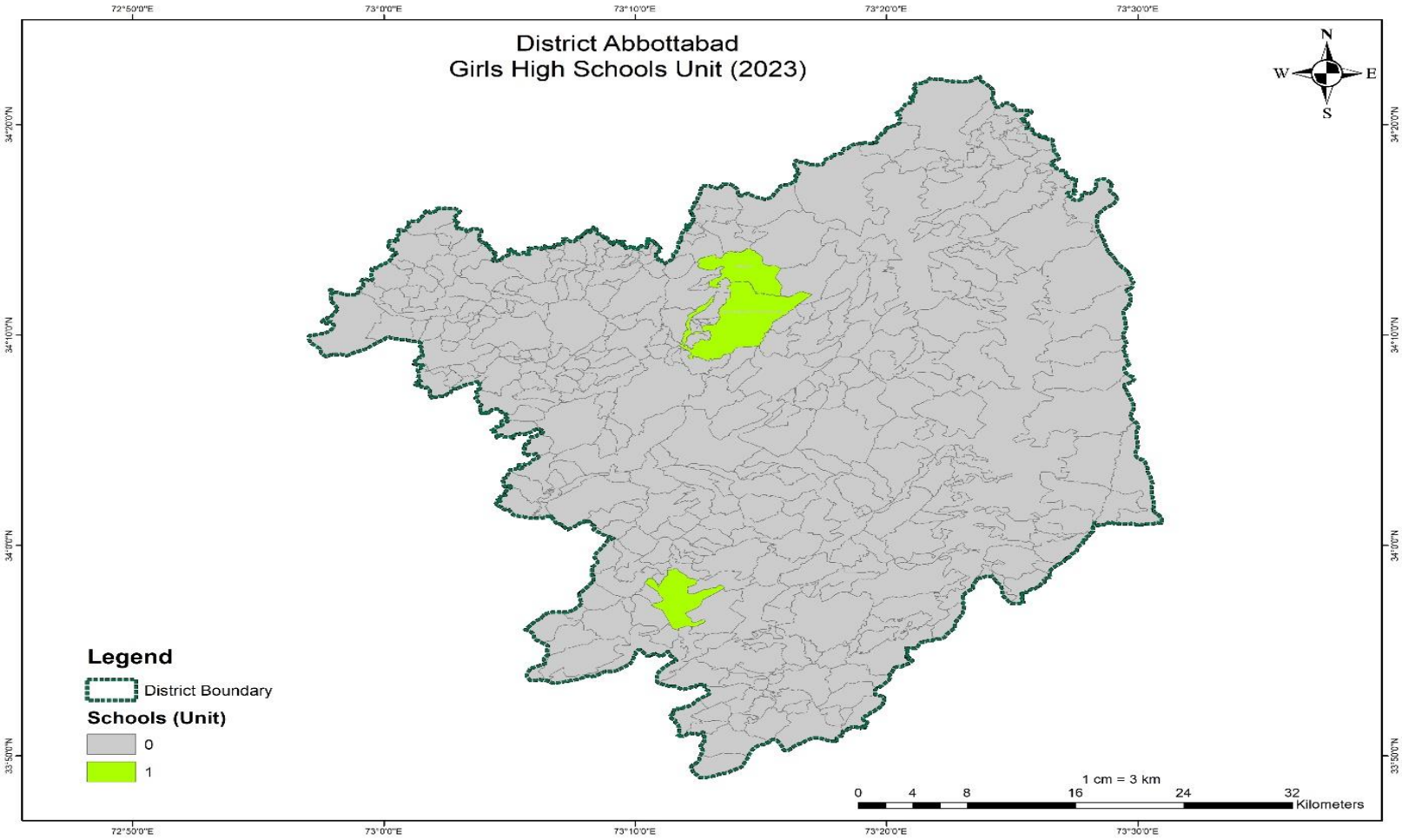
MAP 5-20: Requirement of Girls Primary Schools (2018-2023)

Map shows the requirement of Girls Primary school which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much Primary school will be required where, legends of Map below are good representation of the explanation.



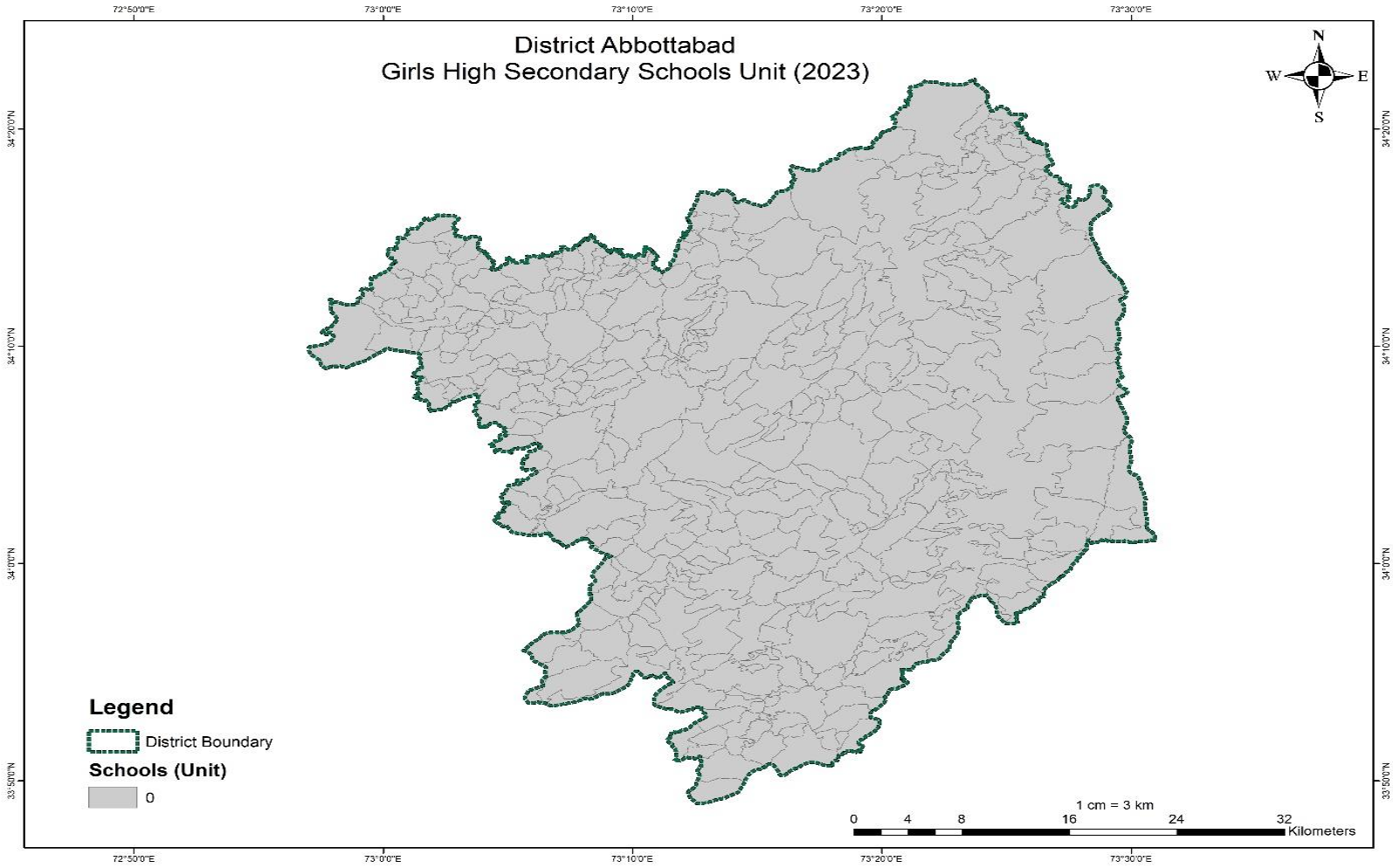
MAP 5-21: Requirement of Girls middle schools (2018-2023)

Map shows the requirement of Girls Middle school which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much Middle school will be required where, legends of Map below are good representation of the explanation.



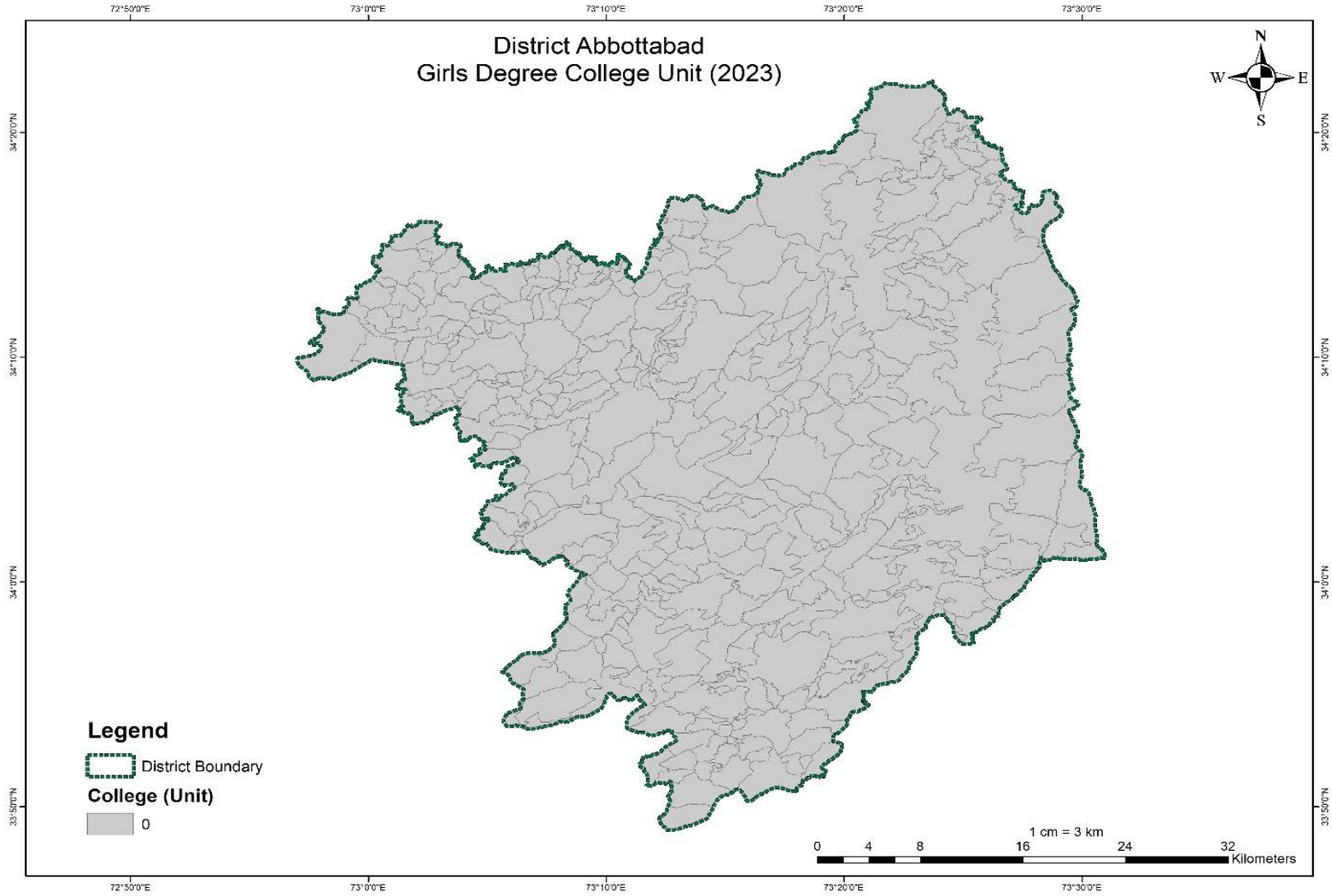
MAP 5-22: Requirement of Girls High School (2018-2023)

Map shows the requirement of Girls High school which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much High school will be required where, legends of Map below are good representation of the explanation.



MAP 5-23: Requirement of Girls High Secondary Schools (2018-2023)

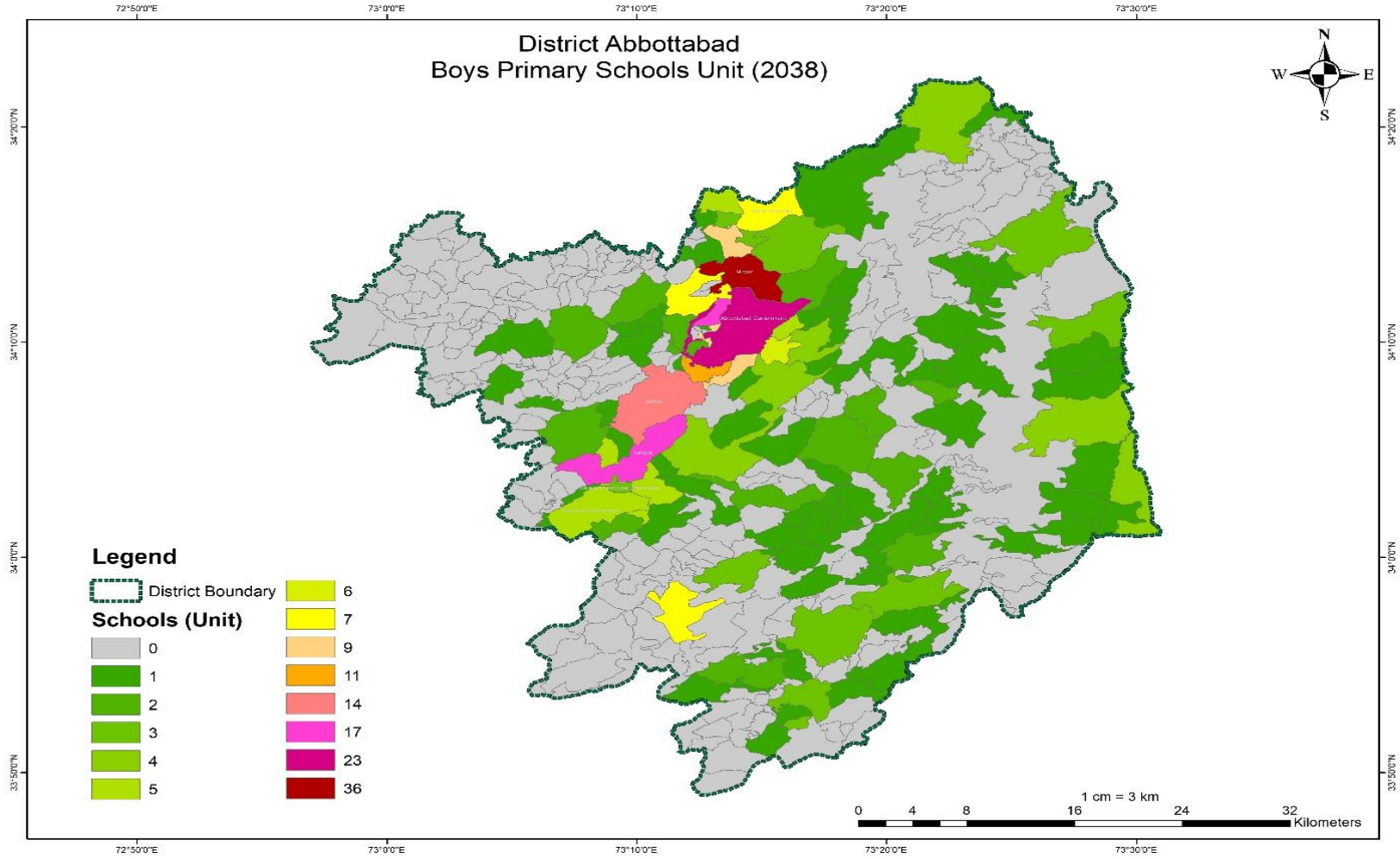
Map shows the requirement of Girls High Secondary school which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much High Secondary school will be required where, legends of Map below are good representation of the explanation. But as shown in the above map no Degree colleges will require in the District Abbottabad.



MAP 5-24: Requirement of Girls Degree college (2018-2023)

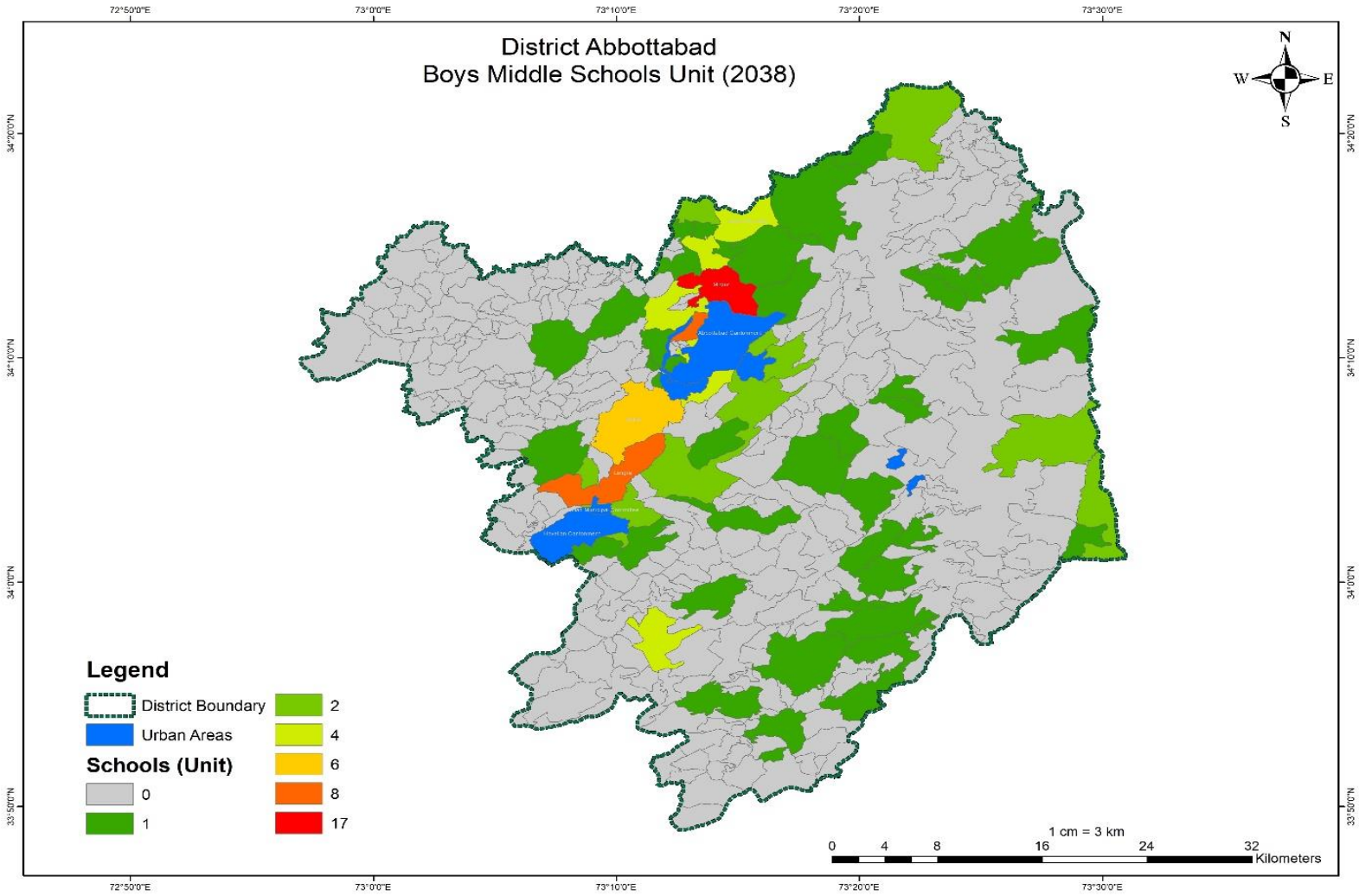
Map shows the requirement of Girls Degree College which will be required for short term plan (2018-2023) in each settlement. Color wise distribution shows that how much Degree College will be required where, legends of Map below are good representation of the explanation.

Required Education Institutions for boys in long term plan (2023-2038):



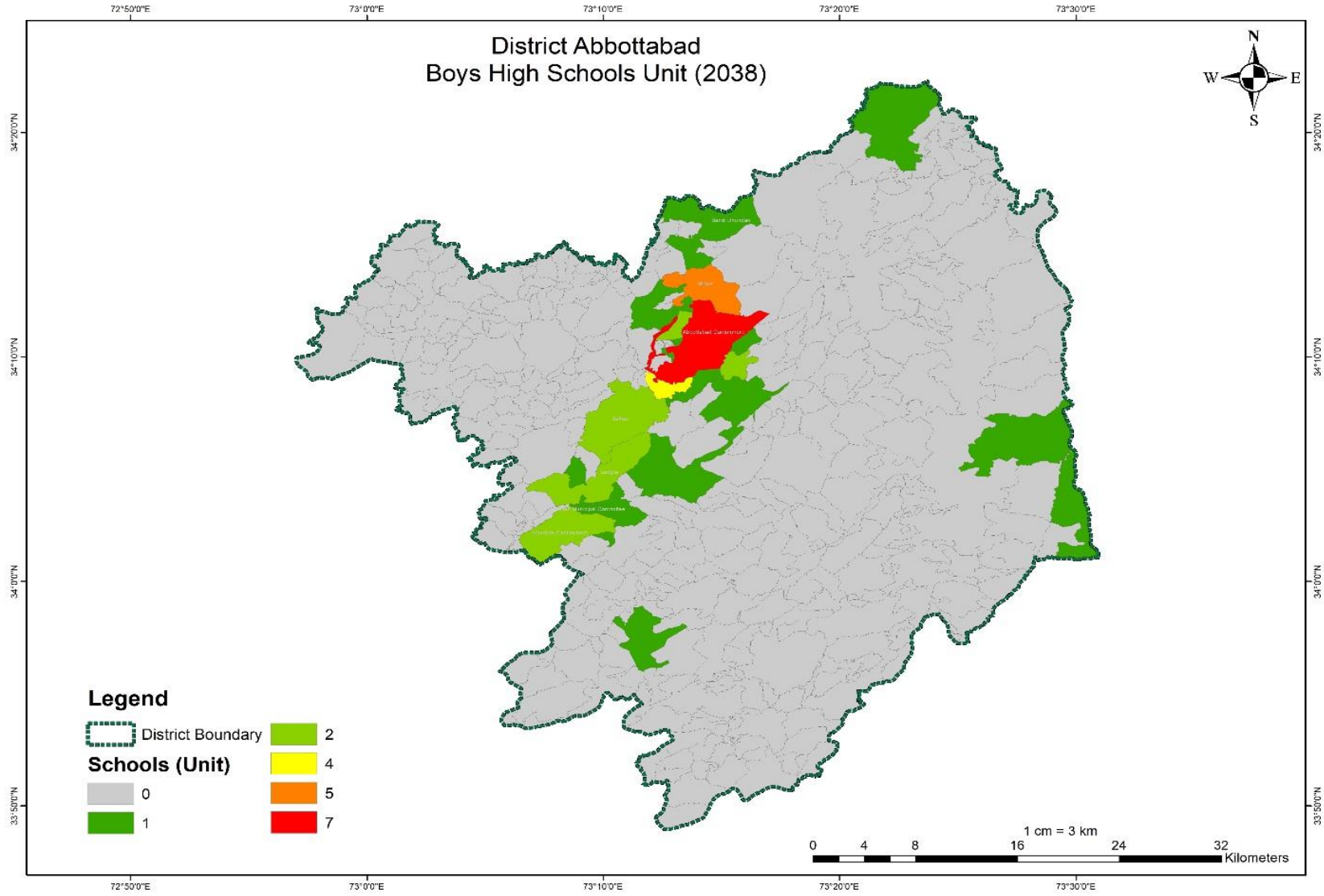
MAP 5-25: Required boys Primary Schools (2023-2038)

Map shows the requirement of Boys Primary school which will be required for long term plan (2023-2028) in each settlement .Color wise distribution shows that how much Primary school will be required where, legends of Map below are good representation of the explanation.



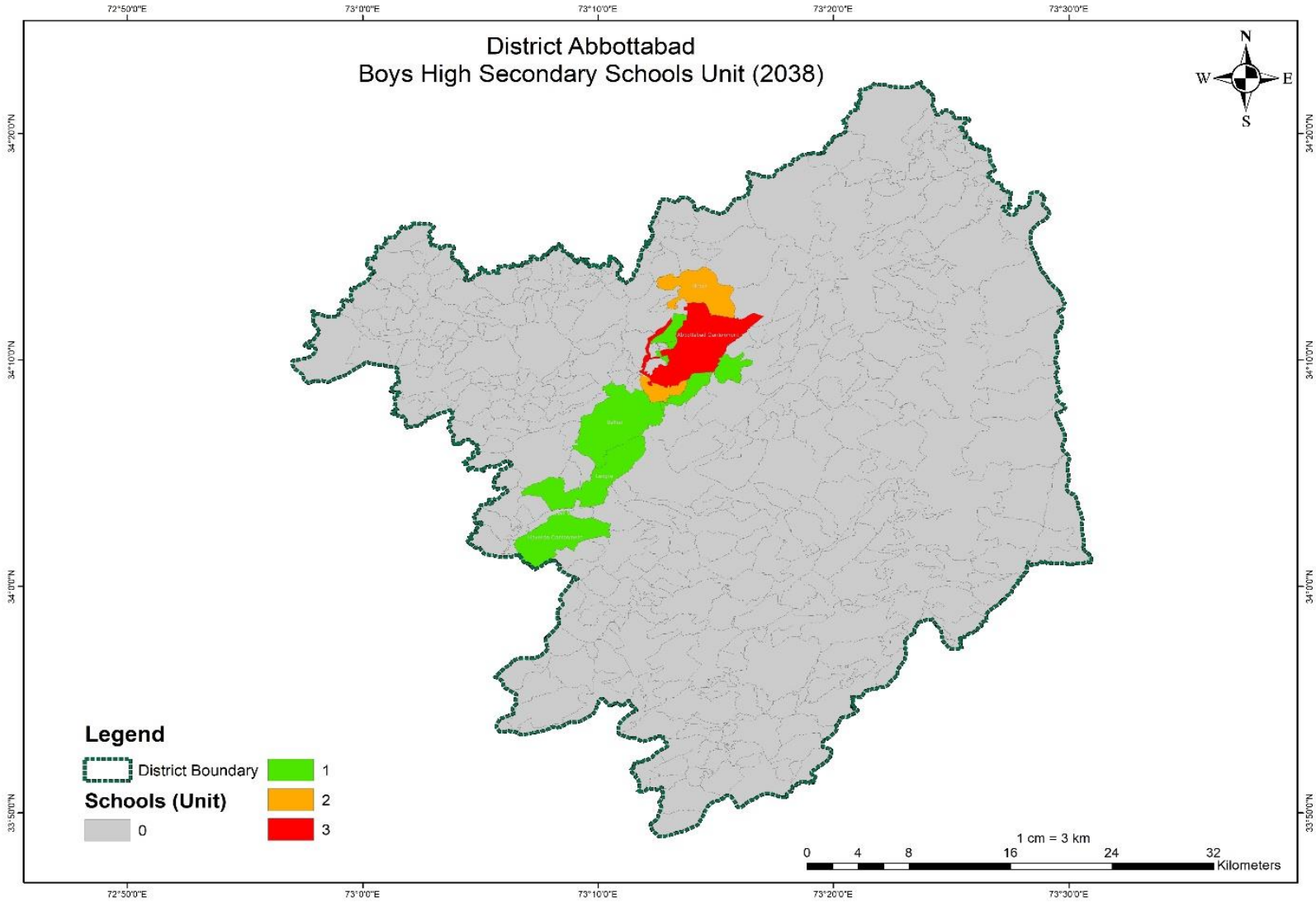
MAP 5-26: Required Boys Middle Schools (2023-2038)

Map shows the requirement of Boys Middle school which will be required for long term plan (2023-2038) in each settlement. Color wise distribution shows that how much Middle school will be required where, legends of Map below are good representation of the explanation.



MAP 5-27: Required Boys High Schools (2023-2038)

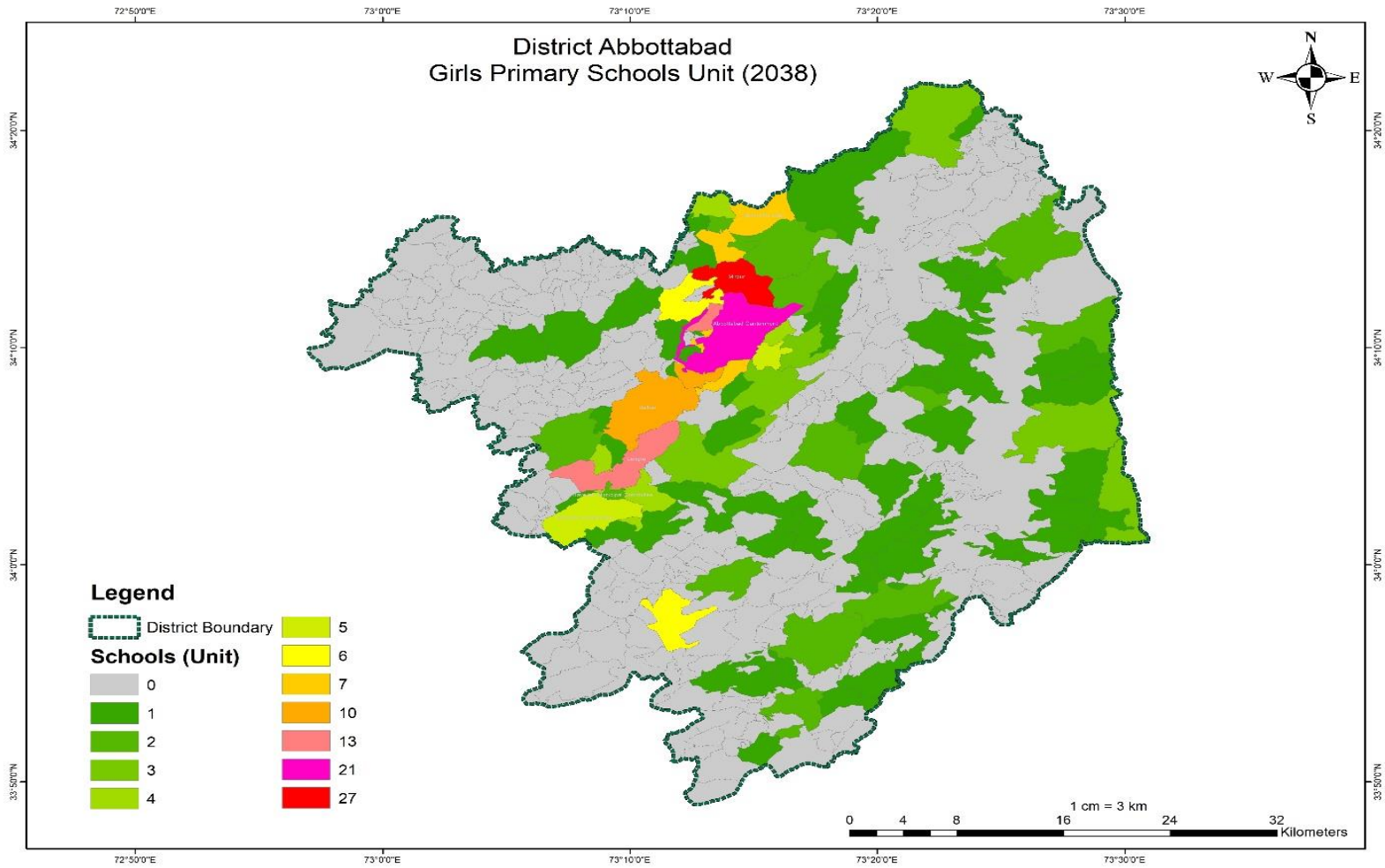
Map shows the requirement of Boys High school which will be required for long term plan (2023-2038) in each settlement. Color wise distribution shows that how much High school will be required where, legends of Map below are good representation of the explanation



MAP 5-28: Required Boys High Secondary Schools (2023-2038)

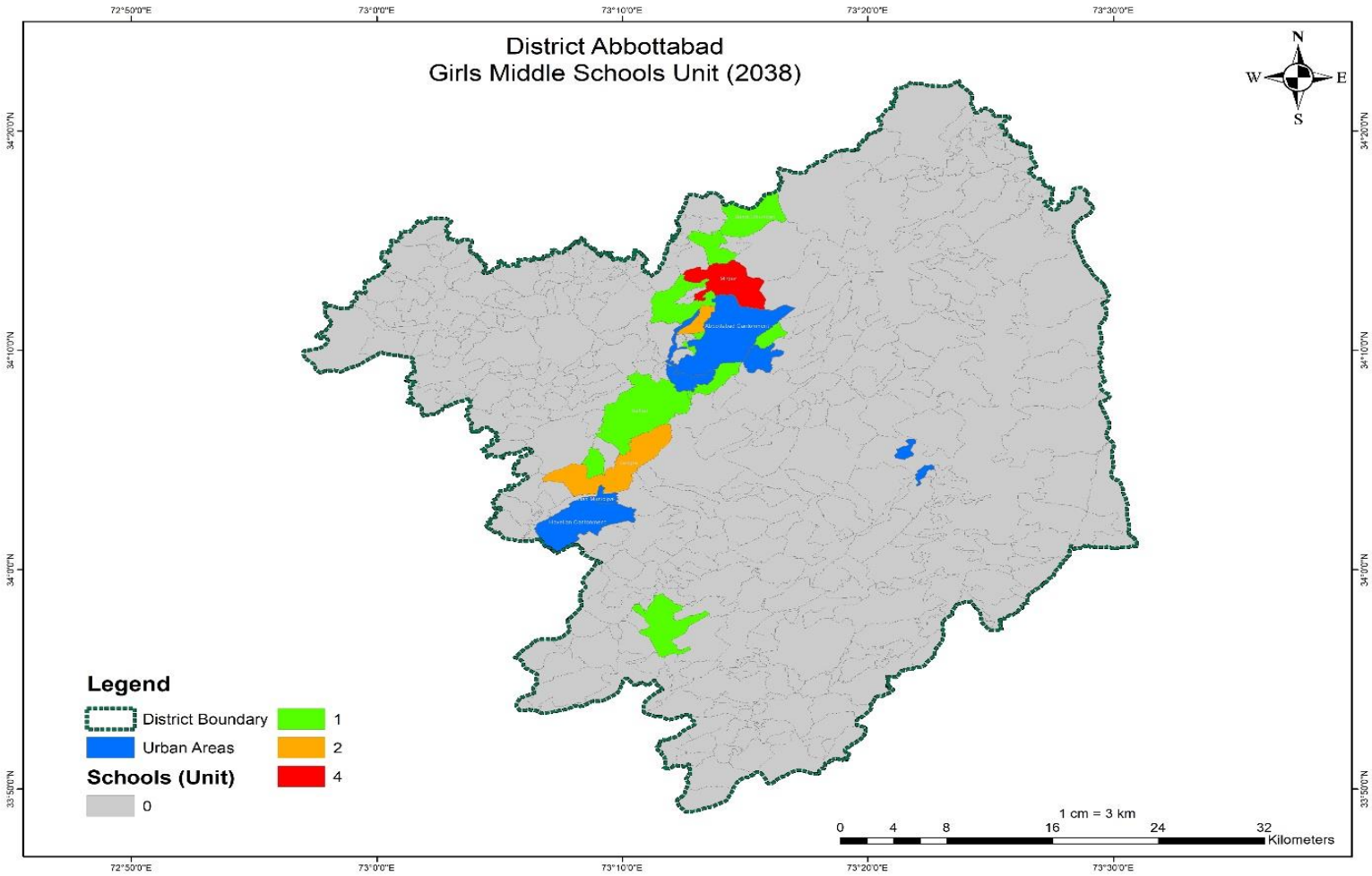
Map shows the requirement of Boys Middle school which will be required for long term plan (2023-2038) in each settlement. Color wise distribution shows that how much Middle school will be required where, legends of Map below are good representation of the explanation

Required Education Institutions for Girls in Long term plan (2019-2039):



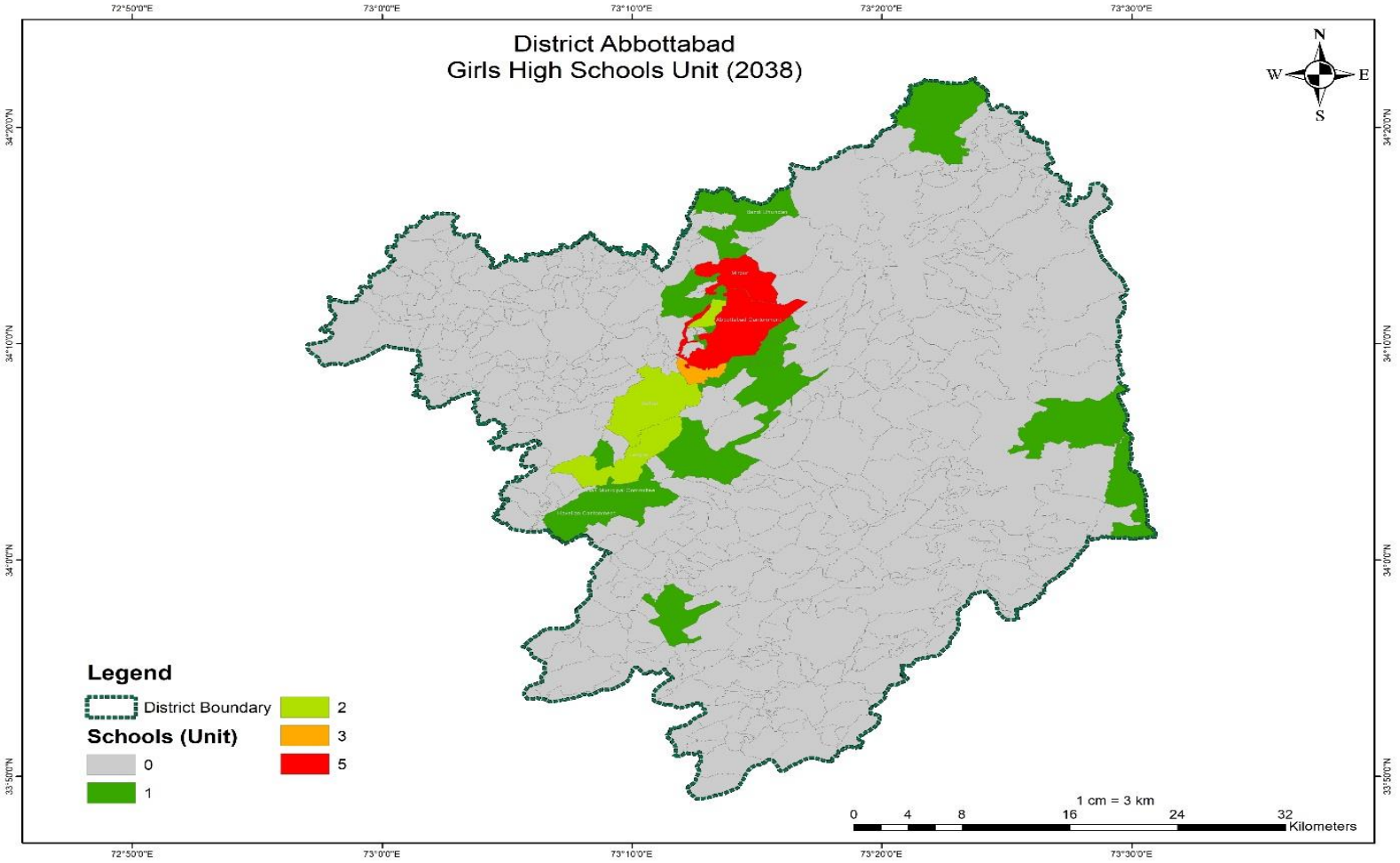
MAP 5-29: Required Girls Primary Schools (2023-2038)

Map shows the requirement of Girls Primary School which will be required for long term plan (2023-2038) in each settlement. Color wise distribution shows that how much Primary School will be required where, legends of Map below are good representation of the explanation



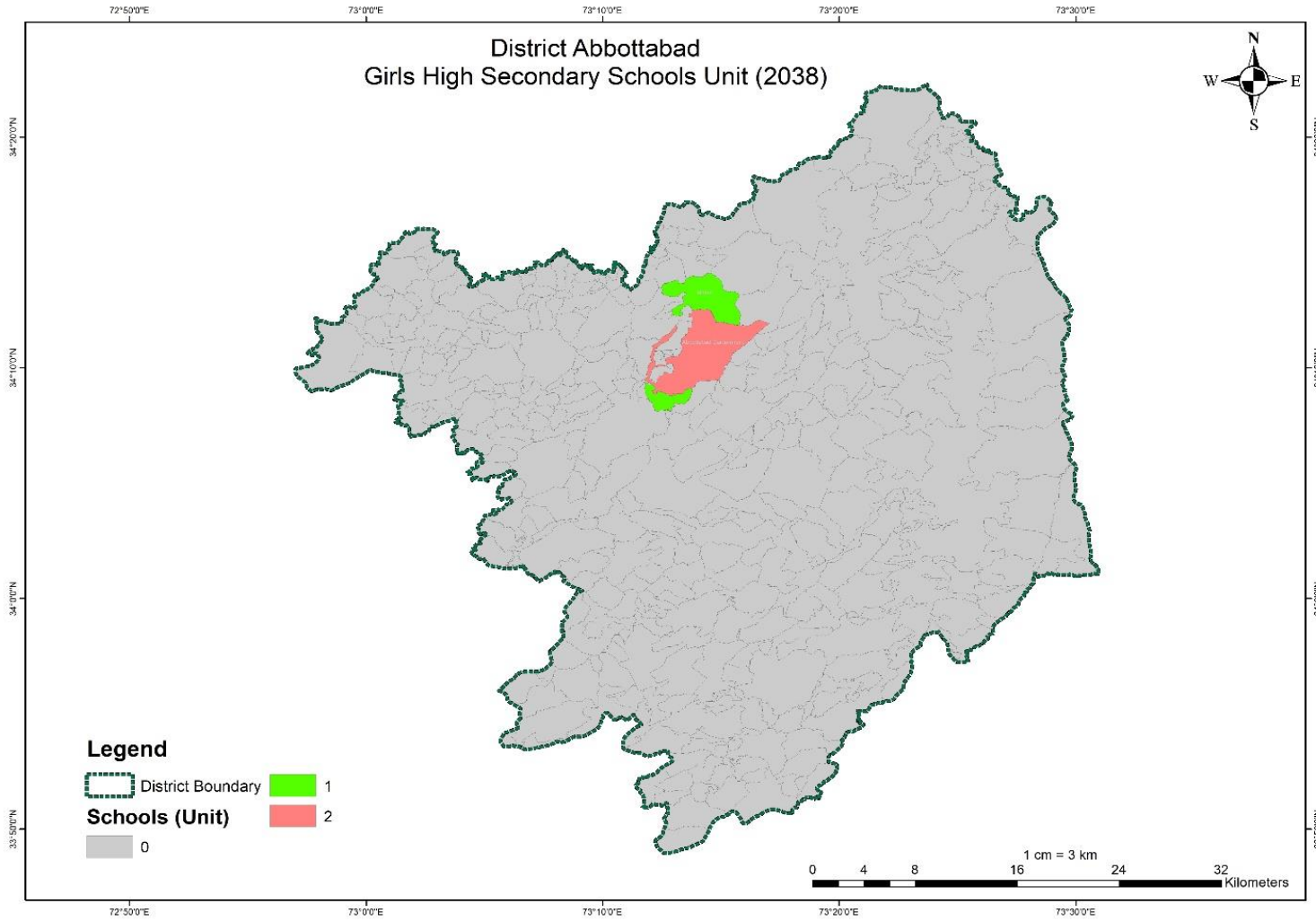
MAP 5-30: Required Girls Middle Schools (2023-2038)

Map shows the requirement of Girls Middle School which will be required for long term plan (2023-2038) in each settlement. Color wise distribution shows that how much Middle School will be required where, legends of Map below are good representation of the explanation



MAP 5-31: Required Girls High Schools (2023-2038)

Map shows the requirement of Girls High School which will be required for long term plan (2023-2038) in each settlement .Color wise distribution shows that how much High School will be required where, legends of Map below are good representation of the explanation



MAP 5-32: Required Girls High Secondary Schools (2023-2038)

Map shows the requirement of Girls High Secondry School which will be required for long term plan (2023-2038) in each settlement. Color wise distribution shows that how much Primary School will be required where, legends of Map below are good representation of the explanation

Chapter 5

Communication and Infrastructure Land Uses

Health Related Land Uses

5.3 Health Facilities

In any society, individuals turn out to be sick and expect access to medicinal services centers and treatment. The issue might be physical, for example, the diarrhea, fever or any physical damage, or mental, for example psychosis, epilepsy or a learning trouble. Ladies have extraordinary necessities, and children require vaccination against basic infections. Notwithstanding the importance of the medical problem, the wellbeing results depend to an expansive degree on people's capacity to get to medicinal services administrations. Unfortunately, health administrations are regularly arranged without counseling to health best models and existing health centers and offices. To counter this, and to fulfill society needs for available, reasonable and affordable facilities, it is vital to recognized current/present health centers and people needs.

Most health centers are found in emergency clinics, facilities and therapeutic focuses run either by the current legislature or the private companies. Clinics ordinarily give crisis, auxiliary, and tertiary medicinal facilities while health institute give essential consideration and some primary treatment or emergency treatment.

The Health facilities in each district are divided into different sections according to availability of services in the district. The main hierarchy of health facilities found in major districts in shown in the Figure 5-10 below:

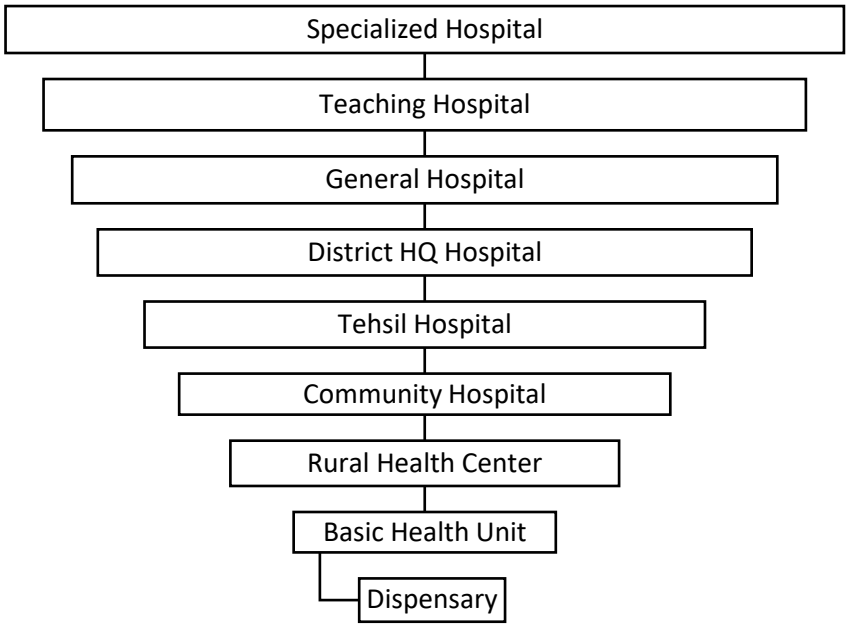


Figure 5-10:Hierarchy of Health Facilities

5.3.1 Distribution of Health Institutions

A health institution is characterized as an establishment which gives health facilities, healing and preventive to every single explicit class of the whole surrounding population from anywhere they belong. There is a descending order of health center's types as characterized Figure 5-10[1].

A Health institution assume an extremely important job in the relief of calamities due to their specific capacity in treating the harmed and dealing with particular danger faced by the society.

Pakistan has a combined health framework structure, which incorporates government foundation, para-statal wellbeing framework, private part, thoughtful society and philanthropic contributors[80]. A noteworthy quality of government's health care design in Pakistan is an effort essential human caring services, conveyed at the society level by enormous number of Lady Health Workers (LHWs) and an expanding number of network maternity specialists (CMWs), and other society-based employers who have earned achievement and trust in the communities[81]. Integral, elective and customary arrangement of recuperating is likewise very prominent in Pakistan[82].

Table 5–22: Number of Government Health Facilities in District Abbottabad[83]

District/ Tehsil	Hospitals		R.H. Cs		Basic Health Units	Dispensaries	T.B Clinics	MCH Center	Sub Health Centers	Leprosy Clinics
	Nos.	Beds	Nos.	Beds						
Abbottabad	11	1410	2	28	54	44	1	2	1	1
Abbottabad Tehsil	9	1330	1	14	36	26	1	2	0	1
Hevellian Tehsil	2	80	1	14	18	18	0	0	1	0

The economy of any country depends on the private sector of the region private sector will encourage to help the government in the provision of basic facilities to the surrounding people like health institution. The distribution of health institutes in District Abbottabad of private sector are given below:

Table 5–23: Number of Private Health Facilities in District Abbottabad[84]

District/Tehsil	Hospitals	Homoeopathic Clinic	Dental Clinic	Ultrasound Clinic	Specialist Clinic	GP Clinic	Laboratories	Chemists
District Abbottabad	18	42	25	23	50	69	37	14
Abbottabad Tehsil	13	35	24	21	50	57	35	11
Hevellian Tehsil	5	7	1	2	0	12	2	3

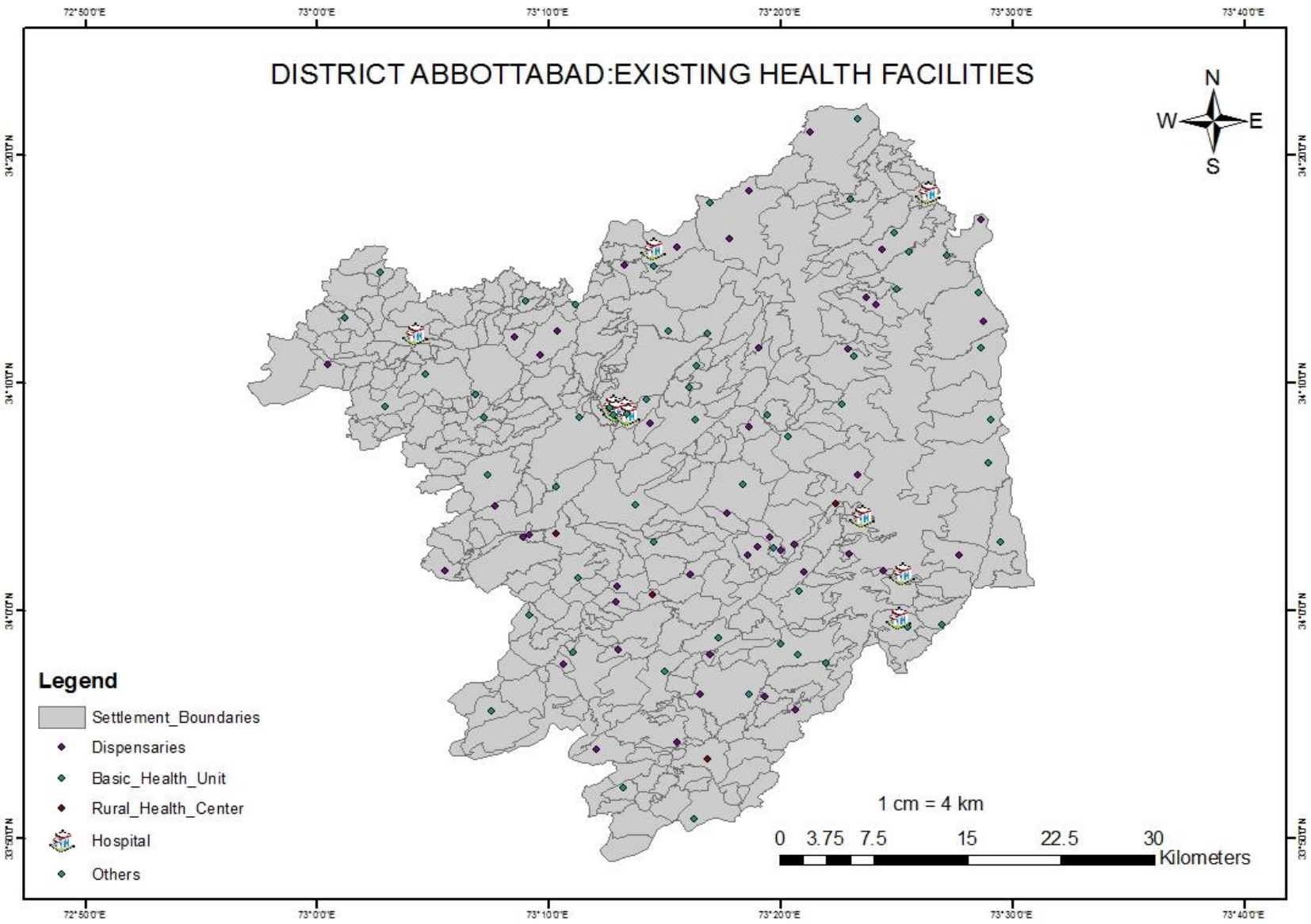
[80]Shaikh BT. Health Care System in Pakistan. In: HimanshuSekhar Rout (Ed.) Health Care Systems: A Global Survey. New Century Publications, New Delhi: 2011; pp. 434-454.

[81]Hafeez A, Mohamud BK, Shiekh MR, Shah SA, Jooma R. Lady health workers programme in Pakistan: challenges, achievements and the way forward. Journal of Pakistan Medical Association 2011; 61(3):210-5.

[82]World Health Organization. Analysis of the private health sector in countries of the Eastern Mediterranean: exploring unfamiliar territory. Regional Office for the Eastern Mediterranean, Cairo: 2014

[83]Khyber Pakhtunkhwa Development Statistics, 2018, Page No: 159

[84]Collected from primary data source, DC Office.



MAP 5-33: Existing Health Facilities

Trained Manpower in Health Institutions

The total number of medical and paramedical staff currently working in public facilities is 1334, while the number of total private practitioners is 383 in District Abbottabad. The Table 5-24 shows a historic perspective of the increase in the trained manpower in the District.

Table 5–24: Trained Manpower in Health Institutions

Trained Manpower	2015	2016	2017
Doctors	214	128	460
Radiologists	1	0	3
Dental Surgeons	5	5	21
Nurses	155	155	198
Nurse Dias	49	49	80
Dias	117	117	117
Primary Health Technician (LHV's)	105	59	58
Other Paramedical Staff Members	510	888	397
Total	**1156**	**1401**	**1334**
Private Medical Practitioners	258	383	383
Total	**1414**	**1784**	**1717**

5.3.2 Doctor to Population ratio

The number of doctors in public sector are 460 and in private sector it is 383, so the total number of doctors in District Abbottabad is 843. While the population according to the 2017 Census is 1039775 persons. The doctor to population ratio of District Abbottabad is:

0.61: 1000[85]

The ratio describes the alarming situation of the District, that for a population of 1000 persons only 0.61 doctors are available. It could also be represented as, that there is only 1 doctor for each 1188 persons in the District.

5.3.3 Major Diseases

A portion of the most occurrences dieses in District Abbottabad is Anemia among ladies, Malaria Parasite, Plasmodium Falciparum Rate, Hepatitis B++ Portion and Hepatitis C++ Portion.

Anemia Among Women

Pregnant women coming to the facility for antenatal care serve as a sample of women from the catchment population. The nutritional status among this sample of pregnant women is suggestive of the nutritional status of women in the catchment population.

In 2016 Anemia was found in 157 women and in 2017 only 961 women were suffered.86

Malaria Parasite

The Malaria Parasite produces a molecule that affects red blood cells, luring mosquitoes to bite infected people, and may enhance the parasite's spread. Malaria Parasites are spread by bites from infected mosquitoes.

[85] Calculated from Population Census 2017 and Table 5-24.
[86] District Health Information System, http://www.dhiskp.gov.pk/reports.php

In 2016 Malaria Parasite was found in 1 persons and in 2017 the number of patients increased to 6.87

Plasmodium Falciparum

Plasmodium Falciparum is a protozoan parasite, one of the species of Plasmodium that cause malaria in humans. It is transmitted by the female Anopheles mosquito of the six malarial parasites. Plasmodium Falciparum causes the most-often fatal and medically severe form of disease.

In 2016 Plasmodium Falciparum was found in 0 persons and in 2017 the number of patients decreased to 8.88

5.3.4 Health Proposals for Short-Term (2018-2023)

Provision of Basic Health Units (BHUs)

This facility is based on population criteria of 1 BHC for 25,000 persons[89], a total of 62 BHUs are required by the end of short-term plan period. The existing number of BHUs is 54, entailing a net requirement of 8 BHUs in areas of the District. The required number of BHUs may be provided preferably in a larger village/settlement for the short-term plan.

Table 5–25: Number of Basic Health Units Required in Short-Term Plan

Total Population 2018	Population 2023	BHUs Required in 2023	Existing BHUs	Net Required by 2023
1,393,213	1,557,034	62	54	8

Provision of Rural Health Centers (RHCs)

This facility is based on population criteria of 1 RHC for 75,000 persons[90], a total of 5 RHCs are required by the end of short-term plan period. The existing number of RHCs is 2, entailing a net requirement of 5 RHCs in rural areas of the District. The required number of RHCs may be provided preferably in a larger village/settlement for the short-term plan.

According to the Development Statistics of KP-2017, less improvement of the health facilities was noted as compared to the growth of the population.

Table 5–26: Rural health Centers Required in Short-Term Plan

Rural Population 2018	Rural Population 2023	RHCs Required in 2023	Existing RHCs	Net Required by 2023
1,080,351	368,178	5	2	3

[87] District Health Information System, http://www.dhiskp.gov.pk/reports.php
[88] District Health Information System, http://www.dhiskp.gov.pk/reports.php
[89] Source: Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.
[90]Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

Increasing Number of Beds

Applying the national standard of 1 beds per 500 persons[91], the gross number of beds required at the end of short-term period is 736 while the existing number of beds is 28. Thus additional 708 beds will be required by the year 2024.

Table 5–27: Number of Beds Required in Short-Term Plan

Population 2018	Population 2023	Number of Bed required in 2023	Existing number of Beds	Net Required by 2023
1,080,351	368,178	736	28	708

5.3.5 Health Proposals for Long-Term Plan (2023-2038)

Provision of Basic Health units (BHUs)

Based on population criteria of 1 BHUs for 25,000 persons[92], a total of 87 BHUs will be required by the year 2039. During the short-term plan of first five years (2019-2024), 71 BHUs are proposed to be provided. If this proposal is implemented, 16 additional BHUs will be required during 2024-2039.

Table 5–28: Number of Basic Health Units Required in Short-Term Plan

Total Population 2023	Population 2038	RHCs Required in 2038	Exist RHCs up to 2023	Net Required by 2038
1,557,034	2,184,271	87	71	16

Provision of Rural Health Centers (RHCs)

Based on population criteria of 1 RHC for 75,000 persons[93], a total of 21 RHCs will be required by the year 2039. During the short-term plan of first five years (2019-2024), 5 RHCs are proposed to be provided. If this proposal is implemented, 16 additional RHC will be required during 2024-2039.

Table 5–29: Rural health Centers Required in Long-Term Plan

Rural Population 2024	Rural Population 2039	RHCs Required in 2039	Exist RHCs up to 2024	Net Required by 2039
1,080,351	1,584,243	21	5	16

[91] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

[92] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

[93] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

Increasing Number of Beds

Applying the national standard of 1 beds per 500 persons[94], number of beds required for the additional population during the period 2019-2039 are 2432 as shown in the following table:

Table 5–30: Number of Beds Required in Long-Term Plan

Population 2024	Population 2039	Number of Bed required in 2039	Exist number of Beds up to 2024	Net Required by 2039
1,080,351	1,584,243	3168	736	2432

5.3.6 Land Required for Health Care Facilities

The range of covered area required for various functions varies substantially and is reflective of the functional requirements and method of delivery of a particular health service, level of technology, socio-economic conditions and life style/ habits of users, climate, etc. The site area required for accommodating one such functional unit also varies widely. The dictates of flexibility, adaptability, expansion, addition of new services, local climate and customs, abundance or scarcity of urban land, etc. need to be considered in developing criteria for allocation of land for BHU, RHU, etc. The standards given in the NRM are being adapted for the Multan Master Plan. There requirements are summarized in Table below Table 5-31.

[94]Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

Table 5–31: Land Requirement for New Health Facilities (IN KANAL)

Year	RHCs		BHUs		DHQs		Total
	Land	No of Facility	Land Require	No of Facility	Land Require	No of Facility	Land Require
2018	22	2	270	54	98	1	390
2023	33	3	40	8	0	0	73
2038	176	16	80	16	0	0	256

5.3.7 Health Policy 2016-2025

To enhance the health of community considered, especially ladies and youngsters, through general access to affordable quality especially about the health facilities, and conveyed through strong and responsive framework of health facilities, prepared to accomplish Sustainable Development Goals/million development goals and provide its other worldwide health related Responsibility.[95]

The National Health Policy gives a general national vision to the Health Sector, dependent on "HEALTH FOR ALL" approach. Under this methodology, the national wellbeing arrangement means to execute the system for ensuring individuals against dangerous disease, securing general public, and updating the health facilities in the target area. Under the new Health Policy, health sector investments are being seen a piece of the Government's Poverty Alleviation Plan of Pakistan. Need consideration has been concurred at all levels of the health part and great good administration is viewed as the reason for the accomplishment of quality medicinal services for people.

Objectives

The wellbeing procedure has developed a sensible viewpoint on what is required to be done in key targeted area, and the measures to be taken to achieve the specific targets. The Policy offers guidelines to the Provinces while finalize plans in the health sector according to their necessities and requirements. The Key Areas of National Health Policy are as underneath:

1) Reduce Widespread Prevalence of Communicable Diseases (for example EPI group of youth infections, TB, Malaria, Hepatitis-B and HIV-AIDS.

2) Address insufficiencies in all level of medicinal services administrations. The principle insufficiencies are recognized as the lacking condition of instruments and medicinal staff at BHU/RHC level. Non-attendance is additionally normal. At the area/tehsil level medical clinics there are significant inadequacies in crisis care, careful administrations, and anesthesia and lab offices. There is no referral framework in task.

3) Remove Professional and Managerial Deficiencies in District Health System. The primary inadequacies have been distinguished as the ineffectualness of the locale wellbeing office to administer wellbeing administrations in a region. DHOs for the most part need in fundamental capabilities and the board abilities. Numerous posts of male and female specialists and paramedics at the essential and optional wellbeing offices are empty, just as master positions in area and tehsil clinics. Emergency clinics are overseen in an unplanned way. So it can improve by;

- Promote more prominent gender value in the health relating sectors

[95]National health vision Pakistan (2016-2025)

- Bridge the Basic Nutrition Gaps in the objective populace for example child, women and helpless populace gatherings.
- Correct urban pre-disposition in the wellbeing division.
- Introduce required control in the private medicinal part with the main goal of guaranteeing legitimate benchmarks of gear and administrations in emergency clinics, facilities and research centers just as private therapeutic school and Tibb/Homeopathic educating establishments.
- Create mass mindfulness in overall wellbeing matters.
- Bring enhancement in the Drug Sector with the main goal of guaranteeing the accessibility, reasonableness and quality of medications in the nation.
- Capacity Building for Health Policy Monitoring in the Ministry of Health.

Thematic Pillars

Some important thematic pillars are designed to achieve the health target in the target area which are given below:

- Strong Health Financing
- Efficient Health Service Delivery
- Organized Human Resources for Health
- Develop cohesive Health Information Systems
- Having good Governance
- Essential Medicines and Technology will provide
- Cross-Sectoral Linkages will develop
- Global Health Responsibilities will the responsibility of the government.

5.3.8 Constraints

All through Pakistan, particularly in developing cities of KP like Abbottabad, the wellbeing framework is immature. The fundamental wellbeing units in targeted zones are not very much prepared. The aftereffects of the investigation by different sources, it demonstrates that the population of the district is at lower ebb as far as essential and tertiary health care.[96] In Abbottabad, the arrangement of value social insurance has never been a need limit for the organizers or strategy creators. To improve the models of health administrations, World Health Organization prescribes to apportion 6 percent of the GDP for health a sector. Be that as it may, the absolute use on health is about 2.4 percent of GDP, of which private use comprises 83.6 percent.[97]

By analyzing different report, the distance from the health centers are matter because the most of the people visit the nearby health center. so, the BHUs should provide within the distance of 1 to 6 kilometers.

By the different studies, very less patient was analyzed by the medical officer. The remaining were seen medical technician, dispenser or a lady health supervisor. The most of the people are not satisfy with the health facilities are provide in the Abbottabad.

Some of the notable constraints in the health sector includes:

There are numerous shortcomings and difficulties which are presently looked by the Abbottabad health services framework. As prove by the different reports, health sectors in Abbottabad have thrived yet the greater part of them have poor administration, low quality of wellbeing facilities, deficiency of resources, drugs, un prepared staff, inaccessibility of female staff, the vast majority of the specialists are occupied in their private practice due to absence of motivations to change their preference.

- Because of poor existing structure of the BHU's, RHC's and Dispensary's. Most of the individuals are not willing to get to medicinal services given by the health institute and along these, the individuals belonged from backward areas are redirected to the tertiary clinics. The distance from centers and deficiency of transportations with poor streets frustrate their entrance to these centers.

- It is likewise discovered that public sectors in Pakistan is underused on account of frail human asset, absence of health-related training, absence of transparency and hindrances because of language and social gap.

5.3.9 Recommendations

Correspondingly, the proposed recommendations in the health sector includes:

- Health Sector should be underscored as in Land-use Plans, as it significantly impacts the soundness of individuals who live and work there.

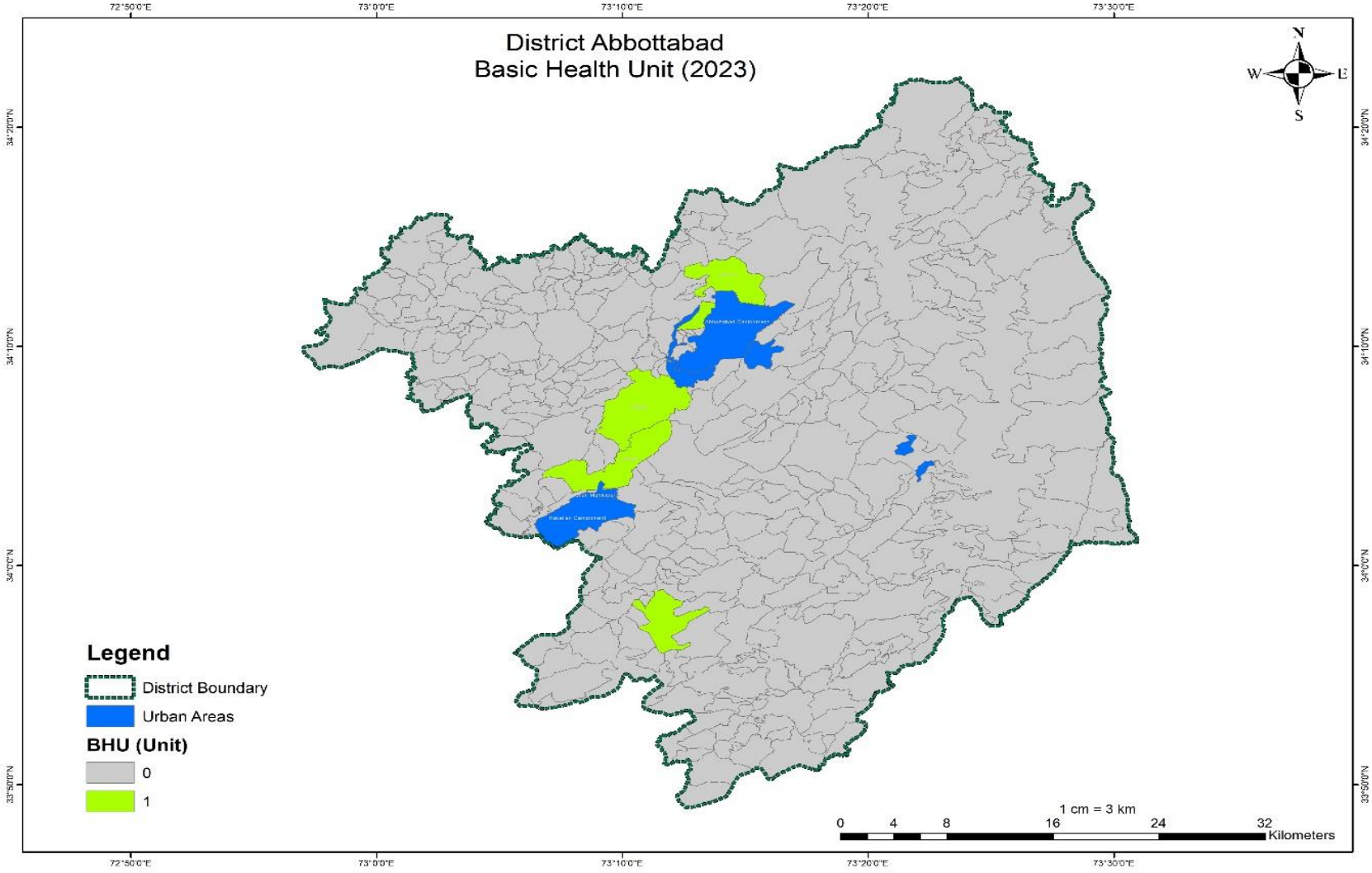
[96] Afzal U, Yusuf A. The state of health in Pakistan: An overview. The Lahore Journal of Economics, 2013; 18 (special edition), 233.

[97] World Health Organization. World health statistics 2009. (pp. 107-117). Geneva, Switzerland: Available from URL: **Error! Hyperlink reference not valid.**

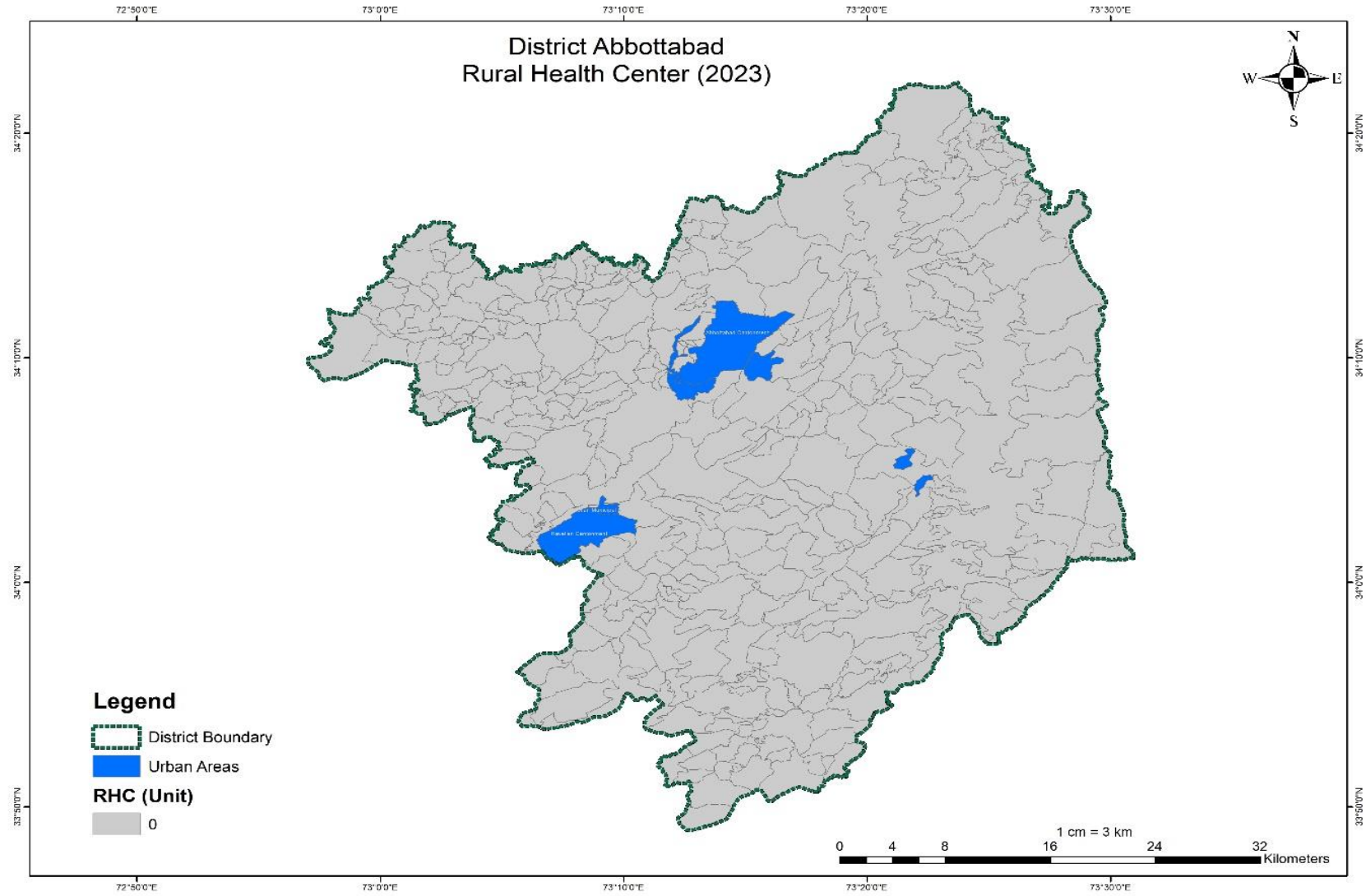
- There is a need to list down the important consideration towards creating wide arrangements and general systems to enhance network plan and building practices and switch the negative patterns identified with human wellbeing.

- It is essential to think about the commitment of private sectors in arrangement of health improvement carters so detailed studies should be conducted to analyze the full condition of health system in Abbottabad.
- The concerned authorities, the city administration and the entrepreneurs in the private sector who are engaged in delivering health care should coordinate their activities and develop a comprehensive program that addresses resource shortages and the objectives of affordable, accessible and effective preventive and curative health care.
- Adequate number of health care workers should be trained and deployed, especially at the lower level facilities.
- Land reservations must be made well in advance and land so allocated must be conserved and prevented from being misused. Land set aside for social needs has a tendency of being misappropriated in our society. Sites reserved for these facilities need to be constantly monitored to prevent encroachment.
- Deficiencies of health facilities in existing residential areas, especially high-density areas, cannot be easily met by construction of new facilities. Other innovative solutions (including expansion/ addition at sites that have suitable vacant space) need to be explored and developed for such areas that are short of land.
- The long-term national goal is 5 hospital beds per thousand populations. Owing to scarcity of resources and apart from a few well provided urban places, the medium-term feasible target may be taken as 2 beds / 1000 populations.
- Where feasible, new facilities in new zones of the city (suitably modified/enhanced) may partially fulfill the needs of adjoining localities that are short of land or where expansion and new construction cannot be undertaken for other reasons.
- Existing hospital buildings, etc. (especially those in high density localities) that are dilapidated or have completed their useful life should be pulled down and replaced with buildings that have been designed to more economical space standards. This measure will enhance the efforts at reducing deficiencies/backlog in built-up areas that are short of open land.

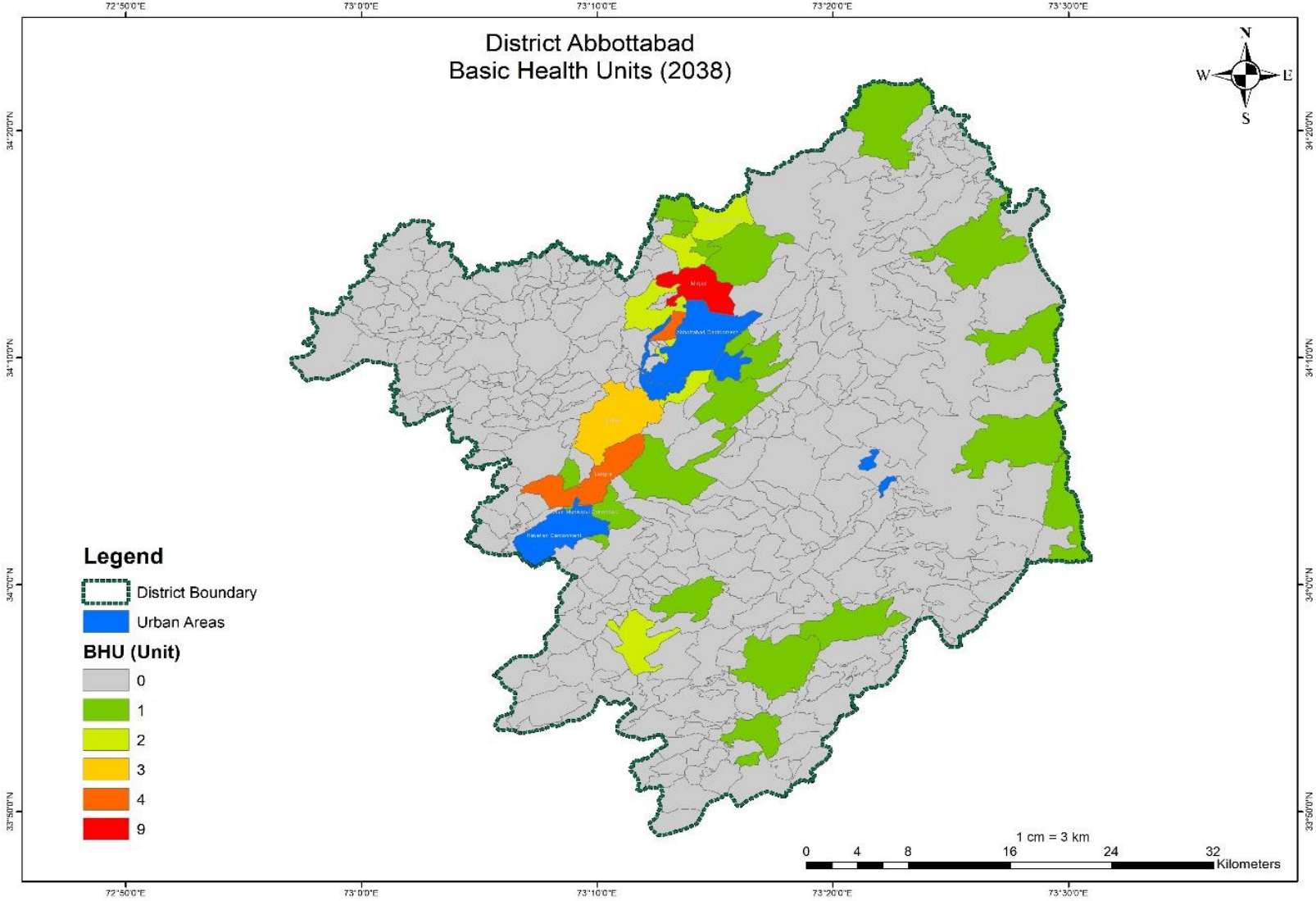
Below Maps shows the requirement of Basic Health Units and rural health centers in the short term as well as in the long term in district Abbottabad. Different colors are the representation of different colors in the map of the provision of health institutes in the district.



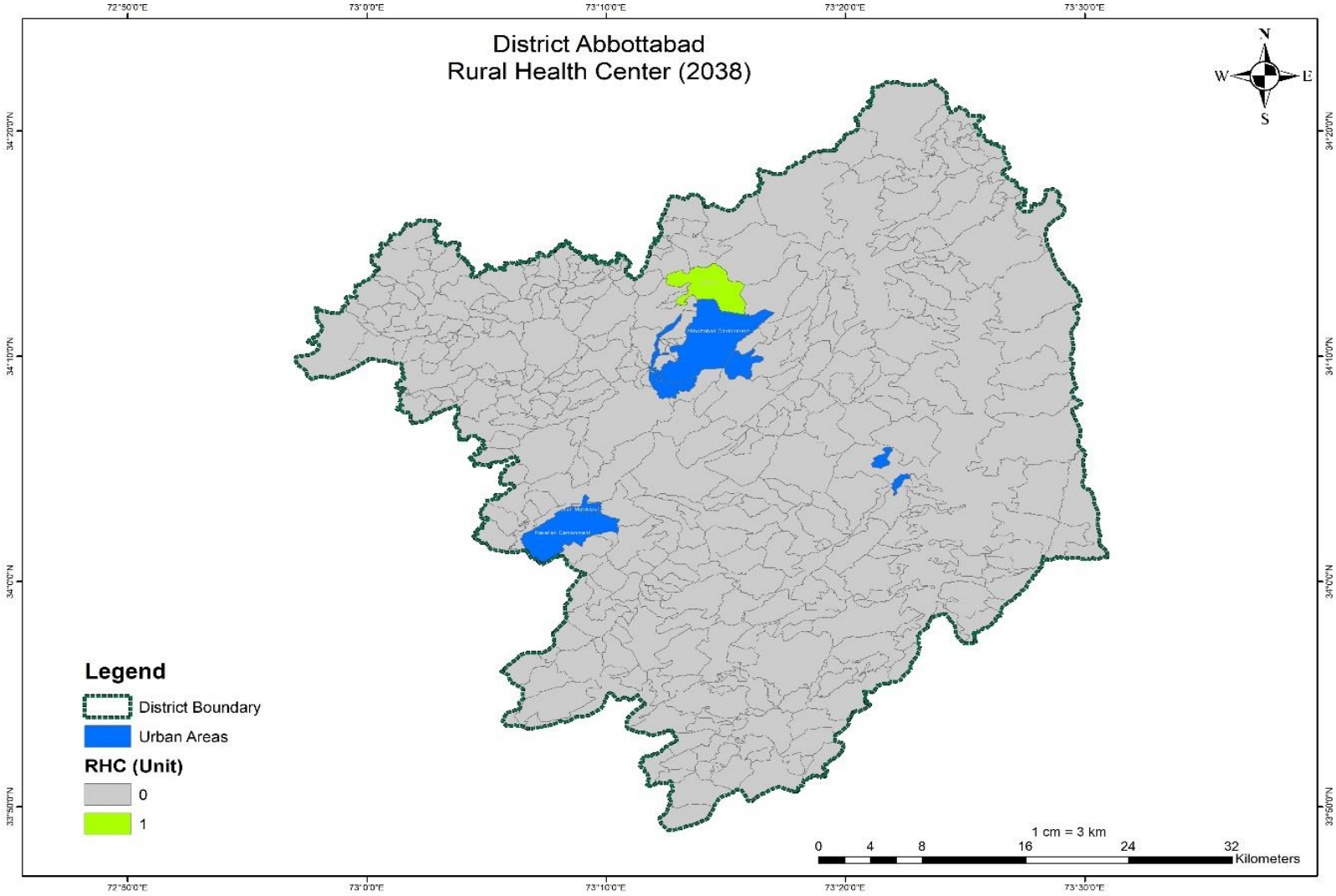
MAP 5-34: Basic Health Unit Required (2018-2023)



MAP 5-35: Rural Health Center (2018-2023)



MAP 5-36: Requirment of BHUs (2023-2038)



MAP 5-37: Basic Health Units (2038)

Chapter 5

Communication and Infrastructure Land Uses

Recreational/Leisure Land Uses

5.4 Recreational Facilities

There is a strong link between the built environment and the physical, social and economic health of a community. From the last few decades, we are planning for vehicle-dependent environments that foster obesity, poor health, social isolation, high costs of infrastructure, and focus away from our downtown cores. Sprawling land use patterns have altered our travel behavior, lead to physical inactivity, and contributed to soaring costs on health care of the community and environment. Planning for parks and recreational facilities can promote active lifestyle, built healthy communities, and lower health care and transportation cost. National recreational and parks association highlighted those well-planned recreational facilities are a key drive toward active transportation, economic growth, environmental conservation and social and equity benefits for community members.

Recreational facilities are an essential part of human life and finds many different forms which are shaped naturally by individual interests but also by the surrounding environment. A list of recreational activities includes sports, hotels, hill resorts, Historical and Religious places, libraries, museum, zoos, open spaces, parks and playgrounds.

5.4.1 Sports Facilities

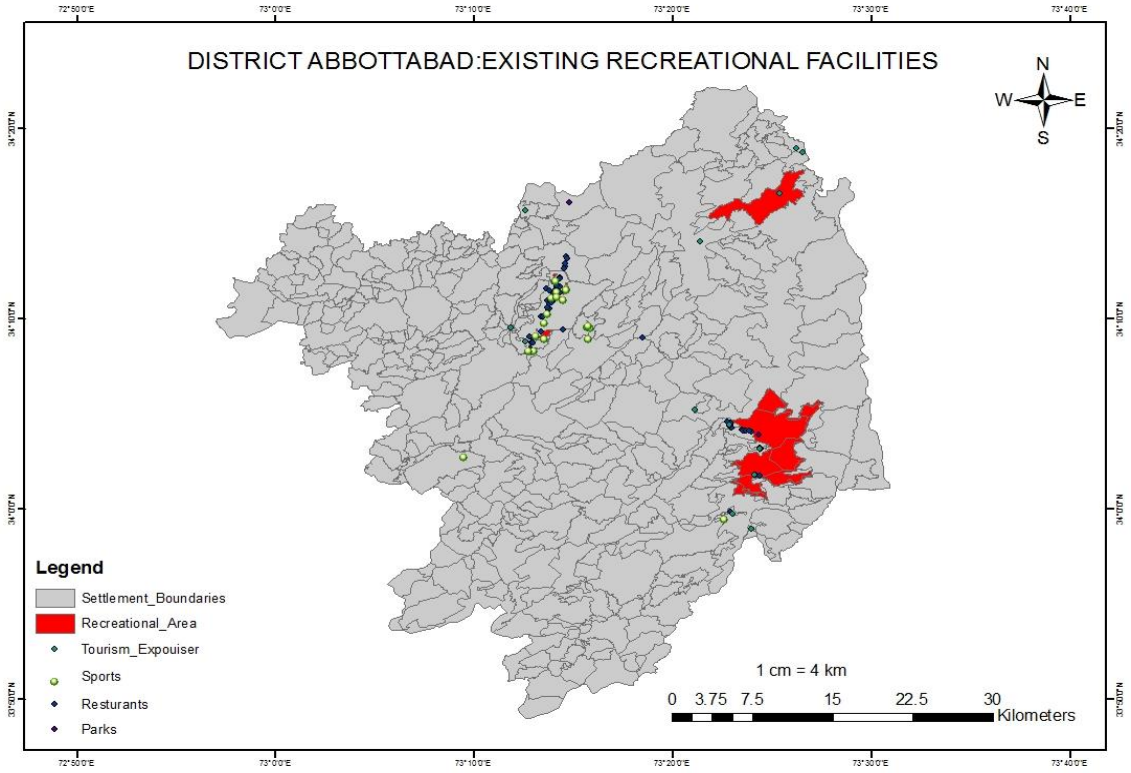
Sporting events have played pivotal roles in creating healthy communities around the globe. Today, contests pushing physical limits are more popular than ever before. As interest in healthy and longevity continues to rise, and government business continue to see sporting events as sound investment and long-lasting impact, sports can play a vital role in shaping a vigorous society for foreseeable future.

There are very limited play grounds and sports facilities exist in District Abbottabad and most of these facilities shows spatial injustice and inequality in its distribution e.g. most of the population are sidestep from these sports facilities while some places have adequate number of sports facilities. The following are some of the existing sports facilities in District Abbottabad[98] like Squash courts, Cricket stadium, Basketball court, Kunj football ground, Hockey Stadium, Murree Road football ground, Badminton Hall, Nawasher football ground, Fitness center, GCMS Schools Basketball Courts, Lora Play Grounds, Rajoya Play Ground, Changla Gali Play Ground, Bara Hoter Play Ground, Sultanpur Play Ground, Pattar Gali Play Ground, Dhamtour Play Ground, Khanaspur Play Ground Ayubia, Banda Qazi Play Ground and Nelotha Play Ground.

Unfortunately, there is no policy for the provision of sports facilities, but quite recently the KP government took an initiative toward 1st sports policy the draft of which is approved by the cabinet. Many countries around the globe have been focusing on improving “Sports-for-all” and youth policies during this period. These initiatives are key to improving community health, physical activity levels and community involvement. To provide better sports and level playing field to youth in rural areas and to bring the talent youth to the mainstream and get the opportunity to represent the province at national and international levels. Under the policy proper infrastructure would be developed at the union council and tehsil levels so the youth of rural and far-flung areas would get the opportunity to play on proper sports facilities and enhance their skills. The policy recommends providing sponsor recreational and fitness opportunities for youth to create a desire among them to lead a healthy lifestyle. Teacher will also be educated to incorporate physical activities after completing school level studies. Some of the ongoing programs in sports sector includes:

[98]Directorate General of Sports & Youth Affairs Government of Khyber Pakhtunkhwa.

- Establishment of international standards multipurpose Gymnasium at Abbottabad.
- Establishment of playgrounds on need basis in KP.



MAP 5-38: Existing recreational facilities

5.4.2 Standards for Allocation of New Ground Facilities for sports

The more capital intensive the facility, the larger the catchment required for its viable operations. The following two tables provide the Standard play field sizes of common outdoor games along with necessary run-ons. These standards have been established by the international federations of concerned games. Sub-standards sizes may be considered for cricket and football where the games are limited to pre-teen and early-teen age group. While, the proceeding table gives the range of sports facilities recommended for various level of urban/settlements:

Table 5–32: Standard Playfield Sizes (meter)

S.no	Game	Playing area	Run On
1	Cricket	20 X 546	---
2	Football	105 X 68	109 X 70
3	Hockey	91 X 55	99 X 59
4	Tennis	23.77 X 10.97	36.5 X 18.29
5	Volleyball	18 X 9	24 X 13
6	Basketball	26 X 14	30 X 18
7	Badminton	13.41 X 6.10	16 X 8

Table 5–33: Active Recreational Standards

S. No	Hierarchy	Population Criteria	Type	Size (Hectare)
1	City Stadium	300,000	Cricket	2
		200,000	football	1.4
			Hockey	1.15
2	Community Play Ground	100,000	combine play field	2.14
3	Neighborhood Play Ground	25000	combine play field	1.63

Table 5–34:Passive recreational Standards[99]

S.no	Type	Description	Allocation Criteria (pop)	Area (ha)	Hectare/1000 pop
1	City Park	Wide range of amusement facilities, fountains, lakes, landscaping etc.	400,000	12 to 15	0.03 to 0.037
2	Community Park	selected amusement facilities fountains, lakes, landscaping, etc.	100,000	4 to 5	0.04 to 0.05
3	Neighborhood Park	wide range of child play fixtures, walking & jogging paths.	25,000	3.25 to 4	0.13 to 0.16
4	Mohalla Parks (3-8 per Mohalla av. Size 0.45 ha each)	Tot-lots with slides, swings, seesaws; other spaces with some turf	6,250	1.6 to 3.6	0.26 to 0.58
			TOTAL		0.485 to 0.862

Table 5–35: ACTIVE RECREATIONAL FACILITIES DEMAND (2018-2023) OF DISTRICT ABBOTTABAD

S.No	Category	Additional Population	TYPE	Active Recreational Facilities Required	Area Required (Ha)
1	**Urban**	65513	CRICKET	0	0
			FOOT BALL	0	0
			HOCKEY	0	0
			COMMUNITY PLAY GROUND	1	2.14
2	**Rural**	115956	CRICKET	0	0
			FOOT BALL	1	1.4
			HOCKEY	1	1.4
			COMMUNITY PLAY GROUND	1	2.14

[99] National reference manual on planning & infrastructure standards, page number 138, Table no 6.12

TOTAL	181469		12	20.12

Table 5–36: PASSIVE RECREATIONAL FACILITIES DEMAND (2018-2023)

S.No	Category	Additional Population	TYPE	Passive Recreational Facilities Required	Area Required
1	Urban	65513	CITY PARK	0	10
			COMMUNITY PARK	1	2.4
			NEIGHBORHOOD PARK	3	4.89
			MOHALLLA PARK	10	10
2	Rural	115956	CITY PARK	0	0
			COMMUNITY PARK	1	2.4
			NEIGHBORHOOD PARK	5	8.15
			MOHALLLA PARK	19	19
TOTAL		4764891		39	56.84

Table 5–37: ACTIVE RECREATIONAL FACILITIES DEMAND (2018-2038) OF DISTRICT ABBOTTABAD

Sr.No	Category	Additional Population	TYPE	Active Recreational Facilities Required	Area Required (Ha)
1	**Urban**	360183	CRICKET	1	2
			FOOT BALL	2	2.8
			HOCKEY	2	2.8
			COMMUNITY PLAY GROUND	4	8.56
			NEIGHBORHOOD PLAY GROUND	14	22.82
2	**Rural**	582058	CRICKET	2	4
			FOOT BALL	3	4.2
			HOCKEY	3	4.2
			COMMUNITY PLAY GROUND	6	12.84
			COMBINE PLAY FIELD	23	37.49
TOTAL		942241		60	101.71

Table 5–38: PASSIVE RECREATIONAL FACILITIES DEMAND OF DISTIRCT ABBOTTABAD (2018-2038)

Sr.No	Category	Additional Population	TYPE	Passive Recreational Facilities Required	Area Required
1	Urban	360183	CITY PARK	1	10
			COMMUNITY PARK	4	9.6
			NEIGHBORHOOD PARK	14	22.82
			MOHALLLA PARK	58	58
2	Rural	582058	CITY PARK	1	10
			COMMUNITY PARK	6	14.4
			NEIGHBORHOOD PARK	23	37.49
			MOHALLLA PARK	93	93
TOTAL		4764891		200	255.31

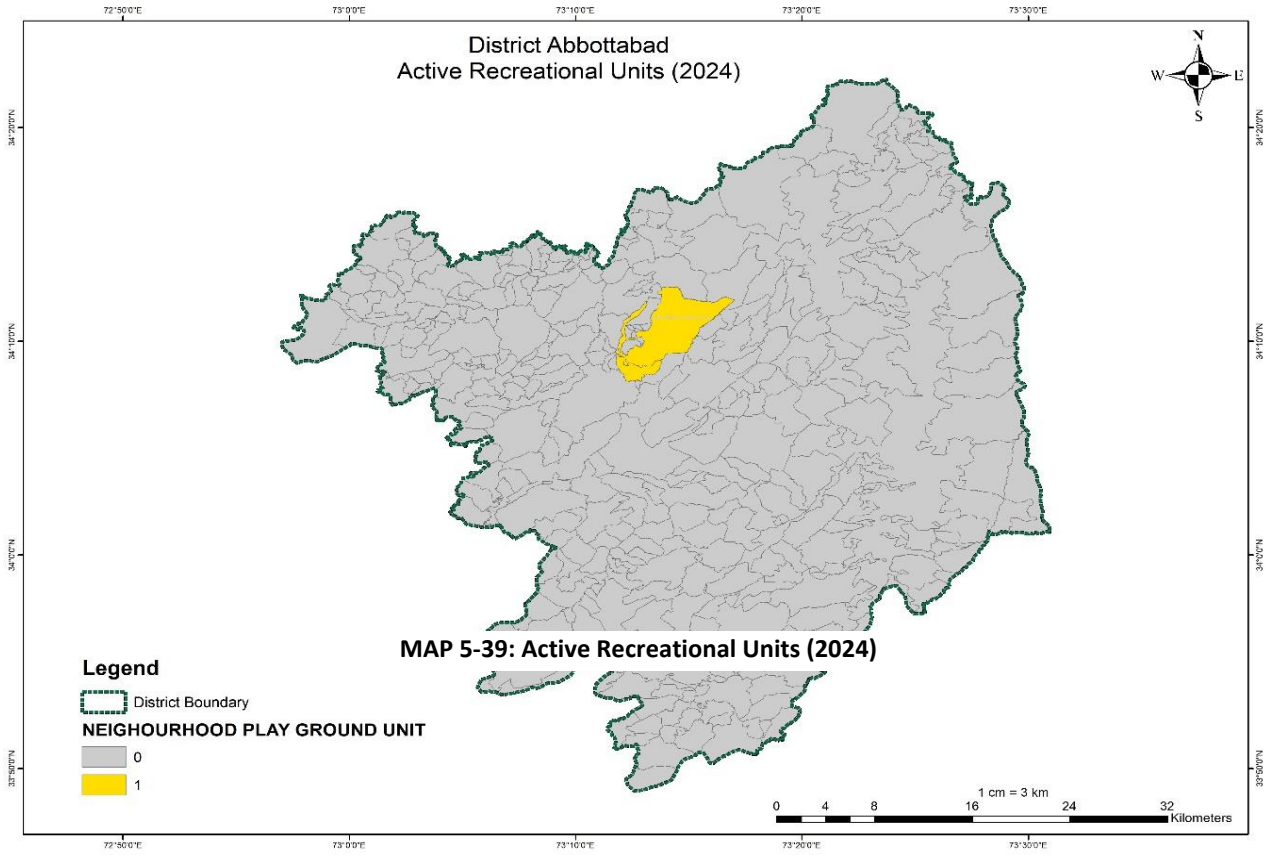
5.4.3 Constraints and Recommendations (Sports)

Sports is the active recreational facility which improve the health of the residence and provide greenery to the society which indirectly improve the environmental condition of the area. There are only a few numbers of sports facilities available in District Abbottabad but most of them are also in disorganized form. Some of the sports facilities also lack access to basic facilities like setting areas, toilets etc. while the district has a wide potential to obtain new sports facilities like trekking, skiing, paragliding and water boating.

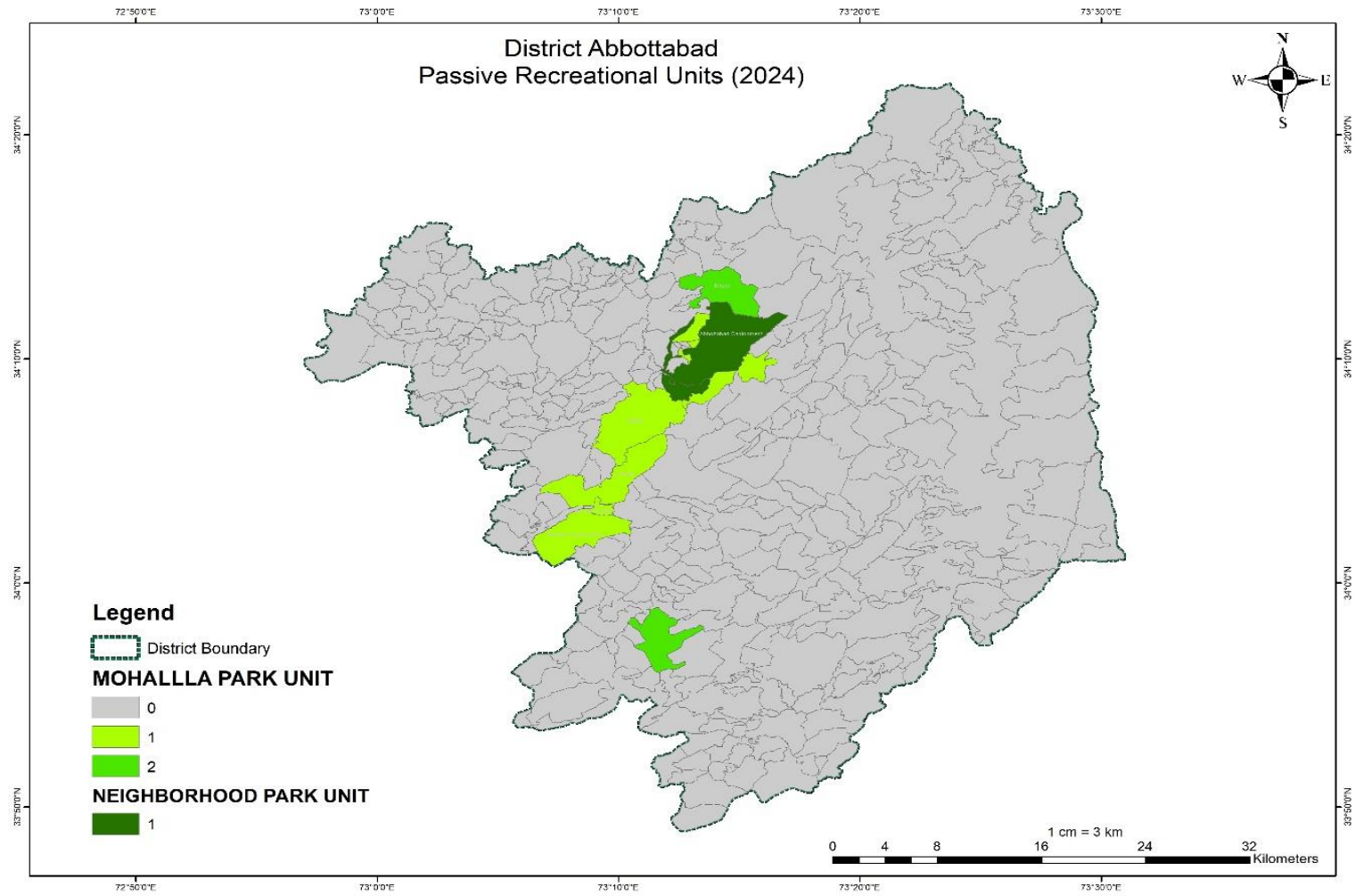
Some of the salient recommendation related to sports includes:

- Basic services like toilets, sitting areas etc. shall be provided to the existing playgrounds.
- According to NRM Standards as specified above new sports facility shall be provided in the district, city, town and neighborhoods. However, they should be developed on eco-designs—lesser use of concrete and building materials and more usage of green architecture and arch nature.
- Sports tournaments shall be arranged to bring awareness and to shift the thoughts of people toward active recreational facilities.
- Water boat and other types of similar activities can be established at Haro River in Harnoi recreational spot, the site attracts a lot of tourists in summer season due to its pleasant environment with lush green forests in the surroundings.
- Abbottabad district contains some beautiful points having a wide range of potential for skating and other types of snow games places like Mushkpuri top can be developed through arranging events and festivals.

Map given above shows the required Active Recreational Facilities in District Abbottabad, only two settlements are required Neighborhood Play ground in short term plan which is highlighted in yellow color and grey color settlements do not require any active reactional facilities in short term plan

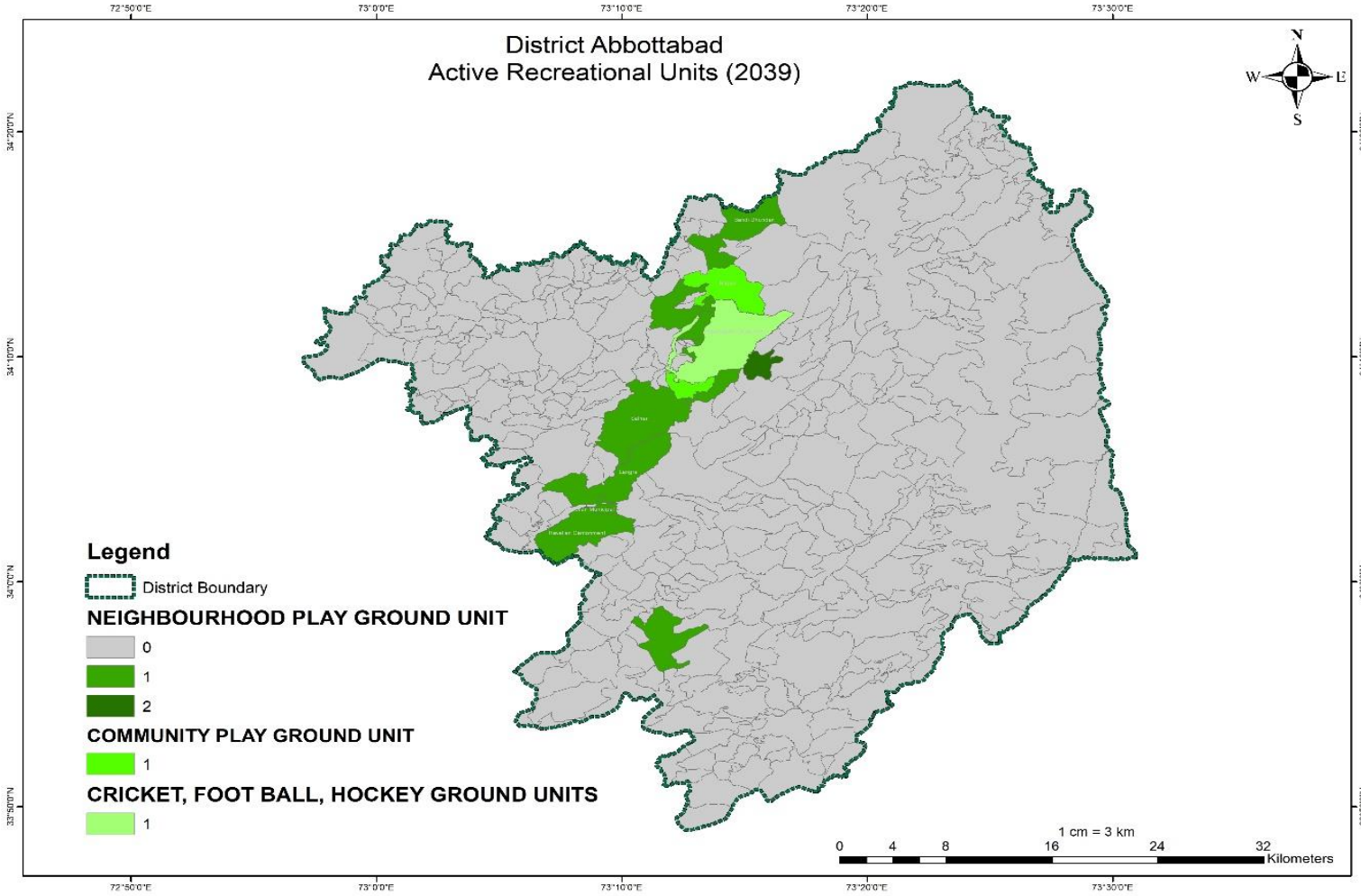


MAP 5-39: Active Recreational Units (2024)



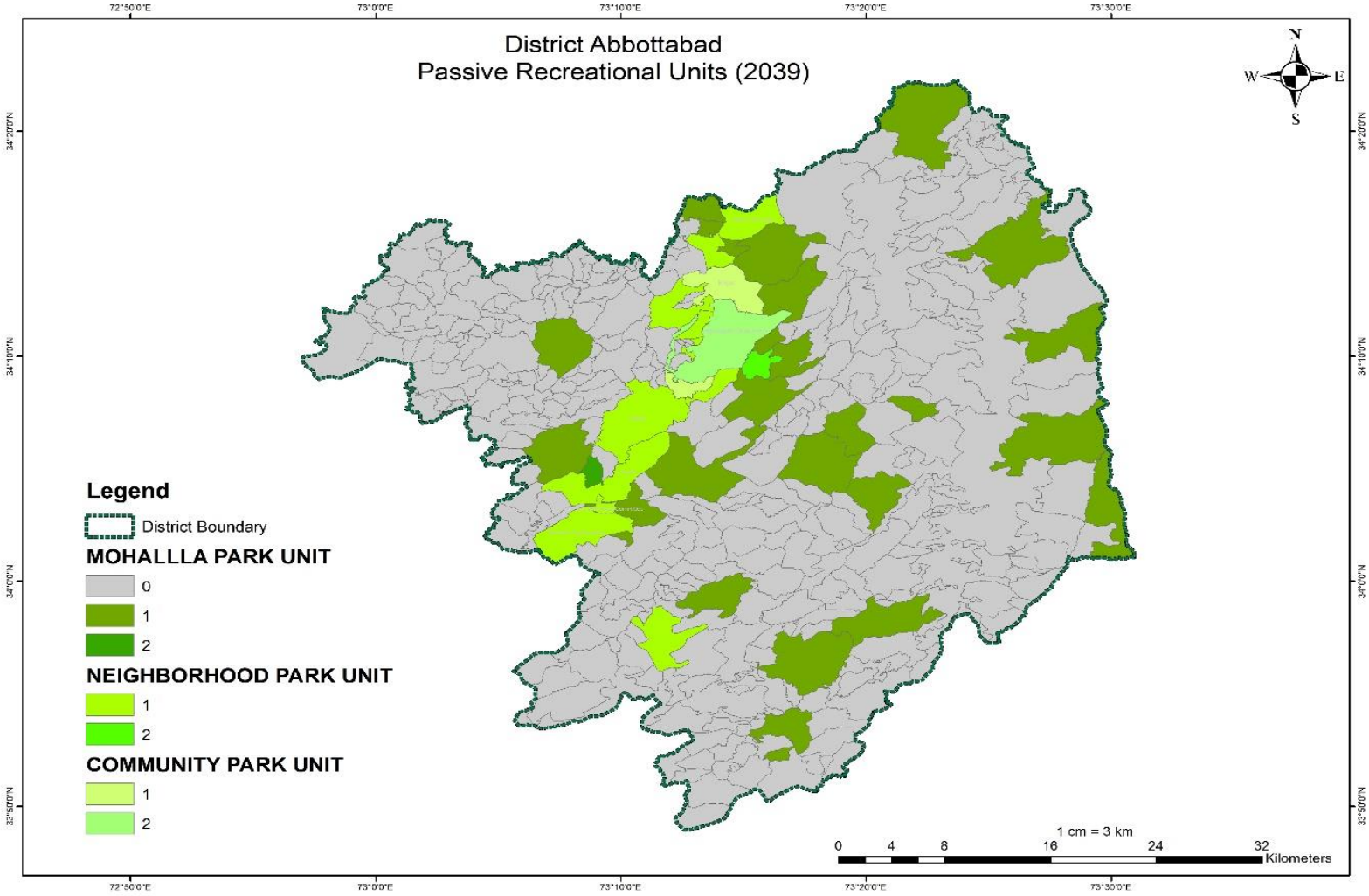
MAP 5-40:Passive Recreational Units (2024)

Map given below shows the required Passive Recreational Facilities in short term plan, in 6 settlements 1 Mohalla park is required in each settlement, which is highlighted with light green color, 2 settlements required 2 Mohalla parks each required 2 parks, which is highlighted with green color and in 1 settlement 1 neighborhood park is required which is highlighted with dark green color in short term plan.



MAP 5-41: Active Recreational Units (2039)

Map given above shows the requirement of Active Recreational facilities in long term plan, 7 settlements are required 1 neighborhood play ground in each, in 1 settlement 2 neighborhood play ground are required, in 2 settlements 1 community play ground is required in each, and 1 settlement is required 1 cricket and football ground.



MAP 5-42: Passive Recreational Units (2039)

Map given above shows the requirement of Passive Recreational Facilities in long term plan, 18 settlements are required 1 Mohalla Parks, 1 settlement required 2 Mohalla parks, 7 settlements are required 1 neighborhood park, 1 settlement is required 2 neighborhood parks, 2 settlements are required 1 community park and 1 settlement is required 2 community parks in long term plan.

5.4.4 Entertainment and Tourism

The entertainment is one of the industries that significantly contribute to the tourism experience. It is relevant to the tourism industry, given that the essence of tourism (relaxation, enjoyment and escapism) is compatible with that of entertainment. Another model of destination competitiveness argue that the existence of resources is insufficient to generate visitation to a destination in the absence of tourism infrastructure, like entertainment and shopping. In the context of Abbottabad, entertainment is relevant to the tourism for two main reasons; firstly, it will bring diversification to the existing tourism offering and secondly, Abbottabad tourism suffers sustainability threats.

As such, it is believed that the integration of entertainment in the tourism experience helps in preserving natural and culture resources. The view equally stands in the context of Galliyat tourism. Given that the zone must handle with limited resources and sustainability problems, the development of entertainment contributes to the diversification of tourism offering. Moreover, it is believed that the entertainment activities giving a breathing space to natural and cultural resources that are often over-exploited in the region tourism.

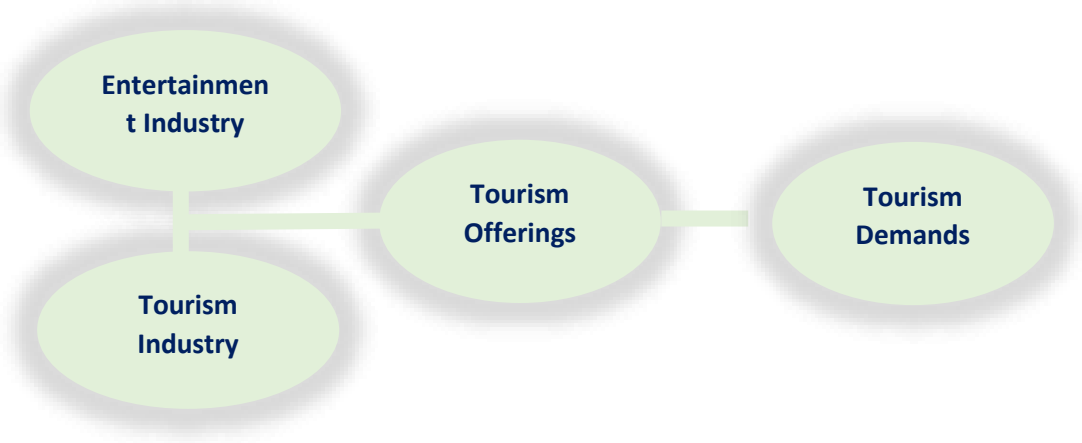


Figure 5-11:Entertainment and Tourism Industry

The tourism and entertainment industries are inexorably linked as tourism provides offering aiming at improving destination attractiveness. The core tourism offering very often needs to be translated into entertainment to enhance its appeal. For instance, a tourism heritage site, as an operand resource, require the support of operand resources like documentaries and films to make the product marketable and more appealing.

Analyzing recreational places and festivities in Abbottabad identifies geographic, cultural and historic niche to be tapped for the tourism industry. The unique geographic location of the town and its establishment as a British Army Cantonment by Major Abbot offers a lot of entertainment facility not only to the citizen of Abbottabad but also to the rest of the country.

On the east side of Abbottabad, the Galiyat region lies, which is a narrow strip located on the border line of Khyber Pakhtunkhwa-Punjab Border, between Abbottabad and Murree. Teeming with a beautiful topography, the mountain is covered by thick pine forests which give Galiyat its unique appearance. It is one of the greenest areas of Pakistan and receives better rainfall than most areas. The established resorts were developed by the British and visitors will visually perceive a plethora of colonial influence there.

The natural splendor of the area lies in the pine forests and a lot of wildlife species such as; Rhesus Monkeys, leopards, red fox, Porcupine etc. Most of the area that falls within the limits of Abbottabad district has historically been the focus of resort tourism. As early as 1880, the British colonial administration established summer camps for its troops in the Galiyat area, with Donga-gali, Nathiagali and Thandiani being reserved for civil servants. Following independence from colonial rule, the cantonments in the Galiyat areas were abandoned. In 1961, the Hazara Hill Tract Improvement Trust (HHTIT) was created to reduce excessive tourist pressure on Murree by redeveloping these abandoned cantonments. Most of the development came in the form of auctioning plots and building a few internal roads and nondescript hotels. The only significant input was the scheme to build a ski resort in 1969, although this initiative did not progress beyond the installation of a chair lift at Ayubia. In the year 1999, the Galiyat Development Authority (GDA) was established to promote tourism, taking over from the HHTIT. Abbottabad is home to some of the most thrilling hiking tracks in Pakistan, including the Mirjani Hill, Mushkpuri Hills and Ayubia tracks.

Mirjani Track; Mirjani is a lofty peak, it takes about four hours to reach the peak through a steep track of about 8 km's from Nathiagali. The scenery at the top of the peak is absolutely spectacular and one can see the Jhelum River, Tarbela Lake, Abbottabad city and Thandiani from the top. The track attracts a lot of tourist in the summer session.

Mashkpori Track; Mushkpuri is another exciting hiking track in Mushkpuri hill, which is 9200 feet-high peaks. One can reach the top of the Mushkpuri either by trekking from Nathiagali or from the track of Dongagali. On the way to Mushkpuri track from Nathiagali one can enjoy the marvelous view of Lalazar park. Much of the mountain range is covered with mesmerizing subalpine conifer forest—acting as a heaven for the trekkers.

Ayubia Track; the Ayubia track is among the world's most beautiful track and is about four kilometers long. It begins at Dunga Gali and passes through the Ayubia National Park which is home to some of the beautiful and diverse flora and fauna. Some of the notable AONBs—tourism sites in Abbottabad includes: Ayubia, Bara Gali, Nathia Gali, Dunga Gali, Changa Gali, Khaira Gali, Thandiani, Kukmang, Dhamtour, Shimla Pahari, Boi-Marhes, Boi Bazar- Kashmir Point, Sajikot Waterfall and Raees Khana Bazar.

5.4.5 Constraints and Recommendations

Due to mountainous northern areas, tourism is one of the important sources of income in district Abbottabad. In the summer when temperature rise to around 45 degrees in Punjab and KP many tourists travels to district Abbottabad. Despite of being blessed with splendor natural beauty a number of deficiencies also exist, described as under:

- Some of the scenic spots like Mushkpuri peak, Thandiani etc. still lack access to basic facility, while some site like Sajikot water fall is still not expose to the tourists.
- Number of hotels lack basic facilities such as drinking water, fuels for cooking and parking.
- Mushkpuri, Mirjani, and Ayubia peak has no proper solid waste management system which leads to degradation of natural beauty and loss of flora and fauna.
- Mushkpuri, Mirjani, and Ayubia peak has no proper solid waste management system, on sessional basis a lot of tourist visit to Mushkpuri and Mirjani where they through the waste here and there which cause environmental degradation of the scenic areas.
- Due to lack of price control system and regulations most of tourists as well as local complaints about inflation in summer
- Sessional prices increase is another major problem in Galiyat region.

Correspondingly, following recommendations are suggested for alleviating the conditions:

- Awareness programs should be arranged to educate the local as well as tourists about the environmental sensitivity of touristic spots and its role in development of Galiyat Region.
- Picnic spots and setting areas should be developed along with other types of facilities such as washrooms, tuck shops, rain shelters etc.
- Exposure of new tourist areas Abbottabad tehsil and Havelian tehsil in such a manner to promote eco-tourism in the region.
- Parking plazas and new parking lots should be developed to avoid road accidents and congestion.
- New Chairlifts and cable cars should be introduced in harmony with nature and either to get dual benefit: promote energy efficient communication between the settlements and facilitate tourists to generate revenue. Dunga Gali to Mushkpuri chairlift is in streamline as proposed by GDA.
- Elevated pathways and thrill walk should be bringing together to create some sort of fun and excitement for adventure lovers.

5.4.6 Historical and Religious Places (insert pictures of all these places)

Ilyasi Masjid; Ilyasi Masjid is a famous, beautiful and historical place of Nawanshahr town. It is the oldest and largest Masjid in Abbottabad and is built on mountain spring in 1932. It is spread over an area of 5-Kanals, with unique architecture of large number of minarets, a white colored building and a small ornamental pool in front of it with colorful fishes inside.

Anglican Church; It is an Anglican church dedicated to St. Luke in 1864 during the British colonization period. It is a historical gothic chapel that holds between 250-300 people on every Sunday.

Bungalow of Civil Surgeon; Civil Surgeon Bungalow constructed in 19th Century & is of historic, aesthetic & architectural significance 19th Century Bungalow of Civil Surgeon of Hazara, Civil Lines, Abbottabad nestled within the long pine trees, constructed in 19th century made from the lime mortar and black stone-craft, bow-bay windows, the sloping roof and a wooden interior. The bungalow is a notable heritage site of district Abbottabad having architectural significance too.

Abbott Museum; The museum is established in 2008 and displayed the ethnology of the area, Gandhara grave culture and burning art of the leaders that contribute in the establishment of Abbottabad town.

Jalal Baba Auditorium; Jalal Baba Auditorium, located in the cantonment area of Abbottabad, was built in 1993. The building complex consists of an auditorium that can hold up to 500-700 people, a public library, Abbasin Arts Council, Abbottabad Development Authority, a computer literacy department and a National Book Foundation Centre. It also has a Karate Club.

Lady Garden; the park was established after the foundation of Abbottabad town. The park is exclusive for the use of European or white ladies and families. several trees and flower imported from England and other places were planted here. The park is a very popular recreational place for the citizen of Abbottabad.

Harnoi Recreational Point; the spot is located 10 km from Abbottabad on the Nathia Gali Road. A lovely residential community in the foothills, infect it is the center of movement from little towns around. It is a rising visitor spot in view of the way that it is extremely close to Abbottabad. A couple of minutes' drives from Abbottabad takes you to this spot.

Ayubia National Park; Ayubia National Park is a small national park in the Murree hills. The initial area of the park was 1684 ha, expanded through a northern extension in 1998 to make a total of 3312 ha. The park supports one of the best remaining examples of moist Himalayan temperate forest in Pakistan and is surrounded by seven major villages and three small towns (Nathiagali, Ayubia and Khanspur). The national park consists entirely of reserve forests, which spill out of the park area on the west and south sides. The scenery is superb with huge pine forests covering the hills and providing shelter to the larger and smaller mammals. Ayubia National Park is a major recreation area visited by large numbers of local tourists, mostly from Islamabad and Abbottabad. No official figures are available, but local estimates suggest that there are about 100,000 visitors per year.

Game Reserve—Qalandar Abad; a Game Reserve is an area where hunting and shooting of wild animals is not allowed, except under a special permit which specifies the maximum number of animals or birds that may be hunted or captured, the area and duration for which such permit is valid. The key wild animals are Grey Partridge, Black Partridge, Raptors, and Fox.

5.4.7 Future plans

- Establishment of public parks in Havelian-Abbottabad, Thana-Malakand and Hangu.
- Construction of Building for Regional Training Institute, Abbottabad
- Establishment of international standard multipurpose Gymanasium at Abbottabad.

5.4.8 Hotels and Hill Resorts

Hotel is basically an apartment building offering maid services, a dining room and room meal services. The hill resorts are a luxury facility that is intended primarily for vacationers and is usually located near special attractions, such as mountain or hilly, scenic or historical area etc. The following data show the number of hotels and hill resorts in the Abbottabad District:

Hotel Amore Donga Gali, Awan Inn Abbottabad, Afaq Hotel Nathiagali, Abbottabad City Guest House Mansehra Road, Abbott Garden Hotel Mandian, Best View Hotel Nathiagali, Executive Guest House Kaghan Colony, Hilal City Guest House Mansehra Road, New Lalazar Guest House Abbottabad, Pine Continental Hotel Pc Mandian, Serena Guest House Jinnah Abad, Pizza Hut Murree Road, VIP Guest House Toheed Colony, Bukhari Guest House Lari Adda, Capital Guest House Muqadas Tower, Exclusive Guest House PMA Link Road, Harizon Guest House Jinnah Road, Shimls Guest House Mall Road, Sareena Guest House Jinnah Abad, Thandiani View Jinnah Abad Road, Travelers Inn Guest House Jinnah Abad and Shimla Guest House

As Abbottabad district is a focus of national and international tourism, there are a lot of restaurants offering a vast variety of foods from Arabian fried chicken, coffee, and Haleem Ghar to Afghani traditional foods. The following table shows restaurants in District Abbottabad: AFC Resturant Shopping Arcade Abbottabad, Al Qamar Resturant Mansehra Road, Afghan Syed Jamal Café Jugian, Abdur Rasheed Resturant Havelian, Coffity Jadoon Plaza, Food Roots Mir Aalam Plaza , Friend Lounge Jadoon Plaza, Green Land Resturant Nathiagali,Green Valley Resturant Mansehra Road, Haleem Ghar Oppt To Ayub Medical Complex, Isfania Continental Resturant Harnow, Insaf Bajoor Resturant Mandian ,Lasania Resturant Mir Pur Chowk, Mr. Cod Jadoon Plaza, Pine Park Resturant Near Fowara Chowk, Red Onion Restaurant Jinnah Road, Umania Resturant Mandian, Manak Resturant Muree Road, Saif Resturant Mandian, Pak Afghan Resturant Jugian and New Afghan Kabli Resturant Jugian

Hotel survey of Galiyat Development Authority shows that:

- Most of the hotels (68 percent) have up to 15 beds while 21percent have 16-30 rooms. These two categories thus constitute 89 percent of the total hotel surveyed. Larger hotels with more than 30 rooms are 12 percent.
- Hotel up to 20 beds are 44 percent of the total, while those having 21 to 40 beds are 38 percent. Together these two categories constitute 82 percent of the total beds.
- Of the total surveyed hotels, the number of average guests per month is up to 1,000; those having 1,000-3,000 while 26 percent hotels charge Rs. 1,000 below per day. Hotel more than Rs. 5000 are 9 percent.
- Most of the hotels have facilities such as call bell, telephone, hot and cold water, while the problem faced by some hotels include lack of parking space and lack of fuel for cooking and heating.

5.4.9 Constraints and Recommendations

1. The lacked availability of reliable data on tourism sector, which was a major hindrance in making targeted policies, developmental plans and monitoring the implementation progress.
2. There is no regular and updated information system in KP that may provide updated and comprehensive information about tourism statistics such as number of tourists, duration of stay, economic activities of tourists, tourism facilities, and employment.

Recommendation:

1. The absence of required reliable data created the need to conduct a detailed baseline survey on KP's tourism sector to generate the required information.
2. The development and management of well-articulated tourism policy, tourism product designing, marketing strategies and public-private partnerships, the tourism sector in KP would contribute to the overall socio-economic development of Area.
3. The area of Galiyat is about 50 to 80Km at north east of the capital city Islamabad, extending on both sides of the Khyber Pakhtunkhwa and Punjab between Abbottabad and Murree. The Khyber Pakhtunkhwa THE UNREVEALED STORY 45 famous mountains of Mushkpuri and Miranjani at the height of around 2,800 meters gives a magnificent look to the area. Nathiagali, Changla Gali, Donga Gali, Khaira Gali and Bara Gali are among the most beautiful and scenic station in the area. In summer season the weather remains pleasant while in winter visitors enjoy snowfall. Easy access through all-weather roads, walking tracks and other facilities are available to the tourists. Ayubia is another place of attraction in the majestic hills of Abbottabad District, where the National Park and Chairlift provide an opportunity to the visitors to enjoy the surrounding panoramic views. Establishment of tourism zone would prove a milestone in the development of tourism sector and attracting more tourists and visitors to Khyber Pakhtunkhwa.

4. The Government is to establish tourism zone to promote sector across the province. Government had done a lot for the promotion of tourism and development and rehabilitation of scenic places, including Galiyat.
5. With the establishment of tourism zone and tourism authority, the foreign tourists would be able to get all facilities under one-window operation.
6. The participants and stakeholders, including experts on tourism, environment and tourism industry, will shed light on the promotion of tourism, challenges, eco-tourism and the tangible steps being taken for the Development of tourism and engagement of private sector in future.
7. The tourism and the latest technology were part and parcel to take the sector to development by generating revenue for the government and the local populace. It would also provide employment and various businesses to the youth.
8. With the establishment of camping pods will facilitating the tourists in scenic spot and attract international tourists would help build Pakistan's positive narrative

5.5 Government Programme

The official added that the KP government's Economic Revitalization Project funded through Multi-Donors Trust Fund would conduct a comprehensive, quantifiable and qualitative assessment and analysis of tourism sector in four tourist locations of KP, including Galiyat in Abbottabad district, Naran in Mansehra district, Kalam in Swat district and Kumrat in Upper Dir.

The study will also propose recommendations for sustainable tourism development with special reference to the four target tourist locations in KP. Later, the participants were divided in five groups to discuss key issues faced by the tourism sector in KP and formulated recommendations for bringing improvements in the performance in the sector.

The key areas discussed included improvement of governance of tourism sector, workforce development and capacity building, tourism infrastructure and facilities, investment promotion in tourism including product development and marketing and cultural heritage and natural conservation.

The Stakeholders will also discuss the government steps for the development of existing tourist spots, rehabilitation of new scenic resorts, data collection on tourism sector, Hindu Kush and Himalaya mountainous range, Alpine Forests, wildlife, traditional foods, history and heritage, culture and scenic valleys in the province.
The Khyber Pakhtunkhwa is gifted with abundant natural beauty of lush green valleys, snow-capped mountains, deserts, rivers, landscapes, rich cultural heritage, springs, streams and serene spots. Scores of people come from abroad and across the country to visit Khyber Pakhtunkhwa to experience the beauty it has to offer.

Chapter 5

Communication and Infrastructure Land Uses

Security Infrastructure Land Uses

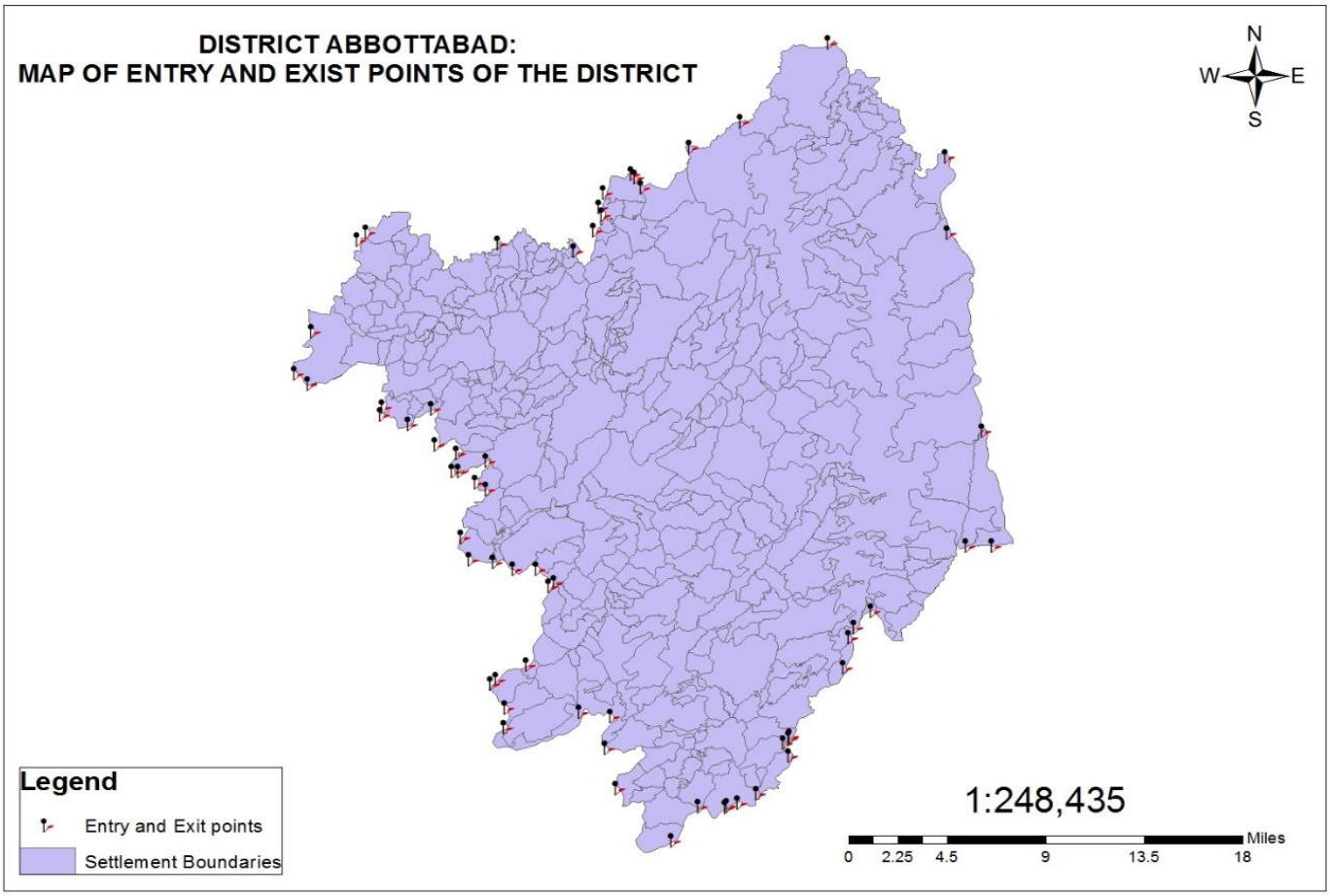
5.7.1 Security

Police, body of officers representing the civil authority of government. Police typically are responsible for maintaining public order and safety, enforcing the law, and preventing, detecting, and investigating criminal activities. These functions are known as policing. Police are often also entrusted with various licensing and regulatory activities.

However, police scholars have criticized this popular understanding of the word police—that it refers to members of a public organization having the legal competence to maintain order and enforce the law—for two reasons. First, it defines police by their ends rather than by the specific means that they use to achieve their goals. Second, the variety of situations in which police are asked to intervene is much greater than law enforcement and order maintenance.

5.7.2 Entry and exist point of the district

There are total of 53 Entry and Exit Points of the District Abbottabad though roads. These roads are metallic and nonmetallic both. People enter though these roads in district Abbottabad. There will a need of facilitating visitors on all these entries and exist points as per safety and security standards.



MAP 5-43:Entry and exit points of the district

5.5.1 Number of police station, Security check post, their current status and coverage

Police stations represent one of the necessary governmental functions requiring careful planning. There are two main objectives to be considered in the construction of the police department building: first, the handling and processing of the prisoners; second, the service to the public- The arrangement should be such that prisoners may be handled within the police department itself. Table 5-39 represents the existing strength of police in the District Abbottabad.

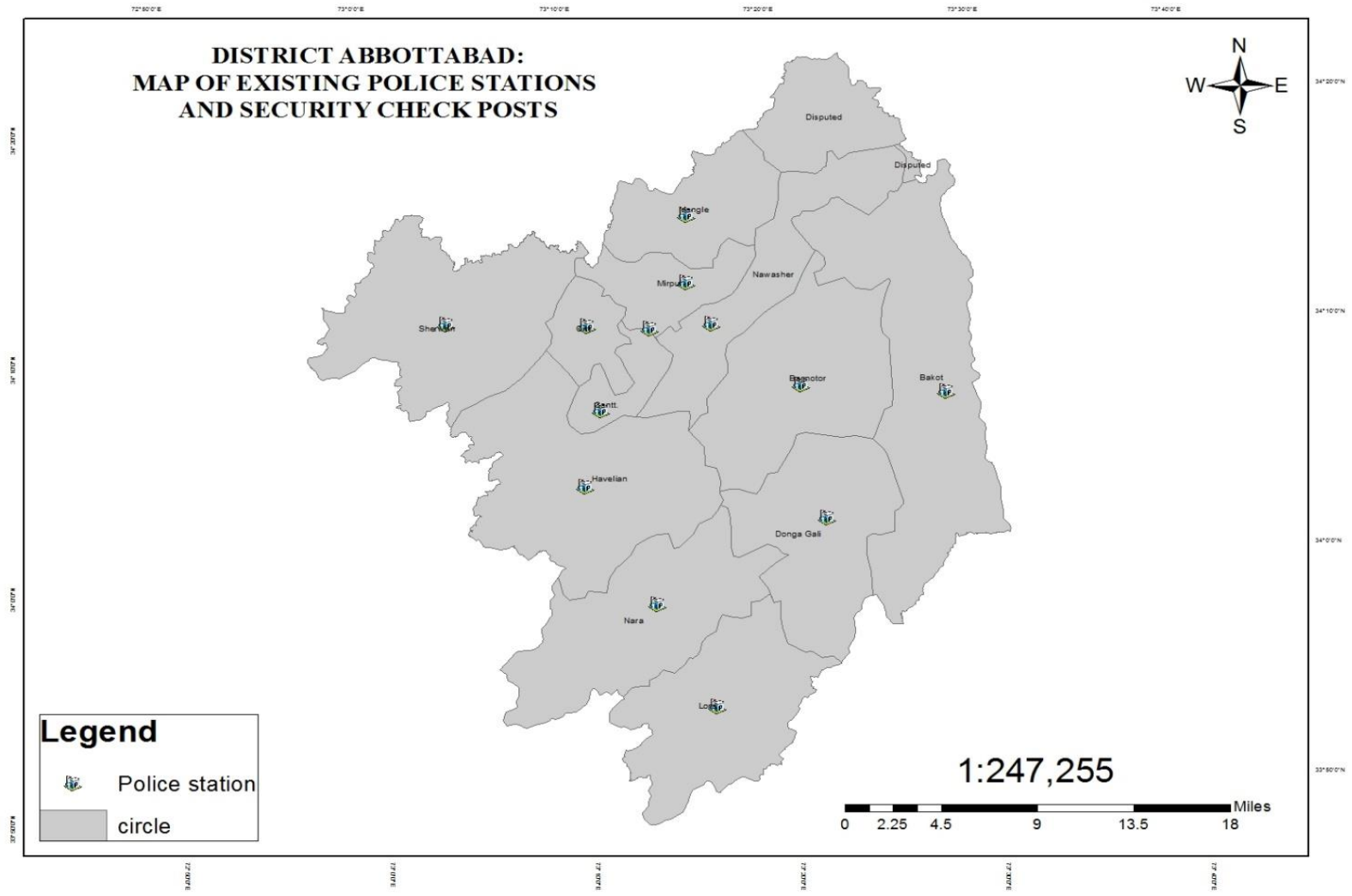
Table 5–39: Statement showing the sanction present and shortage of executive staff

STRENGTH	DPO	SP	DSP	DSP LEGAL	INSPECTOR	INSPECTOR LEGAL	SI	ASI	HC	DRIVER HC	CONSTABLE	DRIVER CONSTABLE	TOTAL
Sanctioned	01	01	02	01	08	01	29	54	153	06	1208	105	1569
Present	01	01	04	--	09	01	25	51	153	06	1206	98	1555
Short fall	--	--	--	01	--	--	04	03	--	--	02	07	17

The below table is shown that KP has 281 police station in KP and Abbottabad district has 13 police stations.

Table 5–40: Number of police stations in KP vs Abbottabad District

Sr.No	Police Stations
KP province	281
Abbottabad District	13



MAP 5-44: Police Station Map of District Abbottabad

5.5.2 Population to security personal ratio and their capacity

Secondary data is collected from the police department of district Abbottabad. From the below data it is observed that present total strength is 1555.

The present ratio is 1363508/1555 =876

According to the US authority, 2.3 policemen are required per 1000 population and according to the international standards, 1 to 4 policeman is needed per 1000 population[100].

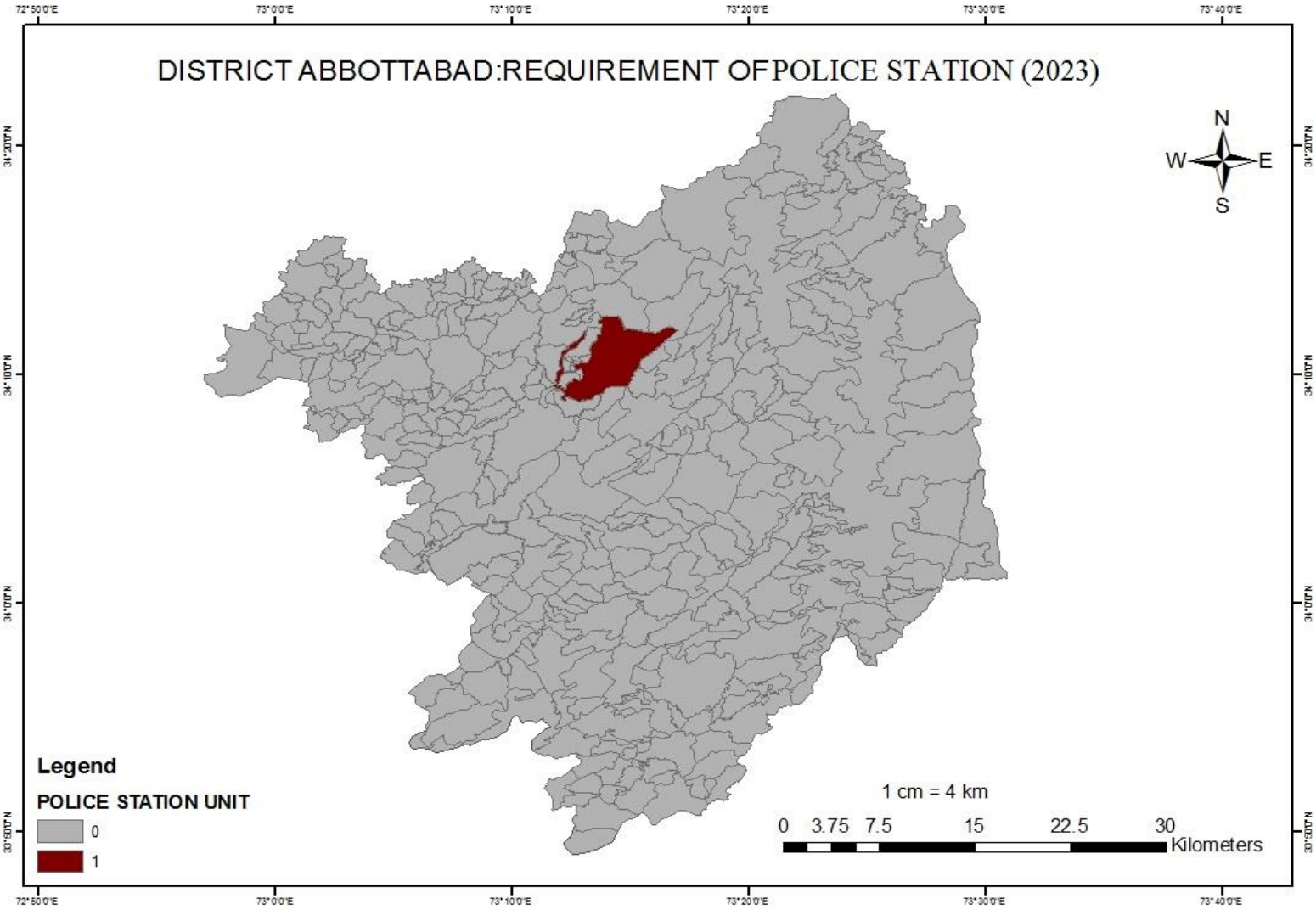
5.5.3 Location and allocation criteria of the new security stations

5.5.4 Requirements of police station in short term (2018-2023)

By the calculation, it is obtained that one police station is required for every 50000 populations and on the current population is 1363508. If the existing population is divide by the 50000 population then required population is 27 police station is required in the district Abbottabad.

By the calculation of the short term, it is concluded that only one police station is required in the next five years for the Abbottabad cantonment for its population (143781).

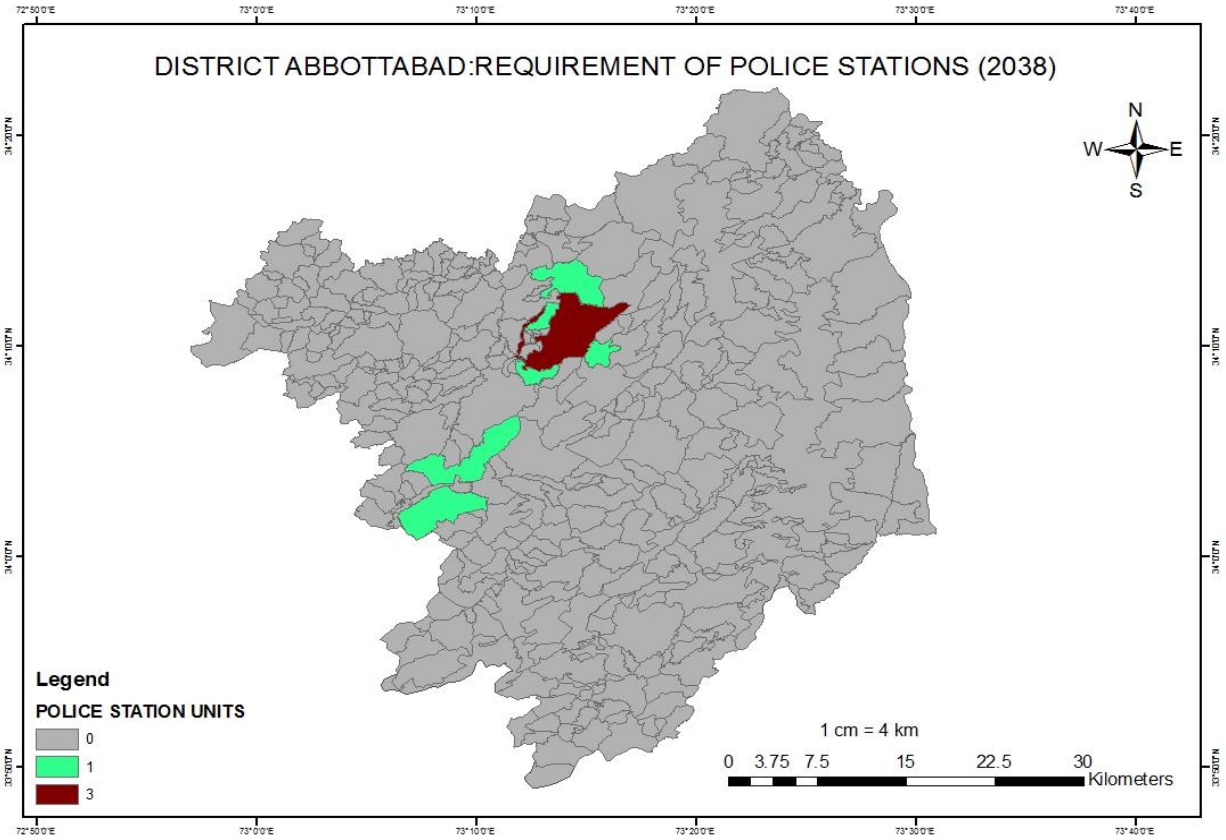
[100] US Security and welfare department report 2018.



MAP 5-45: Proposed Police Station (2018-2023)

5.5.5 Requirements of the police station in the long term (2023-2038)

From the calculation, it is estimated that there are six settlements where one police station will require in the next 20 years and three police stations are required in the largest settlement of Abbottabad in 2038.



MAP 5-46: Proposed Police Station (2023-2038)

5.5.6 Constraints and recommendations

Based on secondary data sources, some of the constraints are given below:
In Abbottabad district, there is one policeman required for 876 populations which is not efficient strength as the security for the whole target area.
The number of police station may be the big demerit for the district. There are 10 zones located. Each zone has one police station but the main constraint that the police station has no equal access to every corner of the zone in the district.

Correspondingly, the following are some specific recommendations
1. The special committee should be formed by the Supreme Court of Pakistan (SCP) constitute with a set of recommendations that the police force across Pakistan should incorporate in their operations. Future Policing should be given topmost priority in changing present work culture. The police leaders must develop a wider vision and sense of direction to work out the strategy for meeting challenges ahead. There should be long term schemes and not ad hoc short term responses. Leaders should have training in management skills, technical, human and conceptual skills. To develop healthy work culture, there should be proper coordination between different security departments.
3. The police workload can be reduced by the adoption of e-governance. The information and communication technologies will help to reduce cost and time in District.

Chapter 5

Communication and Infrastructure Land Uses

Grave yards and Cemeteries Land Uses

5.6 Graveyards

Grave yards have a deep historical connection to the local community. They bring residents closer to an understanding of the past and help to provide insights into how people within the area used to live. By looking at the headstones and reading details about those that have passed, we can gain information on the importance of individuals to the community at the time and the jobs and social connections they had during their life.

There are several major graveyards with the area of 171.995 acres. Some major graveyards of district Abbottabad are given below:

TMA Grave Yard, TAkkia Grave Yard, Sherwan Graveyard, Rajoya Graveyard, Old Grave Yaed of Turk, Musa Zai Colony Grave Yard, Mughal Town Grave Yard, Malik Pra Grave Yard, Karbala Grave Yard, Janaza Ghaah Hari Wali Chowki and Mughal's Grave Yard, Jalal Baba Grave Yard, Jadoon Graveyards, Dhamtor Graveyard, darbar E Alia Siddiqia Rahmat Abad, Choti Shaikhul Bandi Grave Yard, Canttonment Graveyard, Cantt Qabristan, Cantt Grave Yard, British Cemetry, Banda Sahib Khan Grave Yard and Muhallah Ismail Khail Graveyard etc.

Beyond their functional value as an area in which to place people after they've passed, cemeteries can act as a place of memorial. They can become the host of ritual events for families and post-funeral events, allowing the family to give their loved one a respectful and dignified burial process at the end of their life.

Cemeteries hold great significance to communities across the country, and it's important to remember their value throughout our lives. To discover more on the value of your local cemetery, speak with our expert team today.

5.6.1 Graveyards standards:

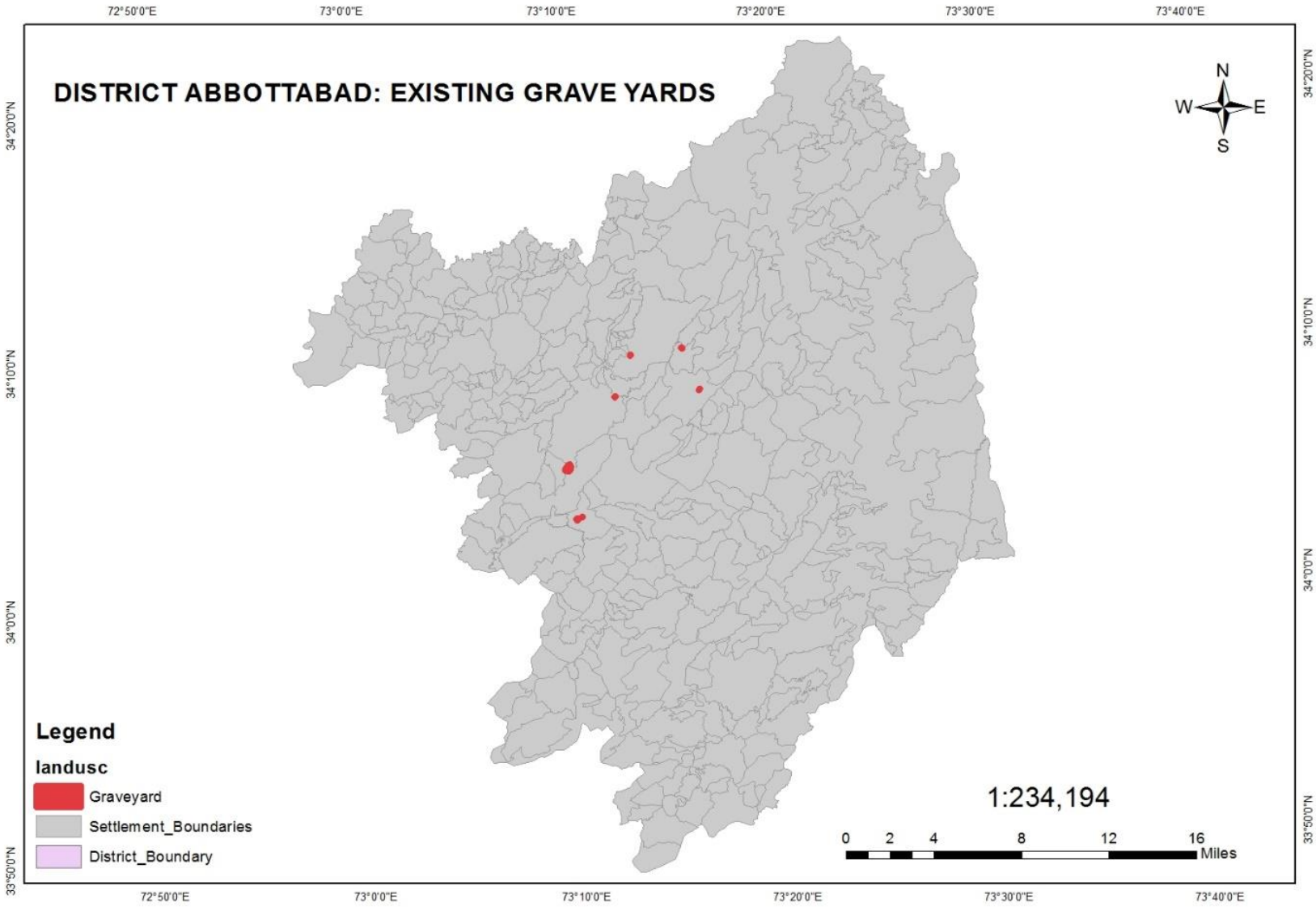
The total built-up area of the urban settlement 2.1% is recommended to be set aside for grave yards. Separate grave yard for each area development scheme is not recommended. Instead, grave yard should be located on the periphery of urban development attaining threshold of 100,000 populations. Standard sizes of graves as per NRM standards are given in the following table[101]:

Table 5–41: Standards of Grave yard's size

Grave Types	**Grave Sizes**
Adults	7' X 4' (2.13 X 1.22 m^2)
Children	6' X 3' (1.83 X 0.91 m^2)
Infants	4' X 3' (1.22 X 0.91 m^2)

Source: National reference manual

[101] National reference manual, NRM



MAP 5-47: Existing Graveyard

The rationale for the provision of graves is given bellow:

Mortality rate = 12/ 1000 Persons
Rotation time for a graveyard = 40 Years
Number of graves required for one rotation = 40 X 12 = 480 graves
Gross size of the grave (circulation, plantation and premises for care taker)
= 9 ft. X 6 ft. = 54 sq. ft.
Total area required = 54 X 480 = 25920 sq. ft. or 0.595 acres / 1000 persons.
At average urban density of 35 persons/acre the total area required for graveyards for say 1000 acres of urban area is = 0.595 X 35 X 1000 = 20.8 or 2.1 percent of total urban are 1000

5.6.2 Grave yard demand (2018-2038)

It is calculable that the additional population for the district Abbottabad throughout the time 2018-2023 are around 181468 whereas that within the next fifteen years (2023-2038), the additional population are concerning 760,769 and also the further site space demand for these time periods are around 107.974055 and 452.65934 severally as shown within the table.

Table 5–42: Graveyard Area for Additional District Population

Year	Population	Additional Population				Graveyard Area Demand (acres)			
		2018-23	2023-28	2028-33	2033-38	2018-23	2023-28	2028-33	2033-38
2018	1363501	_	_	_	_	_	_	_	_
2023	1544969	181468	_	_	_	108	_	_	_
2028	1758083	_	213114	_	_	_	127	_	_
2033	2009125	_	_	251042	_	_	_	149	_
2038	2305738	_	_	_	296613	_	_	_	176
Total		942237				560			

The current population of District Abbottabad is 1363501 where according this population area required for graveyards is 811.287 Acre, where Existing area is 16.78 Acre with 794.50 Acre of backlog. Detail is given in Table:

Table 5–43: Current Graveyard Backlog in District Abbottabad (acres)

Population	**Area Required**	**Existing Area**	**Backlog**
1363501	811	17	795

Net Graveyard Demand in the District is calculated based on calculations in earlier sections, the summary of findings and net graveyard demand is calculated as under:

- Graveyard area for Additional Population (2018-2038): 560 acres
- Current Backlog: 795 acres
- Potential Infill Development Area: 155 acres
- Gross Demand (**560 + 795 + 155) =** **1510 acres**

5.6.3 Constraints and Recommendations

Constraints found in relation with the shortage of graveyards are gathered as under:

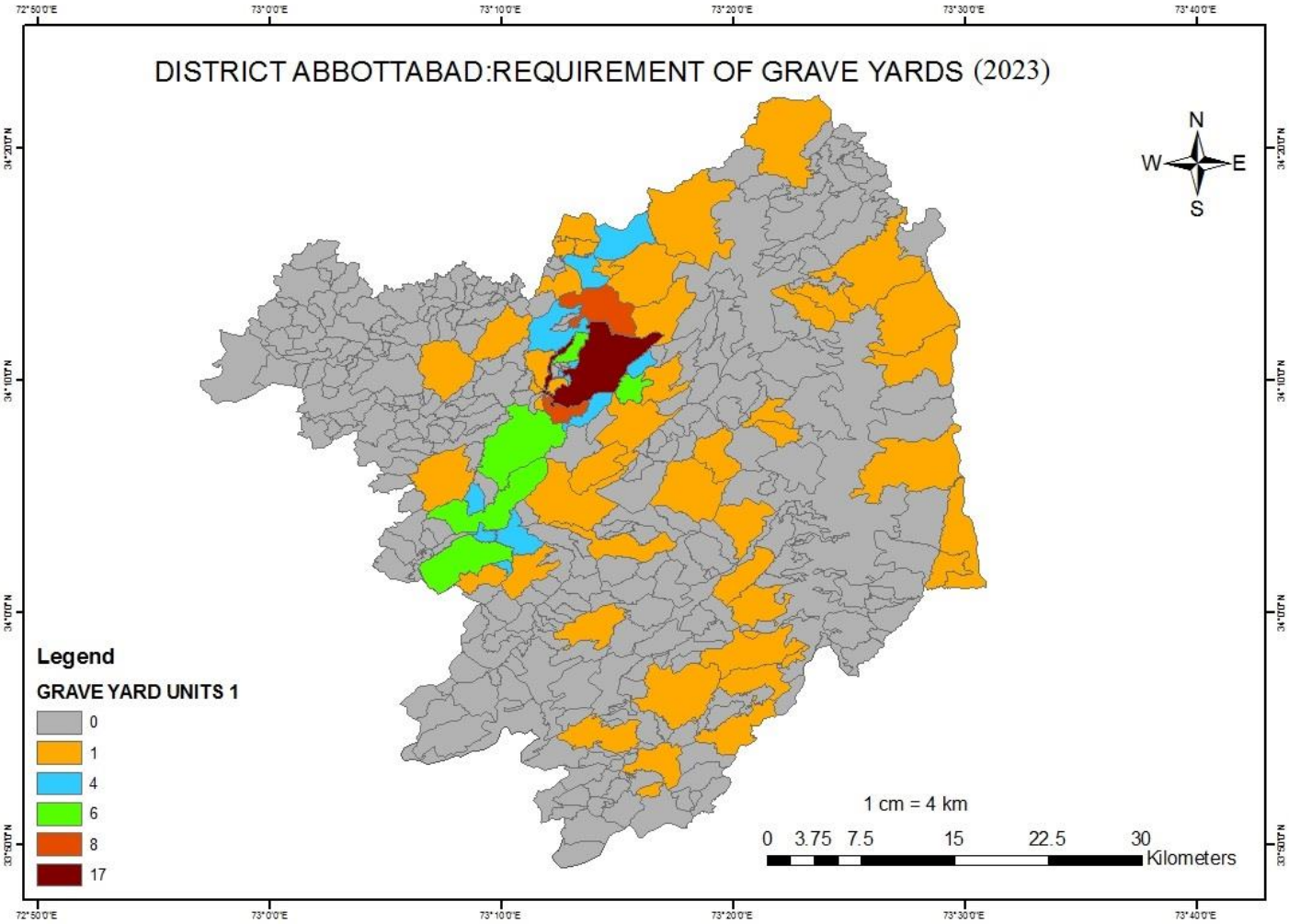
- District Abbottabad facing huge backlog as the existing area for graveyard is only 19 percent of the area required for graveyards.
- According to NRM Standards Separate graveyards for each area development scheme are not recommended. Instead graveyards should be located on the periphery of urban developments, attaining threshold of 100,000 populations, but in Abbottabad there are many graveyards built in minor settlements some even one or two houses.
- TMA's are not capable of managing the graveyards in a proper way.
- There is no proper channel to drainage of rain water which may be the cause of destroying the graves.
- Concerned authorities are not given full attention/ care to these places and not conserved it and reused old graves more than 40 years.
- Most of the Graveyards are near the major roads which have very high price land. This land may be the cause of high earning for concerned authorities and may help in the improvement of economic condition of District Abbottabad.

Correspondingly, some of the salient recommendations in relation with graveyards in Abbottabad district are inscribed as under:

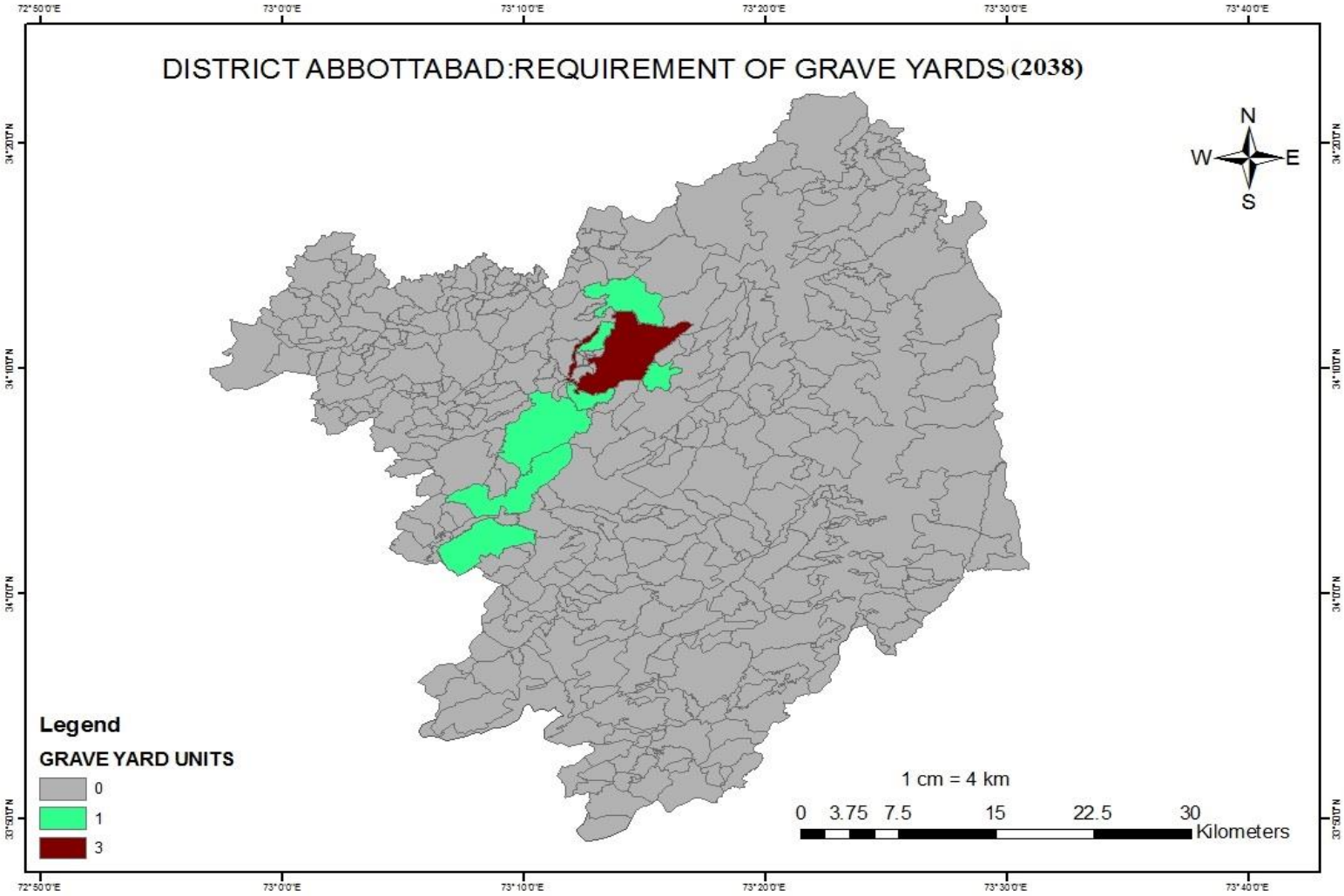
- Graveyards contains precious land of urban areas and shows little attention from the public as well as institutions responsible for its management and monitoring. The graveyard can be an effective for city environment and climate change adaptation tools by greening and planting in graveyard, and by engaging public in such kind activities.
- The concerned authorities will initiate activities to increase awareness of the Memorials and Cemetery/Grave Maintenance that are cost-effective.
- The graveyards should be well landscaped to promote leniency in the urban environment in context of Abbottabad while the TMA must take the responsibility to follow standards in graveyard sizes but more so, efforts must be made so that graveyard can be used for passive recreational purposes for the urbanites.
- Old Graveyards in District Abbottabad should be reuse or convert into new use after concerning with the local community.
- Famous and old grave should be conserved and advance techniques should use to reserve it for acknowledge of contribution of that person in the community.
- The Government may require any local authority to pay such annual contributions to the Committee, for the maintenance of the graveyard, as may be fixed from time to time.

5.6.4 Projected map

The maps are projected on the settlements base. The legends are expressed that one color have number of grave yards required in specified time. The short- and long-term plans of grave yards are shown below:



MAP 5-48: Requirement of Graveyards (2018-2023)



MAP 5-49: Requirement of Graveyards (2023-2038)

Chapter 5

Communication and Infrastructure Land Uses

Municipal Infrastructure Land Uses

5.7 DRINKING WATER SUPPLY, SEWERAGE AND STORM WATER,

Although municipal facilities and infrastructure are conventionally dealt by autonomous municipal administration at the local levels, however, not a single autonomous municipality can survive at its own as it is dependent on several resources which are external to it, fore instance water supply sources, energy sources, crops and vegetables (food) sources as inputs. Likewise, municipalities also provide many services such as educational, health, commercial and industrial activities to the rural hinterlands and discharge wastes in the form of solid, water and air pollution to the overall environment. It is this context, the proceeding lines brings under discussion the water supply, sewerage and drainage, and solid waste management practices and systems in Abbottabad District.

5.7.1 Water Supply System

Groundwater once considered safe and secure is increasingly found to be contaminated with bacteria and chemical pollutants. Mixing of untreated municipal and industrial effluents with the surface and groundwater not only adversely affects the aquatic life but also the freshwater resources, human health and agricultural productivity. The anthropogenic sources of heavy metals include wastes from the electroplating, metal finishing, metallurgical/chemical manufacturing, mine drainage, leather tanning industries etc. and contaminated groundwater from hazardous waste sites. [102]

Access to safe water is a growing concern throughout the District Abbottabad with many areas now facing increasing levels of water pollution. A study found that water quality and its relationship to health was a priority for the households surveyed, particularly in urban areas. For rural households, regular supply and convenient access was more important. But most respondents were aware of the fact that drinking water is contaminated by leaking sewage and drainage pipelines, with 67% of households expressing this as a major concern. [103]

Households use water primarily for drinking, cooking and washing clothes. In urban areas, other uses include washing floors (84%), watering plants (10%) and cleaning vehicles (4%). In rural areas, uses include washing floors (83%), watering plants (10%) and use for animals (6%).

Sources of domestic water supply vary. About, 92% of urban households and 65% of rural households are supplied with water from public-sector pipelines. This includes taps located in public areas to supply multiple households. Findings reveal that overall only 8% of households have their own water source. In urban areas, 88% of households depend primarily on government tanks, while 46% of rural households depend on springs and wells (Table 1). It is widely reported, however, that both urban and rural households obtain water from multiple sources.

Access to clean drinking water is a vital necessity of life. Supply of water to the District Abbottabad urban areas is the responsibility of TMAs and supply to rural areas is the responsibility of the Public Health Engineering Department (PHED). In the district, there are two TMAs i.e. Abbottabad and Havellian, similarly, Pakistan Military Academy and related military institutions are also situated in the district. A separate water supply scheme was in place for Nathiagali, maintained until 2001 by the now-defunct Communications and Works Department, while NGOs such as SUNGI and the SRSP have also executed small water supply schemes across the district in partnership with local communities.

[102] Imran, S., Anwaar, K., Bukhari, L. N., & Ashraf, M. (2016). *Water Quality Status of Major Cities of Pakistan, 2015-2016*. Islamabad: Pakistan Council of Research in Water Resources, Ministry of Science and Technology.
[103] Mustafa, U., Haq, M., & Ahmad, I. (2009). *Environmental Fiscal Reform in Abbottabad: Drinking Water*. Islamabad: IUCN Pakistan.

Water Supply System—On-ground Conditions; according to the 1998 census, only 32.73 percent of households have access to drinking water inside the home, while the remaining 67.27 percent rely on an outdoor source. In-house connections are widely available in urban areas (79.55 percent), with a large portion of this water supplied through pipelines (73.03 percent). But 76 percent of rural households depend on an outdoor source of water, about half of which is supplied either through pipelines or from wells. According to estimates provided by government agencies, in 1999 nearly 98 percent of Abbottabad's population had access to water supply schemes. Estimates for 1998–99, provided by the concerned agencies, show that 85 percent of the rural population and 90 percent of urban residents have access to water supply schemes. These figures are encouraging, although 1999–2000 estimates indicate a fall in coverage to 86 percent for the district, while overall coverage in the province increased to 75 percent.

Official statistics need to be viewed in the context of national figures provided by independent sources. According to the World Bank, for instance, only 60 percent of Pakistan's population had access to an "improved water source" during the period 1990–96 (77 percent urban and 52 percent rural in 1996), while only 30 percent had access to sanitation (WB 2000: 287). Given the disparity between government department claims and estimates from independent sources, the district and town administrations need to examine coverage claims more carefully and create indicators to promote transparency and accountability.

While increasing access to drinking water is of course imperative, existing supply should also be enough to meet the needs of the population. Rural area supply is overwhelming based on community stand posts (connections installed in public places) or tanks, which are provided in places where in-house connections are not available. These public facilities are designed to supply 5 gals per capita daily, far short of actual demand. In the case of community stand posts, unauthorized connections taken by third parties have disturbed the hydraulic balance of the distribution network, severely affecting housing units further down the supply line. In urban areas, meanwhile, water supply is unreliable and intermittent, ranging anywhere from 15 minutes to one hour of continuous supply daily. Another aspect of water supply that must be taken into consideration is quality. In the pursuit of increasing coverage, quality considerations have largely been overlooked. Current indicators disguise the fact that even where water is available, it is not always fit for human consumption. Finally, wastage because of misuse, theft and leakage is high. Conservative estimates put wastage in rural water supply schemes at 30 percent, and as high as 50 percent in the case of urban schemes. Drinking water must be fit for human consumption and supplied insufficient quantities to meet the needs of the population. Wastage in the distribution system must be plugged to maximize efficiency. It is only by examining such additional factors that an objective assessment can be made of the progress achieved in this sector.

Recent investment in water supply schemes is very negligible. During 1999–2000 almost zero allocations made through the People's Works Program, the Tameer-e-Watan Program, and members of the provincial and national assemblies. The District Council Abbottabad is now mandated to spend 30 percent of its outlays on drinking water supply, which amounts to a sum of Rs 50 million for 2015-16. To ensure proper disposal of waste water, 14 sanitation schemes have also been completed, with sanitation coverage for urban areas estimated at 70 percent, but only 12 percent in rural areas.

Financial Constraints in Providing New Water Supply Schemes; the tariff structure, particularly the flat rate charged in rural areas, has created serious financial problems for the concerned departments. During the year 1998–99, a resource gap of Rs 26.2 million, or nearly 79 percent of total expenditure, had to be filled through subsidies, leaving little funding for new initiatives. No systematic study has ever been conducted in Abbottabad to determine domestic water sources, uses and community perceptions.

This chapter provide a preliminary assessment of household attitudes, preferences and potential demand (willingness to pay) for improved water supply services. Data was collected by means of a survey of 455 households in Abbottabad. The sample was divided between urban (60 percent) and rural (40 percent) households. Greater weight was given to urban areas because early analyses suggested greater homogeneity among rural households. A simple contingent valuation was conducted to determine willingness to pay for improved water services. Some elementary econometric analysis was also carried out to provide initial estimates. The findings presented in this chapter are primarily qualitative, focusing on an assessment of general patterns of water use and demand. They are intended to generate a hypothesis and provide direction for more detailed and statistically robust research.

Water Consumption and Supply; households use water primarily for drinking, cooking and washing clothes. In urban areas, other uses include washing floors (84 percent), watering plants (10 percent) and cleaning vehicles (4 percent). In rural areas, uses include washing floors (83 percent), watering plants (10 percent) and use for animals (6 percent). Sources of domestic water supply vary. Within the sample surveyed, 92 percent of urban households and 65 percent of rural households are supplied with water from public-sector pipelines. This includes taps located in public areas to supply multiple households.

Findings reveal that overall only 8 percent of households have their own water source. In urban areas, 88 percent of households depend primarily on government tanks, while 46 percent of rural households depend on springs and wells (Table 1). It is widely reported, however, that both urban and rural households obtain water from multiple sources. Respondents are not satisfied with the quality or quantity of water supply, with 60 percent of urban households and 40 percent of rural households expressing this view. The clear majority (92 percent) think that supplying drinking water is the government responsibility.

The total water production in Abbottabad is approximately 65,000 m3 /d, whereas the water demand is estimated at 76,000 m3 /d. The existing WS system is partially based on groundwater and partially on surface water. The capacity of the surface water scheme is about 16,000 m3 /d and the actual groundwater pumping about 49,000 m3 /d. The surface water scheme cannot operate at the design capacity of the water treatment plant (WTP) in dry periods due to shortage of raw water. On the other hand, the water treatment plant cannot treat highly turbid water after heavy rains, resulting in service interruptions.

There are 83 tube wells and springs sources with pumping equipment in the city, 65 of them being functional and operational. More than half of the functional systems are outdated or in poor condition. The groundwater systems do not provide 24/7 supply and pressure is not constantly maintained in the pipe network. The ground water is not disinfected. There is a high risk of contamination in the network because of intermittent pressure. The water distribution networks have 82 overhead reservoirs (OHRs) or ground storage reservoirs, the latter on hill slopes. All except four are in fair condition and one needs comprehensive rehabilitation. The total storage capacity is enough to store water seven hours at the present demand and more than four hours in 2035.

Quality/Quantity of Drinking Water; access to safe water is a growing concern throughout the district with many areas now facing increasing levels of water pollution. The study found that water quality and its relationship to health are a priority for the households surveyed, particularly in urban areas. For rural households, regular supply and convenient access are more important. But most respondents know drinking water is contaminated by leaking sewage and drainage pipelines, with 67 percent of households expressing this as a major concern. A large proportion of the sample (75 percent) reports negative perceptions about the smell, taste or appearance of the water they receive. Bitterness (45 percent) and saltiness (20 percent) are the main complaints among rural households, while muddiness (51 percent) and

bitterness (26 percent) are most frequently reported by urban residents. Some households also report a 'rust' taste in the water.

According to government statistics, 88 percent of the district urban population and 62 percent of rural residents have access to some form of water supply, primarily from public stand posts (GoP2006). But only 33 percent of households have access to drinking water inside the home, while the remaining 67 percent rely on an outdoor source. Domestic connections are more widely available in urban areas (80 percent), primarily through pipelines (73 percent), but 76 percent of rural households depend on an outdoor source of water (IUCN 2004b). Clearly, much remains to be done. While supply needs to be expanded, there continue to be persistent failures in adopting an integrated approach to address the inter-related issues of supply planning and operation. Initiatives aimed at demand management, pollution control, and watershed and groundwater protection, are also absent or limited in scope. Similarly, efforts to improve access have focused on engineering solutions, where the inherent assumption is that the only problem associated with water supply is access, and not scarcity. The lack of metering for domestic users reflects the fact that scarcity has not been recognized.

Below-Cost Pricing; current water tariffs in the district do not reflect the economic cost of producing drinking water, nor do they consider the net social benefit derived from water resources. Community-managed systems allow users to take water free of charge, while households supplied by the PHED pay a flat rate of 50 rupees per month. A flat rate is charged because water meters have not been installed for most domestic users. Under a JICA project, water meters were installed in some parts of Nawanshahr, where households are billed according to use, but many of the devices were tampered with and rendered useless. Incorrect pricing and supply free of cost send a signal to users that water is both abundant and cheap, removing any incentive households might otherwise have to economize on water use. At the same time, below-cost provision means that government agencies are unable to generate the funds needed for operation, maintenance and infrastructure development. It also ignores the opportunity costs of competing water uses and fails to consider the environmental costs of water extraction and consumption.

Fiscal Deficits; Government agencies in Abbottabad report that budget allocations for water services are insufficient, considering the size of the population and the environmental pressures that must be dealt with. In Abbottabad, annual revenues from water supply schemes barely cover 16 percent of maintenance and repair costs, and government agencies are left with a deficit as high as 80 percent (IUCN 2004b). Charging for water below-cost exacerbates the problem, since it then becomes impossible to generate resources locally to maintain and upgrade existing infrastructure or extend water supply to new areas. Revenue generation is further constrained by problems related to the collection of dues, with many defaulters as well as many illegal connections. Meanwhile, damaged pipelines lead to significant transmission losses.

Institutional Constraints; in certain parts of the district, such as the Nawanshahr union council, water utilities generate enough revenues to cover operation and maintenance costs. Under the current institutional arrangement, however, collection efficiency is not rewarded. Excess revenues go to the TMA rather than the union, and funds collected by district TMAs are in turn transferred to the provincial revenue department. TMAs cannot access these funds without a budgetary allocation being made by the province. Thereafter, it is the TMA that determines the fixed amount that is allocated to each union. In this way, the surplus generated by a union is not available for reinvestment in the same area. With certain parts of the district subsidizing others, and the surplus being channeled back to provincial coffers, there is little incentive for local governments to ensure efficient collection of fees.

Water Scarcity; in 2000, population density in Abbottabad was reported in the range of 447 persons/km2 with an average growth rate of nearly 2 percent (IUCN 2004b). In the same year, average rainfall was

estimated at 72.6 mm a month, which was 40 percent lower than the average recorded during the period 1961Ð90. This trend is expected to continue, with the result that water scarcity in the future will be both acute and widespread. Pressure on water sources is likely to intensify in the future (IUCN 2004b). There is already evidence that this is the case, with a significant number of tube wells (75) ceasing to function owing to groundwater depletion (IUCN 2004a). Rampant misuse of water and the resulting shortages force local agencies to provide water only for a few hours a day, with regular breakdowns in supply. In urban areas, water supply is unreliable even to households that are connected to pipelines, with intermittent supply ranging from 15 minutes to an hour each day (IUCN 2004b). The rugged topography of the district and the expansion of settlements into previously uninhabited areas require additional investment to expand distribution networks.

Declining Quality; there is no system in place to control or routinely monitor drinking water quality. Across the district, waste water from sanitation, industrial and commercial pipelines is discharged into natural water bodies without being treated. The Ayyub Medical College and Hospital Complex alone discharges 18,000 gal/hr of waste water which bypasses the hospital treatment plant and directly enters the Banda Ali Khan stream used by residents not only for irrigation but also for drinking water (IUCN 2004b). A recent study carried out in Abbottabad indicates that declining water quality is creating conditions of high risk, with collected samples showing microbial contamination of 36Ð55 percent, and about 9 percent of the samples being turbid or contaminated by nitrates Water samples were collected from 11 points, covering major localities of the city, and various sources were tested. Indications were that of the 11 locations sampled, only three samples were free from contamination (Kahlown et al 2008).

This situation is compounded by ageing and damaged infrastructure and municipal failures. In the absence of proper solid waste disposal, garbage is dumped into sanitation lines, on hill slopes, and in streams and nullahs. Water supply lines sometimes pass through drainage pipelines, creating the risk of contamination. The use of unlined drains and septic tanks allows waste water to percolate into the soil and contaminate shallow aquifers which serve as the principle source of drinking water for many communities (IUCN 2004a).

It is not just the contamination of drinking water that poses a serious threat to the health of the districts population. Contaminated water is also used for irrigation, which risks contaminating the food chain (IUCN 2004a). In areas where piped water is available, and toilets and septic tanks are used, a large amount of effluent is created, that, along with another household waste, is often fed into the street. This effluent then tends to stagnate, creating a breeding ground for mosquitoes and increasing the populations vulnerability to diseases such as dengue fever and malaria (IUCN 2004b). Without adequate monitoring mechanisms in place it is impossible to enforce water quality standards. Although the importance of ensuring water quality is recognized by the National Drinking Water Policy, actual implementation of this goal is limited or non-existent.

Deteriorating Infrastructure; one of the biggest challenges facing water utilities in Abbottabad is the repair and maintenance of rapidly deteriorating infrastructure. There is no provision to finance the replacement and repair that is urgently required. It is estimated that nearly 50 percent of water schemes in urban areas and 30 percent in rural areas are in a fully or partially deteriorated state (see Annex). At least 92 public utility works in Abbottabad tehsil and 13 in Havelian need substantial repair and rehabilitation. Technical operation and maintenance systems are not well established, and widespread misuse results in leakage and subsequent wastage. The 2005 earthquake compounded the problem by severely damaging water and sanitation infrastructure in many parts of Abbottabad. The lack of adequate records further hinders identification, rehabilitation, extension and planning.

Inequities in Access; in theory, the low price of water is meant to subsidize access for poor households, but this effort has largely failed, with the primary beneficiaries of subsidies often being those who are not poor. Initial survey results support the premise that the existing water tariff structure in Abbottabad, with its built-in subsidies, has failed to benefit the poor. Moreover, poor households often live in marginal and topographically challenging areas that are not serviced by utilities to begin with. In areas where supply is available, the cost of obtaining a water connection is often prohibitive for poorer households. (Currently, it costs approximately 450 rupees for a new connection in Abbottabad.) Paying monthly water charges is also likely to be a constraint for many households, as is evident from the survey, where initial findings demonstrate that the poor are less willing to pay for improved services.

The provision of water varies from one union council to the next. Although topographical challenges such as elevation and rugged terrain play a key role in the design and operation of water infrastructure, there are also institutional constraints that impede efficient service. For example, in the union council of Malik Pura, supply is limited not only by the lack of good governance and the absence of technical capacity but also because of fiscal constraints that prevent extension and improvement of public water services and fail even to cover basic operation and maintenance costs. through drainage pipelines, creating the risk of contamination. The use of unlined drains and septic tanks allows waste water to percolate into the soil and contaminate shallow aquifers which serve as the principle source of drinking water for many communities (IUCN 2004a).

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Initiatives Launched by Government to Cover the Gap in Demand; the overall objective for improving water supply in Abbottabad is to provide a safe 24/7 supply of potable water to all urban citizens. The objective will not be achieved under the current project. In long term, the development of the gravity surface system would provide many benefits. The medium-term development will continue to be based on groundwater resources. A priority package has been prepared within the budget available for the first phase of urban infrastructure development. This priority investment comprises of:

- Field surveys (streams, rainwater harvesting), hydro-meteorological and institutional studies and field surveys for intensified use of the gravity system
- Upgrading of production units in the entire urban area
- Replacement of leaking pipes in the existing networks
- Establishment of five District Metering Areas (DMAs) in three UCs

The objective is to have adequate capacity to satisfy water demand and to improve the efficiency of water production. Around 80 production units will be able to provide enough water to meet the 2035 water demand within the existing service area. Additionally, instrumentation and valving will enable centralized management and control of the production facilities. Non-functional tube wells as well as tube wells that run at low efficiency will be provided with bulk meters, pressure gauges, new motor control units (MCUs) and disinfection facilities. The investments in production units include upgrading of 35 production units to

the capacity of 102-204 m3 /h each, repair and rehabilitation of 45 production units, provision of MCUs, bulk meters and pressure gauges in all 80 production units and provision of disinfection units at all 80 production units, OHRs, or ground storage tanks. It is anticipated that no additional storage capacity is needed in Abbottabad in medium term. To maintain the functionality of the existing reservoirs, the rehabilitation of abandoned reservoirs and repair of functional OHRs/GSTs are recommended. Damaged and rusted pipes that because excess leakage will be replaced. The replacement is proposed to include 290 km, comprising transmission and distribution pipes, to make the network compatible with the new pumping assets.

The three UCs pinned down for the development of five District Metering Areas (DMAs), will include the replacement of the entire distribution network, approximately 96 km, TA 8556 REG - Khyber Pakhtunkhwa Inclusive Urban Growth Program (47285-001) October 2017 to ensure the 24/7 water supply. This will be followed by the implementation of a nonrevenue water (NRW) reduction program in five pilot zones in three UCs with the aim of reducing losses and providing a 24/7 supply within those zones. It will also eliminate the risk of contamination in the network and encourage connection and payment for the service.

The selected areas are

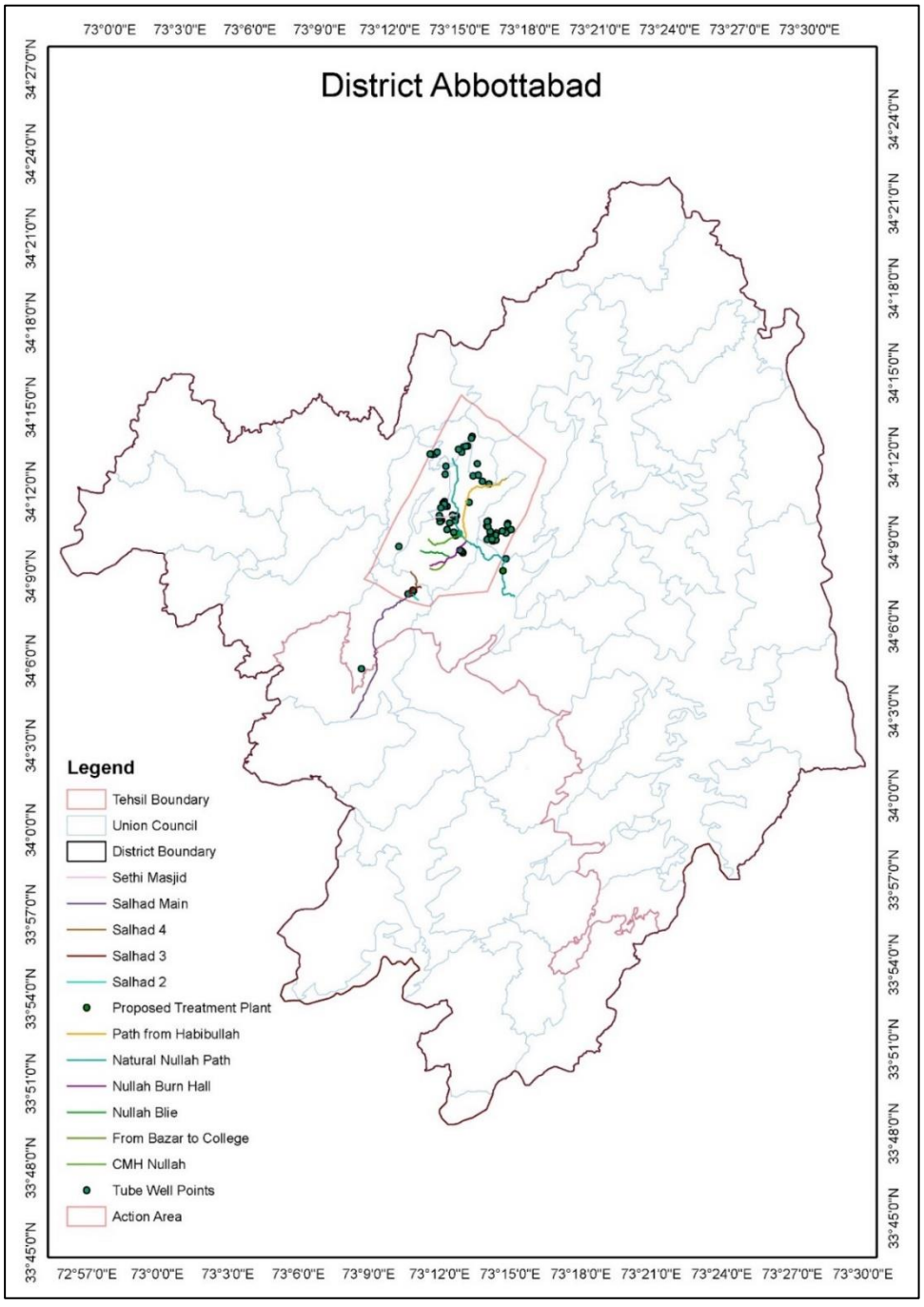
- moderate income areas where resistance to metered water supply and billing is expected to be low; and
- areas with positive attitude to piped water supply, including the following UCs: Central Abbottabad (approximately 5,000 households); Malik Pura (2,500 hh); Malik Pura 2 (3,000 hh); Nawan Shehr 1 (3,300 hh) and Nawan Shehr 2 (3,300 hh). All customers in these areas will be provided with a new property connection and a water meter. All identified illegal connections will be disconnected.
- To improve the water supply, sewerage and drainage services, additional assets will be required for long-term operation and maintenance (O&M) of the infrastructure. The WSSCA staff will carry out the O&M of the water supply and sewerage assets. There will be no need to recruit new staff to carry out O&M.

Future and Current Water Demand per Settlement in the District; the newly established Water Supply and Sanitation Company (WSSC) Abbottabad is responsible for water supply, drainage, sewerage and solid waste management. A piped water supply system covers about 85 percent of the population of Abbottabad. The total water production in Abbottabad is approximately 65,000 m3 /d, whereas the water demand is estimated at 76,000 m3 /d. The quality of service is poor, and only around 52 percent of households have registered water supply connections. There are about 23,500 active connections and numerous illegal connections. The existing water supply system utilizes both ground and surface water. Although surface water is treated, there is no treatment of water in the groundwater system. There is a high risk of contamination in the network because of intermittent pressure. The existing water infrastructure needs repair and expansion.

The combined drainage and sewerage system comprise approximately 300 km of open and covered drains. It serves 85 percent of the city population and covers 90 percent of the city area. Due to the hilly terrain, the drainage and sewerage is based on gravity flows. Untreated sewage is discharged into local streams. Approximately 41,000 households are not connected to the sewerage system. No fees are collected.

The present Solid Waste collection covers approximately 60 percent of the Urban Councils. The disposal efficiency is estimated at 50 percent of the estimated 140 tons of solid waste generated daily. Collection and disposal are insufficient due to a limited fleet and improper location of the existing dumpsite. Around 150 scavengers, mostly children, are involved in informal collection of recyclable items, servicing approximately 15 to 20 scrap shops in the city.

There is no sanitary landfill in Abbottabad. Currently, all waste is dumped at a site at Salhad along the main road on the Karakoram highway. The waste is often burned resulting in air pollution. There is a high risk of waste slides in rainy weather. TMA failed an attempt to install a waste recycling plant at Salhad, and the plant was never used. Sites for a new landfill as well as sewage treatment plant have been identified, but the land has not yet been acquired.



MAP 5-50:Showing Existing Locationof Tube Wells and Proposed Treatment Plants

5.7.2 Waste Water Management

Given the low level of industrial activity in the district, most of the waste water and solid waste generated in Abbottabad comes from homes and institutions. In rural areas, toilets and septic tanks are used wherever piped water is available. The resulting effluent, along with other domestic waste water, is fed into the street *nullah* (drain). In densely populated villages situated in flat areas this effluent tends to stagnate. Pools of waste water serve as breeding grounds for mosquitoes, exposing nearby communities to the risk of diseases such as dengue filariasis and malaria.

In urban areas, where piped water is widely available, the problem of waste water disposal is even more serious. Here, most waste water is discharged either directly as sullage or indirectly as settled sewage into *nullahs* passing through residential areas. In Abbottabad and Havelian, where settlements are built on flat ground, sewage frequently collects in stagnant pools out in the open.

In Abbottabad and Havelian, hospitals, markets, restaurants and small industries add to the problem. The AMC alone discharges 18,000 gal/hr of waste which bypasses the hospital's own treatment plant and is discharged directly into the Banda Ali Khan stream. Alarmingly, this stream is used by area residents for irrigation as well as drinking. Even in Nathiagali, where the GDA is responsible for overall environmental management, waste water disposal is left up to individual households and hotel owners, with the result that untreated sewage and sullage can flow down hillsides, posing a threat to the health of the population and seriously undermining the tourist appeal of the area. Only nominal quantities of industrial waste are generated in the district. One area of concern is the vehicle battery cleaning and repair industry operating in Abbottabad city. Approximately 30 such units cause lead contamination in the surrounding streams and rivers.

5.7.3 Constraints and Recommendations—water supply and Sewerage

In Abbottabad, the goals of sustainability and universal access to drinking water are impeded by severe financial shortfalls. The provision of water below cost reinforces the perception that water is abundant. In fact, water resources are under threat and scarcity is a serious concern. To improve water quality, replace or repair damaged infrastructure and extend the supply network, urgent reform in the water sector is required. Providing sustainable access to safe drinking water will entail investment in watersheds, the prevention of upstream pollution, the enforcement of quality standards, and systematic monitoring of surface and ground water. Properly maintained records on infrastructure and status are needed to ensure effective planning for the future. Funds can be generated by revising water tariffs to reflect consumption. This will allow water supply agencies to meet capital and operating costs and will prevent wasteful use of this precious resource. In addition to fiscal reform, institutional and political factors also need to be taken into consideration.

Fiscal Reform; reform in the water sector must correct the misconception that water is a simple good that can be provided free of charge to all users. Instead, reform must be based on the recognition that water supply is the result of a complex and integrated system that requires the day-to-day management and maintenance of public works. For this effort to be successful, revenues generated from water charges must be channeled back into improving water resources and infrastructure. Where excess revenue is generated, the surplus should be reinvested in the same areas. This will not only provide incentives for

local government agencies to manage their utilities efficiently but will also serve to demonstrate to the public that their money is being put to good use.

Revision of water tariffs; an important environmental fiscal instrument in the water sector is reform of the current water tariff structure, to provide greater access to poor households and to allow investment in the protection of water resources. The mean willingness-to-pay values determined from the survey can be used as a starting point to re-assess pricing policy. The amount that users are required to pay should be sensitive to income differences among households. The legal framework for such a fee already exists, since local government agencies are authorized to levy charges for the services they provide.

Preliminary survey results indicate that while 61 percent currently pay for water, most households are willing to pay, either based on actual use or depending on the number of hours that supply thought pipelines is available. Based on these estimates, the existing flat rate of 50 rupees per month for all connected households can be revised to 58 rupees, as the first phase of water tariff reform. This will increase overall revenues by nearly 208,000 rupees per month. The second and more important phase is to revise the tariff mechanism, moving from a flat rate to a charge based on actual consumption. For this to be possible, water meters will need to be installed in all households. This approach can be tested in a few pilot sites to determine feasibility. A progressive block tariffs system can also be considered, where high volume users pay a higher rate, rather than the current system that provides a covert discount to high-volume users.

Another consideration to keep in mind is that water price reform will have to be carried out slowly, as gradual improvements in water services and quality take place. In the interim, public spending at the federal and provincial level will have to increase since local governments will be unable to shoulder the financial burden unassisted. There is an important role here for donors and non-government organizations to play in supporting government budgets and activities with investment. Improving quality, and investing in surface and groundwater sources, will also help to ensure sustainable supplies in the long term. Another key consideration, especially for managing industrial and commercial water use, is to protect water quality. Non-domestic use charges must be separate from domestic fees. Particularly important is the application of progressive block tariffs for high volume users, so that domestic users do not bear the burden of subsidizing commercial operations. Currently, domestic users pay 50 to 100 rupees per month, depending on the department or agency from which they receive supply, while commercial rates are double that amount. Policy and legislation changes can support such measures, for example by introducing and implementing market-based approaches such as pollution charges, withdrawal charges and fines. It is also important to incorporate environmental costs into decisions that affect water use and quality.

User Charges in Community Managed Systems; many water supply schemes in Abbottabad, particularly in rural areas, are managed by communities. Most such schemes fail to meet the needs of residents, with the water supplied being both insufficient in terms of quantity and unsatisfactory in terms of quality. Community-managed systems do not charge users a fee. As part of the first phase of fiscal reform, a nominal user fee should be introduced. Revenues can be used to finance operational costs in the short term. For the future, a community managed rotating fund should be established, from which surface and groundwater conservation activities can be financed.

Improving Governance; good governance in the drinking water sector needs to balance complex economic, social and environmental objectives. The devolution process launched in 2001 provides an

opportunity to fiscally empower local level government bodies. Although legislation in force mandates fiscal empowerment, the political will to implement these changes on the ground has been lacking. The absence of coordination between various government agencies responsible for water supply and management is a major hurdle. This is a problem not only in terms of management and operational matters but also with respect to the allocation of resources. Local government agencies cannot be properly empowered unless both administrative and fiscal responsibilities are devolved. Currently, fiscal transfers to local government bodies are woefully inadequate. In such a scenario, local agencies cannot carry out their assigned functions.

To improve governance, it is essential to establish clear lines of responsibility. Institutional reform should be bolstered by a long-term commitment from higher tiers of government to finance the necessary actions, and to facilitate these measures with a robust regulatory framework. Good governance will require careful consideration of the institutions in place to manage water supply in Abbottabad, including the role that might be played by the private sector. In certain cases, reform of the existing legal framework will have to be considered. Currently, in the context of water management, the enforcement of legal provisions is ineffective, and penalties and fines are not enough to serve as a disincentive. Federal and provincial environmental agencies will require technical assistance for water quality monitoring. This must be accompanied by stakeholder consultations to establish priorities, identify water bodies in need of urgent attention, and devise participatory schemes for clean-up and conservation. At the same time, it is important to build local capacity to regulate drinking water quality. Routine monitoring at the local level, supported by provincial resources for regular oversight and quality assurance at the national level, requires significant expert input, equipment and training but will pay off over time.

In general, the need for investment is greatest at the local level. But technical and water engineering capacity is also limited at the provincial level and here, too, investment is required. Following the devolution of 2001, powers and responsibilities have been divided between several different tiers but this has not been complemented with investment to build the capacity of the various agencies now responsible for water provision. Administrative capacity must be developed to reduce transaction costs and improve efficiency. Here, progress is impeded by the lack of proper records on water infrastructure, particularly about monitoring, trouble-shooting and planning.

It is necessary also to address the issue of political interference in the identification of water supply schemes. Meanwhile, donors and non-government organizations have an important catalytic and demonstrative role to play, particularly about financial support, advocating reform, building capacity, and introducing discipline and best practices. A coherent approach to water management needs to be applied at the relevant geographical level, such as through a river basin approach, with clear agreement on the responsibilities of local, provincial and federal authorities. A conflict resolution mechanism at the local level is also required.

Consumer and public involvement; building public support for reform in the water sector is critical for the success of EFR in Abbottabad. The traditional mindset that water services are social services and must therefore be provided at no cost or very low cost, must be overcome. This is likely to be a challenge, particularly since water is a politicized and emotional issue. Public hearings and consultations with stakeholders need to be held before price changes and new payment mechanisms are finalized. As in most cases where a previously subsidized service is supplied at a rate that begins to reflect its real cost, there will be debate and disagreement over the merits of the proposed system. For this reason, changes must

be introduced in conjunction with public awareness campaigns, geared towards educating people about growing scarcity, deteriorating quality and the threats to public health. Information must also be provided regarding the current fiscal constraints in the water sector, and the necessity of recovering infrastructure and operating costs from users.

Local communities should come to understand the value of water resources and ecosystems. Transparency and accountability are required in the process of decision making, especially with respect to spending, to persuade water users that increased fees will be invested in improving public water supplies. Strong internal and external audits must be carried out to build public confidence, since many respondents indicated concern that additional water charges will not be used for the intended purposes.

Targeting Poor and Disadvantaged Users; the World Health Organization estimates that the rate of return on investment in water and sanitation is as high as 7.5:1 (Hutton and Haller 2004). Benefits accrue because of savings with respect to time (distance travelled to collect water or visit sanitation facilities) and health costs (reduced illness), as well as by improving labor efficiency and school attendance.

Improving access to water services for the poor in Abbottabad is essential and must be taken into consideration while determining the tariff structure. Affordability for households living below or close to the poverty line should be of the highest priority. High water charges will burden poor households, causing them to reduce water consumption and exposing them to the risks of water- and hygiene related disease. The survey carried out as part of this study indicates that increases in domestic water charges are feasible provided that the poorest households are properly subsidized, and public awareness campaigns are conducted to make the price increase acceptable.

Policies that target poor households, such as through income-related support, must be tested against across-the-board subsidies. In this connection, international guidelines should be considered, where for example it is recommended that the water supply and sanitation costs for poor households should not exceed 1.5 percent of total household (OECD 2003). Higher rates than this are a burden and thought to jeopardize the consumption of other goods and services. While the motive behind subsidies in developing countries has generally been to support poor households, it is essential to keep in mind the criticism this instrument has increasingly been subject to, particularly about encouraging inefficient use of scarce environmental resources.

Environmental Reform; a portion of the revenues recovered from water charges should be invested in improving the quality of existing sources and identifying new sources. While there is a great deal of potential in gravity-based schemes, many existing schemes are either partially or totally non-functional. Rehabilitation of such schemes should be a part of this effort. Alternate water sourcing, including methods such as rain water harvesting, should be considered. Innovative technology and infrastructure, which may require higher initial capital outlays but will be less costly and more robust in the long term, must be explored.

5.7.4 Solid Waste Management

Around the world, population growth and rapid urbanization have led to a massive rise for waste generation. In urban and rural communities alike, changing lifestyles and consumption patterns, including the increased use of goods made from non-biodegradable materials, have added to the problem. The situation in Pakistan is no different. Estimates are that the country generates 50,000 tons of waste daily,

while municipal authorities (IUCN 2004) dispose of only 60 percent of this amount. The remainder accumulates in the environment, giving rise to a host of municipal and public health concerns. In many parts of the country, including Abbottabad, the system of solid waste disposal is inefficient and ineffective. Garbage accumulates on roads and streets, in vacant plots, and on hillsides. While many households and neighborhood communities burn their rubbish out in the open, they are not the only ones who resort to this unsafe and unhealthy practice. In the absence of landfill sites, and without alternative means of waste disposal, municipal authorities in many areas are forced to set fires in garbage dumps to reduce the volume of accumulated waste. The effects of improper waste disposal were felt not just in the environment but also in the health of the population. Air, water and land pollution are serious concerns in and of themselves, but also have a devastating impact on public health and on the livelihoods of many communities, especially those who are the poorest and most disadvantaged. Waste dumped near rivers, lakes and streams contaminates the water supply, with decaying organic matter becoming a breeding ground for disease. Increased carbon and other emissions because of burning garbage in the open space that release toxic compounds into the air and exacerbate global warming.

Currently Abbottabad district was home to 1.33 million inhabitants, which will be increased to 2.3 million in the next two decades—with an average annual growth rate of 2.20 percent. Round about 22 percent of the population lives in urban areas, while the remainder of the district's residents make their home in the countryside. Urban centers are populated densely in the district due to scarcity of flat land in this mountainous terrain. However, recent years have also witnessed increasing migration, putting additional pressure on both land and municipal services, including solid waste management. According to the results of a survey carried out by ICUN in environmental fiscal's reforms in district Abbottabad, an estimated 468 tons of waste is generated daily in the district, 102.70 tons of which is produced in urban areas. Per capita waste generation is estimated at 0.32 kg per day overall, with a slightly higher rate in urban areas. Prior to 2001 and LGA 2013, the provincial public health engineering department was responsible for solid waste management, along with local development authorities, and water and sanitation agencies. Following the promulgation of the Local Government Ordinance (LGO) of 2001, which introduced a process of devolution, town/tehsil municipal administrations (TMAs) were established and made responsible for several public services, including solid waste collection, within their areas of jurisdiction. Their powers do not extend to military installations and cantonments, where cantonment boards are responsible for solid waste management.

The existing and projected solid waste generation rate in the district is calculated with the standard of ICUN as identify in environmental fiscal's reforms in Abbottabad. The per capital waste generation per day standard in the rural areas is 0.319 Kg/per Capita/per Day while in urban areas it is 0.315 Kg/Capita/Day. The average per capita waste generation in the district is 0.317. According to these standards 476.45 tons' waste is generated in district Abbottabad of which 39 percent is generated in urban areas and 61 percent in rural areas. Projected population of the district shows that 805.7 tons/per day waste will be generated up to 2038 with 230.06 tons in urban areas and 577.8 tons in rural areas.

Table 5–44: Waste Generated in District Abbottabad

Year	Population			waste generated per day					
	Urban	Rural	District	Urban (@ 0.315 kg/capita/day)		Rural (@ 0.319 kg/capita/day)		District (@ 0.317 kg/capita/day)	
				KG	Tons	KG	Tons	KG	Tons
2018	302387	1061121	1363508	95252	105	338498	373	432232	476
2023	367900	1177077	1544977	115889	128	375488	414	489758	540
2028	447607	1310485	1758092	140996	155	418045	461	557315	614
2033	544583	1464552	2009135	171544	189	467192	515	636896	702
2038	662570	1643179	2305749	208710	230	524174	578	730922	806

In both Abbottabad and Havelian, solid waste from households is invariably dumped out in the open, often near the houses themselves. Municipal authorities have placed skips for garbage collection in most areas, but this measure has proved to be ineffective. The location of skips is inconvenient, discouraging widespread use. Even where they are used, garbage collection is patchy and haphazard. In addition, many *mohallahs* (neighborhoods) cannot be accessed by municipal waste collection vehicles because unauthorized construction has resulted in streets that are too narrow for such vehicles to enter. The net result is that garbage is left to collect in piles, clogging *nullahs* and creating ideal conditions for the proliferation of disease vectors. Even in Nathiagali, where rubbish bins are available, area residents rarely deposit garbage in these containers. Medical waste and toxic waste from business are not treated separately during collection and disposal. Residual waste such as torn plastic bags, tires and cloth which scavengers are unable to sell is used as fuel and ends up producing harmful emissions. Burning, a common method of waste disposal, also produces toxic gas emissions and seriously affects the health of communities living in proximity to garbage dumps.

Medical Waste; hospital waste management has long been an issue of critical concern both for the health sector and civic authorities. In fact, proper disposal of medical waste was specifically highlighted as an area of concern in the SPCS, which emphasized the indigenous production of incinerators. The AMC with 1,000 beds, nine other civil hospitals with a combined 728 beds, and clinics in the public and private sector, are invariably located in the middle of populated areas, attracting hundreds of patients daily. This situation has no doubt been exacerbated following the policy introduced in 2001 under which all government doctors were asked to shift their private practices to hospital premises. None of these establishments possesses the facilities or expertise to ensure the safe disposal of medical waste. As a result, medical and municipal waste are frequently mixed. Often, pathogenic and radioactive waste is deposited along with ordinary municipal waste at public dumps. An estimated 18,000 kg/day of biomedical waste is generated in the province, of which Abbottabad and Mansehra account for 2,860 kg/day. This is not surprising, considering that the waste generated by the AMC alone is estimated at 800 kg/day.

For its part, the provincial government has taken some measures to remedy the problem. An incinerator was installed at the AMC in 2002, with a capacity of 150 kg per cycle and capable of running four cycles a day, thereby able to handle 600 kg of waste daily, or 75 percent of the total waste generated by the institution. The capacity of this incinerator needs to be improved, particularly since 40 percent of the hospital's waste is removed illegally and sold to recyclers.

5.7.5 Existing Solid Waste Management System

Responsibility for waste management lies in the public sector and is to be executed through city and town authorities. A few initiatives have also been undertaken by the non-government sector. The system of handling waste water and solid waste poses serious threats to the environment as well as human health, not to mention the aesthetic appeal of the district.

A recent attempt by the district administration to relocate the existing garbage dump near the Karakoram highway has been stymied by conflicts over of the choice of a new site. It is impossible to address solid waste and waste water management issues without the involvement of communities that generate the waste. Whether it is urban households, rural communities or commercial enterprises, a cooperative effort is needed to arrive at a common approach that can be used to develop new initiatives. The efficiency of existing players needs to be improved through monitoring and evaluation. To begin with, the treatment plant at the AMC, currently out of operation, needs to be brought back online. The GDA must intervene more actively in waste management of the Galliyat area and the municipal dump next to the Karakoram highway should be moved to a more acceptable location. At the same time, more efficient waste disposal methods, such as landfills and redistribution, need to be investigated. The Jougni waste water treatment plant in Kakul should be reactivated.

Indiscriminate land use, ineffective oversight of construction projects, and the lack of land use planning, zoning and building codes, mean that haphazard growth will continue occur with little or no attention paid to critical issues such as adequate facilities for waste disposal. The problem cannot be addressed in isolation or by a single agency. The long-term effect of inappropriate waste disposal on public health, the environment and tourism cannot be ignored. Between 80 and 90 percent of the local waste management budget goes to pay the salaries of staff whose service delivery is erratic, patchy and unreliable. This is a deplorable failure of governance. In addition to improving the performance of municipal bodies, some of the cost and effort will have to be shared by NGOs and local communities to address the problem realistically. The devolution plan offers considerable opportunity for oversight at the *mohallah* (neighbourhood) level, besides allowing for advocacy to take place at the level of community representatives and leaders. Finally, legal cover and oversight mechanisms are needed to check the pollution of rivers and streams used for irrigation and drinking. Legislation will also be required to stop the indiscriminate dumping of waste which clogs drainage channels.

There are two urban areas in the district, Abbottabad and Havelian, each of which is served by a TMA. In Abbottabad city, solid waste collected by municipal workers transported to a garbage dump at Salhad, located on the Abbottabad-Havelian Road just outside the city limits of Abbottabad, at approximately 3 km from the city Centre. There is no separate dump for Havelian tehsil, where garbage collected by municipal workers dumped on the banks of the river Dor and left there with no further treatment.

Abbottabad TMA works with WSSA in coordination in six urban union councils in which they collected waste from the 24 designated collection points. From there, the waste is transported to Salhad by three tractors and two multi-loader trucks, making four trips daily. Of the 24 collection points in Abbottabad city, 13 are open dumps, while large containers have been placed at the remaining 11 collection points. In Havelian, the TMA has the capacity to collect 12 tons of waste per day. There is only one designated collection point in Havelian, and one tractor with a trolley that makes four trips daily. While the remaining

sub-urban union councils lack collection of garbage including rural areas where waste is directly disposed-off to either river bank or burnt in the open space.

Table 5–45: Municipal waste collection equipment in Abbottabad District

Equipment	TMA Abbottabad[104]	TMA Havelian[105]	WASSA
Multi-loader truck	2	-----	incorporate
Tractor trolley	3	1	
Skip container	24	-----	

The current system of solid waste disposal is highly unsatisfactory. Abbottabad town's solid waste is deposited at a municipal dump site at Salhad, some 3 km from the city in a ravine close to the Karakoram highway. Some of this waste is burned while the remainder is left to rot. There are no landfills in the area, nor have attempts been made to redistribute waste. Havelian disposal site is located near the Daur river bed, some 2 km downstream from the town.

Waste management in Abbottabad city is the responsibility of the TMA, which employs a staff of 129, equipped with two multi-loading trucks, 12 skips, three tractor-trolleys and 70 wheelbarrows, to handle solid waste disposal. The Abbottabad cantonment board performs similar functions for areas under its jurisdiction. In Havelian, the TMA has overall responsibility for waste collection, with a staff of 32 equipped with one tractor, one trolley and 29 wheelbarrows. It is estimated that 8 t of waste is collected each week from Havelian. In addition, the cantonment authorities employ 45 sweepers for waste collection. Nevertheless, waste water and solid waste management is far from satisfactory. The open garbage dump on the highway outside Abbottabad city cannot create a particularly good impression on visitors to the area.

5.7.6 Review of Policies dealing with Solid Waste Management

Matters related to environmental protection generally, and several policy documents, covers solid waste management. These include the National Conservation Strategy of 1992 and the National Environmental Action Plan of 2001 (GOP 2005a). The country's first National Environment Policy were approved in 2005. Although its main purpose is to ensure that environmental concerns are incorporated into development planning, the policy contains a section on waste management, calling for the prevention and reduction of pollution caused by liquid and solid waste (GOP 2005c). Specific objectives in this regard include the following strict enforcement of National Environmental Quality Standards;

- Cleaner production centers and cleaner production techniques; reduction, recycling and reuse of municipal and industrial waste
- Rules and regulations for the management of municipal, industrial, hazardous and hospital waste
- strategies for the integrated management of municipal, industrial, hazardous and hospital waste at the national, provincial and local levels and

[104] TMA Abbottabad.
[105] TMA Havelian.

- Financial and other incentives (reduction or elimination of tariffs, low-interest loans, awards) for technology upgrades, adoption of cleaner technology, and implementation of pollution control measures and compliance with environmental standards.

Similarly, under the Medium-Term Development Framework for the period 2005√10, the government has committed to expand the coverage of The Salhad dump accommodates waste from the Abbottabad TMA as well as the waste management services across the country. Several legal instruments at the federal and provincial level govern waste management issues directly or indirectly. The Pakistan Environmental Protection Act of 1997 regulates various forms of pollution including the improper discharge of waste. National Environmental Quality Standards issued in 1993 and subsequently amended, regulate the discharge of municipal and liquid industrial effluent, and cover a wide range of toxic or harmful substances including smoke, particulate matter, carbon monoxide, arsenic, lead and mercury, but do not consider pollution caused by the improper disposal or ordinary municipal waste. Rules have been framed under the 1997 Act to deal with hospital waste, along with draft rules related to the management of hazardous substances. At the provincial level, the LGO of 2001 provides for the delivery of basic public services. Under this law, TMAs are responsible for the collection and disposal of solid, liquid, industrial and hospital waste. TMAs may also propose to the tehsil council the introduction of a variety of user fees, taxes fines and penalties. If approved, TMAs then have the authority to impose these levies. This mechanism can serve to empower TMAs, allowing them to generate resources locally.

5.7.7 Review of Projects

Ongoing Projects

- Rehabilitation and improvement of existing water supply system of gravity flow Abbottabad.
- Sewerage/sanitation system in Ward 1-15 Abbottabad City Pk-44
- Construction of Water Supply & Sanitation Scheme in Galiyat & Lora Circle District Abbottabad
- Construction of Water Supply & Sanitation Scheme in PK-46 District Abbottabad.

5.7.8 Constraints and recommendations

Some of the noticeable constraints related to solid waste management in the district are:

- Low awareness in people about environmental Education and effects of improper solid waste management.
- Poor collection arrangements of the municipal committee Abbottabad.
- In accessibility of sweeper in crowded areas to collect waste from dustbin, streets etc.
- Number and size of dustbin are not adequate, and their position is also not easily approachable for the people.
- Inappropriate technology for disposal of solid waste and mostly the equipment's and vehicle remain out of order.
- Between 80 and 90 percent of the local waste management budget goes to pay the salaries of staff whose service delivery is erratic, patchy and unreliable. This in itself is a deplorable failure of governance.

  Correspondingly, following are some specific recommendations:

- The present Solid Waste Management System should be carefully operated to collect the actual solid waste generated/day.
- Municipal committee should appoint mobile teams to check the sanitary worker at their corresponding sectors.
- The maintenance of equipment's and vehicles should be ensured.
- The daily solid waste Management report of each sector should be brought into to the notice of senior officer at concerned institute.
- The No. of dustbin at congested places like Nawa shehr must increase, so that the required generation rate of that area is achieved. The location of these dustbins is such that these are easily approachable.
- Mass awareness campaign program for the disposal of solid waste must be launched to create a healthy and clean environment.
- Official and appropriate landfill disposal site must be provided immediately.
- The people are officially restricted for throwing garbage in street, Grounds etc.
- Manual segregation is to be encouraged. Mechanical mean is uneconomical.
- The government should provide new & advance equipment and vehicle in enough number.
- Sanitary worker should be increased, to meet with the required situation.
- Introduce contract system for collection of waste and operation of landfill.
- Basic facilities and increased wages should be given to the sanitary workers.
- Awareness must also be created in the private sector to take part in the solid waste management.
- Landfill & transfer stations should be designed with great safety.
- Composting plants should be installed to generate revenues.
- Education campaign should be arranged to stress the need for recycling.
- Sanitary workers and drain cleaners visit should be based on periodic bases either once are twice daily to provide a lenient delivery of service.
- In addition to improving the performance of municipal bodies, some of the cost and effort will have to be shared by NGOs and local communities to address the problem realistically.
- The devolution plan offers considerable opportunity for oversight at the Mohalla level, besides allowing for advocacy to take place at the level of community representatives and leaders.

Based on above recommendation, the following solid waste management system can be proposed in District Abbottabad to achieve reduction, collection and dumping of waste in a smooth systematic way.

5.7.9 Proposed Solid Waste Management System:

Material reduction, reuse and recycling—commonly referred to as the three R's of waste management are different strategies of reducing the amount of waste produced by manufacturing processes, which ultimately goes to landfill.

These three strategies also commonly form the center of what is referred to as the 'waste management hierarchy' – a list placing various methods of waste reduction in order of most to least desirable. This is a

generally accepted hierarchy, often incorporated into and influential upon waste management legislation. The exact wording of the hierarchy varies, but the broad structure remains the same.[106]

Reduction; is the first and most important step in the hierarchy. This step includes taking a proactive stance in purchasing and using only what is necessary. The idea is to be conscientious of one's supply stream and waste management practices to minimize raw materials.

Reuse; the step following reduction, focuses on finding an alternative use for materials that would otherwise be considered waste and ultimately disposed of. Ideally the goal is to eliminate waste completely.

Recycling; the final step in the traditional hierarchy emphasizes on properly separating and distributing those materials that cannot be reduced or reused, to the appropriate facilities so the items can be applied to the creation or production of new products and goods.

The goal of the 3R's is to minimize the amount of waste sent to landfills, to create a safer and healthier environment. While historically the waste hierarchy has been centrally focused on the 3 R's, the following additional steps can be considered as the booster to areas of 3R's:

Avoidance; is most preferable and challenges an individual and organization to precisely calculate and purchase only what is necessary and avoid obtaining any materials that are not essential and could ultimately be wasted or passed along to the next steps in the hierarchy.

Recovery; entails extracting materials or energy from waste to be used or processed. An example would be reducing waste materials to compost.

Treatment; is subjecting waste to any physical, chemical or biological processes intended to change its volume or character, so that it can be disposed of with minimal or no adverse effect on the environment (Whangarei District Council, 2007).

Disposal; is the final step and least preferred one applied to waste management at work.

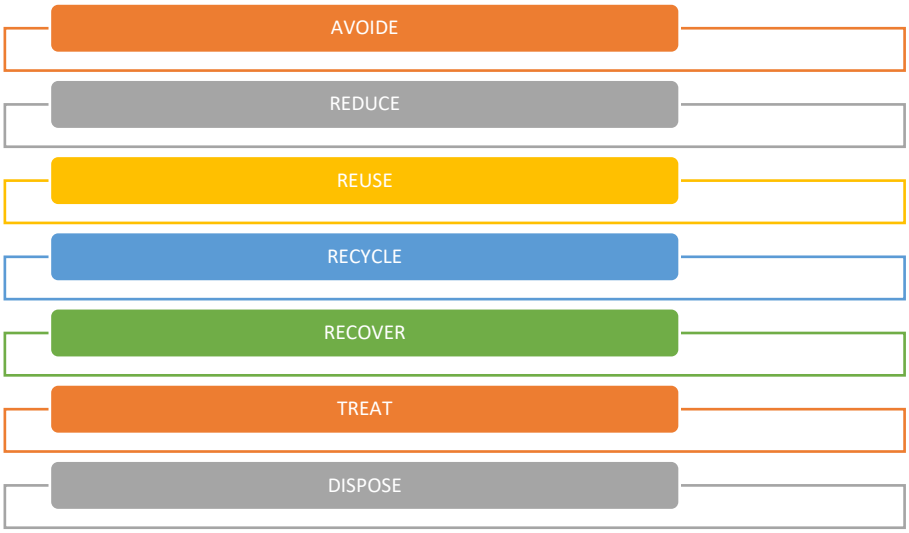


Figure 5-12:Management of Solid Waste

[106] Christopher Holt Nottingham Trent University School of Architecture, Design and the Built Environment

Policy development in Abbottabad City has always been the prerogative of those who are in power. Given the complexity of issues and problems, it is apparent that the top-down solutions and management strategy for solid waste management will not be sustainable, because sustainable solid waste management depends on the participation of citizens in the system. For any future solid waste management system public consultation should be made a prerequisite. By doing so, the Abbottabad Municipality stands to gain on many different fronts. Foremost, public involvement in decision making may help the Abbottabad Municipality to bring the issue at hand to the people. This may in turn help in informing the people and making them aware of the existing problems or solutions proposed. People may be able to share their ideas, thoughts and concerns regarding various aspects of solid waste management in Abbottabad City. This may make the system transparent and efficient, as decisions once taken with consensus will be easier to execute and people will be hopefully more willing to help to execute the plan by reducing their waste, segregating their waste and so on.

Institutions such as schools and colleges should be used in spreading awareness and information transformation. This will save time and valuable resources for the municipal authorities. Regular ward level meetings should be organized to keep the people involved and informed. Baseline data on the status of waste - generated, collected, properly disposed, recycled, composted and thrown in the street should be generated. For this, too, local bodies and institutions can play a substantial and an active role. Research and development should be promoted and encouraged. Study WASA act or regulations.

Chapter 6

District Land Use & Capital Investment Plan

Land Use Plan

6. District Land Use & Capital Investment Plan

6.1 INTRODUCTION

The final chapter deals with two broad areas of intervention for the District Abbottabad, namely; District Land Use Plan for the period 2018-2038 and secondly, it investigates the polarization of functions and facilities within the district to suggest where to invest for public facilities. For the earlier aspect four major land uses have been identified and analysed and through overlay analysis final land use map is developed. It is further proposed that a district level **land use planning working group** should also be formed comprising of all major stakeholders dealing with the land. In future any proposed decision regarding land development must be made in line with the recommendations of DLUP Abbottabad and consensus-based decision of the working group. It is further suggested that while making any decision on land development should also mitigate its negative effects on other land uses and priority should be given to protected zones, economic zones, infrastructural zones and lastly residential zones in hierarchical order. The major components of district land use plan covered in the report are enumerated and explained as under:

A. Natural Land uses (Protected Zones)

1. Geological land uses (hazardous)
2. Geological land uses (mineral deposits)
3. Geological land uses (underground water resources such as springs)
4. Physiographic land uses (DEM based difficult/steep areas)
5. Physiographic land uses (surface water sources such as rivers, streams etc.)
6. Physiographic land uses (Forests)
7. Physiographic land uses (climatic zones with pleasant weather)
8. Physiographic land uses (AONBs: natural scenic beauties for tourism)

B. Production Land Uses

1. Physiographic land uses (prime agriculture zones)
2. Industrial zones in line with mines and mineral zones

C. Infrastructure Land Uses

1. CPEC route and its storage, processing zones and warehouses
2. Communication routes
3. Irrigation networks and dams
4. Major Municipal infrastructure (water/solid waste and other allied infrastructure)
5. Major Social Infrastructure if any (universities, health complexes etc.
6. Tourism and leisure infrastructure (active and passive parks and stadiums)

D. Settlements Land Uses

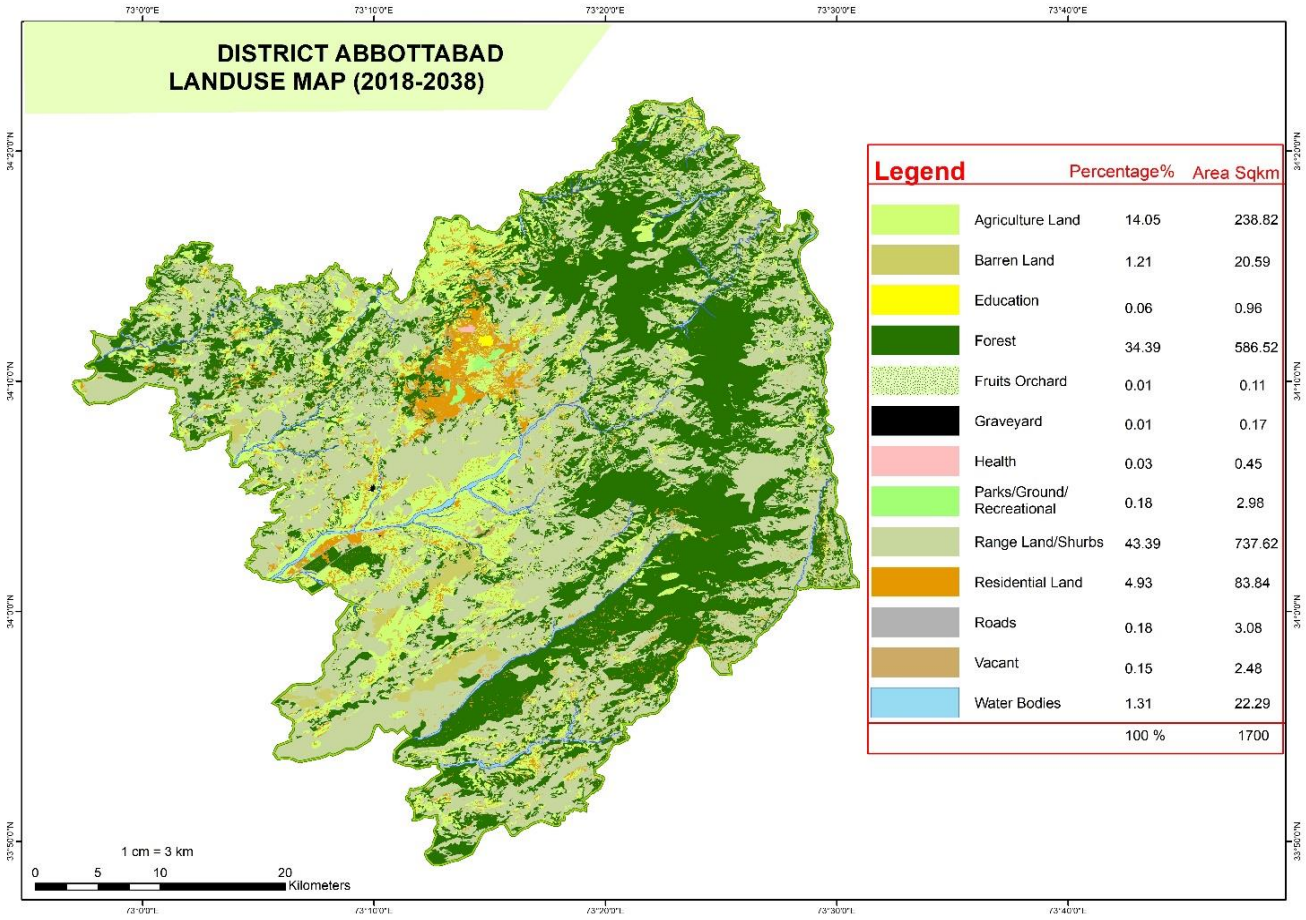
1. Settlements spatial growth (rural and urban, zone based)
2. Minor municipal infrastructure (water supply, sewerage, drainage etc.)
3. Minor social infrastructures (schools, health, community centres etc.)

E. District Land Use Plan

1. A composite map showing natural land uses, production land uses, infrastructure land uses, and settlements land uses with spatial distribution in percentages and in acreage.

6.2 EXISTING LAND USE OF DISTRICT ABBOTTABAD:

The existing land use of district Abbottabad is shown in the map 6-1. The larger part of the area occupied by grazing and shrubs which 43% of the total area. Which is followed by forest which is around 34% of the district area. Some patches of agriculture land also found along the settlement. The residential area coverage is 5% of the total land.



MAP 6-1:Existing Land Use of District Abbottabad:

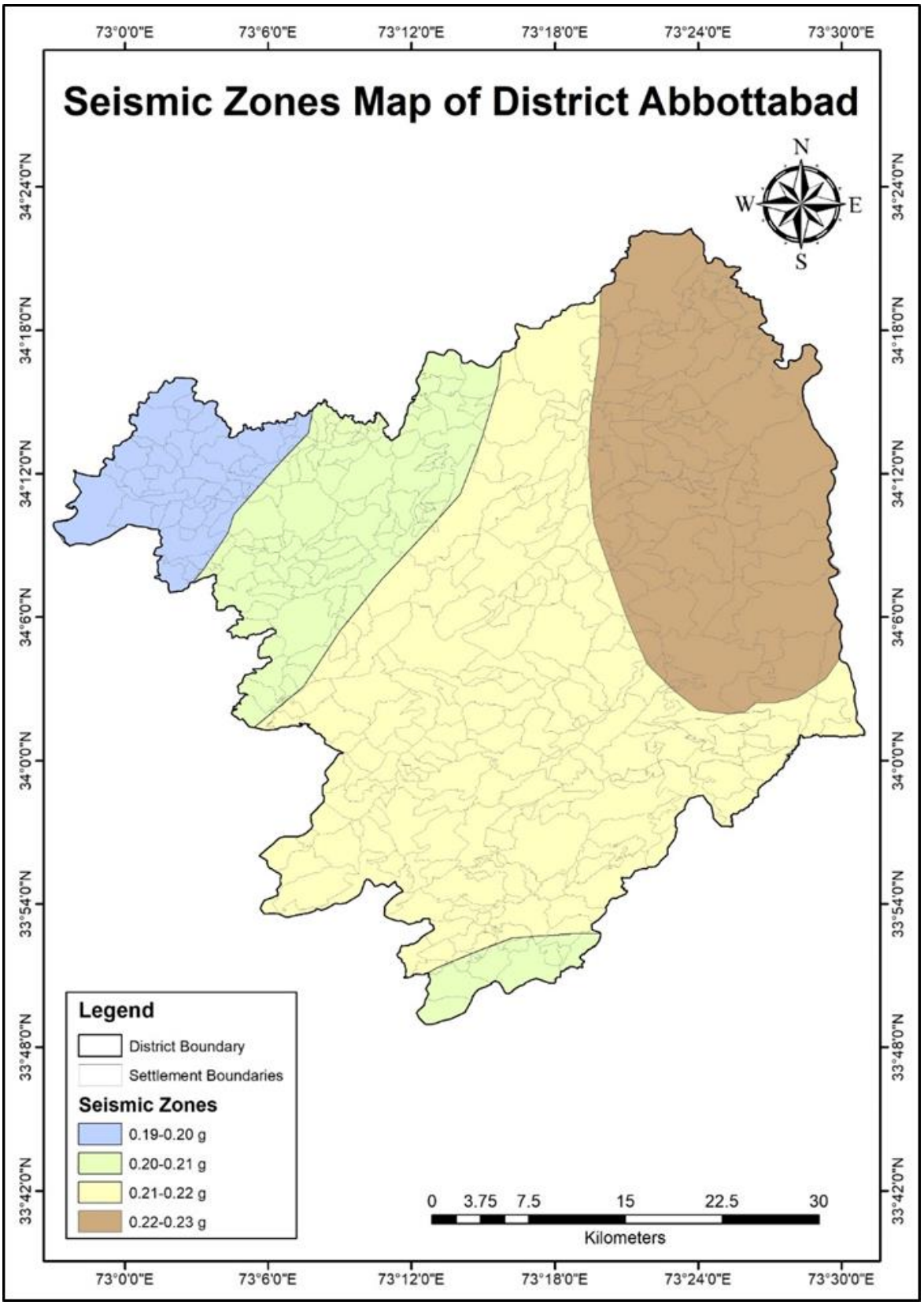
6.3 Natural Land uses (Protected Zones)

6.3.1 Geological land use (hazardous)

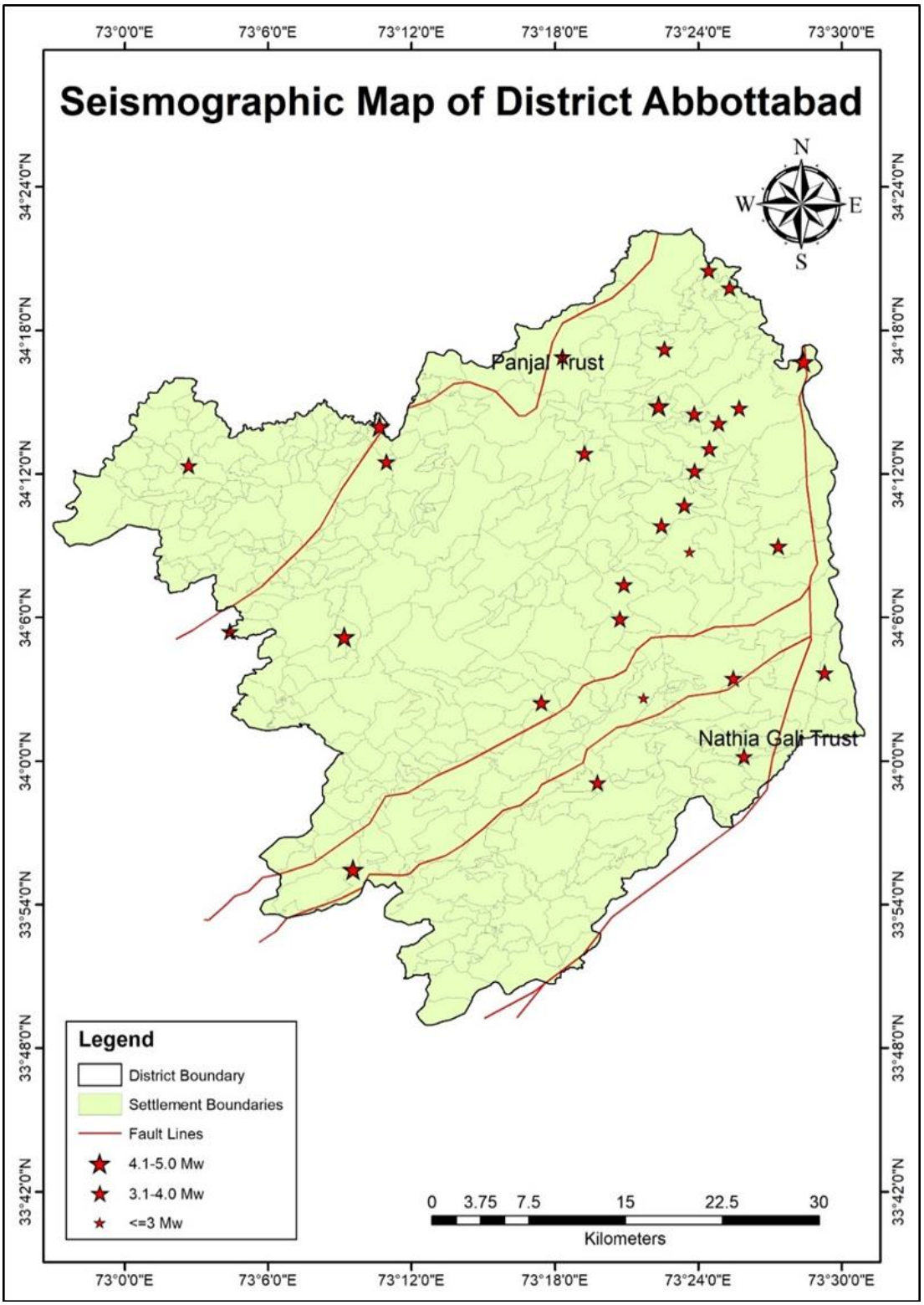
GEOLOGICAL ZONATION

The seismic zonation based on Peak Ground Acceleration measured on the basis of g value has been classified into four categories, namely; (0.19 to 0.20), (0.20 to 0.21), (0.21 to 0.22), and (0.22 to 0.23). All categories fall under instrumental Intensity value of 'VII' having 'moderate' level of potential damage to properties. However, on relative basis the North-Western and Southern parts of the district are relatively safer zones on the basis of lower PGA values and with lower level of steepness in the district. This seismic zonation is also supported by Map 6-2. This map shows that the seismic zoning map depicts that south eastern side of the district is more vulnerable than the other side due to its topography and steep slope. while the seismographic

Map 6-3 describes the Seismic magnitude scales are used to describe the overall strength or "size" of an earthquake and thus its potential for causing ground-shaking. The moment magnitude scale Mw is based on an earthquake's seismic moment, M0, a measure of how much work an earthquake does in sliding one patch of rock past another patch of rock, Again the seismographic map shows that on the eastern side from north to south this intensity is high. The hazard at 0.19 to 0.20 zone is the minimum because of the stiff soil and higher values of shear wave velocity. As we move east ward the velocity and magnitude increases due to the types of rock and its altitude.



Map 6-2:Seismic Zonation Map Based on PGA Values



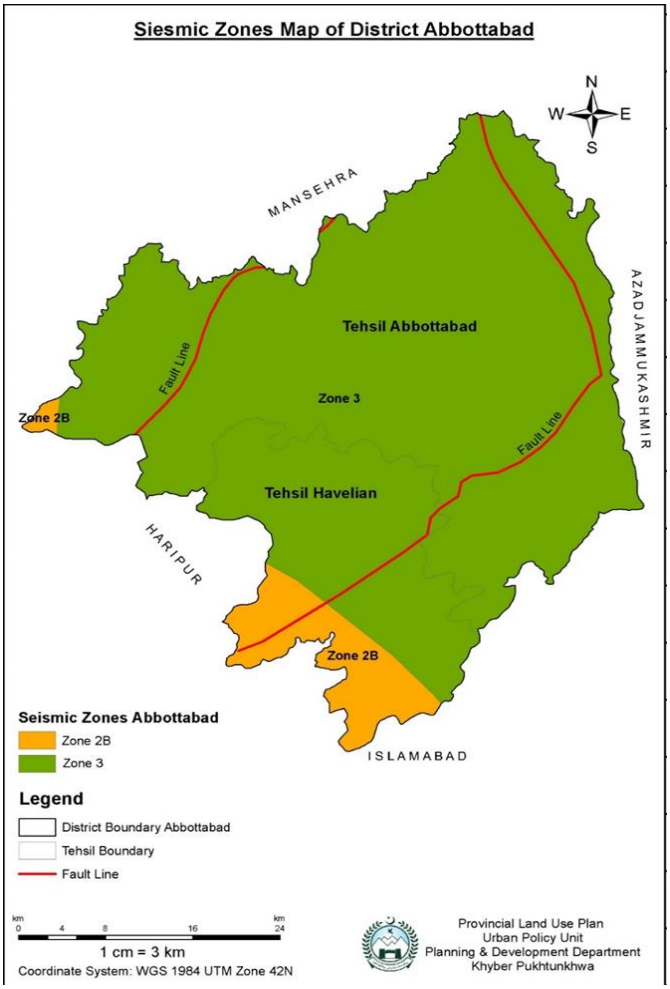
MAP 6-3:Seismic Zonation Map Based on Moment Magnitude (Mw) Scale

6.3.2 Seismic zone map of district Abbottabad

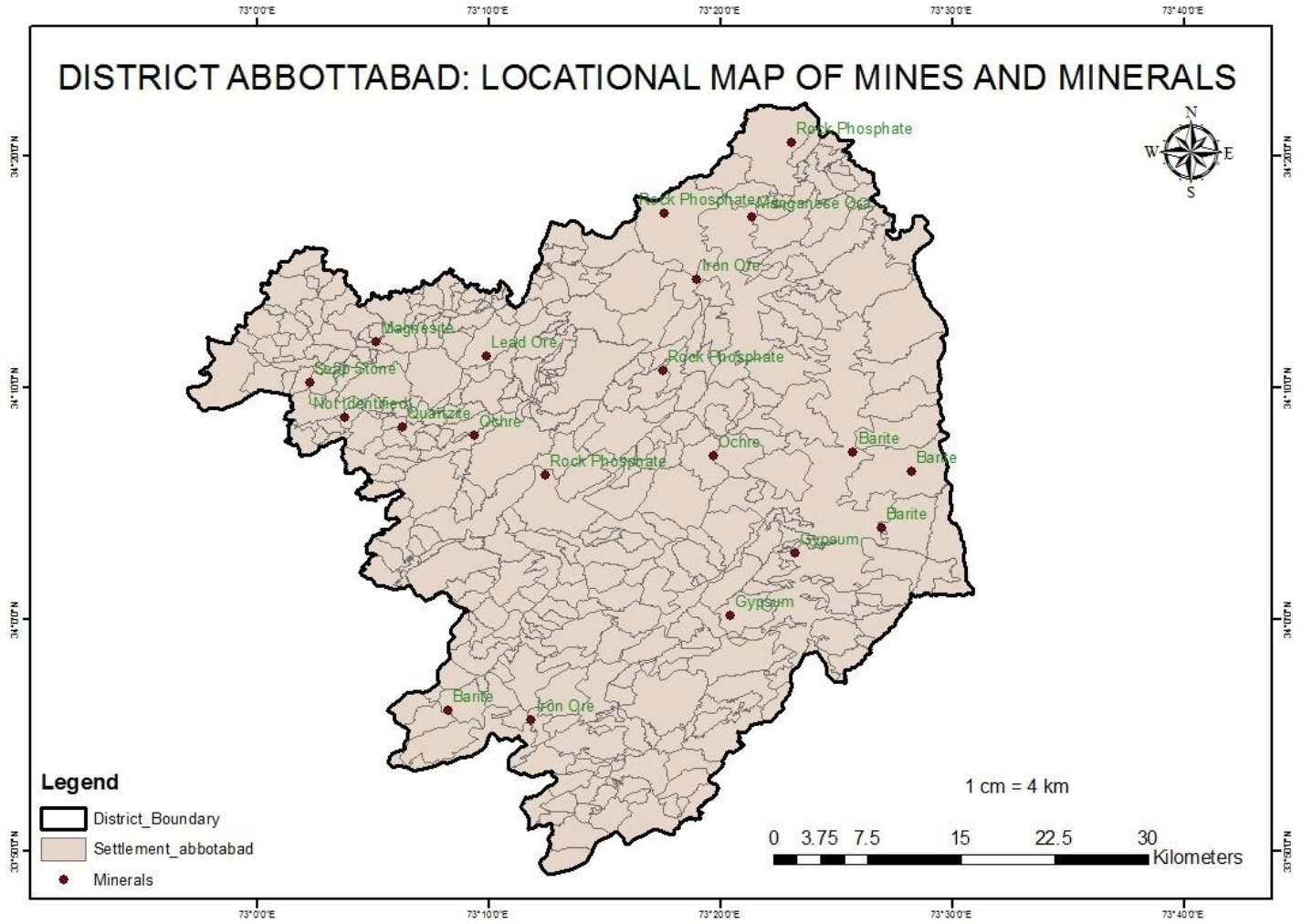
The seismic zoning map of Pakistan proposed by the Building Code of Pakistan (BCP; 2007) According to it, Pakistan is divided into five seismic zones (Zones 1, 2A, 2B, 3, and 4) considering the severity of seismic hazard; zone 1 is the lowest, and zone 4 is the highest seismic zone. So according to that zones the district Abbottabad fall in to Zone 2B and Zone3 as shown in Map 6-4. As It is evident from the seismic zoning map that the entire district is fall into zone 3. Which is prone to earthquake and other natural hazard e.g. landslide etc.

6.3.3 Geological land use (Minerals deposits)

Abbottabad has enriched mineral resources i.e. Some of the minerals mined within the district are barite, dolomite, granite, gypsum, limestone, magnesite, marble, phosphate, red ochre and red oxide. The location of these minerals are shown on map 6-5.

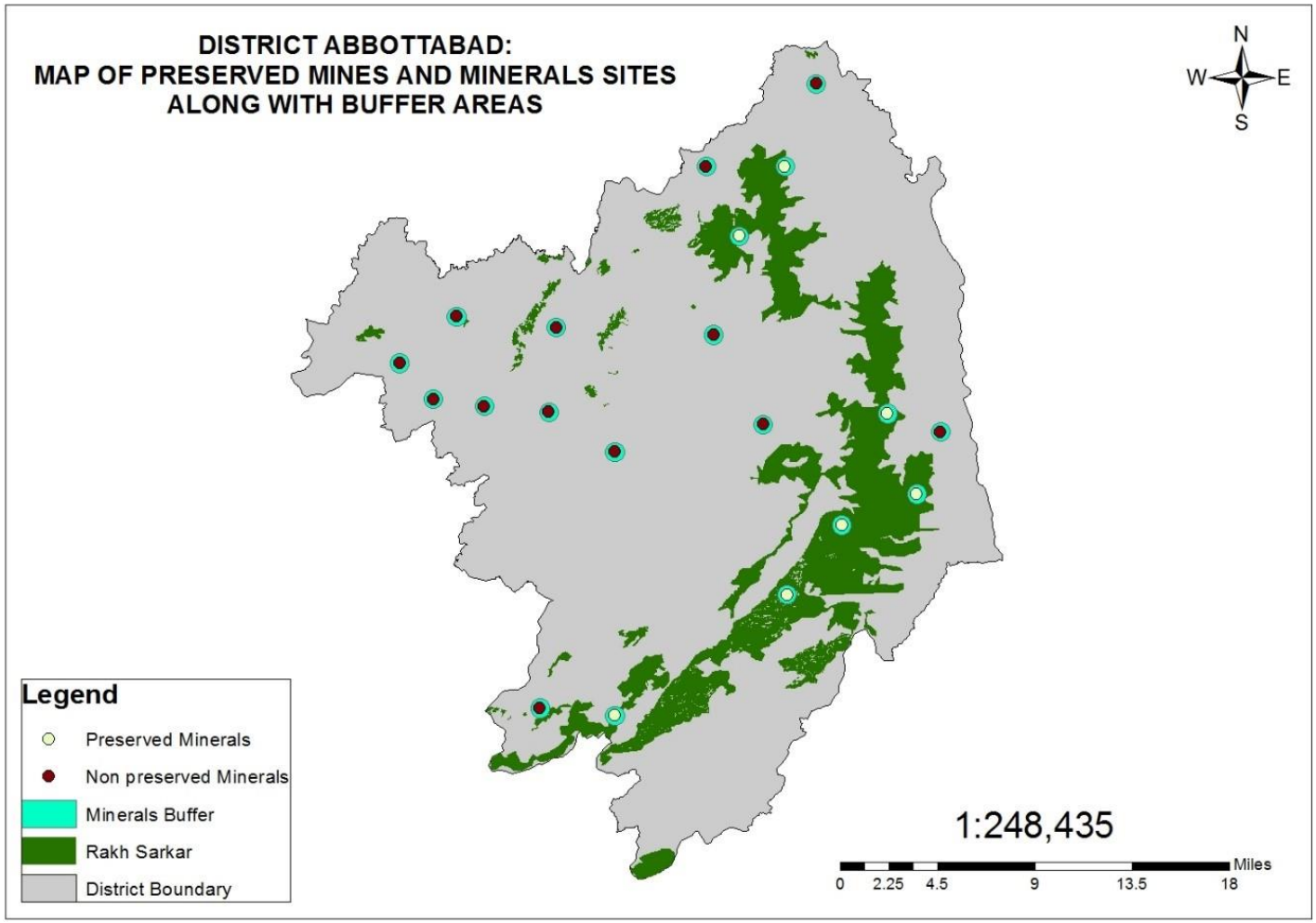


MAP 6-4:Seismic Zonation Map Based on Building Code in Pakistan



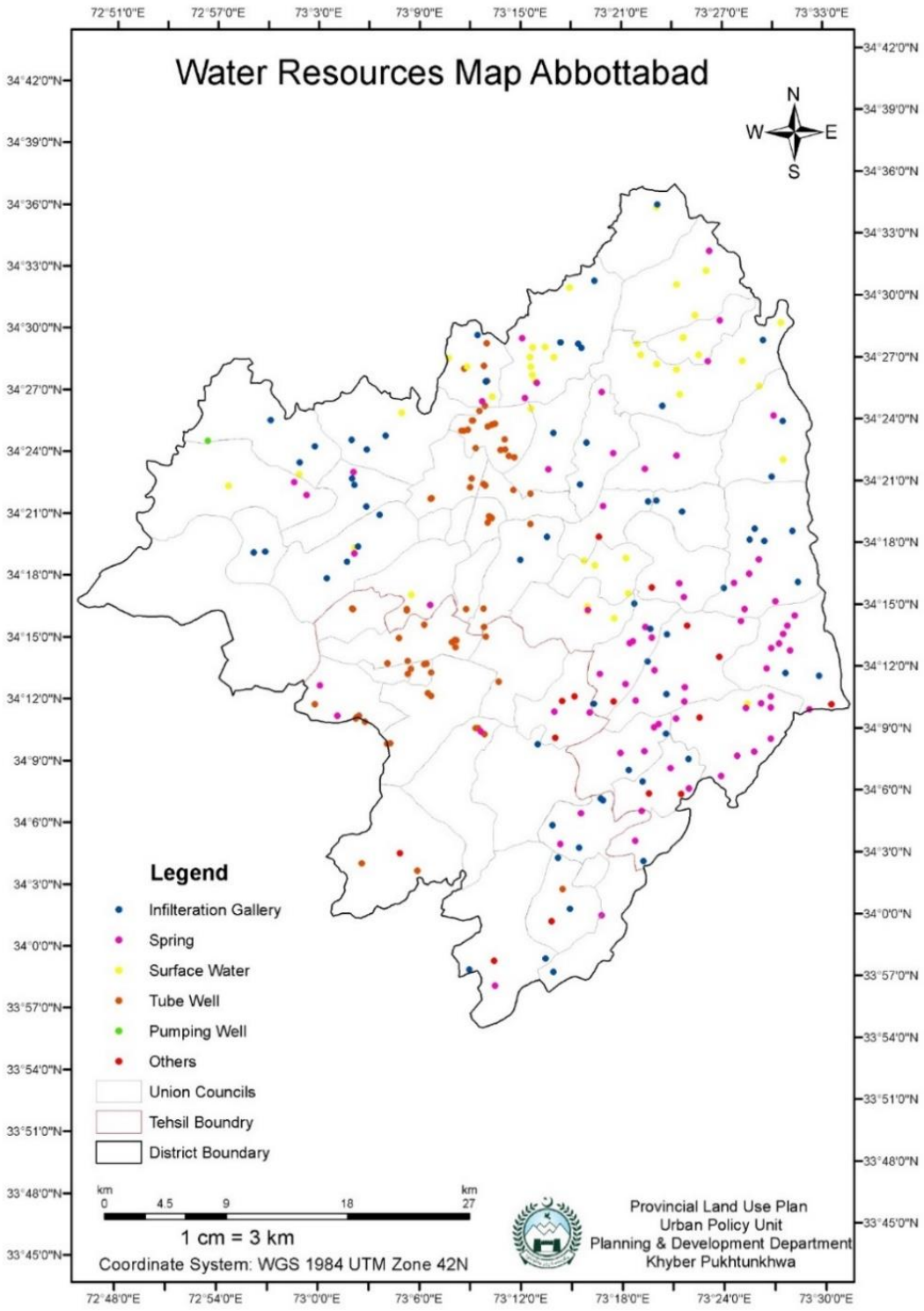
MAP 6-5:Locational map of mines and minerals deposit

6.3.4 PRESERVED MINES AND MINERALS SITES ALONG WITH BUFFER AREAS



MAP 6-6:Preserved mines and minerals along with buffer

6.3.5: GEOLOGICAL LAND USE (UNDERGROUND WATER RESOURCES)

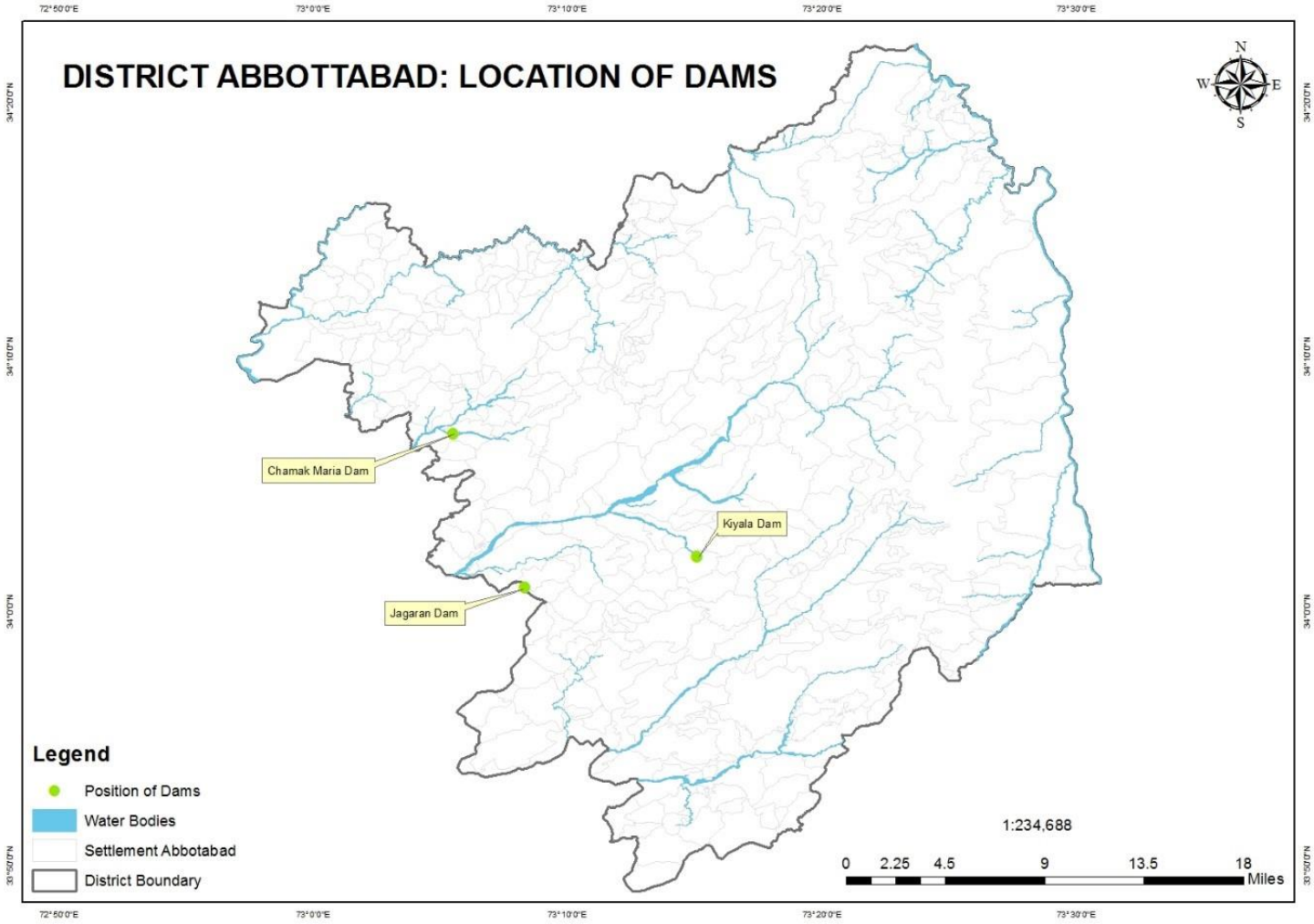


MAP 6-7: Water Resource Map of District Abbottabad

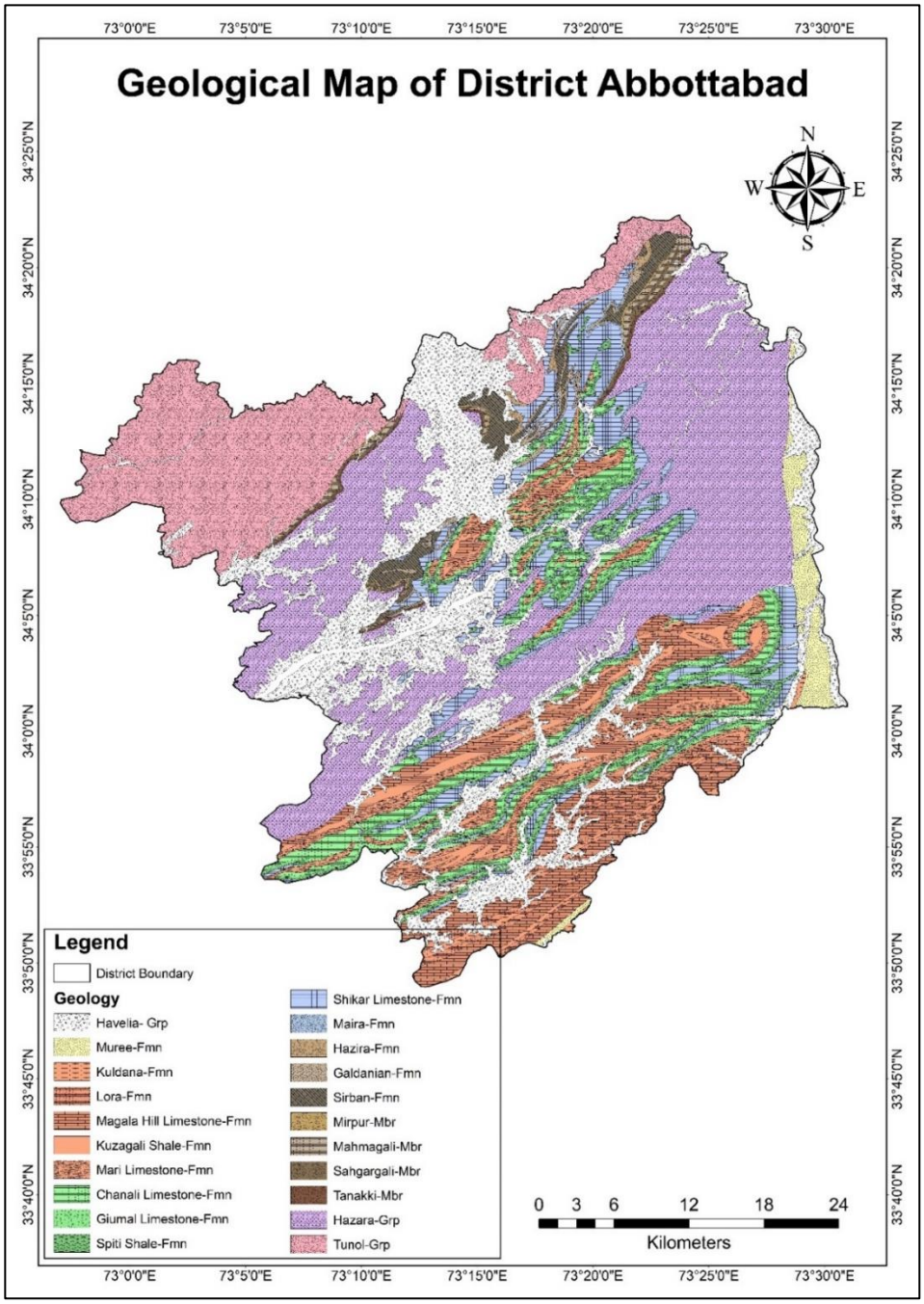
Hydrological Zonation The current land use plan characterizes the district in terms of underground water sources such as springs and wells, rivers and natural drains, canals, dams and reservoirs. As per water bodies acts prevailing in Pakistan the 'right of way' buffer zones around all water bodies (rivers, canals, streams, natural drains, lakes, dams and reservoirs, springs and wells etc.) must be established, preferably 200 feet or more all-around water bodies.

GEOLOGICAL LAND USE The geological formation of the Hazara District (including Abbottabad) range in age from Precambrian to Quaternary and include sedimentary, igneous and metamorphic rocks and unconsolidated material.107Furthermore, the geology of Abbottabad according to the Geological Survey of Pakistan is given in the geology map which is earlier described in detail in chapter 2.

[107] **There are no sources in the current document.**



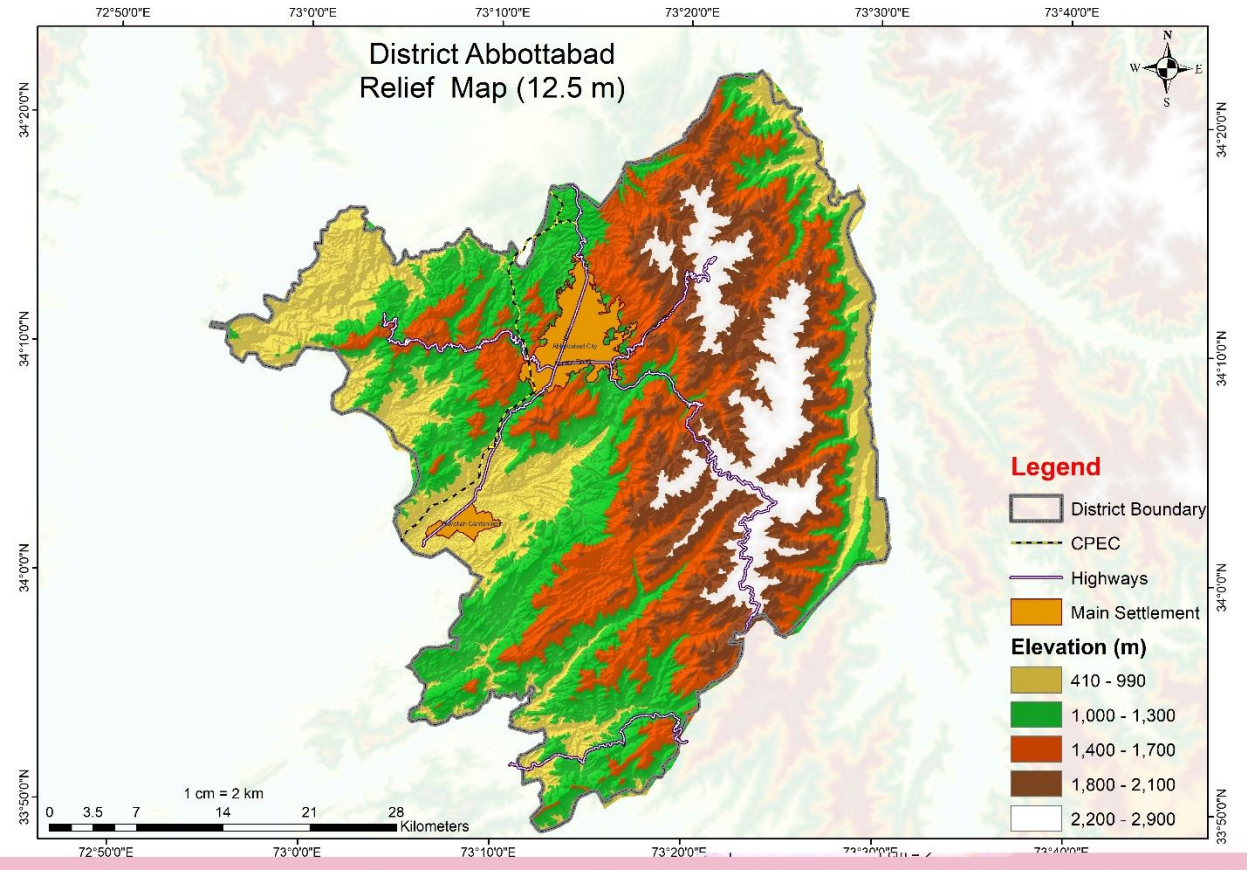
MAP 6-8:Dams and Water Reservoirs in Abbottabad Distrit



MAP 6-9:Geological Map of Abbottabad Distrit

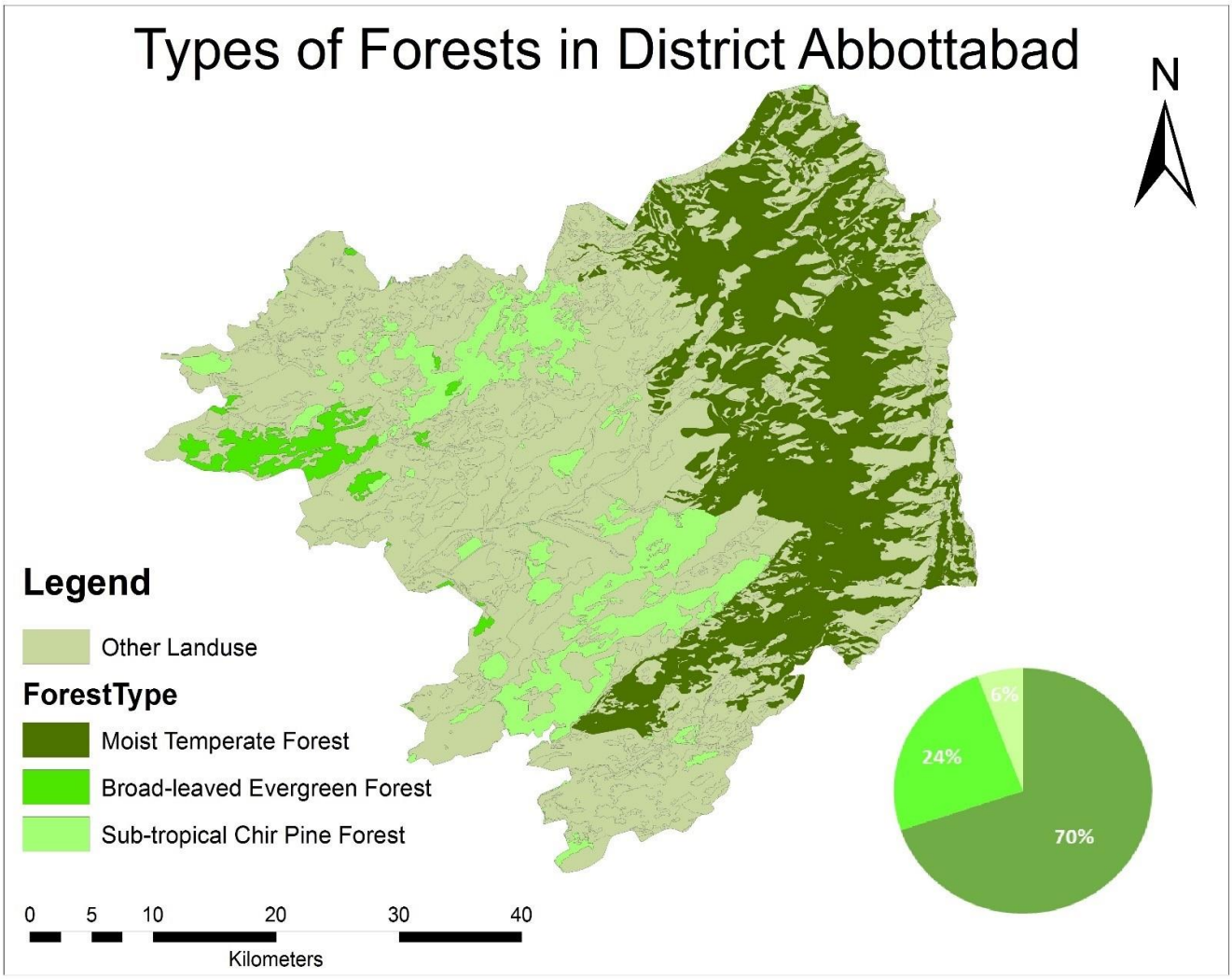
6.3.6 PHYSIOGRAPHIC LAND USE (DEM BASED DIFFICULT/STEEP AREAS)

The following map characterize the elevations/relief features into six categories ranging from 150 m to around 3000 m. The land use plan suggests declaring areas above 1500 m above as protected areas. However, current settlements and production land uses may continue further with enhanced conservation and environmental measures. In the same patterns eco-tourism and improved communications and transportation network may also be suggested through enhanced environmental measures.



MAP 6-10:Relief / Elevation Mao of District Abbottabad

6.3.7: PHYSIOGRAPHIC LAND USES (FORESTS)



MAP 6-11:Types of Forest in District Abbottabad

Forests in the district consist of three major forest types as shown in map 6-11

Moist Temperate Forest; Moist Temperate forests occur in lower Kaghan valley, Hazara, Neelam and Jhelum valleys of Azad Kashmir at an elevation of 1500 to 3000m. it is found in gentle slopes with deep soil especially on cool northern aspects. Main species are comprised of Deodar, Kail, Fir Spruce, Quercus, Alnus, Acer Aesculus and Prunus species.

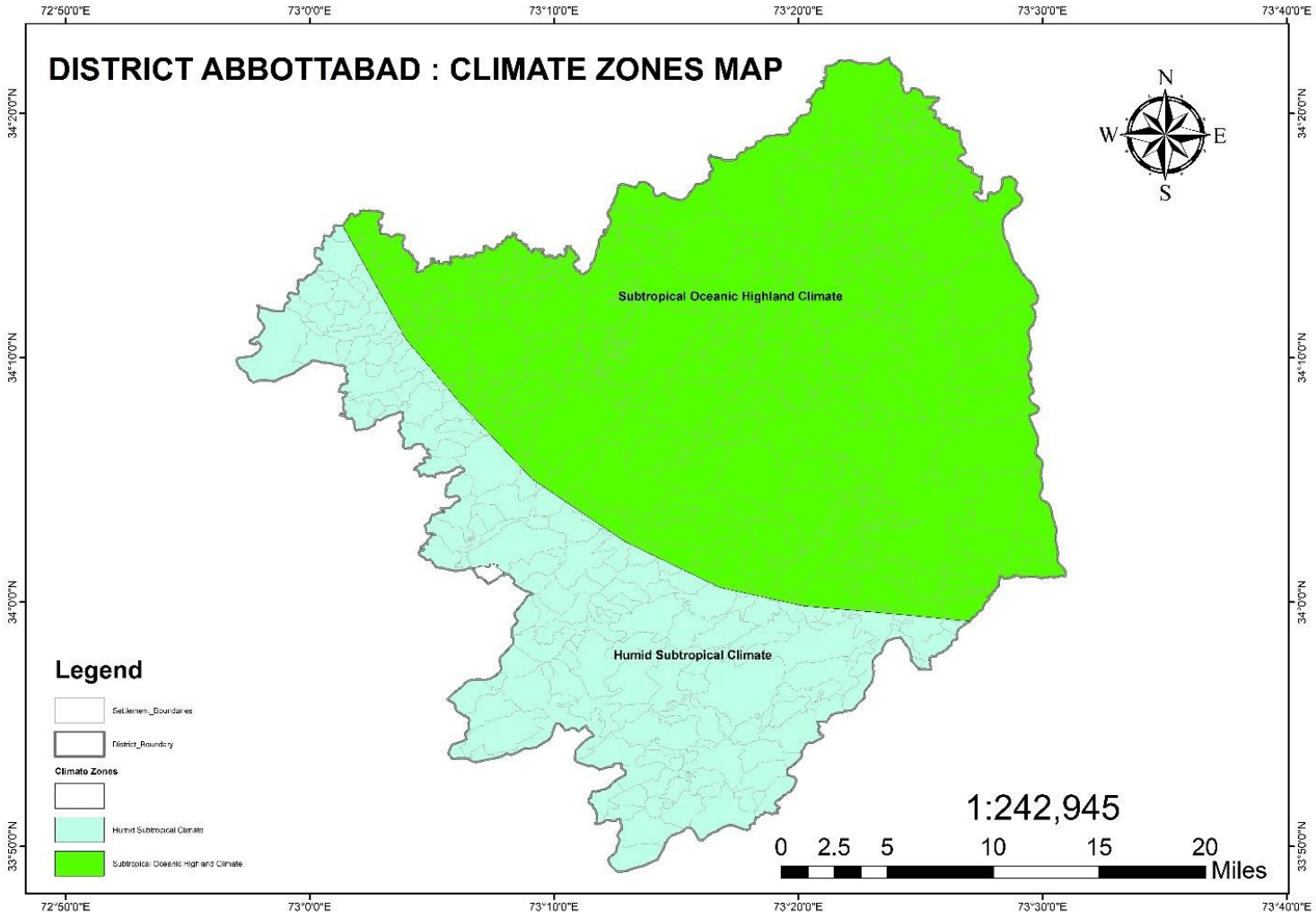
Sub-Tropical Chir Pine Forest; These are open, inflammable pine forests, often without shrub layer. This forest type is found between 800 to 1700m elevation in western Himalaya within the range of South-West summer monsoon. It is found in Lower Dir, Swat, Hazara, AJK and in the foothills of Murree. Main species is Chir Pine.

Sub-Tropical Broad-Leaved Evergreen Forests; These are xerophytic forest with thorny and small-leaved evergreen species. This type occurs in foothills and lower slopes of Himalayas, Salt, Kalachitta Sulaiman Ranges. The typical species of this forest type are; Olea Ferruginea, Acacia Modesta, Dodonaea, Viscosa. Pistacia Integerrima and Zizyphus species etc.

Table 6–1:Forest area in Abbottabad

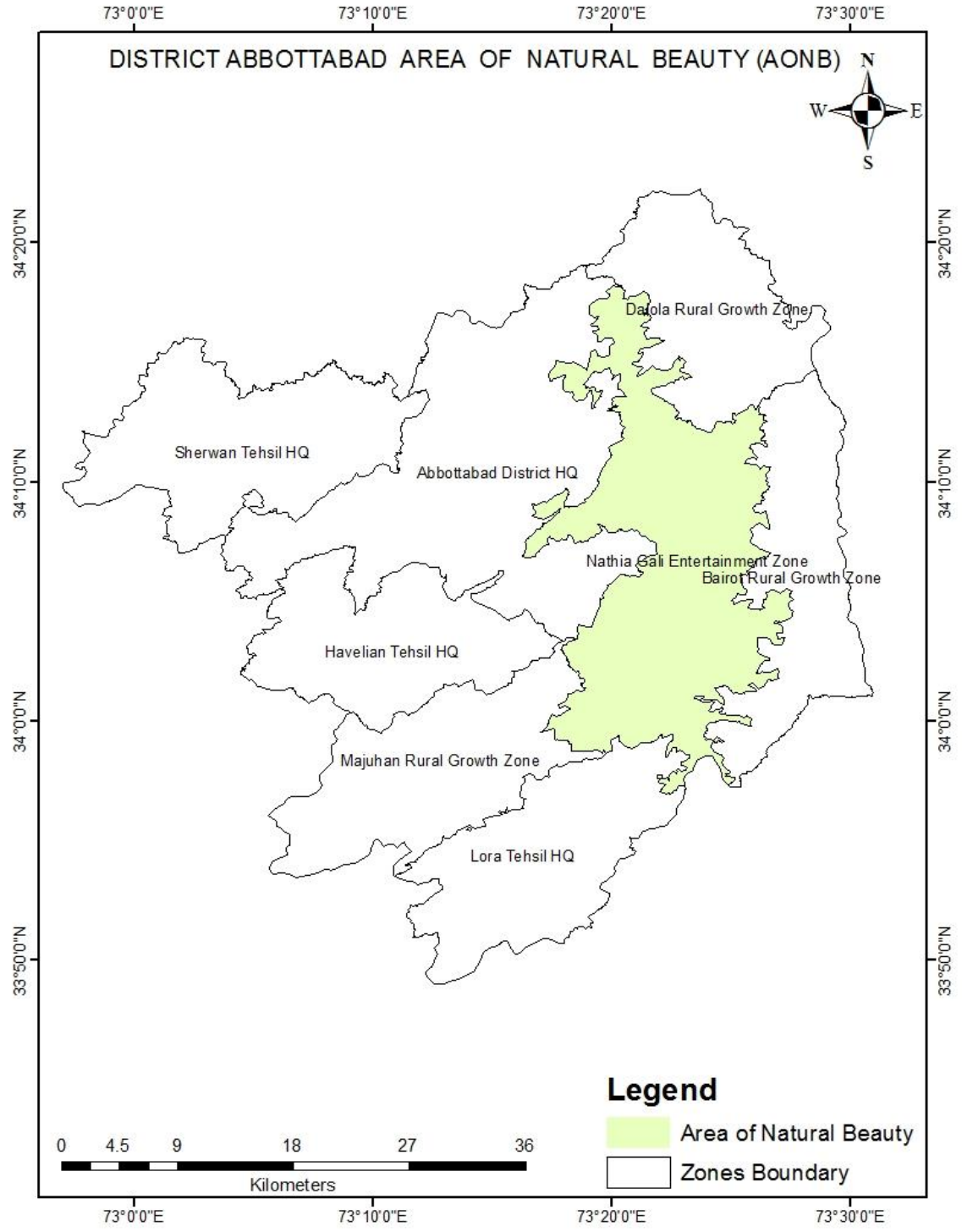
Forest Type	Area (ha)	percentage
Moist Temperate	**46,899**	**26.33**
Sub-Tropical Chir Leaved	**16,416**	**9.2**
Sub-Tropical Broad Leaved	**3,858**	**2.1**
Sub Total	**67,173**	**37.6**

6.3.8 PHYSIOGRAPHIC LAND USES (CLIMATIC ZONES)



MAP 6-12:Physiographic Landuses (Climatic Zone Map)

6.3.9 PHYSIOGRAPHIC LAND USES (AONBS; NATURAL SCENIC BEAUTIES FOR TOURISM)

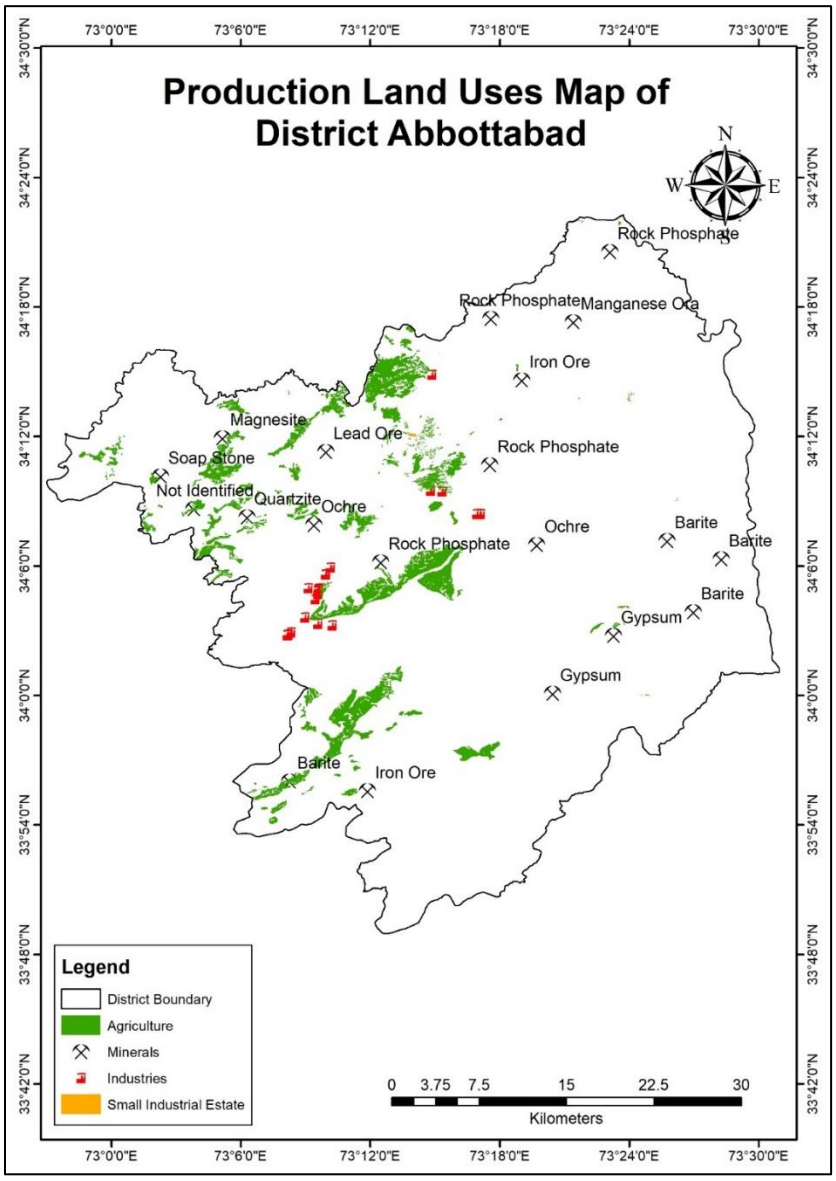


MAP 6-13:Identification of Aonb Areas

6.4 Production Land Uses

6.4.1 Natural/Protected Land Use Zonation

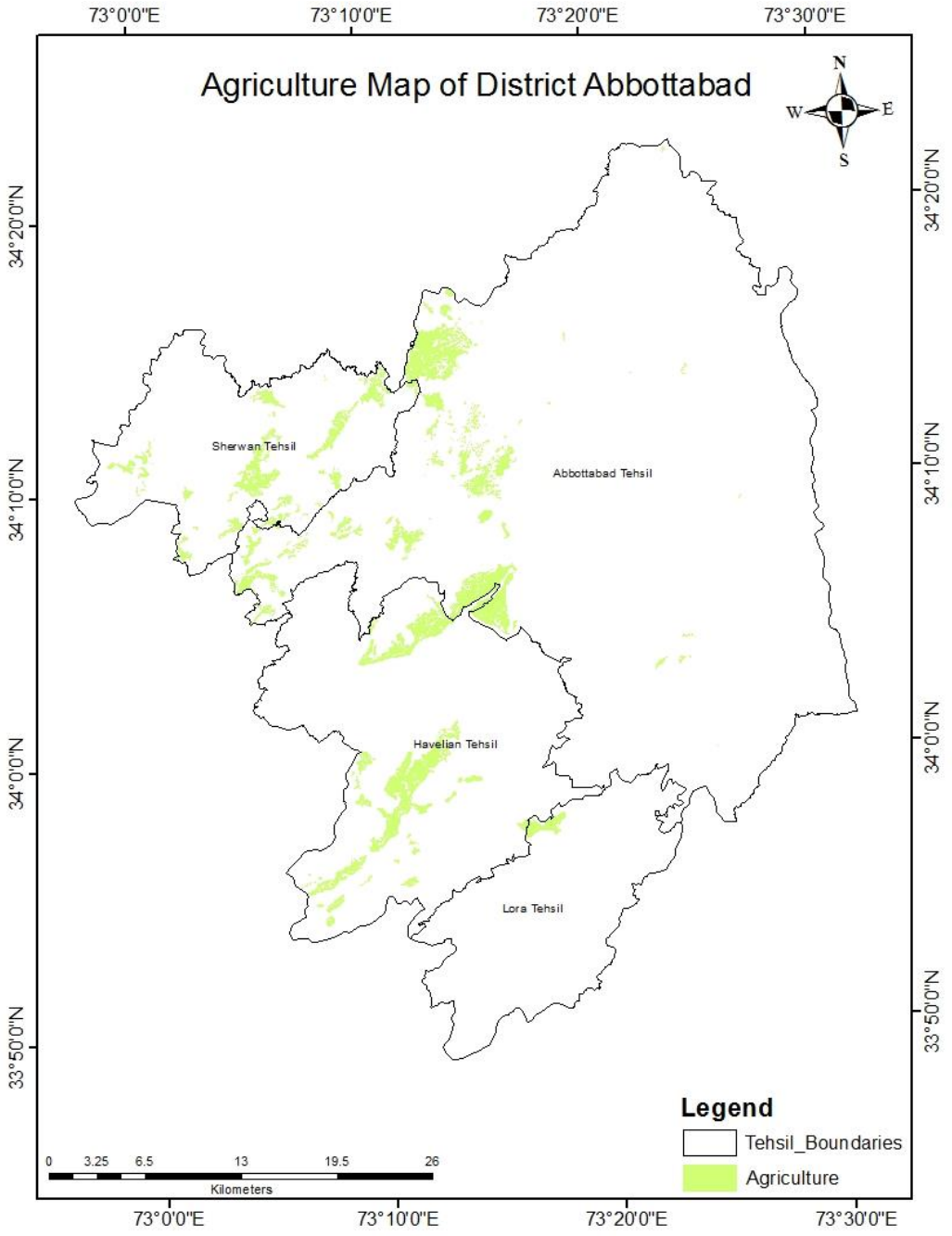
The maps show the cumulative picture of protected/natural land uses in Abbottabad District. The plan recommends protecting all water bodies along with their right of ways and freeze all hazardous zones for settlements land sues. The plan also recommends conserving the areas above 1500 m and the current forest lands in the district. The plan suggests developing protected land uses into eco-tourist sites with improved infrastructure and communication routes. However, it allows to continue current settlements and production land sues but with enhanced environmental considerations in future.



MAP 6-14:Production Land Uses

6.4.2 Physiographic land uses (prime agriculture zones)

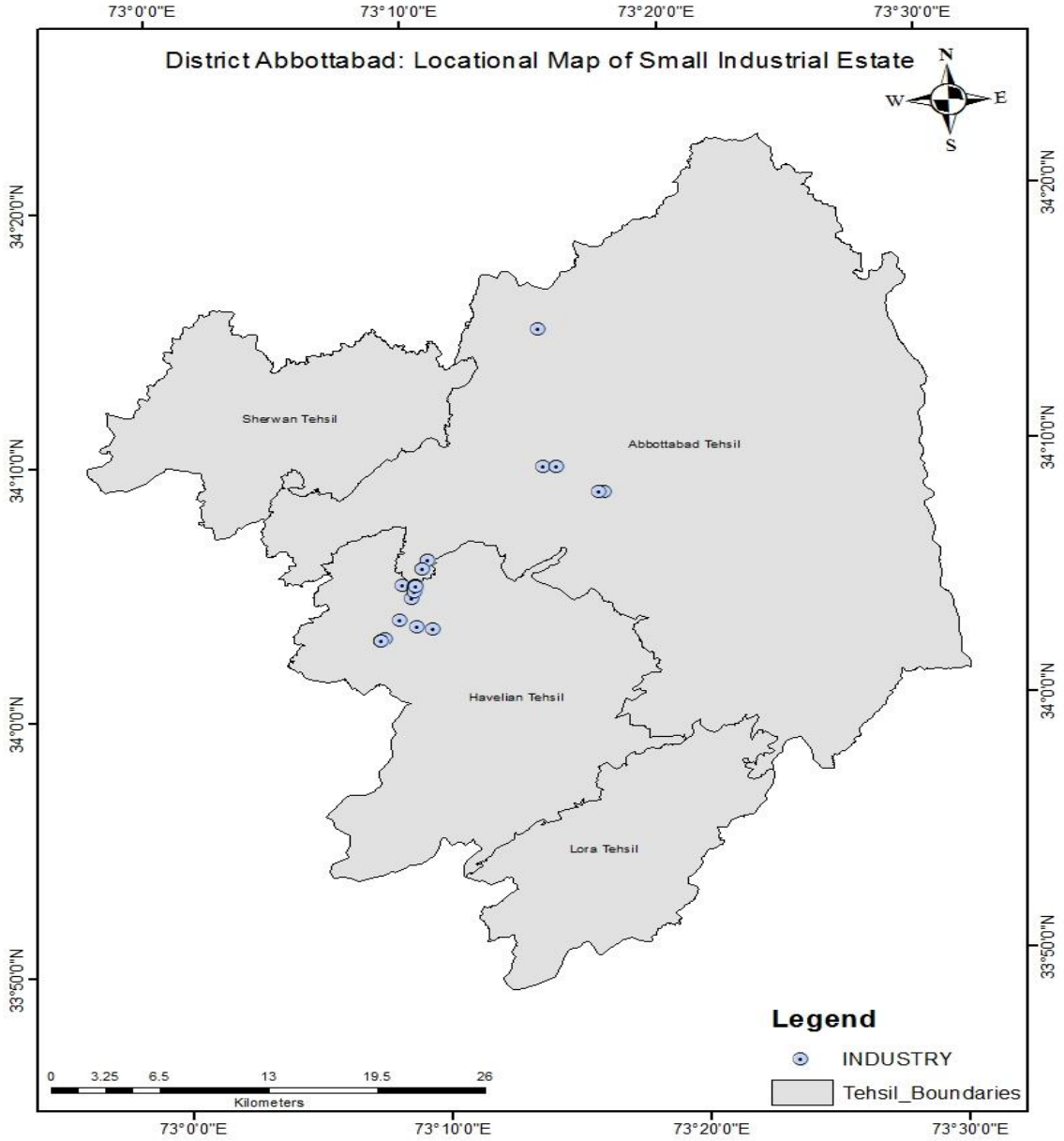
Within production land uses, agricultural land uses rank as the most extensive and important activity, especially in the context of Pakistan. The agricultural land uses are mainly concentrated in the West and South-Western part of the district. The total area under cultivation amounts to around acres and makes 15 % percent of district total area. The spatial coverage and distribution of agricultural lands is given in the following map:



MAP 6-15:Agriculture Land Uses

6.4.3 Industrial zones

Amongst production land uses, mines and minerals operations are also considered and act as one of the major primary employment sectors. The non-metallic minerals are abundant in the district and are largely found in the Mid-Western part of the district. The area is composed of gentle slopes and falls within relatively safer seismic zones. The mid-western part thus can be very conveniently developed as future urban growth zone. This area can be used to develop a counter magnet zone to attract larger populations and thereby alleviating the overburdened Abbottabad municipal zone. The map showing locations of mines and minerals in the district is given as under:

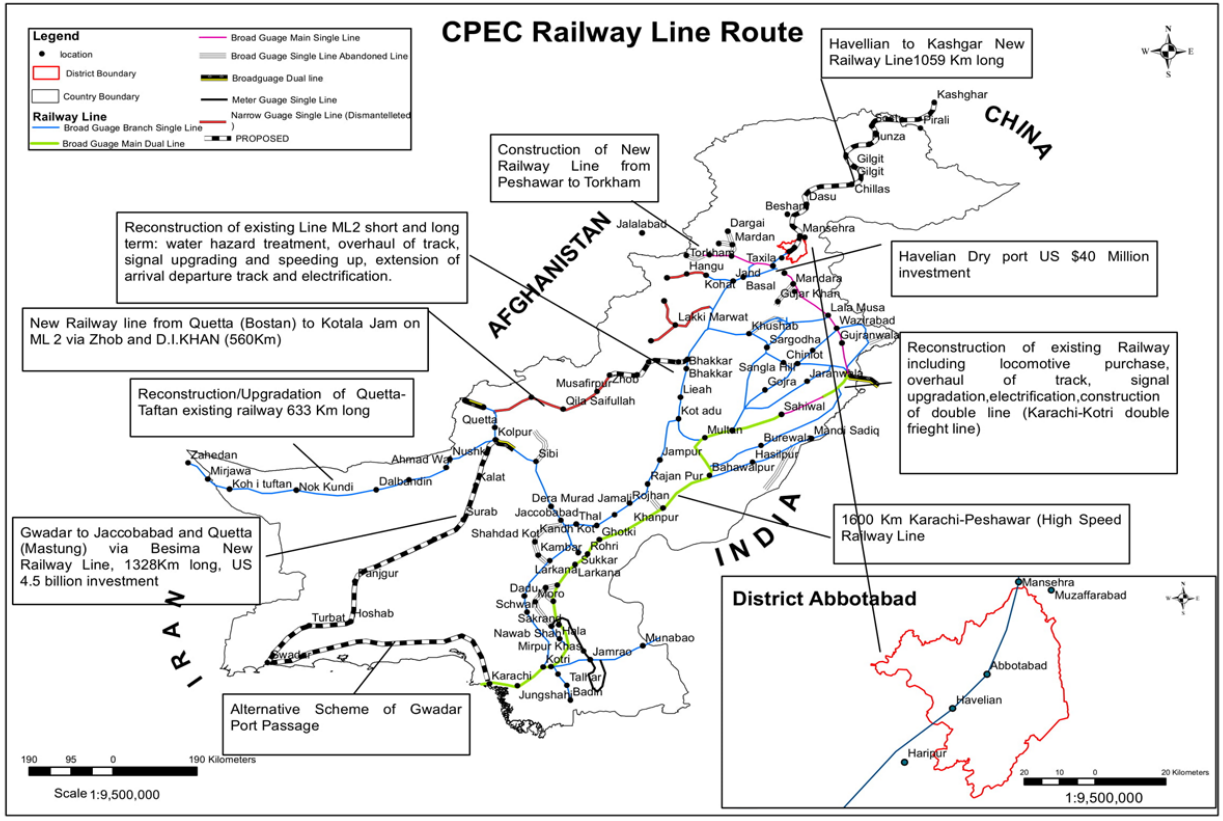


MAP 6-16:Industrial Zone Map of District Abbottabad

6.5 Infrastructure Land Uses

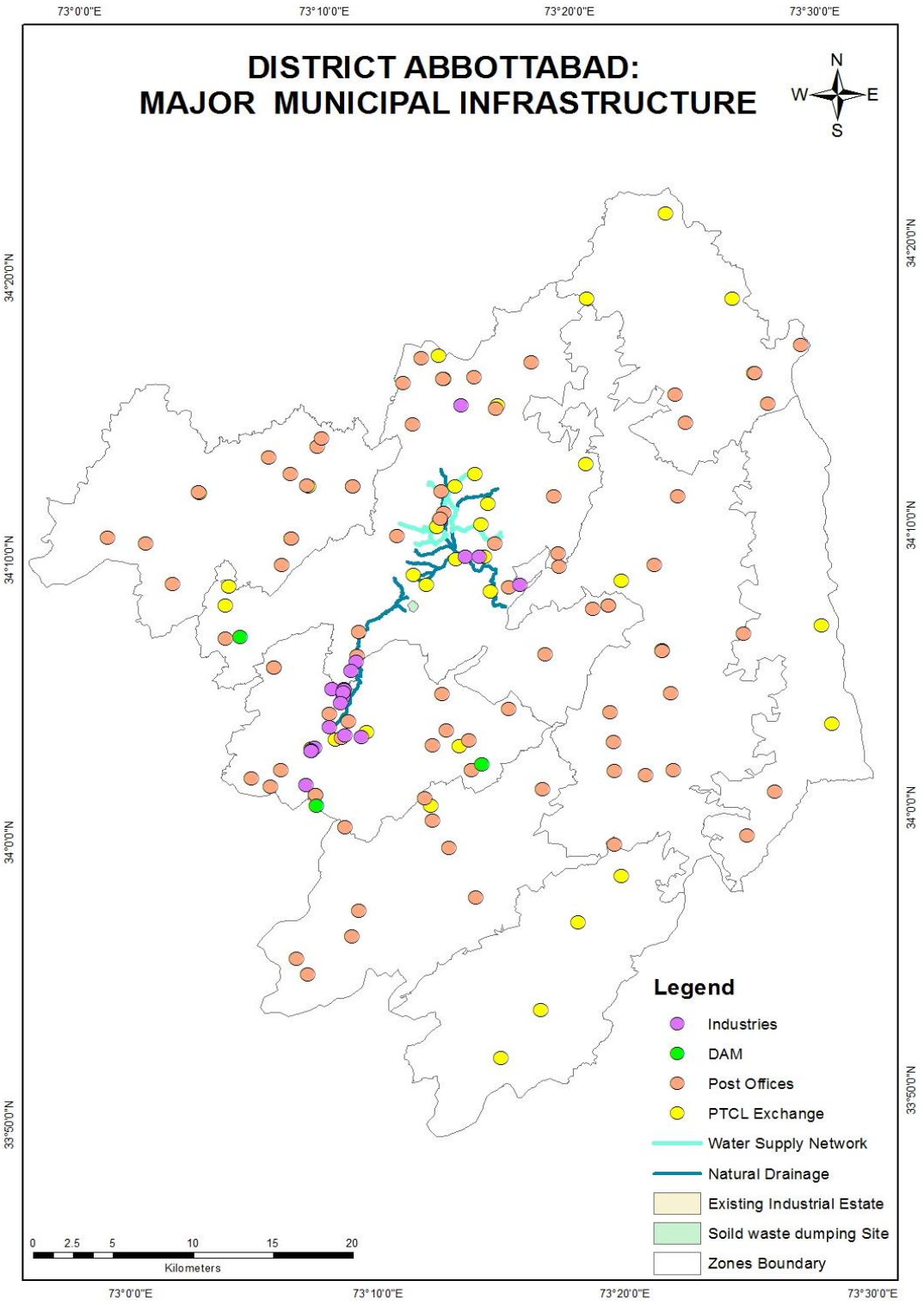
6.5.1 CPECP ROUTE

The third major land use group includes social, physical and economic (point and line) infrastructures. The line infrastructures include major roads, railways, CPEC route, communication and transmission lines. The district land use plan proposes right of ways (buffers) as per existing government legislations work. The map showing CPEC routes and other infrastructures are given as under:

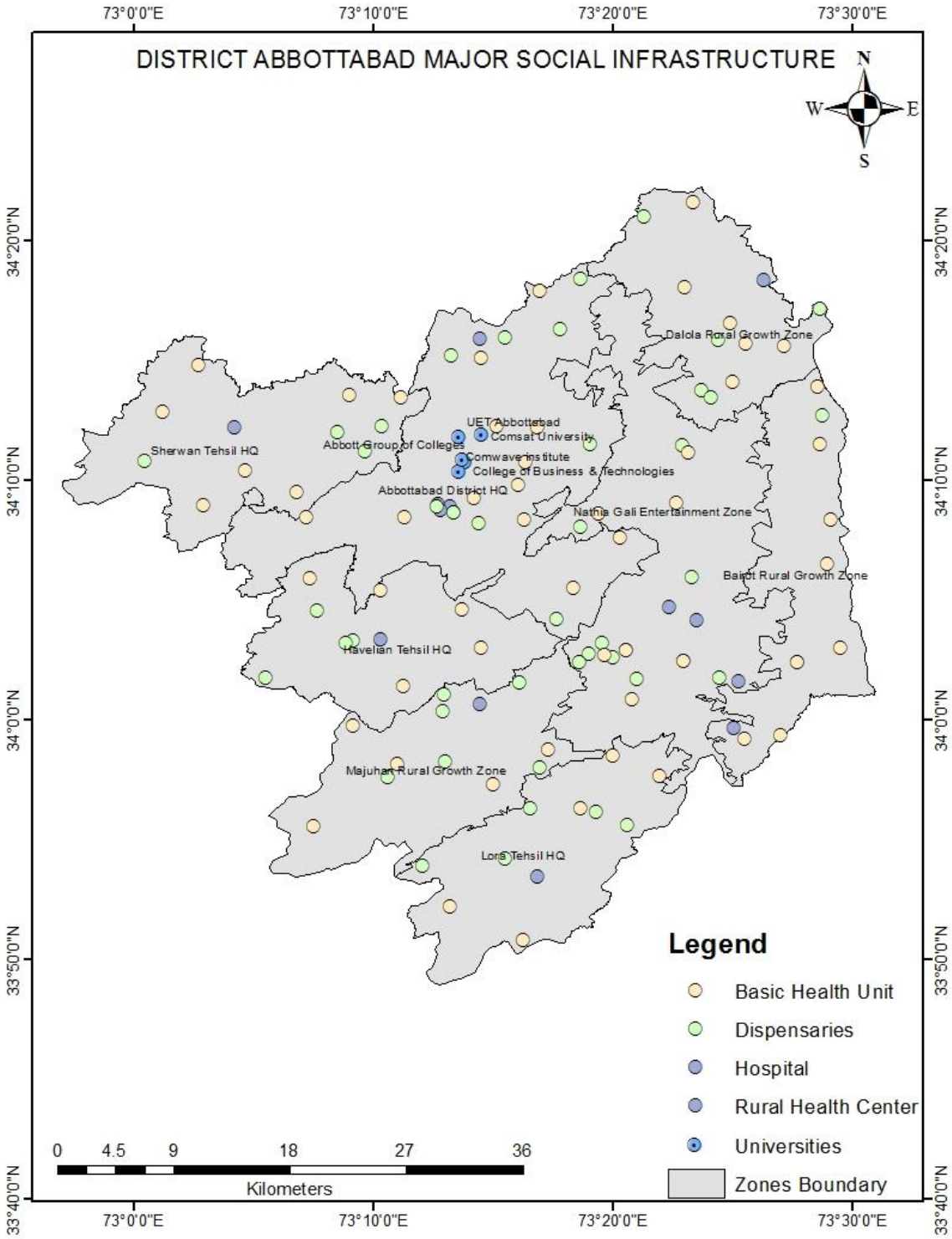


MAP 6-17:CPEC ROUTE and Its Storage, Processing Zones and Warehouses Communication Routes CPEC ROUTE and Its Storage, Proces

6.5.2 IRRIGATION NETWORKS AND DAMS

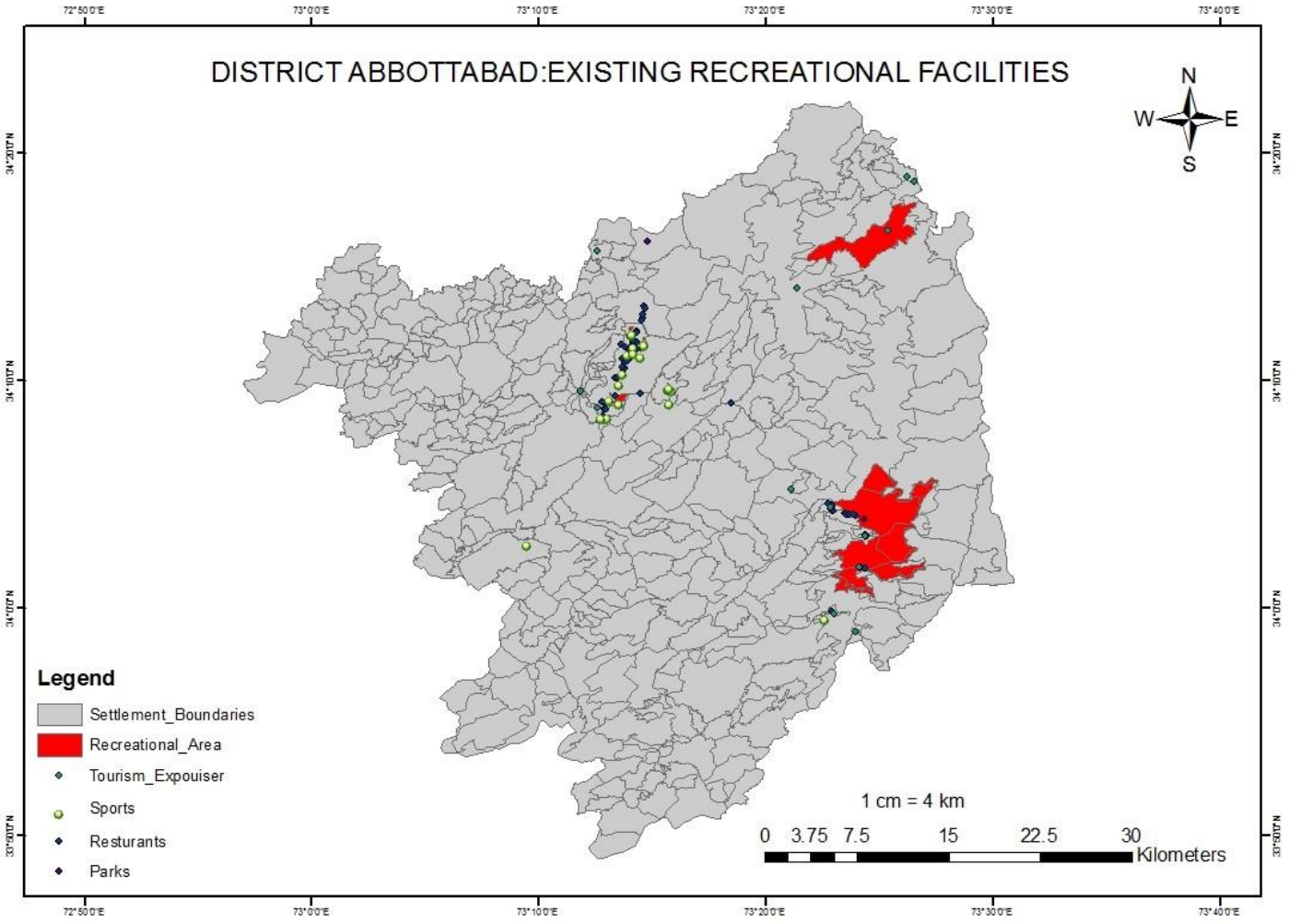


MAP 6-18:Major Municipal Infrastructure (Water/Solid Waste and Other Allied Infrastructure)



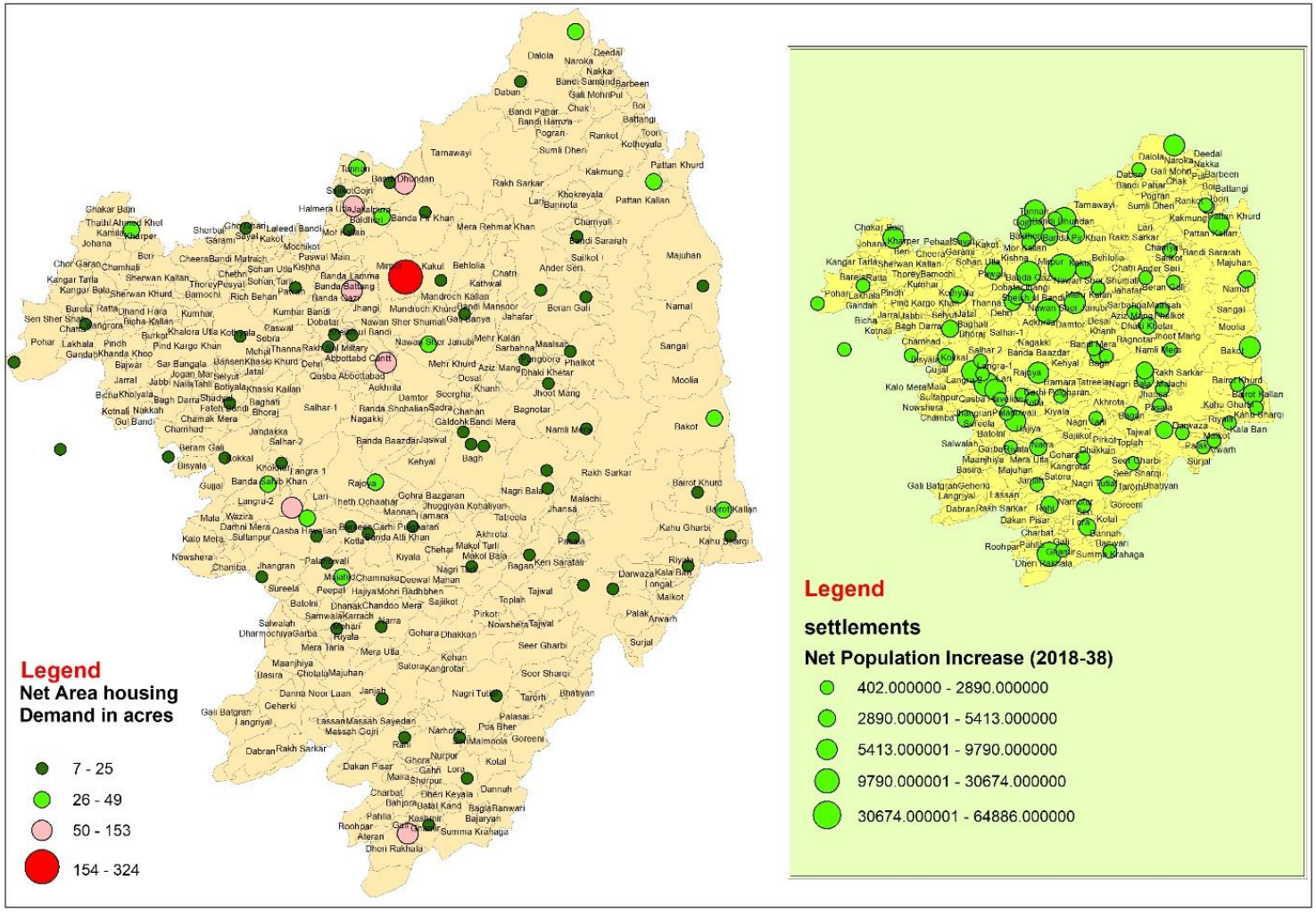
MAP 6-19:Major Social Infrastructure If Any (Universities, Health Complexes) Etc

6.5.3 Tourism and Leisure Infrastructure

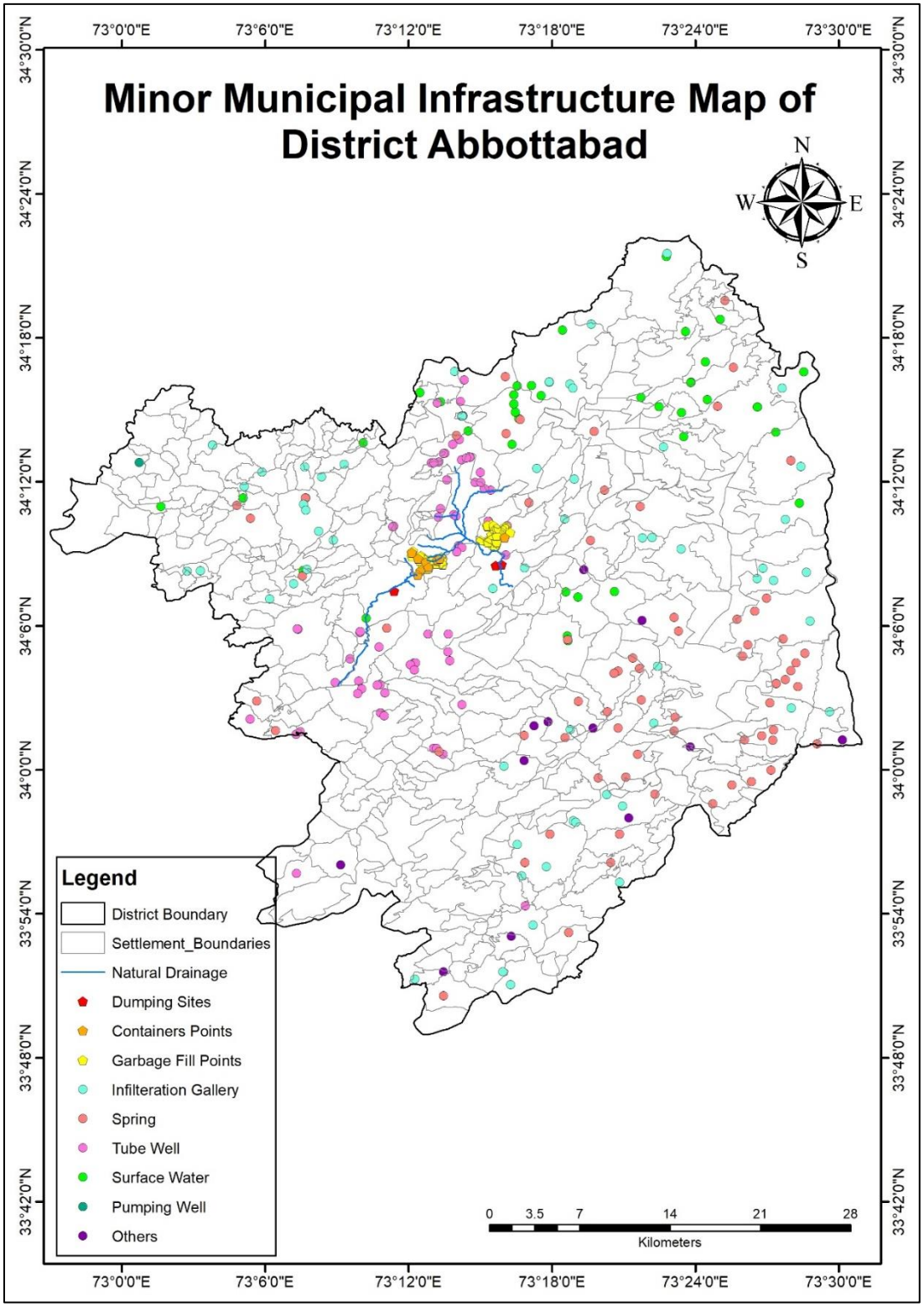


MAP 6-20:Tourism and Leisure Infrastructure (Active and Passive Parks and Stadiums)

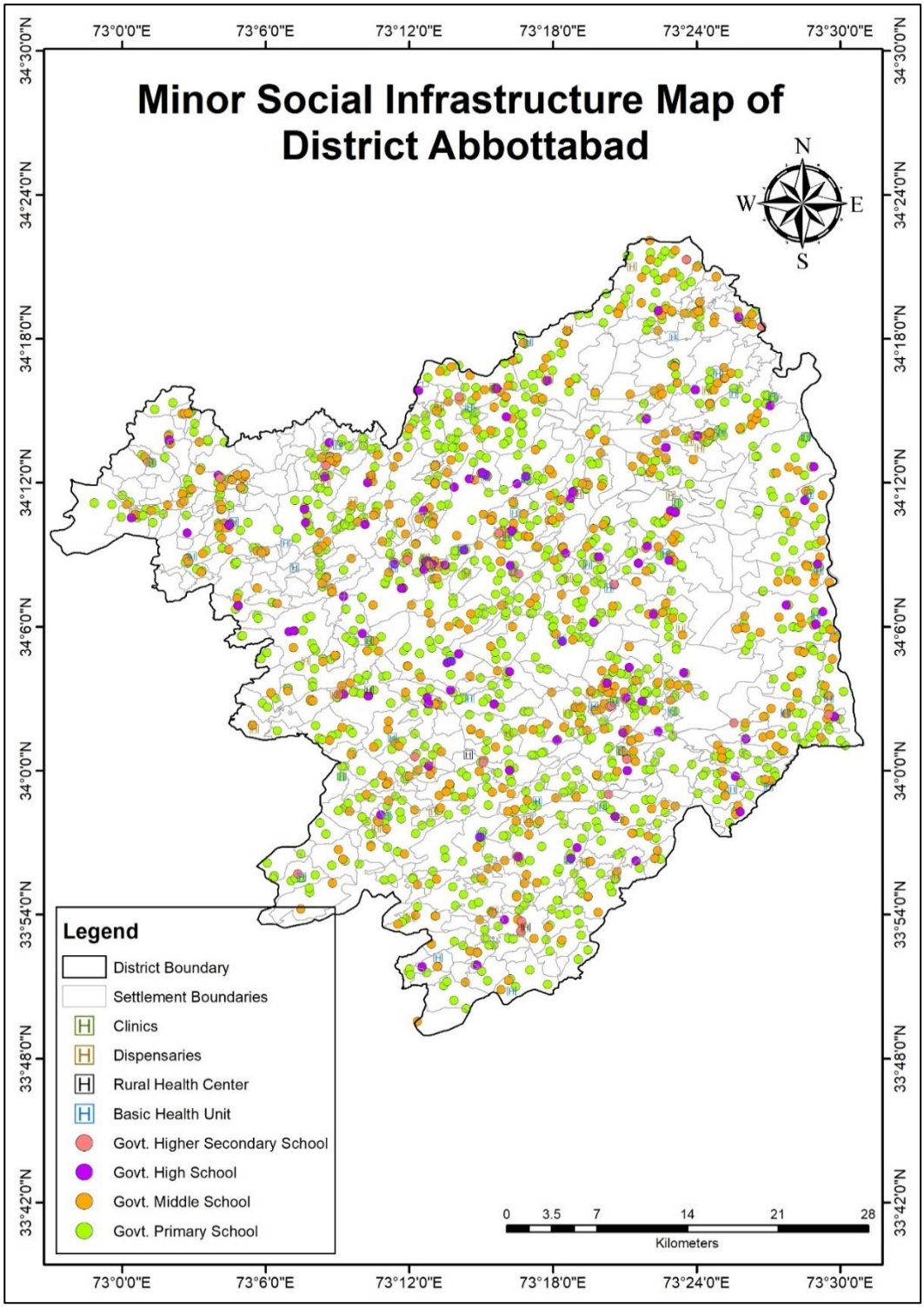
6.6 SETTLEMENTS LAND USES



MAP 6-21:Settlements Spatial Growth (Rural and Urban, Zone Based) Settlements Spatial Growth (Rural and Urban, Zone Based)



MAP 6-22:Minor Municipal Infrastructure (Water Supply, Sewerage, Drainage Etc.)



MAP 6-23:Minor Social Infrastructures (Schools, Health, Community Centres Etc.)

6.7 PROPOSED DISTRICT LAND USE PLAN

A composite map showing natural land uses, production land uses, infrastructure land uses, and settlements land uses with spatial distribution in percentages and in acreage.

The district land use plan specifying the distribution and land requirements for the next 20 years The four major land uses, namely; natural/protected land uses, production land uses, infrastructure land uses, and settlements land uses are given in the following land use plan. A proposed Land use map of District Abbottabad is showing natural land uses, production land uses, infrastructure land uses, and settlements land uses with spatial distribution in percentages and acreage.

The below map 6-22 shows the proposed land use in District Abbottabad for the next 20 years. For the better provision of social and municipal infrastructure, the whole district is divided into 8 zones in which urban and rural areas are counted. The district is divided in to 8 Growth Zones. The Growth Zone (GZ) applies to land that has been identified for future urban development. The zone may also be applied to land adjacent to regional cities and towns where a strategy has been prepared that clearly identifies that the land is suitable for future urban development.

Development sites are finalized after the projection of all required sectors i.e. education, health, parks, playground, and other amenities. These are named as Rural Growth Centres shown in the final map. On the basis of population 3 zones centres (Bairot, Dalola and Mahujan) are selected and project their population to obtain the future demand for hard and soft infrastructure. By designating growth centres, communities can accommodate anticipated growth within a set boundary—extending the existing pattern of development while maintaining a clear edge between town and countryside. Growth centres typically include a mix of uses and public amenities and benefit from access to existing municipal infrastructure.

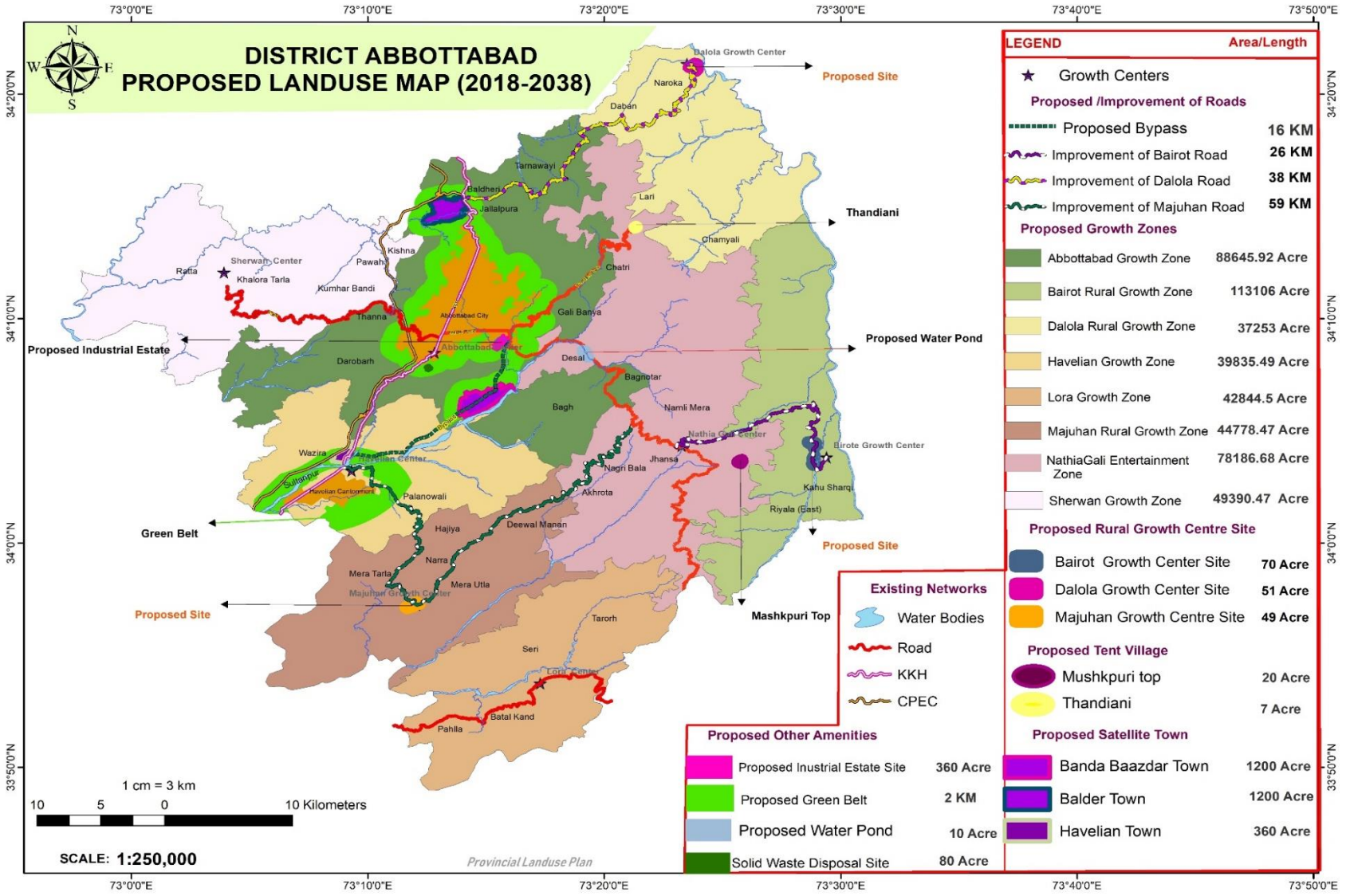
This land-use map highlights the communication network i.e. the Bairot, Dalola and Mahujan Road need the improvement to enhance and promote the movement of people and goods. To reduce the traffic congestion on the KKH and Abbottabad Murree road, new Bypass about 16 km is proposed which can carry the rational load of other existing road networks.

Two points are shown as the selection/ Provision for the tent villages name as Mushkpuri top and Thandiani having total covered area 27 Acres for promotion of tourism in the respected area.

For the provision and fulfil the requirement of housing need in the district three satellite towns are proposed based on population projection. satellite towns are smaller municipalities that are adjacent to a major city which is the core of a metropolitan area. So, the total land required for three 3 satellite town is 2760 Acres. Location of these three towns has graphic representation in the below map.

Other social amenities like small industrial Scale, Green belt, water pond, and solid waste disposal site with the provision of 360,2,10 and 80 acres

In Short, the final land use plan of district Abbottabad is the combination of all Social, and economical, hard and soft infrastructures to provide the vision of future department in the District Abbottabad.



MAP 6-24:Proposed Land Use Map Of District Abbottabad

6.7 SETTLEMENTS LAND USE ZONATION

The fourth major land use are counted under living areas—human settlements comprising both rural and urban centres. Although, land use distribution hierarchy also exist within human settlements and land use demand analysis are separately done for them. But, in this study performed at district level, consider human settlements as one cumulative land use—named as settlement land uses. The study has made land demand analysis both at the rural and urban levels and the land requirements are accounted for the next twenty years plan period (2018-2038). The following tables and the map indicate the land requirements in existing urban and rural centres, respectively:

Table 6–2:Total Land Requirements for Urban Settlements in Abbottabad District

Urban Settlements	Growth Rate (1998-2017)	Population		Urban Area Demand (acres)		
		2028	2038	2028	2038	2018-38
Abbottabad Cantt	4.634	227638	358064	231	363	1067
Abbottabad MC	2.063	87858	107765	43	52	181
Havelian Cantt	2.522	41393	53098	24	31	104
Havelian M.C	0.164	17127	17410	1	1	3
Murre Gallies Cantt	3.716	917	1321	1	1	3
Nawan Shehr TC	3.137	50199	68367	36	49	158
Total	2.706	425131	606025	335	497	1515

Table 6–3:Total Land Requirements for Rural Settlements in Abbottabad District

Sr. No.	Villages	G. Rate (1998/2017)	Population		Land Area Demand (acres)		
			Pop. 2028	Pop. 2038	Net Demand 2028	Net Demand 2038	Gross Demand 2018-2038
1	Ateran	0.94	888	976	0.40	0.44	0.84
2	Dheri Rakhala	0.965	3758	4137	1.72	1.89	3.62
3	Gali	2.55	1094	1408	1.22	1.57	2.79
4	Ghamir	1.655	4390	5173	3.32	3.92	7.24
5	Kashmir	2.07	235	288	0.22	0.27	0.49
6	Pahlla	1.37	2895	3317	1.84	2.11	3.95
7	Roohpar	1.89	1950	2351	1.67	2.00	3.67
8	Battal Kund	1.53	1494	1739	1.05	1.22	2.28
9	Bhajoora	1.41	966	1111	0.63	0.72	1.36
10	Charbat	1.15	897	1006	0.48	0.55	1.03
11	Dakan Pisar	1.455	3736	4317	2.51	2.90	5.42
12	Maira	0.665	248	265	0.08	0.08	0.17
13	Rahi	1.975	7568	9202	6.72	8.17	14.89
14	Sher Pur	2.465	295	376	0.32	0.41	0.73
15	Goreeni	1.51	8209	9537	5.71	6.64	12.36
16	Kotal	2.215	4424	5507	4.35	5.41	9.77
17	Palasai	1.46	847	979	0.57	0.66	1.23
18	Bagla	3.135	179	244	0.24	0.33	0.57
19	Bajarian	-0.045	92	92	0.00	0.00	0.00
20	Banwari	1.325	3011	3435	1.86	2.12	3.98
21	Dannah	0.68	3341	3575	1.10	1.17	2.27
22	Summa Krahaga	1.36	3421	3916	2.16	2.47	4.64
23	Dheri Keyala	1.62	3765	4421	2.79	3.28	6.08

24	Gahri	1.85	1275	1531	1.07	1.28	2.35
25	Ghora	1.275	219	248	0.13	0.14	0.28
26	Lora	2.635	8857	11488	10.14	13.15	23.30
27	Narhotar	1.895	4282	5166	3.66	4.42	8.09
28	Nurpur	0.505	525	552	0.13	0.13	0.27
29	Seri	1.11	733	819	0.38	0.43	0.81
30	That Karam Shah	1.365	231	264	0.15	0.16	0.31
31	Nagri Tutial	1.57	14983	17509	10.81	12.63	23.44
32	Chehr	2.94	3557	4753	4.47	5.98	10.46
33	Dewal Manal	1.86	5284	6353	4.45	5.34	9.79
34	Makol Tarli	1.87	2985	3593	2.53	3.04	5.57
35	Nagri Tarli	2.06	4212	5165	3.89	4.76	8.65
36	Saji Kot	1.37	3828	4387	2.43	2.80	5.23
37	Dabran	0.295	2392	2463	0.34	0.36	0.70
38	Gali Batgran	2.485	1587	2028	1.73	2.20	3.93
39	Geherki	1.55	2550	2974	1.82	2.12	3.94
40	Langriyal	0.965	3437	3783	1.58	1.73	3.31
41	Basira	-2.035	313	254	-0.36	-0.30	-0.66
42	Chotala	1.58	508	594	0.37	0.43	0.80
43	Danna Noor Laan	1.215	3487	3935	1.98	2.24	4.22
44	Faqir Mohd	0.525	599	631	0.15	0.16	0.31
45	Lassan	0.99	963	1063	0.45	0.50	0.95
46	Maanjhiya	-1.28	429	377	-0.30	-0.26	-0.56
47	Garba	1.47	1136	1314	0.77	0.89	1.66
48	Majuhan	0.355	3652	3783	0.64	0.65	1.29
49	Massah Gojri	0.995	1677	1851	0.79	0.87	1.66
50	Massah Sayedan	1.035	621	689	0.31	0.34	0.65

51	Mera Tarla	1.515	632	734	0.44	0.51	0.95
52	Chamnaka	1.47	2326	2691	1.58	1.83	3.41
53	Chandoo Mera	1.75	1620	1927	1.29	1.54	2.83
54	Dhanak	2.705	1124	1467	1.32	1.71	3.03
55	Hajiya	1.575	2959	3459	2.14	2.50	4.64
56	Karrach	-0.225	509	497	-0.06	-0.06	-0.12
57	Mohari	2.34	720	907	0.74	0.94	1.68
58	Riyala	1.95	1500	1819	1.32	1.59	2.91
59	Samwala	0.765	2890	3119	1.06	1.14	2.21
60	Dharmochiya	1.25	931	1055	0.55	0.62	1.17
61	Gohara	1.385	1965	2255	1.26	1.45	2.72
62	Mera Utla	-2.55	731	564	-1.08	-0.84	-1.92
63	Mohribadhbhen	3.94	836	1230	1.34	1.97	3.31
64	Narra	3.245	7718	10621	10.55	14.51	25.07
65	Dhakkan	1.595	3928	4601	2.87	3.37	6.24
66	Janjah	-0.69	684	639	-0.25	-0.22	-0.47
67	Kangrotar	0.925	1364	1495	0.60	0.65	1.26
68	Kehan	1.05	282	313	0.14	0.15	0.30
69	Mari	1.64	1259	1482	0.95	1.11	2.06
70	Satora	1.155	3960	4442	2.15	2.41	4.56
71	Garhi Phulgharan	1.985	7306	8892	6.52	7.93	14.45
72	Gohra Bazgaran	1.19	2979	3354	1.66	1.87	3.54
73	Harnara	1.435	1921	2215	1.28	1.47	2.75
74	Kiyala	0.895	3146	3439	1.34	1.46	2.81
75	Mannan	0.515	354	372	0.09	0.09	0.18
76	Rajoya	2.135	16864	20831	16.06	19.83	35.89
77	Thathi Ochaahar	1.905	843	1018	0.72	0.88	1.60

78	Arwar	0.71	511	548	0.17	0.19	0.36
79	Darwaza	1.86	4717	5671	3.97	4.77	8.74
80	Palak	0.77	6488	7006	2.40	2.59	4.99
81	Surjal (Malikabad)	0.85	3279	3569	1.33	1.45	2.78
82	Kala Ban	1.32	913	1041	0.56	0.64	1.20
83	Longal	2.54	3514	4516	3.90	5.01	8.91
84	Malkot	0.66	5470	5842	1.74	1.86	3.60
85	Riyala (Palak)	1.715	6048	7169	4.73	5.61	10.34
86	Bairot Kalan	2.07	18497	22703	17.14	21.03	38.17
87	Kahu Sharqi	1.76	7678	9142	6.15	7.32	13.47
88	Bairot Khurd	1.355	7722	8835	4.86	5.57	10.43
89	Kahu Gharbi	1.56	6482	7568	4.65	5.43	10.08
90	Bakot	1.905	21495	25959	18.48	22.32	40.80
91	Moolia	1.245	8178	9255	4.76	5.39	10.15
92	Sangal	1.585	6665	7800	4.85	5.68	10.53
93	Majuhan	2.14	15517	19176	14.80	18.30	33.10
94	Namal	2.29	11072	13885	11.22	14.06	25.28
95	Bhatiyan	1.55	3075	3586	2.19	2.56	4.75
96	Seer Sharqi	1.91	6742	8146	5.81	7.02	12.84
97	Tarorh	0.72	3620	3889	1.25	1.35	2.60
98	Pus Bher	2.01	779	951	0.70	0.86	1.57
99	Malmoola	1.855	1288	1548	1.08	1.30	2.38
100	Seer Gharbi	1.795	13471	16094	10.98	13.12	24.10
101	Nowshera	2.35	4653	5870	4.82	6.08	10.91
102	Pirkot	1.64	2754	3240	2.07	2.43	4.50
103	Tajwal	1.58	9988	11683	7.24	8.48	15.72
104	Toplah	2.4	3256	4128	3.44	4.36	7.80

105	Bagan	1.85	7444	8942	6.23	7.49	13.73
106	Jhansa	1.34	5655	6460	3.53	4.02	7.55
107	Lassan (N)	1.945	672	815	0.59	0.72	1.31
108	Keri Sarafali	-0.04	2416	4257	-0.38	9.20	8.82
109	Malachi	0.345	5877	6083	1.00	1.03	2.03
110	Pasala	1.89	5868	7076	5.01	6.04	11.05
111	Akhrota	1.21	4145	4675	2.35	2.65	5.00
112	Makol Bala	1.65	496	584	0.37	0.44	0.82
113	Nagri Bala	1.46	12192	14093	8.23	9.50	17.73
114	Tatreela	0.68	3011	3222	0.99	1.05	2.04
115	Bagh	1.595	11935	13982	8.73	10.24	18.97
116	Jhuggiyan Kohaliyan	1.84	3389	4066	2.83	3.38	6.21
117	Kehyal	1.015	5831	6451	2.80	3.10	5.90
118	Dhaki Khetar	2.145	6079	7517	5.81	7.19	13.00
119	Namli Mera	0.82	9174	9954	3.60	3.90	7.50
120	Jhoot Mang	3.56	5272	7480	7.78	11.04	18.82
121	Pangoora	1.47	1249	1446	0.85	0.99	1.84
122	Bagnotar	0.515	4400	4631	1.10	1.16	2.26
123	Bandi Mera	1.925	9214	11150	8.00	9.68	17.68
124	Chahan	1.7	2689	3182	2.09	2.46	4.55
125	Aziz Mang	1.205	2466	2780	1.39	1.57	2.96
126	Desal	1.31	4454	5073	2.72	3.10	5.82
127	Khanh	1.095	2707	3018	1.40	1.55	2.95
128	Mehr Khurd	2.045	2574	3151	2.36	2.89	5.25
129	Sadra	1.585	499	584	0.36	0.43	0.79
130	Seergha	1.26	859	973	0.51	0.57	1.08
131	Sarbahna	1.02	5118	5664	2.47	2.73	5.20

132	Maalsah	-0.585	1709	1612	-0.51	-0.49	-1.00
133	Phalkot	0.85	9953	10832	4.04	4.39	8.43
134	Ander Seri	0.17	1861	1893	0.16	0.16	0.32
135	Beran Gali	0.975	10497	11567	4.86	5.35	10.21
136	Jahafar	-0.65	1681	2227	-0.72	2.73	2.01
137	Banda Pir Khan	1.605	14909	17482	10.97	12.87	23.84
138	Bandi Dhundan	3.52	22313	31535	32.63	46.11	78.74
139	Tarnawayi	1.06	12042	13381	6.03	6.69	12.72
140	Bandi Saman	0.56	613	648	0.16	0.18	0.34
141	Barbeen	0.075	1349	1359	0.05	0.05	0.10
142	Batangi	0.315	287	297	0.04	0.05	0.09
143	Boi	1.265	989	1121	0.59	0.66	1.25
144	Deedal	2.125	2582	3186	2.45	3.02	5.47
145	Nakka	-1.62	590	501	-0.52	-0.44	-0.97
146	Pul	-0.235	524	512	-0.06	-0.06	-0.12
147	Ran Kot	-0.48	2837	2704	-0.70	-0.66	-1.37
148	Tori	-0.58	603	569	-0.18	-0.17	-0.35
149	Bandi Hamza	1.035	399	442	0.20	0.21	0.41
150	Bandi Pahar	0.79	1505	1628	0.57	0.61	1.19
151	Chak	0.745	1010	1088	0.36	0.39	0.75
152	Gali Mohri	-0.15	915	901	-0.07	-0.07	-0.14
153	Phogran	1.005	537	594	0.26	0.28	0.54
154	Sumli Dheri	0.635	4793	5106	1.47	1.56	3.04
155	Daban	2.58	4333	5591	4.87	6.29	11.16
156	Dalola	1.74	22644	26908	17.94	21.32	39.26
157	Naroka	2.47	3344	4268	3.62	4.62	8.24
158	Pattan Kalan	1.725	17604	20888	13.84	16.42	30.26

159	Bandi Sararah	2.3	5410	6791	5.50	6.90	12.41
160	Banota	2.695	1444	1884	1.68	2.20	3.89
161	Chamyali	1.455	1243	1436	0.84	0.97	1.81
162	Khokhriala	0.775	1192	1288	0.44	0.48	0.92
163	Larri	0.745	934	1006	0.34	0.36	0.70
164	Sial Kot	1.695	7018	8302	5.43	6.42	11.85
165	Kakmung	-0.48	8103	8965	-2.30	4.31	2.01
166	Kotheyala	0.335	521	539	0.08	0.09	0.18
167	Pattan Khurd	1.225	3512	3966	2.01	2.27	4.28
168	Barkot	-1.55	220	188	-0.18	-0.16	-0.35
169	Haal	-3.04	85	63	-0.15	-0.11	-0.26
170	Khalora Tarla	-0.545	281	266	-0.08	-0.08	-0.16
171	Khalora Utla	0.375	339	352	0.06	0.06	0.13
172	Pind Kargo Khan	0.94	9278	10188	4.15	4.55	8.70
173	Gandah (Habibabad)	2.085	1722	2116	1.60	1.97	3.58
174	Kangrora	0.915	1228	1345	0.53	0.59	1.12
175	Khanda Khoh	0.38	596	619	0.11	0.11	0.23
176	Lakhala	0.745	1965	2116	0.70	0.76	1.46
177	Pind	-0.415	354	340	-0.08	-0.07	-0.15
178	Bandi Nikra	2.785	244	321	0.29	0.38	0.68
179	Bareela	0.175	336	342	0.03	0.03	0.06
180	Bashah Kalan	0.15	450	456	0.03	0.03	0.06
181	Bashah Khurd	-0.515	235	223	-0.06	-0.06	-0.12
182	Chahar	-54.4	0	0	0.00	0.00	0.00
183	Chatta	6.14	349	633	0.78	1.42	2.21
184	Dhand Hara	2.105	1414	1741	1.33	1.64	2.97
185	Kangar Bala	-0.515	580	551	-0.16	-0.14	-0.30

186	Pohar	0.34	677	701	0.11	0.12	0.23
187	Rata	0.82	508	551	0.20	0.21	0.42
188	Seri Sher Shah	0.225	200	204	0.02	0.02	0.04
189	Bamochi	0.57	1651	1748	0.46	0.48	0.94
190	Bhateel	-0.4	910	874	-0.19	-0.18	-0.37
191	Kalar Khaitar	0.615	312	332	0.09	0.10	0.19
192	Kumhar (Amir Abad)	0.97	1402	1544	0.65	0.71	1.36
193	Shaheed Abad	0.5	1834	1927	0.45	0.46	0.91
194	Sherwan Kalan	0.82	1280	1389	0.50	0.54	1.05
195	Sherwan Khurd	0.94	2224	2443	0.99	1.10	2.09
196	Thorey	-0.42	618	592	-0.13	-0.13	-0.26
197	Beri	0.425	585	611	0.12	0.13	0.25
198	Chakarh Bain	-0.03	482	480	-0.01	-0.01	-0.02
199	Chamhati	-1.49	474	408	-0.38	-0.33	-0.72
200	Chorgran (Ahmad Khan)	-0.735	208	193	-0.08	-0.08	-0.16
201	Johana	0.2	1379	1407	0.14	0.14	0.28
202	Kamila	1.245	269	304	0.16	0.17	0.33
203	Kangar Tarla	-1.865	476	394	-0.49	-0.41	-0.91
204	Kalabat	-1.945	62	51	-0.07	-0.05	-0.12
205	Kharper	-0.385	444	428	-0.09	-0.08	-0.17
206	Thathi Ahmed Khan	1.135	1257	1407	0.67	0.75	1.42
207	Banda Jaghian	0.54	372	392	0.10	0.10	0.20
208	Chatrhi		362	687	-0.99	1.63	0.64
209	Rich Behan	1.19	0	2938	-11.60	14.69	3.10
210	Sohan Utla	0.405	2510	862	8.58	-8.24	0.34
211	Sohan Tarli	-0.21	803	295	2.48	-2.54	-0.06
212	Thathi Faqir Sahib		304	633	-0.64	1.65	1.01

213	Kumhar Bandi	2.145	0	2996	-9.80	14.98	5.18
214	Kishna	1.725	807	957	0.64	0.75	1.39
215	Laleedi Bandi	0.715	642	689	0.22	0.23	0.46
216	Mochi Kot (Shah Kot)	0.24	844	864	0.10	0.10	0.20
217	Paswal Mian	2.24	2016	2516	2.00	2.50	4.50
218	Pawah	2.105	7509	9248	7.06	8.70	15.76
219	Bandi Matrach	-0.31	590	572	-0.09	-0.09	-0.18
220	Bazurgal	-0.445	76	72	-0.02	-0.02	-0.04
221	Garamri	1.355	934	1069	0.59	0.68	1.27
222	Go Garhi	4.24	362	549	0.61	0.94	1.55
223	Kakot	1.6	1230	1442	0.90	1.06	1.97
224	Pandoo Thana	1.81	2346	2807	1.93	2.30	4.23
225	Pasial	-0.085	244	242	-0.01	-0.01	-0.02
226	Patheri Seydan	-53.405	0	0	0.00	0.00	0.00
227	Peshail	1.415	844	971	0.55	0.63	1.19
228	Sargal	1.555	685	799	0.49	0.57	1.06
229	Sher Bai	-2.275	66	53	-0.09	-0.06	-0.15
230	Sial	0.675	996	1065	0.32	0.35	0.67
231	Talhaar	2.095	722	888	0.68	0.83	1.51
232	Gaheli	1.385	336	386	0.22	0.25	0.47
233	Gup	1.195	137	154	0.07	0.09	0.16
234	Jogan Mar	1.29	976	1110	0.59	0.67	1.26
235	Kothyala	1.535	11757	13691	8.31	9.67	17.98
236	Mukhdabi	1.83	432	518	0.36	0.43	0.79
237	Nallah	-1.22	204	181	-0.13	-0.12	-0.25
238	Paswal	2.76	1887	2477	2.25	2.95	5.20
239	Salyut	1.835	1008	1209	0.84	1.01	1.85

240	Sobra	2.505	996	1275	1.09	1.40	2.49
241	Tahli	1.95	200	242	0.18	0.21	0.39
242	Todoo	2.515	128	164	0.14	0.18	0.32
243	Bachah Sani	1.735	537	638	0.43	0.50	0.93
244	Bhajwar	-3.495	15	11	-0.03	-0.02	-0.05
245	Gul Bandi	0.69	668	715	0.22	0.24	0.46
246	Jabbi	0.86	965	1051	0.40	0.43	0.83
247	Jarral	0.63	2942	3133	0.89	0.96	1.85
248	Kholyala	1.525	1700	1978	1.19	1.39	2.59
249	Kot Nali	0.555	1380	1459	0.37	0.40	0.77
250	Nakhey	1.455	592	684	0.40	0.46	0.86
251	Baghati	1.955	1064	1291	0.94	1.13	2.07
252	Bain Gojri	1.505	752	873	0.52	0.60	1.13
253	Bain Noora	0.175	749	763	0.06	0.07	0.14
254	Banseri	1.47	656	759	0.45	0.51	0.96
255	Bhoraj	1.58	3068	3589	2.23	2.60	4.83
256	Botiala	0.975	449	494	0.21	0.22	0.43
257	Darobarh	1.75	390	464	0.31	0.37	0.68
258	Jatal	1.03	388	429	0.19	0.20	0.39
259	Khaski Kalan	0.125	1496	1514	0.09	0.09	0.18
260	Khaski Khurd	1.795	1609	1923	1.31	1.57	2.88
261	Mehal	1.775	702	838	0.57	0.68	1.25
262	Thanna	1.905	3211	3878	2.76	3.33	6.10
263	Bagh Darah	2.285	2769	3471	2.80	3.51	6.31
264	Beram Gali	0.65	1172	1251	0.37	0.39	0.76
265	Bisala	1.37	1216	1394	0.77	0.89	1.67
266	Chamak Mera	2	3140	3828	2.82	3.44	6.26

267	Chamhad	1.995	1826	2225	1.64	2.00	3.64
268	Fateh Bandi	1.785	341	408	0.27	0.34	0.61
269	Khani That Hiara	1.805	397	475	0.32	0.39	0.72
270	Sar Bangala	-1.61	56	48	-0.05	-0.04	-0.09
271	Shadial	0.89	533	582	0.23	0.24	0.47
272	Banda Baazdad	2.14	7373	7373	12.72	0.00	12.73
273	Jaswal	1.24	851	851	0.93	0.00	0.93
274	Nagakki	0.625	3719	3719	2.18	0.00	2.18
275	Aokhrila	2.37	4566	4566	8.54	0.00	8.54
276	Banda Shohalian	0.505	565	565	0.27	0.00	0.27
277	Damtor	2.215	20605	20605	36.55	0.00	36.55
278	Galdohk	1.57	2652	2652	3.55	0.00	3.55
279	Nawan Sher Janubi	3.02	14852	14852	33.30	0.00	33.31
280	Nawan Sher Shumali	4.335	16575	16575	47.41	0.00	47.41
281	Behlolia	1.805	4146	4958	3.39	4.06	7.46
282	Kakul	1.925	10110	12233	8.78	10.61	19.39
283	Mandroch Kalan	2.84	2441	3230	2.98	3.95	6.93
284	Mandroch Khurd	2.51	2006	2571	2.20	2.83	5.03
285	Khokhar	1.865	5659	6808	4.77	5.74	10.52
286	Salhar	2.92	43094	57466	53.89	71.86	125.75
287	Mir Pur	4.355	73849	113104	128.15	196.28	324.43
288	Gojri	4.275	5902	8970	10.09	15.34	25.44
289	Halmera Tarla	0.775	1131	1222	0.42	0.46	0.88
290	Halmera Utla	1.675	494	584	0.38	0.45	0.83
291	Saji Kot	2.95	4275	5718	5.39	7.21	12.61
292	Tannan	4.105	10475	15663	17.35	25.94	43.29
293	Baldheri	4.55	17323	27031	31.11	48.54	79.65

294	Jallalpura	3.645	7401	10587	11.14	15.93	27.07
295	Mor Kalan	2.88	4720	6270	5.83	7.75	13.59
296	Banda Amlok	4.615	3005	4718	5.45	8.57	14.02
297	Banda Khair Ali Khan	1.52	1689	1964	1.18	1.38	2.56
298	Banda Lamma	1.43	886	1021	0.59	0.68	1.27
299	Banda Noor Ahmed	2.39	1624	2057	1.71	2.17	3.88
300	Banda Phagwarian	2.33	7146	8997	7.35	9.25	16.61
301	Banda Qazi	4.135	18839	28251	31.38	47.06	78.44
302	Banda Sher Khan	2.005	1384	1687	1.24	1.52	2.76
303	Dehri	2.35	1714	2162	1.77	2.24	4.02
304	Dobatar	2.215	6722	8368	6.61	8.23	14.84
305	Banda Batang	2.39	967	1224	1.02	1.29	2.31
306	Banda Faizullah	1.235	711	804	0.41	0.46	0.88
307	Banda Ghazan	3.49	1984	2796	2.88	4.06	6.94
308	Jhangi	4.935	30640	49601	58.57	94.80	153.37
309	Bandi Mansoor	0.625	1895	2017	0.57	0.61	1.18
310	Chatri	1.275	3924	4454	2.33	2.65	4.99
311	Gali Banya	1.98	4135	5031	3.68	4.48	8.16
312	Kathwal	1.125	2244	2510	1.19	1.33	2.52
313	Mera Rehmat Khan	0.485	1290	1354	0.30	0.32	0.63
314	Mehr Kalan	1.24	2415	2731	1.40	1.58	2.98
315	Sheikhul Bandi	2.505	34340	43980	37.63	48.20	85.84
316	Banda Sahib Khan	5.925	8052	14318	17.62	31.33	48.95
317	Langra	4.565	32718	51128	58.90	92.05	150.96
318	Lari	3.22	2053	2819	2.79	3.83	6.62
319	Gujjal	0.715	856	919	0.29	0.32	0.61
320	Jandakka	3.59	2451	3488	3.64	5.18	8.83

321	Kokkal	1.845	10958	13156	9.16	10.99	20.15
322	Darooni Mera	2.685	1102	1102	2.27	0.00	2.27
323	Qasba Havelian	2.305	25217	25217	46.15	0.00	46.15
324	Mala	2.36	1977	1977	3.68	0.00	3.69
325	Sultanpur	2.975	4807	4807	10.66	0.00	10.66
326	Wazira	2.595	2081	2081	4.17	0.00	4.17
327	Chamba	1.535	3955	3955	5.20	0.00	5.20
328	Jhangran	1.435	12822	12822	15.90	0.00	15.90
329	Kalo Mera	1.505	1981	1981	2.56	0.00	2.56
330	Nowshera (Jhangran)	1.85	2930	2930	4.50	0.00	4.50
331	Banda Atti Khan	1.81	4938	5908	4.05	4.85	8.91
332	Barseen	1.455	1580	1825	1.06	1.22	2.29
333	Batolni	0.865	1854	2021	0.77	0.83	1.60
334	Kotla	0.895	1674	1830	0.71	0.78	1.50
335	Mugahid	1.055	1395	1549	0.70	0.77	1.47
336	Palanowali	2.045	6718	8226	6.15	7.54	13.70
337	Peepal	1.655	502	592	0.38	0.45	0.83
338	Salwalah	-1.18	528	469	-0.33	-0.29	-0.63
339	Sureela	2.03	1607	1965	1.46	1.79	3.26
Total		1.037	1326868	1635535	1350	1543	2893

Altogether, for the next 20 years plan period urban settlements require 1515 acres and the rural settlements require 2893 acres with a total settlements land use requirement of 4408 acres on land during the plan period i.e., the years from 2018 to 2038.

Chapter 6

District Land Use & Capital Investment Plan

Capital Investment Plan

6.7 INTRODUCTION

For suggesting more balanced and affective capital investment planning the study make us of functional matrix technique which assesses the extent of polarization or marginalization of facilities and functions within a region and District Abbottabad in the current context. The functional Index/matrix technique has been performed at the Zonal, Union Council (UCs), Patwar Circles (PCs), and Mauza levels. The functional matrix generates a comparative analysis within different zones, UCs, and the Mauzas and specifies where there is any deficiency of public facilities and service provision to the specific area. The detailed analysis is at selected four levels are described as following:

6.7.1 ZONE LEVEL FUNCTIONAL ANALYSIS

The zonal delimitation in the exercise has been done by the planning team keeping in view the geographic, socio-cultural, and demographic homogeneity within the district. Altogether, eight growth zones were delineated and the concentration of functions in the form of education, health, and communication infrastructures were assessed within each zone. The overall functional matrix and its visualization through choropleth mapping are given as under:

Table 6–4:ZONE LEVEL FUNCTIONAL ANALYSIS

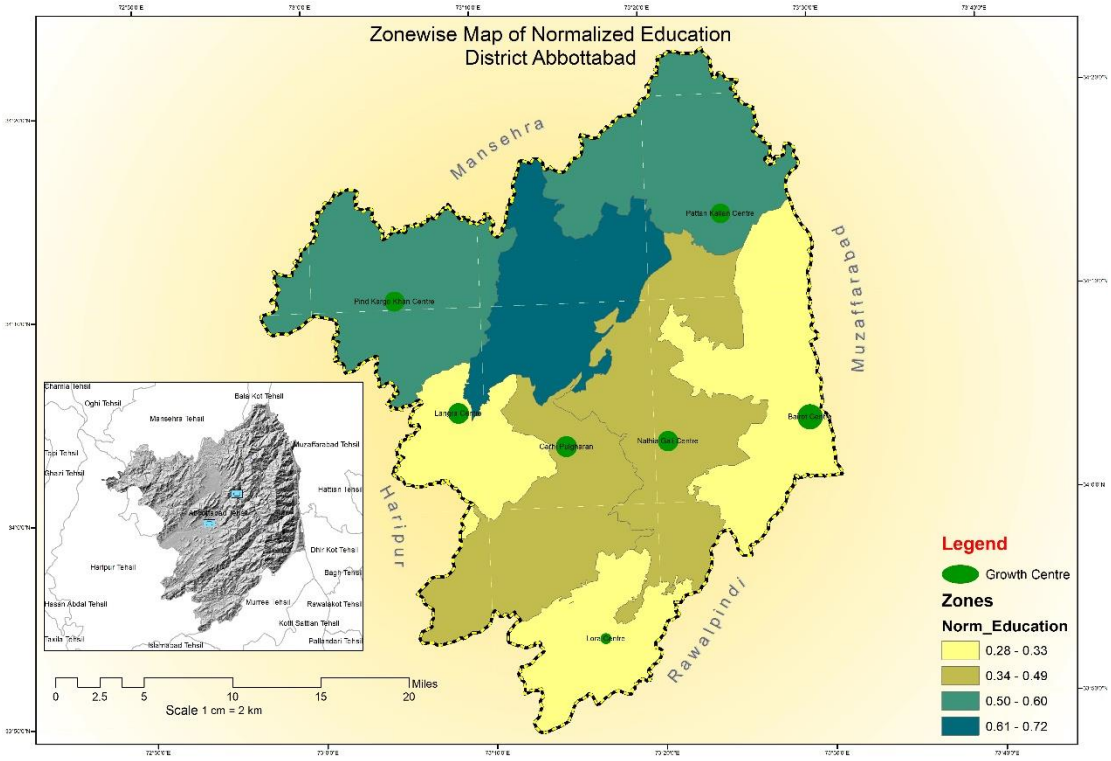
Sr. No.	Growth Zone (GZs)	Population 2018	Population 2038	Normalized Education	Normalized Health	Normalized Post Offices	Overall Functional Centrality Index
1	A	99807	138622	0.33	0.29	0.00	0.21
2	B	136017	187989	0.49	0.58	1.00	0.69
3	F	148046	208324	0.32	0.40	0.17	0.30
4	C	186692	250792	0.48	0.50	0.61	0.53
5	E	162903	234800	0.59	0.57	0.52	0.56
6	D	158068	203361	0.60	0.51	0.83	0.65
7	Un Zoned (H)	352753	700915	0.72	0.31	0.52	0.52
8	G	143022	270534	0.28	0.45	0.52	0.41

Notes:

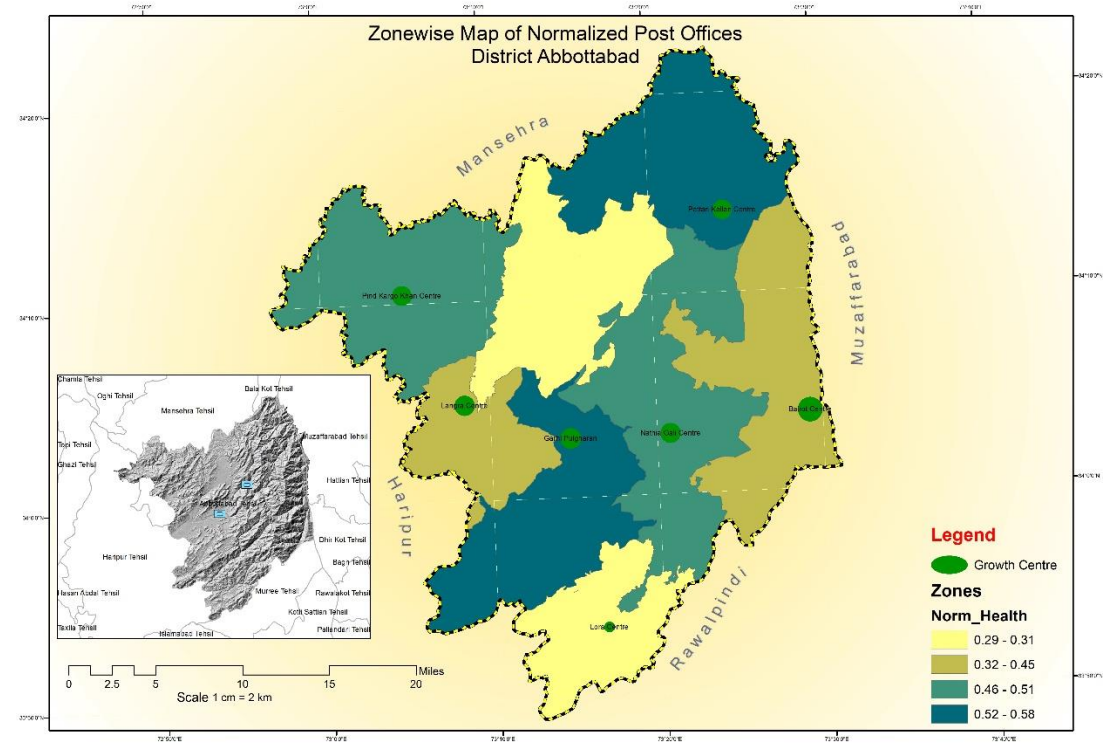
1. Green Cells indicates above average index values
2. White Cells indicates below average index values

The above functional matrix indicates that in terms of education facilities Zones A, F, and G are the least served zones and in future public sector investment needs to be diverted towards these least served zones. Similarly, in terms of health facilities Zones A, F, G, and Un-Zoned (H) are the least served zones and the future public sector

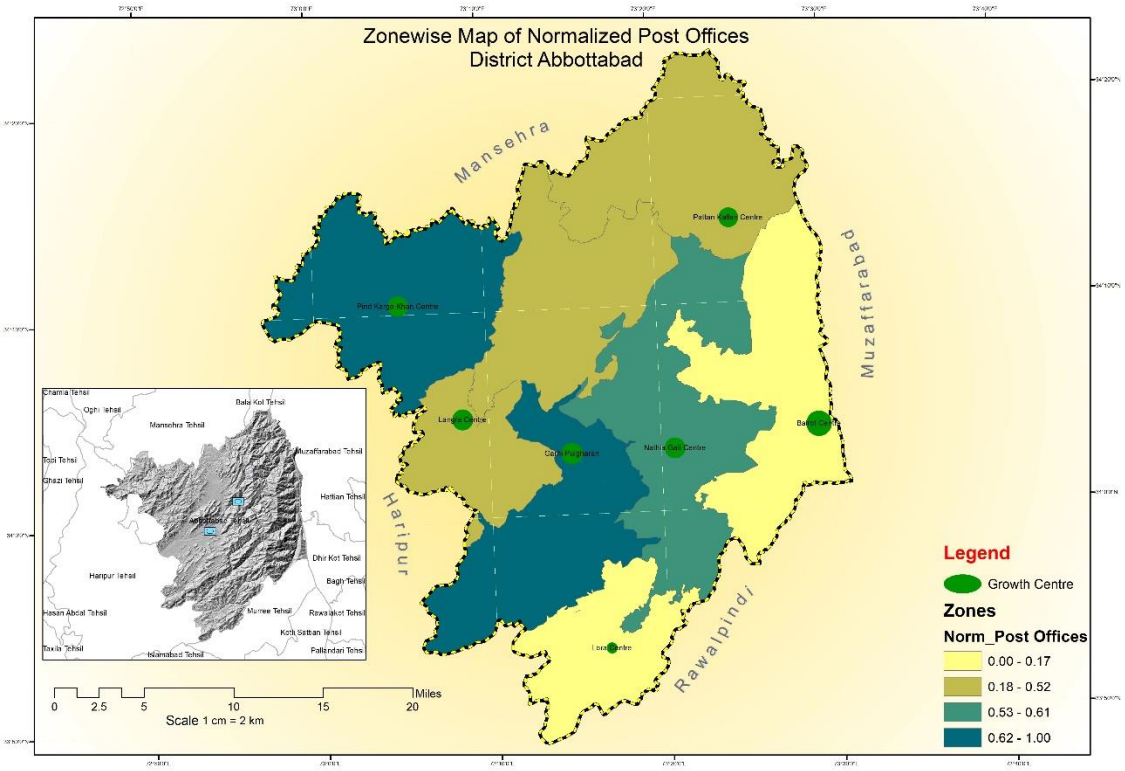
investment should be directed towards these zones. Taking post offices as point communication infrastructure the deficient zones are A, F, E, Un-Zoned (H), and G. On the cumulative basis the deficient zones are A, F, and G. Therefore, there is a need to invest more in Zones A, B, and G to make a more balanced development in the district.



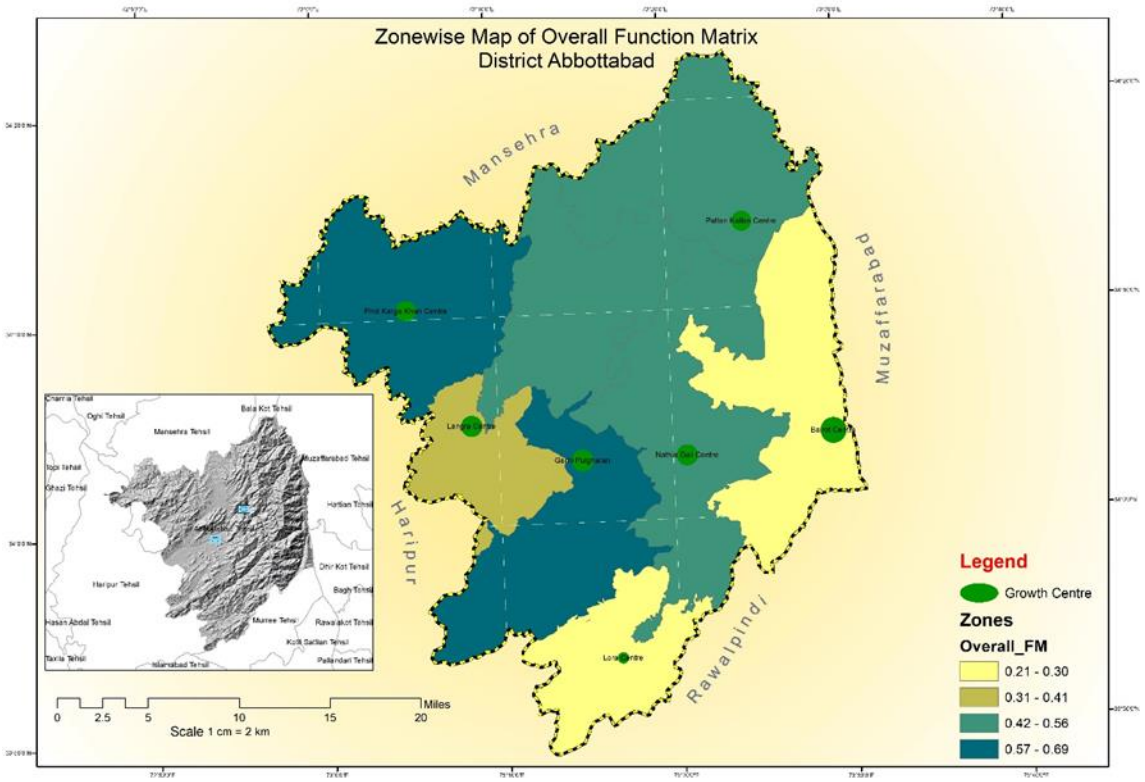
MAP 6-25:Zonewise Map of Normalized Education District Abbottabottabad



MAP 6-26:Zonewise Map of Normalized Health District Abbottabottabad



MAP 6-27:Zonewise Map of Normalized Post Offices District Abbottabottabad



MAP 6-28:Zonewise Map of Overall Function Matrix District Abbottabottabad

6.7.2 Union Council Level Functional Analysis

On the analogy of zonal level functional matrix described earlier, the same analysis has also been performed at the UCs level in the district and are described as under:

Table 6–5:Union Council Level Functional Analysis

Sr. No.	Union Councils Ucs	Population 2018	Population 2038	Normalized Education	Normalized Health	Normalized Post Offices	Overall Functional Matrix
1	**Phallah**	39111	53316	0.17	0.25	0.00	0.14
2	**Gorini**	31679	43308	0.17	0.08	0.00	0.09
3	**Lora**	16196	24489	0.39	0.13	0.00	0.17
4	**Nagri Totial**	12821	17509	0.05	0.13	0.00	0.06
5	**Dewal Manal**	16313	24251	0.20	0.00	0.11	0.10
6	**Langrial**	23588	29350	0.37	0.21	0.78	0.45
7	**Majuhan**	26853	33683	0.29	0.21	0.33	0.28

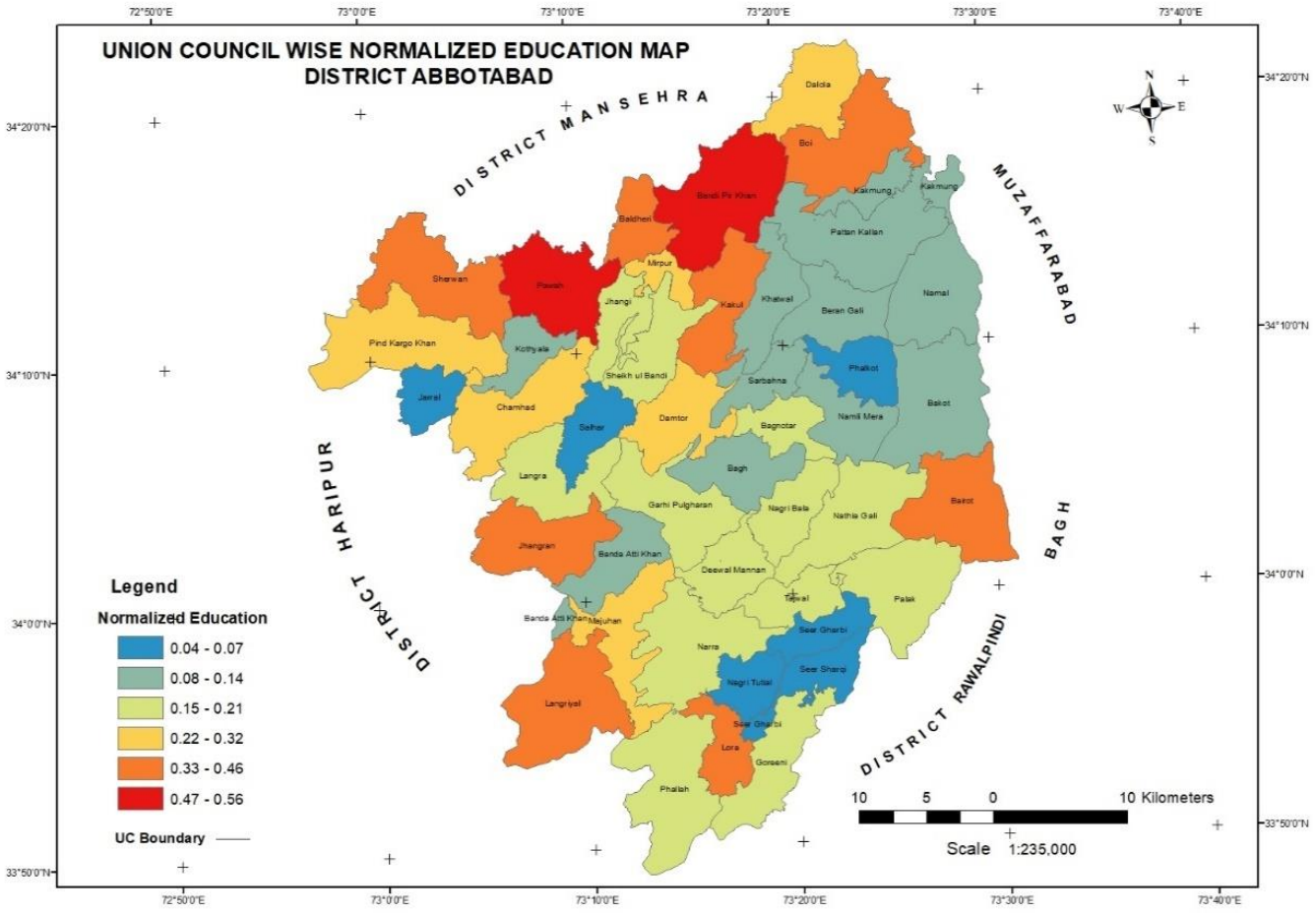
8	**Nara**	27854	42312	0.21	0.54	0.33	0.36
9	**Garhi Phulgran**	41409	58393	0.16	0.25	1.00	0.47
10	**Palak**	40602	52156	0.19	0.38	0.33	0.30
11	**Berote**	55339	80093	0.46	0.29	0.00	0.25
12	**Bakot**	30720	43014	0.12	0.17	0.11	0.13
13	**Namal**	21385	33061	0.09	0.17	0.00	0.09
14	**Seer Sharqi**	11584	15621	0.04	0.08	0.00	0.04
15	**Seer Gharbi**	12985	18593	0.07	0.08	0.11	0.09
16	**Tajwal**	17138	24921	0.19	0.08	0.00	0.09
17	**Nathiya Gali**	36439	49850	0.20	0.21	0.56	0.32
18	**Nagri Bala**	17457	22574	0.21	0.33	0.22	0.26
19	**Bagh**	18283	24499	0.08	0.08	0.11	0.09
20	**Namli Mera**	18167	26397	0.08	0.04	0.11	0.08
21	**Bagnotar**	14065	18963	0.17	0.08	0.22	0.16
22	**Sir Bhanna**	16436	21243	0.10	0.13	0.00	0.08
23	**Phal Kot**	10958	12444	0.05	0.08	0.11	0.08
24	**Biran Gali**	13180	15687	0.10	0.13	0.11	0.11
25	**Banda Pir Khan**	67841	111415	0.56	0.38	0.78	0.57
26	**Boi**	28619	31553	0.40	0.21	0.00	0.20
27	**Dalola**	25035	36767	0.25	0.04	0.00	0.10
28	**Pattan Kalan**	29231	41595	0.14	0.33	0.44	0.31
29	**Kokmang**	12177	13470	0.10	0.13	0.11	0.11
30	**Pind Kargo Khan**	33945	40909	0.24	0.38	0.44	0.35
31	**Sherwan**	24980	27381	0.45	0.13	0.22	0.27
32	**Pawa**	41001	56683	0.52	0.33	1.00	0.62
33	**Kothiala**	15281	21407	0.09	0.08	0.22	0.13
34	**Jarral**	8024	9669	0.05	0.08	0.11	0.08
35	**Chamhad**	34837	47312	0.25	0.17	0.11	0.18
36	**Dhamtore**	39016	56840	0.32	0.17	0.11	0.20
37	**Kakol**	30516	54419	0.40	0.25	0.11	0.25
38	**Salhad**	37021	64274	0.07	0.17	0.22	0.15
39	**Mir Pur**	48218	113104	0.29	0.08	0.00	0.12
40	**Baldheri**	99149	221306	0.41	0.21	0.56	0.39
41	**Jhangi**	84825	172875	0.21	0.00	0.00	0.07
42	**Kuthwal**	14008	18097	0.09	0.04	0.33	0.15
43	**Sheikh-Ul-Bandi**	26813	43980	0.71	0.42	0.44	0.53
44	**Langra**	65567	154093	0.21	0.08	0.56	0.28
45	**Jhangra**	59651	92056	0.39	0.46	0.67	0.51

46	**Bandi Atti Khan**	17804	24385	**0.09**	**0.17**	**0.11**	**0.12**

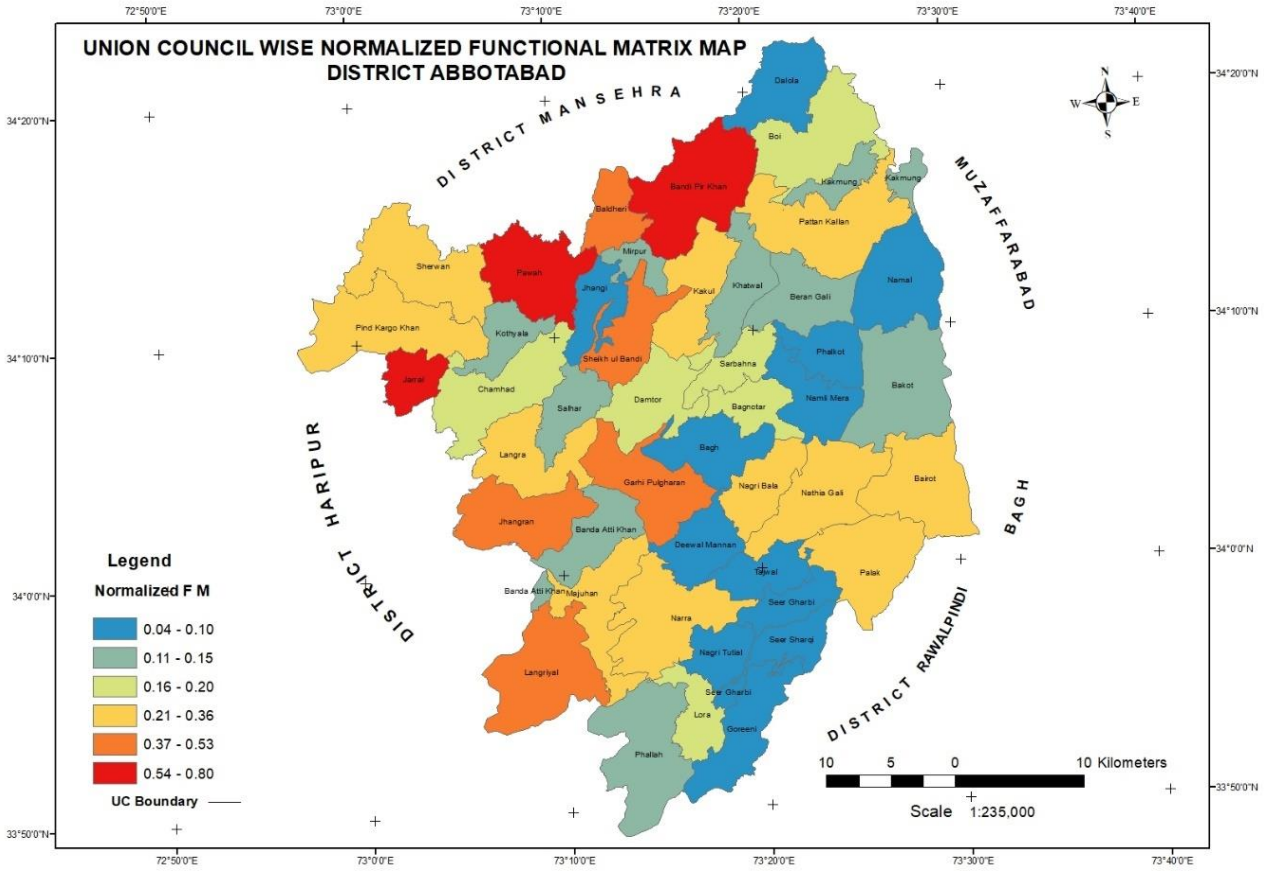
Notes:

3. Green Cells indicates above average index values
4. White Cells indicates below average index values
5. Red Cells indicates bottom 20 % of the below average index values

The above functional matrix describes the above average Union Councils in green cells and the below average UCs in white and red cell together, while, red cells are showing the bottom 20% UCs in terms of health, education, and communication infrastructure deficiencies. Considering, overall functional matrix there are nine UCs which falls under bottom 20 % category, namely; Gorini, Nagri Totial, Namal, Seer Sharqi, Namli Mera, Sir Bhanna, Phal Kot, Jarral, and Jhangi and needs immediate public sector capital investment on education, health and communication infrastructure projects. The UCs based functional matrix is also visualized through choropleth maps in the following:



MAP 6-29:Union Council Wise Normalized Education Map District Abbottabad



MAP 6-30: Union Council Wise Normalized Functional Matrix Map District Abbottabad

6.7.3 Patwar Circle Level Functional Analysis

On the analogy of Zonal and UCs level functional analysis performed above, the same analysis has also been performed at a lower level of Patwar Circles (PCs). The results of this analysis are given as under:

Table 6–6:Patwar Circle Level Functional Analysis

Sr. No.	Patwar Circles	Pop. 2018	Pop. 2038	Normalized Education	Normalized Health	Normalized Post Offices	Overall Functional Matrix
1	**Ghamir**	**13133**	**17650**	**0.12**	**0.13**	**0.00**	**0.08**
2	**Rahi**	**12845**	**18016**	**0.15**	**0.13**	**0.00**	**0.09**

3	**Gorini**	**11353**	**16023**	**0.14**	**0.00**	**0.00**	**0.05**
4	**Danah**	**8973**	**11262**	**0.12**	**0.13**	**0.00**	**0.08**
5	**Lora**	**16196**	**24489**	**0.46**	**0.25**	**0.00**	**0.24**
6	**Nagri Totial**	**12821**	**17509**	**0.12**	**0.19**	**0.00**	**0.10**
7	**Sajikot**	**16313**	**24251**	**0.31**	**0.00**	**0.25**	**0.19**
8	**Langrial**	**8873**	**11248**	**0.23**	**0.13**	**0.75**	**0.37**
9	**Dana Noora Lan**	**5842**	**6854**	**0.11**	**0.06**	**0.25**	**0.14**
10	**Majohan**	**7130**	**8371**	**0.14**	**0.13**	**0.00**	**0.09**
11	**Riala**	**12593**	**16941**	**0.25**	**0.06**	**0.75**	**0.35**
12	**Nara**	**8835**	**14670**	**0.16**	**0.31**	**0.25**	**0.24**
13	**Satora**	**10184**	**12972**	**0.16**	**0.31**	**0.25**	**0.24**
14	**Garhi Phulgran**	**13529**	**18272**	**0.14**	**0.13**	**1.00**	**0.42**
15	**Rajoya**	**14351**	**21849**	**0.10**	**0.13**	**0.25**	**0.16**
16	**Palak**	**13421**	**16794**	**0.15**	**0.19**	**0.25**	**0.20**
17	**Rialah**	**13760**	**18568**	**0.14**	**0.13**	**0.25**	**0.17**
18	**Birot Kalan**	**21519**	**31845**	**0.31**	**0.13**	**0.00**	**0.14**
19	**Birot Khurd**	**12301**	**16403**	**0.15**	**0.19**	**0.00**	**0.11**
20	**Bakot**	**17799**	**25959**	**0.15**	**0.13**	**0.25**	**0.18**
21	**Moolia**	**12921**	**17055**	**0.12**	**0.13**	**0.00**	**0.08**

22	**Namal**	**21385**	**33061**	**0.21**	**0.25**	**0.00**	**0.15**
23	**Seer Sharqi**	**11584**	**15621**	**0.10**	**0.13**	**0.00**	**0.07**
24	**Seer Gharbi**	**12985**	**18593**	**0.17**	**0.13**	**0.25**	**0.18**
25	**Tajwal**	**17138**	**24921**	**0.30**	**0.13**	**0.00**	**0.14**
26	**Bagan**	**11701**	**16217**	**0.19**	**0.06**	**0.25**	**0.17**
27	**Malach**	**13037**	**17416**	**0.09**	**0.19**	**0.75**	**0.34**
28	**Nagri Bala**	**17457**	**22574**	**0.35**	**0.50**	**0.50**	**0.45**
29	**Bagh**	**18283**	**24499**	**0.19**	**0.13**	**0.25**	**0.19**
30	**Namli Mera**	**18167**	**26397**	**0.18**	**0.06**	**0.25**	**0.16**
31	**Bagnotar**	**14065**	**18963**	**0.25**	**0.13**	**0.50**	**0.29**
32	**Sir Bhanna**	**16436**	**21243**	**0.23**	**0.19**	**0.00**	**0.14**
33	**Phal Kot**	**10958**	**12444**	**0.12**	**0.13**	**0.25**	**0.16**
34	**Biran Gali**	**13180**	**15687**	**0.23**	**0.19**	**0.25**	**0.22**
35	**Bandi Dhundan**	**28502**	**49017**	**0.38**	**0.13**	**0.75**	**0.42**
36	**Tar Nawai**	**10837**	**13381**	**0.23**	**0.25**	**0.25**	**0.24**
37	**Boi**	**10008**	**10897**	**0.23**	**0.06**	**0.00**	**0.10**
38	**Sambli Dheri**	**8603**	**9759**	**0.17**	**0.13**	**0.00**	**0.10**

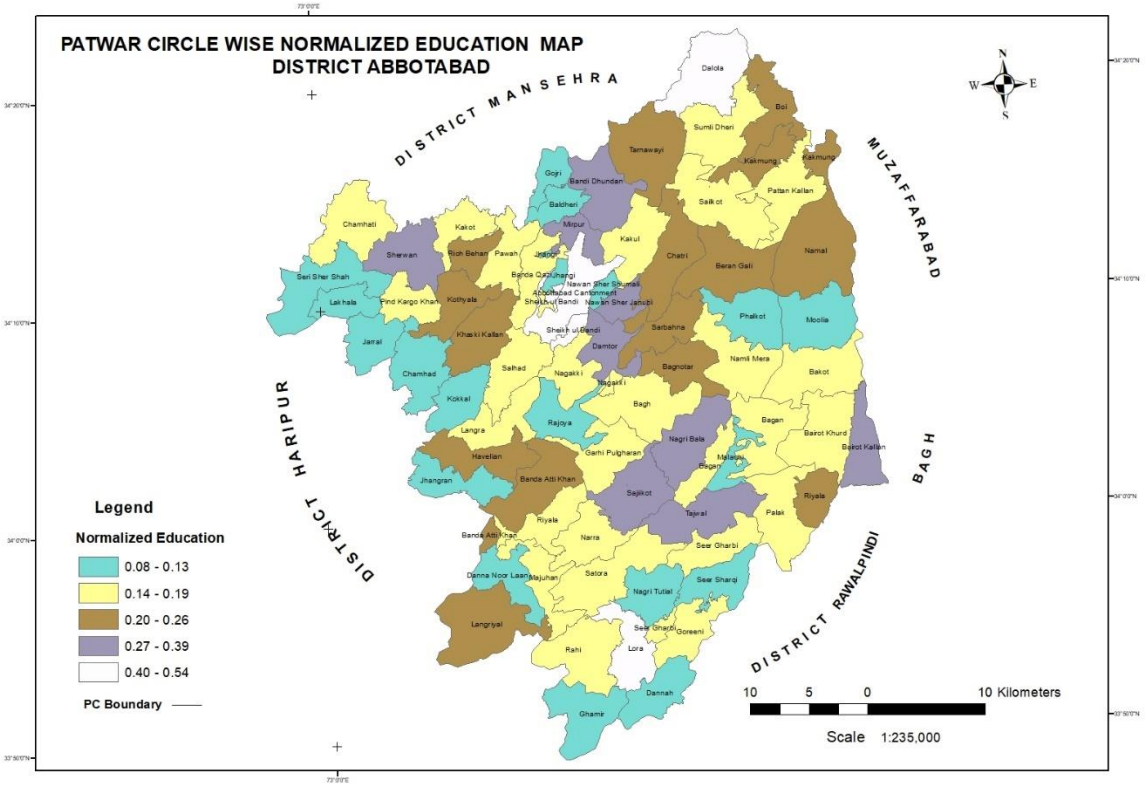
39	**Dalola**	**25035**	**36767**	**0.44**	**0.06**	**0.00**	**0.17**
40	**Pattan Kalan**	**14836**	**20888**	**0.19**	**0.25**	**0.50**	**0.31**
41	**Sial Kot**	**14395**	**20707**	**0.14**	**0.25**	**0.50**	**0.30**
42	**Kokmang**	**12177**	**13470**	**0.24**	**0.19**	**0.25**	**0.23**
43	**Pind Kargoo Khan**	**9445**	**11057**	**0.14**	**0.13**	**0.00**	**0.09**
44	**Lakhala**	**5289**	**6536**	**0.09**	**0.06**	**0.50**	**0.22**
45	**Seri Sher Shah**	**4477**	**5723**	**0.10**	**0.19**	**0.00**	**0.10**
46	**Sherwan**	**9668**	**10849**	**0.30**	**0.06**	**0.25**	**0.20**
47	**Chamhati**	**5644**	**5683**	**0.15**	**0.00**	**0.00**	**0.05**
48	**Rach Behn**	**4765**	**5807**	**0.26**	**0.06**	**0.50**	**0.27**
49	**Pawa**	**11775**	**17270**	**0.14**	**0.13**	**0.25**	**0.17**
50	**Kakot**	**7921**	**10529**	**0.14**	**0.13**	**0.75**	**0.34**
51	**Kothiala**	**15281**	**21407**	**0.21**	**0.13**	**0.50**	**0.28**
52	**Jarral**	**8024**	**9669**	**0.11**	**0.13**	**0.25**	**0.16**
53	**Kassaki Kalan**	**12611**	**16815**	**0.23**	**0.13**	**0.00**	**0.12**
54	**Chamhad**	**9615**	**13682**	**0.11**	**0.00**	**0.25**	**0.12**
55	**Nagaki**	**11634**	**16509**	**0.14**	**0.06**	**0.00**	**0.07**
56	**Dahamtore**	**15748**	**23822**	**0.31**	**0.13**	**0.25**	**0.23**
57	**Nawan Shehr Janubi**	**8191**	**14852**	**0.35**	**0.13**	**0.25**	**0.24**

58	**Shehr Shumali**	**7093**	**16575**	**0.09**	**0.13**	**0.00**	**0.07**
59	**Kakol**	**15232**	**22992**	**0.18**	**0.13**	**0.00**	**0.10**
60	**Salhad**	**37021**	**64274**	**0.15**	**0.25**	**0.50**	**0.30**
61	**Mir Pur**	**48218**	**113104**	**0.39**	**0.13**	**0.00**	**0.17**
62	**Gojri**	**15551**	**32157**	**0.08**	**0.00**	**0.50**	**0.19**
63	**Bal Dheri**	**19829**	**43888**	**0.13**	**0.19**	**0.25**	**0.19**
64	**Banda Qazi**	**31549**	**59225**	**0.16**	**0.00**	**0.00**	**0.05**
65	**Jhangi**	**21727**	**54425**	**0.10**	**0.00**	**0.00**	**0.03**
66	**Chatri**	**14008**	**18097**	**0.20**	**0.06**	**0.75**	**0.34**
67	**Sheikhul Bandi**	**26813**	**43980**	**0.43**	**0.13**	**0.00**	**0.19**
68	**Abbatabad**	**-**	**-**	**0.54**	**0.38**	**1.00**	**0.64**
69	**Langra**	**26960**	**68265**	**0.18**	**0.06**	**0.50**	**0.25**
70	**Kokal**	**11647**	**17563**	**0.09**	**0.00**	**0.25**	**0.11**
71	**Havelian**	**21797**	**35184**	**0.26**	**0.38**	**0.25**	**0.29**
72	**Jhangran**	**16057**	**21688**	**0.11**	**0.06**	**1.00**	**0.39**
73	**Bandi Attaikhan**	**17804**	**24385**	**0.20**	**0.25**	**0.25**	**0.23**

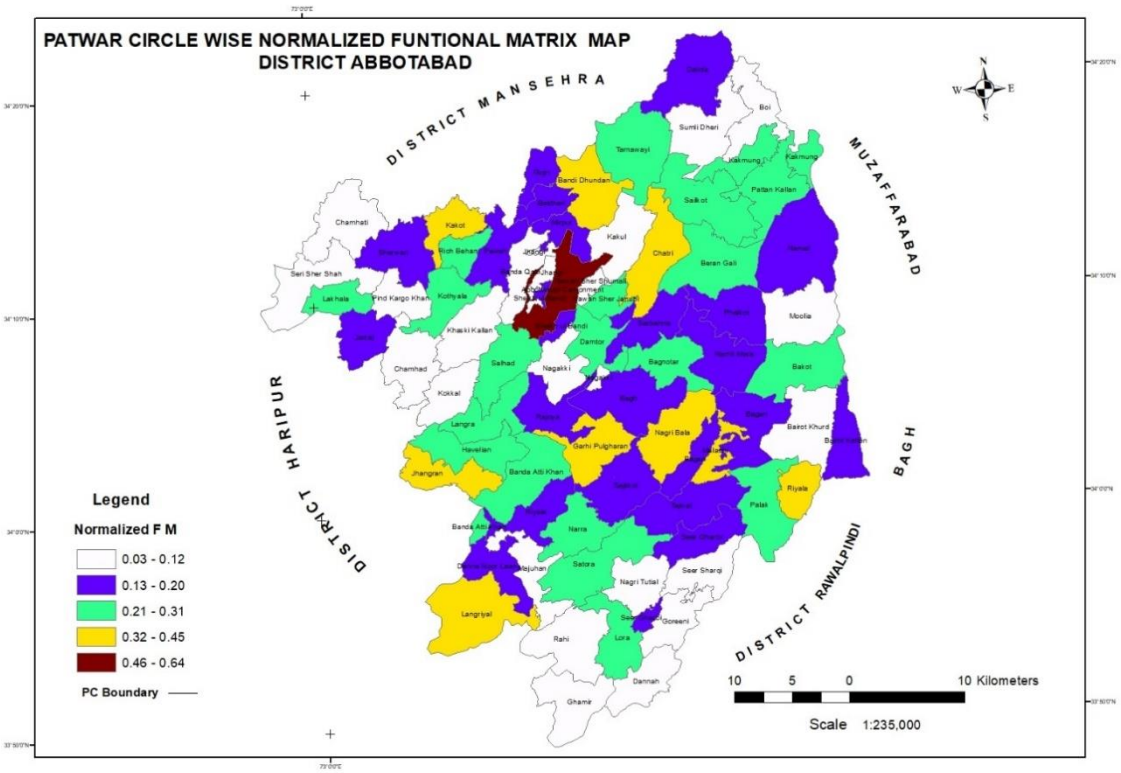
Notes:

6. Green Cells indicates above average index values
7. White Cells indicates below average index values
8. Red Cells indicates bottom 20 % of the below average index values

As per Patwar Circle based functional analysis there are 14 Patwar Circles which fall within below average and can be grouped under lowest 20 % PCs in terms of deficiencies in education, health, and communication infrastructures, namely; Ghamir, Rahi, Gorini, Danah, Majohan, Moolia, Seer Sharqi, Pind Kargoo Khan, Seri Sher Shah, Chamhati, Nagaki, Shehr Shumali, Banda Qazi, and Jhangi. Accordingly, the government should give priority consideration to above mentioned PCs for public sector investment in education, health and allied facilities.



MAP 6-31:Patwar Circle Wise Normalized Education Map District Abbottabad



MAP 6-32:Patwar Circle Wise Normalized Functional Matrix Map District Abbottabad

6.7.4 Mauza Level Functional Analysis

Following the above methodology, the functional analysis has also been performed at the mauza level in district Abbottabad and the results of the analysis are mentioned as under:

Table 6–7:Mauza Level Functional Analysis

Sr. No.	Mauzas/Villages	Population 2018	Population 2038	Normalized Education	Normalized Health	Normalized Post Offices	Overall Functional Matrix
1	Ateran	808	976	0.01	0.00	0.00	0.00
2	Dheri Rakhala	3414	4137	0.04	0.00	0.00	0.01
3	Gali	851	1408	0.01	0.00	0.00	0.00
4	Ghamir	3725	5173	0.02	0.00	0.00	0.01
5	Kashmir	191	288	0.00	0.00	0.00	0.00
6	Pahlla	2527	3317	0.02	0.13	0.00	0.05
7	Roohpar	1617	2351	0.03	0.00	0.00	0.01

8	Battal Kund	1284	1739	0.02	0.00	0.00	0.01
9	Bhajoora	840	1111	0.00	0.00	0.00	0.00
10	Charbat	800	1006	0.02	0.00	0.00	0.01
11	Dakan Pisar	3234	4317	0.04	0.13	0.00	0.06
12	Maira	232	265	0.00	0.00	0.00	0.00
13	Rahi	6224	9202	0.09	0.13	0.00	0.07
14	Sher Pur	231	376	0.01	0.00	0.00	0.00
15	Goreeni	7066	9537	0.09	0.00	0.00	0.03
16	Kotal	3554	5507	0.06	0.00	0.00	0.02
17	Palasai	733	979	0.03	0.00	0.00	0.01
18	Bagla	131	244	0.00	0.00	0.00	0.00
19	Bajarian	92	92	0.03	0.00	0.00	0.01
20	Banwari	2639	3435	0.02	0.00	0.00	0.01
21	Dannah	3122	3575	0.03	0.00	0.00	0.01
22	Summa Krahaga	2989	3916	0.06	0.13	0.00	0.06
23	Dheri Keyala	3206	4421	0.02	0.00	0.00	0.01
24	Gahri	1061	1531	0.01	0.00	0.00	0.00
25	Ghora	193	248	0.00	0.00	0.00	0.00
26	Lora	6829	11488	0.36	0.25	0.00	0.20
27	Narhotar	3549	5166	0.21	0.00	0.00	0.07
28	Nurpur	499	552	0.01	0.00	0.00	0.00
29	Seri	657	819	0.02	0.00	0.00	0.01
30	That Karam Shah	202	264	0.02	0.00	0.00	0.01
31	Nagri Tutial	12821	17509	0.14	0.25	0.00	0.13
32	Chehr	2662	4753	0.06	0.00	0.00	0.02
33	Dewal Manal	4395	6353	0.03	0.00	0.00	0.01

34	Makol Tarli	2480	3593	0.02	0.00	0.00	0.01
35	Nagri Tarli	3435	5165	0.07	0.00	0.25	0.11
36	Saji Kot	3341	4387	0.23	0.00	0.00	0.08
37	Dabran	2323	2463	0.02	0.00	0.25	0.09
38	Gali Batgran	1242	2028	0.03	0.00	0.00	0.01
39	Geherki	2186	2974	0.03	0.00	0.25	0.09
40	Langriyal	3122	3783	0.22	0.13	0.25	0.20
41	Basira	385	254	0.02	0.00	0.00	0.01
42	Chotala	435	594	0.00	0.13	0.00	0.04
43	Danna Noor Laan	3091	3935	0.04	0.00	0.00	0.01
44	Faqir Mohd	569	631	0.00	0.00	0.25	0.08
45	Lassan	873	1063	0.02	0.00	0.00	0.01
46	Maanjhiya	489	377	0.04	0.00	0.00	0.01
47	Garba	982	1314	0.03	0.00	0.00	0.01
48	Majuhan	3525	3783	0.10	0.13	0.00	0.08
49	Massah Gojri	1519	1851	0.02	0.00	0.00	0.01
50	Massah Sayedan	560	689	0.01	0.00	0.00	0.00
51	Mera Tarla	544	734	0.01	0.00	0.00	0.00
52	Chamnaka	2010	2691	0.02	0.00	0.25	0.09
53	Chandoo Mera	1362	1927	0.03	0.00	0.25	0.09
54	Dhanak	861	1467	0.01	0.00	0.00	0.00
55	Hajiya	2531	3459	0.19	0.13	0.00	0.10
56	Karrach	521	497	0.02	0.00	0.00	0.01
57	Mohari	571	907	0.00	0.00	0.00	0.00
58	Riyala	1237	1819	0.01	0.00	0.00	0.00
59	Samwala	2678	3119	0.02	0.00	0.00	0.01

60	Dharmochiya	822	1055	0.02	0.00	0.25	0.09
61	Gohara	1712	2255	0.02	0.00	0.00	0.01
62	Mera Utla	947	564	0.04	0.13	0.00	0.06
63	Mohribadhbhen	568	1230	0.01	0.25	0.00	0.09
64	Narra	5608	10621	0.12	0.00	0.25	0.12
65	Dhakkan	3353	4601	0.09	0.13	0.00	0.07
66	Janjah	733	639	0.03	0.00	0.00	0.01
67	Kangrotar	1244	1495	0.02	0.00	0.00	0.01
68	Kehan	254	313	0.00	0.13	0.00	0.04
69	Mari	1070	1482	0.00	0.00	0.00	0.00
70	Satora	3530	4442	0.06	0.13	0.25	0.14
71	Garhi Phulgharan	6002	8892	0.08	0.13	0.50	0.23
72	Gohra Bazgaran	2647	3354	0.02	0.00	0.25	0.09
73	Harnara	1666	2215	0.02	0.00	0.00	0.01
74	Kiyala	2878	3439	0.03	0.00	0.25	0.09
75	Mannan	336	372	0.01	0.00	0.00	0.00
76	Rajoya	13653	20831	0.11	0.13	0.25	0.16
77	Thathi Ochaahar	698	1018	0.01	0.00	0.00	0.00
78	Arwar	476	548	0.01	0.00	0.00	0.00
79	Darwaza	3923	5671	0.06	0.00	0.00	0.02
80	Palak	6009	7006	0.09	0.19	0.25	0.18
81	Surjal (Malikabad)	3013	3569	0.03	0.00	0.00	0.01
82	Kala Ban	801	1041	0.00	0.00	0.25	0.08
83	Longal	2735	4516	0.03	0.00	0.00	0.01
84	Malkot	5122	5842	0.07	0.13	0.00	0.06

85	Riyala (Palak)	5102	7169	0.08	0.00	0.00	0.03
86	Bairot Kalan	15070	22703	0.17	0.13	0.00	0.10
87	Kahu Sharqi	6449	9142	0.24	0.00	0.00	0.08
88	Bairot Khurd	6749	8835	0.13	0.00	0.00	0.04
89	Kahu Gharbi	5552	7568	0.06	0.25	0.00	0.10
90	Bakot	17799	25959	0.19	0.13	0.25	0.19
91	Moolia	7226	9255	0.08	0.13	0.00	0.07
92	Sangal	5695	7800	0.07	0.00	0.00	0.02
93	Majuhan	12556	19176	0.14	0.13	0.00	0.09
94	Namal	8829	13885	0.11	0.13	0.00	0.08
95	Bhatiyan	2636	3586	0.02	0.00	0.00	0.01
96	Seer Sharqi	5579	8146	0.04	0.00	0.00	0.01
97	Tarorh	3369	3889	0.06	0.25	0.00	0.10
98	Pus Bher	638	951	0.01	0.00	0.00	0.00
99	Malmoola	1072	1548	0.03	0.00	0.00	0.01
100	Seer Gharbi	11275	16094	0.17	0.13	0.25	0.18
101	Nowshera	3689	5870	0.02	0.00	0.00	0.01
102	Pirkot	2341	3240	0.06	0.00	0.00	0.02
103	Tajwal	8539	11683	0.30	0.13	0.00	0.14
104	Toplah	2569	4128	0.02	0.00	0.00	0.01
105	Bagan	6197	8942	0.11	0.13	0.25	0.16
106	Jhansa	4950	6460	0.12	0.00	0.00	0.04
107	Lassan (N)	554	815	0.00	0.00	0.00	0.00
108	Keri Sarafali	2493	4257	0.02	0.00	0.25	0.09
109	Malachi	5678	6083	0.04	0.00	0.25	0.10
110	Pasala	4866	7076	0.04	0.25	0.25	0.18

111	Akhrota	3675	4675	0.09	0.25	0.00	0.11
112	Makol Bala	421	584	0.02	0.00	0.00	0.01
113	Nagri Bala	10547	14093	0.30	0.25	0.50	0.35
114	Tatreela	2814	3222	0.04	0.25	0.00	0.10
115	Bagh	10188	13982	0.14	0.13	0.25	0.17
116	Jhuggiyan Kohaliyan	2824	4066	0.02	0.00	0.00	0.01
117	Kehyal	5271	6451	0.07	0.00	0.00	0.02
118	Dhaki Khetar	4917	7517	0.03	0.00	0.00	0.01
119	Namli Mera	8455	9954	0.13	0.13	0.25	0.17
120	Jhoot Mang	3716	7480	0.02	0.00	0.00	0.01
121	Pangoora	1079	1446	0.03	0.00	0.00	0.01
122	Bagnotar	4179	4631	0.22	0.13	0.25	0.20
123	Bandi Mera	7614	11150	0.11	0.00	0.25	0.12
124	Chahan	2272	3182	0.00	0.00	0.00	0.00
125	Aziz Mang	2188	2780	0.10	0.13	0.00	0.08
126	Desal	3910	5073	0.02	0.00	0.00	0.01
127	Khanh	2428	3018	0.04	0.13	0.00	0.06
128	Mehr Khurd	2102	3151	0.02	0.00	0.00	0.01
129	Sadra	426	584	0.01	0.00	0.00	0.00
130	Seergha	758	973	0.02	0.00	0.00	0.01
131	Sarbahna	4624	5664	0.07	0.00	0.00	0.02
132	Maalsah	1812	1612	0.04	0.00	0.00	0.01
133	Phalkot	9146	10832	0.10	0.13	0.25	0.16
134	Ander Seri	1829	1893	0.09	0.00	0.00	0.03
135	Beran Gali	9526	11567	0.12	0.25	0.25	0.21

136	Jahafar	1825	2227	0.08	0.00	0.00	0.03
137	Banda Pir Khan	12714	17482	0.22	0.00	0.25	0.16
138	Bandi Dhundan	15788	31535	0.28	0.19	0.50	0.32
139	Tarnawayi	10837	13381	0.29	0.38	0.25	0.30
140	Bandi Saman	580	648	0.00	0.00	0.00	0.00
141	Barbeen	1339	1359	0.02	0.00	0.00	0.01
142	Batangi	279	297	0.00	0.00	0.00	0.00
143	Boi	872	1121	0.21	0.06	0.00	0.09
144	Deedal	2092	3186	0.01	0.00	0.00	0.00
145	Nakka	694	501	0.00	0.00	0.00	0.00
146	Pul	536	512	0.07	0.00	0.00	0.02
147	Ran Kot	2977	2704	0.00	0.00	0.00	0.00
148	Tori	639	569	0.00	0.00	0.00	0.00
149	Bandi Hamza	360	442	0.00	0.00	0.00	0.00
150	Bandi Pahar	1391	1628	0.04	0.13	0.00	0.06
151	Chak	938	1088	0.02	0.00	0.00	0.01
152	Gali Mohri	929	901	0.07	0.00	0.00	0.02
153	Phogran	486	594	0.00	0.00	0.00	0.00
154	Sumli Dheri	4499	5106	0.08	0.00	0.00	0.03
155	Daban	3359	5591	0.10	0.00	0.00	0.03
156	Dalola	19056	26908	0.43	0.13	0.00	0.19
157	Naroka	2620	4268	0.04	0.00	0.00	0.01
158	Pattan Kalan	14836	20888	0.23	0.25	0.50	0.33
159	Bandi Sararah	4310	6791	0.11	0.25	0.25	0.20
160	Banota	1107	1884	0.00	0.00	0.00	0.00
161	Chamyali	1075	1436	0.07	0.13	0.00	0.06

162	Khokhriala	1104	1288	0.00	0.00	0.25	0.08
163	Larri	867	1006	0.00	0.00	0.00	0.00
164	Sial Kot	5932	8302	0.00	0.00	0.00	0.00
165	Kakmung	8563	8965	0.30	0.25	0.00	0.18
166	Kotheyala	504	539	0.00	0.00	0.00	0.00
167	Pattan Khurd	3110	3966	0.00	0.00	0.25	0.08
168	Barkot	257	188	0.00	0.00	0.00	0.00
169	Haal	115	63	0.00	0.00	0.00	0.00
170	Khalora Tarla	297	266	0.02	0.00	0.00	0.01
171	Khalora Utla	327	352	0.02	0.00	0.00	0.01
172	Pind Kargo Khan	8449	10188	0.12	0.13	0.00	0.08
173	Gandah (Habibabad)	1401	2116	0.02	0.00	0.00	0.01
174	Kangrora	1121	1345	0.02	0.00	0.00	0.01
175	Khanda Khoh	574	619	0.00	0.00	0.00	0.00
176	Lakhala	1824	2116	0.07	0.13	0.25	0.15
177	Pind	369	340	0.00	0.00	0.25	0.08
178	Bandi Nikra	186	321	0.00	0.00	0.00	0.00
179	Bareela	330	342	0.00	0.00	0.00	0.00
180	Bashah Kalan	444	456	0.00	0.00	0.00	0.00
181	Bashah Khurd	247	223	0.01	0.00	0.00	0.00
182	Chahar	0	0	0.00	0.13	0.00	0.04
183	Chatta	192	633	0.01	0.00	0.00	0.00
184	Dhand Hara	1148	1741	0.03	0.00	0.00	0.01
185	Kangar Bala	611	551	0.02	0.13	0.00	0.05
186	Pohar	655	701	0.02	0.00	0.00	0.01

187	Rata	468	551	0.00	0.00	0.00	0.00
188	Seri Sher Shah	196	204	0.02	0.00	0.00	0.01
189	Bamochi	1560	1748	0.00	0.00	0.00	0.00
190	Bhateel	947	874	0.03	0.00	0.00	0.01
191	Kalar Khaitar	294	332	0.00	0.00	0.00	0.00
192	Kumhar (Amir Abad)	1273	1544	0.00	0.00	0.00	0.00
193	Shaheed Abad	1745	1927	0.00	0.00	0.00	0.00
194	Sherwan Kalan	1180	1389	0.24	0.06	0.00	0.10
195	Sherwan Khurd	2025	2443	0.09	0.00	0.25	0.11
196	Thorey	644	592	0.03	0.00	0.00	0.01
197	Beri	561	611	0.03	0.00	0.00	0.01
198	Chakarh Bain	484	480	0.02	0.00	0.00	0.01
199	Chamhati	551	408	0.01	0.00	0.00	0.00
200	Chorgran (Ahmad Khan)	224	193	0.01	0.00	0.00	0.00
201	Johana	1351	1407	0.02	0.00	0.00	0.01
202	Kamila	238	304	0.00	0.00	0.00	0.00
203	Kangar Tarla	575	394	0.01	0.00	0.00	0.00
204	Kalabat	75	51	0.01	0.00	0.00	0.00
205	Kharper	462	428	0.02	0.00	0.00	0.01
206	Thathi Ahmed Khan	1123	1407	0.04	0.00	0.00	0.01
207	Banda Jaghian	352	392	0.00	0.00	0.00	0.00
208	Chatrhi	560	687	0.02	0.00	0.25	0.09
209	Rich Behan	2319	2938	0.08	0.13	0.25	0.15
210	Sohan Utla	795	862	0.23	0.00	0.00	0.08

211	Sohan Tarli	307	295	0.01	0.00	0.00	0.00
212	Thathi Faqir Sahib	432	633	0.00	0.00	0.00	0.00
213	Kumhar Bandi	1960	2996	0.02	0.00	0.00	0.01
214	Kishna	680	957	0.01	0.00	0.00	0.00
215	Laleedi Bandi	598	689	0.03	0.00	0.00	0.01
216	Mochi Kot (Shah Kot)	824	864	0.02	0.00	0.00	0.01
217	Paswal Mian	1616	2516	0.02	0.00	0.00	0.01
218	Pawah	6097	9248	0.06	0.25	0.25	0.19
219	Bandi Matrach	608	572	0.01	0.00	0.25	0.09
220	Bazurgal	80	72	0.00	0.00	0.00	0.00
221	Garamri	816	1069	0.00	0.00	0.00	0.00
222	Go Garhi	239	549	0.00	0.00	0.00	0.00
223	Kakot	1049	1442	0.02	0.00	0.25	0.09
224	Pandoo Thana	1961	2807	0.01	0.13	0.25	0.13
225	Pasial	246	242	0.00	0.00	0.00	0.00
226	Patheri Seydan	0	0	0.00	0.00	0.00	0.00
227	Peshail	734	971	0.00	0.00	0.00	0.00
228	Sargal	587	799	0.01	0.00	0.00	0.00
229	Sher Bai	83	53	0.00	0.00	0.00	0.00
230	Sial	931	1065	0.00	0.00	0.00	0.00
231	Talhaar	587	888	0.11	0.00	0.00	0.04
232	Gaheli	293	386	0.01	0.00	0.00	0.00
233	Gup	122	154	0.00	0.00	0.00	0.00
234	Jogan Mar	858	1110	0.02	0.00	0.00	0.01
235	Kothyala	10096	13691	0.16	0.00	0.50	0.22

236	Mukhdabi	361	518	0.00	0.13	0.00	0.04
237	Nallah	231	181	0.00	0.00	0.00	0.00
238	Paswal	1437	2477	0.03	0.00	0.00	0.01
239	Salyut	840	1209	0.00	0.00	0.00	0.00
240	Sobra	778	1275	0.03	0.00	0.00	0.01
241	Tahli	165	242	0.00	0.00	0.00	0.00
242	Todoo	100	164	0.00	0.00	0.00	0.00
243	Bachah Sani	452	638	0.00	0.00	0.00	0.00
244	Bhajwar	21	11	0.00	0.00	0.00	0.00
245	Gul Bandi	623	715	0.00	0.00	0.00	0.00
246	Jabbi	886	1051	0.00	0.00	0.00	0.00
247	Jarral	2763	3133	0.09	0.13	0.25	0.15
248	Kholyala	1461	1978	0.04	0.00	0.00	0.01
249	Kot Nali	1305	1459	0.00	0.00	0.00	0.00
250	Nakhey	513	684	0.00	0.00	0.00	0.00
251	Baghati	877	1291	0.03	0.00	0.00	0.01
252	Bain Gojri	648	873	0.00	0.00	0.00	0.00
253	Bain Noora	736	763	0.00	0.00	0.00	0.00
254	Banseri	567	759	0.02	0.00	0.00	0.01
255	Bhoraj	2623	3589	0.02	0.00	0.00	0.01
256	Botiala	408	494	0.00	0.13	0.00	0.04
257	Darobarh	328	464	0.00	0.00	0.00	0.00
258	Jatal	351	429	0.04	0.00	0.00	0.01
259	Khaski Kalan	1478	1514	0.03	0.00	0.00	0.01
260	Khaski Khurd	1347	1923	0.02	0.00	0.00	0.01
261	Mehal	589	838	0.01	0.00	0.00	0.00

262	Thanna	2659	3878	0.10	0.00	0.00	0.03
263	Bagh Darah	2209	3471	0.03	0.00	0.00	0.01
264	Beram Gali	1099	1251	0.02	0.00	0.00	0.01
265	Bisala	1061	1394	0.02	0.00	0.00	0.01
266	Chamak Mera	2576	3828	0.02	0.00	0.00	0.01
267	Chamhad	1498	2225	0.03	0.00	0.25	0.09
268	Fateh Bandi	286	408	0.00	0.00	0.00	0.00
269	Khani That Hiara	332	475	0.00	0.00	0.00	0.00
270	Sar Bangala	66	48	0.00	0.00	0.00	0.00
271	Shadial	488	582	0.00	0.00	0.00	0.00
272	Banda Baazdad	4828	7373	0.06	0.00	0.00	0.02
273	Jaswal	665	851	0.02	0.00	0.00	0.01
274	Nagakki	3283	3719	0.07	0.00	0.00	0.02
275	Aokhrila	2858	4566	0.02	0.13	0.00	0.05
276	Banda Shohalian	511	565	0.01	0.00	0.00	0.00
277	Damtor	13295	20605	0.36	0.13	0.25	0.24
278	Galdohk	1942	2652	0.04	0.00	0.00	0.01
279	Nawan Sher Janubi	8191	14852	0.44	0.13	0.25	0.27
280	Nawan Sher Shumali	7093	16575	0.10	0.13	0.00	0.08
281	Behlolia	3467	4958	0.03	0.00	0.00	0.01
282	Kakul	8355	12233	0.14	0.13	0.00	0.09
283	Mandroch Kalan	1845	3230	0.02	0.00	0.00	0.01
284	Mandroch Khurd	1565	2571	0.01	0.00	0.00	0.00
285	Khokhar	4705	6808	0.03	0.00	0.00	0.01
286	Salhar	32316	57466	0.16	0.25	0.50	0.30

287	Mir Pur	48218	113104	0.42	0.13	0.00	0.18
288	Gojri	3883	8970	0.01	0.00	0.00	0.00
289	Halmera Tarla	1047	1222	0.03	0.00	0.00	0.01
290	Halmera Utla	419	584	0.00	0.00	0.00	0.00
291	Saji Kot	3197	5718	0.01	0.00	0.25	0.09
292	Tannan	7005	15663	0.04	0.00	0.25	0.10
293	Baldheri	11102	27031	0.04	0.13	0.00	0.06
294	Jallalpura	5174	10587	0.06	0.13	0.00	0.06
295	Mor Kalan	3553	6270	0.06	0.00	0.25	0.10
296	Banda Amlok	1914	4718	0.00	0.00	0.00	0.00
297	Banda Khair Ali Khan	1452	1964	0.01	0.00	0.00	0.00
298	Banda Lamma	768	1021	0.03	0.00	0.00	0.01
299	Banda Noor Ahmed	1282	2057	0.03	0.00	0.00	0.01
300	Banda Phagwarian	5676	8997	0.00	0.00	0.00	0.00
301	Banda Qazi	12563	28251	0.04	0.00	0.00	0.01
302	Banda Sher Khan	1135	1687	0.01	0.00	0.00	0.00
303	Dehri	1359	2162	0.03	0.00	0.00	0.01
304	Dobatar	5400	8368	0.03	0.00	0.00	0.01
305	Banda Batang	763	1224	0.00	0.00	0.00	0.00
306	Banda Faizullah	629	804	0.00	0.00	0.00	0.00
307	Banda Ghazan	1408	2796	0.01	0.00	0.00	0.00
308	Jhangi	18927	49601	0.10	0.00	0.00	0.03
309	Bandi Mansoor	1781	2017	0.04	0.13	0.00	0.06
310	Chatri	3457	4454	0.06	0.00	0.00	0.02

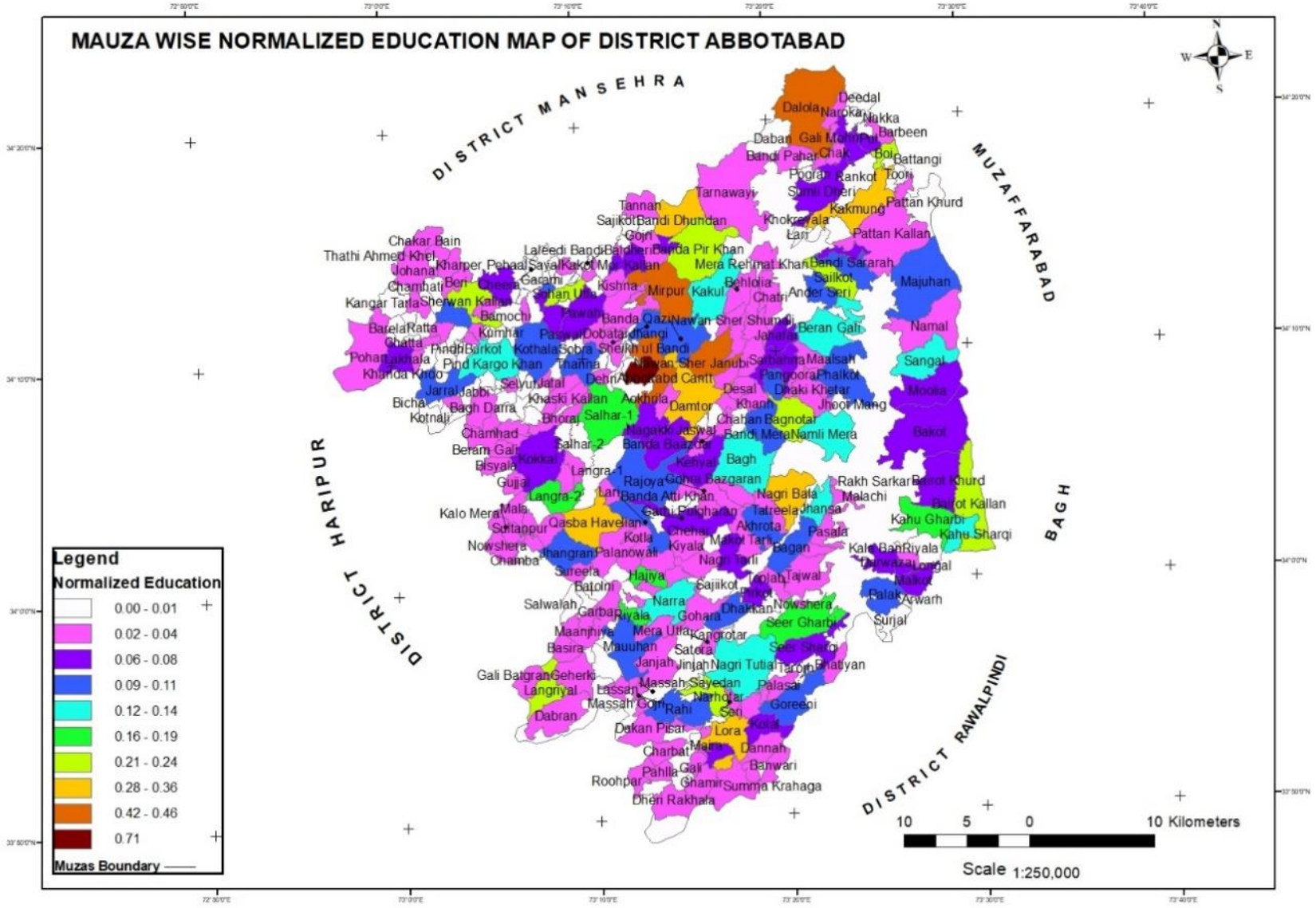
311	Gali Banya	3399	5031	0.04	0.00	0.25	0.10
312	Kathwal	2007	2510	0.03	0.00	0.00	0.01
313	Mera Rehmat Khan	1229	1354	0.04	0.00	0.00	0.01
314	Mehr Kalan	2135	2731	0.02	0.00	0.50	0.17
315	Sheikhul Bandi	26813	43980	0.46	0.13	0.00	0.19
316	Abbatabad Cantt			0.71	0.50	1.00	0.74
317	Rakh Civil Military			0.00	0.00	0.00	0.00
318	Banda Sahib Khan	4528	14318	0.03	0.00	0.00	0.01
319	Langra	20937	51128	0.16	0.13	0.50	0.26
320	Lari	1495	2819	0.02	0.00	0.00	0.01
321	Gujjal	797	919	0.02	0.00	0.00	0.01
322	Jandakka	1723	3488	0.01	0.00	0.00	0.00
323	Kokkal	9127	13156	0.08	0.00	0.25	0.11
324	Darooni Mera	648	1102	0.02	0.00	0.00	0.01
325	Qasba Havelian	15987	25217	0.28	0.50	0.25	0.34
326	Mala	1240	1977	0.02	0.00	0.00	0.01
327	Sultanpur	2675	4807	0.02	0.00	0.00	0.01
328	Wazira	1247	2081	0.00	0.00	0.00	0.00
329	Chamba	2916	3955	0.01	0.00	0.25	0.09
330	Jhangran	9642	12822	0.09	0.00	0.25	0.11
331	Kalo Mera	1469	1981	0.02	0.00	0.00	0.01
332	Nowshera (Jhangran)	2030	2930	0.01	0.13	0.50	0.21
333	Banda Atti Khan	4127	5908	0.09	0.00	0.25	0.11

334	**Barseen**	**1368**	**1825**	**0.01**	**0.00**	**0.00**	**0.00**
335	**Batolni**	**1701**	**2021**	**0.01**	**0.00**	**0.00**	**0.00**
336	**Kotla**	**1531**	**1830**	**0.03**	**0.00**	**0.00**	**0.01**
337	**Mugahid**	**1256**	**1549**	**0.02**	**0.00**	**0.00**	**0.01**
338	**Palanowali**	**5487**	**8226**	**0.03**	**0.13**	**0.00**	**0.05**
339	**Peepal**	**426**	**592**	**0.01**	**0.00**	**0.00**	**0.00**
340	**Salwalah**	**594**	**469**	**0.01**	**0.13**	**0.00**	**0.05**
341	**Sureela**	**1314**	**1965**	**0.02**	**0.00**	**0.00**	**0.01**

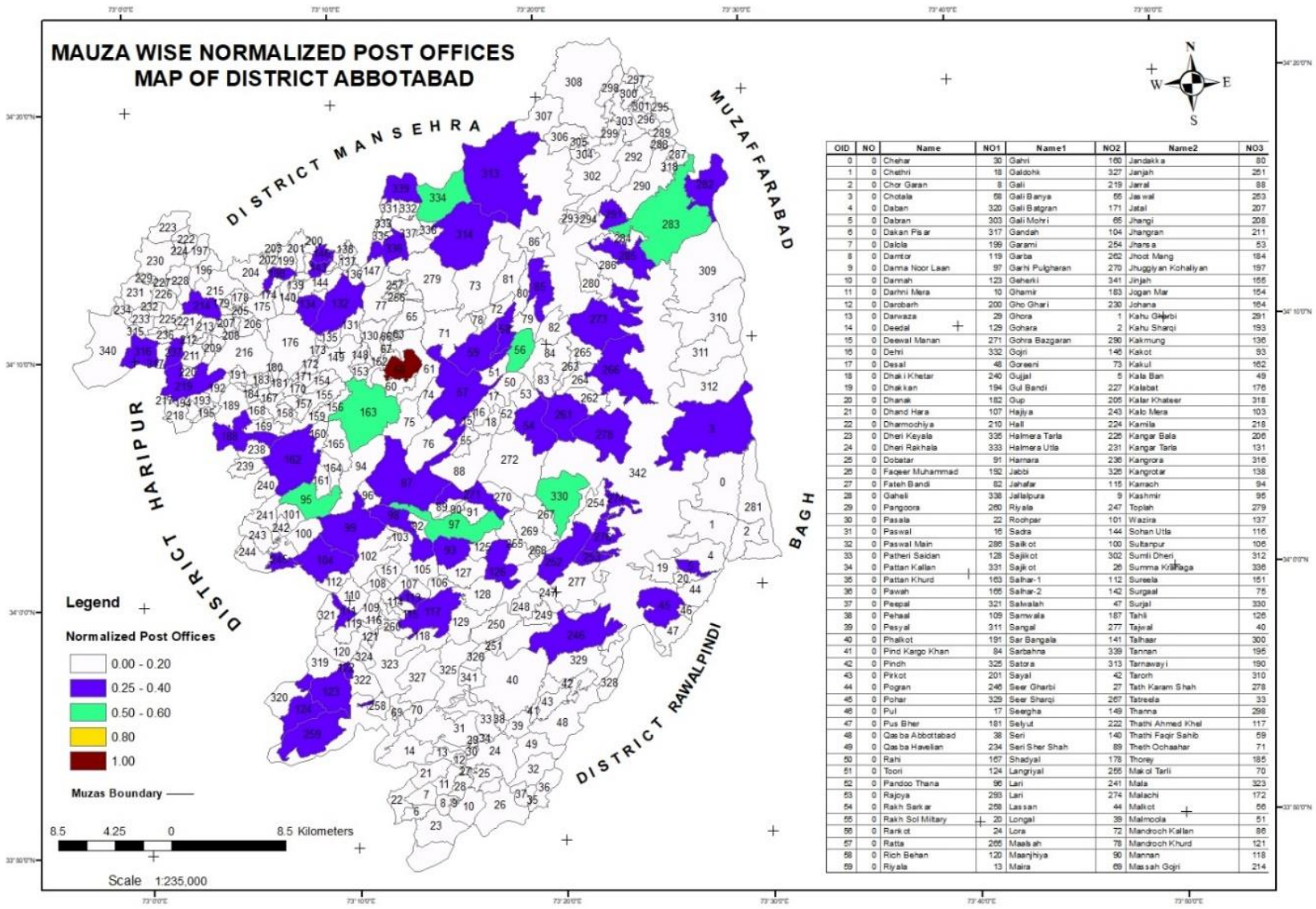
Notes:

9. Green Cells indicates above average index values
10. White Cells indicates below average index values
11. Red Cells indicates bottom 20 % of the below average index values

As per Mauza based functional analysis there are 102 Mauzas which fall within bottom 20 % of least served Mauzas, namely; Ateran, Gali, Kashmir, Bhajoora, Maira, Sher Pur, Bagla, Gahri, Ghora, Nurpur, Massah Sayedan, Mera Tarla, Dhanak, Mohari, Riyala, Mari, Mannan, Thathi Ochaahar, Arwar, Pus Bher, Lassan (N), Chahan, Sadra, Bandi Saman, Batangi, Deedal, Nakka, Ran Kot, Tori, Bandi Hamza, Phogran, Banota, Larri, Sial Kot, Kotheyala, Barkot, Haal, Khanda Khoh, Bandi Nikra, Bareela, Bashah Kalan, Bashah Khurd, Chatta, Rata, Bamochi, Kalar Khaitar, Kumhar (Amir Abad), Shaheed Abad, Chamhati, Chorgran (Ahmad Khan), Kamila, Kangar Tarla, Kalabat, Banda Jaghian, Sohan Tarli, Thathi Faqir Sahib, Kishna, Bazurgal, Garamri, Go Garhi, Pasial, Patheri Seydan, Peshail, Sargal, Sher Bai, Sial, Gaheli, Gup, Nallah, Salyut, Tahli, Todoo, Bachah Sani, Bhajwar, Gul Bandi, Jabbi, Kot Nali, Nakhey, Bain Gojri, Bain Noora, Darobarh, Mehal, Fateh Bandi, Khani That Hiara, Sar Bangala, Shadial, Banda Shohalian, Mandroch, Khurd, Gojri, Halmera Utla, Banda Amlok, Banda Khair Ali Khan, Banda Phagwarian, Banda Sher Khan, Banda Batang, Banda Faizullah, Banda Ghazan, Rakh Civil Military, Jandakka, Wazira, Barseen, Batolni, Peepal Mauza's. In the following, choropleth mapping has also been done using the primary data on education, health and other infrastructure.

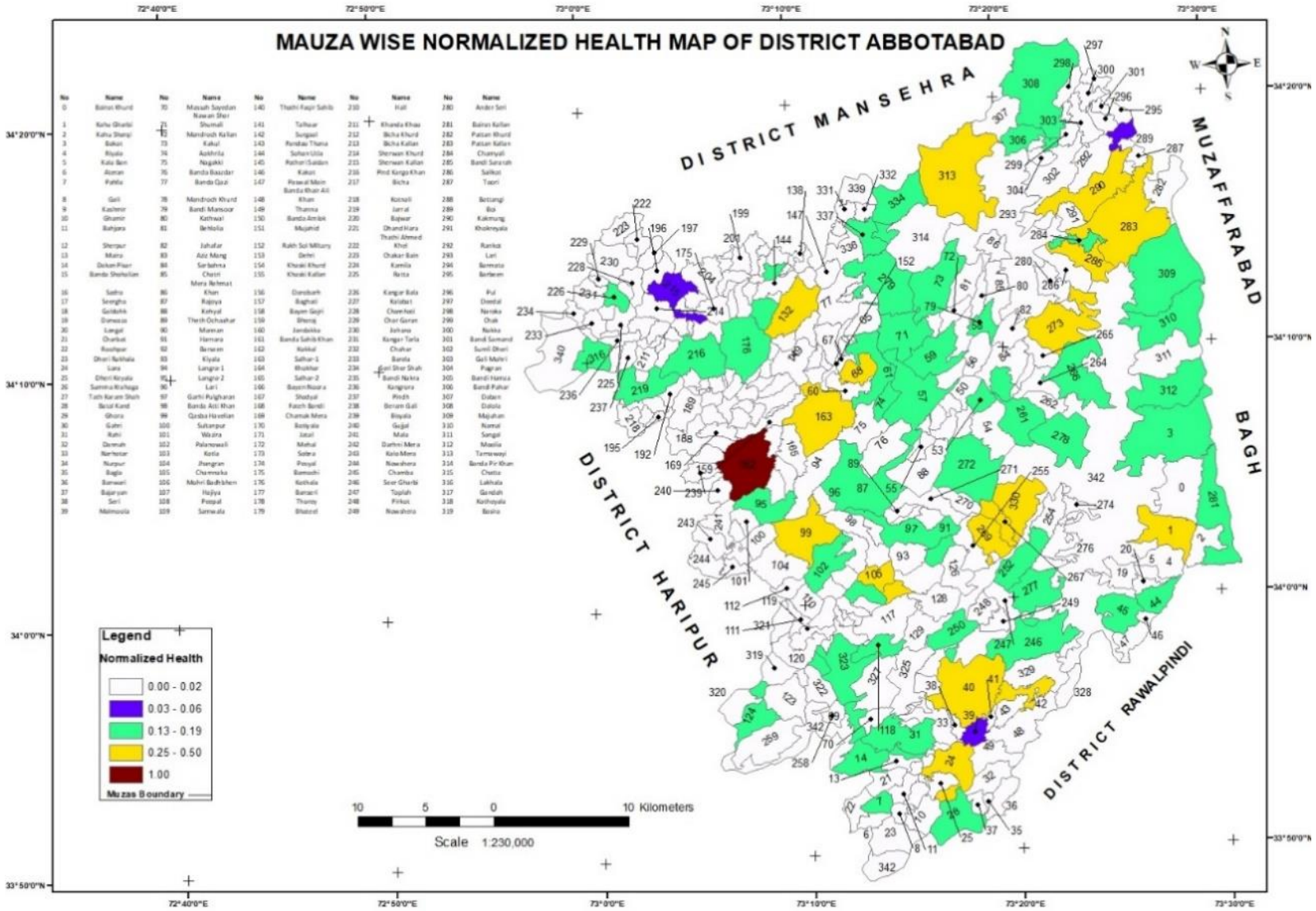


MAP 6-33**:Mauza Wise Normalized Education Map of District Abbottabad**



OID	NO	Name	NO1	Name1	NO2	Name2	NO3
0	0	Chehar	30	Gahri	160	Jandakka	80
1	0	Chethri	18	Galdohi	327	Janjah	251
2	0	Chor Garan	8	Gali	219	Jarral	88
3	0	Chotala	58	Gali Banya	66	Jaswal	253
4	0	Daban	320	Gali Batgran	171	Jatal	207
5	0	Dabran	303	Gali Mohri	65	Jhangi	208
6	0	Dakan Pisar	317	Gandah	104	Jhangran	211
7	0	Dalola	199	Garami	254	Jhansa	53
8	0	Damtor	119	Garba	262	Jhoot Mang	184
9	0	Danna Noor Laan	97	Garhi Pulgharan	270	Jhuggiyan Kohaliyan	197
10	0	Dannah	123	Geherki	341	Jinjah	155
11	0	Darhni Mera	10	Ghamir	183	Jogan Mar	154
12	0	Darobarh	200	Gho Ghari	230	Johana	164
13	0	Darwaza	29	Ghora	1	Kahu Gharbi	291
14	0	Deedal	129	Gohara	2	Kahu Sharqi	193
15	0	Deewal Manan	271	Gohra Bazgaran	290	Kakmung	136
16	0	Dehri	332	Gojri	146	Kakot	93
17	0	Desal	48	Goreeni	73	Kakul	162
18	0	Dhaki Khetar	240	Gujjal	5	Kala Ban	49
19	0	Dhakkan	194	Gul Bandi	227	Kalebat	176
20	0	Dhanak	182	Gup	205	Kaler Khateer	318
21	0	Dhand Hara	107	Hajiya	243	Kalo Mera	103
22	0	Dharmochiya	210	Hall	224	Kamila	218
23	0	Dheri Keyala	335	Halmera Tarla	226	Kangar Bala	206
24	0	Dheri Rakhala	333	Halmera Utla	231	Kangar Tarla	131
25	0	Dobatar	91	Harnara	236	Kangrora	316
26	0	Faqeer Muhammad	152	Jabbi	326	Kangrotar	138
27	0	Fateh Bandi	82	Jahafar	115	Kamach	94
28	0	Gaheli	336	Jallalpura	9	Kashmir	95
29	0	Pangoora	260	Riyala	247	Toplah	279
30	0	Pasala	22	Rochpar	101	Wazira	137
31	0	Paswal	16	Sadra	144	Sohan Utla	116
32	0	Paswal Main	286	Saikot	100	Sultanpur	106
33	0	Patheri Saidan	128	Sajikot	302	Sumli Dheri	312
34	0	Pattan Kallan	331	Sajikot	26	Summa Kalaga	336
35	0	Pattan Khurd	163	Salhar-1	112	Sureela	151
36	0	Pawah	166	Salhar-2	142	Surgaal	75
37	0	Peepal	321	Salwalah	47	Surjal	330
38	0	Pehaal	109	Samwala	187	Tahli	126
39	0	Pesyal	311	Sangal	277	Tajwal	40
40	0	Phalkot	191	Sar Bangala	141	Talhaar	300
41	0	Pind Kargo Khan	84	Sarbahna	339	Tannan	195
42	0	Pindh	325	Satora	313	Tarnawayi	190
43	0	Pirkot	201	Sayal	42	Tarorh	310
44	0	Pogran	246	Seer Gharbi	27	Tath Karam Shah	278
45	0	Pohar	329	Seer Sharqi	267	Tatreela	33
46	0	Pul	17	Seergha	149	Thanna	298
47	0	Pus Bher	181	Selyut	222	Thathi Ahmed Khel	117
48	0	Qasba Abbottabad	38	Seri	140	Thathi Faqir Sahib	59
49	0	Qasba Havelian	234	Seri Sher Shah	89	Theth Ochaahar	71
50	0	Rahi	167	Shadyal	178	Thorey	185
51	0	Toori	124	Langriyal	255	Makol Tarli	70
52	0	Pandoo Thana	96	Lari	241	Mala	323
53	0	Rajoya	293	Lari	274	Malachi	172
54	0	Rakh Sarkar	258	Lassan	44	Malkot	56
55	0	Rakh Sol Military	20	Longal	39	Malmoola	51
56	0	Rankot	24	Lora	72	Mandroch Kallan	86
57	0	Ratta	265	Maallah	78	Mandroch Khurd	121
58	0	Rich Behan	120	Maanjhiya	90	Mannan	118
59	0	Riyala	13	Maira	69	Massah Gojri	214

MAP 6-34:Mauza Wise Normalized Post offices Map of District Abbottabad



MAP 6-35:Mauza Wise Normalized Health Map of District Abbottabad

GOVERNMENT OF KHYBER PAKHTUNKHWA
LOCAL GOVERNMENT, ELECTIONS & RURAL DEVELOPMENT DEPARTMENT

No.SO(UADAs)/LG/1-34/LUBC/2022
Dated the Peshawar, 15th ASeptember,2022

To

1. Minister for Local Government and Rural Development Khyber Pakhtunkhwa
2. Minister for Agriculture, Livestock and Cooperative Khyber Pakhtunkhwa
3. Minister for Industries Khyber Pakhtunkhwa
4. Minister for Environment Khyber Pakhtunkhwa
5. Senior Member Board of Revenue, Revenue and Estate Department
6. Secretary to Government of KP, Housing Department
7. Secretary to Government of KP, Public Health Engineering Department
8. Secretary to Government of KP, Communication and Works Department
9. Secretary to Government of KP, Irrigation Department
10. Secretary to Government of KP, Transport and Mass Transit Department
11. Secretary to Government of KP, Environment Department
12. Secretary to Government of KP, Industries Department
13. Secretary to Government of KP, Agriculture, Livestock and cooperative Department
14. Secretary to Government of KP, Local Government and Rural Development Department
15. Professor Dr. Rawid Khan, Deptt: of Civil Engineering, UET Peshawar
16. Mr. Abdul Halim Paracha, Master in Civic Design, United Kingdom
17. Mr. Hifz-Ur-Rehman, Ex-Secretary
18. Mr. Adnan Ahmad Khan, HOD Architecture Department, CECOS University of I.T and Engineering Sciences, Peshawar
19. Dr. Nasir Javed, (Ex-PAS Officer) Urban Development Specialist

Subject: **1ST MEETING OF THE PROIVINCIAL LAND USE AND BUILDING CONTROL COUNCIL KHYBER PAKHTUNKHWA HELD ON 14/09/2022.**

Sir:

I am directed to refer to the subject noted above and to state that 1st meeting of the Provincial Land Use and Building Control Council was held on 14/09/2022 at Chief Minister House under the kind chairmanship of the Honorable Chief Minister Khyber Pakhtunkhwa. During meeting the plans were principally approved, however, the Honorable Chief Minister has very kindly directed to share copies of all the six completed District Land Use Plans of District Peshawar, Mardan, Swabi, Charsadda, Nowshera and Abbottabad with all members of the Council for their views/comments and inputs with in one week time positively.

I am further directed to enclose here with soft copies of the completed District Land Use Plans (DLUPs) of District Peshawar, Mardan, Swabi, Charsadda, Nowshera and Abbottabad for your views/comments and inputs within one week time positively for further processing of these plans please.

Section Officer (UADAs)

Endst: No. & Date Even:

Copy Forwarded to:

1. The PSO to Chief Minister Khyber Pakhtunkhwa
2. The PS to Additional Chief Secretary P&D Department
3. The DG, Provincial Land Use and Building Control Authority, LGE &RD Department
4. The Executive Director, UPPU, P&D Department
5. The Project Manager PLUP, UPPU, P&D Deprtment

Section Officer (UADAs)

19/9/22

MINUTES OF 1ST MEETING OF PROVINCIAL LANND USE AND BUILDING CONTROL COUNCIL KHYBER PAKHTUNKHWA. HELD ON 14/09/2022.

In order to discuss and approve the finalized District Land Use Plans of six Districts of Peshawar, Mardan, Nowshera, Charsada, Swabi and Abbottabad, 1st meeting of the Provincial Land Use and Building Control Council was held on 14/09/2022 at 11:00 AM at Chief Minister House under the kind chairmanship of the honorable Chief Minister Khyber Pakhtunkhwa.

Mr. Shahab Ali Shah, Additional Chief Secretary P&D Department briefed the forum on the objectives of the Land Use Plan and specially the importance and need of the District Land Use plans for streamlining the development. The purpose of the preparation of these plans is to ensure optimum utilization of land through better management for getting maximum benefit out of it. Peshawar's population is growing at 3.99% which indicates that the population will almost become double after 18 to 20 years. These plans will be a policy document and will serve as planning guidelines for line departments to regulate development at the district level and to know as to how to cater the needs and demands of the growing population in the next twenty years. He further explained that through a comprehensive study suitable zones have been identified in each of the district for each sector like Housing, industries, Tourism, Agriculture land and Livestock, Health services, Education services, Communication/Transport, Parks and green areas, recreational facilities, public buildings, Forest and Range lands, Mines and Minerals, Energy and Power, Trade and Commerce and Natural hazards etc. These plans have been shared with the relevant stakeholders at various planning stages. He requested the chair for principal approval of these plans so that its implemented may be started.

Planning and Development Department, UPPU, gave a detailed presentation of the district land use plan of Peshawar District, whereas the land use proposals contained in each of the remaining five District Land Use Plans were also presented and discussed in details. The forum appreciated all these plans.

The Honorable Chief Minister Khyber Pakhtunkhwa also appreciated the efforts of the Planning and Development Department. The honorable Chief Minister after detailed discussions directed that:

- These plans shall be in line with the Plans and Policies of the Departments and there shall be no overlap and duplication.
- These plans shall be shared with the concerned administrative secretaries/members of the councils for their views/comments and inputs, if any, within one week time positively, before circulation of the minutes.
- All the Departments shall execute/implement these Plans in letter and spirit.

- Agriculture Department was directed to stop any further housing activities on the agriculture lands.
- The LG&RDD was directed that PDA/TMAs may not issue any NOCs for any housing societies/schemes towards North of District Peshawar. Such like NOCs, if required, shall be issued towards south of District Peshawar in the area specified for housing sector under the DLUP Peshawar.
- Progress of the Population department regarding the population control shall be reviewed.
- All the illegal encroachment along the rivers and streams side shall be stopped.
- Grievances redressal mechanism shall be established at District as well as provincial level so as to address any complaint regarding these District Land use plans.
- Similar District Land Use Plans shall also be prepared for all the remaining District of Khyber Pakhtunkhwa including newly Merged Districts.

Decision:

After detail discussion the following decisions were arrives at:

1. All the Six completed District Land Use Plans of District Peshawar, Mardan, Nowshera, Charsadda, Swabi and Abbottabad were principally approved for their further implementation and execution at District level.

The meeting ended with a vote of thanks from and to the chair.

FIRST MEETING OF THE PROVINCIAL LAND USE AND BUILDING CONTROL COUNCIL DATED 14/09/2022

PARTICIPANT LIST

S.No	Name	Designation	Contact No	Signature
1	S.M. Shah	Minister	03447571[illegible]	[signature]
2	FAISAL AMIN	MIN	03345152307	[signature]
3	Abdul Karim	SPL Asst Com Industries	0313528[illegible]	[signature]
4	AMBER ALI KHAN	Secretary Housing	0344-9271558	[signature]
5	Rawid Khan	prof. UET	0300 5734427	[signature]
6	Muhammad Asif	SSC(Dev) DS LCBA	0301-5971257	[signature]
7	Adnan A. Khan	Architect	0301-8498899	[signature]
8	Abdul Halim Paracha	Urban & Regional Building Control Specialist	0341-8595859	[signature]
9	Idrees	Secretary C&W	03335553332	[signature]
10	Jamil Gul	Spl: Secy	03105880989	[signature]
11	Amer Ahmed	Secy T	091 9210316	[signature]
12	Abid Majeed	Secy Env		[signature]
13	M. Nauman	Add. Sec	03036077773	[signature]
14	Zakir Hussain	SMBR		[signature]
15	Shahab Ali Shah	ACS		[signature]
16	Zaheer ul Islam	Sec LG		[signature]
17	Taimoor Jhagra	Minister Fin & Health	—	—