Provincial Land Use Plan (PLUP) Urban Policy and Planning Unit – Planning and Development Department
Government of Khyber Pakhtunkhwa

Final Land Use Plan

District Nowshera
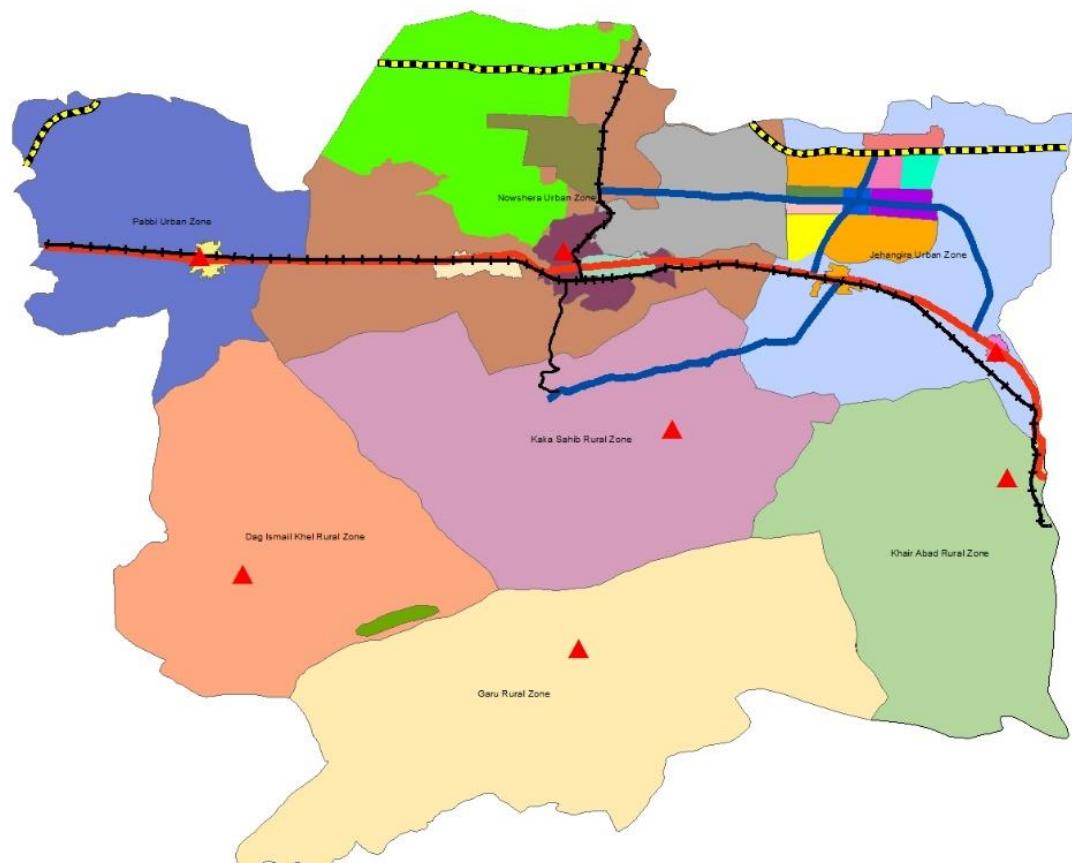
MESSAGE FROM CHIEF MINISTER
KHYBER PAKHTUNKHWA

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.
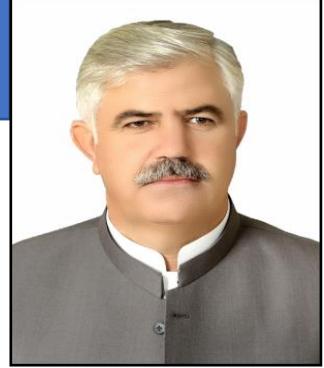
Cities and towns would be in disarray without an appropriate land-use plan, and the traffic movement would not be effective. Industrial facilities would contaminate streams, residential areas, and the air. Urban sprawl would hinder the cities from functioning as they ought to, thus the economy would 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.
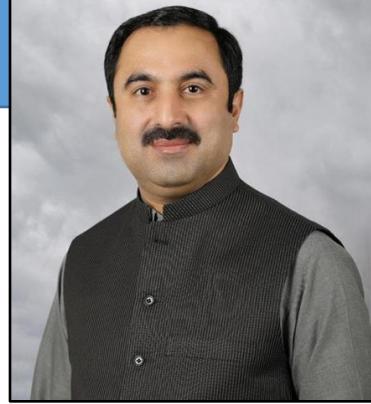
Khyber Pakhtunkhwa has led the way in creating comprehensive land-use strategies. Based on the findings of studies and consultations with key stakeholders, this document serves as a roadmap for the sector plans that will be carried out with careful integration among sectors. District land use planning 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

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 Truck Road
HHs	Households
Kms	Kilometers
KP	Khyber Pakhtunkhwa
DLUP	District Land Use Plan
M1	Motorway Islamabad-Peshawar Section
MC	Municipal Corporation/Committee
NRM	National Reference Manual on Planning and Infrastructure Standards
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. INTRODUCTION

1. THE PROJECT AREA

1.1 BACKGROUND

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 the development of all areas of the province by adopting an integrated and holistic planning approach.

According to Section 4, Sub-Section 2 (xv) of the NWFP (now Khyber Pakhtunkhwa) Housing Authority Act 2005, the Provincial Housing Authority (PHA) is required to formulate a Provincial Land Use Plan/Policy for the province. During the PDWP meeting held in March 2010, the PC-I of PMU for the preparation of Land Use Plans of Khyber Pakhtunkhwa was presented for approval wherein it was decided by the chair that the project shall be completed in phases as proposed in the PC-I. Phase 1 of the Project pertains to land use planning of the five districts namely Peshawar, Nowshera, Charsadda, Mardan and Swabi.

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

The Land Use Plan will help to induce sustainable development, optimize exploitation of land and physical resources, enhance provincial income, increase overall activity and balanced distribution of infrastructure and services. The Land Use Plan will be a tool for guidance to provincial governments, District Governments and TMAs for undertaking integrated and coherent development programs.

1.2 PLUP INTRODUCTION

i. To provide a broad framework for District Spatial Plans and to resolve inter-district planning issues.

ii. To establish a planned hierarchy of settlements and integrated and systematic growth of trunk infrastructure and services in the province.

iii. To provide guidelines for the emerging development corridors.

iv. To suggest parameters for reducing migration to big urban centres.

v. To determine a need for new towns at the feasible locations.

vi. To provide guidelines for the proper development of rural areas.

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

1.3 SCOPE AND ROLE OF DISTRICT LAND USE PLAN

Land-use planning has different levels such as national, provincial, regional, district and local. These are not necessarily sequential but correspond to the levels of government at which decisions about land use are taken. Planning at the national level is more economic in nature, but at lower levels such as urban or local, spatial aspects become more prominent.

Different kinds of decisions are taken at each level, where the methods of planning and kinds of the plan also differ. The greater the interaction between the different levels of planning, the better it is. The flow of information should be in both directions. At each successive level of planning, the degree of detail needed increases, and so too should the direct participation of the local people. Planning at different levels needs information at different scales and levels of generalization.

District Land Use Plan deals with efficient placement of broad, district-level Land Uses and zoning for the sustainable growth of a District as a whole. It differs from the urban structure plans in many ways. A District can have more than one urban area and hundreds of villages and the District Plan has to consider these all. Besides, the nature of Land Uses at District level is not commonly found in an urban area, such as large-scale agriculture, rangeland, forestry, livestock, fishery etc. As against District Plan, the focus in urban plans is identification of issues and solutions for Central Business District, neighborhood planning, urban municipal services etc.

Despite the above however, it is important that while preparing urban plan, it should establish linkages with the District Plan. Urban Plan should be prepared within the broad framework provided by the District Plan, such as future urban growth direction, conserving prime agricultural land, avoiding flood prone areas, considering broad road network proposed in District Plan etc.

At the national level, planning is concerned with national goals and the allocation of resources. In many cases, national land-use planning does not involve the actual allocation of land for different uses, but the establishment of priorities for projects at the national level.

Regional planning deals with the efficient placement of land-use activities, infrastructure, and settlement growth across a larger area of land than an individual city or town. Under Regional Planning, areas covered and specific administrative setups vary widely from country to country. Thus, regional planning may encompass an entire District or more than one District. Regional Plan and District Plan both, however, are equally "regional" in nature. A 'region' in planning terms can be administrative or at least partially functional and is likely to include a network of settlements, rural areas and other uses.

Urban Planning deals with the specific issues of city planning, and urban plans (or structure plans) are prepared within the broad realm provided by District Land Use Plan. It is concerned with the use of land and the design of cities to guide and ensure their orderly development.

In the lowest rung of Land Use planning are local plans or action plans which are prepared within the framework of urban plans, just as urban plans or rural plans are prepared within the framework of District/Regional Plans.

1.4   PLANNING PARADIGM

In the traditional planning paradigm, usually separate spatial plans are prepared for urban and rural areas, while the district land use plan of District Nowshera is a shift from the traditional planning paradigm where spatial plans for urban and rural areas were prepared simultaneously. The Land Use Plan principally emphasizes two major planning techniques which are; projections according to existing scenarios that encompasses the sectors of housing, infrastructure, transportation, commercial, industry and recreational activities and the analysis & proposals for such sectors to improve the living standards of the populace of District Nowshera. The land use plan provides both long-term broad policy guidelines and short-term specific project proposals for cohesive development of the area. The implementation of the plan will reduce regional disparities and will ensure the balanced development of both urban and rural areas in the district.

1.4.1 Sectoral Coverage

For the preparation of the District Land Use Plan of Nowshera (2019-39), agriculture and livestock, trade, commerce and industries, mines, minerals and energy, communication (road, rail and airways, postal services and telegraphs), health and education, tourism, sports and entertainment, including historical and religious places, libraries, museums, zoos, and open spaces, security, graveyards, housing, water (surface and ground water resources), and district economy, these sectors were thoroughly analyzed and mapped using modern techniques of GIS and Remote Sensing.

1.5   THE PROJECT AREA

Nowshera lies on a sandy plain surrounded by hills on the banks of the Kabul River. It is a commercial and industrial center that is connected by rail and road with Dargai (Malakand Pass), Mardan, Peshawar, and Rawalpindi. The town's industries include cotton, wool, and paperboard mills as well as chemical and newsprint factories, powered by the Malakand-Dargai and Warsak hydroelectric projects.

The district is bordered to the west by Peshawar, to the north by Charsadda, towards the north by Mardan, to the east by Swabi, and to the south by District Attock. Nowshera has three cantonments, namely: Nowshera, Risalpur, and Cherat Cantonments.
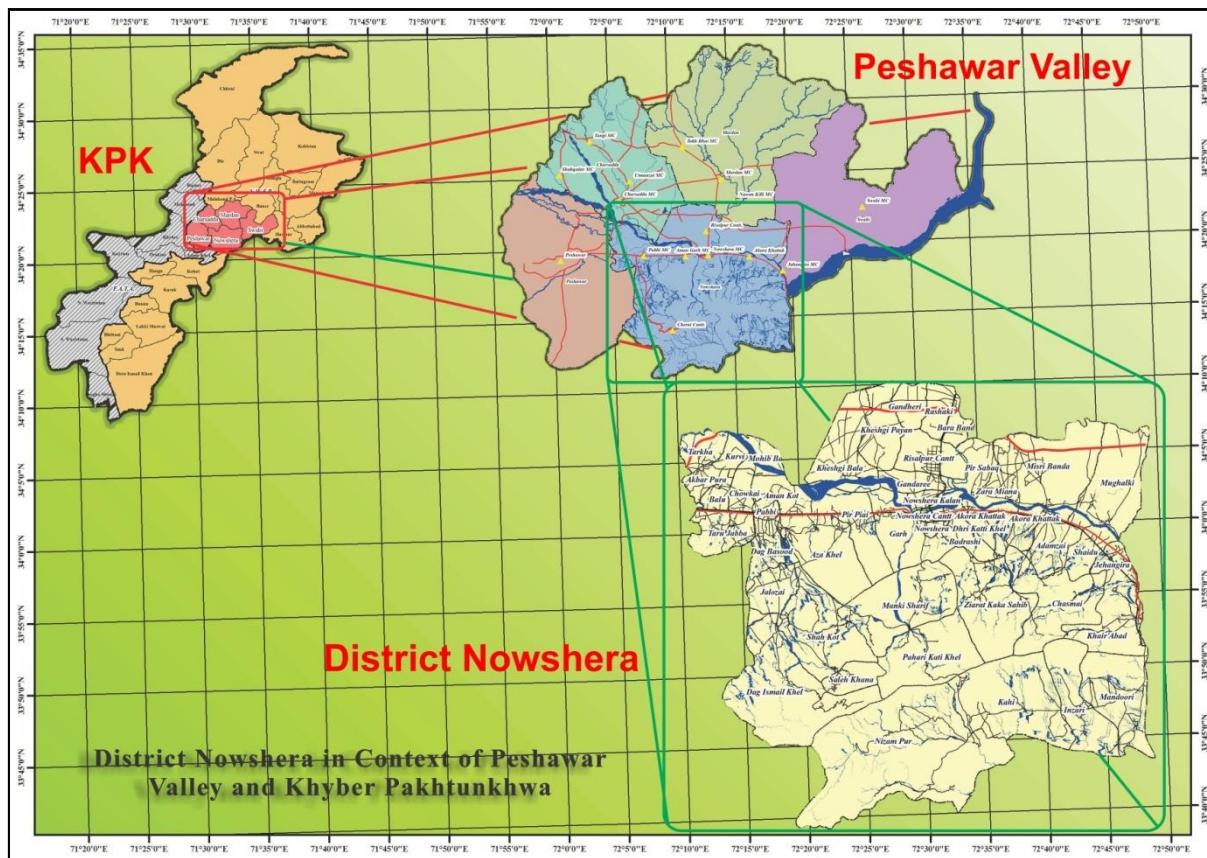
Map 1-1: Project Area

Map 1.1 describes the location of District Nowshera (Project area). It is located both on the KP province map and also on the Peshawar valley map. District Nowshera is located East-West of KP's capital, Peshawar City.

1.6 CLIMATE

Climate is the meteorological conditions, including temperature, precipitation, and wind, that characteristically prevail in a particular region. It encompasses the statistics of temperature, humidity, atmospheric pressure, wind, rainfall, and other meteorological elemental measurements in a given region over long periods.

The climate in Nowshera is known as a local steppe climate. During the year, there is little rainfall in Nowshera. The average temperature is 22 °C and the average annual rainfall is 61 mm.

Generally, four seasons prevail in the area, which may climatologically be divided as;

- Winter: December-March
- Pre-monsoon: April-June
- Monsoon: July-September
- Post-monsoon: October-November

The driest month is December. There is 0 mm of precipitation in December. Most precipitation falls in March, with an average of 143 mm. With an average temperature of 34.2 °C, June is the warmest month. In January, the average temperature is 6.8 °C. It is the lowest average temperature of the entire year. The precipitation varies by 143 mm between the driest month and the wettest month. The average temperature varies during the year by 28.4 °C. Throughout the year, the average relative humidity ranges from 33 to 56 percent. The surface wind speed varies during the year from 1.7 to 7.6 knots, and the direction is usually variable.

Table 1-1: Climatological Normal for District Nowshera (2014)[1]

Parameters/ Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Temp:(°C)	6.8	7.06	9.65	16.8	22.31	28.4	26.2	24.5	23.2	17	13.6	9.62	17
Min. Temp: (°C)	3	3.5	6.1	12.3	17.5	22.6	21.8	20.4	18.3	12.5	9.3	5.3	15
Max. Temp: (°C)	10.6	10.6	13.2	22.4	27.1	34.2	30.5	28.7	28.2	21.6	17.9	14	22
Precipitation(mm)	7	77	143	123	76	34	77	78	45	48	19	0	61
Mean R/H[2] %	50	51	47	41	33	36	50	56	52	48	53	56	48
Mean wind speed (knots)	2.9	4.4	4.1	5.2	5.4	7	7.6	6.3	4.7	2.5	1.7	1.9	4.4
Wind Direction	W	W	W	N	NW/SW	NW	NW	W	SW	W	N	SW	W

Figure 1- 1: Maximum, Minimum and Average Temperature °C 2014
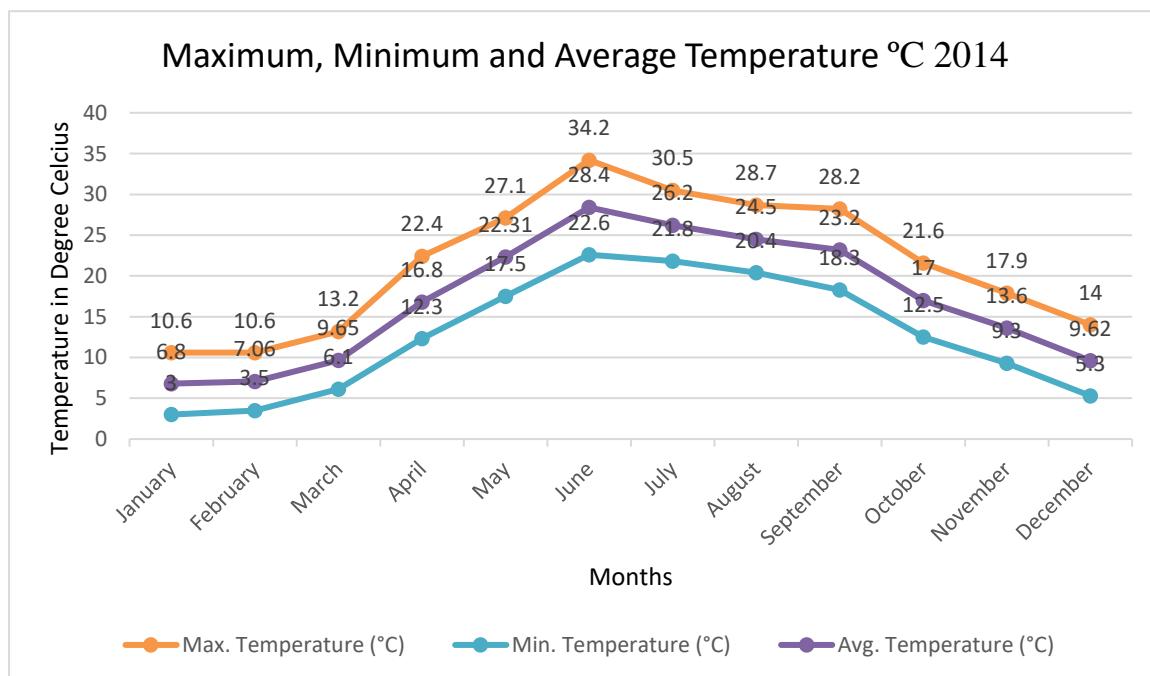
[1] Environmental Profile of KP- 2017, p. 186

[2] District Studies Report Nowshera
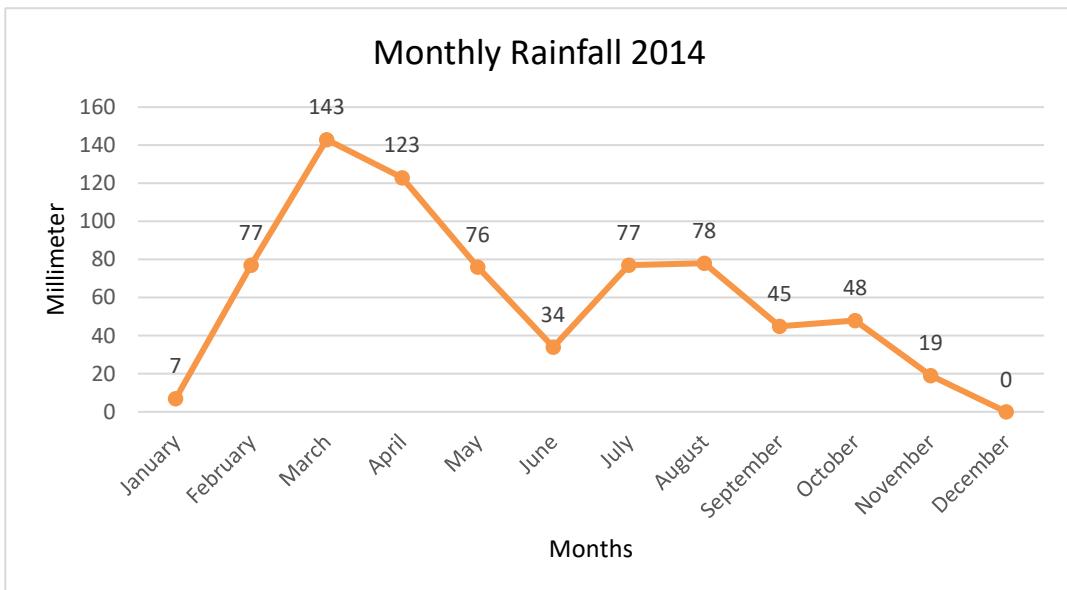
Figure 1- 2: Monthly Rainfall 2014
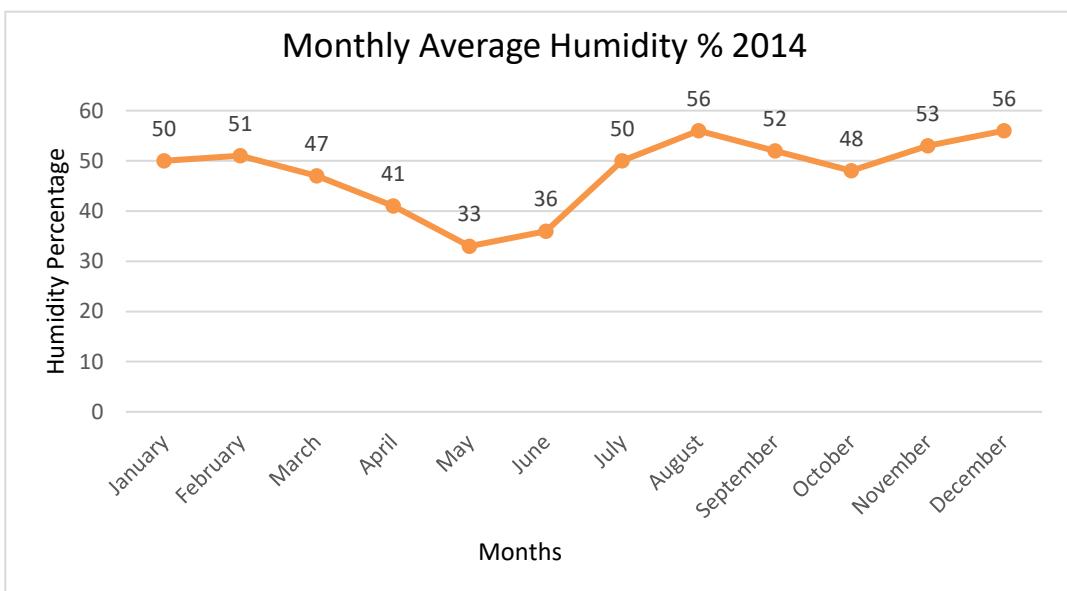
Figure 1- 3: Average Monthly Humidity 2014

1.6.1 Conclusion

District Nowshera experiences moderately severe climatic conditions. The summer in the district is extremely hot. A steep rise in temperature was observed from May to June. Due to intensive cultivation and artificial irrigation, the tract is humid and hot. However, from October onwards, there has been a rapid drop in temperature. The coldest months are December and January. Maximum rainfall was recorded in March, April, and August, with the rainiest month receiving 143 mm. At the end of cold weather, there are occasional thunder storms and hail storms. The relative humidity is quite high throughout the year, with maximum humidity of 56 percent recorded in August and December..

1.7   GEOLOGY

In Pakistan, the history of geographic evolution dates as far back as 1.8 billion years. It is possible to envision how frequently the region was under water throughout this lengthy period, allowing sedimentary rocks to form, and how frequently volcanic lavas invaded the area, forming metamorphic rocks and a variety of intricate geometries that now make the lofty peaks appear so majestic.

1.7.1   Geological profile of District Nowshera

Bed Rock:	Mostly sedimentary and low-grade metamorphic rocks
Composition of sub soil:	About 55% of the district is underlain by recent alluvium. These include recent river, stream, flood plain and lake deposits and belong to the Pleistocene age group
Geological Age:	Precambrian to Cenozoic (quaternary)
District Geological Map:	Not available
Water Table:	Ground water generally occurs under water table conditions with a few local exceptions. Depth to water table generally varies from 13 to 5meters below ground level in barani (arid) areas whereas it within 10 m in canal irrigated areas.
Elevation:	290 m (951ft) For Nowshera Cantonment
Economic Minerals:	Bentonite clay, Shale Clay, Fire Clay, Red oxide, Laterite, Coal, Limestone, Dolomite, Marble, Soaps tone and Silica.
Coordinates*:	$71^O41'\ 00''$ -----$72^O\ 14'\ 00''$ E (Longitudes)
	$33^O\ 42'\ 00''$ -----$34^O\ 09'\ 00''$ N (Latitudes)
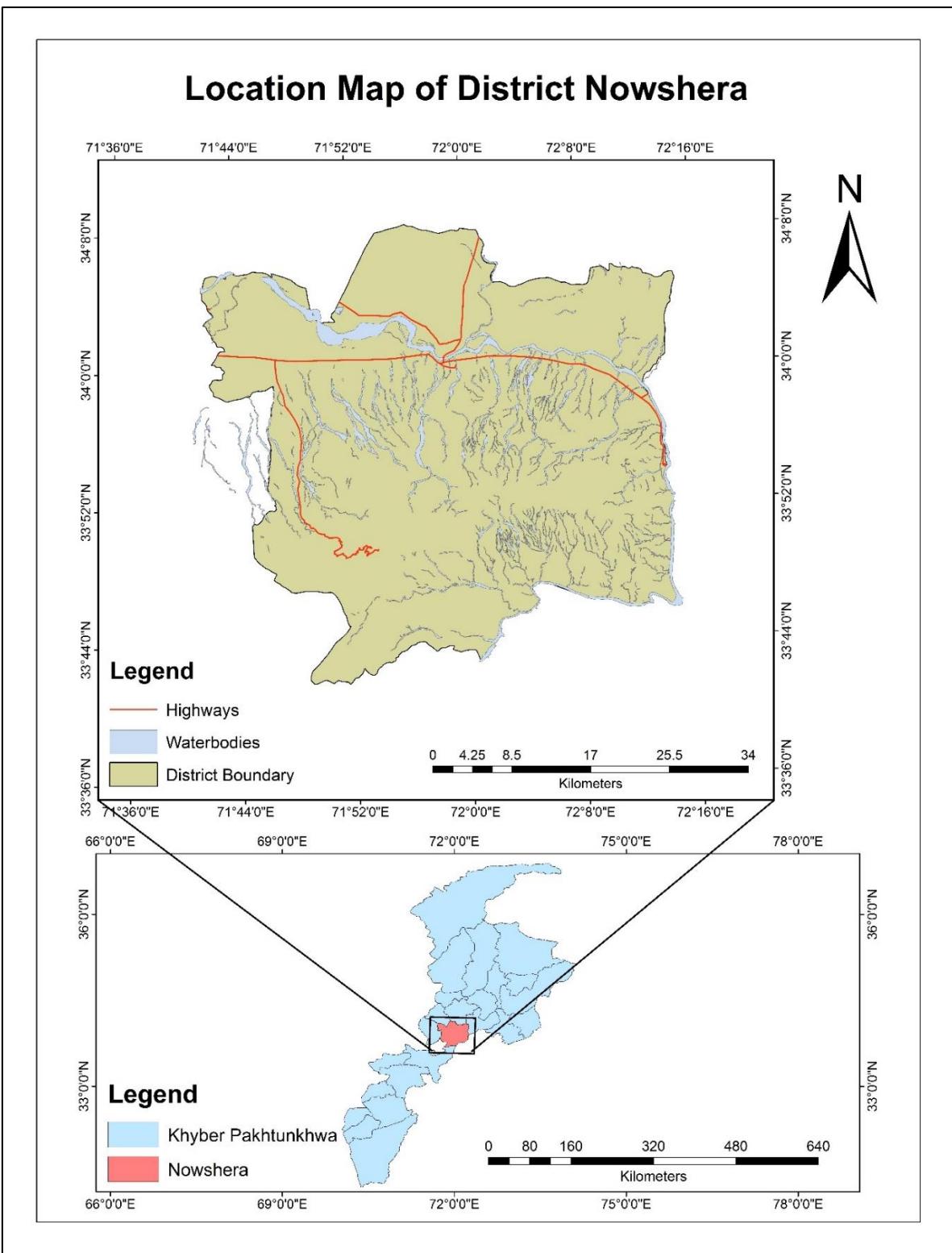
Map 1-2: Location Map of District Nowshera

Map 1-2 shows the location of District Nowshera on the KP map. And also, as the geological coordinates.

1.7.2 Geology of District Nowshera

Active faulting occurs to the north of the MBT along ENE trending high-angle faults in the Peshawar Basin. The faulting is associated with four left-stepping, en-echelon pressure ridges formed within the Peshawar basin parallel to its southern margin. The pressure ridges are, from west to east, the Garhi Chandan, Uch Khattak, Walai, and Misri Banda ridges, each named for villages located in the vicinity.

i. Garhi Chandan Ridge

The Garhi Chandan Ridge defines a broad fold plunging east and west with Murree Formation in the core. The ridge is covered on both sides by sediments of the Pliocene-Pleistocene age, including the ash-bearing sediments dated by Burbank and Tahirkheli (1985). Gravel in this sequence consists predominantly of pre-Murree clasts from the Kala Chitta Range, with Murree clasts increasing in percentage up section. These sediments dip southeast off the eastern end of the ridge at Walai China; the striking ridge extends 8 km northeast to Spin Khak with dips as much as 40°SE. North of the ridge, adjacent to the Murree exposures, sediments dip as high as 60°N. Farther north, the sediments are folded into a syncline and anticline; the northern anticline is asymmetric, with dips ranging from 40°S to 10°N.

ii. Uch Khattak Ridge

Uch Khattak Ridge, bedrock is overlain on the north by fanglomerate containing locally derived Manki Slate clasts. The fanglornerate is itself overlain by river gravel with a northern provenance. This sequence dips 20°N. On the south side of the ridge, fanglomerate dipping 25°S was exposed in a trench near Uch Khattak village. Farther west, in Jabba Khattak Nala, which, like Uch Khattak Nala, cuts through the ridge, lake beds of the Jallozai Formation dip 16°N on the north side of the ridge.

iii. Walai Ridge

The ridge has a gentle north slope and the steep, linear south-southeast-facing ridge has a gentle north slope and a steep, linear south-southeast-facing ridge front that truncates foliation at a low angle. Two streams, the Tangi Khwar and the Pirano Khwar cut through the bed rock ridge and appear to be antecedent to it. These deposits rest directly on Manki Formation. As reported, the catastrophic-flood deposits are separated by a colluvial zone, below which the beds dip 10°N, and above which they dip at only 20°N.

iv. Misri Banda Ridge

The Misri Banda is located north of the Kabul River in an east-trending series of linear bedrock ridges underlain by Paleozoic strata. In the Misri Banda-Mian Dheri area, the bedrock is overlain unconformably by flat-lying lacustrine sediments on the north and by gently to strongly folded lacustrine and fluvial sediments on the south. The lacustrine sediments on the south side are cut by a fault that strikes 60°N to 68°E, dips 80°N, and is exposed for a strike distance of 3 km. The fault zone is about 50 cm wide and is marked by slickenside-bounded lenses of clay and silt.

1.7.2 Seismicity of District Nowshera

Nowshera is in zone 2b of the minor damage zone corresponding to PGA (Peak Ground Acceleration) value of 0.0667g to 0.1g as reported by the Geophysical Centre Quetta. The only active faulting in the south of Nowshera is near Uch Khattak ridge which passes from Piran to Ghari Chandan near the fault, above the Panjal Khairabad Thrust (PKT) in Attock Cherat range. Therefore, this active fault could be the future seismic risk for District Nowshera as shown in map 1-3.
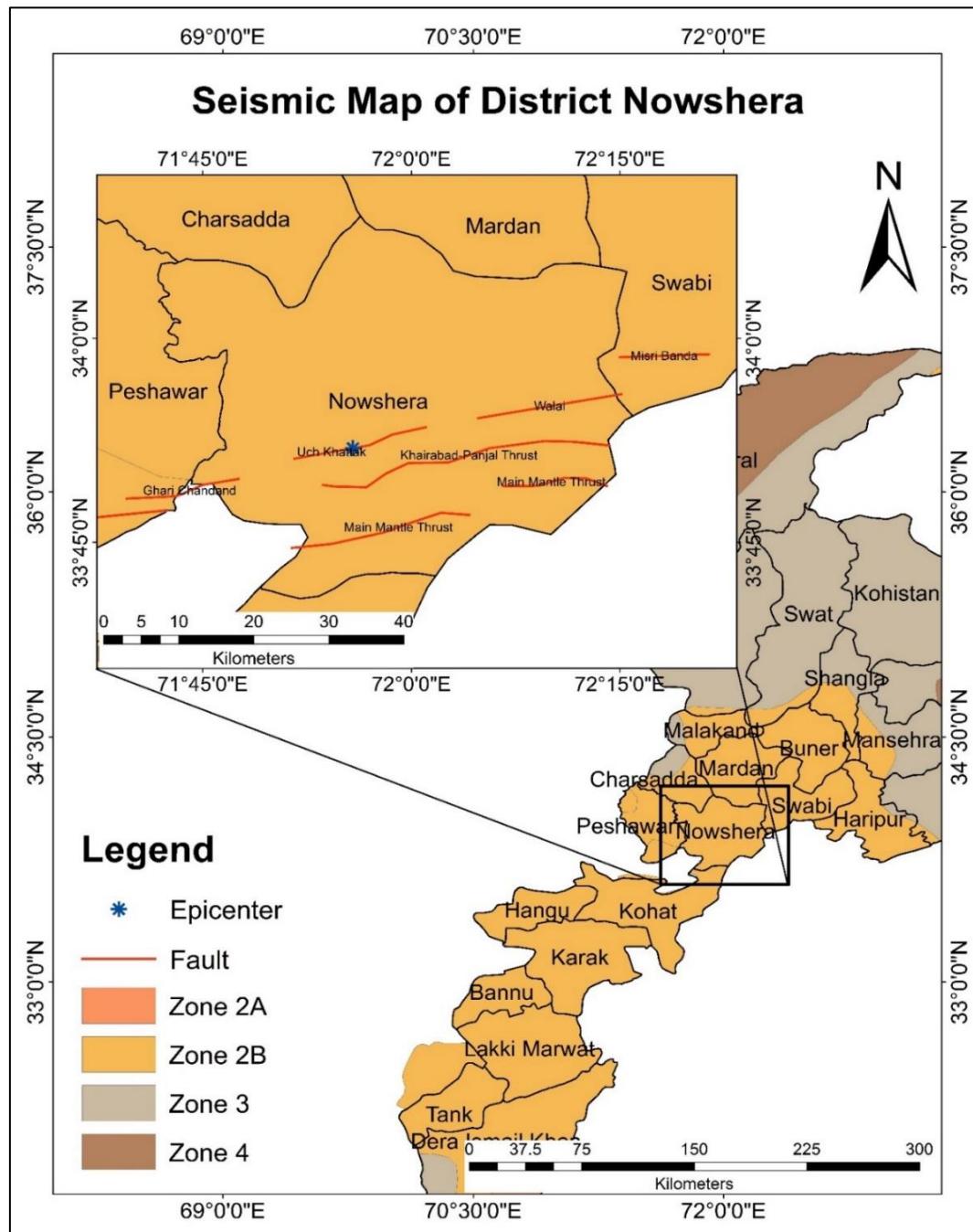
Map 1-3: Seismic map of District Nowshera

Map 1.3 shows the seismic of District Nowshera. On the map, all the fault lines are shown that are passed through District Nowshera. And also, the location of the expected epicentre that could have the chance to occur.

Active faulting occurs to the north of the MBT along ENE trending high-angle faults in the Peshawar Basin. The faulting is associated with four left-stepping, en-echelon pressure ridges formed within the Peshawar basin parallel to its southern margin. The pressure ridges are, from west to east, the Garhi Chandan, Uch Khattak, Walai, and Misri Banda ridges, each named for villages located in the vicinity.

1.7.3 Expected Epicenters

Expected epicenters cannot be predicted for any particular place. However, earth quakes can occur at active fault/thrust lines because energy is continuously stored during the movements of the earth along the fault/thrust lines. The only active faulting in the southern Peshawar basin is a fault which passes from Piran near Uch Khattak ridge and extends to Gharhi Chandan, above the Panjal Khairabad Thrust (PKT), which is in an area across the Attock Cherat range. Therefore, this active fault could be the future (with no time frame) epicenter of earth quakes in this region.

This thrust is shown in Figure 8.
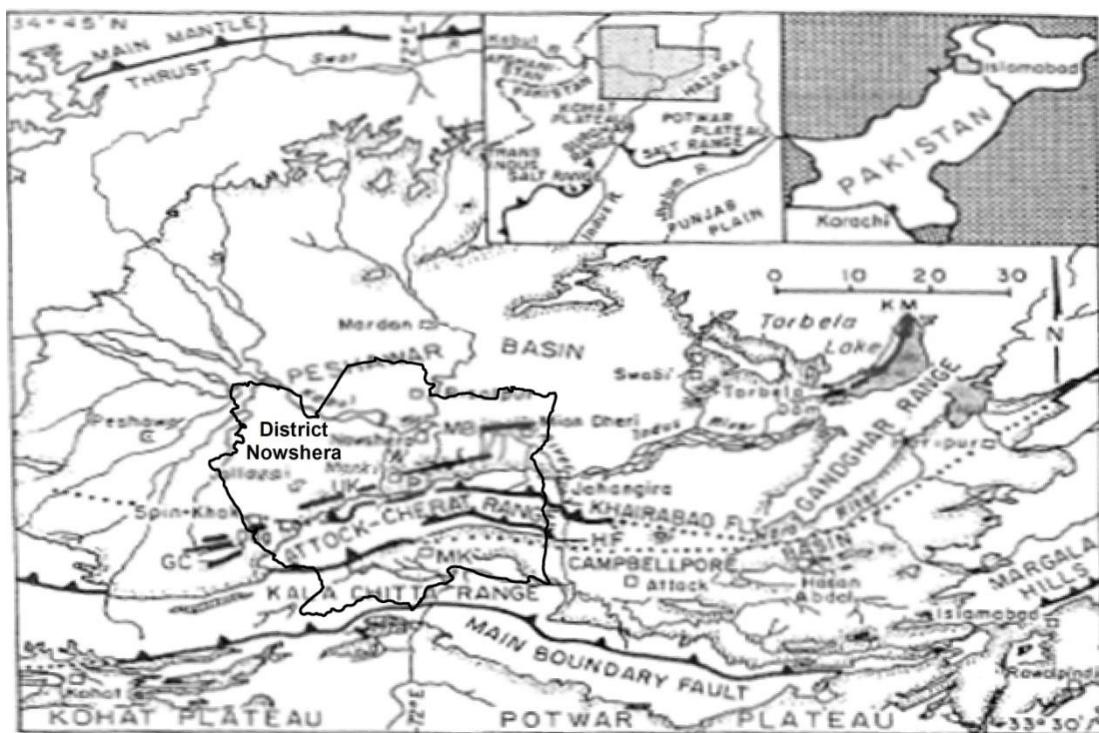
Map 1-4: Expected epicenters

Map 1.4 is of Peshawar Basin showing late Quaternary fault traces (heavy solid lines) and older regional thrust faults (heavy lines with teeth): Main Mantle thrust, Khairabad-Panjal thrust, and Main Boundary thrust F= Hissar tang fault, Pressure ridges: GC= Garhi Chandan; UK= Uch Khattak; W= Wali; MB =Misri Banda. Villages: P = Iosi, MK= Mir Kalan

1.7.4 REVIEW OF GEOLOGY SECTOR POLICIES

A lot of geological work has been conducted since the independence of Pakistan in 1947. The major work has been conducted by the government-owned organization, the Geological Survey of Pakistan, which has the sole mandate to prepare geological maps of different parts and areas of Pakistan. Till date, the Geological Survey of Pakistan has prepared several geological maps of different regions of Pakistan and has covered almost the entire area of Pakistan, including a geological map of Khyber Pakhtunkhwa. The maps thus prepared are being used by various organizations as base maps for geological information.

Besides, organizations such as the Geology Department and Center of Excellence of Peshawar University have generated a lot of geological academic and research data for KP and northern areas. Pakistan Mineral Development Corporation (PMDC), Sarhad Development Authority (SDA), Punjab Mineral Development Corporation, and the Geology Department of Punjab University have also generated extensive data and prepared maps related to the exploration of various metallic and non-metallic minerals in Pakistan.

Oil and Gas Development Corporation (OGDC) and foreign oil companies which have been granted licenses for exploration of oil and gas in the different parts of Pakistan and KP have generated detailed exploration and geological data, but this data is not available to the public or research organizations.

1.7.5 RECOMMENDATIONS FOR GEOLOGY SECTOR

It is recommended that the government of Khyber Pakhtunkhwa should perform a geological survey of each district of the province with the contribution of the Geological Survey of Pakistan. And make sure these are accessible to all governmental departments.

The government of Khyber Pakhtunkhwa demarcates hazard-prone areas that are along the fault lines and makes restrictions on any kind of development activities in the vicinity of those areas. The Geological Survey of Pakistan should jointly conduct hazardous site mapping of landslides and slopes and vulnerability assessment for all districts of the province through a doable mechanism. The information gathered through this exercise will be vital for the construction of roads, canals, dams, hydro-electric power plants, industrial plants, etc.

It is highly recommended that the Directorate of Mines and Minerals, Government of Khyber Pakhtunkhwa should prepare an accurate mineral map of the province along with separate district wise maps with all the vital information such as name, reserve, location, quality, chemical composition of the mineral deposit, lease areas and number of leases etc. This information must be as per international standards..

Geological Map of District Nowshera

Legend

- Murree Formation
- Shagai, Dakhner and Hazara Formation Undivided
- Khyber Limestone, Shekhai, Utch Khattak and Shahkot Formation
- Samana Suk Limestone
- Mesozoic Rocks Undivided
- Paleozoic Rocks Undivided
- Quaternary Alluvium
- River
- Patala Formtaion
- Landikotal Slates and Manki Formation Undivided
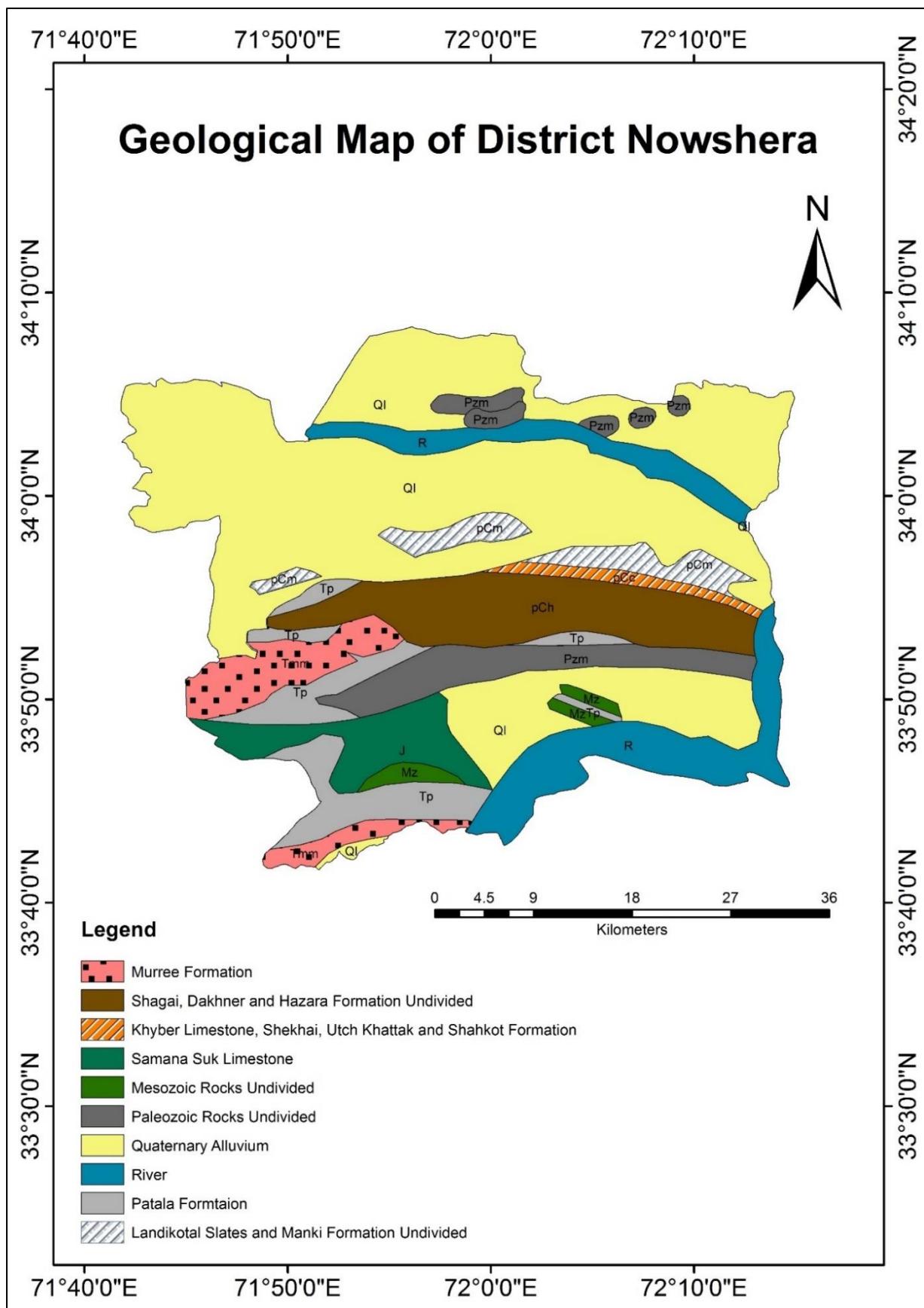
Map 1-5: Geology of District Nowshera

Map 1.5 represents the geology of District Nowshera with different geological features.

1.8 WATER RESOURCES

The rivers in the district are the Kabul and Indus Rivers. The Kabul River enters the district on its western side and joins the Indus River at Kund, near Khairabad. Numerous water bodies, both manmade and natural, run throughout the district on the south bank of the river Kabul. One of the major khawars (water channels), namely Chipla Khawar emerging from the Cherat hills, carries the drainage of this catchment area. This Khawar irrigates the downhill area extending to Pabbi. In addition, there are a number of smaller Khawars, some of which are non-perennial. The Khawars network is beneficial for irrigation and agriculture in the region; however, during the monsoons, they cause havoc as flash floods and regular floods. The settlements in the extreme east, including Chuna Bund in Khairabad, Malla Tor at Naudeh, and those in Dag Ismail Khel, Jabba, and Jallozai, carry a constant supply of water for irrigation so that they are beneficial for the agricultural sector. Many villages in the catchment area use the water for drinking purposes from these Khawars.

Kabul River

Originates in Chitral and via Kabul flows down to Nowshera onwards to attack where it joins River Indus. The flow in the river varies, and a monthly variation exists, and during July - September it's relatively high.

Indus River

The Indus River meets the river Kabul at Khairabad, the junction of Mardan, Nowshera, and Attock districts. The River Indus has a positive effect on the groundwater resources of the District of Nowshera.

1.8.1 Sediment Load And Its Effect on Agriculture

Several studies on water resources and the Kala Bagh Dam Project conducted by WAPDA, PCRWR, and PINSTECH show that in District Nowshera, the Natural Surface Elevation (NSL) varies and surface slopes dictate groundwater slopes. Pakistan Atomic Energy Commission carried out a detailed study of the water resources of Nowshera. PAEC carried out mapping of the region with a very fine grid, i.e., 200 meters' spatial resolution. This map was superimposed on this area for the purpose of estimating the aquifer for groundwater modeling. A steady state 2-D (single layer) groundwater model was developed. The main objective of the groundwater modelling of the area was to assess the available groundwater development potential in different parts of the district, in addition to the pumpage being done at present.

The Kabul River at Attock carries with it the sediment load of soil erosion and its dark coloured water indicates the presence of organic materials from the waste water of industries and municipalities. Warsak Dam, which lies about 100 km upstream, is full of sediments and has lost most of its storage capacity. Outflow contains heavy sediments. This sedimentation is unavoidable and will continue to increase. The system enters the Indus water and the sediments from other reservoirs produce extensive problems in terms of reduction in the irrigation water and a higher frequency of floods.

The hydro-geological investigations carried out in the district revealed that the aquifer is heterogeneous and its depth ranges from 33 to more than 200 m. Sub-surface strata vary rapidly across the area with respect to the type of rocks present, lateral and vertical permeability, storage coefficient, and specific yield.

Hydraulic conductivity in the region ranges from 30-60 m/day and the average specific yield is 12%. The water table elevation varies considerably in the area. It ranges from less than 100 m in the southern portion to more than 300 m in the central part (in relation to the mean sea level). Pumping test data of various tube wells in the district indicates good hydraulic properties of the aquifer system.

1.8.2 Quality of Water District Nowshera

The quality of surface water in District Nowshera is one of the major issues of water resources. Both the ground water and the surface water when tested by different organizations, like PCRWR and EPA, were found to contain high levels of toxic and organic materials. Apparently, this is due to the disposal of untreated wastewater by industries and municipalities indiscriminately in rivers and streams.

The factories of Nowshera Industrial Estate, Risalpur Industrial Estate, and other industrial units along GT Road, residential areas, and municipal wastewater are the prime sources that are polluting sources surface water. It is observed that the water of the Kabul River, which carries pollutants from upstream as well, is extremely polluted.

In the district of Nowshera, the groundwater quality analyses of different tube wells along the River Kabul were carried out to analyze the groundwater quality along the river. For this purpose, groundwater quality in one of the villages (Khyeshgi Payyan) near Nowshera city was examined. The village is situated on the bank of the River Kabul and low flow conditions in the river after the "Indus Water Treaty" is seriously affecting the

Table 1-2 : Groundwater table depth (ft)[3]			
Tube well location	2009	2010	2011
Barabanda	27	29	37
Jehangir town	30	33	39
Seesmandi	38	43	46
Ghandari	36	37	41
Amangarh	43	48	53
Shagulraat	29	34	36

quality of the aquifers in this area. The quality of groundwater from hand pumps in the periphery of Kabul was also investigated. Samples from the two hand pumps near the River Kabul were analyzed to investigate the environmental issues in the Nowshera area. These results clearly show that groundwater quality in these tube wells is not satisfactory, which may be attributable to low flow and a very high rate of contaminants in the Kabul River.

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[3] Source: Assessment of quality of water in Kabul River, Nowshera city, Pakistan, Arshad Ali, Naseem Baig et.al., ARCH. ENVIRON. SCI. (2012), 6, 62-67, July 2012

After analyzing the data, it can be concluded that the water table depth in Nowshera city is lowering more rapidly as compared to tube wells, which are located near the River Kabul. Excessive pumping is to blame for the decline in the groundwater table in Nowshera city due to the high rate of contaminants in the river during low flow. The present river and canal water quality is below the national environmental quality standards (NEQs) and not reasonable for any kind of use. Highly concentrated industrial and domestic wastes, which are being disposed of directly into the River Kabul, are converting its condition from aerobic to anaerobic. Concentrations of different contaminants in river water are very high. On August 1, 2010, this entry was published.

The river Kabul is the major source of the recharge of groundwater for Nowshera city. Due to a lot of groundwater pumping and low river flow, the water table is dropping very quickly in Nowshera. The polluted river water is being used to refill the groundwater, which will make things worse in the future.

It is also concluded that ground water quality along the River Kabul and its tributaries as well as the canals in the region is not satisfactory. Low water flows in the River Kabul and a high number of contaminants are making the environment in the district worse.

At Aman Garh, District Nowshera industries discharge various pollutants into River Kabul in concentrations above the permissible limits laid down by the National and International Standards. These effluents contained toxic metals, high oxygen demanding wastes and appreciable amounts of sulfide. This study indicates the presence of deleterious effects of industrial pollutants in general and sulfide in particular, as alarmingly high concentration of sulfide (608 times higher than the permissible limit) is being discharged in to the River Kabul. Water from various sources, especially River Kabul at Nowshera was analyzed for various parameters like pH, suspended solids, electrical conductivity, alkalinity, hardness, COD, NO_2-N, NO_3-N, chlorides, sulfates, sodium, potassium *etc*. The results indicated localized pollution within half kilometer after the confluence point, and the quality of the river water was observed as deteriorated. Increase in salinity and the presence of appreciable amount of oxygen demanding wastes in effluents and in downstream river was reported. Some incidences have been reported where several buffaloes died[4] and crops dried in fields using a stream water containing effluents of Pak-China Fertilizer and Hazara Super Phosphate Factories.

1.8.3 Groundwater

The groundwater is available mostly at the optimum depth for economic exploitation for various uses by the local inhabitants. The shape of the groundwater table generally follows the surface topography. The discharge from the groundwater reservoir in the district of Nowshera occurs mainly through existing water wells, outflow to rivers and evapo-transpiration. The water table in areas adjacent to the rivers is near the ground surface.

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[4] AKIF, M., KHAN, A.R., SOK, M.K., HUSSAIN, Z., ABRAR, M. AND MUHAMMAD, A., 2002. Textile effluents and their contribution towards aquatic pollution in the Kabul River (Pakistan). *J. chem. Soc. Pak.*, **24**: 106-111.

The depth of groundwater along the Kabul and Indus rivers and in canal irrigated areas in the western part is generally less than 10 m, while it is more than 30 m for areas at higher elevations. The water table in the district rises during the rainy season (July and August) and declines during the dry season (October to December) when the groundwater abstraction is higher.

Existing Groundwater Pumping

Groundwater generally occurs under water table conditions with a few local exceptions. The depth of the water table generally varies from 13 to 50 meters below ground level in barani areas, whereas it is within 10 m in canal irrigated areas. Rainfall is the main source of groundwater recharge. Deep percolation from fields and stream losses at various stages of flow coupled with varying properties of the upper soil strata and the underground aquifer are responsible for the varied availability of groundwater across the district.

A substantial amount of groundwater is being abstracted for different uses in the area through water wells. According to PAEC, the total amount of abstraction from the area through water wells via the field survey of 2265 water wells has been estimated as 322,442 m3/d or 132 cusecs.

1.8.4 Rainfall

The average annual rainfall at Risalpur and Cherat during 1988–2007 was recorded as 684 and 585 mm, respectively. The district of Nowshera receives maximum rainfall, i.e., about 60% in the months of February, March, July and August. It is thought that winter rains contribute relatively more to groundwater recharge than monsoon rains, which are in the form of thunder storms and have more runoff.

1.8.5 Canal Supplies

In the northern and western parts of the area, the canal irrigated land is 50951 acres (20,628 hectares) and served by irrigation channels 136,856 m (136.86 km) long. A good amount of water seeps into the groundwater from irrigation and channel losses.
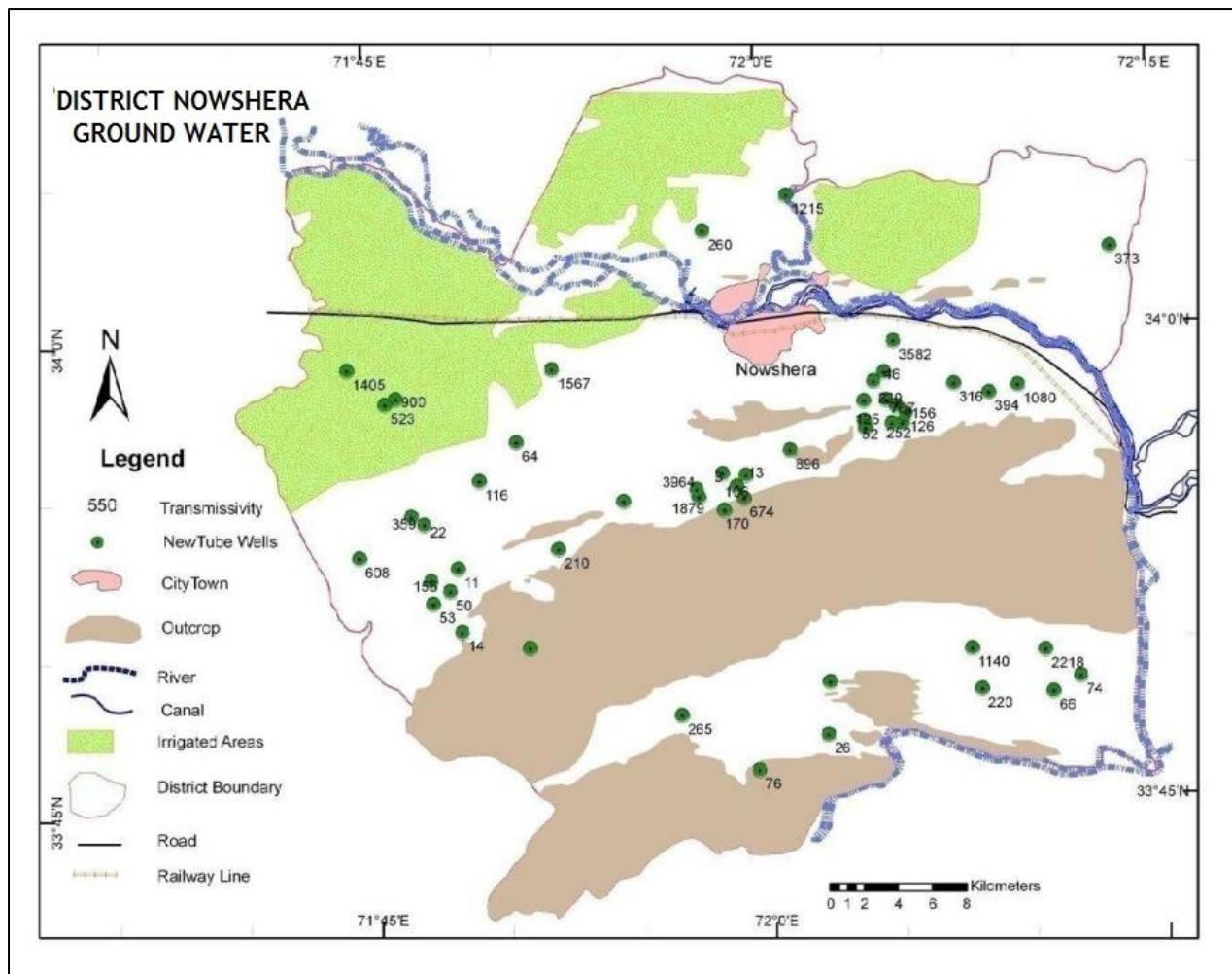
Map 1-6: Ground Water Map of District Nowshera

Map 1.6 describe the district of Nowshera's existing groundwater resources. resources are in the vicinity of an existing river. It shows the high-water table, tube well location and transmissivity, which means the potential of each tube well to withdraw water quantity.
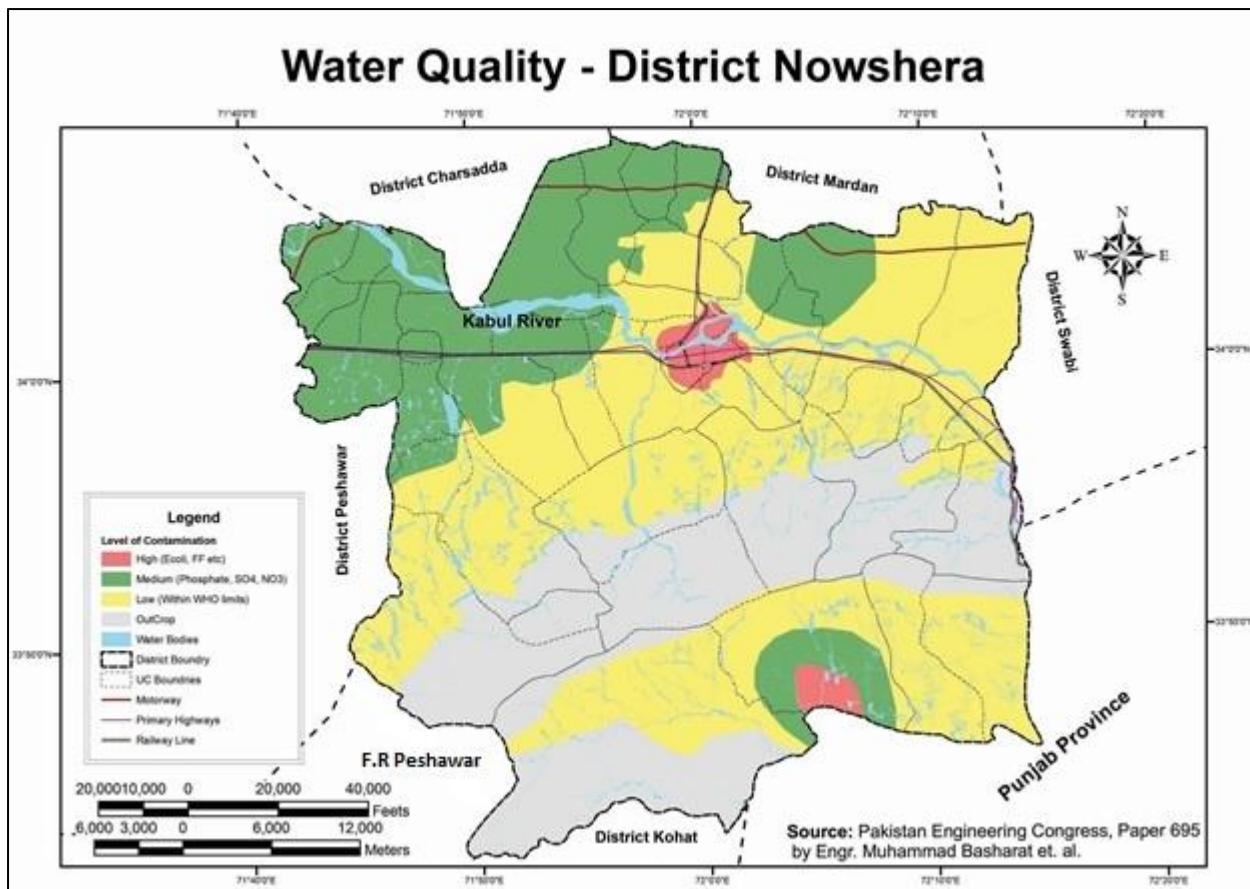
Map 1-7: Water Quality Map of District Nowshera

Map 1.7 describe the water quality of different areas of District Nowshera, yellow area describes the low quality of water that is describe by the World Health Organization. Pink colour represents the high quality of water.

1.8.6 Constraints

Land erosion has created a serious problem for irrigation infrastructure development. Flash floods during heavy rains not only pose a risk to human life and property but also cause severe damage to irrigation and drainage systems. High operation costs, low electricity voltage, and a depleted water table have rendered tube wells inoperable in many parts of the district. Farmers lack the resources, both technical and financial, to operate and maintain irrigation structures such as head-works, diversion heads, and cross-drainage works.

The existing water resource delivery system is inequitable and unpredictable, and many schemes demonstrate a marked absence of proper planning. In many areas, tube wells have been installed without assessing the underground water situation. Similarly, there is a lack of inter -sector coordination or consensus in the construction of small dams. Although farmers constantly battle water scarcity, drought mitigation strategies have not been developed.

Decision making and resource distribution at the government level are carried out on the basis of resource availability rather than technical requirements, resulting in partial services with minimal or no benefits to users. There is limited capacity, in terms of personnel and skills, at the directorate and its field-level offices.

i. Department Level Technical Coordination Stakeholder Participation

During the 2010 floods, the analysis of the Disaster Management Authority and that of various technical committees indicated that the flash floods from the hills in the North West created a major problem of flooding and damage to property and assets. The construction of small dams and headworks will help in the storage of water and reduce the damage due to the backlog of water creating heavy floods. It is recommended that the technical coordination committee, the Provincial Irrigation Department, and other stakeholders like universities and engineering institutions be invited to discuss and approve designs of all projects so that such damages are mitigated.

ii. River and Water Body Pollution

The industrial units discharge untreated effluents directly into surface water, and effluent seepage, as well as other anthropogenic activities, degrade the quality of surface and ground water, rendering it unfit for irrigation and drinking. So, the treatment of the effluents before disposal into surface drains should be practiced in all industrial premises in District Nowshera, KP province and the country to safeguard better water.

1.8.7 Recommendation

Both farmers and industrialists' users of water, are completely ignorant of the quality and quantity issues. The wastage of water resources and unnecessary exploitation of ground water is indiscriminately in vogue. The KP government will launch a major public awareness campaign about water resources, focusing on use, conservation, and pollution. Some of the recommendations are presented below:

- Support the studies to determine the volume of flows in the rivers and tributaries.
- Introduce a system of providing water to the industries through a collective metered system.
- Train farmers and agriculturists in using alternative methods of irrigation and conserving water.
- Assess the need for incentives to industries to comply with EPA effluent disposal regulations.
- Determine the needs for legislation for regulation of agricultural and industrial development, enforcement of standards.
- Introduce the water abstraction licensing; to discourage indiscriminate water pumping by the private sector.
- Implement the national water quality monitoring program.
- Execute the public awareness campaign on the environment.
- Support municipal and industrial waste water control measures.
- Enact new legislation where required.
- Construct small dams where ever feasible.
- There is depletion in water table, it should be given a propriate consideration.
- There is need to adopt water table recharge methods.

1.9   ENVIRONMENT

In general, there are several environmental issues such as water, air and noise pollution. Water pollution refers to the presence in water of harmful and objectionable materials obtained from sewers, industrial wastes, and rainwater run-off in sufficient concentrations to make it unfit for use. The term "water pollution" generally refers to human-induced (anthropogenic) changes to water quality. Thus, the discharge of toxic chemicals from a pipe or the release of livestock waste into a nearby water body is considered pollution.

The rise in global concentrations of greenhouse gases CO_2, CH_4, and N_2O are referred to as "air pollution." It occurs when the air contains gases, dust, fumes, or odors in harmful amounts. That is, amounts which could be harmful to the health or comfort of humans and animals or which could cause damage to plants and materials.

Air pollution can threaten the health of human beings, trees, lakes, crops, and animals, as well as damage the ozone layer and buildings. It can also cause haze, reducing visibility in national parks and wilderness areas. Pollution also has a negative impact on the weather and climate. One of the reasons for the increase in air pollution is the low quantity of rain that caused an increase in smog and carbon dioxide contributing to global warming.

Noise from vehicles and other powered mechanical equipment is intermittent. Transportation vehicles are the worst offenders, with aircraft, railroad stock, trucks, buses, automobiles, and motorcycles all producing excessive noise. Construction equipment, such as jackhammers and bulldozers, also contribute significantly to noise pollution.Besides, with the growing level of air and water pollution, noise pollution has been recognized as a new threat to the inhabitants of cities. Mitigating road traffic noise is a major challenge for city planners and environmental engineers.The volume of a sound above the permissible level of 65 decibels (dB) is called noise.

The The effects of noise are both physical and behavioral in nature. This unwanted sound (noise) can damage physiological and psychological health. Noise pollution can cause annoyance and aggression, hypertension, high stress levels, hearing loss, sleep disturbances, and other harmful effects. Older males exposed to significant occupational noise demonstrate significantly reduced hearing sensitivity compared to their non-exposed peers.

This section describes the environmental pollution particularly parameters of water, air and noise pollution in Nowshera[5]. To take relative measurements of these parameters, the spot values of pollution indicators have been considered and compared with the permissible standards.

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[5] Source: The Land use Consultants obtained the values for air, water and noise level under a contract with 'Pakistan Council of Scientific and Industrial Research' PCSIR Laboratories Complex, Jamrud Road, Peshawar, in June 2017. The tests were done specifically for Land use Project.

1.9.1 Air Quality

Air samples in Nowshera were collected from Nowshera Kalan, the bus stand and Cantt. Railway Station. The table below shows values for parameters for the air samples of Nowshera. A comparison with Pak EPA standards for ambient air is also shown.

Table 1-3: Air Quality					
Parameters	Unit	Nowshera Kalan	Bus Stand (Ada) Nowshera	Cantt Area Railway Station Nowshera	Standard Pak EPA
Nitric Oxides (NO)	µg/m3	2.46	4.92	7.38	40 µg/m3 for 24 hours
Carbon Monoxide (CO)	mg/m3	N. D	N. D	N. D	10 mg/m3 for 1 hour
Nitrogen Dioxide (NO2)	µg/m3	1.88	1.88	1.88	80.00 µg/m3 for 24 hours
Hydrogen Sulfide (H2S)	mg/m3	N. D	N. D	N. D	--
Carbon Dioxide (CO2)	ppm	490.00	490.00	431.00	--
Ammonia (NH3)	ppm	N. D	N. D	N. D	--

Table 1-4: Air Pollution					
Parameters	Result				Standards Pak EPA
	Unit	Nowshera Kalan	Bus Stand (Ada) Nowshera	Cantt Area Railway Station Nowshera	
Particulate matter (PM2.5)	µg/m³	774.00	345.00	317.00	35.00

Effects on Environment

i. **Nitric Oxide (NO)**
- The value of samples of Nowshera is within Pak EPA standards. Generally, NO level exceeds the standards due to high vehicular traffic, traffic jams and idling of vehicles.

Possible impacts of high NO levels

- This can cause lung irritation and weaken the body's defense against respiratory infections.
- It assists in formation of Photochemical smog.

ii. **Carbon Monoxide (CO)**

In Nowshera the CO level for all sampling locations was not detected.

Possible impacts of high CO levels

- If CO increase from the NEQs then it enters the blood stream and reduce oxygen delivery to body's organs and tissues.
- It can develop vision problems
- At very high level, CO is poisonous and can cause death

iii. Nitrogen Dioxide (N0$_2$)

NO$_2$ was within limits at all the three sampled sites of Nowshera.

Possible impacts of high levels of N0$_2$

- Same as that of NO

1.9.2   Noise Level

The Noise level at all sampling sites in Nowshera is higher than Pak-EPA standards.

Table 1-5: Noise Level				
Parameters	**Result**			
	Nowshera Kalan	**Bus Stand (Ada) Nowshera**	**Cantt Area Railway Station Nowshera**	Sound level Meter Model: TES 1350A, Range 30-130dB
Noise	80	84.5	92.85	
Standards Pak EPA	65 dB	65 dB	65 dB	

Note: Commercial Area: 65 dB, Residential Area: 55 dB.

Impacts of higher noise levels

- Higher levels of noise can increase blood pressure and cause other cardiac issues even if the person is not particularly consciously disturbed. Noise pollution can also cause gastric problems. Noise leads to emotional and behavioral stress. A person may feel disturbed in the presence of loud noise such as produced by beating of drums.
- Noise increases the chances of occurrence of diseases such as headache, blood pressure, heart failure, etc.
- Exposure to excessively loud noise, over long periods, can also lead to partial deafness
- Noise disturbs feeding and breeding patterns of some animals and has been identified as a contributing factor of the extinction of some species.

Sources of Noise Pollution

Sound is essential to our daily lives, but noise is not. Noise is generally used as an unwanted sound, or a sound which produces unpleasant effects and discomfort on the ears. Noise can create from many sources which include; household sources, industries, generators, transportation etc.

Transportation is a big source of noise pollution in urban areas. Increasing traffic has given rise to traffic jams in congested areas where the repeated hooting of horns by impatient drivers pierces the ears of road users.

Remedies/Control Measures

Following remedies must be applied:

- Proper legislation on roads to use EPA approved vehicles
- Avoid horns especially near school, colleges, hospitals etc.
- Construction of sound-proof rooms for noisy machines in industrial and manufacturing installations must be encouraged.
- Noise producing industries, airports, bus and transport terminals and railway stations to be sited far from where living places.
- Vegetation (trees) along roads and in residential areas is a good way to reduce noise pollution as they absorb sound.

Table 1-6: Ambient air quality (Equipment used for air quality): NOVA Model 600-2-3-4-5-7-10 Canada[6]

Parameters	Unit	Results			Standards Pak EPA
		Spot # 1	Spot# 2	Spot# 3	
Nitric Oxide (NO)	$\mu g/m^3$	2.46	4.92	7.38	40 $\mu g/m^3$ for 24 hours
Carbon Monoxide (CO)	mg/m^3	N. D	N. D	N. D	10 mg/m^3 for 1 hour
Nitrogen Oxide (NO_2)	$\mu g/m^3$	1.88	1.88	1.88	80 $\mu g/m^3$ for 24 hours
Hydrogen Sulphoid (H_2S)	mg/m^3	N. D	N. D	N. D	------
Carbon Dioxide (CO_2)	ppm	49.00	490.00	431.00	------
Ammonia (NH_2)	ppm	N. D	N. D	N. D	------

Table 1-7: Air pollution: (HAZ dust particulate air monitoring equipment, Model F24M-5000 USA[7]

Parameters	Unit	Results			Standards Pak EPA
		Spot# 1	Spot# 2	Spot# 3	
$PM_{2.5}$	$\mu g/m^3$	774.00	345.00	317.00	35.00

Table 1-8: Noise level test/analyzer[8]

Parameters	Results			Instruments
	Spot# 1	Spot# 2	Spot# 3	
Noise	80.00	84.50	92.86	Sound Level Meter
Standard Pak EPA	65dB	65dB	65dB	Model TES, 1350A Range 30-130dB

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[6] Pakistan council of scientific and industrial research (PCSIR), Test report # 687, 21-06-2017.

[7] Pakistan council of scientific and industrial research (PCSIR), Test report # 687, 21-06-2017.

[8] Pakistan council of scientific and industrial research (PCSIR), Test report # 687, 21-06-2017.

1.9.3 Drinking Water

Water samples were collected from Nowshera Kalan, the bus stand and Cantt. Railway Station. For each sample, various quality parameters were tested. The results of drinking water samples along with their statistical analysis are given below and are also shown in table 1-9.

Effects on Environment:

i. pH

The pH of all samples is within the NEQS limits

ii. Total Dissolved Solid (TDS)

The TDS of samples from Nowshera Kalan and bus stand are within the limits, but higher than NEQ standards in the case of Cantt. Railway station. Total Dissolved Solid (TDS) is a measurement of inorganic salts, organic matter, and other dissolved materials in water. The amount of TDS helps us to classify the water, i.e., fresh water, brackish water, saline water, or hyper saline water. There are no health impacts of high TDS. However, due to the bitter taste, it is difficult to drink.

iii. Turbidity

The turbidity level for all samples of Nowshera is within the NEQS limit.
High turbidity can significantly reduce the aesthetic quality of water. It has no health impacts.

iv. Nitrate (NO$_3$)

The value of NO$_3$ samples is within the NEQS.

v. Calcium as CaCO$_3$

The value of Calcium as CaCO$_3$ in Nowshera is within the NEQS limits.

vi. Chlorides as Cl

The concentration of chlorides is within the NEQs limit at all sampling locations of Nowshera.
Higher chlorides impart taste to drinking water. There are no health-based impacts.

Table 1-9: Chemical Analysis of Water[9]

Parameters	Method No.	Unit	Spot# 1	Spot# 2	Spot# 3	Expected uncertainty	WHO limits for drinking water
pH	4500-H$^+$B	--	7.28	7.42	7.29	0.18	6.60-8.50
Sodium Na	3500-Na	mg/L	153.60	180.27	236.8	1.70	200.00
Potassium K	3500-K	mg/L	14.83	5.87	7.83	0.64	75.00
Total Hardness CaCo$_3$	2340-C	mg/L	339.33	376.00	394.67	3.33	500.00
Calcium as CaCo$_3$	3500-Ca. B	mg/L	176.67	261.31	220.00	2.47	250.00
Magnesium as CaCo$_3$	3500-Mg-B	mg/L	162.67	114.67	174.67	--	150.00
P-alkalinity	2320-B	mg/L	383.27	361.63	809.84	3.27	500.00
Total alkalinity	2320-B	mg/L	Nil	Nil	Nil	--	30.00
Chloride Cl	4500-Cl-B	mg/L	128.36	106.53	126.53	--	250.00
Conductivity	2510-B	µg/cm	1113.33	996.66	1596.67	--	--
Total Dissolved Solid	2540-C	mg/L	896.00	779.00	1444.33	--	1000.00
Total Suspended Solid	2540-D	mg/L	3.33	4.00	3.67	--	5.00
Sulphate SO$_4$	4500-SO$_4$E	mg/L	27.61	30.44	46.73	--	250.00

Table 1- 10: Physio chemical and heavy metals analysis of drinking water (Sample ID Nowshera)

Parameters	Method No.	Unit	Spot# 1	Spot# 2	Spot# 3	WHO limits for drinking water
Colour	220B	--	Colourless	Colourless	Colourless	Colourless
Temperature	2550 B	°C	28.00	28.10	28.00	--
Turbidity	2130 B	NTU	0.48	0.51	0.41	5.00
Taste	2160 A	--	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable

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[9] Pakistan council of scientific and industrial research (PCSIR), Test report # 687, 21-06-2017.

Nitrate as NO$_3$	4500-NO$_3$B	mg/L	19.25	17.87	21.52	50.00
Ammonia as NH$_4$	4500-NH$_3$F	mg/L	0.05	0.07	0.09	--
Iron as Fe	3500-Fe	mg/L	0.05	0.19	0.18	--
Manganese as Mn	3500-Mn	mg/L	0.04	0.07	0.11	0.50

1.9.4 Review of Environment Sector Policies

Before the Eighteenth Amendment was enacted, the subject of "environmental pollution and ecology" appeared in the Concurrent List, allowing both federal and provincial assemblies to frame laws governing natural resources and environmental management. With the enactment of the eighteenth amendment, the Concurrent Legislative List has been abolished. As a result, the provinces now have exclusive jurisdiction to frame laws on environmental pollution and ecology.

Following the Eighteenth Amendment, the Khyber Pakhtunkhwa EPA noted that proper procedures are required for implementing the environmental policy and pollution control protocols. The KP Government has started working on its own comprehensive environmental policy, including levying the pollution charge, development of forests & addressing deforestation, range lands, limiting pollution due to agriculture, housing development, urban development, transportation, noise, water, industrial, health, hazardous and non-hazardous waste handling, and all other types of environmental issues.

The KP EPA recommends that specific rules are framed to regulate vehicle emissions, which are currently being handled under traffic rules. It also raises the issue that "the present form of NEQS is either stringent or relaxed" and suggests that a "standardized form" of 'Environment Quality Standards' based on research shall be formulated to ensure its effective and uniform enforcement". It is further pointed out that rates for pollution charges have not been specified and that such rates should be determined annually.

Regarding the issuing of no-objection certificates for IEE and EIA, the KP EPA suggests that the Director-General of the EPA should have the power to issue a stay order, to halt all project activities (temporarily or permanently), and to impose spot fines. The KP EPA recommends that the Director-General of the EPA should have the power to levy spot fines on those violating EPO. EPA has expressed concerns that PEPA 1997 in its current form fails to address certain issues or that some of the issues have been duplicated.

A close analysis of the PEPA 1997 reveals that it does not address the following subjects:
- Solid waste disposal
- Radiation and radioactive waste
- Vibrations
- Pollution or environmental damage from commercial activities
- Littering and damage to the physical environment.

It is recommended that municipal services, such as sanitation, solid waste management, and the provision of safe drinking water, which are currently not covered by PEPA 1997, be brought under the Directorate General of EPA, and qualified inspectors are appointed at municipalities and even public health departments to regulate the environmental protocols.

It should be noted that several critical issues must be addressed before any provincial legislative action can be initiated. measures will be required by the provincial and federal governments under the environmental protection legislation:

- Rules and regulations under PEPA must be adapted and re-issued along with the provincial environmental law.
- Draft rules under preparation need to be finalized.
- Coordination amongst Provinces: Guidelines issued by respective Provincial EPA for specific sectors should be assessed, amended if necessary, and adopted as a uniform standard policy.
- Requirements for the implementation of multilateral environmental agreements must be included in the provincial environmental laws, and a mechanism for reporting developed
- Funding by donors shall be transferred directly to the provincial governments
- In the Amendment, certain key terms have been omitted (for example, marine pollution, and biological waste); some definitions are inconsistent or outdated (for example, pesticides, and agricultural waste).
- Lack of clarity in certain provisions (for example, environmental laboratories, pollution charge, functioning and jurisdiction of environmental tribunals and environmental magistrates).
- Procedures need to be simplified; clarified or refined (for example, procedures related to environmental protection orders (EPO), environmental impact assessment (EIA), and Environmental Protection Agencies (EPA).
- Role of the police, enforcement responsibility of EPA officers.
- Penalties need to be re-assessed and revised based on the environmental impact of offences rather than the type of offence. The purpose of administrative penalties needs to be clarified and delegated solely to the provinces.
- Environmental quality and emissions standards must be uniform, and no variations should be permitted with respect to the geographical area unless it is to strengthen the standards. The relevant provisions must be amended.
- Forests and National Parks, such as Galiyat and Chitral National Park in KP, and the development of Eco tourist resorts, shall be completely transferred to the Province
- Managing the refugees, especially Afghan refugees is a federal subject, however, there are over a million living in camps in KP., and the environmental pollution due to these camps has become the responsibility of the province while the administrative decision stays with the Federal Government, thus creating a major financial and environmental conflict.

1.9.5 Constraints, Potentials and Recommendations

i. The problems caused by the untreated discharge of effluent from the existing major industrial concerns ask for an efficient effluent collection system and a common effluent treatment plant for the industrial estate.

ii. Land use legislation and fiscal policy are the main tools to address industrial and residential sources of air pollution.

iii. Segregation of building zones for a different purpose: it is essential to consider air pollution when working out the building plans for an area or a city. The first requirement is for residential areas to be protected against fumes from trade and industry and traffic. In principle industrial zones should be located on the downwind side of the community. As far as it is possible industrial zones should be separated from other areas by green belts

iv. The process of establishing zoning should incorporate consultations with all the affected communities and stakeholders as otherwise may likely have serious social and economic constraints. Distance apart the distance that must separate industrial zones and major traffic roads depend on the following factors:

- The extent of the emissions of fumes and smoke

- Meteorological factors affecting their distribution

- The limits of allowable pollution laid down for the residential areas

v. Keeping in view the wind direction, every major source of air pollution ought to be sited as far as possible in the wind shadow of residential areas, but this principle is valid only where there is distinct prevailing wind and then only if there are no other meteorological factors more influential than the wind direction

vi. Open spaces have the following effects on air pollution, therefore, need to be provided properly:

- They encourage the mixing of air masses and help to dilute the impurities.

- They act as settling places of solid particles and so have a direct cleansing effect.

vii. Small and medium-sized industries which rely on urban locations to maintain profitability operate illegally and are making it more difficult to control them for maintaining labour safety and environmental standards.

viii. In the interest of environmental improvement, there is a drive to earmark zones for all industries away from major urban centres. While strict enforcement of such zoning would improve air quality, such a policy points to conflicts between different sector objectives.

ix. Banning new industries in major urban areas exacerbates the phenomenon of an increasing number of under or unemployed workers forced into the informal sector.

x. Urban-based workers have to be transported to and from their homes to far-flung industrial sites therefore to eliminate the potential automobile pollution the industrial zones need to be provided with the residential blocks for the workers.

1.10 FLOODS

1.10.1 Riverine Floods

The Western Peshawar basin is endangered by both riverine floods as well as flash floods. Riverine floods are caused by high discharge in seven streams, which include Jindai and Khiali (Nowshera River), Sardaryab, Naguman, and Shah Alam (Kabul River). Other notable rivers include the Kalapani from north of Mardan and the Bara from south of Peshawar. Except for the Kalapani and Jindai rivers, the rest of these distributaries converge into the main Kabul river within an area of 5 km immediately upstream of the Kabul river bridge on the M1 Motorway. The Bara River joins the Kabul River immediately past the M1 Kabul River Bridge, while Jindai and Kalapani join the Kabul River further downstream near Nowshera. Therefore, within a stretch of about 15 km between M1 Kabul River Bridge and Nowshera, the Kabul River is primarily a confluence area for 7 major river courses, which not only makes this region most vulnerable to flood hazards, but is also a source of an influx of flood water for District Nowshera. The River Kabul is thus the main source of flooding in the district. District Nowshera is not only vulnerable to flooding due to the river Kabul but also due to the back-water effect of the Indus at Kund near Attock, where the River Kabul meets the mighty Indus River. The same happened in 2010/14 when the water could not be drained out quickly due to a record discharge of 400,000 cusecs of water in Kabul as compared to an average normal capacity of 160,000 cusecs at Nowshera. The discharge from Trabela Dam at Attock was phenomenal with 158200 cusecs as recorded on July 27th, 2010.

Table 1-11: Nowshera Union Councils Worsely Affected in 2010	
Nowshera	Akbar Pura, Aman Garh, Aman Kot, Aza Khel Payan, Azakhel Bala, Balu, Bara Banda, Dheri Kati Khel, Gandiri, Kabul River, Khaishki bala, Khaishki Payan, Kurvi, Misri Banda, Mohib Banda, Nawan Killi, Nowshera City, Pabbi, Pir Piai, Pir Sabak, Rashakai, Taru, Zara Miana

1.10.2 Flash floods

Flash flooding is a common phenomenon in district Nowshera. Due to the mountainous terrain in the southern parts of the district and encroachment in the urban center of Nowshera City, flash flooding is very common. Whenever there is high rainfall in the area, there is a kind of flash flood in various parts of the district. The urban centres of Nowshera City, Nowshera Cantt, Pabbi, Akora Khattak, Jahangira, and the rural areas of Khesgi Payan, Bala, Akbar Pura, Pirsabak, Nizampur, Kaka Sahaib, Cherat, and surrounding areas are very prone to flashfloods.

1.10.3 Flood Risk Assessment

The floods inundation of 2010 in Nowshera is considered for the flood risk maps of the district highlighting the Union Councils which are vulnerable due to the interaction of hazards with the exposure of the elements at risk. The Union Councils at risk are as below:

Table 1-12: Flood Risk Assessment					
Union Council	**Level of Risk**	**Union Council**	**Level of Risk**	**Union Council**	**Level of Risk**
Kabul River		Adam Zai		Ainzari	
Khaishki Bala		Aza Khel Payan		Aza Khel Bala	
Khaishki Payan		Ganderi		Badrashi	
Mughalki		Jehangira		Bara Banda	
Nowshera		Khairabad		Dheri Katti Khel	
Nowshera		Mera Akora		Kahi	
Pir Sabaq		Misri Banda		M.c. Jehangera	
Zara Miana		Pir Piai		Manduri	
Banda Mohib		Aman Kot		Manki Sharif	
Dagai	High	Kurvi	Medium	Nazampur Garu	Low
				Pahari Kati Khel	
				Rashaki	
				Ziarat Kaka Sahib	
				Akbar Pura (shindi	
				Balu	
				Chouki Mamrez	
				Dag Baisud	
				Dag Ismail Khel Chapri	
				Dakhli Spin Khak	
				Jallo Zai	
				Kuderzai Khan Sher	
				Shah Kot	
				Taru	

Table 1-13: Impact of Flood in District Nowshera[10]	
No. of affected Villages	105
Total Household in the affected area	96,465
houses destroyed	50,048
houses damaged	17,892
Households in need of assistance	67,940
Population in need of assistance	543,520
Total affected Livestock Population	179,032
Dead	33,905
Affected	145,127

[10] UN Habitat, Initial Assessment of Flood affected areas in Khyber Pakhtunkhwa (KP) July –August 2010
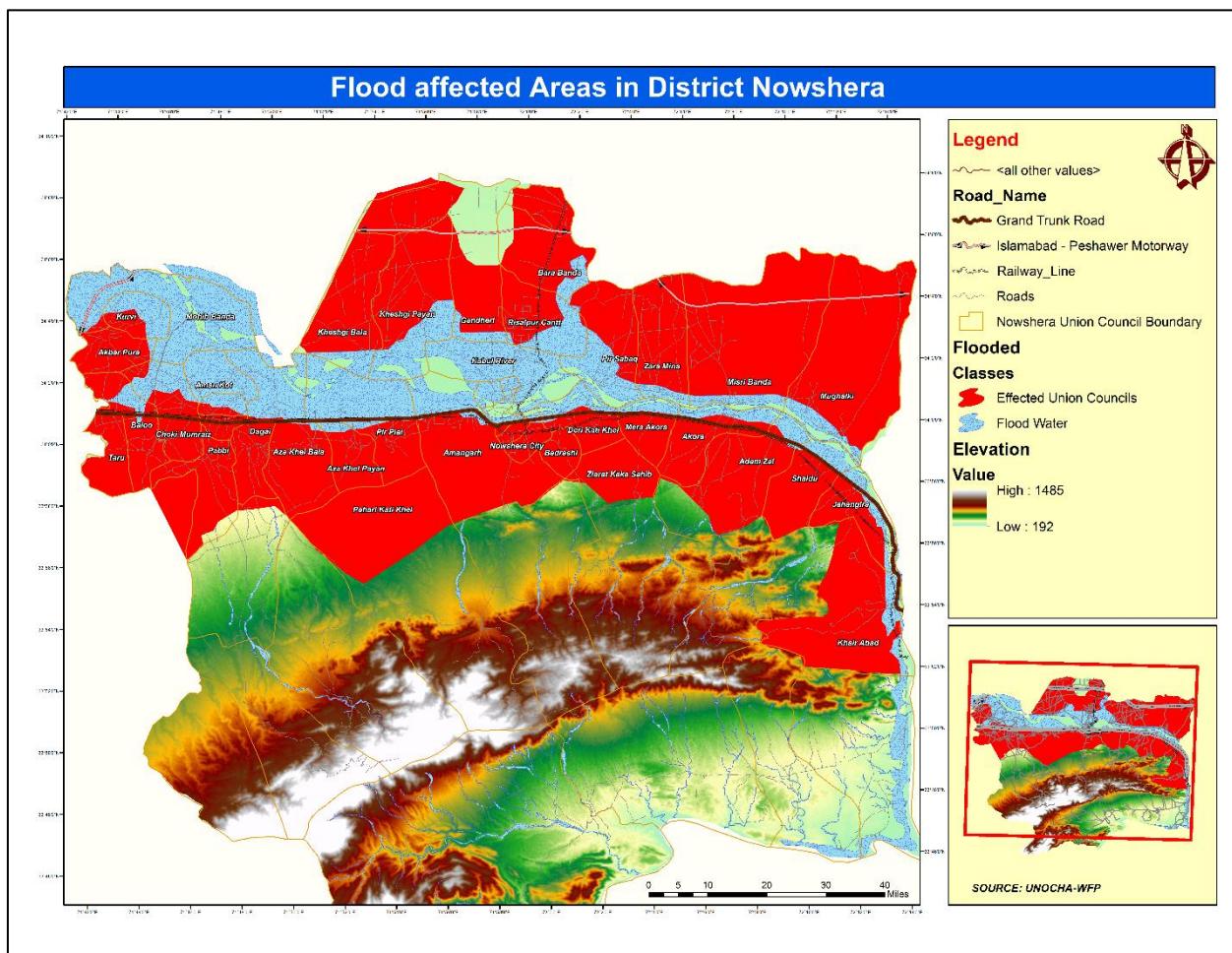
Map 1-8: Flood Map of District Nowshera

Map 1.8 represents the flood area of the map that is most affected in 2010 due to a flood in the river Kabul. The red area represents the severe impact of the flood upon settlements.

Flash floods tend to occur more in recent years owing to changing weather patterns and are characterized by the near absence of early warning cover to warn vulnerable communities.

Around 60,142.3 acres of the area of District Nowshera have been affected due flood. Out of which 44,082 acres is highly flooded prone area while 16,060.3 acres face low-level flood.

1.10.4 Short-Term and Long-Term Plans

Reasons and Justifications

The shortfalls in the 2010 Flood Response were the following:

- Inadequate flood protection arrangements
- Inadequate flood warning arrangements
- Encroachments
- Lack of preparations and Coordination (Provincial Departments and Districts)

- Non-observance of Early Warning by General Public
- Reduced Water Storage and Regulatory Capacity.

To overcome or minimize the damages caused by floods, the following short-term and long-term measures are suggested[11]:

Short-Term Plans

i. Early warning system through WAPDA and Irrigation Department regarding flooding/overtopping of Warsak Dam.
ii. Early warning through existing mechanisms.
iii. Pakistan Metrological Department flood forecasts/warnings and weather forecasts.
iv. Flood warnings by the Local Administration and community-based mechanisms
v. Removal of Encroachments
vi. Re-construction of irrigation channels.
vii. Repair and maintenance of Drainage System.
viii. Restoration of Damage flood protection works
ix. Improvements in flood mitigation measures over River Kabul and its tributaries.

Long-Term Plans:

i. To receive real-time information about water levels, a network of community-level organizations and community volunteers be organized in the catchment areas.
ii. Arrangements for quick dissemination of flood warnings by the Revenue Department and Irrigation Department.
iii. Establishment of observation posts by the Irrigation Department in the likely flood areas.
iv. Civil Defense Staff and volunteers should be made fully functional.
v. Evacuation centres should be earmarked with the assistance of the education department.
vi. For sensitive buildings and records, each Department should prepare its Standard Operating Procedures.
vii. Health Department should formulate comprehensive health response plans.
viii. The works and Services Department should keep strict vigilance on the roads and bridges and initiate necessary measures whenever required.
ix. The encroached areas, particularly along waterways and flood-prone areas should be identified and requisite measures are taken for their removal.

1.10.5 The Challenges of Flood Management

Besides many other challenges, climate change is emerging as perhaps the greatest environmental challenge for Pakistan causing floods, droughts and increasing hunger, poverty, displacement, soil degradation, desertification and deforestation. Rising number of extreme climate events, the shift of

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[11] Source: Monsoon Contingency Plan – 2011, Provincial Disaster Management Authority, KP, June, 2011, Page 17.

monsoon rainfall zone from northeast to North-west. Intense, concentrated monsoon rains in a short time of interval, inconsistent behaviour of monsoon and erratic flash flood events are the major future challenges. There is a strong need to educate people about these natural disasters and their frequent occurrence in the region including Pakistan.

There is a growing recognition that current approaches to flood management are not as sustainable as they might be. Hence, it is imperative to cope with the increasing risks of flooding and the uncertainties of climate change more effectively. Increased population pressure and enhanced economic activities in floodplains, such as the construction of buildings and infrastructure, further increase the risk of flooding. In developing countries with primarily agricultural economies, food security is synonymous with livelihood security. Floodplains contribute substantially to the food production that provides nutrition for the people of these countries. The Asia-Pacific region is subject to the very frequent and severe impacts of floods because of its geographical composition. The majority of the region's major cities are riverine or coastal, which have a concentration of population, assets, economic and industrial development, and infrastructure. Flooding can be caused by torrential rains in urban areas, flash floods in semi-mountainous regions, riverine flooding in main rivers in plain areas, or storm surge. In this respect, rapid urban growth brings us not only prosperity but also a series of challenges in which water-related issues, including the escalation of urban floods, have become essential problems in connection with sustainable development. The increasing urban flood risk has pushed all nations and international organizations to take measures to confront the threats caused by floods and to build flood-resilient cities.

Pakistan is a resource constraint country with a fast-growing population, low natural resource development based and unfavourable local socio-cultural conditions, and climate change is an additional stress for the country. Educating the masses about natural disasters and building up their preparedness at educational institutions can be of great help to minimize the damages of disasters. Media can play its due role in this regard as, without its support, awareness cannot be boosted. Areas vulnerable to climate change-induced natural disasters must have adequate flood protection facilities, besides, reliable medium and long-range Weather & Flood Forecasting & Warning Systems in place.

Table 1-14: Department -wise Flood Management Measures	
Departments	**Flood Management Measures Required:**
Revenue Department	A major stakeholder in managing floods & other disastrous events. Demarcation of encroachments nominating affectees for compensation through its staff & revenue records.
Irrigation Department	Establishment of Flood Emergency Cell Encroachments are to be removed with the assistance of DCO, TMA, and the C&W Department.
Communication and Works Department.	Establishment of Flood Emergency Cell When required, available machinery should be pre-positioned in vulnerable areas.
Transport Department	When needed, Transport Department should coordinate for evacuation of the affected population in an orderly manner. The Regional Transport Authorities should coordinate with respective DCOs for needful arrangements.
Health Department	When required, the Department should establish a Health Emergency Preparedness and Response Cell. The Department should carry out detailed planning with district officials, and district-level health plans should be in place well before the monsoon season.
Food Department	The Department should keep a stock of wheat for a population that may be affected by floods.
Information Department	FM radio stations should be established for warnings and to sensitize the public as soon as flood warnings are received. These stations should guide the public about nearby safer places, foodstuff, health care facilities, health tips and other precautionary measures. The Department should also arrange press briefings/press conferences.

The measures to manage floods at national, provincial and local/District may include as given in Table 1.15.

Table 1-15: Measures of Flood Management at Various Levels		
National Level	**Provincial Level**	**District-Specific Measures**
Early warning system through WAPDA and Irrigation Department regarding flooding/overtopping of Warsak Dam.	The Provincial Emergency Operation Center has been established at PDMA-Khyber Pakhtunkhwa, fully equipped with Modern Communication System. Provincial Emergency Operation Center is the Command and Control Center pre, during and post-disaster situations. Early warning system for disasters developed by PDMA and Metrological Department to be utilized.	Apart from River Kabul, River Systems and potential threat waterways which have a particular tendency to spill over in District Nowshera, are as under: Bara River Chinkar Nullah Chillah Khawar Spin Khak Khawar Dagai Khawar Amangarh Khawar Surya Khawar Kalpani Nullah The encroached areas along these waterways and flood-prone areas should be removed. Besides, there is a need to re-construct irrigation channels in their vicinity and repair/maintain Drainage System.
Early warning through existing mechanisms.	Pakistan Metrological Department flood forecasts/warnings and weather forecasts.	Flood warnings by the Local Administration and community-based mechanisms
	Restoration of Damage flood protection works	To receive real-time information about water levels, a network of community-level organizations and community volunteers be organized in the catchment areas.
	Improvements in flood mitigation measures over River Kabul and its tributaries.	Civil Defense Staff and volunteers should be made fully functional.

	Arrangements for quick dissemination of flood warnings by the Revenue Department and Irrigation Department.	
	Establishment of observation posts by the Irrigation Department in the likely flood areas.	
	Evacuation centres should be earmarked with the assistance of the education department.	
	For sensitive buildings and records, each Department should prepare its Standard Operating Procedures.	
	Health Department should formulate comprehensive health response plans.	
	The works and Services Department should keep strict vigilance on the roads and bridges and initiate necessary measures whenever required.	

1.10.6 Recommendation

Flood management in Pakistan is a task that requires both vast resources and a comprehensive understanding of the flood problem. The nature of floods varies drastically throughout the country due to contrasting physiographic, climatic, hydrologic, demographic, and socio-economic factors. The present approach to flood management incorporates both structural and non-structural measures, yet their inter-linkage and combined efficiency still need to be improved. The efficiency of any proposed measure should be evaluated for its integration into existing measures to achieve efficient and economically viable solutions. The 2010 flood in the upper Indus was due to exceptional intensive rainfall in the catchments of the Kabul and Swat rivers, which was not covered by Doppler Weather Surveillance Radar units. The expansion of structural and non-structural measures is extremely important to enhance the efficiency of the flood management system. Flood zoning and flood mapping projects must be completed on a priority basis. Necessary legal and institutional support must be provided for flood mapping and flood zoning. New dams are necessary for improvement in water management in general and for effective flood management in particular. Unfortunately, maintenance and functioning of flood measures have been neglected. High priorities must be assigned for the proper functioning of measures. The Flood Early Warning System is a state-of-the-art model. Its proper functioning and full utilization must be assured. Comprehensive flood management plans must be prepared and executed without waiting for another devastating flood. In conclusion, a risk-based proactive approach is required to achieve sustainable flood management.

The above-mentioned departments should incorporate NDMA and PDMA for early warning, time lags of a flood, eviction of community, community awareness for self-recovery, preparedness, flood mitigation approaches etc. and provide all local resources to these departments. Mapping and zoning of the hazard-prone area from that make restrictions for any kind of economic/development activities.

1.11 WATER LOGGING AND SALINITY

Water logging and salinity problems have resulted from the arid climate, topography, seepage from unlined canals, poor water management, inadequate drainage, insufficient irrigation supplies, and use of poor-quality drainage water. Areas with varying water table depths; from 1978 to 1998, water table depths less than 1.5 m ranged from 9.0 percent to 18.3 percent, with similar variations observed in water tables 1.5 m to 3.0 m and greater than 3.0 m.

Salinity is generally most pronounced in District Nowshera, along with River Kabul and the vicinity of river Indus. This problem is often characterized by high salt content in the root inhabited layers. Some of these salts adversely affect the growth of crops and may considerably reduce the final produce. In some cases, they may even prevent the germination of seeds. The osmotic or total salt effect influences the ability of plants to absorb water from the soil solution for their growth. Ionic toxicities affect various plant physiological processes; in addition, excess exchangeable sodium results in soil swelling and/or dispersion causing water infiltration, aeration and root proliferation a problem.

The District Nowshera has an area of 169,479 hectares of which about 37 % (61,000) is not available

Table 1-16:District Nowshera Area Irrigated by different sources in NWFP, 2004-05 to 2009 -10[12]							
Year	Area in Hectare						
	Total	Canals		Tube-wells	Wells	Lift Pump	Others
		Govt	Private				
2004-05	24971	20568	67	2270	1703	3	353
2005-06	24971	20568	68	2270	1705	5	355
2006-07	24897	20564	62	2211	1703	5	352
2007-08	24897	20564	62	2210	1701	0	357
2008 -09	24893	20564	62	2210	1701	0	356
2009 - 10	24893	20564	62	2210	1701	0	356

for cultivation; while 52,536 hectares are brought under cultivation. Only 50 %; i.e., 24900 hectares of the cultivated area is irrigated by canals, tube wells and dug wells. The river Kabul Canal system and the Warsak Gravity Canal system irrigate about 90 % of the area. During the past decade, the

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[12] Khyber Pakhtunkhwa Development Statistics, 2004-05 and 2010

irrigated and cultivated area in Nowshera has remained unchanged, similarly, the area irrigated by the tube wells remained 2200 hectares, which indicates that the land affected by waterlogged and saline areas could not improve and be brought under cultivation.

In the District Nowshera though there are three degrees of loss due to water logging and salinity which vary by the depth of water as:

- Severe as greater than three meters
- Moderate as 1.5 to 3.00 meters and
- Low as less than 1.5 meters,

However, the actual loss of the farmed land has been negligible. In District Nowshera, less than 50 percent of the area has groundwater salinity of less than 1500 ppm, and thus the area can be used for hardened crops.

Map 1-9: Water Logging and Salinity Area Map of District Nowshera
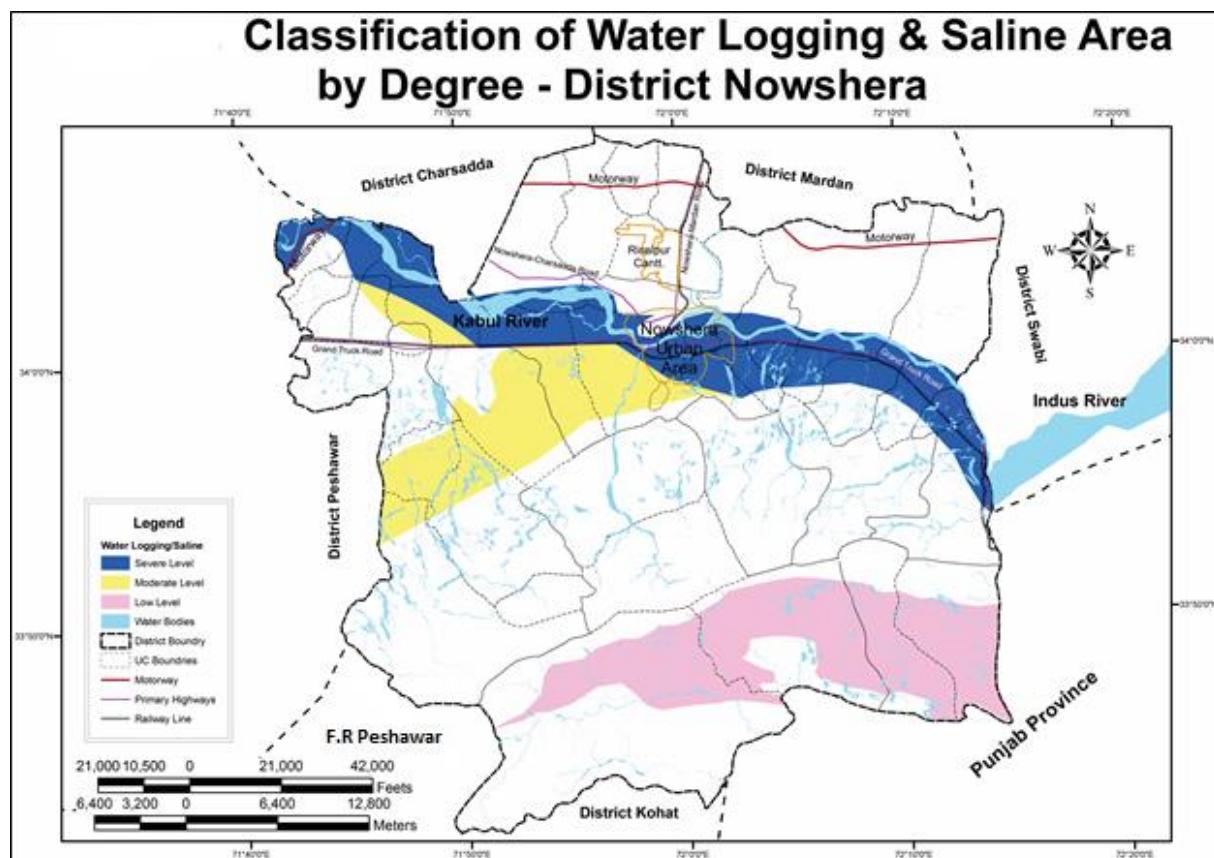
Map 1.9 describe the water logging and salinity level of District Nowshera. Blue represents the severe level, yellow represents moderate and pink represents the low level of water logging and salinity.

1.11.1 Programs to Alleviate Water Logging and Salinity

i. SCARP Program 1980 -1997

WAPDA installed 200 tube wells and a number of dug wells in 1980, under the SCARP program. However, there was little success in this strategy and the water table did not recede. In many areas, the continuous pumping by the tube wells has not proved efficient in lowering the water table and the salts reappear on the surface in the early winter season.

Nowshera Area Irrigated by Resources
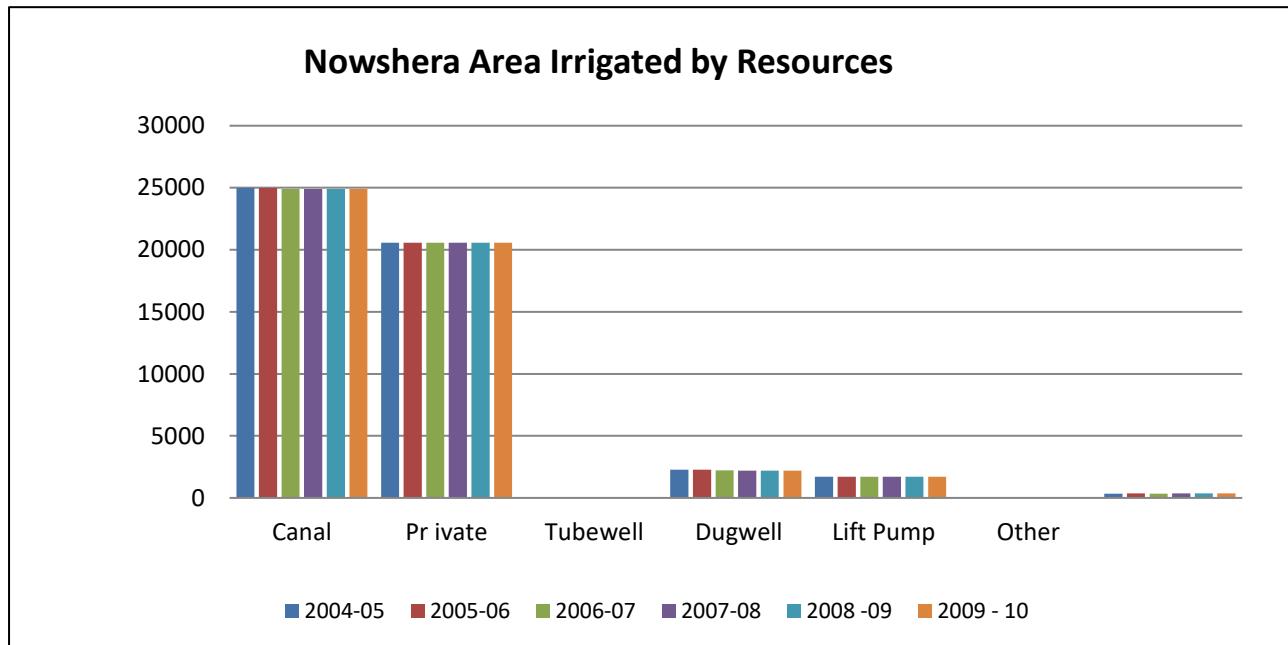
Figure 1- 4: District Nowshera Area Irrigated by Resources

According to a study[13] by the Pakistan Institute of Nuclear Science & Technology, Nilore, Pakistan, the chemical quality of the shallow groundwater is quite poor.

The SCARP Peshawar projects were initiated with the basic objectives as given below:

i.   To eradicate water logging and Salinity in the Peshawar valley.
ii. To bring the areas thus rescued under crops through supplemental irrigation supplies.
iii. Improve the agricultural productivity through better farm management and increased inputs thereby raising the intensity of agriculture and yields.
iv. To lower the water table in the water-logged areas of Peshawar valley.
v.   To control and remove salinity in the identified SCARP area.

The cropped area in Nowshera has not registered any changes under the SCARP Program, and the cultivated, as well as cultivable area, has remained unchanged during this period. Though there may have been some achievements the gains and the loss of area to water logging and salinity have balanced it to show no change. The major gain has been that the area under crops has remained constant ad there has been no deterioration of land due to water logging and salinity.

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[13] Study of ISOTOPES in Peshawar Valley by R. M. QURESHI and others

SCARP was aimed to increase crop production through (a) lowering and controlling groundwater levels; (b) provision of increased irrigation deliveries to leach salts, meet optimum crop water requirements and increase cropping intensities; (c) reclamation of marginally productive and/or abandoned land; and (d) increasing on-farm water use efficiency. These objectives were to be attained through investments in subsurface drainage using perforated PVC pipes and effluent disposal systems comprising open drains, canal remodelling works to handle increased deliveries, watercourse modifications to improve on-farm water use, gypsum application, and rural roads", and improved agricultural extension services. Floods the situation has again worsened.

ii. National Drainage Program - NDP 1998 -2004

The SCARP project was aborted due to the problem that it was draining vertically and there was no provision for horizontal drainage which could have reduced the problem of water logging. Thus, to address the problems of increasing water logging and salinity the National Drainage Project was initiated. The Government of Pakistan launched the National Drainage Program (NDP) in January 1998 which was undertaken to address the problems of Irrigation and Drainage infrastructure. The overall NDP Umbrella Project (Phase-1) was approved by ECNEC on May 26, 1997, for Rs. 31,400 million (equivalent to US$ 785 million). The project envisaged foreign assistance of US$ 525 million (IDA US$ 285 million, ADB US$ 140 million and JBIC US$ 100 million).

In Khyber Pakhtunkhwa, NDP was financed both by the Asian Development Bank and the World Bank. NDP was launched in 1998, to continue for 25 years. The major activities envisaged include

- Remodelling/ extension of existing surface and new drains,
- Rehabilitation/ replacement of saline groundwater (SGW) tube wells,
- Installation of pipe drains in new areas,
- The lining of watercourses in SGW areas,
- Capacity building of the irrigation and other related departments by bringing in institutional reforms;

1.11.2 Existing and Future Programs

The government of KP initiated partnerships and participatory programs for reclaiming waterlogged areas and land affected by sodicity and salinity. To this end, several programs were launched by the government and the NGOs. At present following two programs are working successfully.

i. On-Farm Water Management (OFWM) Program

Projects; NWFP OFWM Project (World Bank Assisted), PHLC (ADB Funded) and MRDP with OFWM component (ADB Funded).

The project is designed to cover the entire province and has two participants the government as technical advisors and facilitators, the user i.e. the farmer who acts through the Water User Association (WUA), which is formed by the local farmers who participate in the program as partners and provide their share in cash or kind i.e., labour, maintenance and some of the materials.

Watercourses would be maintained by the WUAs. They will therefore be responsible for any O&M expenditure after completion of the project gestation period.

ii. Provincial Rural Support Program (RSP)

The RSP has replicated OWFM and provided technical advice to the community groups for the lining of water courses. The financing is made on a partnership basis, the farmers or community association has to mobilize seed money and their share in cash or kind while design and a major portion of the funds are provided by the RSP, from the Poverty Alleviation Fund of the World Bank. After completion of the project, the farmers' association is responsible for the maintenance and upkeep of the project.

iii. Billion tree Tsunami Project

The Billion Tree Tsunami Project is driven by the current Government's vision of Green Growth which ties in the needs for sustainable forestry development in Khyber Pakhtunkhwa generating Green jobs, Gender empowerment, and Preserving Pakistan's natural capital while also addressing the global issue of Climate Change. That project has several objectives two of which have a direct impact on Water logging areas.
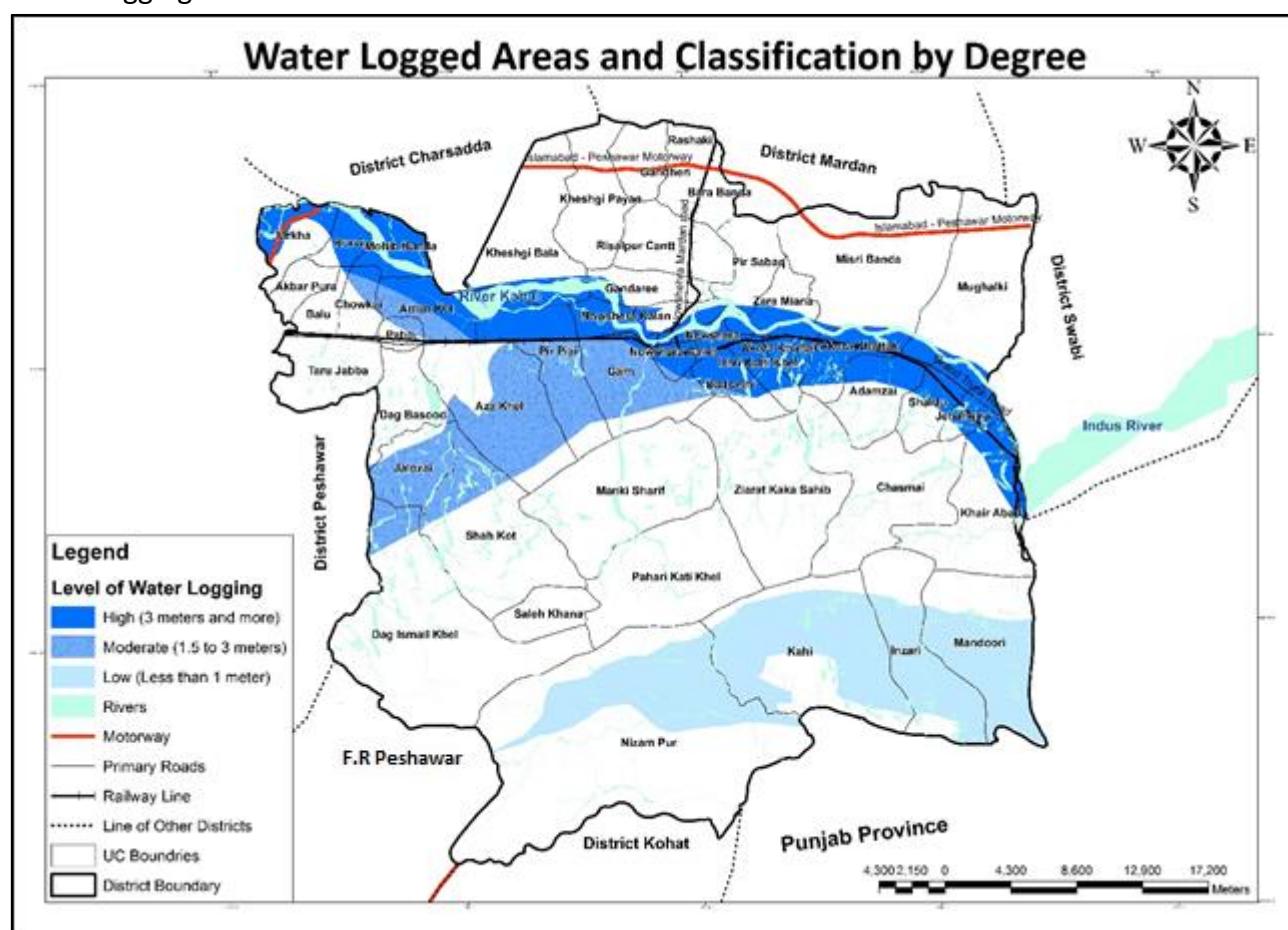
Map 1-10: Water Log Areas Classification by Degree

Map 1.10 represents the water logging area by degree classification regarding high, moderate and low different areas of District Nowshera

- Reclamation of 1000 ha saline and water-logged areas
- Planning and rehabilitation of 10 degraded Watersheds

Benefits of the Current Programs

The OWFM and the RSP have shown remarkable success in terms of reducing water logging and salinity and increasing agricultural incomes for farmers on a partnership basis. Some of the main features of the programs include:

- **Social Mobilization and Support Program;** Forming over ten thousand effective WUAs Associations, registering new WUAs under the 1981 WUAs Ordinance and providing them training and initial management support.
- **Improvement of Irrigation Facilities;** Rehabilitation and lining of the watercourse in the canal and non-canal commanded (barani, rivers, tube well) areas, in Peshawar and other districts of Khyber Pakhtunkhwa
- **Training and Capacity Building,** Imparting training to professionals and sub professionals and farmers in O&M of the watercourse. Creating awareness amongst farmers for efficient/optimal use of irrigation water as per crop water requirements; further, the farmers are also trained and educated to go for sowing high-value crops to increase their farm income per unit area and water.
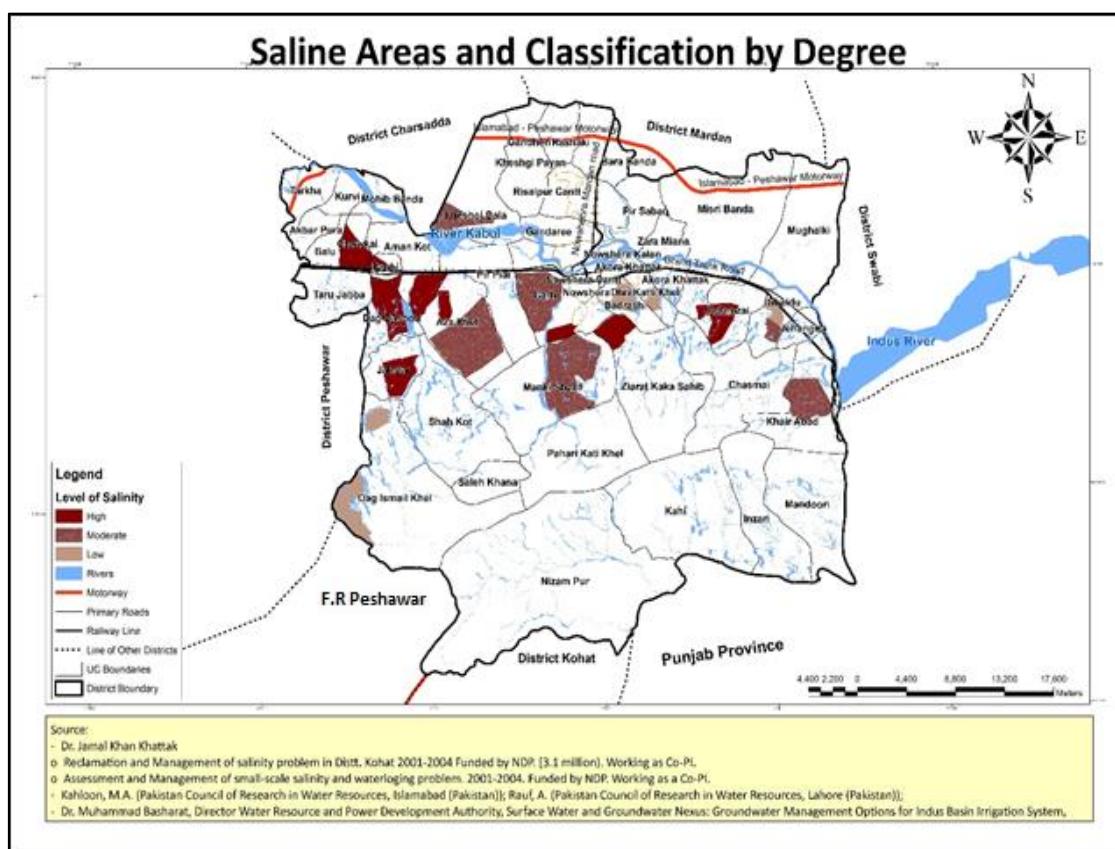
Map 1-11: Saline Area Classification by Degree

Map 1.11 represents the saline area classification by degree regarding high, moderate and low for the entire District Nowshera.

1.12 AGRICULTURE

1.12.1 Area Under Cultivation

According to the agriculture statistics, the total reported area of district Nowshera is 178070 hectares, out of which the total cultivated area according to the year 2016-2017 is 52528 containing the sum of net area sown and current fellow which is 29.5% of the total reported area (Table 1.15). In Table 1.18, Column 2 shows the total reported area, Column 3, 4, and 5 shows the cultivated area, Column 6, and 7 shows the total cropped area, and Column 8,9,10,11 shows the Un-Cultivated area.

1.12.2 Distribution of Area by Crops

i. Crops

Table 1.16 gives a comparative statement of the distribution of area by crops in district Nowshera. According to the crop statistics, 2014,2015,2016, the total area occupied by Wheat crops was 23088, 24841 and 25007 hectares respectively. Wheat ranks first in acreage and production among all food crops. In 2016 total area occupied by maize crops was 12131 hectares showing a drastic improvement in production after recovery from the 2010 flood in the same year, the total area occupied by sugarcane was 5263 hectares. Rice is the second major staple food of most people in Pakistan. In district Nowshera, the rice was sown on an area of 79 hectares because most of the area of the district is either rainfed or hilly due to which limited area is suitable for rice crops.

Table 1-17: Land utilization for Agriculture in District Nowshera[14]										
Year	Reported Area	Cultivated Area			Cropped Area		Un-Cultivated Area			
		Total	Net Sown	Current fallow	Total	Area Sown More than Once	Total	Culturable waste	Forest	Non-Available for cultivation
2017-2014	169470	52528	25321	27207	49089	23768	116942	47129	9120	60693
2014-2015	169470	52528	28252	24276	51986	23734	116942	47129	9120	60693
2015-2016	178070	52528	29389	23139	53802	24413	125542	49995	9120	66427
2016-2017	178070	52528	29389	23139	61030	--	125542	49995	9120	66427

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[14] Development statistic 2018 Khyber Pakhtunkhwa.

Table 1-18: Distribution of Area by Crops in District Nowshera (Hectare)[15]									
Type	**2014-2015**			**2015-2016**			**2016-2017**		
	Area	**Production**	**Yield per Hectare in KG**	**Area**	**Production**	**Yield per Hectare in KG**	**Area**	**Production**	**Yield per Hectare in KG**
Wheat	24841	48909	1969	25007	52671	2106	32557	68347	2099
Maize	12340	33095	2682	12131	33042	2724	10839	30879	2849
Rice	82	152	1854	79	142	1797	123	244	1984
Sugarcane	4260	219279	51474	5263	270003	51302	6734	343935	51074
Rape seed & Mustard	150	94	627	58	37	638	47	32	681
Tobacco	1860	5500	2957	1860	5500	2957	1156	3010	2603
Barley	504	662	1313	337	513	1522	240	359	1496
GRAM	69	62	899	30	28	933	18	16	889

ii. Vegetables

The major vegetables grown in district Nowshera are spinach, potato, tomato, pumpkin, tinda, ladyfinger, brinjal etc. According to the development statistic, the total area under vegetables during 2015-2016 was 2115 hectares with an annual production of 18,934 tons, Table. 1.19 show the distribution of Rabbi and Kharif Vegetables.

Table 1-19: Distribution of Area by Vegetables in District Nowshera (Hectare)[16]									
Vegetables	**2014-2015**			**2015-2016**			**2016-2017**		
	Area	**Production**	**Yield per Hectare in KG**	**Area**	**Production**	**Yield per Hectare in KG**	**Area**	**Production**	**Yield per Hectare in KG**
Rabi Vegetables	797	7896	9907	298	3077	10306	482	5327	11052
Kharif Vegetables	1576	14860	9429	1318	11038	8375	1170	9829	8401
Total	2373	22756	19336	1616	14115	18681	1652	15156	19453

iii. Fruits

Orchards belt are composed of manki sharif, kaka saib, Akora, and Jahangira. Potatoes don't count though, as they're a starchy food. The major fruits of the district Nowshera are citrus, loquat,

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[15] Development statistic 2018 of Khyber Pakhtunkhwa, District wise distribution of area by crops.

[16] Development statistic 2018 Khyber Pakhtunkhwa, district wise distribution of area by Vegetables.

watermelon, musk melon, apricot, apple, guava, pear, peaches, plums and persimmon. The total area occupied by Kharif fruits in 2016 was 1217 hectares with a production of 20,889 tons, and the Rabi fruits area was 334 hectares with a production of 3008 tons. The distribution of areas by fruits in district Nowshera are presented in Table. 1.20.

Table 1-20: Distribution of Area by Fruits in District Nowshera (hectare)[17]									
	2014-2015			2015-2016			2016-2017		
Fruits	Area	Production	Yield per Hectare in KG	Area	Production	Yield per Hectare in KG	Area	Production	Yield per Hectare in KG
Rabi Fruits	382	3383	8856	334	3008	9006	339	3011	8882
Kharif Fruits	1224	20885	17063	1217	20889	17164	1197	20692	17287
Total	1606	24268	25919	1551	23897	26170	1536	5703	26169

1.12.3 Water Management

Table 1.19 shows show the different modes of irrigation use in District Nowshera. The total irrigated area in district Nowshera is 24893 hectares of which 82.6% is irrigated through government canals while 27% area is irrigated through private canals, 8.9% through tube wells, 6.8% hectares is irrigated through wells and 1.43% is irrigated through other sources of irrigation.

Table 1-21: Type of Irrigation Use for Agriculture in District Nowshera[18]								
Year	Total	Canals		Tank	Tube wells	wells	Left pump	Other
		Govt	Private					
2013-2014	24893	20564	62	0	2210	1701	0	356
2014-2015	24893	20564	62	0	2210	1701	0	356
2015-2016	24893	20564	62	0	2210	1701	0	356
2016-2017	24893	20564	62	0	2210	1701	0	356

1.12.4 Influence of Urbanization on Agriculture

Table 1.22 gives the total cultivable area in District Nowshera in the years 1997-98 and 2015-2016. A cultivable area is the farm area which was sown at least once during the census year. It is the sum of area Net Sown and Current Follow. The total cultivable area during 1997-98 was 52,536 hectares, which dropped to 52,528 hectares in 2015-2016.

Table 1-22: Change in Cultivation Area 1997-98 and 2015-16			
Year	Cultivable area		
	Total	Net Sown	Current Fallow
1997-98[19]	52546	30095	22441
2015-16	52528	29389	23139

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[17] Development statistic 2018 Khyber Pakhtunkhwa, district wise distribution of area by fruits.

[18] Agriculture Statistics, Khyber Pakhtunkhwa, Peshawar and Crop statistics KP 2016-17. P#12

[19] 1998 census report District Nowshera

Comparing cultivable areas in 1997-98 with that in 2015-2016, the reduction over the period of 18 years is 18 hectares (44.5 acres), or an average of 2.5 acres per year.

Most of the conversion of agricultural land in Nowshera has taken place longitudinally along GT Road, or north of GT Road. This conversion is attributed to urbanization and other non-agricultural uses such as industries and a number of other factors, as described below:

i.   Installation of Marble Industries:

Many parts of the District which were once agricultural are now being used for the installation of various industries, thus reducing the overall agricultural productivity of the lands. The marble industry is affecting agricultural land in two ways. First, it simply takes the agricultural land out of production where the industry has been installed. Second, is the negative externality caused by these industries. Marble factories create a kind of dust which penetrates the fertile lands and make them infertile or not suitable for the cultivation of certain crops and fruits.

ii. Construction Industry

There is an increasing trend in the construction industry producing various construction materials. These include ready-made roof factories and crush-producing units. These industries when transporting their production materials to factories and markets pollute the nearby fertile agricultural lands. This in turn reduces the productivity of the land.

iii. Fertile lands turn Barren

Many fertile lands turned barren, and many people along the GT roadside told that they were used to cultivating wheat in their fields and it helped them to keep their food bills much lower than now. They now have to purchase wheat flour from the market because their agricultural land has turned barren due to nearby factories. The land is no more suitable to cultivate wheat.

iv. Reduced Productivity of Fruits Orchards

The area from Peshawar to Nowshera was famous for Pear and Plum Orchards. Along the GT road, there were a lot of fruit orchards alongside the road, but these had now vanished. The reason is polluted land is not suitable for their production. Reduced productivity is also the result of the sale of such orchards for factories and other uses.

v.   Housing Schemes

Unplanned housing and a rapid expansion of private and public-sector housing schemes alongside the GT road are other factors identified for the reduced productivity of lands and agricultural land takeoff. The most striking example of housing schemes is the WAPDA housing scheme, which took much of the fertile land and orchards out of production.

vi. Construction of Roads

Another factor which takes agricultural land out of production is the construction of roads and motorways. Many fertile agricultural lands come under the plans for road expansion or construction of a new road. This, on the one hand, is beneficial for the nation but on the other hand, has some

negative impact on agricultural production. Now we look into the effects of reduced agricultural productivity on the local population.

1.12.5 Effects of Reduced Productivity

These are the effects of reduced agricultural productivity,

i. Food Shortage

It was observed that agricultural land take-off creates food shortages. The rapid increase in population indeed requires cities to expand but it's also a fact that as cities expand and agricultural land is taken out of production it will cause food shortages. As we need to produce more and more to meet the food requirements of a rapidly growing population.

ii. Reliance on Imports

As urbanization takes lands out of production and the rapid increase in population requires more and more food, so the country has to import food items from abroad. This is against our national goal of self-sufficiency in food.

iii. Loss of Precious Foreign Exchange

Reliance on imports not only weakens our position with our trading partners but also causes a loss of our precious foreign exchange that could otherwise be used for hi-tech industrial imports to put our country on the path of development.

iv. Increasing Prices

It is also proved that the increase in urbanization has contributed to rising prices of food items. On the one hand, urbanization takes off agricultural land and causes reduced production and on the other supply, shortages create excessive demand for those items and cause the prices to rise sharply.

v. Reduced Exports

Decreased production reduces our export capacity of food items, and we are deprived of the precious foreign exchange that we could have earned otherwise. The area along GT road from Peshawar till Nowshera was a good source of Pear and Plum that could be exported but now as a result of rapid urbanization and reduced production of this fruit, we are losing our potential foreign exchange earnings.

1.12.6 Recommendations to Preserve Agricultural Lands

i. Model villages
A large portion of agricultural land is lost due to urbanization and it can be reduced through the model village concept. A model village is comprised of four major elements, such as Sustainability, community involvement, technology and better connectivity to people through these we can reduce the flow of people from rural to urban.

ii. Industrial Estates

Another factor responsible for taking off the agricultural land is the installation of industry on agricultural land. It should also be checked. Authorities should authorize the installation of industries only in the industrial areas. For this purpose, new industrial areas can be built away from fertile lands.

iii. Check on unplanned housing scheme

There should be a check on unplanned and unapproved housing schemes. The housing scheme is a profitable business nowadays and many schemes are started even without taking N.O.C. from the concerned authorities. Villagers sell their agricultural lands to such private housing scheme owners for a little profit, thus losing a permanent source of their income. To control unplanned development land is proposed for agriculture of 25677 Acres to make restrictions upon for development there.

iv. Motivation to farmers

The farmers didn't have any idea to export their production. These farmers should be taught about modern farming ways and they should be provided with a channel to export their products and not only increase their living standards but earn foreign exchange for the country.

Conclusion

Urbanization not only causes an expansion of built-up areas for housing but also has far-reaching effects on agricultural lands. Urban populations need a much broader supply and service infrastructure than rural populations - from shopping centres to water reservoirs. They usually cannot build their houses with local products, such as clay or wood; instead, steel mills and cement factories are necessary for urban construction. They cannot collect firewood for cooking and heating but depend instead on the production and distribution of commercial energy. Cities also need special areas for sewage treatment and waste disposal; in villages, this is often taken care of at the household level. The process of urbanization usually triggers the growth of specific supply infrastructure and city-specific land-use forms, such as parks, recreation areas, and sports stadiums, which further diminish cropland areas around the cities.

Recommendation

Thus, there is a need on the part of the government as well as our social responsibility to preserve the precious natural gift of Agricultural lands. There is a need for proper management of zoning for each sector i.e., agriculture zone, industrial zone, residency zone etc. Urbanization and urban expansion are a must for development but we cannot ignore the importance of agriculture for a country like Pakistan. With the population increase, our food requirement is also increasing day by day. To meet our food demand, we should not rely on imports rather we have to be self-sufficient in food production and it can only be achieved if we prevent agricultural lands from going out of production.

1.12.7 Recommendations

- The areas of the district which have water logging and salinity problems should be aware to use the types of crops which are resistant to water logging and salinity like sugarcane, maize and rice or through a plantation of eucalyptus and poplar trees.

- The extension staff and experts should be stressed to go regularly to the farmer's community so that the farmers can be able to use efficient use of modern implements, Fertilizers, improved seed etc.

- The area which is still culturable waste should be able for cultivation through land reclamation, levelling irrigation etc.

- Tunnel farming is common in the district of Nowshera, which contributes a lot to the nearby markets, so tunnel technology should be encouraged by the govt.

- As agriculture is directly related to water availability for that purpose either modern methods of irrigation composed of drip, sprinklers or trickle irrigation systems should be incorporated or additional water reservoirs should be started immediately.

- Resistant varieties and quality seeds according to the locality should be recommended by the govt. at the lowest price and at the right time, so that the farmers can get a better yield.

- The farmers should be aware of pest and disease attacks through extension staff so that they can be able control pests and diseases before damage to the crop.

- The seed certification and fertilizer quality should be strictly checked and regulated by the Federal Seed Certification and Registration Department on regular basis.

- Competition among the farmers for the best products should be encouraged.

- The government should provide an alternate system of irrigation other than tube wells to protect the water table level.

- The farmer should provide some period between two consecutive crops to reduce salinity and promote fertility.
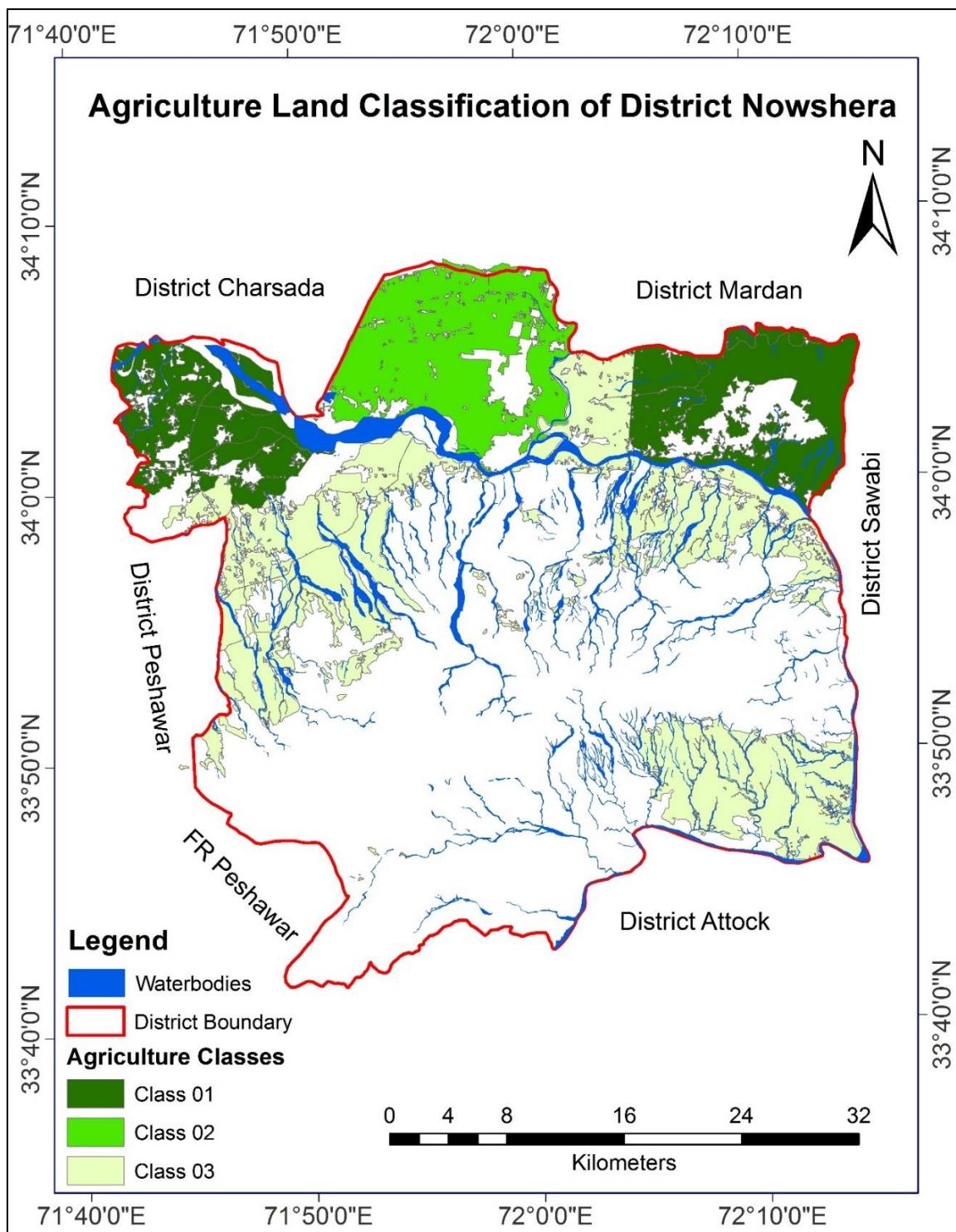
Map 1-12: Agriculture Land Classification of District Nowshera

Map 1.12 represents the fertile area of District Nowshera regarding availability of water resources, land fertility, the feasibility of different crop production and also water logging and salinity.

1.13 ECONOMIC DEVELOPMENT

The land is a finite physical entity in terms of its topography and spatial nature; a broader integrative view also includes natural resources: the minerals, water, geology and the soil biota that the land comprises. Land Use spatially occurs horizontally and can change only in terms of location, area, zoning and type of use; while the resources which have been studied under 21 different sectors and grouped into four broad categories are liable to change with technology, time, demand and exploitation of resources. The resources and investment in infrastructure can vary, resulting in vertical growth.
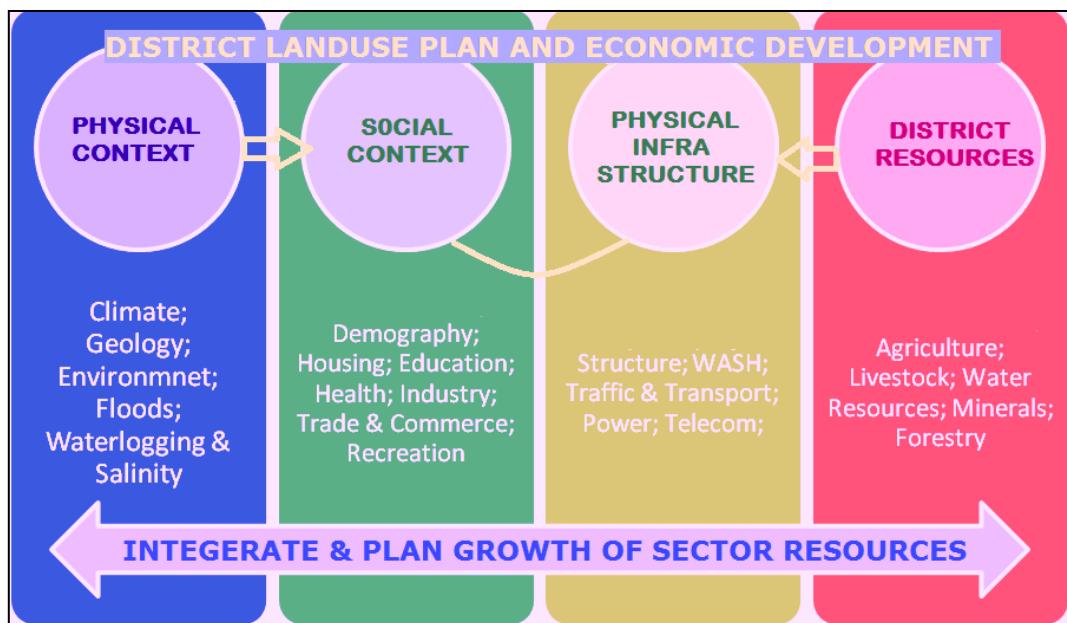
Figure 1- 5: District Land Use Plan and Economic Development

The District Land Use plan for Nowshera is based on exhaustive data collection, situation analysis, and extensive stakeholder discussions, for drawing inferences from more than twenty different sectors that have been grouped under four categories. For economic development, the district land resources are used in ways that take advantage of all these sectors; moreover, examining all uses of land in an integrated manner, makes it possible to minimize conflicts, make the most efficient trade-offs and link social and economic development with spatial land use and land resources, thus helping to achieve the objectives of sustainable economic development. The essence of the integrated approach finds expression in the coordination of varied sectors' planning and management activities concerned with the various aspects of land use and land resources.

More specifically the economic development of the District needs a holistic approach by different levels of governments and departments and a coordinated informed effort for adapting and adopting the agreed objectives of economic growth and development. This will include but is not limited to the following:

1.13.1 Economic Development in the Physical Context

The climate in the District is discussed in detail in District Studies Report; the climate in general has a direct impact on the economy of a region as it impacts the decisions making for location and type of industries and agriculture and Other Land Use. As explained earlier since the climate is not harsh, its impact on Land Use and economic development will be minimal.

The geological study of District Nowshera indicates that 55% of the area is underlain by recent alluvium. Apart from this, about 45% of the area of the district is covered by other rock types. These rocks are revealed in the outcrops that are concentrated in the Eastern and Southern portions of the district. In District Nowshera Land Use Plan, a separate mining zone has been earmarked which will contribute to the economy of the region.

The environmental problems both in the urban area and the peri-urban area are quite pronounced pollution of surface and subsurface water, air and noise pollution that emerge from lack of implementing EPA Act and siting of non-compatible Land Uses, non-availability of proper sanitation system, burning of waste, improper disposal of hazardous waste and haphazard traffic. It is recommended that the department responsible for industrial and municipal wastewater and waste disposal shall be encouraged and mandated to recognize their responsibility for environmental management. The environment is a cross-cutting theme and indirectly and directly impacts economic and social sectors, investment in this sector by adopting proper Land Use and mitigating hazards will have a multiplier effect on the economy**.**

Floods have a direct impact on the economy of a region as it results in damage to property, life and assets. District Nowshera faces a major threat of floods as River Kabul passes through it, and during the floods of 2010 vast areas of the District were affected by the floods. In the Land Use plan urban development or any other developments that may result in loss of life and property during floods has been considered, and are liable to flooding have been earmarked for farming. This will result in minimizing the adverse effect on the economy, thus contributing to economic growth.

The Government of KP initiated partnership and participatory programs for reclaiming waterlogged areas and land affected by sodality and salinity. Since the impact of water logging and salinity is a direct reduction in agricultural activity and thus income; a two-prong approach has been recommended i.e. participatory approach were through the extension program farmers shall be educated in adopting proper drainage and alternative cropping to increase their income; also the programs like OWFM and the RSP which have shown remarkable success in terms of reducing water logging and salinity and increasing agricultural incomes for farmers on partnership basis shall be encouraged, so that the farming income increases and the contributes to economic development

1.13.2 Economic Development – The Social Context

The demographic sector i.e., the population its composition by age and gender and its spatial spread along a time series are one of the basic factors affecting both Land Use and economic growth. The two sectors of demographic growth and economic growth are inversely interlinked; the higher the population growth the lower the economic growth. Additionally, education, training level of skills,

labour force, and the proportion of the dependent population are some of the factors that affect Land Use and the economy. For advocacy of the Land Use Plan, proper demographic projections for District Nowshera for the next 20 Years using different forecasting models such as regression analysis, extrapolation and cohort-survival Method were carried out. Based on the 2017 census the existing population of District Nowshera is around about 1.52 million, likely to increase to about 2.57 million in the year 2037. The proposals for economic development in the context of housing, education health and industry are presented in the following paragraphs:
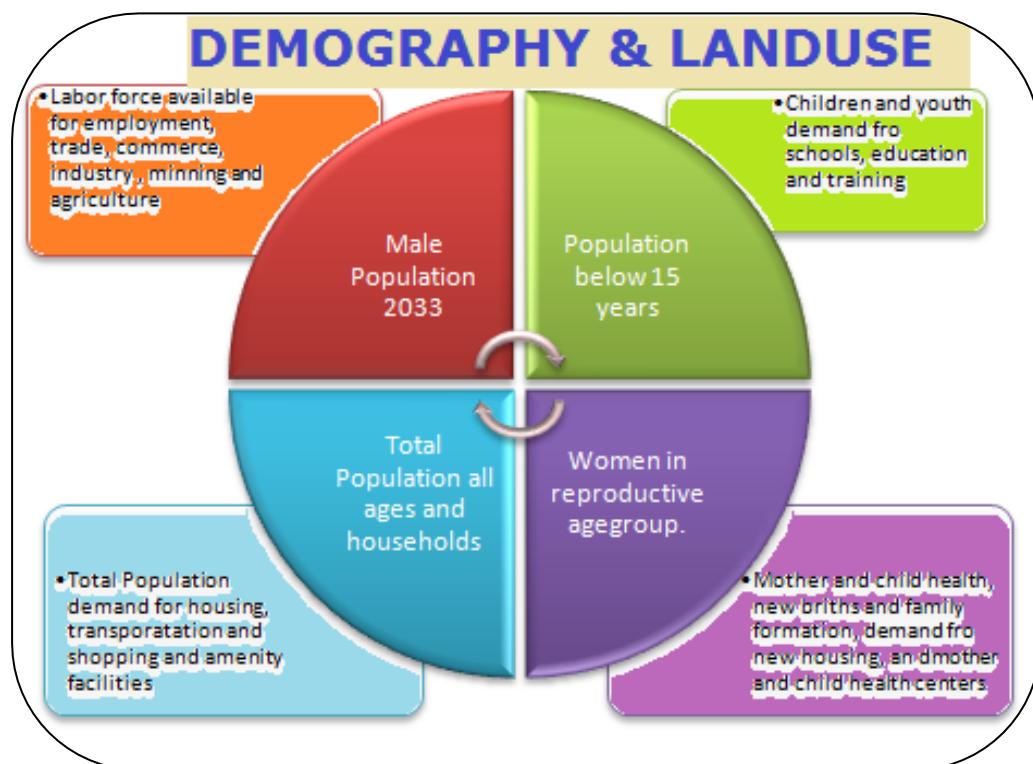
Figure 1- 6: Demography and Land Use

One of the vital factors of the social context is housing; as it impacts both Land Use and employment, generating in the construction industry and service industry. A holistic approach has been used for locating residential areas in the Land Use Plans. All factors that affect housing demand and supply such as income, land values, proximity to urban services, availability of transportation linkages, employment opportunities, cost of infrastructure, availability of construction materials and technology; health and education faculties have been considered. Prime agricultural land has been reserved for farming only and conversion of prime agricultural land to housing and other urban uses has been prohibited. The housing demand during 2019-2024 and 2024-2039 will be 33,940 and 1,41,510 respectively, while the current housing backlog is 54328. The total housing required for the next 20 years, including the existing backlog, is estimated to be 229,779 housing units. This will generate economic activity both during land development and construction as well as employment in education, health, commerce and transportation.

The Land Use Plan and Education sector are vital to the continued evolution of the community. Access to quality educational opportunities within convenient access boosts the chances for success of a

Land Use plan. The educational opportunities in Nowshera have attracted many new residents and businesses. There is a wide range of educational opportunities available in the District. However, the Land Use Plan should encourage the education sector to establish new institutions that provide people with the skills they need for the changing job market.

The educational facilities serve both the local and District population and even wider areas for higher and special education. The accompanying economic activities are direct employment for teaching and other jobs and indirect economic activities for serving large segments of the population in and around the universities, technical colleges, medical colleges and training institutes. Additionally, it also generates economic activities in the field of transportation, and small business of stationers, computers and other accessories. Finally, the trained and skilled youth in the District Nowshera will ultimately serve the province and the nation, thereby generating higher household, regional and national income.

The Land Use for health is spatially spread into two tiers, the local or micro-level health centres which are located close to the residential areas, and in the rural areas, and the hospitals which work at district, regional and even provincial levels for in-door and out-door facilities. There is a strong linkage between health and economic sustainability; a healthier population is productive and contributes substantially to the economy of a region. This will also result in providing jobs for medical professionals and paramedics as well as generating small business activities for the health sector such as medical shops, labs and small private clinics etc.

District Nowshera has a Special Industrial Zone and an Export Processing Zone, both located in Risalpur along Nowshera-Mardan Road. There is a cement factory on Nizampur Road while most of the medium-sized industries are located on GT Road. Small industries are spread throughout the District, particularly along inter-city roads. Under the District Land Use Plan, an industrial estate has been proposed in the North-East of the District, between GT Road and Motorway. The Industrial sector has a direct linkage with economic development, income and employment. Industries create direct jobs; and as such this Land Use is an income generating both through direct job creation, movement of goods and services and related imports/exports and trading. The location and area of land under this use thus directly contribute to the economy.

Trade and Commerce focus on their role in prioritizing the future commercial development efforts, as it is the major income and employment-generating sector, and a large proportion of the population of all ages directly or indirectly depends on small-scale commerce and trade. Land Use under trade and commerce at present is widely spread intermixed with residential areas and spreads along roads and streets. A new trade zone has been proposed for the North-East of the District which will generate employment and income directly and indirectly thus contributing to the economic development of the region and the province.

Recreational facilities and open spaces contribute to the health and environment of a community; which in turn indirectly impacts economic development. The existing Land Use under recreation is reducing; which is a cause of concern. The main recreational areas in the District include Cherat Hill Resort, Aza Khel Park and Kund Park at Khairabad. Development of a sports stadium and Nizampur

Wildlife Park are also included in the Annual Development Plan. Under District Land Use Plan, a new recreational park has been proposed between GT Road and Motorway. These parks and recreational areas when developed will have a direct and indirect impact on the economy of the region.

1.13.3 Physical Infrastructure and Economic Development

Infrastructure is a key ingredient for productivity and growth. Conceptually, physical infrastructure may affect aggregate output in two main ways: first, directly because infrastructure services enter production as an additional input, and second because they raise total factor productivity by reducing transaction and other costs thus allowing more efficient use of conventional productive inputs. Four sectors i.e. Water Supply, Sewerage & Drainage; Traffic and Transport, Power and Telecommunications have been grouped under physical infrastructure.

Most of District Nowshera has piped water supply systems, which are underground and do not show as a zone in the Land Use, however, the waterworks and OHRs and surface reservoirs take up some land, but that too is so negligible when considered at the district level. The major Land Use in this sector is the open drains and the treatment works for sewage and disposal stations. The condition and efficiency of the WASH system directly have a direct linkage to economic development. Enhancing the quality and quantity of water, and collection and treatment of municipal and industrial wastewater in accordance with the PEPA Act 1997 has been recommended by the consultants. The improved infrastructure of WASH will have a direct impact on the economy of the region, as good quality water will contribute to the health of the citizens and be available for businesses and industries. Adequate disposal of the wastewater will, on one hand, result in a reduction in pollution and contamination of surface and subsurface water, while on the other it will impact health by the reduction in waterborne diseases.

The transportation network in an area influences land use and development trends and thus the obvious need of integrating transportation and land use proposals. The main transport infrastructure in Nowshera is provided by three railway stations (operated by Pakistan Railways), and several links to various highways including the Motorway (M-1), the Grand Trunk Road (N-5), the Karakoram Highway (N-35), Nowshera - Dir - Chitral Highway (N-45) and Nowshera - Charsadda - Shergarh Highway (S-9), enabling rail, road and air connections (through Peshawar International Airport, Peshawar - served by all Pakistani airlines and several foreign airlines) to all Pakistani cities as well as neighbouring countries like Afghanistan and China.

Based on an analytical review of the existing conditions of traffic and transport in District Nowshera, particularly heavy traffic volume on GT Road, the consultants have recommended that a new road would be constructed from the existing Nowshera city which will cross the new city and join the G-t at Jehangira. This road will provide inter-changeability to and from all connected roads, provided that intervening junctions are well designed to ensure uninterrupted smooth flow of the inter-city as well as local traffic. Other proposed roads have been integrated with the Land Use proposals and include widening of inter-city roads, reducing congestion in the city centre and shifting of traffic generating Land Uses.

The impact of the proposed roads and the creation of a planned extension of Nowshera towards the North-East will result in the efficient movement of goods and passengers providing intercity and intra-city linkages, which will directly contribute to the economy of the region and result in enhanced regional income. This strategy will also generate income by creating employment during construction and later in the transport sector as drivers, cleaners, managers, maintenance workers, gas stations repair shops and a host of other activities.

The power sector is an important part of District Land Use Plan Nowshera, to provide systematic planning and coordinate development activities for the next 20 years for the rural and urban populations. The electric power sector in Nowshera such as transmission and distribution is managed by PESCO (Peshawar Electric Supply Company).

The electric power sector in Nowshera such as transmission and distribution is managed by PESCO (Peshawar Electric Supply Company). There is no Hydro or Thermal power station in Nowshera and all the required electric power is purchased from WAPDA National Grid.

The service area of District Nowshera is 1748 sq. km, containing 02 divisions and 10 sub-divisions. The total length of transmission lines (all categories) in the District is 3048.72 kilometres, which is about 3.92 percent of the provincial total. The length of about 38 % of the transmission lines is 400 volts, while around 57 % belong to the 11 KV category. Thus, these two categories together form 95 % of the total transmission line length in the District. The total number of grid stations in District Nowshera is 07, against 87 in the entire Province. In District Nowshera, 01 Grid Station is 66 Kv and 06 Grid Stations are 132 KV.

Table 1-23: Power Infrastructure: Province Vs District Nowshera[20]		
Description	**Province**	**District Nowshera**
Service Area	74,521 Sq. Km	1748 Sq. Km
Number of Divisions	31 No	02 No
Number of Sub Divisions	143 No	10 No
LT (400v) Transmission Lines	42,526 km	1169.85 km
11 kv Transmission Lines	31,284 km	1733.87 km
33 kv Transmission Lines	311 km	0
66 kv Transmission Lines	861 km	30 km
132 kv Transmission Lines	1919 km	115 km
220 Kv Transmission Line	750 km	0
500 Kv Transmission Line	117 km	0
Total Transmission lines	77,768 km	3048.92 km
Grid Station 33 kv	06	0
Grid Station 66 kv	18	01
Grid Station 132 kv	59	06
Grid Stations - 220 kv	03	0
Grid Stations 500 kv	01	0
Total Grid Stations	87	07

Power generation capacity in District Nowshera is around 84 MW, whereas average demand is 95 MW and peak demand is 113 MW. Based on average demand, the shortfall is 10.6 MW or 11.17%. A site is available for a hydroelectric power station in Nowshera as the federal government endeavours for addressing the problem of energy shortfall in the country and the provincial government has announced the construction of Latamber Dam in Karak district and Mairoobi and Jaroba Dams in Nowshera to provide cheap electricity and water for agriculture and industrial consumption. There is a need to launch a large-scale expansion program to use the renewable Hydro Electric Potential for power generation.

Identification of existing/potential (renewable and non-renewable resources) power energy sources; Hydro; Solar; Wind; Thermal/Coal/Oil/Gas.

Demand and shortfall in the district Nowshera to be calculated. Moreover, a review of national and provincial policy regarding energy and power is also essential.

At present due to a shortage of electric power outages are frequent and sometimes last more than 12 hours per day. This affects both the productivity at the personal and district level. The government or the public sector needs to augment power on priority. It is suggested that small-scale coal gasification plants can be installed to add to existing power generation. There is a need to encourage and popularize solar power plants at the district and local levels. The available infrastructure of transmission lines and grid stations should be repaired and upgraded to reduce technical losses. The power has a direct linkage with economic development and once improved and made sustainable the economy of the area will grow

The process for planning and developing telecom services should be in line with Land Use planning strategies so that regulations related to radio frequency engineering standards can be used as an illustrative planning tool that coincides with the underlying zoning. Co-relating Land Use planning with telecom infrastructure protects aesthetics and property values by helping in controlling the number of future sites that are in an area. There is a total of 39 telephone exchanges in District Nowshera and 16 broadband sites. Other telecom services in Nowshera include PTCL V Phone (Wireless) and DSL. Telecom assets are a special class of IT assets that require an accurate inventory for effective financial management

1.13.4 Economic Development – District Resources

Urbanization is often considered to have negative impacts on agriculture; for instance, from the loss of agricultural land to urban expansion and an urban bias in public funding for infrastructure, services and subsidies. However due consideration has been given to this aspect in the district Land Use plan and prime agricultural land in the District, wherever possible has been retained for Agricultural Land Use, with recommendations to prohibit any urbanization-related activity in that area. Considering that the District Nowshera is famous for producing both food and cash crops it is recommended that:

- For those farmers who have made their tube wells their water channels should be lined with concrete to decrease the water losses and fuel consumption and increase their profitability.
- The area which is still culturable waste should be enabled for cultivation through land reclamation, levelling, irrigation etc.
- Modern methods of irrigation such as drip, sprinklers or trickle irrigation systems should be incorporated or additional water reservoirs should be started.
- Farm to market transportation system should be improved so that the farmers can bring their goods to market easily.

These interventions will result in higher farm income and economic growth in the District and the Province.

The District has the potential of increasing the value of livestock, and a zone has been reserved for pastures and rangeland. Livestock in the District comprises goats (31%), followed by Cattle (30%),

buffaloes (17%) and sheep (11%); While 3 % of the livestock is camels, horses, mules and donkeys. Additionally, there are 72 poultry farms and 15 fish farms in District Nowshera.

The rivers in the District are the Kabul and Indus Rivers. The Kabul River enters the district on its Western side and joins the Indus River at Kund near Khairabad. Numerous water bodies both man-made and natural run throughout the District on the South bank of River Kabul. One of the major Khawars (water channel) namely Chipla Khawar emerging from Cherat hills carries the drainage of this catchment area. This Khawar irrigates the downhill area extending to Pabbi. In addition, there are several smaller Khawars some of which are non-perennial.

The depth to groundwater along the Kabul and Indus rivers and in canal irrigated areas in the Western part is generally less than 10 m while it is more than 30 m for areas at higher elevations. For economic development and an increase in rural income, the government of KP under the existing irrigation and agricultural system is committed to increasing productivity for poverty alleviation and greater economic benefits. To this end, programs are being initiated for increasing the yield and value of crops and reducing farm inputs, especially water. By increasing the productivity of water, the GoKP will on one hand achieve higher agricultural income as a means of intensifying agricultural production, while on the other hand, this program will result in reducing environmental degradation. The existing water resource delivery system is inequitable and unpredictable, and many schemes demonstrate a marked absence of proper planning. In many areas, tube wells have been installed without assessing the underground water situation. Similarly, there is no inter-sectoral coordination or consensus in the construction of small dams.

Fourteen types of minerals (mainly industrial) are extracted in District Nowshera and include Bentonite Clay, Coal, Dolomite, Fire Clay, Hematite, Lime Stone, Laterite, Marble, Red Oxide, Shale Clay, Slate Stone, Silica Sand, Soap Stone, and Chromite. There are no reported gemstones mined /exploited in the District. Minor minerals in the District are sand, gravel and bajri which are excavated through dredging on the banks of rivers/streams/nullas in the District Nowshera. The economic contribution of the mining sector in District Nowshera can be significant and needs to be institutionalized and enhanced in terms of trained manpower and extraction.

Though the province is very rich in forest resources, District Nowshera has hardly any. The area covered by forests in the District is only around 0.7% of the total forest area in the province, and is spread mostly in the southern part of the District in the hilly area. The massive plantation is a concrete step toward slowing the rate of environmental degradation and mitigating the negative effects of climate change. Plants play a vital role in the protection of the environment and have multiple advantages besides beautification. Spring and the monsoon are two suitable seasons for the plantation of saplings. The monsoon season is ideal for plantation. It is suggested that highway forestry should be encouraged by planting trees along the highways and roads. This will have a two-prong effect, reducing pollution and increasing forest cover in the district. The economic benefits of such an approach will be direct as well as indirect by reducing diseases related to air and noise pollution and minimizing the adverse effects of floods. On August 1, 2010, this entry was published.

CHAPTER. 2   EXISTING LAND USE DISTRIBUTION

2.1   GENERAL

General misuse and mismanagement of agricultural land resources, i.e., soil and water, is the single most important factor responsible for continued land degradation and stagnation of yields. The present use of the land resources is not adapted to the potential of the land and its conservation requirements. It is rather determined by the needs and local trends.

There is thus a dire need for an unbiased and sound plan to be prepared at the district level that can guide the implementing agency in rationalization of all land uses and objective planning and formulation based on the potential and requirements of the land resource. Preparation of a District Land Use Plan will satisfy this need and promote a potential-based use of the land for maximum land resource conservation. It will provide a scientific foundation for resource-based land use planning to rationalize agricultural land use and maximize agricultural production by implementing appropriate management technology and systematic development/improvement of agricultural land resources. This will also ensure conservation of the resources for use for the coming generation. The optimum utilization of land is, in fact, the main objective of the Land Use Plan.

More specifically, the objectives of the Project are:

- Preparation of district Land Use plan for scientific utilization of land resources based on district land resource inventory and quantitative land evaluation through field research.
- Proposing necessary changes in the current land use system to promote conservation of the land resources.
- Identifying tracts of degraded farmland and suggesting economically viable and practical measures for their rehabilitation.

2.2   JUSTIFICATION FOR LAND USE DISTRIBUTION

The purpose of Land Use distribution is to compare the existing distribution with the desired distribution in an area, to identify the shortcoming/dearth of a particular Land Use/s or its excess, and accordingly take corrective measures where ever needed or possible. However, it needs to be considered that unlike housing schemes or industrial estate, at District or City level, there is no 'standardized' distribution of Land Uses. The proportions of Land Uses at the city level are the resultants of past and present socio-economic forces. But in many cases, in urban areas of similar population sizes, market/institutional forces throw up common and widely recognized patterns of land distribution. Despite this, it is important to be aware of the pervasive power of market processes, so that limitations to the scope of planned interventions are understood.

The proportions of land under various uses vary according to the scale under consideration. A small residential scheme will be predominantly occupied by dwelling units, and an industrial estate by various types of factories, while at the urban level; both will be reflected in a certain mix. Recommended Land Use distribution for the above categories is given below:

Table 2-1: Land Use Distribution in Housing Scheme[21]		
Sr. No.	**Land Uses**	**Percentage**
1	Residential	45-52
2	Commercial	2-3
3	Education, Health & Other Community Facilities	7.5-10
4	Roads/Streets	25-30
5	Open Spaces	5-7.5
6	Others	2-5

Table 2-2: Land Use Distribution in Industrial Estates[22]		
Sr. No.	**Land Use**	**Percentage**
1	Factory Plots	60-65
4	Roads	Up to 20
5	Open Spaces	Up to 20
6	Administrative and Other Buildings	5-10

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[21]Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Chapter 10, Page 301, Table 10.1.

[22] ibid, Page 90, Table 5.6.

Table 2-3: Land Use Distribution at Town/City Level (100,000 – 499,000)[23]		
Sr. No.	Land Uses	Percentage
1	Residential	26-48
2	Industrial	3-8
2	Commercial	0.5-2
3	Institutional	2-10
4	Arterial Circulation/Terminals	12-29
5	Recreational Open Spaces	1-7
6	Graveyards	0.5-4
7	Vacant	3-17

2.3   EXISTING LAND USE DISTRIBUTION

The total area of District Nowshera is 1,748 square km, of which the aggregate area of the eight urban settlements[24] in the District is 53.13 square km or about 3.04% of the total District area. The remaining 96.96% comprises villages, range land, agriculture, vacant land, forest (scrubs), water bodies, transportation, Industrial Estate, Graveyards etc.
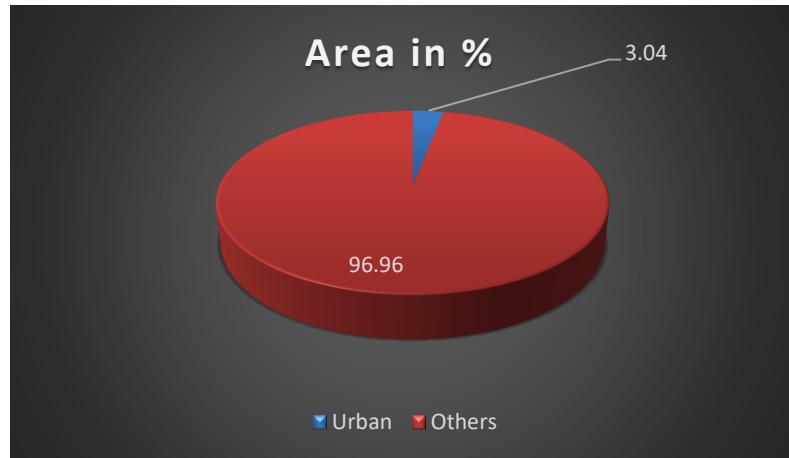
Figure 2-1: Urban-Rural Land Split

2.3.1   Land Use Distribution in Overall District

The maximum area in District Nowshera is under agriculture category (37.88%), followed by the vacant land (24%), range Land (21%), forest (scrub) (9.6%), small towns/villages (4.21%), water bodies (3.81%), roads/railway/terminals (1.55%), urban Residentiary (0.84%), and others. The area and their percentages are given in Table 2.4. The distribution is graphically illustrated in Figure 2.2.

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[23] ibid, Page 305, Table 10.2.

[24] Urban settlement-wise areas are: Nowshera city 20.78 sq. kms, Pabbi 3.12 sq. kms, Jahangira 1.35 sq. kms, Risalpur 14.76 sq. kms, Amangarh 5.19 sq. kms, Akora Khattak 2.65 sq. kms, Nowshera Cantt 4.47 sq. kms and Cherat 0.81 sq. kms (Source: GIS map of Nowshera)

Figure 2- 2: Land Use Distribution-Overall District Area

Table 2-4: Existing land use areas- overall district

Sr. No.	Land Use	Area (sq. Km)	%age
1	Agricultural Related		
1.1	Agriculture	648.50	37.88%
1.2	Range Land	359.56	21.00%
1.3	Forest (Scrub)	67.99	3.97%
1.4	Shrubs/Bushes	14.56	0.85%
1.5	Orchards	12.24	0.71%
2	Community Facilities		
2.1	Main Education Facilities	0.81	0.05%
2.2	Main Health Facilities	0.20	0.01%
2.3	Public/Community Facilities	0.01	0.00%
2.4	Parks/Stadium	0.60	0.04%
3	Transportation		
3.1	Roads/Railways	26.47	1.55%
3.2	Terminals	0.04	0.00%
4	Urban Residentiary[25]	12.78	0.75%
5	Small Towns/Villages	72.01	4.21%
6	Industry	4.88	0.29%
7	Main Commercial	0.76	0.04%
8	Graveyard	5.07	0.30%
9	Water Bodies	65.27	3.81%
10	Vacant Land	420.30	24.55%
	Total	1,712	100.00%

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[25] Urban Residentiary area is pre-dominantly residential area and also includes the local level facilities i.e. education, health, religious, local roads, shops etc.
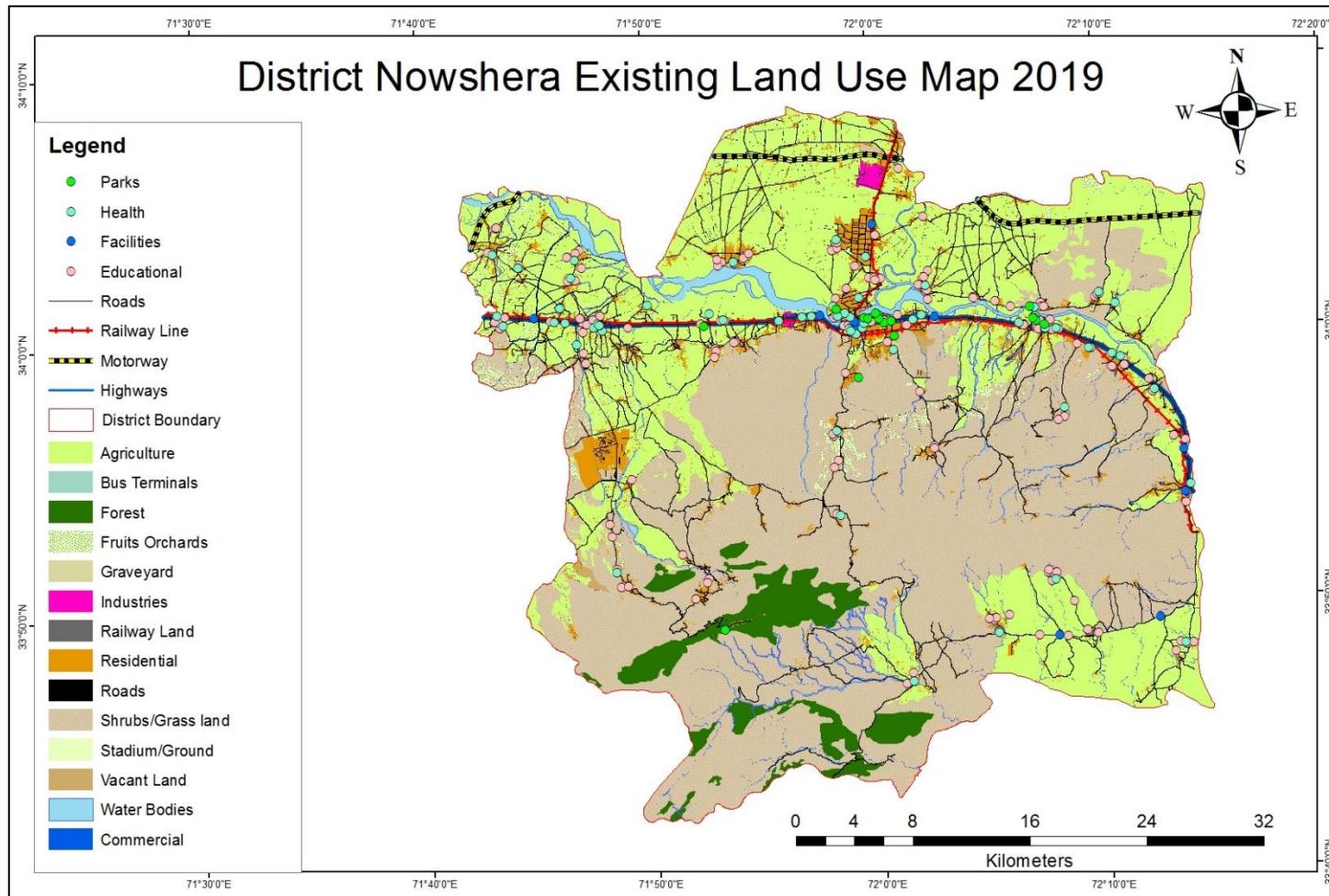
Map 2-1: Existing Land Use of District Nowshera

Map 2.1 represents the existing land use of District Nowshera with different land use features, representing their relative location and area captured by each land use feature

2.3.2 Land Use Distribution in Nowshera City[26]

The current urban area of Nowshera is different from that reported in 1998, as substantial sprawl has taken place over the last 15 years. The following methodology has been used to assess the current urban area of Nowshera.

The current urban area was determined by closely studying the base map/satellite image, and determining the current urban sprawl. The boundary of the urban area was thus marked, and its area was calculated.

The urban area was marked considering the UC boundaries, in which the substantially urbanized/urbanizing area fell (even though such UCs are not entirely urbanized).

Table 2-5: Existing Land Use Areas- Nowshera City			
Sr. No.	**Land Use**	**Area (sq. Km)**	**%age**
1	Urban Residentiary	12.77	61.99%
2	Agriculture Related		
2.1	Agriculture	0.57	2.77%
3	Transportation		
3.1	Roads/Railways	1.97	9.56%
3.2	Terminals	0.04	0.19%
4	Community facilities		
4.1	Main Education Facilities	0.09	0.44%
4.2	Main Health Facilities	0.19	0.92%
4.3	Public/Community Uses	0.01	0.05%
4.4	Parks/Stadium	0.51	2.48%
5	Industry	0.08	0.39%
6	Commercial	0.29	1.41%
7	Graveyard	0.74	3.59%
8	Water Bodies	0.84	4.08%
9	Vacant Land	2.40	11.65%
	Total	20.6	100.00%

The total urban area of Nowshera city thus delineated works out to be 20.6 square km, of which the Urban Residentiary area is 12.77 square kilometres or about 61.99 % of the total urban area. As already stated, the Urban Residentiary area is predominantly residential and also includes the local level facilities i.e. education, health, religion, local roads, shops etc.

The transportation category includes urban roads & railways, terminals i.e. (bus/truck terminals, and railway stations). The area under transportation uses is 2.11 square kilometres, i.e. about 10.24 % of the total urban area.

Statistics about other Land Uses in urban areas are given in Table 2.5 and demonstrated graphically in Figure 2.4.

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[26] Urban Area includes the Complete Union Councils (UCs) i.e. Nowshera Kalan, Nowshera, Nowshera Cantt and partially coincides with Garh, Badrashi, Dheri Katti Khel Union Councils (UCs)
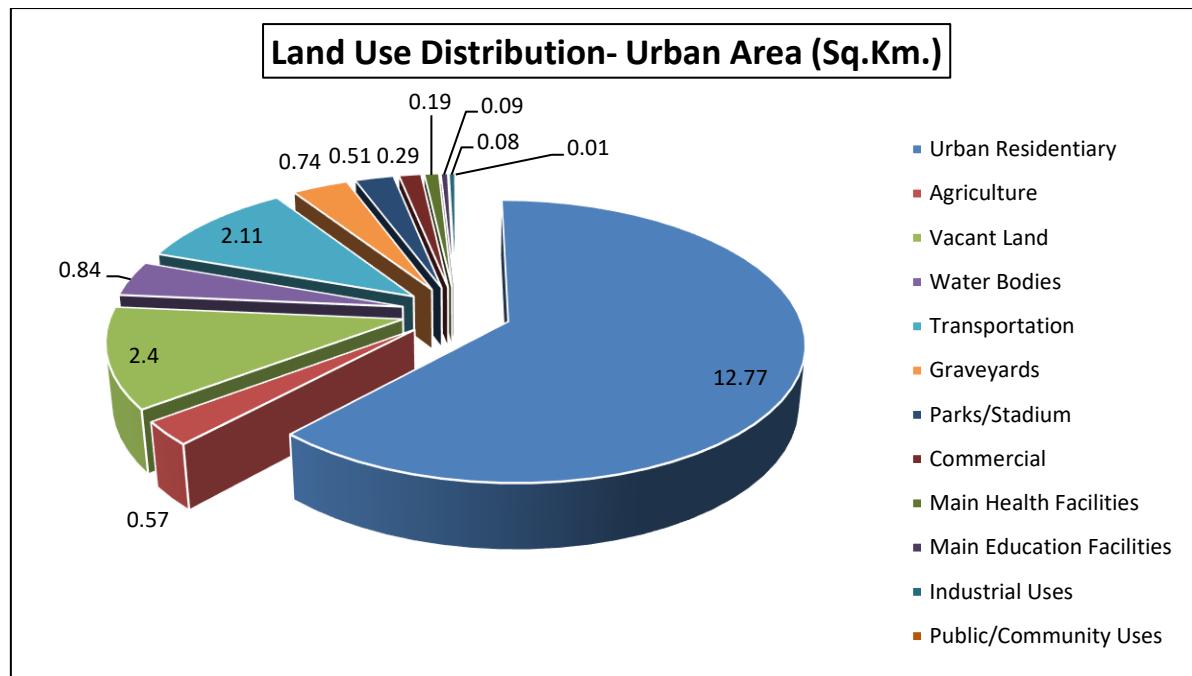
Figure 2-3: Land Use Distribution of Urban Area of District Nowshera

Following is a comparison of Land Use distribution in the urban area of Nowshera with Land Use distribution in other urban areas of similar class categories, i.e. urban areas of 100,000-499,000 populations.

Table 2-6: Land Use Distribution in Nowshera Vs Other Urban Areas in the Country (100,000-499,000 population)								
Land Uses	**Residential**	**Industrial**	**Commercial**	**Institutional**	**Arterial Circulation/ Terminals**	**Recreational Open Spaces**	**Grave yards**	**Vacant**
Nowshera Urban Area	61.99%	0.39%	1.41%	1.41%[27]	10.24%	2.48%	3.59%	11.65%
Other Urban Areas[28]	26-48%	3-8	0.5-2%	2-10%	12-29%	1-7%	0.5-4%	3-17%

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[27] Includes public/community uses, main educational and health facilities.

[28] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 305, Table 10.2.

The following are the main inferences that can be drawn from Table 2.6:

- The percentage of residential area in Nowshera Urban is much higher than in other urban centers of the Country. This indicates that decongestion of the existing urban area is required by opening up new areas for residential use and providing all non-residential but essential Land Uses for the residents.
- The industrial area is very less than per national standard of the other urban centers of the country.
- The area under commercial uses in existing urban areas accords well with other urban areas.
- Nowshera is woefully short of institutional uses, i.e. 1.41% as compared to 2-10% in other urban areas.
- The percentage of area under arterial circulation/terminals is slightly lesser than even the lower end of the range in other urban areas.
- The area under recreational use in Nowshera is falling within range for recreational areas, i.e. 2.48% as compared to 1-7% in other urban areas.

2.4 URBAN AREAS OF DISTRICT NOWSHERA

There is a total of eight urban settlements in District Nowshera. Three of them are Cantts and the remaining five are Municipal Corporations.

2.4.1 Pabbi MC

The total area of Pabbi MC is 3.12 Sq.km or 770.96 Acres. 67% is residential, 21% agriculture, 8% shrubs/open space/range land and 4% are other facilities such as Education, Health, Police Station etc.

Table 2-7: Pabbi MC Land use Distributions

Land Use	Km. sq.	Acres	Percentage
Residential	2.09	516.54	67
Agriculture	0.66	161.9	21
Shrubs/Open area	0.25	61.68	8
Industrial	0	0	0
Facilities	0.12	30.84	4
Total	3.12	770.96	100
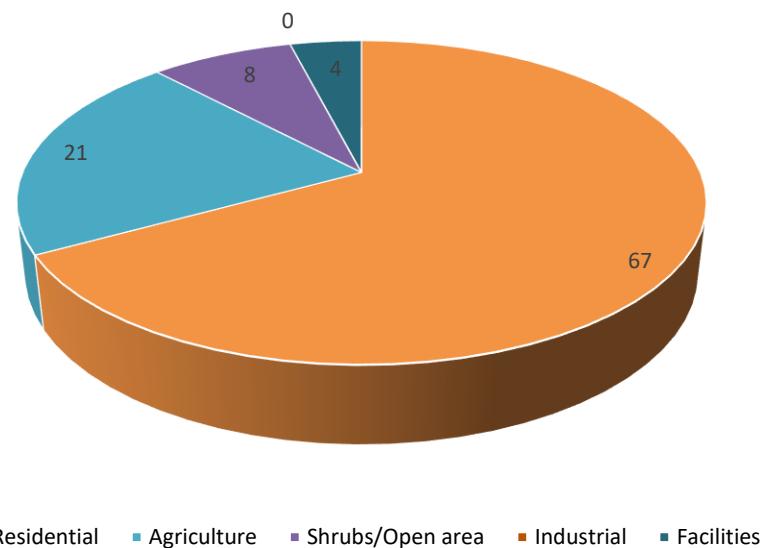
Figure 2-4: Pabbi MC Land use distribution
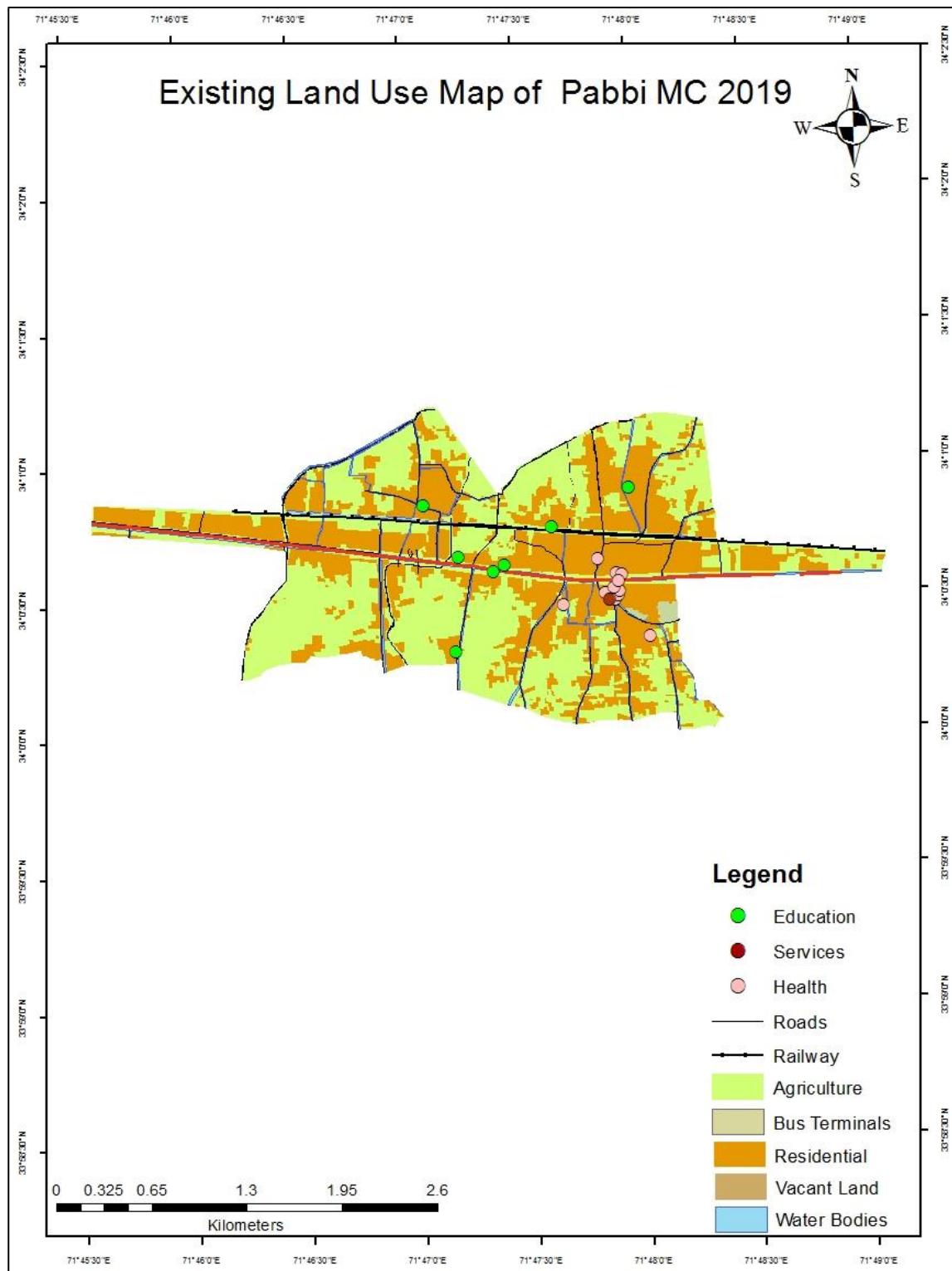
Map 2-2: Pabbi MC Land use

Map 2.2 represents the land use of Pabbi MC. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

2.4.2 Amangarh MC

The total area of Amangarh TC is 5.19 sq. km or 1282.47 acres. 49% is residential, 16% is agriculture, 13% Is open space/shrubs/range land, 19 % is industrial, 1% fruits Orchards and 2% is graveyard.

Table 2-8: Amangarh MC Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	2.54	628.41	49
Agriculture	0.83	205.2	16
Shrubs/Open area	0.67	166.72	13
Industrial	0.99	243.67	19
Fruit Orchard	0.05	12.82	1
Graveyard	0.1	25.65	2
Total	5.19	1282.47	100
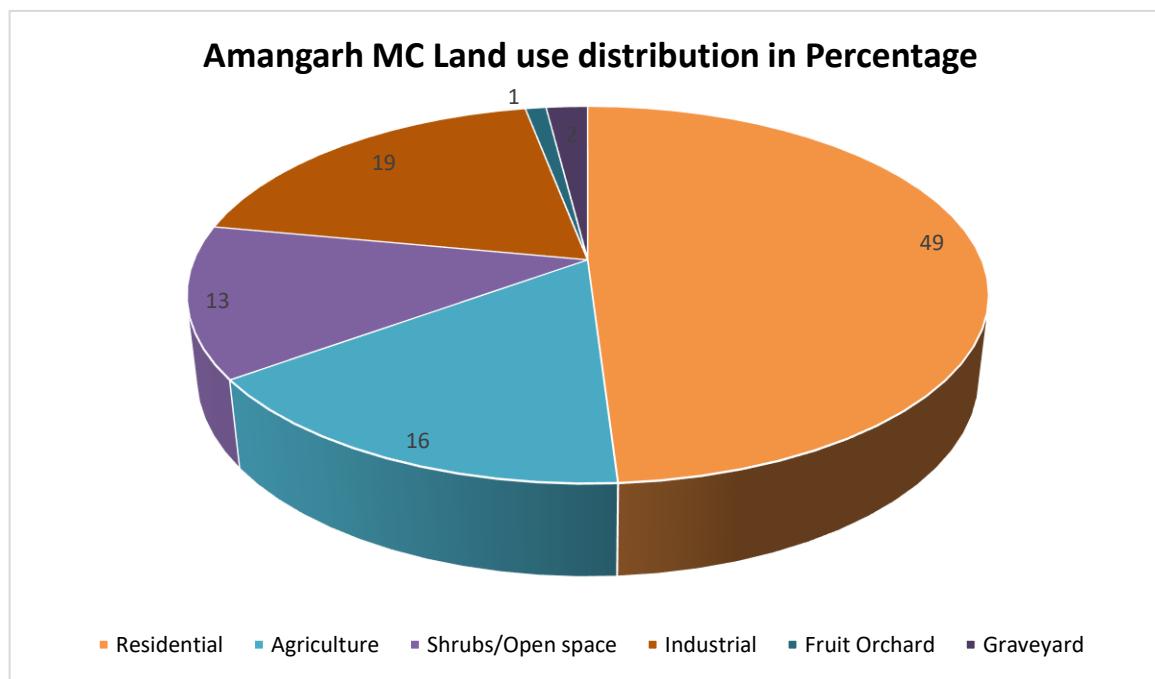
Figure 2-5: Amangarh MC Land use distribution
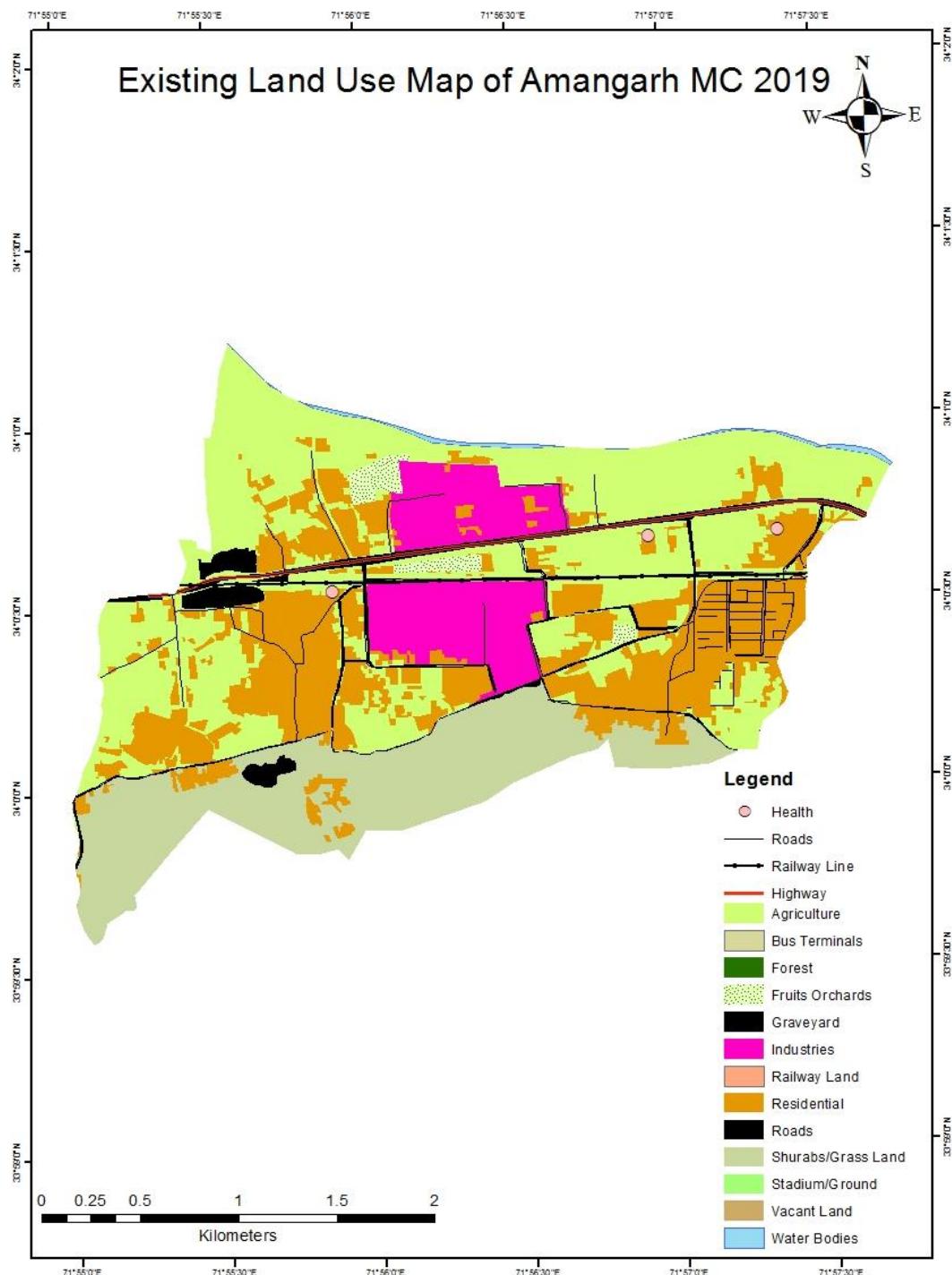
Map 2-3: Amangarh MC Land use

Map 2.3 represents the land use of Amangarh MC. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

2.4.3 Risalpur Cantt

The total area of Risalpur Cantt is 14.76 sq. km or 3647.27 acres. 52% is residential, 13% is agriculture, 30% is open space/shrubs/range land, 3% is other facilities like education, health, and recreational facilities and 2% is a graveyard.

Table 2-9: Risalpur Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	7.68	1896.58	52
Agriculture	1.92	474.15	13
Shrubs/Open area	4.43	1094.18	30
Industrial	0	0	0
Facilities	0.44	109.42	3
Graveyard	0.3	72.95	2
Total	14.76	3647.27	100
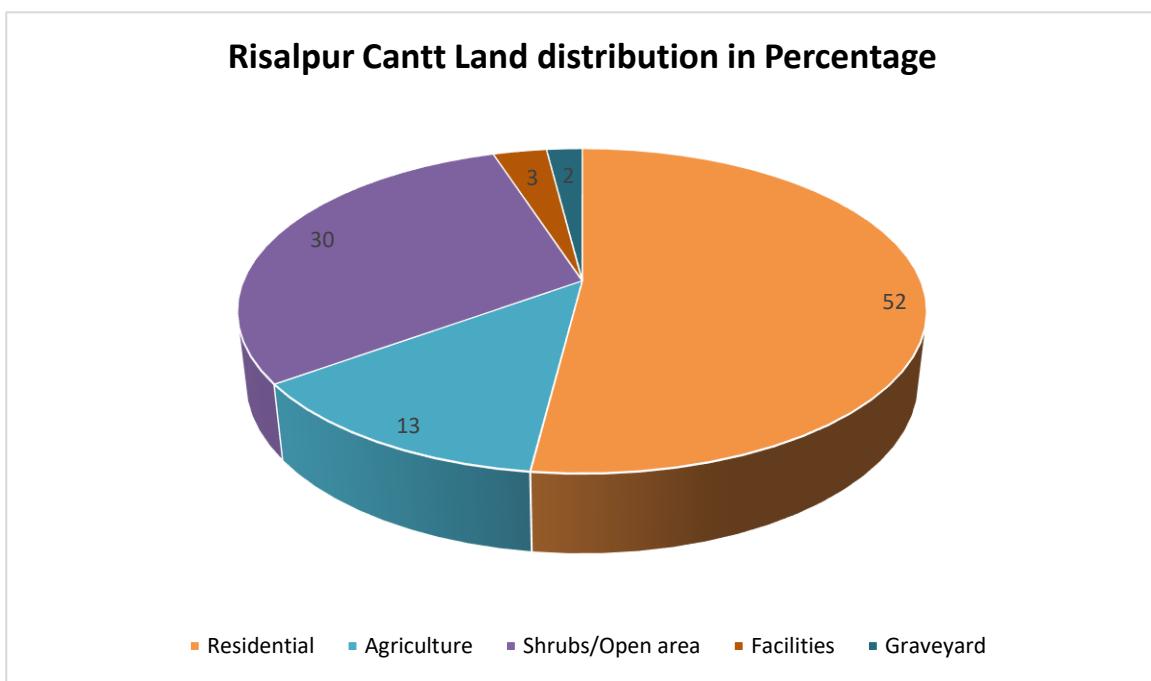
Figure 2-6: Risalpur Cantt Land use Distribution
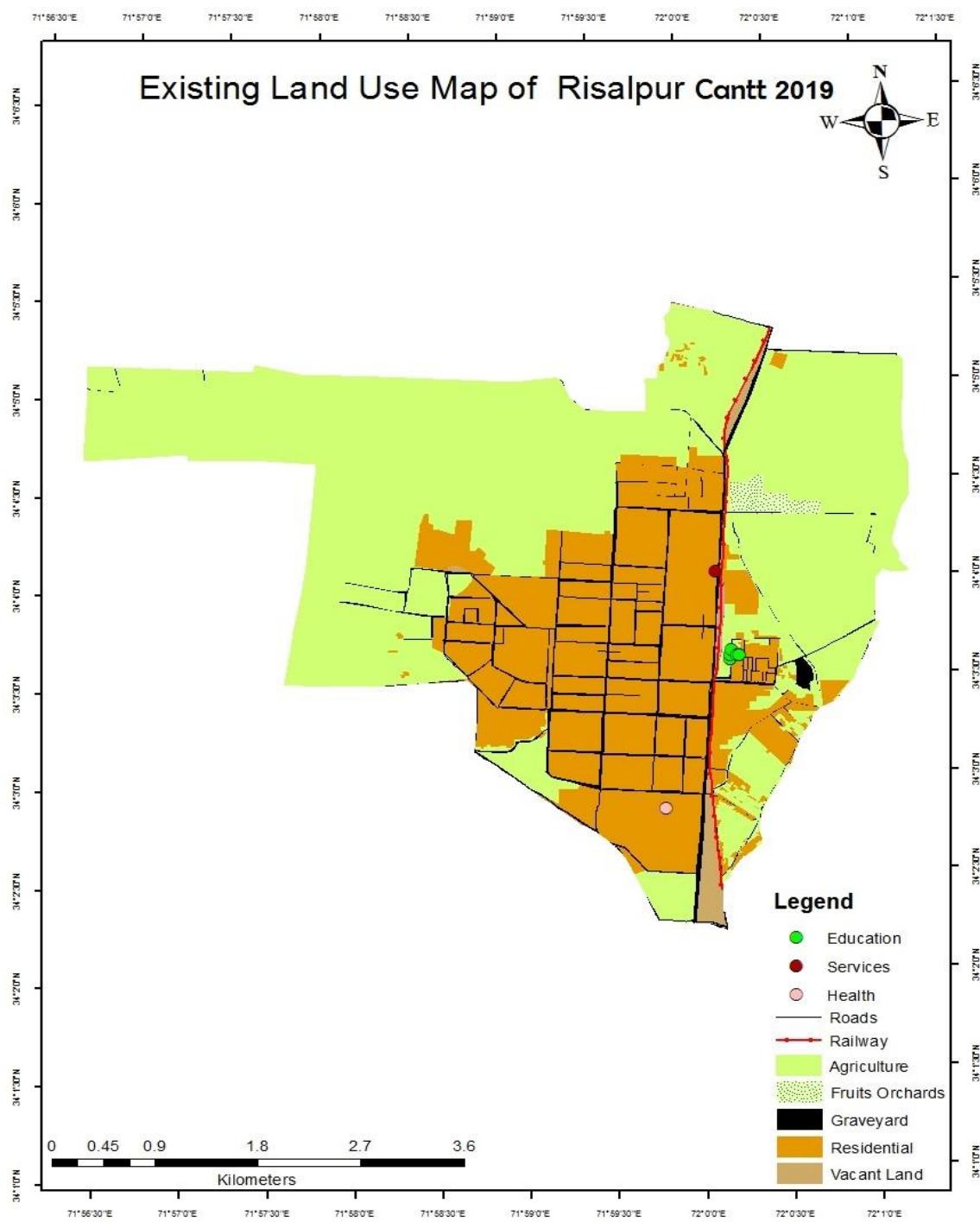
Map 2-4: Risalpur Cantt

Map 2.4 represents the land use of Risalpur Cantt. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

2.4.4 Jahangira MC

The total area of Jahangira MC is 1.35 sq. km or 333.59 acres. 36% is residential, 53% is agriculture, 10% is open space/shrubs/rangeland and 2% is water bodies.

Table 2-10: Jahangira MC Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	0.49	120.09	36
Agriculture	0.72	176.8	53
Shrubs/Open area	0.14	33.36	10
Industrial	0	0	0
Water	0.03	6.67	2
Graveyard	0	0	0
Total	1.35	333.59	100
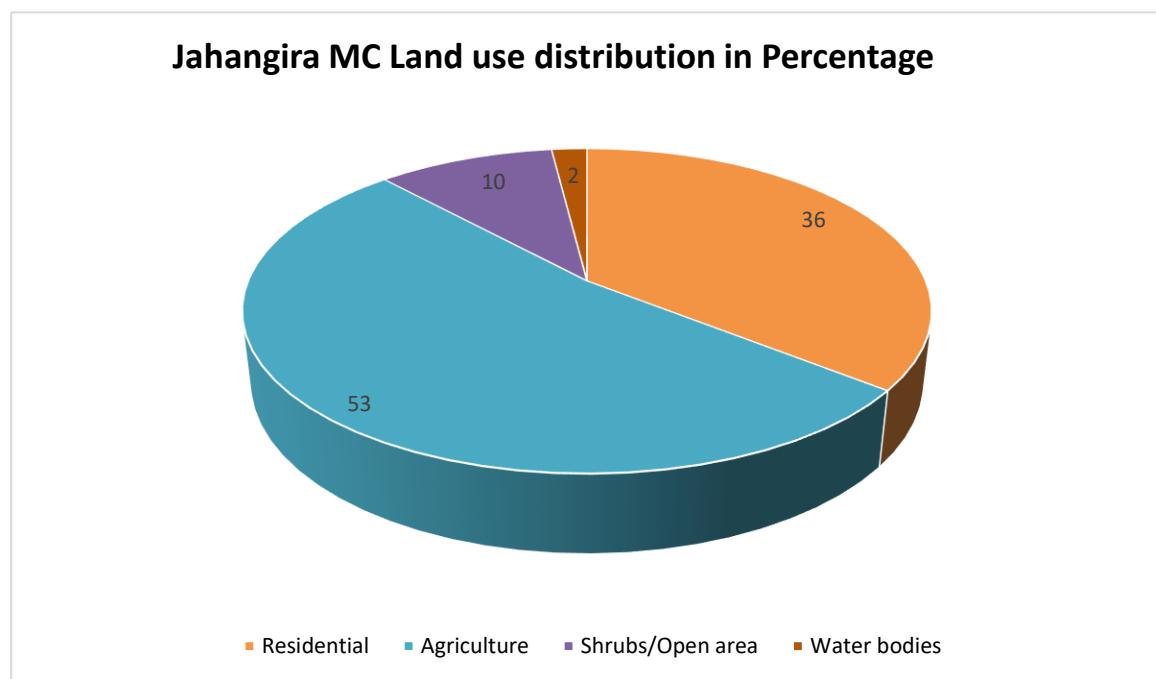
Figure 2-7: Jehangira MC Land use distribution
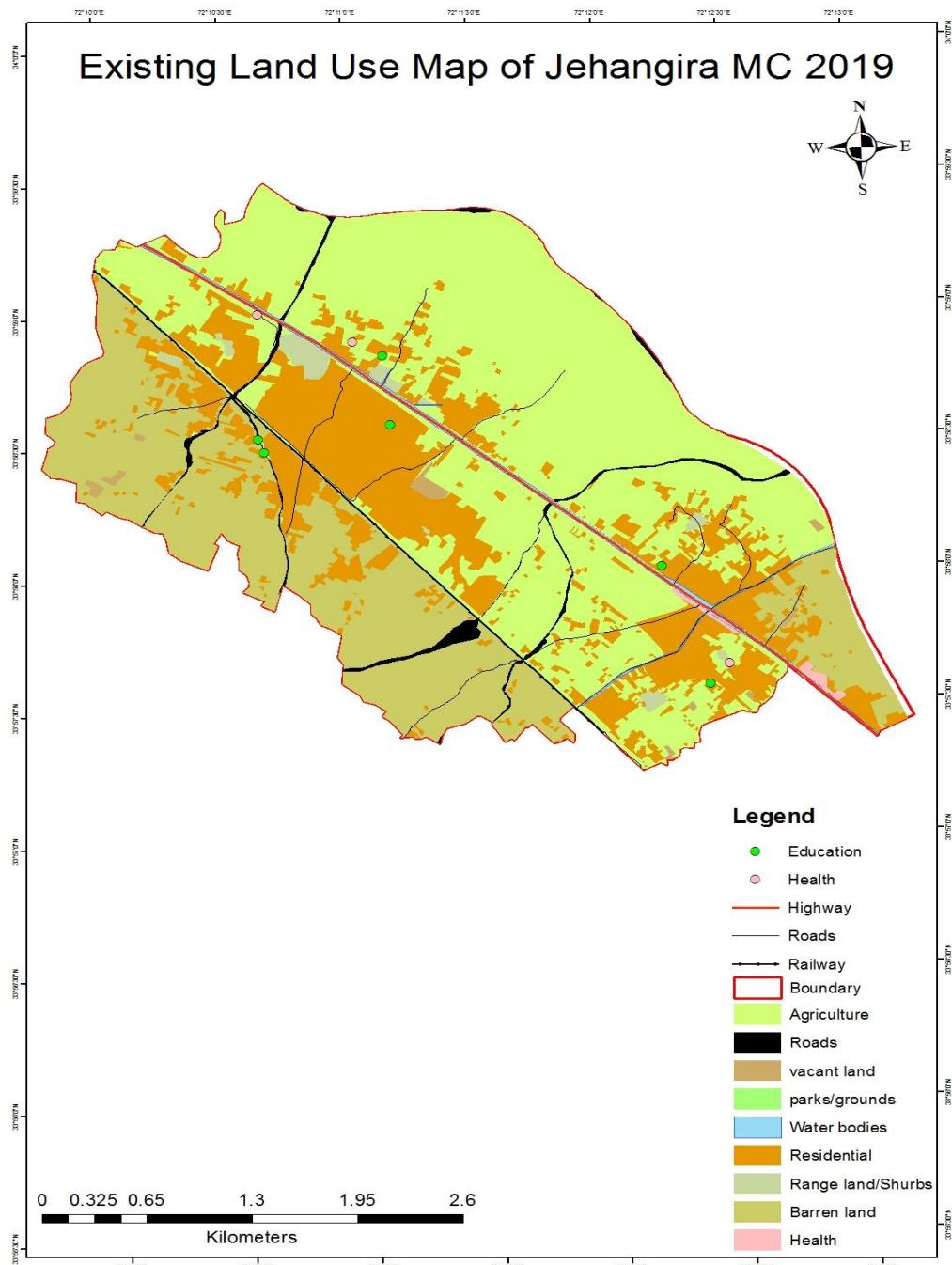
Map 2-5: Jahangira MC Land use

Map 2.5 represents the land use of Jahangira MC. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

2.4.5 Nowshera MC

The total area of Nowshera MC is 20.78 sq. km or 5134.84 acres. 76% is residential, 15% is agriculture, 2% is open area/shrubs/range land, 1% is water bodies and 4% is graveyard.

Table 2-11: Nowshera MC Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	15.79	3902.48	76
Agriculture	3.12	770.23	15
Shrubs/Open area	0.42	102.7	2
Industrial	0	0	0
Water Bodies	0.21	51.35	1
Graveyard	0.83	205.39	4
Total	20.78	5134.84	100
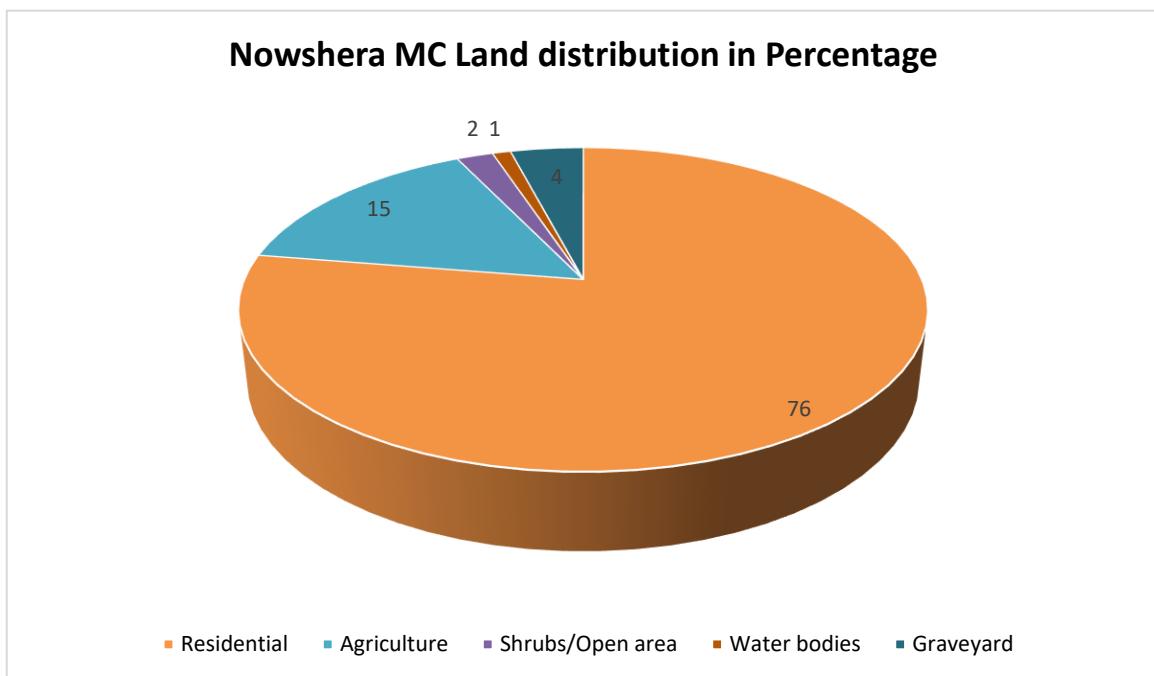
Figure 2-8: Nowshera MC Land use distribution
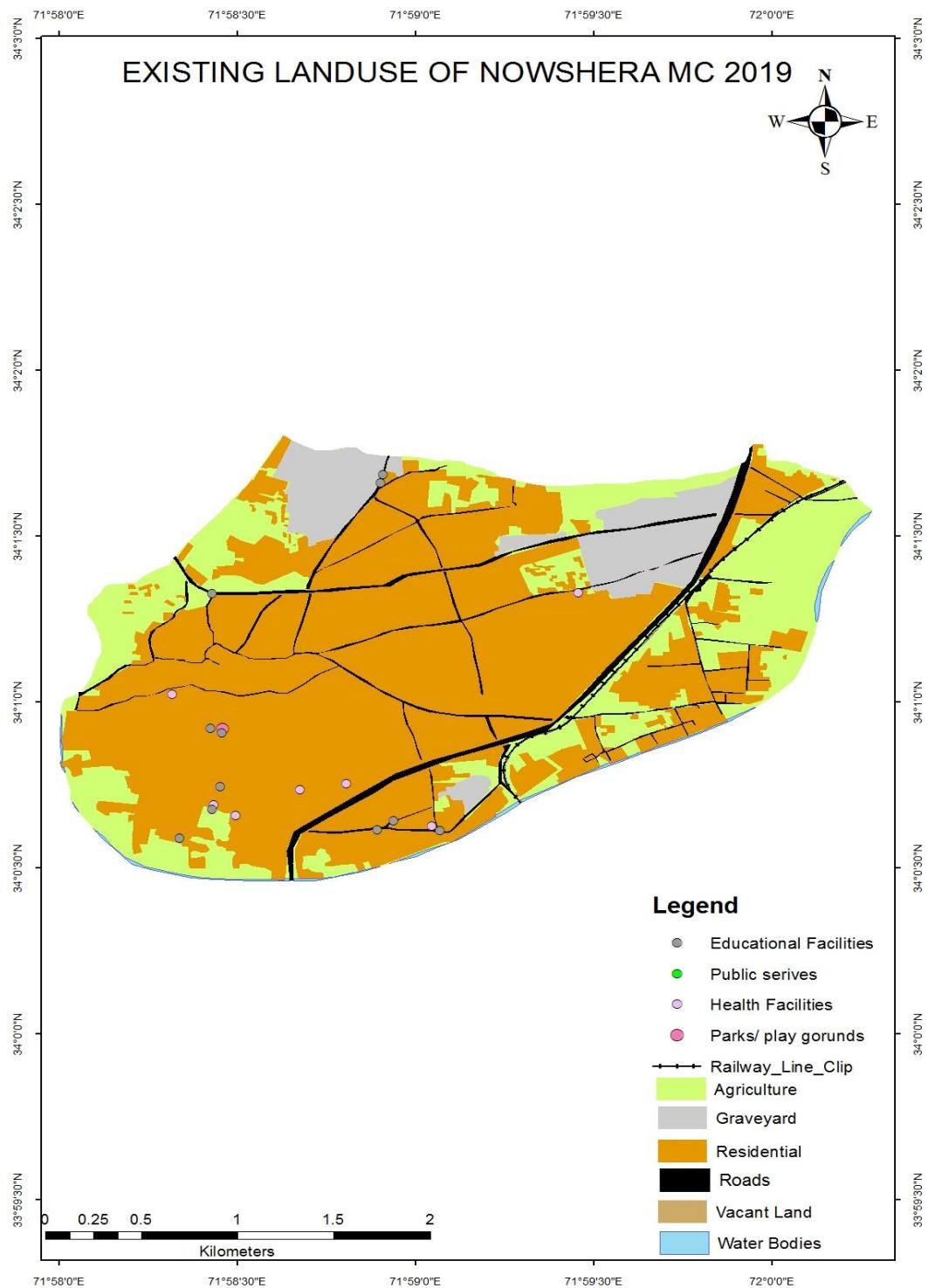
Map 2-6: Nowshera MC Land use

Map 2.6 represents the land use of Nowshera MC. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

2.4.6 Nowshera Cantt

The total area of Nowshera Cantt is 4.47 sq. km or 1104.56 acres. 53% is residential, 13% is agriculture, 23% open area/shrubs/range land, 4% water bodies and 2% is graveyard.

Table 2-12: Nowshera Cantt Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	2.37	585.42	53
Agriculture	0.58	143.59	13
Shrubs/Open area	1.03	254.05	23
Industrial	0	0	0
Water	0.18	44.18	4
Graveyard	0.09	22.09	2
Total	4.47	1104.56	100
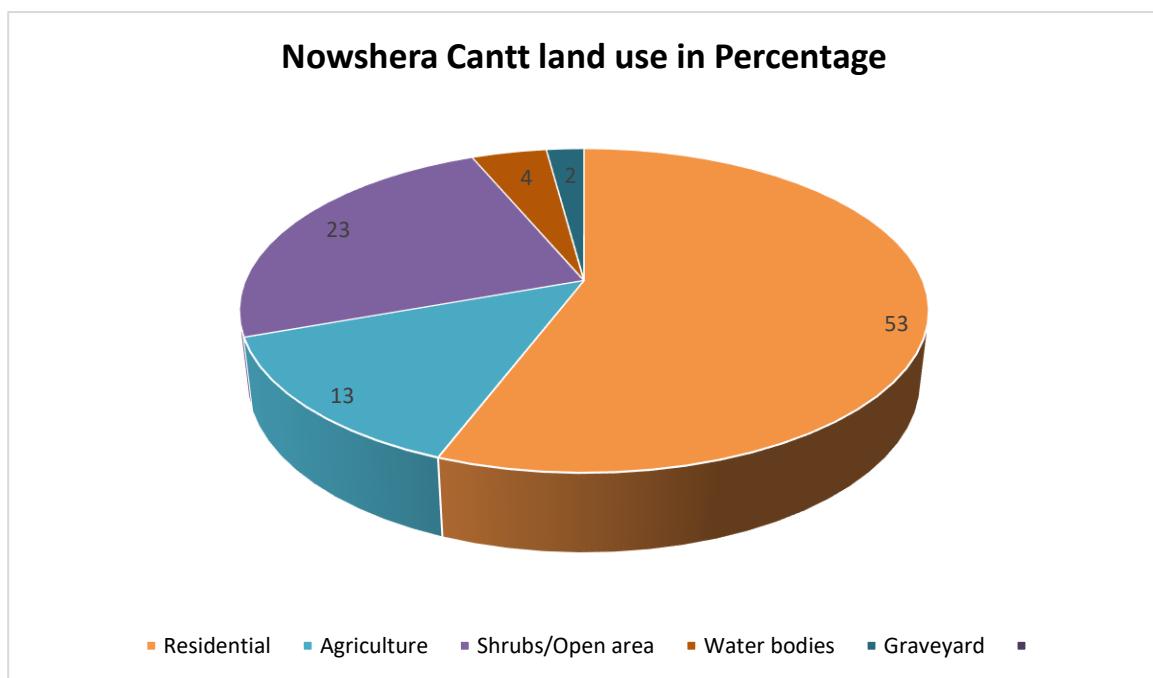
Figure 2-9: Nowshera Cantt Land use distribution

EXISTING LANDUSE OF NOWSHERA CANTT 2019

Legend

- ⦾ Public facilities
- ● Educational facilities
- ● Health facilities
- ▇ Agriculture
- ▇ Graveyard
- ▇ Residential
- ▇ Roads
- ▇ Shurabs/Grass Land
- ▇ Vacant Land
- ▇ Water Bodies

0 0.375 0.75 1.5 2.25 3
Kilometers
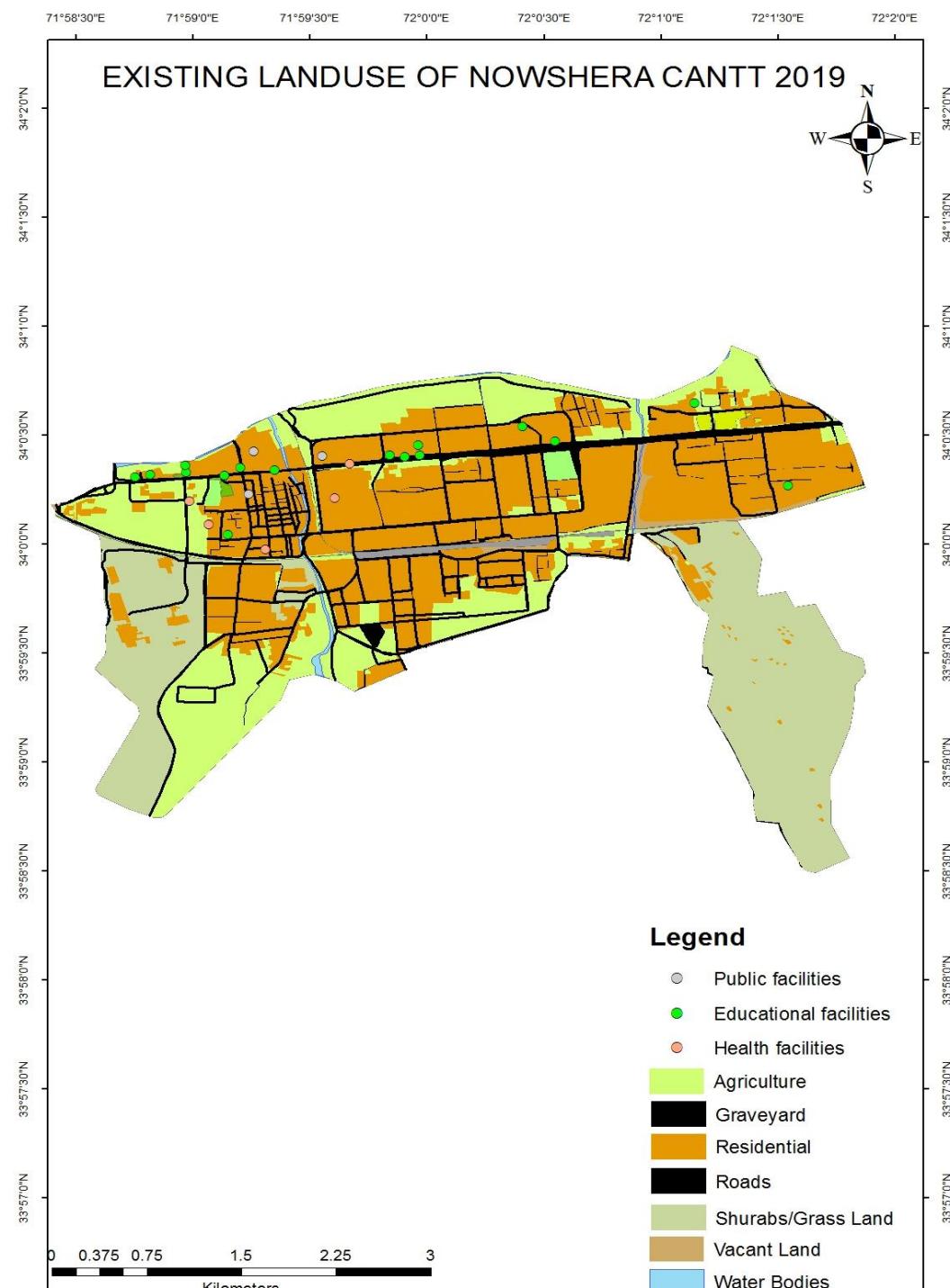
Map 2-7: Nowshera Cantt Land use

Map 2.7 represents the land use of Nowshera Cantt. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

2.4.7 Cherat Cantt

Total area of Cherat Cantt is 0.81 sq.km or 200.15 acres. 14% residential, 2% is agriculture, 8% open area/shrubs/range land, 1% is water bodies and 75% is forest.

Table 2-13: Cherat Cantt Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	0.11	28.02	14
Agriculture	0.02	4	2
Shrubs/Open area	0.06	16.01	8
Industrial	0	0	0
Water	0.01	2	1
Forest	0.61	150.11	75
Total	0.81	200.15	100
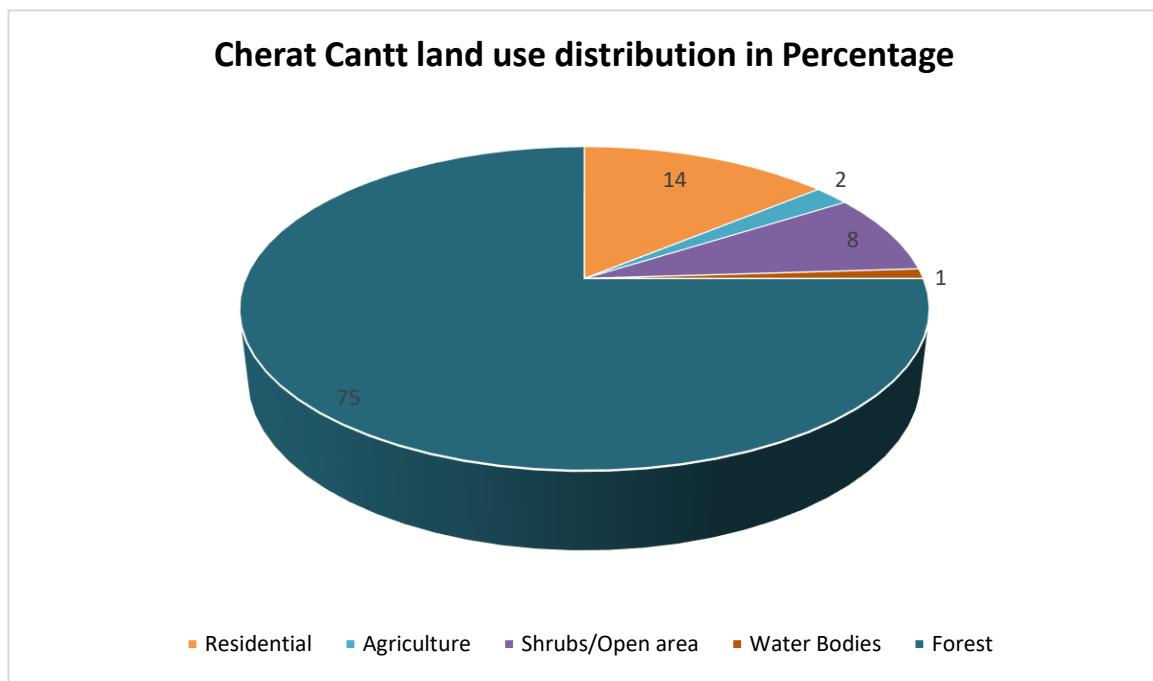
Figure 2-10: Cherat Cantt Land use distribution
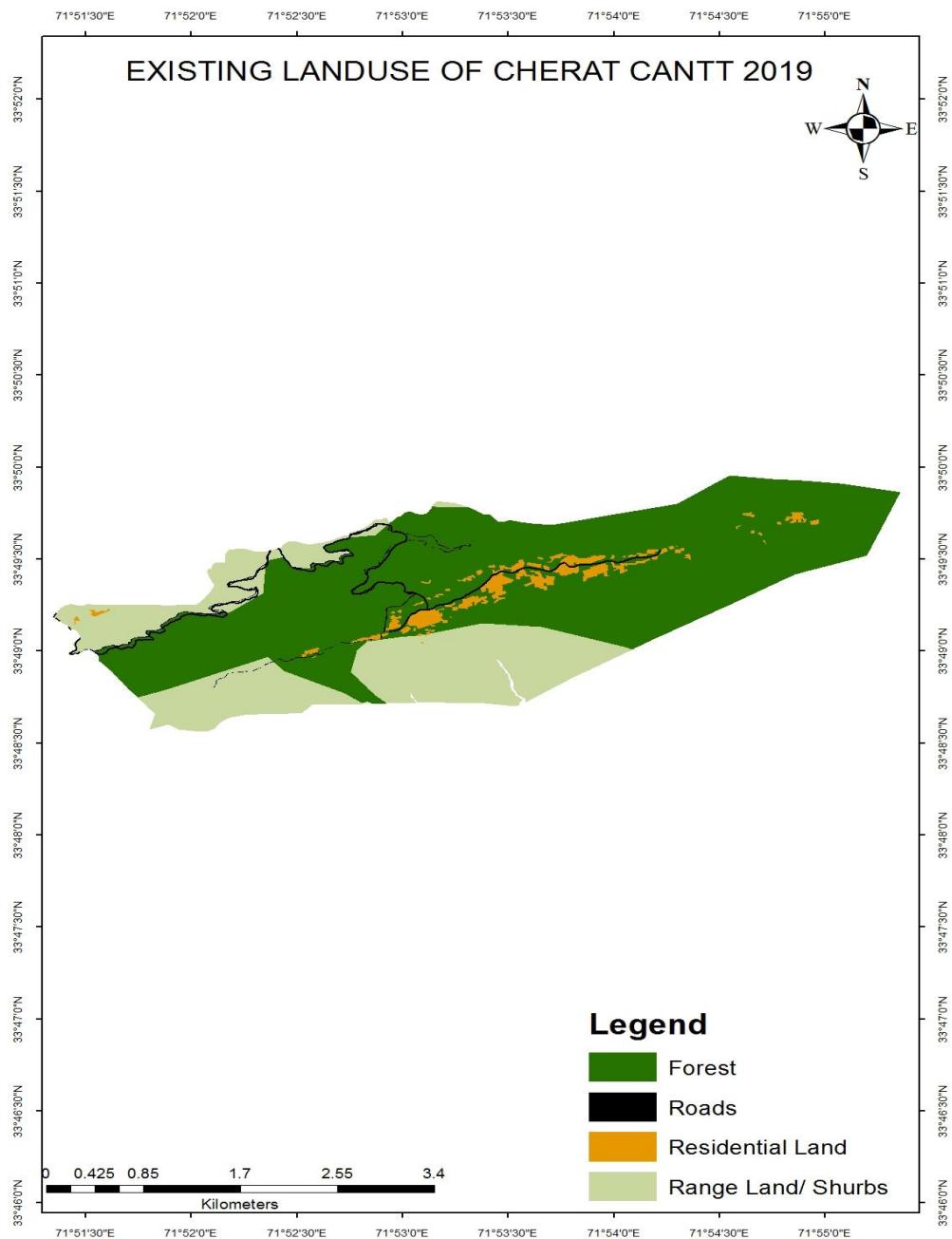
Map 2-8: Cherat Cantt Land use

Map 2.7 represents the land use of Cherat Cantt. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, forest, range land etc.

2.4.8 Akora Khattak MC

The total area of Akora Khattak MC is 2.65 sq. km or 654.96 acres. 48% is residential, 32% is agriculture, 11% is open space/shrubs/range land 5% water bodies and 4% is graveyard.

Table 2-14: Akora Khattak MC Land use distribution

Land Use	Km. sq.	Acres	Percentage
Residential	1.27	314.38	48
Agriculture	0.85	209.59	32
Shrubs/Open area	0.29	72.05	11
Industrial	0	0	0
Water	0.13	32.75	5
Graveyard	0.11	26.2	4
Total	2.65	654.96	100
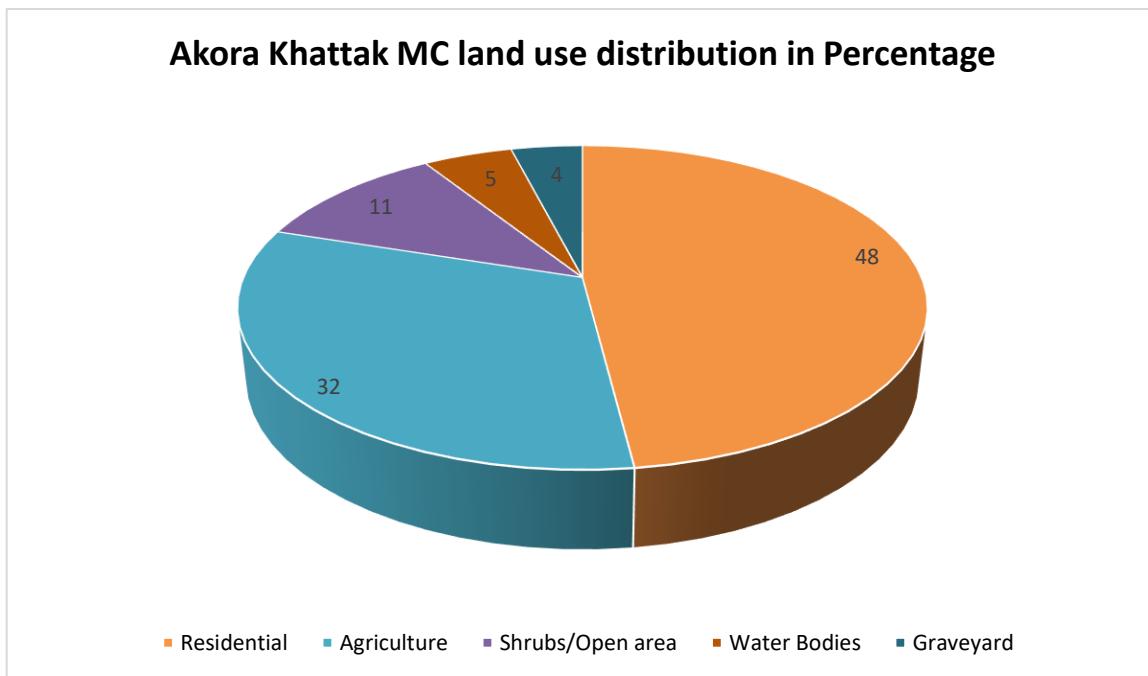
Figure 2-11: Akora Khattak MC Land use distribution.
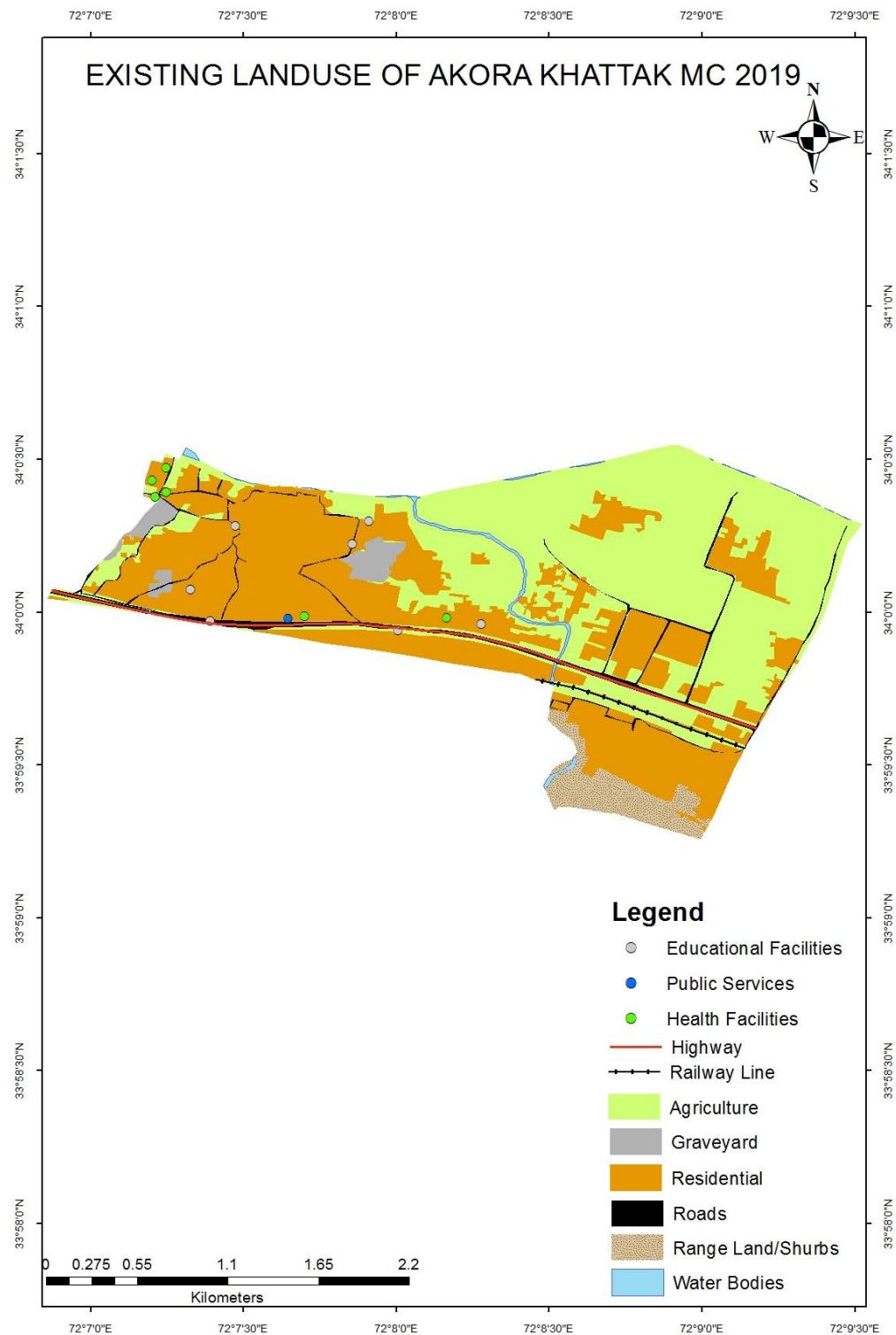
Map 2-9: Akora Khattak MC Land use

Map 2.9 represents the land use of Akora Khattak MC. And represents all physical features of land use with their relative location to each other. Such as agriculture, residential, bus terminals, railways, water bodies etc.

CHAPTER. 3   POPULATION - CURRENT AND FORECASTS

3.1   PAST GROWTH TRENDS: PROVINCE VS DISTRICT NOWSHERA

Inter-census growth rates of the Province and District Nowshera (from 1951 to 2017) are given in Table 3.1. It is clear from the Table that since 1961, the population growth rate in the Province has been declining. It was 3.6% during the period 1961-72, reduced to 3.3% during 1972-81, and further declined to 2.8% during 1981-1998 while a slight increase occurs of .09 from 1998 to 2017.

In the case of District Nowshera, the growth rate increased from 2.2% in 1951/61 to 3.4% during 1961/1972. But since then, the growth rate has been constantly declining up to 1998 and then a

Table 3-1: Past Growth Trends		
Inter-Censual Period	Average Annual Growth Rate (%)	
	Province[29]	District[30]
1951-1961	2.3%	2.2%
1961-1972	3.6%	3.4%
1972-1981	3.3%	3.2%
1981-1998	2.8%	2.9%
1998-2017	2.8%	3.2%

slight increase occurs between 1998-2017 as seen in Table 3.1. It is worth noting that there is not a significant difference between the growth rates of the Province and the District.
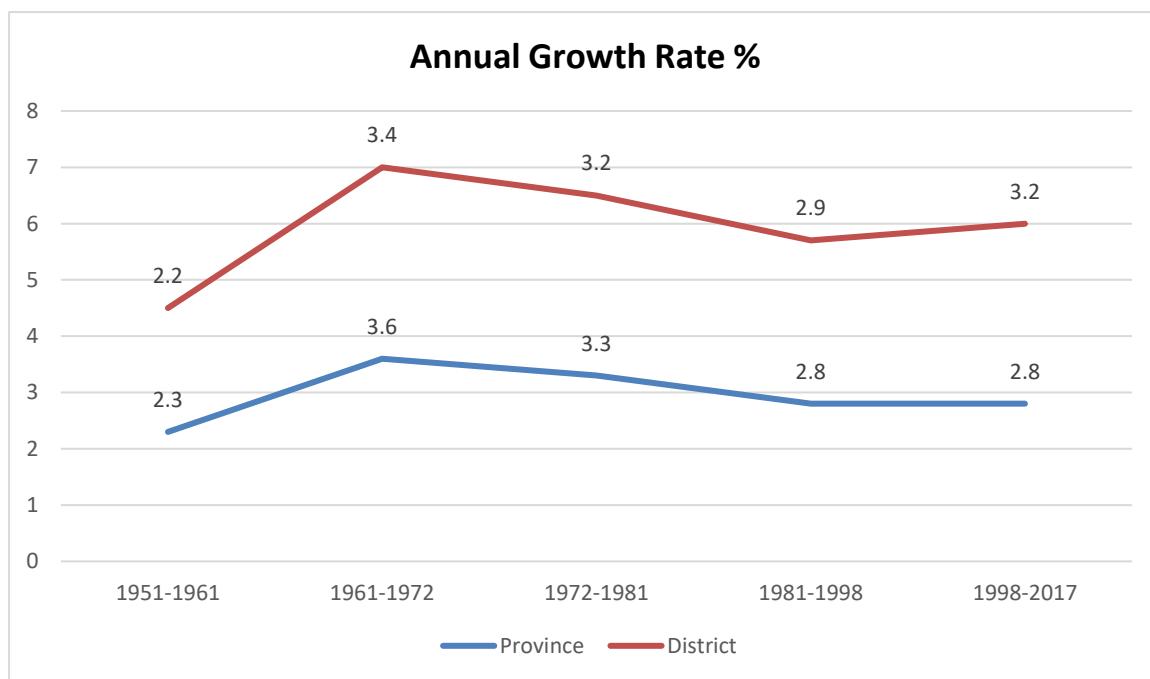
Figure 3-1: Population Distribution and Growth Trend

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[29] Source: Pakistan Bureau of Statistics, Govt. of Pakistan, Hand Book of Population and Housing, 1998 Census, Pakistan, Page 1, Table 1.

[30] Pakistan Bureau of Statistics, Govt. of Pakistan, District Census Report Nowshera, 1998, Page 19, Table 2.1.

3.2 MIGRATION

There are two main causes of population growth:

- Conventional Migration
- Transient Migration

3.2.1 Conventional Migration

Estimates of the magnitude of migration during 1998-2017 of District Nowshera have been made by the following method:

The national rate of growth during 1998-2017 was used to estimate the expected population in the District Nowshera in 2017. When these figures are compared with the actual population as

Table 3-2: District Population – Migration Vs Natural increase		
2017 Census	1518540	(i)
2017 (using National G.R@2.4% during 1998-2017)	1371546	(ii)
1998 Census	874,000	(iii)
Additional Population (1998-2017)	644540	(i)-(iii)=(iv)
Migration Component	146994	(i)-(ii)=(v)
Natural Increase	497546	(iv)-(v)

recorded in the 2017 census, the difference is 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 fairly robust assumption.

The overall national growth rate during the period 1998-2017 was 2.4%. Using this growth rate, the population of District Nowshera in 2017 is calculated to be 1371546. The actual 2017 census population of the District was 1518540, implying a net in-migration of 146994. The additional population during 1998-2017 was 497546, of which, as already stated, the migration component was 146994 (about 22%) and 497546 (78%) were caused by natural increase (Table 3.2).

3.2.2 Transient Migration

Transient migration is a temporary migration that is made for a number of reasons. Transient migration in the context of District Nowshera refers to migration because of factors such as natural disasters and disturbances resulting from armed conflicts. These are described in the sections below:

Afghan Refugees

UNCHR conducted a census of Afghan refugees in April 2011 and reported that there are 39,325 families (204,589 persons) living in camps in Peshawar II, which includes camps in District Nowshera and District Charsadda. There are no separate figures available for District Nowshera.

IDPs due to Border Disturbances

There are 5,350 camp-based IDP families [32](27,888 persons) in the Jalozai area of District Nowshera. Besides, 300 IDPs families are living outside camps in District (Table 3.3)

Flood Affectees/Earthquake Impact

At present, there are no displaced persons living in Nowshera due to the flood effect or earthquake of 2005.

Table 3-3: Transient Population		
Transient Population	**Number of Persons**	**Number of Families**
Afghan Refugees	204,589[31]	39,325
Internally Displaced Persons (Camp-based)	27,888	5,350
Internally Displaced Persons (Outside Camps)	NA	300
Affectees of Flood/Earthquake	--	--
Total		44,975

The summary of the transient population in District Nowshera is given in Table 3.3.

3.3   POPULATION FORECASTS

An estimated number of future populations has been derived for the next 20 years using different forecasting models. These include:

- Regression Analysis
- Extrapolation
- Cohort-Survival Method

The estimates under the three forecasting models have been averaged to avoid uncertainty with growth rate and achieve more accuracy. The estimates under the three forecasting models and the recommended population for different years are presented in Table 3.4.

Table 3-4: Population Forecasts for Plan Period (2019-2039)			
YEAR	**URBAN**	**RURAL**	**DISTRICT**
2017	338,650	1,179,890	1,518,540
2019	341,470	1,263,201	1,604,671
2024	349,729	1,508,066	1,857,795
2029	362,083	1,891,258	2,253,341
2034	374,599	2,314,446	2,689,045
2039	389,324	2,872,407	3,261,990

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[31] Includes those living in District Nowshera, Charsadda and Peshawar II. There are no separate figures available for District Nowshera.

[32] Source: Chief Coordinating Officer, Provincial Disaster Management Authority, Peshawar.

3.4 POPULATION DENSITY

Even more alarming than the population growth trends in District Nowshera are its spiralling population density figures, which highlight the demographic dilemma that confronts the district. As of Census 2017, the population density in Peshawar was 869.73 persons/ sq. km, compared to 409.59 persons/sq. km in the Province. The current population density of District Nowshera is 918.15 persons/sq. km, it is estimated to double up to 1865.98 persons/sq. km at the end of the plan period. It is represented in Table 3-5

Table 3-5: Population Density (sq. Km) of District Peshawar and Khyber Pakhtunkhwa[33]

Year	Population Density (Persons/sq. Km)	
	Province	District
2017	409.59	868.73
2019	432.85	918.15
2024	470.24	1062.86
2029	496.94	1289.10
2034	539.86	1538.36
2039	570.52	1865.98
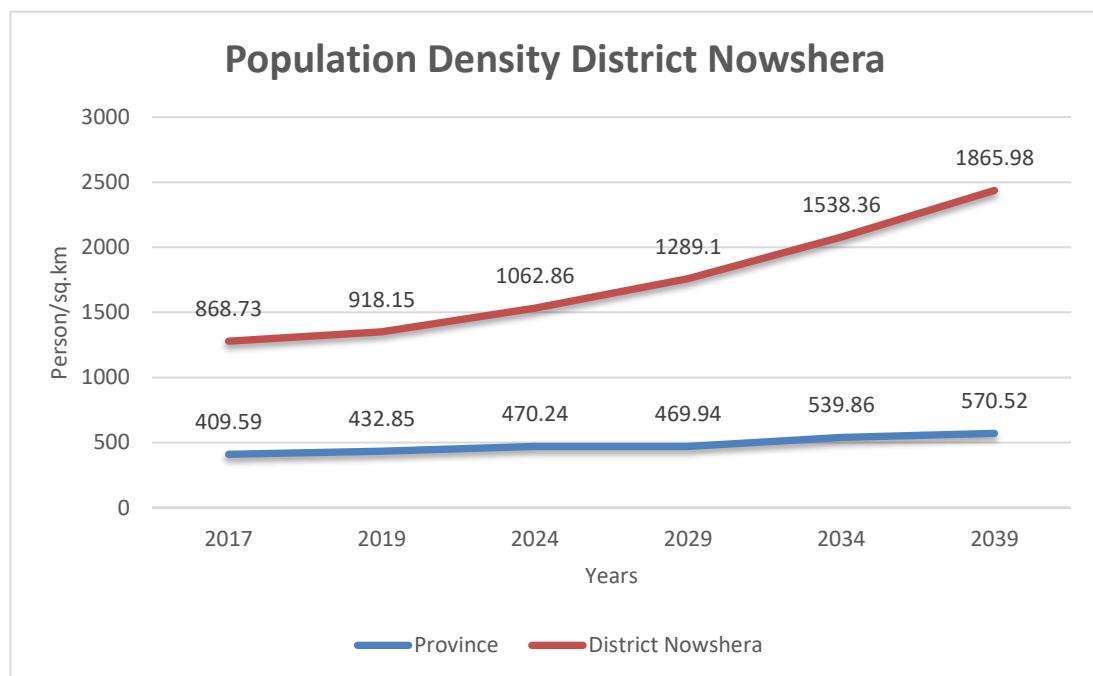
Figure 3-2: Population density person/sq.km

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[33] Density is calculated from population forecasts for plan period (2019-2039).
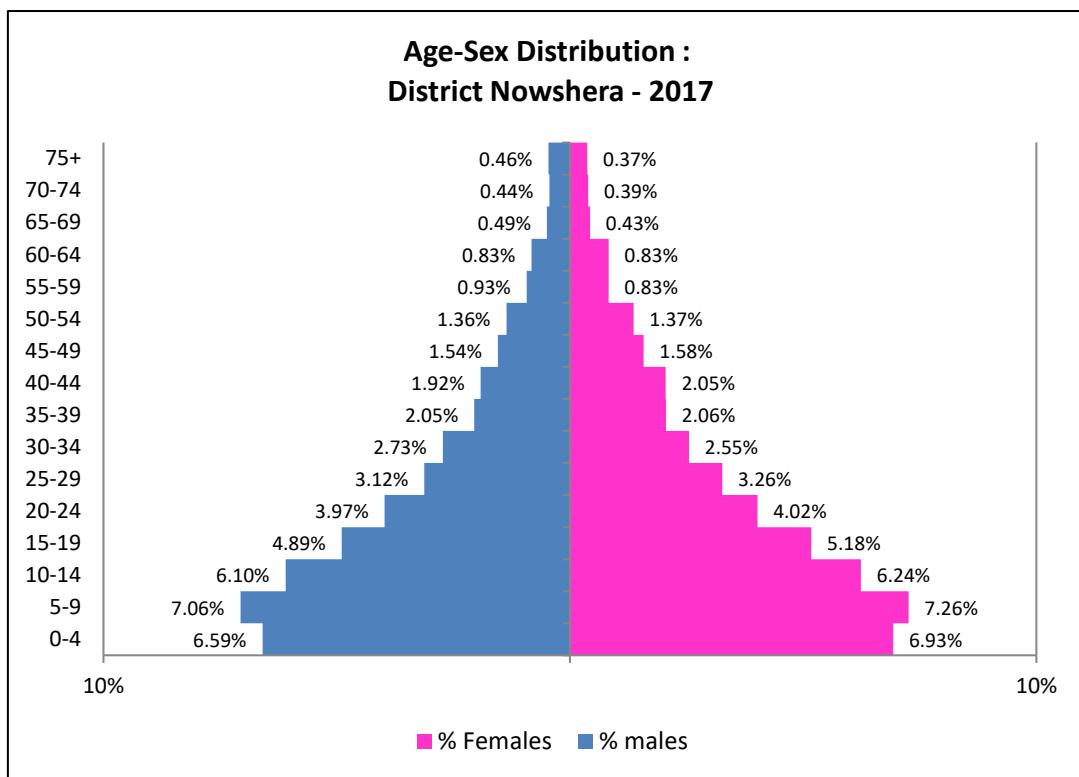
Figure 3-3: Age-Sex Distribution

CHAPTER. 4 REGIONAL PLANNING CONTEXTS

Regional planning deals with the efficient placement of land-use activities, infrastructure, and settlement growth across a larger area of land than an individual city or town as against urban planning which deals with the specific issues of city planning. A 'region' in planning terms can be administrative or at least partially functional and is likely to include a network of settlements and character areas. In the context of this Project, Regional Plan encompasses the entire Peshawar Valley comprising five Districts i.e. Peshawar, Mardan, Nowshera, Charsadda and Swabi.

Regions require various Land Uses; protection of farmland, cities, industrial space, transportation hubs and infrastructure. Regional planning is the science of efficient placement of infrastructure and zoning for the sustainable growth of a region. Regional planning can address region-wide environmental, social, and economic issues which may necessarily require a regional focus.

Regional Plans direct certain levels of development to specific cities and towns to support and manage the region depending on specific needs.

The essential components of regional planning include the following:

- Hierarchy of Settlements
- Growth Trends and Areas of Influence of urban settlements falling in the Region.
- Parameters for reducing migration to urban areas.
- Emerging development corridors, new towns, and planning for rural areas.

All these aspects in the context of the Peshawar Region are discussed below:

4.1 HIERARCHY OF SETTLEMENTS

4.1.1 Objectives of Hierarchy of Settlements

The overall objective of establishing a hierarchy of settlements is to describe and understand the existing structure of the network of settlements (cities and towns) in Peshawar Valley as a key consideration in the formulation of development strategies and projects. The structure is determined by the functions and roles of the settlements.

The major objectives of the Settlement Hierarchy are as below:

- Accommodate and promote the development of linkages and infrastructure servicing of these Towns.
- Accommodate and promote proper planning and sustainable development in their environs
- Promote the role of these towns as economic, social and cultural centres for the surrounding areas
- Promote growth in smaller towns to allow for balanced and coordinated development throughout Peshawar Valley.
- Promote linkages between larger and smaller towns to distribute the resulting influence throughout the region.

- Promote the strengthening of towns as employment and service centers and as attractive residential centers

4.1.2 Hierarchy of Settlements and Land Use Planning

For Land Use planning, it is important to determine the hierarchy of settlements. It helps to achieve the objectives of the project to set out a clear order of preference for the location of different developments. The larger cities having higher threshold populations will need higher order services to serve their own as well as their threshold populations; and vice versa. Peshawar for example, being the provincial headquarter and the most populous city of the province, has or needs higher order facilities than Nowshera. District Nowshera town needs higher order facilities than its smaller urban centers such as Rabbi or; Jahangira and such smaller urban centers need more facilities than the surrounding villages.

The hierarchy of settlements in the case of Peshawar Valley has been determined on basis of the following criteria:

- Population
- Location (e.g. lying within Peshawar Valley Development Corridor or not)
- Number of beds per thousand population
- Number of universities
- Availability of airport
- The administrative status of settlement (i.e. District or Tehsil headquarter).

Scoring for each of the above was done as below:

The score for each District was then added, and based on the aggregate score, the ranking was done, as shown in Table 4.1.

Table 4-1: Criteria-wise Score		
Sr.	Criteria	Score
1.	Settlement Population	1 for every 100,000 population
2.	Location with respect to Peshawar Valley Development Corridor	Inside: 2 Outside: 0
3.	Number of hospital beds per thousand population	< 0.3 beds/1000 population: 1 0.3 to 1 bed/thousand population: 3 > 1 bed/1000 population: 5.
4.	Number of universities	One score per university. If the number of universities exceeds 10, they get a maximum score of 10.
5.	Availability of airport	Airport available: 3 Airport not available: 0
6.	The administrative status of settlement (i.e. District or Tehsil headquarter).	District Headquarters: 2 Tehsil Headquarters: 1

The result of this exercise is given in the table below:

Table 4- 2: Score-wise Settlements Ranking

| Settlements | Population Score | | Location (inside/Outside PVDC) | Number of Hospital Beds/1000 Population | Number of Universities | Airport | Administrative Status (DHQ/THQ) | Total Score | Hierarchy |
	Population (2019)	Score							
Peshawar	1928475	19.28	2	2.83	15	1	2	42.11	1
Mardan	457049	4.57	2	1.02	4	0	2	13.59	2
Swabi	155185	1.55	2	1.09	3	0	2	10.64	3
Takht Bhai	155538	1.55	2	0.86	0	0	1	5.42	8
Charsadda	132737	1.32	2	1.66	1	0	2	7.99	5
Nowshera	122070	1.22	2	1.01	3	0	2	9.23	4
Shabqadar	111759	1.11	2	1.03	0	0	1	5.15	10
Pabbi	84357	0.84	2	1.37	0	0	1	5.21	9
Jahangira	59907	0.59	2	0	0	0	1	3.6	12
Topi	56002	0.56	2	0.94	1	0	1	5.5	7
Risalpur Cantt	53449	0.53	2	0	0	0	0	2.53	14
Aman Garh Industrial Area	57630	0.57	2	0	0	0	0	2.58	13
Tordher TC	51227	0.51	0	0	0	0	0	0.51	17
Zaida MC	41657	0.41	0	0	0	0	0	0.42	18
Tangi	35665	0.35	2	2.35	0	0	1	5.71	6
Utmanzai	35293	0.35	2	0	0	0	0	2.35	15
Akora Khattak	30225	0.30	2	1.73	0	0	0	4.03	11
Nawan Killi	30087	0.30	2	0	0	0	0	2.3	16
Cherat Cantt	5875	0.05	0	0	0	0	0	0.06	19

4.1.3 Conclusions

Peshawar is a primate city in the Province. In other words, it is disproportionately larger than any other settlements in the urban hierarchy. The sheer size and activities of Peshawar become a strong pull factor, bringing additional residents to the city and causing the primate city to become even larger and more disproportional to smaller cities in the Province. Being a primate City, Peshawar is different from Mardan in terms of area of influence, services provided and population.

Figure 4-1: Hierarchy of Urban Settlements in Peshawar Valley

The above analysis indicates that Peshawar (the primate City) and Mardan (Category 1 settlement) have a greater area of influence than settlements lower in the hierarchy. Similarly, Category 2 settlements (Swabi, Takht Bhai, Charsadda, and Nowshera) have wider catchment areas than Category 3 settlements, and so on.

4.2 GROWTH TREND OF URBAN SETTLEMENTS

As per the Population Census of 2017, there were 21 urban settlements in the five Districts of Peshawar Valley. In 1981 however, there were 17 urban settlements in the valley, as four settlements in that year did not have urban status. These included University Town in District Peshawar, Topi MC, Zaida MC and Tordher MC in District Swabi. Since 1981, significant urbanization has taken place; existing urban settlements have grown and new urban settlements have sprung up. For example, in the context of Peshawar, newly urbanized (or to be urbanized) areas include Hayatabad Township, Regi Model Town and a number of private developments. However, these are relatively new developments and their populations cannot be compared in a time-series context.

Districts	Tehsil	Urban Settlements	Population (Census Year)		Growth Rate
			1998	2017	(1998-2017)
Peshawar	Town-I	Peshawar MC	910,807	1893361	3.93
		Peshawar Cantt	68,740	70741	0.15
	Town-II	--	--	--	--
	Town-III	Peshawar Univ. TC	3,269	5940	3.19
	Town-IV	--	--	--	--
Mardan	Mardan	Mardan MC	238,629	351733	2.06
		Mardan Cantt	7,297	6871	-0.32
	Takht Bhai	Takht Bhai MC	49,202	80721	2.64
Nowshera	Nowshera	Nowshera MC	56,576	83567	2.07
		Nowshera Cantt	33,237	36564	0.5
		Aman Garh Industrial Area TC	21,476	38624	3.14
		Risalpur Cantt	31,416	36653	0.81
	Pabbi	Cherat Cantt	2,527	2265	-0.57
		Pabbi MC	31,153	55255	3.06
	Jahangira	Jahangira MC	31,115	52839	2.83
		Akora Khattak MC	19,530	32883	2.78
Swabi	Swabi	Swabi MC	80,157	123412	2.3
		Zaida MC	22,656	31949	1.83
	Topi	Topi MC	30,458	52983	2.96
	Razzar	Nawan Killi TC	18,082	26161	1.96
	Lahor	Tordher TC	27,861	41420	2.11
Charsadda	Charsadda	Charsadda MC	87,218	114565	1.45
	Shabqadar	Shabqadar MC	55,439	91857	2.69
	Tangi	Utmanzai MC	24,848	30747	1.13
		Tangi MC	25,346	33012	1.4

Table 4-3: Urban Settlements Growth Rates
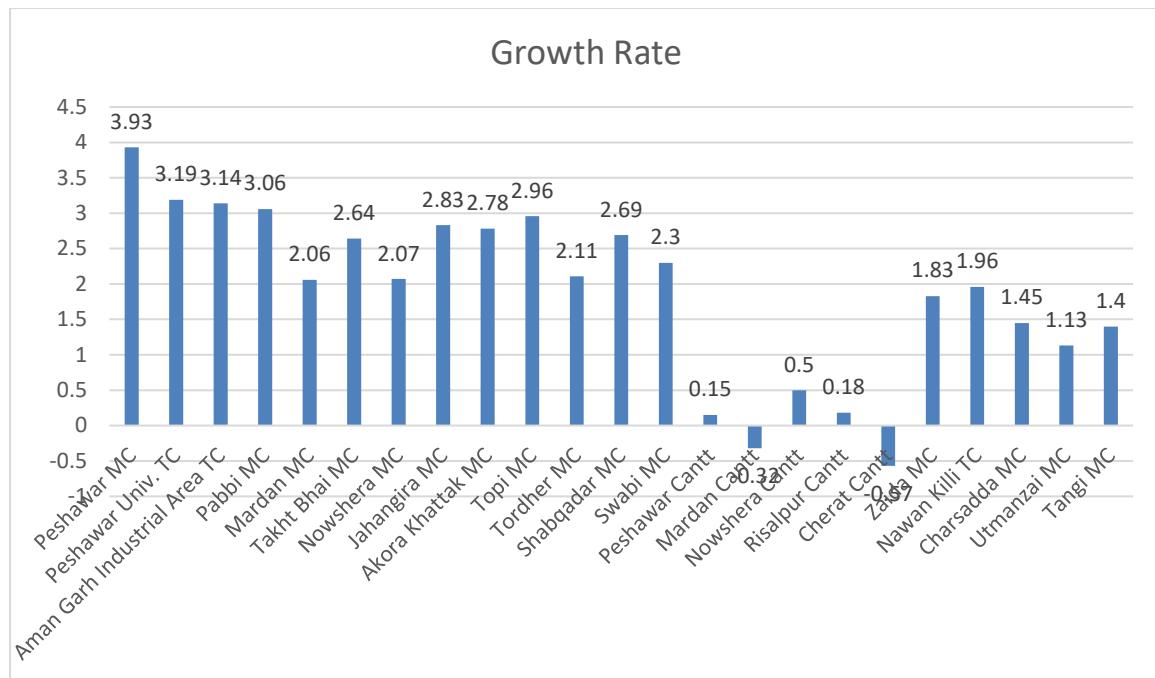
Figure 4- 2: Growth Rates of Urban Settlements in Peshawar Valley

Table 4-4: Growth rate of different Settlements in Peshawar valley		
Urban Settlements	Growth Rate (1998-2017)	Comments
Peshawar MC	3.93	**Above 3 and Below 4**
Peshawar Univ. TC	3.19	
Aman Garh Industrial Area TC	3.14	
Pabbi MC	3.06	
Mardan MC	2.06	**Above 2 and Below 3**
Takht Bhai MC	2.64	
Nowshera MC	2.07	
Jahangira MC	2.83	
Akora Khattak MC	2.78	
Topi MC	2.96	
Tordher MC	2.11	
Shabqadar MC	2.69	
Swabi MC	2.3	
Peshawar Cantt	0.15	**Below 2 and Above -1**
Mardan Cantt	-0.32	
Nowshera Cantt	0.5	
Risalpur Cantt	0.18	
Cherat Cantt	-0.57	
Zaida MC	1.83	
Nawan Killi TC	1.96	
Charsadda MC	1.45	
Utmanzai MC	1.13	
Tangi MC	1.4	
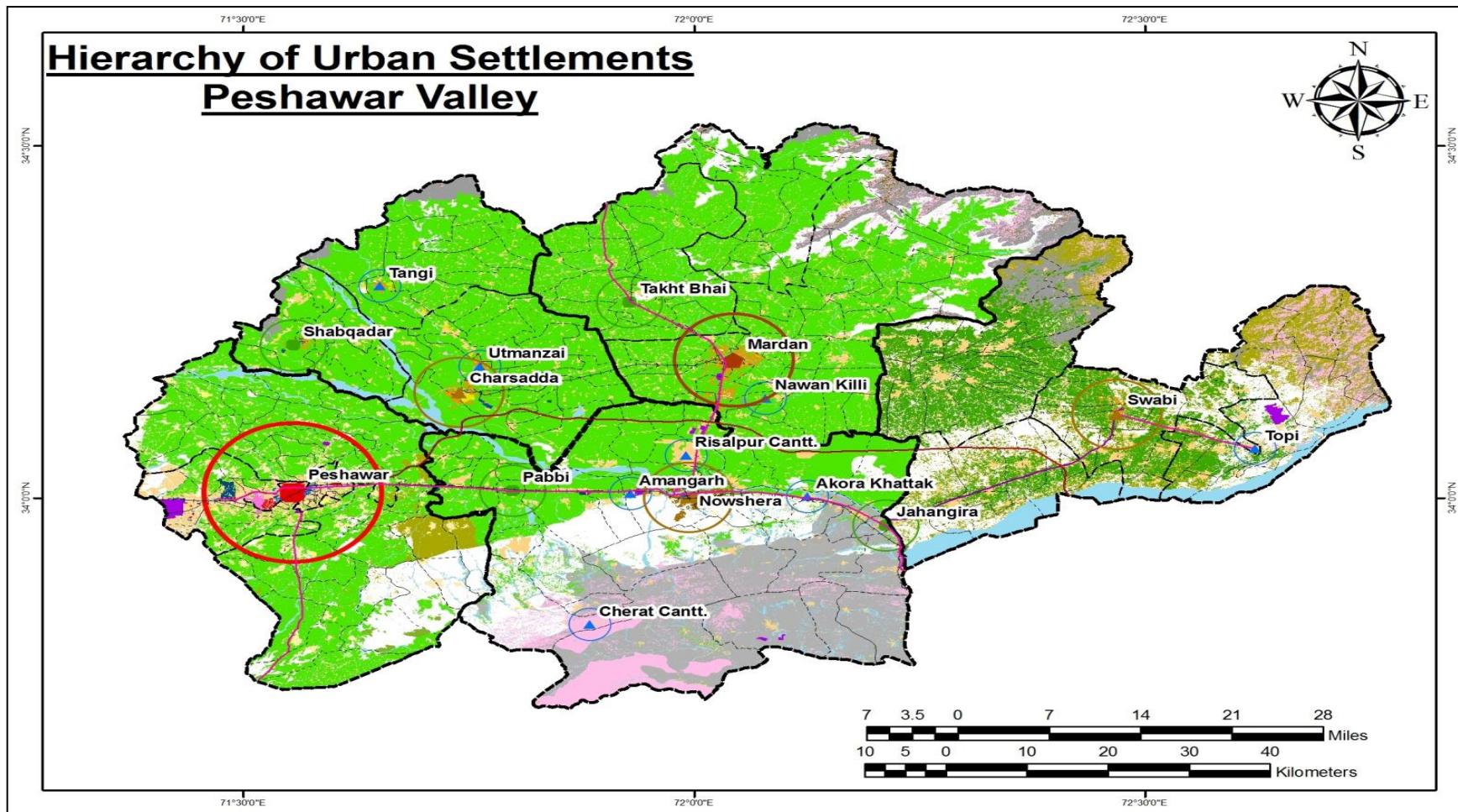
Map 4-1: Hierarchy of Urban Settlements-Peshawar Valley

Map 4.1 shows Peshawar Valley's urban settlement hierarchy. It indicates each settlement's size and proximity.

4.3 SPHERES OF INFLUENCE OF URBAN SETTLEMENTS

The sphere of influence of a settlement describes the area that is served by a settlement, for a particular function. Its sphere of influence for different functions may cover vastly different areas. For instance, a supermarket may attract people from a 20-mile radius, whilst a leisure activity, such as going to the city park, may attract them from far further away.

The larger a settlement, the greater its sphere of influence as it has a wider range of services and functions to attract people to go there. This is shown in the diagram below. A small village may only have a village store selling the daily newspaper and food such as bread and milk. People will only travel the shortest distance they need to buy these products. They are described as being convenience goods. In other words, something that can be bought easily and for the same price all over the place.

A larger town would have a wider sphere of influence because it would have shops and services that are more specialized, and so people would be willing to travel further to use them. The range of service describes the maximum distance that someone would be willing to travel to obtain that good or service. The threshold population of a good or service is the minimum number of people needed to allow that shop or service to be successful. The more specialist a shop is the larger its threshold population is. The same applies to settlements as given in the diagram below.
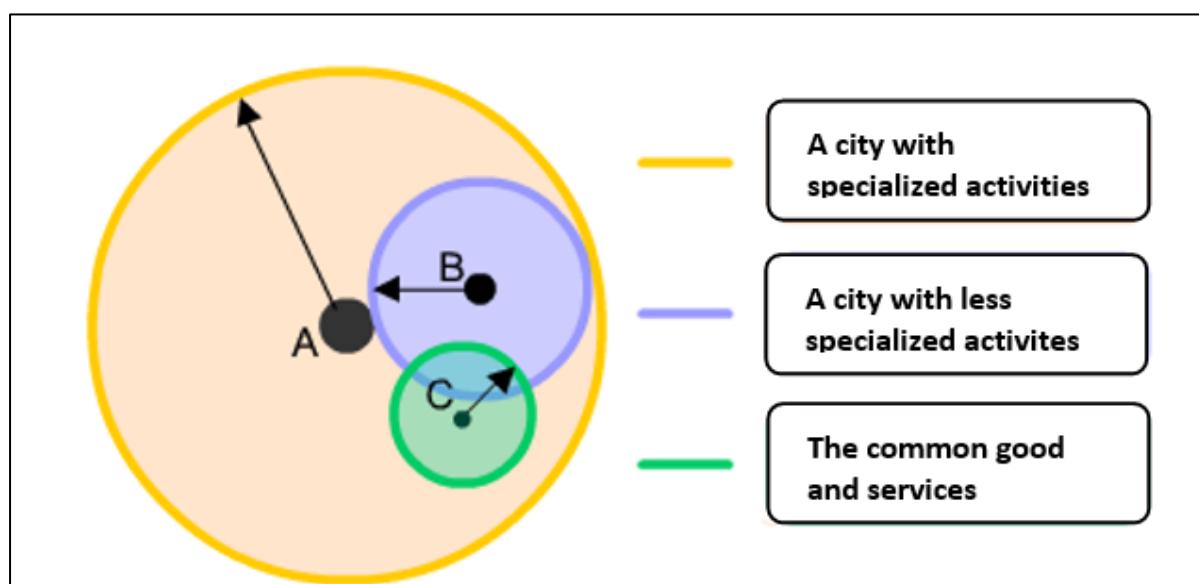
Figure 4-3: Sphere of Influence of Different Settlements

Gravity models measure the pulling power of competing locations, whether cities, shopping centers or towns and the influence this has on the customers that reside within the boundaries. Models identify a boundary line, called the breaking point, at which customers reside within the boundaries, either one side or the other of the line. Calculations can specify a particular breaking point or point of maximum pull between two settlements.

The breaking point between two urban settlements can be calculated by the formula:

$$\text{The breakpoint from A} = \frac{\text{Distance from center A to center B}}{1 + \sqrt{(\text{population B/population A})}}$$

Boundary line of the the area of influence of an urban settlement can then be drawn by a smooth line joining all the breaking points.

The sphere of influence or service areas of urban settlements in Peshawar Valley, using the above methodology has been calculated and shown in the figure below.
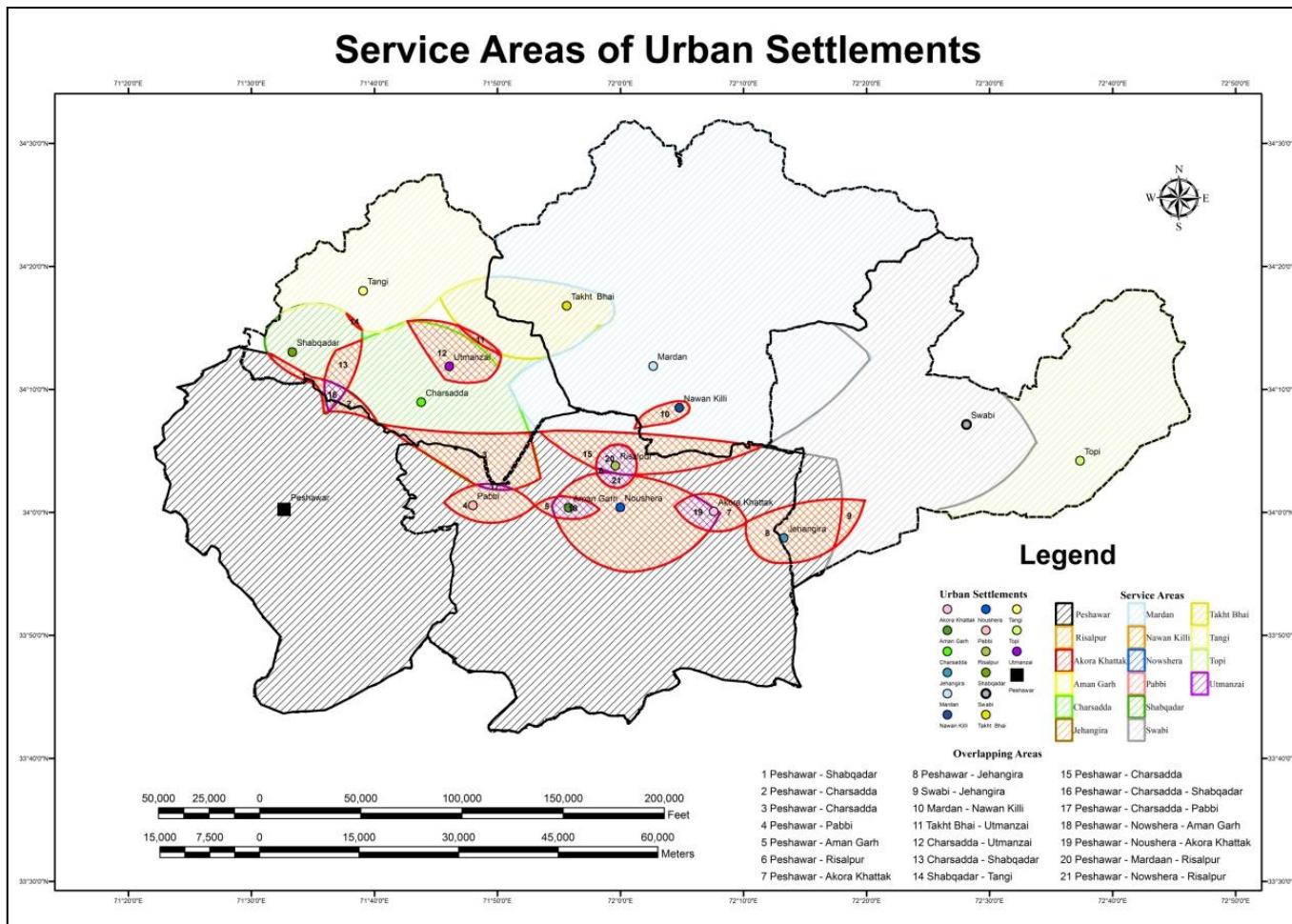
Map 4-2: Service Areas of Urban Settlements

Peshawar has a strong influence on the urban settlements of the Peshawar valley, according to map 4.2.

4.4 PARAMETERS FOR REDUCING MIGRATION TO BIG URBAN CENTERS

Development is a two-pronged strategy, based on the classical debate of efficiency Vs. equity. Focusing on efficiency, there is a need to identify 'development corridors in the region where returns against investments made would be maximum, and in these corridors, the private sector would also be interested to invest. These corridors are thus 'investment zones', encompassing cities as well rural areas. Thus, these will benefit not only urban areas but also rural settlements which lie in it; resulting in better rural development and hence help to retard migration flows to urban areas. These development corridors will also have a spill-over effect even outside these corridors.

The second parameter is to reduce migration to bigger urban centres in the development of new towns at feasible locations. This will however not help unless these are coupled with adequate employment opportunities and other necessary facilities, which make them attractive for the people to live in, and can restrain them to move towards bigger urban centers.

The third factor to reduce migration is sustainable rural development, in which each District should be divided into a number of 'Rural Growth Zones', each zone to comprise of few union councils, and within each zone, a centrally located village would act as 'Rural Growth Center', which will have better inter-village road connectivity as well as access to the nearest main road, provision of basic facilities such as good healthcare, quality education, provision of adequate infrastructure and physical improvement of villages including village streets and houses.

To sum up, the parameters for reducing migration to bigger urban centers are as below:

- Identification of Development Corridors
- Establishment of New towns at appropriate locations with employment opportunities
- Sustainable rural development.

These are elaborated on in subsequent sections.

4.5 VALLEY DEVELOPMENT CORRIDOR (PVDC)

Valley Development Corridor (PVDC) is a major project of Peshawar Valley being proposed under the KP Land Use Project. Development corridors are described as transport (or trade) corridors with under-utilized economic potential in their environments, the development of which would be explored through spatial planning and development projects. They are therefore seen as a means of prioritizing and promoting inter-related infrastructure and large-scale economic sectoral investments in defined geographic areas and optimising the use of infrastructure. PVDC can become the framework and platform for comprehensive and integrated development in the five Districts. PVDC needs to be given great importance as well as active promotion.

PVDC will be of great significance to the development of Peshawar Valley which will provide new opportunities, a new vision as well a new impetus to the developmental activities. It will effectively promote the economic and social development of the valley. The construction of PVDC will enhance connectivity and integration of developmental efforts of the five Districts, which is in the fundamental interests of the people.

As a large and systematic project, which covers 2017-2037, PVDC needs joint and unremitting efforts by the provincial government, companies and all social sectors of KP. In the process of its construction, there is a need for scientific planning, step-by-step implementation, the consensus among Districts through consultation, mutual benefit and win-win results, as well as ensuring quality and safety. All five districts of the Valley should agree to make a list of prioritized or early harvest projects as well as the long-term plan for PVDC. The prioritized or early harvest projects mean the projects which will be completed before 2022, and others by 2037. PVDC is a vision with long-term planning up to 2037.

The central role of the PVDC would include the establishment of new towns, special economic zones including industrial estates, and transportation infrastructure. Besides, there can be projects in the fields of financial services, science and technology, tourism, education, poverty elimination and city planning, etc.

To promote the construction of PVDC, the provincial government needs to set up a PVDC Committee, under which there would be a number of working groups for projects till 2022, long-term planning, transportation infrastructure, new townships and special economic zones.

Efforts are to be made to improve the livelihood of the local people, particularly the construction of educational and medical projects, and vocational institutes. Although hydroelectric projects will be located outside the PVDC framework, feasibility studies will have to be conducted for Solar and wind Power Projects in the proposed corridor.

An efficient and fast transportation network is of vital importance to economic development. The existing road network in Peshawar Valley shall be used in the beginning, developing the missing connections first, with the easiest one on priority, through scientific planning. At the

same time, a feasibility study needs to be conducted for upgrading the railway network in the valley.

The PVDC aims to benefit the economic and social development of all regions in Khyber Pakhtunkhwa and provide effective inter-district connectivity. With the implementation of various projects, PVDC will play an increasingly important role in promoting economic development and uplifting living standard across different parts of the Province. These projects will help boost employment and tax collection, strengthen provincial road connectivity, promote economic development as well as improve people's living standards.

The proposed development corridor encompasses the area between GT Road and Motorway, and well beyond it to cover Mardan-Charsadda Road.

The identified corridors must be able to generate densification activities, and efforts to stimulate SMEs in the proposed corridors. It is also important to establish an appropriate legal and institutional framework before the project gets rolling.

It needs to be ensured that no hype is generated around the corridor with unrealistic expectations for the communities involved which may not be fulfilled in terms of anticipated investments in certain areas of the corridor. The proposed corridors may generate notable successes in private sector investments into regional infrastructure development, industrial development and natural resources exploitation.

The corridor approach represents an understandable and reasonably objective way to prioritize regional infrastructure projects, stimulate investments into productive capacity and achieve economic densification.
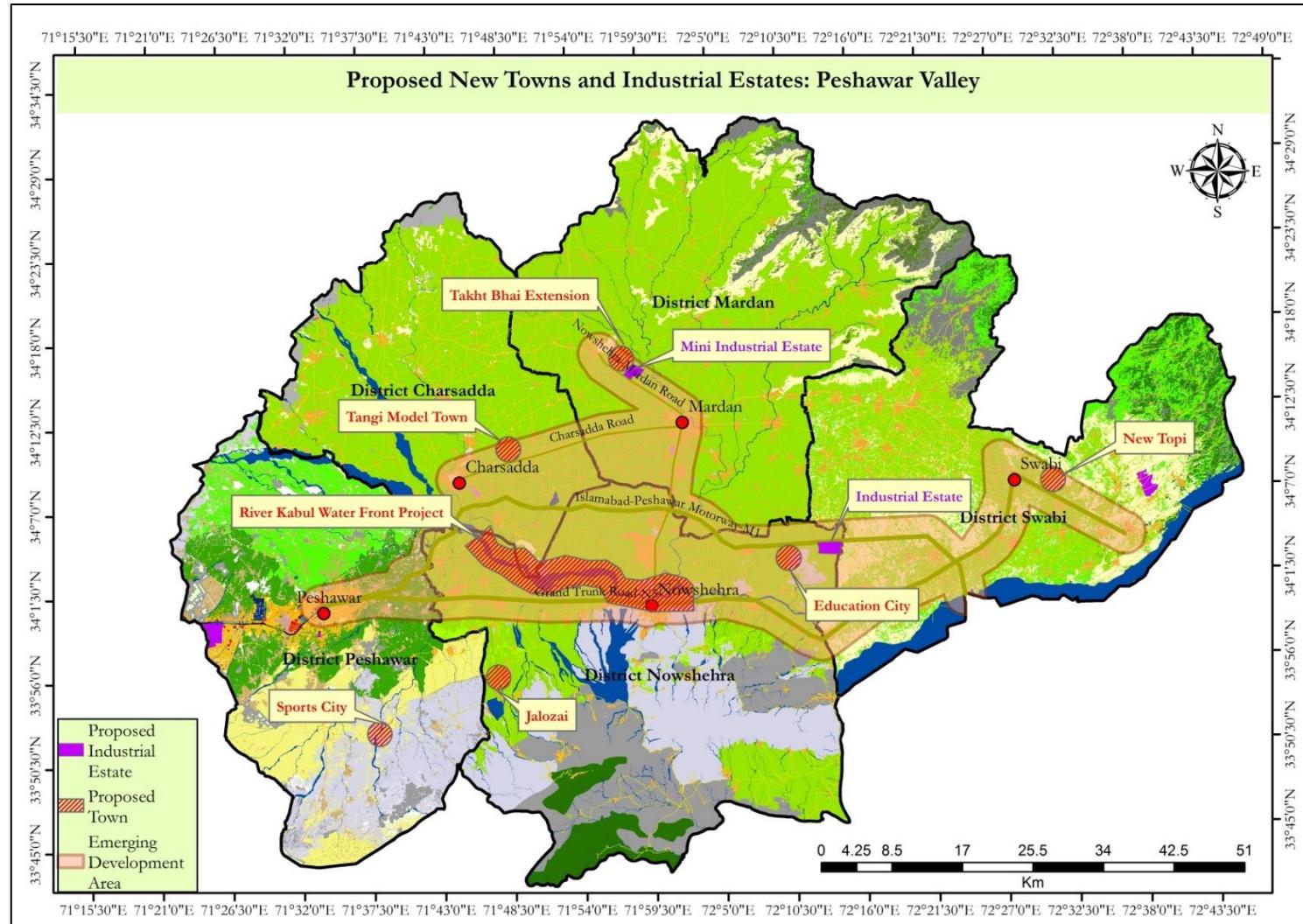
Map 4-3: Proposed Towns and Industrial Estates in Peshawar Valley

Map 4.3 shows the proposed towns and industrial estates of Peshawar valley. The proposed new towns are depending upon the proposed industrial location to provide a balance between the industrial labour force.
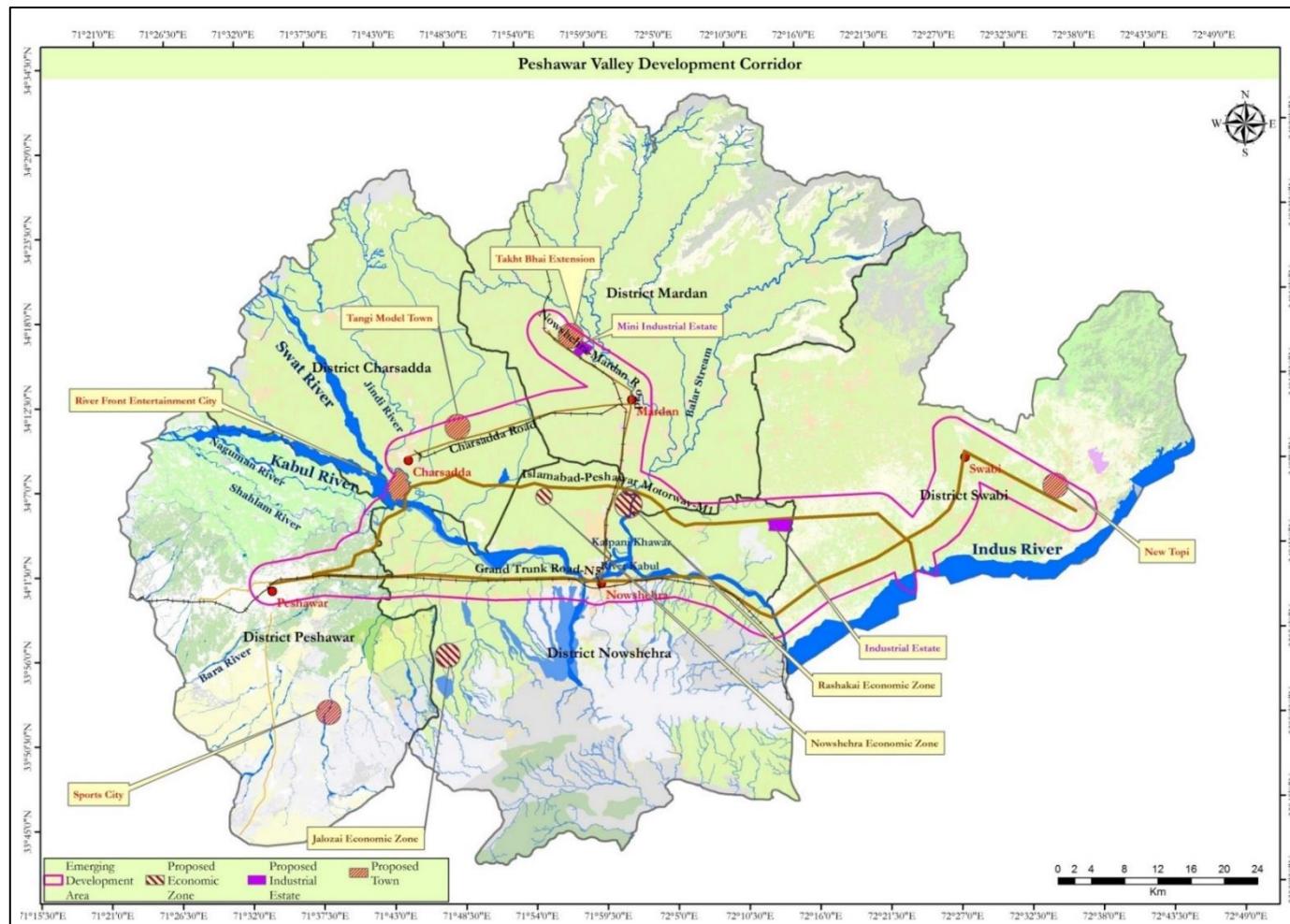
Map 4-4: Development Corridor of Peshawar Valley

Map 4.4 shows the Peshawar Valley development corridor. The development corridor improves an industrial estate and towns. This corridor connects to Pakistan's capital, Islamabad.

4.6 ESTABLISHMENT OF SATELLITE, INTERMEDIATE, SECONDARY, AND INDUSTRIAL TOWNS – THE EMERGING SCENARIO

There are many classical theories developed over the last two centuries to explain the reasons behind the distribution patterns, size, and a number of cities and towns in a region. These theories such as the central place theory or rank size rule etc. are based on various assumptions which are not applicable in real life.

However, the analysis and inferences drawn in the earlier section regarding the hierarchy of settlements provide a sound basis to establish satellite, intermediate, secondary and industrial towns as focal points for the future to cater for the rural and small towns. Before doing so, however, it seems appropriate to provide a brief description of different kinds of towns, as given below:

Satellite Towns

A satellite town or satellite city is a concept in urban planning that refers essentially to smaller metropolitan areas which are located somewhat near to but are mostly independent of larger metropolitan areas.

Intermediate Towns

Intermediate towns perform social and economic functions that are important for regional development, functioning quite reasonably. As a result, intermediate towns are important not only because of their size but also because of the services they provide to rural areas. As service hubs, these towns can offer public, social, business, and personal services to both their people and the rural areas around them.

Intermediate towns can also offer better facilities in social services i.e., health and education, than large and small cities. They become stopping-off points for migrants who might otherwise go directly to the big cities, but the big cities have no more carrying capacity to accommodate more population.

Secondary Towns

Secondary towns serve as trading centers for agricultural and other primary goods. They also serve as centers for providing economic and social services to the rural populations, particularly the rural poor. Secondary towns play important role in reducing poverty in both rural and urban areas and in redirecting rural-urban migration from mega-cities. Rural-urban migration is not only inevitable but also desirable as it allows labor to move to sectors of the economy where it can be more productive. However, rural-urban migration to mega-cities may be undesirable as it may contribute to the diseconomies of scale of these cities. Hence the role of secondary towns is important to control the above.

Industrial Towns

An industrial town is described as the one with a predominant industrial economic base and where workers live within walking distance of their places of work. The term also implies how economic specialization arises through clustering in a particular industry-zoned urban area. Firms in industrial towns battle to internationalize production, and they have only limited resources to invest in research and development

The Economic zones/Industrial Towns that have been approved by the Provincial Government are described below:

4.7 ECONOMIC ZONES

Three Economic Zones have been approved by the Government, the details of which are as below:

4.7.1 Rashakai Economic Zone

Rashakai Economic Zone is spread over an area of about 1,000 acres of land and is located on the M1 motorway at Mardan interchange and links to CPEC through Burhan interchange. Due to its central position in the Province, it is envisaged to be an imminent trade hub. The Economic Zone will also host an IT Park of 100 acres in collaboration with the Board of ITKP. The strength of this zone is its strategic location by being connected to districts and a resource pool which has a predominant investment favorability for industries in fruit & food packaging, textile and auto manufacturing. Further expansion of around 5,000 acres is also under consideration.

4.7.2 Jalozai Economic Zone

This economic zone is spread over an area of 257 acres. It will be a strategic location for small and medium enterprises. The economic zone connects to GT Road through a link road of about 15 KMs from Pabbi. The industrialists of the the Jalozai Economic Zone will have readily available trained human resourcess due to its location in the center of a settled area, which also has a long-established industrial tradition. It will have access to plenty of natural resources and agricultural products.

4.7.3 Nowshera Economic Zone

It spreads over an area of 100 acres and is situated on GT Road. The zone is located at a distance of about 50 km from Peshawar near the Mardan interchange on the Islamabad-Peshawar motorway section.

4.8 NEW TOWNS

New towns can be used as economic 'Growth Poles' for regional level Land Use plans such as the five Districts of Peshawar Valley. New towns in Peshawar Region will exert a positive impact on the economy and lead to a sustained increase in production and incomes in the

region. However, for a new town to be functional and act as a growth pole, it must have some basic industry, education, health and physical concentration of activities with strong backward and lateral linkages. New towns located in older urbanized regions like Peshawar, will also help to revitalize blighted or decaying areas and may infuse life in the area by the creation of dynamic new types of employment and up-to-date amenities.

New towns are also needed in the region for 'Decongestion' of large cities like Peshawar and Mardan. These will help to ease pressure on such bigger urban centers and achieve a more sub-regional distribution of jobs, homes, amenities and transport. This can be a successful strategy for controlling growth in the fringe areas of larger cities. Although in KP and the rest of the Country, new housing schemes and townships within urban areas primarily cater for the needs of the upper strata of society, the trend needs to be rationalized. New towns in Peshawar Valley in particular and in KP as a whole, can be built primarily to resettle the urban poor from overcrowded central areas of larger urban centers to permit the renewal of central city areas.

New towns are also planned for the rural populations to prevent further encroachment on limited prime agricultural land by urban extensions. It is thus important that new towns should be built on land which is unsuitable or poor for agricultural production. Another rationale for the creation of such towns can be a deliberate concentration of the population of scattered hamlets or villages to facilitate/economize the provision of adequate amenities and services.

New towns are a form of urban planning designed to relocate populations away from large cities by grouping homes, hospitals, industry and cultural, recreational, and shopping centers to form entirely new.

A typological distinction can be made between new towns with a 'predetermined location' and new towns where the optimal location can be chosen among several potential sites. In the first category, the site is fixed by the need for proximity to location-bound resources such as mines, sources of energy, or land suitable for specific agricultural development. The second category would include towns built as service centers of development regions and new towns created for the decongestion of existing cities or the reorganization of metropolitan areas.

Industrial towns in 'Isolated Locations' are created to exploit such natural resources as iron, coal, oil, etc. In developing countries most, new towns belong to this type since economic development is given priority over social development objectives such as the decongestion of overcrowded urban centers. Isolated new towns can also serve as foci of scattered settlements.

4.9   ENTERTAINMENT CITY

There is a huge potential for developing an 'Entertainment City' near Charsadda Interchange on M1. Spread over 5,000 kanal, it has an ideal location, being located between River Kabul

and River Jindi. The site is mostly barren and thus agricultural land will not be affected. Entertainment City will be a hub of recreational facilities at the regional level.

4.10 NEW TOWNSHIPS/LARGE SCHEMES IN PIPELINE

New Townships that are already being planned/considered by Provincial Government include Mega City and Jalozai Scheme in District Nowshera and a Sports City in District Peshawar.

Mega City spread over 50,000 Kanal is a project of the Provincial Housing Authority. The site is located near Kernel Sher Khan Interchange on Peshawar - Islamabad Motorway. A preliminary feasibility study of the project has been completed and approved.

The Jalozai site is also located in District Nowshera on main Cherat Road, approximately 8 km from main GT Road near Jalozai industrial estate. The total area of the scheme is 8905 kanal, while the number of plots is 8,044.

4.11 OTHER FEASIBLE LOCATIONS FOR NEW TOWNS

A feasible location for a new town requires detailed studies.

The following three new Towns are proposed in Peshawar Valley at the indicated locations:

- Tangi Model Town, District Charsadda
- Takht Bhai Extension Town in District Mardan
- New Topi in District Swabi.

The existing Tangi settlement is located at about 22 kilometers from Charsadda; while Charsadda is about 28 kms from Peshawar located in the West of KP and is bounded by District Malakand on the North, District Mardan towards East, Districts Nowshera and Peshawar towards South and the Mohmand Agency of the Federally Administered Tribal Areas on the West. Charsadda has one of the most fertile lands in KP. Three rivers are flowing in Charsadda: The River Jindi, the Kabul River, and the Swat River; these rivers are the main sources of irrigation for Charsadda. The three rivers then merge and join the Indus River.

The main crops of Charsadda are; Tobacco, Sugarcane, Sugar beet, Wheat and Maize. Vegetables include Potato, Tomato, Cabbage, Brinjals, Okra and Spinach. Among orchards; apricots, Citrus, Plum, strawberries and Pears are famous. Strawberries, Sugarcane and Tobacco are cultivated abundantly.

Foot Wearing, Cloth Wear and Fishery contribute a lot to the economy of the District. Hundreds of people are involved in making Foot Wear. There are more than 500 footwear manufacturing units that have also started making handmade shoes, bags, belts and small leather accessories but the most popular and highly produced item is footwear (Peshawari Chapal). As already stated, cloth wear manufacturing is also an attractive business for the people of Charsadda.

Being close to the Peshawar metropolis and hence under its shadow effect, Charsadda has not developed industrially as it should have, particularly for the agro-based industry. Besides, being close to Peshawar has its advantages as well as disadvantages. The disadvantage is that most people commute daily from Charsadda to Peshawar and back increasing the traffic load. Besides, people who can afford, tend to build houses in Peshawar causing its sprawl and related issues. A decent well-planned town near Tangi in District Charsadda will help to control this trend and also provide impetus to the District (and hence regional) economy.

Takht Bhai Extension Town

As the name suggests, is a planned extension of the existing Takht Bhai Settlement in District Mardan. The existing urban settlement of Takht Bhai is the fastest growing urban settlement in Peshawar Region; its growth rate was 5.98% during the period 1981-1998. It is the highest rate among all urban settlements in the region. It is also the second largest settlement of District Mardan, after Mardan City. Takht Bhai has situated 15 km from Mardan on Swat-Malakand Road. In 1908/9 ancient Buddhist history was discovered in the mountains.

Some of the possessions of the Buddhist houses and buildings have been taken away illegally. The population is expanding and new houses are being built in and around Takht Bhai. If ignored for a few more years, the tourist and historic attractions will disappear. The authorities need to draw a boundary line, to stop further encroachments. There is a need for a new township at an appropriately located site near Takht Bhai, along with an appropriate living environment, along with tourist rest houses and restaurants where people can relax before and after they embark on the on-wards mountain journey. This will reduce pressure on Mardan City, and will also help to develop the Northern part of Mardan District, as Takht Bhai will become a growth pole for this part of the region.

New Topi in District Swabi

Topi Town lies in the Eastern part of District Swabi. It is located to the West of Tarbela Dam, the world's largest earth-filled dam, which is also the largest hydroelectric generation project in Pakistan.

Topi is home to Ghulam Ishaq Khan Institute of Engineering Sciences and Technology (GIKI), one of the premier technical universities in Pakistan. Gadoon Amazai Industrial Estate is also a few km North-East of Topi. All these key Land Uses i.e. Tarbela dam, GIKI, Gadoon Amazai Industrial Estate and the geographic location of the existing Topi settlement justify a well-planned New Town (New Topi) adjacent to the existing Topi settlement.
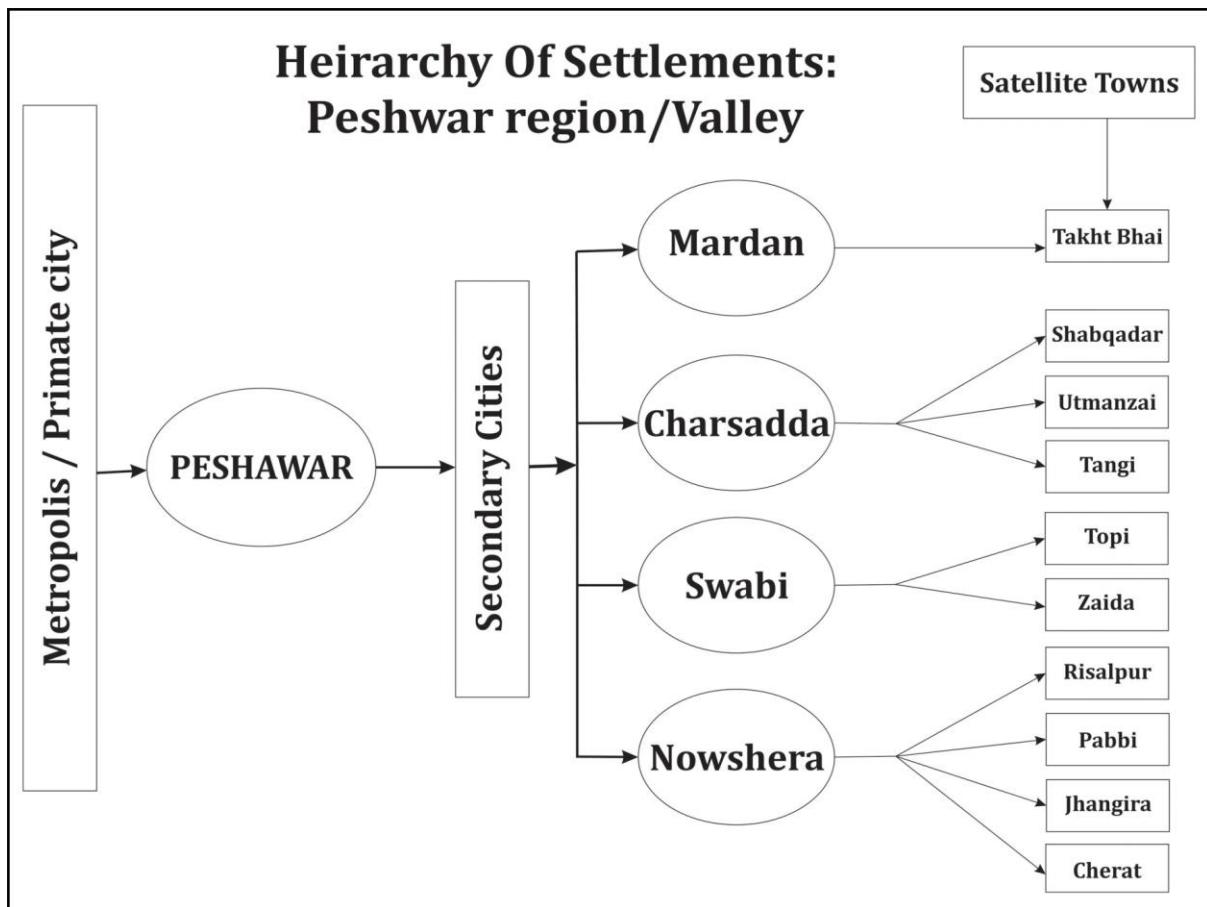
Figure 4-4: Hierarchy of Settlements: Peshawar Region

DISTRICT LAND USE PLAN

CHAPTER. 5   THE LAND USE PLAN

5.1   OVERVIEW

There was always a felt need for provincial land use policy for land use planning and optimum utilization of land resources. The Land Use plans for the five Districts are building blocks toward that end.

At present, there is no framework of policy relating to land use and therefore, in the matters of location and acquisition ad-holism prevails. The government in one department takes certain decisions, which are negated by another department, behind most of which the confrontationist situation is the question of land. There being no Land Use policy within whose framework different departments can decide their projects, contradictory views are taken by different departments, at the root of which is the question of land use.

Locating non-agricultural activity on land best suited for agriculture would not be permitted within the framework of the District Land Use Policy. To decide about location, therefore, land use policy is of vital importance. Under the policy, appropriate land resources would always be available where necessary for development, and the logic of appropriate land use would apply.

The land is required for roads, railway tracks, airports, city expansion, industrial location, mining, afforestation, etc. The District Land Use Policy, and ultimately a Provincial Land Use Strategy would zealously guard the land for the Land Use which has been designated under the Plan, and their conversion to other use would be prohibited. As the policy is based on logic, it would draw public support. The land is required for grazing, but unfortunately, many grazing areas have been eliminated.

The Consultants have taken a holistic view of land as a resource and then assigned to it an appropriate use, resulting in a logical location policy and a framework within which agricultural growth, for example, would accelerate without comprising urban development and industrialization, with the latter not competing with agriculture and moving forward at the cost of agriculture. All this is the rationale behind a properly thought out land use policy.

Provincial Land Use Plan is envisaged as a policy document for an integrated, coordinated and systematic planning and uniform spread of development activities and employment to the rural and sub-urban population close to home and reduce pressure on districts like Nowshera. It aims at establishing a hierarchy of settlements and developments of satellite, Intermediate, Secondary and Industrial Towns as focal points of the future to cater for the rural areas and small towns. It will also guide nation-building departments/agencies, Urban Policy Unit, and District Governments/TMAs in undertaking integrated and coherent development programs through holistic planning.

The Consultants have conducted surveys of twenty-one different sectors as per the Terms of Reference, formulating appropriate plans to achieve the specified objectives, including

protection of prime agricultural land, transport-driven residential and commercial development, allocating spaces for vertical, residential and mixed development zones, and allocating suitable land for agriculture.

Housing is an important element of Land Use planning. Locating housing areas appropriately in the Land Use Plans is based on proximity to urban services, employment opportunities, cost of infrastructure, and restrictions on the conversion of prime agricultural land to housing and other urban uses. There is a need to promote a full range of housing in all communities, including initiating a cooperative effort from the beginning of the planning process and based on the situation, recommend minimizing regulations and generating adequate financing, in an attempt to make housing more affordable and available to all income groups.

All social sectors in Land Use planning are important, but health and education in particular need to be emphasized in the context of land use planning, it is a sustainability issue. The link between health and sustainability is so apparent that many people do not always understand how human health is affected by the shape, form, design and function of the communities in which people live.

Land Use decisions affect the physical development of communities, and also profoundly impact the health of people who live and work there. There is a strong correlation between healthy eating habits and physical activity with rising rates of obesity, diabetes, heart disease, asthma and other health issues. A growing body of evidence points to development practices and Land Use patterns as a major contributing factor in many illnesses, particularly when such practices and patterns discourage physical activity, restrict access to healthy foods and disproportionately expose neighborhoods to environmental pollutants that exacerbate health conditions such as asthma. Traditionally, in the context of land use planning in Khyber Pakhtunkhwa (and for that matter in the country as a whole), health has not been given high priority. That needs to be changed, as there is an important link, as described above, between health, built environment and Land Use.

The Land Use Plan will facilitate determining how much job-producing land should be preserved for the future and preserve existing industrial land for industrial and job-generating purposes. The information will also help to determine the nature and viability of current and future industrial uses, the ability to mix different uses, and the transit-dependency and/or employment characteristics of the local labor force, although some areas may seem to have the same amount of residential or other uses in industrial zones, the impact may not be the same. Other aspects are industrial location, compatibility with surrounding Land Uses particularly housing and agriculture, industrial waste discharge, and industrial zoning with respect to present and potential industries, depending on their types, level of pollution, and traffic attracted/generated.

The decreasing recreational facilities and open spaces are a cause of concern. The pressure on land is increasing because of competing Land Uses. The Land Use Policy, therefore, stresses the need for reserving recreational spaces against many competing demands for land.

The Departments including P&D Department and KP Urban Policy Unit in consultation with planners, administrators, environmentalists, agricultural scientists, local people and NGOs should monitor the plans for land use development and review them periodically after every 5 years, in accordance with the changing socio-economic needs of the time. District Land Use Plans are a new concept in KP as well as the entire Country, and initially, it may be difficult to introduce changes in the existing land use pattern, but with steady long-range planning and an appropriate public information system, the Land Use proposals are not difficult to achieve.

The Government of Khyber Pakhtunkhwa is committed to a sustainable future. Initiating District Land Use Plans is an important initiative of the Provincial Government to make Nowshera an attractive place to live and work. The Government is seeking to steer growth and change the Districts in ways that are economically, socially and environmentally sustainable.

District Land Use Plans are meant to improve the integration of land use and transport planning. The Land Use Plan will help government agencies to improve public facilities and services. The Plan identifies locations for different Land Uses at the most suitable locations and directions, which will guide the implementing agency in rationalizing all land uses and objective planning and formulation based on the potential and requirements of the land resources. Preparation of the District Land Use Plan (DLUP) will promote a potential-based use of the land for maximum land resource conservation. It will also ensure sustainable use of resources for use for the coming generation. The optimum and guided utilization of land is, in fact, the main objective of the Land Use Plan.

District Land Use Plan is a road map of sector strategies, subtly integrated, and derived from analysis of surveys and consultations with different stakeholders. District Land Use Planning is more than just long-term planning, where objectives are set for a specific period of time; it is more proactive, based on anticipated changes in the years to come, thus making corrective alterations in the Plan after appropriate intervals, and involving various stakeholders at different levels of the planning process, that may steer the City District Government, Urban Policy Unit/PMU, and urban local councils in a focused direction.

Broadly, the goals of the Land Use Plan are to address the major challenges facing District Nowshera. The urban areas and villages in the District should maintain their character and vitality. The growth opportunities should be supported throughout the District, and not just in the urban areas. At the same time, however, there should be minimum adverse impacts on agricultural land, and public services.

Urbanization has far-reaching effects on agricultural lands. The process of urbanization usually triggers the growth of urban housing, infrastructure, city-specific land-use forms such as recreational areas/stadiums, public facilities etc., which further diminish cropland around the cities. Urbanization is inevitable but the importance of agriculture cannot be ignored. There is thus a need on the part of the Government as well as a social responsibility to

preserve this natural gift. Agriculture should remain a vital part of life in the District, without compromising industrial development and planned urban growth.

Comprehensive District level decision-making approaches are needed to explore future expansion alternatives and promote growth patterns that are economically viable and environmentally sustainable. Keeping in view all the factors affecting future urban expansion within the District, the most optimum growth direction/s have been identified.

Nowshera is expanding particularly along GT Road and Mardan Road because of a number of factors such as existing physical & social infrastructure, better transport linkages, easier accessibility to different facilities and services and the resulting economies of scale.

Future Land Use Policy for Nowshera should derive from the fact that much of Nowshera's distinct character is its diversity of Land Uses, and it's physical, economic and cultural characteristics. Complete segregation of Land Uses, particularly in the inner areas is neither possible nor desirable. However rampant Land Use conversions, which impede the easy flow of traffic and a non-amendable living environment for the residents must be controlled.

5.2 FRAMEWORK FOR DISTRICT SPATIAL PLAN AND BROAD GUIDELINES TO UNDERTAKE THE PROJECT

To implement the Land Use plans for the five Districts, there is a need to form a regional body such as the Peshawar Valley Development Agency (PVDA), which can not only implement the plans for each of the five Districts, but do so in a coherent and integrated way, and also resolve the inter-district planning issues which may arise during the plan implementation process. At present, there is no regional body which can provide a framework for the implementation of Land Use Plans and take up development projects at the regional level for the valley as a whole. Different projects are being launched or are ongoing in the five Districts of Peshawar Valley.

Thus, to oversee and coordinate the activities of these projects, it is important to create an agency such as PVDA, which may be established in the Urban Policy Unit KP. A senior officer may be assigned the duties of Chief, PVDA. To assist the Chief and coordinate the activities, a number of Deputy Chiefs may be drawn from sectoral departments. The officials should represent their respective departments and provide guidance where necessary.

The abundance of local planning authorities without an apex body at the regional level contributes to the emergence of complex problems such as unclear roles, overlapping functions and responsibilities not fully discharged. These activities impact the growth and development of the region. With no definite policy at the Provincial level, the government employs ad-hoc measures in response to physical development problems. The Plans are articulated poorly as the processes involved are not properly followed due to the existence of many planning authorities with few qualified Town Planners, and lead to little impact in promoting efficient urban and regional development.

Every planning authority has a specific task it performs in ensuring that proper planning is achieved. The proposed PVDA is expected to implement the District Land Use Plans of the 5 Districts while the local government planning authorities such as Peshawar Development Authority, Mardan Development Authority, Provincial Housing Authority, Sarhad Development Authority etc. are empowered by law to carry out specific planning roles. PVDA is not meant to take over their roles, but to ensure that all plans are prepared within the framework of District Land Use Plans.

Planning authorities have the responsibility of approving planning schemes and the administration of the various town and country planning laws and are also empowered to declare any area a planning area within their jurisdiction, after making an adequate investigation about it from PVDA. Lack of linkage between the local authorities and the regional authority such as PVDA leads to the negligence, as the problem is not addressed, leading to haphazard development.

The Land Use Plan will help government agencies to improve public facilities and services. The Plan identifies locations for different Land Uses at the most suitable locations and directions, which will guide the implementing agency in rationalizing all land uses and objective planning and formulation based on the potential and requirements of the land resource. Implementation of the District Land Use Plan (DLUP) will promote potential-based use of the land for maximum land resource conservation. It will also ensure sustainable use of resources for use for the coming generation. The optimum and guided utilization of land is, in fact, the main objective of the Land Use Plan.

It is a road map of sector strategies, subtly integrated, and derived from analysis of surveys and consultations with different stakeholders. District Land Use Planning is more than just long-term planning, where objectives are set for a specific period of time; it is more proactive, based on anticipated changes in the years to come, thus making corrective alterations in the Plan after appropriate intervals, and involving various stakeholders at different levels of the planning process, that may steer the City District Government, Urban Policy Unit/PMU, Development Authority and urban local councils in a focused direction.

There is also a need for the formation of an inter-district advisory committee comprising elected representatives/senior officers of the five districts to discuss and advise PVDA about inter-district planning issues and their resolution.

The proposed PVDA under the auspices of the Urban Policy Unit will be responsible for:

- Coordination with Districts to resolve inter-district planning issues if any.

- Coordination with sectoral departments.

- Coordination with local councils.

- Planning, supervision, monitoring and implementation of Project.

- Organizing and conducting various training programs.

The PvdA through Urban Unit/P&D Department shall also keep close liaison with donors and provide full support to induce their intervention in the target districts. It will also coordinate the relevant activities of various departments/agencies and would coordinate annual review meetings with donors and executing line departments. As already stated, PVDA will be responsible for the implementation, administration and coordination of District Land Use Projects in an integrated manner, including financial management, organization of training programs, and association with line departments and the NGOs.

It is also important to intensify the involvement of line departments in the area. It is proposed to utilize the services of the experts working in these departments so that they can participate in the implementation of the Land Use projects. Similarly, other agencies functioning at provincial and district levels, and have got the expertise relevant to the Project, should also be involved in the execution of the Project

Considering the complexity and enormity of planning issues in the Districts, it is also seeming imperative to have a separate Executive District Officer for Land Use Planning, who will coordinate between the PVDA in Urban Unit and District level Departments, authorities, and agencies responsible for the implementation of various projects. This arrangement is likely to have salutary effects on the achievement of the targets. The proposed PVDA will have jurisdiction over all five Districts, including urban and rural areas.

5.3   THE GROWTH SCENARIO

The urban area of District Nowshera, 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 and the adjoining Cantonment areas; 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 the plan period.

The expansion however needs to be guided in the right direction because of the following reasons:

- Urbanization has far-reaching effects on agricultural lands. The process of urbanization usually triggers the growth of urban housing, infrastructure, city-specific land-use forms such as recreational areas/stadiums, public facilities etc. which further diminish cropland around the cities.

- There is thus a need on the part of the Government and the civil society to preserve this valuable natural gift i.e. agricultural land.

Based on the findings, the agricultural land in the District has been divided into three classes i.e. Class 1, Class 2 and Class 3 (Figure 5.1).

Class 1: Agricultural areas which are irrigated and productive; highly valuable and not recommended for Land Use Change.

Class 2: Agricultural areas which are productive but waterlogged

Class 3: Agricultural areas which are though productive, but are rain-fed; Land Use may be changed for future urbanization.

In the case of Nowshera However, because of a number of factors which are explained in subsequent sections, some of the agricultural land, which is away from the flood-prone area, will have to be utilized for future urbanization.

It is clear from map 5.1 that most of the good quality agricultural land lies in the North of the District, Particularly towards North-East and North-West. The following important factors have also been considered for Land Use planning of District Nowshera:

- River Kabul runs through the built-up area of Nowshera. Nowshera city and cantonment lie in the area most vulnerable to flooding.

- The southern part of the District is mostly Rocky/Hilly and most of it is not suitable for urbanization.

- Besides, most of the mining activities for marble and bentonite etc. also take place in the Southern part of the District.

- The area between the River Kabul and Southern Hills is low-lying, and also not suitable for large-scale urbanization.

Based on the above analysis, the North-Eastern part of the District towards the motorway is the potential growth corridor for future Urbanization.
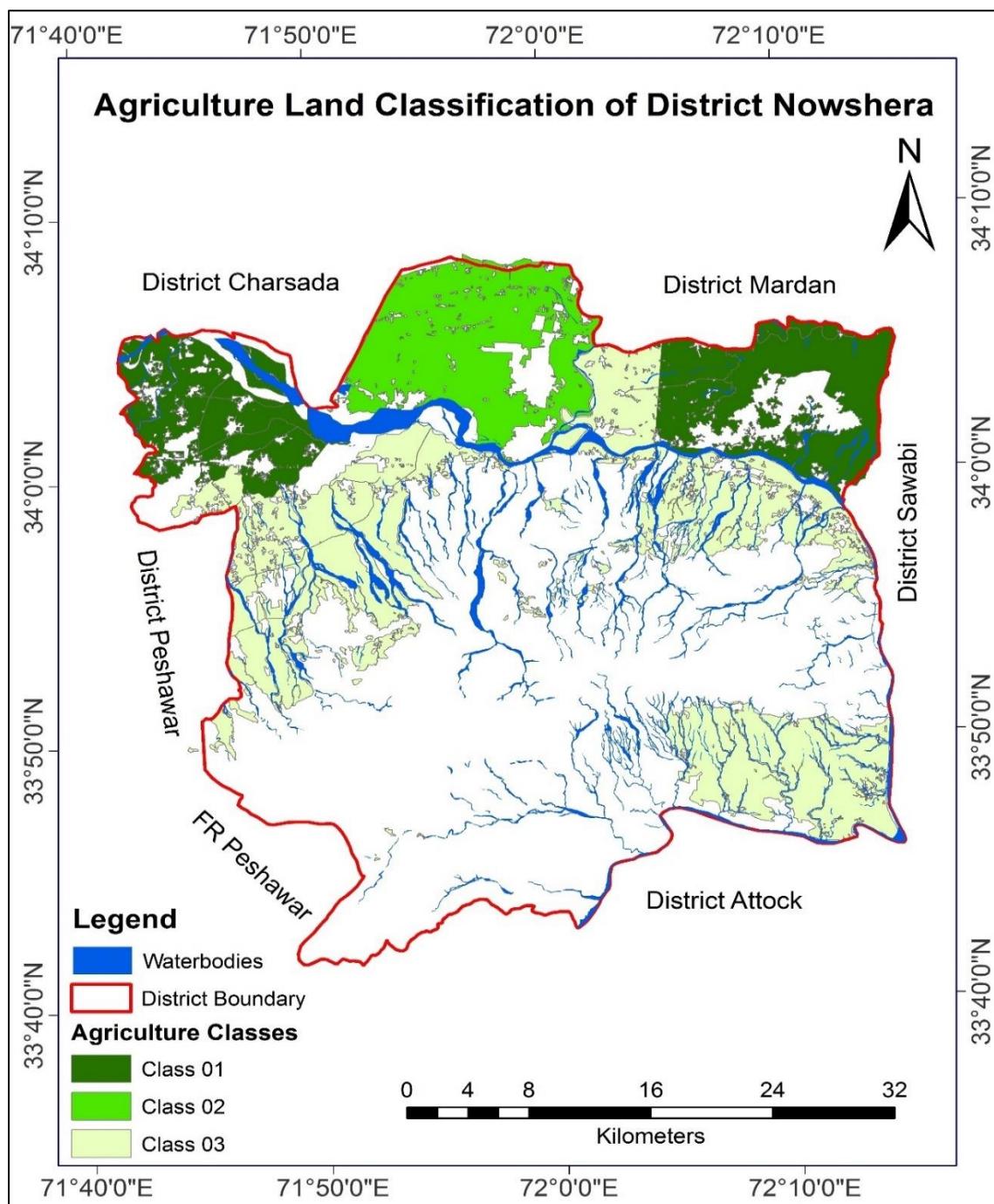
Map 5-1: Agriculture Land Classification

Map 5.1 represents the agricultural land use classification like fertile area regarding availability of water resources, waterlogged and salinity.
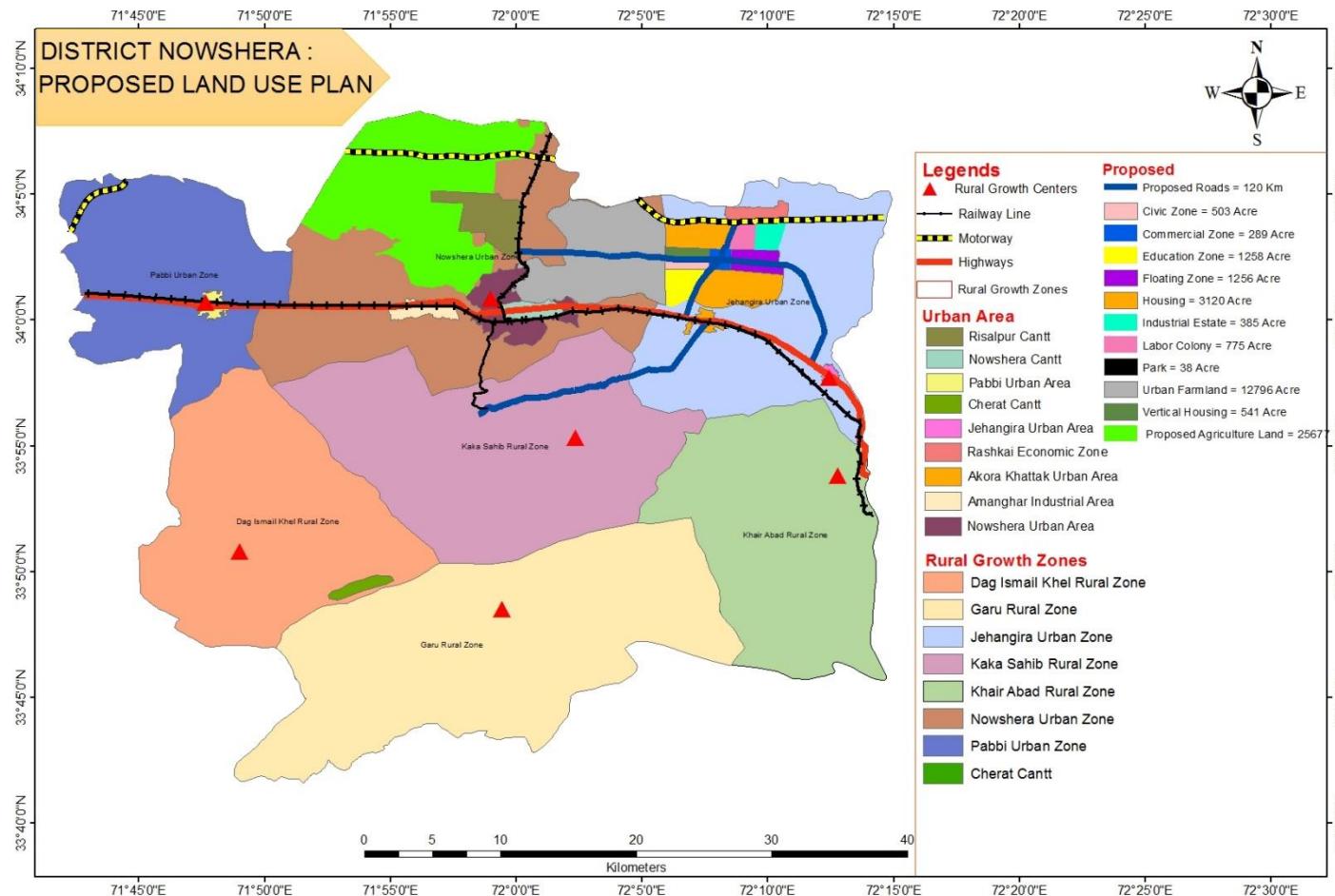
Map 5-2: Potential and Constraints for Future Spatial Growth of District Nowshera

map 5.2 describe the potential growth of District Nowshera for future development. The proposal of a New City near Akora Khattak MC and all proposed roads, rural growth centers, commercial, education, industrial etc. with the respective area and also rural growth zones are shown in the proposed plan.

5.4   EXTENT OF SPATIAL GROWTH (2019-2039)

Assessing the extent and direction of spatial growth of District Nowshera to cater for the growing population over the next 20 years is vital for formulating a realistic land use plan. This section, therefore, attempts to determine the land required in urban and rural areas of the District Nowshera for the plan period.

The following methodology has been used to assess the spatial growth of Nowshera and other urban settlements over the next 20 years:

5.4.1   Population Densities

The total area of District Nowshera is about 1,712 sq. km, of which only about 72 sq. km (4.2%) is categorized as urban (which is the aggregate of all eight urban settlements in the District). Table 5.1 shows the Population densities of urban and rural areas in the District.

Table 5-1: Population Density in District Nowshera						
Urban Area	Population 2017	Population 2019	Area		Population Density	
			Sq. km	Acres	Person/ per sq. km	person/per acre
Jahangira	52839	54974	1.35	333.59	40721.48	164.79
Pabbi	55255	57487	3.12	770.96	18425.32	74.56
Akora Khattak	32883	34211	2.65	654.82	12909.81	52.24
Nowshera City	83567	86943	20.78	5134.84	4183.97	16.93
Amangarh	38624	40184	5.19	1282.47	7742.58	31.33
Nowshera Cantt	36564	38041	4.47	1104.56	8510.29	34.43
Risalpur Cantt	36653	38134	14.76	3647.27	2583.60	10.45
Cherat Cantt	2265	2357	0.81	200.15	2909.87	11.77
Total	338650	352331	53.13	13128.7	6631.48	26.83

It is clear from Table 5.1 above that the current urban density (all eight urban settlements included) is 26.83 persons per acre (PPA). Jahangira has the highest population density i.e. about 164 persons per acre, followed by about 74.56 persons per acre in Pabbi. Nowshera city, Amangarh and Cherat the population densities are fairly close, ranging between 20 to 35 persons per acre. Risalpur has the lowest density among urban settlements (about 10 persons per acre).

5.4.2   Urban Boundaries 2019-2039

Nowshera

As the population of urban areas in District Nowshera continues to grow, its urban boundary needs to be re-defined. The existing urban area is around 53.13 sq. km, of which about 45.06 Sq. Km would be added in the next 20 years, as calculated below. The gross urban area by the end of the plan period would thus be about 78.69 sq. km.

- Urban Population (2019) = 352331[34]
- Urban Area (2019) = 53.13 sq. km[35].
- Current Population Density= 6631.48 persons/sq. km.
- Additional Urban Population (2019-2039) = 171219[36]
- Future Area required = Additional Population/Density = 171219/6631.48 = 25.81 sq. km.
- Total Urban Area in 2039 = 53.13+25.81 =78.94 sq. km.

The urban area of Nowshera by the year 2039 would thus be 78.94 sq. km. The actual urban area by 2039 would be much more than the existing urban area. This is because as proposed in the Land use proposals elaborated earlier, the town would mostly expand towards North-East in the direction of the motorway; where the Provincial Government is considering a number of regional/provincial level developments such as Mega Education City through Provincial Housing Authority and an industrial estate through Sarhad Development Authority. Accordingly, if these areas are included, the 'Greater urban area of Nowshera' by the year 2039 works out to be around 139 sq. km (including the existing urban area).

5.4.3   Union Councils in Nowshera to Urbanize by 2039

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 the population there, resulting in enhanced densities.

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[34] Population estimated from census report 2017.

[35] Source: Estimated for 2019 from Chapter 2, Table 2.5 of this Report.

[36] Source: calculated from existing Urban population from Table 5.3 and estimated population.

Based on the above premise, the current urban and rural/semi-rural UCs which would become a part of urban Nowshera by 2039 is given in Table 5.2.

Of these, three are already urban (or mostly urban), whereas 8UCs currently rural would urbanize by 2039, of which two UCs (Zara Miana and Pir Sabaq) would completely urbanize and the remaining six would partially come under the urban fold.

Urban Boundaries of other Urban Settlements

The growth direction of Amangarh, Nowshera, Akora Khattak and Jehangira will be promoted toward the New Mega City between M1 and GT road while the unpatternd and haphazard growth of Pabbi will be controlled through Jalozai economic zone.

Table 5-2: UCs likely to be part of Greater Nowshera Urban Area – 2039			
S. No.	Name of UCs (Already Urban)	S. No.	Name of Rural UCs (Likely to urbanize)
1	Nowshera	1	Mughalki
2	Nowshera Kalan	2	Misri Banda
3	Nowshera Cantt	3	Zara Miana
		4	Dehri Katti Khel
		5	Badrashi
		6	Gandere
		7	Pir Sabaq
		8	Bara Banda

5.4.3 Union Councils in Smaller Urban Settlements to Urbanize by 2039

The criterion for envisaged urbanization by the year 2037 is similar to that adopted for the Nowshera settlement. Based on this premise, the currently and rural/semi-rural UCs which will at least partially amalgamate with smaller urban settlements are as below:

Table 5-3: Union Councils in Smaller Urban Settlements to Urbanize by 2039	
Name of Urban Settlements	**UC's likely to Urbanize**
Akora Khattak	Adam zai, Akora Khattak
Aman Garh	Garhi, Pir Piai
Cherat	Dag Ismail Khel
Jahangira	Jahangira
Pabbi	Chowkai, Pabbi, Taru Jabba, Dag Basood
Risalpur	Risalpur Cantt, Bara Banda

5.5 SPATIAL STRUCTURE OF DISTRICT NOWSHERA – MULTIPLE NUCLEI APPROACH

Various theoretical models have been evolved to make our understanding of the urban environment richer. Urban Growth Theories explain the internal demographic, spatial, and economic growth of cities. These for example include the Concentric Zone Model, The Sector Theory and Multiple-Nuclei Model. The concentric Zone Model attempts to explain the spatial structure of a City with regard to the usage of "zones" around it. These zones radiate from the inner part of the city and move concentrically outward. The City may be divided into a number of zones that have separate functions spatially.

Sector Theory proposes that spatial competition is not the only source of a city's growth; other factors like prestigious locations (hills, waterfronts), social kinship and affinity also play a role. Thus, cities grow in sectors, rather than in concentric zones. Lower income districts are not necessarily in separate zones but could co-exist with more fashionable/ prestigious areas.

Multiple-Nuclei Model is a well-known model and tries to describe a city's layout. The argument under this model is that city's downtown core (or CBD) is losing its importance in relation to the rest of the city and should be seen only as a nucleus within the metropolitan area. This concept got strengthened with the increasing trend of people moving towards suburbs. Considering this, the multiple-nuclei model is a good fit for sprawling and expansive cities like Nowshera. These nuclei develop into independent areas because of their activities. For example, some economic activities that support one another (for instance, universities and bookstores) will create a nucleus. Other nuclei form because they'd be better off far from one another (e.g., airports and central business districts).

Finally, other nuclei can develop from their economic specialization (transport terminals and railway centers. This theory argues that there are distinct areas where activities are concentrated. While the Concentric Zone Hypothesis proposed that cities grow in zones from the center out, the Multiple Nuclei Theory proposes that these are not necessarily zones, but that similar activities are grouped in certain districts. Thus, we have Central Business districts, Residential Districts, Light manufacturing Districts, Low-income Districts, Suburban Districts, etc.

Under the multi nuclei approach, Nowshera needs to be divided into self-contained entities, so the services are evenly divided into different pockets, rather than being concentrated in some areas. Although a subject of a detailed City Level Structure Plan, it needs to be specified here that in each identified nucleus, a detailed study needs to be conducted to prepare local level area plans under the Urban Structure Plan of Nowshera. A suggested list of nuclei may include:

- Risalpur industrial zone nucleus on Nowshera Mardan Road.
- The City Area includes the cantonment Nucleus.
- Mega City nucleus between GT Road and Motorway in North-Eastern corner of District.

5.6 INTERMEDIATE TOWNS

5.6.1 General

Every person has a basic right to a suitable living environment. The realization of a suitable living environment requires access to basic needs and services, such as health, education, fresh air, clean water, neighbourhood facilities and other convenient services. These may be achieved through the planning of the new settlements and streamlining the existing settlements.

The general pattern of growth and development of human settlements, both urban and rural in District Nowshera, is uncontrolled and haphazard. The majority of the urban settlements contain sub-standard areas all over, except for small pockets of planned development like Paradise City and the Jallozai Housing Scheme. There is a rapid growth in population as shown in Chapter. 3 the existing population of District Nowshera is 1.518 million which will increase to 3.2 million in 2039, due to the migration of a large number of people to the city the urban area is becoming congested. This rapid growth of population and urbanization, coupled with the poor availability of urban services such as water supply, sewerage, garbage and solid waste collection and disposal system, is largely responsible for the poor living environment. Therefore, there is a need to organize the efforts and resources to provide a safe and comfortable living environment, with proper basic services and utilities (such as drinking water, sanitation facilities, education, health and urban services) so that a healthy living environment may be provided to our human settlements. Intermediate towns will also offer better facilities in social services i.e., health and education, than large and small cities. They become stopping-off points for migrants who might otherwise go directly to the Nowshera city, Nowshera cities have no more carrying capacity to accommodate such a huge number of populations.

Intermediate towns will perform social and economic functions that are important for regional development, functioning quite reasonably. Therefore, the intermediate towns are important not merely because of their size, but because of the services they render to the rural areas. As services centers, these towns will provide public, social, commercial and personal services not only to their population but also to the surrounding rural hinterlands.

Two Intermediate Towns are proposed in District Nowshera, the villages which are included in these towns are given below, in Table. 5.4.

Table 5- 4: Villages in Intermediate Towns	
Town	**Villages**
Pabbi Town	Banda Sheikh Ismail, Babi, Balu, Taru, Titara, Garhi Momin, Jabba Daudzai, Dag Behsud, Ali Beg, Qasam, Hakim Garhi, Wazir Garhi, Akbar Pura, Pashtun Garhi, Kandi Tazadin, Ali Shah, Tarkha, Kandi Nasir, Amankot, Banda Nabi, Mohib Banda, Kurvi, Pabbi, Zakhi, Khush Muqam, Dagai
Jehangira Town	Jehangira, Chashmai, Misri Banda, Akora Khattak, Mughaki, Nadark, Main Essa, Shaidu, Adamzai, Narri Naodeh, Kund, Isori, Deh Umri, Nihal Pura

5.5.2 Policies and Programs Related to Intermediate Town

In Pakistan, there is no direct policy that specifically addresses the issues related to the intermediate towns of the country. But there are other policies, both integrated and sectoral, that address the issues related to the human settlements, such as National Settlement Policy (NSP), Management of Cities Policies, Settlement Planning, Shelter, Site and Services including Housing Policies, National Conservation Strategy (NCS) and Sarhad Provincial Conservation Strategy. All these policies mainly concentrate on the big cities of the country. Some specific policies for the development of intermediate- size towns with indirect policies and sectoral development programs, such as farm-to-market roads and highways in Punjab Province of Pakistan, that has a very strong effect on the development of intermediate towns. So also, area-development projects, particularly in Punjab province of Pakistan, i.e., Sargodha and Multan Areas Development Projects, Fruit and Vegetable Development Projects and other micro-enterprises development, particularly by AKRSP in Northern Areas and Chitral, Agricultural Development Bank, Small Industrial Development Board, Livestock, Horticulture and Tourism departments and small hydropower generation projects.

5.5.3 Theoretical Framework for Intermediate Town

The study of intermediate towns, particularly with their location characteristics, growth and function, is very important for rural development. The study of why and how these service functions concentrate together in a certain location is called Central Place Theory presented by Walter Christaller. He referred to the rural settlement that developed from this tendency as "Central Place". This study concentrates only on the central places with sizes between 25,000 to 99,999. The small and intermediate towns perform a lesser function, are more in number and are relatively located near to each other, while the large towns and big cities perform more functions, are few and are located apart from each other.

5.5.4 Functional Role of Intermediate Towns

The size of urban settlement is fundamental to the pattern of urban systems and their development functions in a region. Intermediate towns will provide particular locations for the specialized goods and services and make them available to the consumer throughout the fringe areas of the region. They will have access to lower-order development, as these towns can provide a de-concentrated, articulated and integrated system of cities with potential access to markets. They have access to lower-order goods and services in the local market, as well as higher-order functions that have to be located in the main city of the district, and it constitutes a "balanced" pattern of urbanization.

5.5.5 Intermediate Towns as Service Centers

Intermediate towns would perform social and economic functions that are important for regional development, functioning quite reasonably. Therefore, the intermediate towns are important not merely because of their size, but because of the services they render to the rural areas. As services centers, these towns can provide public, social, commercial and personal services not only to their population but also to the surrounding rural hinterlands.

These towns have sufficiently large populations to offer economies of scale for a wide variety of health, education and welfare services. Economies of intermediate towns would usually dominate by basic consumption and personal services. A study of intermediate cities in developing countries points out that "as they grow, manufacturing and productive services, construction, transport, communications, financial repair and related activities are more important.

Apart from the "Formal" sector of services, the "informal" sector of the economy of the intermediate towns would also play an important role, not only in supporting a large number of people earning their income, but also a large number of consumers who can get their daily needed things at cheaper rates at the most accessible locations.

5.5.7 Intermediate Towns as Agro-Processing Centers

Relatively large populations allow intermediate towns to stimulate agricultural production in their hinterlands. As the intermediate towns grow, it will reflect more and more intensification of agricultural production in the hinterlands. The tendency for farmers is to switch from subsistence to cash-crop production, the introduction of new advanced agricultural methods and procedures, and the diversification of village economies to meet the demand for agricultural and artisanal goods within these towns. In many Third World countries, the intermediate towns have grown as the result of their agricultural processing and distribution functions.

Intermediate towns will promote more equitable economic growth in rural regions. In a study for the World Bank, Richardson argues that these benefits can include commercialization of agriculture, provision of better services to people in rural regions, national spatial integration, diffusion of social and technical innovations from the major metropolitan areas, and from abroad, the decentralization of job opportunities, and "most important of all, the more equitable distribution of welfare, among urban areas and regions resulting from an intermediate-city strategy". These towns act as cultural places and provide access to the services, facilities, and resources needed for rural development. They can provide better marketing- facilities for the agricultural products produced in the surrounding rural areas and create a more efficient way for agro-processing and agricultural-support industries in rural areas, which increase food production, and provide off-farm employment opportunities.

The development of intermediate towns will spread the benefits of development as widely as possible throughout the district economic sector and geographical area and the effects will be a more balanced development. Moreover, strengthening Intermediate towns and the linkages between them and cities can stimulate equitable bottom-up development.

distribution of welfare, among urban areas and regions resulting from an intermediate-city strategy". These towns would act as cultural places and provide access to the services, facilities, and resources needed for rural development. They will provide better marketing- facilities for the agricultural products produced in the surrounding rural areas and create a more efficient

way for agro-processing and agricultural-support industries in rural areas, which increase food production, and provide off-farm employment opportunities.

Intermediate towns play an increasingly important role in the development process of developing countries. This is because of more emphasis on agriculture and rural development; growing awareness towards the formulation of urbanization policies and strategies; and planned dispersal of development activities, particularly in countries that have attained reasonable high levels of urbanization and industrialization.

5.7 PROPOSED SATELLITE TOWN

Satellite town is a new concept of urban planning and it is used to control the expansion of the existing urban area. It is a design somehow near the urban area that is linked with the main core or CBD through existing infrastructure. People of satellite towns commute to the main core on daily basis. due to satellite towns, the burden upon the existing urban infrastructure can be reduced.

5.8   TRANSPORTATION NETWORK

A. EXISTING SITUATION

Accessibility is a prerequisite for organizing all kinds of social or economic activities. This makes transport a core of development planning, cutting across every element of the socio-economic system. Transport plays a crucial role in generating growth by facilitating both domestic and international trade, and by increasing access to other social infrastructures such as schools, hospitals, parks and so on. Transport investment has the potential to raise the social return to both public and private capital and also significantly contributes to lowering the cost of production. The quality of transport infrastructure and level of services is therefore among the key factors that determine the overall efficiency of an economy. This Chapter describes the traffic and transportation network in District Nowshera, and what needs to be done to alleviate the problems of this sector.

main transport infrastructure in District Nowshera is provided by Motorway (M-1), the Grand Trunk Road (N-5), the Karakoram Highway (N-35), Nowshera - Dir - Chitral Highway (N-45) and Nowshera - Charsadda - Shergarh Highway (S-9)and several links to various highways, three railway stations (operated by Pakistan Railways), enabling rail, road and air connections (through Peshawar International Airport, Peshawar - served by all Pakistani airlines and several foreign airlines) to all Pakistani cities as well as neighboring countries like Afghanistan and China. The transport network in District Nowshera is described in detail in the District Studies Report, a summary of which is given below:

5.8.1   Roads and Bridges

The overall density of all national and provincial highways and roads in the province is 0.23 km/sq. km and for provincial highways and roads the density is 0.18 km/sq. km. Accordingly overall road density in District Nowshera (excluding Motorway and National highways) is

0.245 km/ sq. km, which is more than the provincial road density. It is because Nowshera is well connected through a road network and located adjacent to the provincial capital of Khyber Pakhtunkhwa.

The M1 stretch of the Motorway connects Peshawar with Islamabad and joins M2 at Islamabad Interchange as a continuation of the Motorway network. Emanating from Peshawar Ring Road, it moves in an Eastern direction, crossing over the Kabul River. From here it passes through Charsadda, Risalpur, Swabi and Rashakai before crossing the Indus River. It leaves Khyber-Pakhtunkhwa province and enters Punjab, in which it passes through Attock, Burhan and Hasan Abdal. The whole stretch of the M1 consists of 6 lanes with a number of rest areas along the route.

In District Nowshera, there are about 428 KMs Provincial Highways and Roads, as per data reported by Communication & Works Department Peshawar. These include 355 KMs of High Type highways & roads and 73 KMs of Low Type highways & roads.

There are 67 Secondary roads in the District with a total length of about 338 Kilometers; the Right of Way varies from 5.48 meters to 18.89 meters, Carriageway Width (Black Top) varies from 3.66 meters to 7.31 meters and the Shoulder Width from 0.91 meters to 5.79 meters. Details including road names, length, right of way, and carriageway are given in Chapter 14 of District Studies Report, Nowshera.

There is a total of 32 Access roads in the District; this is the fourth category of roads and includes local and farm-to-market roads. The total length of the roads is about 1,260 Kilometers, with the Right of Way varying from 4.26 meters to 7.31 meters, carriageway width (Black Top) 3.66 meters and shoulder Width ranging from 0.30 meters to 1.82 meters. Details including road names, length, right of way, carriageway, and shoulder width are given in Chapter 14 of District Studies Report, Nowshera.

There are 35 bridges in the District; details regarding road name, segment, bridge type, width, length and height are given in District Studies Report, Nowshera (Chapter 14, Table 14.7).

5.8.2   Vehicles Registered in District Nowshera

There is total of 34,790 vehicles[37] registered in District Nowshera, of which 479 are Cars, 75 are Jeeps, 244 tractors, 159 Pick-ups, 159 Vans, 108 Truck (Mazda, Racket, 10 Wheelers), 2200 are Three wheelers (Auto-rickshaws, Qing qi, Loaders) and 19 Buses are registered with excise and taxation department of district Nowshera.

The projected number of vehicles in District Nowshera for the next 10 and 20 years, based on the average annual growth rate of 3.5% for the last 10 years is estimated at 49,075 and 69,225 respectively.

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[37]Source: Provincial Excise & Taxation Department 07/10/2019, Government of Khyber Pakhtunkhwa

5.8.3 Traffic Surveys

In order supplement to the above-described traffic data and to have firsthand data on traffic volume and nature, fresh traffic counts - Manual Classified Counts (MCC) have been conducted by the Consultants, on primary roads of District Nowshera at entry and exit points, along with OD survey to have an up to date scenario.

The traffic counts were conducted for 12 hours, from 7 AM to 7 PM in January 2017. Analysis of the data obtained shows that the peak hours on different roads were as follows in orderly:

- GT Road (Peshawar)
- Mardan Road
- Swabi Road
- GT Road (Attock)

Table 5-5: Traffic Volume on Primary Highways in District Nowshera[38]					
Sr. No	Description	Mardan Road	Swabi Road	GT Road (Peshawar)	GT Road (Attock)	Total
1	In-Coming	7897	5213	12453	4476	30039
2	Out-Going	7451	5531	15763	5630	34375
	Total	15348	10744	28216	10106	64414

Details of traffic surveys, including mode-wise traffic volume, traffic flow during peak hours, level of traffic flow on primary surveys and origin-destination surveys are given in Chapter 14 of District Studies Report, Nowshera. Surveys on primary roads of Nowshera were conducted on a 12-hour basis, from 7 AM to 7 PM, in January 2017.

Following are the main inferences:

- The aggregate flow in terms of a number of vehicles (both sides, all modes) on all four primary roads was 64,414 vehicles.

- Among the total vehicles, the largest share is of cars/jeeps (29%), wagons/minibuses (about 19%), closely followed by motorcycles (17%) and pick-ups/open trucks (about 12%). If trucks of all categories are added, these become significant i.e. about 18%. Large buses and tractor trolleys are much lesser (less than 3% each).

- The total flow of motorcycles/scooters is 11,504 (all roads, both ways), of which the maximum flow is on Swabi Road (39%), followed by Mardan Road and GT Road (Peshawar side), around 25% on each. The volume of motorcycles on GT Road (Attock side) is only about 11%.

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[38]Source: Twelve hours' traffic Surveys by the Consultants from 7 AM to 7 PM in January 2017.

- The total flow of cars/jeeps is 18,660 vehicles, of which more than 51% ply on GT Road (Peshawar), around 22% on Mardan Road, 14% on Swabi Road, closely followed by GT Road (Attock), and where the percentage is about 13%. The trend is fairly similar in the case of wagons/minibuses.

- The volume of large buses is mostly on GT Road (more than 43%) from/to Attock and about 40% from/to Peshawar.

- The flow of truck traffic is heaviest on GT Road (Peshawar side), followed by Mardan Road and GT Road (Attock side). The truck traffic is minimum on Swabi Road.

- If all modes of traffic are considered in aggregate, the flow is highest on GT Road (Peshawar side) i.e. 44%, followed by Mardan Road (24%). The volume of truck traffic is about the same on Swabi Road and GT Road (Attock side), i.e. 16 to 17% each.

- To determine the level of service against the traffic carrying capacity of these roads, maximum traffic flows during peak hours have been converted into equivalent passenger car units (PCUs).

- During the peak hour, about 49% PCUs are on GT Road (Peshawar side), around 18% each in case of Mardan Road and Swabi Road, and 15% in case of GT Road (Attock side)

- For determining the existing level of service of roads under the given traffic flow and other conditions, standards of traffic density ranges as explained in the District Studies Report (Table 14.16) were adopted. The level of service is a qualitative measure describing operational conditions within a traffic stream. It is seen that GT Road (Peshawar side) is approaching unstable flow; it is a reasonably free flow on Mardan Road, and stable/free flow on GT Road (Attock side) and Swabi Road.

- Origin-Destination Surveys have been conducted on primary highways of District Nowshera, at entry/ exit points. The survey was single-day based and covered mainly peak hours of traffic flow.

- A total of 662 vehicles were interviewed of which 36% were cars/jeeps, followed by 33% trucks, 21% wagons/minibuses, 5% buses and 5% tractor trolleys, as inferred from Table 14.20, Chapter 14 of District Studies Report, Nowshera.

- The numbers of vehicles interviewed for origin/destination were fairly uniform on all roads, ranging from 23% on Swabi Road to about 28% on GT Road (Peshawar side).

- Of those whose destination was Nowshera, more than 26% originated from Peshawar, another 26% from Swabi, 22% from Mardan and 15% from Islamabad/Punjab.

- Of those who originated from Nowshera, the destination of 36% was Peshawar, about 27% were Swabi, about 20% Mardan and about 15% were Islamabad/Punjab.

5.8.4 Rail Network

The total railway route kilometrage in KP is about 228, all of which are broad gauge. In the five Districts of Peshawar Valley, the track lengths are given below, including 72 km in District Nowshera.

- Peshawar: 31 kms
- Mardan: 51 kms
- Nowshera: 72 kms
- Charsadda: 15.5 kms
- Swabi: 0 kms

There are three railway stations in District Nowshera i.e., Nowshera, Pabbi and Jahangira. Nowshera Railway Station is of category "B", and only four trains pass through this railway station i.e., Khushal Express, Awami Express, Khyber Mail and Quetta Express. In the year 2010, the number of passengers using the Nowshera railway station was 34,754, the average being 2,896 passengers per month[39]. In 2011, the number rose to 4,062 passengers per month.

Pabbi Railway Station is also category "B", and two trains pass through it i.e. Khushal Express and Awami Express. There is no freight traffic from this railway station as the passengers mostly use Peshawar railway station for this purpose.

Jahangira is the third Railway Station of District Nowshera, and three trains i.e. Khushal Express, Khyber Mail Express and Awami Express pass through it. The number of train passengers using this station was 61,141 in the year 2011, or on average 5,095 passengers per month.

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[39] Source: Pakistan Railways, Peshawar Division.
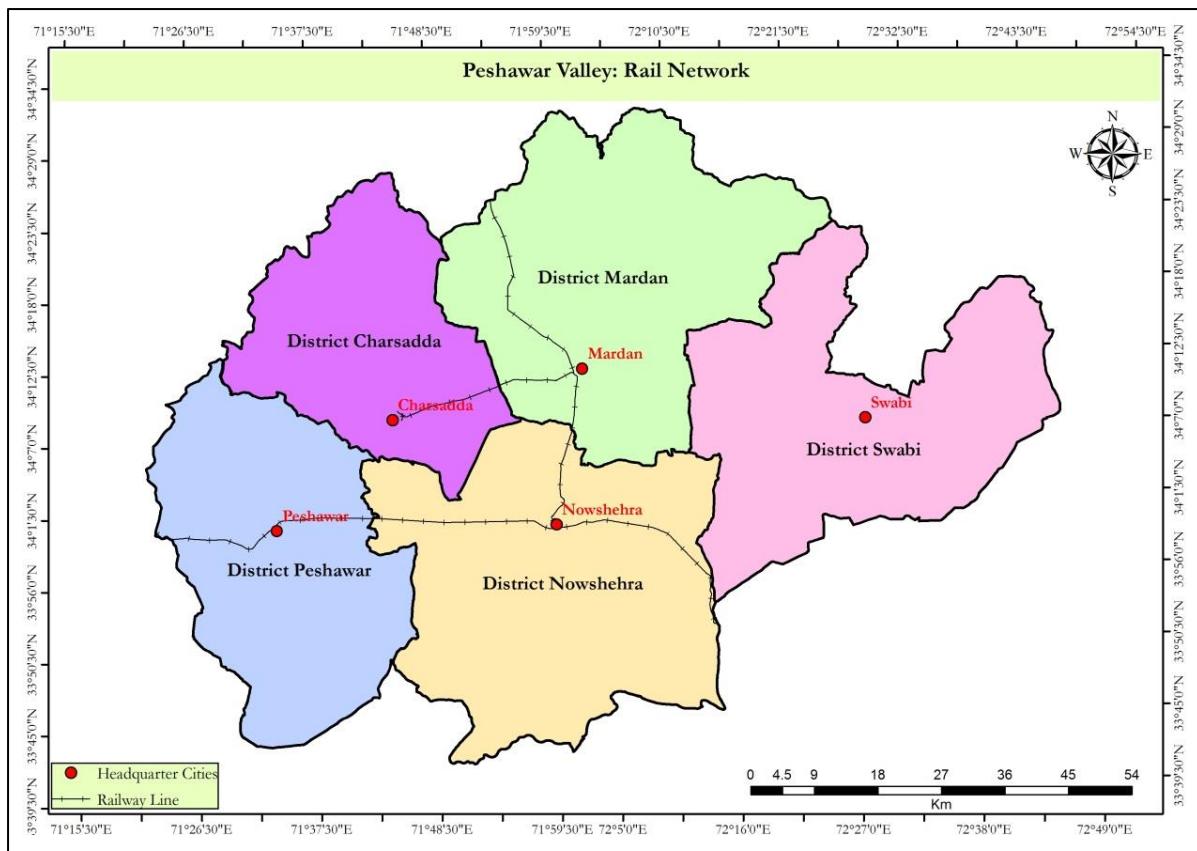
Map 5-3: Rail Network in Peshawar Valley

Map 5.3 represents the railway network of Peshawar valley. In Peshawar valley, the railway network serves District Nowshera, District Peshawar, District Mardan and district Charsadda.
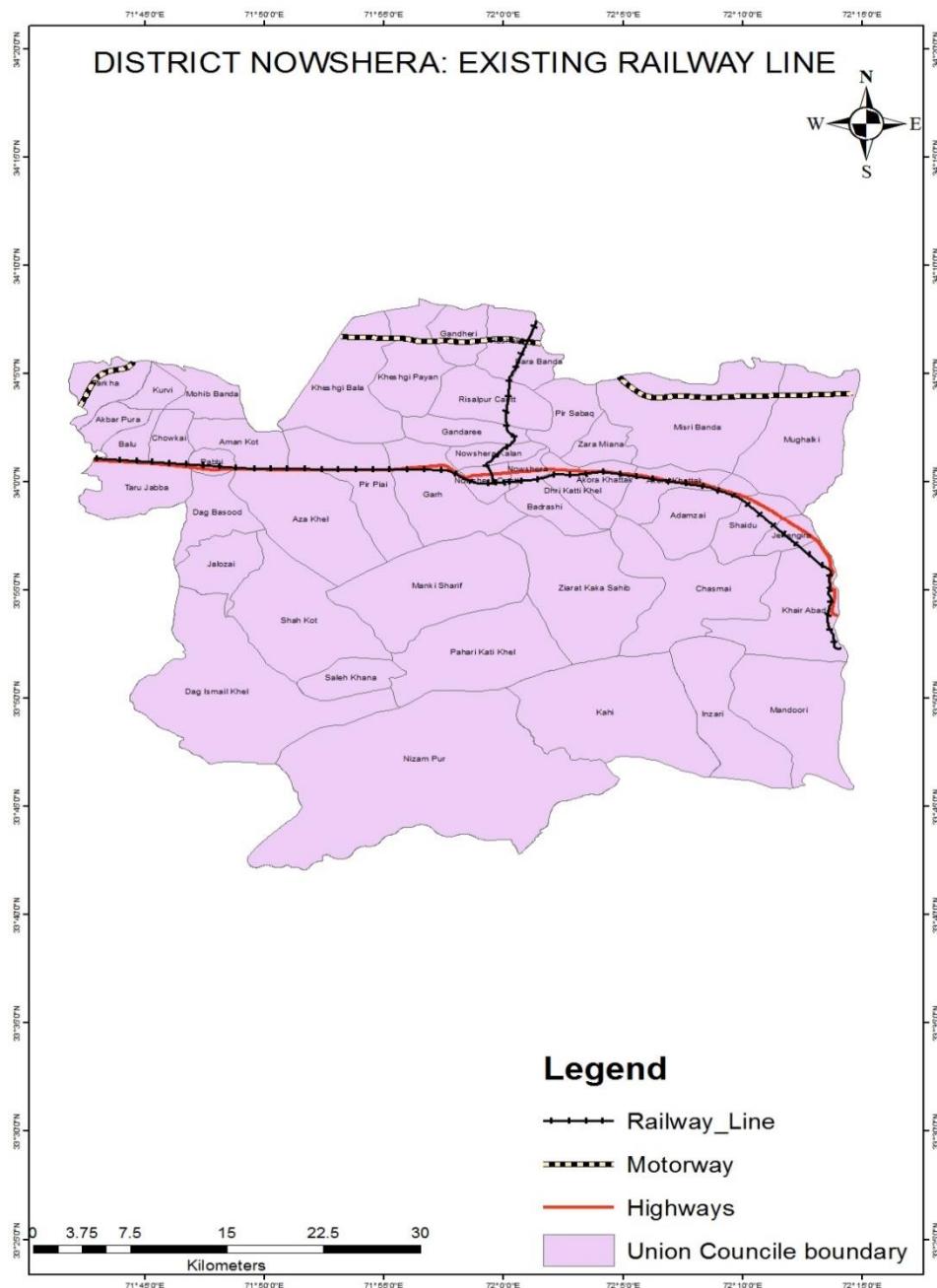
Map 5-4: Railway line in district Nowshera

Map 5.4 represents the railway line of District Nowshera. The railway line passes through the vicinity of urban almost all MC. And also, there are 3 railway junctions near Jahangira MC, Nowshera MC and Pabbi MC.

B. TRANSPORT PROPOSALS

Effective road networks and proper management of the transport system play a major role in the efficient functioning of the city. One of the main objectives of the Land Use Plan at the District level is to increase the capacity of existing roads, open up new areas for development, and decentralise traffic management in the existing CBD including GT Road.

Accordingly, the following is proposed:

5.8.5 Northern Bye-Pass Road (Eastern Loop)

As given in Section 5.6.3-x, the flow of traffic on GT Road (Attock side) and Swabi Road at present is stable/free flow. However, in the years to come, Nowshera's future growth will be towards North-East as already elaborated in earlier sections. Provincial Housing Authority's Mega Education City, Sarhad Development Authority's industrial estate, and consultants' proposals about future residentiary areas, trade center and City Park are all in that direction. These are major traffic-attracting Land Uses and justify the main feeder road, which in fact will be the Eastern loop of the Northern bye-pass. It will originate from GT Road near Chashmai Road, and merge with the Western loop at the point where it meets Mardan Road. Thus, the Southern bye-pass and the two segments of the Northern bye-pass will form a ring road around Nowshera urban area.

5.8.6 Reducing Congestion in Central Area and New City Center

The existing transport system and road network in Nowshera is one of the major issues, which the citizens are facing for a long. The traffic jams on GT road are frequent, and the situation is not significantly different on other roads during the peak hours. GT road enters the city at Shaidu from the Eastern direction and runs all along the urban built-up area for about 56 km up to the Taru Jabba in the West. This road catches almost 90% of the traffic movement anywhere in the city as there is no alternate feeder available to the road users.

The problem originates from the irregular and haphazard urban sprawl. The trend of city expansion is most pronounced in the East-West direction along the GT road. Due to the non-availability of major radial roads and alternate feeder roads, the city is expanding in a linear direction. The result is that length of the urban area is much more than its average width. Due to this linear expansion, most of the unoccupied vacant land pockets in between or adjacent to the built-up area have remained undeveloped, which may get converted to urban slums as there is no proper accessibility and other basic infrastructure in these areas. Similarly, due to the linear expansion of the city, the cost of services provisions towards the extreme edges is much higher. The issue of the traffic has been further aggravated by the fact that most of the traffic generating activities i.e. educational, administrative, commercial, etc., are located on the GT road, adversely affecting the traffic flow.

Besides, the major traffic generating activities in the inner-City areas, i.e. wholesale commercial activities, administrative areas, higher-level educational institutions etc. may be gradually shifted to suitable locations as proposed in the Land use plan. But shifting is a slow and difficult process, and can only be done with the consent of all stakeholders. Besides, congestion can also be reduced in the urban area through better traffic management.

5.8.7 Widening of Inter-City Radial Roads

Besides the above proposals, the traffic problems can also be eased by widening existing radial roads from the city center (GT road) towards the outer edges of the city, and include:

- Nowshera-Mardan road

- Nowshera-Charsadda road
- Jahangira-Swabi road
- Cherat Road

The above roads have low traffic capacity and need to be widened and kept free from all types of permanent and mobile encroachments.

5.8.8   Local Roads toward North-East

In the Proposed area for urbanization in North-East, a mesh of new roads is proposed to be provided. Where ever appropriate, already existing local roads should be incorporated, developed and widened. New roads found necessary at the local planning stage should also be provided. This will facilitate phase-wise spatial development of the District in an organized way.

5.8.9 Proposed Road

Three new roads are proposed one road is from Kaka Sahib Rural Zone to the main highway its length is about 45 km, the second road from Jahangira MC to Nowshera MC and passes through a proposed new city and its length is almost 55 km and another road proposed of length 20 km from the highway to Motorway M-1 and passes through proposed New City.
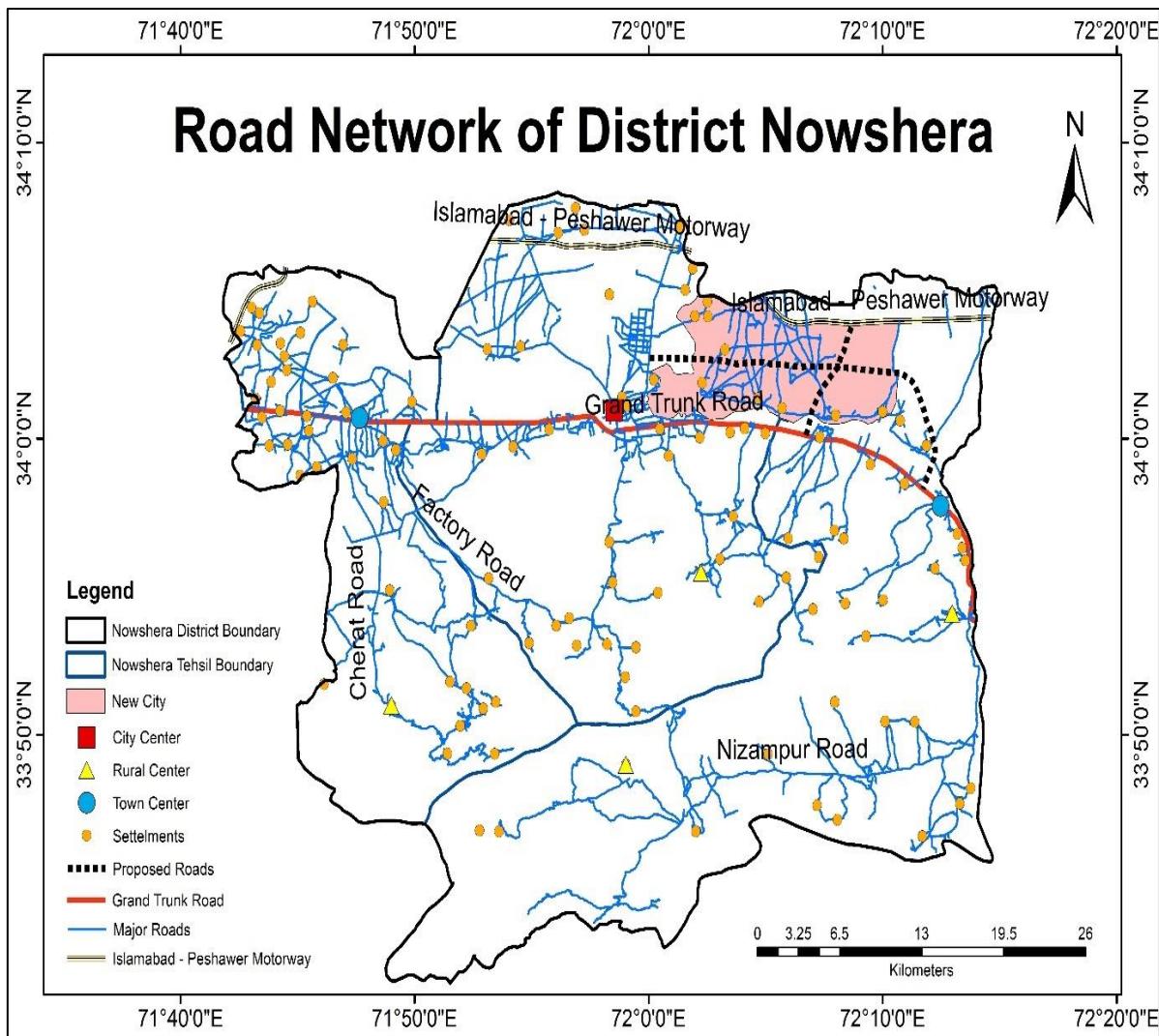
Map 5-5: Road Network Map of District Nowshera

Map 5.5 represents the road networks of District Nowshera. In District Nowshera, there is a Grand trunk road passing through almost all urban settlements. Motorway M-1 pass through District Nowshera.
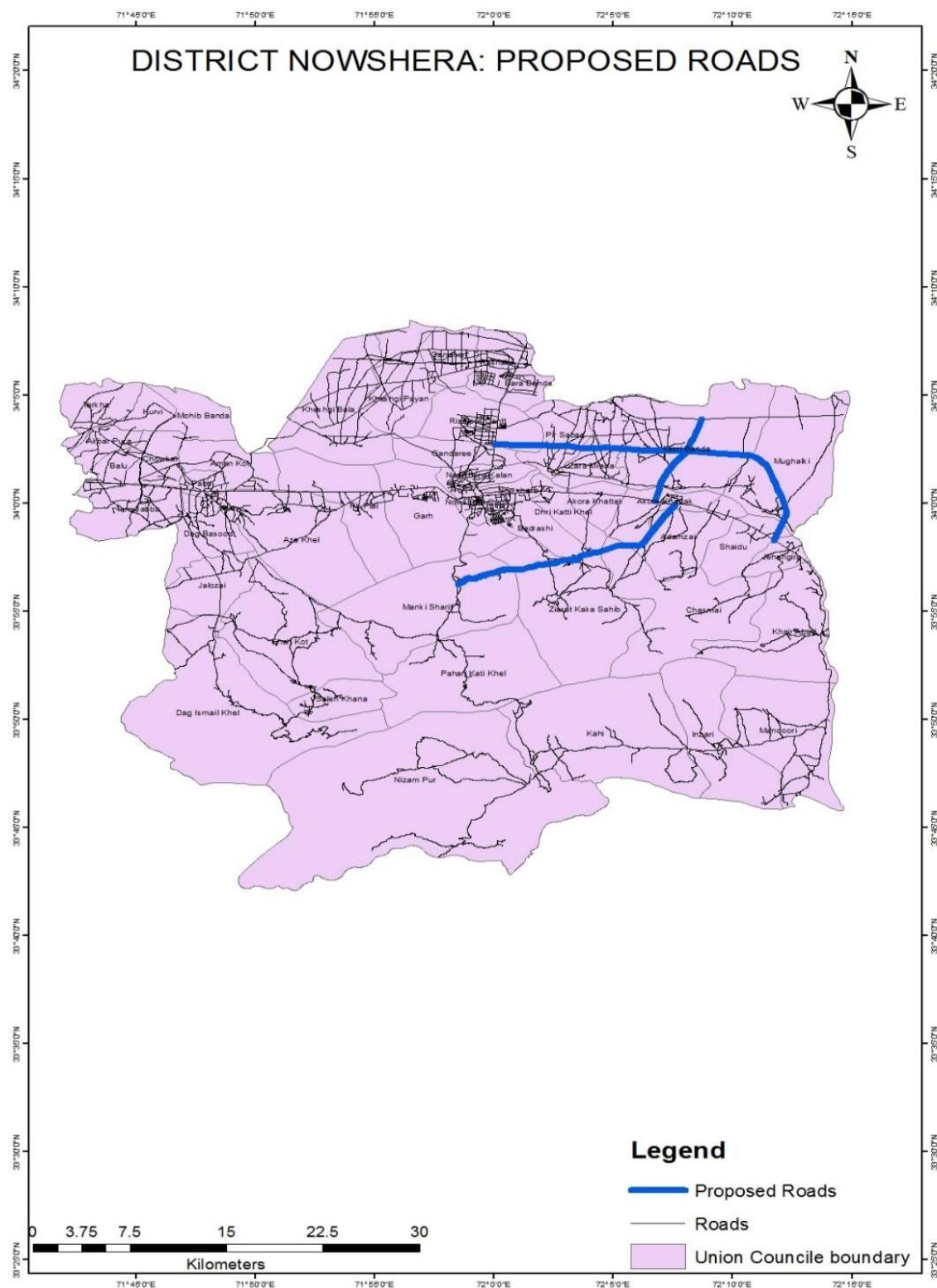
Map 5-6: Proposed roads of District Nowshera

Map 5.6 represents the proposed roads of District Nowshera. These roads meet with the motorway M-1 and also to the new proposed city to provide accessibility to Grand Trunk road.

5.9 HOUSING DEMAND (2019-2039)

5.9.1 Demand for Additional District Population

It is estimated that the additional population during the period 2019-2024 will be around 253,124 while that in the subsequent 15 years (2024-2039), the additional population will be about 1,403,936. The housing demand will increase accordingly which is calculated and given in (Table 5.6). This is based on the assumption that each family of 6 will have one house.

Table 5-6: Housing Demand for Additional District Population									
Year	Population	Additional Population				Housing Demand			
		2019-2024	2024-2029	2029-2034	2034-2039	2019-2024	2024-2029	2029-2034	2034-2039
2019	1604671								
2024	1857795	253124				42178			
2029	2253341		395546				65924		
2034	2689045			435704				72617	
2039	3261731				572686				95448

5.9.2 Housing Shortage/Backlog in District

The main factors that need to be considered for assessing the housing backlog include population, household size and the current housing stock. The current (2019) population of the District Nowshera has been calculated from the census 2017 District wise

Table 5-7: Current Housing Backlog in District Nowshera			
Population	Housing required	Housing stock	Housing backlog
1604671	267445	210035	57410

Population, and divided by 6 (assuming a family size of 6) to calculate the total houses required in 2019; the District population was then divided by the average household size of the District (7.64) to calculate the existing housing stock; the difference between the two gives the current housing shortage. Based on statistics in Table 5.7, the housing backlog in District Nowshera is 57,410 plots/units.

5.9.3 Density and HouseHold size

The household size of district Nowshera is 6.5 in 1981 which increased to 7.8 in 1998 and a slight increase occur of 0.2 up to 2017 while up to 2017 the household size will decline to 6.

Density is the number of people living per square kilometer in 1981 Density of District Nowshera was 310.8 per sq. km which increase to 500 in 1998 and 918 per sq. km in 2019 while up to 2037 the density will increase to 1865.97 persons/per sq. km.

Table 5-8: Density & HH size of District Nowshera		
Year	Density (per SQ km)	Household size
1981	310.8	6.5
1998	500	7.8
2019	918	8
2039	1865.97	6

5.9.4 Gross Housing Demand in the District

Based on calculations in earlier Sections, the summary of findings and gross housing demand is the District is given below:

Housing Demand for Additional Population (2019-2039)   : 216893 houses

Current Backlog (2019)   : 57410 houses

Gross Demand   : 216893+57410= 274303

5.9.5 Housing Demand in Urban Settlements of District Nowshera

There are eight urban settlements in the District and including Nowshera city, Nowshera Cantt, Pabbi, Jahangira, Risalpur Cantt, Amangarh, Akora Khattak and Cherat Cantt. The housing demand in these settlements is calculated as below:

It is estimated that gross housing demand for the additional population in all eight urban settlements of District Nowshera during the period 2019-2029 will be around 12,861 while that in the subsequent next 10 years (2029-2039), it will be 15,677. And overall 2019-2039) would be 28538. This is based on the assumption that each family of 6 will have one house. Settlement-wise statistics are presented in Table 5.9.

Table 5-9: Additional Housing Demand for Additional Population in District Nowshera							
Urban Area	Population in Year			Additional Population		Additional Housing Demand	
	2019	2029	2039	2019-2029	2029-2039	2019-2029	2029-2039
Jehangira	54974	67013	81688	12039	14675	2007	2446
Pabbi	57487	70076	85422	12589	15346	2098	2558
Akora Khattak	34211	41703	50836	7492	9133	1249	1522
Nowshera City	86943	105983	129193	19040	23210	3173	3868
Amangarh	40184	48984	59711	8800	10727	1467	1788
Nowshera Cantt	38041	46372	56527	8331	10155	1389	1693
Risalpur Cantt	38134	46485	56665	8351	10180	1392	1697
Cherat Cantt	2357	2873	3502	516	629	86	105

5.9.6 Housing Shortage/Backlog in Urban Settlements

The main facets that need to be considered for assessing the housing backlog include population, household size and the current housing stock. The overall required number of houses in each settlement was calculated by dividing the current population by the assumed family size of 6 as given in the National Housing Policy. The existing housing stock was calculated by dividing the population by the household size of the respective settlement. The difference between the number of houses required and the existing housing stock gives the current housing shortage. Settlement-wise housing backlog is given in Table 5.10.

Table 5- 10: Housing Backlog in Urban Settlements of District Nowshera					
Urban Area	Population 2019	Housing Required	H.H Size	Existing Stock	Current Backlog
Jehangira	54974	9162	7.9	6959	2203
Pabbi	57487	9581	7.9	7277	2304
Akora Khattak	34211	5702	7.4	4623	1079
Nowshera City	86943	14491	7.4	11749	2742
Amangarh	40184	6697	7.2	5581	1116
Nowshera Cantt	38041	6340	7.2	5283	1057
Risalpur Cantt	38134	6356	7.4	5153	1203
Cherat Cantt	2357	393	7.1	332	61
Total	352331	58722	7.44	46957	11765

5.9.7 Gross Housing Demand in Urban Settlements

Table 5.11 below shows the number of houses required for the additional population during the first 10 years (2019-2029) and subsequent 10 years (2029-2039), the current housing backlog, and the gross housing demand over the next years. The number of houses required by the end of the plan period in Nowshera City is 9783, Jahangira and Pabbi (around about 7 Thousand), Akora Khattak 3850, and approximately five thousand in Amangarh. In Nowshera

Cantt and Risalpur Cantt, there are around 4 thousand, while in Cherat Cantt only 252 houses will be required for the plan year (2039).

Urban Area	Additional Housing Demand			Current Backlog	Gross Housing Demand (2019-2039)
	2019-2029	2019-2039	Total (2019-2039)		
Jehangira	2007	2446	4453	2203	6656
Pabbi	2098	2558	4656	2304	6960
Akora Khattak	1249	1522	2771	1079	3850
Nowshera City	3173	3868	7041	2742	9783
Amangarh	1467	1788	3255	1116	4371
Nowshera Cantt	1389	1693	3082	1057	4139
Risalpur Cantt	1392	1697	3089	1203	4292
Cherat Cantt	86	105	191	61	252
Total	12861	15677	28538	11765	40303

Table 5- 11: Gross Housing Demand in Urban Settlements

5.9.8 Existing housing supply

The main public sector housing schemes in Nowshera include the following:

i) Jalozai Housing Scheme

The Jalozai site is located in District Nowshera on main Cherat Road, approximately 8 km from main GT Road near the university as well as Jalozai industrial estate. The total area of the scheme is 8905 kanals, while the number of plots is 8,044. Plots of 5 Marla, 7 Marla, 10marla and 1 Kanal have been provided in the Scheme, as per details given in Table 5.12.

Table 5-12: Land use Distribution in Jalozai Scheme	
Land Use	Percentage
Residential	48.27 %
Commercial	3.72 %
Open spaces	12.77%
Public buildings	5.35 %
Grave yard	2.08 %
Roads	27.81%

In the Plan, 95 Kanal have been reserved for apartments (about 500) of different sizes. The facilities in the Scheme include a school, mosque and commercial area in each sub-neighbourhood level.

Modern amenities provided in the Scheme also include a mini golf course, hospital, community club, police station, fire brigade, post office and telephone exchange. The maximum width of the main road is 200 ft and the minimum street width is 30ft. When habituated, the total population of the project will be around 60,000. The land uses

Table 5- 13: Plot Size Distribution in Jalozai Scheme	
Plot size	**No. of plots**
5 Marla(25'X54')	2504
7 Marla(31'X61')	1870
10 Marla(37'X74')	2590
01 kanal(60'X90')	1080
Total	**8044**

ii) Mega City

Mega City spread over 50,000 Kanal is a project of the Provincial Housing Authority. The site is located near Kernel Sher Khan Interchange on Peshawar - Islamabad Motorway. The project aims at easing the housing problem and coping with housing demand in District Nowshera. Currently, its feasibility study is under process.

iii) Schemes under Cooperative Housing Act

Following four housing schemes have been approved and developed under the Cooperative Housing Act in District Nowshera:

i. Wapda Colony Taru Jabba
ii. Artillery School Center Colony
iii. Armor Colony Monkey Road Nowshera
iv. Armor Court Center Colony Hakimabad

iv) Approved Private Housing Schemes in Nowshera

There are 8 approved housing schemes in Nowshera which are Muslim Educational City at AzaKhel Bala, Cherat Valley, Khyber Garden, Khyber Motorway Garden, Paradise City, Phase-I, Sher Shah Soori Motorway Town, Khushal Garden and Khattak City (Table 5.14). The largest of these is Muslim Educational City at Aza Khel Bala spread over about 941 kanals, while the smallest is Khattak City (310 kanals). The aggregate number of residential plots in these eight schemes is 5,249, of which about half (2,411) are of 5 Marla's, and 1590 plots are of 10 Marla's. As seen in the Table, other categories of plots are lesser.

Table 5-14: Approved Private Housing Schemes in Nowshera										
Sr. No.	Name of Scheme	Area	Plot-Size Distribution							Commercial Plots
			2 kanal	1 kanal	10 Marla	7 Marla	5 Marla	3 Marla	Miscell.	
1	**Muslim Educational**	940.76 Kanal	-	233	384	110	284	-	99	-

#	Name	Area								Remaining
	City, Aza Khel Bala.									
2	Cherat Valley	870 Kanal	-	148	373	-	693	-	-	9 Kanal
3	Khyber Garden	296.32 kanal	-	38	62	-	340	-	-	2 kanal& 9 Marla
4	Khyber Motorway Garden.	320 kanal, 3 Marla	-	40	136	-	236	-	57	17 Kanal
5	Paradise City, Phase-I	968 kanal	93	167	286	-	466	-	-	52 Kanal
6	Sher Shah Soori Motorway Town.	318 Kanal	10	-	79	-	79	53	23	-
7	Khushal Garden	319 kanal, 10 Marla	10	96	160	-	44	56	-	-
8	Khattak City	310 Kanal	-	9	110	-	269	-	6	-
	Total		113	731	1590	110	2411	109	185	

v)   Unapproved Private Housing Schemes

Unapproved private housing schemes in Nowshera are as below:

- a) Amaan City, Akora Khattak (GT Road)
- b) Zia Model Town, Akora Khattak (GT Road)
- c) Saba Colony, Akora Khattak (GT Road)
- d) Malik City, Motorway Rashakai
- e) Blue City, Motorway Rashakai
- f) Abdullah Town, Amangarh Road
- g) Obaid Valley, Pabbi, Cherat Road
- h) Pearl City, Nowshera
- i) Ali Garden, Azakhel
- j) Madina Model Town, Akora Khattak
- k) Ghazali, Town Nowshera.

5.9.9   Net Housing Demand in the District

Net Housing Demand in the District

Based on calculations in earlier Sections, the summary of findings and net housing demand is given below:

Demand:

Housing Demand for Additional Population (2019-2039): 216893 houses

- Current Backlog   : 57410 houses

- Gross Demand : 216893+57410=274303 – (A)

Potential:

- Plots in private housing schemes: 5,249
- Plots in Public housing schemes : 8,044+56,250 (Co-operative housing schemes) = 64,294
- Total available plots/potential : 69,541 – (B)
- Net Housing Demand at District Level= A-B= 204,762 –(C)
- Considering housing density is 8 houses per acre[40] - (D)
- Considering low density that is 10 houses per acre – (E)
- Considering medium density that is 17 houses per acre – (F)
- Considering high density that is 32 houses per acre- (G)
- So total area required for housing in 2039 according to NRM is C/D = 25,595.25 Acres.
- So total area required for housing in 2039 according to low density is C/E = 20,476.2 Acres.
- So total area required for housing in 2039 according to medium density is C/F = 12,044.82 Acres.
- So the total area required for housing in 2039 according to high density is C/G = 6,398.81Acres.
- The area required for urban housing is 5,037.87 Acres or 20 sq. km

5.9.10 Housing Fluidity

In the case of Peshawar valley and especially District Nowshera, the housing market is following the same course as the rest of Pakistan. The variability of the housing market geographically; such as in the inner city versus the outer area is obvious. The collateral offered by the property in planned areas is much higher as compared to the inner-city area. Consultants are cognizant of the fact that housing agility is one of the many important aspects of collateral. It is therefore important to endeavour to expand the housing market by the local authorities in other relevant areas of collateral including proposals for harmonization and standardization at KP Including District Nowshera.

The fluidity in the economic sector due to the higher rate of return in the housing itself is a factor leading to a gradual increase in investment in the housing stock. During the past three years, the housing private sector developed almost eight residential areas offering some 5,249 plots. In addition to these eight approved schemes, several unapproved areas were also developed by the private sector.

Several studies conducted by the World Bank, Shelter Sector Development, Arif Hassan and Akhtar Hameed Khan Resource Centre have concluded that the role of the public sector

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[40] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 4.5, Page 61

should be that of a facilitator and regulator rather than that of a provider. The public sector shall therefore increase the fluidity of the housing market by speedy approval of townships and housing schemes plans and infrastructure design while the financial institutions shall relax and modify the principles of collateral and give subsidies to the house owners for basic shelter development.

5.9.11 Proposed Locations for New Residentiary Areas

As per the future growth scenario elaborated in Chapter 5, most of the future housing developments are proposed for the North-East of the District, between Motorway and GT Road. The proposed site is away from the flood-prone area due to River Kabul. There is a network of existing roads in and around the site. With Motorway in the North, GT Road in the South, and a proposed Northern bye-pass connecting GT Road with Mardan Road, passing through the site will provide good accessibility from all directions. The proposed area will have access to the Motorway through Karnal Sher Khan Interchange. Besides, all major future land uses are also proposed to be located towards North-East of the District, providing an optimum relationship between the housing area with work, educational, recreational and other land uses.

5.9.12 Housing Proposals

As the population is increasing at a rapid pace, therefore, housing demand is also increasing it will be 204,762 for the plan year (2039) and a reasonable amount of land will be required for housing it needs special attention to provide housing facilities or provide some kind of incentive can address the issue. The total area required for housing according to the Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards is 25,595.25 acres, but due to limited resources and to protect agricultural land in plan medium density is proposed and according to medium density 12,044.82 acres required for housing and Urban housing require 5,037.87 Acres or 20.38 sq. km to fulfil the housing demand up to 2039.

The followings are some kinds of assumptions that can reduce the land for housing.

- The regulatory authority makes some kind of complexity in the bye laws and approves the illegal housing societies.
- Housing societies should adopt regulatory approaches and advertise their housing society through which they must mention basic facilities of life to attract the people to make housing in development schemes.
- Each housing scheme proposes some kind of vertical development approach to increase densities and also regulatory authorities provide some kind of incentive that can enhance housing scheme owners to adopt that.
- The regulatory authority makes some kind of measures for in-fill development. And make sure that the new housing scheme should be according to the landlocked approach.

- The loss of agricultural land in both Urban and Rural will affect the productivity of the district. There is a need to make some kind of bye laws that can deal with rural housing and provide some kind of guidance for housing development and how to protect agricultural land.
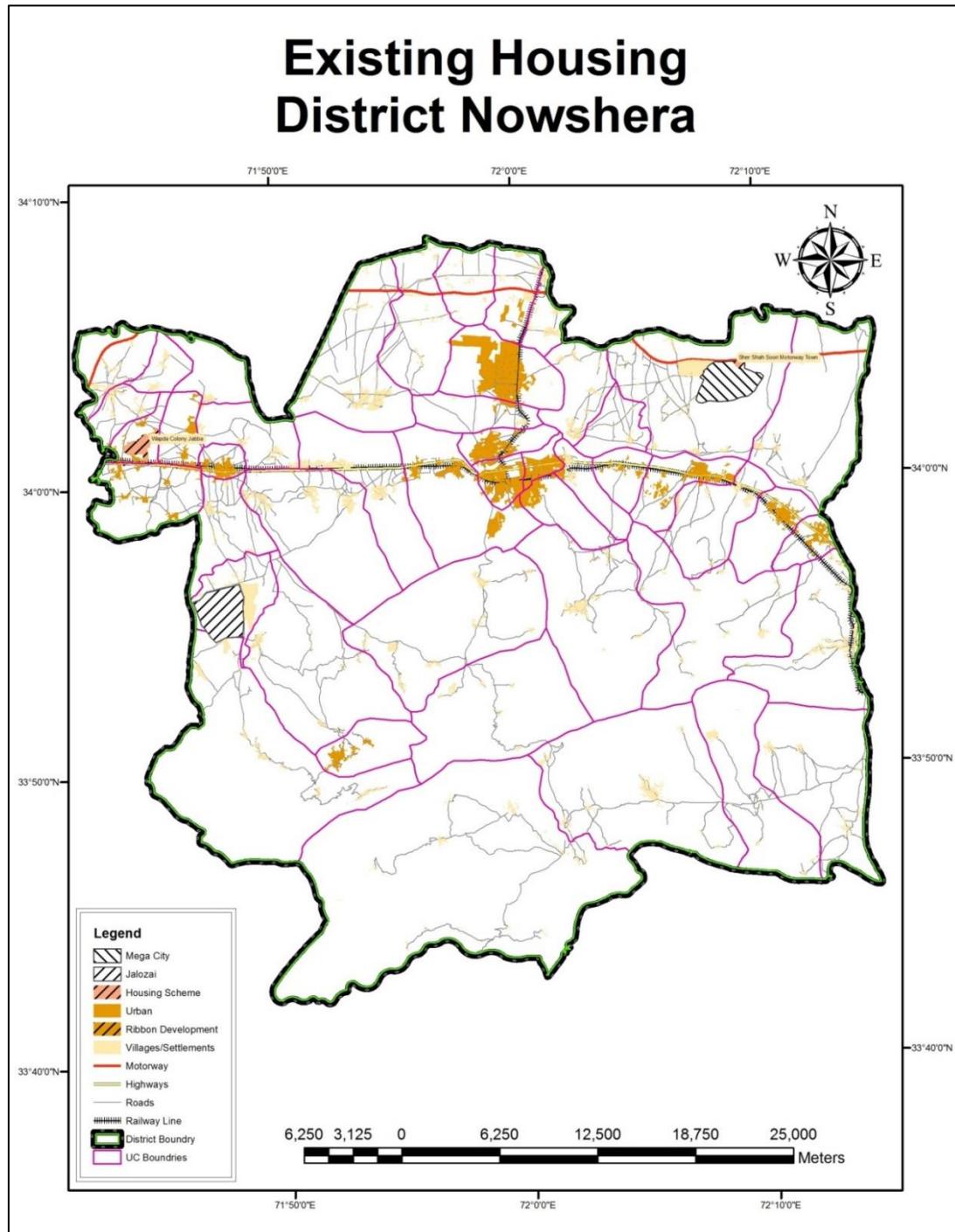
Map 5-7: Existing housing in District Nowshera

Map 5.7 represents the existing housing of District Nowshera. There are also two main housing schemes are shown that are in progress. Such as Megacity and Jalozai housing schemes.

5.9.13 Proposed New City

To meet the housing requirement for the additional population for the plan year 2039 a new city is proposed near Akora Khattak MC. All facilities for residents are proposed such as Housing 3120 acres, Civic zone 503 acres, Commercial 289 acres, Education zone 1258 acres, Floating zone 1256 acres, Industrial zone 385 acres, Labor Colony 775 acres, Park 38 acres, Urban farmland 12796 acres and Vertical housing 541 acres. The proposed New City is in the vicinity of Peshawar-Islamabad Motorway M-1.

Proposed New City somehow meet the demand for housing for the future. The remaining demand can be compensated with unapproved housing schemes that are up to 9 different sizes of plots.

5.10 EDUCATION

Vertical hierarchy is a basic feature in the delivery of formal education. It may be visualized as a pyramid, its base comprising many hundreds of primary schools, while at the top may be a few universities providing specialized education to a much lesser number of postgraduate students. Specialized institutions such as universities are virtually limited to metropolitan cities. According to National Reference Manual for Planning & Infrastructure Standards[41], a unit at each level is fed by a catchment comprising 3-7 facilities of the next lower level. The next lower level in the case of universities is Degree Colleges.

5.10.1 Educational Statistics (2017-2019)

Educational statistics in the District, including a number of different institutions, enrolment and teaching staff are given in the table below:

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

Table 5-15: Educational Statistics in District Nowshera (2017-2018)[42]									
Institutions	**Number**			**Enrolment**			**Teaching Staff**		
	Total	**M**	**F**	**Total**	**M**	**F**	**Total**	**M**	**F**
Primary	767	412	355	132,091	70,578	61,513	3,083	1,718	1,365
Middle	96	47	49	38,327	22,380	15,947	485	230	255
High	106	71	35	17,548	10,678	6,870	1,262	972	292
Higher Secondary	37	17	20	2,781	1,145	1636	538	293	245
Colleges	8	4	4	2,232	607	1,625	226	95	131

5.10.2 Educational Institutions in Private Sector

The total number of private primary schools in the district is 151 with 24996 enrolments, of which 58% are boys and 42% are girls. The number of private primary/middle/secondary schools is 224 with 77803 gross enrolments and 4475 teaching staff with a 17.4 teacher-to-student ratio.

Table 5-16: Number and Enrolment in Private Institutions[43]		
Level	**Number of Institutions**	**Enrolment**
Primary Schools	151	24996
Middle/High/Higher Secondary Schools	224	77803

5.10.3 Literacy Ratio

A person was treated as literate in the 1998 Census if he could read a newspaper or a journal of the same standard and could write a simple letter in any language. Literacy is measured as the ratio, in percentage, of the literate population to the corresponding population aged 10 years and over. The literacy ratio in District Nowshera has increased from 25.72 per cent in 1981, to 41.79 per cent in 1998. The literacy ratio for males in 1998 was 55.97 percent, as against 25.85 percent for females. The literacy rate of district Nowshera is 60% for Urban areas and 54% in a rural areas in 2014-2015. The ratio is much higher in urban areas when compared with rural areas, both for males and females. Table 5.17 compares the literacy ratio of Khyber Pakhtunkhwa with the overall Pakistan statistics. Over the years, the literacy rate in the Province has been improving from 14.5% in 1972 to 50% in 2009, but it is still lower

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[42] Source: Annual statistical report of Government schools 2017-2018, Department of elementary and secondary education. Government of Khyber Pakhtunkhwa.

[43] Source: Bureau of Statistics, Planning & Development Department, Govt. of Khyber Pakhtunkhwa, Khyber Pakhtunkhwa Development Statistics, 2017.

than the Pakistan average. In 2009, the literacy rate is reported to be 57% in the overall country as against 50% in the Province.

Area	1981			1998			2015[45]		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Overall District	25.72	34.00	16.03	42.5	60.6	22.7	56	71	41
Rural	11.85	19.63	3.19	29.19	46.14	10.47	54	69	38
Urban	37.84	46.03	27.83	54.09	65.27	41.11	60	75	46

Table 5-17: Literacy Ratio in District [44]

Area	KP			Pakistan		
	Total	Urban	Rural	Total	Urban	Rural
2009	50.00	62.00	47.00	57.00	74.00	48.00
1998	37.30	58.70	32.50	45.00	64.70	34.40
1981	16.70	35.80	13.20	26.20	47.10	17.30
1972	14.50	33.70	11.00	21.70	41.52	14.30

Table 5-18: Literacy Ratio: KP Vs Pakistan[46]

5.10.4 Participation Rates

Participation Rate is defined as the total enrolment, divided by the population of the age group, which corresponds to a specific level of education. The 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.

Table 5-19: Participation Rate in the District (2015-2016)

Schools	Total	Male	Female
Primary	57.18	58.86	55.36
Middle	29.75	33.28	25.89
High	25.02	29.45	20.28

[44] Pakistan Bureau of Statistics, Govt. of Pakistan, District Census Report of Peshawar, 1998, Page 34, Table 2.5.

[45] Development Statistics of Khyber Pakhtunkhwa, 2017, Bureau of Statistics. Planning and Development Department. Page 141, Table 114.

[46] For the year 2008-2009, the source is Khyber Pakhtunkhwa Development Statistics, 2010, Page 128, Table 97; for the years 1998, 1981 and 1972, source is the same, but Table 96, Page 127.

At the primary level, the participation rate in District for both sexes is approximately 57 (58 for males and 55 for females). At the middle level, the participation rates in the same order are around 30, 33 and about 26. In high schools, the overall participation rate is about 25, while that for males and females is 29 and about 20 respectively (Table 5.19).

5.10.5 Universities - District Nowshera

District Nowshera has two universities in the public sector and one in the private sector. Public sector universities are:

- University of Technology, Nowshera
- University of Engineering & Technology, Peshawar – Jalozai Campus

The university in the private sector is Northern University, Nowshera.
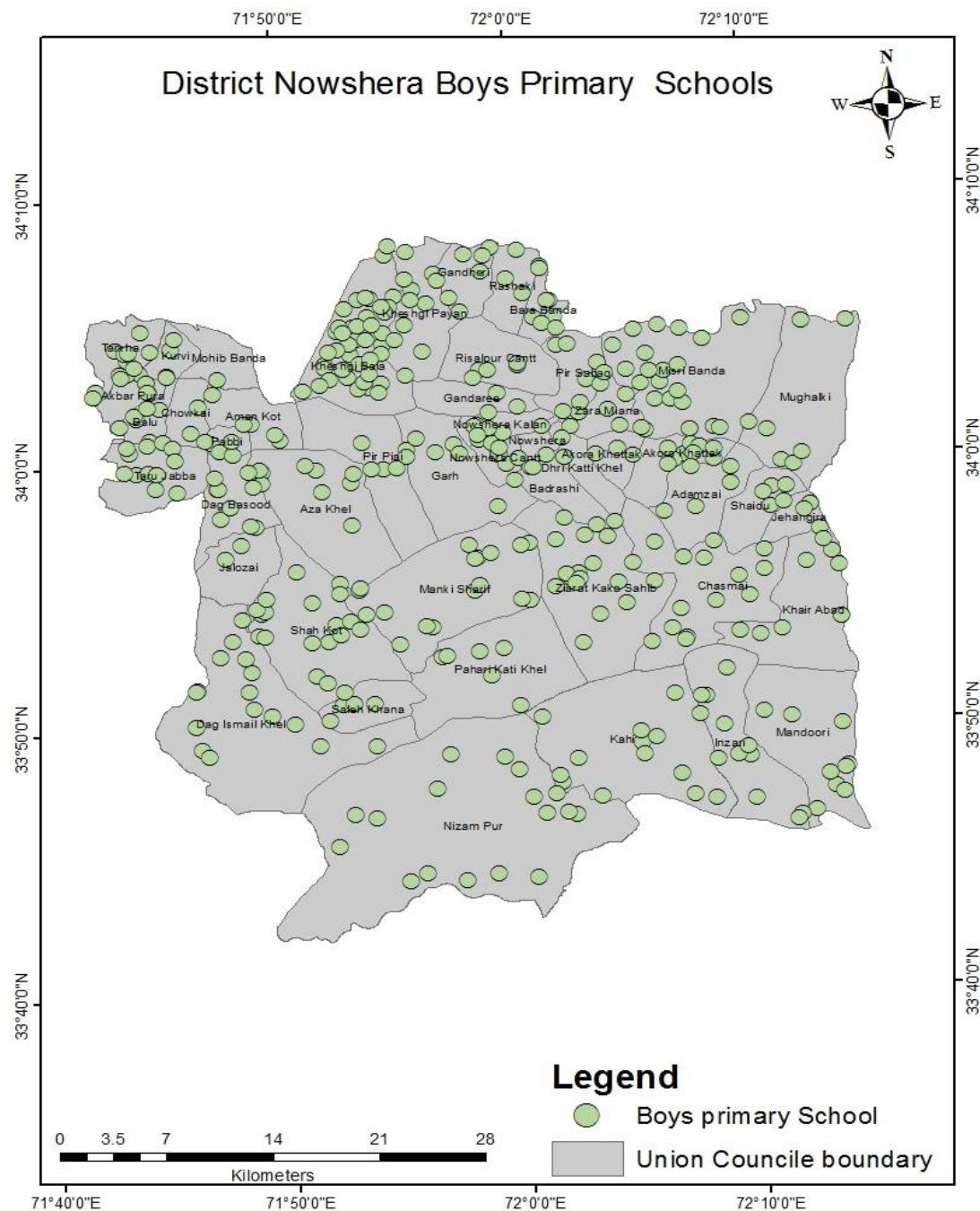
Map 5-8: Government Primary School for Boys

Map 5.8 represents the Government primary schools for boys. The map also represents their relative location in different UCs.
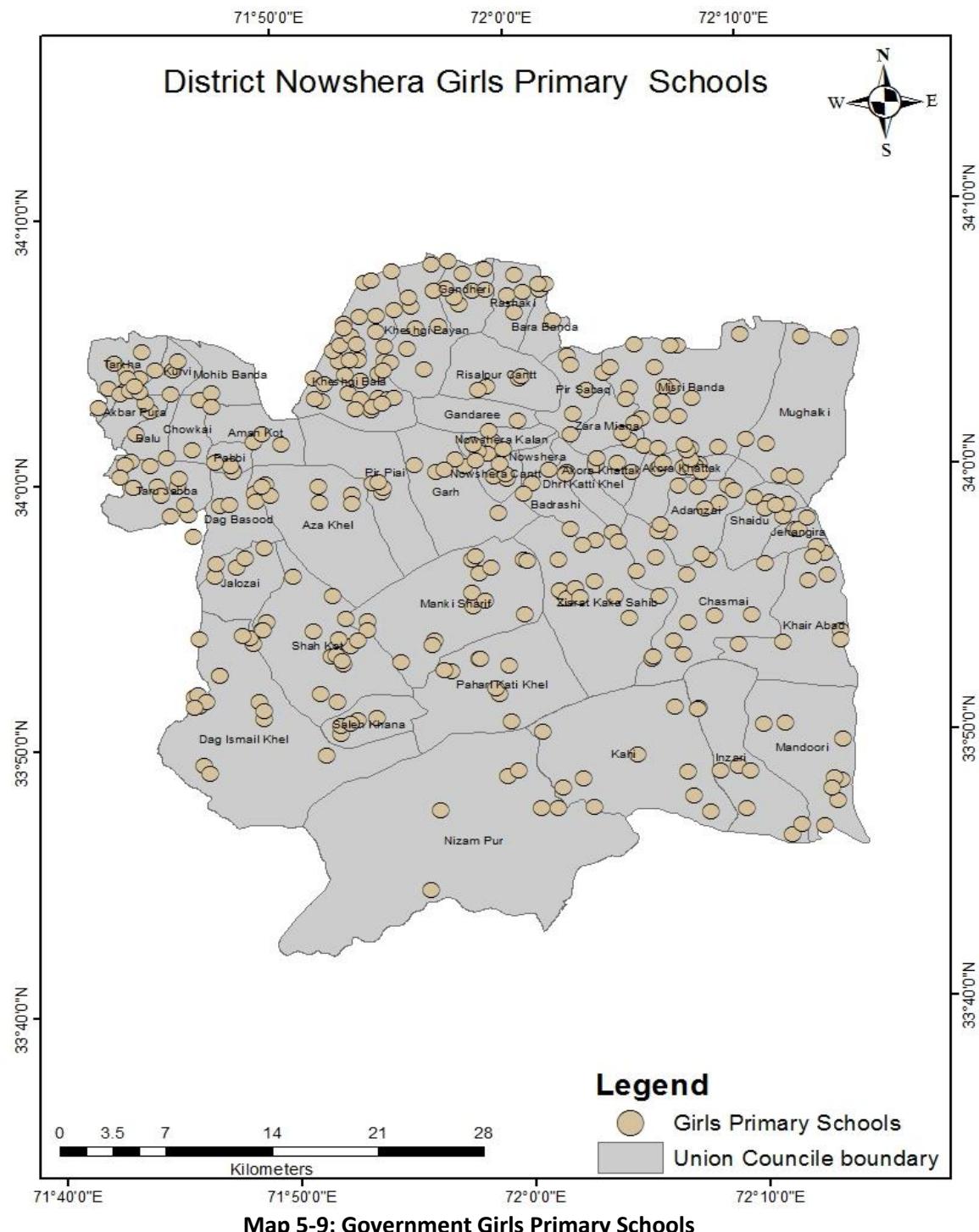
Map 5-9: Government Girls Primary Schools

Map 5.9 describe the location of government primary schools for girls. The map also represents their relative location in different UCs.
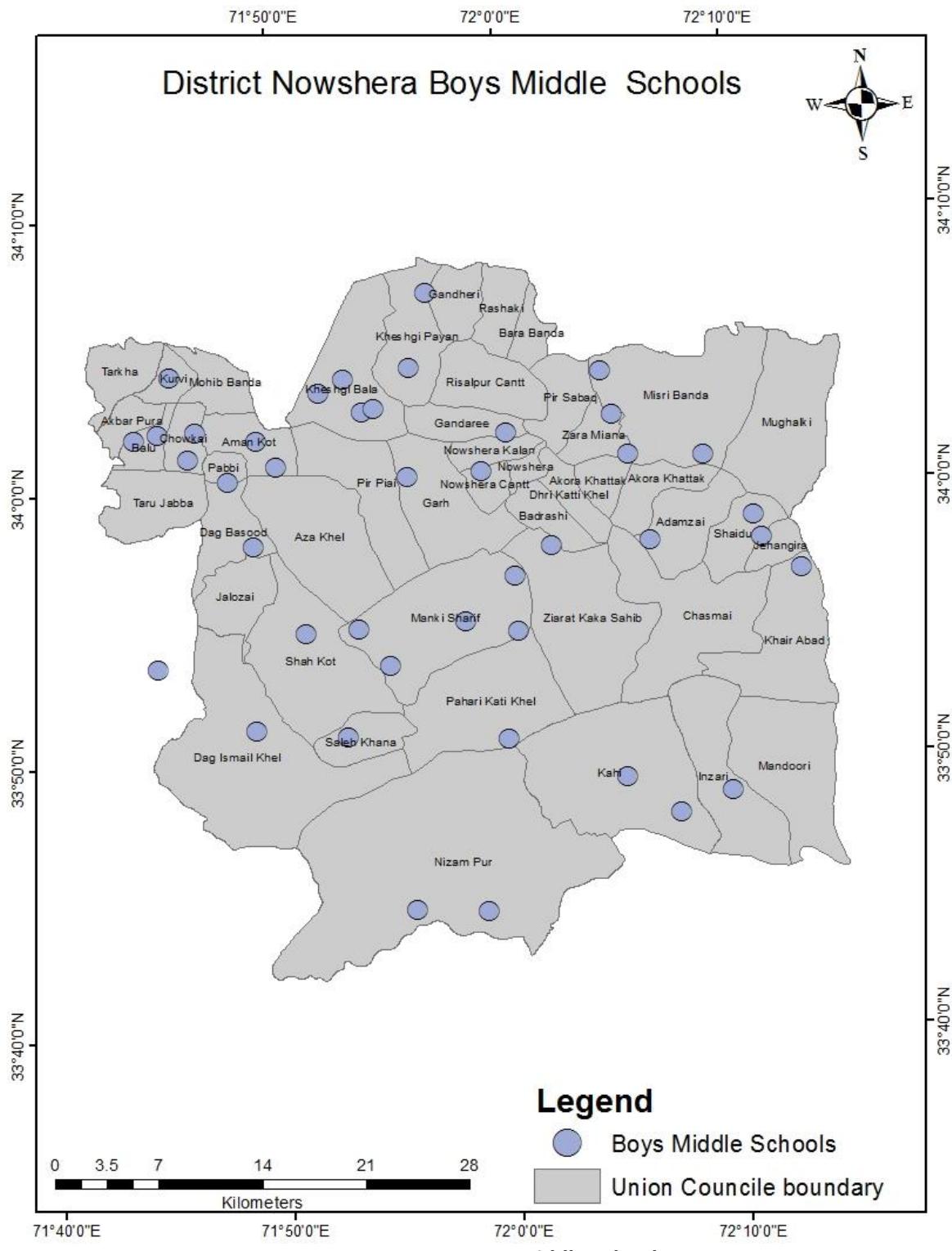
Map 5-10: Government Boys Middle Schools

Map 5.10 represents the Government middle schools for boys. The map also represents their relative location in different UCs.
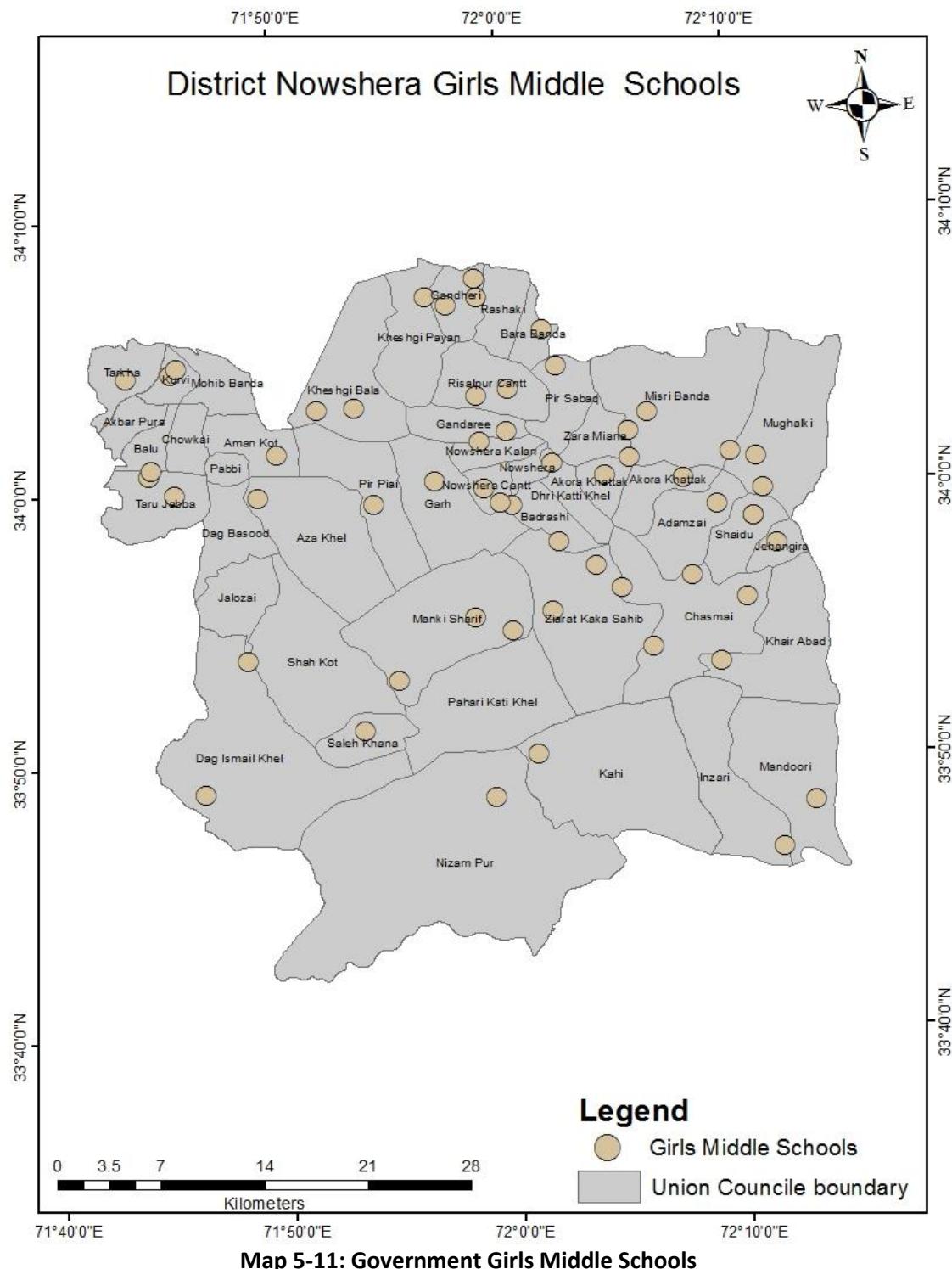
Map 5-11: Government Girls Middle Schools

Map 5.11 represents the Government middle schools for girls. The map also represents their relative location in different UCs.

Map 5-12: Government Boys High Schools
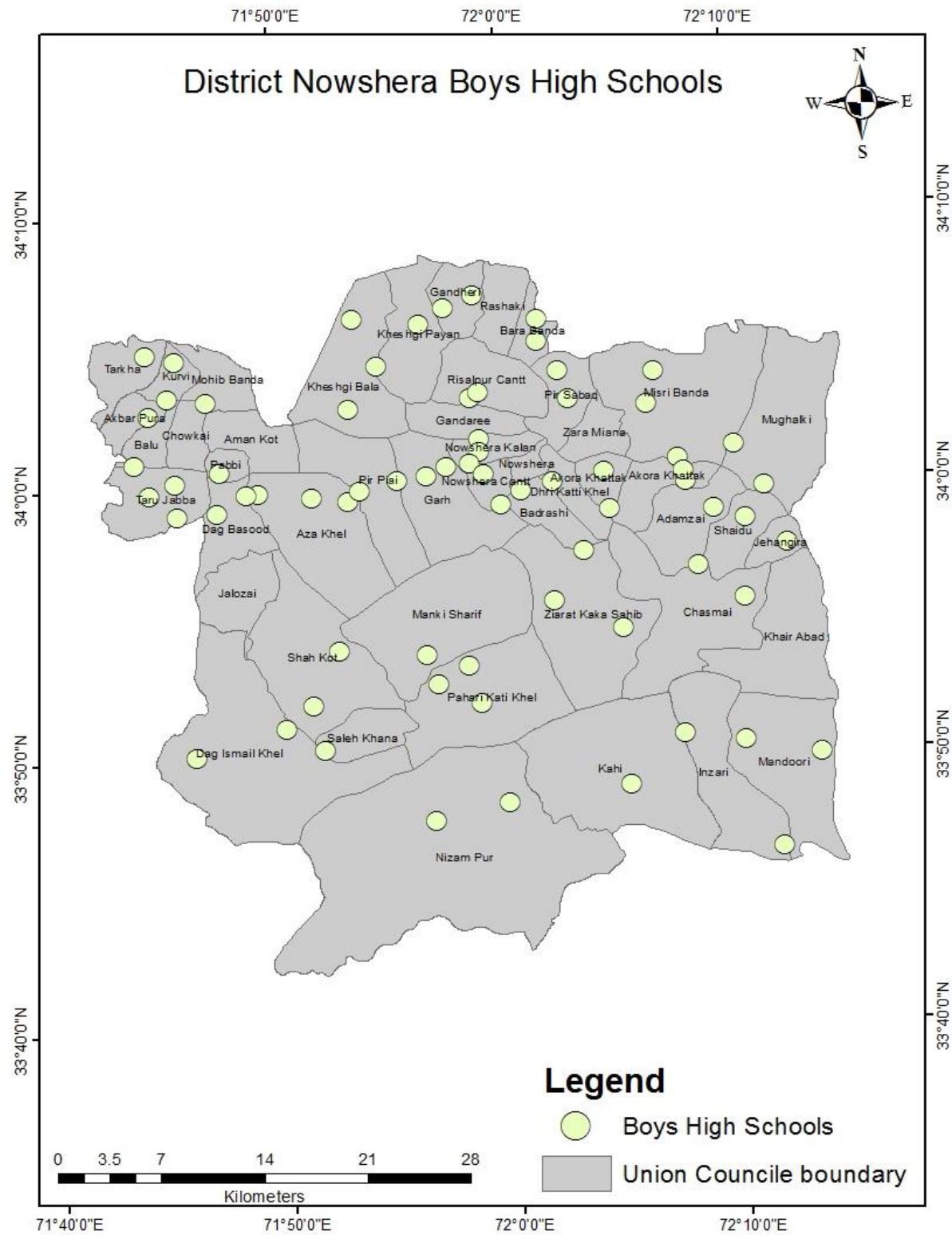
Map 5.12 represents the Government high schools for boys. The map also represents their relative location in different UCs.
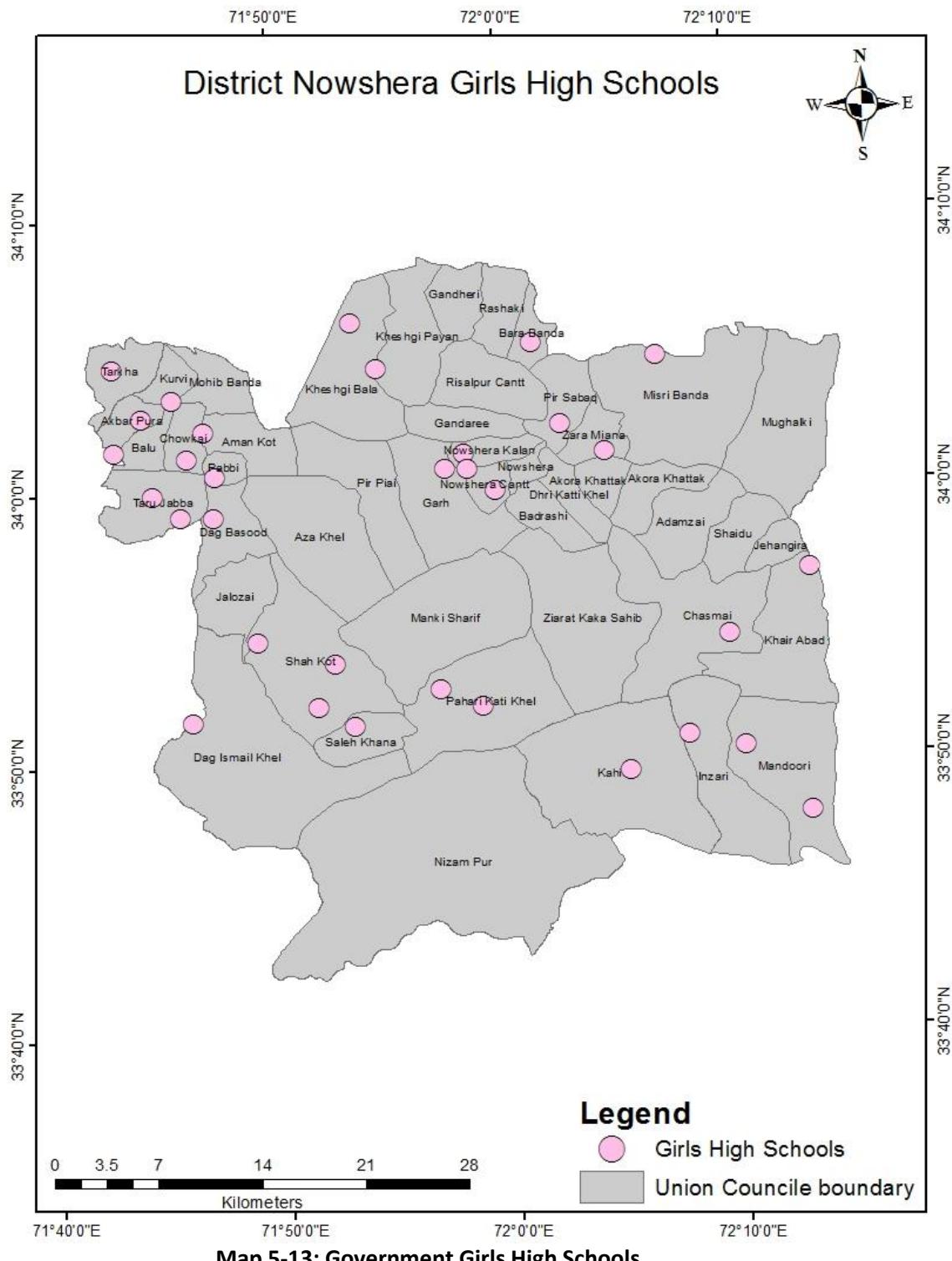
Map 5-13: Government Girls High Schools

Map 5.13 represents the Government high schools for girls. The map also represents their relative location in different UCs.
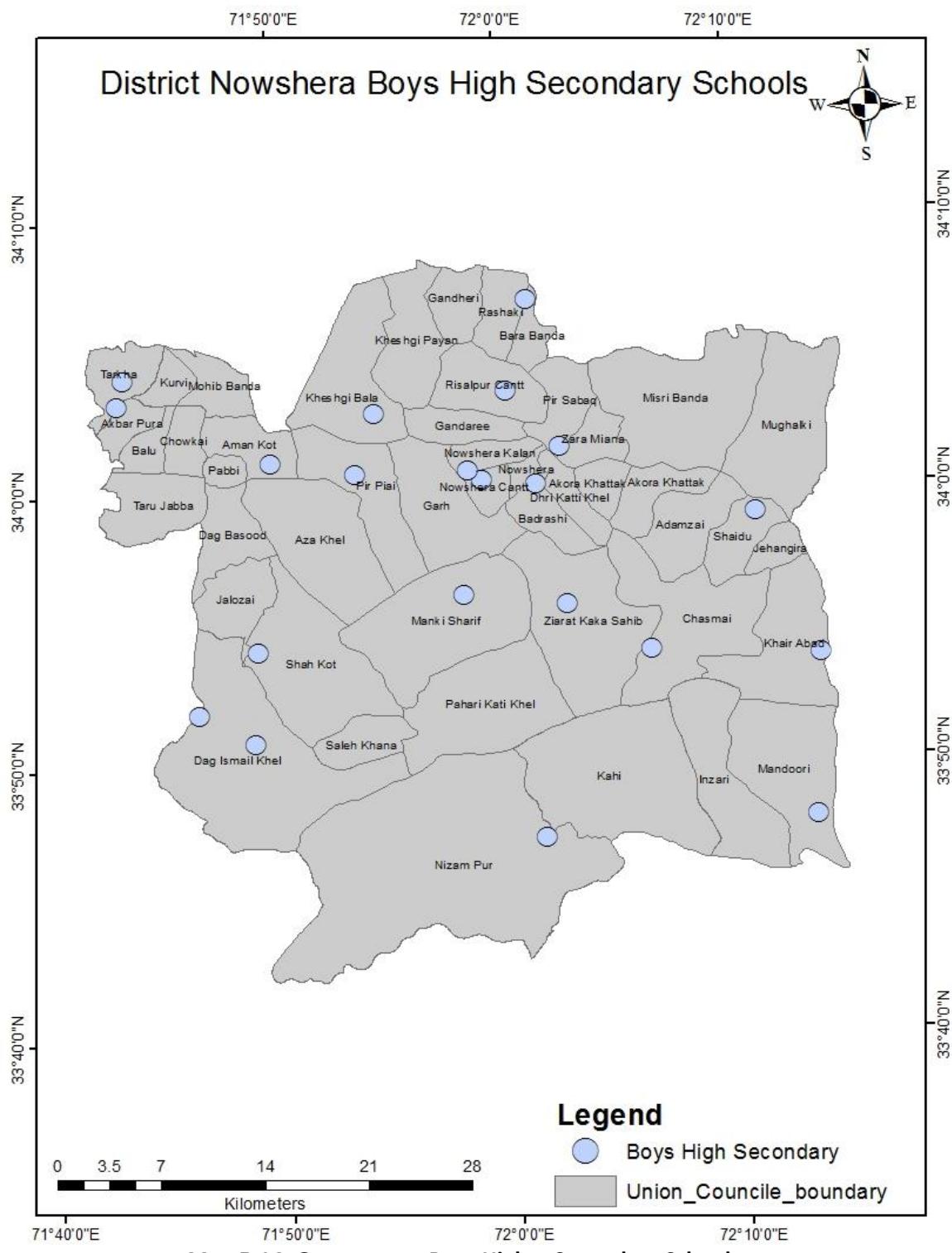
Map 5-14: Government Boys Higher Secondary School

Map 5.14 represents the Government's higher secondary schools for boys. The map also represents their relative location in different UCs.
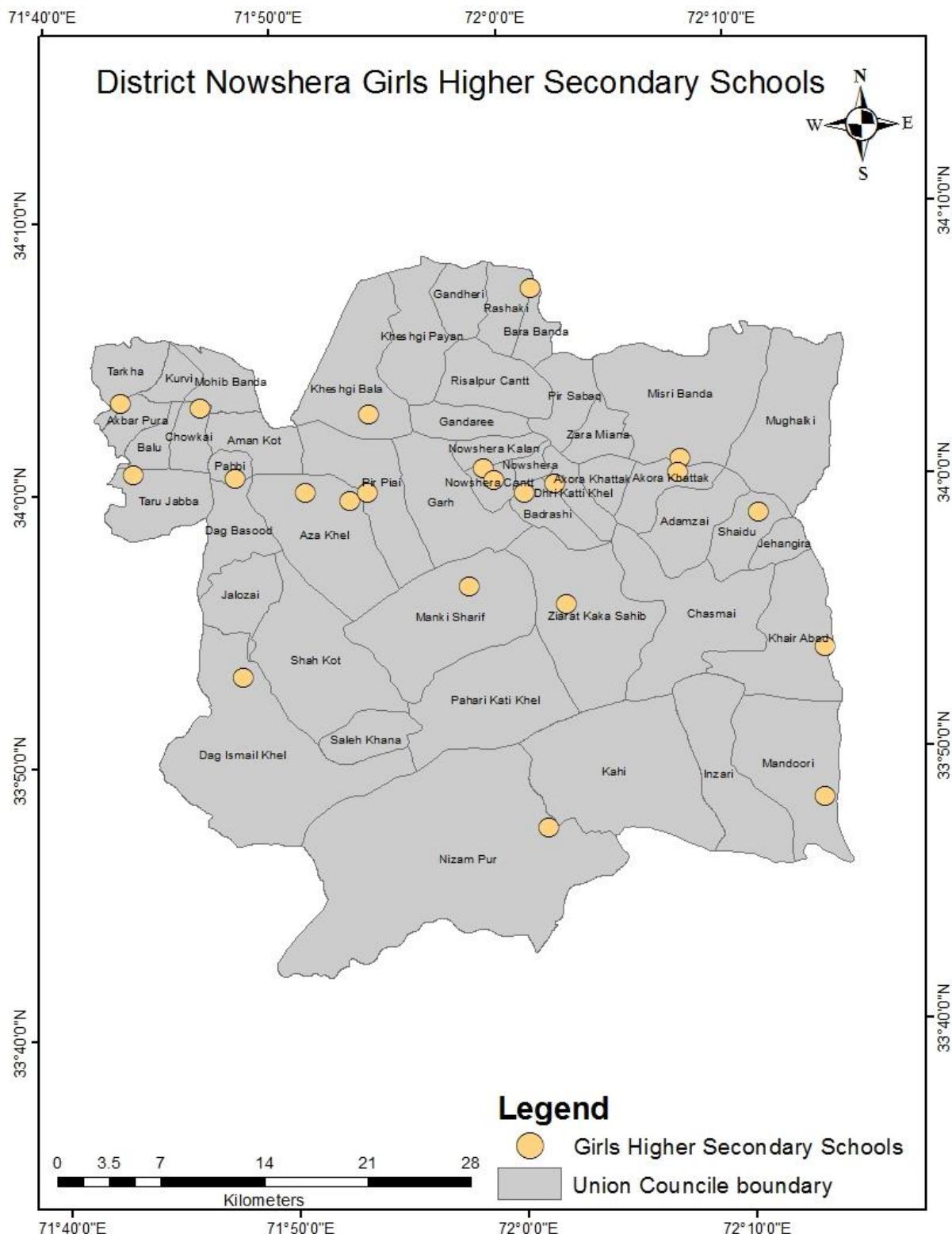
Map 5-15: Government Girls Higher Secondary Schools

Map 5.15 represents the Government's higher secondary schools for girls. The map also represents their relative location in different UCs.
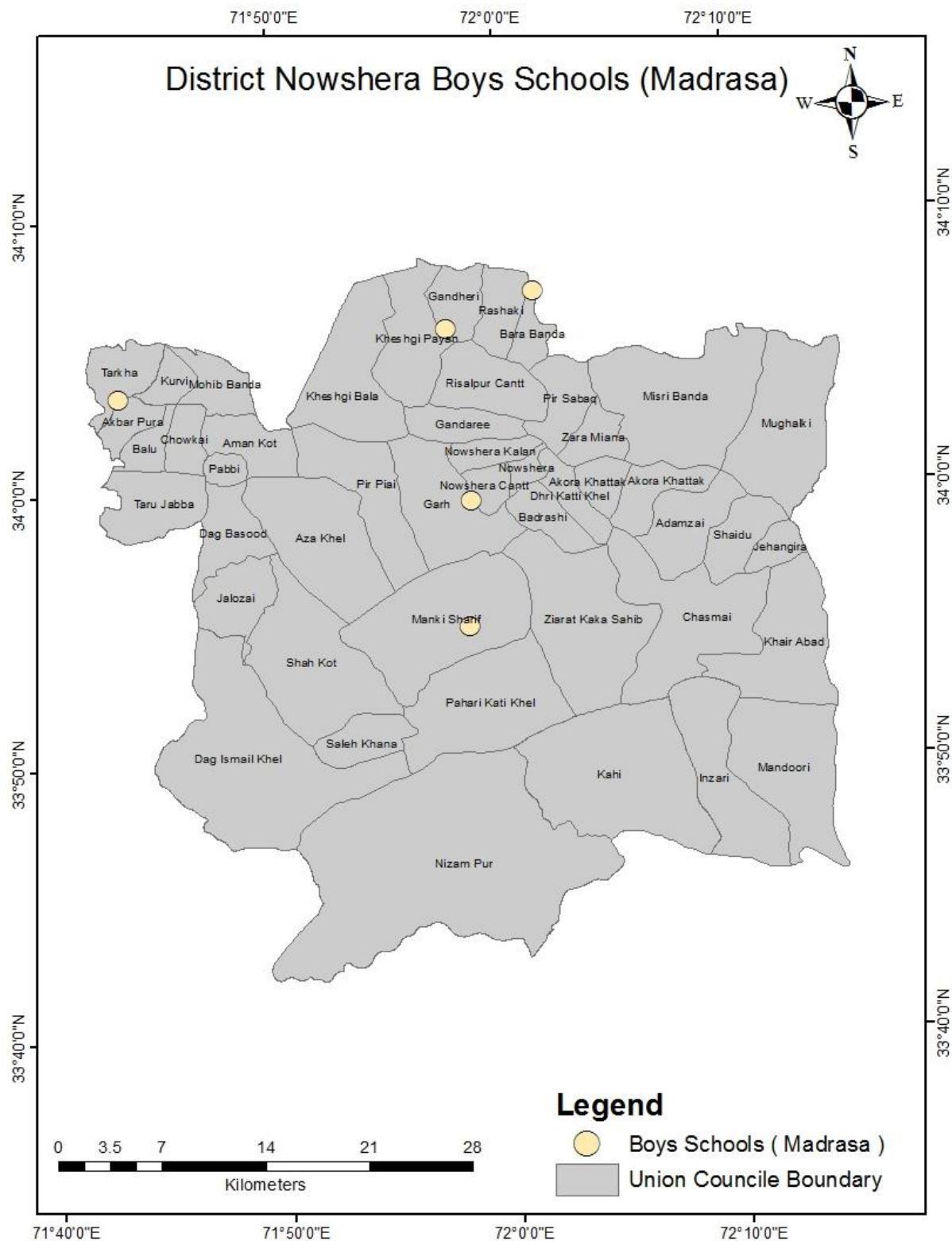
Map 5-16: Boys Deeni Madrasa

Map 5.16 represents the boy's deeni madrasa. The map also represents their relative location in different UCs.

Table 5-22: Additional Collages Required in Short Term Plan (2019-2024)					
District Area	Population 2019	Population 2024	Additional Population (2019-2024)	No. of College Required (@1 C for 4,00,000pop.)	Aggregate Land required (@ 10acre/C)
Urban	352,331	389,002	36,671	0	0
Rural	1,263,201	1,508,066	244,865	0	0
Total	1,615,532	1,897,068	281,536	0	0

5.10.6 Short-Term Educational Plan (2019-2024)

It is estimated that during the short-term plan, the District Nowshera requires 38 additional primary schools and 23 secondary schools. Tables. 20,21,22 below give requirements for urban as well as rural areas of District Nowshera.

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 would be governed by the detailed planning and designing of the relevant areas.

Table 5-20: Additional Primary School Required in Short Term Plan (2019-2024)					
District Area	Population 2019	Population 2024	Additional Population (2019-2024)	No. of Primary Schools Required @1 PS for 7,500 pop.)	Aggregate Land required (@1 acre/PS)
Urban	352,331	389,002	36,671	5	5
Rural	1,263,201	1,508,066	244,865	33	33
Total	1,615,532	1,897,068	281,536	38	38

Table 5-21: Additional Secondary School Required in Short Term Plan (2019-2024)					
District Area	Population 2019	Population 2024	Additional Population (2019-2024)	No. of Secondary School Required @1 SS for 12,000pop.)	Aggregate Land required (@ 4acre/SS)
Urban	352,331	389,002	36,671	3	12
Rural	1,263,201	1,508,066	244,865	20	80
Total	1,615,532	1,897,068	281,536	23	92

5.8.7 Long-Term Education Plan (2024-2039)

It is estimated that during the Long-term plan, the District Nowshera require 140 additional primary schools, 87 secondary schools and 2 colleges. The tables below give requirements for urban as well as rural areas of District Nowshera.

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 would be governed by the detailed planning and designing of the relevant areas.

College is proposed to be provided with balanced distribution over the city, corresponding with the distribution of population. The sites for these institutions should be scrupulously reserved, no matter how long these may take to be built.

District Area	Population 2024	Population 2039	Additional Population (2024-2039)	No. of Primary Schools Required @1 PS for 7,500 pop.)	Aggregate Land required (@1 acre/PS)
Urban	389,002	523,545	134,543	18	18
Rural	1,508,066	2,422,406	914,340	122	122
Total	1,897,068	2,945,951	1,048,883	140	140

Table 5-23: Additional Primary School Required in Long Term Plan (2024-2039)

District Area	Population 2024	Population 2039	Additional Population (2024-2039)	No. of Secondary School Required @1 SS for 12,000 pop.)	Aggregate Land required (@4 acre/SS)
Urban	389,002	523,545	134,543	11	44
Rural	1,508,066	2,422,406	914,340	76	304
Total	1,897,068	2,945,951	1,048,883	87	348

Table 5-24: Additional Secondary School Required in Long Term Plan (2024-2039)

Table 5-25: Additional Collages Required in Long Term Plan (2024-2039)					
District Area	Population 2024	Population 2039	Additional Population (2024-2039)	No. of College Required (@1 C for 4,00,000 pop.)	Aggregate Land required (@10 acre/C)
Urban	389,002	523,545	134,543	0	0
Rural	1,508,066	2,422,406	914,340	2	20
Total	1,897,068	2,945,951	1,048,883	2	20

5.10.8 Existing Deficiency of Educational Institutions (2019)

The Current Population (2019) of District Nowshera, as already stated is 1604671. The existing number of educational institutions in the Districts is given in Table 5.26. The required number for the 2019 population. It is clear that in terms of numbers according to the National Reference Manual of Planning and Infrastructure Standards, there is no dearth of educational institutions in District Nowshera.

Table 5-26: Existing Shortage of Education Institute in District Nowshera			
Institution	Existing Number	Required Number	Shortage
Primary	918	215	Nil
Secondary	426	135	Nil
Collages	8	4	Nil

It is recommended by the consultants to provide basic facilities for school buildings, missing Infrastructure, quality education by improving quality of teaching, Teacher's qualifications and Training, capacity Building of school management staff, IT education, extracurricular activities and formation of education monitoring committees.

5.10.9 Proposed area for education

To meet the requirement for education 1258 Acer is proposed. In this area, almost all types of education facilities are proposed.

5.11 HEALTH

5.11.1 Distribution of Health Institutions

A health institution is defined as an institution which provides health services, curative and preventive to all specific classes of the public as outdoor/indoor patients. There is a hierarchy of health institutions as defined below[47]:

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[47] Source: Bureau of Statistics, Planning & Development Department, Govt. of Khyber Pakhtunkhwa, Khyber Pakhtunkhwa Development Statistics, 2010, Page 142.

Hospital

It is defined as a health institution having 10 or more 10 beds. However, this definition is not valid where the Government has named an institution differently, e.g. Rural Health Center.

Dispensary

It is a health institution having less than 10 beds.

Rural Health Center (RHC)

A Rural Health Center provides medical cover to a population of 10,000 to 50,000 persons. A rural health center may have up to 25 beds with laboratory, X-ray and Mino surgery. Rural Health Centers are linked through tehsil hospitals to District Headquarter Hospitals, which have all medical facilities.

Sub-Health Center

3-4 sub-health centres are attached to a rural health center. However, existing sub-centres are gradually being converted into Basic Health Units.

Basic Health Unit (BHU)

Under the present concept, 4 Basic Health Units are linked to a Rural Health Center. A BHU is provided to serve about 5,000 to 10,000 populations. It is responsible for comprehensive health care which, among other things, includes midwifery, child care, immunization, diarrhoea diseases, malaria control, child spacing, and mental and school health services within its areas.

Table 5.27 gives the distribution of health facilities in the Province as well as in District Nowshera. The total number of hospitals in Khyber Pakhtunkhwa (Government as well as private) is 172, of which 7 hospitals (around 4%) are in District Nowshera. Similarly, of the total of 421 dispensaries in the Province, 16 dispensaries (about 4%) are in District Nowshera. There are 6 Rural Health Centers in the District. The details about TB Clinics, MCH centers, sub-health centers, Basic Health Units and leprosy clinics are given in Table 5.28.

Table 5-28: Distribution of Govt. Vs. Private Hospitals[49]				
Area		**Number of Institutions (2016)**		
		Govt.	**Private**	**Total**
Khyber Pakhtunkhwa	No.	166	72	238
	%	69.6%	30.3%	100%
District Nowshera	No.	7	1	8
	%	87.3%	12.6%	100%
District Vs Province (%)		4.1%	1.3%	3.3%

Table 5-27: Distribution of Health Institutions: Khyber Pakhtunkhwa Vs District Nowshera[48]								
Area	**Number of health Institutions in 2016**							
	Hospitals	**Dispensaries**	**RHCs**	**TB Clinics**	**MCH Centers**	**Sub-Health Centers**	**BHUs**	**Leprosy Clinics**
Khyber Pakhtunkhwa	166	449	91	40	56	23	765	24
District Nowshera	7	16	7	1	2	1	30	0
% in District Nowshera	4.2%	3.5%	7.6%	2.5%	3.6%	4.1%	3.8%	0.0%

5.11.2 Private Health Institutions

Apart from total numbers, it is also important to study the contribution of the private sector in the provision of health facilities. Table 5.27 gives the government-private split for hospitals. Of the total 190 hospitals in the Province, 83% are Government owned and about 17% are being run by the private sector. The situation is not very different in the case of District Nowshera, where about 82% are government hospitals against 16% private hospitals. Comparing

District with the Province, among the Government hospitals, only 4% are in District Nowshera, while less than 3% of the private hospitals are in the District.

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[48] Source: Bureau of Statistics, Planning & Development Department, Khyber Pakhtunkhwa Development Statistics, 2017, Page 159, Table No. 126.

[49] Source: Bureau of Statistics, Planning & Development Department, Khyber Pakhtunkhwa Development Statistics, 2017, Page 164, Table No. 127.

5.11.3 Distribution of Beds

Table 5.30 presents the distribution of beds in the Province as well as in the District health institutions. There is a total of 16,938 beds in the province, of which more than 90% are in hospitals and 8.5% in rural health centers. In District Nowshera, about 82% of the total beds are in hospitals as against about 15% in RHCs, 3% in dispensaries and less than 1% in TB Clinics. Comparing District with the Province in terms of an overall number of beds, only 2.4% of the total beds in the Province are in District Nowshera. Institution-wise split is shown in Table 5.30.

Table 5.30 gives the distribution of beds in Government health institutions against private institutions. In the Province, about 91% of the beds are in government institutions as against 9% in private institutions. In District Nowshera, these percentages are 94% and 6% respectively.

Table 5-29: Distribution of Beds in Health Institutions: Khyber Pakhtunkhwa Vs District Nowshera[50]						
Area		**Number of Beds (2019)**				**Total**
		Hospitals	**Dispensaries**	**RHCs**	**TB Clinics**	
Khyber Pakhtunkhwa	No.	17070	25	1358	52	18505
	%	92.2%	0.1%	7.3%	0.2%	100%
District Nowshera[51]	No.	924	12	120	0	1056
	%	88%	1.3%	11.3%	0%	100%
District Vs Province (%)		5.4%	48%	8.8%	0%	2.2 %

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[50] Source: Khyber Pakhtunkhwa Development Statistics, 2015, Table No. 111, Page 149 and 150.

[51] Source: MS DHQ Hospital Nowshera 2019.

Table 5-30: Beds in Govt. Vs. Private Institutions[52]				
Area		**Number of Beds (2016)**		
		Govt.	**Private**	**Total**
Khyber Pakhtunkhwa	No.	17070	1344	18414
	%	92.7%	7.3%	100%
District Nowshera	No.	1056	20	1076
	%	98.1%	1.9%	100%
District Vs Province (%)		6.1%	1.4%	5.8%

5.11.4 Patients Treated in Health Institutions: Indoor and Outdoor

Table 5.32 shows that in the Province in the year 2015, more than 23 million patients were treated in health institutions, of which about 97% were outdoor patients and around 3% were indoor patients. The former includes old and new cases.

In the case of District Nowshera, the percentages of indoor and outdoor patients were 0.6% and about 99% respectively.

Table 5-31: Patients Treated: Province Vs District Nowshera[53]				
Area		**Patients Treated in 2015**		
		Indoor	**Outdoor[54]**	**Total**
Khyber Pakhtunkhwa	No.	497,299	23,128,087	23,625,386
	%	2.1%	97.8%	100%
District Nowshera	No.	9,938	1,461,909	1,471,847
	%	0.6%	99.3%	100%
District Vs Province (%)		1.9%	5.9%	5.8%

5.11.5 Existing Health Polices

Sustainable Development Goals:

The Heads of State, Government and High Representatives, met at United Nations Headquarters in New York from 25th to 27th September 2015 as the Organization celebrated its seventieth anniversary, they decided on that day a set of new global "Sustainable Development Goals".

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[52] Source: Bureau of Statistics, Planning and Development Department 2017, Government of Khyber Pakhtunkhwa. Table no. 127, Page 161.

[53] Source: Bureau of Statistics, Planning & Development Department, Khyber Pakhtunkhwa Development Statistics, 2017, Table No. 131, Page 171.

[54] Outdoor patients include old and new cases.

In these Goals and targets, they set out a supremely ambitious and transformational vision. They predict a world free of poverty, hunger, disease and want, where all life can thrive. They visualized a world free of fear and violence. A world with universal literacy. A world with equitable and universal access to quality education at all levels, to health care and social protection, where physical, mental and social well-being were assured. A world where they reaffirm their commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene; and where food is sufficient, safe, affordable and nutritious. A world where human habitats are safe, resilient and sustainable and where there is universal access to affordable, reliable and sustainable energy.

They announced 17 Sustainable Development Goals with 169 associated targets which are integrated and indivisible. Never before have world leaders pledged common action and endeavour across such a broad and universal policy agenda.

Of these 17 goals, Goal-3 is to "Ensure healthy lives and promote well-being for all at all ages".

Ensuring healthy lives and promoting well-being for all at all ages is essential to sustainable development. Significant strides have been made in increasing life expectancy and reducing some of the common killers associated with child and maternal mortality. Major progress has been made on increasing access to clean water and sanitation, reducing malaria, tuberculosis, polio and the spread of HIV/AIDS. However, many more efforts are needed to fully eradicate a wide range of diseases and address many different persistent and emerging health issues.

Goal-3: Ensure healthy lives and promote well-being for all at all ages

3.1   By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.

3.2   By 2030, end preventable deaths of newborns and children under 5 years of age, with   all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births   and underJ5 mortality to at least as low as 25 per 1,000 live births.

3.3   By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical   diseases and combat hepatitis, water-borne diseases and other communicable diseases.

3.4   By 2030, reduce by one-third premature mortality from non-communicable diseases   through prevention and treatment and promote mental health and well-being.

3.5   Strengthen the prevention and treatment of substance abuse, including narcotic drug   abuse and harmful use of alcohol.

3.6   By 2020, half the number of global deaths and injuries from road traffic accidents

3.7   By 2030, ensure universal access to sexual and reproductive health-care services,   including family planning, information and education, and the integration of reproductive   health into national strategies and programs.

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.

3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate.

3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, and provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.

3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in the least developed countries and small island developing States.

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

National Health Policy

The National Health Policy provides an overall national vision for the Health Sector based on the "Health for All" approach. Under this approach, the national health policy aims to implement the strategy for protecting people against hazardous diseases, protecting public health, and upgrading curative care facilities. Under the new Health Policy, health sector investments are being viewed as a part of the Government's Poverty Alleviation Plan. Priority attention has been accorded to the primary and secondary tiers of the health sector and good governance is seen as the basis for health sector reforms to achieve quality health care.

The key to the success of the new Health Policy lies in its implementation. This is not an easy task but is by no means impossible. The new Health Policy has outlined implementation modalities and has set targets and a time frame for each of the key areas identified that would be implemented over 10 years. These have to be implemented in partnership between the Federal Ministry of Health and the provincial Departments of Health, and close collaboration with the district health set-up under the Local Government structure. The private health sector would also be taken on board while implementing the key policy initiatives.

The health policy has developed a clear view of what is required to be done in key areas, and the measures to be taken to achieve the envisioned goals. The Policy provides guidelines to

the Provinces while implementing plans in the health sector in accordance with their requirements and priorities. The Key Areas of National Health Policy are as below:

- Key Area No.1: To reduce the Widespread Prevalence of Communicable Diseases (i.e. EPI cluster of childhood diseases, TB, Malaria, Hepatitis-B and HIV-AIDS.

- Key Area No.2: To address inadequacies in primary/secondary health care services. The main inadequacies are identified as the deficient state of equipment and medical personnel at the BHU/RHC level. Absenteeism is common. At the district/tehsil level hospitals there are major shortcomings in emergency care, surgical services, and anaesthesia and laboratory facilities. There is no referral system in operation.

- Key Area No. 3: To Remove Professional and Managerial Deficiencies in District Health System. The main deficiencies have been identified as the ineffectiveness of the district health office to supervise health services in a district. DHOs generally lack essential qualifications and management skills. A large number of posts of male and female doctors and paramedics at the primary and secondary health facilities are vacant, as well as specialist positions in district and tehsil hospitals. Mega-hospitals are managed in an ad-hoc manner.

- Key Area No. 4: To promote greater gender equity in the health sector.

- Key Area No. 5: To bridge the Basic Nutrition Gaps in the target population i.e. children, women and vulnerable population groups.

- Key Area No. 6: To correct urban bias in the health sector.

- Key Area No. 7: To introduce required regulation in the private medical sector to ensure proper standards of equipment and services in hospitals, clinics and laboratories as well as private medical colleges and Tibb/Homeopathic teaching institutions.

- Key Area No. 8: To create mass awareness of public health matters.

- Key Area No. 9: To Effect improvement in the Drug Sector to ensure the availability, affordability and quality of drugs in the country.

- Key Area No. 10: Capacity Building for Health Policy Monitoring in the Ministry of Health.
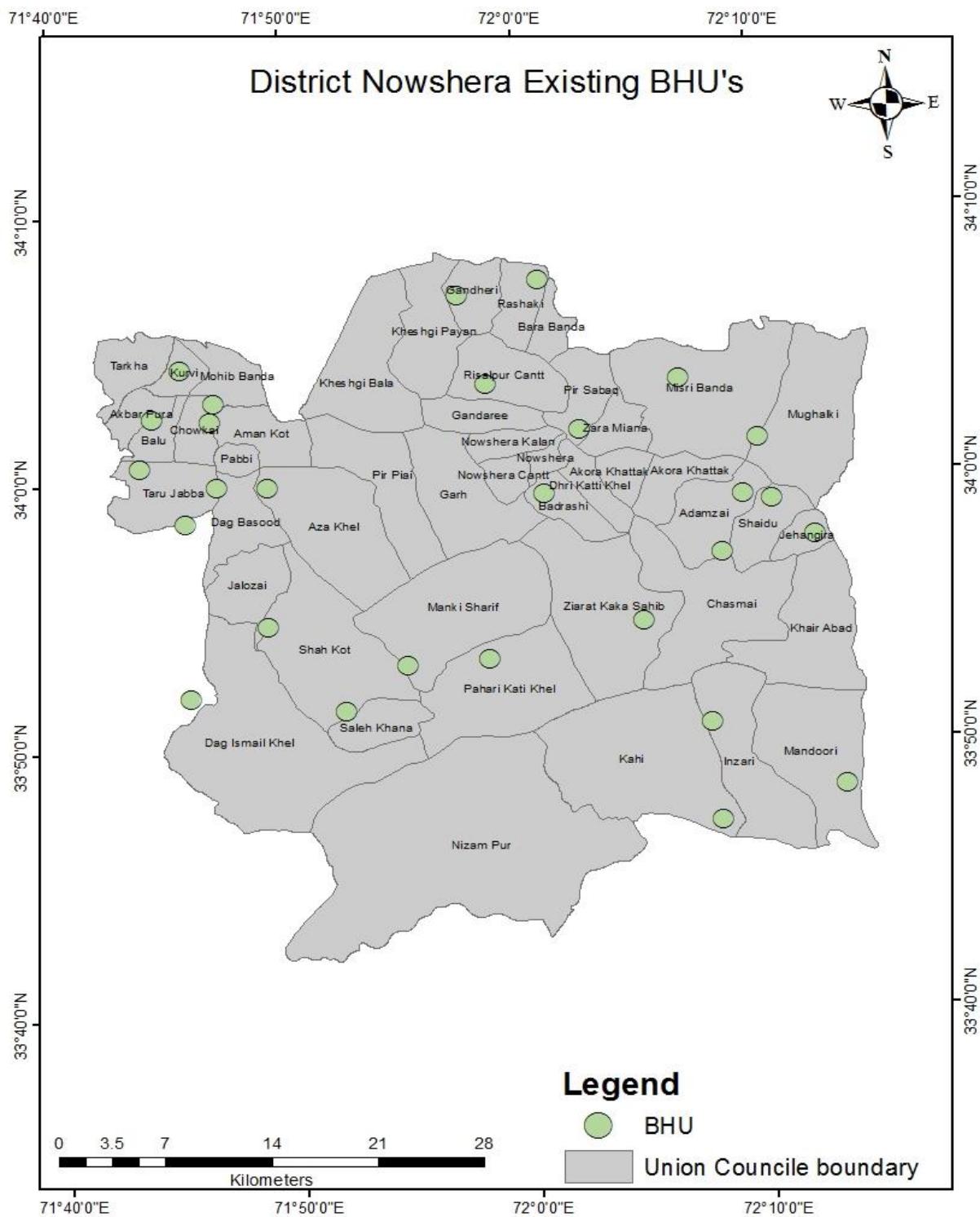
Map 5-17: BHU in District Nowshera

Map 5.17 represents the BHU in District Nowshera. And their relative position in different UCs.
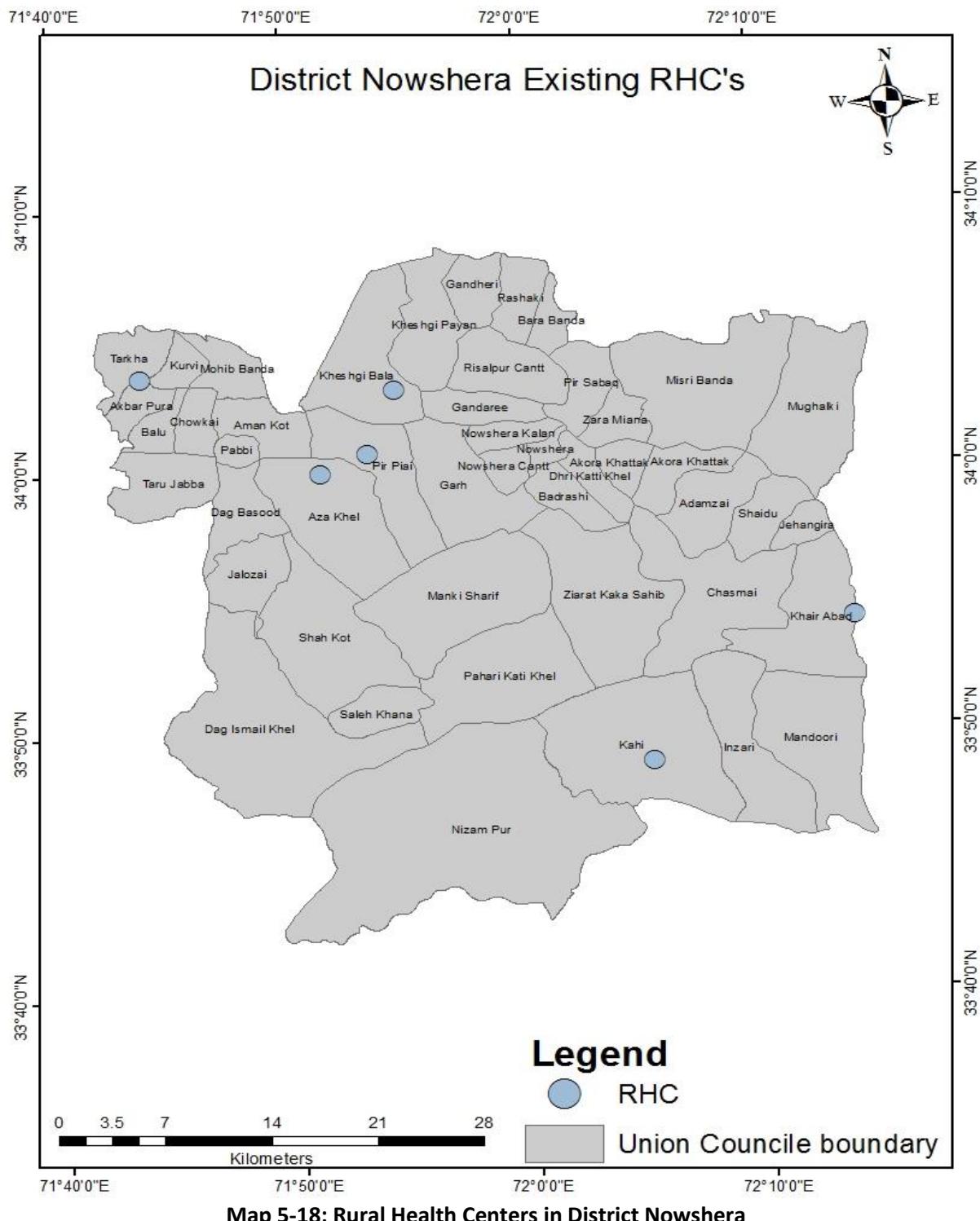
Map 5-18: Rural Health Centers in District Nowshera

Map 5.18 represents the Rural Health Centers in District Nowshera. And their relative position in different UCs.
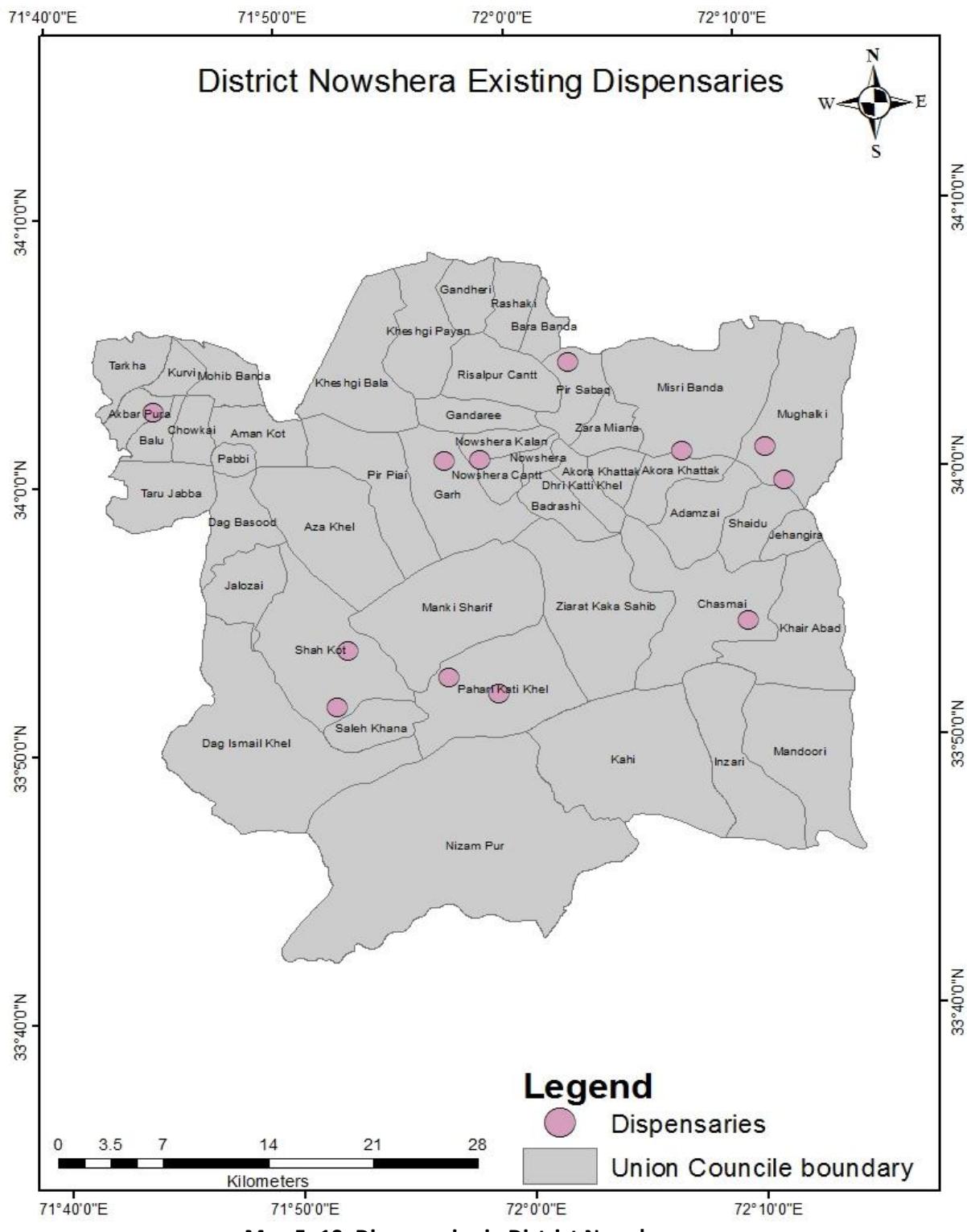
Map 5- 19: Dispensaries in District Nowshera

Map 5.19 represents the Dispensaries in District Nowshera. And their relative position in different UCs.
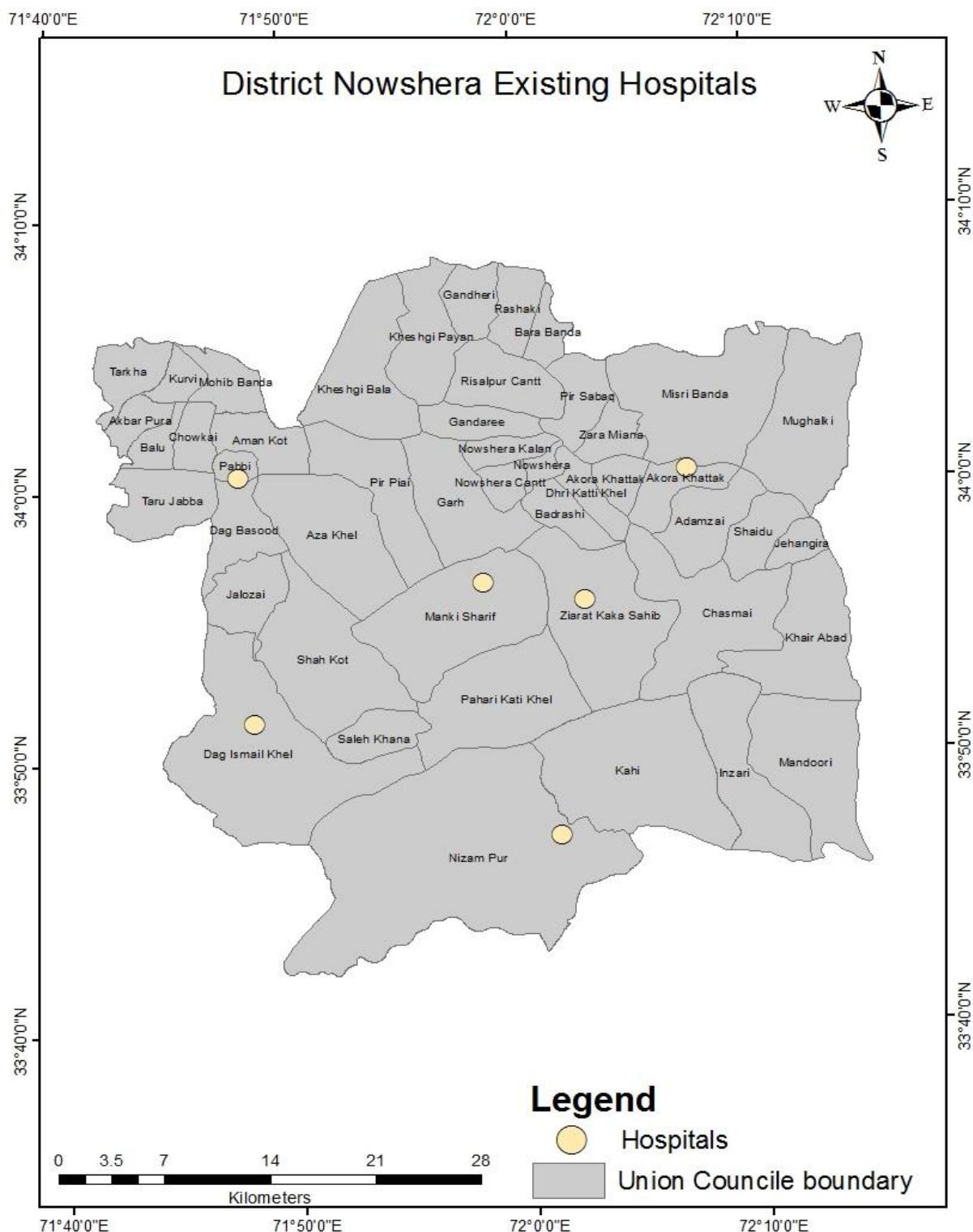
Map 5-20: Hospitals in District Nowshera

Map 5.20 represents the Hospitals in District Nowshera and their relative position in different UCs.

5.11.6 Major Diseases in the Last years

i. Anaemia 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. Table 5.32 shows the detailed statistics in Nowshera.

Table 5-32: Anemia Among Women			
Year	**First Antenatal care visits in the facility**	**ANC-1 women with Hb. under 10 g/dl**	**%age**
2019 1st quarter[55]	5494	1390	25.29
2018 3rd quarter[56]	5650	1069	19
2018 2nd quarter[57]	7864	1535	20

ii. 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. Table 5.33 shows the detailed statistics in Nowshera.

Table 5-33: Malaria Parasite			
Year	**Slides examined**	**MP positive**	**%age**
2019 1st quarter[58]	3032	77	3
2018 3rd quarter[59]	4934	1143	23
2018 2nd quarter[60]	4228	448	11

iii. 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 the disease. Table 5.34 shows the detailed statistics in Nowshera.

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[55] District health information system: 1st Quarter Report 2019,

[56] District health information system: 3rd Quarter Report 2018

[57] District health information system: 2nd Quarter Report 2018

[58] District health information system: 1st Quarter Report 2019

[59] District health information system: 3rd Quarter Report 2018

[60] District health information system: 2nd Quarter Report 2018

Table 5-34: Plasmodium Falciparum			
Year	Slides examined	Slides P. Falciparum +ve	%age
2019 1st quarter[61]	3032	1	0.03
2018 3rd quarter[62]	4934	18	0.36
2018 2nd quarter[63]	4719	0	0

iv. Hepatitis B +ve

Hepatitis B is a serious liver infection caused by the hepatitis B virus (HBV). For some people, hepatitis B infection becomes chronic, meaning it lasts more than six months. Having chronic hepatitis B increases your risk of developing liver failure, liver cancer or cirrhosis. Most people infected with hepatitis B as adults recover fully, even if their signs and symptoms are severe. Infants and children are more likely to develop a chronic hepatitis B infection. A vaccine can prevent hepatitis B, but there's no cure if you have it. If you're infected, taking certain precautions can help prevent spreading HBV to others. Table. 5.35 shows the detailed statistics in Nowshera.

Table 5-35:Hepatitis B+ve			
Year	Patients screened	Hepatitis B +ve	%age
2018[64]	18383	445	2.24
2017[65]	35995	506	1.41
2016[66]	26149	2546	9..74

v. Hepatitis C +ve Proportion

Hepatitis C is an infection caused by a virus that attacks the liver and leads to inflammation. Most people infected with the hepatitis C virus (HCV) have no symptoms. Most people don't know they have the hepatitis C infection until liver damage shows up, decades later, during routine medical tests. Hepatitis C is one of several hepatitis viruses and is generally considered to be among the most serious of these viruses. Hepatitis C is passed through contact with contaminated blood, most commonly through needles (Syringes). Table 5.36 shows the detailed statistics in Nowshera.

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[61] District health information system: 1st Quarter Report 2019

[62] District health information system: 3rd Quarter Report 2018

[63] District health information system: 2nd Quarter Report 2018

[64] District health information system: Annual Report 2018

[65] District health information system: Annual Report 2017

[66] District health information system: Annual Report 2016

Table 5-36: Hepatitis C +ve			
Year	Patients screened	Hepatitis C +ve	%age
2018[67]	18383	433	2.36
2017[68]	35150	452	1.29
2016[69]	26149	2745	10.50

5.11.7 Constraints

The emphasis in the past has been to increase the quantity of health-related services, i.e. number of doctors, rural health centers, basic health units etc. The numbers are important but equally important is the functionality of health centers. Most of these are not as functional as they should be, because of various factors such as shortage of medicines or staff, often both. The above factors become constraints due to the following reasons:

- The zeal to meet the numerical target has compromised the quality and type of facility provided.
- The result has been unmanned and unsupervised health services.
- The focus has been on quantity rather than quality and performance.
- While facilities have been provided in many areas, the absence of medical staff allocated to those facilities has made them less effective.
- There are weaknesses in managerial, administrative, and coordination to ensure the efficiency of the health delivery mechanisms.
- The private sector in the health sector is weak in District Nowshera.
  However, the private sector has a profit motive. There is at present no mechanism whereby the private sector can support the efforts of the government in providing healthcare to those who cannot afford the higher private sector prices.

5.11.8 Recommendations and Conclusions

- Health Sector needs to be emphasized in Land Use Plans, as it profoundly impacts the health of people who live and work there.
- There is a need to focus attention on developing broad policies and general strategies to improve community design and building practices and reverse the negative trends related to human health.
- There needs to be a clear view of what is required to be done in key areas, and the measures to be taken to achieve the envisioned goals. The National Health Policy provides guidelines to the Provinces while implementing plans in the health sector in accordance with their requirements and priorities.

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[67] District health information system: Annual Report 2018

[68] District health information system: Annual Report 2017

[69] District health information system: Annual Report 2016

- It is important to study the contribution of the private sector in the provision of health facilities. Of the total 190 hospitals in the Province, 83% are Government owned and about 17% are being run by the private sector. The situation, however, is fairly in line with District Nowshera, where about 84% of hospitals are in the government sector against 16% are in the private sector hospitals.

- In the Province, more than 91% of beds are in hospitals and 8.2% in rural health centers. In District Nowshera, 76% of the total beds are in hospitals as against 22% in other institutions. Comparing District with the Province, only 1.8% of the total beds in the Province are in District Nowshera.

- In the Province, about 91% of the beds are in government institutions as against 9% in private institutions. In District Nowshera, these percentages are 94% and about 6% respectively. Thus, the Private sector needs to be encouraged to increase the number of beds in their health institutions.

5.11.9 Health Proposals for Short-Term (2019-2024)

Provision of Basic Health Units

The total number of UCs (urban as well as rural) in the District is 47, of which 5 UCs are urban/urbanizing and the remaining 42 UCs are rural. The 5 urban/urbanizing UCs are well served with medical facilities and are not dependent on BHUs. These lie in the Core of Nowshera and include hospitals, medical centers and private health institutions. Thus, in the 5 urban UCs, there are only 2 BHUs while in 42 rural UCs, there are 28 BHUs. Among these, there are 16 rural UCs without any BHU, 24 having one BHU and 2 UCs with two BHUs.

However, as already stated, 16 rural UCs of the District are without any health facility and need at least one BHU in each. The details are provided in Table 5.37.

	Table 5-37: Rural Union Councils with Number of BHUs in District Nowshera		
	Rural UCs Vs BHUs	**Number of UCs**	**Names of UCs[70]**
1	UCs with no BHU	16	Dag Ismail Khel, Shah Kot, Jalozai, Aza Khel, Sale khana, Zyarat Kaka Saheb, Kherabad etc.
2	UCs with 1 BHU	24	Jahangira, Adam Zai, Badrashi, Manki Sharif, Pahari Kati Khel, Mughal Ki, etc.
3	UCs with 2 BHUs	2	Chowkai, Taru Jabba

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[70] Part of Shahi Bala UC in Serial No. 1 and Marazai and Wad pagga in Serial No. 3 are in urban area.

Provision of Rural Health Centers (RHCs)

Based on population criteria of 1 RHC for 75,000 populations[71], a total of 20 RHCs are required by the end of the short-term plan period. The existing number of RHCs is 6, entailing a net requirement of 14 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.

Table 5-38: Rural Health Centers Required in the Short-Term Plan (2019-2024)				
Rural Population 2019	Rural Population 2024	RHCs Required in 2024	Existing RHCs	Net Required by 2024
1,263,201	1,508,066	20	6	14

Increasing Number of Beds

Applying the national standard of 2 beds per 1000 persons[72], the gross number of beds required at the end of a short-term period is 3715, while the existing number of beds is 1076. Thus additional 2639 beds will be required by the year 2024. (Table 5.39)

Table 5-39: Number of Beds Required in Short Term Plan (2019-2024)				
Population 2019	Population 2024	Number of Bed required in 2024	The existing number of Beds	Net Required by 204
1,604,671	1,857,795	3715	409	2639

5.11.8 Health Proposals for Long-Term Plan (2024-2039)

Provision of Basic Health Units

For the period 2024-2039, it is proposed that out of 42 rural union councils, each rural union council should have at least two BHUs. There are already 2 UCs with 2BHUs and they are likely to get urbanized by 2039 and will have better health facilities. However remaining UCs which are recommended to have 2 BHUs on each are:

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[71] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

[72] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual for Planning & Infrastructure Standards, Section 6.2.2, Page 122.

Table 5-40: Union Councils Proposed to have Two BHUs in the Long-Term Plan
Jahangira, Adam zai, Badrashi, manki sharif, Pahari Kati Khel, Mughal Ki, Dag Ismail Khel, Shah Kot, Jalozai, Aza Khel, sale khana, Zyarat kaka sahib, kher Abad.

Provision of Rural Health Centers (RHCs)

Based on population criteria of 1 RHC for 75,000 populations[73], a total of 38 RHCs will be required by the year 2039. During the short-term plan for the first five years (2019-2024), 20 RHCs are proposed to be provided. If this proposal is implemented, 18 additional RHC will be required during 2024-2039.

Table 5-41: Rural Health Centers Required in the Long-Term Plan (2024-2039)				
Rural Population 2024	Rural Population 2039	RHCs Required in 2039	Exist RHCs up to 2024	Net Required by 2039
1,508,066	2,872,407	38	20	18

Increasing Number of Beds

Applying the national standard of 2 beds per 1000 persons[74], the number of beds required for the additional population during the period 2024-2039 is (Table 5.42)

Table 5-42: Number of Beds Required in Long Term Plan (2024-2039)				
Population 2024	Population 2039	Number of Bed required in 2039	Exist number of Beds up to 2024	Net Required by 2037
1,857,795	3,261,731	6523	2639	3884

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[73] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

[74] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual for Planning & Infrastructure Standards, Section 6.2.2, Page 122.

5.12 TRADE ZONE AND COMMERCIAL AREAS

5.12.1 Distribution of Commerce and Trade Centers at International, National, Regional and Sub-Regional Levels

At the international level, grapes are imported, mainly from Afghanistan and China while Nowshera's exports to foreign countries include tobacco, cement and marble. Moreover, it exports cement in large quantities to Afghanistan on daily basis from the Nizamabad cement factory. At the national level, incoming commodities from other parts of the Country (Punjab & Sindh) include fruit and sanitary ware. Outgoing goods to different parts of the Country include fruit, sugarcane, tobacco, sugar and marble.

At the regional level, commodities brought to Nowshera include a variety of fruit such as citrus fruit, apple and peach. These are mainly brought from Swat, Chitral and Peshawar. The goods sent from Nowshera to other parts of the Province include plum, sugar cane, sugar and tobacco.

Table 5-43: Trade and Commerce Linkages of Nowshera at International, National and Regional Levels		
Level	**In-Coming Commodities**	**Out-Going Commodities**
International	Grapes (China, Afghanistan)	Tobacco Marble Cement (Afghanistan)
National	Bananas (Sindh) Water Melon (Punjab) Guava (Punjab) Sanitary Ware (Lahore, Gujranwala)	Fruit Sugarcane Tobacco Marble Cement
Regional	Citrus Fruit (Swat) Apple (Swat, Chitral) Peach (Swat, Peshawar)	Plum Sugarcane Tobacco Sugar

5.12.2 Distribution of Commerce and Trade Centers in Nowshera

The District has great potential to enhance income manifold by allocating more land and financial resources to local businesses and trade to meet local demands and develop export-oriented production in KP. At the regional level, commodities brought to Nowshera include a variety of fruit such as citrus fruit, apple and peach. These are mainly brought from Swat, Chitral and Peshawar. The goods sent from Nowshera to other parts of the Province include plum, sugar cane, sugar and tobacco. The main trade and commercial centers of Nowshera are:

i. Shaheen Market

ii. Haji Shafique Market

iii. Main Bazar Mohalla Doran

iv. Sikandar Hayat Market

v. Momin Khan Market

vi. Risalpur Sadar Bazar

vii. Koochi Market

viii. Main Pabbi Market

ix. Cloth Market (adjacent to the general bus stand)

x. Nowshera Saddar Market

Saddar Bazaar and Nowshera Main Bazaar are the main commercial hubs of Nowshera, where electronics, cloth and sports goods are sold. R.A. Bazaar is also a big commercial center. Several cereal crops, vegetables and fruits are produced in Nowshera, but some are also imported from other Provinces. Sugarcane and tobacco are the intra-provincial exports of District Nowshera. There is an Export Processing Zone in District Nowshera, located at Risalpur. It is a Joint Venture between Sarhad Development Authority (SDA) and Export Processing Zones Authority. It is located on Nowshera-Mardan and is spread over 92 acres, providing 137 plots of different sizes.

Nowshera has to depend heavily on the safety and security of people and assets for the desired rapid commercial growth. Businesses and commerce shall be evolved and developed like the other developed countries. To this end the skill improvement, and increase in efficiency with which new processes are adopted. The flow of information, better infrastructure, availability of funds and quality inputs, and investor/entrepreneurs' managerial capabilities shall be streamlined. Empirical evidence shows that suitable commercial, financial, economic and trade policies directly influence productivity and economic growth.

Because of market forces, rapid Land Use conversions are taking place, particularly from residential to commercial. This is creating multifarious problems including traffic congestion, pollution, delays, inefficient energy consumption, and loss of community character. The relationship between uses such as residential, commercial, industrial, institutional, educational and recreational, and the intensity of each use, directly impacts the City's character and quality of life. Any Land Use conversion thus deserves thorough review by the concerned planning agency, whichever is relevant for a particular location.

Nowshera has few city-level planned commercial centers with adequate parking. Generally, the Land Use pattern in Nowshera is mixed and commercial activities take place in many residential areas and along main roads. This trend is more pronounced in densely populated residential areas where the ground floor is used for commercial purposes and subsequent floors for habitation. This is particularly true for the inner areas of Nowshera.

Future Land Use Policy for Nowshera should respect the fact that much of Nowshera's distinct character lies in its diversity of Land Uses, and it's physical, economic and cultural

characteristics. Complete segregation of Land Uses, particularly in the inner areas is neither possible nor desirable. However rampant Land Use conversions, which impede the easy flow of traffic and a non-amendable living environment for the residents must be controlled. Congestion is not the only curse of indiscriminate Land Use conversion. It also puts further pressure on the already overburdened infrastructure and public services. Commercial areas are of course part and parcel of any human habitat. Planned commercialization itself is not bad; it is the indiscriminate conversion of Land Uses which should be controlled.

Commercial activities of higher order like wholesale markets and trade centers are presently fragmented, located in different parts of the City. A separate, properly planned Commercial/Trade Zone for Nowshera will maximize the aggregate convenience of traders and the inhabitants. By providing such a Center, the present Central Business District of Nowshera and the inner city can be decongested, and the residents can avoid areas of traffic clogging.

The proposed site for the Commercial zone has GT Road towards the South and is surrounded by major Land Uses proposed for the future. The Western boundary of the site touches a part of the proposed residentiary area and the proposed city park towards the East of the commercial zone. The site is well connected to other Districts through GT Road, and to other parts of District Nowshera through the proposed ring road described in an earlier section.

5.12.3 Service Area of Commerce and Trade Centers

Data/information regarding the service area of Nowshera for trade and commerce was collected through field surveys and has already been presented.

One of the methods for assessing the service area of a Town is by applying the well-known Gravity Model. The gravity model takes into account the population size of two places and their distance. Since larger places attract people and commodities more than smaller places and places closer together have a greater attraction, the gravity model incorporates these two features. It helps to draw the boundary of the tributary area of a city or delineate its functional region, using the distance between the settlements and the population of each settlement. The larger a city, the larger would be its trade area. Two cities of equal size have a trade area boundary midway between the two cities. When cities are of unequal size, the boundary lies closer to the smaller city, giving the larger city a larger trade area.

$$BP = \frac{\text{distance between city a and b}}{1 + \sqrt{\frac{\text{pop. b}}{\text{pop. a}}}}$$

BP is distance from city a to breaking point

The formula shown is used to find the breaking point (BP) between two cities. One can determine the complete trade area of a city by determining the BP between multiple cities

and then joining the breaking points by a smooth line. Based on the above methodology and statistics given below, the tributary area of Nowshera is shown in Figure 5.1.

Table 5-44: Parameters to Determine Service Area of Nowshera under Gravity Model			
Cities	City Population (current)	Distance from Nowshera (Km)	Breaking Point (Km)
Nowshera	1,604,671	-	-
Peshawar	2100970	63.1	33.67
Mardan	458240	26.6	9.26
Charsadda	1709087	44.9	22.8
Swabi	288748	66	19.66
Islamabad	1043619	138	61.61
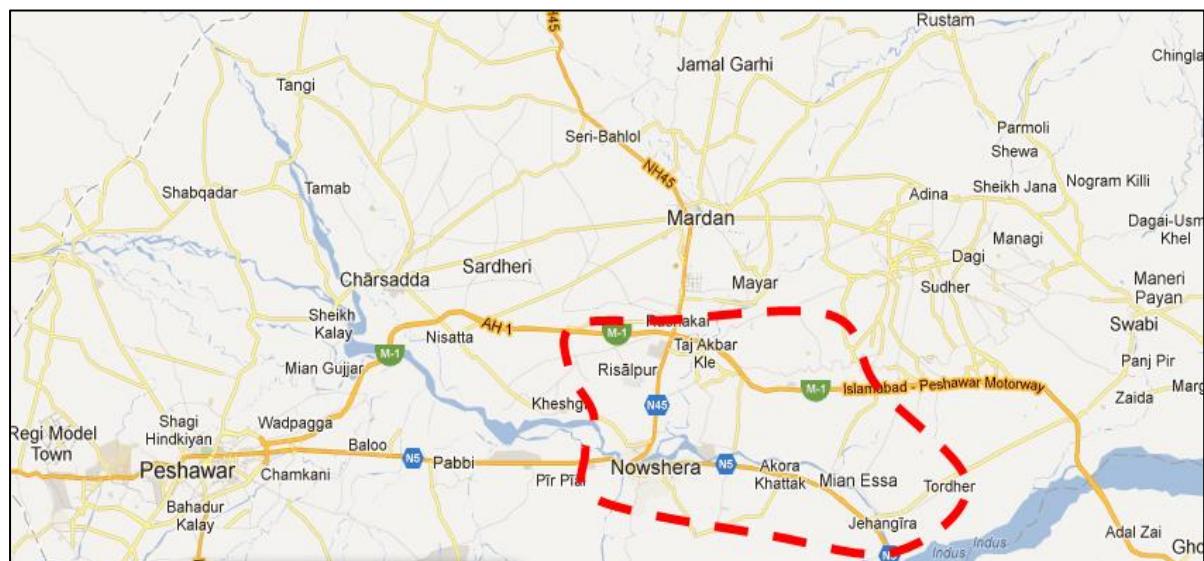
Figure 5-1: Trade and Service Area of District Nowshera

5.12.4 Future Commercial Area Requirement

The proposed Commercial Zone will cater for all kinds of clientele, and attract, city and local trade. It will include wholesale markets which are usually associated with bulk disposal of grains, fruits,

vegetables, meats, and will also have large warehousing and storage facilities.

As is clear from the Table 5.45 that 18.33 acres of the commercial area will be required during the first years of the plan period (2019-2024), and about 67 acres during the subsequent 15 years. The total requirements of the commercial area thus, during the entire plan period will be 85.60 acres.

Table 5-45: Total Future Trade Zone & Commercial Area Required (2019-39)		
Year/Period	Urban Population[75]	Commercial Area Required @0.5 acres/1000 persons)[76]
2019	352331	
2024	389003	
2039	523550	
Additional Urban Population (2019-2024)	36672	18.33 Acres
Additional Urban Population (2024-2039)	134547	67.27 Acres
Total Additional Urban Population (2019-2039)	171219	85.60 Acres

5.12.5 Current Commercial Area Gap

The current commercial area gap has been calculated as below:

- Urban Population (2019): 352331
- Commercial Area required (@0.5 acres/1000 persons)[77]= 176.16 acres
- The current area under commercial Land Use: is 72 acres[78]
- Commercial area deficiency: 176.16-72 = 104.16

Thus, there is a current deficiency of 104.16 acres, and by the end of the plan period, the total commercial area requirement would be 289.76 to meet the future requirement.

5.12.6 Distribution of Dry Ports/Export Processing Zones in Nowshera

Dry Ports[79]

There is no dry port in District Nowshera. Therefore, in the context of a dry port, details such as export/import of various goods/commodities, service area, locational aspects and foreign

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[75] Urban Population of the District Nowshera is projected from 2017 census report and 2% growth rate is adopted.

[76] Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual for Planning & Infrastructure Standards, Page 307, Table 10.4 (adapted)

[77] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 307, Table 10.4 (adapted)

[78] Chapter 2, Table 2.2 of this Report

[79] Source: Information collected by Consultants through interviews with officials of Railways and Department of Customs.

exchange component etc. do not apply. However, there is a dry port in Peshawar, which being the only such facility in KP, serves Nowshera as well.

In the Country as a whole, six dry ports are running under the management of Pakistan Railways:

- Lahore Dry Port Established in 1973
- Karachi Dry Port Established in 1974
- Quetta Dry Port Established in 1984
- Peshawar Dry Port Established in 1986
- Multan Dry Port Established in 1988
- Rawalpindi Dry Port Established in 1990

In addition to the above, there are four Dry Ports established and running under the management of the private sector

- Sialkot Dry Port Established in 1986
- Faisalabad Dry Port Established in 1994
- Pak-China Sust Dry Port
- NLC Dry Port at Thokar Niaz Beg Lahore
- NLC Dry Port at Quetta

Export Processing Zones[80]

There is an Export Processing Zone in District Nowshera, located at Risalpur. It is a Joint Venture between Sarhad Development Authority (SDA) and Export Processing Zones Authority. It is located on Nowshera-Mardan and is spread over 92 acres, providing 137 plots of different sizes.

The following facilities are available for the EPZ Risalpur:

- Duty-free import of machinery, equipment and materials.
- Freedom from national import regulations.
- Exchange control regulations of Pakistan are not applicable.
- Repatriation of capital and profits.
- No sales tax on input goods including electricity/gas bills.
- Duty-free vehicles are allowed under certain conditions.
- The domestic market is available to the extent of 20%. Exceptions may be available.
- Presumptive tax @ 1%.
- One-window operation with simplified procedures.
- All facilities like water, electricity, gas and telecommunications are made available.
- Peaceful, secure, environmentally protected, and pollution-free work area.

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[80] Export Processing Zone Authority: http://www.epza.gov.pk/location.html

The other operational export processing zones in the country are:

- Karachi
- Sandak
- Sialkot
- Duddar

5.12.7 Impact of Trade and Commerce on the Economy

Global recession adversely affected exporting countries including Pakistan. Exports from Pakistan declined to US$ 17.8 billion as compared to the previous year's exports of US$ 19.1 billion. Imports also witnessed a relative decline and fell by 13% as Pakistan's imports during 2008-09 stood at US $ 34.9 billion as compared to US $ 40.4 billion in 2007-08. The impact of Trade and Commerce on national and provincial economies is given in Table 5.46.

Table 5-46: Impact of Trade and Commerce on National and Provincial Economies	
Pakistan	During 2008-9, the export of Textiles, which account for around 54% of Pakistan's total exports, dropped from US$ 10.6 billion to US$ 9.6 billion. The major losers in this regard were Readymade Garments, which dropped by 21.7%, Cotton Yarn, which dropped by 15%, Bed linen, which dropped by 10.2%, Art Silk & Synthetic Textiles, which dropped by 22.1% and Cotton Fabric by 4.0%. The exports of finished leather and leather manufacturers dropped from US$ 1.1 billion to US$ 0.8 billion registering a drop of 24.5%. The Rice exports have registered an impressive growth from US$ 1.84 billion to US$ 1.99 with an increase of 8.2%. Engineering goods also registered an increase of 26.1% from US$ 211.3 to US$ 266.4 million. In this regard, the major contributors have been the specialized machinery, transport equipment, electric fans etc. Taking a long-term view of Pakistan's export performance over the last ten years, Pakistan's share in the global market, according to WTO data, has declined by more than 1/3 to 0.13% in 2009 from 0.21 % in 1999.
Khyber Pakhtunkhwa	Khyber Pakhtunkhwa's share of Pakistan's total GDP has historically comprised 10.5%, although the province accounts for 11.9% of Pakistan's total population. The part of the economy that Khyber Pakhtunkhwa dominates is forestry, where its share has historically ranged from a low of 34.9%to a high of 81%, giving an average of 61.56%. Currently, Khyber Pakhtunkhwa accounts for 10% of Pakistan's GDP, 20% of Pakistan's mining output and since 1972, it has seen its economy grow in size by 3.6 times.
	After suffering for decades due to the fallout of the Soviet invasion of Afghanistan, today they are again being targeted for totally a different situation of terrorism. Agriculture remains important and the main cash crops include wheat, maize, Tobacco (in Swabi), rice, sugar beets, as well as various fruits grown in the province. Some manufacturing and high-tech investments in Peshawar have helped improve job prospects for many locals, while trade in the province involves nearly every product. The bazaars in the province are renowned throughout Pakistan. Numerous workshops throughout the province support the manufacture of small arms and weapons of various types. The province accounts for at least 78% of the marble production in Pakistan.

Punjab	The economy of Punjab is largely based on agriculture and industry. Punjab has the largest and fastest growing economy in the country compared to other provinces and administrative units. Punjab's economy has quadrupled since 1972. Its share of Pakistan's GDP was 54.7% in 2000 and 59% in 2010. It is especially dominant in the Service & Agriculture sectors of the Pakistan Economy. With its contribution ranging from 52.1% to 64.5% in the Service Sector and 56.1% to 61.5% in the Agriculture Sector. It is also a major manpower contributor because it has the largest pool of professionals and highly skilled (Technically trained) manpower in Pakistan. It is also dominant in the Manufacturing sector, though the dominance is not as huge, with historical contributions ranging from a low of 44% to a high of 52.6%. In 2007, Punjab achieved a growth rate of 7.8% and during the period 2002-03 to 2007-08, its economy grew at a rate of between 7% to 8% per year, and during 2008-09 grew at 6% against the total GDP growth of Pakistan at 4%.
Sindh	Sindh has the second largest economy in Pakistan. Its GDP per capita was $1,400 in 2010 which is 50 per cent more than the rest of the nation or 35 per cent more than the national average. Historically, Sindh's contribution to Pakistan's GDP has been between 30% to 32.7%. Its share in the service sector has ranged from 21% to 27.8% and in the agriculture sector from 21.4% to 27.7%. Performance-wise, its best sector is the manufacturing sector, where its share has ranged from 36.7% to 46.5%. Since 1972, Sindh's GDP has expanded by 3.6 times. Endowed with coastal access, Sindh is a major center of economic activity in Pakistan and has a highly diversified economy ranging from heavy industry and finance centered in and around Karachi to a substantial agricultural base along the Indus. Manufacturing includes machine products, cement, plastics, and various other goods. Agriculture is very important in Sindh with cotton, rice, wheat, sugar cane, bananas, and mangoes as the most important crops.
Baluchistan	The economy of Baluchistan is largely based upon the production of natural gas, coal and minerals. Agriculture and livestock also dominate the Baloch economy. Horticultural development is a fairly recent, yet growing phenomenon. Other important economic sectors include fisheries, mining, manufacturing industries, trade and other services being rendered by public and private sector organizations in the province. Limited farming in the east as well as fishing along the southern Arabian Sea coastline are other forms of income and sustenance for the local populations. Due to the tribal lifestyle of many people, animal husbandry is important, as is the trading bazaar found throughout the province. Though the province remains largely underdeveloped, there are currently several major development projects in progress in Baluchistan, including the construction of a new deep-sea port at the strategically important town of Gwadar. The port is projected to be the hub of an energy and trade corridor to and from China and the Central Asian republics.

5.12.8 Work Force

Both in 1998 as well as in 1981, the workforce in trade and commerce is categorized as "Major Division 6 – Wholesale and retail trade and restaurants and hotels".

The categorization of the workforce in this sector is not as skilled, semi-skilled, unskilled and managerial, but as a self-employed, employee (Govt), employee (private), employer and unpaid family worker. Based on the given criteria, the percentages of the workforce in trade and commerce, in the years 1981 and 1998 are presented in the graph. The most prominent changes have been in the Employee (Non-Govt.) category, which have increased from around 0.95% in 1981 to about 17.6% in 1998. The percentage of

Work Force in Trade and Commerce

	Self-Employed	Employee (Govt)	Employee (Non-Govt)	Employer	Unpaid Family Worker
Year 1998	68.17	17.64	8.00	0.83	5.36
Year 1981	67.63	0.95	17.51	6.60	7.31

Figure 5- 2: Work Force in Trade and Commerce

employers, on the other hand, decreased from 6.60% in 1981 to only around 0.83% in 1998. Comparative statistics about other categories of the workforce are presented in the graph.

5.12.9 Constraints

In District Nowshera, there is a great potential to enhance the district's income manifold by allocating more land and financial resources to local businesses and trade to meet local demands and develop export-oriented production in KP.

Nowshera has to depend heavily on the safety and security of people and assets for the desired rapid commercial growth. Businesses and commerce shall be evolved and developed like the other developed countries. To this end the skill improvement, and increase in efficiency with which new processes are adopted. The flow of information, better infrastructure, availability of funds and quality inputs, and investor/entrepreneurs' managerial capabilities shall be streamlined. Empirical evidence shows that suitable commercial, financial, economic and trade policies directly influence productivity and economic growth.

Some of the major constraints to the sustainable development of commerce and trade are listed below:

  i. Lack of properly planned and developed land
  ii. Threats due to terrorism and the absence of emergency disaster response, like firefighting, and emergency exits, as such many lives assets, and property have been damaged during recent terrorists attacks.
  iii. The large fluctuation in prices and rates of products and services
  iv. Frequent power outages
  v. Uncontrolled inflation
  vi. No standardization for specifications of products
  vii. Lack of quality standards
  viii. Lack of adequate and proper Car Parking area
  ix. Absence of loading and unloading bays
  x. Lack of solid and liquid waste disposal.
  xi. Life-threatening mix of petrol pumps, CNG stations, hotels, restaurants, and motels
  xii. Mixed and conflicting land use of education, health, residential small industry, and commercial land use.
  xiii. Absence of basic facilities for the customers like toilets, rest areas, lockers, etc.
  xiv. Lack of firefighting safety and security system
  xv. A mix of hazardous and non-hazardous commercial uses.

5.13 INDUSTRY

5.13.1 Industries – District Nowshera

Apart from the Special Industrial Zone and Export Processing Zone in District Nowshera (both of which are located at Risalpur), most other industries have been developed along major roads in form of ribbon development, particularly Grand Truck Road. Industrialists find this convenient but are problematic for the common man. Vehicles turning into or out of premises cause particular problems, especially when the vehicles have to cross an opposing stream of traffic. Lack of planning control has allowed roadside industrial developments to become a major problem that extends many kilometers along GT Road.

There is a total of 240 industrial units in District Nowshera, of which 80 are operational in the Industrial Zones while 160 are scattered all around the District (Table 5.47). Of the 160 units outside industrial zones, 62 are marble based while 37 are Cement based. Together, these are 61% of the total units. The two major cement plants are AWT Nizampur Cement Plant and Askari Cement, both located at Nizampur.

Most of the medium-sized industries are located along the Grand Trunk Road. Small industries are scattered throughout the District, such as along major inter-city roads or on the periphery of urban areas.

The details about industries in district Nowshera is tabulated in Table 5.48. The number of plots in the Special Industrial Zone is 80, of which 31 are operational. The number of plots in the Export Processing Zone is 137, only 2 of which are in operation.

	Table 5-47: Number of Industries in District Nowshera	
Sr. No	**Particulars**	**No. of Units**
1	Operational units in Rashakai Special Economic Zone	1
2	Operational Units in Nowshera Economic Zone	65
3	Operational Economic Zone Extension	0
4	Operational units in export processing Zone	13
5	Jalozai Economic Zone	1
6	Operational units outside Industrial Zones	160
	Grand Total	240

Table 5-48: Details of Industrial Zone and Export Processing Zone			
1. Rashakai Special Economic Zone		**2. Export Processing Zone Nowshera**	
Area	1000 Acres	Area	92 Acres
Total no of Plots	702	Total no of Plots	137
Total no of Plots allotted	17	Total no of Plots allotted	43
Operational Units	01	Operational Units	11
Under Construction	3	Under Construction	13
Closed Units	0	Closed Unit	19
Infrastructure Facilities	Available	Infrastructure Facilities	Available
Estimated Distance to Peshawar	55/km 45 minutes	Estimated Distance to Peshawar	55
3. Nowshera Economic Zone		**4. Nowshera Economic Zone Extension**	
Area	108	Area	75
Total no of Plots	73	Total no of Plots	92
Total no of Plots allotted	73	Total no of Plots allotted	72
Operational Units	65	Operational Units	0
Under Construction	02	Under Construction	30
Closed Units	06	Closed Units	0
Infrastructure Facilities	Available	Infrastructure Facilities	Available
Estimated Distance to Peshawar	1 hour	Estimated Distance to Peshawar	1 hour
5. Jalozai Economic Zone			
Area	257 Acres		
Total no of Plots	273		
Total no of Plots allotted	212		
Operational Units	1		
Under Construction	73		
Closed Units	0		
Infrastructure Facilities	Available		
Estimated Distance to Peshawar	45 minutes		

Table 5.49 provides historical data for District Nowshera giving a total number of units, running units, and closed units in the past number of years. The running units have generally been on the increase since the year 2004-05. This is contrary to most other Districts of the Province.

In the year 2010-2011, there were a total of 213 industrial units in Nowshera, of which 19 are closed and 194 were operational. These 194 running units include two cement factories at Nizampur, employing a total of 5385 persons, which is more than 20% of the total industrial labour in the District.

Table 5-49: Registered Industrial Units in District Nowshera[81]			
Year	Total	Running Unit	Closed Unit
2004-05	153	117	36
2005-06	175	139	36
2006-07	183	145	38
2007-08	190	149	41
2008-09	190	149	41
2009-10	187	147	40
2010-11	213	194	19
2013-14	205	187	18
2014-15	208	190	18
2015-16	209	192	17

5.13.2 Future Industrial Area Requirement

The industrial area requirement in District Nowshera has been calculated based on additional population for the first 5 years of the plan period (2019-2024) and the subsequent 15 years (2024-2039). The anticipated industrial labour force in these periods was calculated based on a 5% participation rate[82] and industrial area by applying the standard of 50 industrial workers per acre. The results are presented in Table 5.50. It is clear that over the entire plan period; 1330 acres would be required which includes 281.5 acres in the short-term (2019-2024) and 1048.8 acres in the long-term period (2024-2039).

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[81]Source: Bureau of Statistics, Planning & Development Department, NWFP Development Statistics, 2007, Page 181, Table 136 (For the years 2004-2005, 2005-2006 and 2006-2007). For years 2007-2008, 2008-2009 and 2009-2010, the source is Khyber Pakhtunkhwa Development Statistics, 2010, Page 192, Table 140. For year 2013-2014, 2014-2015 and 2015-2016 are taken from Bureau of Statistics, Planning & Development Department, NWFP Development Statistics, 2017, page 200, Table 155.

[82] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards.

Table 5-50: Future Industrial Area Requirement (Acres)			
Parameters	Short-Term Plan (2019-2024)	Long Term Plan (2024-2039)	Total
Additional Population	281536	1048883	1330419
Industrial Labor Force	14076	52444	66520
Industrial Area Required	281.53	1048.88	1330.41

5.13.3 Current Industrial Area Gap

The current industrial area gap has been calculated as below:

- District Population (2019): 1615532
- Industrial Labor Force (@5% of above): 80776
- Industrial area required (@50 workers per acre) = 1615.53 acres
- The current area under Industries: 1532 acres[83]
- Industrial area deficiency: 1615.53-1,532 = 83.53 acres

It is clear from the above that till the end of the plan period, the total industrial area requirement would include 83.53 acres to meet the current deficiency, and 1330.41 acres to meet the future requirement. The total would be thus 83.53+1330.41= 1413.94 acres. An area of 385 acres is proposed to meet somehow requirements this area is proposed upon the present trends towards industrial development.

5.13.4 Proposed Industrial Location

The ADP 2012-2017 of KP recommends the following for future industrial areas in District Nowshera:

- Master Planning of Industrial Estate Nowshera along M-1.
- Extension of Industrial Estate Nowshera (100 Acres).

The industrial estate is proposed to be located along Motorway Link Road, thus providing direct access to the motorway through the Kernel Sher Khan interchange. A city park has been provided adjacent (West) to the proposed estate, which will act as a buffer zone between the industrial estate and the planned land uses nearby.

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[83] Chapter 2, Table 2.1 of this Report
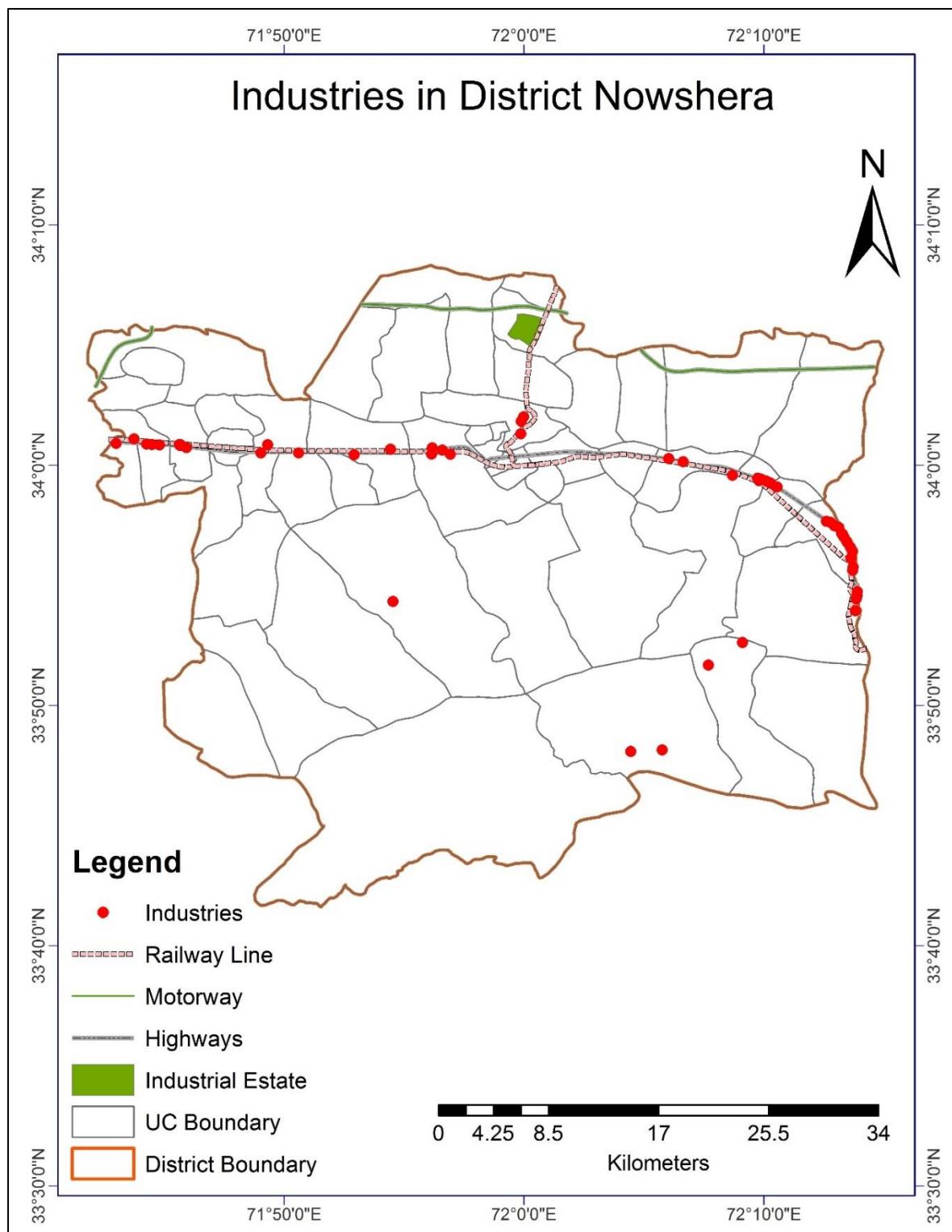
Map 5-21: Industries in District Nowshera

Map 5.21 represents the industry's location in District Nowshera. It also shows that all these industries are along the Grand trunk road.

5.14 MINES AND MINERALS

Fourteen types of various mainly industrial minerals are extracted in the district of Nowshera there are only two metallic (haematite and chromite) mineral areas granted as leases but there is no production of these minerals. There are no reported gemstones that are mined /exploited in this district.

Minor minerals i.e., sand, bajri, and gravel are also extracted from small streams and river banks. Marble cutting and polishing units are working in the district of Nowshera mostly along the Grand Trunk Road (GT Road). Minerals extracted from another district of the province are sent to Karachi and other parts of Pakistan through different private companies operating in Nowshera.

Mineral production for the year 2015-2016 along with leases area of Nowshera is given in Table. 5.51.

Table 5-51: Mineral production for the years 2015-2016 along with the lease area of Nowshera			
Sr. No.	Mineral	Leased areas in acres	Production in metric tons 2015-2016
1.	**Bentonite**	6939.602	2490
2	**Coal**	26967.460	4530
3	**Dolomite**	3149.878	38070
4	**Fire Clay**	1383.900	566
5	**Hematite**	77.469	Nil
6	**Limestone**	551.526	2780965
7	**Laterite**	10108.51	22761
8	**Marble**	551.526	2588
9	**Red oxide**	538.56	Nil
10	**Shale Clay**	7770.975	456011
11	**Slate Stone**	3100.490	42150
12	**Silica sand**	712.291	1050
13	**Soap Stone**	358.073	2550
14	**Chromite**	265.620	Nil

5.14.1 Minerals Mined/Extracted from District Nowshera

i. Bentonite Clay

Bentonite clay is an absorbent aluminium phyllosilicate, essentially impure clay consisting mostly of montmorillonite. There are different types of bentonite, each named after the respective dominant element, such as potassium (K), sodium (Na), calcium (Ca), and aluminium (Al). Bentonite usually forms from weathering of volcanic ash, most often in the presence of water. For industrial purposes, two main classes of bentonite exist sodium and calcium bentonite. In stratigraphy and tephrochronology, completely devitrified (weathered volcanic glass) ash-fall beds are commonly referred to as K-bentonites when the dominant clay species is elite. Other common clay species, and sometimes dominant, are montmorillonite and kaolinite. Kaolinite-dominated clays are commonly referred to as ton steins and are typically associated with coal.

General Uses of Bentonite Clay

Sodium bentonite powder absorbs liquid, has a tremendous swelling ability, is often used in manufacturing, and has many allied applications. Because of its excellent stickiness and fireproof-ability, bentonite is often used as a bond and regulator in moulding ferrous and nonferrous metals and oil and fat refining. Its bonding capabilities make it suitable for metal casting and, when mixed with clay and sand, it forms an adhesive used in building and sewage reservoirs. One of the foremost uses of bentonite powder occurs in the oil drilling and mining industries.

When drilled holes must be filled, bentonite pellets are poured down the hole, and water is added. Because the pellets are solid, they float. The pellets swell together and set in place sealing the hole.

Bentonite is sold in health food stores as a dietary supplement. Its amazing absorption properties draw toxins from the body, much like a sponge, before passing from the body as waste. it is added to antidiarrheal preparations, a vast number of foods (including candy bars and yoghurt), protein powders, baby milk powders, rice milk powders, toothpaste, and animal and pet feed.

Bentonite is also used in other household products, such as cosmetics, medicinal herbal creams, pharmaceutical drugs, anti-irritant lotions for eczema, preparations for colon, kidney, and liver detoxification, fungicides, fertilizer applications, ceramics, and other products in which bonding properties are required.

Present Detail Profile of Bentonite Clay[84]

Locality	Aza Khel, Dag Ismail Khail, Jabba Khattak, Spin Kana, Jalozai
Number of leases	13 (thirteen)
Mining Method	Underground mining
The scale of Mining	Small & primitive mining
Lease Area	6939.602 Acres
Production in tones	2490 tons (2016)

ii. Coal

Coal is a combustible black or brownish-black sedimentary rock normally occurring in rock strata in *layers or veins* called **coal beds** or **coal seams**. The harder forms, such as anthracite coal can be regarded as metamorphic rock because of later exposure to elevated temperature and pressure. Coal is composed primarily of carbon along with variable quantities of other elements, chiefly hydrogen with smaller quantities of sulfur, oxygen, and nitrogen.

As geological processes apply pressure to dead biotic material over time, under suitable conditions it is transformed successively into:

- **Peat,** considered to be a precursor of coal, has industrial importance as a fuel in some regions, for example, Thar coal. In its dehydrated form, peat is a highly effective absorbent for fuel and oil spills on land and water.
- **Lignite,** also referred to as brown coal, is the lowest rank of coal and is used almost exclusively as fuel for electric power generation.
- **Sub-bituminous coal**, whose properties range from those of lignite to those of bituminous coal is used primarily as fuel for steam-electric power generation. Additionally, it is an important source of light aromatic hydrocarbons for the chemical synthesis industry.
- **Bituminous coal**, dense sedimentary rock, black but sometimes dark brown, often with well-defined bands of bright and dull material, is used primarily as fuel in steam-electric power generation, with substantial quantities also used for heat and power applications in manufacturing and to make coke
- *Steam coal* is a grade between bituminous coal and anthracite, once widely used as a fuel for steam locomotives and also fuel for domestic water heating
- **Anthracite**, the highest rank; is a harder, glossy, black coal used primarily for residential and commercial space heating.
- **Graphite**, technically the highest rank, but difficult to ignite and is not so commonly used as fuel: it is mostly used in pencils and, when powdered, as a lubricant.

However, the exact classification varies between countries.

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[84] Source: Directorate General of Mines and Minerals, Government of KP .2016

Uses

Coal as Fuel

Coal is primarily used as a solid fuel to produce electricity and heat through combustion. World coal consumption was about 6.75 billion short tons in 2006[1] and is expected to increase 48% to 9.98 billion short tons by 2030. China produced 2.38 billion tons in 2006. India produced about 447.3 million tons in 2006, and 68.7% of China's electricity comes from coal. The USA consumes about 14% of the world's total, using 90% of it for the generation of electricity.

Coking Coal

Coke is the solid carbonaceous residue derived from low-ash, low-sulfur bituminous coal from which the volatile constituents are driven off by baking in an oven without oxygen at temperatures as high as 1,000 °C (1,832 °F) so that the fixed carbon and residual ash are fused. Metallurgical coke is used as a fuel and as a reducing agent in smelting iron ore in a blast furnace. The coking coal should be low in Sulphur and phosphorus so that they do not migrate to the metal. The product is cast iron and is too rich in dissolved carbon, so must be treated further to make steel.

Gasification

Coal gasification can be used to produce syngas, a mixture of carbon monoxide (CO) and hydrogen (H_2) gas. These syngas can then be converted into transportation fuels like gasoline and diesel through the Fischer-Tropsch process. This technology is currently used by South Africa to make gasoline from coal and natural gas. Alternatively, the hydrogen obtained from gasification can be used for various purposes such as powering a hydrogen economy, and making ammonia.

Liquefaction

Coal can also be converted into liquid fuels such as gasoline or diesel by several different processes.

Present Detail Profile of Coal[85]

Locality	Villages Silah Khana, Assu Khel Kahi, Dag Ismail Khel, KamarSar, Kharakai, Tarusar, Nizampur, Mir Klan, Pirano Kandao, Jamu, Marazai Tang, Shin Ghundai, Shahkot Bala, Jabba Khattak, Lakarai, Gandab, Rakhtai.
Number of leases	27 (twenty-seven)
Mining Method	Underground mining

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[85] Source: Directorate General of Mines and Minerals, Government of KP .2016

The scale of Mining	Small & primitive mining
Lease Area	26967.46 Acres
Production in tones	4530 tons (2016)

iii. Dolomite

Dolomite is a carbonate mineral composed of calcium magnesium carbonate CA Mg $(CO_3)_2$. The term is also used to describe the sedimentary carbonate rock dolostone.

Dolostone (dolomite rock) is composed predominantly of the mineral dolomite with a stoichiometric ratio of 50% or greater content of magnesium replacing calcium. Limestone that is partially replaced by dolomite is referred to as dolomitic limestone.

Uses

Dolomite is used as an ornamental stone, a concrete aggregate, a source of magnesium oxide, and also used for the production of magnesium. It is an important petroleum reservoir rock and serves as the host rock for large strata-bound ore deposits of base metals such as lead, zinc, and copper. Where calcite limestone is uncommon or too costly, dolomite is sometimes used in its place as a flux for the smelting of iron and steel. Large quantities of processed dolomite are used in the production of float glass. In horticulture, dolomite and dolomitic limestone are added to soils and soilless potting mixes to lower their acidity and as a magnesium source. Home and container gardening are common examples of this use. Dolomite is also used as the substrate in marine (saltwater) aquariums to help buffer changes in the pH of the water.

Present Detail Profile of Dolomite[86]

Locality	Villages: Manki, Khai, Misri Banda, and Shado Khel.
Number of leases	05 (five)
Mining Method	Surface mining
The scale of Mining	Small & primitive mining
Lease Area	3149.878 Acres
Production in tones	38070 tons (2016)

iv. Fire Clay

Fire clay is a term applied to a range of refractory (heat resistant) clays used in the manufacture of ceramics, especially fire brick. High-grade fire clays can withstand temperatures of 1775°C. Fire clays range from flint clay (non-plastic) to *plastic fire clays*, but

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[86] Source: Directorate General of Mines and Minerals, Government of KP .2016

there are *semi-flint* and *semi-plastic* fire clays as well. Fire clays consist of natural argillaceous materials, mostly Kaolinite group clays, along with fine-grained micas and quartz, and may also contain organic matter and Sulphur compounds. Fire clay chemical compositions have a range of 23-34wt% aluminium oxide (Al_2O_3), 50-60wt% silicon oxide (SiO_2), and 9-12wt% water. Fire clays usually contain Fe_2O_3, along with Calcium Oxide, Magnesium Oxide, Potassium Oxide, Sodium Oxide, and Titanium Dioxide.

Uses

Because of the abundant supply of fireclay and its comparative cheapness, the refractory bricks made out of it are the most common and extensively used in all places of heat generation, such as:

- In boiler furnaces
- Glass melting furnaces
- Chimney linings
- Pottery kilns blast furnaces
- Reheating furnaces

Present Detail Profile of Fire Clay[87]

Locality	Villages: Kahi, Mama Khel, Gandab, and Toa
Number of leases	05 (five)
Mining Method	Underground mining
The scale of Mining	Small & primitive mining
Lease Area	358.073 Acres
Production in tones	566 tons (2016)

v. Hematite

Hematite is one of the most common minerals it is also spelt as hematite, it is one of the mineral forms of iron oxide (Fe_2O_3). Hematite crystallizes in the rhombohedral system, and it has the same crystal structure as ilmenite and corundum. Hematite and ilmenite form a complete solid solution at temperatures above 950 °C. Hematite is a mineral, coloured black to steel or silver-grey, brown to reddish brown, or red. It is mined as the main ore of iron the colour of most red and brown rock, such as sandstone, is caused by small amounts of Hematite. It is also responsible for the red colour of many minerals such as Garnet, Spinel, and to some extent, Ruby. Non-crystalline forms of Hematite may be transformations of the mineral Limonite that lost water, possibly due to heat.

Uses

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[87] Source: Directorate General of Mines and Minerals, Government of KP .2016

Hematite is the principal ore of iron. Huge quantities are mined throughout the world for industrial production. Hematite was largely used in the past as a red and brown pigment, although nowadays cheaper sources have been substituted. Well-formed Hematite crystals are popular among mineral collectors, and tumbled highly lustrous Hematite from Brazil makes a very popular, inexpensive specimen for amateur collectors. Hematite is also used as a minor gemstone. It is cut and polished into cabochons for jewellery and ornaments, fashioned into beads for bracelets and necklaces, and carved into ornamental figures.

Present Detail Profile of Hematite[88]

Locality	Village: Mazri Tang
Number of leases	01 (one)
Mining Method	Underground mining
The scale of Mining	Small & primitive mining
Lease Area	77.467 Acres
Production in tones	Nil tons (2016)

vi. Lime Stone

Limestone is a sedimentary rock composed primarily of calcium carbonate ($CaCO_3$) in the form of the mineral calcite. It most commonly forms in clear, warm, shallow marine waters. It is usually an organic sedimentary rock that forms from the accumulation of shell, coral, algal, and faecal debris. It can also be a chemical sedimentary rock formed by the precipitation of calcium carbonate from lake or ocean water.

General Uses

It is the raw material for the manufacture of quicklime (calcium oxide), slake lime (calcium hydroxide), cement, and mortar. Pulverized limestone is used as a soil conditioner to neutralize acidic soils. It is crushed for use as aggregate (the solid base for many roads). Geological formations of limestone are among the best petroleum reservoirs. It is added to toothpaste, paper, plastics, paint, tiles, and other materials as both white pigment and a cheap filler. It can suppress methane explosions in underground coal mines. Purified limestone is added to bread and cereals as a source of calcium. Calcium levels in livestock feed are supplemented with it, such as for poultry (when ground). It can be used for remineralizing and increasing the alkalinity of purified water to prevent pipe corrosion and restore essential nutrient levels. Used in blast furnaces, limestone extracts iron from its ore.

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[88] Source: Directorate General of Mines and Minerals, Government of KP .2016

Present Detail Profile of Limestone[89]

Locality	Villages: Ziarat Kaka Sahib, Kaisari, Darwazgai, Buran, Dag Ismail Khel, Munda Killi, Tangaru, Jammu, Tangi, Pirsabaq, Mama Khel, Shin Ghundai, Kaisre, Jammu, Kairabad, Darwazgai Shein and Gul Dheri.
Number of leases	32 (thirty-two)
Mining Method	open pit mining
The scale of Mining	small & primitive mining
Lease Area	67968.85 Acres
Production in tones	2780965 tons (2016)

vii. Laterite

Laterites are soil types that are rich in iron and aluminium, formed in hot and wet tropical areas. Nearly all laterites are rusty-red because of iron oxides. They develop by intensive and long-lasting weathering of the underlying parent rock. Tropical weathering (lateralization) is a prolonged process of chemical weathering that produces a wide variety in the thickness, grade, chemistry, and ore mineralogy of the resulting soils. Laterites are a source of aluminium ore; the ore exists largely in clay minerals and the hydroxides, gibbsite, boehmite, and diaspore, which resembles the composition of bauxite. Laterite ores also were the early major source of nickel.

General Uses

The compact and ferruginous variety of laterite is used widely as road metal and as a local stone for culverts and buildings. It cannot withstand heavy pressure and as such, it is used for the construction of light structures. Laterite as a building stone possesses one advantage it is soft when quarried and can be easily cut and dressed into blocks and bricks which on exposure to air become hard. The industrial use of laterite is in the cement industry. It is used as an additive for lowering the clink erization temperature and supplementing aluminous and iron contents required in the manufacture of cement. It is also used for wastewater treatment.

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[89] Source: Directorate General of Mines and Minerals, Government of KP .2016

Present Detail Profile of Laterite Clay[90]

Locality	Villages: Kahi, Assu Khel, Garu, Mir Kalan, Kamar Mela, Shongai, Jammu, Darwazgai, Hisar Tang, Anzari, Assu Khel, Palosai, Piran Payan, Amiru, Shin Ghundai, Kahan, Tar Khel, Shieki, Kahi, Gandab, Mama Khel
Number of leases	25(twenty-five)
Mining Method	Open pit mining
The scale of Mining	Small & primitive mining
Lease Area	10108.51 Acres
Production in tones	13736 Tons (2010)

viii.Marble

Marble is a rock resulting from the metamorphism of sedimentary carbonate rocks, most commonly limestone or dolomite rock. Metamorphism causes variable recrystallization of the original carbonate mineral grains. The resulting marble rock is typically composed of an interlocking mosaic of carbonate crystals. Primary sedimentary textures and structures of the original carbonate rock (photolith) have typically been modified or destroyed. Pure white marble is the result of the metamorphism of a very pure (silicate-poor) limestone or dolomite photolith. The characteristic swirls and veins of many-coloured marble varieties are usually due to various mineral impurities such as clay, silt, sand, iron oxides, or chert which were originally present as grains or layers in the limestone. Green colouration is often due to serpentine resulting from originally high magnesium limestone or dolostone with silica impurities. These various impurities have been mobilized and recrystallized by the intense pressure and heat of the metamorphism.

Uses

Sculpture/curving decorative items

White marble has been prized for its use in sculptures since classical times. This preference has to do with its softness, relative isotropy and homogeneity, and relative resistance to shattering. Also, the low index of refraction of calcite allows light to penetrate several millimetres into the stone before being scattered out, resulting in the characteristic waxy look which gives "life" to marble sculptures of the human body. Marble is extensively used as table and kitchen tops. Also, it is used for making

Decorative gift items of various uses.

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[90] Source: Directorate General of Mines and Minerals, Government of KP .2011

Construction marble

Construction marble is a stone that is composed of calcite, dolomite, or serpentine which is capable of taking a polish[] More generally in construction, specifically the dimension stone trade, the term "marble" is used for any crystalline calcitic rock (and some non-calcitic rocks) useful as building stone.

Present Detail Profile of Marble[91]

Locality	Villages: Gandab, Pirsabak, Kandar, and Turlandi
Number of leases	06 (six)
Mining Method	Surface mining
The scale of Mining	Small & primitive mining
Lease Area	551.526 Acres
Production in tones	22528 tons (2016)

ix. Red Oxide

Red oxide is Iron oxide (III) or ferric oxide having the chemical formula Fe_2O_3. It is one of the three main oxides of iron, the other two being iron (II) oxide (FeO), which is rare, and iron (II, III) oxide (Fe_3O_4), which also occurs naturally as the mineral magnetite. As the mineral known as hematite, Fe_2O_3 is the main source of iron for the steel industry. Fe_2O_3 is ferromagnetic, dark red, and readily attacked by acids. Rust is often called iron (III) oxide, and to some extent, this label is useful, because rust shares several properties and has a similar composition. To a chemist, rust is considered an ill-defined material, described as *hydrated* ferric oxide.

General Uses

Iron industry

The overwhelming application of Iron (III) oxide is as the feedstock of the steel and iron industries, e.g. the production of iron, steel, and many alloys.

Polishing

A very fine powder of ferric oxide is known as "jeweller's rouge", "red rouge", or simply rouge. It is used to put the final polish on metallic jewellery and lenses, and historically as a cosmetic.

Rouge cuts more slowly than some modern polishes, such as cerium (IV) oxide, but is still used in optics fabrication and by jewellers for the superior finish it can produce. When polishing gold, the rouge slightly stains the gold, which contributes to the appearance of the finished piece. Rouge is sold as a powder, paste, laced on polishing cloths, or solid bar (with a wax or grease binder). Other polishing compounds are also often called "rouge", even when they do

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not contain iron oxide. Jewellers remove the residual rouge on jewellery by use of the ultrasonic cleaning Tool Sharpening

Products sold as a **stropping compound** are often applied to a leather strop to assist in getting a razor edge on knives, straight razors, or any other edged tool.

Pigment

Iron(III) oxide is also used as a pigment, under the names "Pigment Brown 6", "Pigment Brown 7", and "Pigment Red 101".[1] Some of them, e.g. Pigment Red 101 and Pigment Brown 6, are Food and Drug Administration (FDA)-approved for use in cosmetics.

Niche uses

Being inexpensive and nontoxic, ferric oxide finds many niches uses. For example, in its granular form (GFO, granular-ferric-oxide), it is used to remove phosphates in aquariums.

Present Detail Profile of Red Oxide[92]

Locality	Villages: Jammu and Gandab.
Number of leases	02 (two)
Mining Method	Surface mining
The scale of Mining	Small & primitive mining
Lease Area	538.56 Acres
Production in tones	Nil tons (2016)

x. Shale Clay

Shale is a fine-grained sedimentary rock that forms from the compaction of silt and clay-size mineral particles that we commonly call "mud". This composition places shale in a category of sedimentary rocks known as "mudstones". Shale is distinguished from other mudstones because it is fissile and laminated. "Laminated" means that the rock is made up of many thin layers. "Fissile" means that the rock readily splits into thin pieces along the laminations.

Shale is a fine-grained, clastic sedimentary rock composed of mud that is a mix of flakes of clay minerals and tiny fragments (silt-sized particles) of other minerals, especially quartz and calcite. and the typical colour is grey. Shale is characterized by breaks along thin laminae or parallel layering or bedding less than one centimeter in thickness, called fissility. The addition of variable amounts of minor constituents alters the colour of the rock. Black shale results from the presence of greater than one percent carbonaceous material and indicate a reducing environment. Black shale can also be referred to as black metal. Red, brown, and green colours are indicative of ferric oxide (hematite - reds), iron hydroxide (goethite - browns and

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[92] Source: Directorate General of Mines and Minerals, Government of KP .2016

limonite - yellow), or micaceous minerals (chlorite, biotite, and illite - greens). Shales and mud rocks contain roughly 95 percent of the organic matter in all sedimentary rocks. However, this amounts to less than one percent by mass in an average shale. Black shales which form in anoxic conditions contain reduced free carbon along with ferrous iron (Fe^{2+}) and sulfur (S^{2-}). Pyrite and amorphous iron sulfide along with carbon produce black and purple colouration. Shale breaks into thin pieces with sharp edges. It occurs in a wide range of colours that include: red, brown, green, grey, and black. It is the most common sedimentary rock and is found in sedimentary basins worldwide.

Uses of Shale

Some shales have special properties that make them important resources. Black shales contain organic material that sometimes breaks down to form natural gas or oil. Other shales can be crushed and mixed with water to produce clays that can be made into a variety of useful objects.

Conventional Oil and Natural Gas

Black organic shales are the source rock for many of the world's most important oil and natural gas deposits. These black shales obtain their black colour from tiny particles of organic matter that were deposited with the mud from which the shale formed. As the mud was buried and warmed within the earth some of the organic material was transformed into oil and natural gas.

The oil and natural gas migrated out of the shale and upwards through the sediment mass because of their low density. The oil and gas were often trapped within the pore spaces of an overlying rock unit such as sandstone (see illustration at right). These types of oil and gas deposits are known as "conventional reservoirs" because the fluids can easily flow through the pores of the rock and into the extraction well.

Although drilling can extract large amounts of oil and natural gas from the reservoir rock, much of it remains trapped within the shale. This oil and gas are very difficult to remove because it is trapped within tiny pore spaces or adsorbed onto clay mineral particles that make up the shale.

Unconventional Oil and Natural Gas

In the late 1990s, natural gas drilling companies developed new methods for liberating oil and natural gas that is trapped within the tiny pore spaces of shale. This discovery was significant because it unlocked some of the largest natural gas deposits in the world.

Shale Used to Produce Clay

Many years ago, these same items were made from natural clay. However, heavy use depleted most of the small clay deposits. Needing a new source of raw materials, manufacturers soon discovered that mixing finely ground shale with water would produce a lump of clay that often had similar or superior properties. Today, most items that were once

produced from natural clay have been replaced by almost identical items made from clay manufactured by mixing finely ground shale with water.

Shale Used to Produce Cement

Cement is another common material that is often made with shale. To make cement, crushed limestone and shale are heated to a temperature that is high enough to evaporate all water and break down the limestone into calcium oxide and carbon dioxide. The carbon dioxide is lost as an emission but the calcium oxide combined with the heated shale makes a powder that will harden if mixed with water and allowed to dry. Cement is used to make concrete and many other products for the construction industry.

Oil Shale

Oil shale is a rock that contains significant amounts of organic material in the form of kerogen. Up to 1/3 of the rock can be solid kerogen. Liquid and gaseous hydrocarbons can be extracted from oil shale but the rock must be heated and/or treated with solvents. This is usually much less efficient than drilling rocks that will yield oil or gas directly into a well. Extracting the hydrocarbons from oil shale produces emissions and waste products that cause significant environmental concerns. This is one reason why the world's extensive oil shale deposits have not been aggressively utilized.

Present Detail Profile of Shale Clay[93]

Locality	Kahi, Spin Khak, and Lakarai.
Number of leases	03 (three)
Mining Method	Surface mining
The scale of Mining	Small & primitive mining
Lease Area	7770.975 Acres
Production in tones	456011 tons (2016)

xi. Late Stone

Slates are dense and fine-grained rock. The colour of slates is generally grey, red, brown, and green ranging from dark to light. It is produced by the compression of clays, shale, and various other rocks developing a characteristic cleavage consisting of sericite and quartz with biotite, chlorite, and hematite as principal accessories.

In other words, slates are generally formed by low-grade regional metamorphism of pelitic sediments or fine-grained tuffs. It can be associated with other metamorphic sedimentary or volcanic rocks. Slate Stone has developed a well-marked split table cleavage with or without developed recrystallization & spots/knots of minerals like garnet, pyrite, and ulasite, etc. They

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[93] Source: Directorate General of Mines and Minerals, Government of KP .2016

are normally fine to medium grained, moderately hard & compact, less homogeneous with varying textures & shades. It has an ability to split into thin layers along the plane of cleavages due to flattened & elongated minerals along the plane of cleavage.

Uses of Slate

- Paving
- A stepping stone in the garden
- Combined with other materials gives quality and attractiveness
- Square blocks for a broken band in the section of granite paving
- Decorative clocks and thermometers
- Picture frame, mirrors, coasters, trivets, switch plates, candle holders.
- Engraved and painted in jewellery like earrings and pins.

Present Detail Profile of Slate Stone[94]

Locality	Villages; Manki, Sheikhai, Umarai,
Number of leases	04 (four)
Mining Method	Surface mining
The scale of Mining	Small & primitive mining
Lease Area	3100.490 Acres
Production in tones	42150 tons (2016)

xii. Silica Sand

Silica is the most abundant mineral found in the crust of the earth. It forms an important constituent of practically all rock-forming minerals. It is found in a variety of forms, such as quartz crystals, massive forming hills, quartz sand (silica sand), sandstone, quartzite, tripoli, diatomite, flint, opal, chalcedonic forms like agate, onyx, etc., and in with numerous other forms depending upon colours such as purple quartz (amethyst), smoky quartz, yellow quartz or false topaz (citrine), rose quartz and milky quartz. Only pure quartz crystal or rock crystal, untwined, clear, and free from any inclusion, has an important property:

Common Uses

The commonest use of quartz and glass-sand also referred to as silica-sand, is in the manufacture of glass. Great advancement has been made in the manufacture of translucent, transparent, coloured, and clear glass in sheets or glassware. The size of the sand grains is important in the glass industry. It should be between 40 to 80 mesh (BSS). It should be of high purity containing a minimum of 98% SiO_2. In the manufacture of colourless glass, the iron content (Fe_2O_3) should not exceed 0.04%. for optical purposes, the presence of iron oxide

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[94] Source: Directorate General of Mines and Minerals, Government of KP .2016

(Fe_2O_3) of more than 0.008% is not tolerated. Iron and chromium are both objectionable impurities in glass sand. The minutest presence of these impurities gives a colour effect in the glass melt. Glass is manufactured by melting a mixture in the suitable proportion of felspar, dolomite, limestone, and soda ash together with glass-sand at 1400º - 1500ºC in the furnace when clear molten glass is formed.

The average composition of the mixture by parts is soda ash 1; silica sand 2½; limestone/dolomite ¼; borax 1/320; saltpetre 1/160; felspar 1/80 and selenium 1/36000. Selenium is added to neutralize the colour effect imparted by the presence of iron oxide. Twelve grams of selenium are sufficient to neutralize the colour effect of one-tone glass containing 0.15% Fe_2O_3. Borax is used to manufacture borosilicate glass of low alkali content including laboratory wares and optical glass. Boron confers a low coefficient of expansion, increases resistance to mechanical and thermal shocks, and gives a bright and pleasing appearance to the glass.

Abrasives

Glass sand free from organic and clayey impurities is used in the manufacture of sand-paper, abrasive cloth, etc. generally sands crushed from sandstone and quartzite are used. River-borne sands are unsuitable as they do not possess angular faces.

Refractory

Quartzite, sandstone, quartz, and other siliceous rocks lime mica schists are used in the manufacture of silica bricks. Quartzite contains mainly silica and has high refractoriness. The purity of raw material i.e., the high silica content is essential with the least possible Al_2O_3. A phase diagram study has shown that even about 5% Al_2O_3 present brings down the refractoriness from 1728ºC to 1545ºC when eutectic is formed. The presence of 0.01% Al_2O_3 lowers the refractoriness of silica by 4.8ºF and 0.4% of Al_2O_3 by 140ºF. Silica-rock of metamorphic origin is better than that of igneous origin because silica grains cemented with cristobalite and tridymite are stable phases of silica. Silica bricks are used in the steel industry. The importance of silica bricks is fast losing ground because of a gradual change in the practice of manufacturing steel by basic hearth furnace. L.D. the process also eliminates much use of silica bricks as instead dolomite bricks are used. At present, the estimated rate of consumption of silica bricks in the domestic steel plants in the open hearth process using silica roof is 8 kg. per ingot ton of steel as against 2.8 kg. consumed in advanced countries.

Metallurgical

Quartz and quartzite are used in making ferro-silicon for the manufacture of silicon steel.

Present Detail Profile of Silica Sand

Locality	Villages: Pirano Kandao and Khawai.
Number of leases	02 (two)
Mining Method	Surface mining

Scale of Mining	Small & primitive mining
Lease Area	712.291 Acres
Production in tones	1050 tons (2016)

xiii. Chromite

Chromite is an iron chromium oxide: $FeCr_2O_4$. It is an oxide mineral belonging to the spinel group. Magnesium can substitute for iron in variable amounts as it forms a solid solution with magnesiochromite ($MgCr_2O_4$); substitution of aluminium occurs leading to hercynite ($FeAl_2O_4$). The only ores of chromium are the minerals chromite and magnesiochromite. Most of the time, economic geology names chromite the whole chromite-magnesiochromite series: $FeCr_2O_4$, $(Fe, Mg)Cr_2O_4$, $(Mg, Fe)Cr_2O_4$, and $MgCr_2O_4$.

Uses

The following uses for chromium are listed.

- Used for the production of ferrochromium the chromite ore ($FeCr_2O_4$) is reduced with either aluminium or silicon in an aluminothermy reaction and for the production of pure chromium, the iron has to be separated from the chromium in a two-step roasting and leaching process.

- Used for production of metallic chromium.

- Used to harden steel, manufacture stainless steel, and form alloys.

- Used in plating to produce a hard, beautiful surface and to prevent corrosion.

- Used to give glass an emerald green colour. It is responsible for the green colour of emeralds and the red colour of rubies.

- Wide use as a catalyst.

- Dichromates such as $K_2Cr_2O_7$ are oxidizing agents and are used in quantitative analysis and also in tanning leather.

- Lead chromate as chrome yellow is a pigment.

- Compounds are used in the textile industry as mordents.

- Used by aircraft and other industries for anodizing aluminium.

- The refractory industry uses chromite for forming bricks and shapes, as it has a high melting point, moderate thermal expansion, and stable crystalline structure.

- Tanning leather.

Present Detail Profile of Chromite

Locality	Village: Behram Dherii.
Number of leases	01 (one)
Mining Method	Surface mining
Scale of Mining	Small & primitive mining
Lease Area	265.62 Acres
Production in	Nil tons (2010)

xiv. Minor Minerals

Sand, gravel, and bajri are categorized as minor minerals, these are excavated through dredging on the banks of river/stream/nulla side in district Nowshera. These are auctioned in blocks. The excavated material in tons is not recorded. Their leases are granted for one year only.

Sand

It is a naturally occurring granular material composed of finely divided rock and mineral particles. The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide, or SiO_2), usually in the form of quartz. As the term is used by geologists, sand particles range in diameter from 0.0625 mm (or $1/16$ mm, or 62.5 μm) to 2 mm. An individual particle in this range size is termed a sand grain. The next larger size class above the sand is gravel, with particles ranging from 2 mm up to 64 mm. The next smaller size class in geology is silt: particles smaller than 0.0625 mm down to 0.004 mm in diameter. The size specification between sand and gravel has remained constant for more than a century, but particle diameters as small as 0.02 mm were considered sand. Sand feels gritty when rubbed between the fingers (silt, by comparison, feels like flour. ISO 14688 grades grains of sand as fine, medium, and coarse with ranges from 0.063 mm to 0.2 mm to 0.63 mm to 2.0 mm. In the United States, sand is commonly divided into five sub-categories based on size: very fine sand ($1/16$ - ⅛ mm diameter), fine sand (⅛ mm - ¼ mm), medium sand (¼ mm - ½ mm), coarse sand (½ mm - 1 mm), and very coarse sand (1 mm - 2 mm).

Uses

It is mixed with cement and sometimes limes to be used in masonry construction. Sand is a principal component of plaster in the construction of buildings. It is the principal component raw material for making common glass. In paints, it is: mixed to produce a textured finish for walls and ceilings or non-slip floor surfaces. In the foundry, sand is used to make moulds into which molten material is poured. This type of sand must be able to withstand high temperatures and pressure, allow gases to escape, have a uniform, small grain size and be non-reactive with metals.

Sandbags are made which protect against floods and gunfire. The inexpensive bags are easy to transport when empty, and unskilled volunteers can quickly fill them with local sand in emergencies. Graded sand serves as an abrasive in cleaning, preparing, and polishing

Gravel

Gravel is composed of unconsolidated rock fragments that have a general particle size range and include size classes from granule- to boulder-sized fragments. Gravel can be sub-categorized into granule (>2 to 4 mm/0.079 to 0.16 in) and boulder (>64 to 256 mm, 2.5 to 10.1 in).

Uses

Gravel is an important commercial product, with a number of applications. It is used to make concrete, for road construction, for mixing with asphalt, as construction fill, and in the production of construction materials like concrete blocks, bricks, and pipes. It is also used to make roofing shingles.

5.14.2 Future Development Plan in Mineral Sector

- Directorate of Mines and Minerals, Govt of KP has formulated a comprehensive development program of Rs 1250 million in the Mineral sector for the next three years, which includes:
- To establish three model quarries at Mardan, Buner, and Chitral for extraction of marble on scientific lines to avoid wastage of marble at an estimated cost of Rs 150 million each.
- To establish two model mines at Cherat in Nowshera and Shahkot and Sherwan in Abbottabad at an estimated cost of Rs 200 million each.
- To establish a training school for the training of skilled mine workers at an estimated cost of Rs. 100 million.
- In the exploration sector Rs. 30 million has been allocated for the exploration of new minerals.
- In the year 2011-12, the required amount has been released.

5.14.3 Environmental Risks Due to Mining Activities

Mining is a hazardous activity; in addition, mines or queries are generally located in remote areas lacking the means of communication and civic amenities of towns and cities. In District Nowshera, indiscriminate mining activities being undertaken by Private sector mine operators are causing irreparable damage to the environment, like the destruction of landscape, nuisance caused due to dusty operations, etc. The mine operators due to a lack of knowledge and awareness about the environmental problems do not pay much attention to adopting appropriate remedial measures. Even if they know about the problem, due to a lack of enough financial resources they hesitate to invest in the protection of the environment from adverse effects of their mining activities. Such activities are also created significant health and safety-related problems for workers. Workers due to a lack of awareness about their health and

safety continue to work under hazardous conditions. The employer in a bid to earn maximum profit in the shortest possible time often ignores the safety of workers.

5.14.4 Environmental Impact of Underground and Surface Mining

As already stated, there are fourteen types of various mainly industrial minerals extracted in the district of Nowshera there are only two metallic (haematite and chromite) mineral areas granted as leases but there is no production of these minerals.

The environmental impact of underground mining and quarrying of these minerals are presented in Table. 5.52.

Table 5- 52: Surface Mining and Their Environmental Impact			
Sr. No	Domain	General Risks	Limestone
1.	Earth's surface	Areal devastation, altered morphology; dangers of falling rocks at the faces; destruction of cultural assets; formation of large dumps	High Risk
2	Air	Noise; percussion from blasting; dust from working, blasting, excavation, smoke and fumes from self-ignited dumps; blast damp, polluting gases, vibrations.	High Risk
3	Surface water	Altered nutrient level (possibly europhile); pollution by contaminated wastewater, pollution due to aggravated erosion.	Possible Risk
4	Groundwater	Groundwater recession; deterioration of groundwater quality.	Low Risk
5	Soil	Soil loss in the worked area; yield reduction, drying out, ground subsidence, the danger of swamping due to local ground water recovery, soil erosion	Low Risk
6	Flora	Destruction in the near vicinity of the worked area; partial destruction/alteration in the wider vicinity due to altered groundwater level.	High Risk
7	Fauna	Expulsion	High Risk
8	Human	Land-use conflicts; induced settlement, destruction of recreation areas, disturbances by noise and vibration from blasting.	High Risk
9	Structures	Water damage due to groundwater recovery, and vibration-induced damage.	High Risk
10	Miscellaneous	Possible microclimatic changes.	High Risk

5.14.5 Khyber Pakhtunkhwa Mineral Policy 2016

In the district of Nowshera, there are only two metallic (haematite and chromite) mineral areas granted as leases but there is no production of these minerals. There is no metallic, gas which is mined /exploited in this District. Minor minerals i.e., sand, bajri, and gravel are also extracted from small streams and river banks.

The core Policy Principals of Khyber Pakhtunkhwa Mineral policy 2016:

i. 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;

ii. To give preference to integrated mining operations with linkages to upstream and downstream mining and processing-related activities;

iii. To formulate a fiscal and regulatory regime that ensures fair value for Khyber Pakhtunkhwa while offering equitable rewards to private investors in minerals;

iv. To encourage and facilitate mining by legal means and prevent all illegal mining activities without fear or favour, and frame stringent laws to deal with illegal mining activities.

v. To ensure predictable mechanisms for the evaluation of competing for land, water, and other resource-use options;

vi. To eliminate and mitigate adverse social conditions and environmental degradation attributed to mining and related activities;

vii. To support and enable artisanal and small-scale mining activities that create employment, generate revenues, and help reduce poverty, especially in rural areas;

viii. To ensure equitable distribution of benefits from mining and related activities to meet current and future public needs;

ix. To establish an effective and transparent administration and management of the mineral sector;

x. Give preference to local value addition and processing of indigenous minerals.

Sustainable and Environment-Friendly Remedial Measures for Mining Operations:

i. The mines should be surveyed to access the extent of mining activities carried out by each party and to gather information about the deposit.

ii. Topographic maps of the area are prepared or could be acquired by the Geological Survey of Pakistan. Based on the Geological information and the proven reserve of the deposits, a proper mining method could be developed by already employed qualified engineers or by the Directorate of Mines and Minerals, Government of KP with the help of a consultant.

iii. The existing regulations of converting prospecting license to development of the mine and then subsequently converting it to the mining of the deposits should be strictly observed.

iv. Onsite training of labourers may be conducted by the Inspectorate of Mines KP with the coordination of international organizations such as ILO.

v. Training courses related to proper mining, the safety of the workers, and marketing of the minerals may be arranged and conducted by the Inspectorate of Mines NWFP.

vi. Relevant Environmental laws are implemented by the KP Environmental Protection Agency.

vii. Registration of all mines, quarries and other workers with EOBI.

viii. Explore and evaluate the identified mineral deposits on scientific lines

ix. With the help of drilling and other geophysical methods, a reserve of mineral deposits has to be calculated.

x. Geo chemical studies of each potential mineral deposit are necessary

xi. Capacity building is needed to meet the requirement of the mining industry.

xii.   To demonstrate mineral potential a systematic data generation and its documentation on a sustainable basis is needed

xiii.   A step-wise documented procedure be given in a booklet for starting a business in mining which should include, how to apply/renew/mine for a lease, what mining method one should adapt to mine/extract a particular mineral, what are the potential market and where to get human resource. All such information should be available free of cost. It will help the private entrepreneur to invest in the mining sector.

xiv.   Other effective dissemination of mineral data as a source of information should be used to attract as well as facilitate investment

xv.   Bankable documents on the development of mine deposits are prepared so that banks can provide loans to prospective entrepreneurs in the mining sector.

xvi.   Developing of curriculum for graduate/postgraduate studies to suit the local mineral industry.

xvii.   Specialized training in coordination with public and private sectors should be arranged by the academia.

xviii. Market-oriented training and workshops are held on a sustainable basis for the different levels of stakeholders for improved mining and market practices.

xix.   R&D work should be conducted using indigenous technology for value addition of the mineral product to suit the local and international market.

xx.   In gemstones, an accredited laboratory should be established to evaluate finished and uncut gems for marketing gems in the international market.
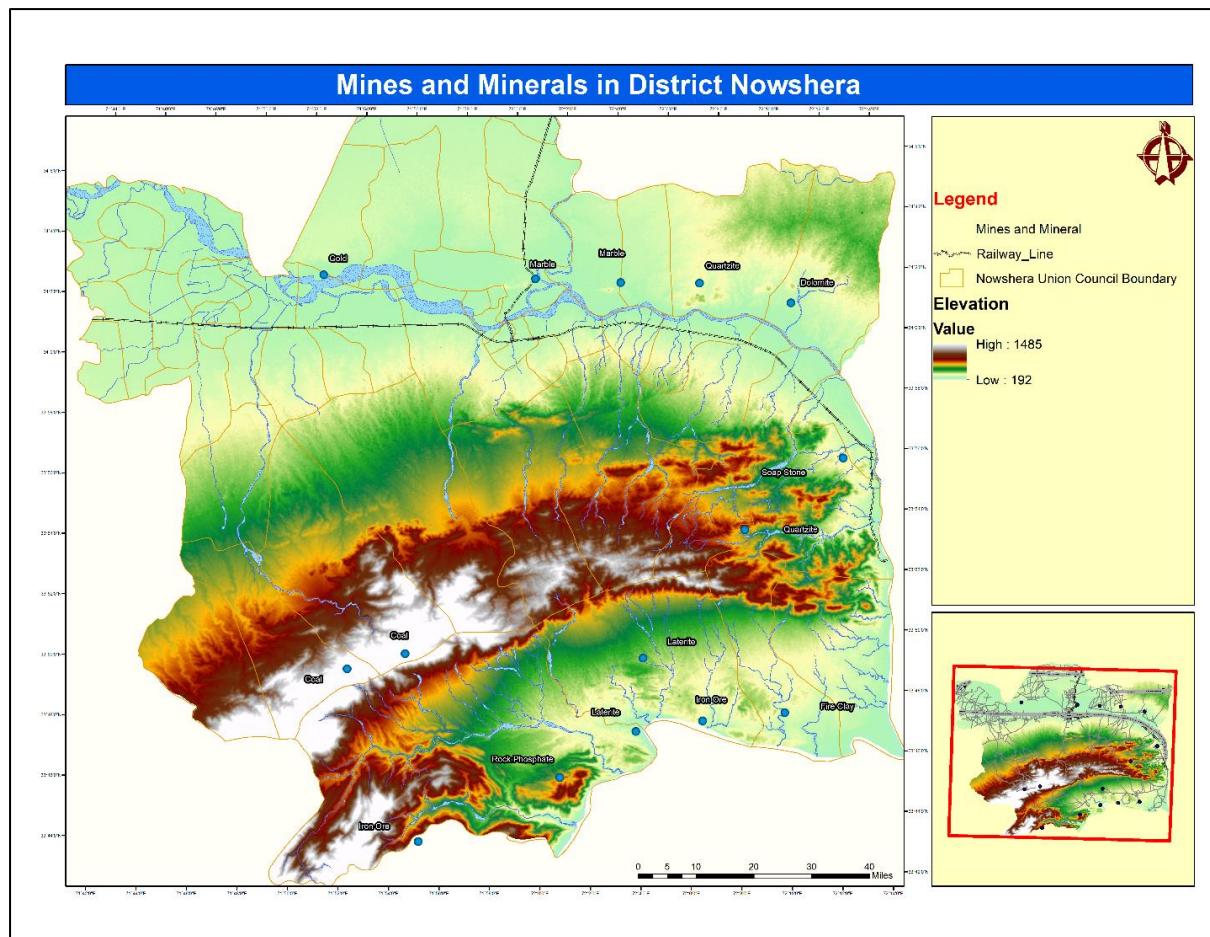
Map 5-22: Mines and Minerals Map of District Nowshera

Map 5.22 represents the resources of minerals in District Nowshera. According to the map, all the mineral resources are on the south side of the District.

5.14.6 Constraints and Recommendations in Mineral Sector

KP is endowed with exhaustible resources of a variety of minerals. To exploit these resources the DGMM and other public sectors stakeholders have to address the following constraints

i. To explore and evaluate the identified mineral deposits on scientific lines

ii. With the help of drilling and other geophysical methods reserve of mineral deposit have to be calculated.

iii. Geo chemical studies of each potential mineral deposit are necessary

iv. Capacity building is needed to meet the requirement of the mining industry.

v. To demonstrate mineral potential a systematic data generation and its documentation on a sustainable basis is needed

vi. A step-wise documented procedure be given in a booklet for starting a business in mining which should include, how to apply/renew/mine for a lease, what mining method one should adapt to mine/extract a particular mineral, what are the potential market and where to get human resource. All such information should be available free of cost. It will help the private entrepreneur to invest in the mining sector.

vii. Other effective dissemination of mineral data as a source of information should be used to attract as well as facilitate investment

viii. Bankable documents on the development of mine deposits are prepared so that banks can provide loans to prospective entrepreneurs in the mining sector.

ix. Developing of curriculum for graduate/postgraduate studies to suit the local mineral industry.

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xi. Market-oriented training and workshops are held on a sustainable basis for the different levels of stakeholders for improved mining and market practices.

xii. R&D work should be conducted using indigenous technology for value addition of the mineral product to suit the local and international market.

xiii. In gemstones, an accredited laboratory should be established to evaluate finished and uncut gems for marketing gems in the international market.

xiv. Mechanism and rules are framed to prevent the leased area to sublet the contractor to extract the valuable mineral on a contract basis which leads to wastage of the valuable minerals and destroys the deposit for further exploitation because of non-scientific mining practices.

xv. Leased holders should use scientific mining practices.

xvi. Leased holders should employ skilled mine workers and mining engineers for exploitation and geologist for exploration.

xvii. KP department should encourage corporate mining

xviii. Leased should be granted to those prospector bidders who have sufficient investment available which should be made mandatory to use scientific practices in the exploration and mining phases.

5.15 PARKS AND RECREATIONAL FACILITIES

5.15.1 Existing Parks and Recreational Facilities

District Nowshera has many places worth visiting and including Manki Sharif, Kana Khel, Bahadar Baba, Saidu Khel, and Cherat hills. Tourists from all over the Province flock to the areas on occasions like Eid and other festivals. Besides, there are a number of parks such as Kund Park, Mangloot Wild Life Park, Jinnah Park (Nowshera Cantonment), and Azakhel Park near G.T. Road. These are described below:

i. Kund Park

It is located on the confluence of River Kabul and the Indus near Khairabad and is a nice family outing place. The park spreads over 176 acres, with the Kabul River lying to its North and Indus River to its South. The Park was established by Peshawar Development Authority, and later handed over to Sarhad Tourism Corporation (STC) for the promotion of tourism in the Province. Keeping in view the ideal location of the Park for the display and propagation of several species of wildlife for promoting conservation awareness and providing recreation opportunities, the KP Wildlife Department has displayed a number of wildlife species in the Park. The lack of recreational opportunities and the absence of a Zoological Garden in Peshawar have further enhanced the importance of Kund Wildlife Park and this Park has become a major attraction for nature tourists. The attractions at Kund Park include:

- Riverside camping
- Fishing
- Boating
- Cable cars
- Sight viewing cars
- Boating
- Bear pits
- Deer house
- Duck ponds
- Leopard house
- Bird's Aviary

The 2010 flood caused devastating damage to the park. Uprooted trees, collapsed bridges and dirt, broken cages, and withering greenery are all that remains in the park. The silt left behind by the 2010 floods has not been cleared. At least 70 mammals including around 20 black and brown bears and blackbuck, spotted deer, hog deer, and chinkara were reportedly lost during the floods.

ii. Mangloot Wild Life Park

The park was Established on the hilltops and plains of Khwara Range near the Indus River in the Nizampur area of District Nowshera, the Manglot Wildlife Park is providing a sanctuary for endangered wildlife species and serves as a scenic recreational resort for the tourists. The park was set up in the 1990s to serve as a sanctuary for wild species creating awareness among people about the importance of biodiversity and providing recreational facilities to visitors. After the passage of almost 20 years, the park is presenting a success story of the efforts being made for the preservation of the natural environment for the protection of endangered wild species. The park was established to make a sanctuary for the conservation of wildlife through the protection of its habitat.

The flora and fauna in the park include scrub forests mainly consisting of olive trees. Vegetation of the forest predominantly is acacia Modesta, zizyphus nummelaria, olea cuspidate, deodonia viscose, and monolithic boxifolia. While animals include Chinkara, hog deer, common leopard, wolf, wild boars, jackals, porcupines, and hares. Reptiles including different kinds of snakes and wild lizards are also found in the park. The birds in the park included Chukar, three varieties of partridges, rock pigeons, dove, and several sparrows from different species.

Within the park, the Wildlife Department has also constructed a mud track of 15 kilometers for providing an opportunity for the visitors to have a look at different scenic views of the park besides viewing some places cluster of different animals while drinking water from pots. The elevation of the track ranges from 700 feet to 3,000 feet.

iii. Cherat Hill Station

Cherat is a hill station, immediately above the villages of Chapri and Saleh Khana in the District Nowshera of Khyber-Pakhtunkhwa in Pakistan. Cherat lies 34 miles southeast of the city of Peshawar at an elevation of 4,500 feet on the west of the Khattak range, which divides the district of Nowshera from Kohat.

During British rule, Cherat was important as a hill cantonment and sanitarium for British troops in what was then the Nowshera Tehsil of the Peshawar District of British India.

Cherat was first used as a sanitarium for troops in 1861 and was used during the hot weather as a health station for the British troops who were quartered in the hot and malicious valley of Peshawar. It was declared a cantonment in 1886. The cantonment commands a view of the whole of the Peshawar valley on one side, and on the other of a portion of the Khwara valley in Peshawar District, and Kohat District as far as the Indus.

A hospital, a church, and a few bungalows were built by the British authorities. The station, which has a good water supply, was throughout the summer the headquarters of the Peshawar Division command, and of one of the two British regiments stationed at Peshawar – a detachment of the other British regiment was also sent here.

iv. Aza Khel Park

Aza Khel is a village equidistant from Nowshera and Peshawar. A Park on main GT Road on an area of about 83 acres of land was completed in 1995 by the Peshawar Development Authority at a cost of about 20 million rupees. The aim was to provide amusement facilities to the residents of the Peshawar Division. The park contains restaurants, auxiliary buildings, soft landscaping, lake fountains, and trees. In summer people drive from Nowshera and Peshawar in the afternoon for recreation and amusement purposes.

5.15.2 Future Requirements for Parks and Stadiums

As already elaborated above, there are already three regional/district level parks in District Nowshera and including Kund Park, Mangloot Park, and Aza Khel Park. These need post-flood rehabilitation and upgrading with a range of amusement and recreational facilities, picnic spots, hard & soft landscaping, etc.

Apart from passive recreational facilities such as those above, District Nowshera also needs active recreation in form of playgrounds and stadiums.

	Population			Additional Population (2019-2039)	Recreational Standards	Requirements
District Area	2019	2024	2039			
Urban	352331	389002	523546	171215	Cricket Stadium for population above 300,000 Hockey Stadium for populations above 200,000	One cricket stadium during the plan period. Two hockey stadiums during the plan period.
Rural	1263201	1508066	2422406	1159205	For bigger villages/settlements above 25,000 population, a combined playfield may be provided.	
Total[96]	1615532	1897068	2945951	1330419		

Table 5-53: Active Recreational Requirements in District Nowshera[95]

As is clear from the Table, the Urban area of Nowshera needs to be provided with one cricket stadium and one hockey stadium during the plan period. Their areas are recommended to be 2 hectares for the cricket stadium and 1.15 hectares for the hockey stadium. Besides in rural areas, for villages larger than 25,000 populations, a combined playfield of 1.63 hectares may be provided.

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[95] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning & Infrastructure Standards, Table 6.11, Page 137.
[96] District Studies Report, Nowshera, KP Land use Project, Chapter 6, Table 6.16.

5.15.3 Hotels and Restaurants

There are 6 registered restaurants/hotels in the District as given below:

- Kabal Baghlan Hotel & Restaurant, Akory, Nowshera
- Dragon Garden Restaurant, Nowshera Cantt.
- Taza Gul Chapal Kabab House, Taru Nowshera
- Midway Restaurant, Kund, Khairabad, Nowshera
- Gala Resort Restaurant, Kund, Nowshera
- Usmania Restaurant.

5.13.4 Historical Buildings

Following are some of the historical places in District Nowshera[97]:

i. Mazar Khushal Khan Baba

Khushal Khan Khattak, the chief of the Khattak tribe was a warrior, poet, and patriot. Khushal Khan has left history and some poems of considerable value, during the wars against Mughal emperors. His Mazar is in Akora Khattak, about 15 kms to the East of Nowshera near the railway station of Akora Khattak, where usually literary meetings take place in which prominent poets of the Pushto language participate.

ii. Mazar Hazrat Kaka Sahib

Hazrat Kaka Sahib was a great saint of the area. His father, Hazrat Bahadur Baba was also a great spiritual personality. The real name of Hazrat Kaka Sahib was "Kastheer" which in Pushto is the name of a yellowish flower. "Kaka" was his nickname given by the people because of respect for him in the hearts of the community. Mazar of Hazrat Kaka Sahib is situated in the hills the South of Nowshera at a distance of about 10 kms from Nowshera railway station. The place has also taken the name Ziarat Kaka Sahib where the religious festival is held yearly at the village of Ziarat to commemorate the anniversary of Hazrat Kaka Sahib's death. It lasts eight or nine days. A large crowds assemble and make offerings at the shrine. The proceeds are divided among the descendants of Kaka Sahib.

The Mazar-e-Akhun Panjo Baba Akbar Pura and Mazar of Noor Gul Baba are also in District Nowshera.

5.13.5 Conserving Areas of High Landscape and Tourism Value

For areas of high landscape value, the primary responsibility for protective measures lies with relevant line Departments, in coordination with the Environmental Protection Agency (EPA).

In the context of Nowshera, such areas include prime agricultural land, particularly North of GT Road, Rivers Kabul and its tributaries flowing through the District. These help to maintain

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[97] Source: Pakistan Bureau of Statistics, Govt. of Pakistan, District Census Report Nowshera, 1998.

the integrity and diversity of ecosystems, protect flora and fauna, and facilitate ecological processes such as water flows, soil regeneration, nutrient cycling and so on, which is vital for all life. Due to population pressures, such areas need to be managed with a sustainable balance of human populations.

Lack of protective measures in these areas is resulting in loss of their natural beauty and environmental degradation. These areas need serious attention as their delicate eco-system is getting unbalanced because of uncontrolled and unregulated physical developments. The remedial measures in the past have been inadequate, resulting in major damages to these environmentally sensitive areas.

Owing to various historic and institutional reasons, the effectuation of protective measures including land use and building control regulations have remained limited to major urban centers. Rural and special areas such as above have been largely neglected resulting in their haphazard and uncontrolled growth and negative impact on the areas of high landscape value. In these areas, the problems get proliferated and involve heavy financing to cure. Scarce budgetary resources constrain such an option. Under the circumstances, it is feared that some of the problems of special areas may become impossible to eradicate unless some timely measures are adopted. A cogent solution is therefore need of the hour. This calls for strict protective measures for these areas, which are as below:

- To conserve natural beauty of such areas, development should not be allowed in areas where it may block views or vistas of outstanding quality.

- Should be a ban on new housing schemes in areas of high landscape value.

- Developments near rivers/water bodies and other flood prone areas should be discouraged not only for aesthetics, but also for reasons of safety, since floods can cause immense damage to life and property, natural vegetation and agriculture as has been witnessed in recent floods.

- An important consideration for areas of high landscape values should be to regulate their growth and to make such areas environmentally sustainable. Involvement of private sector in development efforts for areas of high landscape value in view of funding constraints in the public sector should be encouraged.

- Land use and building control regulations, if implemented properly, are effective tools to ensure the preservation of physical environment. These may include:

- Ban on construction of all type of buildings within 2 kms of river banks.

- Ban on disposal of liquid and solid waste into rivers/streams.

- No industrial activity in areas of high landscape value.

- Protect the water flowing through the area from any form of pollution.

- Control damage/destruction of vegetation

5.16 FOREST

We depend on forests for our survival, from the air we breathe to the wood we use. Besides providing habitats for animals and livelihoods for humans, forests also offer watershed protection, prevent soil erosion and mitigate climate change. Yet, despite our dependence on forests, we are still allowing them to disappear.

5.16.1 Distribution of Forest Land

Before proceeding further, it seems pertinent to define legal classifications of forests, which are as below:

i.   Reserved Forests

The forests under the control of Forest Department which have been declared as Reserved Forests under Khyber Pakhtunkhwa Forest Ordinance 2002 and are generally without rights and privileges.

ii.   Protected Forests

The forests which have been declared as protected forests under the provision of the Khyber Pakhtunkhwa Forest Ordinance 2002 and have some rights and concessions of grazing, grass cutting and cutting of dry/wind fallen tree for domestic fuel wood consumption.

iii.   Unclassed Forests

The public forest lands under the control of Forests Department which are neither reserved forests nor protected forests and are known as Unclassed Forests.

iv.   Resumed Lands

These are private lands taken over by the Government under various land reforms and martial law regulations and managed by the Forest Department.

Table 5-54: Distribution of Forest Land (2015-2016) Area in Acres		
Forest Type	**KP**	**District Nowshera**
Reserved Forest	232157	12936
Protected Forest	1163276	0
Resumed Forest	90271	0
Unclassed Forest	259960	0
Section 38[2]	19183	0
Communal	122944	800
Guzara Forest	688123	0
Private plantation	1767567	15081
Miscellaneous	307080	5325
Total	4650561	34,142

v.   Guzara and Community Forests

These are forest areas which are the joint property of villagers or owned by the individuals and are managed by the Forests Department.

Table.1.8 shows distribution of land in Khyber Pakhtunkhwa and District Nowshera. The gross area under forests in the Province is 2,882,994 acres, out of which major forests are protected forests (40.20%) and Guzara forests (23.81%).

District Nowshera consist of 12936 acres reserved land and 15081 private plantations essentially devoid of any worthwhile forest land. In terms of percentage, forest area in District Nowshera is about 0.7% of the total forest area in the Province.

5.16.2 Forest Type

In District Nowshera, the forest area is spread mostly towards east-north part of the District in the hilly area. Total area under forests in District Nowshera is 34142 acres that is reserved, communal and Private plantation i.e. Resume forest private lands taken over by the Government under various land reforms and regulations and managed by the Forest Department.

Table 5-55: Distribution of Forest Land (2015-2016)		
Forest Type	**Areas (Acres)**	**%ages**
Reserved Forest	12936	37.88882
Communal Forest	800	2.343155
Private Plantation	15081	44.1714
Miscellaneous	5325	15.59663
Total	34142	100

5.16.3 Comparison with Greater Peshawar Region

Forest area in Greater Peshawar Region is 6121621 hectares which consist of reserved forest, Resume land, land under section 38 Communal and Guzara Forest. Overall Contribution of district Nowshera in forestry of Greater Peshawar Region is 6%. Reserved forest and communal forest of the Greater Peshawar Region is 12936 acres and 800 acres; which totally lies in district Nowshera. 7289 acres are miscellaneous forest in which 5325 acres lies in District Nowshera.

Table 5-56: Comparison with Greater Peshawar Region (2015-2016)			
Forest Type	**Peshawar Region**	**Nowshera**	**Contributing % of District Nowshera**
Reserved Forest	12936	12936	100%
Protected Forest	0	0	0%
Resumed Land	4008	0	0%
Unclassed Forest	0	0	0%
Section 38[2]	52	0	0%
Communal	800	800	100%
Guzara Forest	39131	0	0%
Private plantation	547946	15081	3%
Miscellaneous	7289	5325	73%
Total	612162	34142	6%
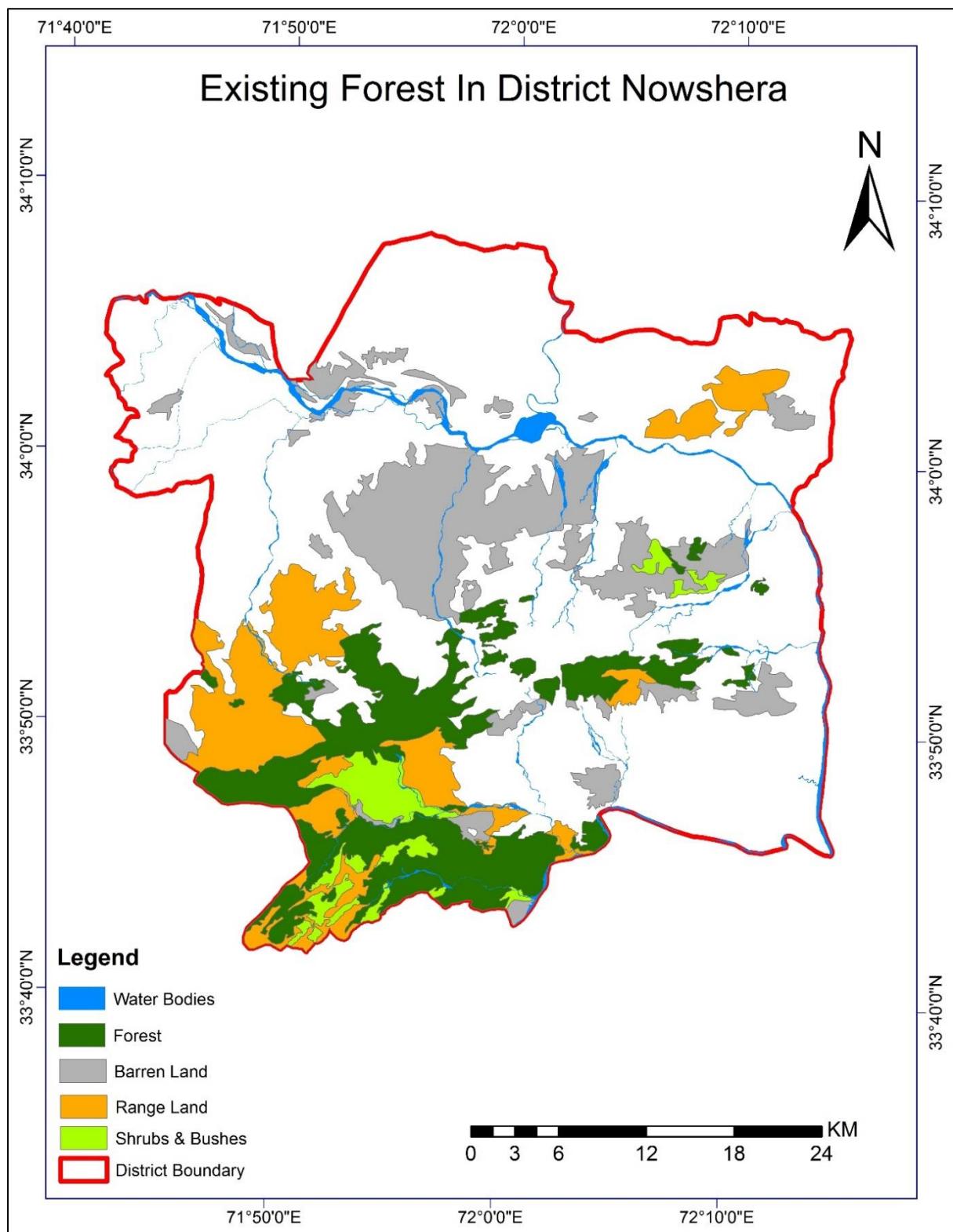
Map 5-23: Existing Forest in District Nowshera

Map 5.23 represents the existing forest of District Nowshera. The existing forest is south of the district. Cherat Cantt is in the forest area of Nowshera.

5.16.4 Impact of Deforestation on Environment [98]

God created this planet with utmost balance and made it a source of survival for mankind and other creatures living in it. Almighty decorated it with deep oceans, high mountains; snowcapped peaks, vast deserts and lush green fields and covered it with Ozone layer to protect it from the dangerous rays coming from sun to make it livable for its dwellers. But the haphazard interventions of man in the nature for the sake of development disturbed the ecological balance by the emission of greenhouse gases in enormous quantity and destroying the Ozone layer.

A report of the International Panel on Climate Changes says that in the past two decades the quantity of carbon has doubled resulting in 3.2 to 9.7-degree increase in the global temperature. The report warns that due to global warming, some glaciers are melting with a speed of 30 meter per year and till 2035, major glaciers are apprehended to disappear from this planet. Experts forecast that melting glaciers will ultimately raise sea level and major cities of the world may come under water.

General Secretary of United Nations has cautioned that, if this situation remains unchanged, 1.8 billion people will be forced to live in such areas where there will be acute shortage of water and till 2025, 2/3 of the world population will face water scarcity problems. A report of WHO discloses that 5 million people are falling prey to climatic diseases each year while 150,000 die due to it. Similarly, 60,000 persons suffer from skin diseases due to ultra violet rays every year.

Ironically, the most advanced and self- claimed civilized nations of the world are more responsible for environmental violations. The USA is emitting 40 percent of greenhouse gases alone, while G-8 countries are producing 70 percent of it. Perhaps it is time to take collaborative steps to check the alarming speed of environmental degradation. The developed countries must sense their duty and ensure measures to control emission of greenhouse gases. But the developing countries should not overlook their endangered future and must plan for rectification of the environment in their jurisdictions. Such countries are adversely affected by climate changes as they are already deprived of the mechanism needed for the maintenance of the environment. Negligence of these nations towards environment can lead them to catastrophe because they don't have enough resources to avoid the threat.

A tangible step to slow the speed of environmental degradation and minimize the negative effects of climatic changes is massive plantation. Plants play a vital role in protection of environment and have multiple advantages beside beautification. They purify air, prevent wind storms and protect soil erosion. Beside these functions, trees emit oxygen and maintain climate at a balancing point. A big size tree can provide oxygen sufficient for 36 infants, while 10 big size trees produce cooling equal to the cooling generated by a one-ton Air Conditioner.

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[98] Source: http://www.khyberpakhtunkhwa.gov.pk/Departments/Forestry/MassPlantation.php

Trees also minimize air pollution, reduce noise and decrease the unpleasant smell by absorbing rotten substances from the drains.

Unfortunately, forests cover 79.699 million hector areas in the country, constituting hardly 5 % of the total areas. Experts advise that at least 25 % of the total area of a country must be covered with forests. In Pakistan per capita forest areas is 0.037 acres while in the developed countries this ratio is one hector per capita. Forests cover 17% of the area of NWFP, including 2.5 % area covered by trees grown in cultivable fields. The existing forest covered area is not sufficient to meet national needs and to cope with environment hazards. There is a dire need for increasing this area by massive plantation.

The current year has been declared as National year of Environment and that is why the KP Forest Department has chalked out a comprehensive plan for mass plantation. Under this plan 5.682 million saplings of different species will be planted with the help of defense forces, Government departments, educational institutions, civil society and farmers during this season in various parts of the province. Arrangements for sensitization of the community and provision of technical assistance to cultivators are also made. Similarly, Ashar plantation (Collective plantation) will be arranged in collaboration of the district administration and farmers at local level. Similarly, saplings raised in tubs in various field nurseries in the province are available at Rs.2 each for general public and at the rate of Rs1.50 each for provincial departments.

5.16.5 Constraints

- Total area of District Nowshera is 1748 sq. kms in which 10.8% barren land, 18.9% Range land, 15.1% Shrubs and Bushes while 41684 hectares of land is covered under forest.[99]
- 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 leading the area to be the barren land.
- Many wonderful species of plants and animals have been lost, and many others remain endangered.
- Another constraint is the Climate change where plants absorb Carbon Dioxide CO_2 (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 CO_2 will remain in the atmosphere and in addition, destroyed vegetation will give off more CO_2 stored in them as they decompose. This will alter

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[99] Calculated from GIS

the climate of that region. Cool climates may get a lot hotter and hot places may get a lot cooler.

5.16.6 Recommendations

- An upland forest has been recommended by the consultant around the shrine of Bahadur Baba, a Muslim saint of 16th century. This area has a potential to grow different forest species while the area around Ziarat Kaka Sahib has been recommended for fruit orchard.
- 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 Nowshera should be preserved to deal with the arising environmental problems.
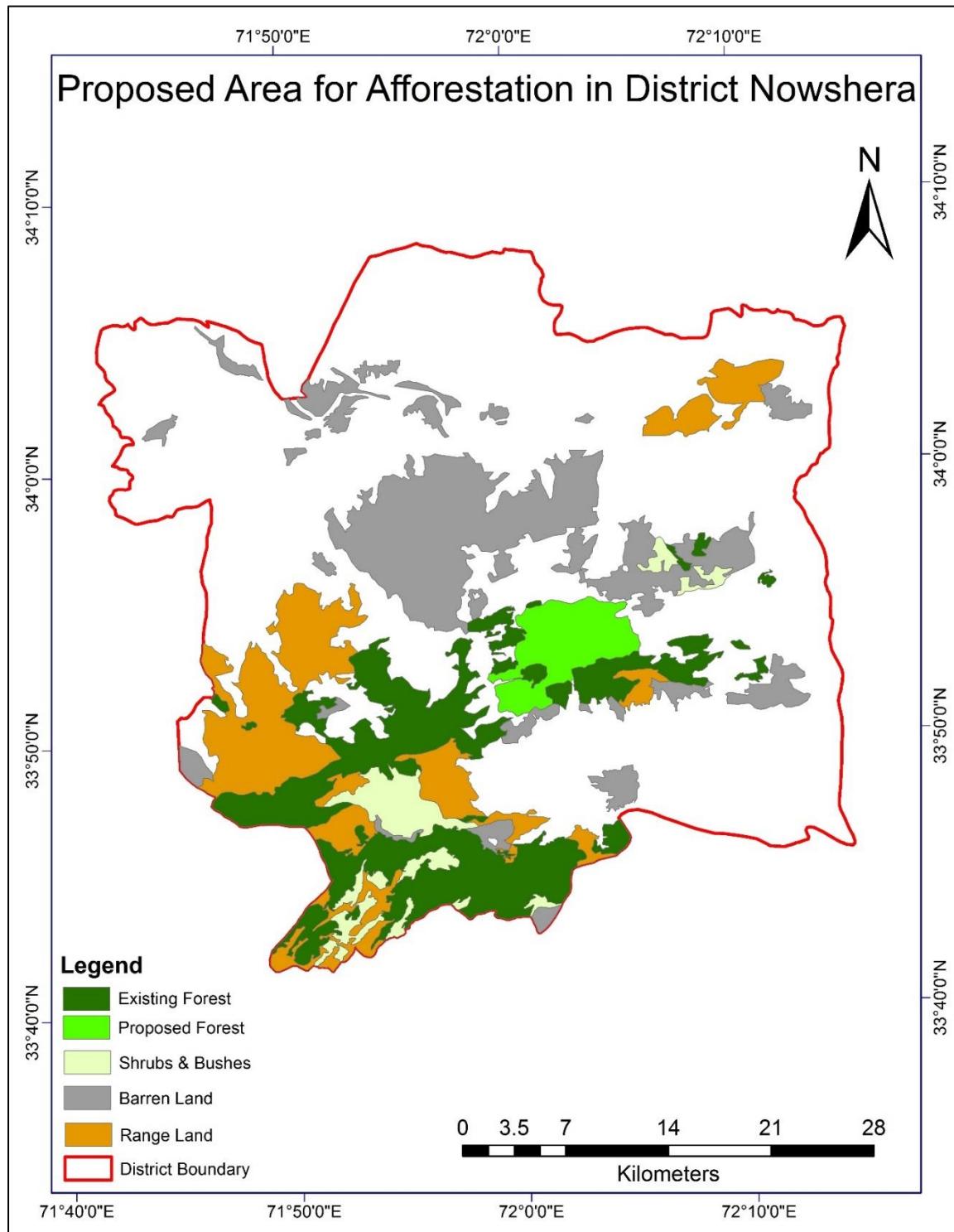
Map 5-24: Proposed Area for Afforestation in District Nowshera

Map 5.24 shows the proposed area of afforestation of District Nowshera. Afforestation is proposed toward the south of District due to range land and open areas.

5.17 POWER DEVELOPMENT

Power sector is an important part of provincial land use plan. This plan is being prepared to provide systematic planning and to coordinate development activities for next 20 years for rural and urban population. In Khyber Pakhtunkhwa, Electric power generation, transmission and distribution is facing a number of challenges. These include availability of reliable and affordable power, rehabilitation of aging and inadequate transmission and distribution system, and efficient construction, operation and maintenance.

5.17.1 Existing Situation in Nowshera

Electric power sector in Nowshera such as transmission and distribution are managed by PESCO (Peshawar Electric Supply Company).   There is no Hydro or Thermal power station in Nowshera and all the required electric power is purchased from WAPDA National Grid.

The service area of District Nowshera is 1748 sq. km, containing 02 divisions and 10 sub-divisions.   The total length of transmission lines (all categories) in the District is 3048.72 kilometers, which is about 3.92 percent of the provincial total. The length of about 38% of the transmission lines is of 400 volts, while around 57 % belong to 11 kv category. Thus, these two categories together form 95% of the total transmission lines length in the District. The total number of grid stations in District Nowshera is 07, against 87 in the entire Province. In District Nowshera, 01 Grid Station is 66 Kv and 06 Grid Stations are of 132 Kv, (Table 5.52).

Table 5-57: Power Infrastructure: Province Vs District Nowshera[100]		
Description	Province	District Nowshera
Service Area	74,521 Sq. Km	1748 Sq. Km
Number of Divisions	31 No	02 No
Number of Sub Divisions	143 No	10 No
LT (400v) Transmission Lines	42,526 km	1169.85 km
11 kv Transmission Lines	31,284 km	1733.87 km
33 kv Transmission Lines	311 km	0
66 kv Transmission Lines	861 km	30 km
132 kv Transmission Lines	1919 km	115 km
220 Kv Transmission Line	750 km	0
500 Kv Transmission Line	117 km	0
Total Transmission lines	77,768 km	3048.92 km
Grid Station 33 kv	06	0
Grid Station 66 kv	18	01
Grid Station 132 kv	59	06
Grid Stations - 220 kv	03	0
Grid Stations 500 kv	01	0
Total Grid Stations	87	07

5.17.2 Power Consumers

In 2015, PESCO reported approximately 45% of their consumption for Domestic and commercial purposes. The other predominant category is industrial, comprising more than 44% customers. And others are comprising of 10%, which are described in (Table 5.58).

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[100] Source: PESCO Data

Table 5-58: Power Consumers (Million KW) 2015			
Sr. No	Description	Province KP	District Nowshera
1	Domestic/commercial Customers	4600.17	268.85
3	Industrial Customers	1888.96	262.21
4	Tube Wells	109.14	22.87
5	Bulk Customers	243.14	37.91
6	Others	20.23	0.18
	Total	6862.46	592.02

5.17.3 Reasons for Load Shedding

The quantity of Electric Power generated is not enough to fulfill the demands of country, which necessitates load shedding. Serious efforts are not made for efficiency improvements, maintenance and repair of power plants. The shut downs of plants become more frequent due to this reason.

Delay to complete the ongoing Hydro Electric Power Projects. According to Sustainable Development Policy Institute, the delay of 18 Hydro Power Plants led to an energy crisis and power shortfall. Besides, alternative energy power projects are not developed on large scale. Non-payments of fuel bills to some of Independent Power Producers (IPP's) by the government is causing shutting down of these power plants. Table 5.59 and Table 5.60 provides similar information regarding short fall for the country, province and District Nowshera.

Table 5- 59: Power Generation Vs Shortfall in the Country	
Total Power generated in the country Oct 2010	14,840 M W
Total Power Generated in the country May 2011	12,999 M W
Peak Demand	17,847 M W
Short Fall	3,007 M W in Oct 2010 4,848 M W in May 2011
Short Fall (%)	16.8 % in Oct 2010 27 % in May 2011

Table 5-60: Power Generation Vs Shortfall – KP Vs District Nowshera			
S. No	Description	Province KP	District Nowshera
1	Average Demand	2100 MW	95 MW
2	Peak Demand	2487 MW	113 MW
3	Available Power	1179 MW	84.38 MW
4	Short Fall	921 MW	10.61 MW
5	Short Fall %	43.8 %	11.17 %

5.17.4 Existing Generating Capacity

Table 5.61 shows electric generation capacity in Pakistan, while the detailed existing installed capacity and capability of WAPDA system is shown in Table 5.58. As seen from Table 5.57, the total installed capacity from different sources of generation is 19,246 megawatts, of which dependable capacity is 17,779 megawatts. Source-wise installed and dependable capacities are shown in the table below. In winter, hydro availability is based on last 5 years' average. The availability excludes 10% forced outages for GENCOs and 6% for IPPs and rentals.

Table 5-61: Electric Generation Capacity (2010)[101]				
Type of Generation	Nameplate / Installed Capacity (MW)	Derated / Dependable Capacity (MW)	Availability (MW)	
			Summer	Winter
WAPDA Hydro	6,444	6,444	6,250	2,300
GENCOs	4,829	3,580	2,780	3,222
IPPs (including Nuclear)	7.911	7,695	5,750	6,900
Rental	62	60	60	60
Total	19,246	17,779	14,840	12,482

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[101] Source: General Manager (Planning), WAPDA/NTDC

Table 5-62: Existing Installed Capacity &Capability of WAPDA System (Nov. 2010)

		Sr. No.	Name of Power Station	Fuel	Installed Capacity (MW)	Capability, (MW)	
						Summer	Winter
Public Sector	Hydel	1	Tarbela		3478	3521	1101
		2	Mangla		1000	1014	409
		3	Ghazi Barotha		1450	1405	580
		4	Warsak		243	171	145
		5	Chashma Low Head		184	91	48
		6	Small Hydels		89	64	20
			Sub-Total (WAPDA Hydel)		6444	6266	2303
	Thermal (GENCOs)	7	TPS Jamshoro # 1-4	Gas/Fo	850	700	
		8	GTPS Kotri #1-7	Gas	174	140	
			Sub-Total GENCO-I		1024	840	
		9	TPS Guddu Steam # 1-4	Gas	640	270	
		10	TPS Guddu C #5-13	Gas	1015	886	
		11	TPS Quetta	Gas	35	25	
			Sub-Total GENCO-II		1690	1180	
		12	TPS Muzaffargarh # 1-6	Gas/FO	1350	1130	
		13	NGPS Multan #1&2	Gas/Fo	195	60	
		14	GTPS Faisalabad # 1-9	Gas/HSD	244	210	
		15	SPS Faisalabad # 1&2	Fo	132	100	
		16	Shahdra G.T	Gas	44	30	
			Sub-Total GENCO-III		1965	1530	
		17	FBC Lakhra	Coal	150	30	
			Sub-Total GENCO-IV		150	30	
			Sub-Total GENCOs		4829	3580	
			Sub-Total (WAPDA+GENCOs)		11273	9846	5883
	Nuclear	18	Chashma Nuclear (PAEC)		325	300	
			Total Capacity (Public)		11598	10146	
Private Sector	Hydel	20	Malakand – III Hydel		81	81	
			Sub-Total (Hydel IPPs)		111	111	
		21	KAPCO	Gas/FO	1638	1386	
	Thermal	22	Hub Power Project (HUBCO)	FO	1292	1200	
		23	Kohinoor Energy Ltd (KEL)	FO	131	124	
		24	AES Lailpur Ltd	FO	362	350	
		25	AES Pak Gen (Pvt) Ltd	FO	365	350	
		26	Southern Elec. Power Co Ltd (SEPCOL)	Fo	135	119	

Sr. No.	Name of Power Station	Fuel	Installed Capacity (MW)	Capability, (MW) Summer	Capability, (MW) Winter
27	Habibullah Energy Ltd (HCPC)	Gas	140	129	
28	Uch Power Project	Gas	586	551	
29	Rouch (Pak) Power Ltd	Fo	450	395	
30	Fauji Kabirwala (FKPCL)	Gas	157	151	
31	Saba Power Company	FO	134	126	
32	Japan Power Generation Ltd	Fo	135	120	
33	Liberty Power Project	Gas	235	211	
34	Altern Energy Ltd (AEL)	Gas	31	31	
35	Attock Generation PP	Fo	163	156	
36	ATLAS Power	Gas	219	219	
37	Engro PP Daharki. Sindh	Gas	227	217	
38	Saif PP Sahiwal, Punjab	RFO/Gas	225	225	
39	Orient PP Balloki, Punjab	RFO/Gas	225	225	
40	Nishat PP Near Lahore, Punjab	RFO	200	200	
41	Nishat Chunian Proj. Near Lahore	RFO	200	200	
	Sapphire PP Muridke, Punjab	Rfo/Gas	225	225	
	Sub-Total (Thermal IPPs)		7475	6909	
42	Gulf Rental PP Gujranwala	Rfo	62	62	
	Sub-Total (Rental)		62	62	
	Total Thermal (IPPs)		7537	6971	
	Total Capacity (Private)		7648	7082	
	Total Hydel (Public + Private)		6555	6377	2414
	Total Thermal (Public + Private)		12691	10851	
	Total (PEPCO System)		19246	17228	13265

Table 5- 63: WAPDA/PEPCO System Historical Trends[102]			
Year	Peak Historical (MW)	Forecast Peak (MW)	Difference (%)
1999-00	9289	9311	0.24
2000-01	9718	9736	0.18
2001-02	10922	10243	-6.21
2002-03	10484	10799	3.00
2003-04	11078	11398	2.80
2004-05	12035	12087	0.43
2005-06	13212	12916	-2.20
2006-07	15138	15213	0.50
2007-08	16838	16480	-2.10
2008-09	17252	17867	3.50
2009-10	17847	19451	8.90

5.17.5 Alternate Resources of Energy in Nowshera

i. Coal Energy

Coal has always been a primary source of energy used to produce electricity, for several reasons. First and foremost, coal is abundant. It is found all over the country and it is easy to get. It is also easy to transport and store, compared to other fuels. Coal is one of the principal minerals produced in Pakistan. The measured coal reserves as on June 30, FY-2009 is 3.46 billion tones. The estimated coal reserves are around 185 billion tones, only a fraction of which is utilized. Pakistan Economy Watch in a statement said that Pakistan reserves of coal worth USD 25 trillion, can cater the electricity requirements of the country for next 100 years.

Coal is oldest technique to run steam turbines for producing electricity. Coal is composed of many types of gases, like carbon, nitrogen and hydrogen and therefore coal is an immense resource for power generation. The negative impacts can be mitigated by adopting proper measure. Federal Government should launch large scale projects for power generation from coal.

Electricity can be generated from coal on small scale at district level by the process of coal gasification. The concept of coal gasification is basically reacting steam heated coal to get

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[102] Source: General Manager Planning WAPDA / NTDC

synthetic fuel gas (Co, H2, CH4). This fuel gas is used to run a generator to produce electricity. Some of the benefits of coal gasification technology is as follows.

- Low fuel cost as compared to diesel or fuel oil
- Easy to operate machines
- Clean and environment friendly.
- Coal gasification machines are manufactured in Lahore. The cost of electricity generation per kwh is about Rs 16/ = based on 20 years machine life and related maintenance / operating cost.[103]

ii. Energy Generation from Garbage[104]

Electricity can be generated from garbage at District Level by utilizing waste management process. The brief description of the process is as follows:

Collection trucks bring waste to the power plant and it is unloaded into the refuse bunker. From refuse bunker it is transferred to combustion chamber for burning. The heat generated by burning the waste is used to heat the boiler and produce steam. The steam is used to revolve the turbine and generator to produce electricity. The gases of combustion pass through a scrubber for removal of acid which is hazardous and cannot be released in the air. The clean gases are then dispersed to the atmosphere through the smoke stack.

Waste generated by public is 0.5 kg per person per day. The population of District Nowshera is 1,267,943. Since the total population is not urbanized and may not generate 0.5 kg per day of garbage. Therefore 50 % population can be considered that generate 0.5 kg per day.   The waste generated will be approximately 316,985 kg, that is equal to approximately 317 tons per day.

This is to be noted that 627 KWH energy can be produced from each ton of combusted solid waste. Approximately 15 percent of the energy produced is used to operate the plant which is 94 Kwh and the balance   533 out of 627 Kwh can be sold to the energy customers.

Therefore, a garbage plant in District Nowshera can produce 168,961 Kwh of electricity to be available for public.

iii. Electricity Generation from Drainage Water

Drainage water can also be used to produce electricity. The drain water is collected into a large reservoir and some of the water is piped to a lower level with gravity. At the lower end of pipe Turbine / Generator is installed. The flowing water is used to turn the turbine / generator to produce electricity. All details are similar to a small hydroelectric plant.

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[103] http://www.kinetixautomation.com/index_files/gasification.htm

[104] Report on urban environmental problems in Pakistan, case study, Hayatabad, Peshawar and Report on waste to power Karnataka (India)

iv. Solar Energy

Solar Energy is an environment friendly and needs to be developed and popularized to achieve the goal of sustainable development. The Solar energy source is widely distributed and abundantly available in Nowshera.

Distt. Nowshera has a peak demand of 113 MW power. Area required for one MW solar power is approximately 11236 sq. meter. To generate 113 MW of power, area required will be 1,269,668 sq. meters (Approximately 1.13 km X 1.13 km). The cost per kwh is Rs 22.4/=, based on 20 years' equipment life and related maintenance / operating cost

Table 5-64: Climate data for Nowshera (2010)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C	20 °C	19 °C	29 °C	33 °C	37 °C	37 °C	37 °C	33 °C	34 °C	31 °C	26 °C	19 °C	30°C
Average low °C	7 °C	10 °C	16 °C	20 °C	23 °C	25 °C	28 °C	26 °C	24 °C	19 °C	11 °C	5 °C	18 °C
Sunshine hours	195.3	192.1	195.3	231.0	297.6	300.0	272.8	263.5	258.0	266.6	234.0	182.9	2,889.1

Nowshera has solar energy of about 200 - 250 watt per m^2 in a day with about 2,889 sunshine hours in a year. Solar insulation "IS" is 19 - 20 Mega Joules/meter sq. a day (1.93 - 2.03 mwh per m^2 in a year) with annual mean sunshine duration of 8 - 8.5 h. Such conditions are ideal for Photovoltaic (PV) and other solar energy applications.

5.17.6 Hydro Electric Potential in Khyber Pakhtunkhwa

Khyber Pakhtunkhwa is blessed with huge hydropower potential. The total hydroelectricity generation capacity is estimated to be more than 25,000 MW. This potential remained focus of interest to private investors and international funding agencies. For the purpose of Hydro Power generation in the province, (SHYDO) Sarhad Hydel Development Organization was established in 1986 to identify and explore the Hydel potential of the province. This organization is under the administrative control of Energy and Power Department of Provincial Government and is governed by Board of Directors. It has identified Hydel potential of more than 6000 MW, which can be explored through public sector, private sector of public private partnership. SHYDO has completed four projects with total installed capacity of 105.3 MW, out of which 81MW Malakand-III-HPP and 18MW Pehur HPP are connected to the national grid. The other two are Shishi HPP 1.8 MW and Rashoon HPP, 4.5 MW. Both are located in Chitral and the generated power is consumed locally in District Chitral. SHYDO has

further planned to develop 56MW within next three years, 600MW in five years' time and 1500MW within ten years' time under its short, medium and long-term plan.[105]

5.17.7 Energy Units Consumed: Past Trends Vs Forecasts

Energy consumption is an index of prosperity and standard of living of people in a country. As a result of technological and industrial development, the demand of energy is rapidly increasing. The province will be facing the acute challenge of energy deficit in the future. Even today the primary energy supplies are not enough to meet the present demand. Therefore, the government needs to give serious thoughts to the development of indigenous alternative and renewable energy resources. In addition, environmental friendly renewable energy sources need to be developed and popularized to achieve the goal of sustainable development.

The annexure at the end of this chapter gives year-wise breakdown of units consumed in the past, during the period 2005 to 2010. The annexure also gives projected data for the next 20 years, computed by applying average growth rate. It is clear that that demand for Electric Energy will increase to about 2 times by the year 2030.

5.17.8 Industrial and Other Consumer Growth in District Nowshera

Table 5.65 show the growth in industrial and other consumers of energy.

Table 5-65: Industrial and Other Consumers Growth in District Nowshera					
Year	Domestic	Commercial	Industrial	Bulk	Tube Wells
2005-2006	122000	14756	2005	187	3472
%Growth					
2006-2007	124195	14976	2021	188	3494
% Growth	1.80	1.49	0.80	0.53	0.63
2007-2008	126380	15227	2043	189	3512
%Growth	1.76	1.68	1.09	0.53	0.52
2008-2009	129561	15523	2065	190	6648
%Growth	2.52	1.94	1.08	0.53	89.29
2009-2010	135282	15982	2090	191	3573
%Growth	4.42	2.96	1.21	0.53	-46.25
%Average Growth	2.62	2.02	1.04	0.53	11.05

The industry sector has a growth rate of 1.04 % in District Nowshera. Therefore, by year 2039 the number of industries will increase 1.23 times in District Nowshera

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[105] SHYDO Brochure

5.17.9 National Power Sector Policy

Water & Power Development Authority (WAPDA) is the main public-sector body involved in generation, transmission and distribution of electric power in Pakistan except Karachi, where KESC is doing the same function.   Electric power generated by every power station such as Tarbela, Warsak, and Mangla etc. is evacuated to the National Grid System. All the generated electricity is purchased by WAPDA at an-agreed price. The provinces get the royalty of the generated power called "Net Hydel Profit" from WAPDA. (NTDC) National Transmission and Dispatch Company is responsible for transmission, dispatch and distribution. (PESCO) Peshawar Electric Supply Company, is a distribution company, it purchases the energy units required in the province from WAPDA, sell to consumers and collect revenue.

Federal Power Policy 2002 provides the facility that any investor can develop Hydel as well as other power projects in Pakistan. Private Power Infrastructure Board (PPIB) under Ministry of Water and Power, Islamabad is the focal body to coordinate such projects. PPIB website has E-Library to provide details of power policy and guidelines for investors to establish power plants.

5.17.10   Provincial Power Policy

Govt. of Khyber Pakhtunkhwa through SHYDO can offer hydropower projects up to 50 MW through private / public sector development with the following incentives.

Project sites, with estimated power potential of more than 5 MW, will be offered for lease through International Competitive Bidding (ICB) on the basis of available power potential at site of the proposed project. The baseline lease price for the purpose of ICB is fixed as Rs. 1000/- per KW per annum. The site will be awarded on the basis of highest bid received above the baseline lease price. The approved lease price will be escalated @ 25% after every 10 years of the lease period. For solicited cites, the power potential determined in the feasibility report will be considered for estimating the total lease money payable per annum to SHYDO.

If the sponsor of the power project succeeds to arrange funds, himself or through a joint venture with other investors, for building another legally permitted project of integrated industry of any type with captive use of the power project, the Govt. of Khyber Pakhtunkhwa will offer incentives for establishing the industry provided that the commercial production from the industry starts with a year from date of commercial operation of the power plant. 5 % duty on import of machinery required for the industry. Lease of public land for the life of the industrial plant, if available.

5.17.11   Constraints

i.   Safe and reliable transmission and distribution of electricity is a major problem due to weak infrastructure of Transmission Lines and Grid Stations. Shut down and tripping are more frequent due to this problem.

ii. Seasonal variation in hydro power generation due to less water available in winter is a serious problem. Therefore, full capacity of hydro power cannot be generated in winter season.

iii. Some of the thermal power plants are run by fuel oil, which is an imported item; the cost of electricity generation is very high as compared to other renewable energy systems.

iv. Coal is available in very large quantity but federal government does not encourage power production from coal.

v. Power production from solar energy is not developed on large scale. Peak demands during the day can be met with the support of this energy.

5.17.12   Recommendations

i.   Federal and Provincial Govt. should launch a large-scale expansion program to use the renewable Hydro Electric Potential for power generation.

ii. Coal is one of the principal minerals available in abundance in the country.

iii. Govt. should develop a policy to install large power plants to utilize this mineral; at district level, small scale coal gasification plants can be installed to add to existing power generation.

iv. Solar energy is available free of cost and there is a need to develop and popularize the solar power plants on large scale at district level.

v.   The provincial Govt. should increase awareness among the public to use renewable energy. A commercial module shall be developed so that the private sector can follow on the same lines.

vi. The available infrastructure of transmission lines and grid stations should be repaired and upgraded to reduce technical losses and to reduce shut downs. The ratio of HT to LT line length needs to be improved by extending more HT lines. Selective reconductoring of heavily loaded feeders should be do ne to reduce HT losses.

vii. Theft of electricity and losses can be reduced to an acceptable limit as follows:

a. The Open conductor LT lines are notoriously vulnerable to unauthorized hooking or kunda connections. Some of the open LT transmission lines should be replaced with NEW TECHNOLOGY, Covered Multiplex Conductors. This would assist in limiting loss from this source.

b. Approximately 95% of PESCO meters are still of the old Electro-Mechanical type. These are vulnerable to slowing and tampering by any one. Large-scale meter tampering, and illegal kunda connections are done with the help of company employees. Therefore, replacement of these meters with electronic units will reduce meter tempering.

5.18 URBAN FARM LAND

It is important to earmark areas for urban agriculture in the form of urban farm land not only to meet the local needs such as vegetables, poultry farming etc., but also to protect this land from unplanned urbanization through legislative urban farm control. Such farm lands are proposed in North of the district, such as East of the Risalpur area.

CHAPTER. 6   PLANNING FOR RURAL AREAS

6.1   POLICY GUIDELINES FOR SUSTAINABLE DEVELOPMENT OF RURAL AREAS

The Northern part of Nowshera is a fertile and productive agricultural land. The agricultural land in the vicinity of the built-up area however, has been gradually absorbed by urban growth. Consequently, the agricultural main-stay and the rural character and economy of the surrounding villages have shattered. These rural settlements are gradually getting converted to 'entrapped urban villages. Agricultural land exists all around the urbanized area of Nowshera, particularly in the Northern direction. It is dependent upon the extent of arable soil and availability of irrigation water. The agricultural tracts Northern part of the District is more productive, as these are served with water courses in form of canals and irrigation minors.

This Chapter proposes guidelines on different aspects of land use planning in rural areas of the District. Planning policies should facilitate and promote sustainable patterns of development in rural areas. This should include policies to sustain, enhance and, where appropriate, revitalize rural settlements and villages for strong, diverse, economic activity, whilst maintaining local character and a high-quality environment. To ensure this, local planning authorities should be aware of the circumstances, needs and priorities of the rural communities and businesses in their area, and of the interdependence between urban and rural areas.

People who live or work in rural areas should have reasonable access to a range of services and facilities. Local planning authorities should facilitate and plan for accessible new services and facilities, particularly where there is an identified need for new or expanded services to strengthen the role of a particular local service center. It should also be ensured that where possible, new development in identified service centers is supported through improvements to public transport, and to walking and cycling facilities; and support mixed and multi-purpose uses that maintain community vitality.

The Planning Authority should also support the provision of small-scale, local facilities to meet community needs outside identified local service centers, particularly where they would benefit those rural residents who would find it difficult to use more distant service centers. These local facilities should be located within or adjacent to existing villages and settlements where access can be gained by walking, cycling and (where available) public transport.

There needs to be a positive approach to planning proposals designed to improve the viability, and community value of existing services and facilities, e.g. village shops and post offices, rural petrol stations, mosques and community buildings, that play an important role in sustaining village communities.

Many villages are of considerable historic value, or make an important contribution to local rural character. Planning authorities should ensure that development respects and, where possible, enhances these particular qualities. It should also contribute to a sense of local identity and regional diversity and be of an appropriate design and scale for its location.

Planning authorities should take a positive approach to innovative, high-quality contemporary designs that are sensitive to their immediate setting and help to make country towns and villages better places for people to live and work.

It should be ensured that the quality and character of rural areas is protected and, where possible, enhanced. There should be particular regard to any areas that have been statutorily designated for their landscape, wildlife or historic qualities where greater priority should be given to restraint of potentially damaging development.

The objective of sustainable developments in rural areas is to raise the quality of life and the environment in rural areas through the promotion of:

- Good quality, sustainable development that respects and, where possible, enhances local distinctiveness and the intrinsic qualities of the countryside; and
- Continued protection of the open countryside for the benefit of all, with the highest level of protection for our most valued landscapes and environmental resources.
- To promote more sustainable patterns of development:
- Focusing most development in, or next to, existing towns and villages;
- Preventing urban sprawl;
- Promoting a range of uses to maximize the potential benefits of the countryside fringing urban areas; and
- Providing appropriate leisure opportunities to enable urban and rural dwellers to enjoy the wider countryside.
- To promote sustainable, diverse and adaptable agriculture sectors where farming achieves high environmental standards, minimizing impact on natural resources, and manages valued landscapes and biodiversity; contributes both directly and indirectly to rural economic diversity; is itself competitive and profitable; and provides high quality products that the public wants.

6.1.1 Key Principles

Sustainable development is the core principle and foundation of good land use planning. The following key principles should be applied:

- Decisions on development proposals should be based on sustainable development principles, ensuring an integrated approach to the consideration of:
- Social inclusion, recognizing the needs of everyone;
- Effective protection and enhancement of the environment;
- Prudent use of natural resources; and
- Maintaining high and stable levels of economic growth and employment.

Good quality, carefully-sited accessible development within existing towns and villages should be allowed where it benefits the local economy and/or community (e.g. affordable housing for identified local needs); maintains or enhances the local environment; and does not conflict with other planning policies.

Accessibility should be a key consideration in all development decisions. Most developments which are likely to generate large numbers of trips should be located in or next to towns or other service centers that are accessible by public transport, walking and cycling. Decisions on the location of other developments in rural areas should, where possible, give people the greatest opportunity to access them by public transport, walking and cycling, consistent with achieving the primary purpose of the development.

New building development in the open countryside away from existing settlements, or outside areas allocated for development in development plans, should be strictly controlled; the overall aim is to protect the countryside for the sake of its intrinsic character and beauty, the diversity of its landscapes, heritage and wildlife, the wealth of its natural resources and so it may be enjoyed by all.

Priority should be given to the re-use of previously-developed ('brownfield') sites in preference to the development of greenfield sites, except in cases where there are no brownfield sites available, or these brownfield sites perform so poorly in terms of sustainability considerations (for example, in their remoteness from settlements and services) in comparison with greenfield sites.

All development in rural areas should be well designed and inclusive, in keeping and scale with its location, and sensitive to the character of the countryside and local distinctiveness.

6.1.2 Agriculture and Farm Diversification

The Government recognizes the important and varied roles of agriculture, including in the maintenance and management of rural areas. Thus, there is a need to proposals that will enable farming and farmers to:

- Become more competitive, sustainable and environmentally friendly;
- Adapt to new and changing markets;
- Diversify into new agricultural opportunities
- Broaden their operations to 'add value' to their primary produce.

The presence of best and most fertile agricultural land should be taken into account alongside other sustainability considerations (e.g. biodiversity; the quality and character of the landscape; its amenity value or heritage interest; accessibility to infrastructure, workforce and markets; maintaining viable communities; and the protection of natural resources, including soil quality).

Where significant development of agricultural land is unavoidable, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality, except where this would be inconsistent with other sustainability considerations. If any

PC	Settlements (Villages)	1998 POPULATION	Growth Rate	2017 Population	POP 2019	POP 2024	POP 2029	POP 2034	POP 2039
ADAM ZAI PC	Adam Zai	6522	2.33	10105	10581	11873	13632	15296	17163
	Isori	5296	3.27	9758	10407	12223	14826	17414	20453
AINZARI GANDAB PC	Ainzari Gandab	10105	2.22	15331	16019	17878	20396	22762	25404
Akora Khattak-I PC	Akora Khattak	10026	5.81	29293	32796	43496	61040	80955	107369
Akora Khattak-II PC	ismail Khel	1112	4.15	2409	2613	3202	4087	5008	6138
	Surya Khel	2479	5.77	7197	8051	10658	14923	19755	26151
	Wattar	2569	6.4	8356	9460	12900	18717	25524	34806
Ali Mohammad PC	Ali Mohammad	1143	5.71	3285	3671	4846	6762	8925	11782
	Mushak	2163	1.75	3005	3111	3393	3765	4106	4479
Dang Dang PC	Banda Hangal	-	3.21	24	26	30	36	42	50
	Chishmai	1157	1.11	1428	1460	1543	1648	1742	1841
	Dang Dang (Hassan Dara)	1149	2.2	1738	1815	2024	2306	2571	2867
	Dargai	1187	2.07	1751	1824	2021	2285	2532	2805
	Deh Umri	941	5.43	2571	2858	3723	5113	6660	8675
	Mali Khel Bala	680	1	822	839	881	936	983	1033
	Mali Khel Payan	1448	1	1750	1785	1876	1992	2093	2200
	Masam Khel	827	1.38	1073	1103	1181	1282	1373	1471
	Uftada Hangal	0		32	32	32	32	32	32
Garu-I PC	Hardomizri Tang	2038	0.08	2069	2072	2081	2091	2099	2107
	Lashora Totki	299	1	361	368	387	411	432	454
	Namal Sara Toi	4341	1.04	5284	5394	5681	6045	6366	6704
Garu-II PC	Garu	9647	2.65	15847	16698	19031	22265	25375	28920
	Kamar Mela	1379	-1.86	966	930	847	757	689	627
Jabbi PC	Aman Pura	684	1.91	980	1018	1119	1253	1378	1514
	Jabbi	4354	1.53	5807	5986	6458	7074	7632	8234
	Kawa	208	-0.7	182	179	173	166	160	155
Kahi PC	Kahi	12412	2.71	20644	21778	24893	29225	33406	38184
	Mami Khel	881	2.27	1350	1412	1580	1807	2022	2262
	Shagai	6795	1.64	9248	9554	10363	11426	12394	13444
Khairabad PC	Khairabad	7296	3.03	12876	13668	15868	18981	22036	25583

	Khawari	3669	0.63	4136	4188	4322	4488	4631	4779
	Mandu Khel	1438	2.41	2259	2369	2669	3079	3468	3907
Maghulki PC	Maghulki	6636	2.48	10569	11100	12546	14533	16426	18567
Manduri PC	Darwa Zai Charpani	3466	2.29	5329	5576	6244	7153	8010	8970
	Hisartang	3850	1.85	5457	5661	6204	6925	7590	8319
	Manduri	1699	0.79	1972	2003	2084	2184	2272	2363
Mian Isa PC	Mian isa	7089	2.97	12354	13099	15163	18074	20922	24219
Misri Banda PC	Misri Banda	12303	3.31	22826	24362	28670	34856	41020	48273
Nandrak PC	Nandrak	5355	0.75	6167	6260	6498	6796	7055	7323
Narri Naodeh PC	Narri Naodeh	4763	2.79	8029	8483	9735	11482	13176	15119
Nihal Pura PC	Katti Miana	1927	1.59	2600	2683	2904	3192	3454	3737
	Kund	271	7.84	1137	1322	1928	3033	4424	6452
	Nihal Pura	1103	2	1608	1673	1847	2080	2297	2536
Shaidu PC	Shaidu	2420	1.18	3026	3098	3285	3525	3737	3963
Toh Gharib Pura PC	Toha Gharib Pura	2932	2.58	4757	5006	5686	6624	7524	8546
Aza Khel Bala PC	Aza Khel Bala	12657	3.6	24798	26616	31764	39273	46870	55936
Aza Khel Payan PC	Aza Khel Payan	11799	3.79	23930	25778	31048	38812	46746	56301
Badrashi PC	Aman Garh	21	-4.95	8	7	6	4	3	2
	Badrashi	16873	5.39	45771	50838	66098	90570	117755	153101
	Dheri Katti Khel	7448	7.11	27485	31532	44453	67125	94632	133409
	Nowshera Khurd	9746	3.17	17628	18763	21932	26448	30915	36135
Behram Killi PC	Behram Killi	12892	3.47	24637	26376	31282	38386	45525	53991
Kalanjar PC	Aspin Kani	1947	-2.46	1214	1155	1020	878	775	685
	Banda Chel	2876	4.52	6661	7277	9077	11834	14761	18413
	Kalanjar	4533	4.12	9765	10586	12954	16505	20197	24715
	Mulla Killi	285	6.06	871	980	1315	1871	2512	3371

Kandar PC	Kandar	8539	5.68	24403	27254	35925	50044	65965	86952
Khaishki Bala PC	Khaishki Bala	23277	3.31	43183	46089	54239	65942	77602	91324
Khaishki Payan PC	Khaishki Payan	20219	2.75	33840	35727	40917	48150	55145	63156
Manki Sharif PC	Rakh Sarkar	220	2.03	322	335	371	418	462	511
	Asha Khel	880	1.62	1195	1234	1337	1473	1596	1729
	Bahadur Khel	1499	2.12	2234	2330	2587	2934	3259	3619
	Garhi Miangan	0	0	0	0	0	0	0	0
	Kana Khel	2038	-0.45	1869	1852	1811	1763	1723	1685
	Maharaji	2143	3.29	3963	4228	4971	6036	7097	8344
	Manki Sharif	6528	2.33	10104	10580	11872	13631	15295	17162
	Tangi Khatak	2036	0.91	2420	2464	2578	2722	2849	2981
Nowshera Kalan PC	Nowshera Kalan	913	6.07	2798	3148	4227	6019	8082	10851
Pir Piai PC	Pir Piai	14919	2.6	24299	25579	29082	33924	38569	43851
Pir Sabak PC	Pir Sabak	21103	3.23	38636	41172	48265	58408	68470	80265
Rashaki PC	Bara Banda	10163	2.93	17593	18639	21534	25609	29587	34183
	Kotar Pan	9396	5.31	25116	27854	36078	49210	63739	82557
	Maira Kandar	4234	4.94	10576	11647	14822	19795	25192	32060
	Rashaki	16041	3.66	31772	34140	40862	50698	60680	72628
Sheikhai PC	Ispin Kani Kalan	4199	4.58	9826	10747	13444	17588	22001	27523
	Kati Khel	1727	1.73	2391	2474	2696	2988	3256	3547
	Khesarey	1774	1.13	2197	2247	2377	2543	2689	2845
	Lakrai	855	1.5	1134	1168	1259	1376	1483	1597
	Palosi	2123	0.63	2391	2421	2498	2594	2677	2763
	Rakh Kati Khel	0	0	0	0	0	0	0	0
	Rakh Khesarey	0	0	0	0	0	0	0	0
	Rakh Lakrai	0	0	0	0	0	0	0	0
	Rakh Palosi	0	0	0	0	0	0	0	0
	Rakh Sadu Khel	23	-100	0	0	0	0	0	0
	Sadu Khel	1435	0.65	1624	1645	1699	1767	1825	1885
	Sheikhai	2886	2.29	4437	4643	5199	5956	6669	7469
Walai PC	Baitul Gharib	597	4.56	1394	1524	1905	2489	3111	3888
	Dokhla	1280	1.85	1812	1880	2060	2300	2520	2762
	Duran	476	1.81	669	693	759	845	924	1011

	'IspinKani Khurd	3883	1.22	4887	5007	5320	5721	6079	6459
	Manhai	1179	1.76	1642	1700	1855	2060	2248	2453
	Pitao	284	0.29	300	302	306	312	316	321
	Rakh Duran	0	0	0	0	0	0	0	0
	Rakh Manhai	0	0	0	0	0	0	0	0
	Sarwar Khel	560	-0.91	471	462	442	418	400	382
	Sehran	0	0	0	0	0	0	0	0
	Shahab Khel	1563	3.95	3262	3525	4278	5398	6551	7951
	Tar Khel	562	1.36	726	746	798	865	926	991
	Walai	3135	-0.75	2719	2678	2579	2466	2374	2287
	Ziarat kaka Sahib	7086	0.93	8442	8600	9007	9522	9973	10445
Zara Miana PC	Turlandi	4135	2.85	7057	7465	8591	10169	11703	13468
	Zara Maina	9330	2.74	15604	16471	18854	22174	25383	29057
Akbar Pura (Shindi Payan) PC	Ali Shah	1163	1.85	1648	1710	1874	2091	2292	2512
	Daman	330	5.5	913	1016	1328	1831	2393	3128
	Duaa	463	1.67	634	655	712	786	854	928
	Misri Pura	198	6.95	710	812	1136	1701	2380	3330
	Mufti	1737	2.37	2711	2841	3194	3676	4133	4646
	Shamsa	4391	4.02	9287	10049	12238	15502	18879	22991
	Shindi Bala	333	3.52	643	689	819	1008	1199	1425
	Shindi Payan	9925	0.77	11491	11669	12125	12696	13192	13708
	Tarkha	4024	2.14	6014	6274	6975	7920	8804	9787
Aman Kot PC	Aman kot	6941	2.52	11132	11700	13251	15385	17423	19732
	Chouki Drab	3626	1.98	5263	5473	6037	6791	7490	8262
	Dheri Ishaq	1470	1.54	1966	2027	2188	2398	2589	2794

Balu PC	Ali Beg	4917	1.02	5964	6086	6403	6805	7159	7532
	Babi	4475		9892	9892	9892	9892	9892	9892
	Balu	4632		9195	9195	9195	9195	9195	9195
	Titara	2950	2.07	4350	4532	5021	5678	6290	6969
Banda Mohib PC	Banda Mohib	6310	1.32	8101	8316	8880	9607	10258	10953
	Banda Sheikh Ismail	4272	2.09	6332	6599	7319	8286	9188	10190
	Khoni	0	0	0	0	0	0	0	0
	Landa	0	0	0	0	0	0	0	0
Banda Nabi PC	Banda Nabi	7138	4.77	17311	19002	23987	31725	40049	50556
Chouki Bibi PC	Chand Bibi	1036	2.16	1556	1624	1807	2054	2286	2544
	Chouki Mamrez (Partly)	5558	5.84	16351	18317	24327	34197	45419	60324
	Kandi Nasir	1060	2.74	1773	1871	2142	2520	2884	3302
	Kandi Taza Din	3164	0.88	3737	3803	3973	4188	4375	4571
	Khush Maqam	3863	2.69	6391	6739	7696	9025	10306	11768
Dag Baisud PC	Dag Baisud	12060	3	21129	22416	25986	31029	35971	41700
Dag Ismail Khel PC	Chapri	1859	-0.06	1838	1836	1830	1824	1818	1813
	Dag Ismail Khel	22115	2.82	37511	39656	45572	53848	61881	71112
	Kotli	3739	-1.96	2566	2466	2234	1984	1797	1628
Dagai PC	Dagai	9949	3.74	19982	21505	25838	32206	38696	46495
	Pishongry	3714	1.53	4953	5106	5508	6034	6510	7023
Garhi Wazir PC	Garhi Wazir	6346	4.54	14764	16135	20146	26295	32831	40992
Jabba Daud Zai PC	Chak Agra	1775	1.81	2497	2588	2831	3153	3449	3772
	Garhi Momin	2071	2.69	3429	3616	4129	4842	5529	6314
	Jabba Daud Zai	4113	3.21	7490	7979	9344	11294	13227	15491
	Jungle	113	-100	0	0	0	0	0	0

PC	Village								
Jabba Khalsa PC	Chak Taru	-	3.21	2402	2559	2997	3622	4242	4968
	Jabba Khalsa	4226	4.45	9672	10552	13118	17034	21177	26328
	Qasam	3753	1.73	5201	5383	5864	6500	7082	7716
	Taru	4294	2.77	7210	7615	8730	10285	11790	13516
Jabba Khattak PC	Bakhtai	4123	1.13	5103	5219	5521	5906	6247	6608
	Jabba Khattak	6062	2.62	9900	10426	11865	13856	15769	17946
	Saleh Khana	5770	3.1	10301	10950	12755	15319	17846	20789
	Shah Kot Bala	1636	1.29	2089	2143	2285	2468	2631	2805
	Shah Kot Payan	1598	-2.39	1009	961	852	737	653	578
Jallozai Mahal PC	Jallozai Mahal	9261	2.21	14018	14644	16336	18625	20776	23176
Jallozai Maira PC	Ispin Khak	3874	-3.69	1897	1760	1458	1164	964	799
	Jallozai Maira	3913	10.22	24867	30210	49141	88107	143321	233138
Pabbi PC	Pabbi	528	12.77	5180	6587	12014	24708	45062	82183
Zakhi PC	Banda Mallahan	3195	2.62	5221	5498	6257	7308	8316	9464
	Kurvi	5531	1.92	7933	8241	9063	10158	11171	12286
	Zakhi	5373	3.6	10519	11290	13474	16659	19882	23727
Total Rural Population		**647343**	**3.21**	**1,179,890**	**1,263,201**	**1,508,066**	**1,891,258**	**2,314,446**	**2,872,407**

undeveloped agricultural land needs to be developed, any adverse effects on the environment should be minimized.

6.1.3 Tourism and Leisure

Tourism and leisure activities are vital to many rural economies and sustaining many rural businesses. Tourism industry is significant source of employment and help to support the prosperity of villages, local heritage and culture.

Sustainable rural tourism and leisure developments that benefit rural businesses, communities and visitors and which utilize and enrich, but do not harm, the character of the countryside, its towns, villages, buildings and other features.

Area with high landscape value, nature conservation or historic qualities should be recognized and designated as such. The provision of essential facilities for tourist visitors is vital for the development of the tourism industry in rural areas.

6.2 RURAL SETTLEMENTS IN DISTRICT NOWSHERA

6.2.1 Number of Rural Settlements

As per District Census Report (2017) of District Nowshera, there are 156 rural settlements in District Nowshera. From the same source, it has been calculated that 45 of these villages had population of 5,000 and above, 46 villages had population between 2,000 to 4,999 while 65 had population varying between 1,000 to 1,999. Thus, combining the above categories, 119 rural settlements (76%) had

population of 1,000 and above, while the remaining about 24% had less than 1,000 populations and in 2039 up to 80% of rural settlements will have population more than 1,000. Table 6.1.

Table 6-1: Number of rural settlements their current and forecast population up to 2039

6.2.2 Growth Pattern of Rural Settlements

Based on the populations of villages as given in the census reports of 2017 and 1998, growth rate of each rural settlement was calculated Table 6.1, based on which these settlements have been divided into 3 categories as per following criteria:

- Rapidly growing villages (growth rate above 3%)
- Moderately growing villages (growth rate between 2%-3%).
- Slowly growing villages (growth rate below 2%)

The results are presented in Table 6.2. As seen, of the total 156[106]villages in District Nowshera, 67 villages are fast growing, 41 have moderate growth and 29 villages have slow growth.

Table 6-2: Growth Pattern of Rural Settlements in Peshawar Valley (Based on 1981-1998 Growth Rate)							
Type of Rural Settlement	No. of Rural Settlements in Districts:					Total	%age
	Peshawar	Mardan	Nowshera	Charsadda	Swabi		
Fast Growing	155	70	67	101	65	458	52.83
Moderately Growing	47	48	41	45	54	235	27.10
Slow Growing	33	32	29	51	29	174	20.07
Total	235	150	137	197	148	867	100

6.2.3 Rapidly Growing Rural Settlements

As seen in Table 6.2, there are 67 fast growing settlements in District Nowshera. There is however vast variation in growth rates of fast-growing settlements (ranging from 3% to about 8%). Such settlements therefore have therefore been divided into the following sub-categories based on their growth rates:

High-High: Above 7%
Middle High: 5-7%
Low High: 3-<5%

Based on the above categorization, the names of villages falling in these categories are given in Table 6.3.

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[106] There is discrepancy between the number of villages in Table 6.1 and 6.2; it is because a few villages in 1998 Census were not listed, and hence their growth rate could not be calculated.

Table 6- 3: Rapidly Growing Rural Settlements			
Growth Category	**Growth Rate**	**Number of Settlements**	**Names of Settlements**
High-High	Above 7%	7	Akora Khattak, Nihal Pura, Aspin Kani, Rakh Sarkar, Maira Kandar, Daman and Shamsa
Medium-High	5% - 7%	4	Narri Naodeh, Badrashi, Jabba Daud Zai, Jallozai Maira
Low-High	3% - 4.99%	56	Adam Zai, Isori, Surya Khel, Wattar, Deh Umri, Masam Khel, Garu, Namal Sara Tot, Kawa, Kahi, Khairabad, Mushak, Hisartang, Mian Isa, Misri Banda, Nandark, Shaidu, Aza Khel Bala, Aza Khel Payan, Dheri Katti Khel, Nowshera Khurd, Banda Nabi, Behram Killi, Dagai, Khaishki Bala, Khaishki Payan, Maharaji, Pir Sabak, Bara Banda, Kotar Pan, Rashaki, Ispin Kani Kalan, Sheikhai, Ispinkani Khurd, Walai, Turlandi, Misri Pura, Mufti, Aman Kot, Chouki Drab, Babi, Chand Bibi, Chouki Mamrez (Partly), Kandi Nasir, Kandi Taza Din, Dag Baisud, Dag Ismail Khel, Garhi Wazir, Chak Agra, Bakhtai, Jabba Khattak, Saleh Khana, Jallozai Mahal, Jabba Khalsa, Qasam, Zakhi
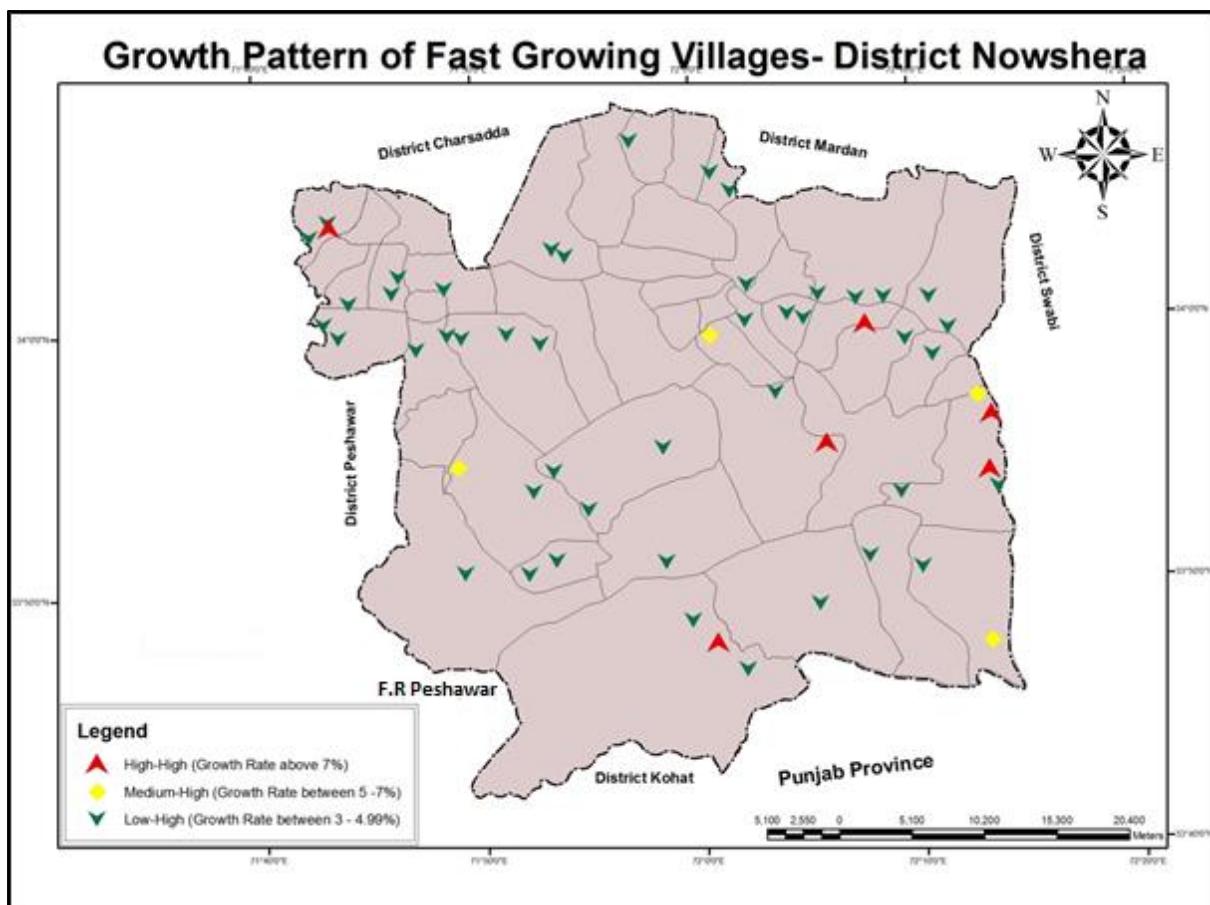
Map 6- 1: Growth Patterns of Fast-Growing Villages of District Nowshera

Map 6.1 represents the growth patterns of fast-growing villages of District Nowshera. These villages show the growth pattern for future and also the expansion of each village direction.

6.3   RURAL DEVELOPMENT THROUGH GROWTH CENTERS

For rural development, it is important to conceive a strategy of developing growth centers aimed at strengthening local governments' financial and administrative capabilities, and improved channels for effective citizen participation in solving problems of common concern. This calls for additional investments in infrastructure and the provision of incentives for micro/cottage industries and services to be located in the identified growth centers. In rural areas, opportunities need to be created to make rural life more bearable, so that these areas can retain their human capital for agricultural, agribusiness and off-farm activities instead of losing them to the urban centers where opportunities may be limited. This would entail developing rural infrastructure including schools and health clinics and feeder roads to enhance market access for farming households.

No regional development concept or theory has received greater attention among regional planners than growth pole theory. It has been subject to various definitions and interpretations, and its application has spread across the globe considerably. The growth pole theory, as originally formulated, assumes that growth does not appear everywhere at the

same time, but it manifests itself in "points" or "poles" of growth, and the growth spreads by different channels and eventually affects the economy as a whole.

In order to attract private sector initiative to accelerate employment-generating activities in the rural areas, it is important to provide urban amenities in rural areas with the objective of stimulating high growth in rural economies. The development of agribusiness and agro-industrial enterprises should be the starting point of any sustainable industrialization process. Agribusiness and agro-industry development can be catalyzed by supporting funding for installation, rehabilitation, and operation of critical infrastructure of "public good" nature that connect rural to urban centers and help integrate the rural economies with the more advanced urban economies.

Such critical infrastructure includes feeder roads, telecommunications systems, public utilities (water supply and sanitation, and energy), and transport facilities. Market access is key to a sustainable increase in agricultural and related products, for without improved access to markets, increases in agricultural productivity cannot translate into higher incomes. Urban bias in terms of investment and infrastructure, in isolation of rural area can be detrimental and costly for the concerned district/region as a whole. These negative aspects may include:

- Proliferation of urban sprawl;
- Premature conversion of rural agricultural land and timberland into urban
- uses;
- Escalation in urban-fringe land prices;
- Lowering water quality due to disturbance of the natural hydrological
- function;
- Impairing the quality of rural living.

For District Nowshera, a number of villages throughout the District have been identified which are proposed to be developed as growth centers in the District rural system. These would be the places that could grow to fill the gap between the urban area and smaller villages.

There are 47 union councils in District Nowshera, of which 8 are urban and 39 are rural[107]. To reduce migration to urban areas, a number of measures can be taken such as employment opportunities near or around the villages, better inter-village road connectivity, provision of basic facilities such as good healthcare, quality education, provision of adequate infrastructure and physical improvement of villages including village streets and houses.

To achieve the above, rural area of District Nowshera is proposed to be divided into a number of rural zones, and a centralized village within each such zone designated as Growth Center for the rural zone. The Growth Center will have following facilities to serve the rural zone.

i.   Model Rural Health Center
ii.   High School

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[107] Source: District Studies Report Nowshera, Chapter 6.

iii. Veterinary Center

iv. Repair shops for tractors and other agricultural implements.

v. Play Ground

vi. Agro-based micro industrial sector

vii. Transport terminal

viii. Good quality rural roads, connecting Growth Center with other main villages of the rural zone, and also a road connecting Growth Center with the nearby highway/major road.

ix. Fruit/vegetable market, which may serve as sale as well as purchase point.

x. Grain market/godowns, where applicable.

xi. Central commercial area.

xii. Bank

xiii. Post Office

xiv. Sub-Police Station

xv. Revenue Office

Table 6-4: Proposed Rural Growth Zones – District Nowshera			
Name of Growth Zone	Growth Center (Name of Village)	UC in Which Growth Center Lies	Other UC's in the Rural Growth Zone
Garu	Garu	Nizam Pur	Nizam pur, Kahi (Complete)
Khair Abad	Khair Abad	Khair Abad	Inzari, Mandoori, Khair Abad,(Complete), ,Adam Zai (Partial)
Kaka Sahib	Kaka Sahib	Ziarat Kaka Sahib	Pahari Kati Khel, Ziarat Kaka Sahib, Manki Sharif (Complete)
Dag Ismail Khel	Dag Ismail Khel	Dag Ismail Khel	Shah Kot, Spin Khak, Dag Ismail Khel (Complete)
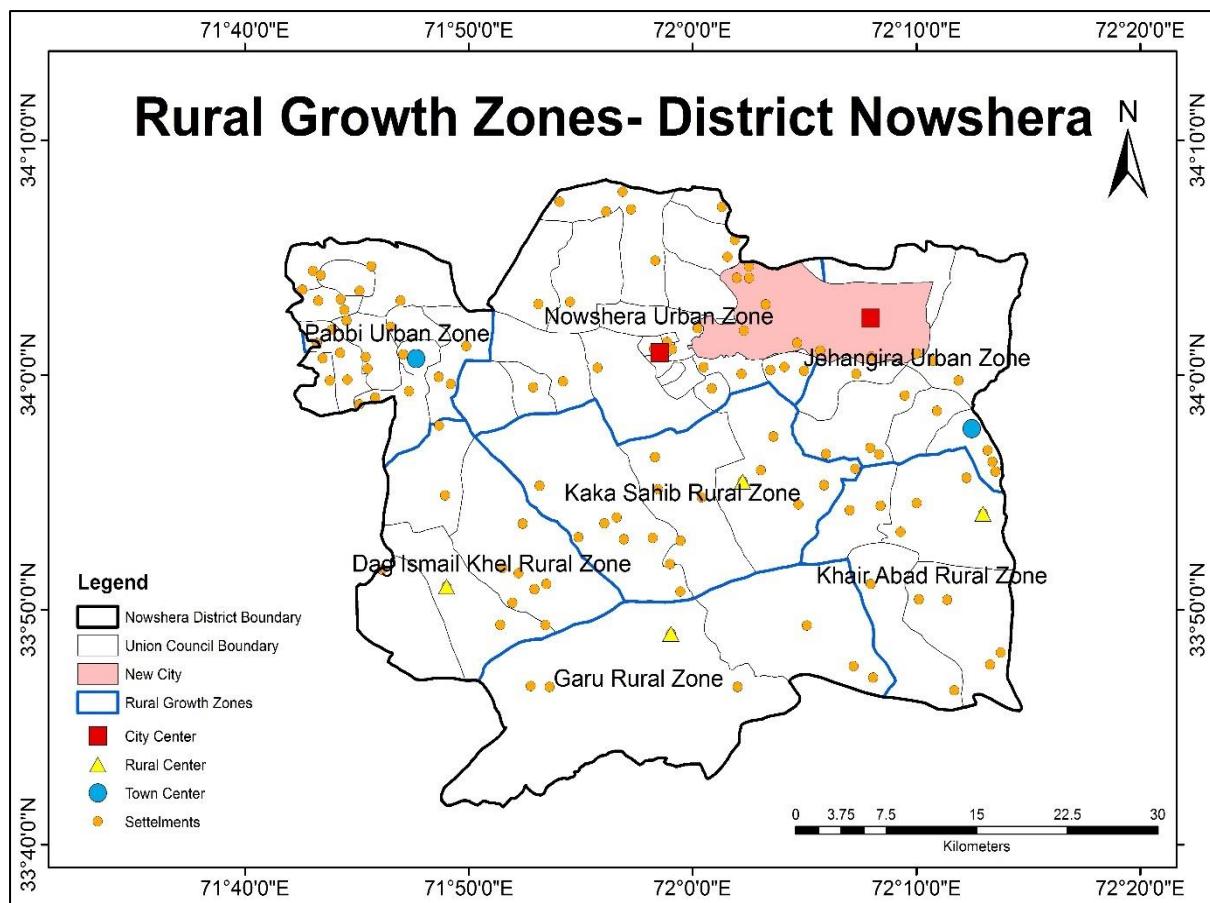
Map 6-2: Rural growth Zones

Map 6.2 represents the rural growth zones and urban growth zones of District Nowshera. It represents the development hierarchy of District.

6.4 GUIDELINES FOR RURAL HOUSING AND OTHER AMENITIES:

Developing rural areas in a sustainable manner, through better regulatory measures can be highly helpful for better and balanced physical as well as economic development.

Lack of guidelines and regulatory measures in rural areas are resulting in uncontrolled and unregulated housing and other physical developments. There have hardly been any remedial measures in the past, resulting in major damages to rural environment. Thus, owing to various historic and institutional reasons, the effectuation of protective measures including Land Use and building control regulations have remained limited to major urban centers. Rural areas have been largely neglected resulting in their haphazard and uncontrolled growth. In these areas, the problems get proliferated and involve heavy financing to cure.

The following guidelines are proposed for rural areas:

- Land for rural housing should be capable of being served with essential infrastructure such as link to road network, water supply, drainage and sanitation at reasonable costs. One of the most critical factors is the availability of suitable land for various

activities. There is a need to identify such land and secure/ safeguard it for planned development.

- The land should be economically developable and should have appropriate location and accessibility to services.

- Conventional Land Use regulations are not applicable in rural areas, as these entail high building costs and standards which are not affordable by most rural households. To make the regulations realistic for rural areas, the procedures and standards must be cut down. At present there are no Land Use and building control regulations for rural areas. These should be formulated and implemented to ensure preservation of rural physical environment.

- Strict Land Use control in rural areas, at current level of the socio-economic development is neither desirable nor possible. Nevertheless, there have to be some guiding principles to rationalize and reasonably exercise control over Land Use and developments in rural areas.

- The Land Use control in rural areas should focus on improving accessibility, control on development activities along major highways, and simplifying the plan approval process.

- Involvement of private sector in development efforts in view of funding constraints in the public sector.

6.5 POSSIBLE MODEL ENVIRONMENTAL VILLAGE: DETAILS OF SITE AREA AND OTHER REQUIREMENTS

For selecting a possible Model Environmental Village, the criteria for selection included its growth rate, distance from existing urban Area, population and present area under village. Of the total 156 rural settlements/villages in District Nowshera, 67 villages have growth rate of above 3%. The selected village 'Pir Sabak' is one of these rapidly growing villages.

Pir Sabak is located 5km away from Risalpur cantonments' Western direction. The current site area of Pir Sabak is 448 Acres. It is bound by Agriculture Land in the North, River Kabul and existing Urban Area towards South, agricultural & vacant land in the East; and Risalpur cantonment along Mardan road towards West. Risalpur Gumbad lar Road connects the village to Mardan Road in the West.

According to District Census Report 1998, population of settlement was 21,103 and growing with a growth rate of 3.23%. Population has been extrapolated till the year 2039, and 5-yearly forecasts are presented in Table 6.5.

Table 6-5: Population Projection	
Year	**Projected Population**
1998	21103
2003	24739
2008	29000
2017	36636
2019	41172
2024	48265
2029	58408
2034	68470
2039	80265

It is estimated that the additional population of Pir Sabak during the period 2019-2024 will be around 7093 while that in the subsequent 15 years (2024-2039), the additional population will be about 32000. The housing demand in these two-time periods will accordingly be 1182 and 5333 respectively, based on the assumption that each family of 6 will have one house (Table 6.6).

Table 6-6: Housing Demand for Additional Population (2019-2039)					
Year	Population	Additional Population		Housing Demand	
		2019-2024	2024-2039	2019-2024	2024-2039
2019	41172	7093		1182	
2024	48265				
2029	58408		32000		5333
2034	68470				
2039	80265				
Total Housing Demand for addition population				6515	

Considering Population density as 8 houses per acre, the area under future houses in different time periods is given in Table 6.7.

It is clear from Table 6.8 that 3.54 acres of commercial area will be required in the village during the 1st five years of plan period (2019-2024), and 16 acres during the subsequent 15 years.

Table 6-7: Area Requirements (Acres)	
Time Period	Required Area
2019-2024	147
2024-2039	666
Total	814

Apart from passive recreational facilities, Pir Sabak also needs active recreation in form of Village Playground, for which an area of 5 Kanal is proposed.

Table 6-8: Future Commercial Area Required (2019-39)		
Year/Period	Population	Commercial Area Required[108]
2019	41172	
2024	48265	
2039	80265	
Additional Population (2019-2024)	7093	3.54 Acres
Additional Population (2024-209)	32000	16 Acres
Total Additional Population (2019-2039)	39093	19.54 Acres

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[108] @0.5 acres/1000 persons)
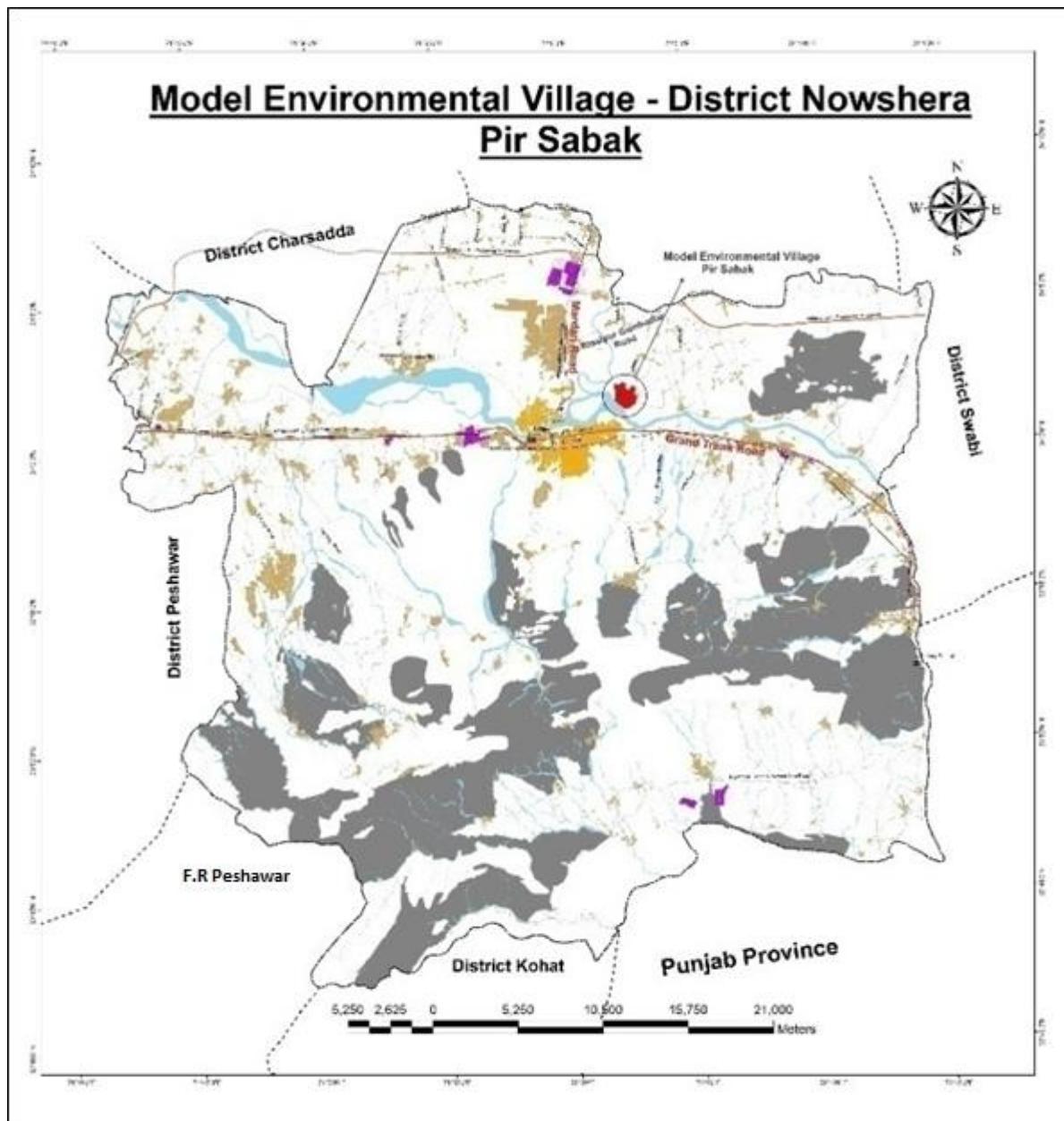
Map 6- 3: Pir Sabaq Model Environmental Village of District Nowshera

Map 6.3 shows the position of model village Pir Sabak, it is located near the Risalpur Cantt. Its growth rate is up to 3.21 that very high its population is increasing very fast and in plan period its population will be about 1 lac.

CHAPTER.7   STRUCTURE FOR REGULAR MONITORING, EVALUATION & UPDATION.

7.1   PROPOSED STRUCTURE

Regular monitoring, evaluation and updating of the Land Use Planning System at District level are important features of the Project, particularly because of involvement of assembly and integration of geographic information. Based on this system, alternative spatial development strategies over the years can be developed depending upon changed circumstances.

Introduction of GIS in the Land Use plan will enhance the rationality of the future decision-making process by improving data accuracy and accessibility and as a consequence will lead to 'better' decision making. The analysis of information, if posted on web shall help to describe the existing situation, contribute to improved understanding of local problems and constraints to development by providing key factors and variables.
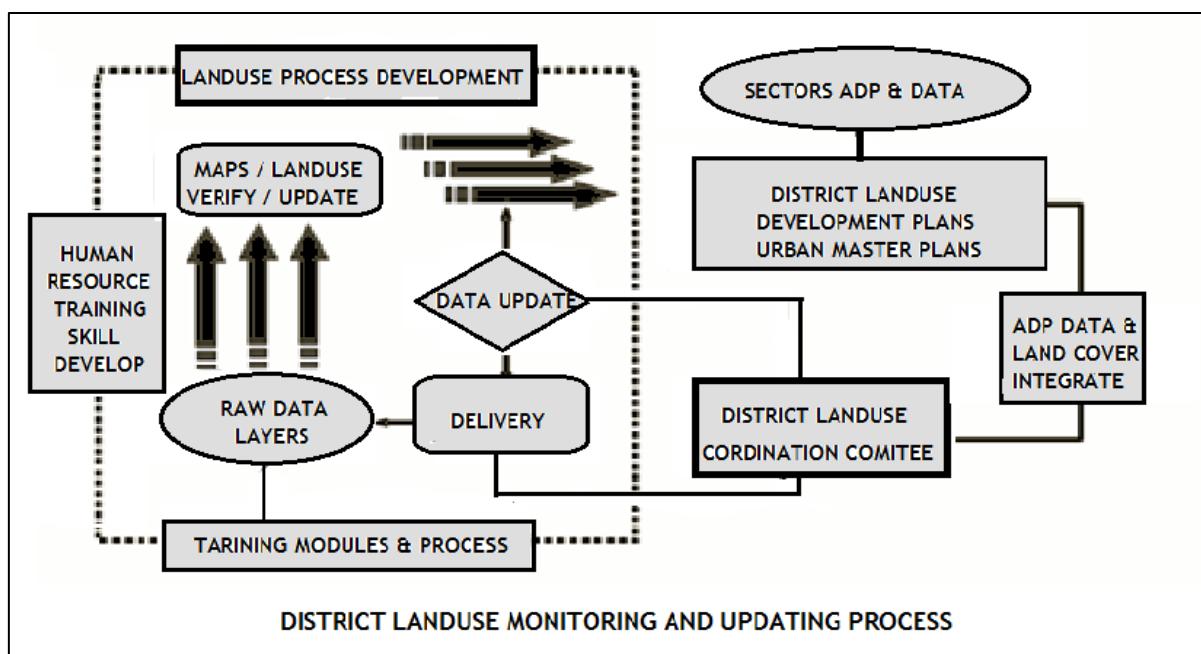
Figure 7-1: District Land Use Monitoring and Updating Process

The GIS based Land Use plan can be used by various departments/agencies for the purpose of data updating and enhancement. The data sharing and the information updating will be a two-way process as both the stake holders and the government departments/ agencies will be able to exchange information and achieve continuous improvement in the quality and quantity of information.

Generally, the Land Use plans in the past were produced using traditional sectoral land cover plans, which described a state of land cover by sectors and plans to be implemented independently without any coordination with other sectors. The result was that more often some sectors were over emphasized and received higher investment, while others which are equally important were marginally developed. Though the process was continuous and

cyclical in nature, however there was no coordination and no Land Use was available at district or provincial level. It was considered a purely town planning subject limited to urban areas only.

The approach used while preparing this Plan focuses on planning based on updated sectoral data and electronic mapping using the Geographical Information systems based on the identification of needs and goals. This coupled with the formulation and evaluation of alternative courses of action, resulted in mapping the information in different layers. This strategy needs updating, developing and implementing the Geographical Information System (GIS) as a new tool and approach for planning. A well-integrated and comprehensive database is an important element that could determine the ultimate success of GIS application in development planning.

The functionality of Land Use Plan can be enhanced by coordinating with all the departments and developing data integration tools to existing system. Consequently, it will be used to assist decision-making, taking into account among other things, the current scenarios of the proposed development, physical constraint and future impacts.

Implementation of District Land Use Plan necessitates development of a module for capacity building of institutions via skill improvement of human resources; and coordination amongst different sectors/departments. It is also recommended to develop web-based GIS Land Use maps for implementation of development plan and for project monitoring. This information should be made available and accessible to the general public with a special application for feedback (refer Figure above).

Proper and effective planning generally involves close monitoring growth, review of Annual Development Plans as well as policy appraisal. Plan Implementation calls for comprehensive information concerning the past, present and future. As spatial representation is critical to development, the attribute data related to the problems or issues to be addressed needs to be translated into spatial manifestation to ease the process of analysis and decision making. A Planning Agency such as Urban Policy Unit or the proposed Peshawar Valley Development Authority, to develop, implement and continually update the mapping via GIS calls for planning and monitoring functions, especially to integrate, assemble and coordinate the information obtained from a wide range of sectors, departments and sources.

An Electronic Data Bank (EDB) should be developed to serve as the eyes and ears to the monitoring process, so as to help in the surveillance of compliance with planning proposals. The EDB shall be provided inputs by all the departments and it is estimated that almost 130-person months of senior level officials, GIS experts and data entry personnel will be involved in managing and updating the EDB. Of these some 120 man-months will be consumed by the respective departments while a Deputy Director assisted by the GIS expert, and data entry persons as well assistants involving 40 person months will be required at the central coordinating office where the district Land Use plans will be updated.

Methods of creating, obtaining and distributing information for the purpose of mid-term reviews, which shall determine policy and implementation issues for further improvement, are imperative. Additionally, for monitoring the process of updating the geospatial information of Land Use; vertical integration of the developed and maintained datasets is essential. To this end the information from TMAs, Development Authorities and line departments at the provincial and district levels should be given due consideration and the relevant persons at each organization shall be properly trained to follow the monitoring software and develop electronic data base.

The P&D Department /Urban Policy Unit established at the provincial level should be expanded to include the incorporation of the GIS into the development plan preparation process at all planning hierarchy, be it the macro or micro level. As such, GIS technology shall be applied in planning activities, which essentially include plans formulation as well as development control.

The use of web-based GIS will be the best approach in overcoming the constraints in development planning, setting targets and resolving disputes involved in the planning process. When the system is properly monitored and updated on regular basis with access to the general public, it will provide huge potential for improving the planning system especially in terms of transparency and accessibility and consequently contributes to better governance.

At present the land records both for urban and rural areas are managed by the age old Patwari system, which has all the record of landholdings and Land Use. The district land use plans and the EDBs will enable the Urban Policy Unit/ P&D Department to update and have easily accessible land records by type, geospatial information, and liable to any disaster such as floods, landslides, earth quake etc.

Figure 7-2: Land Record and Development Potential

Regular updating and electronic monitoring of the land cover will enable the provincial government to introduce a transparent method of land revenue/ property tax and tax on commercial, industrial, agricultural and other Land Uses. This will help the Provincial Revenue Department to update its records and collect the property tax and land revenue etc.

Based on the land cover and Land Uses the provincial government/district government will be able to introduce plans and programs for tree plantation, forestation and land conversion thus enhancing both personal income and provincial income. The development of range lands and forests will also help to achieve the goals of environmental protection.

The electronic data sharing with the citizens and the government departments will be more efficient, more effective, and cost effective, as with a click any one will be able to update its records and initiate information coordinating between stakeholders.

The Land Use development plans monitoring in GIS will support the P&D Department of KP, and the Urban Unit in controlling and monitoring development projects. The implementation will be strongly supported by the EDB & GIS which will provide inputs for the planning information needed through continuous data gathering, updating and, storage.

The District Land Use Plan Monitoring emphasizes on Geospatial physical planning involving spatial data, location and land use activities of proposed development. It will be possible to check whether land use development in the District complies with the planning proposals in the district by comparing current land use development with that proposed.

A series of workshops and trainings may be arranged to ensure smooth technology transfer to acquire the appropriate knowledge and skills to users. The training modules will serve as a supporting factor to GIS capacity building, covering various aspects including competency, infrastructure, procedures and resources essential for overall monitoring, evaluation and updating of Land Use plans.

Table 7-1: Sectors, Tasks and Manning			
Sr. No	Sectors	Tasks	Personnel
1	industries & Commerce	Industrial Estates, Future Development Plans, Type of Industries, Land cover, Data, Annual ADP	Supervisor, Software Manager
2	Agriculture	Cropping Pattern, Land cover, Data, Annual ADP	Supervisor, Software Manager
3	Irrigation	Canals, Wells, Tube wells, type of irrigation, Other data, ADP and Land Cover	Engineer, Data Entry Clerk,
4	Water Resources	Rivers, Canals, Wells, Tube wells, Land cover, Data, Quantity of water, Annual ADP	Engineer, Data Entry Clerk,
5	Water Logging and Salinity	Data on SCAP, Land cover, Data, Financing, Annual ADP	SCARP In charge, Data Entry/ GIS Expert
6	Water Supply and Sewage	Urban Plans, Land cover, Data, Annual ADP	Municipal Engineer, GIS Expert
7	Climate & Weather	Information from Meteorological Department, Data, Annual ADP	Met Officer and Data Entry Clerk
8	Floods/ Disaster	Land cover, Data, Financing, Annual ADP	Engineer, Data Entry Clerk,
9	Environment	Land cover, Data, Financing, Annual ADP	
10	Communications	Land cover, Data, Financing, Annual ADP	
11	Transportation	Land cover, Data, Financing, Annual ADP	
12	Rail and Air	Land cover, Data, Financing, Annual ADP	
13	Housing	Land cover, Data, Financing, Annual ADP	
14	Demography	Data on settlements, Financing, Annual ADP	Demographer
15	Health	Hospitals, Health Centers by location, size and type, Land cover, Data, Annual ADP	Dy. Secy Health, Information Manager
16	Education	Data on Schools, Higher Education, Training Institutes, by size, type and location, Education Plans and Annual ADP	Dy. Secy Education, GIS Expert and Information Manager
17	Tourism/ Entertainment	Hotels, Historic Places, Pars, resorts etc., Data, Annual ADP	Tourism Officer, and Data Entry Clerk
18	Urban Planning/ Expansion	Information from TMAs, Development Authorities, Land cover by type, Urban Land Use, Data, Transportation Network and Annual ADP	Urban Planner and GIS Expert

Sr. No	Sectors	Tasks	Personnel
Table 7-1: Sectors, Tasks and Manning			
19	Existing Land Use	District level Land Use and Land cover by Type, vacant, rage land, Development Plans for Land Use Change Data, and Annual ADP	Supervisor and GIS Expert
20	Mining	Type, size and location of mines, Land cover, Data, Annual ADP	Information from Dy. Director Mining Department, Data Entry Clerk

No	Sectors	Staffing
Table 7-2: Schedule of Expenditure.		
1	industries & Commerce	Supervisor,
		Software Manager
2	Agriculture	Supervisor,
		Software Manager
3	Irrigation	Engineer
		Data Entry Clerk,
4	Water Resources	Engineer
		Data Entry Clerk,
5	Water Logging and Salinity	SCARP In charge
		Data Entry/ GIS
6	Water Supply and Sewage	Municipal Engineer
		GIS Expert
7	Climate & Weather	Met Officer
		Data Entry Clerk
8	Floods/ Disaster	Engineer
		Data Entry Clerk,
9	Environment	Engineer
		Data Entry Clerk,
10	Communications	Engineer
		Data Entry Clerk,
11	Transportation	Engineer
		Data Entry Clerk,
13	Housing	Engineer

Table 7-1: Sectors, Tasks and Manning			
Sr. No	Sectors	Tasks	Personnel
14	Demography	Data Entry Clerk,	
		Demographer	
15	Health	Dy. Secy Health	
		Information Manager	
16	Education	Dy. Secy Education	
		GIS Expert	
		Information Manager	
17	Tourism/ Entertainment	Tourism Officer	
		Data Entry Clerk	
18	Urban Planning/ Expansion	Urban Planner	
		GIS Expert	
19	Existing Land Use	Dy. Director/ Senior level planner	
		Supervisor/ Coordinator	
		GIS Expert	
20	Mining	Information from Dy. Director Mining Department	
		Data Entry Clerk	
	Professionals @ Rs. 250,000/month Others @ Rs. 150,000		
	Other Costs 75 % of above		

7.2 ZONING

The total area of the District needs to be divided in different Land Use zones, as there is a strong need to clearly delineate zonal boundaries to distinguish between residential, large-scale commercial, industrial and other Land Uses in the District. The purpose is to control and direct the use and development of land and properties. Primarily objective of zoning is to improve the efficiency derived from agglomeration economies, ensure minimum standards of health and safety and provide land for public goods and services. The criteria for earmarking the zones have been based on the following characteristics:

- Physical and spatial Characteristics
- Predominant Land Uses
- Intensity of development

In the District Land Use Plan, like all other zones, specific Land Use parameters have been formulated for different zones to facilitate better and effective planning control in the area.

In this Chapter, specific set of parameters have been proposed for better Land Use control in each zone; these regulations are mainly influenced by the characteristics of the zones, and their perceived development pattern.

In Chapter 5, a Land Use strategy has been proposed for Nowshera, including location and allocation of major Land Use zones. For each of the proposed zones, it is important to have Land Use parameters, to facilitate effective planning control. The agricultural area should be preserved in a manner that its character as a green belt is protected to maximum possible extent. In the existing built-up areas, there should be a gradual shifting of non-conforming uses from a particular zone so as to cause minimum hardship to the owners of non-conforming uses. The obnoxious industries may for example be assigned high priority for shifting, depending on the nuisance of the industries. It is high time that stringent steps are taken to adopt a clear-cut policy based on identification and gradual elimination of non-conforming uses located in various zones.

Land Uses permitted/permitted on appeal in different planning zones of Nowshera are proposed in sections below. Permitted Land Uses are those, which the City Government/Planning Agency may allow in a particular zone. Land Uses that can be 'permitted on appeal' should be carefully scrutinized by the planning agency and decided upon on case-to-case basis. Uses not specifically provided in a particular zone are prohibited and should not be permitted. The important thing to emphasize is that a building or Land Use shall not be used in a manner inconsistent with the prescribed use.

Zone-wise regulations considering compatibility of various Land Uses are proposed in section below:

7.3 LAND USE COMPATABILITY

7.3.1 Regulations for Residential Zones

Table 7-3: Regulation for Residential Zones		
Residential	**Uses Permitted**	**Uses Permitted on Appeal**
Low Density Residential	Detached/semidetached dwellings Mosques Primary/High Schools Clinics/Dispensaries Social/Cultural Institutions Local Shopping Areas/Retail Shops Offices of Professionals with adequate parking facilities Parks and Playgrounds Local Recreational Uses Non-commercial vegetable gardens and nurseries. Ancillary uses clearly incidental to residential uses, which must be free from nuisance and hazard.	Commercial Offices and Service Shops of Local Character[109]. Raising of poultry for non-commercial purposes[110]. Petrol pump, gas filling station. Taxi/rickshaw stand.
Medium Density Residential	Apartment Buildings / Multi-family dwellings Colleges and Research Institutions Hostels, Guest Houses Offices of TMAs/other tiers of Local Govt. All uses permitted in low density residential zones[111]	All uses permissible on appeal in low-density residential zone. Restaurants and hotels Hospitals[112] Petrol and Gas filling stations[113].
High Density Residential	All uses permitted in Medium Density Zone Public Utilities and Buildings Recreational Uses Taxi and Rickshaw Stands	All uses permitted on appeal in medium density zone.
Major Commercial Areas	Shopping plazas, Shops and commercial centers, educational institutions, recreational places, parks and open spaces, public and religious buildings and service industries and firefighting arrangements governed by the building and space regulations.	Petrol filling stations, Hospitals, residences, transport terminals, cinemas, clubs and all sort of storage.

7.3.2 Regulations for Educational Zone

Table 7-4: Regulation for Educational Zones

Zone	Uses Permitted	Uses Permitted on Appeal
Educational Zone	Educational and Research Institutions Offices of Social and Cultural Organizations Religious Institutions Parks, Memorials and Monuments Recreational Uses Public Utilities and Buildings Community Facilities, Arts Councils and Auditoriums Government Offices Taxi Stands, Bus Halts Approved Parking Provisions	Hotels Offices of Commercial Institutions Restaurants and Clubs Commercial Recreational uses like theatre halls and cinemas Petrol and gas filling Station Limited Retail Shopping

7.3.3 Regulations for Trade Zone

Table 7-5: Regulation for Trade Zones

Zone	Uses Permitted	Uses Permitted on Appeal
Trade Zone	Wholesale/retail commercial markets and establishments. Restaurants/Hotels. Business and professional offices Transportation Terminals Recreational Uses Public utilities and buildings Approved parking provisions.	Petrol and gas filling stations Hospitals not treating contagious diseases or mental patients.

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[109] Should be located in local shopping center

[110] Provided the birds are properly segregated from the habitable parts of the house.

[111] Subject to density limitations specified for the sub-zone.

[112] Not treating contagious diseases and mental patients

[113] Should be on sites located along roads having at least 30 meters right-of-way and 100 meters away from a crossing of two primary roads or a roundabout.

7.3.4 Regulations for Industrial Zone

Table 7-6: Regulation for Industrial Zones

Zone	Uses Permitted	Uses Permitted on Appeal
Light-Medium Industrial Area	Auto-Mechanic Shops/Yards Motor Bargains Cottage Industrial Units Warehouses and Storage Public Utilities and Buildings Canteens Agriculture (until the area is required for development) Approved Parking Loading and Unloading Provisions Dwellings for watch and ward staff	Bus and Truck Terminals Railway passenger and freight terminals Petrol and gas filling stations Taxi stands Junk Yards Recreational facilities for employees.
Medium-Heavy Industrial Area	All categories permitted in the light-medium industrial zone. Warehousing, storage depots[114] and incidental uses. Approved Parking Loading and unloading provisions. Dwellings for labor and watch and ward staff.	All categories permissible on special appeal in Light-Medium industrial zone. Warehousing of perishable and inflammable commodities.

7.3.5 Regulations for Recreational Areas

Table 7-7: Regulation for Recreational Zones

Zone	Uses Permitted	Uses Permitted on Appeal
Recreational Areas	Recreational areas including parks, playgrounds and related uses. Youth hostels and clubs Taxi and rickshaw stand Bus halts and car parking areas. Dwellings for watch and ward staff. Public utilities and municipal facilities.	Restaurants and establishments selling eatables Incidental recreational uses. Graveyards Adequate parking provisions.

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[114] Only non-perishable and non-inflammable commodities

7.3.6 Regulations for Agricultural Zone

Table 7-8: Regulation for Agricultural Zones

Zone	Uses Permitted	Uses Permitted on Appeal
Agricultural Zone.	Agriculture Horticulture Dairy and poultry farming Milk chilling and pasteurization centers Existing settlements Community facilities and public utilities Servicing/repair of farm equipment and machinery.	Storage, processing and sale of farm products in the zone where produced. Sale of agricultural supplies Parks and recreational uses Retail shopping and service uses

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)

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
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5	Rawid Khan	prof. VET	0300 5734427	
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7	Adnan A. Khan	Architect	0301-8498899	
8	Abdul Halim Paracha	Urban & Regional Buildg control Specialist	0341-8595859	
9	Idrees	Secretary C & W	03335338382	
10	Jamil Gul	Prin: Secy	03105880989	
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12	Aleiq Majeed	Secy Env		
13	M. Nawaz	Add-Sec	03036077773	
14	Lakii Mud	MBR.		
15	Shehab Ali Shed	A C S		
16	Zaheer ul Islam	Sec LG		
17	Taimoor Jahg ir	Minister Adv ir Health	—	—
		.		

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