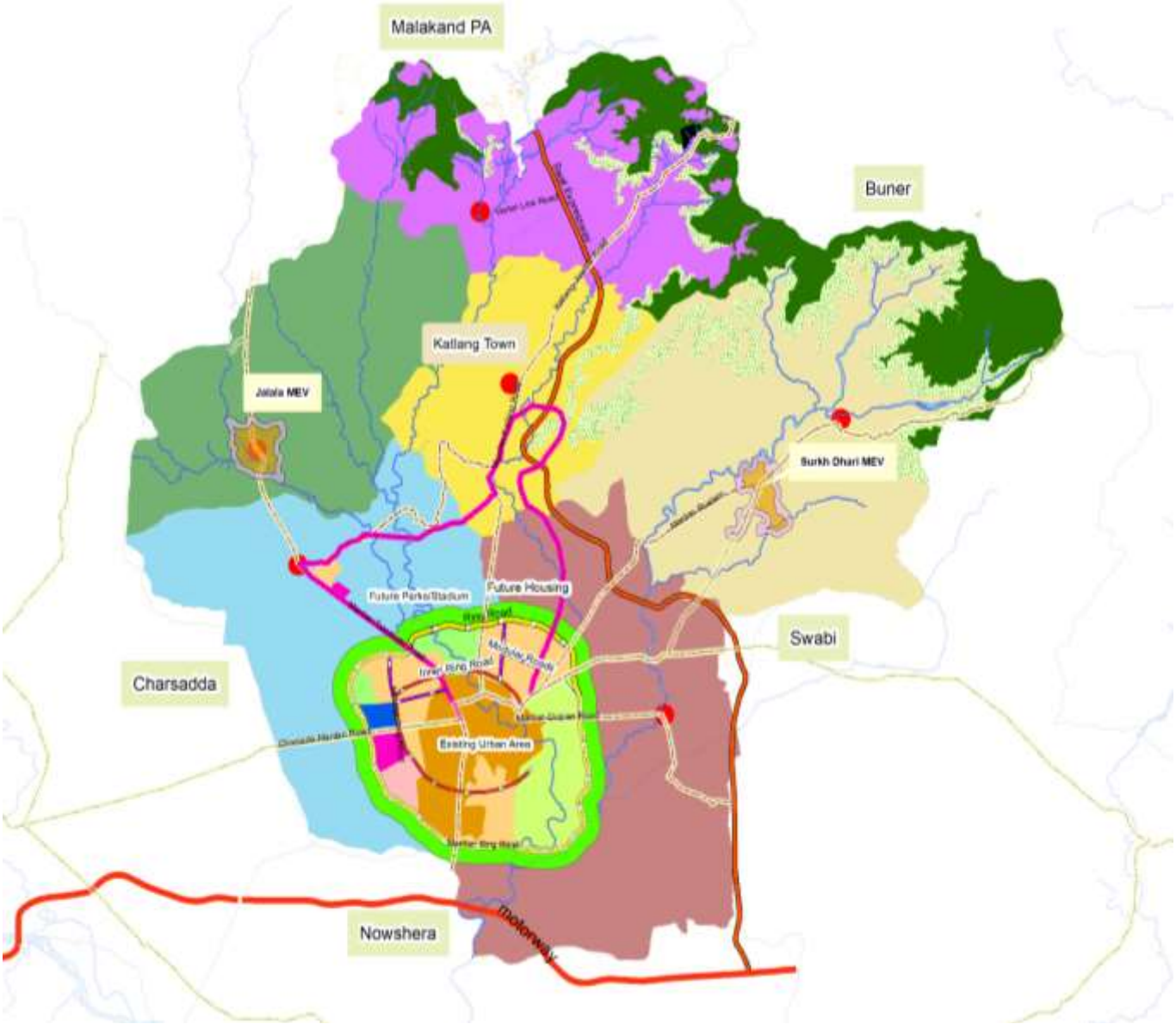
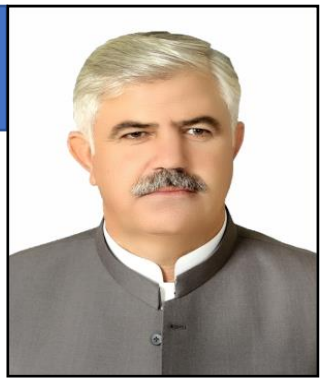
2022

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

Final Land Use Plan of District Mardan



MESSAGE FROM CHIEF MINISTER KHYBER PAKHTUNKHWA



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

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

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

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

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

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

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

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

Mahmood Khan
CHIEF MINISTER

MESSAGE FROM ADDITIONAL CHIEF SECRETARY KHYBER PAKHTUNKHWA

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

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

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

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

Shahab Ali Shah
ACS. P&DD

Acknowledgments

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

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

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

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

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

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

Project Manager
Provincial Land Use Plan

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ABBREVIATIONS AND ACRONYMS

Term	Description
ADB	Asian Development Bank
ADP	Annual Development Program
BHU	Basic Health Unit
Cantt	Cantonment
CIDA	Canadian International Development Agency
dB	Decibels (Unit of Sound)
EPA	Environmental Protection Agency
GIS	Geographical Information System
GT Road	Grand 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
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

1.1 BACKGROUND AND RATIONALE:

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 Land Use Planning approach.

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 the hierarchy of settlements and development 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 balance the distribution of infrastructure and services. The Land Use Plan will be a tool to guide Provincial Government, Urban Policy Unit, District Governments and TMAs in 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 centers.

v. To determine a need for new towns at a feasible location.

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 OBJECTIVES OF DISTRICT LAND USE PLAN:

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. For effective and rational decision-making Interaction between the different levels of planning in any planning process is required. 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 are 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 vastly concerned with the allocation of resources and achieving some urban goals. legally national 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 set-ups vary widely from country to country. Thus, regional planning encompasses an entire administrable unit or may be more than one administrable unit. 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 (Master plans or structure plans) are prepared within the broad realm provided by District Land Use Plan. It is concerned with the use of such parcel of land and provides a detailed framework 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 Mardan 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 encompassing 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 Mardan. 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

The sectors covered in the Land Use Plan of Mardan are listed as under:
Urbanization and hierarchy of human settlement, Demography, 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, museum, zoo and open spaces, security, graveyards, Housing, Water (surface and ground water resources), District economy. For the preparation of the District Land Use Plan of Mardan (2019-39) tall, these sectors were thoroughly analyzed and mapped using modern techniques of GIS and Remote Sensing.

1.5 THE PROJECT AREA:

Mardan is bound by Malakand Division towards North-West, District Buner towards North-East, District Nowshera towards South-East, District Swabi towards East and District Charsada towards South-West. The District lies from 34° 05' to 34° 32' North latitudes and 71° 48' to 72° 25' East longitudes. The total area of the District is 1,632 square Kilometres. Mardan is the second largest city after Peshawar in the Khyber Pakhtunkhwa Province.

Mardan District may broadly be divided into two parts, the the North-Eastern hilly area and South Western plain. The entire Northern side of the District is bounded by the hills.

The South-Western half of the District is mostly composed of fertile plain with low hills strewn across it. It is gradually accepted that this plain once formed the bed of a lake, which was gradually filled up by the load of the river flowing into the surrounding hills. From the foothills,

the plain runs down at first with a steep slope, which carried the rainwater to the lower levels and ultimately to the Kabul River.

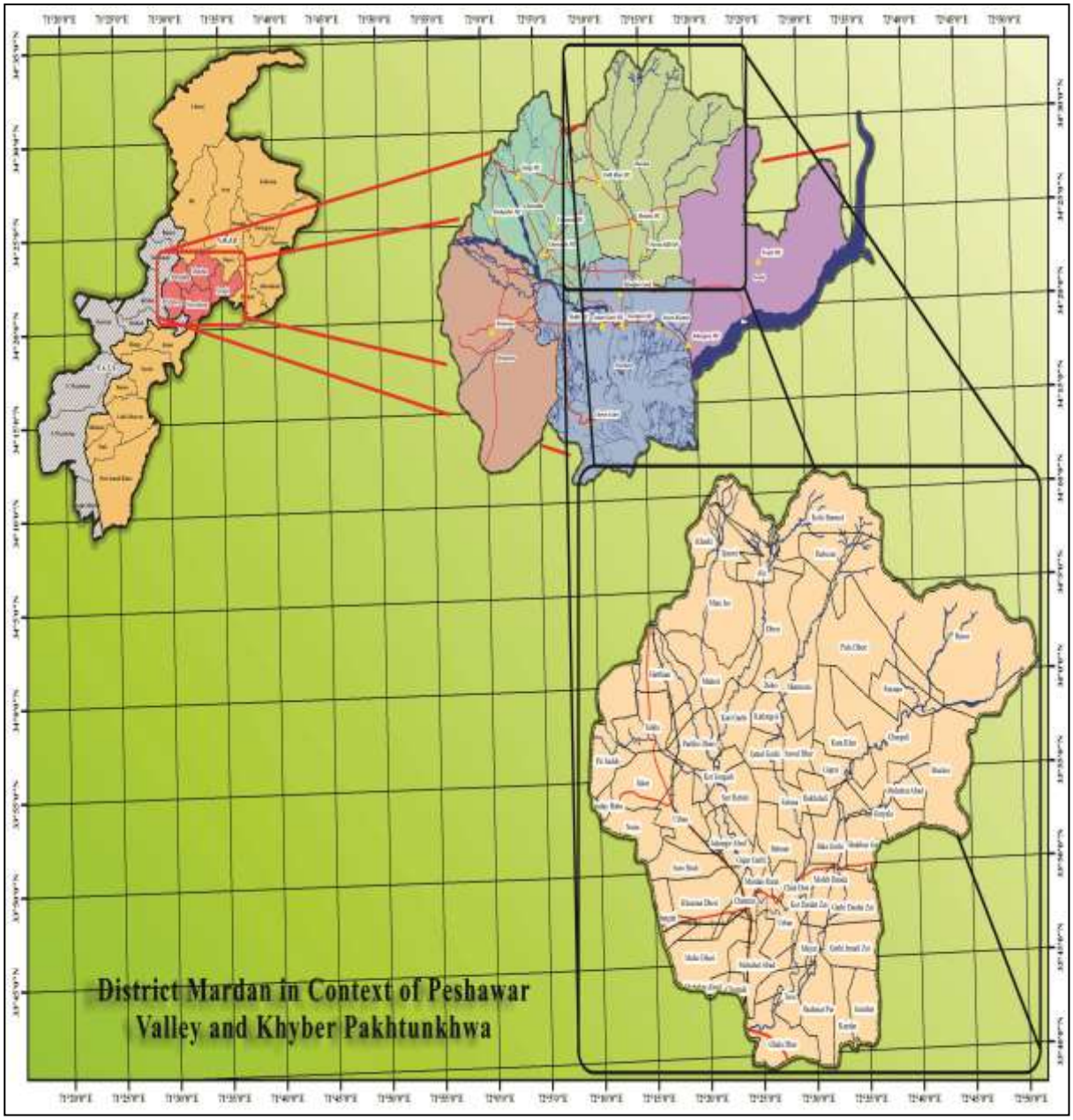


Figure 1. 1 District Mardan with Context of Peshawar Valley and KP

1.6 CLIMATE

1.6.1 Historical Perspective of Range and Monthly Distribution of Temperature

Mardan District has severe climatic conditions with hot summers and cold winters. Winter in Mardan starts in mid-November and ends in late March. The coldest months are December and January. The lowest minimum temperature recorded for the month of January is 3°C. The summer months in District Mardan are May to September. The highest maximum temperature recorded is 37.1°C for the month of July and the mean maximum temperature is also recorded

in the month of July, which is the as same as mentioned earlier. The maximum temperature in summer generally surpasses 37.1 °C during the hottest month and the minimum temperature goes below 3.0 °C during the coldest month. The range and monthly distribution of temperature for the year (2020) for District Mardan, are shown in Table 1.1

1.6.1 Monthly Distribution of Humidity

The average humidity in District Mardan is not very high. Under the influence of the western disturbance and monsoon rainfall, it rises locally. The relative humidity ranges from 44% to 71%. The monthly distribution of humidity is shown in the following Table 1.1.

1.6.2 Prevailing Wind Direction around the Year:

The wind is one of the most highly variable meteorological elements, both in speed and direction. It is influenced by a wide range of factors, from large-scale pressure patterns to the time of day and the nature of the surrounding terrain. The mean surface wind speeds vary during the year ranging from 0.1 to 1.9 knots. The direction of the Wind is usually variable as clear from the following table. In the winter season, the direction of the wind has mostly in SW, W and NW directions, whereas in the summer season the wind direction is recorded also in SE and NE along with other directions. The following Table 1.1 shows the mean wind speed and direction in District Mardan.

Table 1. 1 Climatological Normal for Mardan - (2020)

Parameters/Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MONTHLY MEAN MAX TEMP. (°C)	15.4	22.0	22.4	28.2	33.9	35.8	37.1	35.4	34.4	31.9	22.9	19.5
MONTHLY MEAN MIN TEMP. (°C)	3.0	6.1	11.1	15.5	19.6	23.1	25.3	25.9	21.3	14.1	7.1	4.3
MONTHLY TOTAL RAINFALL (MM)	64.4	18.5	173.3	41.1	50.1	46.8	15.3	169.7	65.4	3.2	79.4	2.0
MEAN MONTHLY R/H %	60	48	61	51	44	47	49	64	59	60	71	60
MEAN MONTHLY WIND SPEED (KNOTS)	1.1	1.3	1.8	1.5	1.5	1.7	1.9	1.8	0.6	0.1	0.1	0.5
MEAN MONTHLY WIND DIRECTION	N14E	S87E	N20E	S0W	N45E	S77E	S62E	S76E	N11E	N45W	N45E	S45W

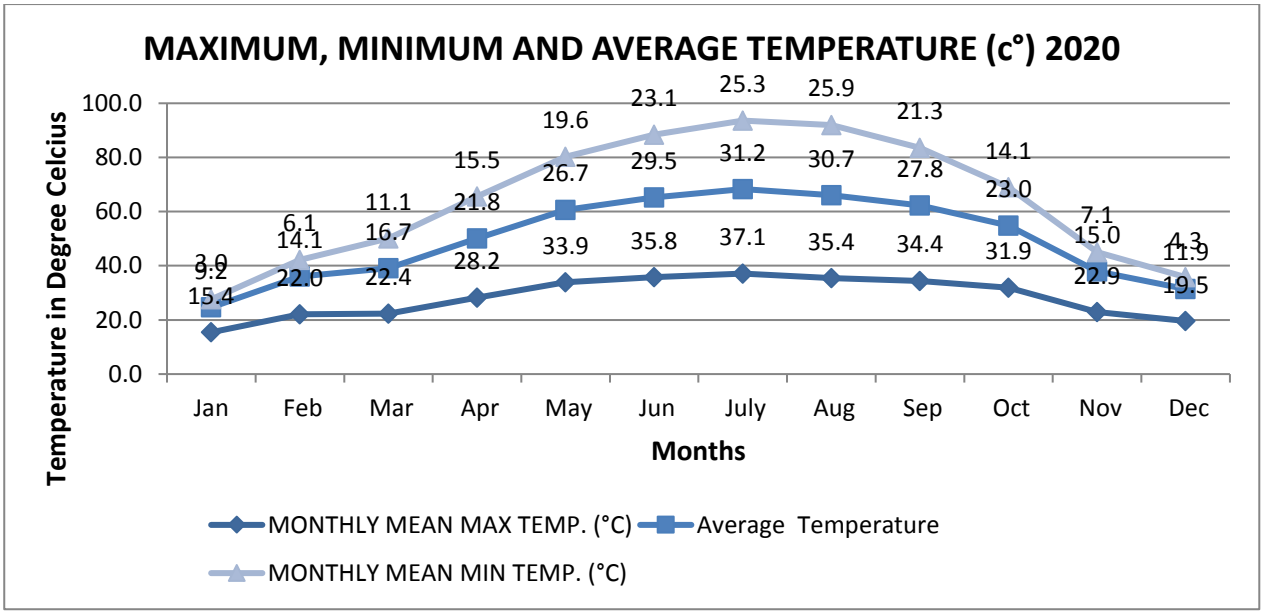


Figure 1. 2 Maximum, Minimum and Average Temperature(c°), 2020

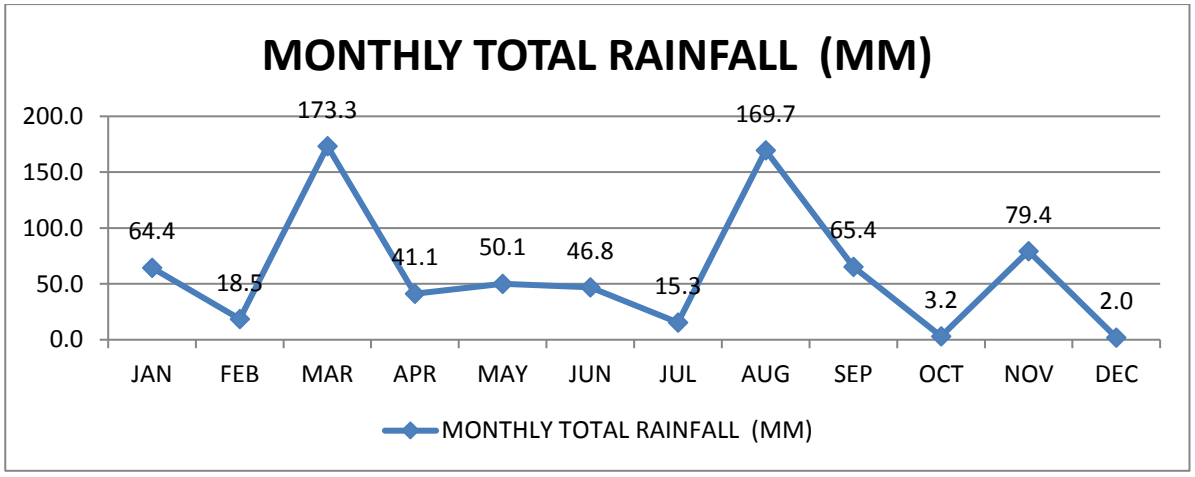


Figure 1. 3 Monthly Rainfall (mm), 2020

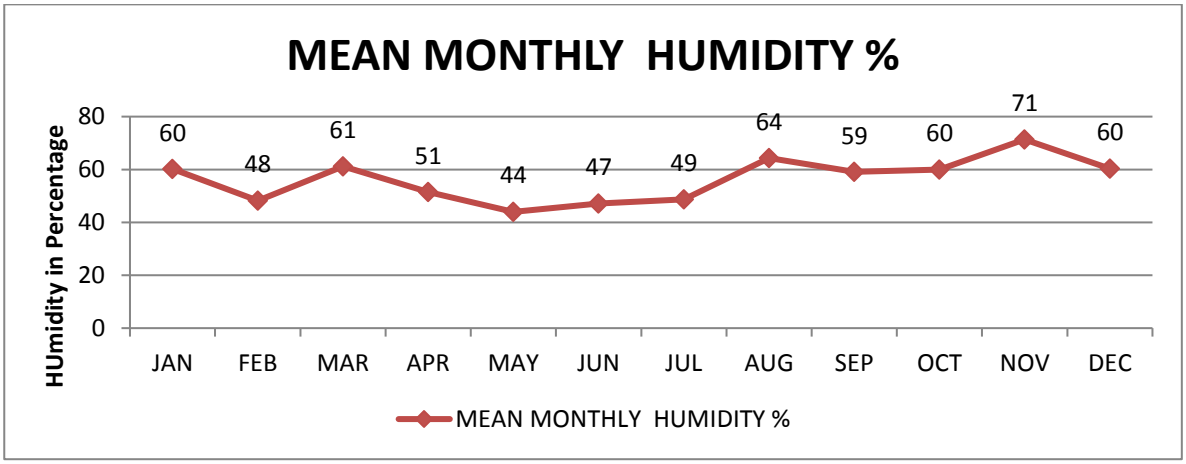
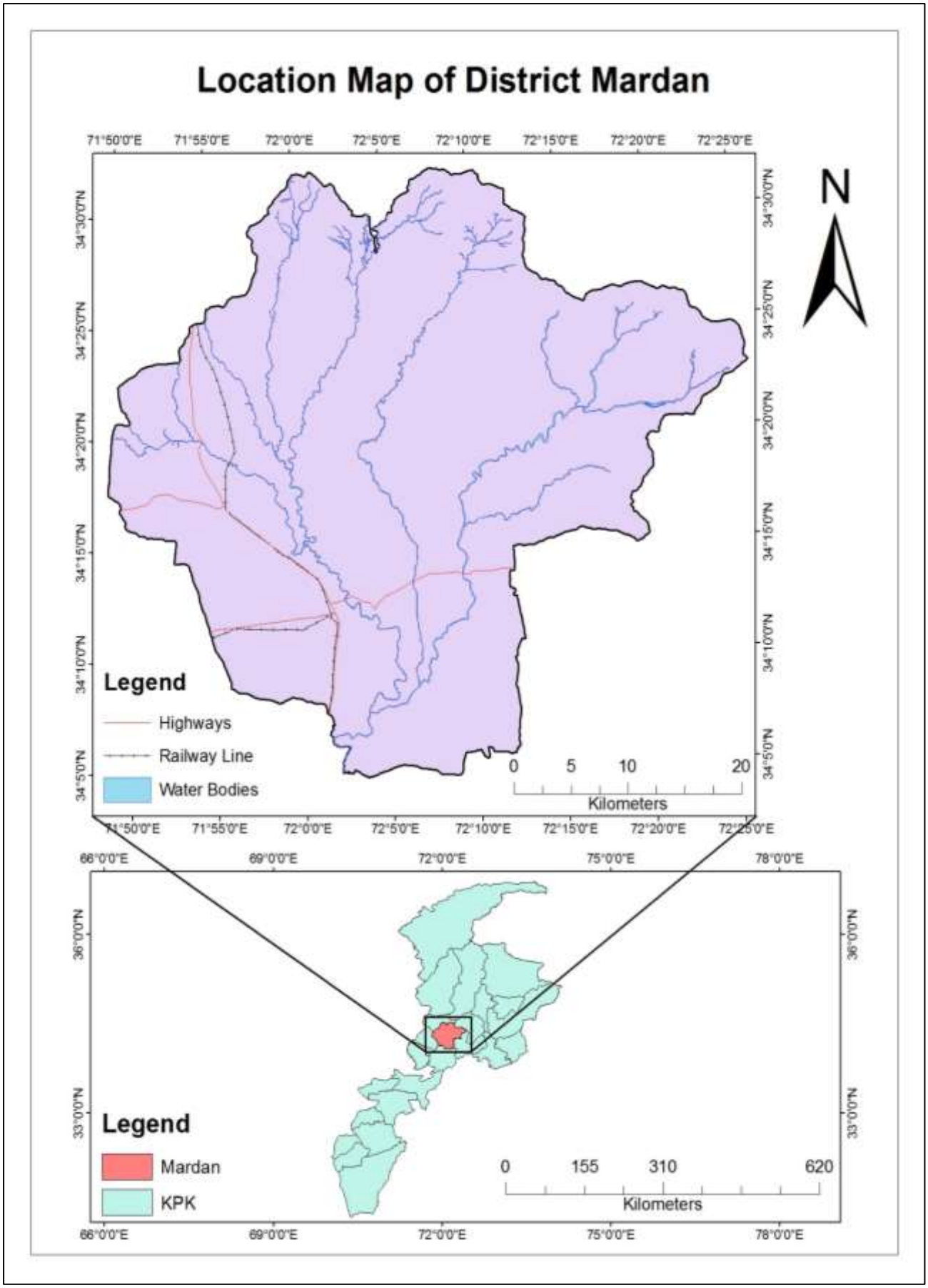


Figure 1. 4 Monthly Average Humidity (%), 2020

1.7 GEOLOGY

Mardan District consist mainly of a north-eastern hilly part and south-western plain area. The plain area of Mardan is comprised of alluvial cover of hundreds of meters thickness while the mountainous area consists of the rocks of Shewa Shahbazgarhi. Which can be divided into Acidic and basic rocks. Acidic rocks are microporphyry, porphyritic granite, aegirine riececkite porphyry, riececkite gneiss. The acidic rocks are intruded by basic rocks such as metagabbro, metadolorite and local quartz monozonite. Minerals in the basic rocks include hastingsite, clinopyroxene, orthopyroxene, biotite and epidote while the acidic rocks have orthoclase, plagioclase and ferromagnesian minerals. Along with acidic and basic rocks, the three types of microstructure observed in the area are i) deformation structure ii) recovery structure and iii) recrystallization structure. It can be estimated from the structure and texture that the rocks had undergone intense cataclization/and or mylonization in the past. The origin of Shewa Shehbazgarhi is of igneous nature. It was suggested that catacalsite and metagabbro can be dated to Precambrian times and subduction phenomena. However, the origination of gneisses microgranite could be related with intrusion of basic magma, or either to tectonic activity. The rocks classified of small outcrop south of Shahbazgarhi into acidic dykes, gneissose microgranite, metagabbro, lamprophyric dykes and cataclastic types. In the east of Mardan, Salkala Formation, Tanowal Formation and Ambela Granitic Complex are present towards Swabi District. Salkala Formation has sulfide mineral seems while Ambela Granite Complex is a batholithic mass comprising of granites, alkali granite, quartz syenites and basic dykes.



Map 1. 1 Location Map of District Mardan

1.7.1 Geology of District Mardan[1]:

About 70% of District Mardan constitutes Quaternary Alluvium these are unconsolidated deposits of gravel, sand, silt and clay. The remaining 30% of the District is the constitute Kashala, Nikanai Ghar and Saidu formations undivided from the Mesozoic Era and from the Paleozoic Era it has Marghuzar and Duma formations undivided, Shewa, Ambela and Warsak Complexes undivided and Paleozoic Rocks undivided.

Quaternary Alluvium: Unconsolidated deposit of gravel, sand, silt and clay.

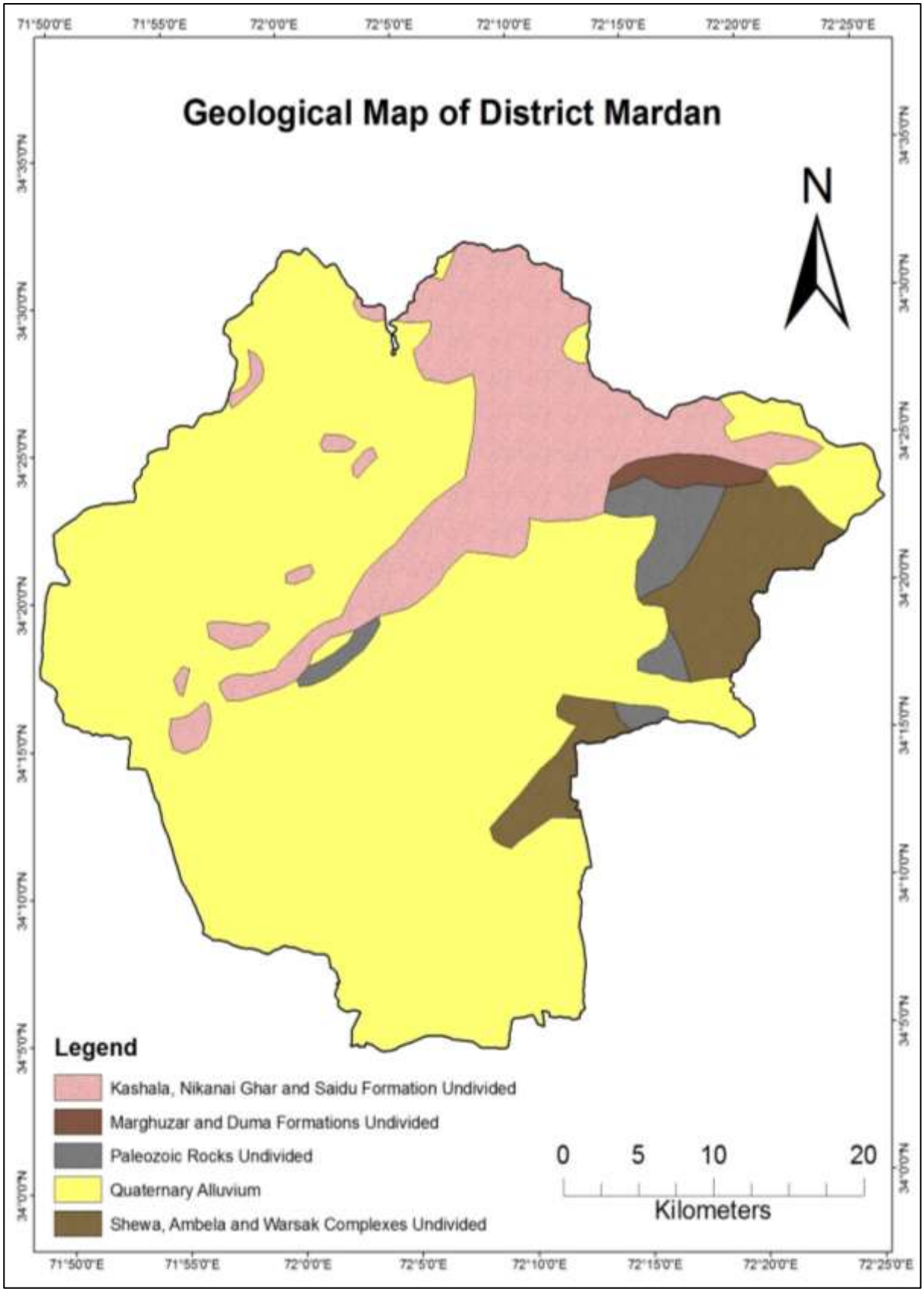
Kashala, Nikanai Ghar and Saidu formation undivided: Kashala Fm comprises calc. Garnet schist, schistose marble, marble and calcareous phyllite; Nikanai Ghar Fm consisting of calcite marble, dolomitic marble and minor phyllite; Saidu Fm comprising graphic phyllite and schist with minor calcite marble. Age to middle Mesozoic.

Marghuzar and Duma formation undivided: Comprises amphibolite hornblende schist, biotite schist, garnetiferous schist, green schist, schistose marble, phlogopite marble, dolomitic marble, tremolite marble and metapsammite. Age Premarin to late Carboniferous.

Shewa, Ambela and Warsak Complexes undivided: The Shewa complex comprises alkaline microgranite and porphyry, intruded by dolorite. Ambela complex contains syenite, nepheline syenite, alkali granite and minor carbonatite. Intruded by dolorite and tourmaline pegmatites. Age 279 to 315 Ma. The Warsak complex consists of microporphyry, porphyritic granite, riebeckite, granite gneiss and intruded by basic rocks.

Palaeozoic Rocks undivided: Jafar Kandao fm; Argillite, limestone, argillaceous and calcareous quartzite. **Lowara Mena fm;** Phyllite and phyletic slate with beds of fossiliferous limestone, carbonaceous shale and dolorite dykes. **Warsak Metamorphic complex;** Quartz mica schist, garnet mica schist, amphibolite schist with hydrothermal quartz veins.

[1] Extracted form Geological Map of N.W.F.P Pakistan 2006, Geological Survey of Pakistan.



Map 1. 2 Geological Map of District Mardan[2]

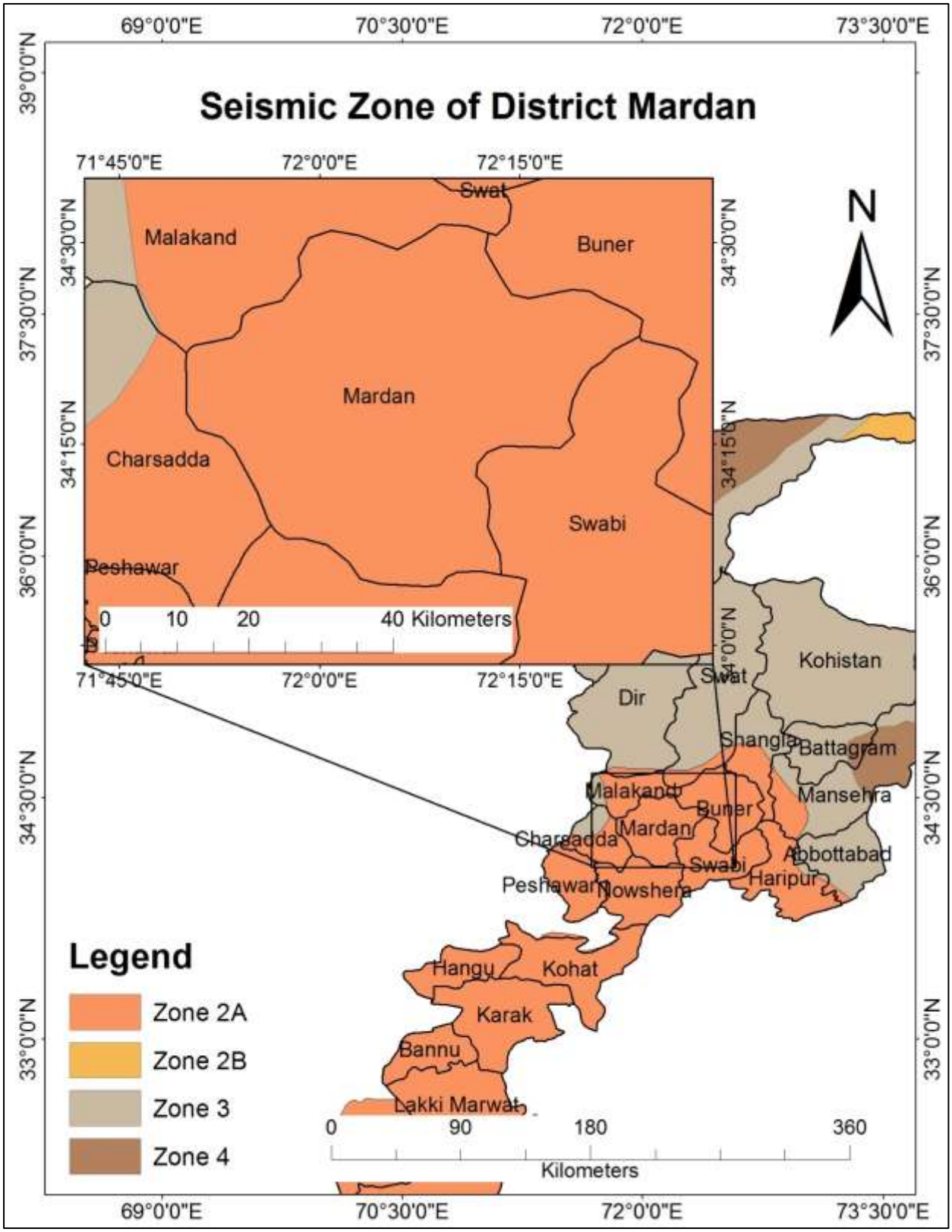
[2] Extracted form Geological Map of N.W.F.P Pakistan 2006, Geological Survey of Pakistan.

Seismic Conditions of Mardan District:

Regarding seismicity in the District, Mardan lies in Zone 2A of minor damage zone corresponding to PGA (Peak Ground Acceleration) value of 0.0667g to 0.1g. Small magnitude earthquakes, less than 4.5 have occurred near the city of Peshawar, but no earthquake of magnitude greater than 5.0 has occurred in close vicinity of Peshawar and none has occurred within the Peshawar Valley.

Expected epicentres cannot be predicted at 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 the Uch-Khattak fault, above the Panjal-Khairabad Thrust (PKT) which is in the area across the Attock-Cherat range. Therefore, this active fault could be the future (with no time frame) epicentres of earth quakes in this region.[3]

[3] Final District Studies Report Peshawar (Resivsed) January, 2013.



Map 1. 3 Seismic Zone of District Mardan[4]

[4] Naqash, M. T., Matteis, G. D., & Luca, A. D. (2012). Critical overview on the seismic design of steel Moment Resisting Frames. 45th IEP Convention. ResearchGate.

1.8 ENVIRONMENT:

The high rate of industrialization, unplanned urbanization, and heavy load of transportation and retarded rate of awareness /education in masses generally caused increase in pollution of air, water and soil. Industry is the main source of pollution in Mardan like other cities. The marble industry is the major water consumer and polluter industry. Besides, the major source of pollution is the poisonous & hazardous emissions from sugar mills in District Mardan.

This section describes the environmental pollution particularly parameters of water, air and noise pollution. In order to take relative measurements of these parameters, the spot values of pollution indicators have been considered and compared with the permissible NEQs.

1.8.1 Air Quality

Air samples were tested at 29 different locations in Mardan[5]. Table below shows the minimum, maximum and mean values of air parameters for 29 air samples for Mardan. Comparison with National Environmental Quality Standards (NEQs) for ambient air are also shown.

Table 1. 2 Air Quality

S.No.	Parameters	Results				NEQs
		Units	Min	Max	Mean	
1	Carbon Monoxide (CO)	mg/m^3	2.0	8.5	4.6	10
2	Nitric Oxide (NO)	ug/m^3	4.7	51.7	22.2	40
3	Nitrogen Oxide (NO_2)	ug/m^3	69.6	150.4	113.6	80
4	Sulfer Dioxide (SO_2)	ug/m^3	21.5	68.1	39.2	120
5	Particulate Matter ($PM_{2.5}$)	ug/m^3	40.0	80.0	55.7	15

Comments

- The mean value of CO level at all sampling points of Mardan city is within the NEQs limits. Individual values at some locations are higher than NEQS limits. High vehicular traffic concentration at these points may be the main reason. The main source of CO emissions are vehicles. Those locations are following:
- College Chowk Bicket Gunj
- Bazar Katlang Chungi
- The mean value of $N0_2$ is above NEQ_S limits. When the NO_2 exceed from a certain level can cause lungs irritation and weaken the body's defense against respiratory system and assists in formation of photo chemical smog.
- The $PM_{2.5}$ level at all sampling points exceeded the NEQ_S level. The biggest impact of particulate air pollution on public health is understood to be from long-term exposure to $PM_{2.s}$ (10-15 years), which increases the age-specific mortality risk. Exposure to high concentrations of $PM_{2.s}$ can also exacerbate lung and heart disease.

[5] Environmental Profile of Kp, 2017, page number 32, Environmental Protection Agency

1.8.2 Drinking Water

Sixty-five drinking water samples were collected from Mardan. For each sample 25 different quality parameters were tested. The results of 65 drinking water samples are shown in the Table and their statistical analysis is also shown in the same table.

Table 1. 3 Mean Results of 65 Drinking Water Samples for Mardan

Sr. No.	Parameters	Units	Results			NEQs
			Min	Max	Mean	
1	pH		7.29	8.77	7.92	6.5-8.5
2	TDS	mg/L	225	944	448.80	‹1,000
3	Temp		11.9	25.1	18.75	
4	Electrical Conductivity	uS/cm	450	1857	898.32	
5	Taste		Acceptable	Acceptable	Acceptable	Acceptable
6	Odour		Acceptable	Acceptable	Acceptable	Acceptable
7	Color	TCU	‹15	‹15	‹15	
8	Turbidity	NTU	0.04	3.45	0.56	‹5
9	NH_4	mg/L	0.003	0.09	0.03	
10	NO_2	mg/L	0.01	0.35	0.08	‹3
11	NO_3	mg/L	0.8	58	11.10	≤50
12	Ca Hardness	mg/L	54	390	167.83	‹500
13	Chlorides	mg/L	1.2	242.4	40.71	‹250
14	Sulphate	mg/L	11	233	68.14	
15	Iodine	mg/L	BDL	BDL	BDL	
16	TOC	mg/L	0.18	0.32	0.24	
17	Flouride	mg/L	0.021	1.56	0.14	≤1.5
18	As	mg/L	0.0004	0.01956	0.00	≤0.05
19	Fe	mg/L	0.1072	1.1982	0.64	
20	Mg	mg/L	11.32	97.385	28.45	
21	Mn	mg/L	0.0007	0.0046	0.00	≤0.5
22	Na	mg/L	12.75	128.816	33.97	
23	K	mg/L	0.91	19.878	6.12	
24	TC	MPN/100ml	0	90	9.32	0
25	FC	MPN/100ml	0	26	2.26	0

Comments

- The TDS at all sampling points is within the NEQS limit.
- The Turbidity and $N0_2$ at all sampling points are within the NEQS limit.
- The mean level of $N0_3$ at all sampling points is within the NEQS but at some location level is exceeded. These are locations are:
    - Neher Chowk, Fazal Colony
    - Bazar-e-Shaheedan site 2
- Calcium hardness at all sampling points is within the NEQs limit.
- Chlorides are also within the NEQs at all sampling points.
- The mean value of fiouride is within the limit except one location, which is Akbar Colony
- The mean value of Arsenic is within the NEQs
- The mean value of Manganese is within the NEQs
- At many places FC was detected. It shows fecal contamination. Hence bacteriological quality is not as per NEQS.

Impacts of high levels of Water pollutants

- 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 bitter taste it is difficult to drink.

Turbidity

- High turbidity can significantly reduce the aesthetic quality of water. It has no health impacts.

Nitrogen Dioxide ($N0_2$)

- High concentration of nitrate can cause a disease "Methemoglobinemia[6]"
- High nitrate levels may also affect the oxygen-carrying ability of the blood of pregnant women.

Calcium Hardness

- There are no health-based impacts of higher Ca hardness.

Chlorides

- Higher chlorides impart taste to drinking water. There are no health-based impacts.

Fluorides

- Higher levels of fluorides (> 1.5 mg/L) result is mottling of teeth and make the teeth brittle.

[6] Methemoglobinemia is a blood disorder in which an abnormal amount of methemoglobin, a form of hemoglobin is produced. Hemoglobin is the protein in red blood cells that carries and distributes oxygen to the body.

Iodine

- Exposure to high iodine concentrations in drinking water has detrimental effects on the intelligence of children.

Arsenic

- Arsenic in drinking water causes bladder, lung and skin cancer, and may cause kidney and liver cancer.
- Arsenic harms the central and peripheral nervous systems, as well as heart and blood vessels, and causes serious skin problems.

1.8.3 Noise Level:

The noise levels at different sampling points in Mardan are given in the Table 1-4 below:

Table 1. 4 Noise Level of Different Samples for District Mardan

S.No.	Location	Noise (dB(A))	NEQs (dB(A))
1	Rashakai Chowk	63.0	65
2	Nawa Kali Chowk	70.0	65
3	Mahabat Abad Phatak	68.0	65
4	Sheikh Mattoon	65.0	65
5	Naway Adda Chowk	64.0	65
6	Charsadda Chowk	60.0	65
7	Dosehra Chowk	61.0	65
8	College Chowk	73.0	65
9	Bicket Gunj Bazar	70.0	65
10	Pakistan Chowk	68.0	65
11	Mir Afzal Khan Bazar	65.0	65
12	Shaheedan Bazar	66.0	65
13	Topu Chowk	71.0	65
14	Bank Road	69.0	65
15	Malakand Chowk	66.0	65
16	MuqamChowk	77.0	65
17	Katlang Chungi	70.0	65
18	New Sarak Bazar	72.0	65
19	Baghdada Bazar	69.0	65
20	Shankar Main Rd Chowk	70.0	65
21	Naher Chowk & Par Hoti Chowk	69.0	65
22	Par hoti chowk	65.0	65
23	Toru Chowk	71.0	65

Table 1. 4 Noise Level of Different Samples for District Mardan			
S.No.	**Location**	**Noise (dB(A))**	**NEQs (dB(A))**
24	Kashmir Manday	69.0	65
25	Gaju Khan Bazar	62.0	65
26	Police Line Chowk	72.0	65
27	Khwaja Ganj Bazar	68.0	65
28	Shamsi Rd	68.0	65
29	Chato Chowk	71.0	65
Mean		**68.0**	
Minimum		**60.0**	
Maximum		**77.0**	

Remedies/Control Measures:

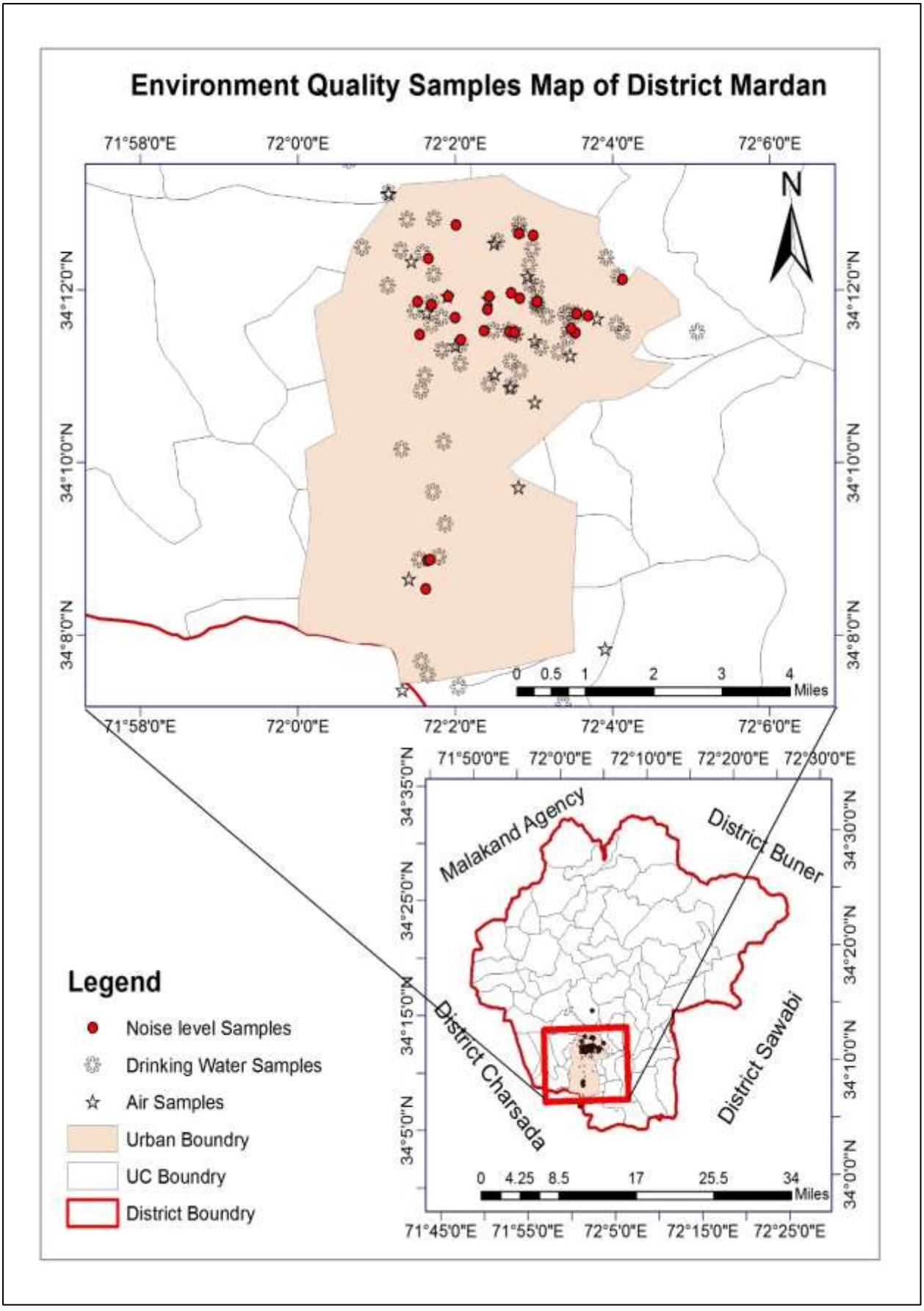
Following remedies must be applied:

- 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.

1.8.4 Industrial Pollutants Areas

There are different types of industries such as Marble, Sugar, tobacco and medicine etc. These industries are mostly situated in Nowshera-Mardan road. The effluent of these industries contributes to different types of pollution such as air, noise, water. Most of the marble factories are located on the bank of Nowshera-Mardan road. The white powder of marble factories discharges directly to the canals without any proper treatment procedure. Waste water of marbles and chips factories contain harmful chemical which directly effects aquatic life, pollute the surrounding environment for residence, and poison the agriculture land which is irrigated through these canals.

The Sugar and Tobbaco industries situated near to residential and commercial areas which causes air and water pollution. There is no proper discharge pattern of effluents from these industries. The bad smell of these effluent can irritate the local peopal and cause diseases.



Map 1. 4 Environment Quality Samples Map of District Mardan

1.8.5 Constraints:

In Mardan, the increased number of vehicles without proper testing, factories established without proper planning, smoke and dust on the roads has created an atmosphere which is neither acceptable to human life nor climate friendly. The industrial units are scattered over a vast area with greater concentration in and around the city. Industrial emissions from chimneys are also a source of air pollution in these areas. The increased number of brick kilns situated in the province particularly in Mardan has almost doubled the level of air pollution mainly due to the use of large amount of unauthorized fuel. Massive burning of solid waste and domestic activities are also contributing air pollution. Some specific environment-related constraints are:

i. Small and medium-size industries which rely on urban locations to maintain profitability operating illegally and are making it more difficult to control them for maintaining labor safety and environmental standards.

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

iii. Shortage of funds required for taking curative actions required is the main constraint to reduce pollution

iv. 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

v. Training and measuring equipment need to be provided to highway police to enable them to enforce smoke emission standards.

vi. 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.

vii. One of the major issues is to adopt a carrot and stick policy to educate people and investors and institutions to reduce waste and pollution, and at the same time to levy fines on those who violate environmental regulations and pollute environment.

1.8.6 Government Programme (ADP 2016-2017)

On-Going Programs:

- Establishment of three Divisional Offices of EPA Khyber Pakhtunkhwa, at Mardan, Kohat and Bannu.
- Environmental Trainings for line departments at provincial and District levels.
- Establishment of Climate Change Cell for Multilateral Environmental Agreements in EPA.
- Updation of Revised Environmental Profile of KP.
- Promotion of Applied Research on Environment through Academic Institutions in Khyber Pakhtunkhwa
- Activity Based Capacity Building of EPA in Khyber Pakhtunkhwa
- Strengthening of EPA Monitoring Through Geographic Information System (GIS).

1.8.7 Existing Laws and 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 the environmental pollution and ecology.

One immediate consequence of this new state of affairs is that the federal PEPA 1997 now applies only to the Islamabad Capital Territory and those areas not included in any province, but autonomous administration unit.

Updation of Environmental Profile of Khyber Pakhtunkhwa (KP), 2017

Government of Khyber Pakhtunkhwa (KP) through consultants undertook "Updation of Revised Environmental Profile of Khyber Pakhtunkhwa compiled in year 2008". The objective was to document the current state of the environment. The Report includes both primary and secondary data. For primary data, five environmental parameters were selected including air, drinking water, and Noise).

The report briefly explains the significance and need of updation of environmental profile, and locations in each of the seven divisional headquarter from where primary data was collected. International guidelines and practices, were adopted during sampling and testing. Test results obtained were compared with National Environmental Quality Standards (NEQS). These have already been explained in earlier section.

Khyber Pakhtunkhwa Environmental Protection Act, 2014

Following the Eighteenth Amendment the Khyber Pakhtunkhwa EPA noted that proper procedures are required for implementing the environmental policy and pollution control protocols. Accordingly, Khyber Pakhtunkhwa Environmental Protection Act was enacted in 2014. The salient features of the Act are:

- The Act provides for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development in Khyber Pakhtunkhwa
- Ensure enforcement of the Khyber Pakhtunkhwa Environmental Quality Standards;
- Establish standards for the quality of the ambient air, water and land, by Notification;
- Establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
- Carry out and conduct environmental monitoring and implementation of environmental approvals provided in this Act;
- Issue licenses for the consignment, handling, transport, treatment, disposal, storage, handling or otherwise dealing with hazardous substances;
- Certify laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act;
- Identify the needs for and initiate legislation in various sectors of the environment;

- Provide guidance and technical assistance to the relevant Federal and Provincial Government Agencies in the management of natural and environmental incidents and disasters;
- Render advice and assistance in environmental matters including such information and data available with it as may be required for carrying out the purposes of this Act:
- Promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;
- Enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;

1.8.8 Recommendations:

i. Zoning for various urban, industrial and commercial land uses should be enforced to improve air quality and to avoid conflicts between different sectors.
ii. The organic farming should be promoted to reduce surface water pollution and to maintain the life of the soil for the immediate and future generations.
iii. The process of establishing land use zone should incorporate through consultations with all the affected communities and stakeholders otherwise may likely to have serious social and economic constraints.
iv. Industrial zones must have labour colony to accommodate the workers coming from other cities. This will reduce the use of automobile and the congestion arised from it use.
v. Land use legislation and fiscal policy are the main tools to address industrial and residential sources of air pollution.
vi. Coordination amongst Provinces: Guidelines issued by respective Provincial EPA for specific sectors should be assessed, amended if necessary, and adopted as uniform standard policy.
vii. Requirements for the implementation of multilateral environmental agreements must be included in the provincial environmental laws, and a mechanism for report development.
viii. Procedures need to be simplified; clarified or refined (for example, procedures related to environmental protection orders (EPO), environmental impact assessment (EIA), Environmental Protection Agencies (EPA).
ix. Role of police, enforcement responsibility of EPA officers.
x. 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.
xi. Environmental quality and emissions standards must be uniform, and no variations should be permitted with respect to geographical area unless it is to strengthen the standards. The relevant provisions must be amended.

1.9 FLOODS

Almost every year the frequency of monsoon rains increases, because of this the province of Khyber Pakhtunkhwa suffers from more severe flash floods. Floods of 2010 are among the worst disasters that have hit Pakistan in recent history. The Province of Khyber Pakhtunkhwa was the most affected. The deadly water surge started from the mountainous North while the peculiar terrain of Province gave this surge an enormous force which ultimately resulted in total destruction of whatever stood in its path. The damage due to 2010 floods in District Mardan is presented in the table below:

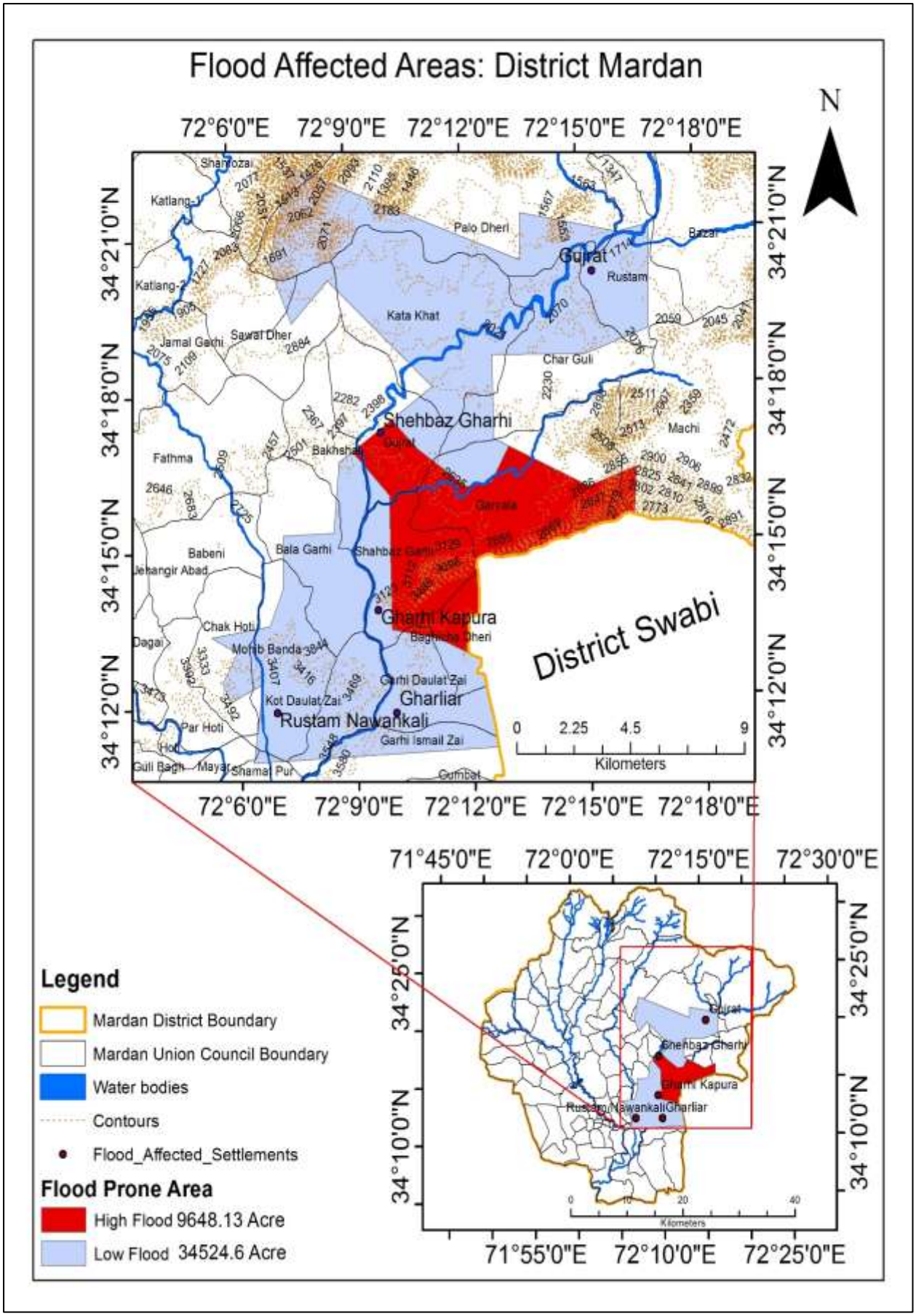
Flash floods tend to occur more in recent years owing to changing weather pattern and are characterized by near absence of early warning cover to warn vulnerable communities.

Table 1. 5 Impact of Flood in Mardan District[7]

No. of affected Villages	182
Total House hold in affected area	36,145
Houses destroyed	1,629
Houses damaged	2,650
HH in need of assistance	6,541
Population in need of assistance	61,600
Total affected Livestock Population	31,949
a. Dead	**164**
b. Affected	**31,785**

Around 31,340 acres of area of District Mardan has been affected due flood. Out of which 12,348 acres is highly flood prone area while 18,992 acres face low level flood. It has affected around 7 Union councils, which includes Shahbaz Garhi, Garyala, Charguli, Bala Garhi, Mohib Banda, Kot Daulat Zai and Garhi Daulat Zai.

[7] Initial Assessment of Flood affected areas in Khyber Pakhtunkhwa (KP) July –August 2010



Map 1. 5 Flood Map of District Mardan

1.9.1 Short-Term and Long-Term Plans

Reasons and Justifications

The shortfalls in 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:[8]

Short-Term Plans

i. Early warning system through WAPDA and Irrigation Department regarding flooding.
ii. Pakistan Metrological Department flood forecasts/warnings and weather forecasts.
iii. Flood warning by the Local Administration and community-based mechanisms.
iv. Removal of Encroachments.
v. Re-construction of irrigation channels.
vi. Repair and maintenance of Drainage System.
vii. Restoration of Damage flood protection works.
viii. Improvements in flood mitigation measures over River Swat 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 broadcasting of flood warning by Revenue Department and Irrigation Department.
iii. Establishment of observation posts by Irrigation Department in the likely flood areas.
iv. Civil Defense Staff and volunteers should be made fully functional.
v. Evacuation centers should be earmarked with the assistance of education department.
vi. For sensitive buildings and record, each Department should prepare its own Standard Operating Procedures.
vii. Health Department should formulate comprehensive health response plans.
viii. 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 taken for their removal.

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

1.9.2 Integrated Approach in Flood Management

i. Flood management plays important role in protecting people and their socio-economic activities in flood plains from flooding. The development in the river basins has been closely linked with successful implementation of flood control projects. In the past, exposure to flood risks has been handled largely through structural measures. However, strategies that rely largely on structural solutions unfortunately alter the natural environment of the river, which may result in loss of habitats, biological diversity and ecosystem productivity.

ii. Further, structural approaches are bound to fail the moment an extraordinary or unforeseen event occurs. These traditional approaches, where the risks are merely transferred spatially, are likely to generate conflicts and inequities. Environmental degradation has the potential to threaten human security, including life and livelihoods, and food and health security. This realization has recently led to calls for a paradigm shift from traditional flood management to Integrated Flood Management. Need more comprehensive detail to explain the author point of view.

iii. Integrated Flood Management (IFM) is a concept that addresses issues of human security against flood risks and sustainable development within the framework of Integrated Water Resources Management (IWRM). Such an integrated approach to flood management can play an important role in sustainable development and poverty reduction. Integrated Flood Management aims at minimizing loss of life from flooding while maximizing the net benefits derived from flood plains.

1.9.3 Flood Management

Surface water storages (large, medium & small dams), flood embankments and flood flows retention basins, is a traditional approach to attenuating flood peaks. Water storage attenuate floods by slowing the rate of rising waters, by enhancing the time it takes for the waters to attain high level and evade the synchronization of flood peaks, hence, lowering the peak level in the downstream areas. Such storages reservoirs serve multiple purposes i.e. storage of water mainly for irrigation water supplies, hydropower generation including flood management. Storage Reservoirs have to be used in an appropriate combination with other structural and non-structural measures.

Seemingly self-evident, but regularly overlooked in practice, is the need to make flood management a part not only of the planning and design, but also of the operation of reservoirs. Releases of surplus water from reservoirs at the time, when rivers in the downstream areas experiencing high flood flows can create risks, therefore, careful operation of reservoirs can minimize the loss of human life and damages to property due to properly managed releases. In this context transboundary cooperation is indispensable.

Flood embankments are most likely to be appropriate for floodplains that are already intensely used, in the process of urbanization, or where the residual risks of intense floodplain use may be easier to handle than the risks in other areas i.e. (Landslides or other disturbances).

Land-use control is generally adopted where intensive development on a particular floodplain is undesirable. Providing incentives for development to be undertaken elsewhere may be more effective than simply trying to stop development on the floodplain. Where land is under development pressure, however, especially from informal development, land-use control is less likely to be effective. Flood protection or construction of houses at high elevation is most

appropriate where development intensities are low and properties are scattered, or where the warnings times are short. In areas prone to frequent flooding, protection of the infrastructure and the communication links from floods can reduce the debilitating impacts of flood on the economy.

Flood Forecasting & issuance of timely warnings are complementary to all forms of intervention. A combination of timely, clear & accurate warning messages with a high level of community awareness gives the best level of preparedness for self-reliant action during floods. Public education program/awareness campaign is crucial to the success of warnings intended to preclude a hazard from turning into a disaster. Evacuation is an essential constituent of emergency planning, and evacuation routes may be upward into a flood refuge at a higher elevation or outward, depending upon the local circumstances. Outward evacuations are generally necessary where the depths of water are significant, where flood velocities are high and where the buildings are vulnerable. Successful evacuations require planning and awareness among the population of what to do in a flood emergency. Active community participation in the planning stage and regular exercises to assess the viability of the system help ensure that evacuations are effective. The provision of basic amenities such as water supply, sanitation and security in areas where affectees gather is particularly important in establishing a viable evacuation system.

The floods may be managed through the following actions by different Departments/agencies[9]:

Table 1. 6 Department-wise Flood Management Measures Required

Departments	Flood Management Measures Required:
Irrigation Department	• Establishment of Flood Emergency Cell • Encroachments to be removed with the assistance of DCO, TMA, and 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 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 population that may be affected by floods.
Information Department	• FM radio stations should be established for advance warnings and to sensitize the public as soon as flood warnings are received. These stations should guide the public

[9] Source: Adapted from: Monsoon Contingency Plan – 2011, Provincial Disaster Management Authority, KP, June, 2011.

Table 1. 6 Department-wise Flood Management Measures Required	
Departments	**Flood Management Measures Required:**
	about nearby safer places, food stuff, health care facilities, health tips and other precautionary measures. • The Department should also arrange press briefings/press conferences.

1.9.4 Constraints and Recommendations

There are many lessons to learn from the flood catastrophe in Pakistan and especially in KP. Some of the vital constraints include:

i. Lack of attention to watershed management. Massive deforestation had taken place in KP, resulting in increased surface runoff and siltation in major reservoirs;
ii. Non-professional flood management by provinces. Machinery, adequate stone reserve stock and sand bags etc, at vulnerable sections of flood embankments were not available. Evacuation routes, emergency shelters, war rooms were not properly planned;
iii. Lack of capacity of NDMA and PDMAs
iv. Inadequate budget allocation for maintenance of existing flood protection infrastructures and new flood works;
v. Institutions at Provincial and District levels were not adequately prepared to cope with such unprecedented floods in the context of global climate changes.

Mardan District administration should take measure to deal with disaster and protect people from future catastrophic flood disasters and increase the resilience of infrastructure, economies and communities including better emergency warning and evacuation systems, better flood protection for key infrastructure and plans to help communities recover once the waters recede. To prevent future catastrophic flood disasters, the following recommendations are made:

i. Identification of flood release channels/escape channels to desert areas/off channel storages that would provide major reduction in flood peak discharge in main rivers.
ii. Flood Plain Mapping/Zoning all along the flood prone water bodies and its tributaries for restricting/prohibiting by law permanent settlements in high and medium flood risk areas (Districts to enact laws);
iii. Review and revision of the design criteria and discharge capacities of bridges/ communication infrastructure and flood protection bunds keeping in view the bench marks of 2010-floods;
iv. Identification of low flood risk areas for future cities, towns and villages, industrial areas etc.
v. Mutual support insurance system on provincial-wide basis to support recovery for infrastructure and affectees.
vi. Public awareness and capacity development of the citizens through DRR (Disaster Risk Reduction) Plan.

1.10 WATER RESOURCES

Water is the life blood of the planet and of critical importance for all socio-economic development. Need to be defined in a correct way. Water is centered to human need equitable growth and development. It is one of the key drivers of sustainable economic growth through contribution to activities such as agriculture, manufacturing, mines, energy and transportation. It contributes to social activities such as productive use of water within the households (poverty alleviation), water for drinking, Sanitation and health. It should therefore be managed in a manner that is sensitive to and supportive to the many competing demands that is place on it. Further, the management activities should not compromise the requirement of the future as well as ecological requirements. Based on these elements water should be center to the integrated planning and development processPoint is not clear. (Confrence, 2012)

1.10.1 Water Resources in District Mardan

Mardan District may broadly be divided into two parts, North-Eastern hilly area and south western plain. The entire Northern side of the District is bounded by the hills. In the District, the highest points in these hills are Pajja or Sakra, 2056 meters high and Garo or Pato, 1816 meters high. The southwestern half of the District is mostly composed of fertile plain with low hills strewn across it. It is gradually accepted that this plain once formed the bed of a lake, which was gradually filled up by the load of the river flowing into from the surrounding hills. From the foothills the plain runs down at first with a steep slope, which carried the rainwater to the lower levels and ultimately to the Kabul River.

Table 1. 7 Canals in Mardan District

Name of water Body	Discharge Cusecs	Length in Kilometers
Main Canal	949	6.66
Disty No 7	25	4.27
Disty No 8	454	21.19
Koragh Branch	94	14.96
Sheikh Yusuf Minor	32	5.78
Maho Dheri Minor	28	4.53
Disty No 9 1, 2 &3	535	44.17
Kalpani Disty (KD) & 1 &2	257	33.75
Total Discharge	2354 Cusecs	

The main source of irrigational water in Mardan District is the canals; the upper Swat canal irrigates most part of the District and lower Swat canal irrigates south-western part of the District. The other sources are tube wells and lift irrigation (DCR, 1998). The main drainage system comprises of surface drains which also provide water for irrigation; particularly the Kalpani Nullah, and eight canals, and tube wells which draw ground water from the Aquifer (Table 19.1). The aquifer is fed and recharged by the rainwater close to the hills.

Generally, streams flow from north to the south. Most of the streams drain into Kabul River. Kalpani, an important stream of the District Mardan rises in the Baizai and flowing southwards join Kabul River. Other important streams which join Kalpani are Baghiari Khawar on the west and Muqam Khawar, coming from Sudham valley and Naranji Khawar from the Narangi hills on the left.

1.10.2 Sediment Load and Its Effect on Agriculture

District Mardan is a part of Peshawar basin, most of its land is agricultural. It has one of the world's best irrigation systems, which were laid down by the British government during British

Rule on subcontinent (1857-1947). Mardan District has quaternary fanglomerates along the margins of the basin while the central part of the basin is generally covered with fluvial micaceous sand, gravels and lacustrine deposits. On the basis of varying lithologies, the quaternary sediments, covered soils and hosting aquifers of the basin are classified as piedmont, floodplain and lacustrine sediments, soils and aquifers respectively.

The aquifers of the District Mardan is generally categorized as alkaline earth fresh water with high contents of alkalis but in certain areas small input of alkaline freshwater has also been noticed. Among the physical parameters, pH of the water of this basin varies from acidic (pH = 4.5) to alkaline (pH = 10.1) while the EC and TDS are generally within the permissible limit with elevation in certain areas of the basin. In most parts of the basin both surface and ground waters have cations (Ca, Mg, Na, K) and anions (i.e., SO4, Cl, HCO3) within the permissible limit. However, in certain areas of the basin these cations and anions have high concentrations and could be considered hazardous.

1.10.3 Quality of Water in Mardan District

The water quality in Mardan varies with the seasons. During May to July the concentration of light elements and turbidity increases due to low precipitation, similarly during November – February the concentration is relatively high, however during monsoons and March rains the dissolved elements get diluted. During a study by the Water Aid and Ms. Nida Gul (M Phill Thesis) it was investigated that the water from old tube wells with rusted and relatively outlived pipes is contaminated by the effluent in the surface water sources. In a recent study conducted in 2011 it was found that the deep ground water is of relatively good quality.

The minimum, maximum and average ADD values for trace and heavy elements in shallow ground water were as following; Fe from 0.00 to 4.39E-02mg/kg-day with average value of 3.00E-03mg/kg-day, Mn from 0.00 to 2.11E-03mg/kg-day with average value of 5.00E-04mg/kg-day, Cu from 6.7E-02 to 7.00E-03mg/kg-day with average value of 7.00E-03mg/kg-day, Pb from 0.00 to 8.00E-04mg/kg-day with average value of 7.00E-05mg/kg-day, Zn from 0.00 to 1.13E-01mg/kg-day with average value of 1.90E-02mg/kg-day, Ni from 0.00 to 5.00E-04mg/kg-day with average value of 1.00E-04mg/kg-day, Cr from 0.00 to 1.00E-03mg/kg-day with average value of 2.00E-05mg/kg-day, Cd from 0.00 to 1.00E-04mg/kg-day, with average value of 2.00E-05mg/kg-day and As from 0.00 to 2.00E-04mg/kg-day with average value of 2.30E-05mg/kg-day. For Mardan District results of tests conducted by several organizations, including Nida Gul were reported in her MPhil Thesis in 2011. These tests indicate the HQ of trace and heavy elements in the shallow ground water.

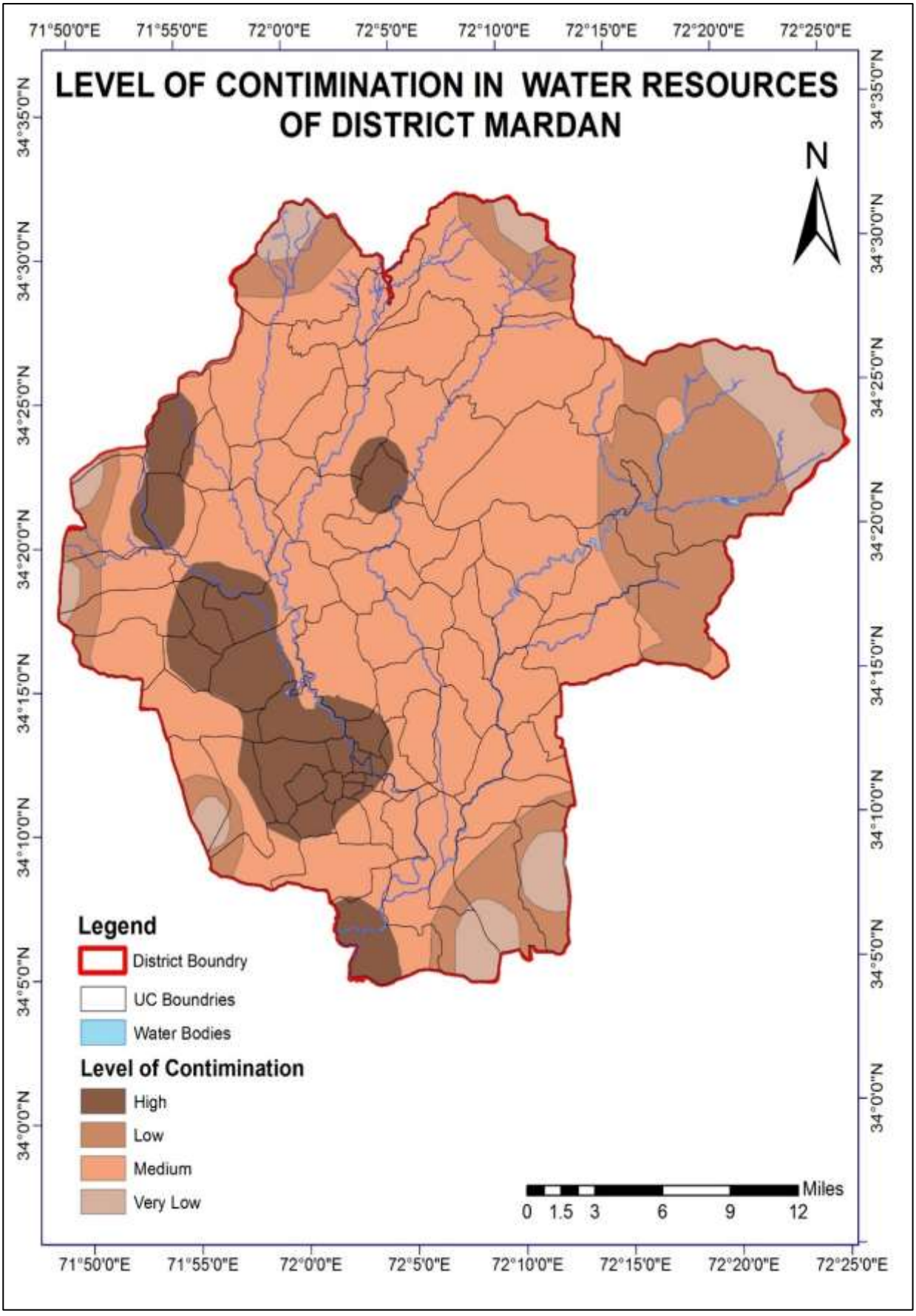
The HQ values of these elements were found as; Fe from 0.00 to 17.57 with average value of 1.20, Mn from 0.00 to 0.01 with average value of 0.00, Cu from 0.00 to 1.82 with average value of 0.19, Pb from 0.00 to 0.22 with average value of 0.02, Zn from 0.00 to 0.37 with average value of 0.06, Ni from 0.00 to 0.02 with average value of 0.00, Cr from 0.00 to 0.00 with average value of 0.00, Cd from 0.00 to 0.23 with average value of 0.04, As from 0.00 to 0.70 with average value of 0.07. Majority of trace and heavy elements were found with HQ values <1, indicating no risk as suggested by USEPA approach (1999). However, 7% of samples from the shallow ground water

were showing high risk due to HQ values >10 for Fe. Similarly, 7% samples were recorded with HQ value >1- <5 for Cu, indicating low risk in accordance with USEPA approach 1999.

The cancer risk values were calculated only for Arsenic in shallow ground water samples. It ranged from 0.00 to 1.10E-04 with average value of 3.47E-05. According to USEPA approach 1999 these values indicate low cancer risk.

In the Water Quality map of 1.6, shows level of contamination has been categorized as high, moderate and low:

- High Contamination: Minerals, Ecolis & FF, above WHO limits.
- Moderate Contamination: Water having moderate levels of nitrates, phosphates, & sulphates, +10% of WHO limits
- Low Contamination: With low levels of Feacal forms E-colai, +5% of WHO limits
- Very Low Contamination: Below the WHO limits



Map 1. 6 Level of Water Contamination Map of District Mardan

1.10.4 Ground Water

A substantial amount of groundwater is being abstracted for different uses in the area through tube wells. The total amount of abstraction from the area through water wells varies as during a dry spell it increases while in summers when the rivers are full the dependence on the well water reduces.

The groundwater is available mostly at the optimum depth for economic exploitation for various uses by the local inhabitants. The shape of groundwater table generally follows the surface topography. The discharge from the groundwater reservoir in District Mardan occurs mainly through existing water wells and outflow to rivers and evapo-transpiration water table is near to the ground surface. The water table in the District rises during rainy season (January – March and July and August) and declines during dry season (October to December) when the groundwater abstraction is higher (WAPDA, 2008).

There are eight canals in the district, the canal irrigated land is served through water courses. An appreciable amount of water is percolating to groundwater from irrigation application and channel loses.

There are three major aquifer systems:

i. Phratic (water table) aquifer system and
ii. Confined (artesian) aquifer system,
iii. Flood plains, streams aquifer. Water table in the aquifer is found to a depth of 30-60 meters below ground surface and is mainly composed of coarse sand and gravels.

Hydraulic conductivity in the basin ranges from 30-60 m/day and average specific yield is 12%. Water table elevation varies considerably in the area. It ranges from less than 100 m in the southern portion to more than 1500 m in the mountainous north (in relation to the mean sea level).

The main sources of recharge to the aquifer are precipitation, seepage from rivers, surface storage reservoirs, and irrigation networks. The drilled wells are commonly used for irrigation, industrial and domestic purposes. Drilled wells range in depth from 50 to 150 m.

The water quality in the City of Mardan was tested by the PCRWR and municipal authorities, by obtaining water samples from 31 tube wells; these samples have been tested for chemical and other contamination. The presence of higher oxygen demanding pathogens and the possibility of biological activities, and the COD value was found to be much above the permissible limit. The water samples from dug wells were also tested and the tube well samples were found to be less polluted then the shallow wells.

The test results depict that water from some of the tube wells located close to the water drains which carry waste water as well were polluted with heavy concentration of magnesium and calcium. Results also show that water at few locations was not potable. Treatment of water at the municipal level is needed and shall be introduced on priority.

1.10.5 Existing and Ongoing Programs

Integrated development strategy 2014-18 take the following measures for water resources:

- Bringing more arable land under cultivation will not only redress the food deficiency of the province but would also improve the socio-economic conditions of KP's residents.
- To irrigate the balance area of 4.443 million acres there is a dire need to develop new water sector infrastructure, such as building new major canal systems, the construction of small dams for water harvesting and the construction of small irrigation channels. New water canals including the Siran Right Bank Canal and an extension of Pehur High Level Canal are underway.
- Seepage losses need to be minimized by lining Kacha (uncemented) irrigation channels.
- Coordinated water management by farmers needs to be promoted.
- Water-saving crops like fruit, vegetables and pulses need to be introduced more widely.

1.10.6 Constraints

Higher physical water productivity and economic water productivity reduce poverty in two ways.

i. Targeted interventions enable poor people or marginal producers to gain access to water or
ii. Use of water more productively for nutrition and income generation.

During 2010 floods the analysis of the Disaster Management Authority and that of various technical committees indicated that the Motorway Bridge built by the National Highway Authority created a bottle neck by restricting the width of the river to 500 feet. This obstacle of restricted width was one of the reasons for backlog off water creating heavy floods, which resulted in loss of life property and assets.

All the industrial units in the Mardan District discharge their effluents directly into surface water and the seepage taking from the effluents as well as other anthropogenic activities impair the quality of surface and ground water, making them unfit for irrigation and drinking purposes. So, the treatment of the effluents before disposal into surface drains should be practiced in all industrial premises to safeguard better water.

1.10.7 Recommendation

Industrialists, domestic and commercial users of water are completely ignorant of the quality issues. The District government shall adopt following measures to monitor the quality of water.

- The existing irrigation and water supply systems in the peri-urban areas of the District shall be improved and institutionalized by upgrading the system. To this end; technical study, feasibility studies shall be carried out for small schemes.
- As shallow ground water sources have been reported with relatively high values of different parameters so, it is suggested that the old dug wells and hand pumps should be renewed or replaced with deep ground water wells.
- Proper salinity control programs should be adopted throughout the whole District to reduce salts content in soils and their seepage to ground water sources.
- Fertilizers and other agro chemicals should be used properly in agricultural fields so that accumulation of various hazardous elements can be avoided.

- Monitoring of water of the District Mardan in regard to environmental health risk assessment should be performed regularly in future.
- The wastage of water resources and unnecessary exploitation of ground water is indiscriminately in vogue.
- A comprehensive water quality management program be established and implemented.
- In order to safeguard quality of water both the industries and municipal waste water shall be treated before disposal into surface drains should be practiced in all industrial premises of the country.
- Canals shall be properly concreted; to reduce the contamination load of the sediments in the river and to reduce water logging in the District.
- Technical coordination committee and other stakeholders like universities, and engineering institutions shall be invited to discuss and approve designs of all projects related with water contamination and usage.
- The GoKP shall develop a major campaign to raise public awareness of the environment and include following:

    - 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 system
    - Assess the need for incentives to industries to comply with EPA effluent disposal regulations.
    - Determine the needs for legislation for regulation of industrial development, enforcement of standards and water abstraction licensing.
    - 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.

1.11 FOREST

1.11.1 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 Forest Act 1927 and have some rights and concessions of grazing, grass 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.

v. Guzara & 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 21.1 shows distribution of land in Khyber Pakhtunkhwa and District Mardan. 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%). The details are given in Table 21.1.

District Mardan is essentially devoid of any worthwhile forest land. There is only 3351 acres of land under forests, all of which is resumed land. Resumed lands are private lands taken over by the Government under various land reforms and martial law regulations and managed by the Forest Department. In terms of percentage, forest area in District Mardan is 0.11% of the total forest area in the Province.

Table 1. 8 Distribution of Forest Land (2016-2017)10 Area in Acres		
Forest Type	**Khyber Pakhtunkhwa**	**District Mardan**
Reserved Forest	232157	0
Protected Forest	1163276	0
Resumed Forest	90271	3,351
Unclassed Forest	259960	0
Section 38[11]	19183	0
Communal	122944	0
Guzara Forest	688123	0
Private plantation	1767567	88378
Miscellaneous	307080	0
Total	**4650561**	**91,729**

1.11.2 Forest Type – District Mardan

In District Mardan, the forest area is spread mostly towards east-north part of the District in the hilly area. Total area under forests in District Mardan is 3,351 acres that is resumed land only, i.e. private lands taken over by the Government under various land reforms and regulations and managed by the Forest Department.

Table 1. 9 Distribution of Forest Land (2016-2017)		
Forrest Type	**Areas (Acres)**	**%age**
Resumed Land	3,351	3.65
Private Plantation	88,378	96.35
Total	91,729	100

[10] Khyber Pakhtunkhwa Development Statistic 2020

[11] Section 38 forest area are privately owned lands voluntarily and temporary put under the control of forest Department for the conservation and preservation of soil and vegetables.

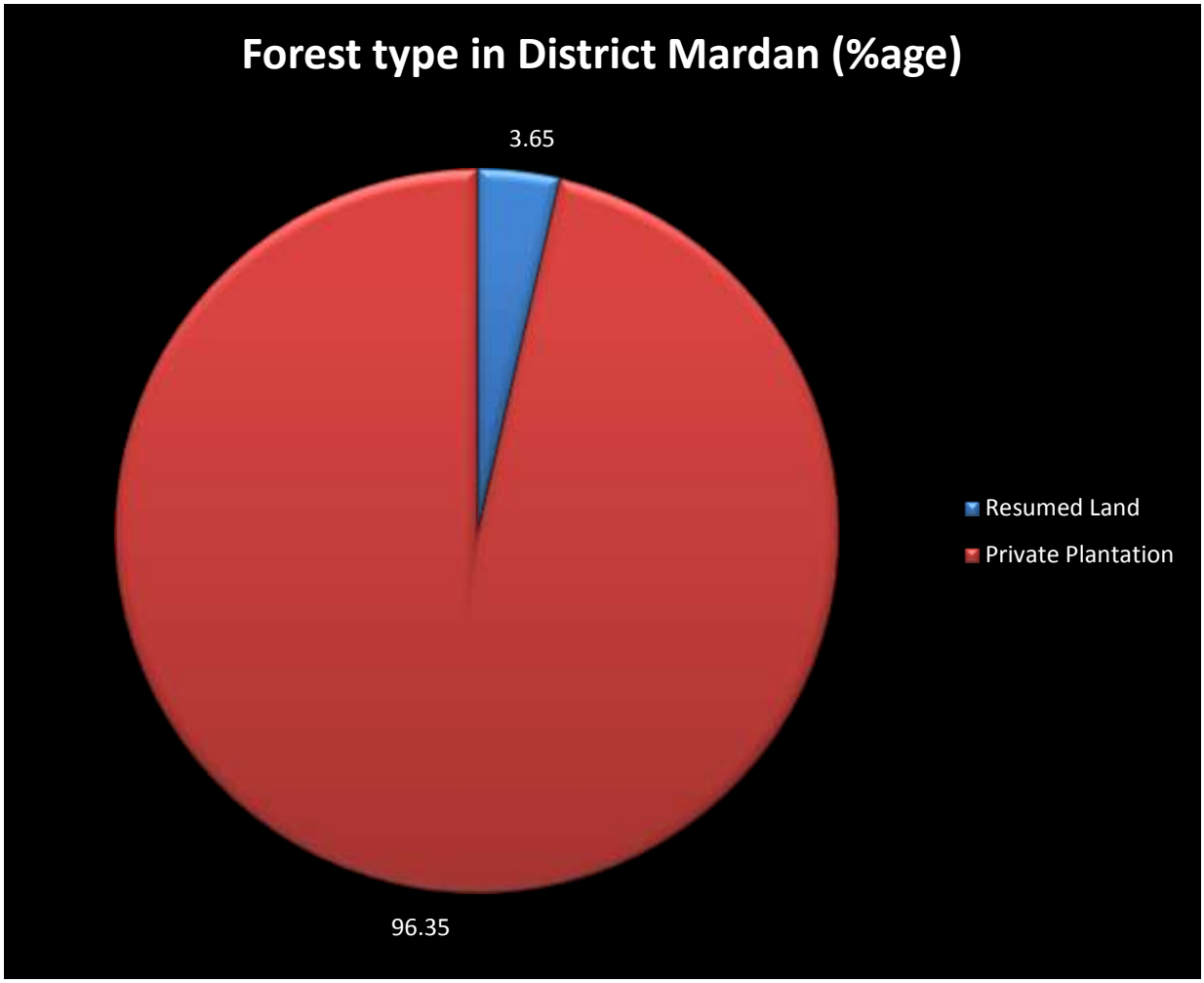
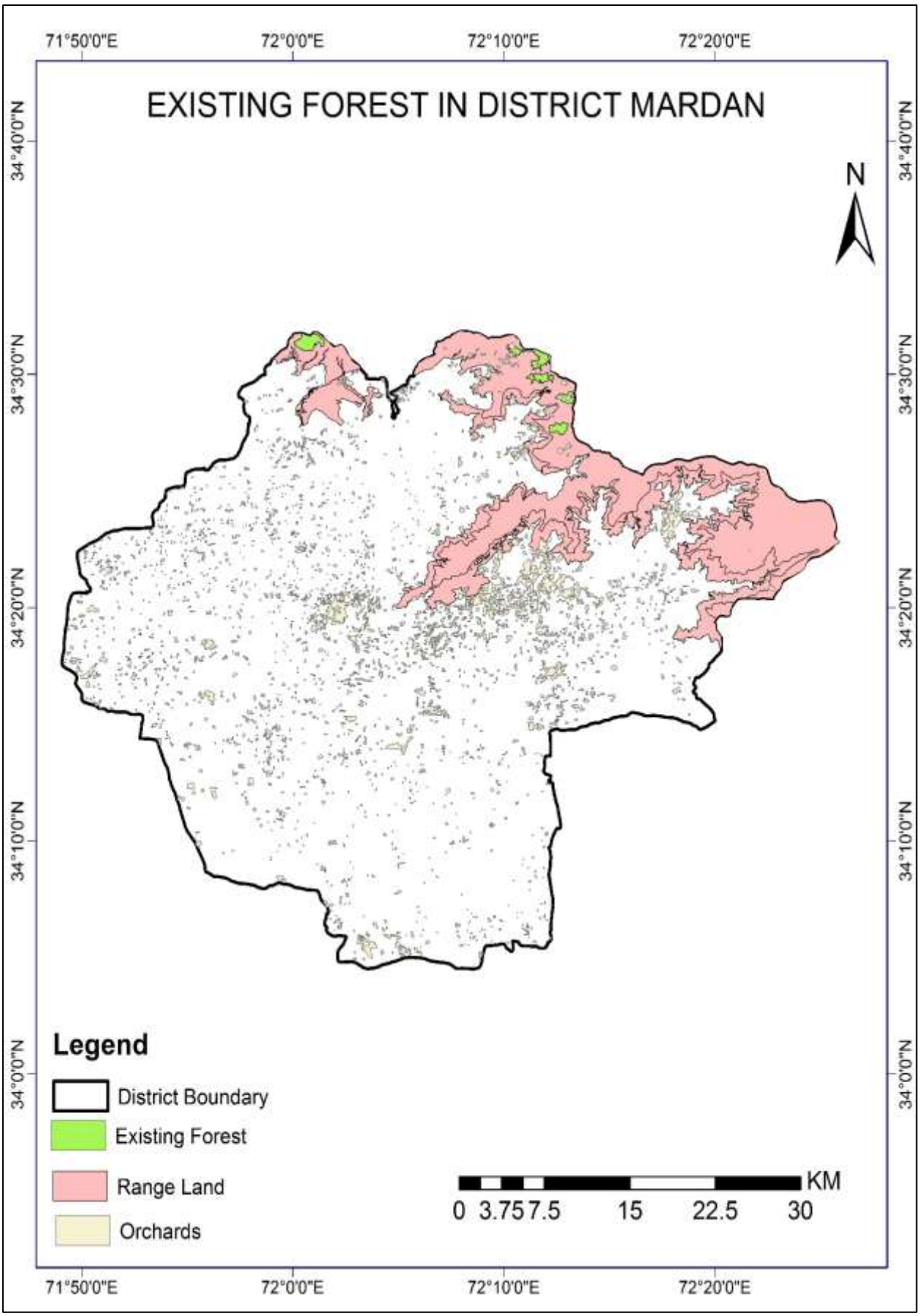


Figure 1. 5 Forest Type in District Mardan (%Age)



Map 1. 7 Existing Forest Map of District Mardan

1.11.3 Forest versus Environment[12]

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 waterand 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. Trees also minimize air pollution, reduce noise and decrease the unpleasant smell by absorbing rotten substances from the drains.

Planting a tree is a virtue as the Holly Prophet (PBUH) has termed tree plantation as “Sadqa" and has ordered his followers not to cut fruit bearing trees in the occupied territory in war times. The saying of the Holly prophet indicates the degree of importance Islam gives to plantation.

Spring and monsoon are two suitable seasons for the plantation of saplings. Monsoon is favorable season for plantation in all parts of the province except Chitral. There is enough humidity in the atmosphere in this season which enables sapling to establish its roots in the new environment. But one must note that this season is only favorable for saplings raised in tubs and

[12] Section 38 forest area are privately owned lands voluntarily and

not for bare root plants. Therefore, special care should be given to the earth ball of the sapling and it must not be disturbed during plantation to ensure its survival. Only planned and organized plantation can bring best results. Therefore, before initiating plantation, the nature of plants should be determined. That is, what sorts of saplings are needed on which terrain? Whether plants are needed for commercial needs or beautification? Besides, environmental purposes are also focused upon.

A few points should be kept in mind while chalking out plan for plantation. Plants must be carefully selected according to the climatic conditions of the area where the sapling are to be planted. Similarly, while determining plantation of fruit or commercial plants, priority should be given to plants which are grown abundantly in that area. Such plantation will stable local market and pave way for its export to national and international market as well.

Trees are also a sound source of income generation. Quick growing trees, largely used in industries can prove useful for this purpose. Experts advise plantation of trees like poplar, sesame and simal. Its market is wide as the wood of these trees is used in sports goods manufacturing, match industry, shoes making, plywood, chip board and furniture. Mulberry can be a source of income in rural areas as it is useful for silk production.

After selection of plants according to needs and climatic conditions is done, the crucial phase of shifting it to the plantation site is started. Plants should always be procured from the nearest satiation to shift it easily at low cost without any sort of harm to it. Experts consider nurseries developed by cultivators themselves as most suitable for this purpose. In case self-raised nurseries are not available, stock developed by Forest Department can prove a better source for acquisition of saplings.

A number of tips may not be ignored while choosing saplings for plantations. The length of the selected sapling should be at least one foot and the stump must be double in length than its roots. Similarly, Collar (The point where stump and root join with each other) should be strong and roots must be thick enough Plantation of too small, doubled stump or saplings with yellow leaves should be avoided.

Before saplings are shifted to the plantation site, necessary arrangements must be ensured to plant it quickly. At the first step a two feet deep pit with the same width should be dug out for placing the sapling in it. Experts advise larger size of pit in hilly areas. Distance among the ditches and rows should be according to the nature of the plants to allow it to flourish well. After preparation of pits, soft soil and composite fertilizer should be deposited along the sides of the pits to fill it promptly after the sapling is placed in it.

Any sort of negligence can harm the sapling and endanger its survival. The sapling must be irrigated one night before uprooting it and the earth ball should not be disturbed during the process of uprooting and shipment. The sapling should be uprooted in such quantity which can be planted easily on that day. If the sapling has been grown in a plastic bag, the bag should be removed carefully before planting it. Cloudy weather is considered most suitable for plantation. The sapling should be kept straight in the ditch and the ditch must be filled with soft soil and fertilizer up to collar of the sapling. The soft soil should be pressed watered promptly after it is filled.

The phase of protection of the plant is started just after the stage of plantation is over. There are a number of enemies of the sapling which include animals, insects, children, flood water and

storms. Proper care and attention is essential to enable the plant to develop in the new atmosphere to contribute in beautification and recertification of the environment.

Mass plantation is imperative to overcome environmental problems. In order to cope up with environmental issues, banks of canals, sides of water reservoirs and other suitable places places must be used for plantation. Yards of the houses, open places, hilly slopes and barren land should be covered with trees in plantation season to enhance the forest covered area.

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 KHYBER PAKHTUNKHWA, 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.

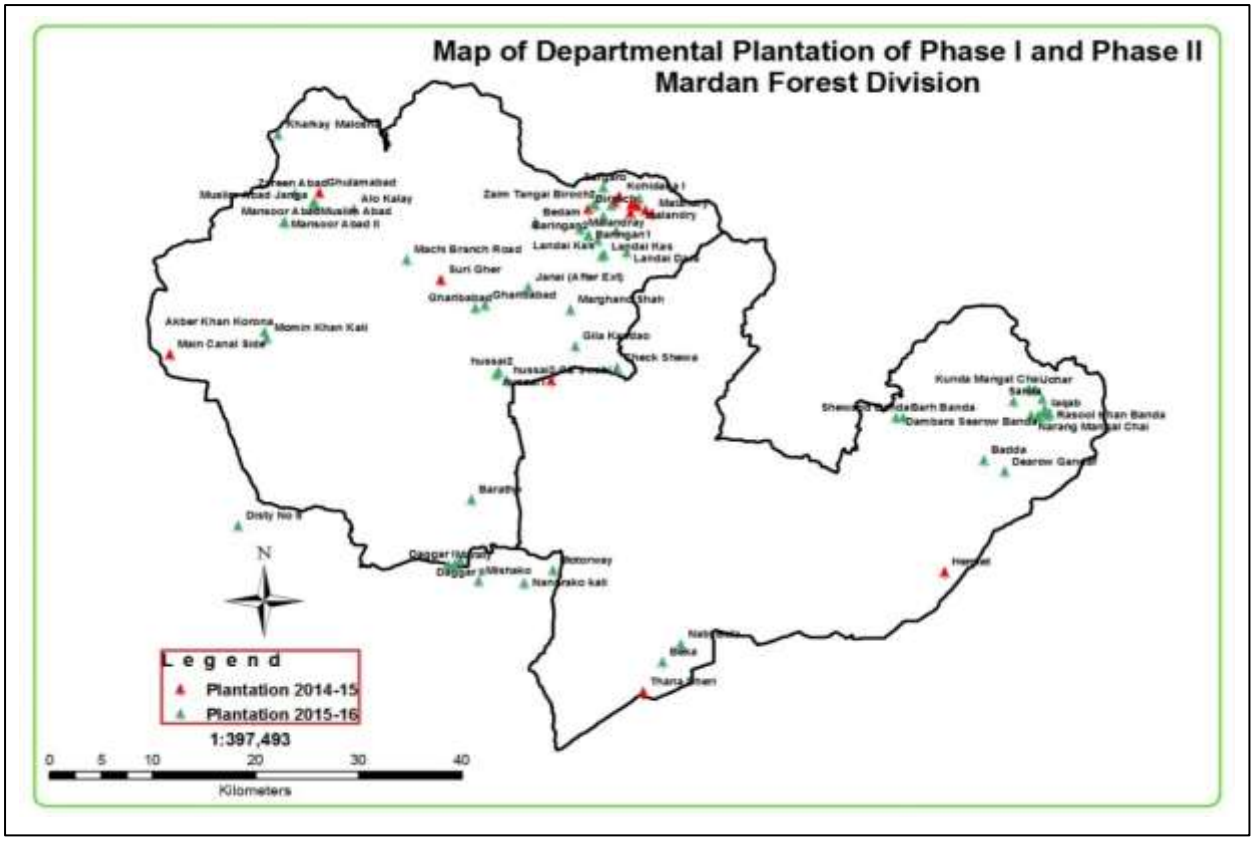
The current year has been declared as National year of Environment and that is why the KP Forest Department has chalked out a comprehensive plan for mass plantation. Under this plan 5.682 million saplings of different species will be planted with the help of defense forces, Government departments, educational 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, Asher 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.

1.11.4 Ongoing Programs

Billion Tree Tsunami project aims to turn the tide on land degradation and loss in the mountainous, formerly forested KP province in the Hindu Kush mountain range. The campaign simultaneously helped KP province fulfil its 348,400 hectare commitment to the Bonn Challenge – a global effort to bring 150 million hectares of deforested and degraded land into restoration by 2020 and 350 million hectares by 2030. This marks the first Bonn Challenge pledge to reach its restoration goal.

"The project is naturally restoring a previously deforested landscape, which will assist in meeting present and future needs and offers multiple benefits for climate adaptation and mitigation in a very climate-vulnerable province," says Muhammad Tehmasip, Project Director of the Billion Tree Tsunami.

The following areas are selected by the billion-tree tsunami for plantation in District Mardan.



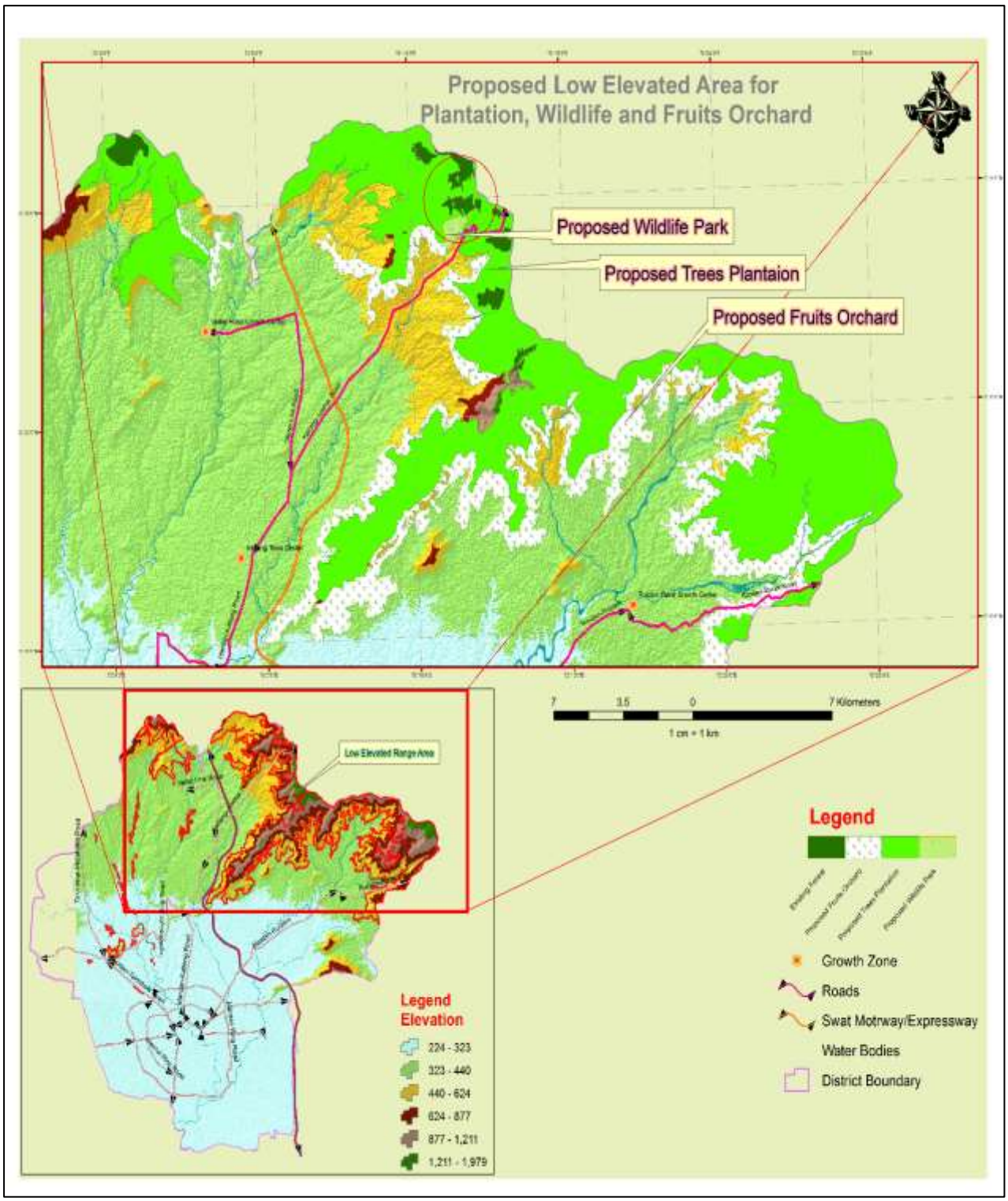
Map 1. 8 Planation Map of District Mardan

1.11.5 Constraint and Recommendation:

District Mardan has a little amount of area under forest, most of the hilly part in District is range land as show above in the map ----. Existing forest area is 624-hectare wile 7143-hectare area is considered as range land. Mardan has a wide potential of species like flora and fauna. The present flora of the irrigated areas is exotic. The common trees are mesquite, ber, different species of acacia and jand. The most common shrubs are tarmariax, articulata, spands, akk, small red poppy, spera, pueghambrigul, drab grass, spera, eamelthorl and pohli chaulai etc. the range land is proposed for future orchard and plantation as show in the Map 1.9 The District has a variety of fauna comprising the following

- Snake
- Mongoose
- Jackal
- Wild Goat
- Pheasant
- Mule

The range land of District Mardan is proposed for fruit orchard and tree plantation which will increase the scenic beauty of the area and in wide range it will contribute to reduce climate change and global warming. Wild life is proposed near the sangu village in tahsil katlang of District Mardan. Which will increase our wild life productivity and will also serve as a recreational area for residence of katlang, and Buner.



Map 1. 9 Proposed Map Planation, Wildlife and Fruits Orchard of District Mardan

1.12 ECONOMIC DEVELOPMENT

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 soils biota that the land comprises. The 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 a vertical growth.

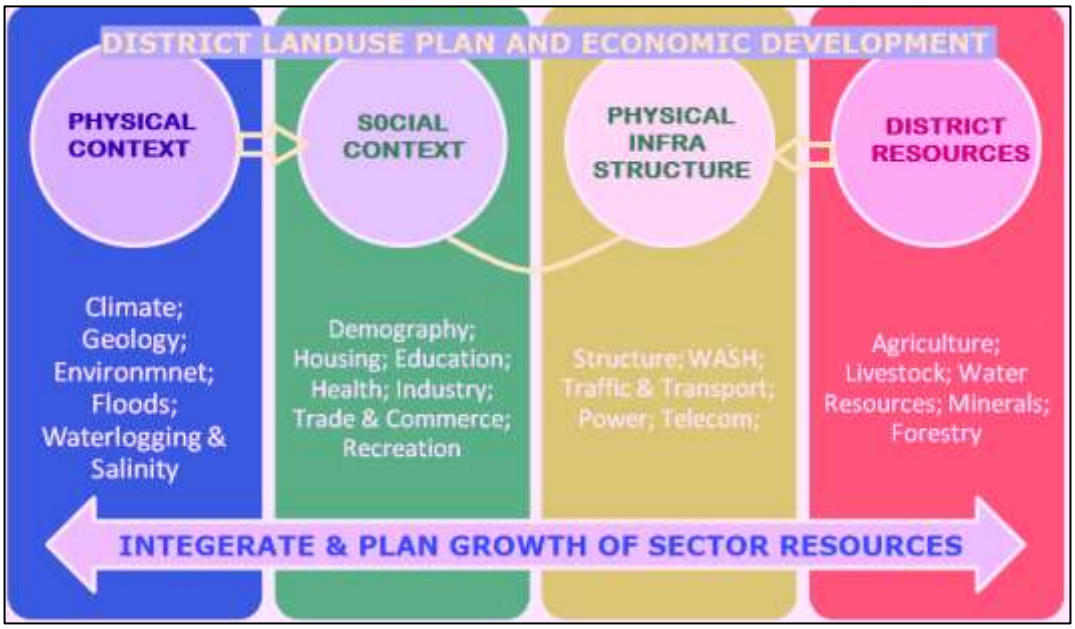


Figure 1. 6 District Land Use Plan and Economic Development

The District Land Use Plan for District Mardan is based on exhaustive data collection, situation analysis, and extensive stakeholder discussions, for drawing inferences of more than twenty different sectors that have been grouped under four categories (refer fig). For economic development the District land resources are used in ways that take advantage of all these sectors; more over by examining all uses of land in an integrated manner, it makes it possible to minimize conflicts, to make the most efficient trade-offs and to 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 not limited to the following:

1.12.1 Economic Development in the Physical Context

Climate in the District is discussed in details in District Studies Report; climate in general has an impact on economy of a region as it influences the decision making for location and type of industries and agriculture and other Land Uses. As explained earlier since the climate is not harsh, its impact on Land Use and economic development will be minimal.

About 85% of the District Mardan is underlain by recent alluvium. These include recent river, stream, flood plain and lake deposits and belong to the Pleistocene age group. These are classed into the following four types: i.e. Stream beds, Fan deposits, Alluvium and Lacustrine deposits. Apart from these, about 15% of the area of the District is covered by other rock types. These rocks are typically revealed in the outcrops that stretch in a belt that roughly divides the District into two along a NE-SW stretch. Few of these rocks are located along the North-Eastern and Eastern corner of the District.

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 environmental management shall be recognized as a high priority sector and propose to establish environmental accountability. It is also 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. 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 direct impact on economy of a region as it results in damage to property, life and assets. Around 166 square kilometers of area of District Mardan was affected due floods in 2010. It has affected around 7 Union councils and 182 villages. The affected union councils included Shahbaz Garhi, Garyala, Charguli, Bala Garhi, Mohib Banda, Kot Daulat Zai and Garhi Daulat Zai. Total households in the affected area were more than 36,000. Thus, in the Land Use Plan, area liable to flooding has not been proposed for habitation purposes. This will result in minimizing the adverse effect on economy, thus contributing to economic growth. The details of damages due to flooding in District Mardan are given in Section 1.8 above as well as in Chapter 4 of District Studies Report.

Table 1. 10 Flood Prone Area in Mardan

Flood Prone Area (Sq. km)	% of Total District Area	Affected Villages (2010 floods)	Total HHs in Affected Area
166	10%	182	36,145

Water logged area in District Mardan is around 440 square kilometers, which is about 27% of the total District area. Government of KP initiated partnership and participatory programs for reclaiming waterlogged area 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 where through the extension program farmers shall be educated in adopting proper drainage and alternative cropping to increase their income; also the programs like On-Farm Water Management (OWFM) and the Rural Support Program(RSP) have shown remarkable success in terms of reducing water logging

and salinity and increasing agricultural incomes for farmers, contributing to economic development.

1.12.2 Economic Development – The Social Context

Demographic sector i.e., the population its composition by age and gender and its spatial spread along a time series is one of the basic factors affecting both the Land Use and economic growth. Demographic growth and economic growth are inversely interlinked; the higher the population growth the lower the economic growth. Additionally, education, training level of skills, labor force, and the proportion of dependent population are some of the factors that affect Land Use and economy.

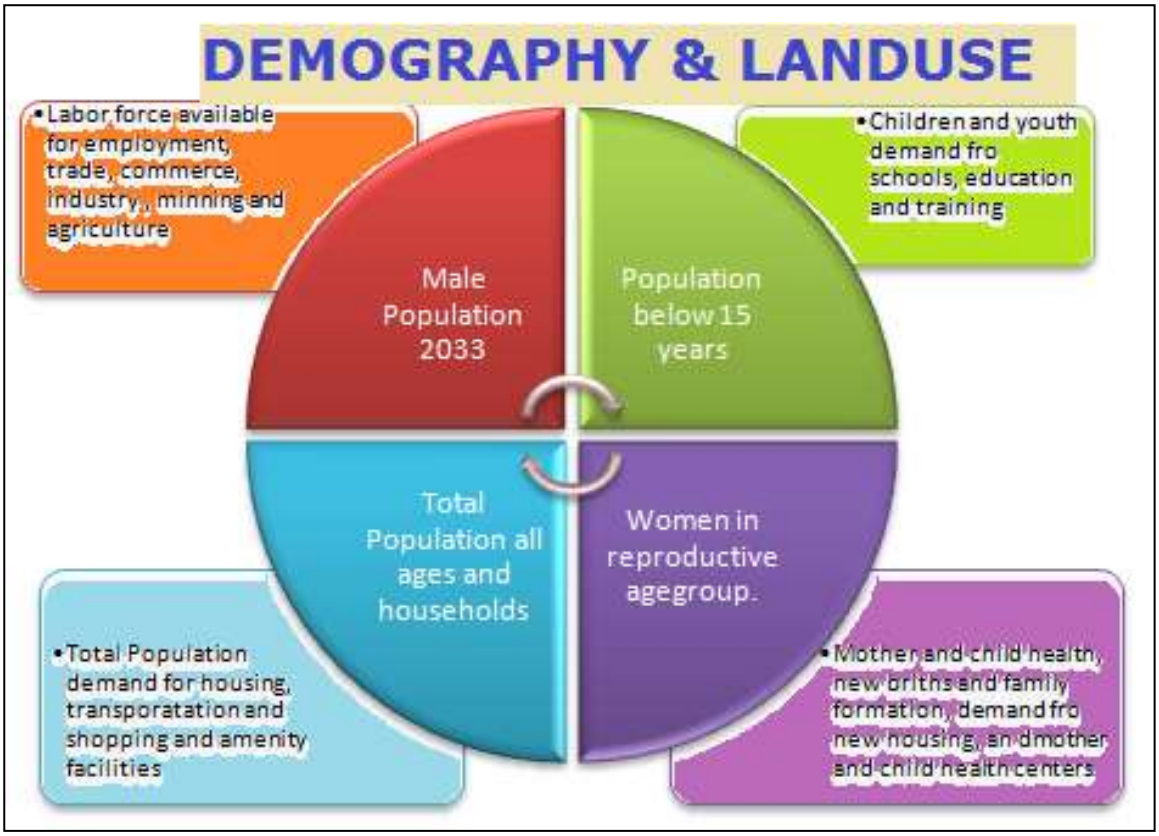


Figure 1. 7 Demography and Land Use

Under Land Use Plan of Mardan, proper demographic projections have been made for the District for next 20 years using different forecasting models such as regression analysis, extrapolation and cohort-survival methods.

Based on the 2017 census the population of District Mardan is 2.373 million, likely to increase to about 4.2 million in the year 2040. The proposals for economic development in context of housing, education health and industry are given below:

One of the vital factors of the social context is housing; as it impacts both the Land Use, and employment, generating in construction industry and service industry. Holistic approach has been used for locating residential areas in the Land Use Plans. All factors that affect housing demand and supply such as land values, proximity to urban services, availability of transportation linkages, employment opportunities, 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 such land to housing and other urban uses is proposed to be prohibited. The housing demand during 2021-2025 and 2026-2040 will be 47252 and 215176 respectively, while the current housing backlog is 13088. The total housing required for the next 20 years, including the existing backlog, is estimated to be 251765 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 is 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 Mardan will reduce migration towards larger urban centers, and will also attract many new residents and businesses in the District. The Land Use Plan encourages education sector to establish new institutions that provide people with the skills they need for the changing job market.

Table 1. 11 Literacy Rate in Mardan

Literacy Ratio	Participation Rates	
	Primary	Middle & High
55%	61%	33%

The educational facilities serve both the local and District population and even wider area for higher and special education. The accompanied economic activities are direct employment for teaching and other jobs and indirect economic activities for serving large segments of 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 Mardan District will ultimately serve the province and the nation, thereby generating higher household, regional and national income.

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

Table 1. 12 Health Facilities in Mardan

Hospitals	Dispensaries	RHCs	BHUs	Others
10	18	4	49	4

In Mardan District industries are established mostly along Takht Bhai Road and Nowshera Road. There is a Small Industrial Estate on Nowshera Road having 338 plots. Industries have been established over 99 plots, of which 89 are operational and 10 are closed. Besides, there are 172 industries along roads, of which 152 are operational. Under the District Land Use Plan, a new industrial area for Mardan is proposed on Charsadda Road, and a small industrial estate near Takht Bhai. The Industrial sector has a direct linkage with economic development, income and employment. Industries create direct jobs; and as such this Land Use is 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 contributes to the economy.

Mardan Land Use Plan also focuses on trade & commerce, as it is the major income and employment-generating sector, and a large proportion of population of all ages directly or indirectly depends on it. Trade and commerce at present is widely spread, intermixed with residential areas and scattered along roads and streets. A new trade zone has been proposed towards West of Mardan Urban area, located North of Charsadda Road and East of Ring Road. By virtue of its location and linkages, the proposed site for Trade/Commercial center will become the future hub of commercial activities in District Mardan. It 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 decreasing recreational facilities and open spaces are a cause of concern. The pressure on land is increasing because of competing Land Uses. The main recreational places in District Mardan are Pir Sattar Park, Azakhel Park, Amir Muhammad Park, Piran Daga Park, Tooti Park, Company Bagh and Ghulam Nabi Park

A Recreational Park has been suggested opposite to proposed Trade Centre, East of Ring Road. Besides Takht Bhai has an archaeological site, which initially was a Zoroastrian complex which, after the later arrival of Buddhism was then converted into a Buddhist monastic complex. It is dated to the 1st century BC. The complex is regarded by archaeologists as being particularly representative of the architecture of Buddhist monastic centers from its era. It was listed as a UNESCO World Heritage Site in 1980. A 'Heritage Park' has thus been proposed at the site, which will attract more local and foreign tourists, thus boosting the local economy.

1.12.3 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 a more efficient use of conventional productive inputs. Four sectors i.e. Water Supply& Sewerage; Traffic and Transport, Power and Telecommunications have been grouped under physical infrastructure.

Most of District Mardan has piped water supply systems, which is underground and does 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 has a direct linkage to the economic development. Enhancing the quality and quantity of water, and collection and treatment of municipal and industrial waste water in accordance with the KP environmental Act 2014 has been recommended by the consultants. The improved infrastructure of WASH will have direct impact on the economy of the region, as good quality water will contribute to health of the citizens and be available for businesses and industries. Adequate disposal of the wastewater will on one hand result in reduction in pollution and contamination of surface and subsurface water, while on the other it will impact health by reduction in water borne diseases.

Transportation network in an area influences Land Use and development trends and thus the obvious need of integrating transportation and Land Use proposals. Effective road network and proper management of transport system play major role in the efficient functioning of a habitat.

One of the main objectives of Land Use Plan at District level is to increase the capacity of existing roads, opening up new area for development, and decentralization and traffic management in the inner city.
The main transport infrastructure in District Mardan is provided by several links to various highways including the Motorway (M-1), Nowshera Road, Malakand Road, Charsadda Road and Swabi Road.

A major problem being faced by Mardan is that main inter-city roads such as roads coming from Nowshera, Malakand, Charsadda and Swabi converge in the urban area of Mardan causing immense traffic problems, although through traffic gets diverted on the existing ring road, which to some extent eases the traffic flow on inner urban roads. The Land Use Plan also proposes widening of existing intra-city roads and mesh of new roads in the area proposed for future urbanization.
The impact of the proposed roads and creation of a planned extension of Mardan will result in efficient movement of goods and passengers providing inter-city 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 for drivers, cleaners, managers, maintenance workers, gas stations, repair shops and a host of other activities.

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

Power generation capacity in District Mardan is 71 MW, whereas average demand is 93 MW and peak demand is 116 MW. Based on average demand, the shortfall is 22MW or 31%. There is a need to launch a large-scale expansion program to use the renewable Hydro Electric Potential for power generation.

At present due to shortage of electricity power outages are frequent and sometimes last more than 12 hours in 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 the solar power plants at District and local level. 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.

Table 1. 13 Power Generation in Mardan

Power Generated	Average Demand	Shortfall
71 MW	93 MW	22 MW

The process for planning and developing telecom services have to be in line with Land Use Planning strategies, so that regulations related to radio frequency engineering standards can be used as illustrative planning tool that coincides with the underlying zoning. Co-relating Land Use Planning with telecom infrastructure protects aesthetics and property values by helping in controlling the number of future sites that are located in an area. There is a total of 40 telephone exchanges in District Mardan with 34,357 connections. The installed capacity of broadband connections is 10,614. Other telecom services in Mardan 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.

1.12.4 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.

Total Cultivable Area in District Mardan is 999.26 Sq. Km, which is 61% of the total District area.

More than 75% of rice in Peshawar Valley is produced in District Mardan. The District is also at the top in production of wheat and maize, and second in production of sugar cane, only slightly behind District Charsadda. Thus, District Mardan has a comparative advantage in agricultural production, and this advantage can be further enhanced by the following measures:

Table 1. 14 Crop Production in Mardan

Crops	Wheat	Maize	Sugar Cane	Rice
Production in metric tons (2016-2017)	87418	89232	1339397	3191

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

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

The District has a potential of increasing the value of livestock. Livestock in the District comprise of cattle (39%), followed by goats (32%), buffaloes (18%) and sheep (8%); While 3% of the livestock is camels, horses, mules and donkeys. Additionally, there are 375 poultry farms 105 fish farms in District Mardan, all privately owned.

The livestock sector in Khyber Pakhtunkhwa, despite having great potential for poverty alleviation, has not developed on commercial lines because of paucity of funds, capacity and technology constraints. Another important benefit of livestock is the best utilization of the passive woman labor force which makes more than 50% of national population. Besides the above some Non-Governmental Organizations are also working for improvement of the socio-economic status of the livestock farmers. The product of livestock especially goats both

slaughtered and live are mostly exported to Afghanistan and Middle East, this potential shall be exploited to increase the provincial income and economic development of the region.

The main source of irrigational water in Mardan District is the canals; the upper Swat canal irrigates most part of the District and lower Swat canal irrigates South-Western part of the District. The other sources are tube wells and lift irrigation. Water table in the aquifer is found to a depth of 30-60 meters below ground surface and is mainly composed of coarse sand and gravels. For economic development and 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 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.

In mining, mainly marble (26,653 metric tons) and limestone (753,091 metric tons) are extracted in the District of Mardan. Other minerals such as dolomite, granite and barite are also extracted. Minor minerals i.e., sand, bajri and gravel are also extracted from small streams and rivers banks. Mable cutting and polishing units are working at various places of the District Mardan. Uncut Marble and tiles are sent to Islamabad and Punjab province through different private companies operating in Mardan.The economic contribution of the mining sector in Mardan District can be significant and needs to be institutionalized and enhanced in terms of trained manpower and extraction.

Though the Province is very rich in the forest resources, but in Mardan District there are hardly any, except for some scatters. 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. Spring and monsoon are two suitable seasons for the plantation of saplings. Monsoon is favorable season 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, and reducing pollution and increasing forest cover in the District. These economic benefits of such an approach will be direct as well as indirect by reducing diseases related to air and noise pollution, and minimizing adverse effects of floods.

CHAPTER 2: LAND USE DISTRIBUTION

2.1 GENERAL

General misuse and mismanagement of our agricultural land resources, i.e. soil and water, is the single most important factor responsible for continued land degradation and stagnation of yields. 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 owner's needs and local trends.

There is thus a dire need that an unbiased and sound plan be prepared at 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 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 basis to rationalize Land Uses so as to ensure conservation of the resources. The optimum utilization of land is, in fact, the main objective of the Land Use Plan.

More specifically, objectives of the Plan are:

- 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.

There is no known example of Land Use distribution at District level, with which Mardan can be compared. In fact, even at urban level, there is wide variation in the proportions of Land Uses. However, comparing Land Use distribution of urban area of Mardan with other urban areas brings out the diversity of functions. This has been done in Section 2.2.2.

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 scheme or industrial estate, at District or City level, there is no 'standardized' distribution of Land Uses. The proportions of Land Uses at 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. Obviously, a small residential scheme will be predominantly occupied by dwelling units, an industrial estate by various types of factories, while at 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[13]		
S. 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[14]		
S. No.	**Land Uses**	**Percentage**
1	Factory Plots	60-65
4	Roads	Up to 20
5	Open Spaces	Up to 20
6	Administrative and Other Buildings	5-10

Table 2. 3 Land Use Distribution at Town/City Level (500,000+ Population)[15]		
S. No.	**Land Uses**	**Percentage**
1	Residential	24-32
2	Industrial	2-15
2	Commercial	1-2
3	Institutional	3-8
4	Arterial Circulation/Terminals	13-20
5	Recreational Open Spaces	2-5
6	Graveyards	0.5-3.5
7	Vacant	9-45

[13] ibid, Page 301, Table 10.1.

[14] ibid, Page 90, Table 5.6.

[15] ibid, Page 305, Table 10.2.

2.3 EXISTING LAND USE DISTRIBUTION – DISTRICT MARDAN

Total area of District Mardan is 1633.7 square km, comprising of the following three Tehsils:

- Mardan Tehsil
- Takht Bhai Tehsil
- Katlang Tehsil

Of the above, Mardan Tehsil is 925.8 square kilometers, or about 57% of the total District area, Takht Bhai Tehsil is 404.8 square km or 25% of the total District area, while Katlang Tehsil is around 303.1 sq. km or 18% of the total area. Land Use Distribution in the District is given in Table 2.4.

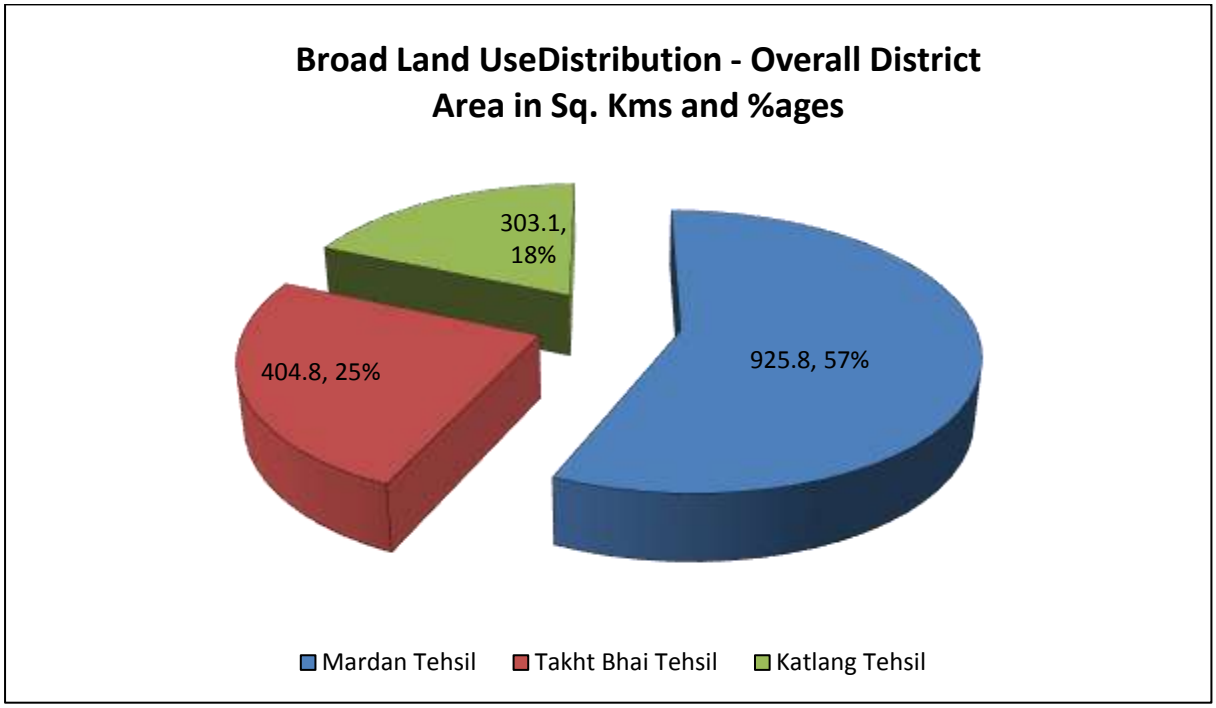


Figure 2. 1 Broad Land Use Distribution of District Mardan

2.3.1 Land Use Distribution in Overall District

The maximum area in District Mardan is under Agriculture category (71.71%), followed by the shurbs and grass land (14.88%), Residential areas(8.57%), water bodies (1.21%), forest (1.06%), transportation i.e. main roads/railway/terminals (0.90%), Graveyard (0.41%) and Industries, railwayroads 0.03% and vacant land (0.07%) and others.

The area and their percentages are given in Table 2.4. The distribution is graphically illustrated in Figure 2.2 and Map 2.1.

Table 2. 4 Land Use Distribution of District Mardan			
S. No	**Land use class**	**Area in Sq. km**	**Area in Percentage (%)**
1	Agriculture	1171.87	71.71
2	Forest	17.34	1.06
3	Fruit orchards	19.07	1.16
4	Graveyard	6.72	0.41
5	Industry	0.55	0.03
6	Railway	0.55	0.03
7	Residential	139.43	8.57
8	Roads	15.31	0.92
9	Shrubs/Grass	243.28	14.88
10	Stadium/Grounds	0.32	0.01
11	Vaccant Land	1.22	0.07
12	Water Bodies	19.87	1.21

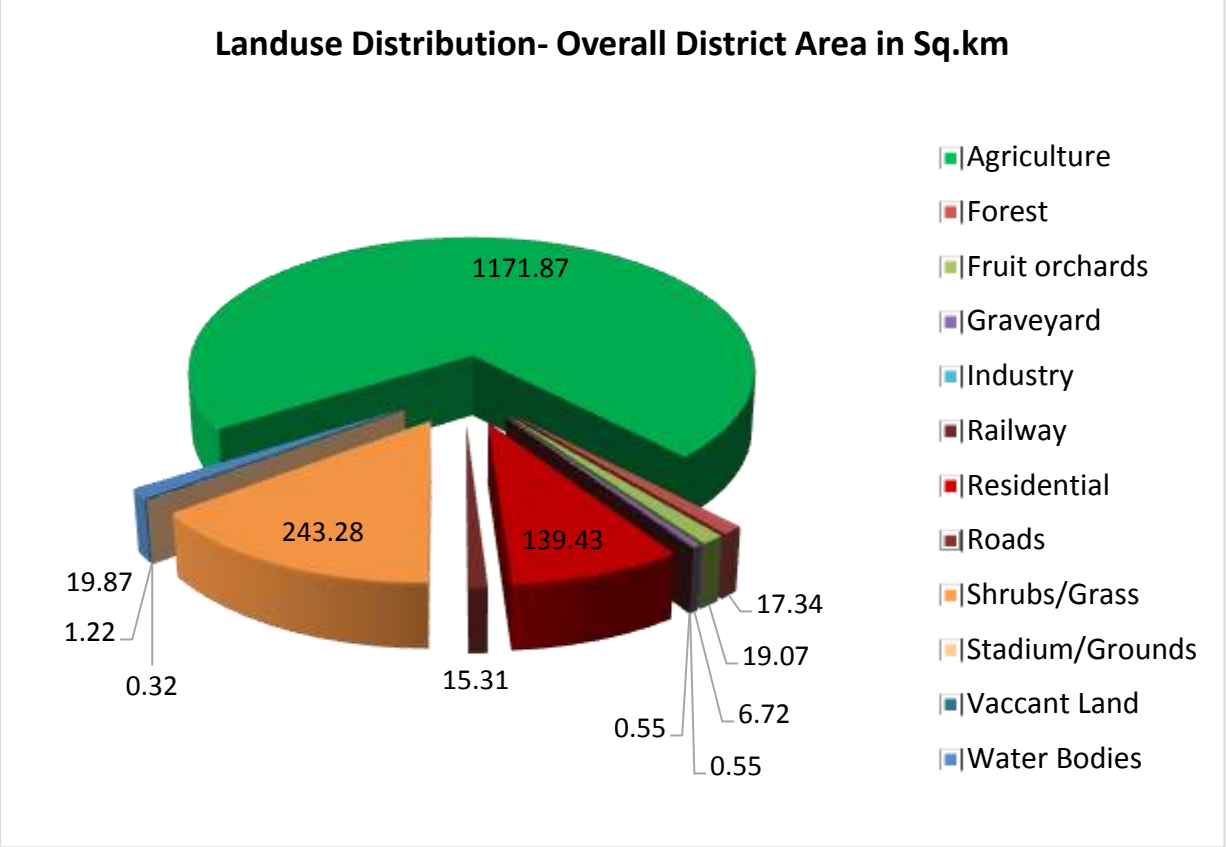
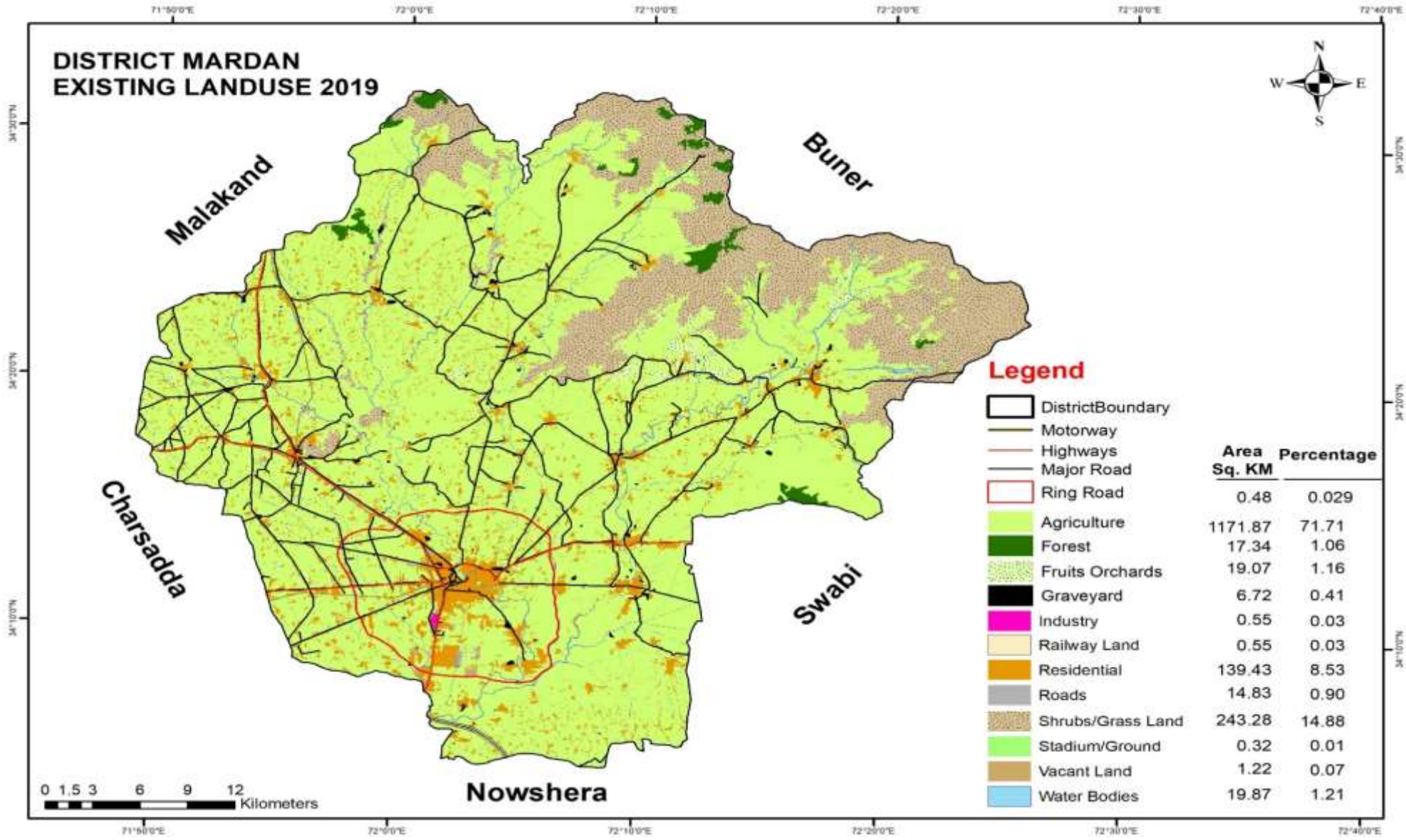


Figure 2. 2 Land Use Distribution of District Mardan



Map 2. 1 Existing Land use Map of District Mardan

2.3.2 Land Use Distribution in Mardan Tehsil

The Mardan Tehsil comprises the area of 925.81 square kilometer. The maximum area in this Tehsil consist of agriculture which is 612.25 square kilometer or 66% followed by the vacant land (10.17%), range land (7.3%), settlements/villages (6.2%), forest (4.14%), urban residentiary (1.99%), transportation i.e. road, bus/truck terminals, railway station (1.36%), bushes/scrubs (1.2%), water bodies (1.17%) and other Land Uses have been less than 1% in total Mardan Tehsil area.

Statistics about Land Uses in Mardan Tehsil are given in Table 2.5 and illustrated graphically in figure 2.5.

Table 2. 5 Land Use Distribution of Mardan Tehsil, District Mardan

S. No	Land use class	Area in Sq.km	Area in Percentage (%)
1	Agriculture	619.99	67.62
2	Forest	7.72	0.84
3	Fruit orchards	13.32	1.45
4	Graveyard	3.47	0.38
5	Industry	0.51	0.06
6	Railway	0.32	0.04
7	Residential	83.24	9.08
8	Roads	10.56	1.15
9	Shrubs/Grass	164.85	7.98
10	Stadium/Grounds	0.15	0.02
11	Vaccant Land	1.06	0.12
12	Water Bodies	11.64	1.27

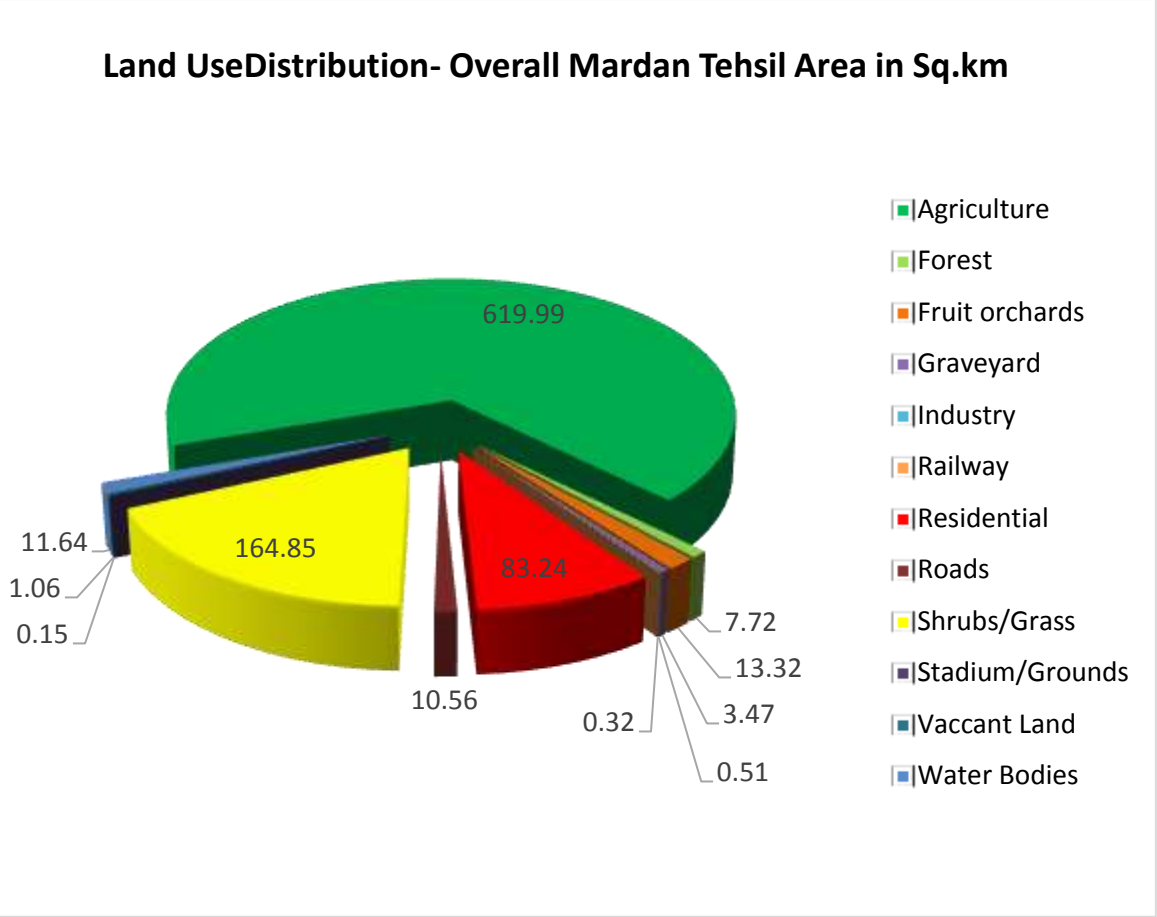
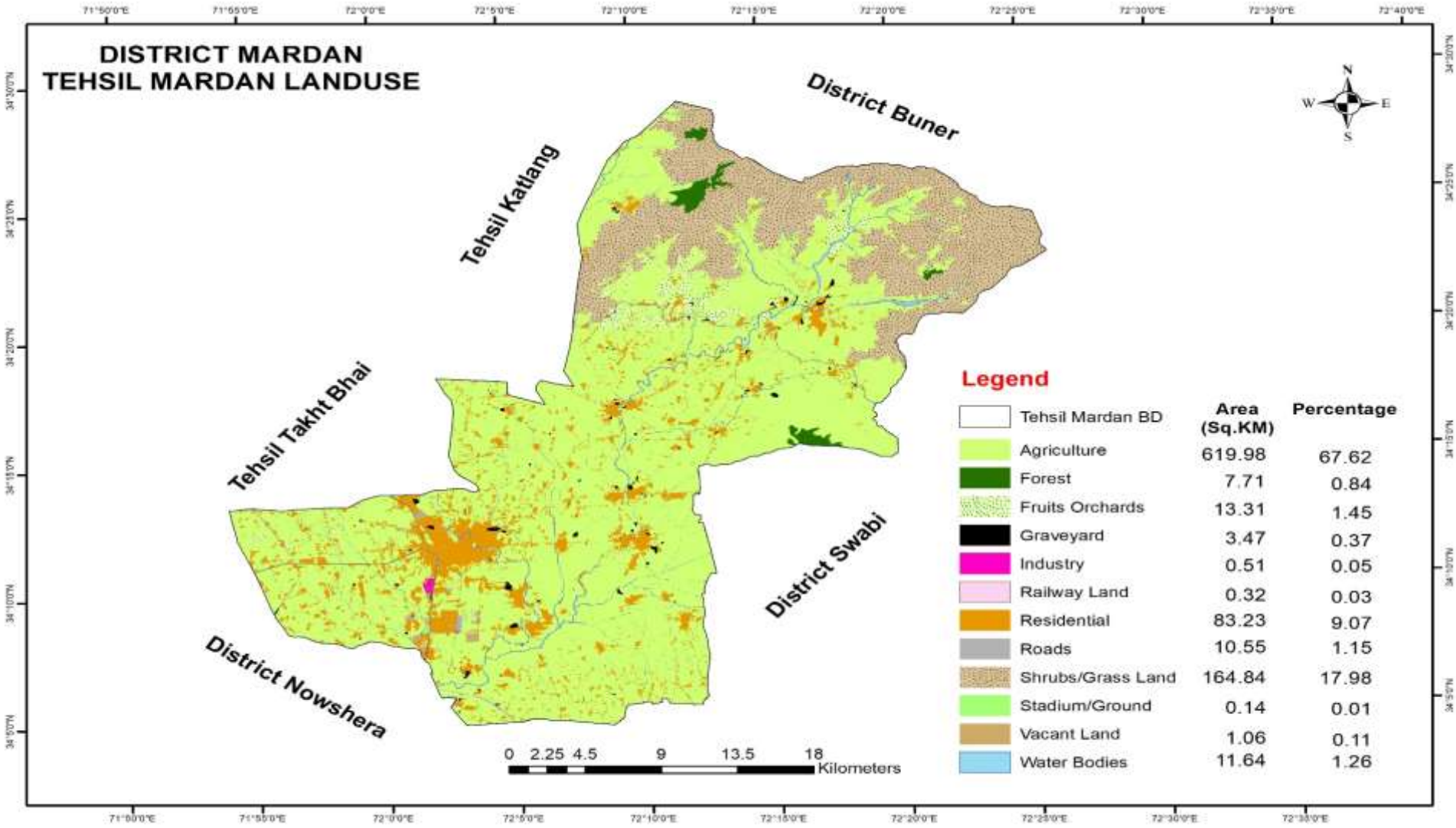


Figure 2. 3 Land Use Distribution in Mardan Tehsil Area



Map 2. 2 Existing Land use Map of Mardan Tehsil

2.3.3 Land Use Distribution in Takht Bhai Tehsil

The Takht Bhai Tehsil comprises the area of 404.83 square kilometer. The maximum area in this Tehsil consist of agriculture which is 335 square kilometer or 84.27% followed by the residential area of (7.55%), shrub and grass land (1.88%), transportation i.e. roads, terminals (0.89%), water bodies (1.09%), fruit orchards (1.05%) and other.

The area and their percentages are given in Table 2.6. The distribution is graphically illustrated in Figure 2.4.

Table 2. 6 Existing Land Use Areas- Takht Bhai Tehsil

Sr. No.	Land Use	Area (Sq. Km)	Area in percentage (%)
1	Agriculture	335	84.27
2	Forest	2.46	0.62
3	Fruit orchards	4.18	1.05
4	Graveyard	2.01	0.5
5	Industry	0.03	0.02
6	Railway	0.21	0.05
7	Residential	38	9.55
8	Roads	4	0.89
9	Shrubs/Grass	7.46	1.88
10	Stadium/Grounds	0.17	0.04
11	Vaccant Land	0.15	0.04
12	Water Bodies	4.35	1.09

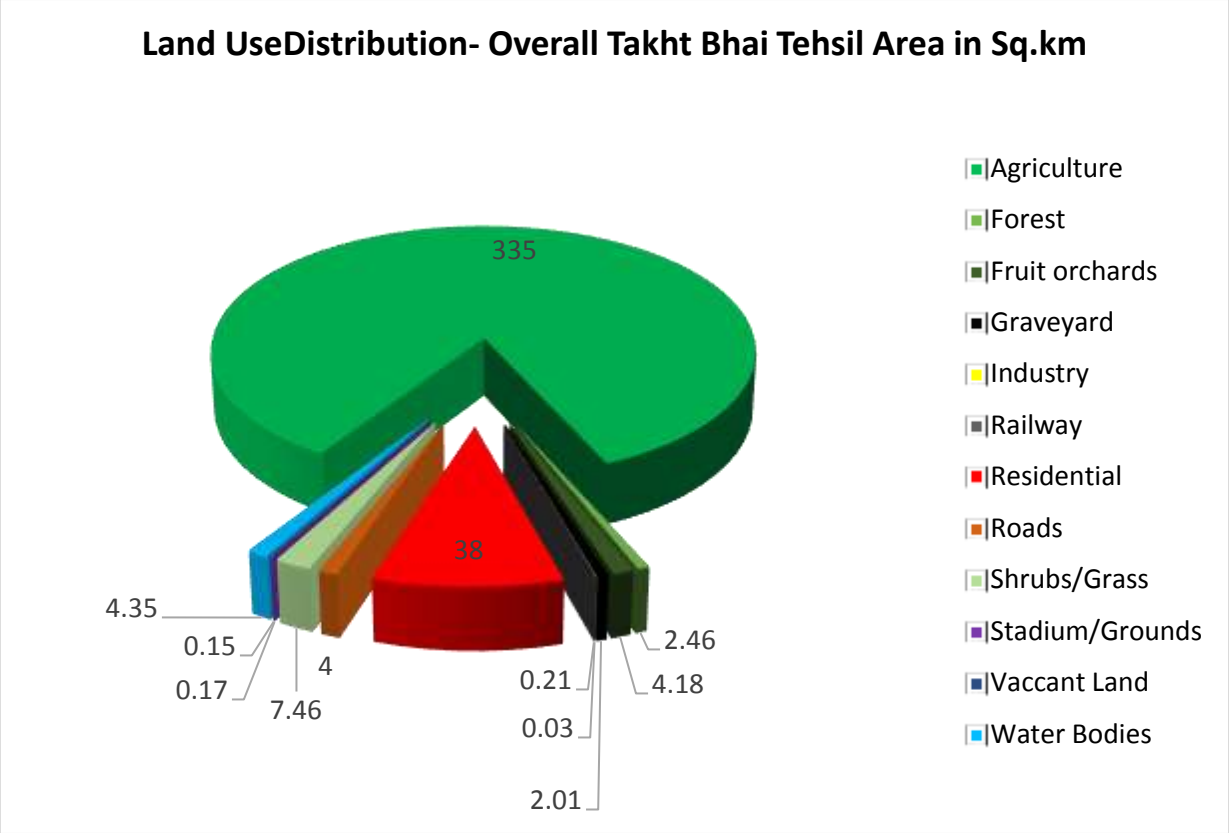
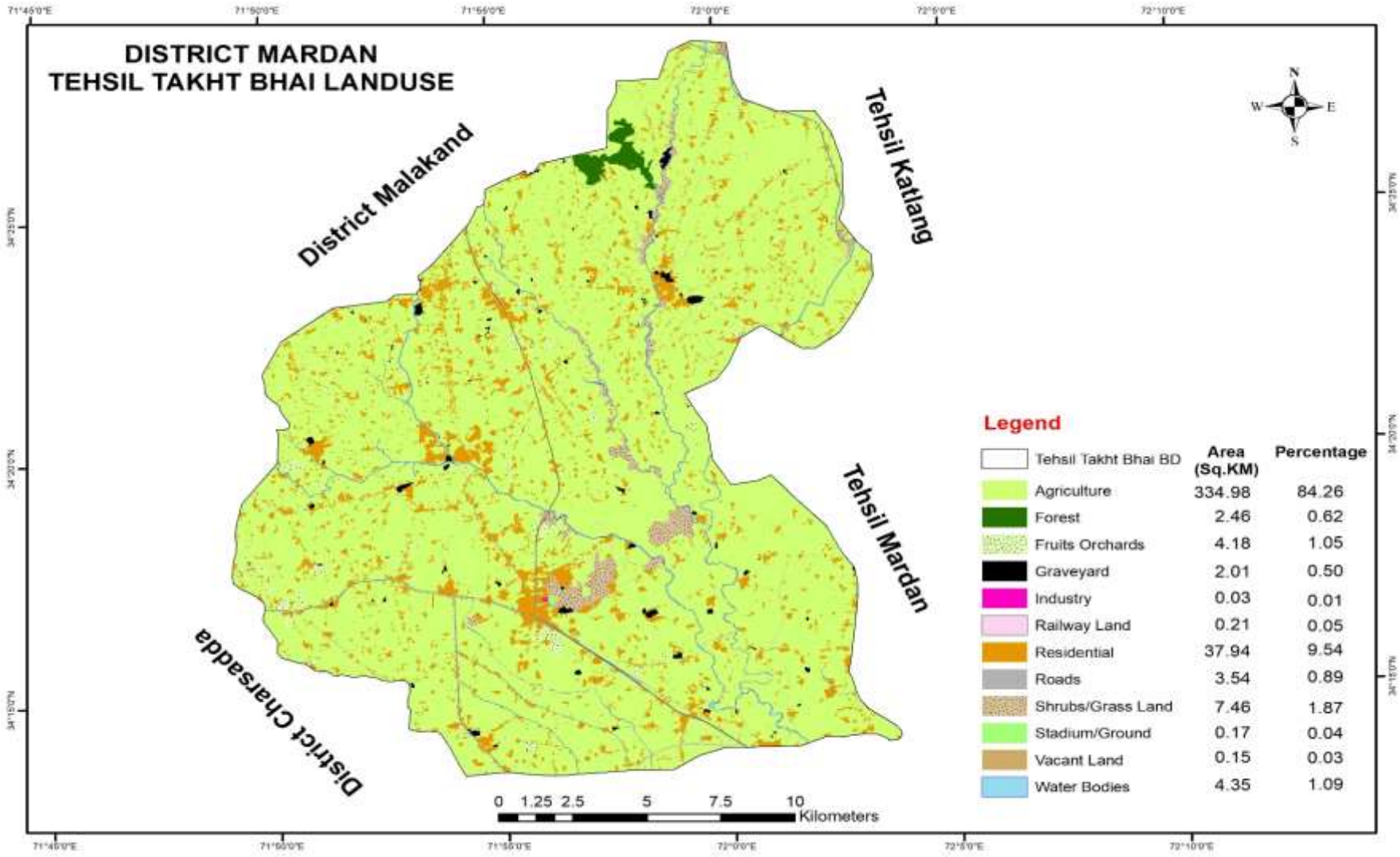


Figure 2. 4 Land Use Distribution in Takht Bhai Tehsil Area



Map 2. 3 Existing Land use Map of Takht Bhai Tehsil

2.3.4 Land Use Distribution in Katlang Tehsil

The Katlang Tehsil comprises the area of 303.17 square kilometer. The most area in this tehsil consists of agriculture land which is 204 square kilometer or 68.23% followed by the Shrubs/Grass land (22.11%), residential (5.26%), forest (2.08%), fruit orchards (0.49%), water bodies (1.23%), roads (0.17%) and graveyard (0.40).

Statistics about Land Uses in Katlang Tehsil are given in Table 2.7 and illustrated graphically in Figure 2.5.

Table 2. 7 Existing Land Use Areas- Katlang Tehsil

Sr. No.	Land Use	Area (Sq. Km)	Area in Percentage (%)
1	Agriculture	204	68.23
2	Forest	6.23	2.08
3	Shrubs/Grass Land	66.02	22.11
4	Fruits Orchards	1.5	0.49
5	Residential	15.72	5.26
6	Roads	0.51	0.17
7	Graveyard	1.20	0.40
8	Water bodies	3.68	1.23

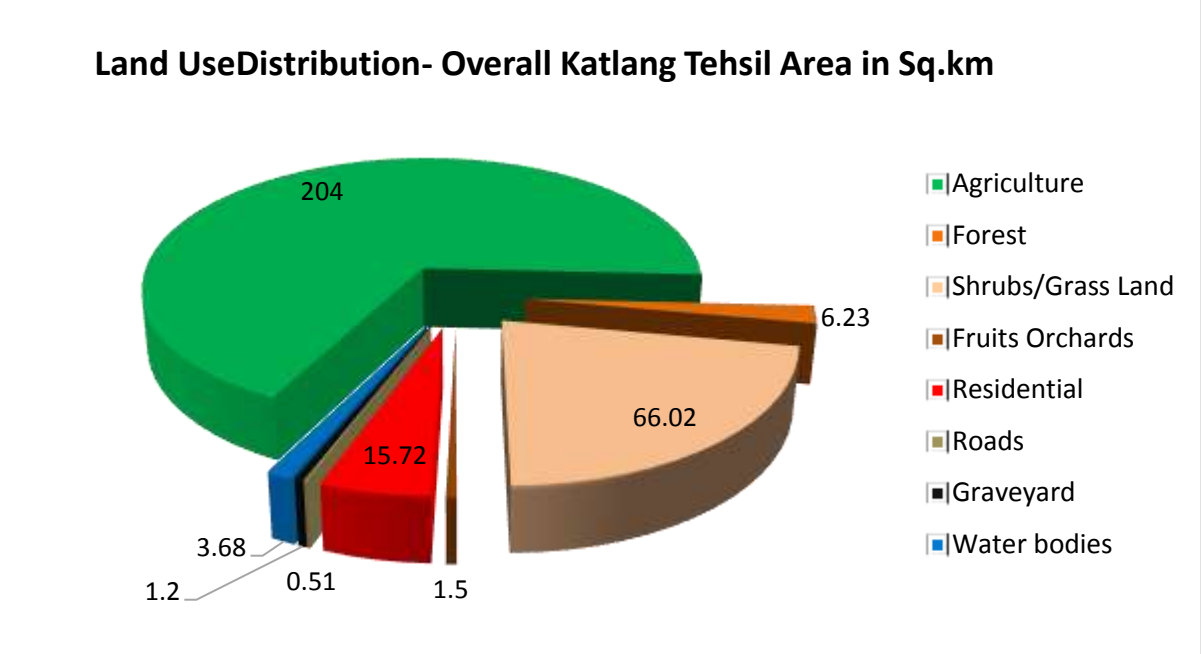
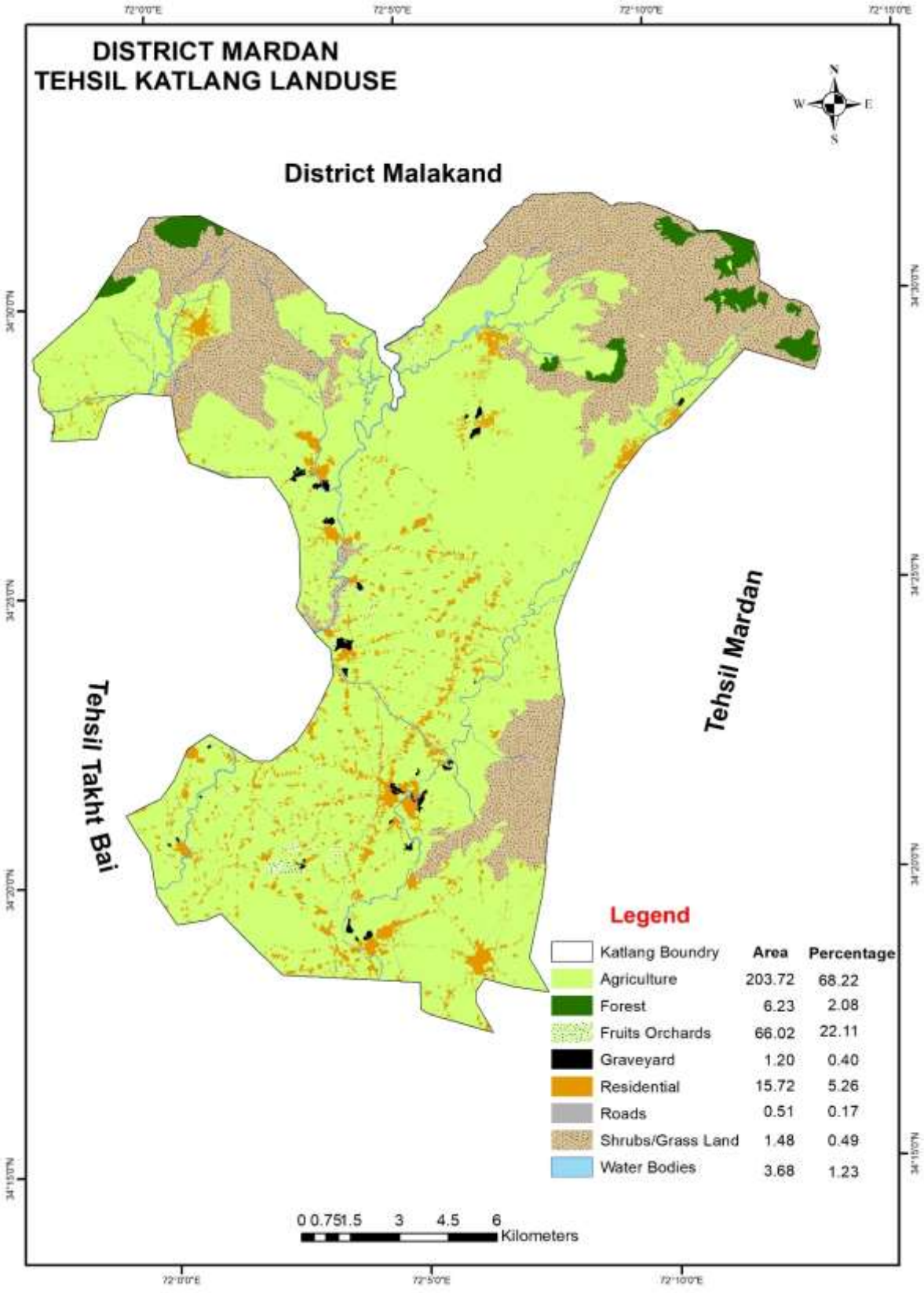


Figure 2. 5 Land Use Distribution of Katlang Tehsil Area



Map 2. 4 Existing Land use Map of Katlang Tehsil

2.3.5 Land Use Distribution in Mardan Urban Area

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

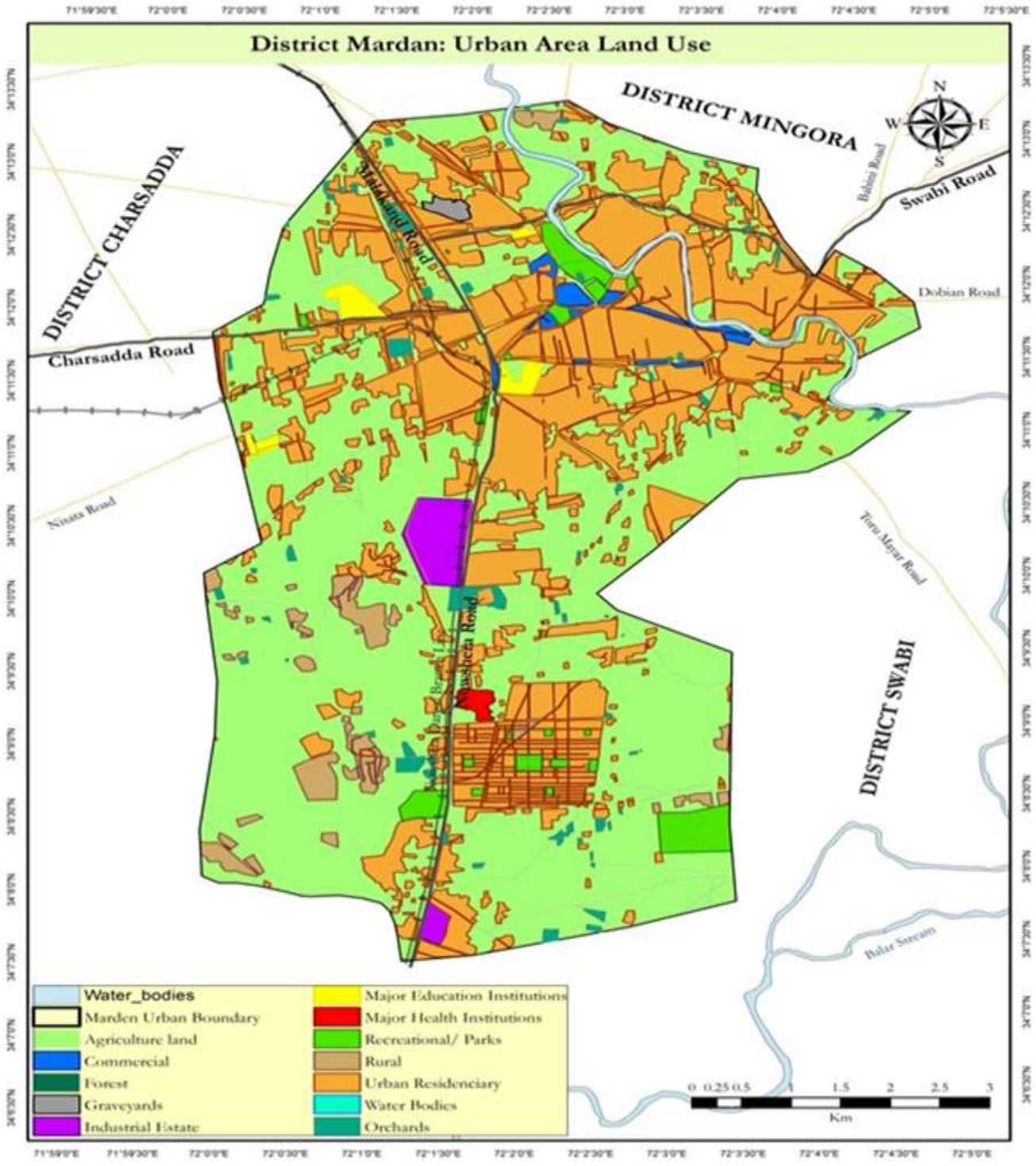
- The current urban area was determined by closely studying the base map/satellite image, and determining the current urban sprawl. The boundary of urban area was thus marked, and its area calculated.
- The urban area was marked considering the Physical feature i.e. water bodies, roads and UC boundaries in which the substantially urbanized/urbanizing area fell (even though such area is not entirely urbanized).

Table 2. 8 Existing Land Use Areas- Mardan Urban Area

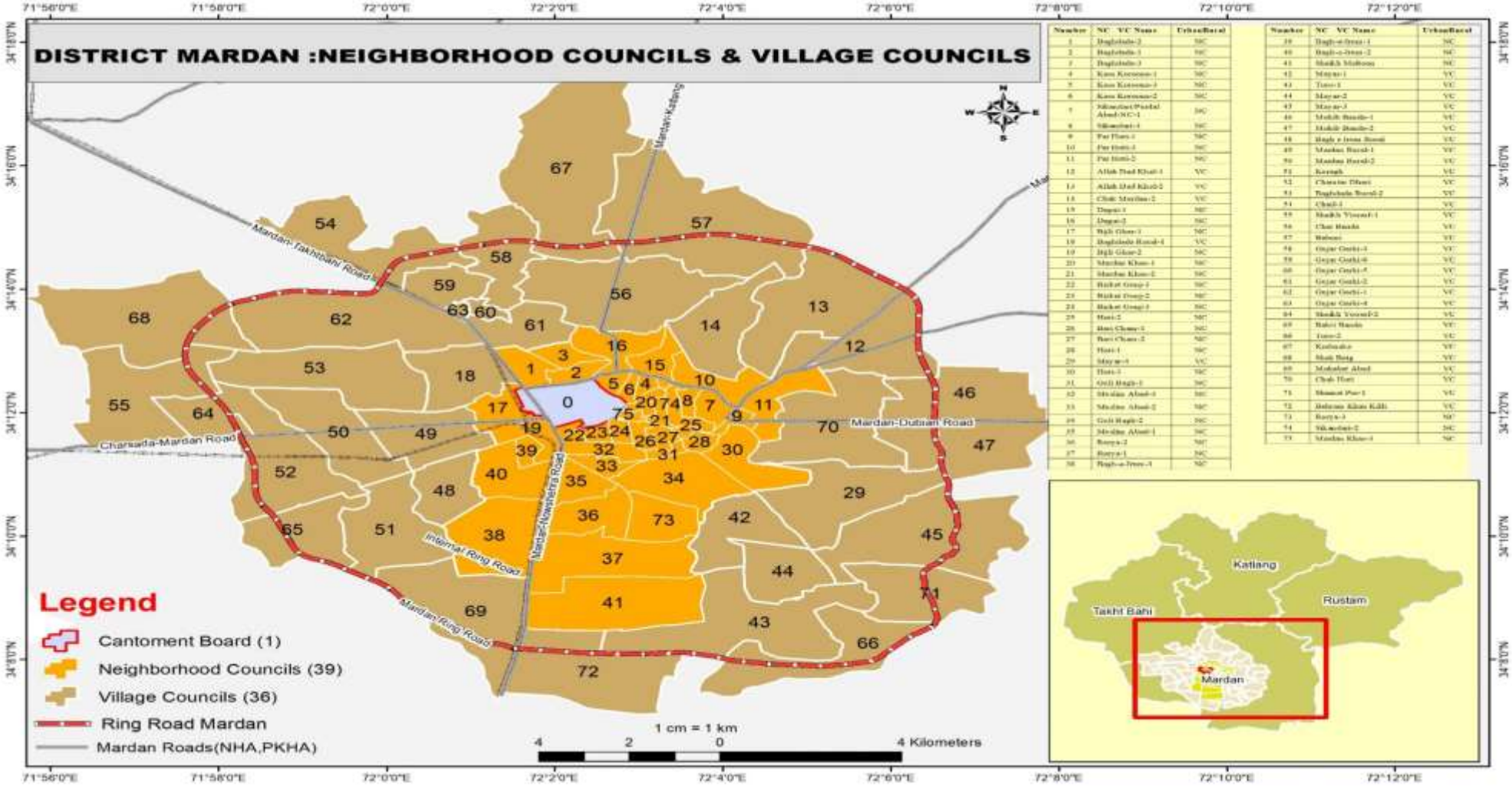
Sr. No.	Land Use	Area (Sq. Km)	%age
1	**Urban Residentiary**	18.16	33.92%
2	**Agricultural Related**		
2.1	Agriculture	30.62	57.21%
2.2	Forest	0.01	0.02%
2.3	Bushes/ Scrubs	0.002	0.004%
3	**Transportation**		
3.1	Roads/Railways	1.61	3.00%
3.2	Terminals	1.61	3.00%
4	**Community facilities**		
4.1	Main Education Facilities	0.27	0.50%
4.2	Main Health Facilities	0.22	0.41%
4.3	Public/Community Uses	0.05	0.09%
4.4	Parks/Recreational Places	1.04	1.94%
5	**Industry**	0.7	1.31%
6	**Commercial**	0.28	0.52%
7	**Graveyard**	0.09	0.17%
8	**Water Bodies**	0.4	0.75%
Total		**53.53**	**100.00%**

Total urban area thus delineated works out in Mardan to be 53.53 square km, of which Urban Residentiary area is 18.44 square kilometers or about 34.45 % of the total urban area. As already stated, Urban Residentiary area is pre-dominantly residential area and also includes the local level facilities i.e. education, health, religious, local roads, shops etc.

Transportation category includes urban roads & railways, terminals i.e. (bus/truck terminals and railway stations). The area under transportation uses is 1.67 square kilometers, i.e. about 3.12 % of the total urban area.

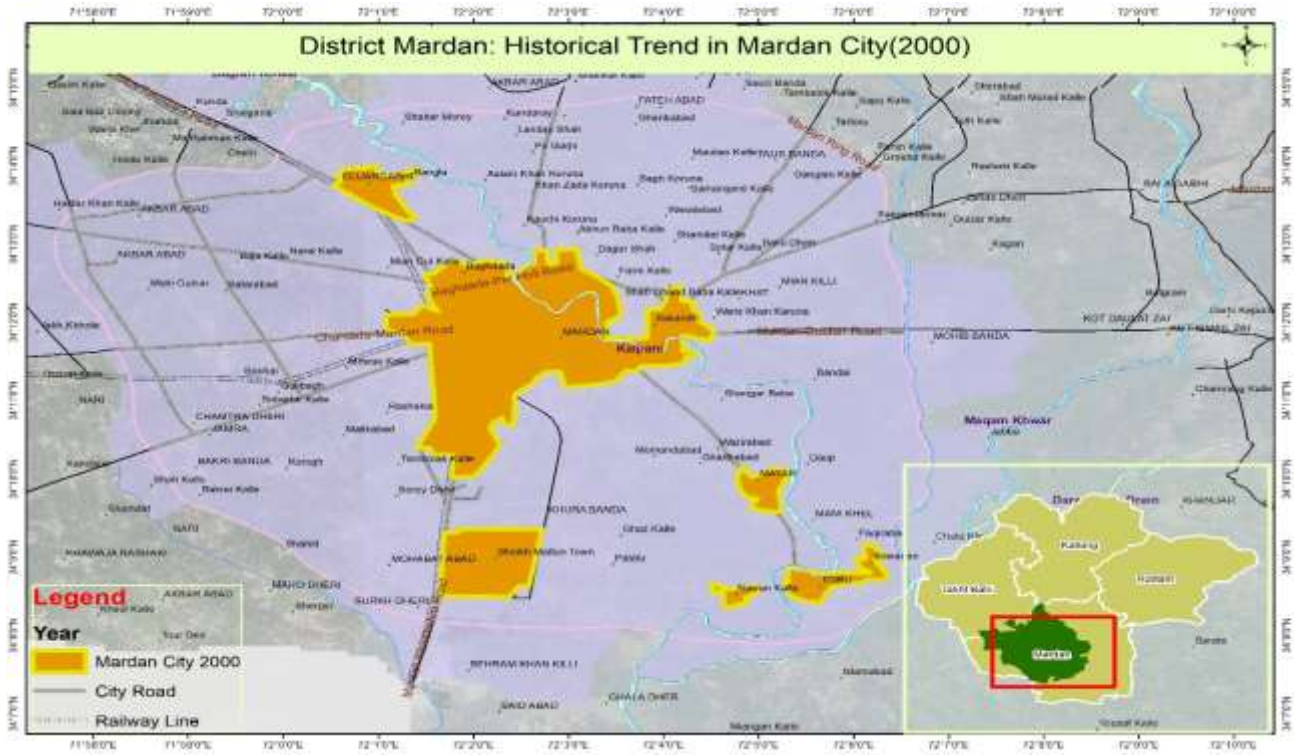


Map 2. 5 Existing Urban Area Land Use of District Mardan



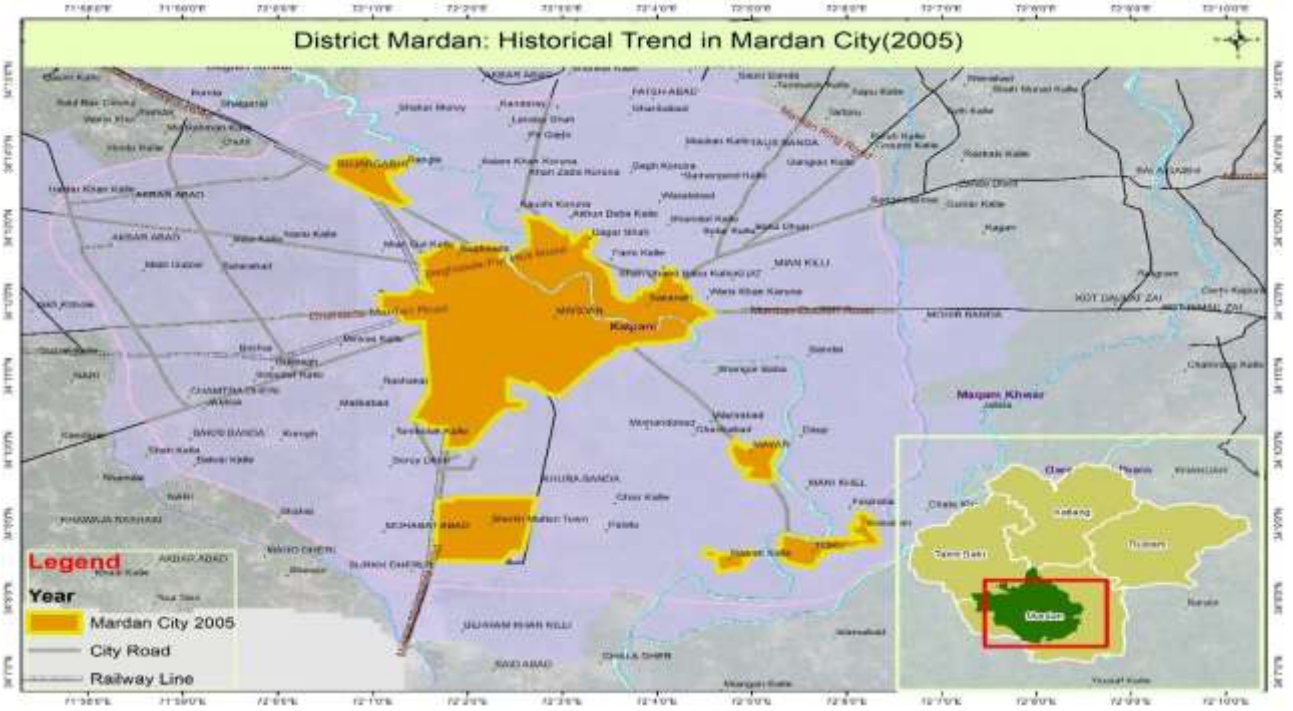
Map 2. 6 Neighbourhood Councils and Village Councils Map of Mardan City

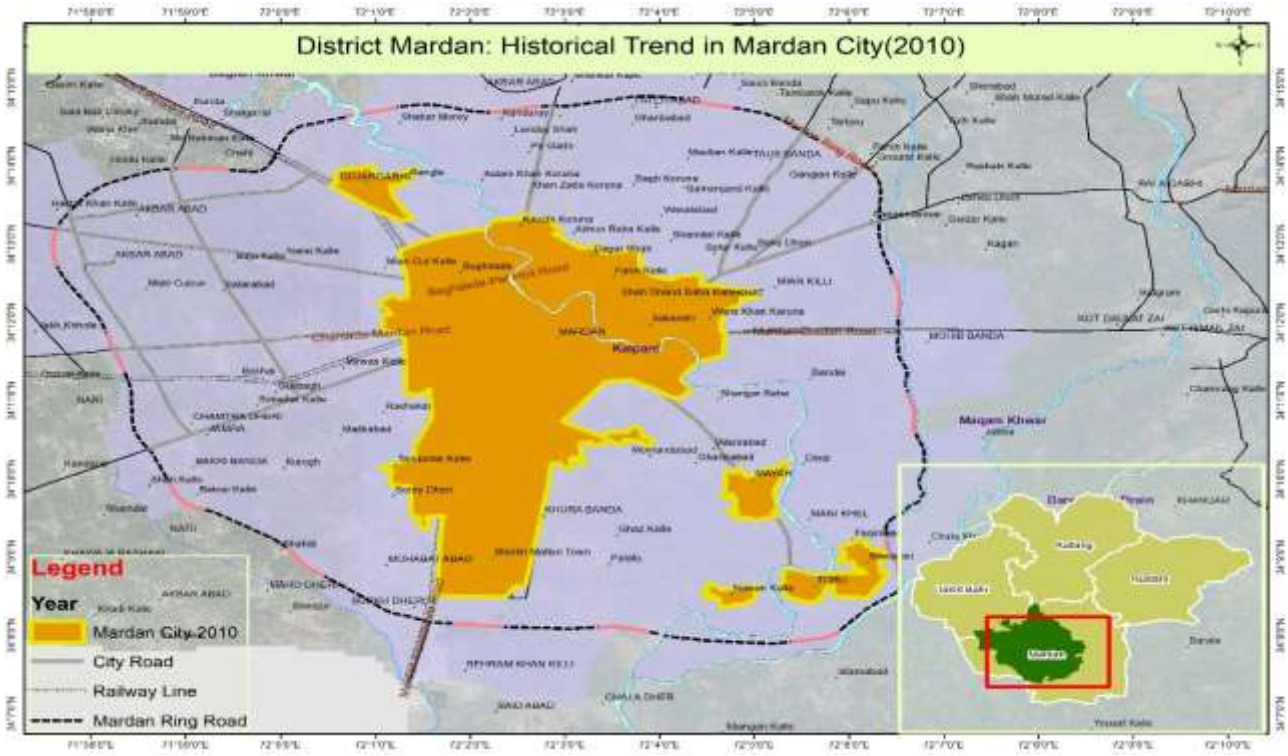
Mardan City is the Divisional and District Headquarter of Mardan Division and District respectively. Mardan, known as the city of hospitality, is a federation of a number of small towns coming together to form a large city. Mardan City contains Mardan Cantonment, 39 NCs of Mardan Municipal Committee and 36 VCs with in Mardan Ring Road (MRR). Thus, the project area is to the extent of the Mardan Ring Road, which is about 142 square kilometers (35,100 acres).



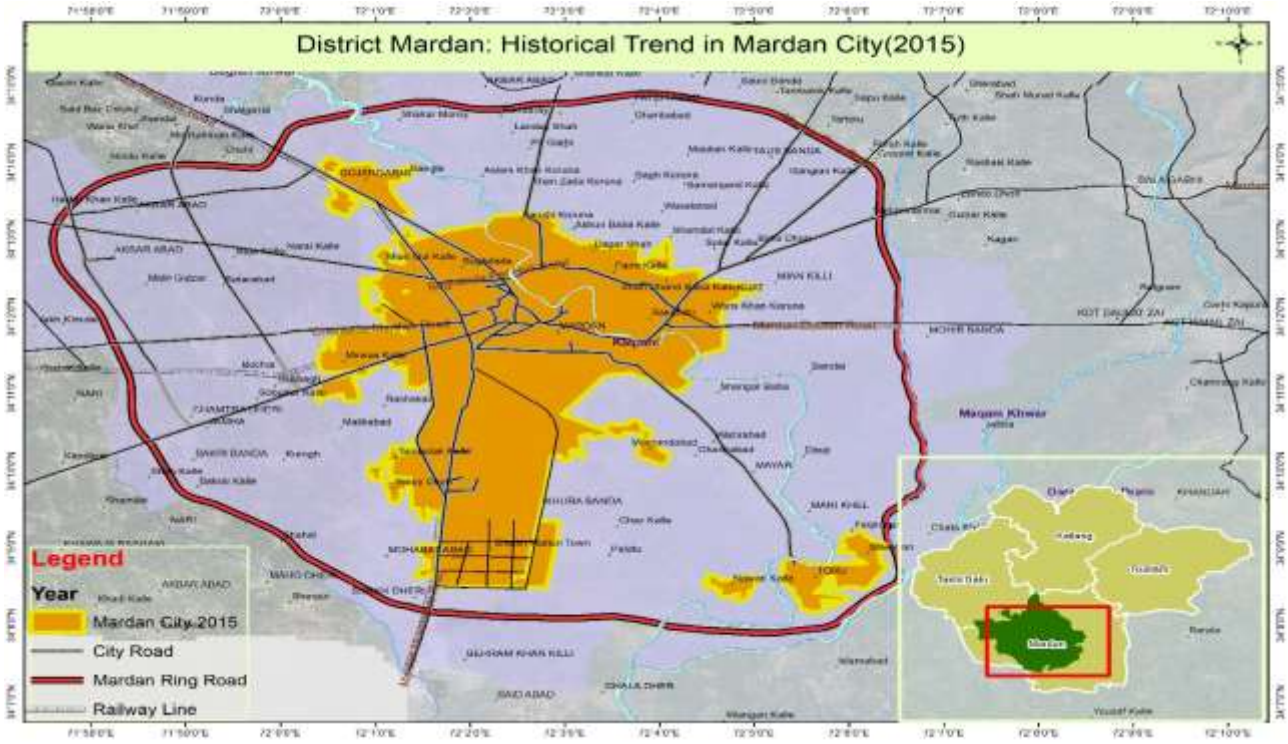
Map 2. 7 Land use map of 2000

As information technology has improved, cartography has largely switched from digitization to informatization, and has begun to focus on automatic mapping requirements, including multiscale expressions of spatial data in geographic information science (GIS), series scale-map production, updating multiscale geospatial databases, and so on. The above image is the application of GIS which allows us to track the change that has occurred in the past years commonly referred as Change Detection. The Difference in both maps clearly indicates the direction of growth during the years and allows us to predict the direction of future growth.



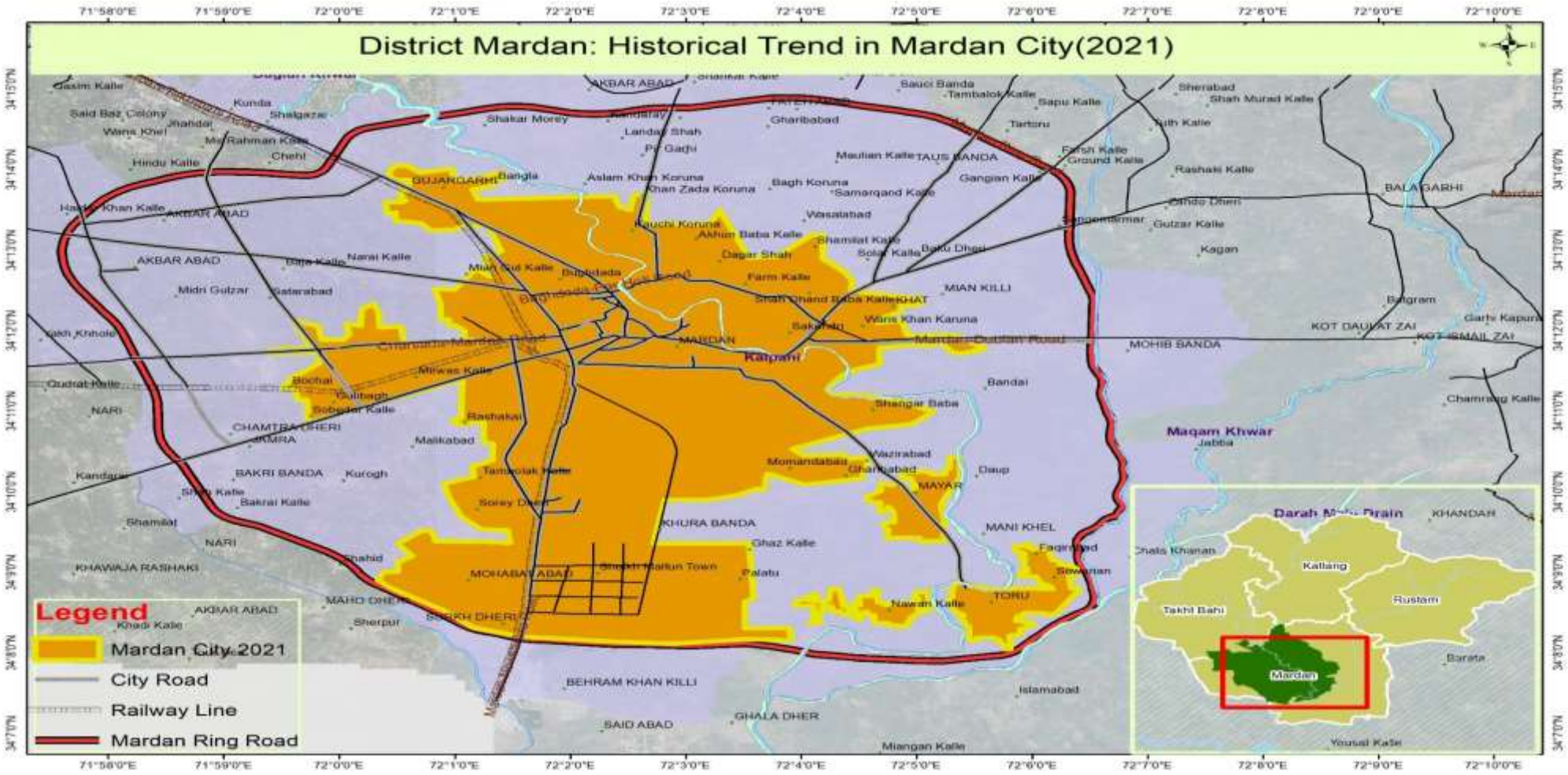


Map 2. 8 Land use map of 2010



Map 2. 9 : Land use map of 2015

Change Detection can be defined as the process of identifying differences in the state of an object or phenomenon by observing it at different times. The Historical trend of the Mardan city is provided in the above figures for the respective years of 2010-2015. Analysis of the above figures revealed that the city has been expanding in all directions, however, the majority of the growth has occurred towards the south of city i.e. towards Risalpur.



Map 2. 10 Land use map of 2021

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. The map clearly illustrates the concept of growth pole theory. It can be clearly seen that the growth is taking place along the major roads which is termed as ribbon development in Planning. Most of the development is occurring alongside the ring road. After analysing the growth of city, expansion for future has not been proposed towards East to avoid Kalpani Khawar which usually gets inundated in rainy season. Furthermore, area further East is also prone to flooding. The new development has been proposed towards North- East and North West.

CHAPTER 3: POPULATION – CURRENT AND FORECASTS

3.1 PAST GROWTH TRENDS: PROVINCE VS DISTRICT MARDAN

Inter-census growth rates of the Province and District Mardan (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 of .09 occur during the period of 1998-2017.

In case of District Mardan, the growth rate has been declined from the year 1951 to 1981, while a slight increase of 0.43 occur from 1981-1998. The growth rate of the District is significantly reduced to 2.58 during the plan period of 1998-2017.

Table 3. 1 Past Province and District Growth Rates

Inter-Censual Period	Average Annual Growth Rate (%)	
	Province[16]	District[17]
1951-1961	2.3%	3.03%
1961-1972	3.6%	3.23%
1972-1981	3.3%	2.81%
1981-1998	2.8%	3.01%
1998-2017	2.89%	2.58%
2017-2021	2.90% Except of Merged District of FATA	2.59%

Table 3. 2 Past Urban- Rural Growth Trends

Year	Urban		Rural		District	
	Population	Urban %	Population	Rural %	Growth Rate	Population
1951	48827	13.66	308628	86.34	---------	357455
1961	81113	16.85	400184	83.15	3.03%	481297
1972	127263	18.27	569359	81.73	3.23%	696622
1981	166302	18.87	715163	81.13	2.81%	881465
1998	295128	20.21	1164972	79.79	3.01%	1460100
2017	477594	18.17	2151191	81.83	2.58%	2628785

[16] Source: Handbook of Population and Housing Census, 1998 Census, Pakistan, Page 1, Table 1.

[17] District Census Report, 1998, Page 25, Table 2.1.

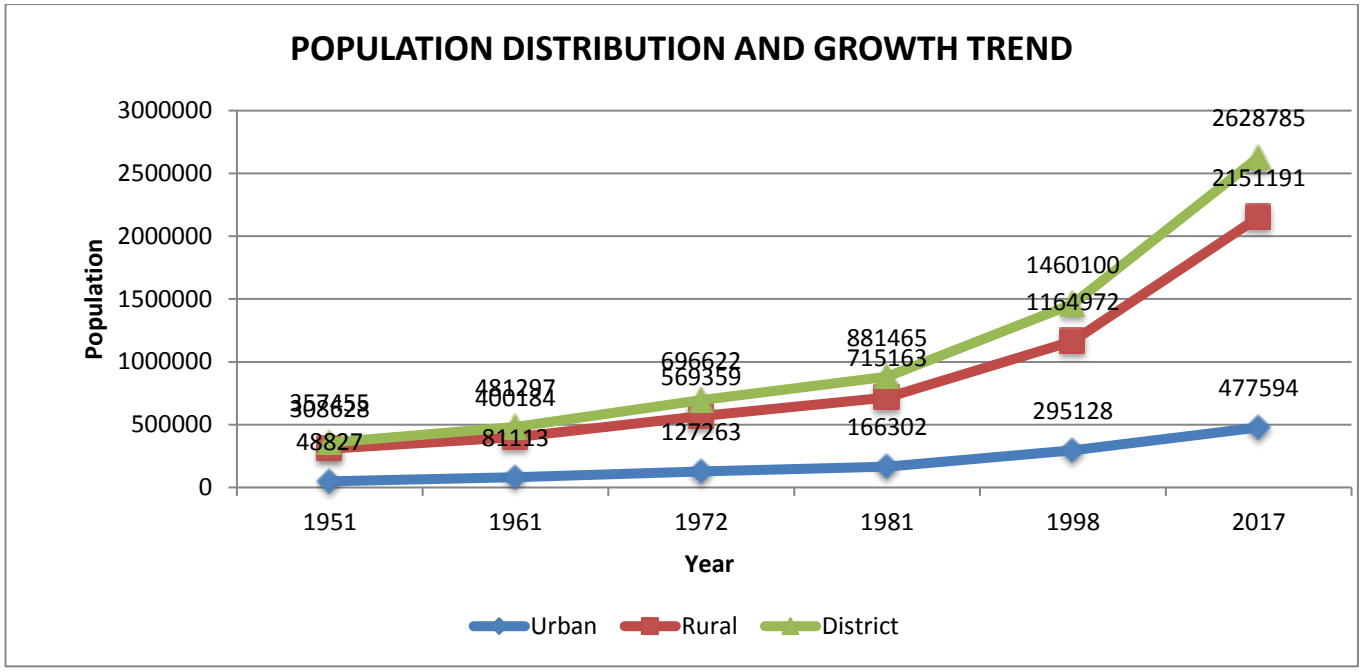


Figure 3. 1 Population Distribution and Growth Trend

3.2 MIGRATION

There are two main causes of population growth:

- Natural Increase
- Migration
  - Conventional Migration
  - Transient Migration

3.2.1 Conventional Migration

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

Table 3. 3 District Population – Migration Vs. Natural increase		
2017 Census	2373061	(i)
2017 (using National G.R@2.4% during 1998-2017)	2291142	(ii)
1998 Census	1460,000	(iii)
Additional Population (1998-2017)	913061	(i)-(iii)=(iv)
Migration	81919	(i)-(ii)=(v)
Natural Increase	831142	(iv)-(v)

National growth rate during 1998-2017 was applied on 1998 population to estimate expected population in the District Mardan in 2017, assuming uniform natural increase. When these figures are compared with actual population as recorded in 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 robust assumption.

The overall national growth rate during the period 1998-2017 was 2.4%. Using this growth rate, the population of District Mardan in 2017 is calculated to be 2,291,142. The actual 2017 census population of the District was 2,373,061, implying a net in-migration of 81919. The additional population during

1998-2017 was 913061, of which, as already stated, the migration component was 81919 (9%), and the remaining 831142(91%) was caused by a natural increase.

3.2.2 Transient Migration

Transient migration in the context of the Mardan District refers to the analysis of mobility due to several factors which are shaped due to 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 May 2011 and reported that 31,284 Afghan families are residing outside regular camps in District Mardan, and their total population is 144,204. The family size thus works out to be 4.6. Most of them are living in Mardan I & III.

IDPs due to Border Disturbances

There are no camp-based IDPs in District Mardan. However, IDPs living outside camps are about 90,000, constituting 17,961 families[19].

Flood Affectees/Earthquake Impact

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

Transient Population		
Transient Population	**Number of Persons**	**Number of Families**
Afghan Refugees	95,459[18]	17,859
Internally Displaced Persons	84	14
Affectees of Flood/Earthquake	--	--
Total	**95,543**	**17,873**

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

Comparing the above with District Mardan's assessed population for 2021, it is estimated that the transient population is around 3.63% of the District's regular population.

[18] Includes those living in District Swabi. There are no separate figures available for District Mardan.

[19] Source: Chief Coordinating Officer, Provincial Disaster Management Authority, Mardan.

3.3 POPULATION FORECASTS

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

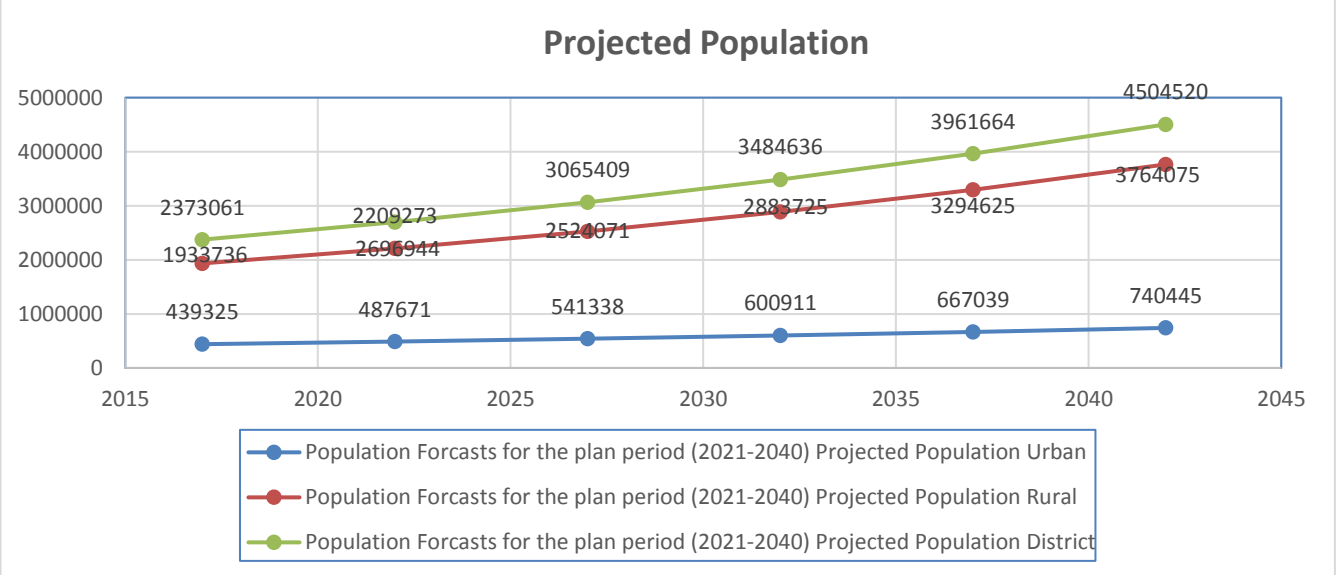
- Regression Analysis
- Extrapolation
- Cohort-Survival Method

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 the plan period (2022-2042)

Period	Projected Population		
	Urban	Rural	District
2017	439325	1933736	2373061
2022	487671	2209273	2696944
2028	541338	2524071	3065409
2032	600911	2883725	3484636
2037	667039	3294625	3961664
2042	740445	3764075	4504520

Figure 3. 2 Projected Population



3.4 POPULATION DENSITY

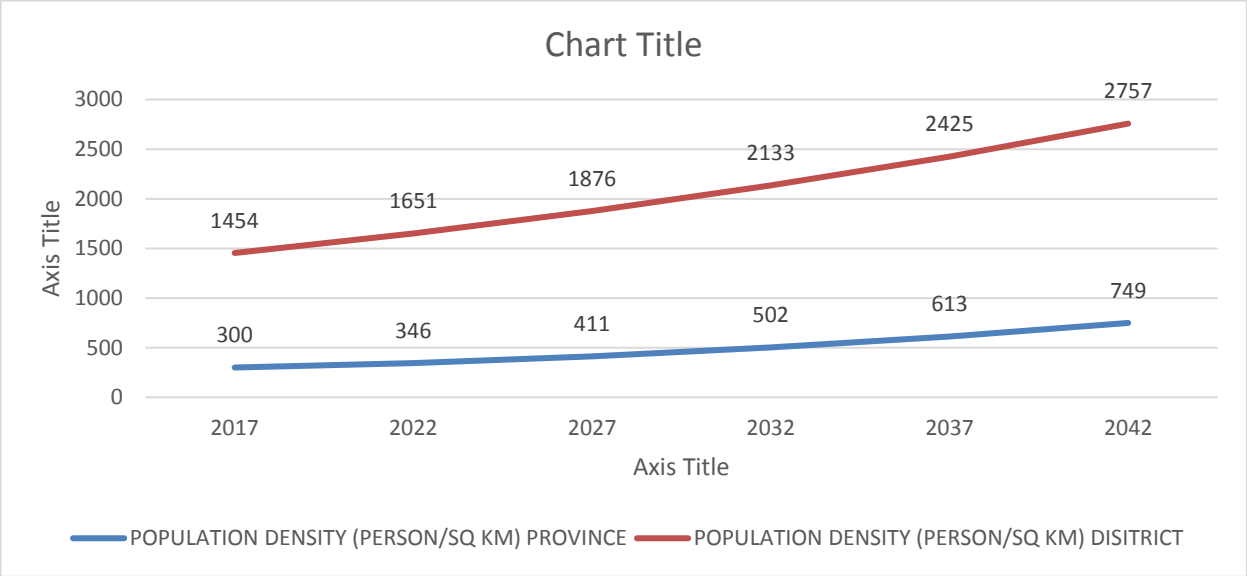
Even more alarming than the population growth trends in District Mardan is its spiraling population density figures, which highlight the demographic dilemma that confronts the District. As of Census-

2017, the population density in Mardan was at 1454.08 persons/ sq. km, compared to 300 persons/sq. km in the Province. The current population density of District Mardan is 1651 persons/sq. km, it is estimated to increase 67% up-to 2757 persons/sq. km at the end of the plan period. The detail is represented in Table 3-5.

Table 3-1: Population Density (Sq. Km) of District Mardan and Khyber Pakhtunkhwa

Table 3. 5 Population Density In District Mardan And Khyber Pakhtunkhwa		
YEAR	**POPULATION DENSITY (PERSON/SQ KM)**	
	PROVINCE	**DISITRICT**
2017	300	1454
2022	346	1651
2027	411	1876
2032	502	2133
2037	613	2425
2042	749	2757

Figure 3. 3 Population density of District Mardan Vs KP



The Age-Sex distribution of population in the year 2017 is shown in the pyramid below[20].

[20] In terms of percentages, the age-sex distribution remains stable and does not significantly change over a period of time; the distribution is based on 1998 census.

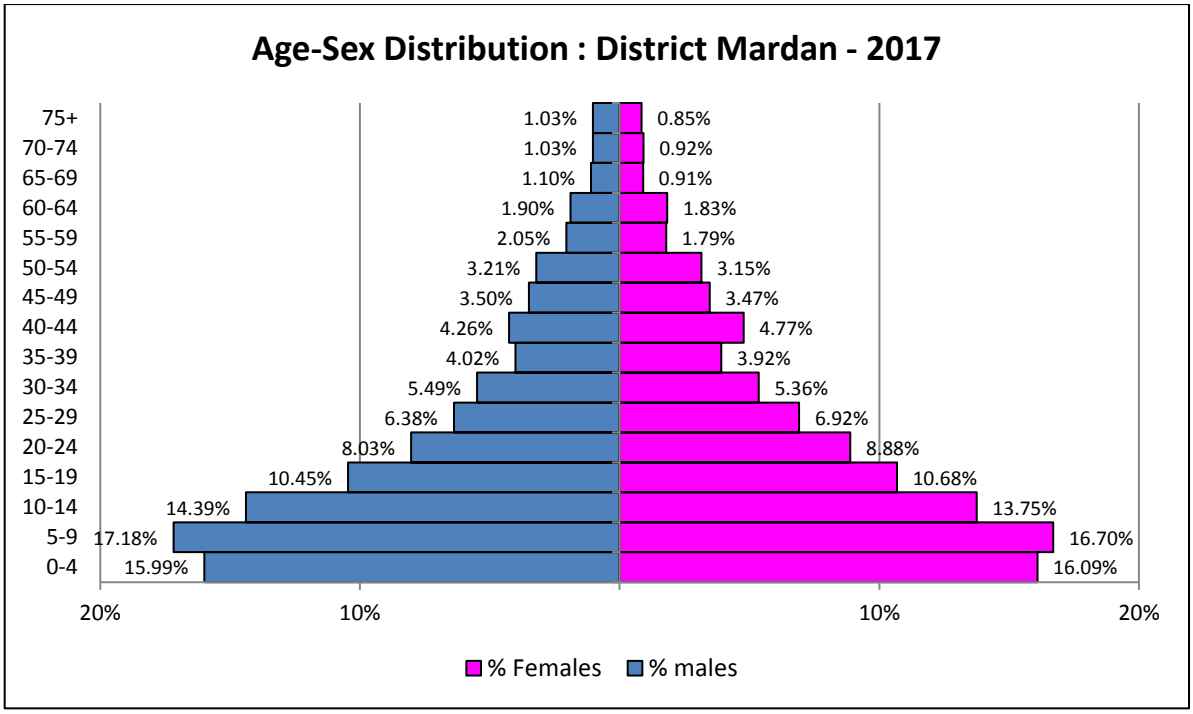


Figure 3. 4 Age-Sex Distribution of District Mardan

CHAPTER 4: REGIONAL PLANNING CONTEXT

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 Land Use Planning encompasses the entire Peshawar Valley comprising of the administrative five Districts i.e. Peshawar, Mardan, Nowshera, Charsadda and Swabi.

Regions require various Land Uses; protection of farm land, 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 in order 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 sphere of Influence of urban settlements with in the Region.
- Reducing pressure on Urban Centers.
- Establishing development corridors, new towns, and planning for rural areas.

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

4.1 HIERARCHY OF SETTLEMENTS:

4.1.1 Objectives of Hierarchy of Settlements:

The overall objective of establishing 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. Structure is determined by the functions and roles of the settlements.

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 centers 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 in order 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 objectives of the Project in order to set out a clear order of preference for the location of different developments. The larger cities having higher threshold population 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 Charsadda. In District Charsadda, Charsadda town needs higher order facilities than its smaller urban centers such as Utmanzai or Tangi; and such smaller urban centers need more facilities than the surrounding villages.

The hierarchy of settlements in case of Peshawar Valley has been determined on basis of 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
- Administrative status of settlement (i.e., District or Tehsil headquarter).

Scoring for each of the above was done as below:

Table 4. 1 Characteristic-wise Distribution of Score

Characteristic	Score
Settlement Population	1 for every 100,000 population
Location with respect to Peshawar Valley Development Corridor	Inside: 2 Outside: 0
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.
Number of universities	One score per university. If the number of universities exceeds 10, they get a maximum score of 10.
Availability of airport	Airport available: 3 Airport not available: 0
Administrative status of settlement (i.e. District or Tehsil headquarter).	District Headquarter: 2 Tehsil Headquarter: 1

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

The result of this exercise is given in the Table 4.2 below:

Table 4. 2 Hierarchy of Settlements Score-wise

Settlements	Population Score		Location (inside/Outside RDC)	Number of Hospital Beds/1000 Population	Number of Universities	Airport	Administrative Status (DHQ/THQ)	Total Score	Hierarchy
	Population (2019)	Score							
Peshawar	1,928,475	19.28	2	2.83	15	1	2	42.11	1
Mardan	457,049	4.57	2	1.02	4	0	2	13.59	2
Swabi	155,185	1.55	2	2.09	3	0	2	10.64	3
Takht Bhai	155,538	1.56	2	0.86	0	0	1	5.42	8
Charsadda	132,737	1.33	2	1.66	1	0	2	7.99	5
Nowshera	122,070	1.22	2	1.01	3	0	2	9.23	4
Shabqadar	111,759	1.12	2	1.03	0	0	1	5.15	10
Pabbi	84,357	0.84	2	1.37	0	0	1	5.21	9
Jahangira	59,907	0.6	2	0	0	0	1	3.6	12
Topi	56,002	0.56	2	0.94	1	0	1	5.5	7
Risalpur Cantt	53,449	0.53	2	0	0	0	0	2.53	14
Aman Garh Industrial Area	57,630	0.58	2	0	0	0	0	2.58	13
Tordher TC	51,227	0.51	0	0	0	0	0	0.51	17
Zaida MC	41,657	0.42	0	0	0	0	0	0.42	18
Tangi	35,665	0.36	2	2.35	0	0	1	5.71	6
Utmanzai	35,293	0.35	2	0	0	0	0	2.35	15
Akora Khattak	30,225	0.3	2	1.73	0	0	0	4.03	11
Nawan Killi	30,087	0.3	2	0	0	0	0	2.3	16
Cherat Cantt	5,875	0.06	0	0	0	0	0	0.06	19

4.1.3 Conclusions:

Peshawar is the primate city of Khyber Pakhtunkhwa. In other words, it is disproportionately larger than any other town or city in the urban hierarchy. The sheer size and activities of Peshawar becomes 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, Nowshera and Charsada in terms of population, area of influence and services provided.

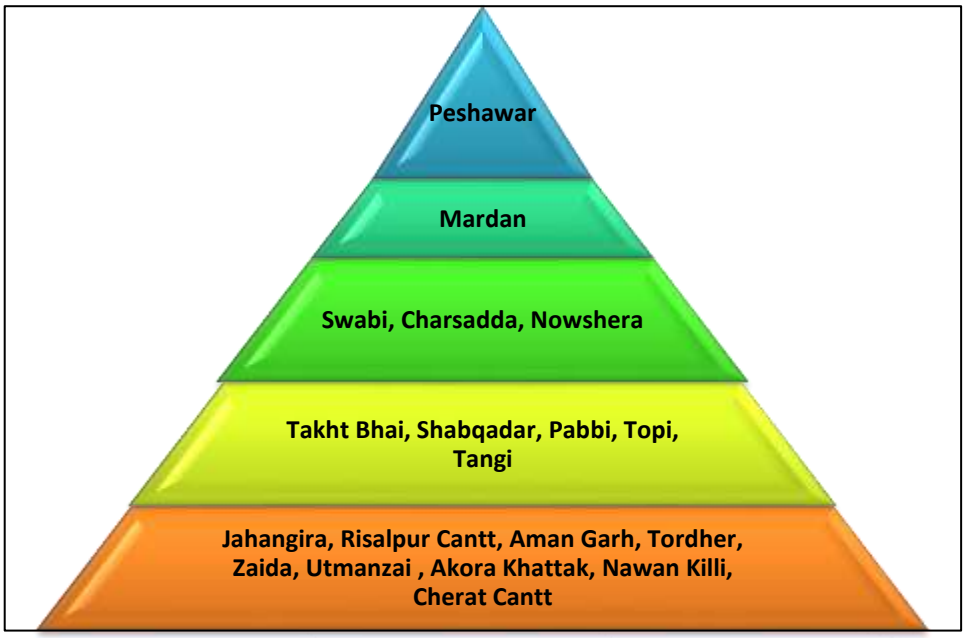


Figure 4. 1 Hierarchy of Urban Settlements in Greater Peshawar Region

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

4.2 GROWTH TREND OF URBAN SETTLEMENTS:

According to 1998 census report, there were 21 urban settlements in the greater Peshawar region. In 1981 however, there were 17 urban settlements in the valley, as four settlements in that year did not

Table 4. 3 Urban Settlements Growth Rates

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

have urban status. These included University Town in District Peshawar, and 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 time-series context.

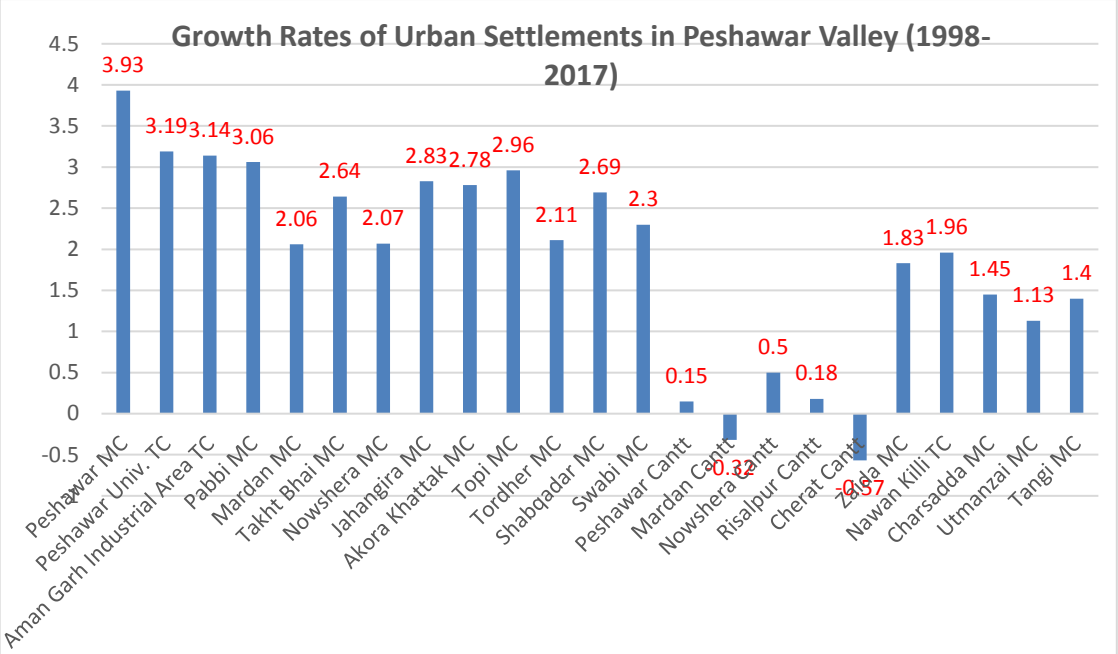
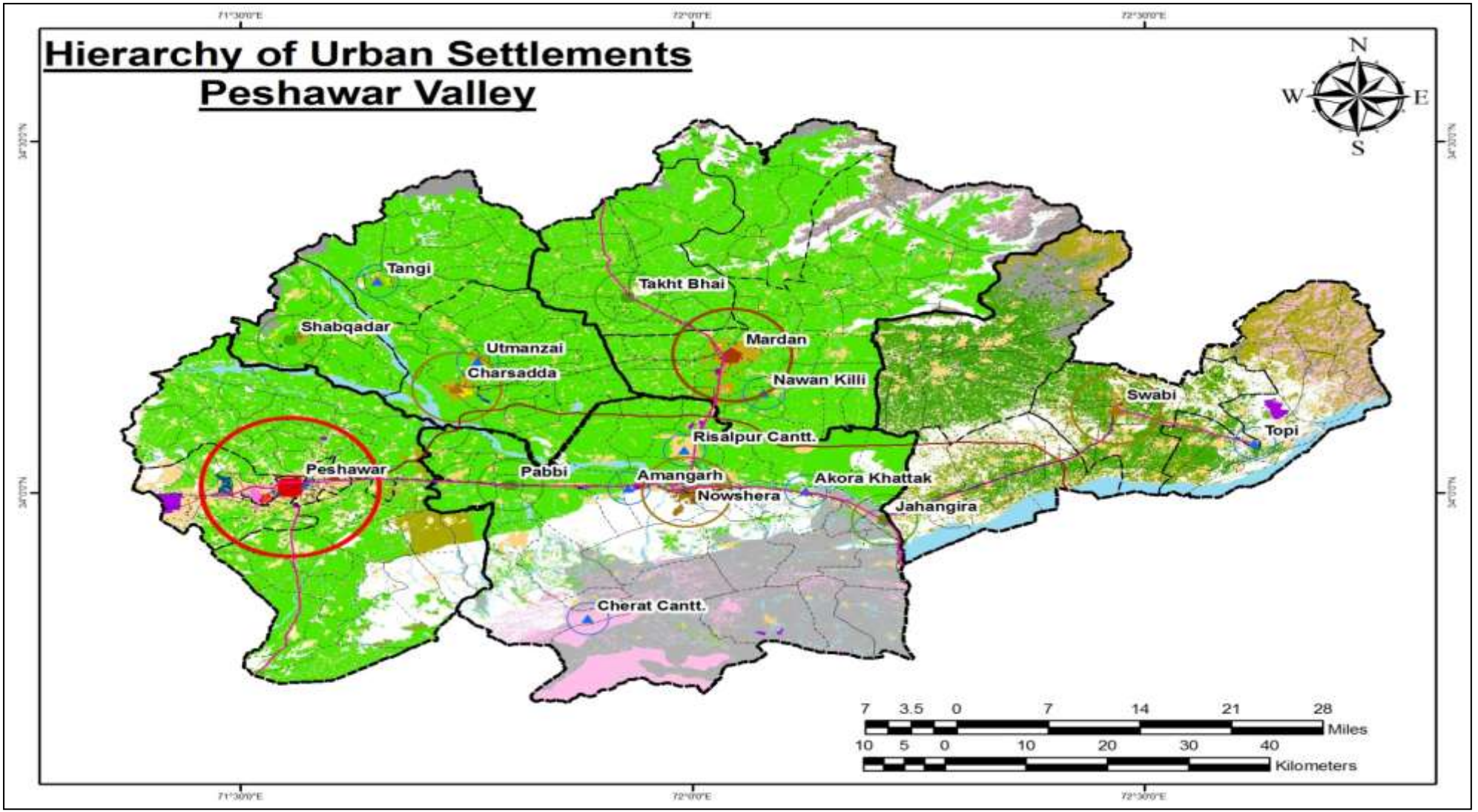


Figure 4. 2 Growth Rates of Urban Settlements in Peshawar Valley

Table 4. 4 Growth Pattern of Urban Settlements in Peshawar Valley		
Urban Settlements	Growth Rate (1998-2017)	Settlements with Growth Rate Differences
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 in Peshawar valley

Note: The radii of circles correspond to population sizes of settlements (Radii Not to Scale)

4.3 CENTERS AND ITS SPHERES OF INFLUENCE:

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-KM radius, whilst a leisure activity, such as going to the city park may attract them from far further away.

The larger a settlement, 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 avail 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 service or facilities to be successful. The more specialized an activity or service will require a higher threshold population. The same applies to settlements as given in the diagram below.

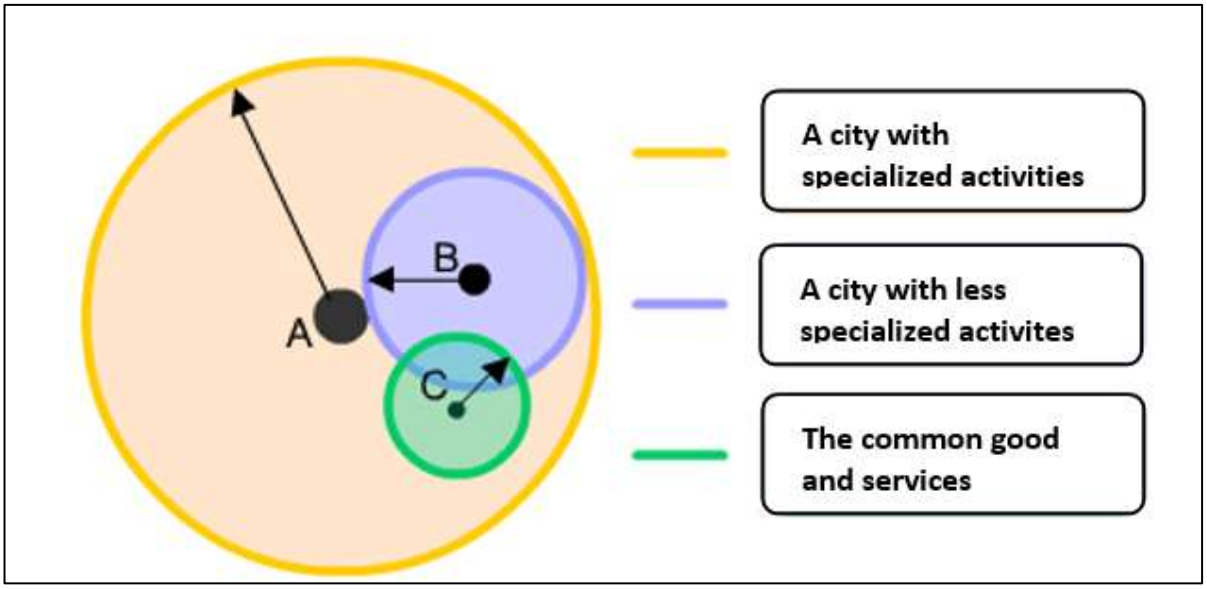


Figure 4. 3 Centers and their Spheres

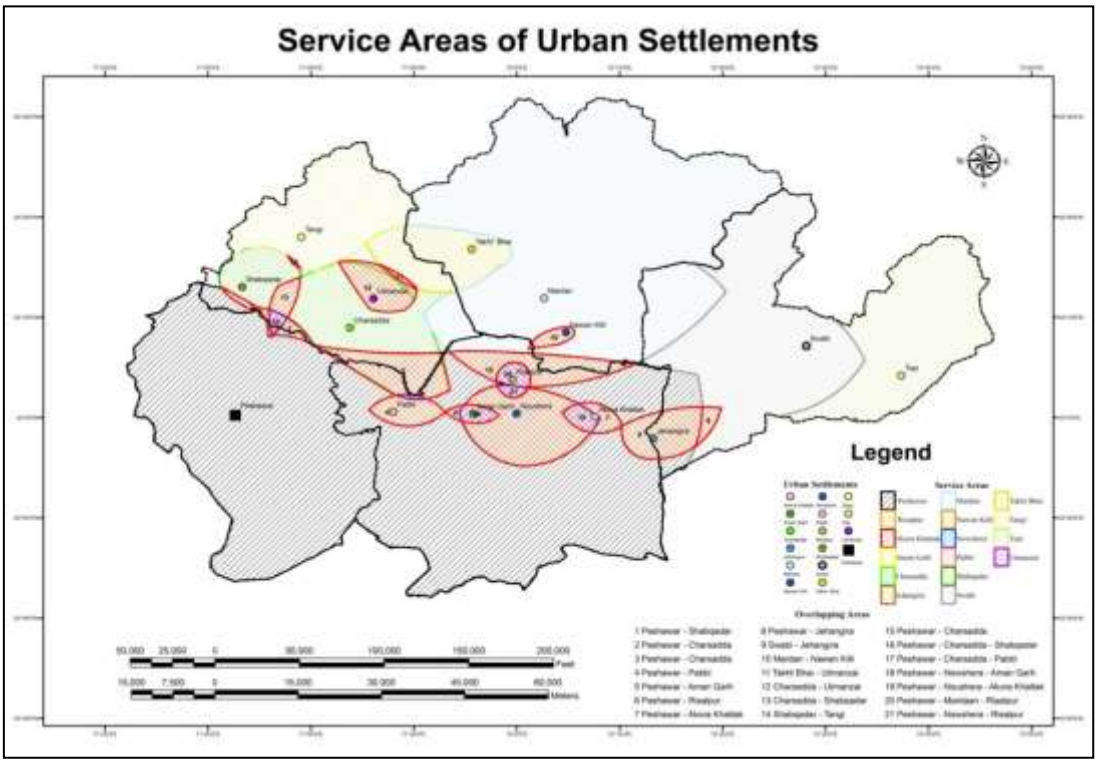
Gravity models measure the pulling power of competing locations, whether cities, shopping centers or towns and the influence this has on the customers that reside within the boundaries. Models identify a boundary line, called the breaking point, at which customers that reside within the boundaries, either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

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 area of influence 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 Services Areas of Urban Settlements

4.4 REDUCING PRESSURE ON LARGE 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 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. In fact, these development corridors will also have a spill-over effect even outside these corridors.

To efficiently reduce migration pressure on larger urban centers, there is an emergent need to establish 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 Centre', 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 in subsequent sections.

4.5 REGIONAL DEVELOPMENT CORRIDOR (RDC):

Regional Development Corridor (RDC) is a major project of Greater Peshawar Region being proposed under the KP Land Use Project. Development corridors are described as transport (or trade) corridors with under-utilized economic potential in their environs, 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 optimize the use of existing infrastructure and resources. RDC can become the framework and platform for comprehensive and integrated development in the Region. RDC needs to be given great importance as well as active promotion.

RDC will be of great significance to the development of Peshawar Valley which will provide new opportunities, new vision as well as new impetus to the developmental activities. It will effectively promote the economic and social development of the valley. The construction of RDC 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 2021-2040, RDC 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, consensus among Districts through consultation, mutual benefit and win-win results, as well as ensuring quality and safety. Greater Peshawar Region should agree to make a list of prioritized or early harvest projects as well as the long-term plan for RDC. The prioritized or early harvest projects mean the projects which will be completed before 2025, and others by 2040. RDC is a vision with the long-term planning up to 2040.

The central role of the RDC would include 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 alteration and city planning, etc.

To promote the establishment of RDC, the provincial Government needs to set up a RDC Committee, under which there would be a number of working groups for projects till 2024, 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, medical, and vocational institutes. Although hydro-electric projects will be located outside RDC framework, feasibility studies will have to be conducted for Solar and wind Power Projects in the proposed corridor.

Efficient, fast transportation network is of vital importance to the economic development. The existing transportation system of Peshawar should be upgraded on priority basis through systematic planning and link it with Annual development plan (ADP). New routes can be proposed to increase accessibility and avoid congestion. At the same time, feasibility study needs to be conducted for upgrading railway network in the Grater Peshawar Region. (Grater Peshawar region circular Railway)

The RDC 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, RDC will

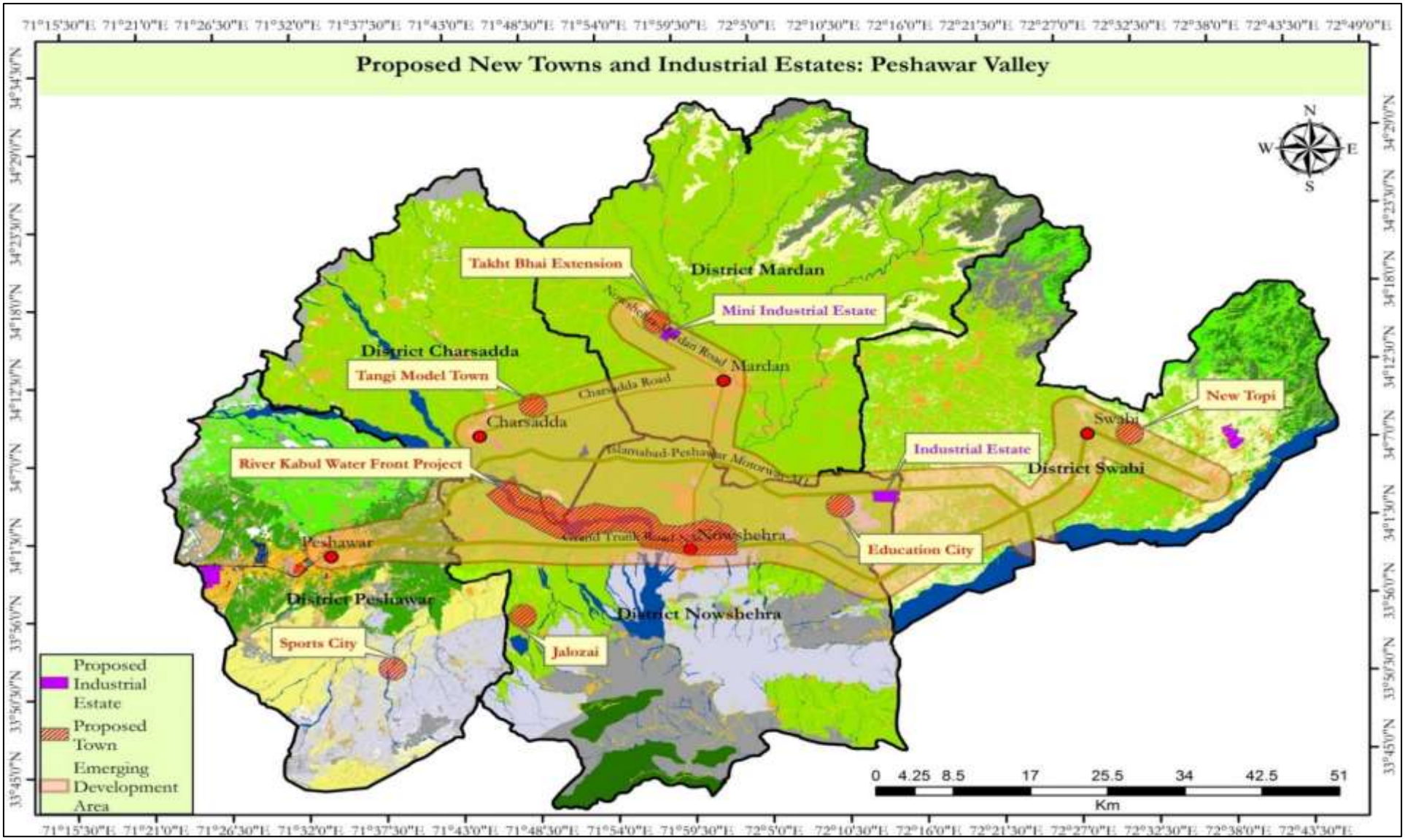
play an increasingly important role in promoting the economic development and uplifting living standard across different parts of of the Province. These projects will help boost employment and tax collection, strengthen the provincial road connectivity, promote economic development as well as improve people's living standard.

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

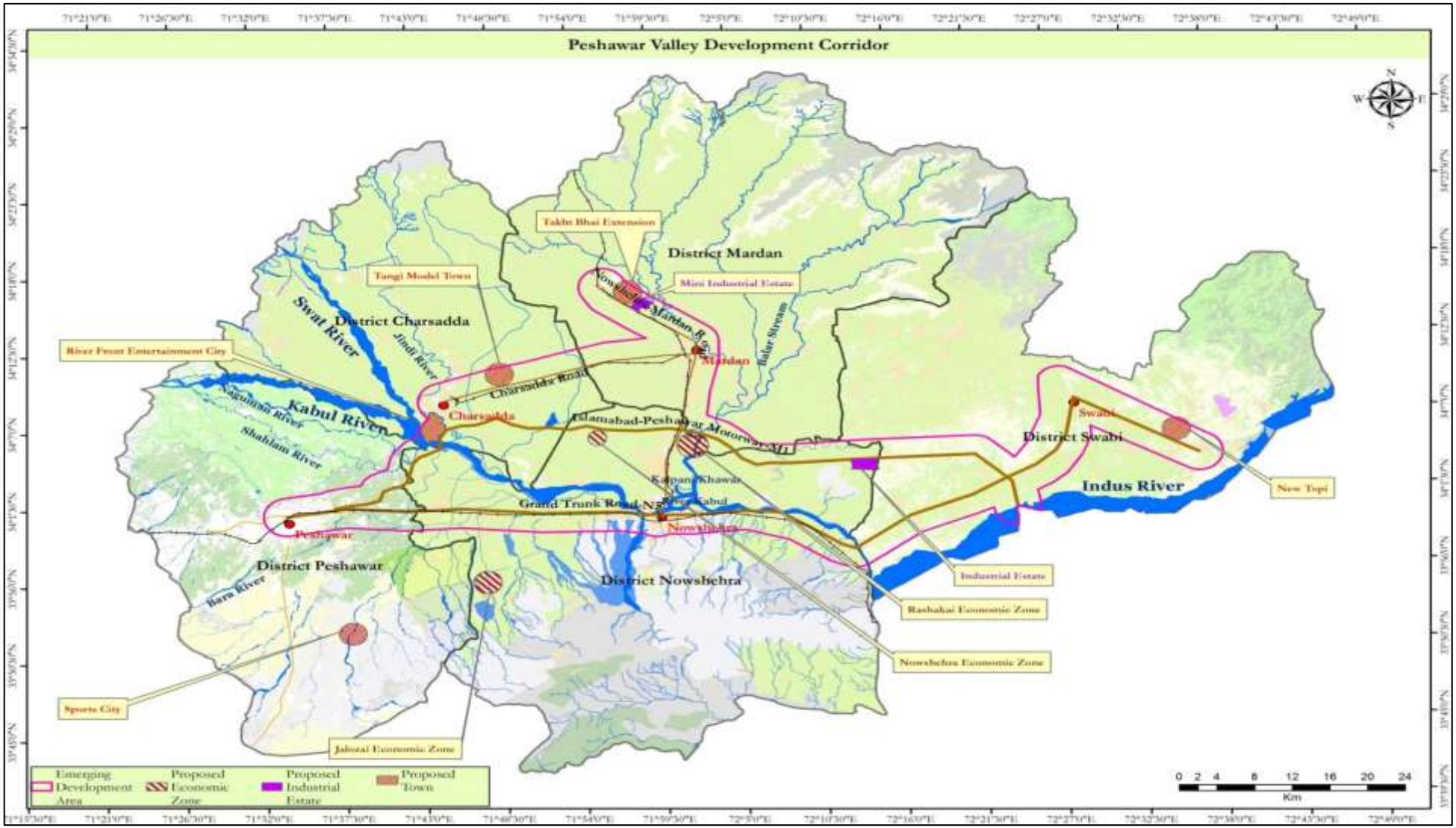
It is important that the identified corridors should be able to generate densification activities, and efforts to stimulate SMEs in the proposed corridors. It is also important to establish an appropriate legal and institutional framework before the project gets rolling.

It needs to be ensured that no speculation 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. To get maximum benefit from CEPAC, these corridors should be linked with CEPAC. This will help the provincial government to attract both national and international investors.

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 New Towns and Industrial Estates in Peshawar Valley



Map 4- 1: Peshawar Valley Development Corridor

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

There are many classical theories developed over last two centuries to explain the reasons behind the distribution patterns, size, and number of cities and towns in a region. However, in real life due to so many factors it is not possible to determine hierarchy of settlements based on hypothetical models. Hierarchy of settlements can be determine based on the level of services provided and their population sizes.

The analysis and inferences drawn in earlier section regarding hierarchy of settlements provides solid basis to establish satellite, intermediate, secondary and industrial towns as focal points for 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:

4.6.1 Satellite Towns:

A satellite town or satellite city is a concept in urban planning that refers essentially to smaller urban areas which are located somewhat near to, but are mostly independent of larger metropolitan areas. The large urban center in greater Peshawar region has a great potential for establishment of both new satellite town as well as execution of existing satellite town like Hayatabad and Ragilalma in Peshawar and sheik Maltoon in Mardan. The extinction of both Hayatabad and Sheik Maltoon is highly describe and required of the boundaries of these two towns are not immediately extended. The uncontrolled urban growth will create land like conditions around these towns and will have a negative environmental impact on these towns. Due to unplanned growth around these satellite towns that will disrupt, these disturb the municipal services in these areas also. In future these residents will face multiple problems.

4.6.2 Intermediate Towns:

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

In fact, 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.

4.6.3 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.

4.6.4 Industrial Towns:

An industrial town is described as the one with predominant industrial economic base and where workers live within walking-distance of their places of work. The term also implies the ways in which economic specialization arises through clustering in a particular industry-zoned urban area. Firms in industrial towns get benefits of aggloments and economize their cost of production to better compete in the national and international market. (Due to scarcity of resources 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 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 predominent 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 Jalozai Economic Zone will have readily available trained human resource 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 Kms from Peshawar near Mardan interchange on 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 of production and of incomes of 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 urbanised 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 the purpose of '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 rest of the Country, new housing schemes and townships within urban areas primarily cater for the needs of upper strata of society, but 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 centersto permit the renewal of central city areas.

New towns are also planned for rural population 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 creation of such towns can be 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 a huge potential of developing an 'Entertainment City' near Charsadda Interchange on M1. Spread over around 5,000 kanals, it has 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 regional level.

4.10 PROPOSED NEW TOWN OF THE PHA:

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 Provincial Housing Authority. The site is located near Kernel Sher Khan Interchange on Peshawar - Islamabad Motorway. 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. Total area of scheme is 8905 kanals, while the number of plots is 8,044.

4.11 OTHER FEASIBLE LOCATIONS FOR NEW TOWNS:

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.

Tangi Town is located at a distance of 22 kilometers from north of the District capital of Charsadda; while Charsadda is about 28 Kms from Peshawar. Charsadda has one of the most fertile lands in KP. There are three rivers 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 agriculture produce of Charsadda are; Tobacco, Sugarcane, Sugar beet, Wheat and Maize. Vegetables include Potato, Tomato, Cabbage, Brinjals, Okra and Spinach. Among orchards; Apricot, Citrus, Plum, Strawberry and Pears are famous. Strawberry, Sugarcane and Tobacco are cultivated abundantly.

Charsadda is also famous for Foot Wearing, Cloth Wear and Fishery that contribute a lot towards the District economy. 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 (Peshaware Chapal). As already stated, cloth wear manufacturing is also an attractive business for the people of Charsadda.

Being close to Peshawar metropolis and hence under its shadow effect, Charsadda has not developed industrially as it should have, particularly for agro-based industry. Besides, being close to Peshawar it has many locational advantages. Charsadda also function as a satellite town of Peshawar most people commute daily from Charsadda to Peshawar and back increasing traffic load. Further, people who can afford, tend to build houses in Peshawar causing its sprawl and related issues. A well-planned town near

Tangi with required urban facilities and services in District Charsadda will help to control this trend and also provide impetus to the District (and hence regional) economy.

4.11.1 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 of the region. It is also the second largest settlement of District Mardan, after Mardan City. Takht Bhai is situated 15 km from Mardan on Swat-Malakand Road. In 1908/9 the 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, so stop further encroachments. There is a need for a new township at an appropriately located site near Takht Bhai, along with appropriate living environment, along with tourist rest houses and restaurants where people can relax before and after they embark for the on-wards mountain journey. This will reduce pressure on Mardan City, and will also help to develop Northern part of Mardan District, as Takht Bhai will become a growth pole for this part of the region.

4.11.2 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 of Pakistan. Gadoon Amazai Industrial Estate, is also a few kms North-East of Topi. All these key Land Uses i.e. Tarbela dam, GIKI, Gadoon Amazai Industrial Estate and the geographic location of existing Topi settlement justify a well-planned New Town (New Topi) adjacent to existing Topi settlement.

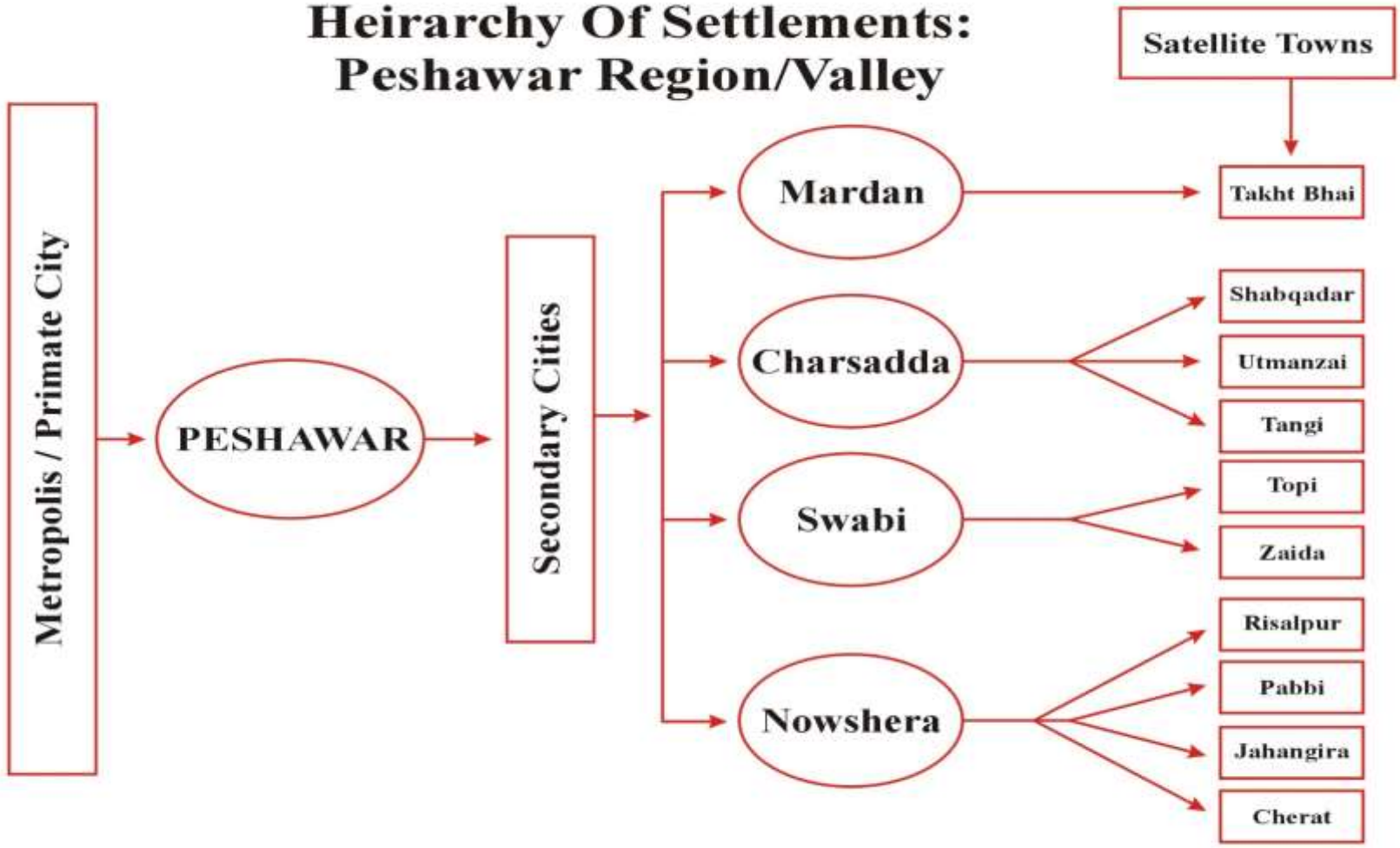


Figure 4. 4 Heirarchy of Settlements Peshawar Region/Valley

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 towards that end.

At present there is no framew ork or a policy relating to land use and therefore, in the matters of location and acquisition ad-hocism prevails. Government in one department takes certain decisions, which is 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.

Land is required for various kinds of activities including 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 rationalized. Land also required for grazing, but un-controlled grazing will convert the pasture into a barren unfortunately many of grazing areas have been eliminated.

The Land Use Plan have taken a holistic view of land as a resource and each parcel of land has been assigned to a designated use with compromising the competing uses. For example, prime agriculture land will not be used for urban development or industrialization.

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 larger cities like Peshawar. It aims at establishing hierarchy of settlements and developments of satellite, Intermediate, Secondary and Industrial Towns as focal points of future to cater the rural areas and small towns. It will also provide guidance to nation building departments/agencies, Urban Policy Unit, District Governments/TMAs for undertaking integrated and coherent development programs through holistic planning.

The Consultants have conducted surveys of twenty-one different sectors as per 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.

Population and Land Use Planning are highly correlated with each other. District Peshawar is located roughly in the center of the province, and prior to beginning of disturbances in the region in 1980s, Peshawar sustained and provided access to mountains and other tourism resorts further North. Sustainable development is constrained now-a-days not only by the scarcity of natural resources, but also by the quality and quantity of human resources. The population aspects are therefore vital and have been incorporated in the District Land Use Plan.

The provision of housing particularly to low income groups is an important aspect of Land Use Planning. Demarking appropriate are for housing in the Land Use Plan is based on proximity to urban services, employment opportunities, cost of infrastructure, and restrictions on conversion of prime agricultural land to housing and other urban uses. The provision of shelter is a basic human right and Land Use Plan considers the provision of low-cost housing to all segments of society as a basic need. The Land Use Plan has identified appropriate areas for filling gaps in the existing housing requirements and further needs of the District population. There is a need to promote full range of housing in all communities, including initiating a cooperative effort from the beginning of the planning process and based on situation, recommend minimizing regulations and generating adequate financing, in an attempt to make housing more affordable and available to all income groups.

Education plays a vital role in the social and economic development of any community. The relationship between Land Use Planning and educational facilities location plays a positive role. Access to quality educational opportunities within convenient access will boost the chances for success of a Land Use Plan. The educational opportunities in Peshawar have attracted many new residents and businesses. There is a wide range of educational opportunities available in the District. However, the Land Use Plan encourages education sector to establish new institutions that provide people with the skills they need for the changing job market. Higher educational facilities that serve wider areas, much beyond the administrative boundaries of District, have therefore been located with convenient access, without causing traffic bottlenecks for the areas in vicinity.

All social sectors in Land Use Planning are important, but health in particular needs to be emphasized as 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 the way in which human health is affected by the shape, form, design and function of the communities in which people livened more comprehensive detail for the role of health facilities inn landuse plan.

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 due to priority. That needs to be changed, as there is important link, as described above, between health, built environment and Land Use.

The Land Use Plan will facilitate in determining how much of job-producing land should be preserved for the future, and to preserve existing industrial land for industrial and job-generating purposes. The information will also help to determine nature and viability of current and future industrial uses, the ability to mix different uses, 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 Provincial Housing 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 it 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 appropriate public information system, the Land Use proposals are not difficult to achieve.

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

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 Mardan 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 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 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 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 pro-active, 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 planning process, that may steer the City District Government, Provincial Housing Authority/PMU, Urban Policy Unit, Development Authority and urban local councils in a focused direction.

Broadly, goals of Land Use Plan are to address the major challenges facing District Mardan. 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, and 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 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. Thus, growth benefiting the agricultural economy and agro-based industry is strongly encouraged.

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.

This Chapter attempts to elaborate the strategy, based on planning rationale, availability of suitable land and linkages with surrounding settlements. Subsequently, Land Use proposals have been based on this analysis.

District Mardan lies towards North of Peshawar Valley, bound by District Charsadda in the West, District Swabi in the East and District Nowshera towards South. The District has two main urban settlements i.e. Mardan City and Takht Bhai.

Mardan city is located towards Southern part of the District, and lies at the confluence of many inter-city roads, which converge/pass through Mardan urban area. These include Nowshera Road, Charsadda Road, Malakand Road and Swabi Road. Mardan City has been expanding in all directions, particularly along Nowshera Road and Malakand Road. The growth along Swabi Road and Charsadda Road has been relatively lesser. Takht Bhai lies towards Western part of the District and towards North-West of Mardan City. The town is located on Malakand Road (NH 45).

Like other District, future Land Use policy for Mardan should derive from the fact that much of Mardan's distinct character is its diversity of Land Uses, and its 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 easy flow of traffic and a non-amenable living environment for the local residents must be controlled.

To implement the Land Use Plans for the five Districts, there is a need to form a regional body such as 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 framework for the implementation of Land Use Plans and take up development projects of regional level for valley as a whole. Different projects are being launched or are on-going 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 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 in 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 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 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 various town and country planning laws and also empowered to declare any area a planning area within their jurisdiction, after making 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 really 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 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 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.

5.3 THE GROWTH DIRECTION:

The urban area of District Mardan, like all other urban areas, needs to expand to cater for the future population. Besides, currently most of the social facilities, institutions and amenity areas are concentrated in the existing urban area; provision has to be made for similar facilities in the peri-urban area which is likely to be urbanized over the next 20 years i.e., the duration of plan period.

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

- Urbanization has far-reaching effects on agricultural lands. The process of urbanization usually triggers growth of urban housing, infrastructure, city-specific land-use forms such as recreational areas/stadiums, and 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 Consultants 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 not recommended for Land Use change.
    - Class 2: Agricultural areas which are productive but water logged
    - Class 3: Agricultural areas which are though productive, but are rain-fed; Land Use may be changed for future urbanization.

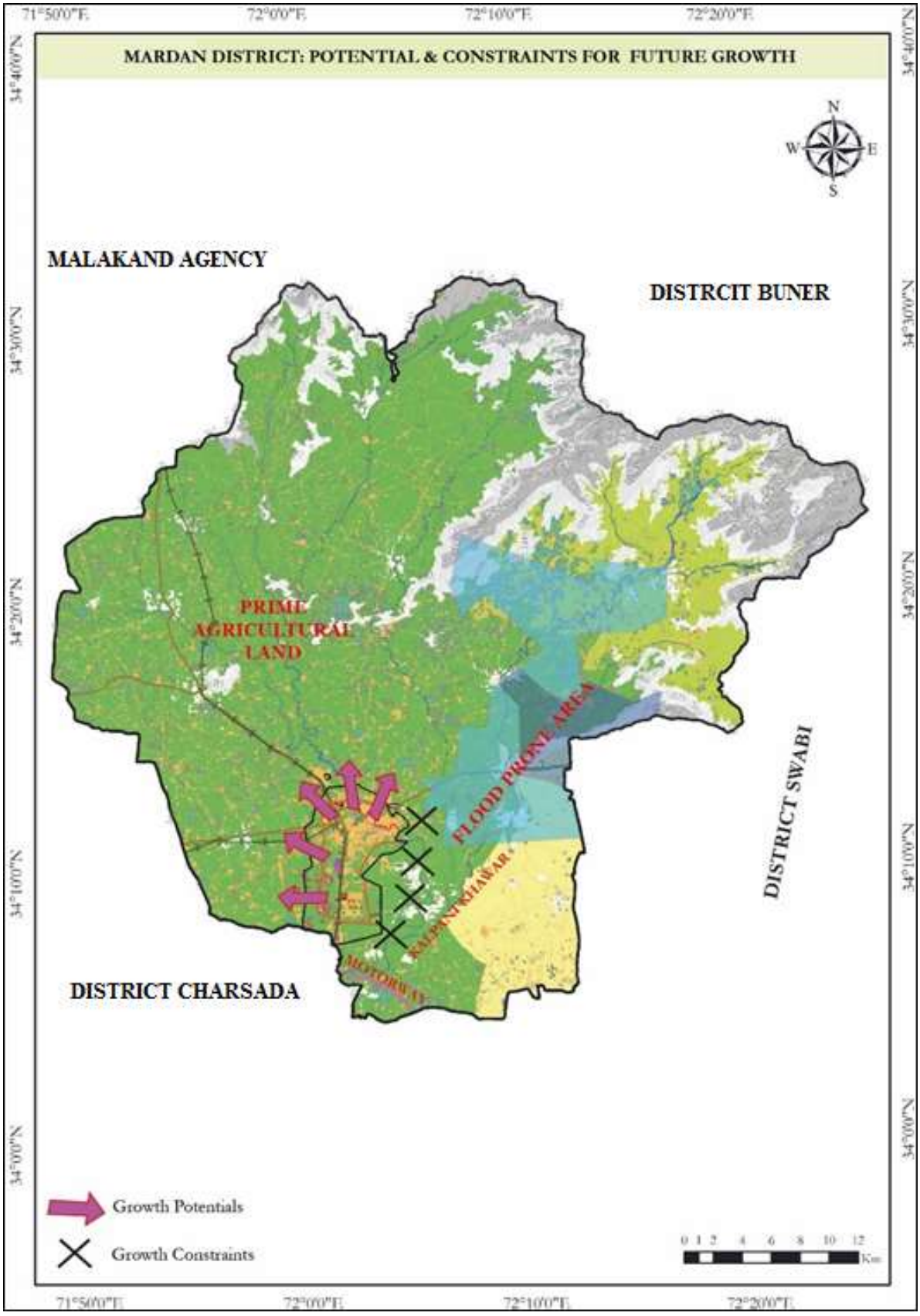
District Mardan has very fertile agricultural land. As seen in Chapter 2, more than 71% of area in the District is under agriculture, and most of it is good quality agricultural land. However, because of a number of factors which are explained in subsequent sections, some of the agricultural land, which is suitable for urban development, will have to be utilized for future urbanization.

As already stated, and shown in the map, most of the agricultural land in the District is of good quality, except for Eastern part of the District (class 2) and agricultural land in South-Eastern corner of the District (class 3).

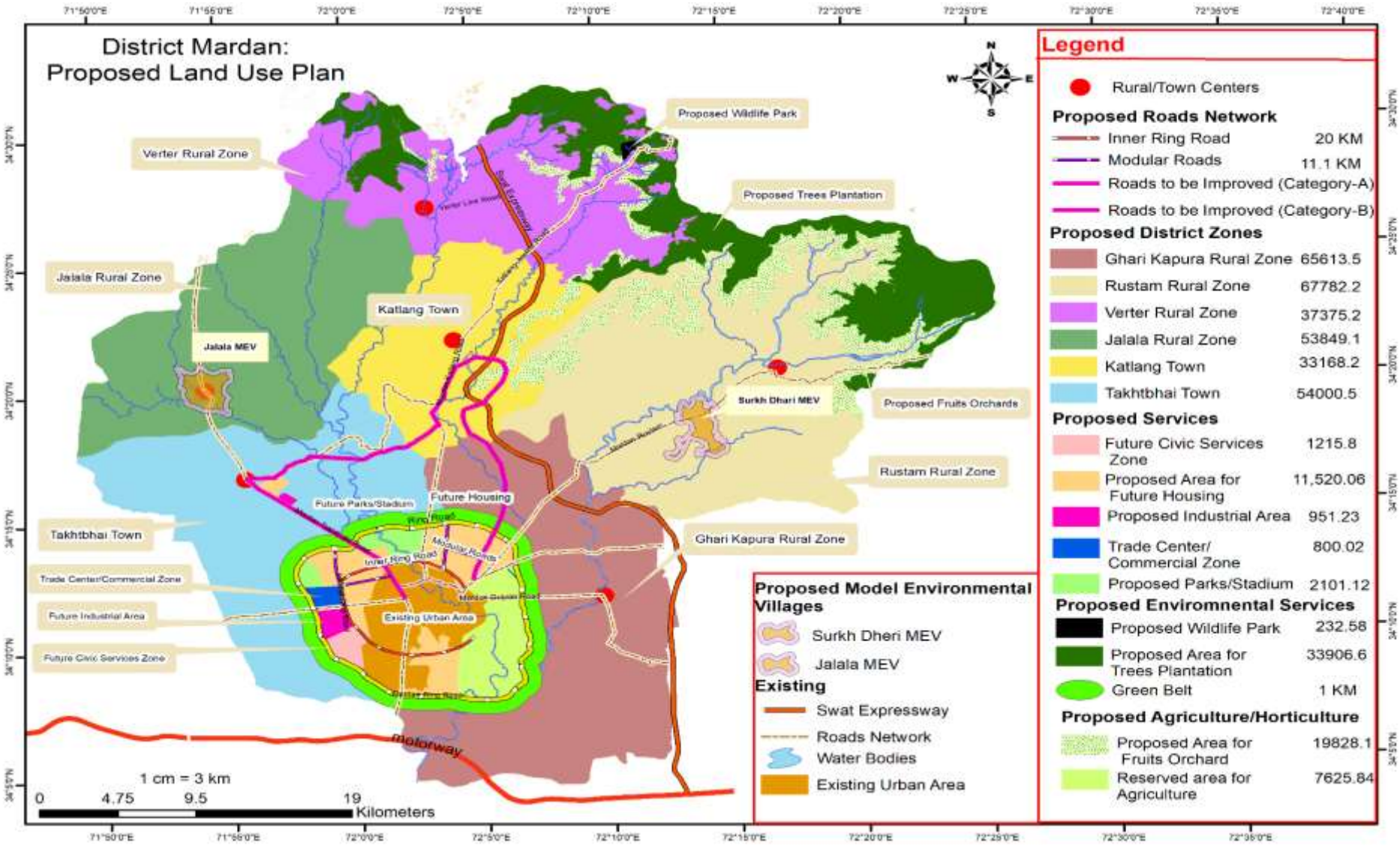
The following important factors have also been considered for Land Use Planning of District Mardan:

- A part of area towards East of the District is flood-prone, mostly consisting of 7 union councils, which include Shahbaz Garhi, Garyala, Charguli, Bala Garhi, Mohib Banda, Kot Daulat Zai and Garhi Daulat Zai, and also because of frequent inundation by Kalpani Khawar. Thus, new human habitations in these directions must be discouraged.
- At present expansion is taking place haphazardly along inter-city roads in leap-frog fashion, leaving fertile agricultural land trapped between these linear developments. Such trapped areas ultimately develop into slums. It is therefore important that guided development must be encouraged in compact form.
- Most of the public and private housing developments are taking place towards South of the District, along Nowshera Road.
- In view of the above rationale, it is suggested that future urban expansion should take place towards South of the District, between Charsadda Road and Nowshera Road, and also towards East of Nowshera Road. The future urbanizing area should remain within Southern segment of ring road, so that future urban development takes place in a compact manner to achieve economies of scale and avoid unnecessary land wastage.

Based on the above rationale, the potential growth areas of District Mardan are shown in the map below:



Map 5. 1 Potential and Constraints Map for Future of District Mardan



Map 5. 2 Proposed Land Use Map of District Mardan

5.4 Proposed Land Usemap of District Mardan for Plan Period (2021-40)

In order to make our cities liveable and sustainable the future planning is important to accommodate peopal and provide facilities to build a healthy socities. For this purpose, the District Mardan Land Useplan for a period of 20 years were proposed according to the District population. The projection was carried out according to current population growth rate. The proposed land use of District Mardan as shown in Map 5.2 shows the following recommended plan for the plan period of 2021-2040. Proposed roads were provided to accommodate future and present traffic within District and congested urban centre of the city. District zones were provided to tackle the future population with planned growth and for better services provision in these zones. The detail of these zones with area are shown graphically. Due to rapid urbanization of urban area in Mardan it is necessary to provide basic facilities for the current as well as future population. For this purpose, differen propsed civic services were suggested to tackle the future population of urban areas in the District. Environmental degradation is going in our Mardan hard surfaces are replacesed green surfaces. For the preservation of future wild life and increase forestry of the District is also proposed. A green belt of about one kilometre is proposed in the outer part of the ring road to discourage the future growth of the city in precious agriculture land and unplanned expansion of District Mardan. In order to accommodate the future population and fulfill the current housing backlog the total area for the housing were proposed within the ringroad. For the improvent of horticulture sector in the District the fruit orchards were also proposed.

5.4 EXTENT OF SPATIAL GROWTH (2021-2040):

Assessing extent and direction of spatial growth of Mardan 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 for the plan period.

Spatial growth of Mardan over the plan period depends on future housing demand, transportation network, new commercial areas, industry, major health, educational and recreational facilities etc. These aspects are described in this section.

5.4.1 Population Densities:

The total area of District Mardan is about 1,634 sq. km, of which about 53.53 sq. km (3.3%) is categorized as Mardan Urban. Table 5.1 below shows Population densities of urban and rural area in District Mardan.

Table 5. 1 Gross Population Densities			
Location	**Population (2021)**	**Area**	**Population Density (Persons per Sq. Km)**
Urban Area	477594[21]	53.53[22] Sq. Km (13,222 acres)	8,922 persons per sq. km (36 persons per acre)
Rural Area	2,151,191[23]	1,580.17 Sq. Km (390,302 acres)	1,361 persons per sq. km (5.5 persons per acre)
District Total	2,628,785[24]	1,633.7[25] Sq. Km (403,524 acres)	1,609 persons per sq. km (6.5 persons per acre)

It is clear from the above Table that the current urban density is 36 persons per acre (PPA) in Mardan City. This is not a high figure and does not call for much reduction in urban density for decongestion; there is however a need for segregating non-compatible and traffic-attracting Land Uses from inner city. Such steps will result in better living environment for the residents.

5.4.2 Urban Boundary 2021 – 2040:

As the population of Mardan City continues to grow, its urban boundary needs to be re-defined. The existing urban area is around 53.53 sq. km, to which about 26.07 Sq Km, would be added, as calculated below. The gross urban area by the end of plan period would thus be around 83.59 sq km.

- Urban Population, Mardan City (2021) = 477594[26]
- Urban Area (2021) = 53.53 sq. km[27].
- Current Population Density = 8,922 persons/sq. km.
- Additional Urban Population (2021-2040) =232566[28]
- Future Area required = Additional Population/Density = 232,566/8,922 = 26.07 sq. km.

[21] Urban Population of Mardan City of 2021 was projected using 1998-2017 population density.

[22]Ref. Chapter 2, (Land UseDistribution) of this Report

[23] Obtained by subtracting urban population from the total District Population.

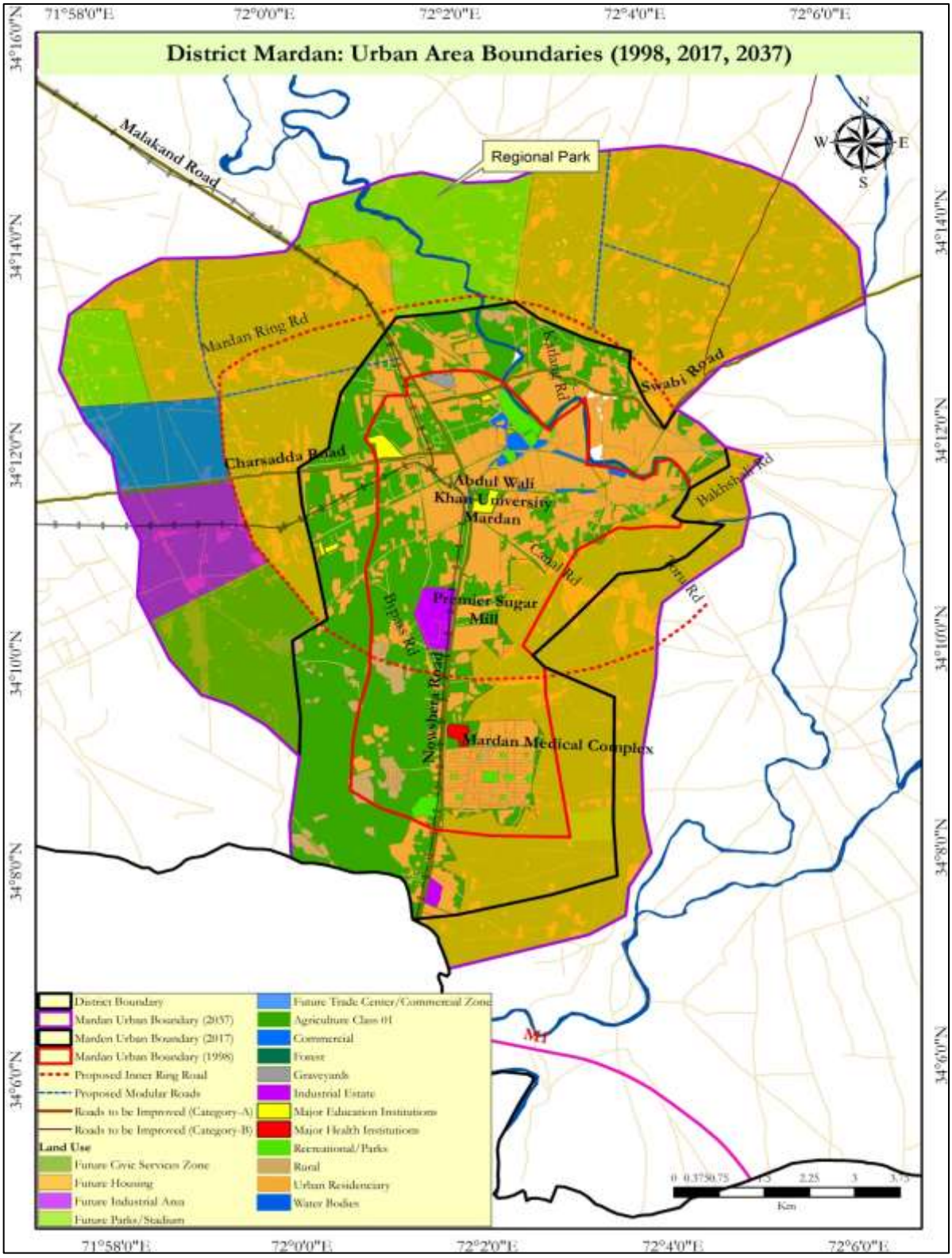
[24] Source: District Studies Report Mardan, KP Land UseProject, Chapter 6, and Table 6.15.

[25] Calculated from approved base map of District Mardan

[26] Source: Table 5.1

[27] Source: Chapter 2, Table 2.5.

[28] Source: Table 5.7.



Map 5. 3 Urban Area in 1998, 2017 and 2040 of District Mardan

5.4.3 Union Councils to Urbanize by 2040:

The criterion for envisaged urbanization by the year 2040 is not entirely density-based, but also stems from the proposed Land Use strategy. Future densities will be driven by the proposed Land Uses in a particular direction, even if the current densities over there are relatively lower than elsewhere, but

expansion in that direction otherwise is desirable. Thus, the proposed trunk infrastructure in a particular direction, future housing, new commercial & industrial areas, health, education & recreational areas, major road network etc will attract population there, resulting in enhanced densities.

As already stated, the current urban area of Mardan is spread over 53.53 square km, and the area required for additional urban population during the period 2021-2040 would be 26.07 sq. km. The urban boundary of Mardan by the year 2040 would thus encompass 53.5+26.07=79.57 sq. km. The currently rural/semi-rural UCs which would urbanize by 2040 are 12, as given in Table 5.2. Except for Charguli and urban UCs, all of the remaining 10 UCs would urbanize partially, as the areas of UCs are quite large.

Table 5. 2 : UCs Likely to Urbanize[29] by 2040

Sr. No	Name of UC
1	Charguli
2	Mohib Banda
3	Urban
4	Mohabat Abad
5	Toru
6	Mayar
7	Chak Hoti
8	Mardar Rural
9	Chamtar
10	Maho Dheri
11	Khazana Dheri
12	Kot Daulat

[29] Except Maira Surizai Payan and Chamkani which will urbanize completely, the remaining 18 UCs will urbanize partially.

5.5 HOUSING:

Adequate shelter for all has been recognized as basic human right at the UN habitat conference 1996. The housing situation of Pakistan has deteriorated and being one of the major pillars of macro economy, government need to ensure adequate housing to all its citizen through proper planning and management, indicative, motivationNeed explanation for this content. Special emphasis would be given to micro finance to low income communities.

5.5.1 Existing Housing Stock

The total housing unit in District Mardan in 2017 was 311868 . The detail of housing units of 1998 and 2017 are given in the Table 5-3.

The housing stock in 2017 has increased with a growth rate of 2.875% in urban and 3.212% in rural sector. On the basis of 2017 and 1998 census household data the current (2021) housing units will be forecasted using the growth rate between 1998-2017 censuses. The current housing units in Mardan as per projections are 353033 having 66511 urban and 286522 rural units.

Table 5. 3 Existing Housing Stock in District Mardan[30]

Existing Housing Stock in District Mardan			
Year	**1998 (Census)**	**2017 (Census)**	**2022[31] (Current Housing Units)**
Urban	34625	59382	66523
Rural	138463	252486	286526
Total	173088	311868	353049

5.5.2 Housing Shortage/Backlog

The main facets that need to be considered for assessing housing backlog include population, household size and the current housing stock. The current (2022) population of the District Peshawar is shown in Table 5-4. The Table shows required number of Houses (@household size 6 as assume in the land use plan), and those currently housing stock available. The difference between the two is the current housing shortage, which is calculated to be 251,765 as shown in the Table 5-4.

[30] District Wise number of housing units (urban & rural) of KP, page number 258, Development statistic of KP 2020

[31] Projected based upon the growth rate of housing units of 1998 and 2017 census.

Table 5. 4 Current Housing Backlog in District Mardan

Category	Population 2022	Housing required	Housing stock	Housing backlog
Urban	487813	81302	66523	14779
Rural	2209599	368,266	286526	81740
Total	**2697412**	449,568	353049	96519

5.5.3 In-fill Development

i) Public Sector Housing Schemes

Sheikh Maltoon Town is the only public-sector housing scheme in Mardan, and has three phases. Phase IV is also consideration by Mardan Development Authority. The plot size distribution in Sheikh Maltoon Town is given in Table 5.5. The total number of plots in all the three phases is 5,253 of various categories, of which 2,780 plots are in Phase-I, 1,961 plots in Phase-II and 512 plots in Phase-III. Most of the plots in Phase-I are of 1 Kanal and 10 marlas, Phase-II also has 5 Marla plots, while most of the plots in Phase-III are 3 marlas (about 54%). The details are given in Table 5.5.

Table 5. 5 Numbers and Sizes of Plots in Sheikh Maltoon Town

Plot Size	Phase-I		Phase-II		Phase-III	
	No. of Plots	%	No. of Plots	%	No. of Plots	%
1 Kanal	1,230	44.24	551	28.09	77	15.04
10 Marla	1,046	37.63	416	21.21	82	16.01
7 Marla	0	0	560	28.57	0	0
6.5 Marla	504	18.13	0	0	0	0
6 Marla	0	0	0	0	79	15.43
5 Marla	0	0	434	22.13	0	0
3 Marla	0	0	0	0	274	53.52
Total	**2,780**	**100**	**1,961**	**100**	**512**	**100**

ii) Approved Private Housing Schemes

The approved housing schemes in private sector in Mardan are given in below table 5-7:

Table 5. 6 List of approved Housing Schemes[32]

S.NO	NAME	NATURE OF SCHEME	ADDRESS	APPROVAL STATUS	AREA (IN KANALS)
1	Sheikh Maltoon Township	Public Scheme	Main Malakand Road	Approved	5084
2	Bismillah Township	Private Scheme	Bypass Road	Approved	477
3	Garden Town	Private Scheme	Sawabi Road	Approved	150

[32] LGE&RDD

4	Green Acre	Private Scheme	Ring Road Mardan	Approved	1364
5	Gulberg Model Town	Private Scheme	Main Malakand Road	Approved	374
6	Gulshan Model Town Phase-1 & Phase-2	Private Scheme	Ring Road Mardan	Approved	403
7	Icon Valley Town	Private Scheme	Ghaladher Road	Approved	633
8	Orchad villas Town	Private Scheme	Mohabatabad Pattak	Approved	240
9	Sheikh Shehzad Model Town	Private Scheme	Charsadda Road	Approved	331
10	Sheikh Yasin Township	Private Scheme	Charsadda Road	Approved	480

Land use Distribution in private housing schemes is presented in Table 5.6 while the number and sizes of plots in the private housing schemes are given in Table 5.8.

Table 5. 7 Land Use Distribution in Private Housing Scheme

Land uses	Gulberg Model Town Phase-I		Sheikh Shahzad Model Town		Mardan Model Town		Bismillah Town		Mardan Housing Project	
	Area (Kanals)	%	Area (Kanals)	%	Area (Kanals)	%	Area (Kanals)	%	Area (Kanals)	%
Residential	144.38	56.4	317.22	69.56	119.63	77.45	270.08	59.02	738	54.1
Roads/Streets	67.24	26.28	65.14	14.28	29.82	19.31	117.63	24.18	383.85	28.18
Commercial	12.94	5.01	22.8	5			21.01	5	68.1	5
Parks	18.11	7.07	31.92	7	4.27	2.76	29.42	7	96.79	7.11
Mosques	2.13	0.83	2.75	0.64	0.74	0.45	Public Buildings:	2.79	Public Buildings:	
Dispensary	1.97	0.78	5.3	1.16						
Girls School	1.63	0.64					11.76		47.86	
Boys School	1.4	0.55	1.75	0.38						3.51
Welfare Centre	0.48	0.18								
Shadi Hall	0.48	0.18								
Graveyard	5.17	2.2	9.12	2			8.4	2	27.4	2.01
Total	**255.93**	**100**	**456**	**100**	**154.46**	**100**	**458.3**	**100**	**1362**	**100**

Table 5. 8 Numbers and Sizes of plots in Private Housing Scheme										
Plot Size	**Gulberg Model**		**Sheikh Shahzad Model Town**		**Mardan Model Town**		**Bismillah Town**		**Mardan Housing Project**	
	No. of Plots	**%**	**No. of Plots**	**%**	**No. of Plots**	**%**	**No. of Plots**	**%**	**No. of Plots**	**%**
2 Kanal	0	0	Under review, not yet finalized.		Under review, not yet finalized.		0	0	78	7.39
1 Kanal	47	1.72					199	41.03	412	39.05
10 Marla	1,131	41.35					176	36.29	565	53.56
9 Marla	4	0.15					0	0	0	0
8 Marla	4	0.15					0	0	0	0
7 Marla	626	22.89					63	12.99	0	0
6 Marla	16	0.58					19	3.92	0	0
5 Marla	855	31.26					28	5.77	0	0
Irregular	52	1.9					0	0	0	0
Total	**2,735**	**100**					**485**	**100**	**1,055**	**100**

iii) Un-Approved Private Housing Schemes

Unapproved private housing schemes in Mardan are given in below table 5-10. These are small schemes, ranging in area from 25 kanals to 80 kanals:

Table 5. 9 List of Unapproved Private Housing Schemes[33]

S.NO	NAME	NATURE OF SCHEME	ADDRESS	APPROVAL STATUS	AREA (IN KANALS)
1	Faisal town	Private Scheme	Bakhshali Road	Unapproved	94
2	Green Mansion Housing Scheme	Private Scheme	Ghaladher Road	Unapproved	562
3	Icon Life Mardan	Private Scheme	Eastern Bypass Road	Unapproved	426
4	Mardan Enclave	Private Scheme	Eastern Bypass Road	Unapproved	417
5	Mardan housing scheme	Private Scheme	Northern Bypass Road	Unapproved	198

[33] LGE&RDD

6	Park Avenue	Private Scheme	Western Bypass Road	Unapproved	357
7	Park City	Private Scheme	Nowshehra Road	Unapproved	739
8	Pearl Enclave	Private Scheme	Charsadda Road	Unapproved	150
9	Prime housing society	Private Scheme	Bypass Road	Unapproved	244
10	Sherali Garden	Private Scheme	Bacha Khan Road	Unapproved	
11	Green Homes Mardan	Private Scheme	Ring Road Mardan	Unapproved	97
12	The Garden City	Private Scheme	Toru Road	Unapproved	76
13	The Garden Town	Private Scheme	Sawabi Road	Unapproved	635
14	Vip Housing Society	Private Scheme	Nowshera Road	Unapproved	116
15	Marhaba Colony	Private Scheme	Ring Road Mardan	Unapproved	836
16	Zarak Garden Colony	Private Scheme	Canal Road	Unapproved	301
17	Yousafzai Town	Private Scheme	Bakhshali Road	Unapproved	136

The above list shows the number of un approved housing schemes in Mardan. The district landuse plan proposes that the above-mentioned housing schemes should be fined heavily as per regulations in the approved landuse and building control authority act. The unapproved housing schemes degrade the environment and poses an adverse impact on quality of life. However, there may be certain situations in which the unapproved housing schemes with some alterations may comply with planning standards and such housing schemes should not be completely demolished.

5.5.4 National Housing Policy:

The high population growth, combined with difficulties in governance and inadequate investment in urban development has resulted in uncontrolled and unplanned growth of cities and towns, a deterioration in urban environment and deficiency in all forms of services. The problems are particularly pronounced for urban poor as they suffer to a great degree because of overcrowding and deprivation in infrastructure and services. These problems are exacerbated by both political refugees and migrants in search for economic opportunity. The absence of large scale flexible institutional financing over all phases of housing development, land development, construction, bridge and mortgage financing are

both cause and effect of the under-developed housing delivery system. The Policy has been prepared with a practical approach to achieve the following aims and objectives:

- To provide enabling strategy, capacity-building and institutional development aiming at empowering all stake holders, particularly local authorities, the private sector, non-Governmental organizations and community-based organizations, to play an effective role in shelter and human settlements planning and management.
- To introduce a strategy that would combine community participation and institutional strengthening in support of the development of a commercially based system of housing finance for land and house purchase; house construction improvement and upgrading. In addition, innovative approaches to collateral and screening of eligible households for incremental housing finance and home improvement credits which are compatible with the affordability limits of moderate and low-income households, would be introduced.
- To improve the housing conditions of the low-income population, through development capacity building and institution of new ideas, such as reduced housing standards, appropriate technology, incremental housing development, community participation and squatter-settlement regulation.
- To upgrade existing towns and cities with better city planning through improvement of infrastructure, creation of employment opportunities and affordable housing under a phased program, giving higher attention to those cities and towns which are comparatively more productive and efficient and require lower investments.
- To provide for an effective institutional capacity building frame work responsive to the grass roots devolved powers, to minimize general disparities and imbalances, not only between urban and rural areas but also between various income groups.
- Long term solution for housing lies in this sector, which should be a High Priority for economic development. It should not be considered as an area parasitic upon other economic activities but as an instrument of economic and cultural development. This sector can lend support in achieving all the key national goals including employment, economic growth and promotion of market-oriented economy and higher levels of public and private savings.
- To make the Government as a catalyst and facilitator in case of land policy, financial policy, improvement of katchi abadis and slums, research and development and institutional development.

5.5.5 Housing demand of projected population in the District:

The housing demand in the district over the next 20 years is 275026. During the period 2022-2027, there would a demand of about 47257 houses in the District. The statistics for the subsequent 15 years (2028-2042) and for the entire plan period (2022-2042) are given in Table 5.5.

Table 5. 10 Additional Housing Demand

Housing Demand For Additional Population in the District Mardan									
Year	**District Population**	**Additional Population**				**Housing Demand**			
		2022-2027	**2028-2032**	**2033-2037**	**2038-2042**	**2022-2027**	**2027-2032**	**2032-2037**	**2037-2042**
2022	2697412								
2027	2913102	215690				35948			
2032	3311906		398,128				66,354		
2037	3765753			453,003				75,500	
2042	4282288				515,493				85,915
Total		**1,582,314**				**263,717**			

5.5.6 Net Housing Demand in the District

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

Demand (2022-2042):

- District Housing Demand for Additional Population : 263,717 houses[34]
- Current Backlog : 96519 houses[35]
- Gross Demand : 263717+96519= 360236– (A)

Potential:

- Plots in public sector (phase I&II of Sheikh Maltoon Town) : 2,473
- Plots in Private housing schemes : 4,275
- Total available plots/potential : 2,473+4,275= 6,748 – (B)
- Net Housing Demand at District Level (2021-2040) = A-B= 645592.3-6,748= 638844.3

[34] Source: Table 5.3.

[35] Source: Table 5.4

5.5.7 Housing demand urban Rural split:

The housing demand in the District over the next 20 years is 264,145. The demand for urban and rural areas is shown separately in the Table 5-10. During the period 2022-2027, there is a demand of about 6934 plots in urban area, while in the same period the demand in rural areas would be about 30001. The statistics for the subsequent 15 years (2028-2040) and for the entire plan period (2022-2042) are given in Table 5.10.

Table 5. 11 Housing Demand Urban-Rural Split

Year	Additional Population			Housing Demand		Total
	Urban	Rural	Total	Urban	Rural	
2022-2027	31625	184065	215690	5271	30677	35948
2028-2042	191669	1177517	1369186	31944	196253	228197
Total	223294	1361582	1584876	37215	226930	264145

5.5.8 Area Requirements:

Considering Population density as 8 houses per acre, all values (number of plots) in Table 5.10 are divided by 8 to get Area required for housing in Acres. For the total housing demand (additional for next 20 years plus current backlog), gross area required is 33,019 acres (133.62 Sq. km), of which acres (24 sq km) is in urban area and 28525 acres (115.4 sq. km) in rural areas (Table 5.11). The Table also gives split of areas required in urban and rural areas.

Table 5. 12 Area Required for Housing (Acre)

Time Period	Area		
	Urban	Rural	Total
2022-2027	659	3,835	4,494
2028-2042	3,993	24,532	28,525
TOTAL	4,652	28,367	33,019

5.5.9 Proposed Locations for New Housing Areas

The new housing is proposed as in-fill development in Mardan's urban boundary of 2021, as well as along Swabi Road towards North-East and along Kalakand Road towards North-West of Mardan urban area. Thus, as per land use strategy, most of the future housing developments are proposed towards North-East and North-West. Expansion has not been proposed towards East to avoid Kalpani Khawar which usually gets inundated in rainy season. Similarly, area further East is also prone to flooding. Furthermore, the existing settlements which reflects slums features should be taken into consideration and slum upgradation techniques such as slum renewal, rehabilitation, demolition and reconstruction should be adopted. Gentrification should be promoted in order to attract new businesses and improving houses of the existing developed areas. It should also be proposed in the new proposed areas so that the underdeveloped areas also flourish from this process.

5.5 TRAFFIC AND TRANSPORTATION

5.6.1 Existing Situation

Accessibility is prerequisite for organizing all kinds of social or economic activities. This makes transport a core of development planning, cutting across every element of 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 potential to raise social return to both public and private capital and also significantly contributes to lowering 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 Mardan, and what needs to be done to alleviate the problems of this sector.

The main transport infrastructure in District Mardan is provided by a Railway Station (operated by Pakistan Railways), a National Highway (N45) and links to several highways including Motorway (M1), Grand Trunk Road (N5), and the Karakoram Highway (N35), enabling road, rail and air connections (through nearby Bacha Khan International Airport, Peshawar - served by all Pakistani airlines and till recently some foreign airlines) to all Pakistani cities as well as some gulf countries.

5.6.2 Roads and Bridges

Motorway – M1

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

The M1 is a motorway in Khyber-Pakhtunkhwa and Punjab, Pakistan. It is 155 km long, with 108 km in Khyber-Pakhtunkhwa and the remaining 67 km in Punjab. It has become a vital link to Afghanistan and Central Asia and is expected to take much traffic off the highly used N5. It is part of Pakistan's Motorway Network.

National Highways

Pakistan has a nationwide network of national highways that are distinct from its motorways. The main difference between the two is that, unlike motorways, national highways are not controlled-access or limited access. As in the case of motorways, Pakistan's National Highway Authority is responsible for all national highways

Provincial Highways & Roads

In Mardan District, there are about 302.218 KMs Provincial Highways and Roads, as per data reported by Communication & Works Department Peshawar. These include 291.428 KMs high type and 10.790 KMs low type of highways & roads.

Secondary Roads

In the District Mardan, total 65 Secondary roads have been reported by Communication & Works Department Peshawar. This type of roads is third category of roads, denoted as ‘D’ by C & W Department. Total of the roads is over 439.55 Kilometers, Right of Way ranging from 18 ft to 100 ft,

Black Top width from 12 ft 60 ft and Shoulder width from 2 to 6 meters. Details regarding these road names, length, right of way, carriageway and shoulder width are given in the District Studies Report of Mardan.

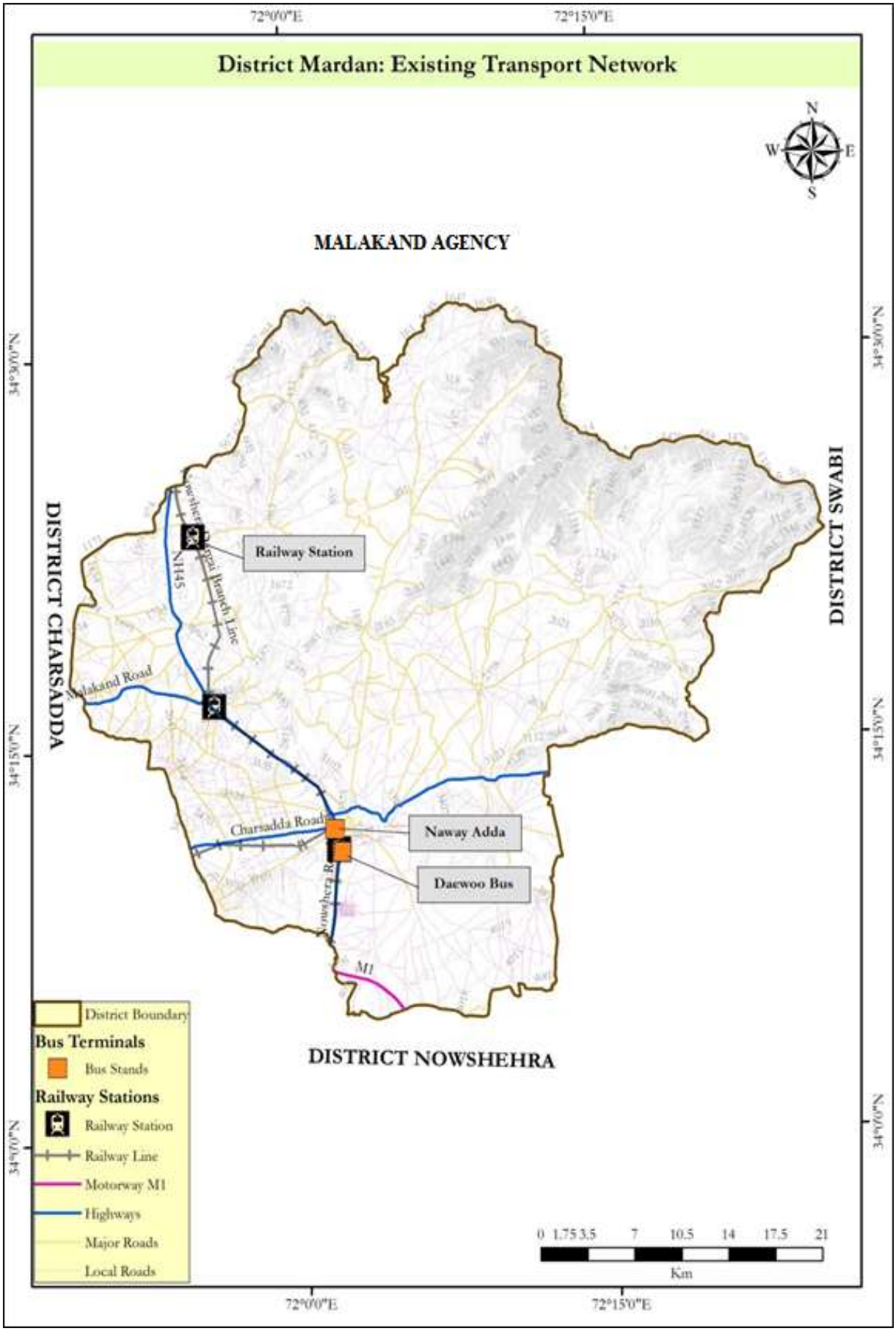
Access Roads

A total of 104 Access roads has been reported in District Mardan by Communication & Works Department. This type of roads is fourth category of roads, denoted as 'A' by C & W Department, and include local and farm to market roads. Total length of the roads is over 403 Kilometers, Right of Way ranging from 18 ft to 40 ft, Black Top width from 12 ft 24 ft and Shoulder width from 2 to 6 meters.

It may be mentioned that actual ROW is never constant throughout the length of any highway/ road. It is a revenue matter and varies for different segments of roads. Instead, carriageway width or number of lanes is much important to assess their traffic capacity.

Bridges

The District has 89 bridges as reported by Communication & Works Department. Details regarding road name, bridge name, width, length and height are given in the District Studies Report of District Mardan.



Map 5. 4 Existing Transport Network of District Mardan

5.6.3 Vehicles Registered in District Mardan

Total 69,326 vehicles are registered in District Mardan whereas 67,049 are reported to be on- Road. Evidently, the vehicles plying in the District are lesser than those registered here. This is true for all categories of vehicles except motor cycles/ scooters, as seen in the Table5.12.

Table 5. 13 Motor Vehicles Population in District Mardan[36]

Vehicle Type	Registered Vehicles	% age	Vehicles On Road	% age
Vehicles Motor Cycle/Scooters	37,699	54	39,494	59
Motor Cars/Jeeps/Taxi	14,402	21	12,423	19
Buses/Mini Buses	1,519	2	1,312	2
Motor Cabs Rickshaws	197	0	193	0
Public Carrier Trucks	2,221	3	1,614	2
Other Vehicles (Tractors, Private Trucks, Dumpers, Ambulances, Cranes, Water Tankers, Delivery Vans & Pickups)	13,288	20	12,013	18
Total	69,326	100	67,049	100

The projected vehicles in District Mardan for next 10 and 20 years, based on average annual growth rate of 3.5% for last 10 years are respectively estimated at 97,791 and 137,944 total vehicles, as seen in the Table 5.13 below:

Table 5. 14 Projected Motor Vehicles in District Mardan for Next 10 & 20 Years

Vehicles Type	2011	%age	2021	2031
Motor Cycle/Scooters	37,699	54	53,178	75,013
Motor Cars/Jeeps/Taxi	14,402	21	20,315	28,657
Buses/Mini Buses	1,519	2	2,143	3,022
Motor Cabs Rickshaws	197	0	278	392
Public Carrier Trucks	2,221	3	3,133	4,419
Other Vehicles (Tractors, Private Trucks, Dumpers, Ambulances, Cranes, Water Tankers, Delivery Vans & Pickups)	13,288	19	18,744	26,440
Total	69,326	100	97,791	137,944

[36] Provincial Excise & Taxation Department KP

5.6.4 Traffic Surveys

a. Traffic Volumes

In order supplement to above information and to have first hand data on traffic volume and nature, fresh traffic counts - Manual Classified Counts (MCC) were conducted by the Consultants, on primary roads of District Mardan at entry and exit points, along with Origin-Destination surveys. In order to compliment above traffic data including first hand data about nature and volume of traffic, fresh Manual Classified Counts (MCC) were conducted on primary roads of District Mardan at entry and exit points. The survey was conducted on hourly basis, from 7 AM to 7 PM in January, 2013.

Analysis of the data obtained shows that the peak hours on different roads were as follows:

- Nowshera Road: 10-11 AM
- Swabi Road: 9-10 AM
- Mardan Road: 4-5 AM
- Malakand Road: 9-10 AM.

Table 5.14 summarizes the existing traffic volume (in-coming and out-going) on the four primary roads of District Mardan:

Table 5. 15 Traffic Volume on Primary Roads in District Mardan[37]

S. No.	Direction	Nowshera Road	Swabi Road	Mardan Road	Malakand Road	Total
1	In-Coming	14,524	5,272	4,541	6,304	30,641
2	Out-Going	12,832	4,957	4,378	6,920	29,087
Total		27,356	10,229	8,919	13,224	59,728
%		45.80	17.13	14.93	22.14	100

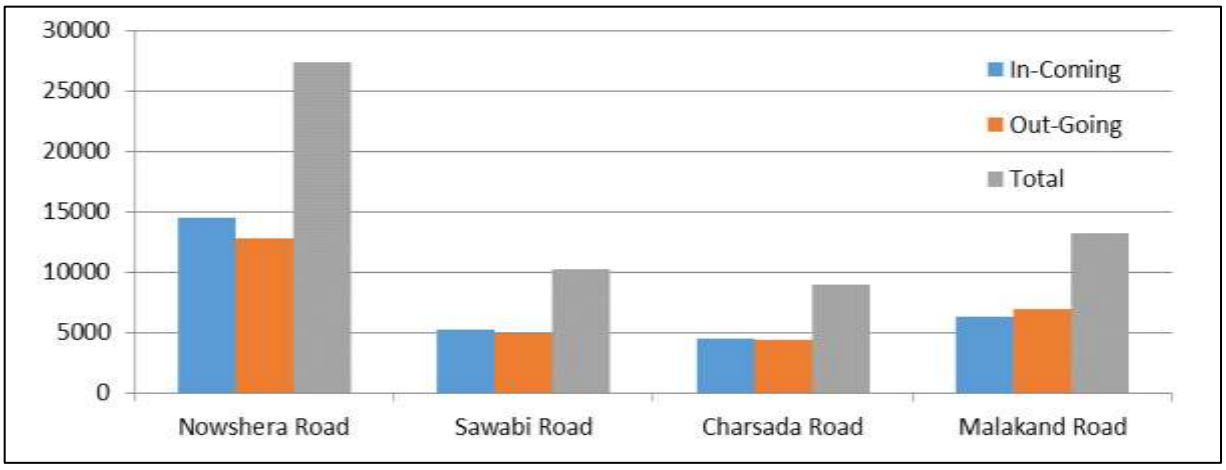


Figure 5. 1 Traffic Volume on Primary Roads in District Mardan

[37] Field Surveys by the Consultants, January 2013.

Traffic Volume Survey within city:

A full-fledged traffic survey was not possible in the short time available for the study. However, based on past records, discussions with the local citizens and on own observations, the following eleven main roads & intersections were selected for traffic count for the daily traffic flow.

The Summary of traffic count surveys at eleven stations is given below:

Table 5. 16 List of Intersections Covered by Traffic Counts

S. No.	Station Name	Date	Day / Night	Timing Of Counting	
				From	To
1	Baghdada Chowk intersection	10-08-20	Day	7:30 AM	7:00 PM
2	Dosehra Chowk	14-07-20	Day	7:30 AM	7:20 PM
3	Kachehri Chowk	13/08/2020	Day	10:00 AM	10:00 PM
4	Charsadda Chowk	17-08-2020	Day	7:30 AM	7:00 PM
5	Malakand chowk	19-10-2020	Day	10:00 AM	7:00 PM
6	Pakistan Chowk	06/10/2020	Day	7:00 AM	7:00 PM
7	College Chowk	22/10/2020	Day	10:15 AM	10:00 PM
8	Swabi Road	07.12.2020	Day/Night	7:30 AM	7:00 AM
9	Bab-e-Mardan	10.11.2020	Day/Night	9:30 AM	7:00 AM
10	Sheikh Maltoon Town	25.11.2020	Day	8:00 AM	6:00 PM
11	Malakand Road	15/12/2020	Day/Night	7:00 AM	6:00 AM

Table 5. 17 Traffic Volume Count Survey - Type of Vehicles

Vehicle Type	TVC	%
Motor Bikes/ Rikshaws / Qinqis	84731	31.63
Car/Jeep/Suzuki Van/Taxi	142491	53.19
Light Truck/Mazdas	26143	9.76
Large Buses (Over 20 seats)	2134	0.80
Pickup/Wagon/Hiace	2604	0.97
Truck/Trailer (2Axle)	3953	1.48
Truck/Trailer (3Axle)	2906	1.08
Truck/Trailer (4 Axle)	491	0.18
Truck/Trailer (5 Axle)	141	0.05

Truck/Trailer (6 Axle)	196	0.07
Tractor Trolley	2108	0.79
Total	267898	100.00

The traffic volume survey results indicates that among various vehicle typologies i.e. Rikshaws, Motor Bikes and Qinqis (31.63%) and Car, Jeep and Van (51.19%) are dominant in traffic generation at all intersection. Motorbike Qingqi and rickshaw are the most common affordable public transport mode used for intra City movement in Mardan city.

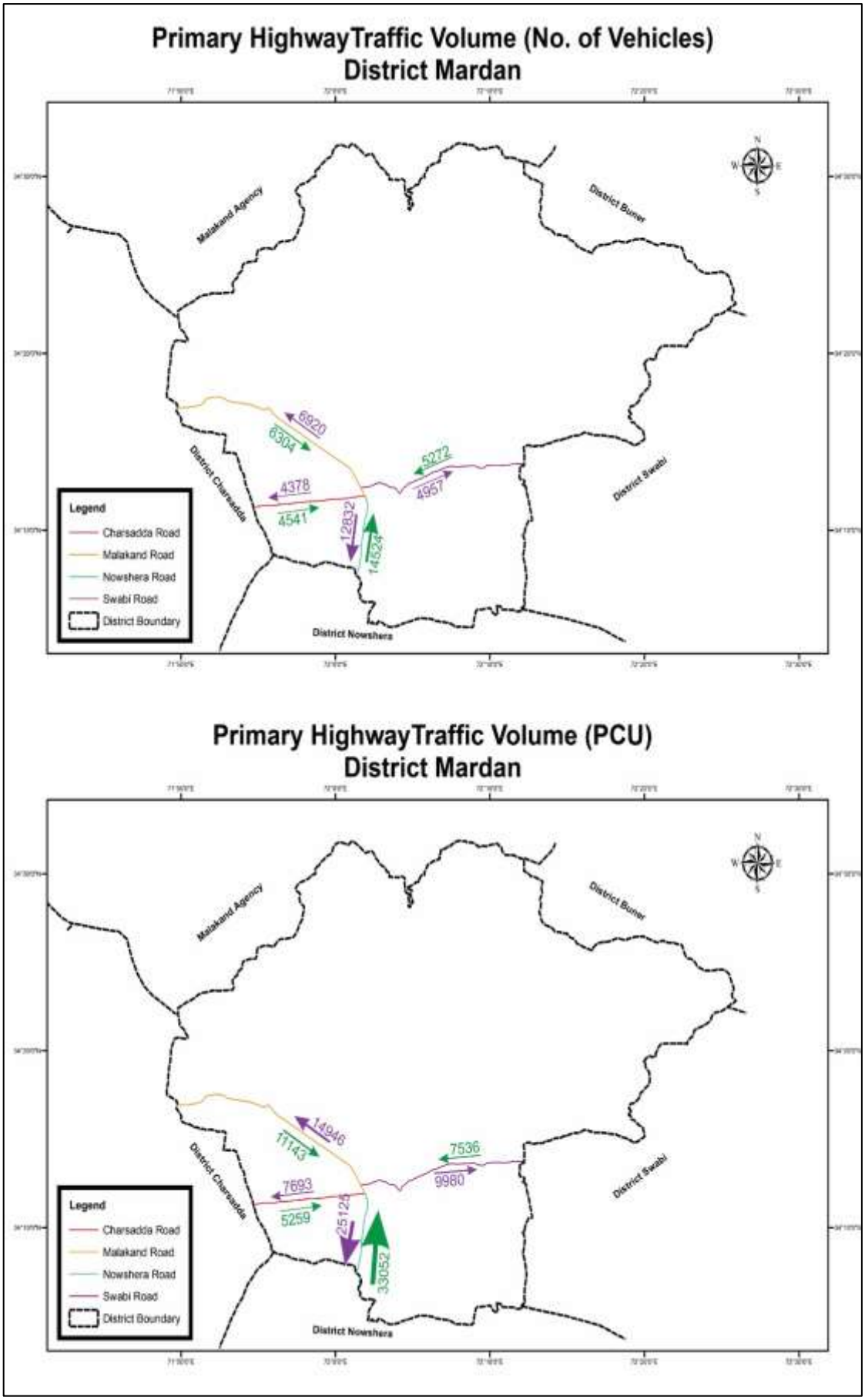
Table 5. 18 Traffic volume capacity ratio

S. No.	Location	Hours	Average Traffic Volume (PCUs / hour)	No. of Lanes	Available capacity on 12'-0" Lane	Volume Capacity Ratio
1	Baghdada Chowk intersection	12	1,179	2	3000	**78.60**
2	Dosehra Chowk	12	1,359	2	3000	**90.60**
3	Kachehri Chowk	12	1035	2	3000	**69.00**
4	Bab-e-mardan	12	3,514	4	6000	**117.13**
5	Charsadda Chowk	12	946	2	3000	63.07
6	Malakand Chowk	12	1,476	2	3000	**98.40**
7	Shaikh Maltoon Chowk	12	2,604	4	6000	**86.80**
8	College Chowk	12	3,149	4	6000	**104.97**
9	Malakand Road	24	1,352	2	3000	**90.13**
10	Swabi road	12	1,148	2	3000	**76.53**

The detailed statistics are presented in the District Studies Report. Following are the main inferences:

i. Total Traffic volume on the four primary roads of District Mardan (in-coming plus out-going) is 59,728 vehicles, of which maximum volume is on Nowshera Road (about 46% of total flow, both ways), followed by Malakand Road (22%), Swabi Road (17%) closely followed by Mardan Road (about 15%). The vehicles include all modes of traffic including motor Cycles/ Scooter, Car/Jeep, Wagons/Mini Buses, Buses, pickups, trucks, and tractor trolleys.
ii. In terms of modal split, 28% of the total traffic volume (on all four primary roads, both ways) comprises of cars/jeeps, followed by motor cycles (23%), wagons/mini buses (17%) and around 10% pick-up trucks. Other modes are relatively much less.
iii. Of the total cars/jeeps, about 36% ply on Nowshera Road, 24% on Malakand Road,21% on Swabi Road and 19% on Mardan Road.
iv. Among the motor cycles/scooters, about 40% ply on Nowshera Road, 22% on Mardan Road, and 19% each on Swabi Road and Malakand Road.
v. Of the total wagons/mini buses about 57% ply on Nowshera Road, followed by Malakand Road (20%), Swabi Road (15%) and Mardan Road (9%).
vi. The trend for large buses is roughly similar to wagons/mini buses. Of the total, most large buses (62%) travel on Nowshera Road, followed by 27% in case of Malakand Road, 9% on Swabi Road and less than 3% on Mardan Road.

Table 5. 19 Mode-Wise Traffic Volume on Primary Highways in District Mardan						
Vehicles Type	**Direction**	**Nowshera Road**	**Swabi Road**	**Mardan Road**	**Malakand Road**	**Total**
Motor Cycle/ Scooter	In-Coming	2,550	1,597	1,766	1,480	7,393
	Out-Going	2,801	968	1,175	1,175	6,119
	Total	5,351	2,565	2,941	2,655	13,512
	%	39.60	18.98	21.77	19.65	100.00
Car/ Jeep / Taxi	In-Coming	3,030	2,130	1,884	2,401	9,445
	Out-Going	3,007	1,366	1,411	1,717	7,501
	Total	6,037	3,496	3,295	4,118	16,946
	%	35.62	20.63	19.44	24.30	100.00
Wagons/Mini Bus/ Medium Bus (12 to 20 seats)	In-Coming	2,905	571	340	638	4,454
	Out-Going	2,924	912	544	1,395	5,775
	Total	5,829	1,483	884	2,033	10,229
	%	56.99	14.50	8.64	19.87	100.00
Large Bus (over 20 seats)	In-Coming	859	114	34	255	1,262
	Out-Going	678	109	31	417	1,235
	Total	1,537	223	65	672	2,497
	%	61.55	8.93	2.60	26.91	100.00
Pickup/ Truck (open back)	In-Coming	1,701	302	204	678	2,885
	Out-Going	941	665	840	915	3,361
	Total	2,642	967	1,044	1,593	6,246
	%	42.30	15.48	16.71	25.50	100.00
Truck (2 Axle Rigid)	In-Coming	1,356	176	105	323	1,960
	Out-Going	1,052	403	122	553	2,130
	Total	2,408	579	227	876	4,090
	%	58.88	14.16	5.55	21.42	100.00
Truck (3 Axle Rigid)	In-Coming	790	130	52	216	1,188
	Out-Going	614	369	82	315	1,380
	Total	1,404	499	134	531	2,568
	%	54.67	19.43	5.22	20.68	100.00
Articulated Truck (4, 5, 6 or more Axles)	In-Coming	609	16	6	75	706
	Out-Going	228	27	4	99	358
	Total	837	43	10	174	1,064
	%	78.67	4.04	0.94	16.35	100.00
Tractor Trolley	In-Coming	724	236	150	238	1,348
	Out-Going	587	138	169	334	1,228
	Total	1,311	374	319	572	2,576
	%	50.89	14.52	12.38	22.20	100.00
Total all Vehicles	In-Coming	14,524	5,272	4,541	6,304	30,641
Total all Vehicles	Out-Going	12,832	4,957	4,378	6,920	29,087
Total all Vehicles	Both Sides	27,356	10,229	8,919	13,224	59,728
	%	45.80	17.13	14.93	22.14	100.00



Map 5. 5 Traffic Volume (No. of Vehicle and PCUS) on Primary Roads - District Mardan

b. Level of Service

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

Of the total traffic volume in peak hour, more than 53% PCUs are on Nowshera Road, followed by Malakand Road (23%), Swabi Road (15%) and Mardan Road (9%) (Table 5.16)

Traffic flows on peak hours on primary roads have been converted to PCUs so that level of service against traffic carrying capacity of the roads can be determined, as would be seen in next paragraph.

Table 5. 20 Maximum Hourly Traffic Flow on Primary Roads, District Mardan[38]

Vehicles Type	PCU Equi.	Nowshera Road		Swabi Road		Mardan Road		Malakand Road	
		Hr 4, 10-11 AM		Hr 3, 9-10 AM		Hr 10, 04-05 PM		Hr 3, 09-10 AM	
		Veh	PCUs	Veh	PCUs	Veh	PCUs	Veh	PCUs
Motor Cycle/ Scooter	0.33	727	239.91	321	105.93	327	107.91	256	84.48
Car/ Jeep / Taxi	1	602	602	379	379	333	333	484	484
Wagons/Mini Bus/Medium Bus (12 to 20 seats)	1.5	754	1131	167	250.5	56	84	287	430.5
Large Bus (over 20 seats)	4	274	1096	58	232	2	8	87	348
Pickup/ Truck (open back)	4	321	1284	108	432	163	652	167	668
Truck (2 Axle Rigid)	4	327	1308	89	356	7	28	106	424
Truck (3 Axle Rigid)	4	212	848	56	224	9	36	117	468
Articulated Truck (4, 5, 6 or more Axles)	4.5	142	639	14	63	0	0	21	94.5
Tractor Trolley	4.5	173	778.5	51	229.5	29	130.5	91	409.5
Total		3,532	7,926	1,243	2,271	926	1,379	1,616	3,411
%			52.89		15.15		9.20		22.76

Table 5. 21 Standard Levels of Service (Traffic Flow on Roads)

Service Levels	Operation Conditions	Density Range (PCU/ Hour/Lane)
A	Free Flow	0 – 660
B	Reasonably Free Flow	666 – 1080
C	Stable Flow	1086 – 1560
D	Approaching Unstable Flow	1566 – 2100
E	Unstable Flow	2106 – 2700
F	Forced Flow	> 2700

[38] Estimation/ Conversions by the Consultants

For determining the existing level of service of roads under the given traffic flow and other conditions, following standards of traffic density ranges have been adopted. Level of service is qualitative measure describing operational conditions within a traffic stream. Its different levels are tabulated below:

Accordingly, following are the existing levels of service delivered by primary roads of District Mardan under the given conditions of traffic flow, roads, etc. It has been estimated that Nowshera Road is offering the poorest level of service, followed by the Malakand Road. On both of these roads, traffic flow is approaching unstable level (Table 5.22):

Table 5. 22 Level of Traffic Flow on Primary Roads, District Mardan[39]

Primary Roads	Operation Hours	Total PCUs	Lanes	PCU/ Lane	Level of Traffic Flow	
Nowshera Road	10-11 AM	7926.4	4	1981.6	D	Approaching to Unstable Flow
Swabi Road	09-10 AM	2271.9	2	1136	C	Stable Flow
Mardan Road	04-05 PM	1379.4	2	689.7	B	Reasonably Free Flow
Malakand Road	09-10 AM	3411	2	1705.5	D	Approaching to Unstable Flow

b. Origin-Destination Surveys

Traffic Origin-Destination Survey was conducted during January 2013, on primary highways of Mardan District, at boundaries and entry/ exit points. The roads included Nowshera Road, Swabi Road, Mardan Road and Malakand Road. The survey was single day based and covered mainly peak hours of traffic flow.

Following is the summary of inferences of O-D survey:

i. A total of 478 vehicles were interviewed of which 31% were cars/jeeps, followed by 16% in case of wagons/mini buses and a similar percentage of pick-ups, about 11% large buses, and 22% trucks of different categories.
ii. Most of the vehicles interviewed for origin/destination were on Nowshera Road (38%), followed by 32% on Malakand Road, 21% on Swabi Road and 9% on Charsadda Road.
iii. Of those who originated from Mardan, about 31% were destined for FATA, around 20% for Swabi, about 18% for Nowshera, 13% for Charsadda and about 11% for Peshawar.
iv. Of those whose destination was Mardan, 25% were coming from FATA, about 22% from Swabi, about 17% from Nowshera, 15% from Peshawar and 11% from Punjab/Islamabad. Detailed statistics are given in O-D Tables, Chapter 14 of District Studies Report Mardan.

5.6.5 Rail Network

The total railway route kilometrage in KP is about 228, all of which is broad gauge. In the five Districts of Peshawar Valley, the track lengths are as below:

- Peshawar: 31 kms
- Mardan: 51 kms

[39] Traffic Analysis by the Consultants.

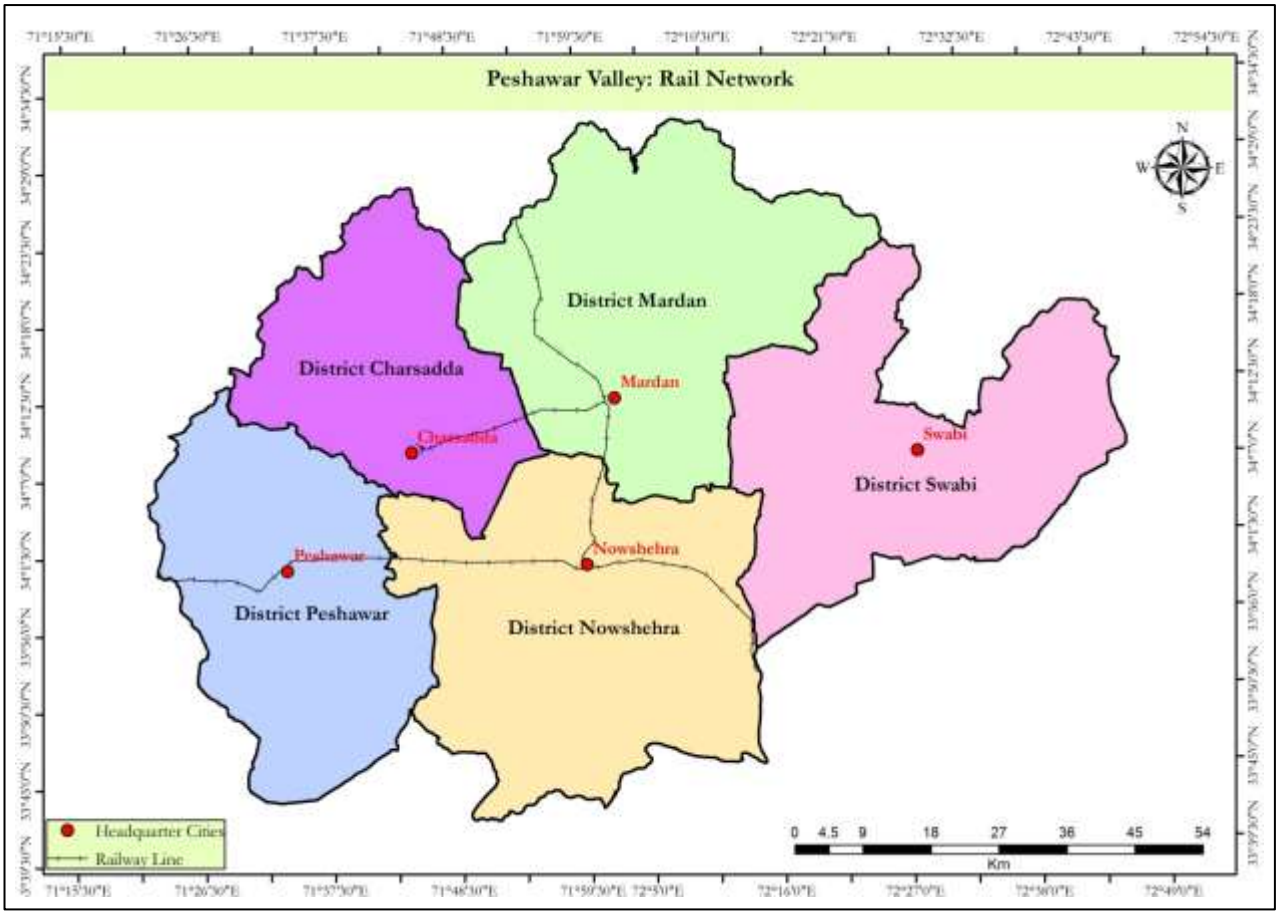
- Nowshera: 72 kms
- Charsadda: 15.5 kms
- Swabi: 0 kms

Mardan railway station, spread over 75 acres, remained closed for passenger traffic for many years. The last passenger train, which was a special train, arrived on September 15th, 2009. Most of area under the railway station has been leased out for different purposes. The regular train was briefly re-started in January 2010. Month-wise number of passengers is given in Table 5.23.

Table 5. 23 Number of Railway Passengers[40]

Months, 2010	Total Passengers
January	381
February	1762
March	2645
April	1986
May	1138
June	947
July	1026

[40] Pakistan Railways, Peshawar Division



Map 5. 6 Rail Network in Peshawar Valley

5.6.6 Air Network

There is no airport in District Mardan. There are six civil airports in the province but the main and only international airport is Peshawar Airport (Bacha Khan International Airport), serving the entire Province. It is maintained by Civil Aviation Authority which oversees and regulates all aspects of civil aviation in Pakistan.

5.7 TRANSPORTATION PROPOSALS

Effective road network and proper management of transport system play major role in the efficient functioning. One of the main objectives of Land Use Plan at District level is to increase the capacity of existing roads, opening up new area for development, and decentralization and traffic management in the inner city.

5.7.1 Improvement of Mardan-Malakand Road

Analysis of traffic surveys reveal that of the total traffic volume on the four primary roads of District Mardan (in-coming plus out-going), maximum volume after Nowshera Road is on Malakand Road (22% of total flow). The vehicles include all modes of traffic including motor Cycles/ Scooter, Car/Jeep, Wagons/Mini Buses, Buses, pickups, trucks, and tractor trolleys.

Origin-Destination surveys reveal that of those who originated from Mardan, maximum (about 31%) were destined for Malakand, and those whose destination was Mardan, 25% were coming from the above area.

This road is gateway to Swat and Northern areas, and is of tremendous value to further promote tourism in the region, and therefore it is of utmost importance that it should be upgraded. The segment of this road from Mardan to Takht Bhai is of great importance, particularly because of archeological sites in the areas which already attract many tourists, and with improved access and facilities in the area, the flow of tourists can further be increased, enhancing local economy.

5.7.2 Improvement of Mardan-Nowshera Road

As seen earlier, total traffic volume on the four primary roads of District Mardan (in-coming plus out-going) is 59,728 vehicles, of which maximum volume is on Nowshera Road (about 46% of total flow, both ways). Thus, about half of traffic load is on Nowshera Road. Results of O-D surveys show that of the total vehicles originating from Mardan, about 18% were destined for Nowshera, and of those whose destination was Mardan, 17% were coming from Nowshera.

Besides, as seen in Table 5.16, traffic on Mardan-Nowshera Road is approaching unstable level. There is thus an urgent need to improve/upgrade this road.

5.7.3 Improvement of Takht Bhai-Katlang-Mardan Road

It is important to link tehsil headquarters for administrative, economic and social reasons, and to open up the lagging areas of the District. A road currently exists, but is not in good shape and is proposed to be improved/upgraded.

5.7.4 Improvement of Existing Mardan Ring Road

Mardan has a Ring Road around it providing fairly high level of interchangeability to and from all the radial (primary) roads. This can be further improved provided the intervening junctions are well designed (involving grade separation where feasible) to ensure uninterrupted smooth flow of the inter-city as well as local traffic.

5.7.5 Proposed Inner Ring Road

The existing Ring Road is at considerable distance from the existing urban area. The proposed new developments are adjacent/close to Mardan City to achieve urban contiguity. Series of concentric roads intersected by inter-city radial roads provide more efficiency than a single ring road. An inner ring road

has thus been proposed nearer to the urban area. This will increase efficiency of traffic flow, reduce congestion, and provide better access to proposed developments such as new industrial estate, proposed trade centre and civic zone etc.

5.7.6 Improvement of Cordon Junctions

It has been observed that peak hour traffic at cordon junctions and other junctions of primary and secondary urban roads get choked and cause traffic problems. It is therefore suggested to enlist, study and improve all such junctions throughout the District, preferably through grade separation where feasible.

5.7.7 Reducing Congestion in Central Urban Area

One of the major problems being faced by Mardan is that all main inter-city roads converge in the urban area of Mardan causing immense traffic problems, as inter-city traffic mingles with the local traffic. Nowshera Road enters the District (and Mardan City) from South, Charsadda Road from West, Malakand Road from North-West, and Swabi Road from the East. Besides a number of other smaller roads also pass through Mardan urban area. Thus the traffic jams on urban roads are significant. The improvement/extension of Ring Road proposed earlier will thus help to reduce congestion as all the through traffic will be diverted, and will move to their destinations via the Ring Road rather than passing through the urban area.
Relocation of Whole Sale Market, Fruit & Vegetable Market, is also recommended from inner city to outer area so as to ensure smooth traffic flow and better transport services.

5.7.8 Widening of Inter-City Radial Roads

The problems identified above can be solved by eased by widening existing radial roads, which are:

i. Mardan-Nowshera Road
ii. Mardan-Charsadda Road
iii. Mardan-Malakand Road

The widening and improvement of above roads will also improve the linkages between Mardan and surrounding Districts, as well as settlements within the District such as Takht Bhai and larger villages. The above roads need to be widened and kept free from all types of permanent and mobile encroachments. From transportation perspective, all main settlements in the District need to be seen in holistically and linkages between one another need to be strengthened. This will also help to decrease the traffic load in urban areas of Mardan and also increase efficiency of District road network.

5.7.9 Shifting of Traffic-Generating Land Uses

The major traffic generating activities in the inner-city areas, such as transport terminals, wholesale commercial activities, administrative areas, and 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 consent of all stakeholders.

There is a need to chalk out and implement workable policy for establishment and improvement of Private Passenger Transport Stands and Goods Forwarding Agencies. Relocation of General Bus Stand and Truck Stand for smooth traffic flow is also proposed as shown in the Plan.

5.7.10 Proposals and their objectives for transport corridors.

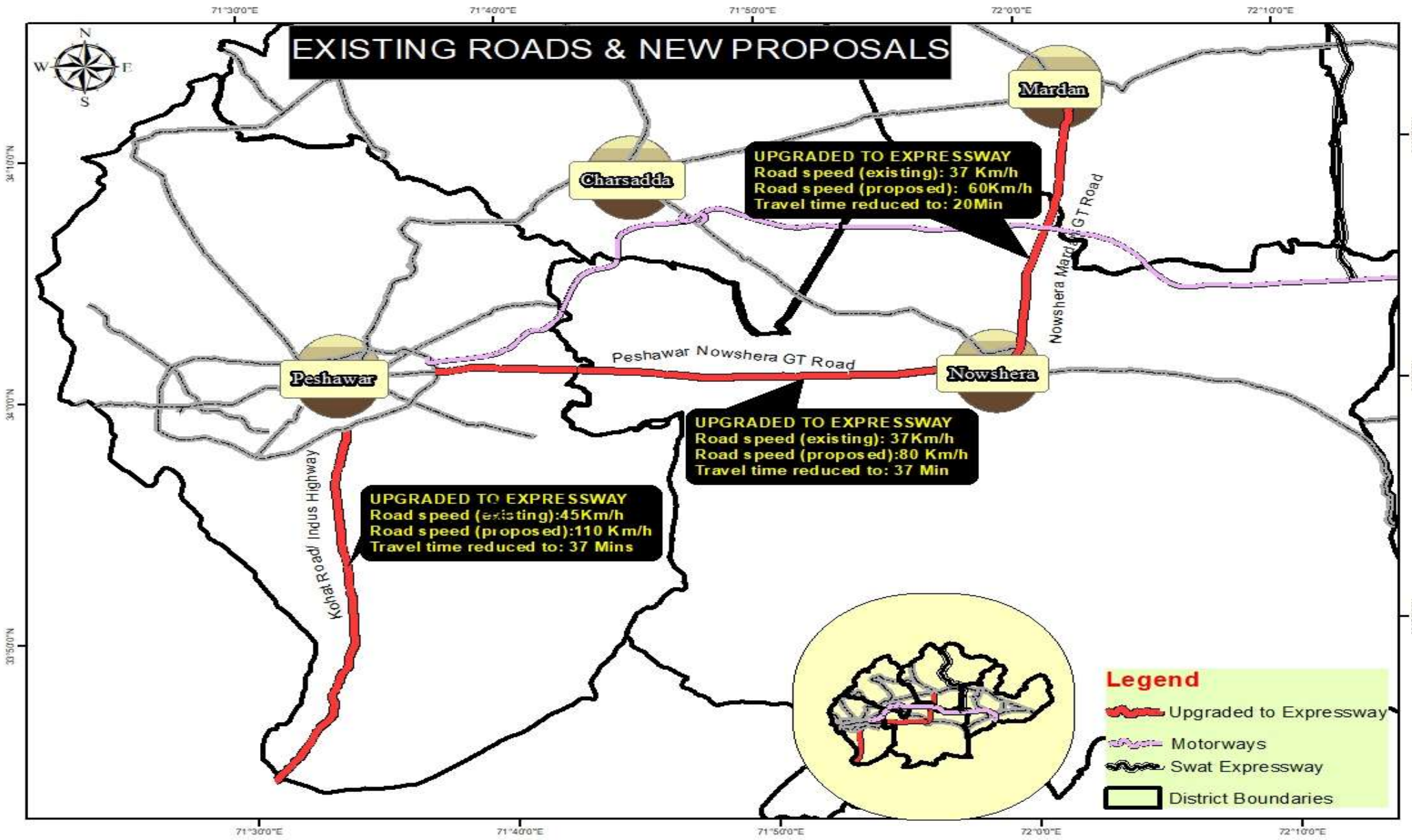
- **N-45 Nowshera to Mardan Section upgraded to Expressway**
  - Improve connectivity for passengers and freight between Nowshera, Risalpur and Mardan.
  - Provide easy accessibility to Motorway M-1.
  - Improves inter city connection
  - Removes congestion
  - Maintains the Uniform flow of traffic
  - To add bridges and underpasses where needed
  - Total traffic volume is 27,474 vehicles

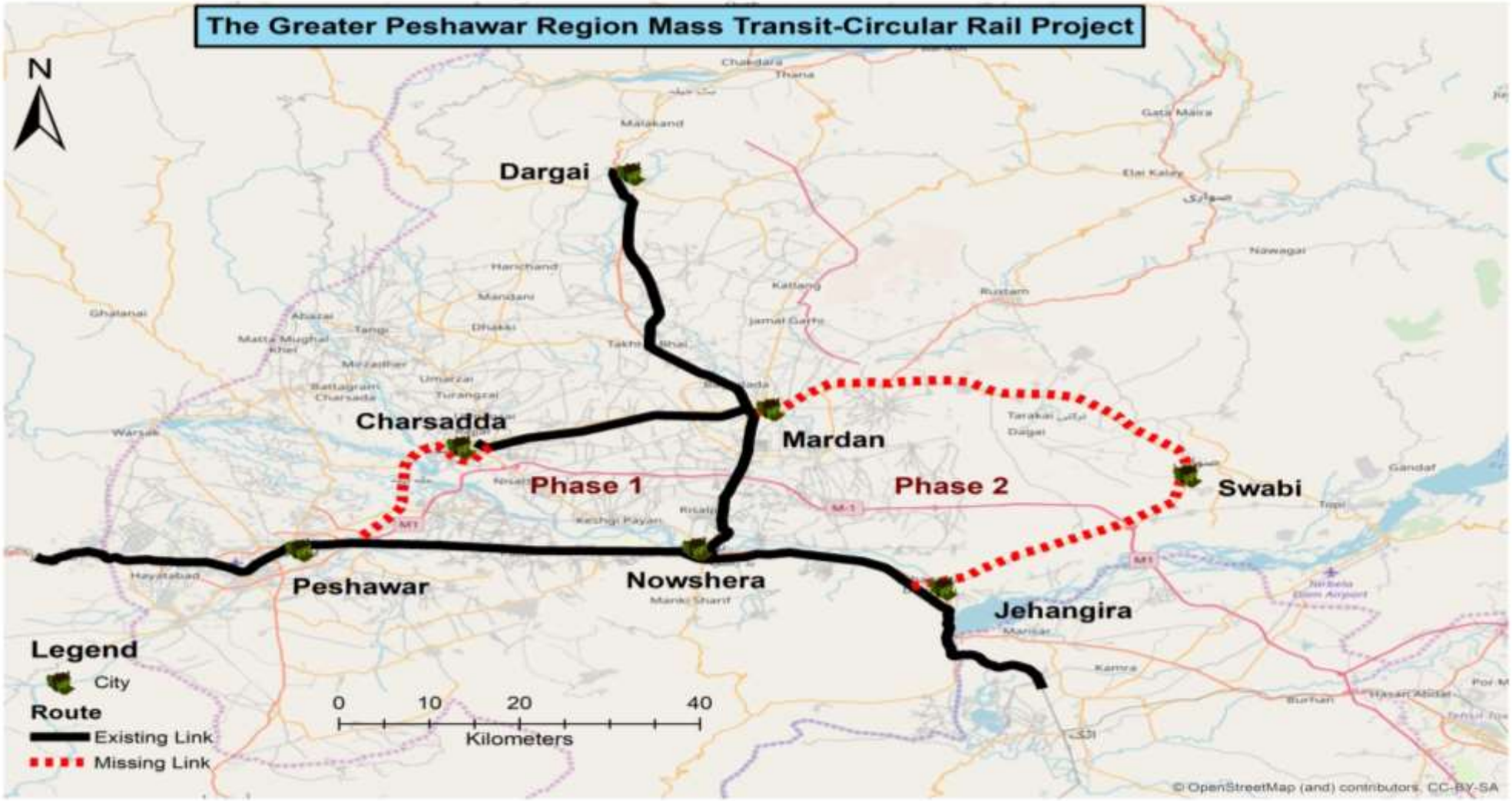
- **Mardan - Charsada Road**
  - Dualization of road is in progress (PKHA)
  - Total traffic volume is 8,805 vehicles

- **Sawabi - Mardan Road**
  - Rehabilitation of Swabi Mardan road in progress (PKHA)
  - Serves Gadoon Amazi Industrial Estate

Total traffic volume is 10,102 vehicles

Map 5. 7 Proposed Road Network in District Mardan





Govt. of Khyber Pakhtunkhwa is establishing a commuter Rail Network, "**The Greater Peshawar Region Mass Transit – Circular Rail Project"**

- It will connect **Peshawar-Nowshera-Mardan-Charsadda** in **Phase-I** while **Swabi, Jahangira and Dargai** in **Phase-II** using the existing/Laying new infrastructure where necessary
    - MoU for the project was signed between Government of Khyber Pakhtunkhwa and CRCC on **18th June 2019**

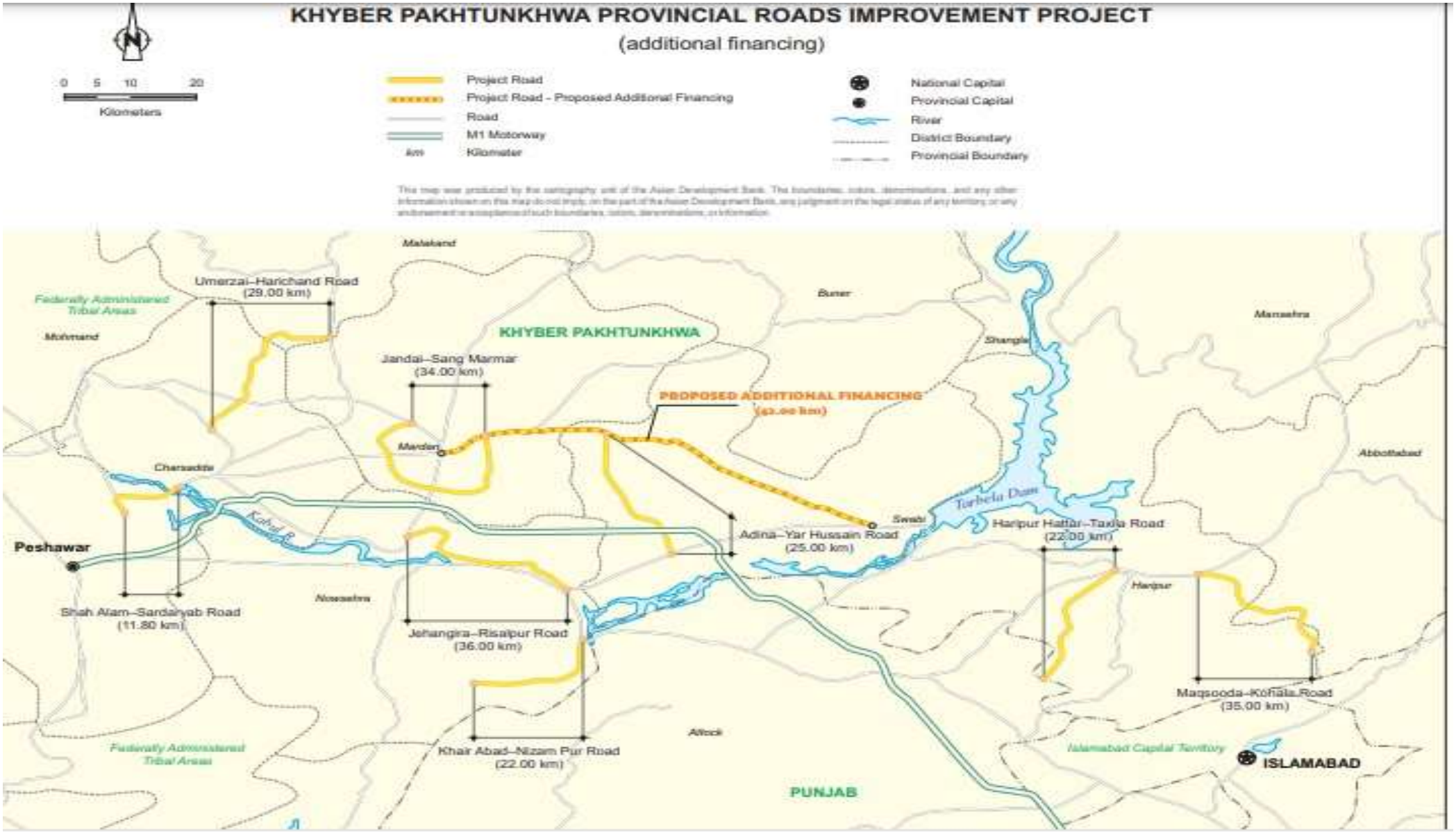
5.7.11 Ongoing and Proposed Programmes

Improvement and widening of N-45 (NHA)

5.7.12 Ring Road from Swabi Interchange on M-1 to Gadoon Amazi Industrial Estate

PSDP (2020-21) Allocation (Millions)	Rupee	Foreign	Total
	20	0	20

Length	35 km
Cost	17.66 Million
Scope	Construction of Ring Road Swabi Interchange on M-1 to Gadoon Amazi Industrial Estate
Status	PC-II approved by DDWP. Consultancy Under Procurement


KHYBER PAKHTUNKHWA PROVINCIAL ROADS IMPROVEMENT PROJECT
(additional financing)
0 5 10 20
Kilometers
Project Road
Project Road – Proposed Additional Financing
Road
M1 Motorway
Km Kilometer
National Capital
Provincial Capital
River
District Boundary
Provincial Boundary
Malakand
Umerzai–Haricharid Road
(29.00 km)
Federally Administered Tribal Areas
Mohmand
KHYBER PAKHTUNKHWA
Jandai–Sang Marmar
(34.00 km)
PROPOSED ADDITIONAL FINANCING
(42.00 km)
Mardan
Charsadda
Peshawar
Kabul R.
Shah Alam–Sardaryab Road
(11.80 km)
Nowshera
Jehangira–Risalpur Road
(36.00 km)
Adina–Yar Hussain Road
(25.00 km)
Swabi
Tarbela Dam
Buner
Shangla
Mansehra
Abbottabad
Haripur Hattar–Taxila Road
(22.00 km)
Haripur
Maqsooda–Kohala Road
(35.00 km)
Attock
Khair Abad–Nizam Pur Road
(22.00 km)
Federally Administered Tribal Areas
Islamabad Capital Territory
ISLAMABAD
PUNJAB

5.9 TRADE ZONE AND COMMERCIAL AREAS

5.9.1 Distribution of Commerce and Trade Centers:

Mardan is the second largest city of Khyber Pakhtunkhwa, a major trade and commerce center and plays a vital role in the economy of the province. The District has trade and commerce linkages at international, national and regional levels.

At international level, grapes, apples and tiles are imported, mainly from Afghanistan and China while Mardan's exports to foreign countries include tobacco and marble. At national level, in-coming commodities from other parts of the Country (Punjab & Sindh) include fruit and sanitary ware. Out-going good to different parts of the Country include fruit, sugarcane, tobacco, sugar and marble.

At regional level, commodities brought to Mardan include variety of fruit such as citrus fruit, apple and peach. These are mainly brought from Swat, Chitral and Peshawar. The goods sent from Mardan to other parts of the Province include plum, sugar cane, sugar and tobacco. The details are shown in Table 5.20.

Table 5. 24 Trade and Commerce Linkages of Mardan at International, National and Regional Levels

LEVEL	IN-COMING COMMODITIES	OUT-GOING COMMODITIES
INTERNATIONAL	Grapes (China, Afghanistan) Apples (Afghanistan) Tiles (China)	Tobacco Marble
NATIONAL	Citrus Fruit (Punjab) Bananas (Sindh) Water melon (Punjab) Guava (Punjab) Tiles (Punjab, Karachi) Sanitary ware (Lahore, Gujranwala)	Fruit (Plum, Peach) Sugarcane Tobacco Sugar Marble
REGIONAL	Citrus Fruit (Swat) Apple (Swat, Chitral) Peach (Swat, Peshawar)	Plum Sugarcane Tobacco Sugar
SUB-REGIONAL/LOCAL	Vegetables Water Melon	

5.9.2 Services Area of Commerce and Trade Centers in Mardan:

Trade and Commerce in Khyber Pakhtunkhwa is a major income and employment-generating sector, and a large proportion of male population of all ages directly or indirectly depends on small scale commerce and trade. As Mardan is the second largest city of Khyber Pakhtunkhwa, a major trade and commerce center and plays a vital role in the economy of the province. The District has trade and commerce linkages at international, national and regional levels.

Commercial and Trade Centers:
The main trade and commercial centers of Mardan are:

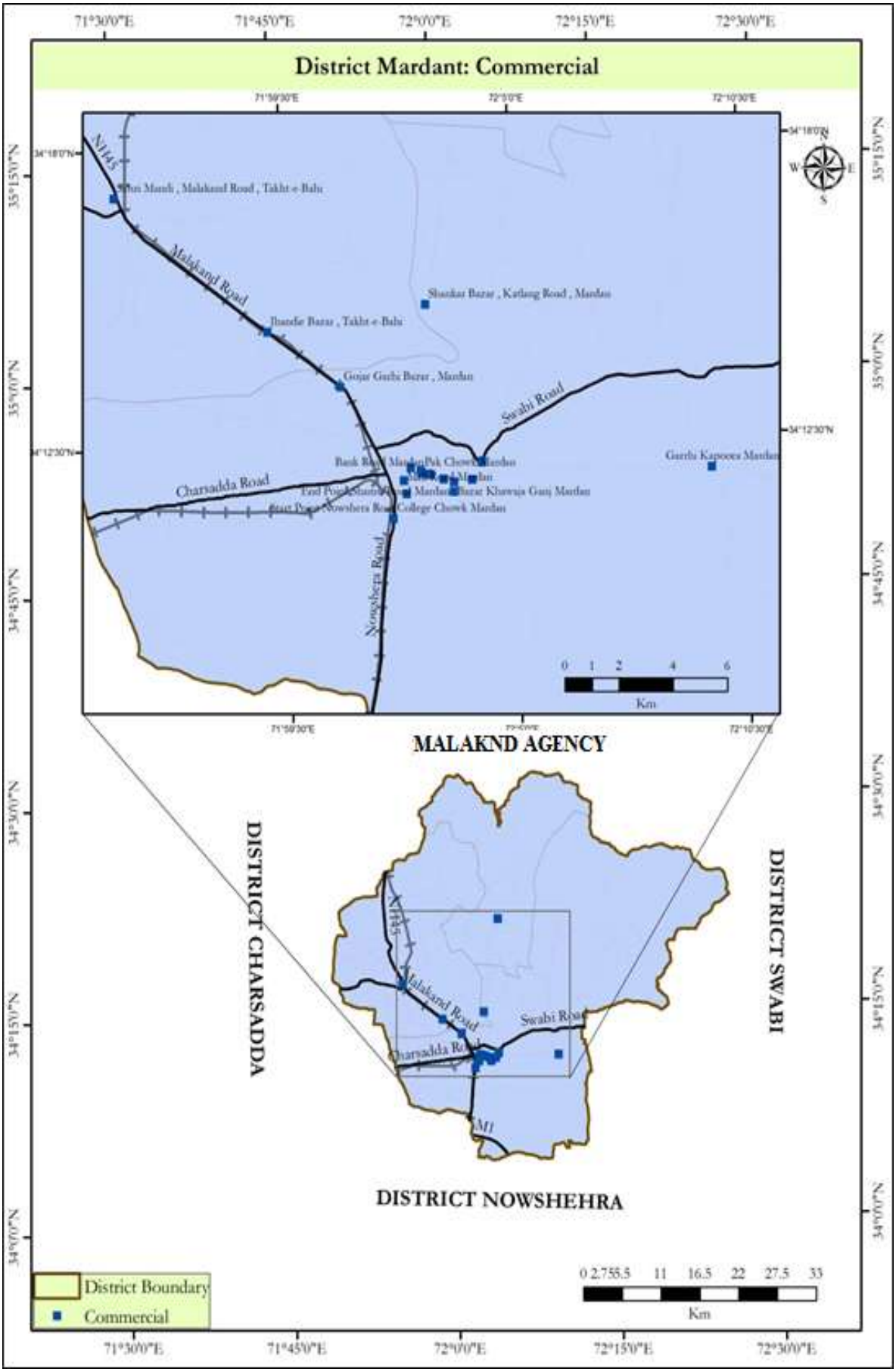
i. Bank Road
ii. Khawja Ganj Road

iii. Sarfaraz Ganj Road
iv. Parhoti Road and
v. Younas Stadium, Sabzi Mandi Road.

Bank Road is the main commercial hub of Mardan, where electronics, cloth and sports goods are sold. Khawja Ganj Road is also a big commercial centre. Several cereal crops, vegetables and fruits are produced in Mardan, but some are also imported from other Provinces. Sugarcane and tobacco are the intra-provincial exports of District Mardan. There are two sugar mills namely Mardan sugar mill and Premiere sugar mill which have a big contribution towards production of sugar in the Province.

Because of market forces, rapid Land Useconversions 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 Useconversion thus deserves thorough review by the concerned planning agency, whichever is relevant for a particular location.

Mardan has few city-levels planned commercial centers with adequate parking. Generally, Land Usepattern in Mardan 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 ground floor is used for commercial purposes and subsequent floors for habitation. This is particularly true for inner areas of Mardan.



Map 5. 8 Commercial Zones and Markets in District Mardan

Service Area:

Data/information regarding service area of Mardan for trade and commerce was collected through field surveys, and has already been presented in Section 11.1.

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 boundary of the tributary area of a city or delineate its functional region, using the distance between the settlements and population of each settlement. 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 Mardan is shown in the Figure below.

Table 5. 25 Parameters to Determine Service Area of Mardan under Gravity Model

Cities	City Population (2019)	Distance from Mardan (Km)	Breaking Point (Km)
Mardan	458,240	--	--
Peshawar	2100970	63.1	32.79
Swabi	288748	47.4	25.77
Charsadda	1702715	28.6	12.93

Figure 5. 2 Trade and Service Area of District Mardan as Determined Through Gravity Model

Current Commercial Area Gap:

The current commercial area gap has been calculated as below:

- Urban Population (2022): 487671
- Commercial Area required (@0.5 acres/1000 persons)[41]= 238.797 acres
- Current area under commercial land use: 0.28 sq. km = 69 acres[42]
- Commercial area deficiency: 238.797-69=169.797 acres

It is clear from the above that by the end of plan period, the total commercial area requirement would include 238.797 acres to meet the current deficiency, and 116.283 acres to meet the future requirement. The total would be thus 238.797+116.283 = 355.08 acres.

5.9.3 Distribution of Dry Ports/Export Processing Zones in Mardan:

Dry Ports:

There is no dry port in District Mardan. Therefore, in the context of dry port, details such as export/import of various goods/commodities, service area, locational aspects and foreign exchange component etc do not apply.

In the Country as a whole, there are six dry ports 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 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[43]:

[41] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 307, Table 10.4 (adapted)

[43] Export Processing Zone Authority: http://www.epza.gov.pk/location.html

There is no Export Processing Zone in Mardan. In this context therefore, details such as export/import of various goods/commodities, service area, locational aspects and foreign exchange component etc do not apply.

There are four operational export processing zones in the Country, i.e.:

- Karachi
- Risalpur
- Sandak
- Sialkot
- Duddar

Risalpur Export Zone 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.

5.9.4 Impact of Trade and Commerce on Economy:

Global recession adversely affected exporting countries including Pakistan. Exports from Pakistan declined to US$ 17.8 billion as compared to 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.

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 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'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 are grown in the province. Some manufacturing and high-tech investments in Mardan has 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.

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% as of 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 major manpower contributor because it has 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 raging 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%.

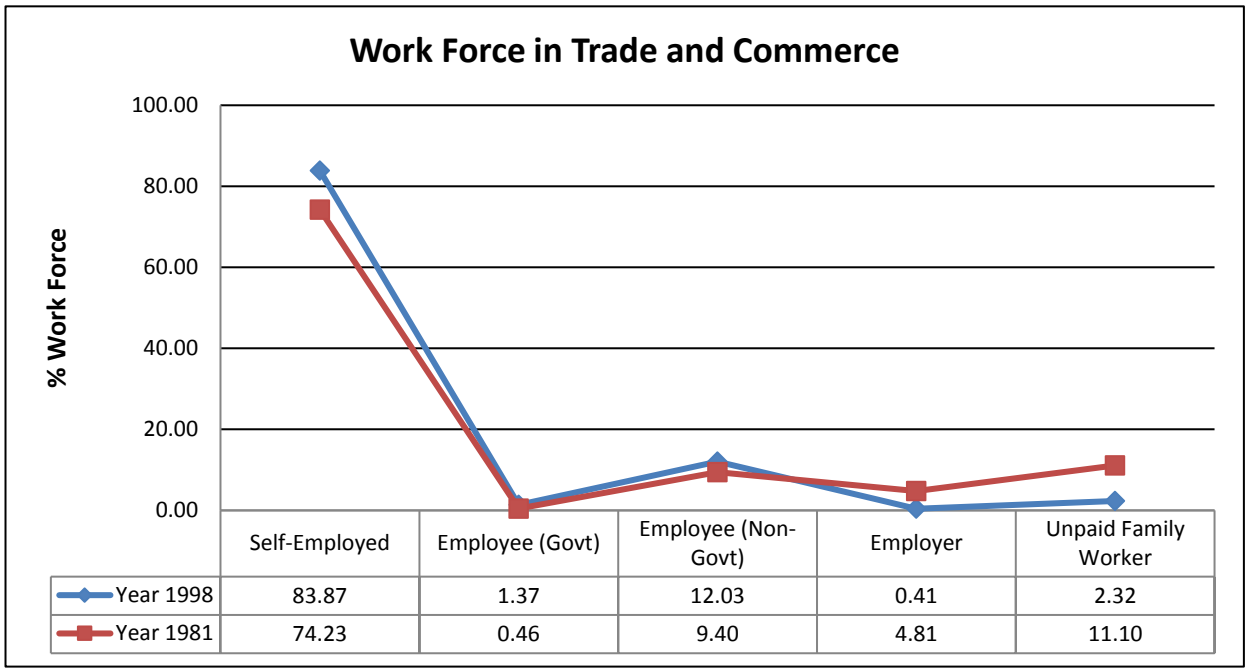
Sindh has the second largest economy in Pakistan. Its GDP per capita was $1,400 in 2010 which is 50 per cent more than the rest of the nation or 35 per cent more than the national average. Historically, Sindh's contribution to Pakistan's GDP has been between 30% to 32.7%. Its share in the service sector 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 centre of economic activity in Pakistan and has a highly diversified economy ranging from heavy industry and finance centred 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.

The economy of Balochistan 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 are trading bazaar found throughout the province. Though the province remains largely underdeveloped, there are currently several major development projects in progress in Balochistan, including the construction of a new deep-sea port at the strategically important town of Gawadar. The port is projected to be the hub of an energy and trade corridor to and from China and the Central Asian republics.

5.9.5 Work Force:

Both in 1998 as well as in 1981, the work force in trade and commerce is categorized as “Major Division 6 – Wholesale and retail trade and restaurants and hotels”.

The categorisation of workforce in this sector is not as skilled, semi-skilled, unskilled and managerial, but as self-employed, employee (Govt), employee (private), employer and unpaid family workers. Based on the given criteria, the percentages of workforce in trade and commerce, in the years 1981 and 1998 are presented in the graph. Most prominent changes have been in self-employed category, which have increased from around 74% in 1981 to about 84% in 1998. The percentage of unpaid family workers on the other hand has decreased from 11% in 1981 to only around 2% in 1998. Comparative statistics about other categories of work force are presented in the graph.



	Self-Employed	Employee (Govt)	Employee (Non-Govt)	Employer	Unpaid Family Worker
Year 1998	83.87	1.37	12.03	0.41	2.32
Year 1981	74.23	0.46	9.40	4.81	11.10

Figure 5. 3 Work Force in Trade and Commerce[44]

5.9.6 Future Plan:

Future Land Use policy for Mardan should respect the fact that much of Mardan's distinct character lies in its diversity of landuses, and its physical, economic and cultural characteristics. Complete segregation of landuses, particularly in the inner areas is neither possible nor desirable. However rampant Land Useconversions, which impede easy flow of traffic and a non-amenable living environment for the local residents must be controlled. Congestion is not the only curse of indiscriminate Land Useconversion. 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 landuses 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 Zone for Mardan will maximize the aggregate convenience of traders and the inhabitants. By providing such a Centre, the present Central Business District of Mardan and the inner city can be decongested, and the residents can avoid areas of traffic clogging.

The Site for Trade/Commercial Zone is proposed along Charsadda Road West of Mardan urban area, lying between the existing outer ring road and the proposed inner ring road. With roads all around, the site has easy access for all concerned, including retailers, wholesalers and customers.

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.

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[44] Source for 1981: District Census Report of Peshawar, 1981, Page 61, Major Division 6.

Source for 1998: District Census Report of Peshawar, 1998, Page 144, Industrial Division 6.

As is clear from the Table5.22 that about 20.8 acres of commercial area will be required during the first years of plan period (2022-2027) and about 95.48 acres during the subsequent 15 years. The total requirements of commercial area thus, during the entire plan period will be 116.28 acres.

Table 5. 26 Commercial Area Required in Mardan (2022-42)		
Year/Period	**Urban Population**[45]	**Commercial Area Required** @0.5 acres/1000 persons)[46]
2022	487671	
2027	541338	
2042	740445	
Additional Urban Population (2022-2027)	48346	20.8 Acres
Additional Urban Population (2027-2042)	199107	95.48 Acres
Total Additional Urban Population (2022-2042)	252774	116.28 Acres

5.9.7 Constraints:

In District Mardan there is a great potential to enhance District's income manifold by allocating more land and financial resources to local business and trade to meet local demands and develop export-oriented production in KP.

Mardan would have to depend more heavily on 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. To this end 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 the productivity and economic growth.

Some of the major constraint to sustainable development of commerce and trade are listed below:

i. Lack of properly planned and developed land
ii. Threat due to terrorism and absence of emergency disaster response, like fire fighting, and emergency exits, as such many lives assets and property has been damaged during recent terrorists' attacks.
iii. 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

[45] Urban Population of Mardan City in 2017 projected for the respective years using 2017-1998 urban growth rateof 2017.

[46]Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Page 307, Table 10.4 (adapted).

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 Useof education, health, residential small industry and commercial landuse.
xiii. Absence of basic facilities for the customers like toilets, rest areas, lockers etc.
xiv. Lack of fire fighting safety and security system
xv. Mix of hazardous and non-hazardous commercial uses.

5.9.8 Recommendations:

It is recommended that the Provincial Government should formulate policies to encourage private sector investors to strengthen the trade and commerce sector. To this end the provincial and local government may adopt following:

- **Availability of infrastructure**
  - Transportation network
  - Water supply and drainage
  - Solid waste collection and disposal
  - Electricity
  - Communication links
- **Availability of developed and secured land**
  - Properly zoned for different type of trade and commerce by size and type
  - Security and peaceful environment
- **Upgrade Quality of Human resources**
  - Skilled
  - Unskilled
  - Managerial
- **Capital – on easy terms; availability of finances for**
  - Initial capital for investment
  - Running capital
- **Environmental Issues'**
  - Mitigation of pollutants
  - Air pollution – Gaseous emission
  - Waste Water
  - Noise
  - Solid waste
  - Odours
  - Aesthetics
  - Effective disposal of recyclables, and other wastes

- **Social environment,**
    - Availability of
        - schools,
        - Commercial areas & markets, both for workers & for the products
        - housing
        - Congregation/Religious places Mosques etc
        - Community facilities
        - Hospitals. Clinics
        - Entertainment areas in close vicinity to the industrial area
        - Open spaces parks and play grounds
        - Efficient Transport system

5.10 PUBLIC AND COMMUNITY FACILITIES

5.10.1 Proposed Civic Zone

The Civic Zone is proposed along Nisata Road towards its South, close to existing Mardan Urban Area. Apart from Nisata Road, it also has the two ring roads towards its West and East. The Civic Zone is proposed to have offices, public buildings, higher order health and education facilities, libraries, Jamia Mosque, a mini sports complex, banks, police station and post office etc.

5.11 EDUCATION

Vertical hierarchy is a basic feature in the delivery of formal education. It may be visualized as a pyramid, its base comprising of many hundreds of primary schools, while at the top may be a few universities providing specialized education to much lesser number of post graduate students. Specialized institutions such as universities are virtually limited to metropolitan cities. According to National Reference Manual for Planning & Infrastructure Standards[47] a unit at each level is fed by a catchment comprising 3-7 facilities of the next lower level. The next lower level in case of universities is Degree Colleges, which presently are 17 in District Mardan[48]. Educational statistics in the District, including number of different institutions, enrolment and teaching staff is given in the Table below:

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

[48] Development Statistics of KP 2020, Page 106, Table No. 80.

Table 5. 27 Educational Statistics in District Mardan (2018-2019)[49]									
Institutions	**Number**			**Enrolment**			**Teaching Staff**		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Primary	1408	806	602	273,658	138,328	135,330	6,181	3,570	2,611
Middle	160	74	86	87,206	51022	36184	975	562	413
High	176	88	88	37,959	23059	14900	2,647	1,535	1112
Higher Secondary	72	42	30	9,238	5750	3,488	2,121	1331	790

[49] Development Statistics of KP 2020, Page 98-108.

5.11.1 Educational Institutions in Private Sector

The total number of prvate primary institutions in District Mardan is 174, which is 1408 in government sector; however, the number of middle schools in private sector is 237 as of 160 in government sector.

The details of numbers of high and higher secondary private institutions in District Mardan is given in Table 5-24.

Table 5. 28 Number of Private Institutions

Institutions	Number
Primary	174
Middle	237
High	190
Higher Secondary	57

Educationl Facilities in Government Sector

The details number of Boys and Girls education facilities details in given table.

Literacy Ratio

A person was treated as literate in 1998 Census if he could read newspaper or a journal of the same standard and could write a simple letter in any language. The literacy is measured as the ratio, in percentage, of literate population to corresponding population aged 15 years and over. The Adult literacy ratio in Mardan District in 2018-2019 was 55%[50].

S.no	Table 5. 29 District Mardan Education Facilities (2022)			
	Institutions (Boys)	Number	Institutions (Girls)	Number
1.	GPS	797	GGPS	579
2.	GDC	07	GDC	02
3.	GCC	02	GCC	01
4.	GMS	75	GGMS	92
5.	GHS	84	GGHS	82
6.	GHSS	39	GGHSS	28
7.	GCMHS	02	GGCMHS	02
8.	GMKS	05	GGC	03
9.	GMPS	14	GPGCG	01
10.			GGDC	06
12.			GGCMS	20
13.			GGPMS	02

[50] Development Statistics of KP 2020, Page 138, Table 112.

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. 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. 30 Participation rate in the District (2018-2019)[51]			
Schools	Both Sexes	Male	Female
Primary	61.00%	59.00%	64.00%
Middle & High	33.00%	37.00%	28.00%

At primary level, the participation rate in District Mardan for both sexes is around 61% (59 for males and 64 for females). At middle and high level, the participation rates in the same order are around 33, 37 and 28. (Table 5.31)

Student Teacher Ratio:

Table 5. 31 Teacher Student Ratio of District Mardan

Teachers-Students Ratio of District Mardan (2018-2019)[52]			
Institution	**Enrolment**	**Teaching Staff**	**Ratio**
Primary	273,658	6,181	44.27406569
Middle	87,206	975	89.44205128
High	37,959	2,647	14.34038534
High Secondary	9,238	2,121	4.355492692
Colleges	6,915	293	23.60068259

5.11.2 Colleges and Institutes:

Table 5. 32 District Mardan Colleges	
S.No.	**Name of College**
1	Suffa Hi Tech Girls College Defence Baghdada Mardan
2	Islamia Girls College Muqam Baghdada Mardan
3	Defence College for Girls Muqam Baghdada Mardan
4	The Mardan Model College for Girls Nsr Road Mardan
5	The Mardan Model College for Boys Nsr Road Mardan
6	The Fazal Haq College Nistta Road Mardan
7	Ansi Degree College for Boys Nsr Road Mardan
8	Mardan Instute Of Learning System Sector, B Sheikh Maltoon
9	Service Public College Shamsi Road Mardan
10	Mit Model College Malakand Road Muqam Mardan
11	The Frontier Model College Toru Mardan
12	Tufai Shaheed College Prc Cantt Mardan
13	Danish Public College Gujar Garhi Mardan

[51] Development Statistics of KP 2020, Page 134, Table 108.

[52] Development Statistics of KP 2020.

Table 5. 32 District Mardan Colleges	
S.No.	**Name of College**
14	Takht Bhai College for Women Takht Bhai Maradan
15	Iqra College Swabi Road Parhoti Mardan
16	F.G. Inter College for Boys Mardan Cantt
17	The Eastren College Shamsi Road Mardan
18	F.G. Girls Inter College Mardan Cantt
19	Ghazali College for Women Muqam Baghdada Mardan
20	Sher Shah Suri College Canal Road Mardan
21	Sudhum Science College Rustam Mardan
22	Mardan College of Management Science Muqam Bghdada Mardan
23	Al-Muslim College Nsr Road Irum Colony Mardan
24	Pak College Swabi Road Parhoti Mardan
25	Tameer Seerat College Mohib Road Parhoti Mardan
26	The Quaid Azam College for Boys Mohib Road Parhoti Mardan
27	Taj Inter College Kohi Road Katlang Mardan
28	Frontier Comprehensive College Malakan Road Shergarh Mardan
29	Success Educationsystem Swabi Parhoti Mardan
30	Saif Memorial College the Mall Mardan
31	Quaide Azam Girls College Police Line Mardan
32	Learners College Shahbaz Garhi Mardan
33	Imst College for Boys Koragh Chowk By Pass Mardan
34	The Professor College Shahbaz Garhi Mardan
35	Peshawar Model Degree College (Boys) Nisatta Road Mardan
36	Peshawar Model Degree College (Girls) Nisatta Road Mardan
37	Mis College for Boys Charsadda Road Mardan
38	Sultan Muhammad Memorial College Takkar Road Takht Bhai
39	Iqra Girls College Garhi Kapura Mardan
40	Fatima Girls College Mena Bazar Lund Khwar Mardan
41	The Leads Campus College Bagh Irum Mardan

5.11.3 Universities

District Mardan has the following universities:

i. Abdul Wali Khan University Mardan (2009)
ii. Women University Mardan (2016)
iii. Agricultural University, Peshawar, Sub-campus Mardan
iv. University of Engineering. & Technology, Mardan

5.11.4 Constraints

i. Literacy in Khyber Pakhtunkhwa Pakistan rose from 16.7 in 1981 to 37.30 in 1998 and further to 37.30 in 1998. But it is still considerably lesser than the national average, which in the same order was 21.7, 26.2 and 45 respectively[53].
ii. When compared with the provincial figures, the literacy in District Mardan in 1998 was marginally higher the provincial average i.e. 48.27 in District as against 37.3 in the Province (Tables 8.14 and 8.15 above).
iii. Participation rate in District Mardan is lower than the provincial average at primary, middle and high levels. The provincial average at primary level is 86 as against 61 in the District. For middle and high, the statistics in the same order are 58.5 as against 33 in the District. This is true for male as well as female participation[54].
iv. Expanding and modernizing vocational and tertiary education, better access, teaching and research are needed at the tertiary level to equip graduates with the high-level skills needed to build a knowledge economy.
v. Improving education quality and governance: These challenges call for improvements in governance and greater accountability on the part of education service providers. This requires:
vi. Continued government commitment to education and policy reforms.
vii. Capacity building in institutions delivering education services.

5.11.5 Short Term Education Plan (2022-2027)

It is estimated that during the short-term plan, the District Mardan requires 49 additional primary schools and 30 secondary schools. Tables below give requirements for urban as well as rural areas of District Mardan.

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. 33 Additional Primary School Required in Short Term Plan (2022-2027)[55]

Additional Primary School Required in Short Term Plan (2022-2027)					
District Area	**Population 2022**	**Population 2027**	**Additional Population (2022-2027)**	**No. of Primary Schools Required @1 PS for 7,500 pop.)**	**Aggregate Land required (@1 acre/PS)**
Urban	487813	5,19,438	31,625	5	5
Rural	2209599	2393664	184,065	26	26
Total	2697412	2913102	215,690	30	30

[53] KP Development Statistics, 2020

[54] KP Development Statistics, 2020

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

Table 5. 34 Additional Secondary School Required in Short Term Plan (2022-2027)

Additional Secondary School Required in Short Term Plan (2022-2027)					
District Area	**Population 2021**	**Population 2027**	**Additional Population (2022-2027)**	**No. of SS Required @1 SS for 12,000pop.)**	**Aggregate Land required (@ 4acre/SS)**
Urban	4,87,813	5,19,438	31,625	3	16
Rural	2,209,599	2,393,664	184,065	26	104
Total	2,697,412	3,065,409	215,690	30	120

Table 5. 35 Additional Colleges Required in Short Term Plan (2022-2027)

Additional Colleges Required in Short Term Plan (2022-2027)					
District Area	**Population 2022**	**Population 2027**	**Additional Population (2022-2027)**	**No. of Colloges Required @1 Colge for 4,00,000pop.)**	**Aggregate Land required (@ 10acre/C)**
Urban	4,87,813	5,19,438	31,625	0	0
Rural	2,209,599	2,393,664	184,065	1	10
Total	2,697,412	3,065,409	215,690	1	10

5.11.6 Long-Term Education Plan (2028-2042)

It is estimated that during the Long-term plan, the District Mardan require 181 additional primary schools, 244 secondary schools and 7 colleges. Tables below give requirements for urban as well as rural areas of District Mardan.

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 in actually being built.

Table 5. 36 Additional Primary School Required in Long Term Plan (2028-2042)[56]

District Area	Population 2028	Population 2042	Additional Population (2026-2040)	No. of Primary Schools Required @1 PS for 7,500 pop.)	Aggregate Land required (@1 acre/PS)
Urban	5,19,438	7,11,107	1,91,669	25	25
Rural	23,93,664	35,71,181	1,77,517	156	156
Total	29,13,102	42,82,288	13,69,186	181	181

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

Table 5. 37 Additional Secondary School Required in Long Term Plan (2028-2042)

Additional Primary School Required in Long Term Plan (2028-2042)					
District Area	**Population 2028**	**Population 2042**	**Additional Population (2026-2040)**	**No. of SS Required @1 SS for 12,000 pop.)**	**Aggregate Land required (@4 acre/SS)**
Urban	5,19,438	7,11,107	1,91,669	16	64
Rural	23,93,664	35,71,181	1,77,517	228	912
Total	29,13,102	42,82,288	13,69,186	244	976

Table 5. 38 Additional Colleges Required in Long Term Plan (2028-2042)

Additional Colleges Required in Long Term Plan (2028-2042)					
District Area	**Population 2028**	**Population 2042**	**Additional Population (2026-2040)**	**No. of Colloges Required @1 colloge for 4,00,000 pop.)**	**Aggregate Land required (@10 acre/C)**
Urban	5,19,438	7,11,107	1,91,669	**0**	**0**
Rural	23,93,664	35,71,181	1,77,517	**7**	**70**
Total	29,13,102	42,82,288	13,69,186	**7**	**70**

5.11.7 Proposed locations of Future Educational Institutions

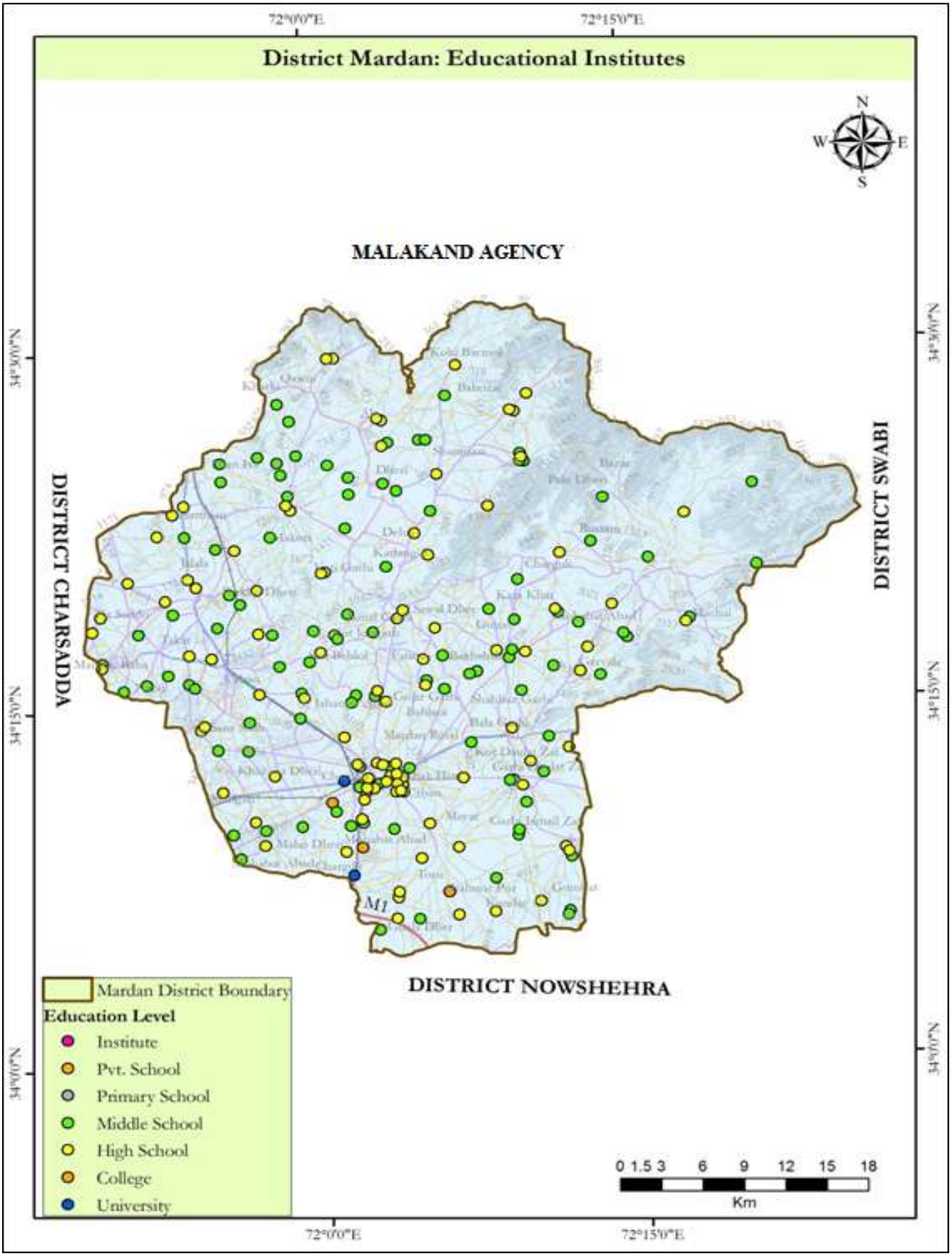
Primary schools should obviously be within existing or planned housing areas which they will be serving. These should be within easy walking distance of houses, away from the busy roads. Secondary schools should have good access by car and safe access by foot. These should not be located along busy roads carrying fast traffic. Primary and secondary schools are residentiary uses and their exact location can be marked at the detailed planning stage of proposed housing areas. Higher Educational institutions such as degree and post graduate colleges/universities may be located in the proposed Civic Zone, which will accommodate higher level educational institutions.

Following are the proposed guide lines for location of educational institutions:

Table 5. 39 Locational Guidelines for Educational Institutions[57].		
Sr. No.	**Educational Institutions**	**Locational Guidelines**
1.	Primary School	• Close to existing or planned housing areas which they will be serving. • Within easy walking distance of houses. • Generally located centrally in a residential mohalla, away from the busy roads.

[57] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual (NRM), Chapter 6, Section 6.1 (adapted).

		• Catchment area for urban schools: 0.5-1 km. • Catchment area for rural schools: 2.2 kms.
2.	Secondary School	• Should have good vehicular access and safe access by foot. • Away from schools of opposite gender. • Away from major busy roads carrying fast traffic. • Be located on roads with good linkages to their catchment area. • Catchment area for urban schools: 1.25-2.45 km. • Catchment area for rural schools: 5-10 kms.
3.	Inter College	• Catchment area for urban schools-Boys: 2.75-4 km. • Catchment area for rural schools-Boys: 10-15 kms. • Catchment area for urban schools-Girls: 3.25-5 km
4.	Degree College	• Large city.
5	University	• Metropolitan City surroundings.



Map 5. 9 : Educational Institutes in District Mardan

5.12 HEALTH:

5.12.1 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[58]:

Hospital

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

Dispensary

It is a health institution having less than 10 beds.

Rural Health Centre (RHC)

A Rural Health Centre 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 Minor surgery. Rural Health Centers are linked through tehsil hospitals to District Headquarter Hospitals, which have all medical facilities.

Sub-Health Centre

3-4 sub-health centers are attached to a rural health center. However, existing sub-centers 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 Centre. 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, diarrhea diseases, malaria control, child spacing, mental and school health services within its areas.

The total number of hospitals (Government and Private) in Khyber Pakhtunkhwa is 271 of which 10 hospitals (about 4%) are in District Mardan. Out of 271 total hospitals in in the province 196 are government and 75 are private while in Mardan district out of 10 hospitals 8 are government and 2 are private. Similarly, of the total 973 dispensaries in the Province, 19 dispensaries (about 2%) are in District Mardan. There are only 6 Rural Health Centers in the District. The details of distribution of TB Clinics, MCH centers, sub-health centers, Basic Health Units and clinics in the Province as well as in District Mardan are given in Table 5.35.

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

Table 5. 40 Distribution of Health Institutions: Khyber Pakhtunkhwa Vs District Mardan[59]										
Number of health Institutions in 2022										
Area	Total Hospitals	Govt Hospitals	Private Hospitals	Dispensaries	RHCs	TB Clinics	MCH Centers	Sub-Health Centers	BHUs	Leprosy Clinics
Khyber Pakhtunkhwa	271	196	75	973	125	73	151	26	943	23
District Mardan	10	8	2	19	6	1	2	0	47	1
% in District Mardan	3.69	4.08	2.67	1.85	3.20	1.37	1.32	0.00	5.20	4.35

5.12.2 Health Services Facilities in Private Sector:

In District Mardan private sector play a vital role in the provision of health facilities not only to the residence of Mardan but also to the other Districts of KP. The major hospitals in private sector are:

- Khyber Hospital, Mardan
- Omeed ki Kiran Foundation, Mardan
- Behtar Zindagi Center Mardan
- Asif Medicare
- Adan Medical Center
- Anwar Medical Center

All these health service providing institute are located within the Urban limits of the city. Most of the institutions are poorley located without taking into considraiton any spatial planning standards or plan.

5.12.3 Major disease in last 2 years:

In 2020 and 2021, the major diseases reported in public hospitals were Corona, Fever, Sepsis and Asphxia. The coronavirus or COVID19 pandemic is an ongoing pandemic caused by severe acute respiratory syndrome. The first case of corona was identified in early December, 2019 in Wuhan province of China. The WHO declared public emergency on 30th January, 2020 and later a pandemic on 11th March 2020. At present (April 8, 2021), more than 132 million cases and 2.88 million deaths have been confirmed due to COVID19 making it one of the deadliest pandemic in history.

The common symptoms of COVID19 includes dry cough, fever, tiredness, aches and pains, sore throat, headache, loss of taste, and diarrhea and serious symptoms include difficulty in breathing, chest pain, and loss of speech or movement. The precautionary measures required for preventing one from getting exposed to COVID19 includes: use of face mask, wash hands frequently for 20 seconds etc.

[59] Source: Bureau of Statistics, Planning & Development Department, Govt. of Khyber Pakhtunkhwa, Khyber Pakhtunkhwa Development Statistics, 2020, Table 125, Page 163, 164.

First case of COVID19 was registered in Pakistan on 26th February, 2020 in Karachi. In Khyber Pakhtunkhwa, 88099 cases and 2363 deaths due to COVID19 were registered till April 8, 2021. 76640 people have recovered from COVID19 in Khyber Pakhtunkhwa. Mardan has been severely affected by COVID19 having 3245 cases and 123 deaths are registered till April 8, 2021. 2526 people have recovered from COVID19 in Mardan.

Table 5. 41 Corona Cases in District Peshawar Vs Khyber Pakhtunkhwa (March, 2021)[60]						
	Cases total	24hrs	Deaths total	24hrs	Recoveries	Active Cases
KP	88099	1044	2363	21	76640	9096
Mardan	3245	73	123	3	2526	596

Fever, also known as pyrexia and febrile response, is defined as having a temperature above the normal range due to an increase in the body's temperature set-point. There is not a single agreed-upon upper limit for normal temperature with sources using values between 37.5 and 38.3 °C (99.5 and 100.9 °F). This is more common in young children. Fevers do not typically go higher than 41 to 42 °C (105.8 to 107.6 °F).[61]

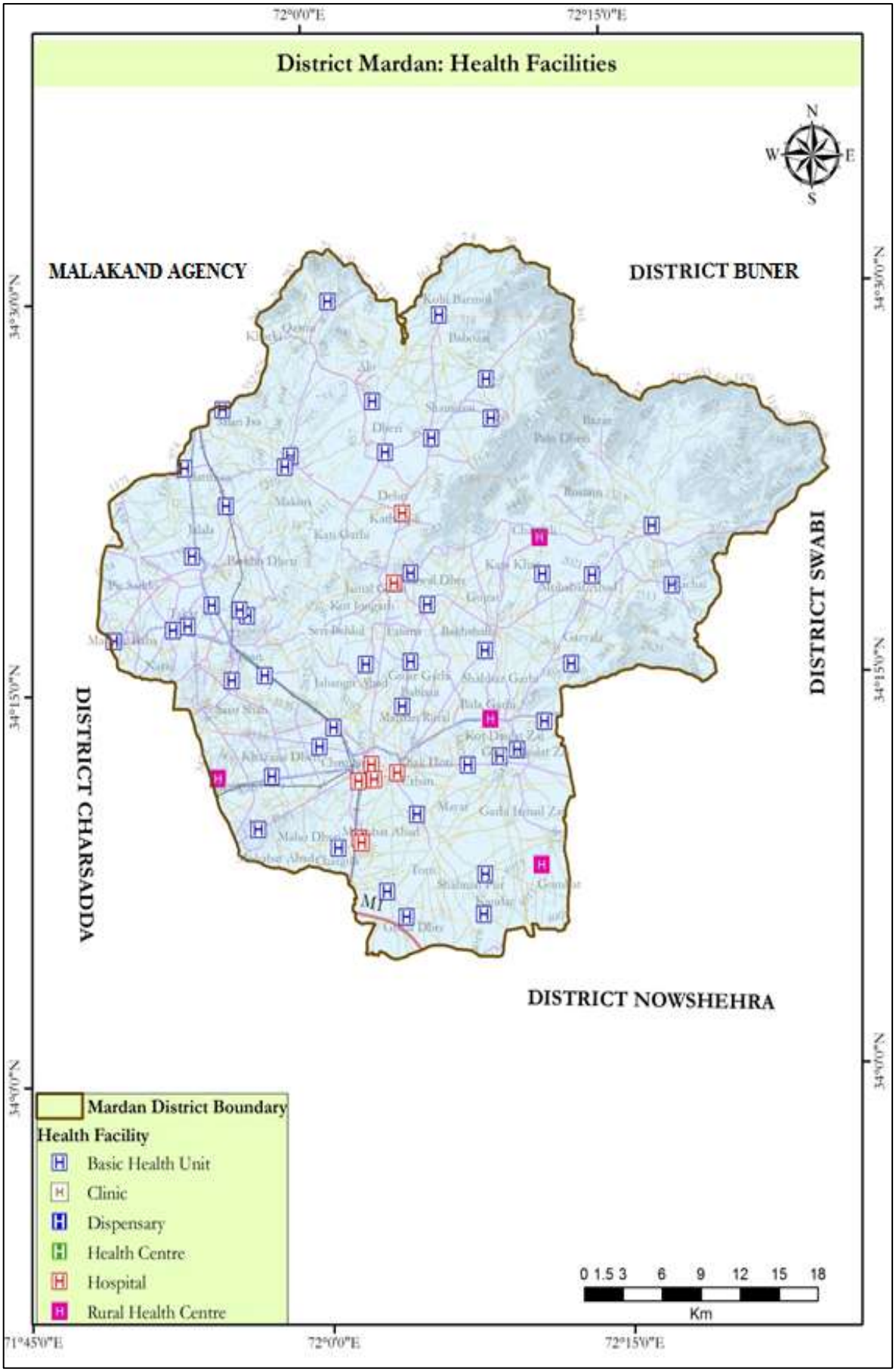
Sepsis is a life-threatening condition that arises when the body's response to infection causes injury to its own tissues and organs. Common signs and symptoms include fever, increased heart rate, increased breathing rate, and confusion. There also may be symptoms related to a specific infection, such as a cough with pneumonia, or painful urination with a kidney infection.[62] Asphyxia or asphyxiation is a condition of severely deficient supply of oxygen to the body that arises from abnormal breathing. An example of asphyxia is choking. Asphyxia causes generalized hypoxia, which affects primarily the tissues and organs. There are many circumstances that can induce asphyxia, all of which are characterized by an inability of an individual to acquire sufficient oxygen through breathing for an extended period of time. Asphyxia can cause coma or death.[63]

[60] http://healthkp.gov.pk/public/uploads/sitrep_Sitrep%20-%202021_03_31.pdf

[61] https://en.wikipedia.org/wiki/Fever

[62] https://en.wikipedia.org/wiki/Sepsis

[63] https://en.wikipedia.org/wiki/Asphyxia



Map 5. 10 : Health Facilities in District Mardan

5.12.4 Distribution of Beds:

Table 5.36 presents the distribution of beds in the Province as well as in the District health institutions. There is a total of 22110 beds in the province of which 20835 are government beds and 1275 are private hospital beds. The numbers of bed in District Mardan are 772 in comparison with 22110 beds in the province.

It is deduced from the Table that in the year 2019, there were on average 2,959 persons per bed in District Mardan.

Table 5. 42 Distributions of Beds in Hospitals: Khyber Pakhtunkhwa Vs District Mardan[64]

Area	Total Hospital Beds	Government Hospital Beds	Private Hospital Beds
Khyber Pakhtunkhwa	**22110**	**20835**	**1275**
District Mardan	**772**	**772**	**0**

Table 5. 43 Distribution of Govt Beds in Health Institutions: Khyber Pakhtunkhwa Vs District Mardan[65]

Area		Number of Beds (2019)				Total
		Hospitals	Dispensaries	RHCs	TB Clinics	
Khyber Pakhtunkhwa	**No.**	**20,835**	**12**	**1,802**	**52**	**22,701**
	%	**91.78**	**0.05**	**7.94**	**0.23**	**100**
District Mardan	**No.**	**772**	**0**	**74**	**0**	**846**
	%	**91.25**	**0**	**8.75**	**0**	**100**

5.12.5 Patients Treated in Health Institutions: Indoor and Outdoor:

Table 5.37 shows that in the Province in the year 2019, about 29.53 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 Mardan, patients treated were about 99% in Outdoor.

[64] Source: Bureau of Statistics, Planning & Development Department, Govt. of Khyber Pakhtunkhwa, Khyber Pakhtunkhwa Development Statistics, 2020, Table No.125, Page 163, 164.

[65] Source: Bureau of Statistics, Planning & Development Department, Govt. of Khyber Pakhtunkhwa, Khyber Pakhtunkhwa Development Statistics, 2020, Table No.124, Page 157, 158.

Table 5. 44 Patients Treated: Province Vs District Mardan[66]				
Area		Patients Treated in 2019		
		Indoor	Outdoor[67]	Total
Khyber Pakhtunkhwa	No.	981,704	28557178	29,538,882
	%	3.32	96.68	100
District Mardan	No.	11907	1402370	1414277
	%	0.84	99.16	100

5.12.6 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".

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 endeavor across such a broad and universal policy agenda.

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

Ensuring healthy lives and promoting the 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.

[66] Source: Bureau of Statistics, Planning & Development Department, Govt. of Khyber Pakhtunkhwa, Khyber Pakhtunkhwa Development Statistics, 2020, Table No. 129, Page 170.

[67] Outdoor patients include old and new cases.

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, halve 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 for 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, 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 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 “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 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 a 10-year period. These have to be implemented in partnership between the federal Ministry of Health and the provincial Departments of Health, and in 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 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 BHU/RHC level. Absenteeism is common. At the District/tehsil level hospitals there are major shortcomings in emergency care, surgical services, and anesthesia 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 in 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 with a view to ensuring proper standards of equipment and services in hospitals, clinics and laboratories as well as private medical college and Tibb/Homeopathic teaching institutions.
- Key Area No. 8: To create mass awareness in public health matters.
- Key Area No. 9: To Effect improvement in the Drug Sector with a view to ensuring 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.

5.12.7 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 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 end 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 coordinating to ensure the efficiency of health delivery mechanism.
- The private sector in health is quite strong in District Peshawar, but week in rest of the Province.
- However, private sector has profit motive. There is at present no mechanism whereby the private sector can support efforts of the government in providing healthcare to those who cannot afford the higher private sector prices.

5.12.8 Recommendations and Conclusions:

- Health Sector needs to be emphasized as in Land Use Plans, as it profoundly impacts the health of people who live and work there.
- There is a need to focus attention towards 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.
- It is important to study the contribution of private sector in provision of health facilities. Of the total 271 hospitals in the Province, 72% are Government owned and about 28% are being run by private sector. In District Mardan however, there are 10 hospitals, 8 of which Govt.-owned and 2 of which Private owned. However, a number of Govt. sponsored health institutions are in the pipeline which will help to ease the current pressure on health facilities in Mardan.
- In the Province, about 92% beds are in hospitals and 8% in rural health centers. In District Mardan 91% of the total beds are in hospitals as against 9% in other institutions. Comparing District with the Province, only 3.7% of the total beds in the Province are in District Mardan. There is thus a dire need to increase the number of beds in public as well as private health institutions.
- In the Province, about 92% of the beds are in government institutions as against 8% in private institutions.

5.12.9 Health Proposals for Short-Term (2021-2025):

i. Provision of Basic Health Units

The total number of UCs (urban as well as rural) in the District is 58 and having 49 BHUs.8 UCs are urban / urbanizing and remaining 50 UCs are rural. The 8 urban/urbanizing UCs are well-served with medical facilities, and are not dependent on BHUs. These lie in the Core of Mardan and include hospitals, medical centers and private health institutions. Thus, in the 8 urban UCs, BHUs are not required. In 50

rural UCs, 21 rural UCs are without any BHU, and thus need at least one BHU in each of these. While Remaining 29 Rural UCs have 1 or more BHUs each. The details of UCs with no BHU and recommended to have 1 BHU during 2021-2025 are provided in Table 5.38.

Table 5. 45 Rural Union Councils with Number of BHUs in District Mardan

Sr. No	Rural UCs Vs BHUs	Number of UCs	Names of UC
1	UCs with no BHU	21	Pir Saddo, Narai, Parkho Dheri, Kati garhi, kot jhonger, Jahangir Abad, Saro shah, Mayar, Kandar, Chak Hoti, Mohib Banda, garhi Ismail zai, Toru, Garyala, Bazar, Babuzai, Gujrat, Mohabat Abad, Alo, Kharki, Kohi Barmol
2	UCs with 1 BHU	17	Jalala, Manday Baba, Mian Esa, Qasim, Shamozai, Rustam, Palo Dehri, Machai, Kata Kath, Bakshali, Sawal Dher, Babiani, Fatima, Seri Behlol, Kot Daulat Zai, Charguli.

ii. Provision of Rural Health Centers (RHCs)[68]:

Based on population criteria of 1 RHC for 75,000 populations, a total of 29 RHCs are required by the end of short-term plan period. The existing number of RHCs is 4, entailing further requirement of 28 RHCs in rural areas of the District Mardan.

The required number of RHCs may be provided preferably in a larger village/settlement for the short-term plan.

Table 5. 46 Rural Health Centers Required in the Short-Term Plan

Rural Population (2022)[69]	Rural Population (2027)[70]	Existing[71] RHCs	Existing Shortage (2022)	RHCs Required in 2027	Further Required by 2027
2209599	2393664	4	29	32	28

iii. Increasing Number of Beds:

Applying the national standard of 2 beds per 1000 persons, the gross number of beds required at the end of short-term period is 5,826, while the existing numbers of beds are 1348. Thus existing shortage of beds in the year 2020 is 3810 while in 2027 further 4478 beds will be required. (Table 5.40)

Table 5. 47 Number of Beds Required in the Short-Term Plan

Population (2022)	Population (2027)	Existing Number of Beds[72]	Existing Shortage (2022)	No. of beds Required in 2027	Net Required by 2027
2697412	2913102	**1348**	**3810**	**5826**	**4478**

5.12.10 Health Proposals for Long-Term Plan (2026-2040)

i. Provision of Basic Health Units:

For the period 2026-2040 it is proposed that out of 50 rural union councils, each rural union council should have at least two BHUs. There are already UCs with 2 BHUs and they are likely to get urbanized till 2040 and will have better health facilities. However remaining UCs are recommended to have 2 BHUs in each during the long-term period are as below

[68] Source: Environment & Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Table 6.7, Page 122.

[69] Source: Table 5.1 of this Report

[70] Section 5.41 of this Report.

[71] Source: KP Land Use Project, District Studies Report Peshawar, Chapter 9.

[72] Source: KP Land Use Project, District Studies Report, Peshawar, Chapter 9, Section 9.5, Table 9.4.

Table 5. 48 Union Councils Proposed to have Two BHUs in the Long-Term Plan
Pir Saddo, Narai, Parkho Dheri, Kati garhi, Kot jhonger, Jahangir Abad, Saro shah, Mayar, Kandar, Chak Hoti, Mohib Banda, garhi Ismail zai, Toru, Garyala, Bazar, Babuzai, Gujrat, Mohabat Abad, Alo, Kharki, Kohl Barmol, Jalala, Manday Baba, Mian Esa, Qasim, Shamozai, Rustam, Palo Dehri, Machai, Kata Kath, Bakshali, Sawal Dher, Babiani, Fatima, Seri Behlol, Kot Daulat Zai, Charguli.

ii. Provision of Rural Health Centers (RHCs)

Based on population criteria of 1 RHC for 75,000 populations, a total of 47 RHCs will be required by the year 2042. During the short-term plan of first five years (2022-2027), 32 RHCs are proposed to be provided. If this proposal is implemented, 15 additional RHC will be required during 2028-2042 .

Table 5. 49 Rural Health Centers Required in the Long-Term Plan				
Rural Population 2028[73]	**Rural Population 2042[74]**	**RHCs Required in 2042**	**Existing RHCs in 2028[75]**	**Further Required by 2040**
2393664	3571181	47	32	15

iii. Increasing Number of Beds:

Applying the national standard of 2 beds per 1000 persons, number of beds required for the additional population during the period 2028-2042 are 2738. (Table 5.49).

Table 5. 50 Number of Beds Required in the Long-Term Plan				
District Population (2028)	**District Population (2042)**	**Number of beds Required in 2042**	**Existing Number of beds in 2028**	**Further Required by 2042**
2913102	4282288	8564	5826	2738

[73] Source: Table 5.41 of this Report.

[74]Table 5.44 of this Report.

[75] If short-term proposals for 2021-2025 are implemented.

5.13 INDUSTRY

5.13.1 Industrial Employment and Distribution by Type

There are total of 172 industrial units in District Mardan, of which 99 are in the small industrial estate which having 777 employments while 73 are outside, having 3805 employments (Table 5.50). of the total 99 industrial units in Small Industrial Estate, 82 units (more than 82.8%) are marble units.

Table 5. 51 Number of Industry in District Mardan[76]

Sr. No	Particulars	Total No. of Units	Employment
1	Total No. of Units in Small Industrial Estate.	99	777
2	Total No. of Units Outside Small Industrial Estate.	73	3805
Total		**172**	**4582**

Heavy, medium and light industrial zones/small industries estates

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

There is a total of 172 industrial units in Mardan, of which 20 are closed and 152 are operational. These 152 running units include a Textile (Mills Sector), employing a total of 2105 person, which is 45% of the total industrial labor in the District. Besides, there are 6 medium level industry units according to labor force per unit. On the basis of above criteria, the industrial units in District Mardan may be categorized as given in Table

Table 5. 52 Categorization into Heavy, Medium and Small Industries[77]

Categories	No. of Employees	Nature of Industry	No. of Industrial Unit	No. of Employees	% with Total Employees
Heavy	More than 500	Textile (Mills Sector)	1	2105	45.940637
Medium	100-499	Sugar, Cigarettes	6	1106	24.137931
Small	Less than 100	Others	165	1371	29.921432
Total			172	4582	100

[76] Directory of Industrial Establishments 2011

[77] Directory of Industrial Establishments 2011

Industrial Growth Pattern-Historical Perspective

The number of total industrial units in Khyber Pakhtunkhwa has been increasing, except the year 2017-18 when there was no change having 2584 in 2016-17. However, this is the total number of industrial units which include running as well as closed units given in the tabe below (Table 5.33).

The Table also provides historical data for District Mardan giving total number of units, running units and closed units in the past number of years. In District Mardan, the running units have generally been on the increase since the year 2016-17. In the 2018-19, the numbers of running units have increased to 229 from 176 in the previous year. Table 5.33 presents total, running and closed units as absolute numbers as well in form of percentage of provincial total.

Table 5. 53 Total Number of Registered Industrial Units Running & Closed[78]

Year[79]	Khyber Pakhtunkhwa			District Mardan			% District Mardan with Province		
	Total	Running Unit	Closed Unit	Total	Running Unit	Closed Unit	Total	Running Unit	Closed Unit
2016-17	2584	2222	362	186	176	10	7.20%	7.90%	2.76%
2017-18	2584	2222	362	186	176	10	7.20%	7.90%	2.76%
2018-19	2800	2391	409	250	229	21	8.90%	9.57%	5.13%

As already stated, there are total of 398 industrial units in District Mardan, of which 212 are in the small industrial estate while 73 are outside it. The details about types of industrial units in District Mardan are given in the Table below:

Table 5. 54 Industrial Units in District Mardan

SIE Mardan Phase I				SIE Mardan Phase II			
Industry	**Total**	**Operational**	**Close**	**Industry**	**Total**	**Operational**	**Close**
Marbal	47	47		Marbal	88	88	
Food	1	1		Furniture	3	3	
Utility Store	1	1		Ice Factory	1	1	
Shoes Factory	1	1		Commercial	6	6	
Match Industry	1	1		Match Industry	1		1
Cold Storage	1	1		Cold Storage	1	1	
Pvt Limited	1	1		PTCL	1	1	
Foot Wear	1	1		Rubber Industry	1	1	
Ghee Mill	1		1	Aluminium	1	1	
Package Industry	1		1	Flour Mill	1	1	
Aluminium	1		1	Can Industry	1		1
Paparh & Chips	1		1	**Total=**	**105**	**103**	**2**
Plastic Shoes	1		1				
Total=	**59**	**54**	**5**				

[78]Source: Development Statistics 2020

[79] Development Statistics 2020

Table 5. 55 SIE Mardan Phase III			
Industry	**Total**	**Operational**	**Close**
Marbal	43	43	
Engineering Ind	1	1	
Sweet Ind	1	1	
Pipe Ind	1	1	
Trade Ind	1	1	
Plastic Ind	1	1	
Total=	**48**	**48**	**0**

Table 5. 56 Mardan Pvt Industry			
Industry	**Total**	**Operational**	**Close**
Marbal	1	1	
Stone Crushing	73	65	8
Segments	16	16	
Slabs Beems	7	6	1
Slabs Segment	1	1	
Steel Furniture	2		
Agriculture Equipments	10	10	
Rice Hosking	1	1	
Mineral Water	6	6	
Sugar	2	1	1
Flour	21	15	6
Cigarettes	5	4	1
Cotton Waste	5	5	
Furniture	26	26	
Landry Soap	2	2	
Paper	1		1
M.S Bars	1		1
Plastic Shaping Bage	1		1
Safety Match	1		1
Ice	3	3	
Yarn	1	1	
Total=	**186**	**163**	**21**

5.13.2 Future Industrial Area Requirement

The industrial area requirement in District Mardan has been calculated on the basis of additional population for the first 5 years of plan period (2021-2025) and subsequent 15 years (2026-2040). The anticipated industrial labor force in these periods was calculated on the basis of 5% participation rate and industrial area by applying the standard of 50 industrial workers per acre. The results are presented in the Table below. It is clear that over the entire plan period; 1650 acres would be required which includes 283.5 acres in the short-term (2021-2025) and 1367 acres in the long-term period (2026-2040).

Table 5. 57 Future Industrial Area Requirements

Parameters	Short-Term Plan Period (2021-2025)	Long-Term Plan Period (2026-2040)	Total (2021-2040)
Additional Population	283511	1366624	1650135
Industrial labor force[80]	14175.55	68331	82507
Industrial Area Required[81]	283.5 Acres	1367 Acres	1650 Acres

5.13.3 Current Industrial Area Gap

The current industrial area gap has been calculated as below:

- District Population (2021): 2628785 [82]
- Industrial Labor Force (@5% of above): 131439
- Industrial area required (@50 workers per acre) = 2629 acres
- Current Industrial area in the District: = 0.70 sq. km= 173 acres[83]
- Industrial area deficiency: 2503 -173=2456 acres

It is clear from the above that till the end of plan period, the total industrial area requirement would include 2629 acres to meet the current deficiency, and 1650 acres to meet the future requirement. The total would be thus 2629+1650 = 4279 acres.

5.11.4 Proposed Industrial Location

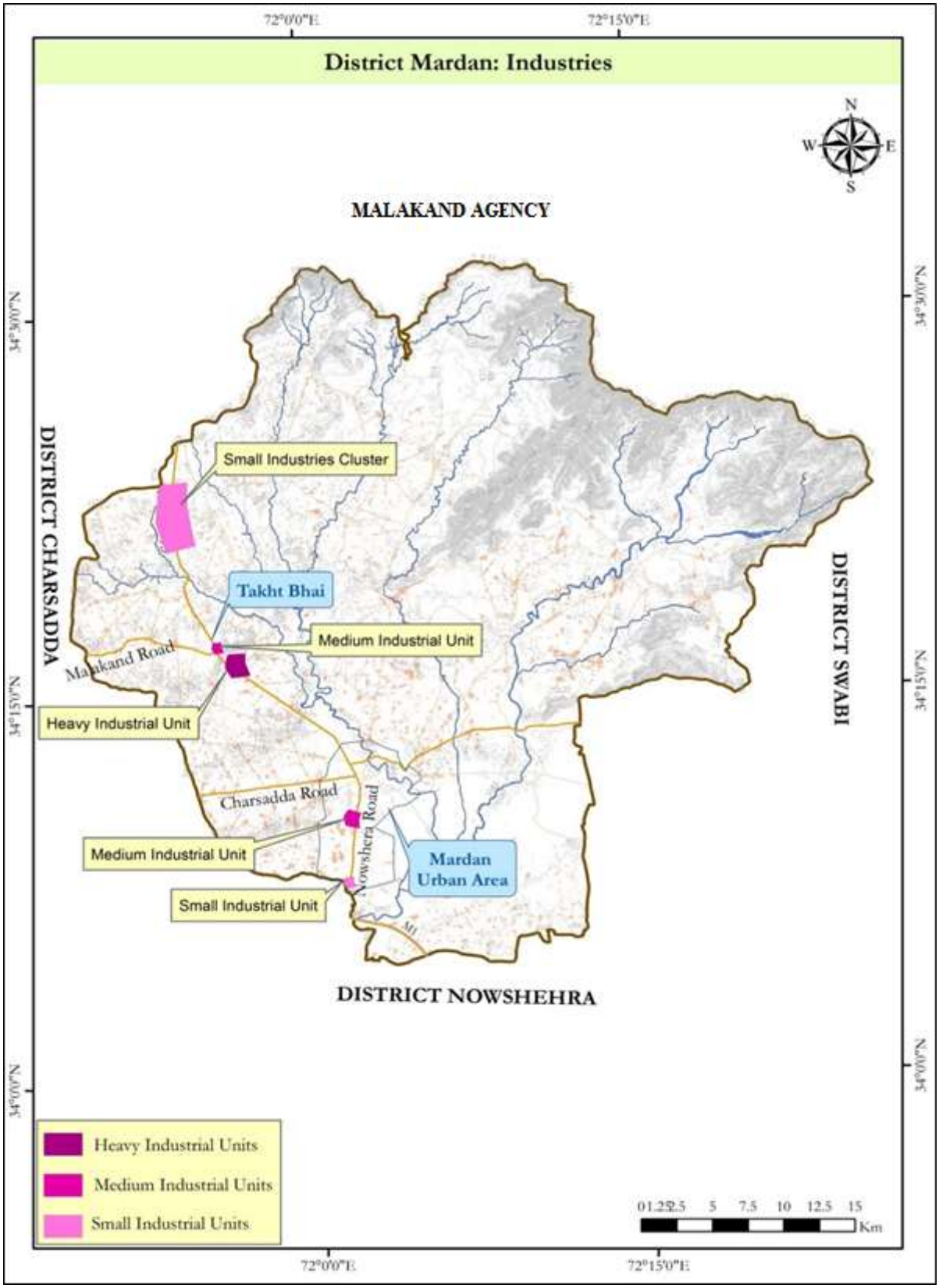
New industrial estate is proposed between Charsadda Road and Nisata Road, and with existing ring road towards West and proposed inner ring road towards East. The site thus has strong road linkages, facilitating easy access of raw material as well as finished products in all directions. The site has proposed trade zone in the North and proposed civic zone in the South.

[80] Pakistan Bureau of Statistics, Govt. of Pakistan, Labor Force Statistics 2008-2009, Table 21 (www.pbs.gov.pk); Labor force participation rate given is 7.46% for population of 10 years & above. Averaging it over the gross population, the participation rate comes out to be around 5%.

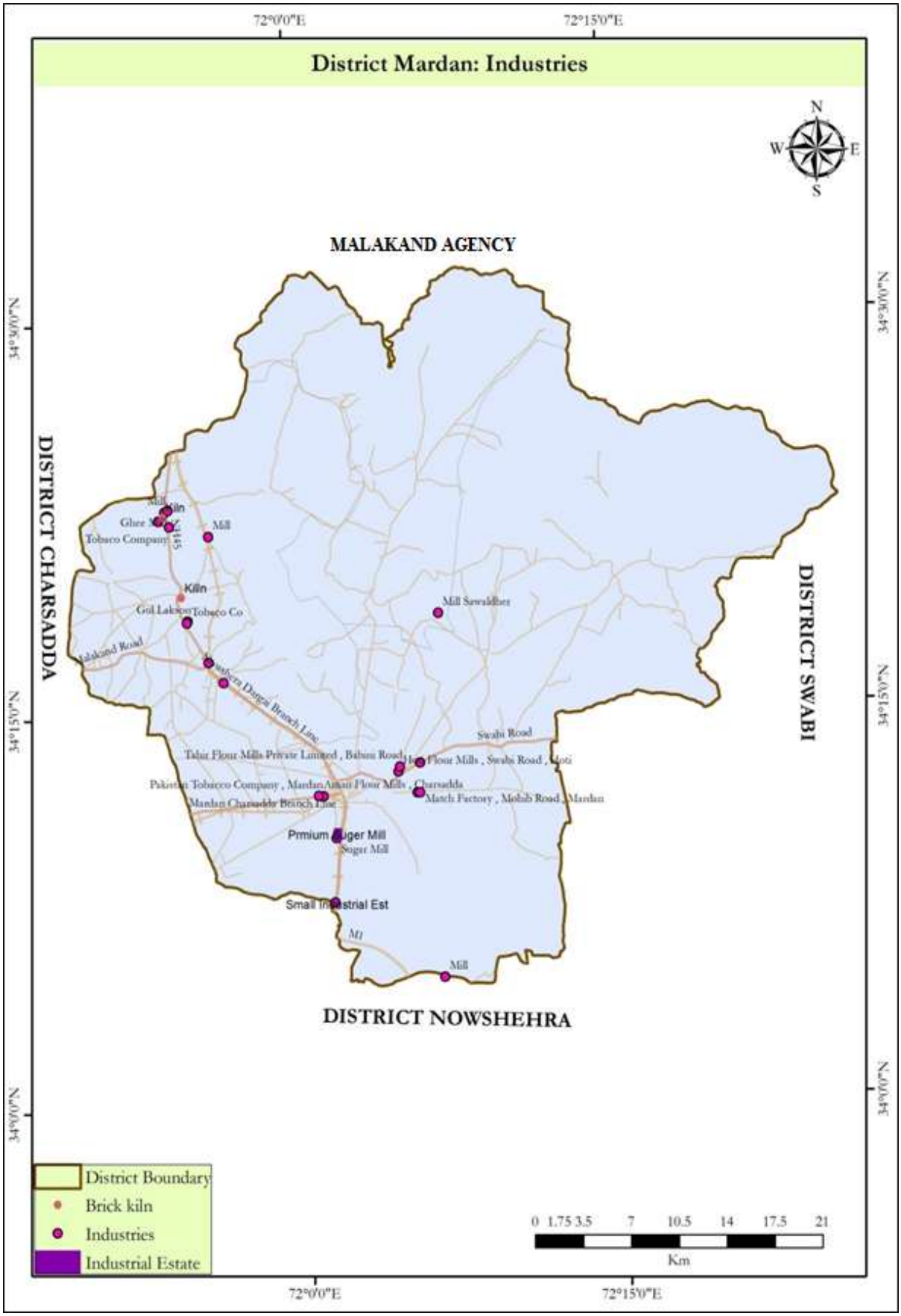
[81] Source: Environment and Urban Affairs Division, Govt. of Pakistan, National Reference Manual on Planning and Infrastructure Standards, Section 5.3.1.2, Page 89 (adapted @50 industrial workers per acre).

[82] KP Land UseProject, District Studies Report Mardan, Chapter 6, and Table 6.14.

[83] Chapter 2, Table 2.4 of this Report



Map 5. 11 category-wise Industries Map of District Mardan



Map 5. 12 Industries Location Map of District Mardan

5.11.5 Constraints/Disparities in Mardan

Apart from locational disadvantages, high cost of working capital coupled with some other reasons, are apparently responsible for rendering vast majority of the Mardan industrial units to carry out operations much lower than their operational capacity. Furthermore, the non-availibility of updated data regarding the number of workers in the industrial sector is a serious missing link upon which the industries are categorized into heavy, medium and small industries.

High cost of financing/working capital and difficulties in obtaining improved technology, especially modern imported technology on the part of Mardan industrialists are some of the main reasons for rendering majority of the industrial units to carry out operations below their manufacturing capacity.

The locational disadvantage makes the Mardan-based industrialists to bear greater transportation cost to transport the imported raw material from the Karachi seaport.

This results not only in raising the overall cost of production in addition to reducing the competitive value of the Mardan products against the goods manufactured in Punjab and other parts of the country, the locational disadvantage has also been hampering products of the Province to access to bigger markets of the country.

There is only single planned small industrial estate in the Mardan; and none for medium and heavy industries in the District.

5.11.6 Review of Existing Laws/Policies[84]

With more than 700 units closed or sick and less than 60,000 people employed in the industrial sector; and the changing international situation, it was a high point for the provincial government to adopt measures for the revival of sick units and create conducive environment for growth of industries.

After continuous interaction with the private sector especially Sarhad Chamber of Commerce and Industry, it was felt that the provincial government has to come forward for the relief and facilitation of the industrial sector.

In order to offset the location disadvantage some of the areas, which became part of the industrial policy, were considered crucial for rapid industrialization of the province.

In keeping with the new international realities and considering the private sector as engine of growth, the provincial government has embarked on a policy of facilitation.

It is evident that there is much more potential in the industrial sector of the province than has been exploited so far. The main resources of the province i.e. tourism, minerals and hydropower are yet to be fully tapped.

Industrial sector is the key player in the development of any area. According to Growth Pole theory, Growth is not uniform over an entire region, but instead takes place around a specific pole. The industrial sector serves as a growth pole in any area. Hence the industries are proposed (based on the feasibility study that will be conducted) in the low-lying region in order to prosper locals of region with the benefits of the respective sector.

[84] District Studies Report Mardan

5.15 RECREATIONAL FACILITIES:

The decreasing recreational facilities and open spaces are a cause of concern. The pressure on land is increasing because of competing land uses. The planning agencies therefore, should stress the need for reserving recreational spaces against many competing demands for land.

5.15.1 Sports Facilities:

Mardan Sports Complex:

Mardan Sports Complex is a multiple purpose sports complex located in Sheikh Maltoon Town Mardan. It was constructed in 2006 by Mardan District government with the help of Government of Pakistan. Initially, facilities for cricket, football, basketball and volleyball were made available. The swimming pool facility was then built in 2011 at the cost of Rs.50 million while in 2016, the PTI led government of Khyber Pakhtunkhwa constructed an international standard hockey turf at the sports complex at the cost Rs.67.69 million.

Mardan Sports Complex currently hold sporting facilities for the following sports.

- Hockey Ground
- Football Ground
- Cricket Ground
- Alhletics track
- Boxing
- Swimming pool
- Indoor facilities for Badminton
- Table Tennis
- Judo, wushu and taekwondo

Apart from Mardan Sports Complex, there are some other sports facilities as well in Mardan, they are:

i. College Cricket Ground, Situated in Abdul Wali Khan University.
ii. College Hockey Ground, Situated in Abdul Wali Khan University.
iii. PRC Golf Club
iv. Younus Stadium
v. Mardan Cricket Academy

5.15.2 Entertainment:

As already stated, under this category of Recreational Facilities include Hotels, Hill resorts, Cinemas, Arts councils and Theatres.

There are no hill resorts, arts councils and theatres in Mardan, though a few cinemas such as Nandara Cinema exist. The main facilities under this category are restaurants. There are 13 registered restaurants/hotels in the District have been obtained from the official publication prepared by “Directorate of Sports and Youth Affairs” and the details are given below:

- Al-Adress Hotel Bank Road Mardan
- Zaman Hotel & Restaurant Bank Road Mardan
- Idreesia Chargha House Judge Bazar Mardan
- Faran Restaurant, Mardan
- Wali Mohammad Chargha House Mardan

- Daster Khan Restaurant, M1 Motor Way Mardan
- Palace4 Restaurant Rashakai M1 Motor Way Mardan
- Tila Muhammad Restaurant Pakistan Chowk Mardan
- Sardar Cafe Pakistan Chowk Mardan
- Prince Hotel Chaply Kabab Mardan
- Shan Restaurant Nandara Cinema Mardan
- Ajab Khan Restaurant Opp. Distt. Hospital Mardan
- Falsteen Hotel & Restaurant Mardan
- Sultan Restaurant
- Wali Muhammad Chargha House Mardan
- Shelton Restaurant

5.15.3 Historical Places:

Following are some of the historical places in District Mardan[85]:

i. Shahbaz Garhi

Shahbaz Garhi is situated on Mardan Swabi road at a distance of 12 kilometer from Mardan. The emperor Baber in his book Tuzk-e-Babri has given reference of this monastery. It has also been stated that this village with the name of a famous religious person. In the ancient books the name of this village is Varshapura. In 7th century, a Chinese pilgrim Mr. Haven Sang, visited this monastery and recorded this polosha in his book. A servant of Tajit Singh, Mr. Moart saw this inscription in 1832 for the first time and made thirteen lines copy. Later on, Herd Duclus Assistant Commissioner Mardan stated that these words are of Khoroshti language.

ii. Kashmir Ghar

Kashmir Ghar is situated east of Katlang near village Babozai. Nearby by the wall of this monastery small broken sculptures are available, where the Hindu Pandits worshiped. There is also swimming pool which seems to be 'ashnan'.

iii. Sawal Dher

This site is situated at a distance of 4 kilometers in the south west of Jamal Garhi. Most of the sculptures of this monastery are presented in the Lahore Museum. It is the ancient city where a village Sawal Dher is now situated.

iv. Jamal Garhi

Jamal garhi is situated at 13 kilometers from the Mardan city and is connected by the metalled road. It is situated at the middle of the Takht Bhai and Shahbaz garhi at equal distance of 12 kilometers from each side. A company Sappers and Miners explored this site firstly. The Kharoshti inscription was discovered from this site, having main round stupa. Haven sang say nothing about this stupa, hostel, main stapes, court yard of many stupas and secret wall. The Chinese Pilgrim also say nothing about this important place. In 1836 Sikh General has made it Gandaparas. Kahamghum also explore this monastery in the 1876. Later on, in 1910-11 it has again has excavated.

[85] Source: District Census Report, 1998.

v. Takht Bhai

Takht Bhai is situated on the Mardan Malakand Road at the distance of 15 kilometers from Mardan. The ancient Buddhist monastery is situated at the height of 5500 feet from the surrounding land. In 1908-9 Sandapora Kharoshti inscription and coins were discovered. This monastery has a large number of buildings, such as conference hall.

vi. Sari Behlol

The monastery is situated at Mardan Malakand Road at a distance of about 10 kilometers from Mardan. It is situated at a mount. According to the statement of Dr. Spooner, Dr. Arl-Strain, it is a big treasury of Gandahera Art. The 2/3 sculptures of Peshawar Museum have been taken from the Sari Beholo site. In the opinion of Archaeologists due to sudden fire burning here the sculpture remained preserved. Coins were also found from this site.

It is expedient to preserve premises of historical value in Khyber Pakhtunkhwa. Thus, no alteration/renovation, demolition or re- erection of any portion of a historical building should be affected without the prior permission in writing of the concerned Department of the Government.

Accordingly, the Provincial Government should make regulations in pursuance of the powers conferred by First Schedule, Part D, Clause iii (m), of KP (then NWFP) Local Government Ordinance, 2001.

5.15.4 Religious Places:

Masjids:

- Tableeghi Markaz
- Bilal Masjid
- Eid Gah
- Minar Masjid
- Masjid Hilal

Churches:

- Free Evengical Church
- Northern Diocese Church

Temples:

- Babu Mohallah Mandir

5.15.5 Museums:

Mardan Museum Mardan:[86]

Mardan Museum was first established in the Town Hall in 1990 under the supervision of the then Commissioner Mardan Divisoin, Sahibzada Riaz Noor. The museum consisted of a single hall which displayed few Gandharan sculptures. In 2006 on the request of Provincial Government the District Government had provided a chunk of land for the construction of a new building of Mardan Museum. The building has been completed consisted of three Galleries and was inaugurated by Ameer Haider Khan Hoti, Chief Minister Khyber Pakhtunkhwa in 2009.

[86] Source: https://www.kparchaeology.com/front_cms/museum/museum_info/32

a. Gandhara Gallery

Mardan Museum has the most beautiful collection of Gandharan sculptures. Most of these sculptures come from the sites of Takht-i-Bahi, Jamal Garhi and Sahri Bahlol. These are the Previous birth (Jataka) stories of Buddha, life scenes of Buddha, Palace scenes, Individual images of Buddha and Bodhisattva, Bejeweled heads of Bodhisattva, Stucco heads of Buddha and Architectural elements.

b. Ethnological Gallery

The Ethnological Gallery represents the ethnic profile of the region. These include the traditional jewelry, household objects, weapons, embroidery works and musical instruments. There are wooden and leather stools and boxes. The jewelry exhibited includes earrings, ear pendants, finger rings, necklaces, torques, bangles, bracelets, head ornaments and shoulder ornaments in silver. The embroidery work displayed in the gallery includes shirts and shawls. Weapons displayed include swords, muzzle loaded guns and pistols, representing the culture and tradition of nineteenth and early twentieth century. Household objects in wood, stone, and metal includes spoons, bowls, trays, querns, samawar, tea pots and glasses etc. Others are decorated terracotta Kalo khanaibowls and modern dishes. The musical instruments are rabab, sitar, tabla, tambourine, flute, drum, pitcher and Harmonium.

c. Islamic Gallery

Islamic Gallery exhibits the manuscripts of eighth to thirteen century Hijri. These include the beautiful calligraphic specimens of Quran, religious texts and poetry etc. The language is mostly Arabic and Persian where the dominant calligraphic styles are Naskh and Nastalique.

5.15.6 Libraries:

Mardan Public Library

The Mardan Public Library has a total covered area of 31,000 sft. It is located in the heart of city and has a collection of more than 10,000 books. It provides services to the all public specially research scholars and students of Post Graduate College, which is situated opposite to the Public Library.

5.15.7 Open Spaces:

The existing main open spaces/parks in District Mardan are as following:

- Piran Daga Park
- Tooti Park
- Company Bagh
- Ghulam Nabi Park
- Ameer Muhammad Khan Park (Under construction)

The decreasing recreational facilities and open spaces are a cause of concern. Provision of spaces for active outdoor recreation is hindered by high land prices, pressure on land and high population densities in urban area. Thus, reserving land for recreational purposes has to be stressed against many competing demands for land.

5.15.8 Future Metropolitan Park, City Stadium/Park Area Requirements.

According to the National refrence Manual, there is need of 1 cricket, foot ball and hockey grounds as per calculations in the urban area of Mardan. The same is calculated for the rural sector and is given in

the table 5-39. The annual development plan of 2021-2022 has approved the proposals of big parks around the big cities which will have a major impact on reacreational sector. Details of active and passive recreational facilities required for District Mardan are given in the table below:

Table 5. 58 : Recreational Facilities Demand of District Mardan (2021-2040)

Active Recreational Facilities					
S. No	**Category**	**Additional Population**	**Type**	**Active Recreational Facilities Required**	**Area Required (Ha)**
1	**Urban**	232566	Cricket	1	2
			Foot Ball	1	1.4
			Hockey	1	1.5
			Community Play Ground	2	4.3
			Neighborhood Play Ground	9	14.7
2	**Rural**	1417569	Cricket	5	10
			Foot Ball	7	9.8
			Hockey	7	10.5
			Community Play Ground	57	122
			Combine Play Field	14	30
Total		1650135		**104**	**206.2**
Passive Recreational Facilities					
Category		**Additional Population**	**Type**	**Active Recreational Facilities Required**	**Area Required (Ha)**
Urban		232566	City Park	1	12
			Community Park	2	8
			Neighborhood Park	9	29.25
			Mohallla Park	37	59.2
			City Park	4	48
Rural		1417569	Community Park	14	56
			Neighborhood Park	57	185.25
			Mohallla Park	227	363.2
Total		1650135		**351**	**760.9**

SOLID WASTE MANAGEMENT

Urban households and businesses generate large amounts of solid waste that must be collected to maintain a healthy and hygienic lifestyle through regular, recycling or proper handling. Many cities are facing increasing solid waste management challenges due to rapid urbanization, insufficient technical and financial capacity or insufficient policy focus. The higher the income level of a city, the greater the amount of solid waste generated. The growth that developing and emerging countries are about to experience, will pose even greater challenges in terms of economies.

Waste management refers to the "collection, transportation, processing, recycling or disposal of waste materials". It is recognized that waste management practices differ between developed and developing countries, urban and rural areas and between residential and industrial producers. In waste management strategies, an assessment of the quantity and characteristics of waste generated is essential for the development and cost-effective management methods. However, little attention has been paid to the different characteristics of solid waste, seasonal variations and future trends in waste generation.

1. Existing condition of Solid waste management in the settlement

Municipal solid waste management (MSWM) is considered a serious environmental challenge confronting local authorities in many countries around the world. This is especially true in developing countries. As a result of rapid population growth and the increased rate of unplanned urbanization in many cities of the developing world, the amount of municipal solid waste is increasing tremendously. Solid waste management is one of the major reasons of environmental degradation in Pakistan in general and Khyber Pakhtunkhwa in particular. Solid waste management is not carried out in a sufficient and proper manner in collection, transportation and disposal or dumping regardless of the size of the city. Solid waste management was not a big challenge due to its manageable volume, organic nature and environment friendly local practices. In the past decade, volume and composition of solid waste has changed a lot due to increase in population and increased use of plastic-based materials.

Under SUDP (in early nineties) a solid waste management system was executed, waste bins were installed in streets, transfer stations were identified, and a land fill site was developed. Local government, due to lack of funds and capacities, could not manage and maintain the system. Currently nothing exists except a neat and clean landfill site which is also under litigation. In recent times the size and volume of the waste generated has increased massively. The management of such amount of waste has evolved as a challenge to the management authorities. Furthermore, the lack of resources including tractors, human resource and latest machinery and equipment's is also contributing to the prevailing solid waste management. The existing solid waste generated

2. Current and Projected Solid Waste Generation in the settlement/district.

Considering waste generation rate as 0.5 kg per capita per day with the present population of the Mardan District, the total municipal solid waste load is approx. 1314.39 metric tons per day at present. The solid waste generation for future population of the Mardan District is estimated as 2139.46 metric tons per day. Thus, additional solid waste of approx. 825.07 million tons will be generated in the period of 2021 to 2040.

Table 5. 59 Solid Waste Generation for Present 2020 and Future 2040

Present Population 2021	**Current Solid Waste Generation (M.Tons)**	**Projected Population 2040**	**Future Solid Waste Generation (M.Tons)**
2628785	**1314.39**	4278920	**2139.46**

Source: DLUP Mardan 2021.

Census: 2017

Solid Waste Generation @ 0.5kg per capita per day.

3. Existing collection, transportation and disposal system.

Presently, WSSCM is responsible for the Solid waste collection and disposal for Mardan City. This is accomplished with the help of approx. 36 vehicles and 440 workers. As per the data collected from WSSCM, the details of vehicle fleet and the physical condition details of the vehicles are shown in the figure. The open dumping is carried out in the outskirts in low lying lands. WSSCM has increased the solid waste collection from 40 tons/day to 120 tons/day. Solid waste generation for Mardan City is estimated as 0.5 kg/c/day. Mardan has a land fill site which is redundant due to lack of funding and capacities. Moreover, the land for the landfill site has become disputed due to claims by some villagers. The areas lying outside the boundary of the city are dealt by the Tehsil Municipal Administration which uses the conventional method of waste collection and transferring it to the disposal site. However, it has been observed that they are not able to move all the waste generated to the final disposal site because of their limited capacity. The Municipal staff and the general public are usually unaware of the modern solid waste management spells such as 3R's i.e., Reduce, Reuse and Recycle. There is a serious deficiency of training center for the staff which will enable them to tackle the issue more effectively. Lack of properly qualified and trained staff also contributes to the dilemma caused by the solid waste.

Garbage Collection Containers in Mardan City and Mardan District

There are a total of 210 containers that are installed by the WSSCM in Mardan City which are fully functional and are under their supervision. Different containers having different sizes are installed depending upon the area served, the details of which are given in the table below:

Table 5. 60 Garbage Collection Containers

No. of Containers	**Container Volume**		
210	**Size**	**0.8**	**5**
	Nos	**80**	**130**

4. Review of Rules/Policies dealing with Solid Waste Management

Solid waste management is a major problem which is faced by almost every developing country. The provision of appropriate rules and policies and their successful implementation leads to eco-friendly environment. There are certain provisions in the Khyber Pakhtunkhwa Environmental Protection Act, 2014 which are given below:

In the environmental protection act following Section which are related to Solid waste

14. Prohibition of import of hazardous waste, which states that no person can bring or carry and not transport hazardous waste into the territorial jurisdiction of the Province of the Khyber Pakhtunkhwa.

15. Handling of hazardous substances, No one have authority to collect, generate or use the hazardous waste unless government of Khyber Pakhtunkhwa issues licenses

17.Environmental Protection Order includes that government agency looks after every type of hazardous waste if any type of violation occur or occurred to disturbed the environmental quality standard so to take such measures that the Agency may consider necessary. For example, immediate stoppage or controlling the discharge or action to remove or otherwise dispose of the effluent. And ask the district administration and police to enforce or execute such orders or directions. Impose and recover administrative penalty or pollution charges as may be applicable.

18. Penalties. --- Violation of the **Section 11(. Prohibition of certain discharges or emissions), 12 (Strategic environmental assessment), 13 (. Initial environmental examination and environmental impact assessment), 14, and 17 (already mentioned earlier)** or any order passed issued thereunder, shall be punishable with a minimum fine of fifty thousand rupees which may extend to five million rupees, and in the case of a continuing contravention of failure, with a compulsory additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues.

National Environmental Quality Standards (NEQS) 2000 & 2010

The National Environmental Quality Standards (NEQS), 2000 & 2010, specify the following standards:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers);
- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources; ▪ Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles;

5. Proposed solid waste landfill /disposal sites and Geographical analysis through GIS (A Decision Support System) proposed and existing.

Mardan has a landfill, but it is redundant due to a lack of funding and capacity. In addition, the land used for the landfill has also been disputed due to the demands of some villagers claiming the ownership of land. Areas outside the city boundaries are handled by the Tehsil Municipal Administration, which uses traditional waste collection methods and transfers them to disposal sites. However, it was noted that due to their limited capacity, they were not able to transfer all of the waste generated to final disposal sites. Current land fill site is _____

The existing landfill site have certain problems which includes the ownership status of the land, this issue needs to be resolved in order to maintain smooth activities in the area. Mardan is rapidly urbanizing and the land is becoming scarce in the city, due to scarcity of land the existing landfill site is proposed for the new incineration plant which will not only reduce the size of the waste generated but will also produce energy which can be used for several purposes. Another reason for selecting this site is that the land is already under no use and after the installation will serve a purpose of eco-friendly environment.

6. Constraints and recommendations:

In most of the developing countries a huge amount of money is spent on the collection and transportation of solid waste which is not a permanent approach to tackle the issue of solid waste. The WSSCM is responsible for collecting the solid waste of Mardan City only while the outside areas of the cities are the responsibility of the respective TMA's. The staff required for the effective management of solid waste in Mardan city as well as Mardan District is undersupply which leads to poor management of the sector. There are two solid waste disposal sites as per the data provided by the Mardan Company WSSCM which are currently not in the state of functionality. The following are the recommendations based on the constraints that were faced during the survey:

- Institutional capacity building (ICB) of the concerned departments will make a positive contribution in the effective management of solid waste. Currently, WSSCM is transferring 120 tons which is not the total amount of waste generated in the city. Increasing the institutional capacity will help in mitigating the existing amount of waste generated.
- Certain measures should be taken in order to the existing practice of throwing Garbage into open spaces or in any other areas rather than his own premises. Those who perform such act shall be heavily fined and will have to pay the fees to the collector of garbage to avoid the same act in future.
- There is a famous quote which states that "ONE PERSON WASTE IS ANOTHER PERSON TREASURE". The waste often includes certain materials which possess potential of recovery or reuse. The widely used approach of solid waste management such as 3R's i.e. Reduce, Reuse and Recycle shall be illustrated to the general public to eradicate/minimize the huge amount of solid waste.
- The concept of segregated waste bins labelled with the nature of waste to be dumped shall be adopted which will help the concerned municipality to transfer the waste into their respective area of treatment station.
- People are currently unaware of the modern techniques that are extensively used to eradicate the solid waste. Certain Initiatives are taken recently in Pakistan, specifically Islamabad which includes the installation of "Cash for Trash" bins which provides cash to users for dumping waste into the designated vending machine. Such initiative should be adopted in Mardan to encourage the public for dumping the waste in their proper location.
- Waste generation in Mardan District is 0.5kg/pc/pd which sums to a total of 1314.39 metric tonnes. The existing institutions in Mardan are undersupply and not in a position to treat such amount of waste. Services from private companies dealing with solid waste must be hired and

such agencies should be encouraged by providing certain certificates etc. so that they continue their services until the government agencies have increased their capacity.

- During the process of data collection, it was found that there is a serious issue of communication gap between the departments such as MDA, TMA's and WSSCM. Any activity that is carried by one institution is limited to themselves only and other respective department of the same sector remains completely in shadow from such activity.
- The establishment of waste recovery and recycling facilities should be facilitated to reduce waste at the dump site and ensure value addition to waste through material recovery.
- Industries should use the waste provided by the Municipality for combustion purposes however, the criteria for the treatment of emitted toxic gases must be met. This method will help us to reserve other resources such as coal, gas etc for other useful purposes.
- Authorities should design a legal framework on household participation to allow the local authority and waste collection companies compel the households to pay for the services.
- Despite all the methods elaborated earlier, there will still be an amount of solid waste left which cannot be treated and the only way to eradicate them is burning them to ashes. The Incineration Plant is proposed to be provided in the Mardan District, the size of which will be dependent upon the funding available or the amount of solid waste to be treated. The waste produced at the Incineration Plant i.e., Ash from the fire can be used for other several purposes such as construction material etc. The Incineration Plant will reduce the size of the waste generated up to 90%. Energy is produced at the incineration plant which can be used to overcome the shortfall of electricity.

5.15.9 DRINKING WATER SUPPLY, SEWERAGE AND STORM WATER DRAINAGE

Source(s) of drinking water supply.

Water Supply

Households are the largest consumers of public water supply. In the past, Mardan has been blessed with a seemingly unlimited supply of groundwater for public use. This abundance means that it is relatively easy to expand the water supply system to introduce new wells and related infrastructure in the face of a growing population. Past patterns of water use are unlikely to be sustainable in the future, as conditions drawn from groundwater resources will limit the amount of water available in a growing city. It is important to manage drinking water resources in the most effective and practical manner to meet the immediate and future needs of communities.

Currently, Mardan city is facing great shortage of water in underground aquifers and in irrigation canals especially due to over extraction, reduced precipitation and 50% reduction in its irrigation share. The average annual temperature is 22.2 °C in Mardan and the rainfall here averages 559 mm. Canals fed through River Swat provide irrigation water which also recharges the underground waters. Source of Water Supply

The main sources of public water supply are

- Groundwater aquifers underneath urban Mardan
- Surface streams
- Small bores

The aquifers in urban areas are mainly due to seepage and rainfall in Swat River. The public water supply system in urban areas is based on a tube well system installed in the area, which distributes drinking water to users either through direct pumping or through an elevated reservoir. A considerable number of households draw water from wells, boreholes and hand-operated pumps.

As a result of inefficient public sector water supply, there are more and more small holes in the houses. This trend ensures the continuity of the water supply, but also encourages the waste of water. Freshwater is used for a variety of purposes owing to the lack of reuse, recycling and water treatment systems.

1. **Quality/quantity of drinking water at source and user per WHO/local standards.**

Water quality tests carried out in various time periods were studied. Review of secondary data and tests conducted identifies some concerns related to the drinking water. Evaluation of the Quality of Drinking Water of Mardan District was done from PCSIR, PCRWR and other certified institutions. Generally, water quality is good but for drinking with some exceptions. The collected samples indicate the presence of faucal coliform was also detected during the tests. It can be concluded that some of water samples analyzed were not completely fit for drinking.

The majority source of drinking water in Mardan is shallow water wells, while the rest use surface water like from rivers, ponds, streams etc. Most of the houses have their own bore well at home as water is available at a depth of 100ft.

Water supply is insufficient, and its quality is not satisfactory. Water supply pipes are mostly old, rusted, leaking and are passing through open drains at many locations. Wastewater in the drains contaminates the drinking water inside the pipes through leaks. According to survey more than 60% of the people have personal bore system and 40 % are depending on the public water supply system, hand pumps, and other sources.

The increasing trend of the personal bore system is due to the unhygienic water supply and lack of provision of water to all the households. According to the Survey 93% of the households have their own wells. The quality of drinking water of Mardan is not up to the mark that's why there is increasing trend of water borne diseases among the dwellers of Mardan city.

2. Future and Current Water Demand per Settlement in the District.

Over a recent five-year period, the public water supply had an abstraction rate averaging between 20 and 30 gallons per person per day, with a median of 25 gallons per person per day. The demand for potable water is aggravated by the fact that this water is typically used for all purposes. This means that high-quality drinking water is used for purposes where lower quality water would suffice. The present supply is not known, thus assuming 25 gallons per person per day is extracting through tube wells, private bore holes and surface streams, the following water supply and water demand has been worked out.

At present the gap in between water supply and demand is worked out as 10.95 MGD. It is expected that in next 20 years, water demand will remain as 30 gallons per capita per day and total water demand in 2040 will be 107 MGD. Therefore, after fulfilling the present gap the additional water demand for Mardan City will be as 52.28 MGD. The estimated water demand for the period of 2021 to 2040 is shown in the table given below:

Table 5. 61 Solid Waste Generation for Present 2021 and Future 2040

Present Population 2021	**Present Supply (MGD)**	**Present Demand (MGD)**	**Present Gap (MGD)**	**Future Demand 2040 (MGD)**
2628785	**54.72**	**65.67**	**10.95**	**107**

Source: DLUP Mardan 2021.

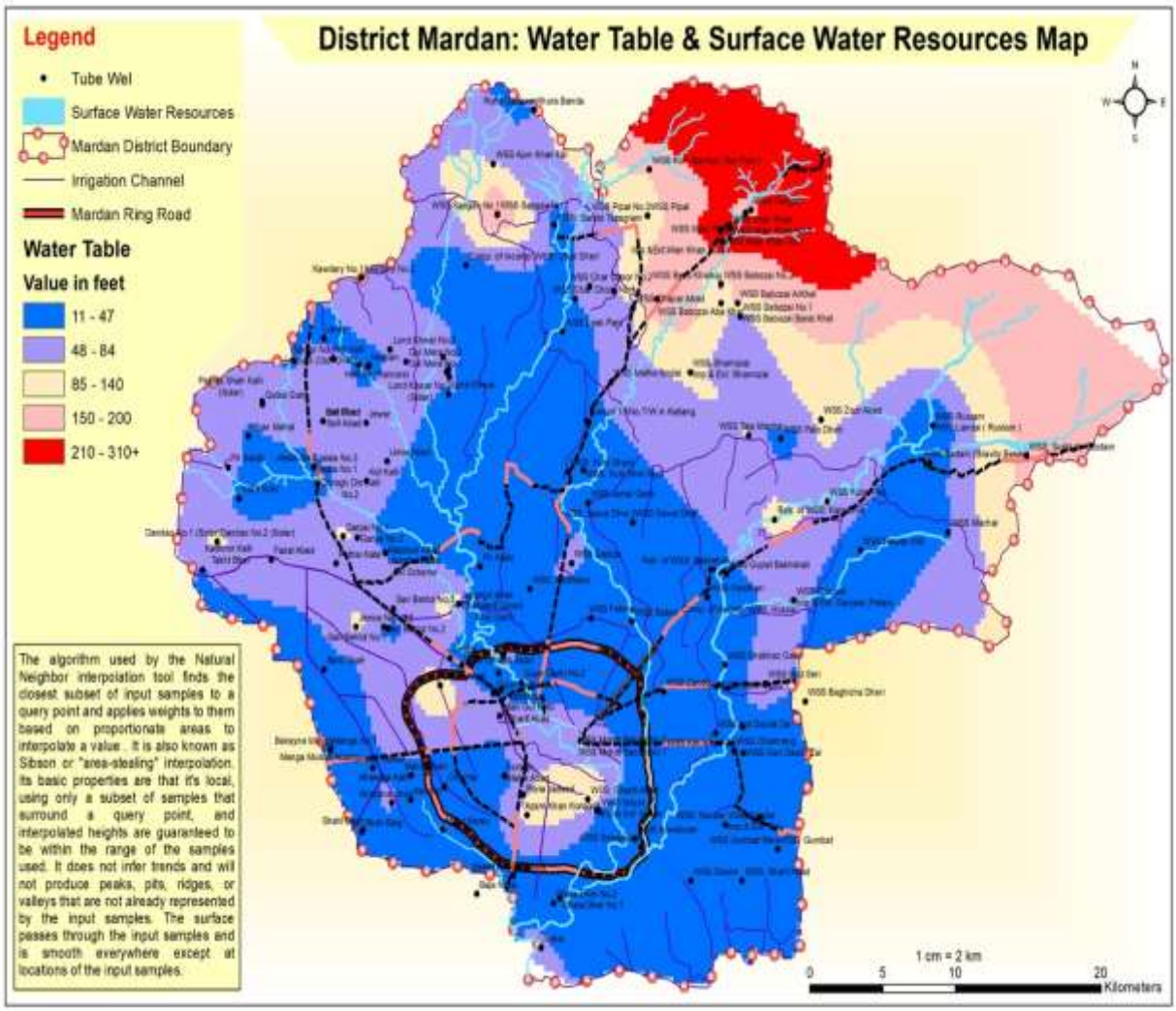
Census: 2017

Present Supply @ 25 gallons per capita per day

Present Demand @ 30 gallons per capita per day

3. Existing coverage of the water supply/gaps in demand.

There are 17 sustainable development goals amongst which Sustainable development goal number 6 is the provision of clean water and sanitation which clearly identifies the importance of clean water and sanitation. There are various institutions responsible for the management of the water supply and sanitation sector. Public Health Engineering Department in Mardan deals with the management of tube wells and other sources of drinking water. A total of 206 schemes of water supply are dealt by the PHED in two sub divisions i.e. Mardan and Takht Bhai , Mardan having 100 sources of drinking water supply in Mardan division and 106 in Takth Bhai division.

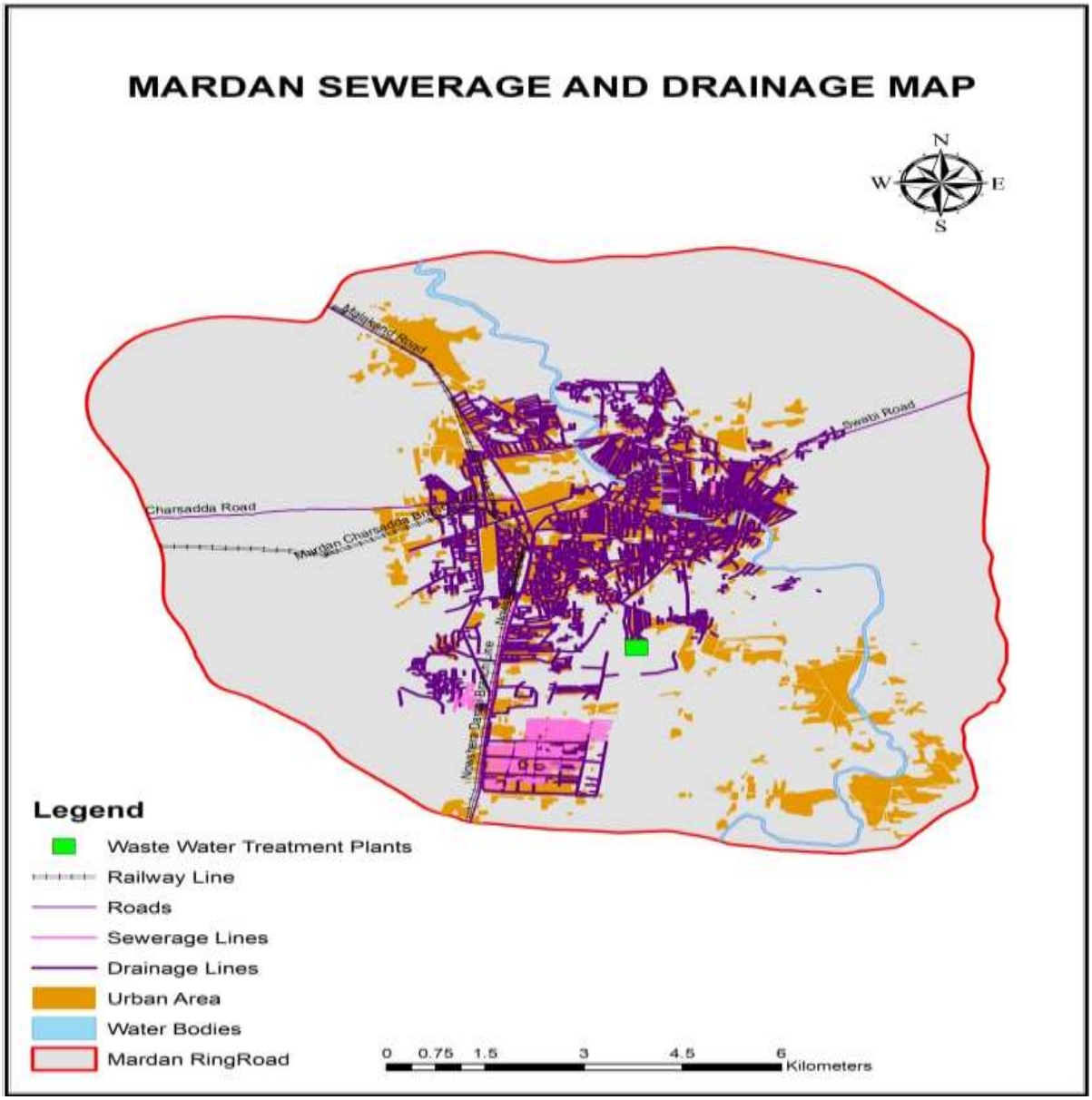


Map 5. 13 water table and surface water resources in the Mardan district

The above map shows water table and surface water resources in Mardan district. Blue color in the map shows water level 11 to 47 feet below surface, purple color shows 48 to 84 feet water depth below earth surface.

4. Existing Situation of the Drainage System

Mardan has a complex network of Sewerage and Drainage system which is shown in the map given below. About two decades ago, the authorities laid a trunk sewer leading to the Sewage Treatment so that the local government could use it after laying street sewers and connecting homes. Unfortunately, owing to a lack of funds and capacity, the plan was never implemented and the infrastructure now requires major repairs and the replacement of electrical and mechanical equipment, as well as street sewer and house connections. Similarly, the Sewage Treatment and main sewer in the town of Sheikh Maltoon will require similar repairs and will need to be connected to the town's existing sewerage network.



Map 5. 14 Mardan Seqearge Sewerage And Drainage

5. Available/proposed waste water treatment plant and their feasible locations.

A wastewater treatment plant is a facility in which a combination of various processes (e.g., physical, chemical and biological) are used to treat industrial wastewater and remove pollutants. Sewerage treatment plant has been transferred but is non-functional since more than a decade.

Due to the non-functionality of the existing sewage and drainage treatment plants, the installation of new sewage plant was a dire need. The feasibility criteria for the proposed waste water treatment plant were as below:

- It should be along the flow (level).
- Near to an industry.
- At a distance from the community.
- Accessible.
- Large enough with the possibility of extension in future.
- Sludge treatment and disposal facility.

The waste water treatment plant is sized by Multiplying your Minimum Population (P) by 150 to get your daily estimated wastewater production. For example, a three-bed house with a Minimum Population (P) of 5 people would have a daily estimated wastewater production of 750 liters per day (5 x 150). A water treatment plant is designed for 30 million gallons per day (mgd) Millions of Gallons per Day. The flocculator dimensions are length = 100 ft, width = 50 ft, depth = 16 ft as they were used in the United States and are proposed for the Mardan District as well. The best location which were fulfilling the criteria already stated above was along the Kalpani River. Hence the waste treatment plant was proposed alongside the Kalpani River. This will also eliminate the risk of getting inundated in the rainy season. The following steps will be carried out in the waste water treatment plant:

- Screening
- Aeration or Pre-chlorination
- Coagulation and flocculation
- Sedimentation
- Filtration
- Chlorination
- Supplementary treatment

6. Constraints and recommendations

District Mardan possesses potential for provision of better water quality if managed properly. The respective sector of Water supply, sewerage and drainage system has certain limitations which includes the limitation of data and undersupply of the staff engaged in the concerned departments.

Soak pits will be built in absorbent soil and shall be located 300 m away from a water well, hand pump or surface water body. Soak pits in non-absorbent soil will not be constructed.

Ensure that the soak pits remain covered all the time and measures are taken to prevent entry of rainwater into them.

5.16 AGRICULTURE:

Mardan is the Intermediate city of Khyber Pakhtunkhwa. It was declared as a District in 1937 with the bifurcation of District of Peshawar. Swabi and Charsadda Districts were later carved out of District Mardan in the 1980s. District Mardan is now comprises of two tehsils i.e. Takht Bhai and Mardan. Most of its land is agricultural. It has one of the world's best irrigation systems, which were laid down by the British government during British Rule on subcontinent (1857-1947). It was part of the ancient Gandhara Civilization. There are still remains of the Gandhara Civilization, scattered in different areas of Mardan.

The total area of Mardan is about 1,632 sq km. Malakand, Charsadda, Nowshera, Swabi and Buner Districts surround the District Mardan. Mardan District is hilly in the northeast, while the southwestern half is a fertile plain. Generally, streams flow from north to the south. Most of the streams drain into the Kabul River. The summer season is extremely hot. During May and June dust storms are frequent during the night. Most of the rainfall occurs in the months of July, August, December, and January.

Mardan is blessed with fertile agricultural land; therefore, most of the people are associated with agriculture. Main crops are Virginia tobacco, sugarcane and wheat. Commercial deposits of marble, Limestone, Dolomite and Granite also exist in Mardan District. Veins of a good quality of Topaz, being a valuable gemstone have been found in the hillocks of Shaheed Ghundai and Shamozai Katlang, Mardan. Besides agriculture and mining as major economic activities, Mardan is also famous for its three major potential clusters namely Light Engineering Cluster (Takht Bhai), Furniture Cluster (Mardan) and Handicrafts Cluster (Mardan).

Mardan is known as one of the best agricultural areas in the country, with a suitable land for cultivation of sugar cane and tobacco and is therefore, rightly called the land of sugar cane and tobacco. Major crops grown in the area includes; maize, rice, jowar, sugarcane, ground nut (Kharif), wheat, barley, mustard (Rabi). Horticulture is one of the major potential sectors of Mardan. Major fruits produced there includes, plum, pear, persimmon, peach and orange. Other fruits being produced in Mardan include apple, apricot, leechi, mango and lemon.

5.16.1 Cultivation Area and Conversion Trends:

The major portion of this population i.e., about 83% is dwelling in rural areas putting a tremendous pressure on land resources. To cater for the livelihood needs of this mammoth population, the province possesses 10.17 million hectares of land. However, the cultivable area is 2.75 million hectares. Out of cultivable area only 1.8 million hectares is cultivated where as 1.08 million hectares is cultivable waste. Due to great diversity in climate and soils, Khyber Pakhtunkhwa grows over 42 crops; the major ones being wheat, rice, barley, maize, sugarcane, tobacco, rape & mustard, groundnut, pulses, vegetables and fruits. The major crops occupy nearly 90% of the total cropped area and play an important role in sustaining the living of the rural population.

According to the Crops statistics of Khyber Pakhtunkhwa, the total reported area of District Mardan is 162100 hectares, out of which according to the year 2020-21 the total cultivated area is 99046 containing the sum of net area sown and current fellow which is 68.77 of the total reported area (Table 17.1). Total cropped area in District Mardan in 2020-2021 is 111482 hectares containing the net sown area and that area which is sown more than once in a single year. In table 5-39, Row 2 shows total reported area, Row 3, 4, 5 shows cultivated area, Row 6,7 shows total cropped area, and Row 8,9,10,11 shows Un-Cultivated area. (Cultivated Area: that farm area which was sown at least once during the year under the report or for the year before). It is the sum of area Net Sown and Current Fallow. Net Sown is that cultivated farm area which was actually cropped during the year under report regardless of the number of crops raised and includes area under fruit trees for the same year, while Current Fallow is that cultivated farm area which was cropped neither during the census year nor in the year before that. Cropped Area means the aggregate area of crops raised in a farm during the census year including the area under fruits trees. Culturable Waste is that form of farm area which has the potential for being cultivation after either land leveling or stone removal etc. Forest Area is that uncultivated farm area which is under forest. Area not available for cultivation means barren or mountainous land, area under roads, Canals, Rivers and all such areas which are not utilized for agriculture purpose.

Table 5. 62 Area under Cultivation in District Mardan[87]

Area Under Cultivation in District Mardan						
Year		**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2020-21**
Total Reported Area		126661	162100	162100	162100	162100
Cultivated Area	**Total**	**78854**	**33841**	**99841**	**99196**	99046
	Net Sown	77142	81673	81673	80550	80468
	Current fallow	1712	18168	18168	18646	18578
Cropped Area	**Total**	**78717**	**115339**	**115339**	**109676**	111482
	Area Sown More than Once	1575	33666	33666	29126	31014
Un-Cultivated Area	**Total**	**47807**	**62259**	**62259**	**62904**	63054
	Culturable waste	19629	5182	5182	5188	5184
	Forest	105	7920	7920	7920	7933

[87] Source: Development Statistic of Khyber Pakhtunkhwa, 2020

	Non-Available for cultivation	28073	49157	49157	49796	49937

5.16.2 Distribution of Area by Crops

Crops

Table 5-40 gives a comparative statement of distribution of area by crops in District Mardan. According to the crop statistics, 2020-21, the total areas occupied by tobacco crop were, 3,537 hactare. Wheat ranks first in acreage and production among all food crops. In 2020-2021 total area occupied by wheat was 40,373 hectares. In the same year, total area occupied by sugarcane was 30,172 hectares. Rice is the second major staple food of the most people of Pakistan. In District Mardan the rice was sown on an area of 2,417 hectare, while area under maize crop was 24,025 hectares.

Table 5. 63 Distribution of Area by Crops in District Mardan (Hectare)

Distribution of Area by Crops in District Mardan									
Product	2017-18			2018-19			2020-21		
	Area (ha)	Production (Ton)	Yield per Hectare in Kg	Area (ha)	Production (Ton)	Yield per Hectare in Kg	Area (ha)	Production (Ton)	Yield per Hectare in Kg
Wheat	10380	85345	2128	40160	85035	2094	40373	89525	2218
Maize	25041	79033	3156	25170	80653	3204	24025	76442	3202
Rice	1837	2958	1610	1908	3129	1640	2417	3940	1690
Barley	1103	927	840	977	848	868	956	836	874
Sugarcane	30389	1290874	42478	29381	1266027	43090	30172	1298603	43397
Rape Seed & Mustard	434	245	565	426	239	561	208	426	
Cotton	1	0	200	1	0	300	1	0	300
Tobbaco	4017	11900	2962	4652	12781	2747	3537	10550	2983
Jowar	974	670	688	962	661	687	1062	730	682

Vegetables

Total area under vegetables during 2017-18 was 2,476 hectares with a production of 31,718 tons. In 2020-21 the total area decrease into 2,438 with the production of 25,365 the area of District Mardan are presented in Table 5.16.4 below.

Table 5-43: Distribution of Area by vegetables in District Mardan (hectare)

Table 5. 64 Distribution of Area by vegetables in District Mardan (hectare)			
Product	**2017-18**	**2018-19**	**2020-21**

	Area (ha)	Production (Ton)	Yield per Hectare in Kg	Area (ha)	Production (Ton)	Yield per Hectare in Kg	Area (ha)	Production (Ton)	Yield per Hectare in Kg
Rabi Vegetables	1154	16838	14591	1111	16322	14691	1275	18970	12757
Kharif Vegetables	1322	14880	11256	1310	13212	10085	1163	14664	12608
Total	2476	31718	25847	2421	29534	24776	2438	33634	25,365

Fruits

The total area occupied by Kharif fruits in 2020-21 was 1,396 hectares with a production of 13,578 tons, and Rabi fruits area was 383 hectares with a production of 5025 tons. Kharif Fruits are presented in Table 5-44, while province-wise fruit production is presented in annex 2.

Table 5. 65 Distribution of Area by Fruits in District Mardan (hectare)

Distribution of Area by Fruits in District Mardan (hectare)									
Fruits	2017-2018			2018-2019			2020-21		
	Area	Production	Yield per Hectare in KG	Area	Production	Yield per Hectare in KG	Area	Production	Yield per Hectare in KG
Rabi Fruits	282	3443	12209	289	3524	12194	383	5025	13121
Kharif Fruits	1317	12828	9740	1364	13267	9727	1396	13578	9736
Total fruits	1599	16271	21949	1653	16791	21921	1,776	18,603	22,857

5.16.3 Water Management

According to the United Nations' "UN World Water Development Report", the total renewable water resources decreased from 2,961 m³ per capita in 2000 to 1,420 m³ per capita in 2005. A more recent study indicates an available supply of water of little more than 1,000 m³ per person, which puts Pakistan in the category of a high stress country. Using data from the Pakistani federal government's Planning and Development Division, the overall water availability has decreased from 1,299 m³ per capita in 1996-97 to 1,101 m³ per capita in 2004-05. In view of growing population, urbanization and increased industrialization, the situation is likely to get worse. Nevertheless, excessive mining of groundwater goes on. Despite a lowering water table, the annual growth rate of electric tube-wells has been indicated to 6.7% and for diesel tube-wells to about 7.4%. In addition, increasing pollution and saltwater intrusion threaten the country's water resources. About 36% of the groundwater is classified as highly saline.

Table 5- 15: Type of Irrigation Use for Agriculture in District Mardan

Table 5. 66 Type of Irrigation Use for Agriculture in District Mardan[88]								
Year	Total Irrigatted Area (Area in Hectares)	Canals		Tanks	Tube wells	wells	Lift pump	Other
		Govt	Private					
2016-2017	74185	66266	0	0	1570	4371	984	994
2018-2019	73965	66067	0	0	1564	4362	979	993
2019-2020	73708	65839	0	0	1556	4347	943	993
2020-2021	73583	65745	0	0	39	4335	2461	1003

The major chunk of cultivated land is rain-fed which constitute 49% of the cultivated area. This scenario resulted in a situation where 94% farms are now below the range of 12.5 acres, which is a subsistence farm level.

5.16.4 Agricultural Employment

There has been no provision in any of the three successive laws (1969, 2002 and 2008) allowing agricultural workers as they are not defined as an industry.[89] All the successive labor laws, although notexplicitly, exclude agriculture but these also do not expressly cover this and seem to be excluding small agriculture workers like tenants, share croppers and self-employed from their definition.

Table 5. 67 Labor force in rural areas of the District[90]			
Labor Force (All Areas)	Labor force (Rural Areas)		
Both sexes	Both sexes	Male	Female
304778	230645	226332	4313

Most of the people in rural area are farmers by profession. They are engaged either directly or indirectly in agriculture. Agriculture is the major source of employment in rural area. Like other parts of Pakistan, the share of agriculture in employment has decreased over the years. Still, it is larger than any other sector of the economy. According to the District census reports 1998 of Khyber Pakhtunkhwa the total Labor force involved in the District in various industries were 304778 out of which 230645 containing both sexes were working in rural areas. Table 17.9 shows labor force in rural areas of the District.

Agriculture labor is of three types i.e. family labor, casual hired labor and permanent hired labor. Small and marginal farms generally use family labor only. On large farms, the relative importance of family labor declines owing to (i) the need to supervise work done by hired labor, (ii) consideration of social status, and (iii) alternative employment opportunities for family members by virtue of their better education. Therefore, large farmers usually hire labor to cultivate their land and perform domestic activities, in most of the casual hired labor was mainly used in land preparation, sowing, hoeing/weeding, harvesting and picking of vegetables/fruits.

The problem of underemployment in agriculture is due to surplus labor. Farm size decreases over time due to division of land holdings. Many of small farmers do not have enough land to fully employ their

[88] Development Statistic of Khyber Pakhtunkhwa 2020

[89]http://www.wageindicator.org/main/documents/Labor_and_Employment_Law-A_Profile_on_Pakistan.pdf, Page 8.

[90] District Census Reports 1998 Census of Khyber Pakhtunkhwa

labor hours. This leads to underemployment in agriculture. Measuring the level and trends in the hours worked is important to calculate the level of underemployment. The level of engagement of agricultural labor is linked with the farm size.

Permanent hired Labors According to the Farm Size

Some families having large land holdings employ permanent farm labor. They perform various farm and domestic activities. There is a positive relationship between farm size and permanent hired labor hours. Permanent hired labors are either on monthly or yearly basis. In District Mardan, the average permanent hired labor per farm per year is 27.00 ranging from 0 to 225.02 as indicating in Table 17.10.

Table 5. 68 Permanent Hired Labor Hours According to Farm Size

Farm Size (Hectares)	Permanent Hired Labor (Hours Per Farm Per Year)
< 1	-
1 TO < 2	-
2 TO < 3	-
3 TO < 4	-
4 TO < 5	-
≥5	225.02
All Farms	27

Engagement and Time Spent of Family Labor According to Farm Size

There is positive relationship between farm size and average working hours spent per adult unit per farm. Table 17.9 depicts engagement and time spent of family labor according to farm size. The size of family labor per farm increases with farm size. In District Mardan, the average size of family labor per farm is 2.40 units ranging from 1.47 to 3.50. As time spent per week on farm is concerned, in District Mardan, the average working hours spent per family laborer per week is 18.42 ranging from 7.69 to 36.47. Engagement and time spent of family labor according to farm size is presented in Table 17. 11.

Table 5. 69 Engagement and Time Spent of family Labor according to Farm size

Farm Size	Engagement of Family Labor and Time Spent Per Farm	
	Adult units per farm	Working hours per adult unit/Week
< 1	1.47	7.69
1 TO < 2	1.87	12.73
2 TO < 3	2.56	18.09
3 TO < 4	3.17	22.89
4 TO < 5	3.33	30.65
≥5	3.5	36.47
ALL FARMS	2.4	18.42

Casual Hired Labor Hours According to Farm Size:

Small farms generally perform all the farming operations themselves. Medium and large farms hire casual labor at peak agricultural period like harvesting and threshing of crops, picking of vegetables/fruits and sometimes for land preparation, sowing of crops and hoeing/weeding. There is positive relationship between farm size and average casual hired labor hours per farm. Payment to casual hired labor is made in kind or cash or in both. Average casual hired labor hours per farm per week increases with farm size in the district. The average casual hired labor hours per farm per week are 9.55. It ranges from 3.09 to 31.95 hours per week. Table 17.12 shows the casual hired labor hours according to farm size.

Table 5. 70 Casual Hired Labor Hours according to Farm Size

Farm Size (HA)	Average Casual Hired Labor Hours Per Farm Per Week
< 1	3.09
1 TO < 2	4.84
2 TO < 3	7.23
3 TO < 4	7.6
4 TO < 5	16.2
≥5	31.95
All Farms	9.55

5.16.5 Influence of Urbanization on Agriculture

Table 5-48 gives the total cultivable area in District Mardan in the years 1997-98 and 2018-19. Cultivable area is the farm area which was sown at least once during the census year. It is the sum of Net Sown and Current Follow areas. The total cultivable area during 1997-98 was 112,790 hectares, which decrease to 99,046 hectares in 2020-21. Comparing cultivable area in 1997-98 with that in 2020-2021, the decrease of cultivated area over the period of 22 years has been 13,744 hectares (33,963 acres).

With in-flow of rural migrants to urban areas of District Mardan, there have been significant changes in land utilization, cropping pattern and sources of irrigation. However, though Mardan being the Intermediate city of Khyber Pakhtunkhwa, significant urbanization is taking place as which has a huge effect on total crops production.

Table 5. 71 Change in Cultivated Area During 1997/98 – 2018/19

Year	Cultivable Area (hectares)		
	Total Column	Net Sown	Current Fallow
1997-98[91]	112,790	96,532	16,258
2018-19[92]	99,196	80,550	18,646
2020-21	99046	80468	18578

As already stated, 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, this has not been the case in District Mardan, because agricultural producers and rural consumers also rely on urban-based enterprises for a wide range of goods and services, including access to markets.

5.16.6 Constraints:

- Scarcity of irrigation water is a major constraint in District Mardan. A large part of agricultural area in District Mardan is rain-fed, due to which farmers face hurdles.
- The land tenure system of Mardan has created a chain of intermediaries in between the state and the tenants. The system, instead of being conducive to agricultural development, stands in the way of its progress.

[91] District census report Mardan, 1998, section 1.2.1, Page 15.

[92] Source: Khyber Pakhtunkhwa Development Statistics, 2020, Land uses.

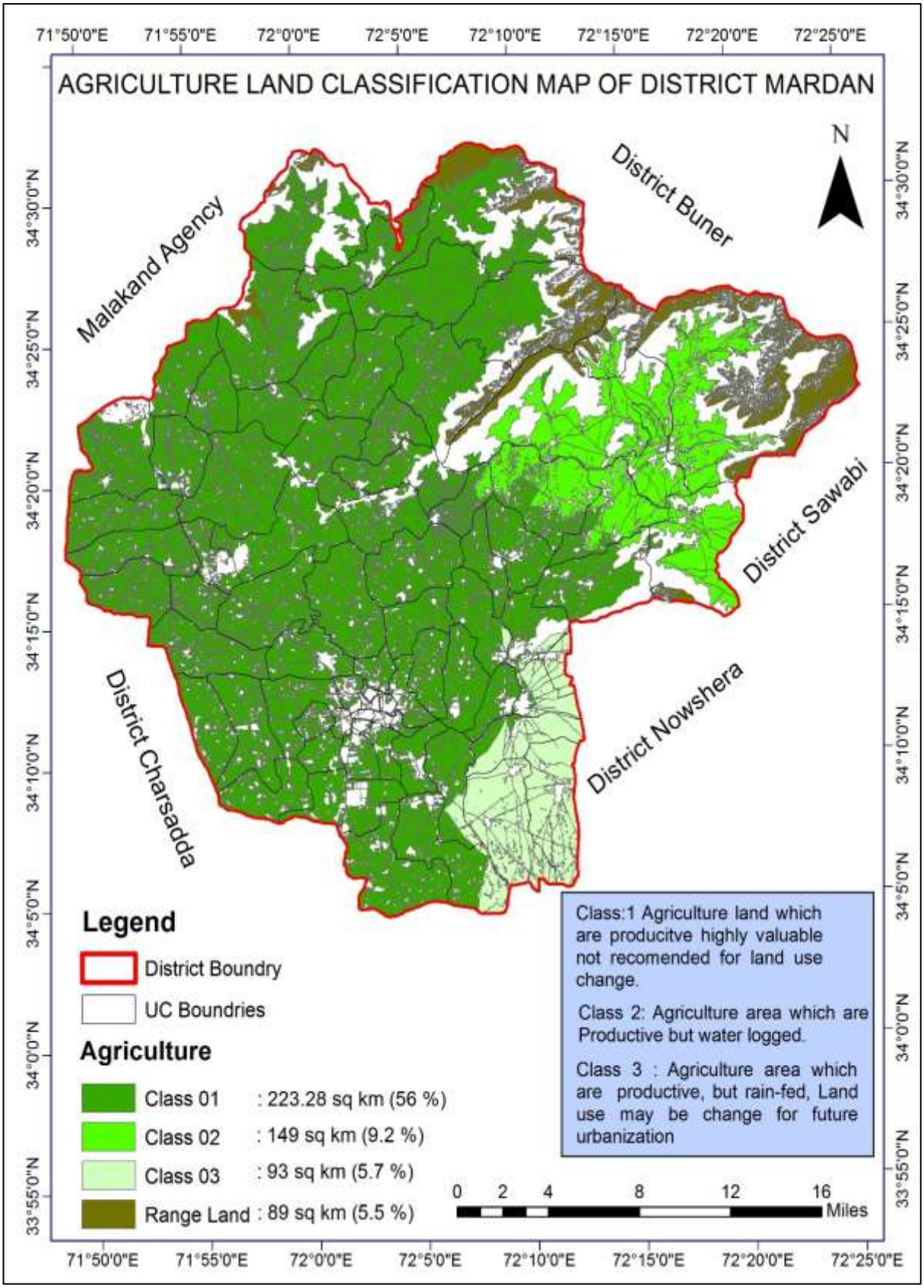
- In some areas of District Mardan, especially in hilly regions, the upper fertile soil is being eroded by different natural agents of change. Thus, the fertility is poor and soils are becoming less productive.
- The marketing facilities for agricultural products in District Mardan are still far from satisfactory. Our cultivators cannot get just prices for their produce due to defective marketing organization. Moreover, the chain of middlemen between the producers and ultimate consumers takes a heavy share of their produce. Thus, the cultivators do not take much real interest in increasing production.
- Due to lack of agricultural education and methods of modern research, the farmers of the District cannot control the various diseases of crops and attacks of pests and insects.
- Most of Mardan villages have no or poor farm to market road. So, farmers have to face innumerable hardships to sell their products.
- The farmers of Mardan are mostly un-educated and lack technical knowledge. They are unable to understand the modern scientific methods of agriculture and often remain ignorant of good means to protect and increase their yield. Their production is therefore low.
- Majority of farmers are poor and often live hand to mouth condition. Most of them are always under heavy burdens of debts. Due to lack of capital they cannot afford to purchase modern implements, Fertilizers, improved seed etc. Hence, they cannot attain the required standards.
- Most of the farmers of the locality are still stuck to the old traditions of their forefathers. The circumstances have compelled them to use the crude implements, because due to small holdings of land and poverty they are unable to acquire and use modern technology. That is why their yield is lower than that of other provinces of the country.
- Salinity control and reclamation project (SCARP) have reclaimed some areas from water logging and salinity but still a lot of water logged and saline areas prevail in the District Mardan.
- The small farmers are increasing in District Mardan like other Districts as the lands are dividing generation by generation. So, there are huge numbers of farmer who own less than 4 acres of land. These small farmers do not get credit facilities to purchase seeds, pesticides, fertilizers etc. The average yield of the District is much low than the required yield, as there is a huge gap between the productive yield and wanted yield.

5.16.7 Recommendations:

- Large part of the District is saline and water-logged. Tube-wells should be installed in the affected areas to decrease the salinity by reducing water table. Beds of new canals should be made of concrete to avoid water-logging. Reclamation of waterlogged and saline area should be cover through plantation of Eucalyptus and poplar trees. These measures should be taken on priority basis to avoid further deterioration of land.
- Improved sugarcane verities should be introduced in District Mardan so that their sugar content should be enhanced.
- Strawberry producers should be encouraged; Offseason vegetable farming should also be encouraged.
- More and more multinational companies should be encouraged in the District so that the farmers can get the best price.
- The payments from sugar mills to the farmers must be strictly regulated.
- The area located on the bank of river Kabul is rain-fed which is the most fertile and leveled area. It needs irrigation facility which can be easily provided from the river Kabul.

- The seed certification and fertilizer quality should be strictly checked and regulated by the FSC and Rd on regular basis.
- On farm training regarding new technology should be regulated.
- Competition among the farmers for best production should be encouraged.
- In rain-fed area those farmers who have made their own tube wells, will introduce with drip irrigation system in which water and agro chemical are directly delivered to the root zone of the plant.
- Large tracts of area of District Mardan is left uncultivated which can be used profitably by tree plantation.
- The water storage capacity is decreasing due to sedimentation. In order to increase production to meet food requirements of the locality, additional water has to be provided. The additional water reservoirs may therefore be started immediately.

- The agricultural yield can also be increased to a great extent by using fertilizers. The use of fertilizers should be provided on low prices because due to poverty and illiteracy the farmers hesitate to purchase the fertilizers. Also, organic sources of fertilizers should be introduced in the locality which can enhance soil fertility.
- The use of better seeds, fertilizers, pesticides and modern implements is not possible without adequate credit facilities for the farmers. The government has extended the existing credit facilities to a large extent. The commercial banks also grant loans to the farmers, but still there is a need for more facilities as our farmers are very poor. The commercial banks may be encouraged to provide credit to small farmers in addition to Zarai Tarqauati Bank.
- The farmers should be provided better quality seeds at the lowest price and at the right time. Better seeds will ultimately give better yield.
- Various plant diseases damage a large part of our crops. But our procedures should be simplified and various marketing facilities should be provided to the cultivators. Farmers have no effective control over them. Therefore, preventive and narrative measures should be taken.
  As most of the villages of the District is located on a distant from the main markets, so the transportation system should be improved through roads.
- Development on agriculture land will be discourage and development zone or city growth will be identified toward barren land.
- Awareness program shall be introduced to familiar farmers with the advance seeds, fertilizer, and irrigation facilities.
- Infrastructure development shall be discouraged on agriculture land to conserve fertile agriculture land.



Map 5. 15 Agricultural Map of District Mardan

5.17 FUELS AND MINERAL

Mainly marble and limestone minerals are extracted in the District of Mardan. Other minerals such as dolomite, granite and barite are also extracted. There is no reported metallic or gemstones which are mined /exploited in this District.

Minor minerals i.e., sand, bajri and gravel are also extracted from small streams and rivers banks. Marble cutting and polishing units are working at various places of District Mardan. Uncut Marble and tiles are sent to Islamabad and Punjab province through different private companies operating in Mardan. Mineral leases area of Mardan is given in

Table 5. 72 Fuels and Mineral leases

Sr. No.	Mineral	
1.	Barite	
2	Limestone	59
3	Dolomite	9
4	Marble	
5	Granite	

5.17.1 Katlang Topaz

According to an estimate, there are 09 million carats of pink topaz in Katlang, Mardan. Though some believe Katlang's topaz is equivalent to its Brazilian variety in standard, but many rates of higher quality. According to local gem experts, Katlang topaz can fetch prices up to Rs 20,000 per carat. Their prices increase with their weight and beauty. They say that at Katlang topaz of the quality of sapphire has also been found. Experts believe there are huge prospects for investment in this sector in terms of scientific mining and cutting and polishing of gemstones. Computer-aided designing and manufacturing courses for gems and jewelry workers should be organised which will add to their value and also increase investment in the sector.

The sector has a big potential but it is in the shambles and a large quantity of the precious and semi-precious stones is exported raw. Then there is illegal gems trade. As most of the precious stones exist in remote areas, there is an urgent need of infrastructure development.

Indiscriminate blasting and rough cutting spoils the precious mines and stones. Law and order situation, lack of modern cutting and polishing facilities and indifferent attitude of the government is hindering the opening of local training and purchase centers and creating problems for the gems sector.

5.17.2 Minerals mined/extracted from District Mardan

i. Dolomite

Dolomite is a carbonate mineral composed of calcium magnesium carbonate $CaMg(CO_3)_2$. 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. Details of location and leased area for dolomite in Mardan are given in Table 5.61.

Present Detail Profile of Dolomite:[93]

Number of leases	09 (Nine)
Mining Method	Surface mining
Scale of Mining	Small & primitive mining

Table 5. 73 Location and leased area for dolomite in Mardan

S.N O	NAME OF MINERAL TITLE HOLDER WITH ADDRESS	FILE NO/Lease No
		Dolomite
1	Haji Khan Zaman	MDW/DM/ML Dolomite (2)99 MDW/DM/ML Dolomite (3)99 MDW/DM/ML Dolomite (4)99 MDW/DM/ML Dolomite (5)99
2	Mr. Hakeem Jan C/O khan Zaman Bangla	MDW/DM/ML Dolomite (6)99 MDW/DM/ML Dolomite (8)99
3	Mr. Hajji Shah Nawaz	MDW/DM/ML Dolomite (10)2000 MDW/DM/ML Dolomite (11)2005
4	Mr. Muhammed Ramzan S/O Rehmat Ullah Khan	MDW/DN/ML -Dolomite (15)/2012

ii. Limestone

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 fecal debris. It can also be a chemical sedimentary rock formed by the precipitation of calcium carbonate from lake or ocean water. Details of location and leased area for limestone in Mardan are given in Table 5.62.

Present Detail Profile of Limestone[94]

Number of leases	59 (Fifty-nine)
Mining Method	open pit mining
Scale of Mining	small & primitive mining

[93] Source: Assistant Director Office, Mines and Minerals Mardan, 2021

[94] Source: Assistant Director Office, Mines and Minerals Mardan, 2021

Table 5. 74 Location and File No/lease No Limestone in Mardan

S.N.O	NAME OF MINERAL TITLE HOLDER WITH ADDRESS	FILE NO/lease No
1	Haji Sharifullah S/o Rehmat Ullah	MDW/DN/ML Lime stone (155)/2012 MDW/DN/ML Lime stone (156)/2012 MDW/DN/ML Lime stone (140)/2006
2	M/S Mehmood Construction Co: C/o Haji Sharif Ullah S/O Rehmat Ullah	MDW/DN/PL-Limestone (211)/2016
3	Haji Khan Zaman	MDW/DN/ML Lime Stone (129)96 MDW/DN/ML Lime Stone (130)96 MDW/DM/ML Limestone (10)/81
4	Mr. Imran Aziz S/O Abdul Aziz	MDW/DN/ML Lime stone (148)/2012 MDW/DM/ML limestone (150)2012
5	M/S Baloch Mining Company	MDW/DN/ML Lime stone (147)/2010
6	Mr. Maqbool Bhatti M/S:Rightway Mining	MDW/DN/ML Lime stone (143)2007
7	M/S Star Mining Company C/O Haji Khan Zaman	MDW/DN/ML -Lime stone (85)/95
8	M/S: Quaid Mining Company C/O: Haji Khan zaman	MDW/DN/ML Lime stone (76)95
9	Mr. Hakeem Jan C/O khan Zaman Bangla	MDW/DN/ML Lime stone (157)/2012 MDW/DN/ML Lime stone (40)/93 MDW/DM/ML Lime Stone (38)/93
10	Mr. Waheed Ullah Khan S/O Haji Khan Zaman for M/S:Waheed & Company	MDW/DN/ML Lime stone (74)/95 MDW/DM/ML Lime Stone (80)1995
11	Mr. Akhtar Nawaz C/O: Haji Khan zaman	MDW/DN/ML Lime stone (99)/95
12	Mstt:Khurshaid Tabasum Mining Company D.I.Khan C/O: Haji Khan zaman	MDW/DN/ML Lime stone (84)/95 MDW/DM/ML Limestone (75)95
13	Mr. Fatehullah	MDW/DN/ML Lime stone (159)/2015
14	Haji Zaro Jan	MDW/DN/ML Lime Stone (133)2010
15	Mr. Farid Ullah Khan S/O: Haji Khan Zaman	MDW/DM/ML Lime Stone (73)95
16	Mr. Imtiaz Khan	MDW/DM/ML Lime Stone (82)95

17	Mr. Sher Zaman	MDW/DM/ML Lime Stone (72)95
18	Saleem Nawaz Khan S/O Haji Shah Nawaz	MDW/DN/ML - Limestone (151)/2012
19	M/S " Hafiz Ghazi Merjan & Company	MDW/DN/ML - Lime stone (77)/95
20	Mr. Muhammed Nawaz S/O Ghulam Qadir	MDW/DM/ML limestone (146)09 MDW/DN/PL -Limestone (275)/2021 MDW/DN/PL -Limestone (273)/2020 MDW/DN/PL -Limestone (278)/2021
21	Mr. Shahibzada Aziz Ahmed Jan S/O Shahibzada Dost Muhammed Jan	MDW/DM/PL Limestone (230)2017
22	Abdul Shakoor	MDW/DN/ML -Limestone (158)/2013
23	M/S A/S Mining Pvt: Ltd,	MDW/DN/PL -Limestone (261)/2019
24	M/s Haqsar Tamirati Co. C/o Syed Fazal Abbas Shah	MDW/DN/PL -Limestone(227)/2017 MDW/DN/PL -Limestone(228)/2017
25	Arsaln Aziz	MDW/DN/ML -Limestone (175)/2020 MDW/DN/ PL-Limestone (0242)/2021
26	Muhammad Aslam S/o Muhammad Akram	MDW/DN/ML -Limestone (160)/2014
27	Mr. Daulat Khan S/O Abdul Majeed Khan,	MDW/DM/PL Limestone (262)2019
28	M/S Reliance Tech Muhammad Javed (Sole Proprietor)	MDW/DN/ML -Limestone (169)/2019 MDW/DN/ML -Limestone (172)/2020
29	Muhammad Amir Khan S/O Musa Khan,	MDW/DN/ML -Limestone (170)/2020 MDW/DN/ML -Limestone (171)/2020
30	Muhammad Amin S/O Jalal Khan	MDW/DN/ML -Limestone (173)/2020
31	Ziaullah S/O Mashal Khan	MDW/DN/ML -Limestone (174)/2020
32	Durmar Jan S/O Zaro Jan	MDW/DN/ML -Limestone (177)/2021
33	Muhammad Awais	MDW/DN/PL -Limestone (257)/2018
34	Muhammad Jamil Khan	MDW/DN/PL -Limestone (259)/2017
35	Muhammad Noman Khan	MDW/DN/PL -Limestone (236)/2017
36	Mir Ghulam	MDW/DN/PL -Limestone (268)/2020
37	Mr.Hidayatullah Khan s/o Mr. Mazullah	MDW/DN/PL -Limestone (265)/2020

38	Mr.Mattiullah Babar s/o Gulistan Khan	MDW/DN/ML -Limestone (176)/2020
39	Malik Amir Azam	MDW/DN/ PL -Limestone (264)/2020
40	Muhammad Humayun S/o Abdul Majeed Khan	MDW/DN/ PL -Limestone (271)/2020 MDW/DN/ PL -Limestone (274)/2021
41	Syed Anees Ur Rehman	MDW/DN/ M L -Limestone (152)/20 1 2
	TOTAL	**59**

iii. Marble

Marble is a rock resulting from 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 (protolith) have typically been modified or destroyed. Pure white marble is the result of metamorphism of a very pure (silicate-poor) limestone or dolomite protolith. The characteristic swirls and veins of many-colored 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 coloration 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. Details of location and leased area for marble in Mardan are given in Table 5.63.

Present Detail Profile of Marble[95]

Number of leases	55 (Fifty-One)
Mining Method	Surface mining
Scale of Mining	Small & primitive mining
Lease Area	8674.154787

Table 5. 75 Location and leased area for Marbles in Mardan

S. No.	Location	Area (in acres)
1	Village Sawaldher Mardan	199.96
2	Village Badam Mardan	199.93
3	Village Palo Dheri Mardan	165.350566
4	Village Shamozai Mardan	34.938017
5	Village Shikrai Baba Mardan	48.447831
6	Village Shamozai Mardan	152.32

[95] Source: Assistant Director Office, Mines and Minerals Mardan, 2021

7	Village Palo Dheri Mardan	89.38
8	Village Palo Dheri Mardan	106.58
9	Village Shamozai Mardan	184.49
10	Village Babuzai Mardan	199.7
11	Village Badam Mardan	68.79
12	Village Palo Dheri Mardan	197.5
13	Village Palo Dheri Mardan	166.905992
14	Village Shamozai Mardan	199.93
15	Village Shamozai Mardan	146.97
16	Village Babuzai Mardan	487.489
17	Village Persai Mardan	199.98
18	Village Palo Dheri Mardan	167
19	Bezat Mardan	200
20	Village Babuzai Mardan	200
21	Village Babuzai Mardan	155.88843
22	Village Babuzai Mardan	85.91
23	Village Mian Khan Sangau Mardan	499.741736
24	Village Mian Khan Sangau Mardan	500
25	Village Shamozai Mardan	143.79
26	Village Babuzai Mardan	375.785124
27	Village Palo Dheri Mardan	84.752273
28	Village Palo Dheri Mardan	199.84
29	Village Nakhtan Baba Ziarat Mardan	137.51
30	Village Sorai Malanderi Mardan	199.9
31	Village Babuzai Mardan	199.97
32	Village Palo Dheri Mardan	60.491397
33	Village Shamozai Mardan	152.96
34	Village Palo Dheri Mardan	115.33
35	Matta Mardan	243.347107
36	Village Palo Dheri Mardan	16.78719
37	Village Palo Dheri Mardan	19.88
38	Village Palo Dheri Mardan	83.5
39	Village Palo Dheri Mardan	200
40	Village Shamozai Mardan	199.95
41	Village Shamozai Mardan	200
42	Village Shamozai Mardan	23.698
43	Mian Kalay Mardan	21
44	Baroach District Mardan	199.535124
45	Village Palo Dher Mardan	205.53
46	Village Sorai Malanderi Mardan	199.8
47	Village Shamozai Mardan	99.88
48	Sher Abad Mardan	199.31
49	Nakhtan Baba Ziarat Mardan	199.45
50	Babuzai/Spinkai Mardan	35.177
51	Sher Abad Mardan	199.78

iv. Granite

The word granite comes from the Latin *granum*, a grain, in reference to the coarse-grained structure of such a crystalline rock. Granite is a common widely occurring type of intrusive, felsic, igneous rock. Granite usually has a medium- to coarse-grained texture. Occasionally some individual crystals (phenocrysts) are larger than the groundmass, in which case the texture is known as porphyritic. A granitic rock with a porphyritic texture is sometimes known as porphyry. Granites can be pink to gray in color, depending on their chemistry and mineralogy. By definition, granite is an igneous rock with at least 20% quartz by volume. Granite differs from granodiorite in that at least 35% of the feldspar in granite is alkali feldspar as opposed to plagioclase; it is the alkali feldspar that gives many granites a distinctive pink color. Outcrops of granite tend to form tors and rounded massifs. Granites sometimes occur in circular depressions surrounded by a range of hills, formed by the metamorphic aureole or hornfels. Granite is usually found in the continental plates of the Earth's crust.

Granite is nearly always massive (lacking internal structures), hard and tough, and therefore it has gained widespread use as a construction stone. The average density of granite is between 2.65 and 2.75 g/cm^3, its compressive strength usually lies above 200 MPa, and its melting temperature is 1215 - 1260 °C.

Granitoid is a general, descriptive field term for light-colored, coarse-grained igneous rocks. Details of location and leased area for granite in Mardan are given in Table 5.64

Present Detail Profile of Granite[96]

Number of leases	40 (Fourty)
Mining Method	Surface mining
Scale of Mining	Small & primitive mining
Lease Area	8010.077

Table 5. 76 : Location and leased area for Granite in Mardan

S. No.	Location	Area (in acres)
1	Village Natian Mardan	199.987
2	Village Natian Mardan	796
3	Surmal Mardan	199
4	Village Khishki Rustam Mardan	200
5	Near Village Sir Bata Mardan	195.3
6	Village Loe Darra Mardan	199
7	Near Village wara darra Mardan	199.61
8	Village Surkhabai Mardan	200
9	Village Dala Kandao Mardan	199.4
10	Village Anwari Sar Mardan	160.97
11	Bodh Sari Mardan	200
12	Near Village Bara Banda Mardan	194.6
13	Village Loe Darra Natian Mardan	198.31
14	Kambela Mardan	185.6
15	Kambela Mardan	157.45
16	Near Village Surkhabai Mardan	200
17	Weran Gariala Mardan	178.62

[96] Source: Assistant Director Office, Mines and Minerals Mardan, 2021

18	Village Sir Bata Mardan	199.8
19	Village Garo Mardan	198.7
20	Kali Bagh Mardan	93.43
21	Near Village Kali Bagh Mardan	140.08
22	Near Village Loe/Warra Darra Mardan	199.8
23	Near Village Shinai/kutpal Garo Mardan	199.23
24	Bahadur Banda Mardan	199.74
25	Bahadur Banda Mardan	199.76
26	Near Village Garu Sarbata Mardan	200
27	Aman Kot Mardan	200
28	Near village Palwari Mardan	199.25
29	Near Village Jali Obo Mardan	195.26
30	Near Village Surkh Dheri Mardan	69.24
31	Bara Banda Mardan	197.44
32	Near Shah Vand Machi Mardan	199.63
33	Garo Water Fall Mardab	85
34	Ghanal Mardan	172.5
35	Pitao Malandrai Mardan	199.78
36	Pitao Malandrai Mardan	200.16
37	Momanra Mardab	197.83
38	Bara Banda Mardan	199.71
39	Bara Banda Mardan	200
40	Aman Kot Sar Mardan	199.89

v. Barite

Barite, or bayrte, ($BaSO_4$) is a mineral consisting of barium sulfate. Barite itself is generally white or colorless, and is the main source of barium. The term "primary barite" refers to marketable product, which includes crude barite (run of mine) and the products of simple beneficiation methods, such as washing, jigging, heavy media separation, tabling, flotation. Most crude barite requires some upgrading to minimum purity or density. Barite that is used as an aggregate in “heavy” cement is crushed and screened to a uniform size. Most barite is ground to a small, uniform size before it is used as filler or extender, an addition to industrial products, or a weighting agent in petroleum well drilling mud. Details of location and leased area for barite in Mardan are given in Table 5.65.

Present Detail Profile of Barite[97]:

Locality	Villages; Smats
Number of leases	01 (one)
Mining Method	Surface mining
Scale of Mining	Small & primitive mining
Lease Area	193.338 Acres

[97] Source: Assistant Director Office, Mines and Minerals Mardan, 2021

Table 5. 77 Location and leased area for barite in Mardan		
S. No.	**Location**	**Area (in acres)**
1	Village Kashmir Smats Mardan	193.338

vi. Asbestos

Asbestos is a set of six naturally occurring silicate minerals used commercially for their desirable physical properties. They all have in common their eponymous, asbestiform habit: long (ca. 1:20 aspect ratio), thin fibrous crystals. The prolonged inhalation of asbestos fibers can cause serious illnesses, including malignant lung cancer, mesothelioma (a formerly rare cancer strongly associated with exposure to amphibole asbestos), and asbestosis (a type of pneumoconiosis). Long exposure to high concentrations of asbestos fibers will cause health problems. This is most common among the miners of asbestos, since they have the longest exposure to it.

Present Detail Profile of Asbestos[98]

Locality	Villages; Alpurai, Behram Dheri and etc.
Number of leases	0 (None)
Mining Method	Surface mining
Scale of Mining	Small & primitive illegal mining
Lease Area	Not known

vii. Minor Minerals

Sand, gravel and bajri are categorised as minor minerals, these are excavated though dredging on the banks of river/stream/nulla side in District Mardan. They 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 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 sands as fine, medium and coarse with ranges 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

[98] Source: Assistant Director Office, Mines and Minerals Mardan, 2021

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).

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).

5.17.3 Uses of the minerals mined/extracted from District Mardan

i. Dolomite

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 pH of the water.

ii. Limestone:

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 road). 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 is supplemented with it, such as for poultry (when ground). It can be used for re-mineralizing and increasing the alkalinity of purified water to prevent pipe corrosion and to restore essential nutrient levels. Used in blast furnaces, limestone extracts iron from its ore.

iii. Marble

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 a relative resistance to shattering. Also, the low index of refraction of calcite allows light to penetrate several millimeters 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 extensive used as table and kitchen tops. Also, it is used for making Decorative gift items of various uses.

Construction marble

Construction marble is a stone which 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.

iv. Granite

Sculpture and memorials

In some area's granite is used for gravestones and memorials. Granite is a hard stone and requires skill to carve by hand. Until the early 18th century granite could only be carved by hand tools with generally poor results. Modern methods of carving include using computer-controlled rotary bits and sandblasting over a rubber stencil. Leaving the letters, numbers and emblems exposed on the stone, the blaster can create virtually any kind of artwork or epitaph.

Buildings

Granite has been extensively used as a dimension stone and as flooring tiles in public and commercial buildings and monuments. With increasing amounts of acid rain in parts of the world, granite has begun to supplant marble as a monument material, since it is much more durable. Polished granite is also a popular choice for kitchen countertops due to its high durability and aesthetic qualities. In building and for countertops, the term "granite" is often applied to all igneous rocks with large crystals, and not specifically to those with a granitic composition.

Engineering

Engineers have traditionally used polished granite surface plates to establish a plane of reference, since they are relatively impervious and inflexible. Sandblasted concrete with a heavy aggregate content has an appearance similar to rough granite, and is often used as a substitute when use of real granite is impractical.

v. Barite

Oil Industry

Some 77% worldwide is used as a weighting agent for drilling fluids in oil and gas exploration to suppress high formation pressures and prevent blowouts. As a well is drilled, the bit passes through various formations, each with different characteristics. The deeper the hole, the more barite is needed as a percentage of the total mud mix. An additional benefit of barite is that it is non-magnetic and thus does not interfere with magnetic measurements taken in the borehole, either during logging-while-drilling or in separate drill hole logging. Barite used for drilling petroleum wells can be black, blue, brown or gray depending on the ore body. The barite is finely ground so that at least 97% of the material, by weight, can pass through a 200-mesh (75-µm) screen, and no more than 30%, by weight, can be less than 6 µm diameter. The ground barite also must be dense enough so that its specific gravity is 4.2 or greater, soft enough to not damage the bearings of a tricone drill bit, chemically inert, and containing no more than 250 milligrams/kilogram of soluble alkaline salts.

Other uses

After processing barite is used as filler in paint and plastics, sound reduction in engine compartments, coat of automobile finishes for smoothness and corrosion resistance, friction products for automobiles and trucks, radiation-shielding cement, glass ceramics and medical applications (for example, a barium meal before a contrast CAT scan). Barite is supplied in a variety of forms and the price depends on the amount of processing; filler applications commanding higher prices following intense physical processing by grinding and micronising, and there are further premiums for whiteness and brightness and color.

Historically barite was used for the production of barium hydroxide for sugar refining, and as a white pigment for textiles, paper, and paint.

vi. Asbestos

Asbestos is strong, fire-resistant, flexible and a good thermal insulator. These qualities encouraged its use in a variety of products. It is used for thermal insulation, fire proofing, acoustic insulation, roofing, flooring and in a variety of other building materials.

vii. Sand

It is mixed with cement and sometimes lime to be used in masonry construction. Sand is a principal component of plaster in construction of buildings. It is the principal component raw material for making common glass. In paints, it is: mixed to produces a textured finish for walls and ceilings or non-slip floor surfaces. In 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

viii. Gravel

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.

5.17.4 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 Mineral sector for the next three years, which include:
- To establish three model quarries at Mardan, Buner and Chitral for extraction of marble on scientific lines in order to avoid wastage of marble at an estimated cost of Rs 150 million each.
- To established two model mines at Shahkot, Cherat and Sherwan in Abbottabad at an estimated cost of Rs 200 million each.
- To established a training school for the training of skill 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.

5.17.5 Constraints and Recommendations in Mineral Sector

KP is endowed with in exhaustible resources of variety of minerals. To exploit these resources the DGMM and other public sectors stake holders have to address 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 is necessary
iv. Capacity building is needed to meet the requirement of mining industry.
v. In order to demonstrate mineral potential a systematic data generation and its documentation on 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 mining sector.

vii. Other effective dissemination of mineral data as source of information should be used to attract as well as facilitate investment

viii. Bankable document on development of mine deposit be prepared so that banks can provide loans to the prospective entrepreneur in mining sector.

ix. Developing of curriculum for graduate/post graduate studies to suit to local mineral industry.

x. Specialised training in coordination with public and private sectors should be arranged by the academia.

xi. Market oriented training and workshops be held on sustainable basis for the different level of stake holders for the improved mining and market practices.

xii. R&D work should be conducted using indigenous technology for value addition of mineral product to suit to local and international market.

xiii. In gemstones an accredited laboratory should be established to evaluate finished and uncut gems for marketing of gems in international market.

xiv. Mechanism and rules are to framed to prevent the leased area to sublet to contractor to extract the valuable mineral on contract basis which leads to wastage of the valuable minerals and destroy 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 exploration and mining phases.

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. This Chapter pertains to District Mardan which covers all aspects required under TOR including Electric Demand Forecast for the next 20 years.

5.17.1 Existing Situation in Mardan

Electric power sector in Mardan such as transmission and distribution are managed by PESCO (Peshawar Electric Supply Company). There is no Hydel or thermal power station in Mardan and all the required electric power is purchased from WAPDA National Grid. SHYDO has identified a 2.6 MW hydro power plant at village Alo, near Katlang, Distt. Mardan. The project is in design stage and when completed will be added to the list of small hydro power plants. SHYDO is working on similar potential everywhere in the province including Marda.

Power Infrastructure

The service area of District Mardan is 1627 sq km, containing 02 divisions and 13 sub-divisions. The total length of transmission lines (all categories) in the District is 4,654 kilometers, which is about 5.98 percent of the provincial total. The length of about 50 % of the transmission lines is of 400 volts, while around 47.5 % belong to 11 KV category. Thus, these two categories together form 97.5 % of the total transmission lines length in the District. The total number of grid stations in District Mardan is 05, against 87 in the entire Province. In the District, 4 Grid Station are of 132 KV and 1 Grid Station is 220 KV (Table 5.66).

Table 5. 78 Power Infrastructure: Province Vs District Mardan[99]

Description	Province	Mardan District
Service Area	74,521 Sq Km	1627 Sq Km
Number of Divisions	31 No	02 No
Number of Sub Divisions	143 No	13 No
LT (400v) Transmission Lines	42,526 km	2327 km
11 kv Transmission Lines	31,284 km	2209 km
33 kv Transmission Lines	311 km	0
66 kv Transmission Lines	861 km	0
132 kv Transmission Lines	1919 km	73 km
220 Kv Transmission Line	750 km	45
500 Kv Transmission Line	117 km	0
Total Transmission lines	**77,768 km**	**4654 km**
Grid Station 33 kv	06	0
Grid Station 66 kv	18	0
Grid Station 132 kv	59	04
Grid Stations - 220 kv	03	01
Grid Stations 500 kv	01	0

[99] Source: PESCO Data

Table 5. 78 Power Infrastructure: Province Vs District Mardan[99]		
Description	**Province**	**Mardan District**
Total Grid Stations	**87**	**05**

Transmission and Distribution Losses

PESCO reported total system energy losses of 37.1% in the 2015-16 fiscal year. The transmission losses are 4.5% as estimated, the distribution component of loss would be 32.6%. The difference between the distribution technical losses of 13.4% and probable total distribution loss of 32.6% is a non-technical (commercial) loss of 19.2%. This figure is likely to reflect large-scale meter tampering, illegal line kunda connections and meter reading fraud aided and abetted by company employees.

Power Consumers

According to development statistics 2017 the total2.8 million registered customers in the province. Approximately 88% of their customers are Domestic. The other predominant category is commercial, comprising more than 10% customers. The industrial customers are less than 1% of all customers served (Table 5.67).

Table 5. 79 Power Consumers			
S. No	**Description**	**Province KP**	**Mardan District**
1	Domestic Customers	2886597	243590
2	Commercial Customers	259,127	20,877
3	Industrial Customers	28967	2824
4	Tube Wells	26,732	2,354
5	Bulk Customers	848	29
	Total	3202471	269674

5.17.2 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 short fall. 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 15.4 explains the situation in the country, while Table 5.68 provides similar information for the Province and District Mardan.

Table 5. 80 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. 81 Power Availability Vs Shortfall – KP Vs District Mardan[100]			
S. No	**Description**	**Province KP**	**Mardan District**
1	Average Demand	2,100 MW	93 MW
2	Peak Demand	2,487 MW	116 MW
3	Available Power	1,179 MW	71 MW
4	Short Fall	921 MW	22 MW
5	Short Fall %	43.8 %	31 %

5.17.3 Existing Generating Capacity

Table 5.70 shows electric generation capacity in Pakistan, while the detailed existing installed capacity and capability of WAPDA system is shown in Table 15.2. As seen from Table 15.1, 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. 82 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

Table 5. 83 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	

[100] PESCO Data

[101] Source: General Manager (Planning), WAPDA/NTDC

			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	

Sr. No.		Name of Power Station		Fuel	Installed Capacity (MW)	Capability, (MW)	
						Summer	Winter
Private Sector	Hydel	20	Malakand – III Hydel			81	81
			Sub-Total (Hydel IPPs)			111	111
		21	KAPCO		Gas/FO	1638	1386
		22	Hub Power Project (HUBCO)		FO	1292	1200
	Thermal	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
		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			Total Hydel (Public + Private)		6555	6377	2414
			Total Thermal (Public + Private)		12691	10851	
			Total (PEPCO System)		19246	17228	13265

Table 5. 84 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

5.17.4 Alternate Resources of Energy in Mardan

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 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 are as follows.

- Low fuel cost as compared to diesel or fuel oil
- Easy to operate machines

[102] Source: General Manager Planning WAPDA / NTDC

- 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. Details are available on the following website.
http://www.kinetixautomation.com/index_files/gasification.htm

ii. Energy Generation from Garbage

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 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 Mardan is 2,146,767. 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 536,691 kg, i.e. equal to 536.69 tons per day. 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 Kwh can be sold to the energy customers. Therefore, a garbage plant in Mardan District can produce 286,055 Kwh of electricity to be available for public.[103]

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.

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 District Mardan. District Mardan has a peak demand of 116 MW power. Area required for one MW solar power is approximately 11236 sq meters. To generate 116 MW of power, area required will be approximately 1,103,376 sq meters (01 km X 1.3 km). The cost per kwh is Rs 22.4/= based on 20 years equipment life and related maintenance / operating cost.

Table 5. 85 Climate data for Mardan (2017)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C	20.1°C	19.5 C	29.1 C	33.6 C	38 C	39.5°C	38.1°C	33.6°C	34.4°C	32.2°C	26.6°C	19°C	30.3°C
Average low °C	1.8°C	6.6 °C	12.7 °C	17.3 °C	20.6°C	22.7°C	26.7 °C	24.9°C	21 °C	16.2 °C	6.8°C	1.3 °C	14.8 °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

[103] Report on urban environmental problems in Pakistan, case study, Hayatabad, Peshawar and Report on waste to power Karnataka, India

Mardan 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.

5.17.5 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.[104]

5.17.6 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, environmentally 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.

Industrial and other Consumers Growth in District Mardan

Table 5. 86 Consumer Growth in District Mardan

Year	Domestic	Commercial	Industrial	Bulk	Tube Wells
2008-2009	181,243	20,087	2,395	124	2,263
%Growth	3.40	2.95	2.31	0.00	0.04
2009-2010	194,458	20,877	2,448	128	2354
%Growth	7.29	3.93	2.21	3.23	4.02
2010-2011	199,622	21,342	2,481	141	2,385
%Growth	2.66	2.23	1.35	10.16	1.32
% Average Growth	3.34	3.04	1.96	4.46	1.79

[104] SHYDO Brochure

The industry sector has a growth rate of 1.96 % in District Mardan. Therefore, by year 2030 the number of industries will increase 1.47 times in Mardan District

5.17.7 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.

5.17.8 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.

5.17.9 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 trippings 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.

5.17.10 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 re-conductoring 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.

CHAPTER 6: PLANNING FOR INTERMEDIATE TOWNS AND RURAL AREAS

6.1.1 DEVELOPMENT OF INTERMEDIATE TOWNS:

Centralization concept of planning is a type of spatial planning, this concept is a main feature of planned cities. But this concept does not work affectively in unplanned and congested cites. For such cities there is a need for decentralization of facilities and resources to reduce load on the cities.

In decentralization the load will be shared amongst the city and its surrounding intermediate towns. These towns will help in reducing the congestion of city by providing that services outside the city. These towns will facilitate the residents of the peripheral areas of the city and will also serve the people of the surrounding villages.

Intermediate towns 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 service not only to its own population but also to the surrounding rural hinterlands

In fact, 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.

6.1.2 Facilities provided in Town center:

The facilities which should be provided in the Town Centers are:

- Degree Colleges for Women and Men
- Hospital
- Civic Center
- Police Station
- Transport terminal
- Resturants and Cafes
- Hotels
- Public Library
- Parks
- Central Commercial Area
- Post Office
- Sports Complex

6.1.3 Existing Town Centers:

Takht Bhai Intermediate Town

It is plan to extend the existing Takht Bhai Tehsil and upgrade it to an intermediate town, as it is the fastest growing urban settlement in District Mardan. It is also the second largest settlement of District Mardan, after Mardan City. The growth rate of Takht Bhai is 2.64% during the period 1998-2017, which is the highest rate among all urban settlements of District Mardan. Takht Bhai is situated 15 km from Mardan on Swat-Malakand Road.

In 1908-09 the 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, so stop further encroachments. There is a need for a new township at an appropriately located site near Takht Bhai, along with appropriate living environment, along with tourist rest houses and restaurants where people can relax before and after they embark for the on-wards mountain journey. This will reduce pressure on Mardan City, and will also help to develop Northern part of Mardan District, as Takht Bhai will become a growth pole for this part of the region.

Katlang Intermediate Town

It has been declared as a tehsil in 2010 by the Chief Minister Amir Haider Khan Hoti. It is situated about 19 km north of Mardan City, bordering with District Buner and Malakand. It is surrounded by canals in west and north. Katlang has a busy market with most of the facilities available. Katlang fair, held on Friday, is very popular among the residents of Katlang and the surroundings.

Katlang is also popular for its Topaz, according to an estimate, there are 09 million carats of pink topaz in Katlang. Though some believe Katlang's topaz is equivalent to its Brazilian variety in standard, but many other rates it even of higher quality than that. “The Katlang topaz is simply matchless in beauty, weight, hardness and shine. It is as hard as diamond”, says a local gem expert. According to him, the Mingora emerald and Katlang topaz can fetch prices up to Rs20,000 per carat. Their prices increase with their weight and beauty. He says that at Katlang topaz of the quality of sapphire has also been found.

An express way is under construction will connect Malkand Region to the Motorway at Kernal Sher Khan Interchange, Sawabi via Katlang Tehsil. An interchange will also be provided at the Katlang Tehsil, which will provide linkage to Katlang as well as to Juwahr. Through these linkages this tehsil will transform into an economic hub in future, which requires proper planning of the Katlang Tehsil. This induces the need for transforming Katlang into an Intermediate Town of Mardan City.

Table 6. 1 Intermediate Towns – District Mardan

Name of Town	Tehsil	Town Center	UC in which Town Center lies	Other UC’s in the Rural growth zone
Takht Bahi	Takht Bahi	Takht Bahi	Damae Koh	Takar, Narai, Pat Baba, Saroshah, Manga, Khazana Dheri, Maho Dheri, Seri Bahlol, Jehangirabad, Kotjungara.
Katlang	Katlang	Katlang	Katlang-1	Katlang-2, Jamal Gahri, Katti Gahri, Shamozai, Dheri Lekpani

6.2 POLICY GUIDELINES FOR SUSTAINABLE DEVELOPMENT OF RURAL AREAS

The peripheral area and countryside of Mardan is a fertile and productive agricultural land. The agricultural land in the vicinity of the built-up area however, is gradually being 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.

This Section 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 centre. 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.

6.2.1 Key Principles

i. 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;
- Present use of natural resources; and
- Maintaining high and stable levels of economic growth and employment.

ii. 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.

iii. 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.

iv. 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.

v. 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.

vi. 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.

6.2.2 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:

i. Become more competitive, sustainable and environmentally friendly;
ii. Adapt to new and changing markets;

iii. Diversify into new agricultural opportunities
iv. 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 undeveloped agricultural land needs to be developed, any adverse effects on the environment should be minimized.

6.2.3 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.

6.3 RURAL SETTLEMENTS

6.3.1 Number of Rural Settlements

As per District Census Report (2017) of District Mardan, there are 168 rural settlements in the District. From the same source, it has been calculated that in the year 2017, around 66% of these villages had population of 5,000 and above, around 16% had population between 2,000 to 4,999 while around 10% had population varying between 1,000 to 1,999. Thus, combining the above categories, 95% rural settlements had population of 1,000 and above, while the remaining about 5% had less than 1,000 populations.

Table 6. 2 No. of Rural Settlements in Peshawar Valley (2017)[105]

Population Categories	Number of Villages					Total	% of Villages
	Peshawar	**Mardan**	**Nowshera**	**Charsadda**	**Swabi**		
5000 & above	69	112	43	60	54	338	36.89
2,000 – 4,999	75	28	46	70	38	257	28.05
1,000-1,999	43	18	27	32	25	145	15.82
500-999	33	4	11	17	18	83	9.06
200-499	18	3	10	17	9	57	6.22

[105] Source: District Census Reports of Five Districts, 1998, Page 53, Table 3.

Less than 200	5	2	4	4	5	20	2.18
Uninhabited	3	1	12	0	0	16	1.74
Total	246	168	153	200	149	916	100

6.3.2 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, 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 867[106] rural settlements, 458 villages are rapidly growing, 235 have moderate growth and 174 villages have slow growth.

Table 6. 3 Growth Pattern of Rural Settlements in Peshawar Valley

Type of Rural Settlement	No. of Rural Settlements					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

6.3.3 Rapidly Growing Rural Settlements

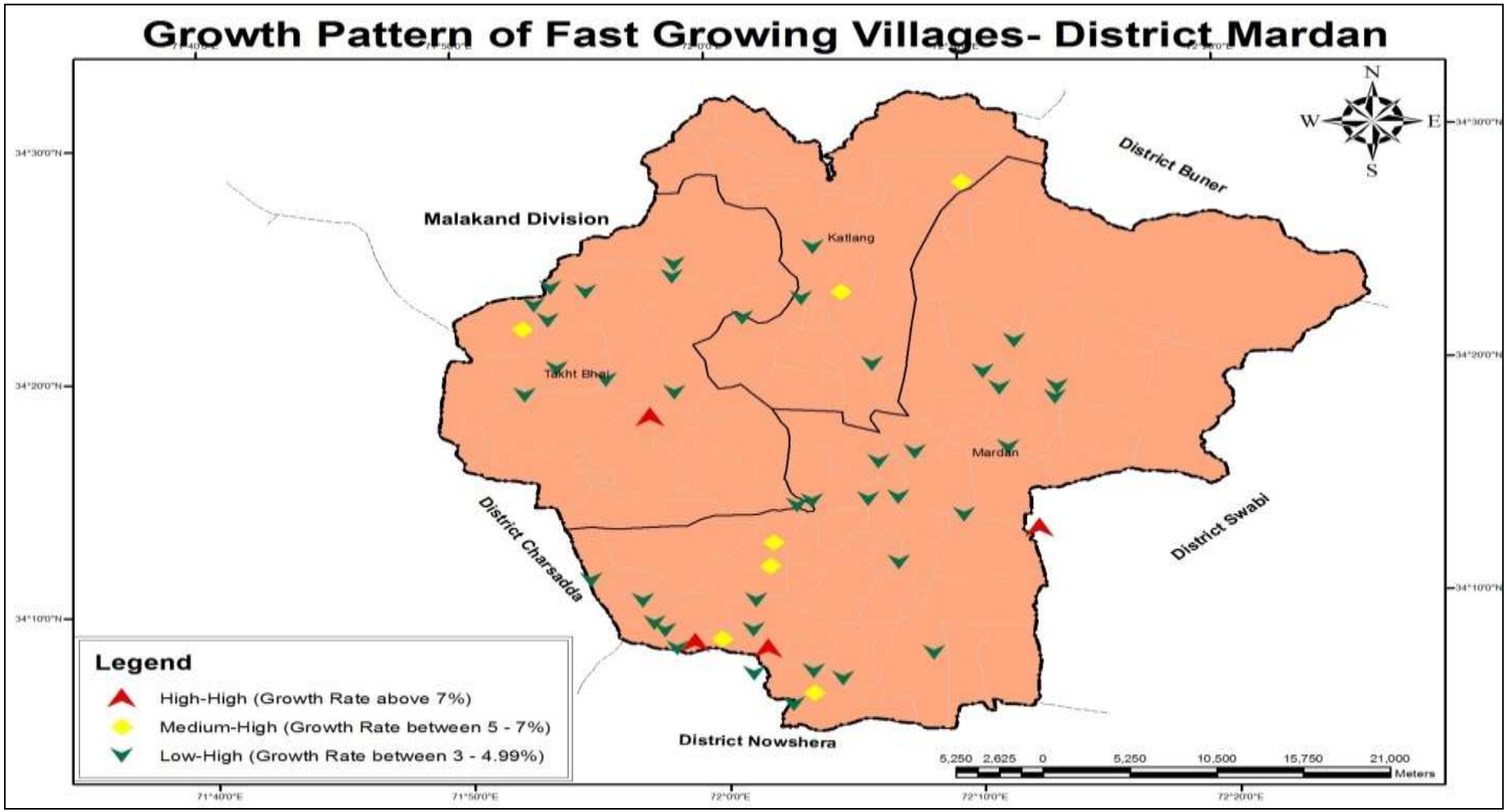
As seen in Table 6.2, there are 70 fast growing settlements in District Mardan. There is however vast variation in the growth rates of fast-growing settlements, ranging from 3% to about 17%. Such settlements therefore have therefore been divided into the following sub-categories based on their growth 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 6.4.

[106] There is discrepancy between the number of villages in Table 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. 4 Rapidly Growing Rural Settlements			
Growth Category	**Growth Rate**	**Number of Settlements**	**Names of Settlements**
High-High	Above 7%	4	Khura Banda, Surkh Deri, Khan Killi, Urya.
Medium-High	5% - 7%	4	Bahram Khan Killi, Mohabbat Abad, Husai, Dagai.
Low-High	3% - 4.99%	39	Alo, Barmola, Ghazi Baba, Sarobi, Allah Dad Khel, Bagh-e-aram, Korough, Chak Shahbaz Garhi, Chauki, Hoti, Berkri banda, Khanjor, Khawaja Rakshi, Maho derhi, Amin Abad, Bagh Dada, Kaki Dheri, Khazan Dheri, Mangah, Chak Mardan, Barigon, Bazar, Surkhabi, Jalal, Ismail Zai, Charguli, Chail, Jangira abad, Jalala, Kot Jongarh, Makuri, Diwan Khel, Shahbat Khel, Qutab Garh, Arbi Banda, Sri Behlol.



Map 6. 1 Map 5. 16 : Educational Institutes in District Mardan

Growth Pattern Map of Fast-Growing Villages

Map 6.1 describe the growth pattern of fast-growing villages of District Mardan. These are categoried regarding to their population growth rate.[107]

[107] Table 6.4 of this Report.

6.4 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 Mardan, 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 75 union councils in District Mardan, of which 14 are urban and 61 are rural[108]. 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.

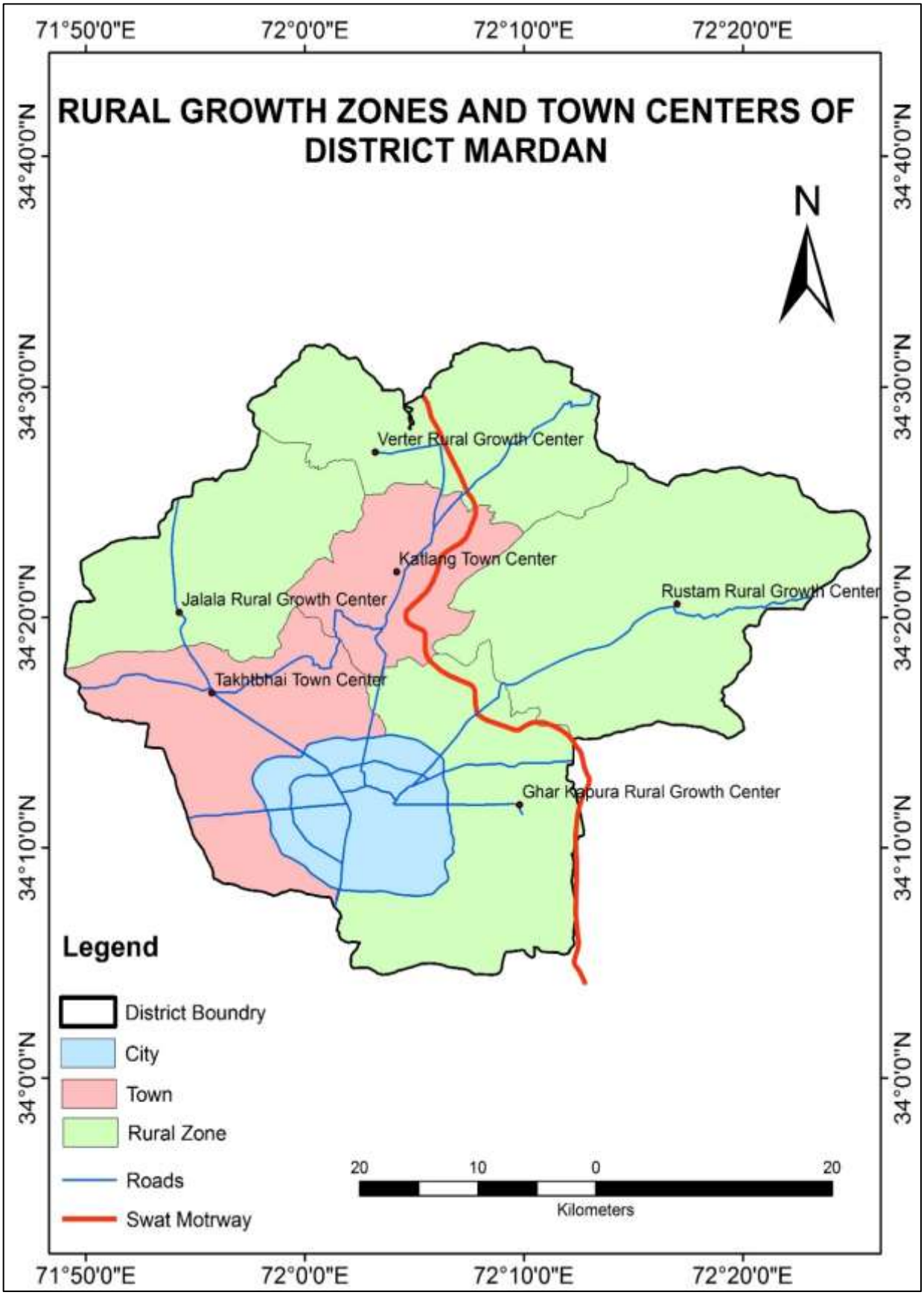
Table 6. 5 Rural Growth Zones – District Mardan

Name of growth zone	Tehsil	Growth centre (Name of village)	UC in which growth centre lies	Other UC's in the Rural growth zone
Jalara	Takht Bahi	Jalara	Jalara	Pir Sadai, Maday Baba, Parkho Dheri, Lund Khawar, Makori, Mian Issa, Sher Ghar, Hatiyan
Verter	Katlang	Verter	Qasmi	Ikram Pur, Alo, Kohai Barmol, Babozai
Garhi Daulat Zai	Mardan	Garhi Daulat Zai	Garhi Daulat Zai	Fatima, Bakshali, Toru, Ghala Dher, Shamat Pur, Gumbat, Kandar, Mayar, Garhi Ismail Zai, Kot Daulat Zai, Chak Hoti, Mardan Rural, Mohib Banda, Garhi Daulat Zai, Babiani, Bala Garhi, Shahbaz Garhi, (Complete)
Rustam	Mardan	Rustam	Rustam	Rustam, Palo Dheri, Bazar, Charguli, Machai, Kata Khat, Gujrat, Garyala, Mohabat Abad (Complete)

To achieve the above, rural area of District Mardan is proposed to be divided into a number of rural zones, and a centralized village within each such zone designated as Growth Centre for the rural zone. The Growth Centre will have following facilities to serve the rural zone.

- Model Rural Health Centre
- High Schools
- Veterinary Centre
- Repair shops for tractors and other agricultural implements.
- Play Ground
- Agro-based micro industrial sector
- Good quality rural roads, connecting Growth Centre with other main villages of the rural zone, and also a road connecting Growth Centre with the nearby highway/major road.
- Fruit/vegetable market, which may serve as sale as well as purchase point.
- Grain market/godowns, where applicable.
- Bank
- Sub-Police Station
- Revenue Office

[108] Source: District Studies Report Mardan, Chapter 6.



Map 6. 2 Rural Growth Zones and Town Centers of District Mardan

Map 6.2 describe about rural growth zones and town centers of District Mardan and their spatial location with respect to each other.

6.5 GUIDELINES FOR RURAL & TOWN HOUSING AND OTHER AMENITIES:

Developing towns & 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 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 natural 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 and town 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 towns and rural areas:

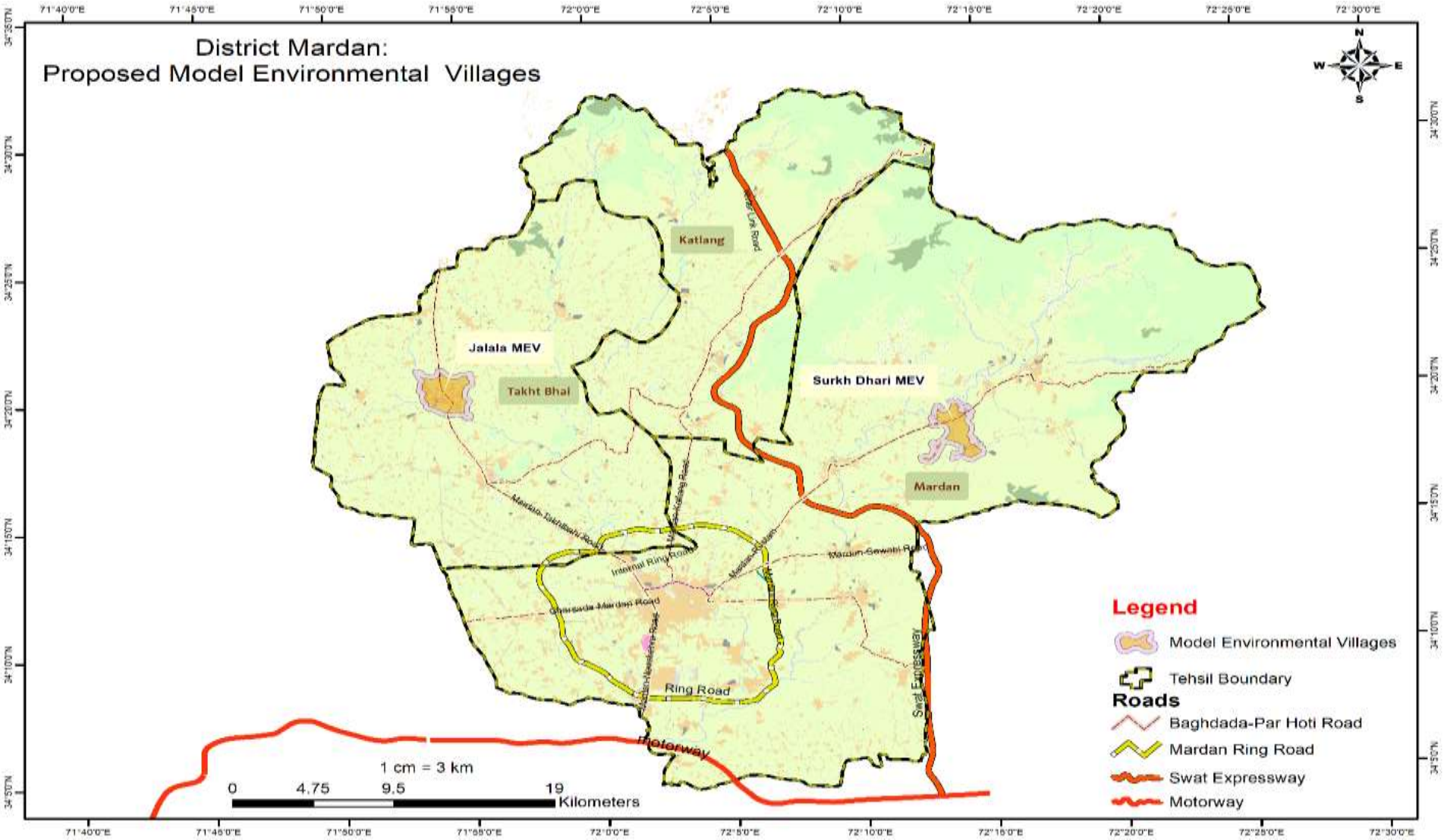
- Land for housing should be capable of being served with essential infrastructure such as link to road network, water supply, drainage and sanitation at reasonable costs. One of the most critical factors is the availability of suitable land for various activities. There is a need to identify such land 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.
- By laws should be formulated and implemented for towns to control the urban sprawl, haphazard development in the town center and scattered development throughout the town.
- 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 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.

6.6 POSSIBLE MODEL ENVIRONMENTAL VILLAGE: DETAILS OF SITE AREA AND OTHER REQUIREMENTS

For selecting possible Model Environmental Villages, the criteria for selection included its growth rate, distance from existing urban Area, population and present area under village. From total 168 rural settlements/villages in District Mardan, 50 villages have growth rate of above 3%. The selected villages are Jalala and Surkh Dheri.

Table 6. 6 Model Environmental Villages population up to plan period							
Name	**Population 1998**	**Population 2017**	**Population 2019**	**Population 2024**	**Population 2029**	**Population 2034**	**Population 2039**
Jalala	14571	38005	42213	55094	76393	100940	134148
Surkh Dheri	8486	22240	24676	32058	44029	57492	75225
Total	23057	60245	66889	87152	120422	158432	209373

Table 6. 7 Area-wise services of Model Environmental Villages		
Different Services	**Area (Acers)**	
	Jalala	**Surkh Dheri**
Residential	1141.8	1098
Commercial	76.2	73.2
Education	57.09	54.09
Open Space	285.45	274.5
Public Building	38.06	36.6
Roads/Streets	285.45	274.5
Graveyard	19.03	18.3
Total	1903	1830



Map 6. 3**: Model Environmental Village**

Map 6.3 shows the spatial location of two proposed Jalala and Surkh Dheri Model Environmental Villages.

CHAPTER 7: SCHEDULE FOR REGULAR MONITORING, EVALUATION & UPDATING

7.1 PROPOSED STRUCTURE:

Regular monitoring, evaluation and updating of the Land Use Planning System at the District level are important features of the Project, particularly because of the 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.

The 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 the web shall help to describe the existing situation, and contribute to an improved understanding of local problems and constraints to development by providing key factors and variables.

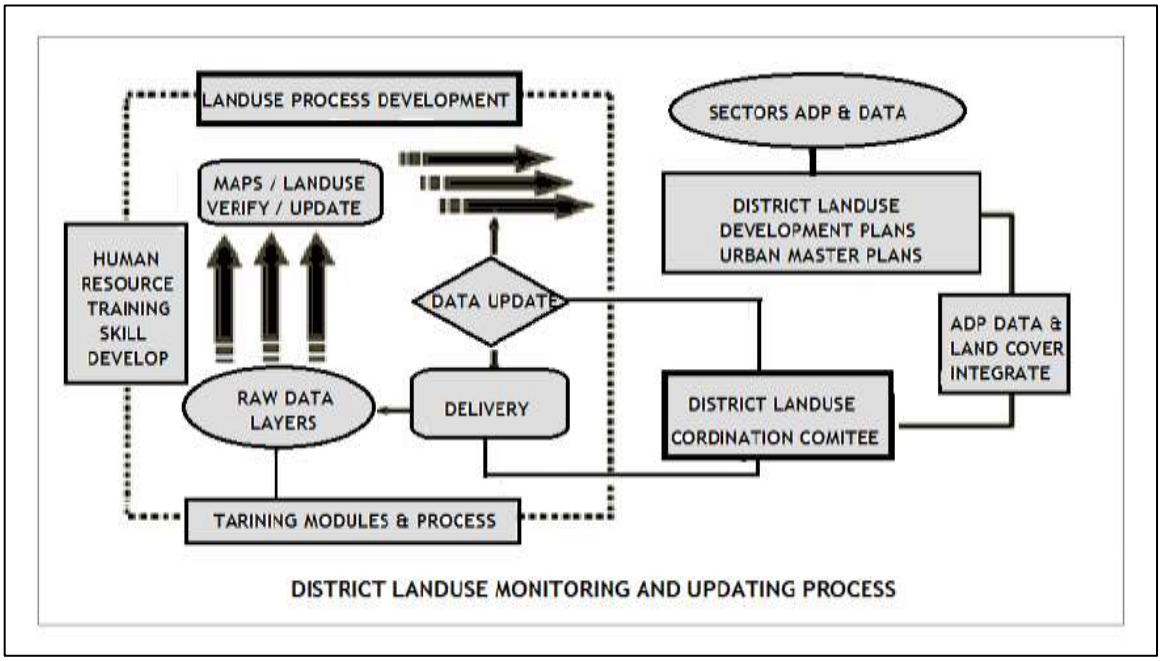


Figure 7. 1 Proposed Structure

The GIS-based Land Use Plan can be used by various departments/agencies for data updating and enhancement. The data sharing and the information updating will be a two-way process as both the stakeholders 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 pure 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, development and implementation 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 Land Use landholdings and Land Use. The District Land 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.

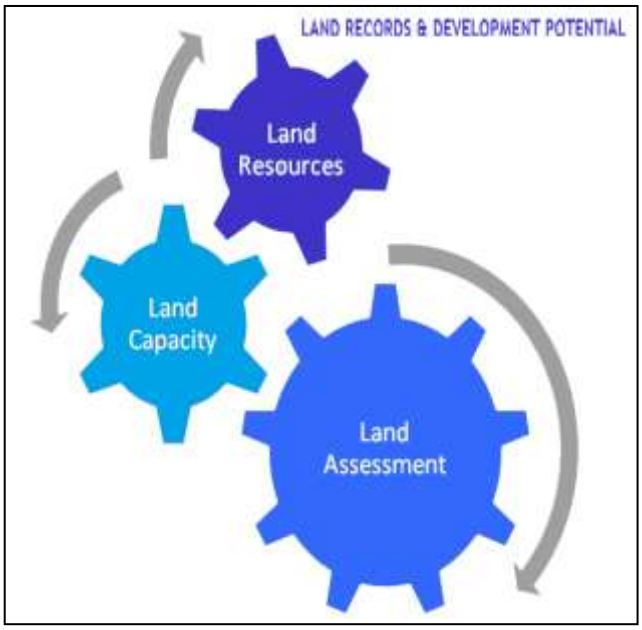


Figure 7. 2 Land Records and Development Potential

Regular updating and electronic monitoring of the land cover will enable the provincial government to introduce a transparent tax method of land revenue/ property tax and 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.

Figure 7. 3 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, Tubewells, type of irrigation, Other data, ADP and Land Cover	Engineer, Data Entry Clerk,
4	Water Resources	Rivers, Canals, Wells, Tubewells, 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
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

Figure 7. 3 Sectors, Tasks and Manning			
Sr. No	**Sectors**	**Tasks**	**Personnel**
20	Mining	Type, size and location of mines, Land cover, Data, Annual ADP	Information from Dy. Director Mining Department, Data Entry Clerk

Figure 7. 4 Schedule of Expenditure		
Sr. No	**Sectors**	**Staffing**
1	industries & Commerce	Supervisor,
		Software Manager
2	Agriculture	Supervisor,
		Software Manager
3	Irrigations	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
		Data Entry Clerk,
14	Demography	Demographer
15	Health	Dy. Secy Health

Figure 7. 4 Schedule of Expenditure		
Sr. No	**Sectors**	**Staffing**
		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 6, a Land Use strategy has been proposed for Mardan, 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 Mardan 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:

Figure 7. 5 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 fire fighting arrangements governed by the	Petrol filling stations, Hospitals, residences, transport terminals,

[109] Should be located in local shopping centre

[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 metres right-of-way and 100 metres away from a crossing of two primary roads or a roundabout.

Figure 7. 5 Regulation for Residential Zones		
Residential	**Uses Permitted**	**Uses Permitted on Appeal**
	building and space regulations.	cinemas, clubs and all sort of storage.

7.3.2 Regulations for Educational Zone:

Table 7- 1: Regulation for Education Zone		
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:

Figure 7. 6 Regulations 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.

7.3.4 Regulations for Industrial Zones:

Figure 7. 7 Regulations 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:

Figure 7. 8 Regulation for Recreational Areas		
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.

[114] Only non-perishable and non-inflammable commodities

7.3.6 Regulations for Agricultural Zone:

Figure 7. 9 Regulations for Agricultural Zone		
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

Annexure 1.

Settlement Wise Demographic Statistics												
Mardan UC's	**PC**	**Settlements (Villages)**	**1998 Population**	**Growth Rate**	**2017 Population**	**Pop 2022**	**Pop 2027**	**Pop 2032**	**Pop 2037**	**Pop 2042**	**Add (27-22)**	**Add (42-27)**
Alo	Alo	Alo	12319	3.27	22,714	26682	31343	36819	43251	50807	4661	19464
		Pipal	5580	2.62	9,126	10387	11823	13457	15317	17434	1436	5611
Babozai	Babozai	Babozai Abakhel	7848	1.98	11,396	12571	13868	15298	16876	18617	1297	4749
		Babozai Baratkhel	4318	2.36	6,729	7562	8499	9551	10734	12063	937	3564
Dheri	Dheri	Cherchor	3985	0.75	4,591	4765	4946	5134	5329	5531	181	585
		Dheri	9550	2.12	14237	15814	17567	19513	21675	24077	1753	6510
		Jangi Dher	1390	2.28	2134	2389	2674	2993	3351	3751	285	1077
		Kotki	1857	2.77	3,122	3579	4104	4705	5394	6184	525	2080
		Lak Pani	5315	2.64	8,724	9939	11324	12901	14698	16745	1385	5421
Jamal Garhi	Jamal Garhi	Jamal Garhi	17,056	2.59	27746	31536	35845	40741	46307	52633	4309	16788
Kati Garhi	Kati Garhi	Kati Garhi	7083	2.07	10,451	11578	12825	14208	15739	17436	1247	4611
		Shamsi	2054	2.92	3,549	4098	4733	5465	6311	7288	635	2555
		Shero	9291	1.99	13,504	14900	16441	18141	20017	22088	1541	5647
Katlang	Katlang	Katlang	23248	2.3	35,794	40099	44922	50324	56377	63157	4823	18235
Kharki	Kharki	Kharki	13466	2.78	22,666	25995	29812	34190	39211	44970	3817	15158
Kohi	Kohi	Barmola	333	3.08	593	690	803	935	1089	1267	113	464
		Kohi	10826	2.31	16,697	18714	20974	23507	26346	29528	2260	8554
Kunj	Kunj	Kunj	1955	2.08	2,892	3206	3554	3940	4367	4841	348	1287
		Shakartangi	6767	2.16	10,151	11294	12566	13981	15556	17308	1272	4742
Mian Khan	Mian Khan	Main Khan	5997	2.26	9,177	10264	11480	12840	14361	16063	1216	4583
		Sangao	4047	1.26	5,138	5471	5826	6203	6606	7034	355	1208
Qasmai	Qasmai	Ghazi Baba	1412	3.53	2,732	3250	3867	4600	5473	6511	617	2644
		Qasmai	7618	2.57	12,329	13994	15885	18030	20465	23230	1891	7345
		Sarobi	2165	4.78	5,253	6633	8376	10576	13354	16862	1743	8486
		Taza Gram	6360	1.65	8,673	9411	10211	11080	12022	13044	800	2833
Sawal Dher	Sawal Dher	Bilandi	5267	2.97	9,191	10641	12320	14265	16515	19121	1679	6801
		Sawal Dir	19606	1.64	26,722	28991	31452	34122	37019	40162	2461	8710
Shamozai	Shamozai Pc	Matodigram	10962	1.95	15,810	17409	19171	21110	23246	25598	1762	6427
		Shamozai	13871	2.28	21,303	23849	26700	29891	33464	37464	2851	10764
Allah Dad Khel	Allah Dad Khel	Allah Dad Khel	10549	3.56	20,513	24436	29110	34677	41309	49210	4674	20100
		Taus Banda	3494	2.66	5,750	6555	7474	8521	9714	11075	919	3601

Settlement Wise Demographic Statistics												
Mardan UC's	**PC**	**Settlements (Villages)**	**1998 Population**	**Growth Rate**	**2017 Population**	**Pop 2022**	**Pop 2027**	**Pop 2032**	**Pop 2037**	**Pop 2042**	**Add (27-22)**	**Add (42-27)**
Baghe E Aram	Bagh-E-Aram	Bagh-E-Aram	2295	4.48	5,275	6567	8174	10176	12667	15769	1607	7595
		Korough	5154	3.48	9,868	11707	13890	16479	19551	23195	2183	9305
Chak Shahbaz Garhi	Chak Shabaz Garhi	Chak Shabaz Garhi	6717	3.35	12,571	14825	17484	20619	24316	28676	2659	11192
		Koz Band	1475	2.72	2,454	2806	3208	3668	4194	4795	402	1587
Mohib Banda	Mohib Banda	Mohib Banda	12083	2.55	19,489	22102	25065	28425	32235	36557	2963	11492
Ghala Der	Ghala Der	Bhago Banda	5288	2.46	8,398	9485	10713	12100	13666	15435	1228	4722
		Chauki	4536	3.26	8,342	9793	11496	13495	15841	18596	1703	7100
		Gala Dher	8690	2.79	14,671	16839	19327	22183	25461	29223	2488	9896
		Kaho	1090	2.09	1,616	1792	1988	2205	2446	2713	196	725
		Khat	999	0.43	1,083	1106	1130	1154	1179	1204	24	74
		Panjtar	1690	2.52	2,713	3073	3480	3942	4465	5057	407	1577
Gumbat	Gumbat	Gaddar	2187	2.42	3,442	3878	4370	4924	5548	6251	492	1881
		Gumbat	14646	2.3	22,547	25258	28295	31697	35507	39777	3037	11482
Hoti	Hoti	Hoti	7831	4.46	17,945	22321	27764	34535	42956	53431	5443	25667

Settlement Wise Demographic Statistics												
Mardan UC's	**PC**	**Settlements (Villages)**	**1998 Population**	**Growth Rate**	**2017 Population**	**Pop 2022**	**Pop 2027**	**Pop 2032**	**Pop 2037**	**Pop 2042**	**Add (27-22)**	**Add (42-27)**
Khandar	Khandar	Khandar	5252	2.42	8,266	9314	10495	11825	13324	15013	1181	4518
		Qasam	7622	2.56	12,327	13989	15876	18017	20447	23205	1887	7329
		Sharef Abad	3150	2.83	5,350	6150	7070	8128	9343	10741	920	3671
Maho Derhi	Maho Derhi	Bakri Banda	3522	3.39	6,633	7835	9256	10933	12915	15256	1421	6000
		Khanjar	3067	3.58	5,988	7141	8516	10155	12110	14441	1375	5925
		Khwaja Rashki	4174	3.06	7,403	8608	10009	11638	13532	15734	1401	5725
		Maho Derhi	3397	4.13	7,327	8970	10981	13442	16456	20145	2011	9164
Mayar	Mayar	Mayar	23717	2.74	39622	45351	51909	59414	68005	77839	6558	25930
Mohabat Abad	Mohabadt Abad	Amin Abad	2230	4.57	5,217	6525	8160	10205	12763	15962	1635	7802
		Bahram Khan Kilii	5759	5.43	15,723	20480	26675	34745	45257	58948	6195	32273
		Khura Banda	547	16.53	10,008	21505	46211	99300	213377	458508	24706	412297
		Mohabat Abad	4378	5.63	12,396	16302	21438	28192	37075	48756	5136	27318
		Platoo	2189	2.99	3,829	4436	5139	5954	6898	7991	703	2852
		Surkh Dheri	1919	6.2	6,015	8125	10974	14823	20022	27044	2849	16070
Shamat Pur	Shamad Pur	Akbar Pura	113	2.24	172	192	215	240	268	299	23	84
		Mani Khel	397	-2.07	267	241	217	195	176	158	-24	-59
		Shamat Pur	14292	1.68	19,600	21299	23144	25150	27330	29698	1845	6554
Toru	Toru	Chak Toru	10395	2.51	16,663	18866	21360	24185	27382	31002	2494	9642
		Toru	16925	2.38	26,461	29763	33477	37655	42354	47640	3714	14163
Babiani	Babiani	Babian	6882	1.9	9,836	10805	11870	13040	14325	15736	1065	3866
		Charbanda	9090	2.68	15,035	17164	19594	22368	25536	29151	2430	9557
		Jori Banda	1403	1.33	1,805	1929	2061	2202	2353	2514	132	453
		Koti Naka	8483	2.78	14,286	16386	18795	21558	24728	28363	2409	9568

Settlement Wise Demographic Statistics												
Mardan UC's	**PC**	**Settlements (Villages)**	**1998 Population**	**Growth Rate**	**2017 Population**	**Pop 2022**	**Pop 2027**	**Pop 2032**	**Pop 2037**	**Pop 2042**	**Add (27-22)**	**Add (42-27)**
Bagh Dad	Bagh Dada	Akbar Abad	1213	-0.14	1,181	1173	1164	1156	1148	1140	-9	-24
		Bagh Dada	8280	4.95	20,735	26401	33615	42800	54495	69386	7214	35771
		Chamtra Derhi	4144	2.91	7,147	8249	9521	10990	12685	14641	1272	5120
		Rakh Sarkar	440	-0.85	374	358	343	329	315	302	-15	-41
Bakshali	Bakshali	Bakhshali	16241	2.35	25,232	28334	31817	35728	40120	45052	3483	13235
		Kaki Dehri	597	3	1,047	1214	1407	1631	1891	2193	193	786
Bala Garhi	Bala Garhi	Bala Garhi	10644	2.41	16,734	18850	21233	23918	26942	30349	2383	9116
		Cham Derhi	2558	2.64	4,199	4784	5450	6210	7075	8061	666	2611
Fatima	Fatima	Fatima	12104	2.75	20,280	23230	26609	30480	34914	39993	3379	13384
		Gadar	8078	2.14	12,080	13429	14930	16597	18451	20512	1501	5582
		Hamza Khan	4481	2.53	7,201	8158	9243	10472	11865	13442	1085	4199
		Qazi Abad	2979	1.65	4,064	4410	4786	5193	5636	6115	376	1329
Baghecha Derhi	Baghecha Derhi	Baghecha Derhi	7676	2.39	12,030	13540	15239	17152	19305	21728	1699	6489
Garhi Daulat Zai	Garhi Dawaltzai	Garhi Dawalt Zai	18982	2.3	29,225	32740	36677	41088	46029	51564	3937	14887
Garhi Ismail Zai	Garhi Ismail Zai	Garhi Ismail Zai	13113	2.2	19,830	22110	24652	27487	30648	34172	2542	9520
Garyala	Garyala	Bhai Khan	3952	-2.02	2680	2420	2185	1972	1781	1608	-235	-577
		Garyala	10232	1.68	14,051	15274	16604	18049	19620	21328	1330	4724
		Husai	1815	5.31	4,849	6280	8133	10534	13642	17668	1853	9535
Gujrat	Gujrat	Gujrat	11241	1.83	15,877	17387	19041	20853	22836	25009	1654	5968
		Jhungarah	5988	2.18	9,013	10037	11177	12447	13861	15436	1140	4259
Kot Daulat Zai	Kot Daulat Zai	Kot Daulat Zai	7175	2.64	11,762	13396	15257	17376	19790	22539	1861	7282
		Kot Ismail Zai	6146	1.97	8,898	9808	10811	11917	13136	14479	1003	3668
Mangah	Mangah	Bakyana	4886	1.21	6,146	6528	6935	7366	7825	8312	407	1377
		Mangah	9136	3.05	16,167	18787	21832	25370	29481	34259	3045	12427
		Shekh Yousaf	7976	2.24	12,145	13566	15153	16926	18907	21119	1587	5966
Mardan	Mardan	Chak Mardan	10474	4.82	25,613	32408	41007	51886	65652	83070	8599	42063
		Dagai	309	5.46	849	1108	1445	1886	2460	3210	337	1765
		Mardan	13467	4.82	32,960	41714	52793	66814	84559	107018	11079	54225
Shah Bazgarh	Shah Bazgarh	Shah Bazgarh	23087	2.56	37,295	42312	48004	54461	61787	70098	5692	22094
Baroach	Baroach	Baringon	1193	3.04	2,107	2447	2842	3301	3834	4453	395	1611
		Baroch	2025	2.59	3,291	3740	4249	4829	5487	6235	509	1986
		Pirsai	2141	2.96	3,725	4309	4986	5768	6673	7719	677	2733
		Pitao Malandari	1560	2.14	2,332	2592	2882	3203	3561	3958	290	1076
		Sori Malndari	1219	1.48	1,612	1735	1867	2010	2163	2328	132	461
Bazar	Bazar	Aman Kot	533	0.94	637	668	700	733	768	805	32	105

Settlement Wise Demographic Statistics												
Mardan UC's	**PC**	**Settlements (Villages)**	**1998 Population**	**Growth Rate**	**2017 Population**	**Pop 2022**	**Pop 2027**	**Pop 2032**	**Pop 2037**	**Pop 2042**	**Add (27-22)**	**Add (42-27)**
		Bazar	8274	3.64	16,325	19522	23345	27916	33383	39920	3823	16575
		Garho	951	1.88	1,355	1487	1633	1792	1967	2159	146	526
		Surkhabi	2224	4.01	4,697	5718	6962	8475	10318	12561	1244	5599
China	China	Alai	4330	1.45	5,687	6110	6564	7053	7577	8141	454	1577
		Landi	2166	2.31	3,341	3745	4197	4704	5272	5909	452	1712
		China	4365	2.19	6586	7339	8178	9113	10155	11315	839	3137
Kata Khat	Kata Khat	Bari Kab	4432	0.94	5,295	5549	5815	6093	6386	6692	266	877
		Kata Khat	9271	2.8	15661	17978	20638	23691	27195	31219	2660	10581
		Kotar Pan	5098	2.75	8,533	9772	11190	12815	14675	16805	1418	5615
Machai	Machai	Chak Shewa	239	1	289	304	319	336	353	371	15	52
		Chak Sung Bhati	0	0	0	0	0	0	0	0	0	0
		Chak Taja	0	2.7	1,551	0	0	0	0	0	0	0
		Jalal Daulatzai	1453	1.87	2,066	2267	2486	2728	2993	3283	219	797
		Jalal Ismail Zai	904	3.12	1,622	1892	2206	2573	3001	3500	314	1294
		Machai	10384	2.53	16,702	18927	21449	24306	27545	31214	2522	9765
		Taja	831	-0.19	801	793	786	778	771	763	-7	-23
		Urya	158	8.22	709	1053	1562	2319	3443	5111	509	3549
Palo Dheri	Palo Dheri	Hamza Kot	1867	0.2	1,940	1960	1980	2000	2020	2040	20	60
		Palo Dheri	10575	2.99	18,495	21426	24822	28755	33312	38592	3396	13770
Rustam	Rustam	Nodeh	5275	1.72	7,297	7947	8656	9428	10268	11183	709	2527
		Rustam	21785	2.03	31,915	35289	39019	43144	47705	52747	3730	13728
Charguli	Surkh Derhi Pc	Chargul	1350	1.71	1,862	2026	2205	2400	2612	2843	179	638
		Charguli	9244	3.03	16,296	18918	21962	25496	29598	34360	3044	12398
		Khairabad	2599	1.75	3,615	3943	4301	4691	5116	5580	358	1279
		Surkh Derhi	6055	1.97	8,770	9668	10658	11749	12952	14279	990	3621
Jahangir Abad	Jangir Abad	Chail	12934	3.93	26,920	32647	39593	48017	58233	70623	6946	31030
		Jangir Abad	7039	3.14	12,654	14766	17230	20106	23461	27377	2464	10147
Hattian	Hattian	Hattian	21455	2.82	36392	41821	48060	55230	63469	72937	6239	24877
Sher Garh	Sher Garh	Sher Garh	21845	2.86	37,342	43000	49516	57019	65660	75609	6516	26093
Jalala	Jalala	Jalala	11335	4.29	25,175	31057	38314	47267	58312	71937	7257	33623
		Khan Killi	3236	7.52	12,830	18435	26490	38063	54693	78588	8055	52098
Kot Jongarh	Kot Jongarh	Kot Jongarh	10056	3.26	18,486	21698	25469	29895	35090	41187	3771	15718
		Said Abad	6421	2.87	10,987	12655	14577	16790	19339	22275	1922	7698
Landkhwar	Landkhwar	Lund Khwar	31671	2	46,105	50894	56180	62016	68457	75568	5286	19388
Dagai	Dagai	Dagai	1662	0.77	1,922	1997	2075	2156	2240	2327	78	252

Settlement Wise Demographic Statistics												
Mardan UC's	**PC**	**Settlements (Villages)**	**1998 Population**	**Growth Rate**	**2017 Population**	**Pop 2022**	**Pop 2027**	**Pop 2032**	**Pop 2037**	**Pop 2042**	**Add (27-22)**	**Add (42-27)**
Mian Isa		Dundia	2179	1.94	3,142	3460	3809	4195	4619	5086	349	1277
		Kalo	10096	2.88	17,315	19956	23000	26508	30551	35211	3044	12211
		Maingano Kali	2744	2.56	4437	5035	5714	6484	7358	8350	679	2636
		Main Isa	6440	3.55	12,502	14887	17726	21107	25133	29926	2839	12200
		Zarin Abad	4246	0.46	4,633	4741	4851	4963	5079	5196	110	345
Nari	Nari	Ahmad Abad	7761	2.08	11,471	12713	14090	15616	17307	19181	1377	5091
		Main Kali	1993	2.97	3,475	4022	4656	5390	6239	7222	634	2566
		Nari	11271	1.81	15,836	17318	18940	20713	22652	24772	1622	5832
		Rahmat Abad	3505	2.51	5,615	6356	7196	8146	9221	10439	840	3243
Parkho Derhi	Parkho Derhi	Diwan Khel	3556	3.11	6,362	7414	8641	10070	11736	13677	1227	5036
		Parkho Derhi	11520	2.52	18,480	20927	23699	26837	30392	34417	2772	10718
		Shahbat Khel	8274	3.01	14,524	16842	19530	22647	26261	30453	2688	10923
Pir Saddo	Pir Saddo	Pir Saddo	16196	2.34	25,125	28203	31657	35535	39888	44774	3454	13117
		Qutab Garh	9407	3.21	17,151	20088	23527	27556	32274	37801	3439	14274
Saroshah	Saroshah	Fateh Abad	1217	2.3	1,874	2099	2352	2635	2952	3307	253	955
		Feroz Pur	5557	2.07	8196	9078	10056	11139	12338	13666	978	3610
		Jamra	1945	2.03	2,848	3149	3481	3849	4255	4704	332	1223
		Nari	4335	2.48	6904	7803	8820	9969	11268	12736	1017	3916
		Saroshah	7369	2	10,736	11854	13088	14450	15954	17615	1234	4527
		Shah Baigh	5310	1.17	6618	7013	7431	7875	8344	8842	418	1411
Seri Behlol	Seri Behlol	Afzal Abad	5702	1.63	7,746	8396	9101	9865	10694	11592	705	2491
		Arbi Banda	7672	3.16	13851	16181	18903	22082	25796	30135	2722	11232
		Pir Abad	3187	2.4	5,002	5632	6341	7140	8039	9052	709	2711
		Siri Behlol	6098	3.39	11,480	13560	16016	18917	22344	26391	2456	10375
Takar	Takar	Akbar Abad	6732	1.92	9,655	10616	11673	12835	14112	15517	1057	3844
		Fazal Abad	19640	2.63	32,145	36595	41661	47428	53994	61469	5066	19808
		Takar	12010	2.42	18,907	21305	24008	27053	30484	34351	2703	10343
Gujhar Garhi	Gujhar Garhi	Gujar Garhi	28169	1.97	40,817	45002	49615	54702	60310	66493	4613	16878
Khazana Dheri	Khazana Deri	Khazana Derhi	12380	3.14	22,289	26019	30374	35457	41391	48317	4355	17943
Makuri	Makurin	Makuri	11719	3.11	20,959	24424	28461	33166	38649	45038	4037	16577

Annexure 2.

2019																					
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
ALO	ALO	ALO	13	13	6	18	2	8	1	10	0	0	10	10	1	2	2	8	0	0	0	0
		PIPAL	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**19**	**19**	**9**	**9**	**3**	**12**	**1**	**10**	**0**	**0**	**14**	**14**	**2**	**4**	**3**	**12**	**0**	**0**	**0**	**0**
BABOZAI	BABOZAI	BABOZAI ABAKHEL	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
		BABOZAI BARATKHEL	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
Total			**11**	**11**	**5**	**5**	**2**	**8**	**1**	**10**	**0**	**0**	**8**	**8**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
DHERI	DHERI	CHERCHOR	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		DHERI	8	8	4	4	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
		JANGI DHER	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KOTKI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		LAK PANI	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**19**	**19**	**9**	**9**	**3**	**12**	**1**	**10**	**0**	**0**	**14**	**14**	**2**	**4**	**3**	**12**	**0**	**0**	**0**	**0**
JAMALGARHI	JAMALGARHI	JAMAL GARHI	16	16	7	7	2	8	1	10	0	0	12	12	2	4	2	8	0	0	0	0
Total			**16**	**16**	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**12**	**12**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
KATIGARHI	KATIGARHI	KATI GARHI	6	6	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
		SHAMSI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SHERO	8	8	4	4	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
Total			**16**	**16**	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**12**	**12**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
KATLANG	KATLANG	KATLANG	21	21	10	10	3	12	1	10	0	0	16	16	2	4	3	12	1	10	0	0
Total			**21**	**21**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
KHARKI	KHARKI	KHARKI	13	13	6	6	2	8	1	10	0	0	10	10	1	2	2	8	0	0	0	0
Total			**13**	**13**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**10**	**10**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
KOHI	KOHI	BARMOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOHI	10	10	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
Total			**10**	**10**	**5**	**5**	**1**	**4**	**1**	**10**	**0**	**0**	**8**	**8**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
KUNJ	KUNJ	KUNJ	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHAKARTANGI	6	6	3	3	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**8**	**8**	**3**	**3**	**1**	**4**	**0**	**0**	**0**	**0**	**6**	**6**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
MIAN KHAN	MIAN KHAN	MAIN KHAN	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		SANGAO	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
Total			**8**	**8**	**4**	**4**	**1**	**4**	**0**	**0**	**0**	**0**	**6**	**6**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
QASMAI	QASMAI	GHAZI BABA	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		QASMAI	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
		SAROBI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		TAZA GRAM	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**17**	**17**	**8**	**8**	**2**	**8**	**1**	**10**	**0**	**0**	**13**	**13**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
SAWAL DHER	SAWAL DHER	BILANDI	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		SAWAL DIR	15	15	7	7	2	8	1	10	0	0	12	12	2	4	2	8	0	0	0	0
Total			**21**	**21**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
SHAMOZAI	SHAMOZAI PC	MATODIGRAM	9	9	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		SHAMOZAI	12	12	6	6	2	8	1	10	0	0	9	9	1	2	2	8	0	0	0	0
Total			**22**	**22**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
ALLAH DAD KHEL	ALLAH DAD KHEL	ALLAH DAD KHEL	12	12	6	6	2	8	1	10	0	0	9	9	1	2	2	8	0	0	0	0
		TAUS BANDA	3	3	2	2	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
Total			**16**	**16**	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**12**	**12**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
Baghee Aram	BAGH-E-ARAM	BAGH-E-ARAM	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		KOROUGH	6	6	3	3	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**9**	**9**	**4**	**4**	**1**	**4**	**1**	**10**	**0**	**0**	**7**	**7**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
Chak Shahbaz Garhi	CHAK SHABAZ GARHI	CHAK SHABAZ GARHI	7	7	3	3	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
		KOZ BAND	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Total			**9**	**9**	**4**	**4**	**1**	**4**	**1**	**10**	**0**	**0**	**7**	**7**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
MOHIB	MOHIB	MOHIB BANDA	11	11	5	5	2	8	1	10	0	0	9	9	1	2	2	8	0	0	0	0

2019																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
BANDA	**BANDA**																					
Total			**11**	**11**	**5**	**5**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
GHALA DER	**GHALA DER**	**BHAGO BANDA**	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		CHAUKI	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		GALA DHER	9	9	4	4	1	4	1	10	0	0	6	6	1	2	1	4	0	0	0	0
		KAHO	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KHAT	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PANJTAR	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Total			**22**	**22**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
Gumbat	**GUMBAT**	**GADDAR**	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		GUMBAT	13	13	6	6	2	8	1	10	0	0	10	10	1	2	2	8	0	0	0	0
Total			**15**	**15**	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**11**	**11**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**

2019																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
Hoti	HOTI	HOTI	11	11	5	5	2	8	1	10	0	0	8	8	1	2	2	8	0	0	0	0
Total			**11**	**11**	**5**	**5**	**2**	**8**	**1**	**10**	**0**	**0**	**8**	**8**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
Khandar	KHANDAR	KHANDAR	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		QASAM	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
		SHAREF ABAD	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
Total			**15**	**15**	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**11**	**11**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
Maho Derhi	MAHO DERHI	BAKRI BANDA	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		KHANJAR	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		KHWAJA RASHKI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		MAHO DERHI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
Total			**16**	**16**	**8**	**8**	**2**	**8**	**1**	**10**	**0**	**0**	**12**	**12**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
Mayar	MAYAR	MAYAR	23	23	11	11	3	12	1	10	0	0	17	17	2	4	3	12	1	10	0	0
Total			**23**	**23**	**11**	**11**	**3**	**12**	**1**	**10**	**0**	**0**	**17**	**17**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
Mohabat Abad	MOHABADT ABAD	AMIN ABAD	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		BAHRAM KHAN KILII	10	10	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		KHURA BANDA	8	8	3	3	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
		MOHABAT ABAD	8	8	4	4	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
		PLATOO	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SURKH DHERI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
Total			**34**	**34**	**16**	**16**	**5**	**20**	**2**	**20**	**0**	**0**	**26**	**26**	**4**	**8**	**5**	**20**	**1**	**10**	**0**	**0**

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
Shamat Pur	SHAMAD PUR	AKBAR PURA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MANI KHEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHAMAT PUR	11	11	5	5	2	8	1	10	0	0	8	8	1	2	2	8	0	0	0	0
Total			**12**	**12**	**5**	**5**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
Toru	TORU	CHAK TORU	10	10	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		TORU	15	15	7	7	2	8	1	10	0	0	12	12	2	4	2	8	0	0	0	0
Total			**25**	**25**	**12**	**12**	**4**	**16**	**2**	**20**	**0**	**0**	**19**	**19**	**3**	**6**	**4**	**16**	**1**	**10**	**0**	**0**
Babiani	BABIANI	BABIAN	6	6	3	3	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		CHARBANDA	9	9	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		JORI BANDA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KOTI NAKA	8	8	4	4	1	4	1	10	0	0	6	6	1	2	1	4	0	0	0	0
Total			**24**	24	**11**	**11**	**3**	**12**	**1**	**10**	**0**	**0**	**18**	**18**	**3**	**6**	**3**	**12**	**1**	**10**	**0**	**0**
BAGHDAD	BAGHDADA	AKBAR ABAD	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAGH DADA	13	13	6	6	2	8	1	10	0	0	10	10	1	2	2	8	0	0	0	0
		CHAMTRA DERHI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		RAKH SARKAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			**18**	18	**8**	**8**	**3**	**12**	**1**	**10**	**0**	**0**	**13**	**13**	**2**	**4**	**3**	**12**	**0**	**0**	**0**	**0**
BAKSHALI	BAKSHALI	BAKHSHALI	15	15	7	7	2	8	1	10	0	0	11	11	2	4	2	8	0	0	0	0
		KAKI DEHRI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			**15**	15	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**11**	**11**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
BALAGARHI	BALAGARHI	BALA GARHI	10	10	5	5	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		CHAM DERHI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
Total			**12**	12	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
FATIMA	FATIMA	FATIMA	12	12	5	5	2	8	1	10	0	0	9	9	1	2	2	8	0	0	0	0
		GADAR	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
		HAMZA KHAN	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		QAZI ABAD	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
Total			**25**	**25**	**12**	**12**	**4**	**16**	**2**	**20**	**0**	**0**	**19**	**19**	**3**	**6**	**4**	**16**	**1**	**10**	**0**	**0**
BAGHECHADERHI	BAGHECHADERHI	BAGHECHA DERHI	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
Total			**7**	**7**	**3**	**3**	**1**	**4**	**0**	**0**	**0**	**0**	**5**	**5**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
GARHI DAUL	GARHI	GARHI DAWALTZAI	17	17	8	8	2	8	1	10	0	0	13	13	2	4	2	8	0	0	0	0

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
ATZAI	**DAWALTZAI**																						
Total			**17**	**17**	**8**	**8**	**2**	**8**	**1**	**10**	**0**	**0**	**13**	**13**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
GARHI ISMAIL ZAI	**GARHI ISMAIL ZAI**	**GARHI ISMAILZAI**	12	12	5	5	2	8	1	10	0	0	9	9	1	2	2	8	0	0	0	0
Total			**12**	**12**	**5**	**5**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
GARYALA	**GARYALA**	**BHAI KHAN**	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		GARYALA	8	8	4	4	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
		HUSAI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
Total			**12**	**12**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
GUJRAT	**GUJRAT**	**GUJRAT**	9	9	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		JHUNGARAH	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**14**	**14**	**7**	**7**	**2**	**8**	**1**	**10**	**0**	**0**	**11**	**11**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
KOT DAULAT ZAI	KOT DAULAT ZAI	KOT DAULAT ZAI	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
		KOT ISMAIL ZAI	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
Total			**12**	**12**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**
MANGAH	MANGAH	BAKYANA	3	3	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		MANGAH	10	10	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		SHEKH YOUSAF	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
Total			**20**	**20**	**9**	**9**	**3**	**12**	**1**	**10**	**0**	**0**	**15**	**15**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
MARDAN	MARDAN	CHAK MARDAN	16	16	7	7	2	8	1	10	0	0	12	12	2	4	2	8	0	0	0	0
		DAGAI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MARDAN	20	20	9	9	3	12	1	10	0	0	15	15	2	4	3	12	1	10	0	0
Total			**36**	**36**	**17**	**17**	**5**	**20**	**2**	**20**	**0**	**0**	**27**	**27**	**4**	**8**	**5**	**20**	**1**	**10**	**0**	**0**
SHAH BAZGARH	SHAH BAZGARH	SHAH BAZGARH	22	22	10	10	3	12	1	10	0	0	16	16	2	4	3	12	1	10	0	0
Total			**22**	**22**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
BAROACH	BAROACH	BARINGON	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		BAROCH	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		PIRSAI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		PITAO MALANDARI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SORI MALNDARI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Total			**8**	**8**	**4**	**4**	**1**	**4**	**0**	**0**	**0**	**0**	**6**	**6**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
BAZAR	BAZAR	AMAN KOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAZAR	10	10	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0	0	0
		GARHO	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		SURKHABI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
Total			**14**	**14**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**10**	**10**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**	**0**	**0**
CHINA	CHINA	ALAI	3	3	2	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
		LANDI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		CHINA	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0	0	0
Total			**9**	**9**	**4**	**4**	**1**	**4**	**1**	**10**	**0**	**0**	**7**	**7**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**0**	**0**
KATA KHAT	KATA KHAT	BARI KAB	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
		KATA KHAT	9	9	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0	0	0
		KOTAR PAN	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0	0	0
Total			**17**	**17**	**8**	**8**	**2**	**8**	**1**	**10**	**0**	**0**	**13**	**13**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**	**0**	**0**
MACHAI	MACHAI	CHAK SHEWA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAK SUNG BHATI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAK TAJA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		JALAL DAULATZAI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		JALAL ISMAILZAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		MACHAI	10	10	5	5	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0	0	0
		TAJA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		URYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			**14**	**14**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**10**	**10**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**	**0**	**0**
PALODHERI	PALODHERI	HAMZA KOT	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		PALO DHERI	11	11	5	5	2	8	1	10	0	0	8	8	1	2	2	8	0	0	0	0	0	0
Total			**12**	**12**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**	**0**	**0**
RUSTAM	RUSTAM	NODEH	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0	0	0
		RUSTAM	18	18	9	9	3	12	1	10	0	0	14	14	2	4	3	12	0	0	0	0	0	0
Total			**23**	**23**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**17**	**17**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	**0**	**0**
CHARGULI	SURKH DERHI PC	CHARGUL	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
		CHARGULI	10	10	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0	0	0
		KHAIRABAD	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
		SURKHDERHI	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0	0	0

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree		
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	
Total			**18**	**18**	**8**	**8**	**3**	**12**	**1**	**10**	**0**	**0**	**13**	**13**	**2**	**4**	**3**	**12**	**0**	**0**	**0**	**0**	
JAHANGIR ABAD	**JANGIR ABAD**	**CHAIL**	16	16	7	7	2	8	1	10	0	0	12	12	2	4	2	8	0	0	0	0	
		JANGIR ABAD	7	7	3	3	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0	
Total			**24**	**24**	**11**	**11**	**3**	**12**	**1**	**10**	**0**	**0**	**18**	**18**	**3**	**6**	**3**	**12**	**1**	**10**	**0**	**0**	
HATTIAN	**HATTIAN**	**HATTIAN**	21	21	10	10	3	12	1	10	0	0	16	16	2	4	3	12	1	10	0	0	
Total			**21**	**21**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	
SHER GARH	**SHER GARH**	**SHER GARH**	22	22	10	10	3	12	1	10	0	0	16	16	2	4	3	12	1	10	0	0	
Total			**22**	**22**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	
JALALA	**JALALA**	**JALALA**	15	15	7	7	2	8	1	10	0	0	11	11	2	4	2	8	0	0	0	0	
		KHAN KILLI	8	8	4	4	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0	
Total			**23**	**23**	**11**	**11**	**3**	**12**	**1**	**10**	**0**	**0**	**18**	**18**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree		
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	
KOT JONGARH	KOT JONGARH	KOT JONGARH	11	11	5	5	2	8	1	10	0	0	8	8	1	2	2	8	0	0	0	0	
		SAID ABAD	6	6	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0	
Total			**17**	**17**	**8**	**8**	**3**	**12**	**1**	**10**	**0**	**0**	**13**	**13**	**2**	**4**	**3**	**12**	**0**	**0**	**0**	**0**	
LAND KHWAR	LAND KHWAR	LUND KHWAR	27	27	12	12	4	16	2	20	0	0	20	20	3	6	4	16	1	10	0	0	
Total			**27**	**27**	**12**	**12**	**4**	**16**	**2**	**20**	**0**	**0**	**20**	**20**	**3**	**6**	**4**	**16**	**1**	**10**	**0**	**0**	
DAGAI	DAGAI	DAGAI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	
Total			**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
MIAN ISA	Mian ISA	DUNDIA	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	
		KALO	10	10	5	5	1	4	1	10	0	0	8	8	1	2	1	4	0	0	0	0	
		MAINGANO KALI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	
		MAIN ISA	7	7	3	3	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0	
		ZARIN ABAD	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	
Total			**25**	**25**	**11**	**11**	**4**	**16**	**1**	**10**	**0**	**0**	**18**	**18**	**3**	**6**	**4**	**16**	**1**	**10**	**0**	**0**	
NARI	NARI	AHMAD ABAD	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0	
		MAIN KALI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	
		NARI	9	9	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0	
		RAHMAT ABAD	3	3	2	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	
Total			**21**	**21**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	
PARKHODERHI	PARKHODERHI	DIWAN KHEL	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0	
		PARKHODERHI	11	11	5	5	2	8	1	10	0	0	8	8	1	2	2	8	0	0	0	0	
		SHAHBAT KHEL	9	9	4	4	1	4	1	10	0	0	6	6	1	2	1	4	0	0	0	0	
Total			**23**	**23**	**11**	**11**	**3**	**12**	**1**	**10**	**0**	**0**	**17**	**17**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	
PIR SADDO	PIR SADDO	PIR SADDO	15	15	7	7	2	8	1	10	0	0	11	11	2	4	2	8	0	0	0	0	
		QUTAB GARH	10	10	5	5	1	4	1	10	0	0	8	8	1	2	1	4	0	0	0	0	
Total			**25**	**25**	**11**	**11**	**4**	**16**	**1**	**10**	**0**	**0**	**19**	**19**	**3**	**6**	**4**	**16**	**1**	**10**	**0**	**0**	
SAROSHAH	SAROSHAH	FATEH ABAD	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	
		FEROZ PUR	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0	
		JAMRA	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	
		NARI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0	
		SAROSHAH	6	6	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0	
		SHAH BAIGH	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0	
Total			**21**	**21**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**16**	**16**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**	

2019																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree	
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
SERI BEHLOL	SERI BEHLOL	AFZAL ABAD	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		ARBI BANDA	8	8	4	4	1	4	0	0	0	0	6	6	1	2	1	4	0	0	0	0
		PIR ABAD	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SIRI BEHLOL	7	7	3	3	1	4	0	0	0	0	5	5	1	2	1	4	0	0	0	0
Total			**22**	**22**	**10**	**10**	**3**	**12**	**1**	**10**	**0**	**0**	**17**	**17**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**
TAKAR	TAKAR	AKBAR ABAD	6	6	3	3	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
		FAZAL ABAD	19	19	9	9	3	12	1	10	0	0	14	14	2	4	3	12	0	0	0	0
		TAKAR	11	11	5	5	2	8	1	10	0	0	8	8	1	2	2	8	0	0	0	0
Total			**35**	**35**	**16**	**16**	**5**	**20**	**2**	**20**	**0**	**0**	**27**	**27**	**4**	**8**	**5**	**20**	**1**	**10**	**0**	**0**
GUJHAR GARHI	GUJHAR GARHI	GUJAR GARHI	24	24	11	11	3	12	1	10	0	0	18	18	2	4	3	12	1	10	0	0
Total			**24**	**24**	**11**	**11**	**3**	**12**	**1**	**10**	**0**	**0**	**18**	**18**	**2**	**4**	**3**	**12**	**1**	**10**	**0**	**0**

2019																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girls Education										
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree		
			2qa	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	
KHAZANA DHERI	KHAZANA DERI	KHAZANA DERHI	13	13	6	6	2	8	1	10	0	0	10	10	1	2	2	8	0	0	0	0	
Total			**13**	**13**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**10**	**10**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**	
MAKURI	MAKURI	MAKURI	12	12	6	6	2	8	1	10	0	0	9	9	1	2	2	8	0	0	0	0	
Total			**12**	**12**	**6**	**6**	**2**	**8**	**1**	**10**	**0**	**0**	**9**	**9**	**1**	**2**	**2**	**8**	**0**	**0**	**0**	**0**	

Annexure 3.

2024																					
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree Clg	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
ALO	ALO	ALO	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		PIPAL	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BABOZAI	BABOZAI	BABOZAI ABAKHEL	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		BABOZAI BARAT KHEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
DHERI	DHERI	CHERCHOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		DHERI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		JANGI DHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOTKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		LAK PANI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
JAMAL GARHI	JAMAL GARHI	JAMAL GARHI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KATI GARHI	KATI GARHI	KATI GARHI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHAMSI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHERO	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KATLANG	KATLANG	KATLANG	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KHARKI	KHARKI	KHARKI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KOHI	KOHI	BARMOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOHI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			1	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KUNJ	KUNJ	KUNJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHAKARTANGI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MIAN KHAN	MIAN KHAN	MAIN KHAN	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SANGAO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

2024																					
Mardan UC	**PC**	**Settlements (Villages)**	**Boys Schools**										**Girl Schools**									
			Primary		**Middle**		**High School**		**High Secondary School**		**Degree**		**Primary**		**Middle**		**High School**		**High Secondary School**		**Degree Clg**	
			Units	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**
QASMAI	**QASMAI**	**GHAZI BABA**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		QASMAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SAROBI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		TAZA GRAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SAWALDHER	**SAWALDHER**	**BILANDI**	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SAWALDIR	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SHAMOZAI	**SHAMOZAI PC**	**MATODIGRAM**	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHAMOZAI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
ALLAH DAD KHEL	**ALLAH DAD KHEL**	**ALLAH DAD KHEL**	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		TAUS BANDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Baghe e Aram	**BAGH-E-ARAM**	**BAGH-E-ARAM**	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KOROUGH	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chak Shahbaz Garhi	**CHAK SHABAZ GARHI**	**CHAK SHABAZ GARHI**	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KOZ BAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MOHIB BANDA	**MOHIB BANDA**	**MOHIB BANDA**	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GHALADER	**GHALADER**	**BHAGO BANDA**	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAUKI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		GALA DHER	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KAHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KHAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PANJTAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Gumbat	**GUMBAT**	**GADDAR**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GUMBAT	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

2024																					
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree Clg	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
Hoti	HOTI	HOTI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Khandar	KHANDAR	KHANDAR	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		QASAM	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHAREFABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Maho Derhi	MAHO DERHI	BAKRI BANDA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KHANJAR	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KHWAJA RASHKI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MAHO DERHI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mayar	MAYAR	MAYAR	3	3	2	2	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
			3	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mohabat Abad	MOHABADT ABAD	AMIN ABAD	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		BAHRAM KHAN KILII	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		KHURA BANDA	9	9	4	4	1	4	1	10	0	0	7	7	1	2	1	4	0	0	0	0
		MOHABAT ABAD	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		PLATOO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SURKHDHERI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			17	**17**	**8**	**8**	**2**	**8**	**1**	**10**	**0**	**0**	**12**	**12**	**2**	**4**	**2**	**8**	**0**	**0**	**0**	**0**
Shamat Pur	SHAMAD PUR	AKBAR PURA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MANI KHEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHAMAT PUR	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Toru	TORU	CHAK TORU	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		TORU	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Babiani	BABIANI	BABIAN	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHARBANDA	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		JORI BANDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOTI NAKA	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

2024																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree		Primary		Middle		High School		High Secondary School		Degree Clg	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BAGHDAD	BAGHDADA	AKBARABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAGHDADA	3	3	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		CHAMTRA DERHI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RAKH SARKAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			4	**4**	**2**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**
BAKSHALI	BAKSHALI	BAKHSHALI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KAKI DEHRI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BALA GARHI	BALA GARHI	BALA GARHI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		CHAM DERHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
FATIMA	FATIMA	FATIMA	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		GADAR	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		HAMZA KHAN	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		QAZI ABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BAGHECHA DERHI	BAGHECHA DERHI	BAGHECHA DERHI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GARHI DAULAT ZAI	GARHI DAWALTZAI	GARHI DAWALT ZAI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GARHI ISMAIL ZAI	GARHI ISMAIL ZAI	GARHI ISMAIL ZAI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			1	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GARYALA	GARYALA	BHAI KHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GARYALA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		HUSAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			1	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GUJRAT	GUJRAT	GUJRAT	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		JHUNGARAH	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KOT DAULAT ZAI	KOT DAULAT ZAI	KOT DAULAT ZAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

2024																						
Mardan UC	**PC**	**Settlements (Villages)**	**Boys Schools**										**Girl Schools**									
			Primary		**Middle**		**High School**		**High Secondary School**		**Degree**		**Primary**		**Middle**		**High School**		**High Secondary School**		**Degree Clg**	
			Units	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**
		KOT ISMAILZAI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MANGAH	**MANGAH**	**BAKYANA**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MANGAH	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHEKH YOUSAF	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MARDAN	**MARDAN**	**CHAK MARDAN**	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		DAGAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MARDAN	5	5	2	2	1	4	0	0	0	0	4	4	1	2	1	4	0	0	0	0
			10	**10**	**4**	**4**	**1**	**4**	**1**	**10**	**0**	**0**	**7**	**7**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
SHAH BAZGARH	**SHAH BAZGARH**	**SHAH BAZGARH**	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BAROACH	**BAROACH**	**BARINGON**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAROCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PIRSAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PITAO MALANDARI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SORI MALNDARI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
BAZAR	**BAZAR**	**AMAN KOT**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAZAR	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		GARHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SURKHABI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
CHINA	**CHINA**	**ALAI**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		LANDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHINA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KATAKHAT	**KATAKHAT**	**BARIKAB**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KATAKHAT	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KOTARPAN	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

2024																					
Mardan UC	**PC**	**Settlements (Villages)**	**Boys Schools**										**Girl Schools**									
			Primary		**Middle**		**High School**		**High Secondary School**		**Degree**		**Primary**		**Middle**		**High School**		**High Secondary School**		**Degree Clg**	
			Units	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**
MACHAI	**MACHAI**	**CHAK SHEWA**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAK SUNG BHATI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAK TAJA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		JALAL DAULA TZAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		JALAL ISMAIL ZAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MACHAI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		TAJA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		URYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PALO DHERI	**PALO DHERI**	**HAMZA KOT**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PALO DHERI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RUSTAM	**RUSTAM**	**NODEH**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RUSTAM	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
CHAR GULI	**SURKH DERHI PC**	**CHARGUL**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHARGULI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KHAIRABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SURKHDERHI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
JAHANGIR ABAD	**JANGIR ABAD**	**CHAIL**	3	3	2	2	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
		JANGIR ABAD	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			5	**5**	**2**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**4**	**4**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**
HATTIAN	**HATTIAN**	**HATTIAN**	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SHER GARH	**SHER GARH**	**SHER GARH**	3	3	2	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
JALALA	**JALALA**	**JALALA**	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		KHAN KILLI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
			7	**7**	**3**	**3**	**1**	**4**	**0**	**0**	**0**	**0**	**5**	**5**	**1**	**2**	**1**	**4**	**0**	**0**	**0**	**0**
KOT JONGARH	**KOT JONGARH**	**KOT JONGARH**	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

2024																						
Mardan UC	**PC**	**Settlements (Villages)**	**Boys Schools**										**Girl Schools**									
			Primary		**Middle**		**High School**		**High Secondary School**		**Degree**		**Primary**		**Middle**		**High School**		**High Secondary School**		**Degree Clg**	
			Units	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**
		SAID ABAD	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
LANDKHWAR	**LANDKHWAR**	**LUNDKHWAR**	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
DAGAI	**DAGAI**	**DAGAI**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MIANISA	**Mian ISA**	**DUNDIA**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KALO	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MAINGANO KALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MAIN ISA	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		ZARIN ABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			4	**4**	**2**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**
NARI	**NARI**	**AHMAD ABAD**	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MAIN KALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		NARI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		RAHMAT ABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PARKHO DERHI	**PARKHO DERHI**	**DIWAN KHEL**	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PARKHO DERHI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHAHBAT KHEL	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PIR SADDO	**PIR SADDO**	**PIR SADDO**	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		QUTAB GARH	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			4	**4**	**2**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**
SAROSHAH	**SAROSHAH**	**FATEH ABAD**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		FEROZ PUR	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		JAMRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		NARI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SAROSHAH	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHAH BAIGH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		AFZAL ABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2024																					
Mardan UC	**PC**	**Settlements (Villages)**	**Boys Schools**										**Girl Schools**									
			Primary		**Middle**		**High School**		**High Secondary School**		**Degree**		**Primary**		**Middle**		**High School**		**High Secondary School**		**Degree Clg**	
			Units	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**	**Units**	**Area**
SERI BEHLOL	**SERI BEHLOL**	**ARBI BANDA**	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		PIR ABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SIRI BEHLOL	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			3	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TAKAR	**TAKAR**	**AKBAR ABAD**	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		FAZAL ABAD	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		TAKAR	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			5	**5**	**2**	**2**	**1**	**4**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**
GUJHAR GARHI	**GUJHAR GARHI**	**GUJAR GARHI**	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
KHAZANA DHERI	**KHAZANA DERI**	**KHAZANA DERHI**	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MAKURI	**MAKURI**	**MAKURI**	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			2	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Annexure 4.

2039																					
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
ALO	ALO	ALO	11	11	5	5	2	8	1	10	0	0	8	8	1	1	2	8	0	0	0	0
		PIPAL	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			14	14	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
BABOZAI	BABOZAI	BABOZAI ABAKHEL	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		BABOZAI BARAT KHEL	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			5	5	2	2	1	4	0	0	0	0	4	4	0	0	1	4	0	0	0	0
DHERI	DHERI	CHERCHOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		DHERI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		JANGI DHER	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOTKI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		LAK PANI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
JAMAL GARHI	JAMAL GARHI	JAMAL GARHI	9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
KATI GARHI	KATI GARHI	KATI GARHI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SHAMSI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHERO	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
KATLANG	KATLANG	KATLANG	10	10	5	5	1	4	1	10	0	0	8	8	1	1	1	4	0	0	0	0
			10	10	5	5	1	4	1	10	0	0	8	8	1	1	1	4	0	0	0	0
KHARKI	KHARKI	KHARKI	8	8	4	4	1	4	1	10	0	0	6	6	1	1	1	4	0	0	0	0
			8	8	4	4	1	4	1	10	0	0	6	6	1	1	1	4	0	0	0	0
KOHI	KOHI	BARMOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOHI	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
KUNJ	KUNJ	KUNJ	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SHAKARTANGI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			3	3	2	2	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
MIAN KHAN	MIAN KHAN	MAIN KHAN	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SANGAO	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

2039																					
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
			3	3	2	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
QASMAI	QASMAI	GHAZI BABA	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		QASMAI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		SAROBI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		TAZA GRAM	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			12	12	5	5	2	8	1	10	0	0	9	9	1	1	2	8	0	0	0	0
SAWAL DHER	SAWAL DHER	BILANDI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		SAWAL DIR	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
SHAMOZAI	SHAMOZAI PC	MATODI GRAM	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		SHAMOZAI	6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
			10	10	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
ALLAH DAD KHEL	ALLAH DAD KHEL	ALLAH DAD KHEL	11	11	5	5	2	8	1	10	0	0	8	8	1	1	2	8	0	0	0	0
		TAUS BANDA	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			13	13	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
Baghe e Aram	BAGH-E-ARAM	BAGH-E-ARAM	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		KOROUGH	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
Chak Shahbaz Garhi	CHAK SHABAZ GARHI	CHAK SHABAZ GARHI	6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
		KOZ BAND	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
MOHIB BANDA	MOHIB BANDA	MOHIB BANDA	6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
			6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
GHALADER	GHALADER	BHAGO BANDA	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		CHAUKI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		GALA DHER	5	5	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		KAHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KHAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PANJTAR	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			13	13	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
Gumbat	GUMBAT	GADDAR	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

2039																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
		GUMBAT	6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
			7	7	3	3	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
Hoti	HOTI	HOTI	14	14	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
			14	14	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
Khandar	KHANDAR	KHANDAR	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		QASAM	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		SHAREFABAD	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	6	6	1	1	1	4	0	0	0	0
Maho Derhi	MAHO DERHI	BAKRI BANDA	3	3	2	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		KHANJAR	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		KHWAJA RASHKI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		MAHO DERHI	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			15	15	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
Mayar	MAYAR	MAYAR	14	14	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
			14	14	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
Mohabat Abad	MOHABADT ABAD	AMIN ABAD	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		BAHRAM KHAN KILII	17	17	8	8	2	8	1	10	0	0	13	13	2	2	2	8	0	0	0	0
		KHURA BANDA	171	171	79	79	25	100	10	100	1	15	129	129	18	18	25	100	4	16	1	15
		MOHABAT ABAD	14	14	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
		PLATOO	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SURKHDHERI	8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
			216	216	100	100	31	124	13	130	1	15	162	162	23	23	31	124	6	24	1	15
Shamat Pur	SHAMAD PUR	AKBAR PURA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MANI KHEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SHAMAT PUR	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
			4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
Toru	TORU	CHAK TORU	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		TORU	8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
			13	13	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
Babiani		BABIAN	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0

2039																							
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools										
			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
	BABIANI	CHARBANDA	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		JORI BANDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KOTI NAKA	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			13	13	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
BAGHDAD	BAGHDADA	AKBARABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAGHDADA	19	19	9	9	3	12	1	10	0	0	14	14	2	2	3	12	0	0	0	0
		CHAMTRA DERHI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		RAKH SARKAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			22	22	10	10	3	12	1	10	0	0	16	16	2	2	3	12	1	4	0	0
BAKSHALI	BAKSHALI	BAKHSHALI	7	7	3	3	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
		KAKI DEHRI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
BALA GARHI	BALA GARHI	BALA GARHI	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		CHAM DERHI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
FATIMA	FATIMA	FATIMA	7	7	3	3	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
		GADAR	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		HAMZA KHAN	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		QAZI ABAD	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			14	14	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
BAGHECHA DERHI	BAGHECHA DERHI	BAGHECHA DERHI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
			4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
GARHI DAULAT ZAI	GARHI DAWALTZAI	GARHI DAWALT ZAI	8	8	4	4	1	4	1	10	0	0	6	6	1	1	1	4	0	0	0	0
			8	8	4	4	1	4	1	10	0	0	6	6	1	1	1	4	0	0	0	0
GARHI ISMAIL ZAI	GARHI ISMAIL ZAI	GARHI ISMAIL ZAI	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
GARYALA	GARYALA	BHAI KHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GARYALA	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		HUSAI	5	5	2	2	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0

2039																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
GUJRAT	GUJRAT	GUJRAT	3	3	2	2	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
		JHUNGARAH	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			6	6	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
KOT DAULAT ZAI	KOT DAULAT ZAI	KOT DAULAT ZAI	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
		KOT ISMAILZAI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
MANGAH	MANGAH	BAKYANA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MANGAH	7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
		SHEKH YOUSAF	3	3	2	2	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0
			11	11	5	5	2	8	1	10	0	0	8	8	1	1	2	8	0	0	0	0
MARDAN	MARDAN	CHAK MARDAN	22	22	10	10	3	12	1	10	0	0	17	17	2	2	3	12	1	4	0	0
		DAGAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MARDAN	29	29	13	13	4	16	2	20	0	0	21	21	3	3	4	16	1	4	0	0
			52	52	24	24	8	32	3	30	0	0	39	39	5	5	8	32	1	4	0	0
SHAH BAZGARH	SHAH BAZGARH	SHAH BAZGARH	12	12	6	6	2	8	1	10	0	0	9	9	1	1	2	8	0	0	0	0
			12	12	6	6	2	8	1	10	0	0	9	9	1	1	2	8	0	0	0	0
BAROACH	BAROACH	BARINGON	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		BAROCH	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		PIRSAI	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		PITAO MALANDARI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SORI MALNDARI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
BAZAR	BAZAR	AMAN KOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		BAZAR	9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
		GARHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SURKHABI	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			12	12	6	6	2	8	1	10	0	0	9	9	1	1	2	8	0	0	0	0
CHINA	CHINA	ALAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		LANDI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		CHINA	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0

2039																						
Mardan UC	PC	Settlements (Villages)	Boys Schools										Girl Schools									
			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
			4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
KATA KHAT	KATA KHAT	BARI KAB	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		KATA KHAT	6	6	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		KOTAR PAN	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
MACHAI	MACHAI	CHAK SHEWA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAK SUNG BHATI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHAK TAJA	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		JALAL DAULATZAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		JALAL ISMAILZAI	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MACHAI	5	5	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		TAJA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		URYA	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
PALO DHERI	PALO DHERI	HAMZA KOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		PALO DHERI	8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
			8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
RUSTAM	RUSTAM	NODEH	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		RUSTAM	8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
CHARGULI	SURKHDERHI PC	CHARGUL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHARGULI	7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
		KHAIRABAD	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SURKHDERHI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
			10	10	5	5	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
JAHANGIR ABAD	JANGIR ABAD	CHAIL	17	17	8	8	2	8	1	10	0	0	13	13	2	2	2	8	0	0	0	0
		JANGIR ABAD	6	6	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			22	22	10	10	3	12	1	10	0	0	17	17	2	2	3	12	1	4	0	0
HATTIAN	HATTIAN	HATTIAN	14	14	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
			14	14	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
SHER GARH	SHER GARH	SHER GARH	14	14	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0

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			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
			14	14	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
JALALA	JALALA	JALALA	18	18	8	8	3	12	1	10	0	0	13	13	2	2	3	12	0	0	0	0
		KHAN KILLI	26	26	12	12	4	16	2	20	0	0	19	19	3	3	4	16	1	4	0	0
			44	44	20	20	6	24	3	30	0	0	33	33	5	5	6	24	1	4	0	0
KOT JONGARH	KOT JONGARH	KOT JONGARH	9	9	4	4	1	4	1	10	0	0	6	6	1	1	1	4	0	0	0	0
		SAID ABAD	4	4	2	2	1	4	0	0	0	0	3	3	0	0	1	4	0	0	0	0
			13	13	6	6	2	8	1	10	0	0	10	10	1	1	2	8	0	0	0	0
LANDKHWAR	LANDKHWAR	LUNDKHWAR	11	11	5	5	2	8	1	10	0	0	8	8	1	1	2	8	0	0	0	0
			11	11	5	5	2	8	1	10	0	0	8	8	1	1	2	8	0	0	0	0
DAGAI	DAGAI	DAGAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIANISA	Mian ISA	DUNDIA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		KALO	7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
		MAINGANO KALI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		MAIN ISA	7	7	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
		ZARIN ABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			16	16	7	7	2	8	1	10	0	0	12	12	2	2	2	8	0	0	0	0
NARI	NARI	AHMAD ABAD	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		MAIN KALI	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		NARI	3	3	2	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		RAHMAT ABAD	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
PARKHO DERHI	PARKHO DERHI	DIWAN KHEL	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		PARKHO DERHI	6	6	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
		SHAHBAT KHEL	6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
			15	15	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
PIR SADDO	PIR SADDO	PIR SADDO	7	7	3	3	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
		QUTAB GARH	8	8	4	4	1	4	0	0	0	0	6	6	1	1	1	4	0	0	0	0
			15	15	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
SAROSHAH	SAROSHAH	FATEH ABAD	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		FEROZ PUR	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0

2039																						
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			Primary		Middle		High School		High Secondary School		Degree collg		Primary		Middle		High School		High Secondary School		Gegree	
			Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area	Units	Area
		JAMRA	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		NARI	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SAROSHAH	3	3	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		SHAH BAIGH	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
SERI BEHLOL	SERI BEHLOL	AFZAL ABAD	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		ARBI BANDA	6	6	3	3	1	4	0	0	0	0	5	5	1	1	1	4	0	0	0	0
		PIR ABAD	2	2	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
		SIRI BEHLOL	6	6	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			15	15	7	7	2	8	1	10	0	0	11	11	2	2	2	8	0	0	0	0
TAKAR	TAKAR	AKBAR ABAD	2	2	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
		FAZAL ABAD	11	11	5	5	2	8	1	10	0	0	8	8	1	1	2	8	0	0	0	0
		TAKAR	6	6	3	3	1	4	0	0	0	0	4	4	1	1	1	4	0	0	0	0
			19	19	9	9	3	12	1	10	0	0	14	14	2	2	3	12	0	0	0	0
GUJHAR GARHI	GUJHAR GARHI	GUJAR GARHI	10	10	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
			10	10	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
KHAZANA DHERI	KHAZANA DERI	KHAZANA DERHI	10	10	5	5	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
			10	10	5	5	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
MAKURI	MAKURI	MAKURI	9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0
			9	9	4	4	1	4	1	10	0	0	7	7	1	1	1	4	0	0	0	0

GOVERNMENT OF KHYBER PAKHTUNKHWA
LOCAL GOVERNMENT, ELECTIONS & RURAL DEVELOPMENT DEPARTMENT

No.SO(UADAs)/LG/1-34/LUBC/2022
Dated the Peshawar, 15th ASeptember,2022

To

1. Minister for Local Government and Rural Development Khyber Pakhtunkhwa
2. Minister for Agriculture, Livestock and Cooperative Khyber Pakhtunkhwa
3. Minister for Industries Khyber Pakhtunkhwa
4. Minister for Environment Khyber Pakhtunkhwa
5. Senior Member Board of Revenue, Revenue and Estate Department
6. Secretary to Government of KP, Housing Department
7. Secretary to Government of KP, Public Health Engineering Department
8. Secretary to Government of KP, Communication and Works Department
9. Secretary to Government of KP, Irrigation Department
10. Secretary to Government of KP, Transport and Mass Transit Department
11. Secretary to Government of KP, Environment Department
12. Secretary to Government of KP, Industries Department
13. Secretary to Government of KP, Agriculture, Livestock and cooperative Department
14. Secretary to Government of KP, Local Government and Rural Development Department
15. Professor Dr. Rawid Khan, Deptt: of Civil Engineering, UET Peshawar
16. Mr. Abdul Halim Paracha, Master in Civic Design, United Kingdom
17. Mr. Hifz-Ur-Rehman, Ex-Secretary
18. Mr. Adnan Ahmad Khan, HOD Architecture Department, CECOS University of I.T and Engineering Sciences, Peshawar
19. Dr. Nasir Javed, (Ex-PAS Officer) Urban Development Specialist

Subject: **1ST MEETING OF THE PROIVINCIAL LAND USE AND BUILDING CONTROL COUNCIL KHYBER PAKHTUNKHWA HELD ON 14/09/2022.**

Sir:

I am directed to refer to the subject noted above and to state that 1st meeting of the Provincial Land Use and Building Control Council was held on 14/09/2022 at Chief Minister House under the kind chairmanship of the Honorable Chief Minister Khyber Pakhtunkhwa. During meeting the plans were principally approved, however, the Honorable Chief Minister has very kindly directed to share copies of all the six completed District Land Use Plans of District Peshawar, Mardan, Swabi, Charsadda, Nowshera and Abbottabad with all members of the Council for their views/comments and inputs with in one week time positively.

I am further directed to enclose here with soft copies of the completed District Land Use Plans (DLUPs) of District Peshawar, Mardan, Swabi, Charsadda, Nowshera and Abbottabad for your views/comments and inputs within one week time positively for further processing of these plans please.

Section Officer (UADAs)

Endst: No. & Date Even:

Copy Forwarded to:

1. The PSO to Chief Minister Khyber Pakhtunkhwa
2. The PS to Additional Chief Secretary P&D Department
3. The DG, Provincial Land Use and Building Control Authority, LGE &RD Department
4. The Executive Director, UPPU, P&D Department
5. The Project Manager PLUP, UPPU, P&D Deprtment

Section Officer (UADAs)

19/9/22

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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.

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- 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.

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FIRST MEETING OF THE PROVINCIAL LAND USE AND BUILDING CONTROL COUNCIL DATED 14/09/2022

PARTICIPANT LIST

S.No	Name	Designation	Contact No	Signature
1	S.M. [illegible]	Minister	03447571[illegible]	[signature]
2	FAISAL AMIN	MIN	03345152307	[signature]
3	Abdul Karim	SPL Asst CM Industries	03135280[illegible]	[signature]
4	AMBER ALI KHAN	Secretary Housing	0344-9271558	[signature]
5	Rawid Khan	Prof. UET	0300 5734427	[signature]
6	Muhammad Asif	SS(Dev) DS LCB&A	0301-5971237	[signature]
7	Adnan A. Khan	Architect	0301-8498899	[signature]
8	Abdul Halim Paracha	Urban & Regional Building Control Specialist	0301-8595859	[signature]
9	Idrees	Secretary	03335553382	[signature]
10	Jamal Gul	C&W Spl: Secy	03105880989	[signature]
11	Aneeshulah	Secy P&D	091 9210316	[signature]
12	Abid Majeed	Secy Env		[signature]
13	M. Nauman	Add. Sec	03036077773	[signature]
14	Zakir Muh	SMBR		[signature]
15	Shahab Ali Shah	ACS		[signature]
16	Zaheer ul Islam	Sec LG		[signature]
17	Taimoor Jahangir	Minister for Health	—	—