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

Transport & Connectivity Plan

Regional Development Planning of Multan Division

DISCLAIMER

The Regional Connectivity and Transport Plan document is prepared solely for guidance Purposes. While maximum care and caution have been observed while developing the Regional Connectivity and Transport Plan; The Urban Unit shall not be responsible for any flaw. Neither, Urban Sector Planning and Management Services Unit (Private) Limited, nor its employees make any representation (expressed or implied) or warranties as to the Comprehensiveness of the information contained here in and for any subsequent or resultant tendering process carried out. Both Urban Sector Planning and Management Services Unit (Private) Limited or its employees or representatives will not be liable to reimburse or compensate for any costs or expenses incurred by acting upon this Regional Connectivity and Transport Plan document.

ACKNOWLEDGMENTS

Preparation of the Regional Connectivity and Transport Plan document is a coordinated team effort of The Urban Unit and the allied government departments including but not limited to the Communication and Works Department and Transport Department.
The Regional Connectivity and Transport Plan document team would also like to appraise the contribution of the Local District Administration for their valuable data input and contribution during plan preparation and subsequent peer review and adoption.

Review Team

Omer Masood
Chief Executive Officer

Technical Team

Dr. Syed Murtaza Asghar Bukhari
Senior Specialist – Transport & Connectivity

Engr. Mohsin Raza
Program Manager – Transport Planning & Management

Engr. Aleem Akram
Project officer – Transport Planning & Management

Engr. Ahmad Ali Shokat
Project officer – Transport Planning & Management

Design & Layout

Muhammad Zubair

Printed in Pakistan

The Urban Unit
503 – Shaheen Complex, Egerton Road, Lahore
Tel: +42 99205316-22 Fax: +42 99205323
Email: uspmu@punjab.gov.pk Website: www.urbanunit.gov.pk

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

C&WD	Communication and Works Department, Government of the Punjab
P&D	Planning and Development Board, Government of the Punjab
ADT	Average Daily Traffic
PCU	Passenger Car Unit
LOS	Level of Service
NHA	National Highway Authority of Pakistan
BRT	Bus Rapid Transit
PSS	Punjab Spatial Strategy
GDP	Gross Domestic Product
ADP	Annual Development Plan
MDA	Multan Development Authority
DRTA	District Regional Transport Authority
SDGs	Sustainable Development Goals
VPD	Vehicles per day
HTV	Heavy Transport Vehicles
LTV	Light Transport Vehicles
MDP	Multan Dry Port
GFAs	Goods Forwarding Agencies
PTIAI	Public Transport Infrastructure Accessibility Index

DISCLAIMER

Urban Sector Planning and Management Sector Unit (Pvt.) Ltd. has prepared this report on the Transport & Connectivity Plan of the Multan Division. Maximum care and caution have been observed while developing this document. No part of this document may be reproduced or transmitted in any form or by any means or mechanical, including photocopying, recording, or information storage and retrieval the express permission, in writing, by a competent authority. The opinions expressed in the document are solely those of the authors and publishing in any way constitutes an endorsement of the opinion by the Urban Unit.

GENERAL MANAGER

Dr. Syed Murtaza Asghar Bukhari

TECHNICAL TEAM

Mohsin Raza, M.Sc. (PE), Program Manager, The Urban Unit

Ahmad Shoukat, Project Officer, The Urban Unit

INTRODUCTION

1.1 Background

Regional transport planning is the process of developing a comprehensive and coordinated transportation plan for a specific region or area. The goal of regional transport planning is to ensure that the transportation network in the region is efficient, effective, and sustainable. It is an interdisciplinary approach that involves stakeholders from various sectors including government, transportation providers, local communities, businesses, and advocacy groups.

Regional transport planning considers the current and future transportation needs of the region and its residents. This includes the demand for different modes of transportation such as roads, public transit, biking and walking paths, and air transportation. The process also considers the current and future land use patterns in the region, as well as the impact that transportation has on the environment and quality of life in the region.

A regional transportation plan outlines the goals and objectives of the transportation system in the region and provides a comprehensive vision for the future. The plan also outlines specific projects and programs that will be implemented to achieve these goals and objectives.

Another important aspect of regional transport planning is the involvement of various stakeholders in the process. This includes representatives from the public, private, and non-profit sectors, as well as community members. The input and perspectives of these stakeholders are crucial in helping to shape the transportation plan that best meets the needs of the region.

One of the main benefits of regional transport planning is that it allows for a more coordinated approach to transportation development. This can lead to the more efficient use of resources and the creation of a more cohesive transportation network. Additionally, regional transport planning can help to promote economic development in the region as well as improve access to employment, educational, and recreational opportunities.

In summary, regional transport planning is a critical process for ensuring the sustainable and efficient development of transportation networks in regions and communities. It involves considering the current and future needs of the region, as well as the perspectives and input of a wide range of stakeholders. By working together to create comprehensive and coordinated transportation plans, stakeholders can create transportation systems that serve the needs of the communities and promote sustainable growth and development.

Throughout financial year, the Planning and Development (P&D) Board, Government of the Punjab, receives numerous funding requests for road and transport schemes put forwarded by the respective departments: Communication and Works Department (C&WD) and the Transport Department. However, these individual road schemes at times lack a regional perspective and overlook benefits that may be associated with the alternate transport and connectivity schemes.

This regional transport plan addresses this gap for Multan Division for the next ten years (2023-2033). It allows for a comprehensive and coordinated approach to transportation development, which can lead to the more efficient use of resources and the creation of a more cohesive transportation network. By setting regional priorities, this rapid regional transport planning studies ensure that the transportation system in the region is efficient, effective, and sustainable.

It should be noted that the Urban Unit has the expertise, in-house spatial data repositories, and experience necessary to carry out a comprehensive assessment of the transportation needs in the region. Through this regional transport planning study, the Urban Unit provided a platform for stakeholder engagement and collaboration that allows for collecting any missing data. These stakeholders included but are not limited to the C&WD, District Regional Transport Authorities (DRTAs), and other relevant government officials in the respective district administrations: Multan, Vehari, Khanewal and Lodhran. The input and perspectives of these stakeholders helped shape the transportation plan that best meets the needs of the region.

1.2 Multan Division, An Overview

Multan Division is in the south of Punjab Province, next to the Bahawalpur Division (100 km away). Other nearby and key destinations and their road travel distances from Multan are Faisalabad, 242km; Lahore, 338 km; Zhob, 428 km; Islamabad, 539 km, and Karachi, 879 km (**Figure 1-1)**. The division is connected to these destinations via a network of national and provincial roads as well as the Pakistan Railways. The division is comprised of four districts: Multan, Vehari, Khanewal, and Lodhran. Multan District is spread over an area of 3788 km^2 and has a population of around 4.7 million (4,745,109 according to 2017 Census). The district has a diverse economy that primarily relies on agriculture. Mango is a well-known produce of the district.

Additionally, Multan is known for producing a variety of crops including wheat, cotton, and sugarcane. The industrial sector is focused on textiles, food processing, and engineering, with textile manufacturing being the largest industry. There are 220 cotton ginning and spinning factories in Multan which comprise 37.4% of the total industrial units in the district. The service sector, including retail, banking, and financial institutions, also plays an important role. Tourism is a growing contributor to the economy due to the city's rich cultural and historical heritage, with attractions such as the Multan Fort, the Mausoleum of Shah Rukn-e-Alam, and the Shrine of Bahauddin Zakariya drawing visitors from all over the country and the world. Overall, Multan's economy is diverse and growing, with ample opportunities for businesses and investors.

Khanewal District, established in 1985, comprises four tehsils: Khanewal, Mian Channu, Kabirwala, and Jahanian. Situated along the Peshawar-Karachi main railway line and the Grand Trunk Road (N-5), the district enjoys strategic transportation links. It is surrounded by six neighboring districts: Multan, Jhang, Sahiwal, Vehari, Toba Tek Singh, and Muzaffargarh. Tulamba, an ancient town located in Tehsil Mian Channu, holds historical importance as it is believed to have been visited by Alexander the Great. The district covers a total area of 4,349 square kilometers and consists of 135 union councils and 679 villages. Khanewal

District is primarily an agricultural region, with farming being the major occupation of its residents.

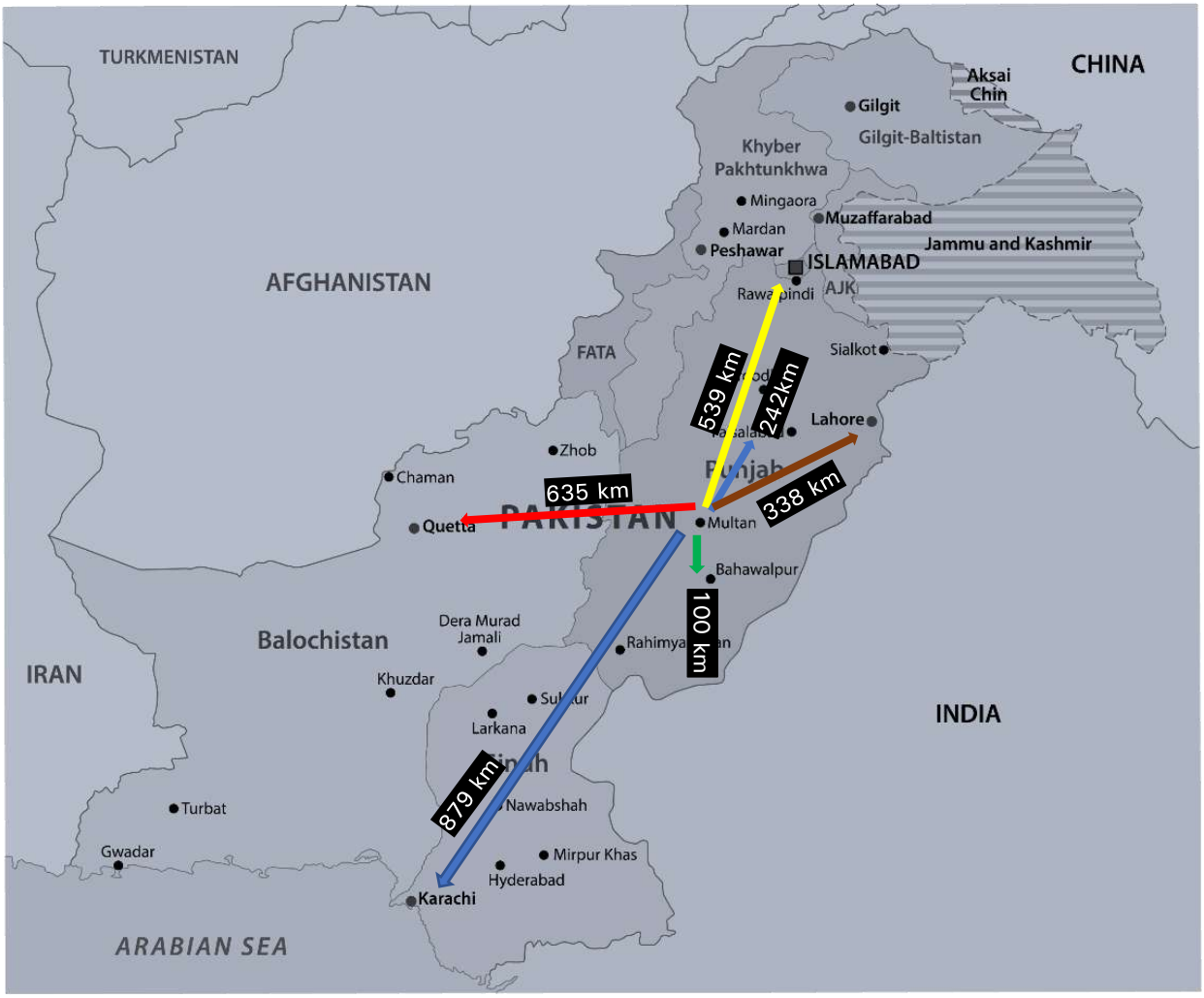


Figure 1-1: Multan Division Location and Regional Positioning

The district has a population of approximately 2.92 million, with a mix of rural and urban areas. The rural population stands at 2.36 million, while the urban population is around 564,000. The district exhibits a nearly equal distribution of male and female residents. Land utilization statistics indicate that about 85.34% of the total area is dedicated to cultivated agriculture, while the remaining 14.66% is uncultivated land.

Khanewal District is home to various industries and registered industrial units, contributing to its economic development. These include spinning and weaving mills, cotton ginning factories, poultry farming and hatcheries, food and beverage companies, sugar mills, agricultural implement manufacturers, rice mills, brick kilns, flour mills, powerhouses, and seed processing facilities. Notable industries in the district include Nestle Pakistan Pvt. Ltd. in Kabirwala, Unilever Tea Factory in Khanewal, Colony Sugar Mills in Mian Channu, Rousch

Power Plant in Abdul Hakim, and various textile mills such as Hussain Textile Mills, Masood Fabrics Pvt. Ltd., and Qureshi Textile Mills.

Vehari is divided into three tehsils, namely Vehari, Burewala, and Mailsi. The district is further divided into 105 union councils and encompasses a total of 774 villages. The district has a total area of 4,364 square kilometers. The population of Vehari District is estimated to be around 2,897,446 people. The district has a predominantly rural population, accounting for 82.5% of the total population, while the remaining 17.5% live in urban areas. In terms of industries, Vehari District is home to various manufacturing facilities. It has 98 cotton factories, 61 rice mills, 17 flour mills, 4 ghee mills, 94 oil mills, and 310 brick kilns. These industries contribute to the economic development of the district.

Vehari is situated at a distance of approximately 96 kilometers from the city of Multan. The city finds its location along the historically significant Multan-Delhi Road, which was originally constructed under the patronage of the illustrious Mughal Emperor Sher Shah Suri. Positioned at an elevation of 443 feet above the sea level, Vehari proudly holds the 62nd position among the largest cities in Pakistan. Geographically, it shares borders with Bahawalnagar and Pakpattan towards the east, Khanewal and Lodhran towards the west, while the flowing waters of the Satluj River and Bahawalpur grace its southern periphery. To the north lies the city of Sahiwal. Extending over a considerable expanse, Vehari spans approximately 80 miles in the east-west direction and 40 miles in the north-south direction. With a thriving population estimated to be around 3.5 million inhabitants, Vehari stands as a vibrant and bustling city.

Vehari encompasses several important places of historical and cultural significance. The Masood Jhandir Research Library, the largest private library in the country, stands in Sardar Pur Jhandir village, offering an extensive collection of books, periodicals, and manuscripts. Chak Dewan boasts a rich history, with legends of forts and the presence of revered figures like Hazrat Sher Dewan Chawli and Baba Guru Nanak. Sardar Pur Jhandir village is known for its modernized infrastructure and the renowned Sardar Pur Jhandir Library. Luddan village holds historical evidence, while Karampur stands as one of the oldest towns with ties to the Rajput and Arain families. Lastly, Machiwal village, established during the Sikh rule, adds to the district's cultural fabric. These significant places showcase the heritage and intellectual pursuits of Vehari District.

District Lodhran encompasses three tehsils: Lodhran, Kehror Pacca, and Dunyapur. It is comprised of 70 union councils and 436 villages. The district is irrigated by 60 canals, with the Mailsi canal being the primary source. There are no major headworks. Lodhran is home to the ruins of Taiwat and Tilwara towns, situated near Haveli Naseer Khan Tehsil, offering glimpses into the region's archaeological heritage. Within Lodhran, there are three significant shrines, including Noori Lal, Hazrat Baba Sakhi Pir Jeewan Sultan, and Sultan Ayoub Qattal. The district is characterized by a diverse population comprising various ethnic groups, including Lodhra, Awan, Rajpur Kanju, Baloch, Arain, Jat, Bhatti, Syed, Joiya, Noon, Tareen, Ghallu, Malik, and Jhandeer. The languages spoken in the area are Urdu, Sariki, and Punjabi.

In terms of industries, Lodhran hosts two spinning mills, three ghee mills, 65 ginning mills, 16 flour mills, 11 rice mills, and four oil extraction units, contributing to the economic

development of the district. The land statistics indicate a total area of 691,115 acres, with 599,457 acres dedicated to cultivation and 91,658 acres remaining uncultivated. According to the 2017 census, the total population of District Lodhran stands at 1.7 million, with approximately 0.86 million males and 0.83 million females. The average household size is around eight persons, resulting in a significant number of household units reaching 262,650. District Lodhran showcases a blend of cultural heritage, agricultural productivity, and industrial growth, contributing to its overall development and significance within the region.

1.3 Transport Connectivity of Multan Division

Figure 1-2 summarizes the key transport nodes and links that play major role in transport connectivity within and beyond the region. The division is served by Multan International Airport; one of the busiest airports in the country which witnessed an annual 6097 aircraft movements including both commercial and non-commercial aircrafts according to the data available with the Civil Aviation Authority. (Civil Aviation Authority, 2021). The airport facilitated movement of 765635 passengers that included domestic and international travelers. Concerning roadways, the division is served by 31801.18 km of roads including three motorways: M-3 (Lahore-Abdul Hakeem Motorway), M-4 (Pindi-Bhattian-Faisalabad Motorway) and M-5 (Multan-Sukkur Motorway). Additionally, there are 39 railways stations, and one dry port, namely, Multan Dry Port. To support freight transport, there are 50 goods forwarding agencies (GFAs) in the division but only one formal truck terminal in Multan. For passenger transport, there are 37 inter-city public transport terminals in the division.

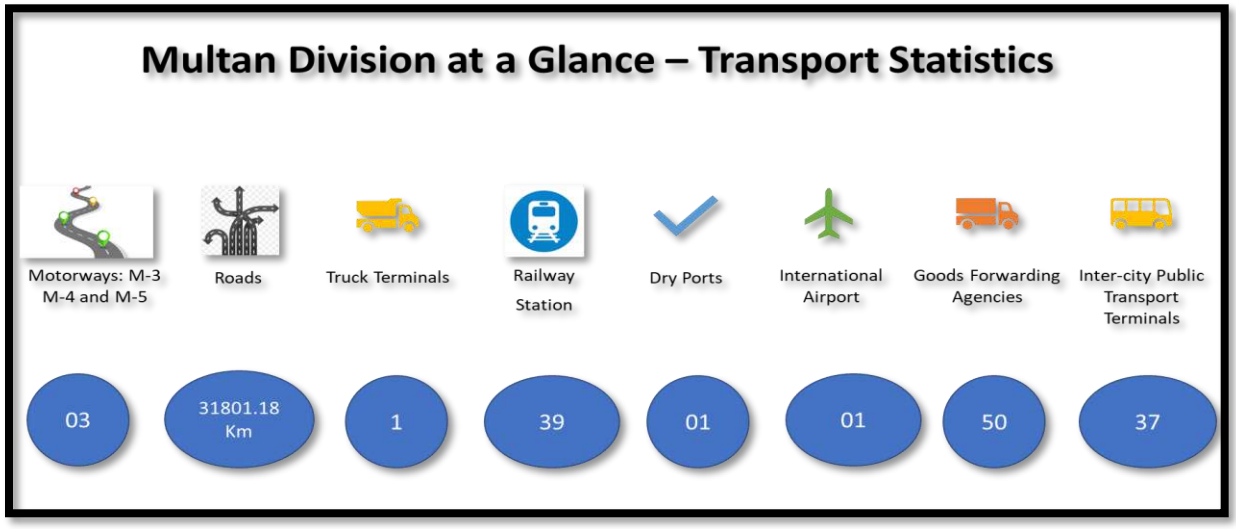


Figure 1-2: Key Transport Connectivity Nodes and Links in Multan

Road, Rail and Air Transport

The total length of the road network in Pakistan at present is 500,749.27 km (NTRC, 2023). This includes 2,471.19 km of Motorways, 427.96 km of Expressways, and 4387.70 km of primary roads. Punjab, being the most populace province of the country has the longest road network. Total length of roads in Punjab is around 280,103.65 km. Further, sub-classification of these roads includes approximately 1291.21 km of motorways, 185.35 km of Expressways, 14556 km of Highways, and 2342.92 km of primary roads.

The district wise profile of the road network statistics of Multan Division are summarized in Figure 2-1 to Figure 2-4. Multan District has a population of 4,745,109 (Census 2017), an area of 3788 sq.km (The Urban Unit), and a total road network length of 10586 km. The length of motorways that fall in Multan is 148.3 km, and the length of provincial highways is 276.6 km, primary roads, 75.7 km, secondary roads, 1386.1 km, and local roads 8609.9 km (Figure 2-1). The Multan district is well connected with adjacent districts through an extensive network of motorways, national highways and provincial highways. N5 serves as one of the primary corridors, it connects Multan with Khanewal on eastern side and Bahawalpur on the southern side. Other corridors include M4 that connects Multan with Khanewal and onwards Faisalabad. In addition to national highways, major provincial highways connect Multan with Lodhran and Vehari.

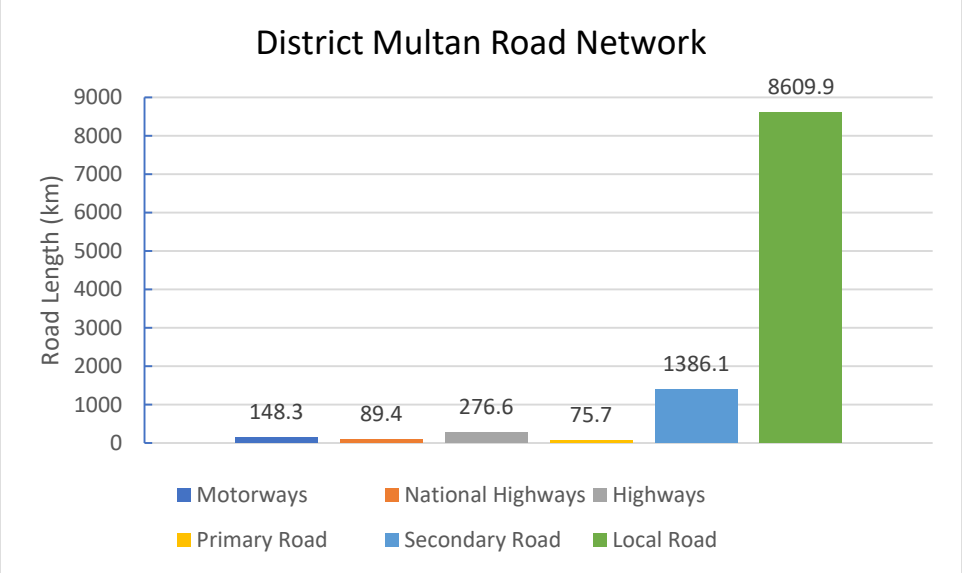


Figure 2-1: Road Network of District Multan

Khanewal has a population 2,921,986 (Census 2017), an area of 4,292 sq.km (The Urban Unit), and a total road network length of 8,414.9 km. The length of motorways passing through Khanewal is 89.4 km. The length of provincial highways is 281.9 km, primary roads, 8.2 km, secondary roads, 2179.9 km, and local roads 5775.8 km (Figure 2-2). The Khanewal district is well connected with adjoining districts through an extensive network of motorways, national highways and provincial highways. N5 serves connects

Khanewal with Multan westerly and Sahiwal easterly. Khanewal-Lodhran Expressways (E-5) connects the district with Lodhran and witnesses high volumes of traffic.

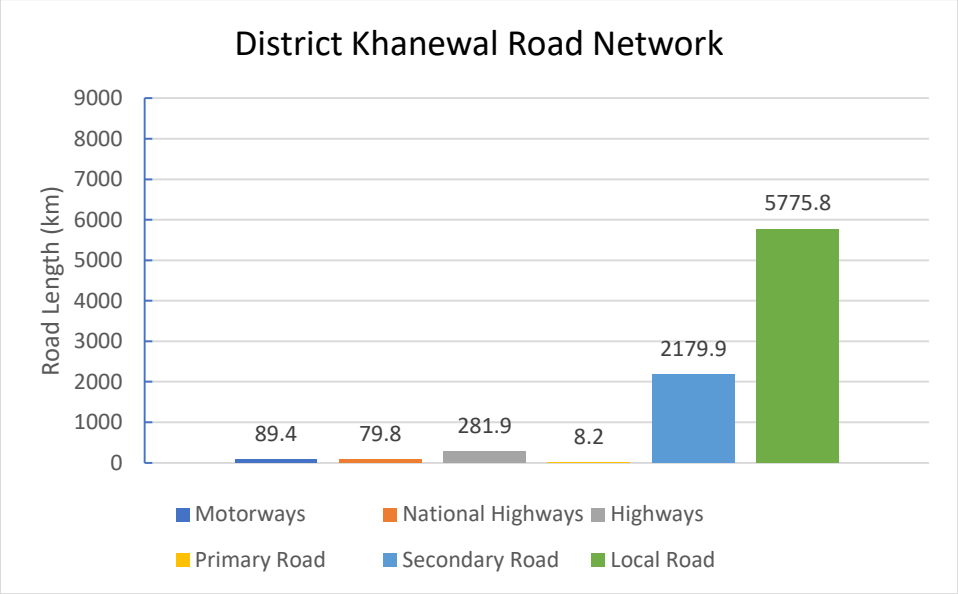


Figure 2-2: Road Network, Khanewal District

Lodhran has a population 1,700,620 (Census 2017), an area of 2,913 sq.km (The Urban Unit), and a total road network length of 5,316.3 km. There are no motorways within the district boundary. The length of provincial highways is 288.4 km, primary roads, 8.1 km, secondary roads, 1,301.9 km, and local roads 3,730.7 km (Figure 2-3). The Lodhran district is linked with bordering districts through national highway and a network of provincial highways. N-5 connects Lodhran with Multan on north-east side and Bahawalpur on southern side of district. In addition, Lodhran-Khanewal Expressway (E-5) connects Lodhran with Khanewal. Provincial highways connect the district with Vehari.

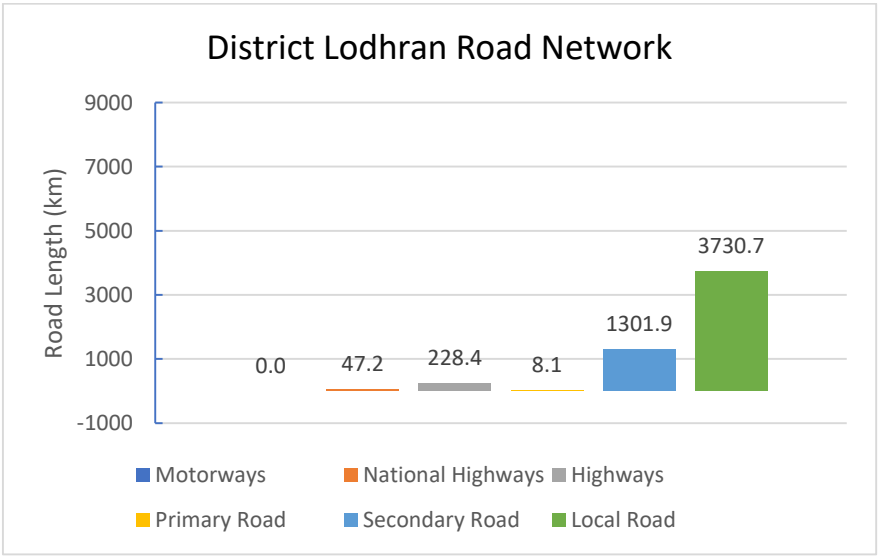


Figure 2-3: Road Network, Lodhran District

Vehari has a population of 2,897,446 (Census 2017), an area of 4,377 sq.km (The Urban Unit), and a total road network length of 7,483.9 km. No motorways pass through the district. The length of provincial highways is 375.8 km, primary roads, 51.1 km, secondary roads, 1221 km, and local roads 5836.1 km (Figure 2-4). Provincial highways connect the district with Lodhran on the West, Hasilpur and Bahawalnagar in the South, Khanewal in the North and Sahiwal in the East.

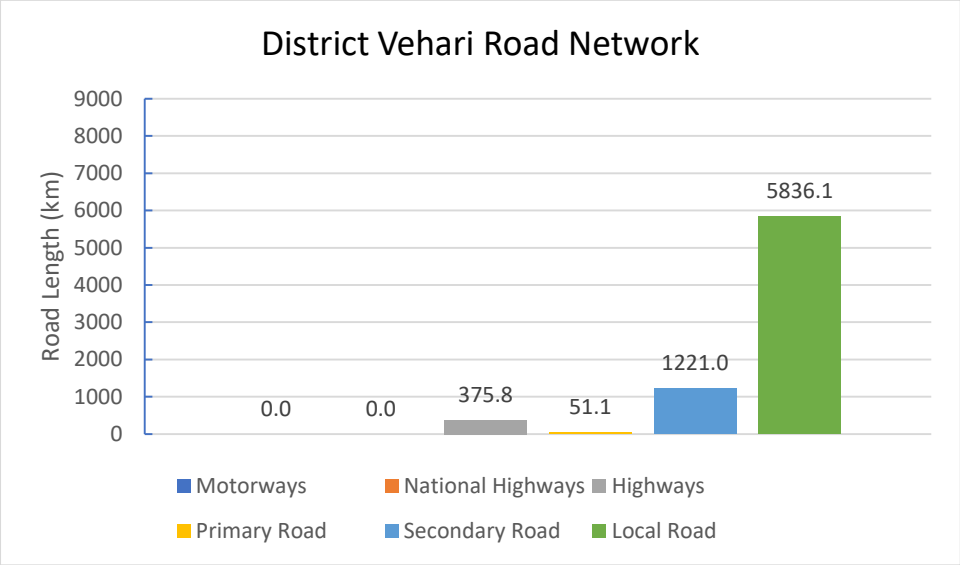


Figure 2-4: Road Network, Vehari District

2.1 Road Sector Funding by Year

The total funding of annual development program in Multan Division for all the sectors is shown year-wise for the year 2018 through 2022, in Figure 2-5. From 2018 to 2022, the all-sector funds ranged from PKR 0.07 billion in 2018 to PKR 53.02 billion in 2022. The road sector funds varied from PKR 0 in 2018 to PKR 32.07 billion in 2022. The percentage allocations for road sector funds ranged from 0% in 2018 to 60% in 2022. The highest percentage allocation of road sector funds was observed in 2022, with 32.07 billion Pakistani rupees being allocated, which is equivalent to 60% of the all-sector funds. In contrast, the lowest percentage allocation of Road Sector Funds was observed in 2018.

This data shows that when the road repair and maintenance needs can only be postponed, and not ignored for a long time. This however results in accumulation of funding needs which at times might consume a much bigger chunk of the overall funding than routinely needed. The data also highlights the need for a road asset management (RAM) tool that could equip the decision makers to foresee road repair and maintenance need and arrange for budgeting in advance. Delays in minor road repairs often lead to more expensive resurfacing requirements that put unnecessary burden on the provincial exchequer. Moreover, a RAM tool can help distribute the road sector funding among various schemes in a justified way.

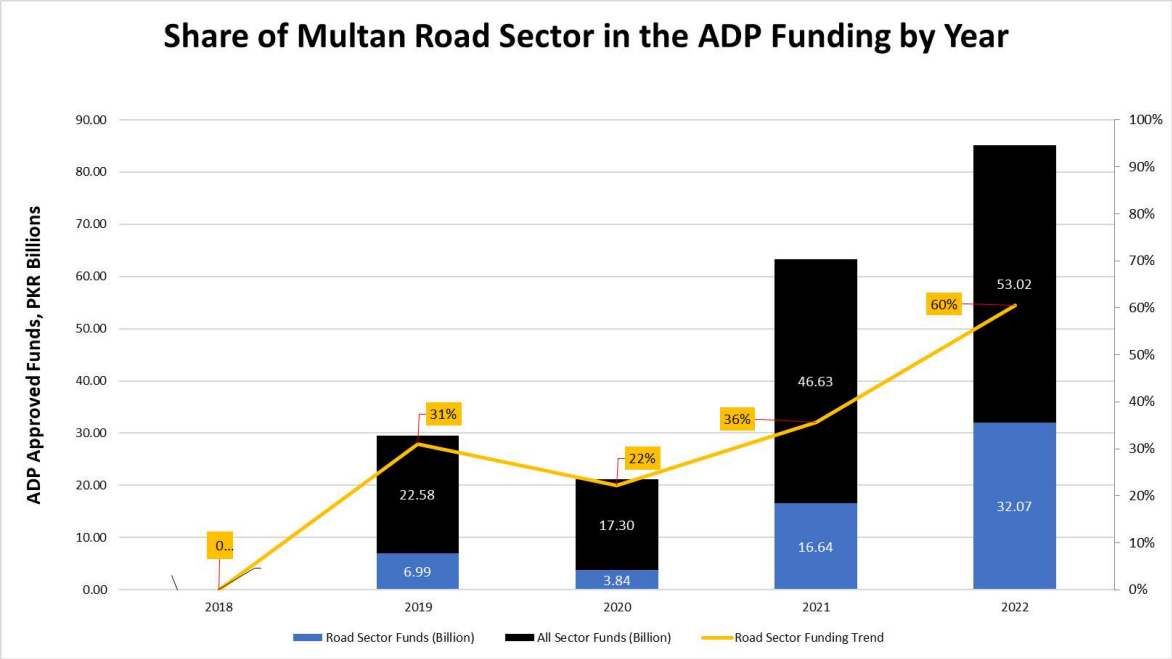


Figure 2-5: Share of Road Sector in ADP Funding

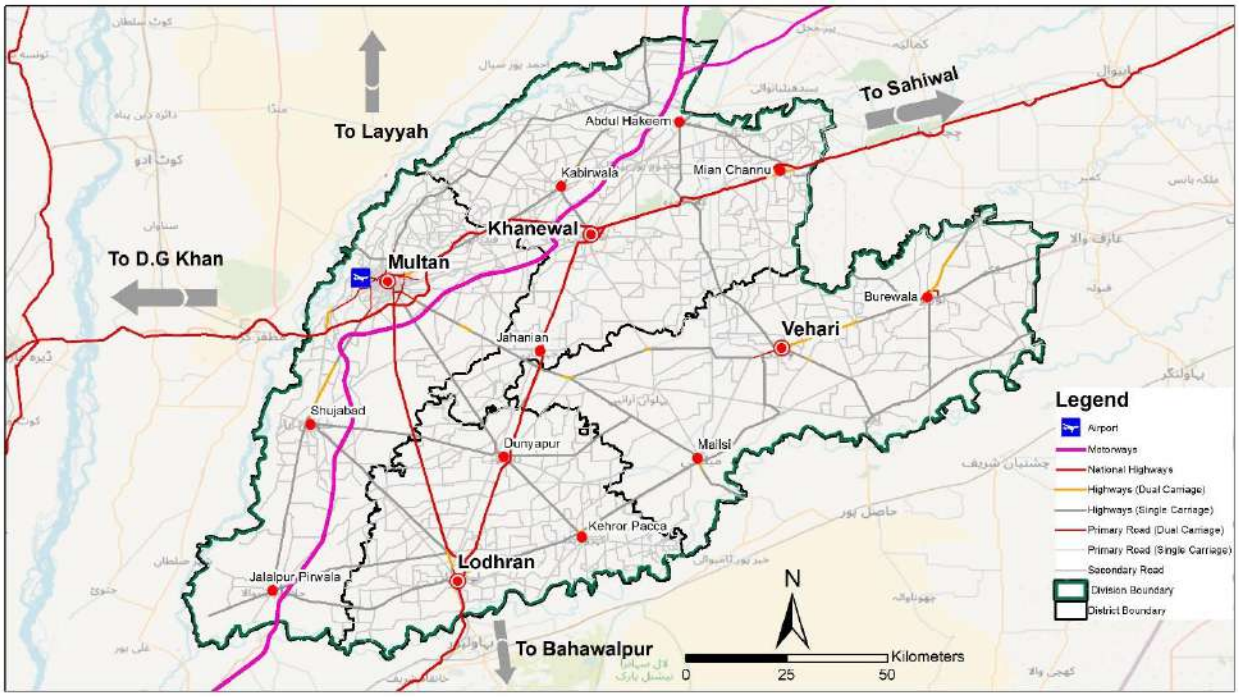
2.2 Road Network Mobility

Motorways, national highways, and provincial highways especially those with dual carriageways accommodate high speed traffic. The average design speed of motorways in Pakistan is 120 km/hr, national highways 100 km/hr, and provincial roads, 80 km/hr for dual carriageways and 50 km/hr for single carriageways. However, factors such as high traffic volume and deteriorated roads often result in less than desired speeds on these roads, in particular the provincial highways that find it increasingly hard to compromise between access and mobility. Figure 2-6 depicts an overall situation of roadway mobility in terms of the road types in the division.

The motorways that provide access to Multan Division include, Multan-Faisalabad Motorway (M-4), Sukkur Multan Motorway (M-5), and Lahore-Abdul Hakeem Motorway (M-3) as shown in Figure 2-6. Other high speed national roads include N-5 (GT Road) that connects Multan with Karachi via Bahawalpur in the South-West and Peshawar (via Lahore and Rawalpindi) in the North. N-70 (Multan-Qilla Saifullah Highway) is another national highway that originates from Multan and Terminates in Balochistan in Qila Saifullah. Additionally, Khanewal and Lodhran are connected by E-5 (Lodhran-Khanewal Expressway).

Key provincial roads provide connectivity, primarily through single carriageways among key cities in the division: Multan, Khanewal, Kabirwala, Mian Channu, Shujabad, Jahanian, Kacha Khou, Vehari, Burewala, Mailsi, Lodhran, Kahror Pakka, Dunyapur, and Jalalpur Pirwala. The length of provincial highways that comprise dual carriageways is negligible considering the vast area of the division. In many cases, according to the policy of the Communication and Works Department, Government of the Punjab, there is a need to dualize the road to accommodate high traffic volume. As a policy, the P&D Board recommends considering provincial roads (arterials) that witness more than 8000 vehicles per day (P&D Board, 2018).

Figure 2-6: National and Provincial Road Network in Multan Division



The total average daily traffic on the major provincial roads in Multan is shown on Figure 2-7. The highest daily traffic volumes, measured in vehicles per day (VPD), were observed on Multan Vehari Road (20023 VPD). The second and the third busiest roads are Bosan Road (12368 VPD) and Head-Islam to Kacha Khuh Road (11300 VPD). Other roads that feature heavy traffic volumes are Multan Norther Bypass Road that connects Multan with Layyah (10527 VPD) and Burewala-Arifwala Road (10632 VPD). These, and other high traffic volume roads are candidates for dualization. Therefore, this report looks at the traffic split on each of these roads to understand the impact of possible dualization of the road on the overall mobility, and the cost benefit ratio of such interventions. In addition, there are roads which feature traffic but might not be suitable candidates for dualization. Such roads have been considered for upgradation and widening. Further discussion on this follows in the later parts of this report.

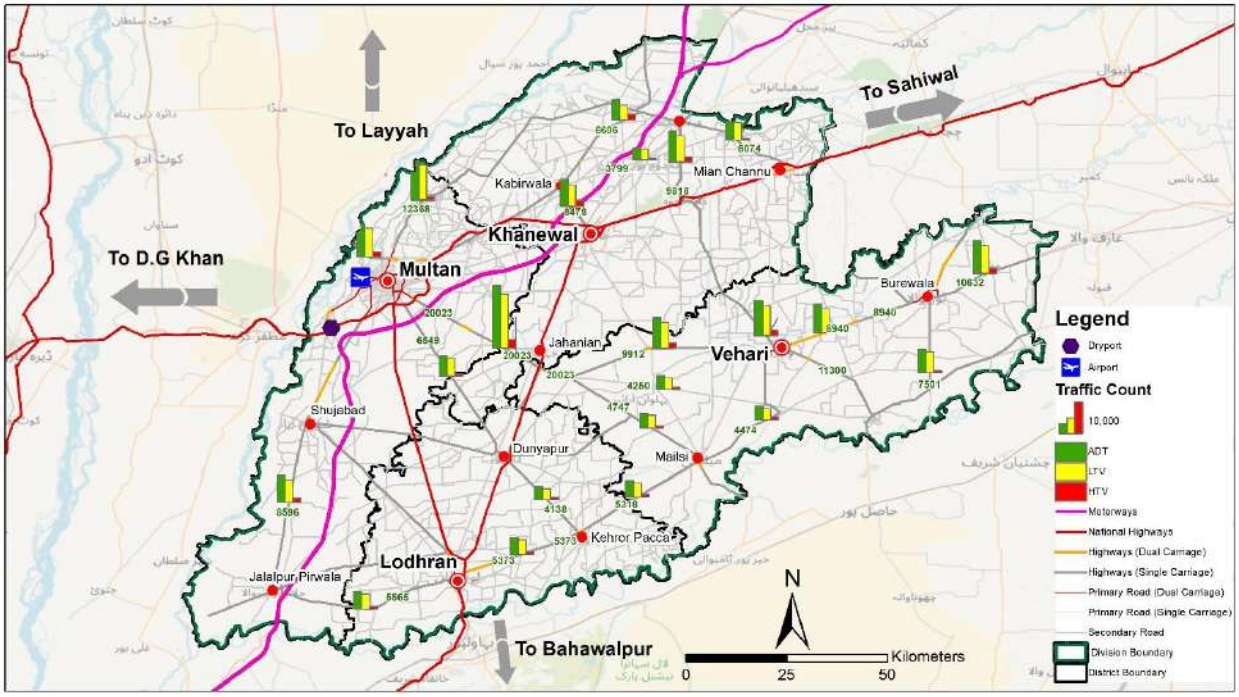


Figure 2-7: Average Daily Traffic on Key Provincial Roads

Light transport vehicles (LTVs) constitute the major share of traffic on nearly all the provincial roads indicating passenger transport as the dominant transport type. However, significant volumes of heavy transport vehicles (HTVs) have been also been observed on many roads including Khanewal-Kabirwala Road (1759 HTVs) and BZU-Abdul Hakeem Road (1015 HTVs). These roads make a good candidate to be declared as freight corridors with truck terminals, commercial facilities, and industrial parks. Figure 2-8 shows existing primary (national) and secondary (provincial) freight corridors based on extant HTV volume and the spatial distribution of small, medium and large-scale industrial units in Multan Division. The national freight corridors include N-5, N-70, M-5, M-4, M-3, and E-5. The provincial freight corridors include Khanewal Kabirwala Road, Jhang Road, Multan-Vehari Road, Burewala-Chichawatni Road, and Burewala Arifwala Road. In addition, Vehari-Kacha Khuh Road is also a freight corridor linking Vehari (and Hasilpur from Bahawalpur Division) to Khanewal and onwards to Jhang. The road also connects with Abdul Hakim where the traffic may choose to enter the national road network via M-3 or M-4.

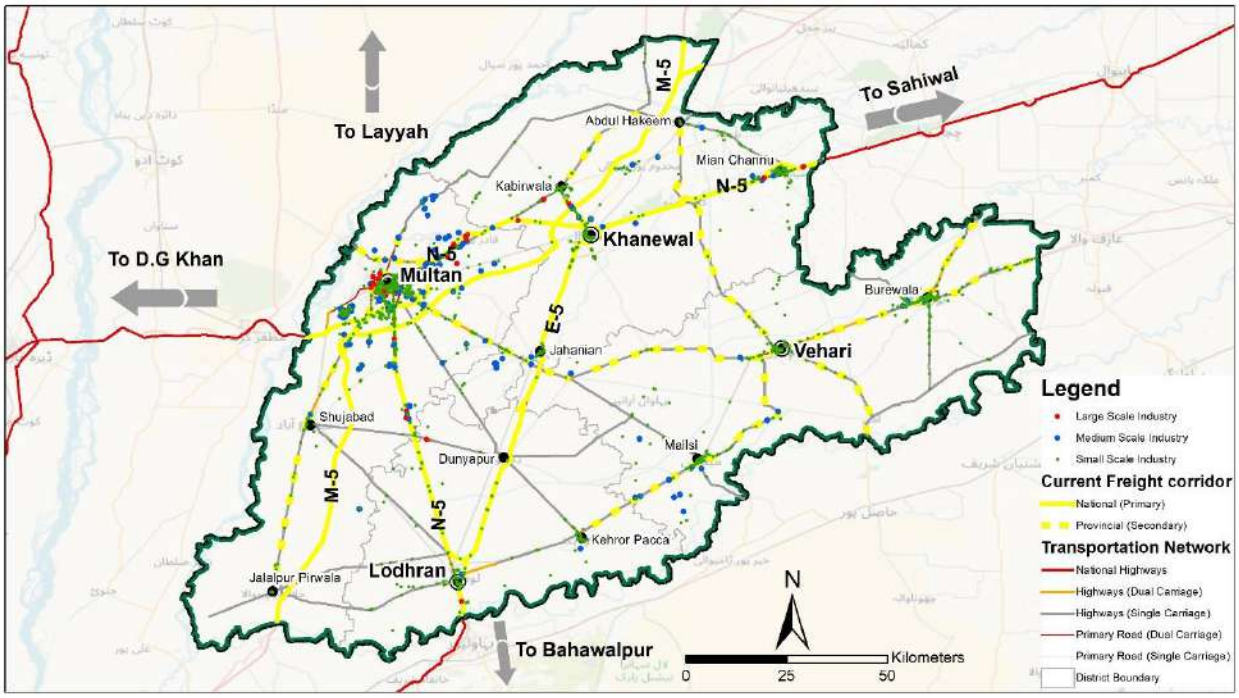


Figure 2-8: Freight Corridors in Multan Division

So far, we do not see many systematic efforts to realize the potential of these freight corridors. Declaring them as freight corridors might help public and private sectors to build and operate relevant facilities that would help not only transporters and truck drivers but also the wider business community and the region (in general).

2.3 Freight Transport Accessibility

Freight transport or logistics is attributed to the transport of goods by way of land, water or air. Having a strong logistics and transportation enhance increases economic competitiveness whereas, the inefficient transport and logistics costs may result into an increasing cost for different firms, in particularly those competing in the export market.

Freight delivery in Pakistan greatly relies on road network. The same is true for Punjab. At present more than 96% of the freight traffic is carried through roads. The main reason for this is the inefficient freight operations by other modes in particularly railways.

Punjab has the largest economy in the country and is the most industrialized province having around 68,000 industrial units. Punjab also serves as a spatial link between Khyber Pakhtunkhwa and Sindh i.e., provides North to South connectivity. Much of the local and international freight transport emerging from seaports of Port-Qassim and Gwadar transverse Punjab to its desired destination. Presently, there are 7 major dry ports in Punjab enlisted below in Table 2.1. These ports serve as a hub for shipment of international and domestic cargo to inland destinations.

Table 2-1: Dry Ports in Punjab

Sr No.	Dry Port	Type
1	Lahore Dry Port	Public sector
2	Multan Dry Port	Public sector
3	Rawalpindi Dry Port	Public sector
4	NLC dry port	Private sector
5	Sialkot Dry Port	Private sector
6	Premnagar dry port	Private sector
7	Faisalabad Dry Port	Private sector

Multan Dry Port (MDP) offers same day transshipment permit (TP), excise duty payment services, and same day clearance services. Accessibility analysis of the dry-port shows that it can serve 53% of industrial units within 10 minutes, 10% of the units between 10 and 20 minutes, 16% in less than 40 minutes and 5% between 40 minutes and an hour (Figure 2-9). It takes more than 60 minutes for the remaining 16% of the industries to access MDP.

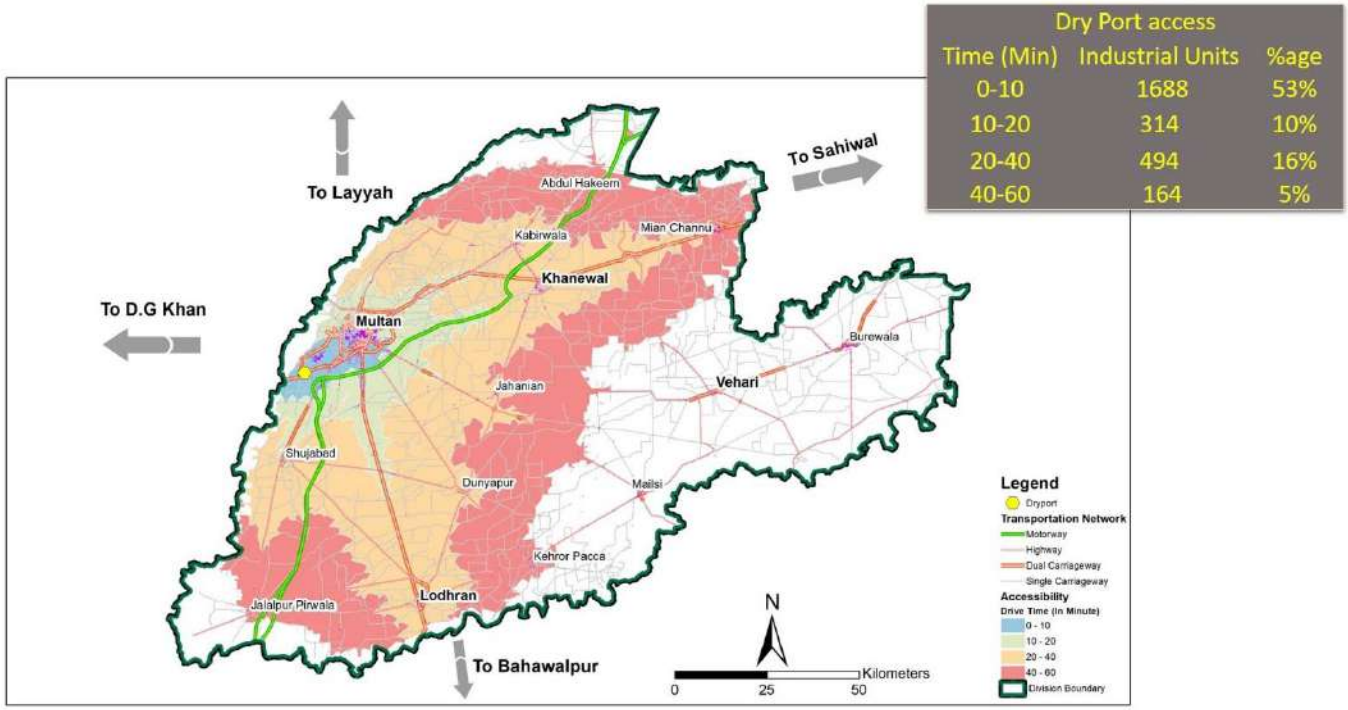


Figure 2-9: Dry Port Accessibility Analysis, Multan

Besides freight and logistics transport agencies that mainly deal with container shipments concerning large industries, goods forwarding agencies (GFAs) play a key role in transport goods for small scale industries and vendors. There are more than 640 GFAs in Punjab (Table 2-2). Of these, 21 lie in Multan, 23 in Vehari, and 06 in Lodhran. The goods forwarding agencies operate in private capacity and there seems a lack of regulation from the public sector for the trucking industry.

Table 2-2: Goods Forwarding Agencies (GFAs) in Punjab

District	GFA's	District	GFA's	District	GFA's
T.T Singh	56	Okara	17	Layyah	6
Sialkot	16	Khushab	30	Nankana sahib	10
Jhang	10	Lodhran	6	M.B din	14
Gujrat	10	Sahiwal	6	Kasur	38
Chiniot	14	Bhakar	19	Muzaffargarh	36
Bahawalnagar	27	Hafizabad	4	Bahawalpur	8
Chakwal	11	Gujranwala	2	Narowal	17
Multan	21	Rawalpindi	102	Pakpattan	7
Vehari	23	Faisalabad	106	R.Y khan	2
Mianwali	9	Sheikhupura	0	Attock	0

Private GFAs usually rent out open spaces and convert them into adhoc truck parking lots (Figure 2-10) that lack even basic facilities for the drivers such as eating, taking rest, and sleeping. There are not enough security provisions either and interviewed drivers expressed concerns about the safety of loaded goods. This lack of deserved attention to truck drivers have been persisting for far too long across the country, and has given rise to problems such as driver fatigue and road accidents. In addition, a lack of formal truck terminals has resulted in goods transport accessibility-issues.

Figure 2-10: A Goods-Forwarding-Agency Stand in Multan

As mentioned earlier, there is only one formal goods transport truck terminal in Multan (along the Makhdoom Rasheed Road). An accessibility analysis of the terminal is shown in Figure 2-11. The terminal provides a transport coverage to 2% of the geographical extent of Multan

Division within a time band of 0-10 minutes. This coverage is increased to 8% when the drive time is increased to range from 10 to 20 minutes. By further increasing the drive time to 30 minutes, around 12% of the division may be served. However, these calculations assume that there are enough trucks to respond to each service request without any delay which might not happen all the time. This analysis indicates the need for increasing the number of formal truck-stands with all the necessary facilities for drivers. To begin with, the regulator agencies can make one model truck terminal in each of the district headquarters with all the basic facilities for the trucking community. These model truck terminals can help set standards for private GFAs and the entire sector may be regulated for an improved quality of life for drivers and a better service provision for the industry.

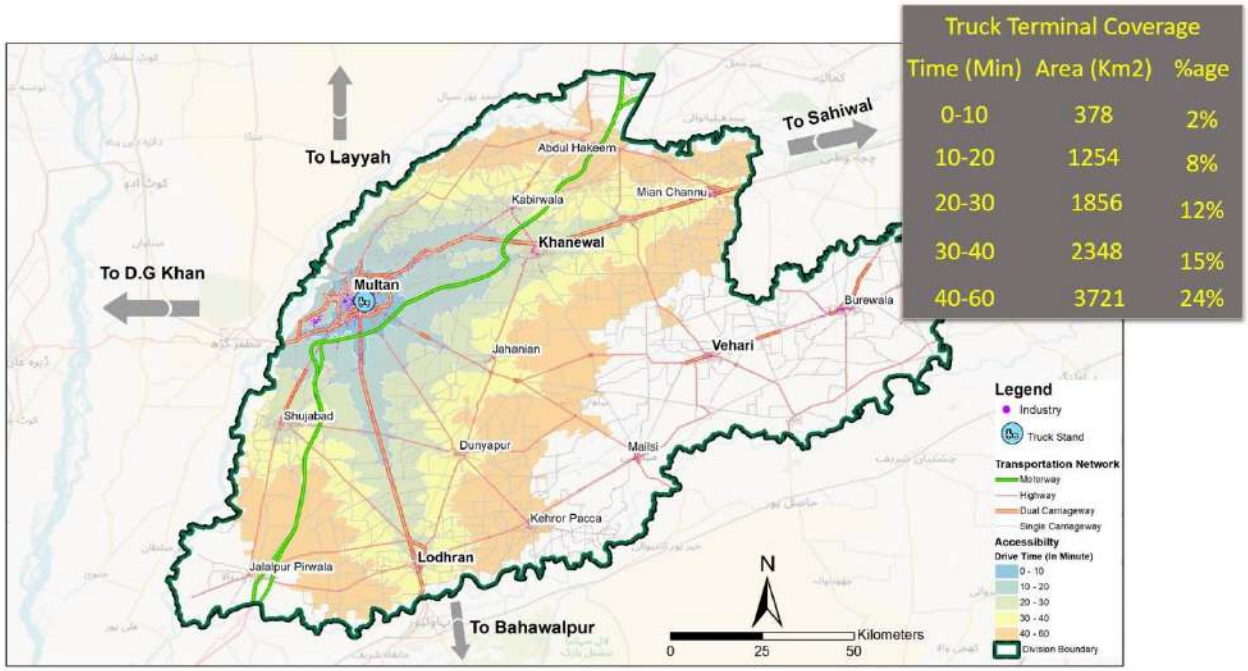


Figure 2-11: Truck Terminal accessibility analysis, Multan

2.4 Public Transport

Public transport affects socio-economic development of cities in two ways. Firstly, inadequacies in public transport provision create barriers by limiting individual and community participation in activities such as employment, health, and education, etc. These inadequacies can be due to inappropriate network link between the transport system, and activities. Secondly, operation of the public transport system results in environmental, aesthetic, and social externalities on individuals and communities, as opposed to others. In both scenarios, people are forced to opt alternate modes of travel usually private means to access their desired activities.

Rapid increase in population has resulted in more vehicular trips across the province and within the cities. Consequentially, both inter-city and intra-city public transport system has observed major changes. Apart from urbanization, other factors have also contributed to these variations. Nonetheless, multiple efforts have been made to revitalize public transport

system in the province; however, share of private vehicular trips both within intercity and intra-city travel has remained higher. The public transport system can be classified as:

1. Intercity Public Transport
2. Intra-city (or Urban) Public Transport

2.4.1 Inter City Public Transport

Intercity Transport in Punjab is partially deregulated. The Government of Punjab only regulates the fare of non-air-conditioned intercity transport to ensure equity, and convenience to the public. Presently there are more than 116,000 intercity and 26,000 intra-city vehicles playing in Punjab who has obtained route permits from regulatory authority during 2014-17. Likewise, there are three hundred and seventy-four (374) intercity bus terminals in Punjab classified as A, B, C and D Class terminals. Presently, there is no A-class terminal in the province, there are only three (3) B-class terminals. There are one hundred and fourteen (114) C-class terminals. Likewise, there are two hundred and fifty-five (255) D-class terminals in the province.

There are 35 intercity bus terminals in Multan Division of which 10 are owned by government while the rest (25) are privately owned. District wise list of bus terminals with type is given in Table 2-3. General bus stand in Multan City is in good condition all the basic amenities are available to public and drivers. While poor cleanliness, pavement and drainage conditions persist in general bus stand of many THQs in the division. More on the accessibility of these bus terminals follows in the next chapter.

Table 2-3: District Wise Bus Terminals in Multan

District Name	Terminal Type	Number of Terminal
Khanewal	C Class Stand	03
	D Class Stand	02
Multan	B Class Stand	01
	C Class Stand	02
	D Class Stand	14
Lodhran	C Class Stand	02
	D Class Stand	02
Vehari	C Class Stand	02
	D Class Stand	07

2.5 Rail Network

Rail transport plays a pivotal role in facilitating efficient and cost-effective passenger and freight movement, bringing several significant advantages to the transportation industry. One of the key benefits is the potential for reduced transport costs. Railways have the capacity to carry large volumes of passengers and freight over long distances, offering economies of scale. By consolidating a substantial number of individuals or goods into a single train, rail transport allows for cost savings compared to individual vehicles or smaller-scale transportation methods. This leads to lower per-unit transport costs and improved affordability for both passengers and businesses.

Furthermore, rail transport contributes to the economy of scales. The large capacity of trains enables efficient utilization of resources, such as fuel and labor. By transporting a considerable number of passengers or a substantial quantity of goods in a single journey, rail transport maximizes the use of available infrastructure and minimizes the need for additional investments in roads and highways. This leads to improved productivity and cost efficiency, benefiting industries reliant on bulk transportation, such as manufacturing, agriculture, and mining.

In terms of environmental sustainability, rail transport has gained recognition for its comparatively lower carbon footprint compared to other modes of transportation. Trains generally consume less energy per passenger or ton of freight transported, resulting in reduced greenhouse gas emissions. By promoting modal shifts from road and air transport to rail, countries can significantly reduce their overall carbon emissions, mitigate air pollution, and contribute to environmental conservation efforts. Additionally, rail transport is often electrified, allowing for the utilization of renewable energy sources, further enhancing its sustainability credentials.

Safety is another crucial aspect where rail transport excels. Railways are designed with safety as a top priority, featuring dedicated tracks, signaling systems, and strict operational protocols. This helps minimize the risks associated with accidents and collisions, making rail transport one of the safest modes of transportation. With its predictable routes and centralized control systems, rail transport offers a high level of reliability and reduces the likelihood of human errors that can lead to accidents. These safety characteristics make rail an attractive option for both passengers and businesses seeking secure and dependable transportation solutions.

In conclusion, rail transport brings numerous benefits to passenger and freight transportation. It offers reduced transport costs through economies of scale, contributes to the economy of scales, enhances environmental sustainability through lower carbon emissions, and prioritizes safety with its dedicated infrastructure and operational protocols. Recognizing the importance of rail transport and investing in its development can lead to a more efficient, cost-effective, and sustainable transportation system, fostering economic growth while minimizing environmental impact and ensuring the well-being of passengers and freight operators alike.

Figure 2-12 provides some insights into the railway access of the people in Multan Division. It presents data on the distribution of individuals based on the time it takes for them to reach the nearby railway station. The population is categorized into three time-ranges: 0-20 minutes, 20-40 minutes, and 40-60 minutes. The analysis reveals that a significant proportion of the population, approximately 72%, enjoys convenient railway access, requiring only 0-20 minutes to reach the nearest railway station. This suggests that a large portion of the population resides in close proximity to the railway infrastructure, enabling them to easily utilize rail transportation for their commuting needs. Most of the district headquarters and tehsil headquarters in the Multan Division are located along the railway line, including Mian Channu, Multan, Khanewal, Lodhran, and Vehari.

Approximately 23% of the population falls into the 20-40 minutes time range, indicating a moderate level of convenience in accessing the railway. This includes easterly part of Jalalpur-Pirwala Tehsil, and a part of the region between Vehari and Khanewal. These individuals may have to travel a bit farther but still have relatively convenient access. A smaller proportion, comprising about 4% of the population, falls into the 40-60 minutes time range, indicating that they face comparatively longer commuting times to access the railway. This group includes individuals residing in the Northern part of Khanewal district and Western Part of Jalalpur-Pirwala District.

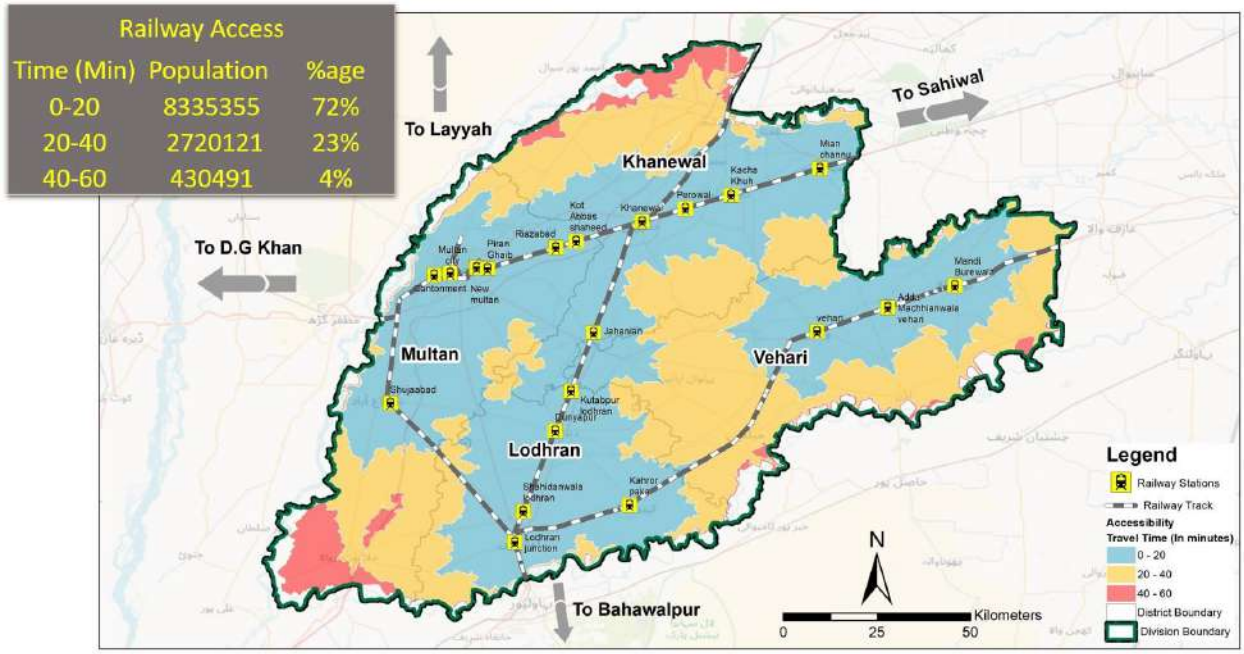


Figure 2-12: Existing Rail Network Accessibility, Multan

2.6 Airport

Air transport plays a vital role in connecting people and goods across the globe, offering unparalleled speed and accessibility. It serves as a catalyst for economic growth, enabling the efficient movement of passengers and high-value goods across vast distances. One of the key advantages of air transport is its ability to bridge geographical barriers and facilitate international trade, tourism, and cultural exchange. By connecting distant regions and facilitating rapid global mobility, air transport contributes to economic development and creates opportunities for businesses to expand their markets.

Furthermore, air transport delivers unparalleled time efficiency. With its high speed, long-distance flights can be completed in a fraction of the time compared to other modes of transportation. This makes air transport particularly advantageous for time-sensitive activities, such as emergency medical services, perishable goods transportation, and time-critical business travel. The ability to swiftly transport people and goods over vast distances contributes to the efficiency and competitiveness of various industries, allowing for quick decision-making, just-in-time delivery, and global connectivity.

In terms of safety, air transport has achieved remarkable advancements and stringent safety standards. The aviation industry invests significant resources in technology, infrastructure, and training to ensure the highest level of safety for passengers and crew. Aircraft are equipped with advanced navigation systems, state-of-the-art communication tools, and rigorous maintenance protocols. Additionally, comprehensive safety regulations and continuous oversight by aviation authorities further enhance the safety record of air transport. While no mode of transportation is entirely risk-free, the industry's commitment to safety, coupled with ongoing advancements in technology, contributes to the high level of trust passengers place in air travel.

Moreover, air transport brings substantial economic benefits to nations. It creates direct and indirect employment opportunities, ranging from pilots and cabin crew to ground staff, maintenance personnel, and airport services. Airports serve as critical economic hubs, attracting businesses, fostering tourism, and promoting international investments. The aviation industry stimulates trade, drives tourism revenues, and supports various ancillary services, such as hospitality, retail, and transportation. The economic impact of air transport extends beyond its direct contributions, as it acts as a catalyst for economic activity in numerous sectors and regions.

In conclusion, air transport plays a pivotal role in global connectivity, economic development, time efficiency, and safety. It enables rapid and efficient long-distance travel, facilitates international trade and tourism, and stimulates economic growth. The industry's commitment to safety, coupled with its ability to connect distant regions and facilitate time-sensitive activities, makes air transport an indispensable mode of transportation for both passengers and high-value goods. Recognizing the importance of air transport and investing in its infrastructure and operations can further enhance global connectivity, foster economic growth, and facilitate greater cultural exchange in our increasingly interconnected world.

Figure 2-13 provides insights into the distribution of the population based on the time required to reach the Multan International Airport. It offers a comprehensive overview of the accessibility levels for individuals residing anywhere in Multan Division. The population is categorized into four-time ranges: 0-10 minutes, 20-30 minutes, 30-40 minutes, and 40-60 minutes. Analysis reveals that a considerable portion of the population, approximately 17%, enjoys convenient airport access, requiring a mere 0-10 minutes of travel time. This indicates that a significant number of individuals reside in close proximity to the airport, enabling them to easily access air transportation for their travel needs. However, it is noteworthy that a relatively smaller proportion, comprising 6% of the population, falls within the 10-20 minutes time range, suggesting a slightly longer travel time to reach the airport. These individuals may reside in areas that are moderately closer to the airport, necessitating a short commute but still benefiting from relatively convenient access.

Additionally, approximately 25% of the population falls into the 20-40 minutes time range, indicating that they require a moderate amount of time to reach the airport. These individuals may reside at a reasonable distance from the airport, requiring a longer commute but still enjoying relatively accessible airport connectivity. Furthermore, about 19% of the population

falls within the 40-60 minutes time range, indicating that they face longer travel times to access the airport. This group may include individuals residing in more remote areas or regions farther away from the airport, requiring additional time and planning to reach their air travel destinations. It takes more than an hour for the remaining population of the division to access the Multan International Airport.

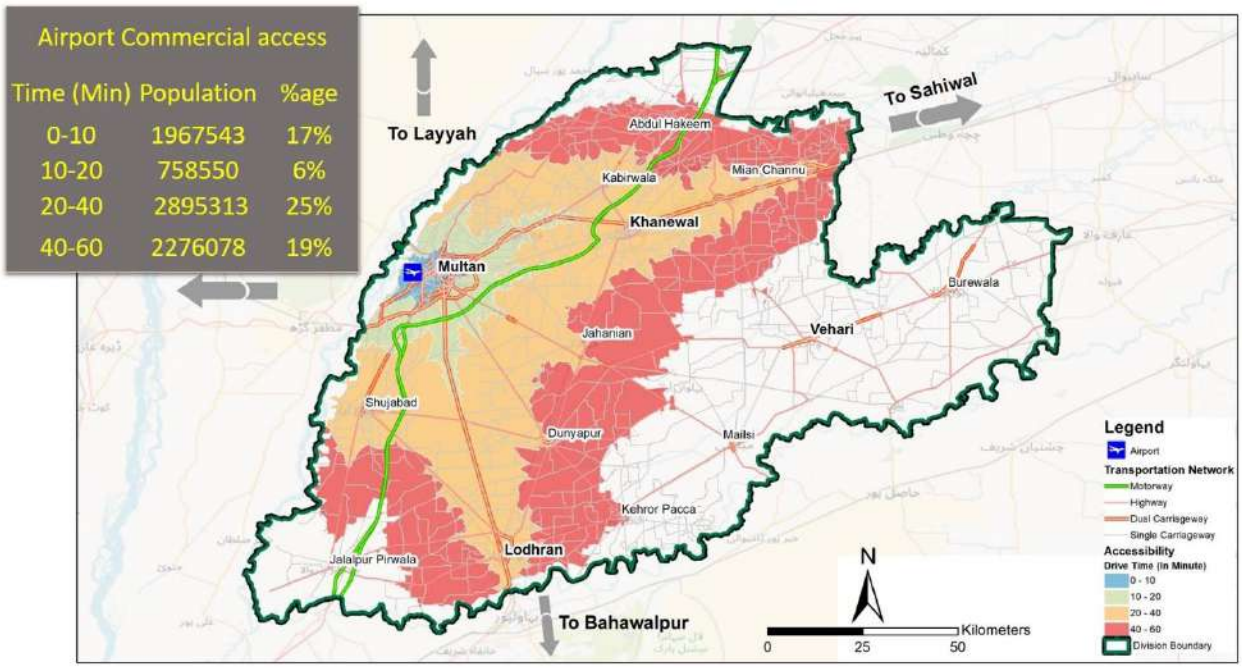


Figure 2-13: Airport Accessibility, Multan

ANALYSIS

This chapter includes an analysis of the missing connectivity links that are crucial for passenger and freight transport in Multan division. This analysis will lead to identification of the transport and connectivity schemes for the division. In particular, focus of the proposed interventions will be road sector schemes (dualizations or widening/improvement), freight transport schemes (truck terminals), and public transport schemes (mass transit). The analysis aims to compare the extant status of transport and connectivity infrastructure with transport demand, thereby identifying the missing transport infrastructure that the public agencies must provide to completely realize the potential of the division.

3.1 Identification of Road Schemes

With reference to Figure 2-6, there is a clear indication that most of the provincial roads, that play key role in the regional transport and connectivity of the division, are single (undivided) roads. Not only such roads fail to fulfil the mobility need of the regional traffic, but also, they present a safety hazard due to an increased possibility of head-on collision. In addition to mobility and safety, other road functions such as accessibility also play a role in identification of new road schemes. Here, a methodology for identification of road network schemes is presented that takes into account all these factors as well as the cost benefit ratio of the investment.

Figure 3-1 explains how to identify road schemes that can help obtain the highest rate of return both in economic and social terms. Identification of links is based on the analysis of directness index, travel speed, connectivity to CPEC and motorways of Pakistan, public transport infrastructure accessibility index (PTIAI), consultation with experts, quality and reliability of existing road network. Each identified link is then subjected to a detailed cost benefit analysis to ensure that the project is financially sound.

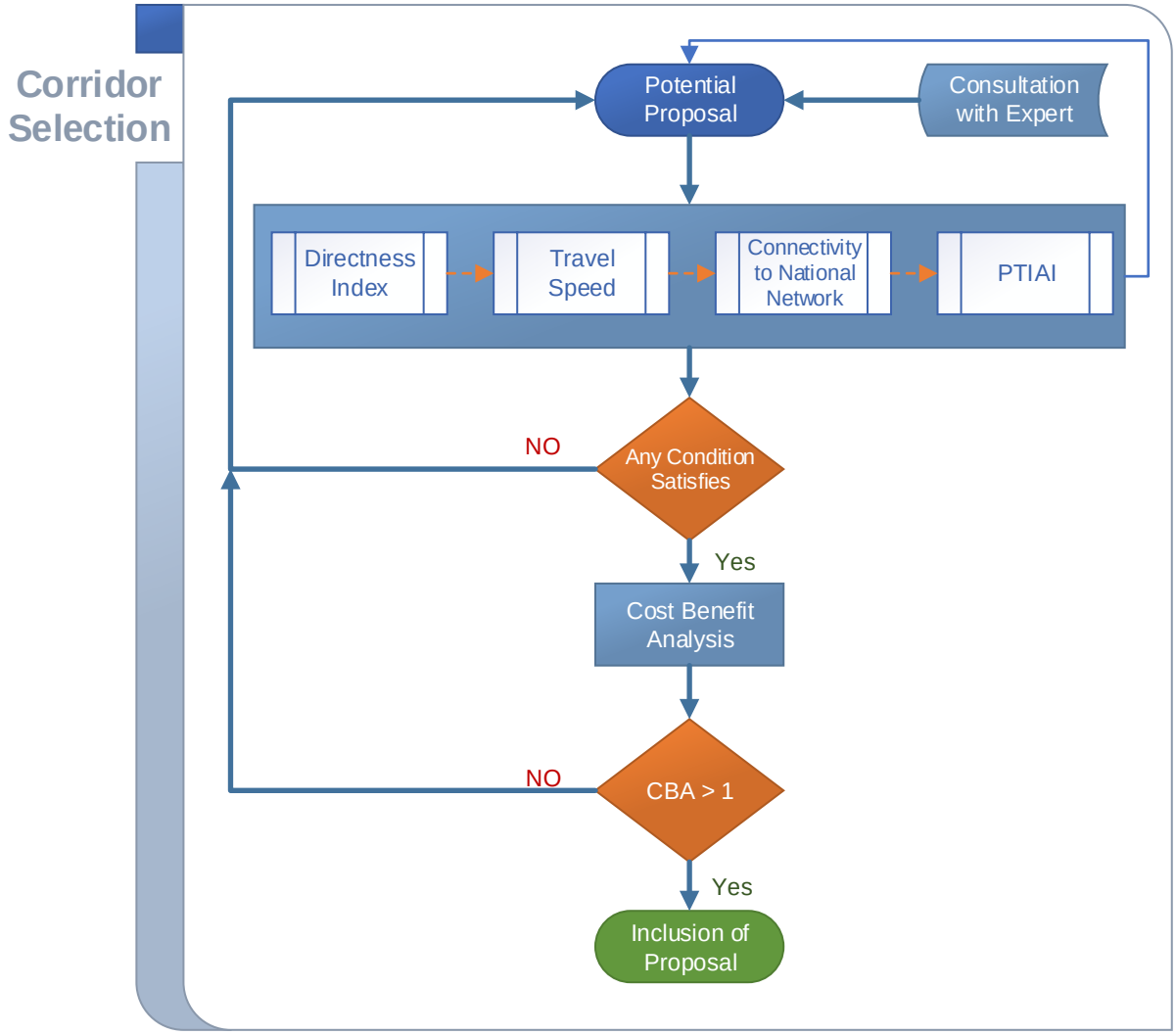


Figure 3-1: Identification and Selection of Proposed Road Corridors

3.1.1 Directness Index

Directness index measures the ratio of network distance between two points and the Euclidean distance between same points. It is a common indicator to measure accessibility of the two points. The index has lowest limit of 1 but upper limit is not fixed. A ratio of 1 indicates that a direct possible corridor is available between two points. Various studies have been carried to identify the benchmark value of the ratio but factors such as geography and topology of the area limits selection of absolute value. Nevertheless, some researchers through empirical analyses have found that a value of 1.2 holds true for various settings1. Keeping in view past studies a value of 1.2 is selected as threshold for connectivity, therefore any OD pair that have a value higher than 1.2 is considered as indirect connection and a

[1] Ballou, R., Rahardja, H. and Sakai, N. (2002), "Selected country circuity factors for road travel distance estimation", Transportation Research Part A , Vol. 36(9), Elsevier, pp. 843– 848.
Love, R. and Morris, J. (1979), "Mathematical models of road travel distances", Management Science, Institute of Management Sciences, pp. 130–139.

new corridor that reduces this value is considered feasible. The indicator is calculated on ArcGIS using network analyst tool to determine the shortest corridor between origin and destination.

3.1.2 Travel Speed

Travel speed is based on the type, width, quality and class of the road network available between origin and destination under free flow condition. It determines the quality of road network available and identifies a poor link even if it provides direct accessibility. Travel speed is calculated for the identified corridor using ArcGIS network analyst tool. Free flow speeds based on road class is tabulated in Table 3-1.

Table 3-1: Road Speed in km/hr for different road classes

Road Class	Dual Carriageway	Single Carriageway
Expressway/Motorway	120	-
Highways	100	80
Primary Road	70	60
Secondary Road	50	40
Local Road	-	30

3.1.3 Connectivity to National Network

National road network of Pakistan is developed by National Highway Authority funded by the federal government. It comprises a network of motorways and national highways that are aimed to improve the mobility. High speed motorway network passes through Punjab via network of M2, M3, M4, and M-5. To utilize the benefits of this network, it is crucial to connect cities and industries away from motorway with a high speed and reliable road link to these motorways. Hence links that provide connection with already built or under construction national network are considered as a viable option and proceeded for Benefit Cost Analysis (BCA).

3.1.4 Public Transport Infrastructure Accessibility Index

Public Transport Infrastructure Accessibility Index (PTIAI) is an index developed by the Urban Unit based on Transport Accessibility Index (TAI)2. TAI was initially developed by Gamma and Trutz Haase for Department of Transport, Republic of Ireland to provide an important input in determining accessibility to assist the government in their programs. PTIAI is modified form of TAI developed to identify and estimate the population being deprived by transport and to identify future improvement areas where transport provision is to be enhanced. The detailed methodology of the index can be read in the Urban Unit Publication of Public Transport Infrastructure Accessibility Index. Highlights of the results of the Index for Multan Division are given in Figure 3-2.

[2] Towards the Development of Transport Accessibility Index, Gamma and Trutz Haase, 2007

District	Tehsil	PTIAI	Rank
Multan	Multan Saddar	82.1	9
	Multan City	95.3	3
	Jalalpur Pir wala	30.0	97
	Shujaabad	55.7	37
Khanewal	Khanewal	58.8	30
	Kabirwala	38.0	83
	Jahanian	41.7	70
	Mian Channu	41.7	70
Vehari	Vehari	62.7	25
	Mailsi	50.1	53
	Burewala	39.3	72
Lodhran	Lodhran	44	65
	Kahror Paka	44	65
	Dunyapur	37	85

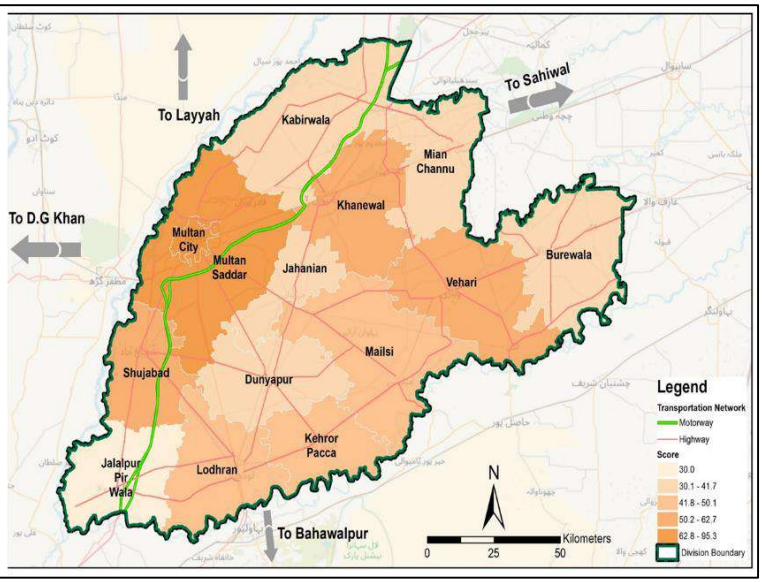


Figure 3-2: Results of PTIAI for Tehsils of Multan

3.1.5 Benefit-Cost Analysis

Benefit-Cost analysis (BCA) calculates a benefit cost ratio (BCR) that identifies the relationship between the cost and benefits of a proposed project. The ratio is used to measure both the quantitative and the qualitative factors, since sometimes the benefits and the costs cannot be measured exclusively in financial terms. When possible, the qualitative factors should be translated into quantitative terms for the results to be easily understandable and tangible. The BCR is calculated by dividing the total discounted benefits of a project by the total discounted costs of the project. In order to calculate the discounted values of benefits and costs, Net Present Value (NPV) is used, in which the values are divided by the sum of 1 and the discount rate raised to the number of periods. This will give the net present values of future benefits and costs.

$$NPV\ of\ Benefits = \sum_{t=0}^{n} \left\{ \frac{Benefits_t}{(1+r)^t} \right\}$$

$$NPV\ of\ Costs = \sum_{t=0}^{n} \left\{ \frac{Costs_t}{(1+r)^t} \right\}$$

Where:

r = Discount rate
t = Number of years
n = Total number of years (design life)

Once the accumulated values of benefits and costs are calculated then just by dividing them BCR can be calculated.

$$BCR = \frac{NPV\ of\ Benefits}{NPV\ of\ Costs}$$

After calculating the BCR of proposed projects, if the value of BCR is greater than 1 than the proposed project is assumed to be the economically feasible and if the value of BCR is less than 1 than the proposed project is assumed to be economically not feasible.

Using the above methodology, 24 road network schemes were tested for a preliminary economic feasibility (Table 3-2). These schemes primarily aim to improve the provincial roads to fulfil the regional transport needs. Most of the proposed schemes aim to dualize provincial roads to meet the eligibility standards as discussed above. Widening/improvement is recommended for those road projects where current operating speeds are lower than the design speeds but the traffic count is not enough to justify adding more lanes to the existing roads. For a detailed BCA, please refer to Annexure-I.

Table 3-2: Summary of Benefit Cost Ratio Analysis of Potential Road Schemes

Sr No	Linkage	Accumulated Benefits (Rs. Million)	Accumulated Costs (Rs. Million)	B/C Ratio
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	33,827.94	8,461.90	4.00
2	Dualization of Road from Abdul Hakim to Kacha Khuh	18,202.25	3,873.41	4.70
3	Dualization of Road from Khanewal to Kabirwala	10,312.56	2,244.59	4.59
4	Dualization of Road from Mian Channu to Abdul Hakim	13,293.94	5,614.26	2.37
5	Widening/Improvement of Kabirwala-Tulamba Road	5,907.36	1,683.04	3.51
6	Dualization of Burewala-Mian Channu Road	27,077.91	8,864.90	3.05
7	Dualization of Road from Vehari Head Islam to Kacha Khuh	83,020.31	15,609.34	5.32
8	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	10,415.48	3,973.34	2.62
9	Widening/Improvement of Road from Dunyapur to Kahror Pacca	5,512.48	1,728.69	3.19
10	Dualization of Multan Dunyapur Road	28,254.50	10,165.32	2.78
11	Dualization of Lodhran Jalalpur Pirwala Road	20,942.39	7,820.52	2.68
12	Widening/Improvement of Shujaabad-Dunyapur Road	6,626.85	1,549.59	4.28
13	Dualization of Road from Mailsi to Kahror Pakka	16,043.57	6,507.24	2.47
14	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	12,558.67	3,103.49	4.05

15	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary	10,269.11	2,080.01	4.94
16	Widening/Improvement of Road from Shujaabad to Jalalpur	16,895.88	2,003.77	8.43
17	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	59,066.91	6,322.12	9.34
18	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	26,874.60	7,149.59	3.76
19	Dualization of Burewala-Arifwala Road up to District Boundary	27,312.24	5,290.41	5.16
20	Dualization of Road from Karampur to Luddan	6,979.21	4,533.91	1.54
21	Dualization of Road from Vehari to Burewala	21,425.45	5,251.57	4.08
22	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	40,621.07	8,108.02	5.01
23	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	9,814.78	1,898.36	5.17
24	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	9,138.33	1,827.04	5.00

3.2 Identification of Truck Terminal Sites

As discussed above, the existing truck terminals, especially those under the patronage of government, are not enough to meet the freight transport needs of the region. Therefore, three new terminals have been identified for the three district-headquarters (Table 3-3). To ensure equity, each of the four districts gets one model truck terminal Figure 3-3). Note that Multan already has a functional truck terminal therefore new sites have not been identified. The purpose of these potential sites was enhancing the accessibility of the goods transport services to the entire division.

Table 3-3: Potential Truck Terminal Sites.

	Site Location	District
1	Near Faisal Movers Bus Terminal in Khanewal City	Khanewal
2	Near Sabzi Mandi in Vehari City	Vehari
3	Near Akhtar Saddiqui Transport Company in Lodhran City	Lodhran

Figure 3-3 shows spatial distribution of the potential sites. It can be seen that the sites are located near provincial highways for smooth movement of truck traffic. Moreover, care has been taken to select such sites that minimize the distance of the district headquarter to the

major divisional, regional, and national connectivity corridors such as national highways and motorways.

3.2.1 Methodology

The connectivity of the potential sites has been modelled mathematically. Let C_j be the connectivity score of location j that depends on k factors, then it can be written as follows:

$$C_j = 1/\sum_{k=1}^{5} C_{jk}$$

For a given location *j*, we can calculate the corresponding C_k values as follows:

$C_{j1} = C_{\mathrm{jN}}/C_{\mathrm{maxN}}$ = Distance of location '*j*' from National Highway/Distance of the farthest location from the Highway.

Similarly,

$C_{j2} = C_{\mathrm{jM}}/C_{\mathrm{maxM}}$ = Distance of location '*j*' from Motorway/Distance of the farthest location from Motorway.

Figure 3-3 shows the impact of construction new truck terminals. It can be seen that with the proposed truck terminals, the goods transport accessibility significantly improves in comparison to the existing freight transport accessibility of the districts (Figure 2-11). Most industries, particularly those in the district headquarters, would get a rapid goods transport cover (0-10 minutes availability of trucking service). Specifically, the rapid coverage increases from its current 2% to 6% (more than double) when the proposed truck terminals are constructed. This enhanced freight accessibility can be further improved in the future by introducing similar truck terminals at Tehsil Level. Alternatively, an improved road infrastructure can help shorten the travel time between truck terminals and industrial facilities.

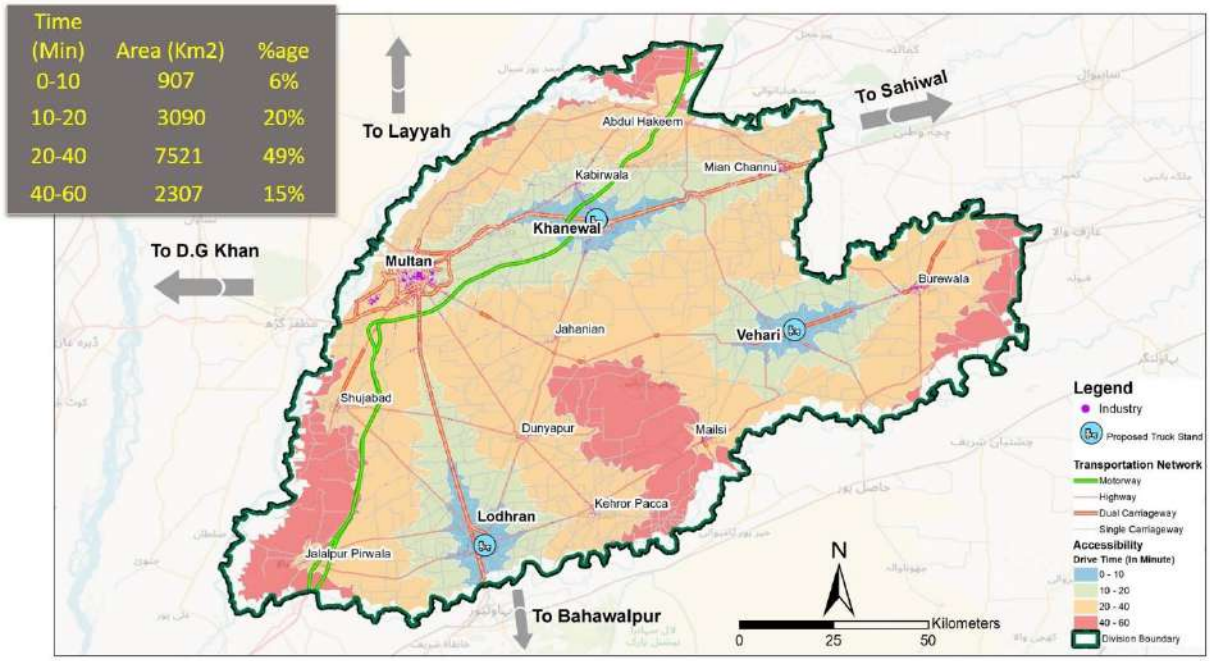


Figure 3-3: Accessibility Analysis of the Proposed Truck Terminal Locations

3.3 Identification of Public Transport Schemes

A GIS based Public Transport Accessibility analysis of inter-city transport is presented here. For this purpose, areas accessible in 20, 40 and 60 mints drive time threshold are considered for analysis from each bus terminal. Following map illustrate the area served based on drive time by each bus terminal. An overwhelming majority of residents (71%)

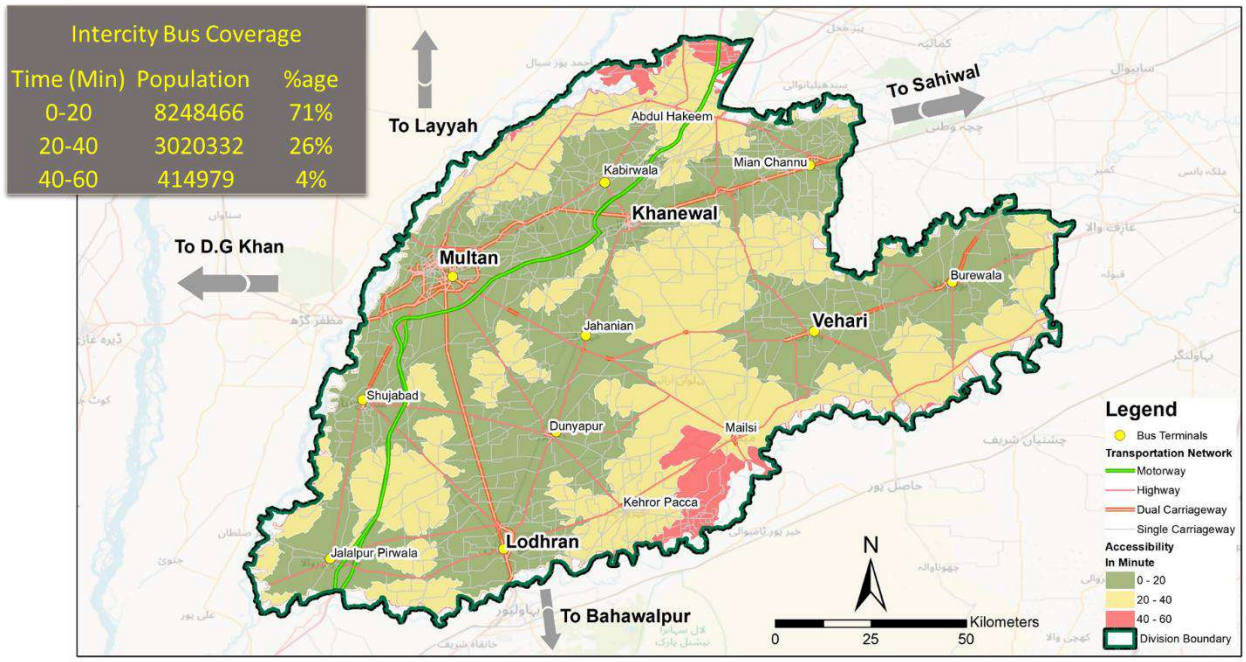


Figure 3-4: Inter-City Public Transport Accessibility Analysis

have access to intercity public transport terminals in less than 20 minutes. When the time range is increased to 60 minutes, the entire population of the division is served as further illustrated in Table 3-5 by cumulative percentage of population. It implies that the inter-city public transport is accessible to almost the entire population of the division at a reasonable travel distance.

Table 3-4: Inter-city Public Transport Accessibility

Intercity Bus Coverage			
Time (mint)	Population	%Age	Cumulative %Age
0-20	8248466	71%	71%
20-40	3020332	26%	97%
40-60	414979	3%	100%

PROPOSED INTERVENTIONS

The proposed interventions for the upcoming ADPs target a 10-year planning horizon from the year 2023 to 2033. The proposed interventions encompass road and transport sectors. The road sector schemes include dualization and upgradation schemes while the transport sector schemes include urban transport interventions as well as the construction of new model truck terminals in the district headquarters. A preliminary cost estimate and the target implementation timelines for each of the projects have been proposed. It should be noted that these cost estimates rely on the average cost of similar road and transport schemes that have been completed recently in Punjab. Therefore, the reader should expect possibility of large variations in the cost estimates when detailed design of the proposed facilities is conceived in the future.

4.1 Road Schemes

These road schemes are aimed at improving the provincial road network for better regional connectivity. As discussed in the previous chapters, many provincial roads in Multan Division are single lane, despite an ADT of more than 8000. The evaluation of benefit-cost ratio of these roads, as discussed in the previous chapter, gives forth 24 road schemes that should be completed over the next ten years to ensure the required mobility and accessibility on the road network. These road schemes are summarized in Table 4-1. A detailed cost-benefit analysis of these roads is presented in Annexure-I. The benefit-cost ratio of these projects might form the basis of their funding priority. That is, a road scheme with higher benefit-cost ratio gets funding earlier as compared to a road scheme with lower benefit cost ratio.

Eighteen (18) of the proposed road intervention are dualization schemes while the remaining six are aimed at improving/widening of the roads. In terms of implementation timeline, there are three schemes that have been proposed for implementation in the long-term (2029-2033), four in the medium term (2026-2029), and the remaining 17 in the short term (2023-2026). The total cost of short-term projects is PKR 74.26 billion, medium-term, 33.1 billion, and short term, 18.3 billion. Thus, Multan Division would tentatively need PKR 120 billion over the next ten years in order to dualize and improvement/widen its roads infrastructure. Note that an additional PKR 5 billion needs to be funded in Sahiwal District for the Burewala-Mian Channu Road Segment that falls outside Multan Division (in Sahiwal)

Table 4-1: Proposed Road Schemes Multan Division.

#	District	Schemes	Length (km)	ADT Projections			Timeline
				2026	2029	2033	
1	Khanewal	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	42.6	7647	8853	10760	Medium Term (2026-29)
2	Khanewal	Dualization of Road from Abdul Hakim to Kacha Khuh	19.5	11366	13157	15992	Short Term (2023-26)
3	Khanewal	Dualization of Road from Khanewal to Kabirwala	11.3	9814	11361	13810	Short Term (2023-26)

4	Khanewal	Dualization of Road from Mian Channu to Abdul Hakim	26.9	7031	8140	9894	Medium Term (2026-29)
5	Khanewal	Widening/Improvement of Kabirwala-Tulamba Road	36.8	4398	5091	6188	Short Term (2023-26)
6	Khanewal-Sahiwal-Vehari	Dualization of Burewala-Mian Channu Road	47.8	7870	9110	11073	Medium Term (2026-29)
7	Khanewal-Vehari	Dualization of Road from Vehari Head Islam to Kacha Khuh	83.5	13081	15143	18407	Short Term (2023-26)
8	Lodhran	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	21.2	6220	7200	8752	Long Term (2029-33)
9	Lodhran	Widening/Improvement of Road from Dunyapur to Kahror Pacca	24.7	4790	5545	6740	Short Term (2023-26)
10	Lodhran-Khanewal-Multan	Dualization of Multan Dunyapur Road	48.1	7581	8776	10668	Medium Term (2026-29)
11	Lodhran-Multan	Dualization of Lodhran Jalalpur Pirwala Road	41.1	6442	7458	9065	Long Term (2029-33)
12	Lodhran-Multan	Widening/Improvement of Shujaabad-Dunyapur Road	40.0	3427	3967	4822	Short Term (2023-26)
13	Lodhran-Vehari	Dualization of Road from Mailsi to Kahror Pakka	31.3	6156	7127	8662	Long Term (2029-33)
14	Multan	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	13.2	14318	16574	20146	Short Term (2023-26)
15	Multan	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary	10.7	12187	14108	17148	Short Term (2023-26)
16	Multan	Widening/Improvement of Road from Shujaabad to Jalalpur	40.0	9951	11519	14002	Short Term (2023-26)
17	Multan-Khanewal-Vehari	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	33.6	23179	26833	32615	Short Term (2023-26)
18	Vehari	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	38.4	8683	10052	12218	Short Term (2023-26)
19	Vehari	Dualization of Burewala-Arifwala Road up to District Boundary	28.4	12308	14248	17318	Short Term (2023-26)
20	Vehari	Dualization of Road from Karampur to Luddan	21.8	4486	5193	6312	Short Term (2023-26)
21	Vehari	Dualization of Road from Vehari to Burewala	25.3	10349	11980	14562	Short Term (2023-26)
22	Vehari	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	42.0	11474	13283	16146	Short Term (2023-26)
23	Vehari	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	41.6	5495	6361	7732	Short Term (2023-26)
24	Vehari	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	38.0	5179	5996	7288	Short Term (2023-26)

The spatial distribution of the proposed road network schemes is shown in Figure 4-1. The proposed network is spread across the division connecting the region with high-speed road links at Tehsil Level and beyond. Moreover, high speed connectivity with national roadways has been ensured. For example, the proposed dualization of Khanewal-Kabirwala road improves the link of both the cities with Multan-Faisalabad Motorway (M-4) as well as the GT Road (N-5). Likewise, Head-Islam to Kacha-Khuh Road leads further upto Abdul Hakim, thereby improving the connectivity of Hasilpur and Vehari, with Lahore-Abdul Hakim Motorway (M-3) as well as Multan Faisalabad Motorway (M-4).

Moreover, the interconnectivity of THQs and DHQs will be significantly improved when the proposed interventions are implemented. For instance, the busy road connection between Multan and Vehari would become much faster after its proposed dualization is completed. The Multan Bypass Link would connect the division with Muzaffargarh. On the East side, the links of Khanewal and Vehari Districts with Jhang and Sahiwal districts respectively would be greatly improved.

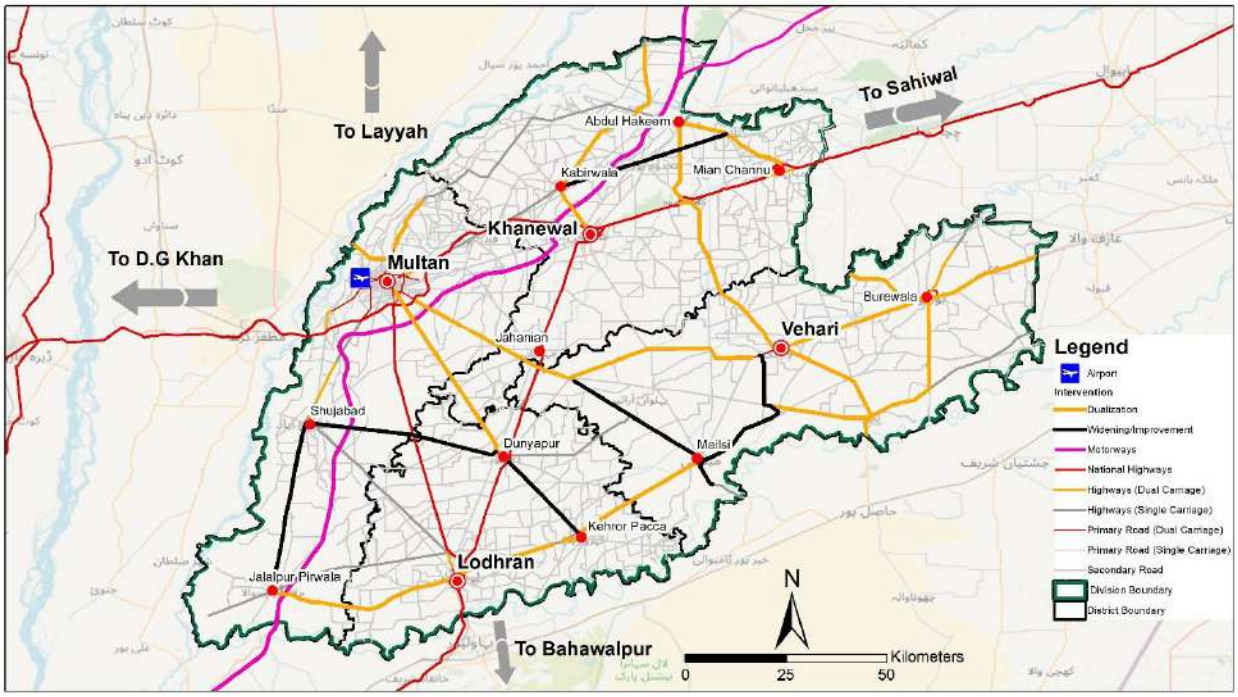


Figure 4-1: Spatial Distribution of Proposed Road Network Schemes

A more detailed district-wise analysis is presented in the following paragraphs. Khanewal District is proposed to develop nine of its existing roads in the next ten years totaling PKR 30.7 billion (Table 4-2). The table presents an overview of road development initiatives at a macro level in the Khanewal district. These projects aim to improve the road infrastructure by implementing dualization, widening, and improvement schemes. The combined length of all the listed road projects is 307 kilometers, which will contribute to better connectivity and transportation efficiency in the district.

The road schemes serve a significant number of Passenger Car Units (PCUs) ranging from 4,360 to 24,682, indicating the potential reduction in traffic congestion and travel times. The Benefit/Cost (B/C) ratios of the schemes range from 2.37 to 9.34, indicating their economic viability and potential for positive returns on investment. The total cost of the listed road development projects is 30,708.88 million PKR. This includes expenses associated with dualization, widening, and improvement of the roads.

Table 4-2: Proposed Road Schemes, District Khanewal

S. No.	Schemes	Districts	Total Length (km)	PCUs	B/C Ratio	Scheme Cost PKR (Millions)	Khanewal Segment (km)	Khanewal Segment Cost PKR (Millions)	Timeline
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	Khanewal	42.6	11149	4.00	8461.90	42.6	8461.90	2026-2029
2	Dualization of Road from Abdul Hakim to Kacha Khuh	Khanewal	19.5	13106	4.70	3873.41	19.5	3873.41	2023-2026
3	Dualization of Road from Khanewal to Kabirwala	Khanewal	11.3	12814	4.59	2244.59	11.3	2244.59	2023-2026
4	Dualization of Road from Mian Channu to Abdul Hakim	Khanewal	26.9	6939	2.37	5614.26	26.9	5614.26	2026-2029
5	Widening/Improvement of Kabirwala-Tulamba Road	Khanewal	36.8	4360	3.51	1683.04	36.8	1683.04	2023-2026
6	Dualization of Burewala-Mian Channu Road	Khanewal-Sahiwal-Vehari	47.8	7954	3.05	8864.90	0.6	111.27	2026-2029
7	Dualization of Road from Vehari Head Islam to Kacha Khuh	Khanewal-Vehari	83.5	13960	5.32	15609.34	26.3	4916.47	2023-2026
8	Dualization of Multan Dunyapur Road	Lodhran-Khanewal-Multan	48.1	8248	2.78	10165.32	8.2	1732.97	2026-2029
9	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	Multan-Khanewal-Vehari	33.6	24682	9.34	6322.12	11.0	2070.97	2023-2026
Grant Total								**30708.88**	

Figure 4-2 shows the spatial distribution of proposed road schemes in Khanewal District. In the Northern part of the district, the proposed dualization of Jhang Road would connect Kabirwala Tehsil to Jhang. This road is a busy freight corridor and accommodates traffic to and from Multan, Khanewal and Kabirwala. In the center of the region, key proposed roads are Kabirwala-Tulamba Road and Kacha-Khou Abdul Hakeem Road.

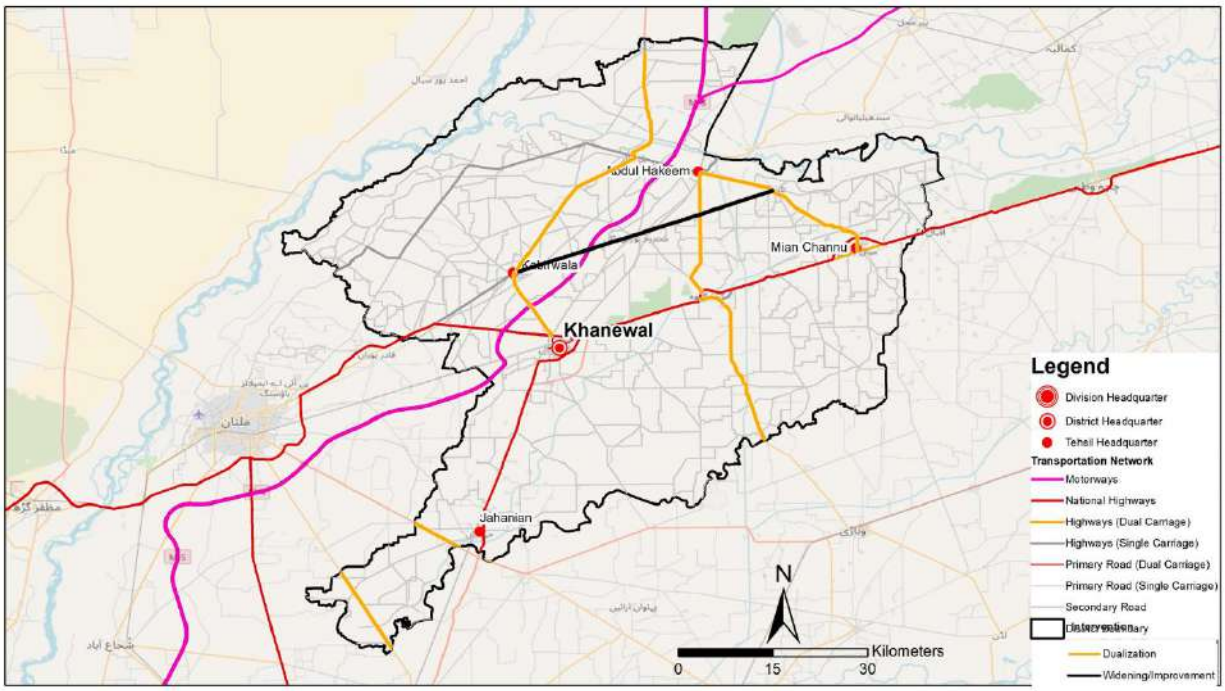


Figure 4-2: Spatial Distribution of Proposed Roads in Khanewal

Figure 4-3 shows the implementation timeline of the proposed schemes in Khanewal. The dualization of Jhang road is proposed to be a midterm intervention (2026-2029) because the projected traffic seems to be served well by the extant road infrastructure till that period of time. Likewise, the dualization of Mian Channu-Abdul Hakeem Road is also proposed to be a Medium-Term project considering its traffic volume. The Dualization of Khanewal-Kabirwala Road is proposed to be completed in short term i.e., up to the year 2026. Likewise, the road connecting Vehari with Abdul Hakeem via Kacha Khuh also needs to be dualized in the short term. It implies that Khanewal would require PKR 14.8 billion in short term and the remaining PKR 15.9 billion in medium term to complete the road infrastructure improvement.

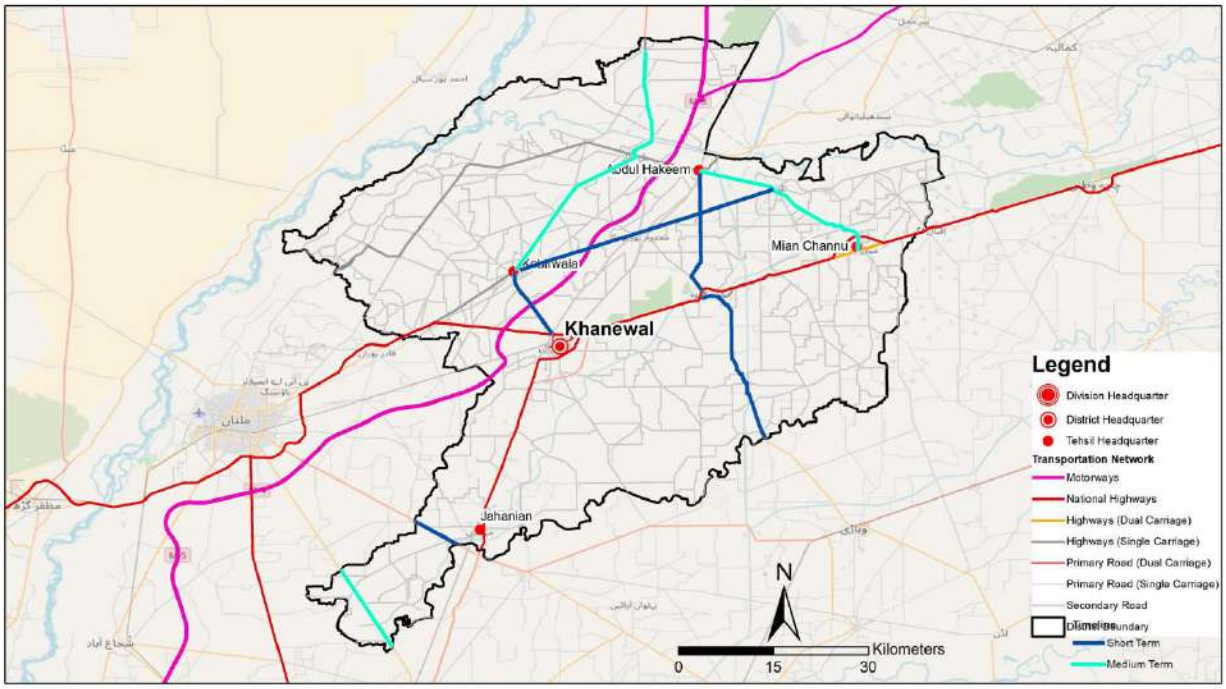


Figure 4-3: Timeline of Proposed Roads in Khanewal

The total cost of proposed road schemes in Lodhran is PKR 17.23 billion. This includes four dualization schemes and two widening/improvement schemes. Three of the proposed six roads would require long term implementation (2029-2033) which implies that the extant road widths are enough to serve traffic adequately for the next six years on these roads. Of the remaining three projects, two are proposed to be short term (2023-2026) projects and one road (Multan-Dunyapur Road) to be a medium-term scheme (2026-2029).

Table 4-3: Proposed Road Schemes, District Lodhran

S. No.	Schemes	Districts	Total Length (km)	PCUs	B/C Ratio	Scheme Cost PKR (Millions)	Lodhran Segment (km)	Cost of Lodhran Segment PKR (Millions)	Timeline
1	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	Lodhran	21.2	6898	2.62	3973.34	21.2	3973.34	2029-2033
2	Widening/Improvement of Road from Dunyapur to Kahror Pacca	Lodhran	24.7	6062	3.19	1728.69	24.7	1728.69	2023-2026
3	Dualization of Multan Dunyapur Road	Lodhran-Khanewal-Multan	48.1	8248	2.78	10165.32	15.9	3360.26	2026-2029
4	Dualization of Lodhran Jalalpur Pirwala Road	Lodhran-Multan	41.1	7154	2.68	7820.52	26.40	5023.40	2029-2033
5	Widening/Improvement of Shujaabad-Dunyapur Road	Lodhran-Multan	40.0	4500	4.28	1549.59	21.2	821.28	2023-2026
6	Dualization of Road from Mailsi to Kahror Pakka	Lodhran-Vehari	31.3	7197	2.47	6507.24	11.2	2328.47	2029-2033
Toal Cost								**17235.45**	

Figure 4-4 shows the spatial distribution of the proposed road schemes in Lodhran. The dualization schemes will provide the much needed East West connectivity for Lodhran with Vehari and Multan. Note that the North-South connectivity of the district is already excellent

as it is supported by multi-lane nationalhighways including GT Road (N-5) and E-5 (Lodhran-Khanewal Expressway). Multan Sukker Motorway (M-5) also passes nearby reinforcing the North-West connectivity of the district. The weaker links are road connections with Vehari, Kahror Pakka and Jalalpur Pirwala that have been proposed to dualize in this study.

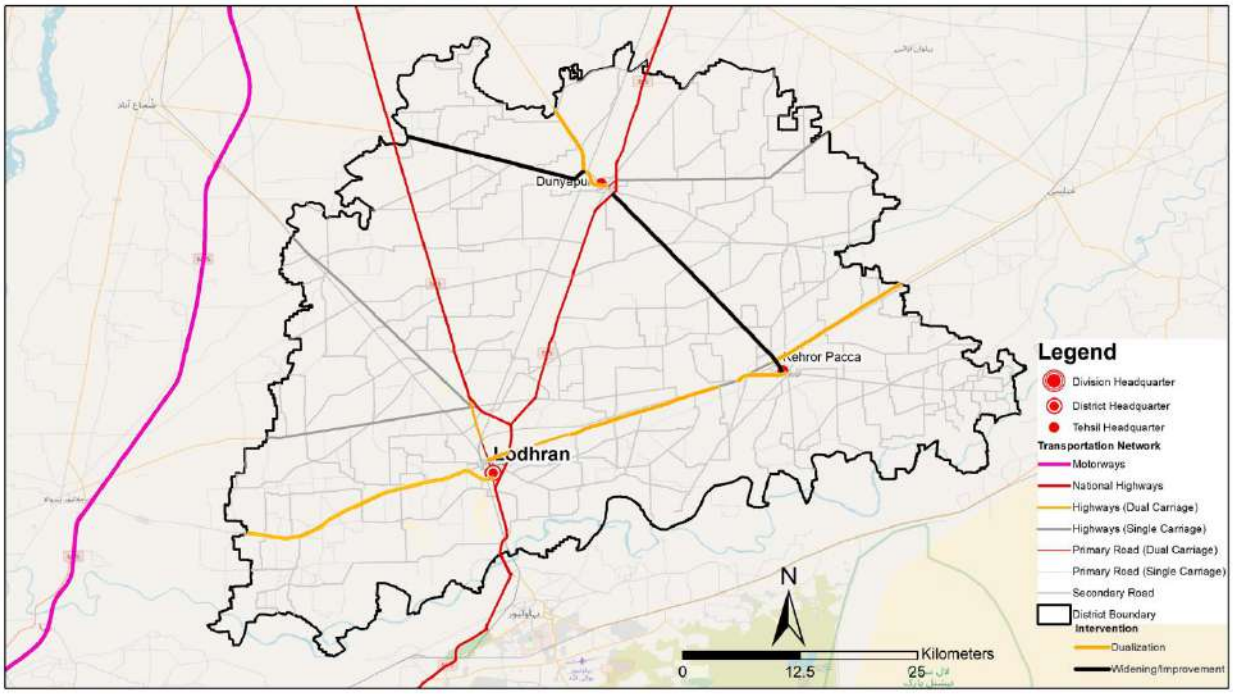


Figure 4-4: Spatial Distribution of Proposed Roads in Lodhran

Figure 4-5 shows the implementation timeline of the proposed schemes. Although the East West connectivity is lagging behind the North-West connectivity of the district, the traffic counts show that the extant road width in this direction will be sufficient for the next six years and dualization would be required only in the long term (2029-2033). The Kahror Pakka-Dunyapur Link however needs immediate attention and so does the Shujaabad-Dunyapur link. The dualization of Multan Dunyapur Road however can be carried out in the medium-term time frame (2026-2029).

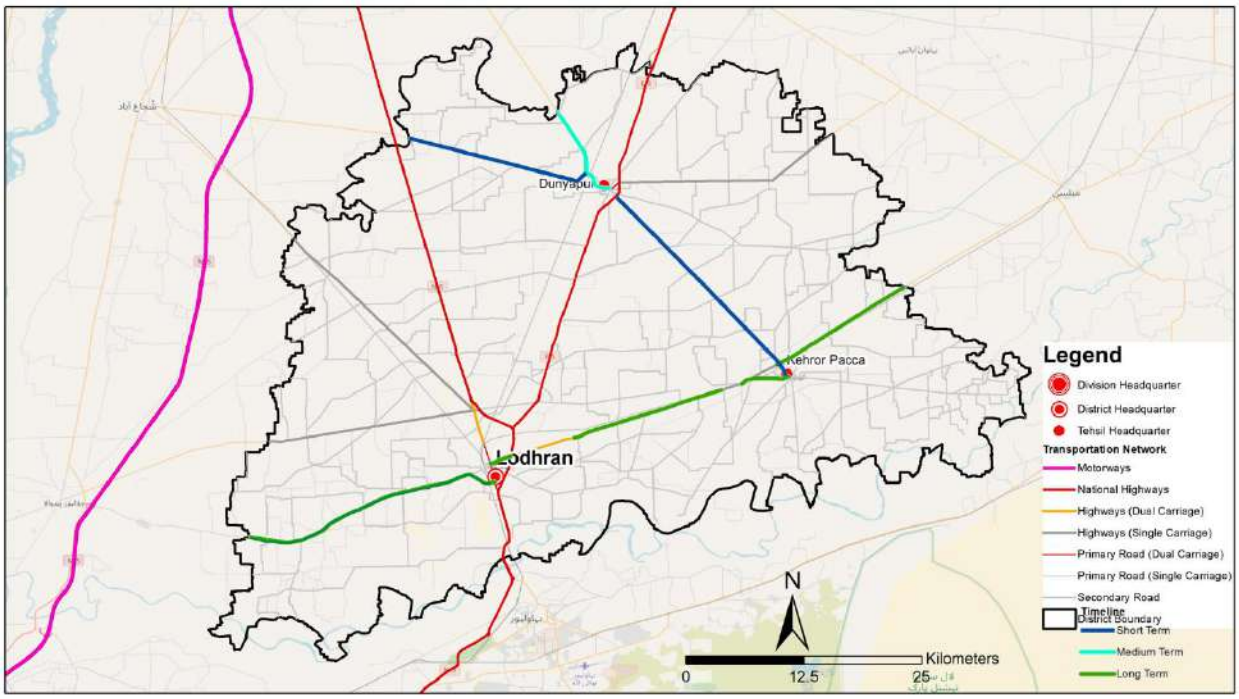


Figure 4-5: Timeline of Proposed Roads in Lodhran

Table 4-4 shows proposed road schemes for Multan District. The total portfolio the schemes is around PKR 19.1 billion, of which 16.3 billion would be incurred on dualization of roads and the remaining on widening/improvement projects. Out of seven roads proposed in the study, six comprise dualization and the only road that is proposed for widening/improvement in the Multan Division is Shujaabad-Jalalpur Pirwala.

Table 4-4: Proposed Road Schemes, District Multan

S. No.	Schemes	Districts	Total Length (km)	PCUs	B/C Ratio	Scheme Cost PKR (Millions)	Multan Segment (km)	Cost of Multan Segment PKR (Millions)	Timeline
1	Dualization of Multan Dunyapur Road	Lodhran-Khanewal-Multan	48.1	8248	2.78	10165.32	24.0	5072.09	2026-2029
2	Dualization of Lodhran Jalalpur Pirwala Road	Lodhran-Multan	41.1	7154	2.68	7820.52	14.7	2804.73	2029-2033
3	Widening/Improvement of Shujaabad-Dunyapur Road	Lodhran-Multan	40.0	4500	4.28	1549.59	18.8	728.31	2023-2026
4	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	Multan	13.2	13358	4.05	3103.49	13.2	3103.49	2023-2026
5	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary	Multan	10.7	13475	4.94	2080.01	10.7	2080.01	2023-2026
6	Widening/Improvement of Road from Shujaabad to Jalalpur	Multan	40.0	11473	8.43	2003.77	40.0	2003.77	2023-2026
7	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	Multan-Khanewal-Vehari	33.6	24682	9.34	6322.12	17.6	3313.56	2023-2026
Total Cost								**19105.95**	

Figure 4-6 shows the spatial distribution of the proposed roads in Multan District. The district already is served by various national roads including M-4, M-5, N-5 and N-70. The proposed interventions are aimed at strengthening the weaker links in all directions. For example, the proposed dualization of Norther Bypass would enhance the connection of Multan with Muzaffargarh in the North. Likewise, the proposed dualization of Bosan Road would enhance North East connectivity in the Urban area and its outskirts. Dualization of Multan-Vehari Road and Multan-Dunyapur Road would strengthen one of the busiest corridors in the southern side.

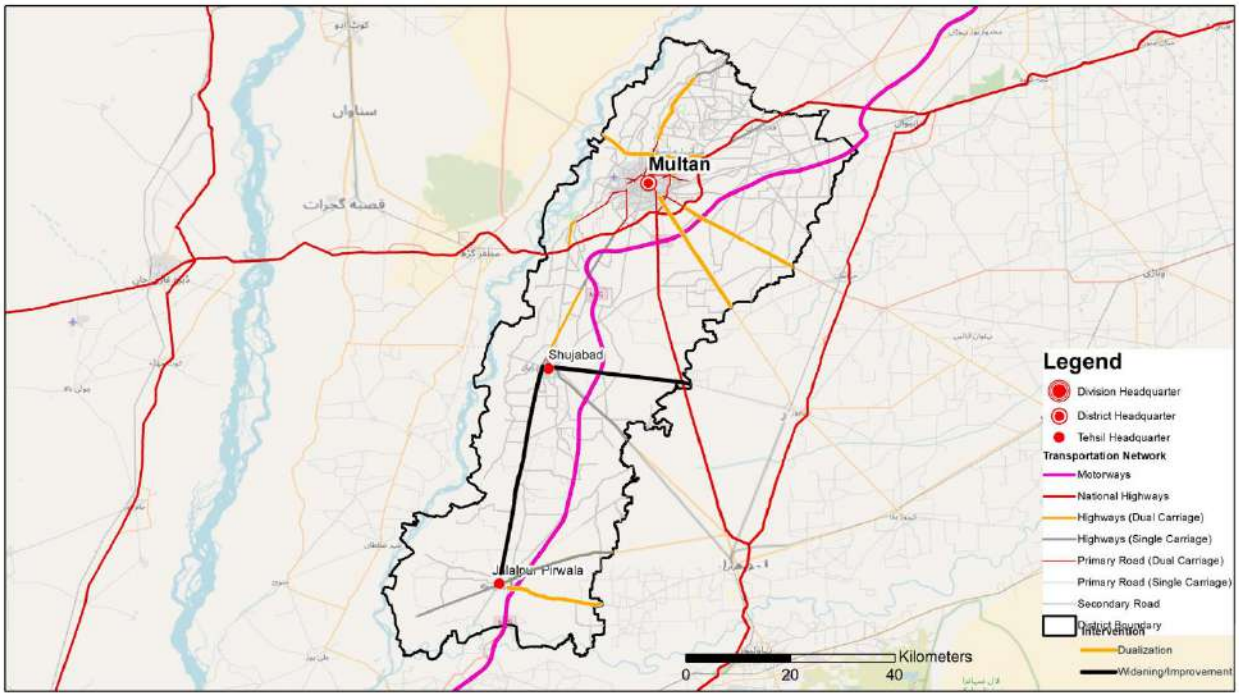


Figure 4-6: Spatial Distribution of Proposed Roads in Multan

Figure 4-7 shows the proposed implantation timeline of the schemes. The Multan-Dunyapur Road is proposed for dualization in medium term (2026-2029) while the Jalalpur-Pirwala to Lodhran Road is proposed as a long-term intervention. The remaining five road schemes (Bosan Road, Northern Bypass, Multan-Vehari, Shujabad-Jalalpur Pirwala, and Shujaabad Dunyapur) are all short-term interventions (2023-2026).

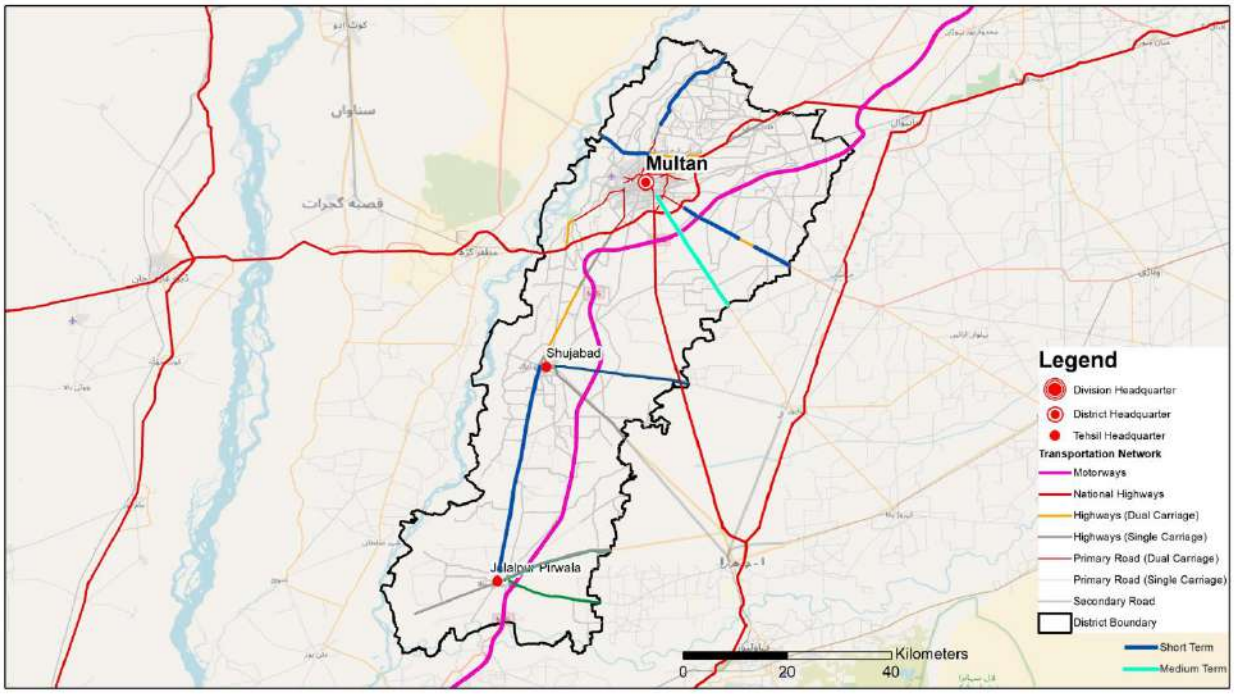


Figure 4-7: Timeline of Proposed Roads in Multan

Table 4-5 lists the proposed road schemes in Vehari District. There are 11 roads that have been proposed for dualization or widening/improvement program in the next 10 years. Notably, nine of these proposed schemes are proposed for dualization and only two are proposed for widening/improvement. The total cost of all the proposed schemes is around PKR 53 billion. The cost of widening/improvement projects is only PKR 3.7 billion while the remaining 49.3 billion would incur on the dualization of single road that connect key parts of the district and feature heavy traffic volumes.

Table 4-5: Proposed Road Schemes, District Vehari

S. No.	Schemes	Districts	Total Length (km)	PCUs	B/C Ratio	Scheme Cost PKR (Millions)	Vehari Segment (km)	Cost of Vehari Segment PKR (Millions)	Timeline
1	Dualization of Burewala-Mian Channu Road	Khanewal-Sahiwal-Vehari	47.8	7954	3.05	8864.90	16.7	3097.2	2026-2029
2	Dualization of Road from Vehari Head Islam to Kacha Khuh	Khanewal-Vehari	83.5	13960	5.32	15609.34	57.2	10692.9	2023-2026
3	Dualization of Road from Mailsi to Kahror Pakka	Lodhran-Vehari	31.3	7197	2.47	6507.24	20.1	4178.8	2029-2033
4	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	Multan-Khanewal-Vehari	33.6	24682	9.34	6322.12	5.0	941.4	2023-2026
5	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	Vehari	38.4	9826	3.76	7149.59	38.4	7149.6	2023-2026
6	Dualization of Burewala-Arifwala Road up to District Boundary	Vehari	28.4	13503	5.16	5290.41	28.4	5290.4	2023-2026
7	Dualization of Road from Karampur to Luddan	Vehari	21.8	4495	1.54	4533.91	21.8	4533.9	2023-2026
8	Dualization of Road from Vehari to Burewala	Vehari	25.3	11890	4.08	5251.57	25.3	5251.6	2023-2026
9	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	Vehari	42.0	13579	5.01	8108.02	42.0	8108.0	2023-2026
10	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	Vehari	41.6	6408	5.17	1898.36	41.6	1898.4	2023-2026
11	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	Vehari	38.0	6532	5.00	1827.04	38.0	1827.0	2023-2026
Grand Total								**52969.0**	

Figure 4-8 shows the spatial distribution of the proposed road schemes. It can be seen that the proposed interventions cover almost all the key roads in the district strengthening connectivity within and beyond the district. For example, Burewala-Arifwala Road would connect Vehari with Sahiwal. Vehari Kacha Khou would enhance connectivity with Hasilpur, M-3 and M-4. Last but not least, Vehari to Tibba-Sultanpur Road will accommodate heavy traffic between Multan and Vehari.

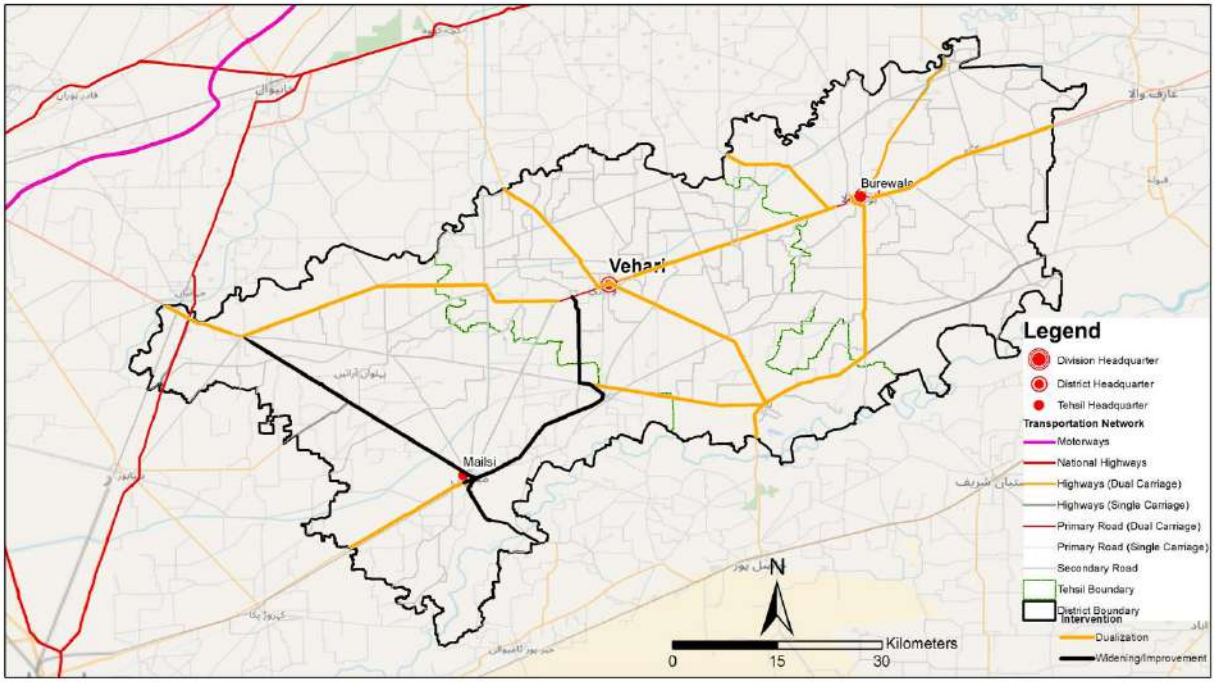


Figure 4-8: Spatial Distribution of Proposed Roads in Vehari

Figure 4-9 shows the implementation timeline of the proposed projects. Nine of the proposed interventions are short term schemes (2023-2026), one (dualization of Burewala to Mian-Channu Road) is medium term (2026-2029) and another (Dualization of Mailsi to Kahror Pakka Road) is a long-term intervention (2029-2033)

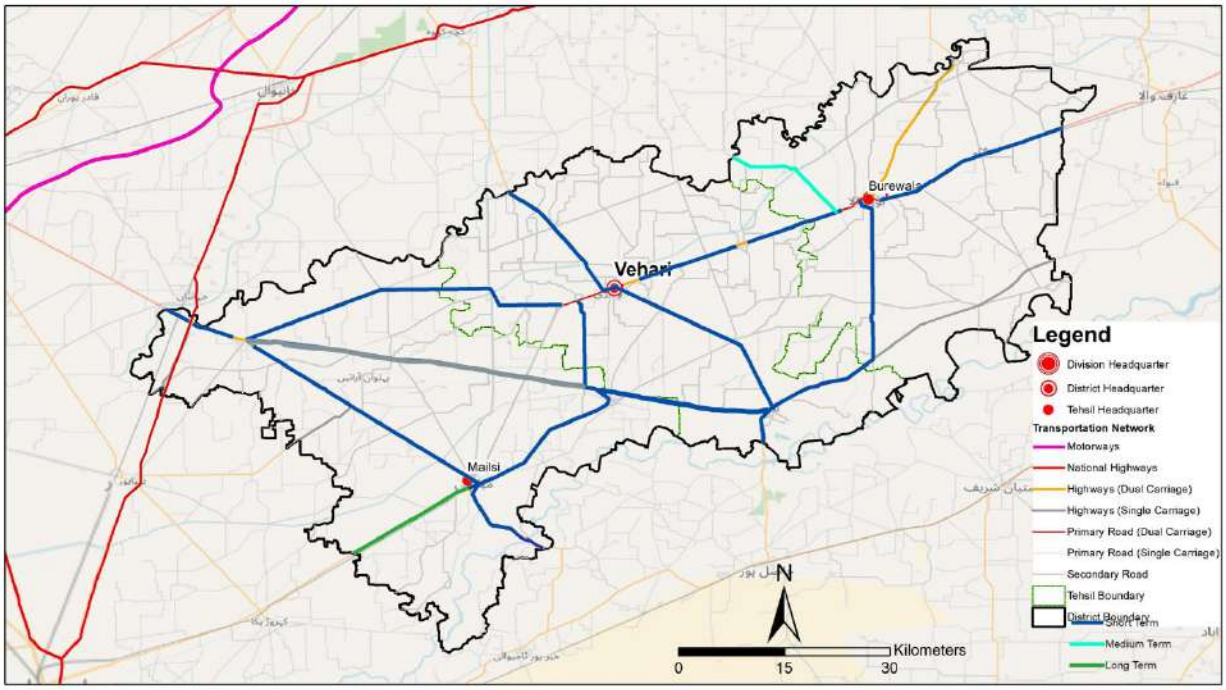


Figure 4-9: Timeline of Proposed Roads in Vehari

4.2 Truck Terminals

Table 4-6 provides information on the implementation timeline of three projects related to the construction of modal truck terminals in Multan. These projects are scheduled to be implemented between 2023 and 2026. The first project, "Construction of Modal Truck Terminal Near Faisal Movers," is planned for Khanewal district. The construction of this truck terminal aims to provide a dedicated facility for handling truck traffic and logistics operations. It is expected to enhance the efficiency of transportation services in the area and contribute to improved trade and commerce.

The second project, "Construction of Modal Truck Terminal Near Sabzi Mandi," is intended for Vehari district. This truck terminal will serve as a centralized hub for truck operations. By providing modern facilities and infrastructure, it will help streamline the movement of goods and support the local industry. The third project, "Construction of Modal Truck Terminal Near Akhtar Saddiqui Transport company," is planned for Lodhran district. This truck terminal aims to cater to the needs of the transport industry in the area, offering a designated space for truck parking, loading, and unloading activities. It is expected to improve logistics operations and contribute to the overall development of the transport sector in the district. The proposed interventions would be able to serve 90% of the Division Area within one hour travel time window.

Table 4-6: Proposed Truck Terminals

	Project Name	District/ Sector	Implementation Timeline
1	Construction of Modal Truck Terminal Near Faisal Movers	Khanewal	2023-2026
2	Construction of Modal Truck Terminal Near Sabzi Mandi	Vehari	2023-2026
3	Construction of Modal Truck Terminal Near Akhtar Saddiqui Transport company	Lodhran	2023-2026

4.3 Public Transport

The intercity transport service is found to be satisfactory during this study, therefore, no new schemes have been proposed in this regard. The proposed public transport schemes (Table 4-7) target urban transport in Multan city. These proposals are based on a study by the Punjab Mass Transit Authority and cater for the mass movement of passengers in the divisional headquarter of Multan. The proposed mass transit system consists of three new trunk routes (in addition to the existing Red Line): Orange Line, Blue Line and Purple Line in the next ten years. Moreover, additional feeder routes and their integration with the extant transport modes is suggested in the coming ten years. These public transport facilities are expected to ease traffic congestion in Multan city while providing a cheaper way to commute for different activities such as shopping, businesses, education etc.

Table 4-7: BRT Trunk and Feeder Routes Implementation Timeline for Multan City

S. No.	Proposed Interventions	Implementation Timeline
1	Construction of Orange Line Corridor-2 (BCG Chowk Terminal to Kumharanwala Chowk Terminal)	2023-2029
2	Construction of Purple Line Corridor-3 (Nag Shah to Pak Arab Fertilizer Factory)	2023-2029
3	Construction of purple Line Corridor-3 (Nag Shah to Pak Arab Fertilizer Factory)	2023-2029
4	Construction of Blue Line Corridor-4 (Multan Airport to Kot Rab Nawaz)	2030-2033
5	Development Feeder Network	2023-2029
6	Development of Integrated Operations of Feeder Routes and Regular Urban Transport	2030-2033

Spatial Distribution of the Trunk Routes is shown in Figure 4-10. Red Line Corridor is 21.29 km, it starts at Bahauddin Zakariya University and ends at Kumharanwala Chowk (including a 2.97 km extension that offshoots from the BCG Chowk). Orange Line Route is 14.94 km, starts from Kumharan Chowk and ends at BCG Chowk. Purple line starts at Pak Arab Fertilizer Factory and ends at Nag Shah (19.04 km) and Blue Line start from the airport and ends at Kot Rab Nawaz (16.34 km).

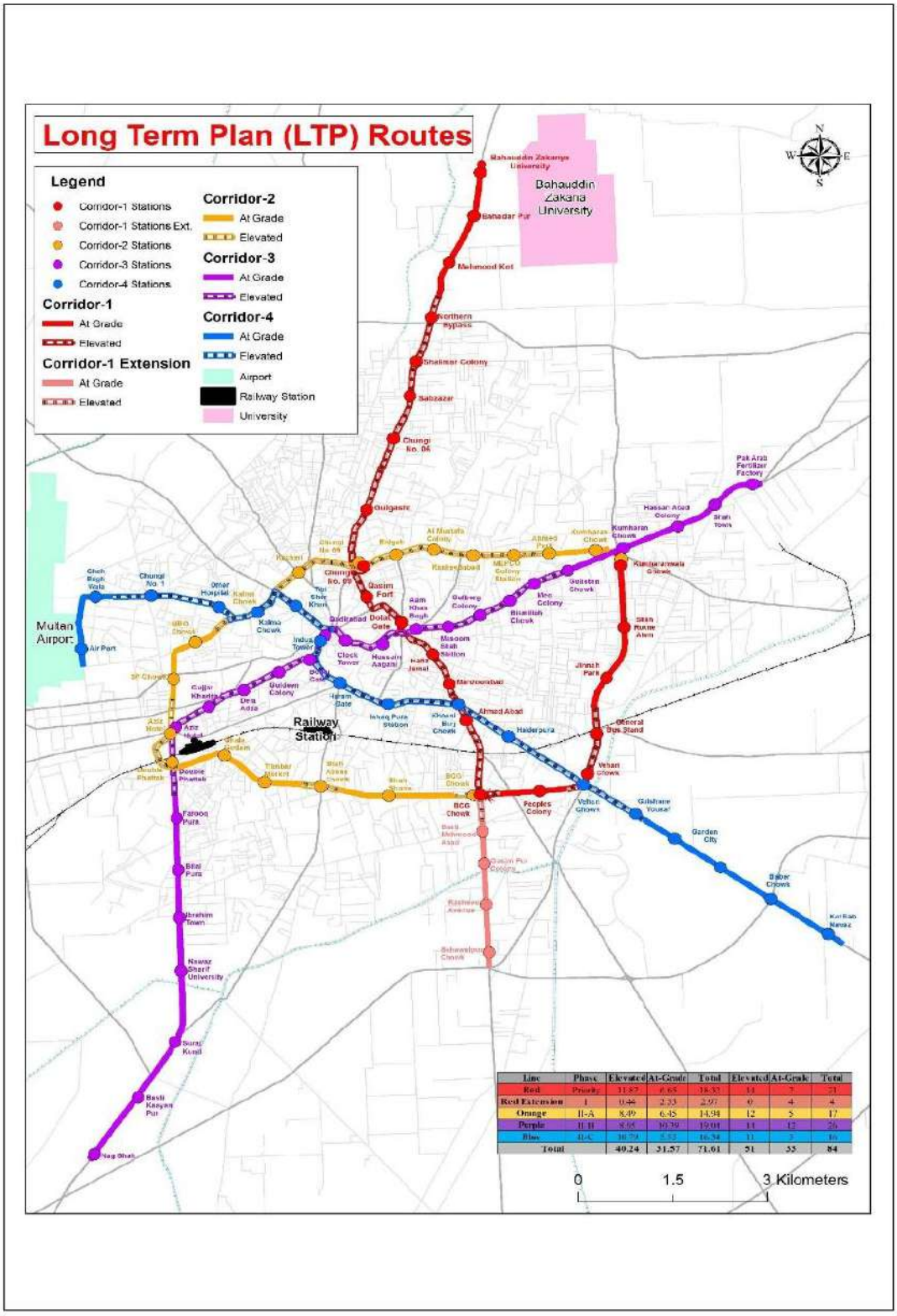


Figure 4-10: Spatial Distribution of Trunk Routes, BRT Multan

4.4 Sectoral Targets

The sectoral targets have been shown in the Figure 4-11 to facilitate the implementation of the proposed projects and to visualize their impact. In the base year 2023, the share of dual carriageways in the entire road network is only 8.5%. The proposed interventions would enhance it to 14.8% by 2029 and 16% by 2033. Likewise, currently there is only one BRT route operational in Multan. It is proposed to introduce three more BRT routes to the system (Purple Line, Orange Line, Blue Line). Likewise, the number of feeder routes would increase and be integrated with other modes of transport such as railways, para-transits, and ride-hailing services. Currently, there is only one formal truck terminal in the division (in Multan). This would increase to four by 2033. Thus, the proposed interventions would have a multi-prong effect on enhancing the road and transport sector infrastructure in Multan.

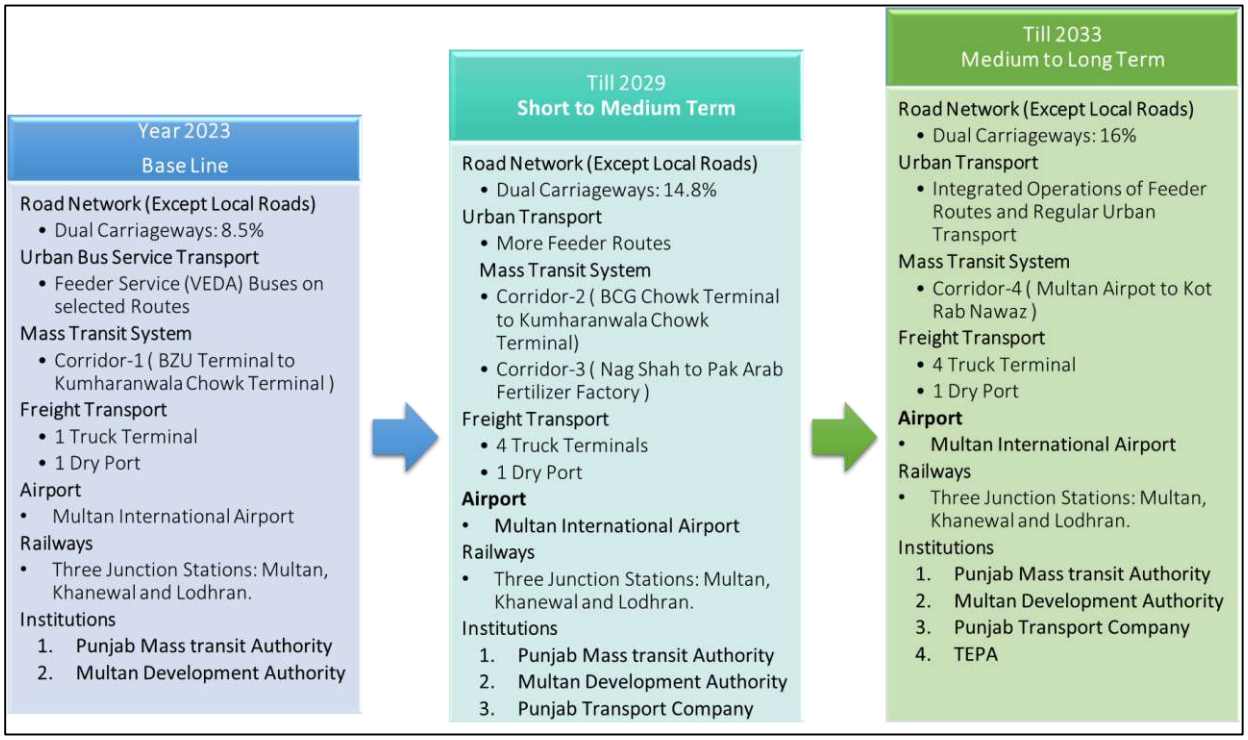


Figure 4-11: Sectoral Targets

ANNEXURE I

COST-BENEFIT ANALYSIS OF THE POTENTIAL ROAD SCHEMES

Sheet 1 Candidate Links and Proposed Improvements

#	Proposed Schemes	Existing Link				Proposed Link			
		Carriag -eway	Distance (Km)	Speed (kph)	TT (Hrs)	Carriageway	Distance (Km)	Speed (kph)	TT (Hrs)
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	Dual	0	80	0	Dual	42.6	80	0.5325
		Single	42.6	40	1.065	Single	0	50	0
		Total	42.6	-	1.065	Total	42.6	-	0.5325
2	Dualization of Road from Abdul Hakim to Kacha Khuh	Dual	0	80	0	Dual	19.5	80	0.2437
		Single	19.5	40	0.4875	Single	0	50	0
		Total	19.5	-	0.4875	Total	19.5	-	0.2437
3	Dualization of Road from Khanewal to Kabirwala	Dual	0	80	0	Dual	11.3	80	0.1412
		Single	11.3	40	0.2825	Single	0	50	0
		Total	11.3	-	0.2825	Total	11.3	-	0.1412
4	Dualization of Road from Mian Channu to Abdul Hakim	Dual	0	80	0	Dual	26.9	80	0.3362
		Single	26.9	40	0.6725	Single	0	50	0
		Total	26.9	-	0.6725	Total	26.9	-	0.3362
5		Dual	0	80	0	Dual	0	80	0
		Single	36.8	40	0.92	Single	36.8	50	0.736

	Widening/Improvement of Kabirwala-Tulamba Road	Total	36.8	-	0.92	Total	36.8	-	0.736
6	Dualization of Burewala-Mian Channu Road	Dual	0	80	0	Dual	47.8	80	0.5975
		Single	47.8	40	1.195	Single	0	50	0
		Total	47.8	-	1.195	Total	47.8	-	0.5975
7	Dualization of Road from Vehari Head Islam to Kacha Khuh	Dual	0	80	0	Dual	83.5	80	1.0437
		Single	83.5	40	2.0875	Single	0	50	0
		Total	83.5	-	2.0875	Total	83.5	-	1.0437
8	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	Dual	0	80	0	Dual	21.2	80	0.265
		Single	21.2	40	0.53	Single	0	50	0
		Total	21.2	-	0.53	Total	21.2	-	0.265
9	Widening/Improvement of Road from Dunyapur to Kahror Pacca	Dual	0	80	0	Dual	0	80	0
		Single	24.7	40	0.6175	Single	24.7	50	0.494
		Total	24.7	-	0.6175	Total	24.7	-	0.494
10	Dualization of Multan Dunyapur Road	Dual	0	80	0	Dual	48.1	80	0.6012
		Single	48.1	40	1.2025	Single	0	50	0
		Total	48.1	-	1.2025	Total	48.1	-	0.6012
11	Dualization of Lodhran Jalalpur Pirwala Road	Dual	0	80	0	Dual	41.1	80	0.5137
		Single	41.1	40	1.0275	Single	0	50	0

		Total	41.1	-	1.0275	Total	41.1	-	0.5137
12	Widening/Improvement of Shujaabad-Dunyapur Road	Dual	0	80	0	Dual	0	80	0
		Single	40	40	1	Single	40	50	0.8
		Total	40	-	1	Total	40	-	0.8
13	Dualization of Road from Mailsi to Kahror Pakka	Dual	0	80	0	Dual	31.3	80	0.3912
		Single	31.3	40	0.7825	Single	0	50	0
		Total	31.3	-	0.7825	Total	31.3	-	0.3912
14	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	Dual	0	80	0	Dual	13.2	80	0.165
		Single	13.2	40	0.33	Single	0	50	0
		Total	13.2	-	0.33	Total	13.2	-	0.165
15	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary	Dual	0	80	0	Dual	10.7	80	0.1337
		Single	10.7	40	0.2675	Single	0	50	0
		Total	10.7	-	0.2675	Total	10.7	-	0.1337
16	Widening/Improvement of Road from Shujaabad to Jalalpur	Dual	0	80	0	Dual	0	80	0
		Single	40	40	1	Single	40	50	0.8
		Total	40	-	1	Total	40	-	0.8
17	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	Dual	0	80	0	Dual	33.6	80	0.42
		Single	33.6	40	0.84	Single	0	50	0
		Total	33.6	-	0.84	Total	33.6	-	0.42
18	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	Dual	0	80	0	Dual	38.4	80	0.48
		Single	38.4	40	0.96	Single	0	50	0
		Total	38.4	-	0.96	Total	38.4	-	0.48
19		Dual	0	80	0	Dual	28.4	80	0.355
		Single	28.4	40	0.71	Single	0	50	0

	Dualization of Burewala-Arifwala Road up to District Boundary	Total	28.4	-	0.71	Total	28.4	-	0.355
20	Dualization of Road from Karampur to Luddan	Dual	0	80	0	Dual	21.8	80	0.2725
		Single	21.8	40	0.545	Single	0	50	0
		Total	21.8	-	0.545	Total	21.8	-	0.2725
21	Dualization of Road from Vehari to Burewala	Dual	0	80	0	Dual	25.3	80	0.3162
		Single	25.3	40	0.6325	Single	0	50	0
		Total	25.3	-	0.6325	Total	25.3	-	0.3162
22	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	Dual	0	80	0	Dual	42	80	0.525
		Single	42	40	1.05	Single	0	50	0
		Total	42	-	1.05	Total	42	-	0.525
23	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	Dual	0	80	0	Dual	0	80	0
		Single	41.6	40	1.04	Single	41.6	50	0.832
		Total	41.6	-	1.04	Total	41.6	-	0.832
24	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	Dual	0	80	0	Dual	0	80	0
		Single	38	40	0.95	Single	38	50	0.76
		Total	38	-	0.95	Total	38	-	0.76

ANNEXURE I
Sheet 2 Travel Time Savings

Sr No	Linkage	Existing Travel Time (Hrs)	Travel Time After Improve-ment (Hrs)	Travel Time Saved per PCU per Day (Hrs)	PCU per Day	Total Time Saved per Day (Hrs)	Total Time Saved per Year (Hrs)	Time Value of Occupants (Rs./Hr)	Total Amount Saved Annually Rs.
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	1.07	0.53	0.53	11,149	5,937.0	2,166,996.1	1,749.0	3,790,076,184.4
2	Dualization of Road from Abdul Hakim to Kacha Khuh	0.49	0.24	0.24	13,106	3,194.6	1,166,024.4	1,749.0	2,039,376,741.2
3	Dualization of Road from Khanewal to Kabirwala	0.28	0.14	0.14	12,814	1,809.9	660,616.0	1,749.0	1,155,417,400.4
4	Dualization of Road from Mian Channu to Abdul Hakim	0.67	0.34	0.34	6,939	2,333.2	851,601.5	1,749.0	1,489,450,955.2
5	Widening/Improvement of Kabirwala-Tulamba Road	0.92	0.74	0.18	4,360	802.3	292,834.4	1,749.0	512,167,348.1
6	Dualization of Burewala-Mian Channu Road	1.20	0.60	0.60	7,954	4,752.3	1,734,593.8	1,749.0	3,033,804,600.4
7	Dualization of Road from Vehari Head Islam to Kacha Khuh	2.09	1.04	1.04	13,960	14,570.5	5,318,228.5	1,749.0	9,301,581,660.2

8	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	0.53	0.27	0.27	6,898	1,828.0	667,209.1	1,749.0	1,166,948,628.5
9	Widening/Improvement of Road from Dunyapur to Kahror Pacca	0.62	0.49	0.12	6,062	748.7	273,259.8	1,749.0	477,931,398.9
10	Dualization of Multan Dunyapur Road	1.20	0.60	0.60	8,248	4,958.8	1,809,965.4	1,749.0	3,165,629,522.9
11	Dualization of Lodhran Jalalpur Pirwala Road	1.03	0.51	0.51	7,154	3,675.5	1,341,556.0	1,749.0	2,346,381,474.1
12	Widening/Improvement of Shujaabad-Dunyapur Road	1.00	0.80	0.20	4,500	900.0	328,500.0	1,749.0	574,546,500.0
13	Dualization of Road from Mailsi to Kahror Pakka	0.78	0.39	0.39	7,197	2,815.7	1,027,740.9	1,749.0	1,797,518,798.6
14	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	0.33	0.17	0.17	13,358	2,204.1	804,500.6	1,749.0	1,407,071,560.3
15	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary	0.27	0.13	0.13	13,475	1,802.3	657,832.7	1,749.0	1,150,549,315.8
16	Widening/Improvement of Road from Shujaabad to Jalalpur	1.00	0.80	0.20	11,473	2,294.7	837,547.3	1,749.0	1,464,870,140.3
17	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	0.84	0.42	0.42	24,682	10,366.5	3,783,788.9	1,749.0	6,617,846,829.8

18	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	0.96	0.48	0.48	9,826	4,716.6	1,721,569.5	1,749.0	3,011,025,076.5
19	Dualization of Burewala-Arifwala Road up to District Boundary	0.71	0.36	0.36	13,503	4,793.4	1,749,604.6	1,749.0	3,060,058,406.9
20	Dualization of Road from Karampur to Luddan	0.55	0.27	0.27	4,495	1,224.9	447,083.9	1,749.0	781,949,806.7
21	Dualization of Road from Vehari to Burewala	0.63	0.32	0.32	11,890	3,760.3	1,372,500.6	1,749.0	2,400,503,634.7
22	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	1.05	0.53	0.53	13,579	7,129.2	2,602,160.2	1,749.0	4,551,178,172.3
23	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	1.04	0.83	0.21	6,408	1,333.0	486,529.5	1,749.0	850,940,137.5
24	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	0.95	0.76	0.19	6,532	1,241.1	452,997.0	1,749.0	792,291,707.5

ANNEXURE I
SHEET 3- Vehicle Operating Costs Savings

Sr No	Linkage	Distance (km)		VOC (Rs./km/ PCU/Day)		PCU per Day	Vehicle Operating Cost (Rs./Year)		VOC Per Annum
		Existing	New	Before	After		Before	After	Rs
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	42.6	42.6	52.8	52.4	11,149	9,149,965,952	9,084,126,204	65,839,748
2	Dualization of Road from Abdul Hakim to Kacha Khuh	19.5	19.5	52.8	52.4	13,106	4,923,443,973	4,888,016,703	35,427,270
3	Dualization of Road from Khanewal to Kabirwala	11.3	11.3	52.8	52.4	12,814	2,789,397,722	2,769,326,254	20,071,467
4	Dualization of Road from Mian Channu to Abdul Hakim	26.9	26.9	52.8	52.4	6,939	3,595,818,359	3,569,944,189	25,874,170
5	Widening/Improvement of Kabirwala-Tulamba Road	36.8	36.8	52.8	50.5	4,360	3,091,173,877	2,959,583,986	131,589,891
6	Dualization of Burewala-Mian Channu Road	47.8	47.8	52.8	52.4	7,954	7,324,182,272	7,271,480,183	52,702,089
7	Dualization of Road from Vehari Head Islam to Kacha Khuh	83.5	83.5	52.8	52.4	13,960	22,455,790,161	22,294,206,656	161,583,506
8	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	21.2	21.2	52.8	52.4	6,898	2,817,236,303	2,796,964,520	20,271,784
9	Widening/Improvement of Road from Dunyapur to Kahror Pacca	24.7	24.7	52.8	50.5	6,062	2,884,543,618	2,761,749,885	122,793,733

10	Dualization of Multan Dunyapur Road	48.1	48.1	52.8	52.4	8,248	7,642,432,749	7,587,440,648	54,992,101
11	Dualization of Lodhran Jalalpur Pirwala Road	41.1	41.1	52.8	52.4	7,154	5,664,611,885	5,623,851,447	40,760,438
12	Widening/Improvement of Shujaabad-Dunyapur Road	40.0	40.0	52.8	50.5	4,500	3,467,661,768	3,320,044,956	147,616,812
13	Dualization of Road from Mailsi to Kahror Pakka	31.3	31.3	52.8	52.4	7,197	4,339,552,823	4,308,327,017	31,225,806
14	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	13.2	13.2	52.8	52.4	13,358	3,396,938,806	3,372,495,699	24,443,107
15	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary	10.7	10.7	52.8	52.4	13,475	2,777,645,238	2,757,658,337	19,986,901
16	Widening/Improvement of Road from Shujaabad to Jalalpur	40.0	40.0	52.8	50.5	11,473	8,841,188,973	8,464,823,509	376,365,464
17	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	33.6	33.6	52.8	52.4	24,682	15,976,743,006	15,861,780,311	114,962,694
18	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	38.4	38.4	52.8	52.4	9,826	7,269,188,162	7,216,881,790	52,306,372
19	Dualization of Burewala-Arifwala Road up to District Boundary	28.4	28.4	52.8	52.4	13,503	7,387,563,963	7,334,405,803	53,158,160
20	Dualization of Road from Karampur to Luddan	21.8	21.8	52.8	52.4	4,495	1,887,775,802	1,874,192,070	13,583,732
21	Dualization of Road from Vehari to Burewala	25.3	25.3	52.8	52.4	11,890	5,795,273,091	5,753,572,464	41,700,628
22	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	42.0	42.0	52.8	52.4	13,579	10,987,411,148	10,908,349,828	79,061,320

23	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	41.6	41.6	52.8	50.5	6,408	5,135,829,009	4,917,199,063	218,629,946
24	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	38.0	38.0	52.8	50.5	6,532	4,781,857,801	4,578,296,252	203,561,550

ANNEXURE I
SHEET 4-A Existing Link Fuel Cost

Sr No	Link	Existing							
		Carriage-way	Distance (Km)	Speed (kph)	Fuel Consumption (Rs./km/veh/day)	Fuel Consumption (Rs./veh/day)	Vehicles ADT (PCU)	Total Fuel Cost (Rs./Day)	Total Fuel Cost Annually (PKR Millions)
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	Dual	0	80	19.94	0.00	0	0	3760.17
		Single	42.6	40	21.69	923.99	11,149	10,301,840	
		Total	42.6	-	-	923.99	11,149	10,301,840	
2	Dualization of Road from Abdul Hakim to Kacha Khuh	Dual	0	80	19.94	0.00	0	0	2023.29
		Single	19.5	40	21.69	422.96	13,106	5,543,248	
		Total	19.5	-	-	422.96	13,106	5,543,248	
3	Dualization of Road from Khanewal to Kabirwala	Dual	0	80	19.94	0.00	0	0	1146.30
		Single	11.3	40	21.69	245.10	12,814	3,140,550	
		Total	11.3	-	-	245.10	12,814	3,140,550	
4	Dualization of Road from Mian Channu to Abdul Hakim	Dual	0	80	19.94	0.00	0	0	1477.70
		Single	26.9	40	21.69	583.46	6,939	4,048,490	
		Total	26.9	-	-	583.46	6,939	4,048,490	
5	Widening/Improvement of Kabirwala-Tulamba Road	Dual	0	80	19.94	0.00	0	0	1270.32
		Single	36.8	40	21.69	798.19	4,360	3,480,317	
		Total	36.8	-	-	798.19	4,360	3,480,317	
6	Dualization of Burewala-Mian Channu Road	Dual	0	80	19.94	0.00	0	0	3009.87
		Single	47.8	40	21.69	1036.78	7,954	8,246,212	
		Total	47.8	-	-	1036.78	7,954	8,246,212	
7		Dual	0	80	19.94	0.00	0	0	9228.19

	Dualization of Road from Vehari Head Islam to Kacha Khuh	Single	83.5	40	21.69	1811.12	13,960	25,282,713	
		Total	83.5	-	-	1811.12	13,960	25,282,713	
8	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	Dual	0	80	19.94	0.00	0	0	1157.74
		Single	21.2	40	21.69	459.83	6,898	3,171,894	
		Total	21.2	-	-	459.83	6,898	3,171,894	
9	Widening/Improvement of Road from Dunyapur to Kahror Pacca	Dual	0	80	19.94	0.00	0	0	1185.40
		Single	24.7	40	21.69	535.74	6,062	3,247,674	
		Total	24.7	-	-	535.74	6,062	3,247,674	
10	Dualization of Multan Dunyapur Road	Dual	0	80	19.94	0.00	0	0	3140.65
		Single	48.1	40	21.69	1043.29	8,248	8,604,526	
		Total	48.1	-	-	1043.29	8,248	8,604,526	
11	Dualization of Lodhran Jalalpur Pirwala Road	Dual	0	80	19.94	0.00	0	0	2327.87
		Single	41.1	40	21.69	891.46	7,154	6,377,721	
		Total	41.1	-	-	891.46	7,154	6,377,721	
12	Widening/Improvement of Shujaabad-Dunyapur Road	Dual	0	80	19.94	0.00	0	0	1425.03
		Single	40	40	21.69	867.60	4,500	3,904,200	
		Total	40	-	-	867.60	4,500	3,904,200	
13	Dualization of Road from Mailsi to Kahror Pakka	Dual	0	80	19.94	0.00	0	0	1783.34
		Single	31.3	40	21.69	678.90	7,197	4,885,852	
		Total	31.3	-	-	678.90	7,197	4,885,852	
14	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	Dual	0	80	19.94	0.00	0	0	1395.97
		Single	13.2	40	21.69	286.31	13,358	3,824,574	
		Total	13.2	-	-	286.31	13,358	3,824,574	
15	Dualization of Multan Bypass from Shahidpur	Dual	0	80	19.94	0.00	0	0	1141.47
		Single	10.7	40	21.69	232.08	13,475	3,127,318	
		Total	10.7	-	-	232.08	13,475	3,127,318	

	Chowk to District Boundary								
16	Widening/Improvement of Road from Shujaabad to Jalalpur	Dual	0	80	19.94	0.00	0	0	3633.28
		Single	40	40	21.69	867.60	11,473	9,954,192	
		Total	40	-	-	867.60	11,473	9,954,192	
17	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	Dual	0	80	19.94	0.00	0	0	6565.63
		Single	33.6	40	21.69	728.78	24,682	17,988,029	
		Total	33.6	-	-	728.78	24,682	17,988,029	
18	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	Dual	0	80	19.94	0.00	0	0	2987.27
		Single	38.4	40	21.69	832.90	9,826	8,184,294	
		Total	38.4	-	-	832.90	9,826	8,184,294	
19	Dualization of Burewala-Arifwala Road up to District Boundary	Dual	0	80	19.94	0.00	0	0	3035.91
		Single	28.4	40	21.69	616.00	13,503	8,317,572	
		Total	28.4	-	-	616.00	13,503	8,317,572	
20	Dualization of Road from Karampur to Luddan	Dual	0	80	19.94	0.00	0	0	775.78
		Single	21.8	40	21.69	472.84	4,495	2,125,425	
		Total	21.8	-	-	472.84	4,495	2,125,425	
21	Dualization of Road from Vehari to Burewala	Dual	0	80	19.94	0.00	0	0	2381.56
		Single	25.3	40	21.69	548.76	11,890	6,524,830	
		Total	25.3	-	-	548.76	11,890	6,524,830	
22	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	Dual	0	80	19.94	0.00	0	0	4515.27
		Single	42	40	21.69	910.98	13,579	12,370,598	
		Total	42	-	-	910.98	13,579	12,370,598	
23	Widening Improvement of Tibba Sultanpur-	Dual	0	80	19.94	0.00	0	0	2110.57
		Single	41.6	40	21.69	902.30	6,408	5,782,370	

	Mailsi-Khairpur Road upto District Boundary	Total	41.6	-	-	902.30	6,408	5,782,370	
24	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	Dual	0	80	19.94	0.00	0	0	1965.10
		Single	41.7	40	21.69	904.473	6408.45	5796270	
		Total	41.7	-	-	904.473	6408.45	5796270	

SHEET 4-B Proposed-Link Fuel Cost

Sr No	Link	Proposed							
		Carriage-way	Distance (Km)	Speed (kph)	Fuel Consumption (Rs./km/veh/day)	Fuel Consumption (Rs./veh/day)	Vehicles ADT (PCU)	Total Fuel Cost (Rs./Day)	Total Fuel Cost Annually (PKR Millions)
1	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal	Dual	42.6	80	19.94	849.44	11,149	9,470,664	3456.79
		Single	0	50	20.28	0.00	0	0	
		Total	42.6	-	-	849.44	11,149	9,470,664	
2	Dualization of Road from Abdul Hakim to Kacha Khuh	Dual	19.5	80	19.94	388.83	13,106	5,096,006	1860.04
		Single	0	50	20.28	0.00	0	0	
		Total	19.5	-	-	388.83	13,106	5,096,006	
3	Dualization of Road from Khanewal to Kabirwala	Dual	11.3	80	19.94	225.32	12,814	2,887,163	1053.81
		Single	0	50	20.28	0.00	0	0	
		Total	11.3	-	-	225.32	12,814	2,887,163	
4	Dualization of Road from Mian Channu to Abdul Hakim	Dual	26.9	80	19.94	536.39	6,939	3,721,848	1358.47
		Single	0	50	20.28	0.00	0	0	
		Total	26.9	-	-	536.39	6,939	3,721,848	
5	Widening/Improvement of Kabirwala-Tulamba Road	Dual	0	80	19.94	0.00	0	0	1187.74
		Single	36.8	50	20.28	746.30	4,360	3,254,072	
		Total	36.8	-	-	746.30	4,360	3,254,072	
6	Dualization of Burewala-Mian Channu Road	Dual	47.8	80	19.94	953.13	7,954	7,580,888	2767.02
		Single	0	50	20.28	0.00	0	0	
		Total	47.8	-	-	953.13	7,954	7,580,888	

7	Dualization of Road from Vehari Head Islam to Kacha Khuh	Dual	83.5	80	19.94	1664.99	13,960	23,242,844	8483.64
		Single	0	50	20.28	0.00	0	0	
		Total	83.5	-	-	1664.99	13,960	23,242,844	
8	Dualization of Road from Lodhran to Kahror Pakka via Dhanote	Dual	21.2	80	19.94	422.73	6,898	2,915,978	1064.33
		Single	0	50	20.28	0.00	0	0	
		Total	21.2	-	-	422.73	6,898	2,915,978	
9	Widening/Improvement of Road from Dunyapur to Kahror Pacca	Dual	0	80	19.94	0.00	0	0	1108.34
		Single	24.7	50	20.28	500.92	6,062	3,036,553	
		Total	24.7	-	-	500.92	6,062	3,036,553	
10	Dualization of Multan Dunyapur Road	Dual	48.1	80	19.94	959.11	8,248	7,910,293	2887.26
		Single	0	50	20.28	0.00	0	0	
		Total	48.1	-	-	959.11	8,248	7,910,293	
11	Dualization of Lodhran Jalalpur Pirwala Road	Dual	41.1	80	19.94	819.53	7,154	5,863,151	2140.05
		Single	0	50	20.28	0.00	0	0	
		Total	41.1	-	-	819.53	7,154	5,863,151	
12	Widening/Improvement of Shujaabad-Dunyapur Road	Dual	0	80	19.94	0.00	0	0	1332.40
		Single	40	50	20.28	811.20	4,500	3,650,400	
		Total	40	-	-	811.20	4,500	3,650,400	
13	Dualization of Road from Mailsi to Kahror Pakka	Dual	31.3	80	19.94	624.12	7,197	4,491,650	1639.45
		Single	0	50	20.28	0.00	0	0	
		Total	31.3	-	-	624.12	7,197	4,491,650	
14	Dualization of Bosan Road from Jinnah Avenue to Abadi Adda Bosan	Dual	13.2	80	19.94	263.21	13,358	3,515,998	1283.34
		Single	0	50	20.28	0.00	0	0	
		Total	13.2	-	-	263.21	13,358	3,515,998	
15	Dualization of Multan Bypass from Shahidpur	Dual	10.7	80	19.94	213.36	13,475	2,874,999	1049.37
		Single	0	50	20.28	0.00	0	0	

	Chowk to District Boundary	Total	10.7	-	-	213.36	13,475	2,874,999	
16	Widening/Improvement of Road from Shujaabad to Jalalpur	Dual	0	80	19.94	0.00	0	0	3397.09
		Single	40	50	20.28	811.20	11,473	9,307,100	
		Total	40	-	-	811.20	11,473	9,307,100	
17	Dualization of Multan-Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)	Dual	33.6	80	19.94	669.98	24,682	16,536,713	6035.90
		Single	0	50	20.28	0.00	0	0	
		Total	33.6	-	-	669.98	24,682	16,536,713	
18	Dualization of Burewala Luddan Road via Kachi Pakki Chowk	Dual	38.4	80	19.94	765.70	9,826	7,523,966	2746.25
		Single	0	50	20.28	0.00	0	0	
		Total	38.4	-	-	765.70	9,826	7,523,966	
19	Dualization of Burewala-Arifwala Road up to District Boundary	Dual	28.4	80	19.94	566.30	13,503	7,646,491	2790.97
		Single	0	50	20.28	0.00	0	0	
		Total	28.4	-	-	566.30	13,503	7,646,491	
20	Dualization of Road from Karampur to Luddan	Dual	21.8	80	19.94	434.69	4,495	1,953,941	713.19
		Single	0	50	20.28	0.00	0	0	
		Total	21.8	-	-	434.69	4,495	1,953,941	
21	Dualization of Road from Vehari to Burewala	Dual	25.3	80	19.94	504.48	11,890	5,998,392	2189.41
		Single	0	50	20.28	0.00	0	0	
		Total	25.3	-	-	504.48	11,890	5,998,392	
22	Dualization of Vehari-Multan Road from Vehari to Tibba Sultanpur	Dual	42	80	19.94	837.48	13,579	11,372,509	4150.97
		Single	0	50	20.28	0.00	0	0	
		Total	42	-	-	837.48	13,579	11,372,509	

23	Widening Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary	Dual	0	80	19.94	0.00	0	0	1973.36
		Single	41.6	50	20.28	843.65	6,408	5,406,476	
		Total	41.6	-	-	843.65	6,408	5,406,476	
24	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road	Dual	0	80	19.94	0.00	0	0	1837.36
		Single	38	50	20.28	770.64	6,532	5,033,851	
		Total	38	-	-	770.64	6,532	5,033,851	

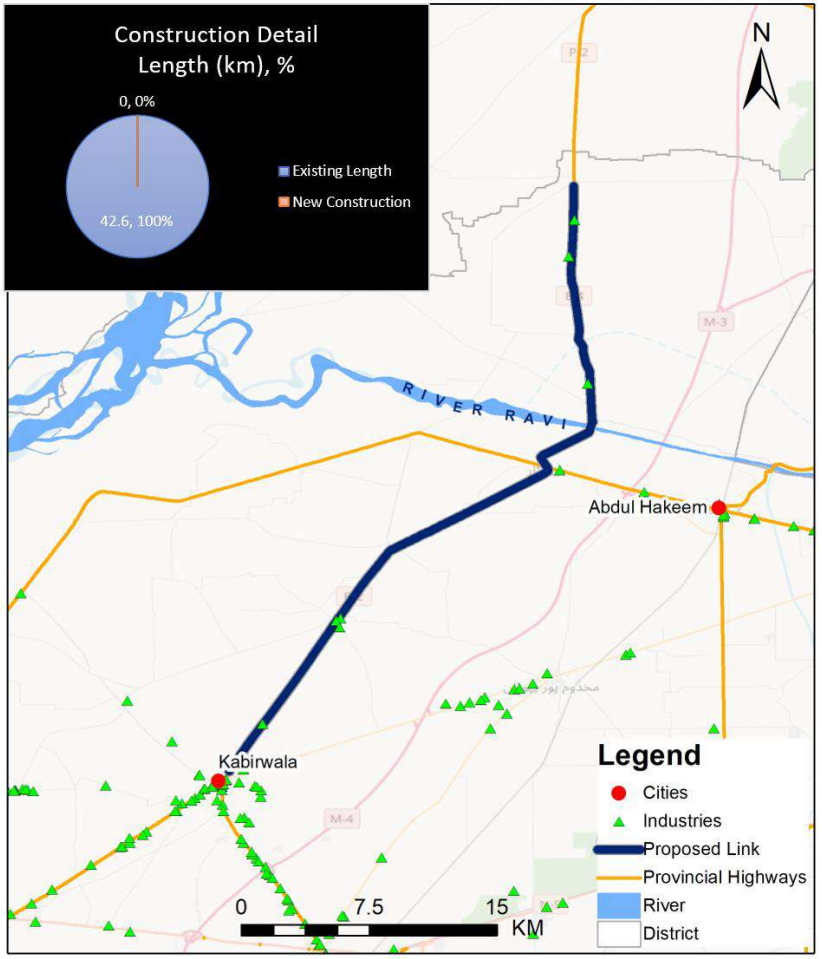
ANNEXURE II

PROPOSED ROAD SCHEMES

1: Jhang Road

Project Name	Dualization of Jhang Road from Kabirwala to the District Boundary of Khanewal
Districts	Khanewal
Length	42.6 km
Phase	Medium-Term (Year 2026 – 2029)
Total Cost (PKR Millions)	8461.90
Benefit Cost Ratio	4.0

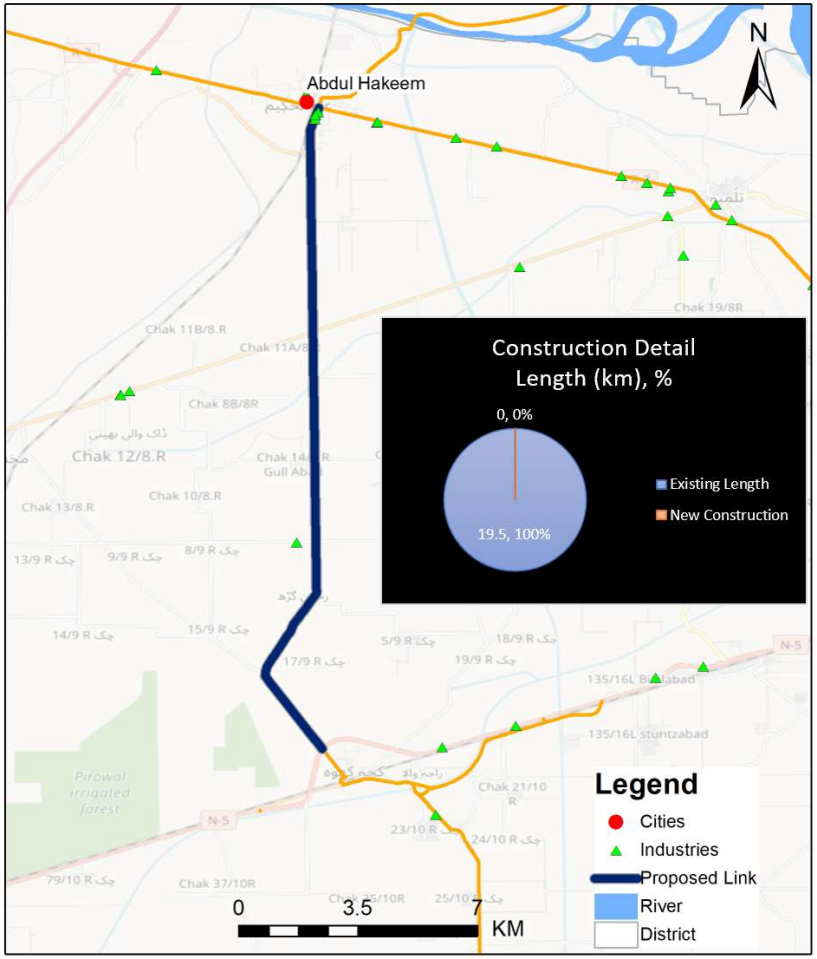
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious



2: Abdul Hakim-Kacha Khuh

Project Name	Dualization of Road from Abdul Hakim to Kacha Khuh
Districts	Khanewal
Length	19.5 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost (PKR Millions)	3873.41
Benefit Cost Ratio	4.7

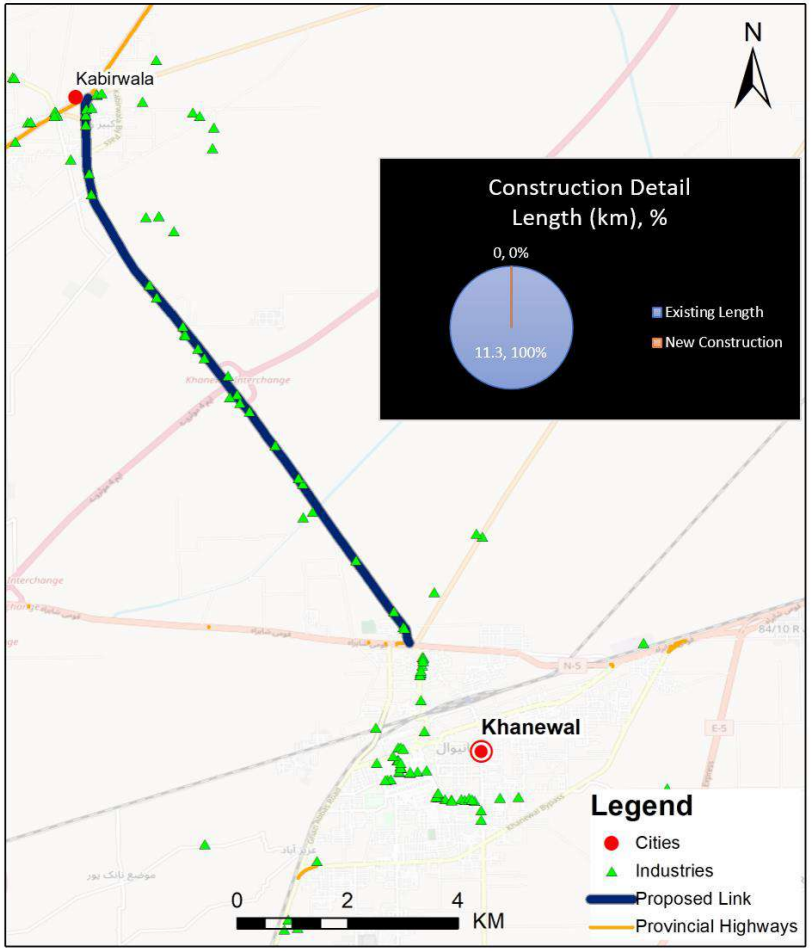
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious



3: Khanewal-Kabirwala

Project Name	Dualization of Road from Khanewal to Kabirwala
Districts	Khanewal
Length	11.3 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost (PKR Millions)	2244.59
Benefit Cost Ratio	4.6

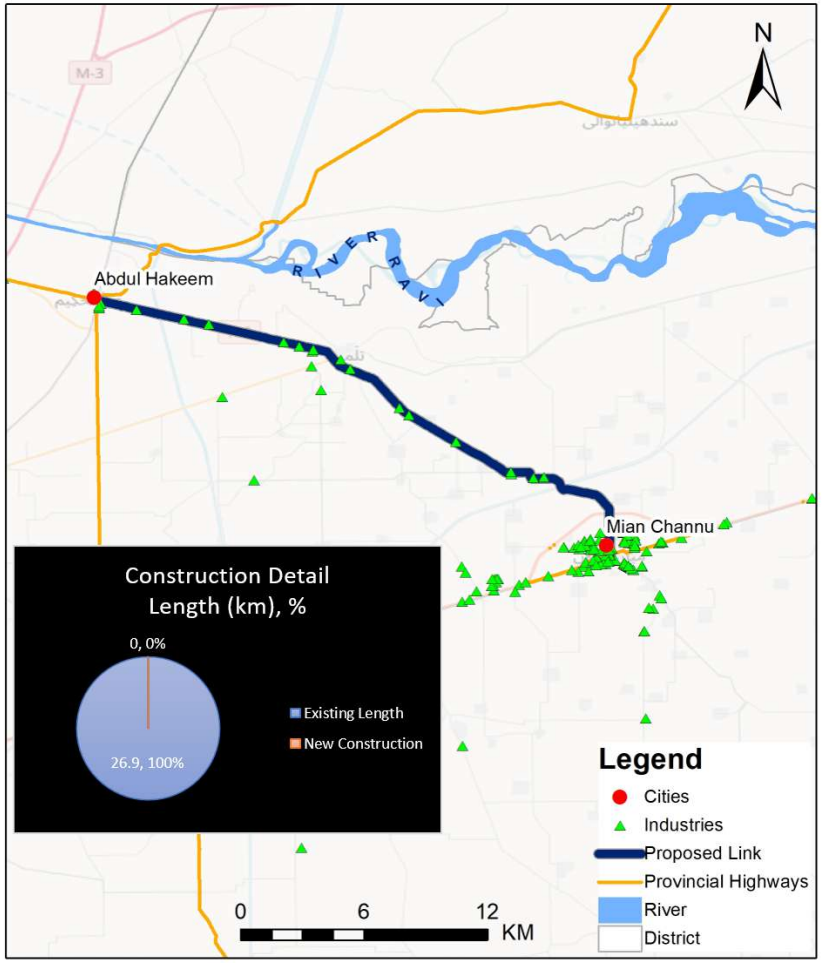
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious



4: Mian Channu-Abdul Hakim Road

Project Name	Dualization of Road from Mian Channu to Abdul Hakim
Districts	Khanewal
Length	26.9 km
Phase	Medium-Term (Year 2026 – 2029)
Total Cost (PKR Millions)	5614.26
Benefit Cost Ratio	2.4

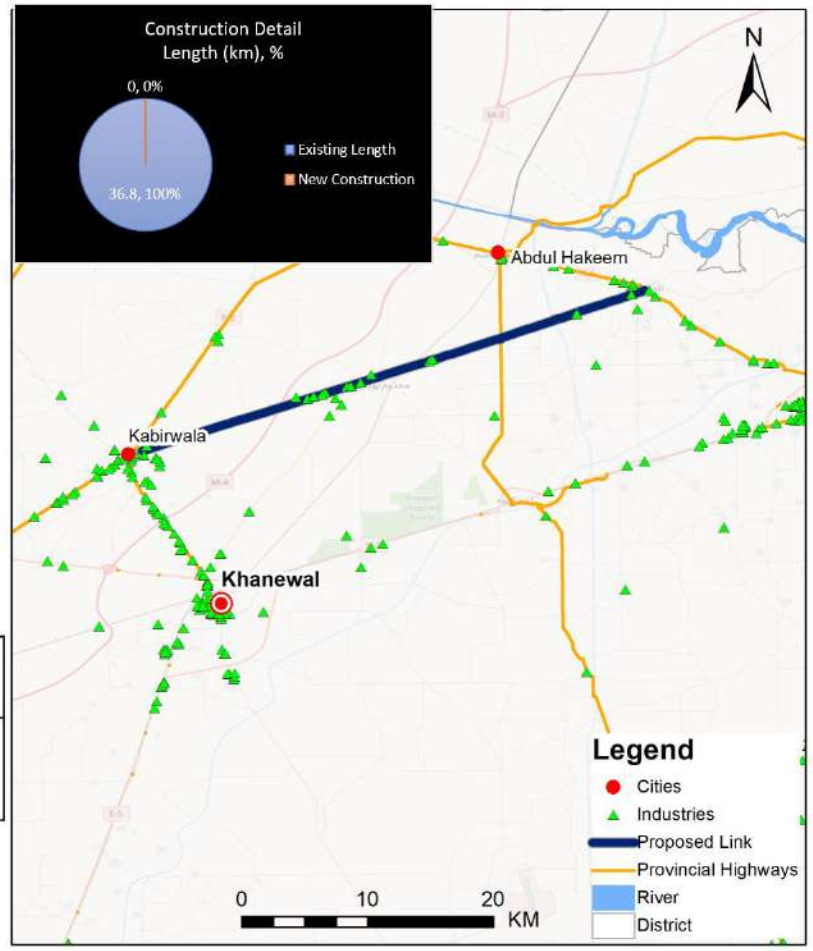
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious



5: Kabirwala-Tulamba

Project Name	Widening/Improvement of Kabirwala-Tulamba Road
Districts	Khanewal
Length	36.8 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost (PKR Millions)	1683.04
Benefit Cost Ratio	3.5

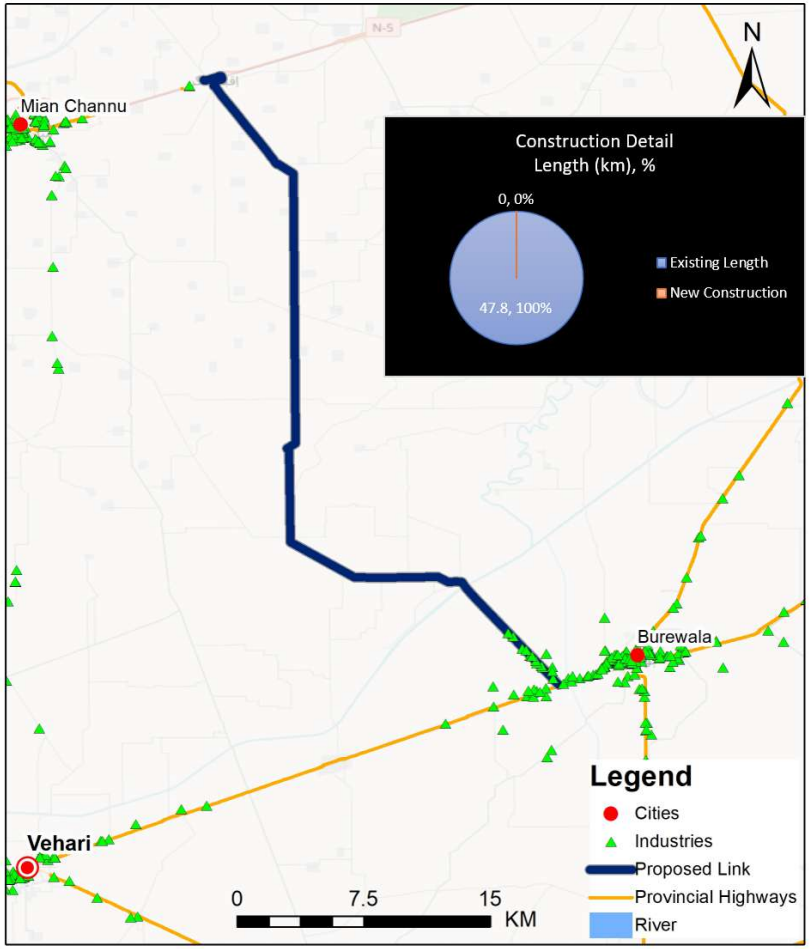
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious



6: Burewala-Mian Channu

Project Name	Dualization of Burewala-Mian Channu Road
Districts	Khanewal-Sahiwal-Vehari
Length	47.8 km
Phase	Medium-Term (Year 2026 – 2029)
Total Cost (PKR Millions)	8864.90
Benefit Cost Ratio	3.1

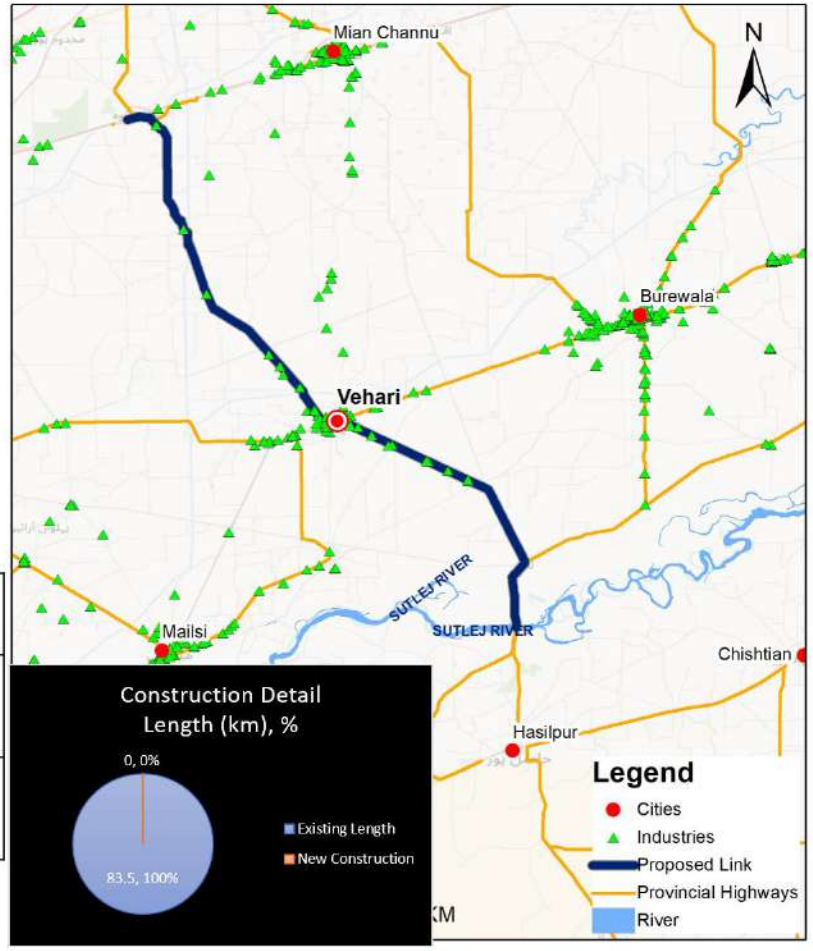
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious
Vehari	Cotton Industry, Cotton Seed Oil.	Mango, Guava, Orange, Sugarcane, Cotton.	Historical Sites, Largest Pvt Library in Pakistan
Sahiwal	Food, Chip Board, Textile, Pharma, Tobacco	Wheat, Sugarcane, Maize and Cotton	Historical (Harappa) Sites and some Shrines.



7: Head Islam to Kacha Khu

Project Name	Dualization of Road from Head Islam Vehari to Kacha Khuh
Districts	Khanewal-Vehari
Length	83.5 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost (PKR Millions)	15609.34
Benefit Cost Ratio	5.3

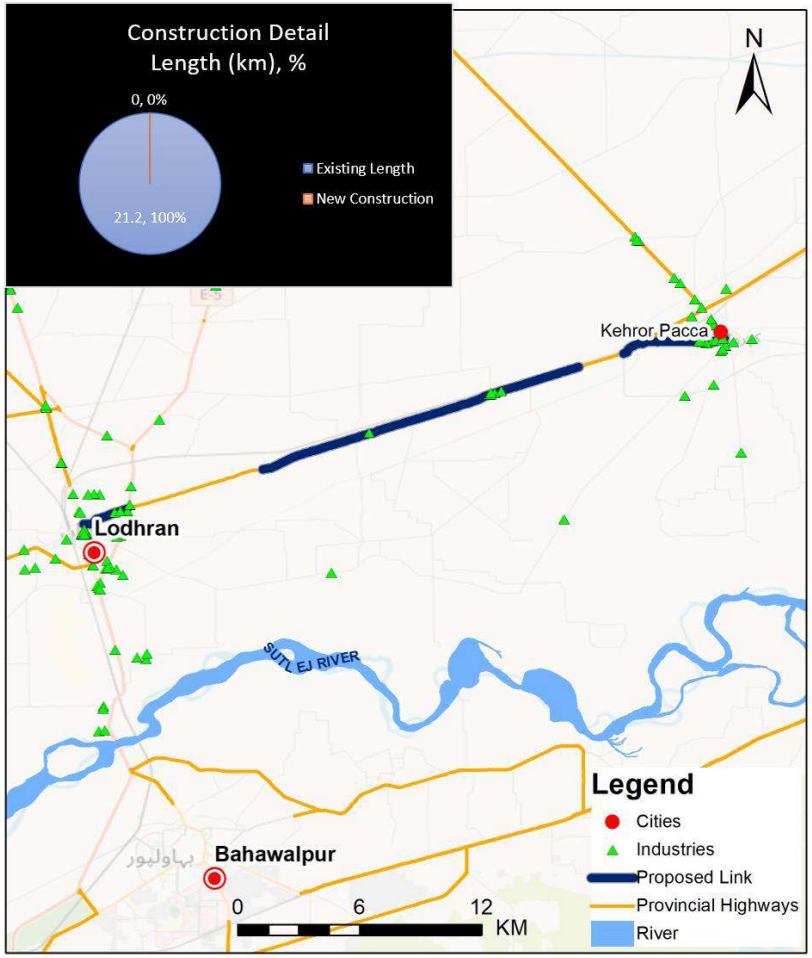
District	Industrial Produce	Agriculture Produce	Tourism Site
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious
Vehari	Cotton Industry, Cotton Seed Oil.	Mango, Guava, Orange, Sugarcane, Cotton.	Historical Sites, Largest Pvt Library in Pakistan



8: Lodhran to Kahror Pacca

Project Name	Dualization of Road from Lodhran to Kahror Pakka via Dhanote
Districts	Lodhran
Length	21.2 km
Phase	Long-Term (Year 2029 – 2033)
Total Cost PKR Millions	3937.34
Benefit Cost Ratio	2.6

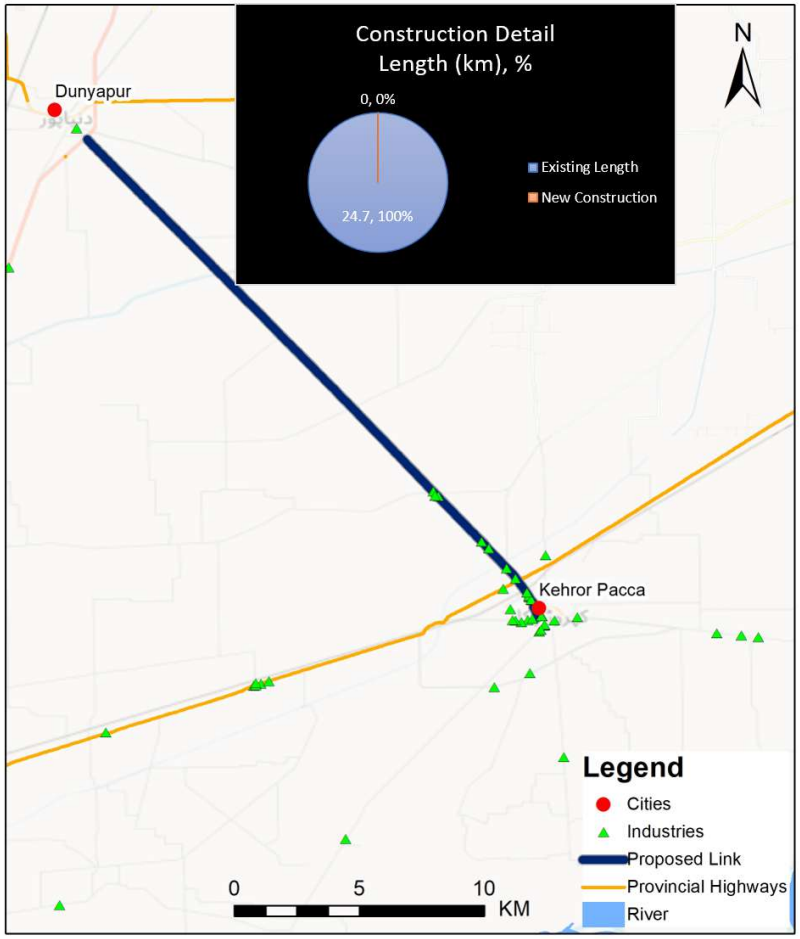
District	Industrial Produce	Agriculture Produce	Tourism Site
Lodhran	Ghee and some potential for auto spare parts industry	Sesame, sugarcane, Wheat Rice.	Ruins of Taiwat and Tilwara towns



9: Dunyapur to Kahror Pacca

Project Name	Widening/Improvement of Road from Dunyapur to Kahror Pakka
Districts	Lodhran
Length	24.7 km
Phase	Short Term (Year 2023 – 2026)
Total Cost PKR Millions	1728.69
Benefit Cost Ratio	3.2

District	Industrial Produce	Agriculture Produce	Tourism Site
Lodhran	Ghee and some potential for auto spare parts industry	Sesame, sugarcane, Wheat Rice.	Ruins of Taiwat and Tilwara towns



10: Multan-Dunyapur Road

Project Name Dualization of Road from Multan to Dunyapur

Districts Lodhran-Khanewal-Multan

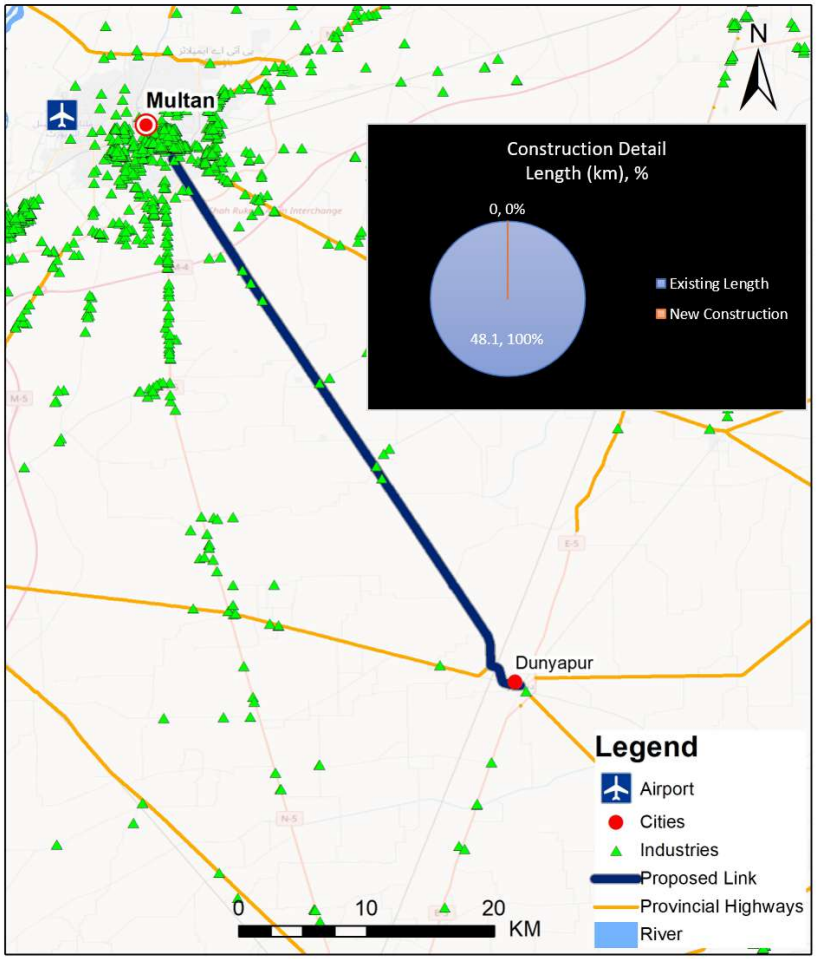
Length 48.1 km

Phase Medium Term (Year 2026 – 2029)

Total Cost PKR Millions 10165.32

Benefit Cost Ratio 2.8

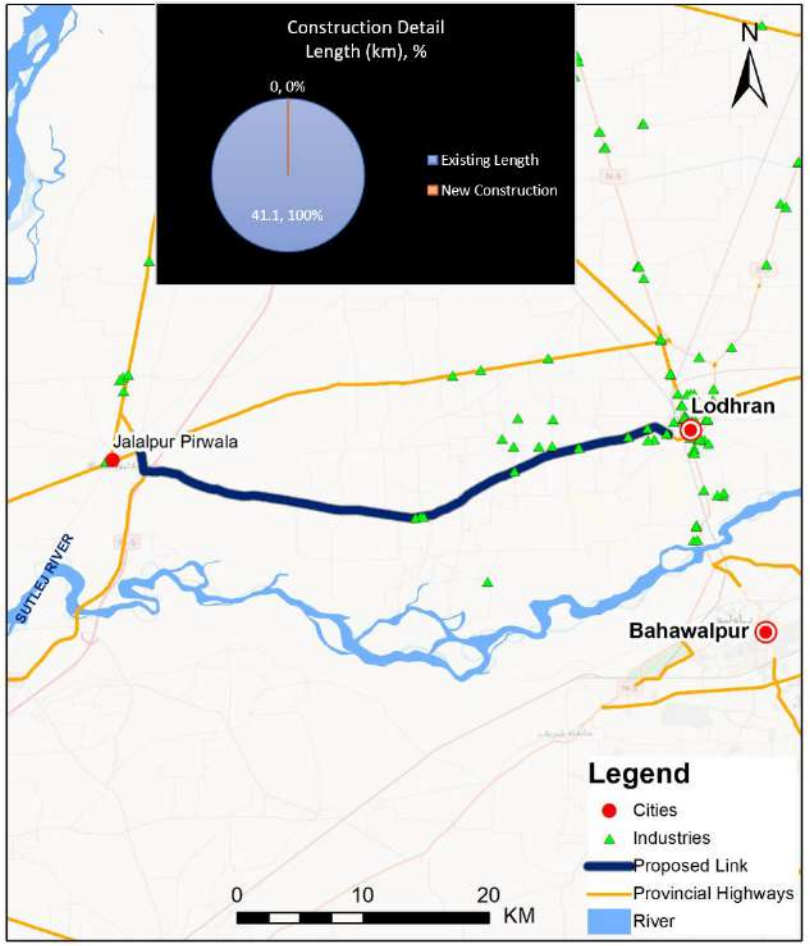
District	Industrial Produce	Agriculture Produce	Tourism Site
Lodhran	Ghee and some potential for auto spare parts industry	Sesame, sugarcane, Wheat Rice.	Ruins of Taiwat and Tilwara towns
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



11: Lodhran Jalalpur Pirwala Road

Project Name	Dualization of Lodhran Jalapur-Pirwala Road
Districts	Lodhran-Multan
Length	41.1 km
Phase	Long Term (Year 2029 – 2033)
Total Cost PKR Millions	7820.52
Benefit Cost Ratio	2.7

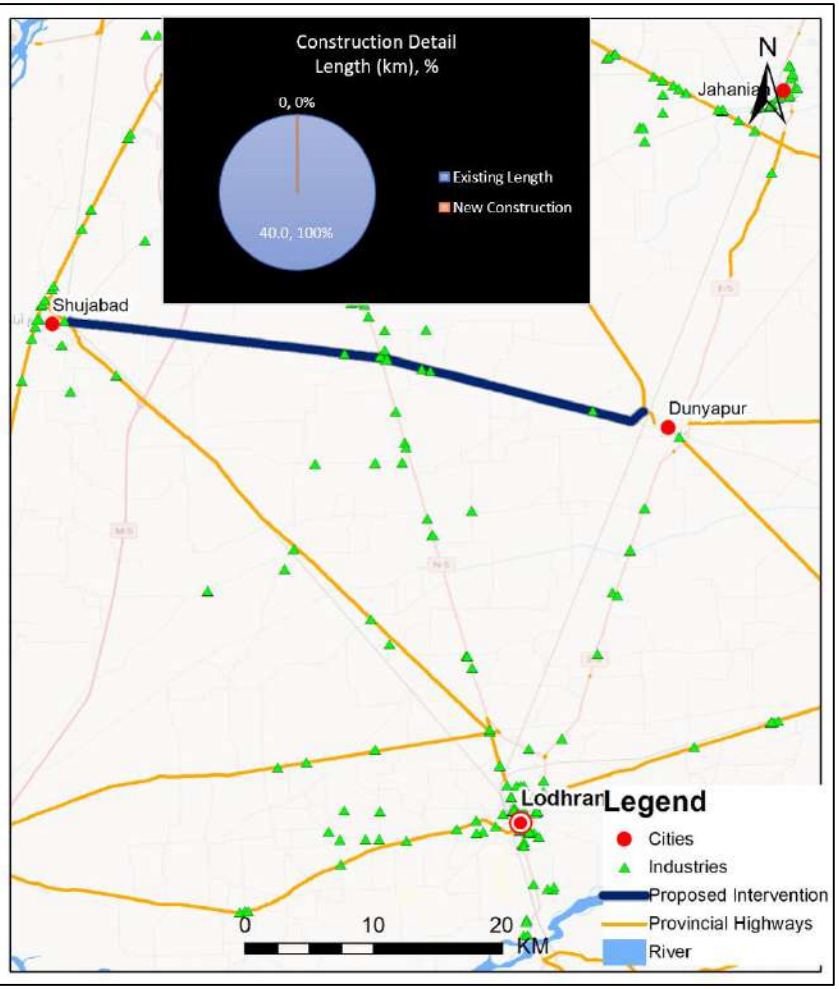
District	Industrial Produce	Agriculture Produce	Tourism Site
Lodhran	Ghee and some potential for auto spare parts industry	Sesame, sugarcane, Wheat Rice.	Ruins of Taiwat and Tilwara towns
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



12: Shujaabad-Dunyapur Road

Project Name	Dualization of Shujaabad-Dunyapur Road
Districts	Lodhran-Multan
Length	40.0 km
Phase	Short Term (Year 2023 – 2026)
Total Cost PKR Millions	1549.59
Benefit Cost Ratio	4.3

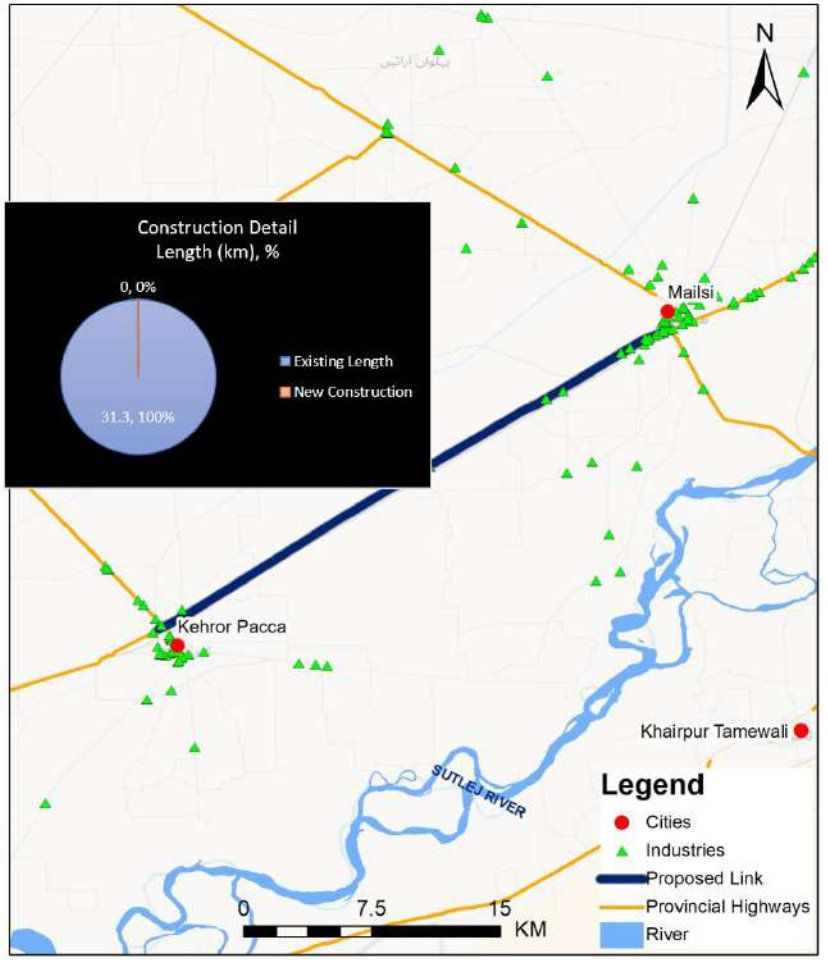
District	Industrial Produce	Agriculture Produce	Tourism Site
Lodhran	Ghee and some potential for auto spare parts industry	Sesame, sugarcane, Wheat Rice.	Ruins of Taiwat and Tilwara towns
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



13: Mailsi-Kehror Pakka Road

Project Name	Dualization of Road from Mailsi to Kahror Pakka
Districts	Lodhran-Vehari
Length	31.3 km
Phase	Long Term (Year 2029 – 2033)
Total Cost PKR Millions	6507.24
Benefit Cost Ratio	2.5

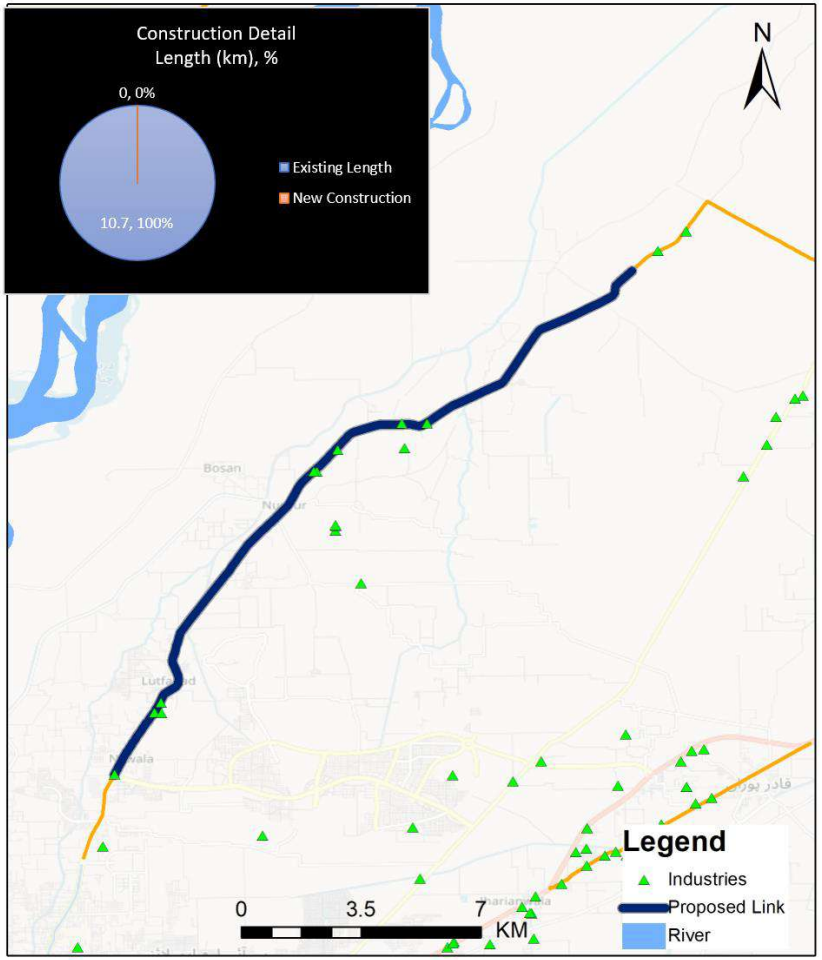
District	Industrial Produce	Agriculture Produce	Tourism Site
Lodhran	Ghee and some potential for auto spare parts industry	Sesame, sugarcane, Wheat Rice.	Ruins of Taiwat and Tilwara towns
Vehari	Cotton Industry, Cotton Seed Oil.	Mango, Guava, Orange, Sugarcane, Cotton.	Historical Sites, Largest Pvt Library in Pakistan



14: Multan-Adda Bosan Road

Project Name	Dualization of Bosan Road from Jinnah Avenue to Adda Bosan
Districts	Multan
Length	13.2 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	3103.49
Benefit Cost Ratio	4.0

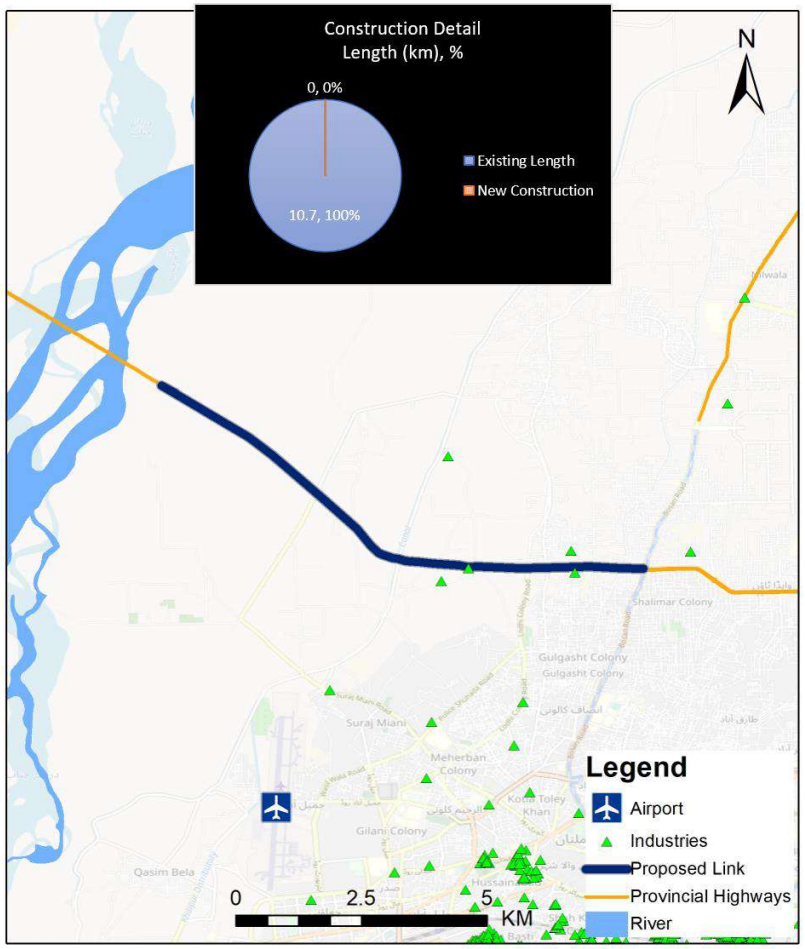
District	Industrial Produce	Agriculture Produce	Tourism Site
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



15: Multan Bypass Road

Project Name	Dualization of Multan Bypass from Shahidpur Chowk to District Boundary
Districts	Multan
Length	10.7 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	2080.01
Benefit Cost Ratio	4.9

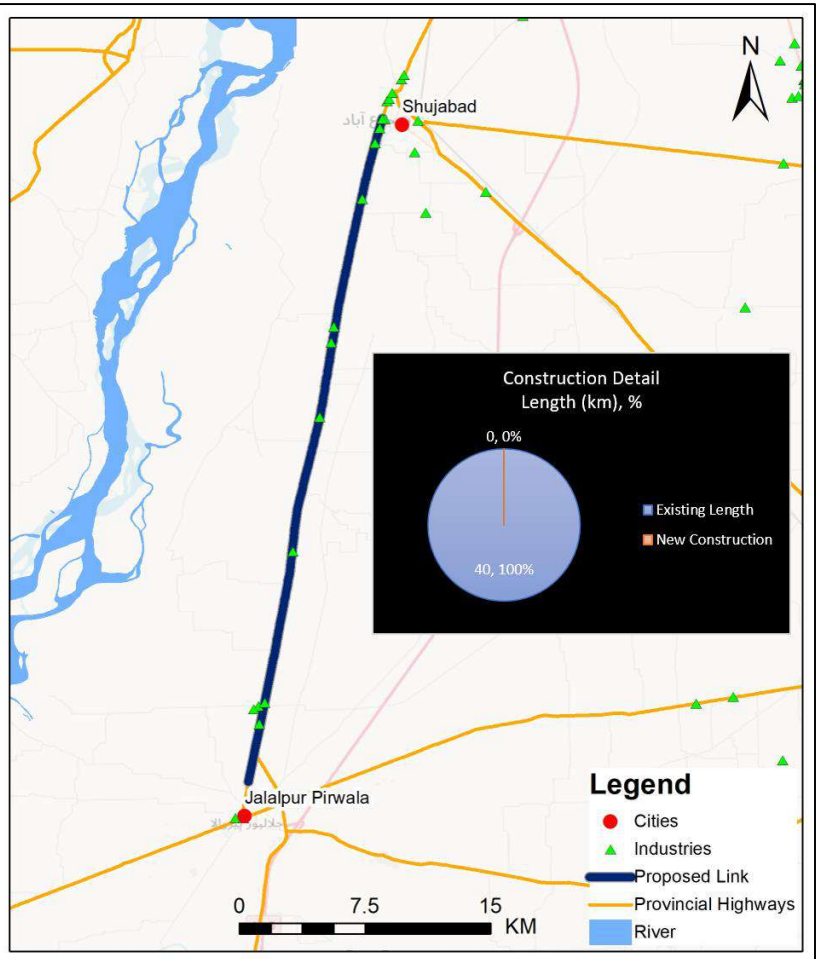
District	Industrial Produce	Agriculture Produce	Tourism Site
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



16: Shujaabad-Jalalpur Pirwala Road

Project Name	Widening/Improvement of Road from Shujaabad to Jalalpur Pirwala
Districts	Multan
Length	40 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	2003.77
Benefit Cost Ratio	8.4

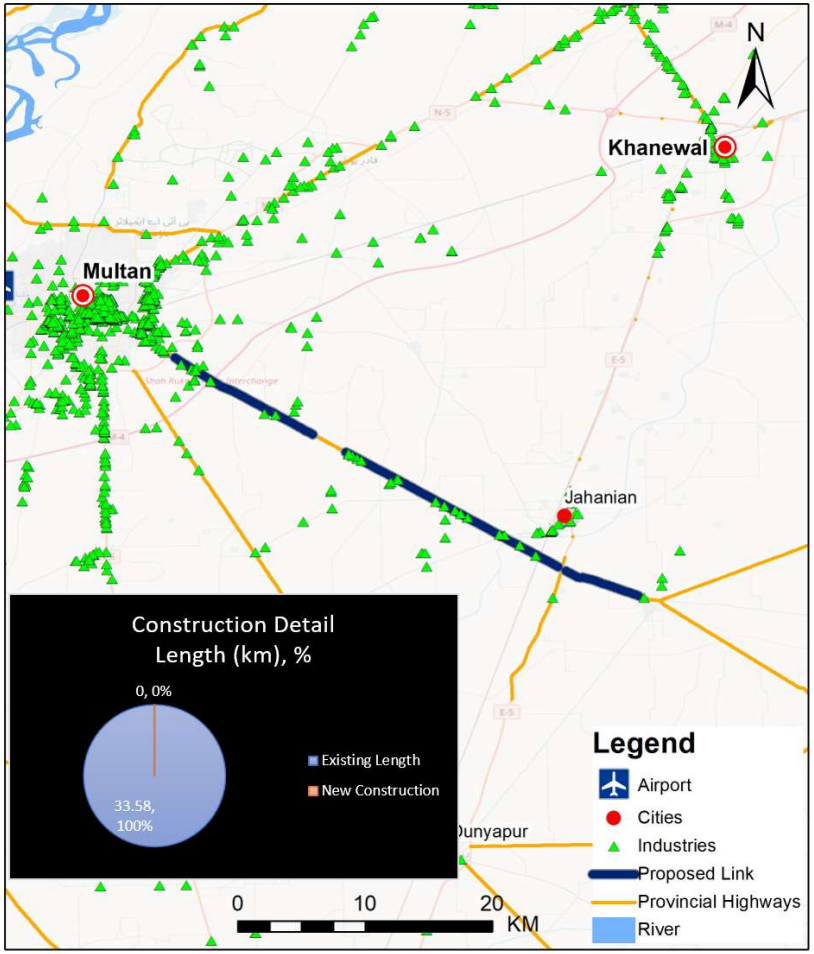
District	Industrial Produce	Agriculture Produce	Tourism Site
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



17: Multan-Vehari Road

Project Name	Dualization of Multan Vehari Road from Vehari Chowk (Multan) to Tibba Sultanpur (Vehari)
Districts	Multan-Khanewal-Vehari
Length	33.6 km
Phase	Short Term (Year 2023 – 2026)
Total Cost PKR Millions	6322.12
Benefit Cost Ratio	9.3

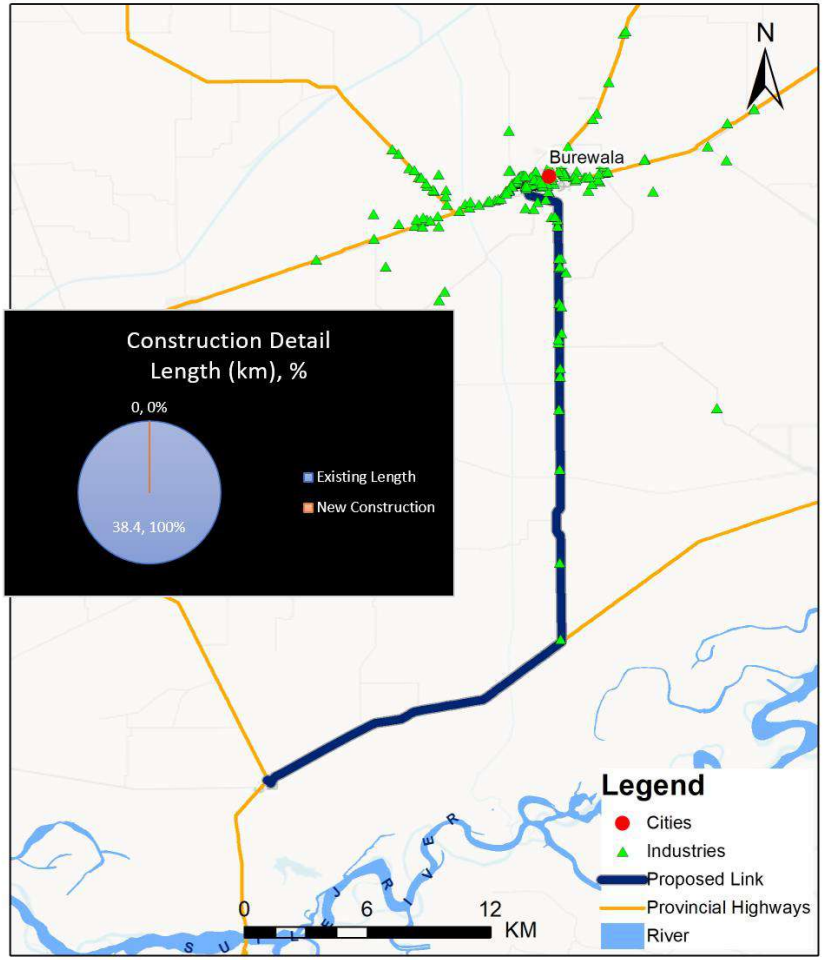
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A
Khanewal	Textile, Poultry, Food, Seed	Wheat, Cotton, Sugarcane, Other Crops	Historical and religious
Multan	Fertilizers, Pottery Cosmetics, Cotton Processing, Textile, Sugar	Mango, Rice, Cotton, Sugarcane, Corn (Maize), Oilseeds, Fruits, And Vegetables.	Religious and cultural tourism



18: Burewala-Luddan Road

Project Name	Dualization of Burewala-Luddan Road via Kachi Pakki Chowk
Districts	Vehari
Length	38.4 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	7149.59
Benefit Cost Ratio	3.8

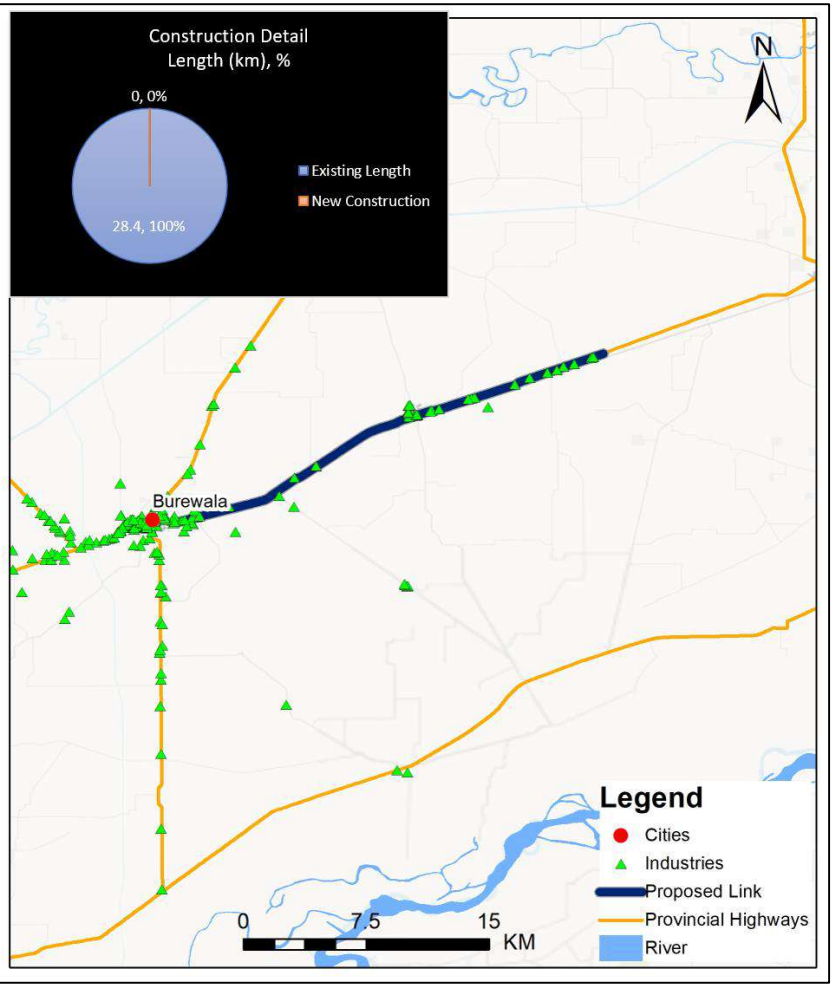
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



19: Burewala-Arifwala

Project Name	Dualization of Road from Burewala to Arifwala upto district boundary
Districts	Vehari
Length	28.4 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	5290.41
Benefit Cost Ratio	5.2

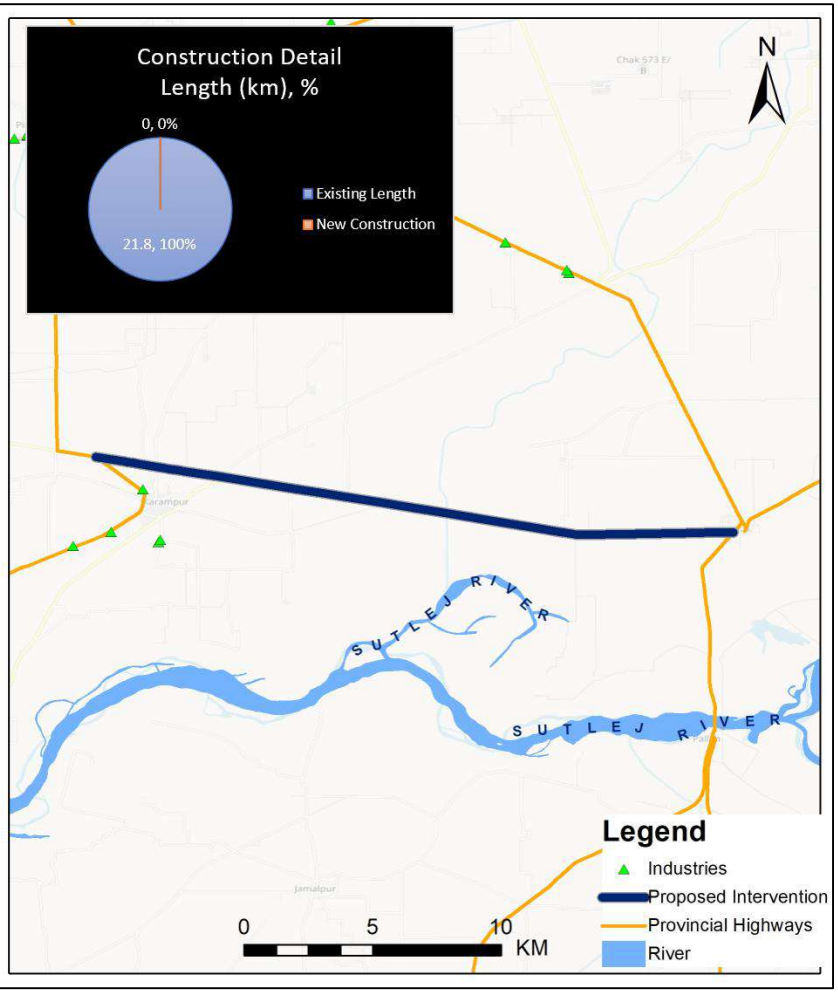
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



20: Karampur-Luddan Road

Project Name	Dualization of Road from Karampur to Luddan
Districts	Vehari
Length	21.8 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	4533.91
Benefit Cost Ratio	1.5

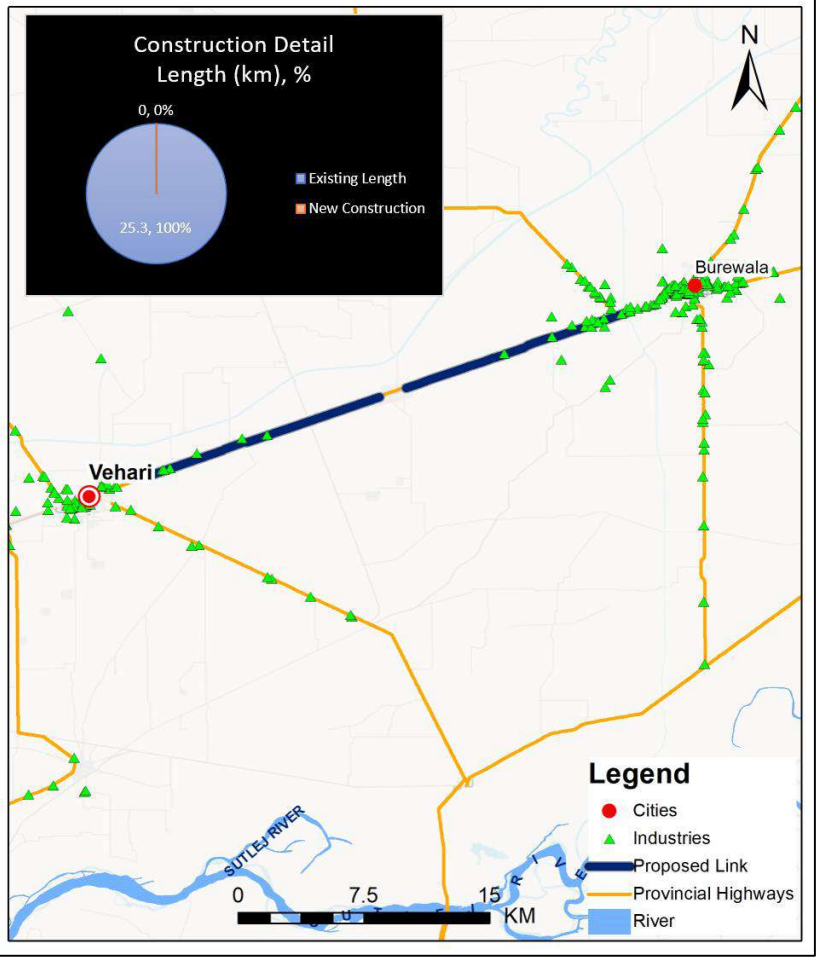
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



21: Vehari-Burewala Road

Project Name	Dualization of Road from Vehari to Burewala
Districts	Vehari
Length	25.3 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	5251.57
Benefit Cost Ratio	4.1

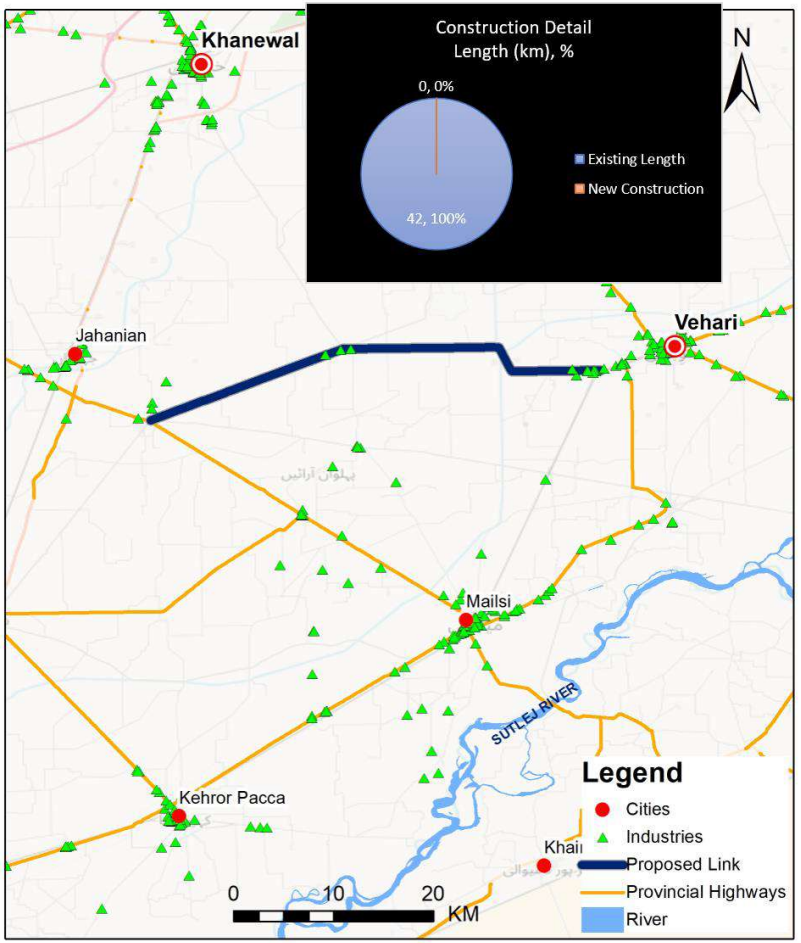
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



22: Vehari-Tibba Sultanpur Road

Project Name	Dualization of Vehari Multan Road from Vehari to Tibba Sultanpur
Districts	Vehari
Length	42 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	8108.02
Benefit Cost Ratio	5.0

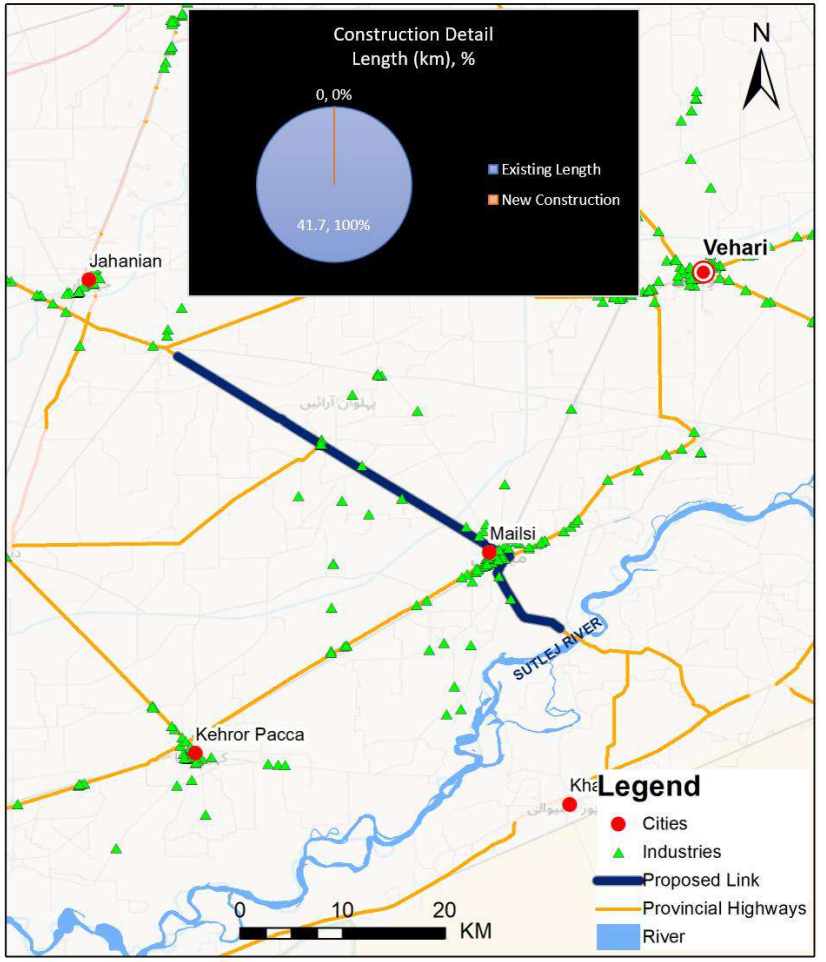
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



23: Tibba Sultanpur-Mailsi Road

Project Name	Widening/Improvement of Tibba Sultanpur-Mailsi-Khairpur Road upto District Boundary
Districts	Vehari
Length	41.6 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	1898.36
Benefit Cost Ratio	5.2

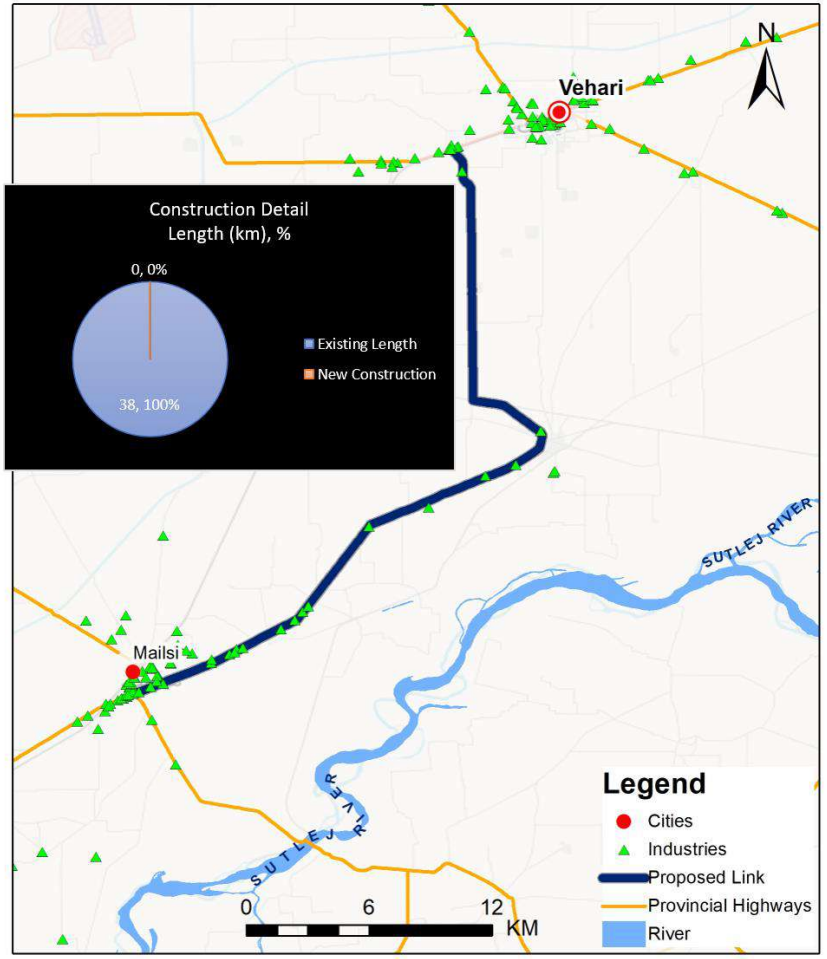
District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



24: Vehari to Mailsi Road

Project Name	Widening/Improvement of Road from Vehari to Mailsi via Karampur Road
Districts	Vehari
Length	38 km
Phase	Short-Term (Year 2023 – 2026)
Total Cost PKR Millions	1827.04
Benefit Cost Ratio	5.0

District	Industrial Produce	Agriculture Produce	Tourism Site
Vehari	Cotton inudustry Cotton Seed Oil,	Mango, Guava, Orange, Sugarcane, Cotton.	N/A



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

TheUrbanUnit urbanunitGop

503 - Shaheen Complex, Egerton Road, Lahore - Pakistan
042-99205316-22 042-99205323
uspmu@punjab.gov.pk www.urbanunit.gov.pk