



Government of Nepal



District Transport Master Plan (DTMP)



Ministry of Federal Affairs and Local
Development

Department of Local Infrastructure
Development and Agricultural Roads
(DOLIDAR)



District Development Committee,
Makawanpur

Volume I: Main Report

January 2015

Prepared by Rural Infrastructure Developers Consultant P. Ltd (RIDC) for the District Development Committee (DDC) and District Technical Office (DTO) Makawanpur with Technical Assistance from the Department of Local Infrastructure and Agricultural Roads (DOLIDAR), Ministry of Federal Affairs and Local Development and grant supported by DFID through Rural Access Programme Phase 3 (RAP 3)



Government of Nepal
Ministry of Federal Affairs and Local Development
Office of the District Development Committee
Hetauda, Makwanpur.

Ph.057-520350,057-520950

Ref.no.

FOREWORD

It is my great pleasure to introduce this revised District Transport Master Plan (DTMP) of Makawanpur district which was concurred by the district stakeholder's meeting and District Core Road Network selected by DDC body on 18th April, 2014 and approved by DDC Board on 22nd May 2014. Based on DTMP guideline 2012, all District Core Road Networks (DRCN) aiming to connect all Village Development Committee(VDC) headquarters with the district headquarters, either directly or through highway and strategic road network have been selected.

It is believed the document will be helpful for sustainable planning, resource mobilization, implementation and monitoring of the road development. The document is anticipated to lineout creating substantial employment opportunities for rural people and conservation, improvement and new construction activities of the existing road network. DRCN plays a vital role to strengthen and promote overall economic growth of the district through established and improved year round transport services reinforcing transportation linkages. It is most decisive to expand DRCN in a planned way as per the DTMP recommendation by considering the framework of available resource of DDC. This document is very essential in lobbying the donor agencies through central government recover. Furthermore, this document will be supportive in avoiding existing duplication in resource allocation in road network development by considering basket fund approach.

I would like to express my gratitude to Rural Access Programme (RAP3) for financial and technical support. Secondly, My thanks go to Er. Sanjeev Shrestha, Chief District Engineer and all the concerned DDC & DTO staffs for their efforts to organize and make succeed the workshop as well as finalizing DRCNs and collecting data. Accordingly, I would like to express my heart full gratitude to ministry of Federal Affairs and Local Development (MFALD) and Department of Local Infrastructure Development and Agriculture Road (DOLIDAR) for providing valuable suggestions and cooperation to produce this report. Any pioneering and constructive suggestion regarding to the document will be highly appreciable.

.....
Gokarna Prasad Sharma
Local Development Officer
DDC Makwanpur

Acknowledgement

The District Transport Master Plan (DTMP) of Makawanpur District has been prepared for District Development Makawanpur with the funding support from Rural Access Programme 3 (RAP3) under the Contract Agreement between RAP3 and Rural Infrastructure Developers' Consultant (P) Ltd. (Contract No: RTI Sector DTMP/001/2012 amendment no. 2) to carry out the task of preparing of DTMP of Makawanpur District of Nepal. We would like to convey our indebtedness to RTI Sector Maintenance Pilot and RAP3 for entrusting us the responsibility to carry out the task of preparing of DTMP of Makawanpur District.

We would like to express our sincere gratitude to the Project Coordinator Mr. Ganga Bahadur Basnet (SDE) of DoLIDAR, and Program Manager Mr. Michael Green, Deputy Programme Manager Mr. Dilli Prakash Sitaula and Central Asset Management Engineer Mr. Laxman Bhakta Dahi Shrestha of RAP3, whose valuable co-operation and suggestions guided us to accomplish the agreed task to this level. We would also like to express our sincere thanks to LDO of Makawanpur DDC, Mr. Gokarna Prasad Sharma, DTO Chief Mr. Sanjiv Shrestha (SDE), Planning Officer, Program Officer, Information Officer, Engineers, Sub-engineers and other staffs of DDC and DTO Office of Makawanpur for their extended help and regular support and coordination at different levels while working at the field level.

The local leaders and local people from Makawanpur district are also thankful for their help and suggestion for the selection and identification of the DRCN. We hope, this DTMP of Makawanpur District will be very helpful and a valuable guideline for the planning and development of effective and systematic transport network in Makawanpur District.

Finally, we would like to thanks the DTMP team members for their hard working and valuable efforts to bring the study report in this stage.

Jagat Rana Bhat
Executive Director
Rural Infrastructure Developers Consultants P. Ltd

Executive summary

Makawanpur district is located in Narayani zone of Central Development Region and it covers an area of 2418 square kilometres within latitude 27°10' N to 27°40'N and longitude 84°41'E to 85°31'E. Makawanpur district is surrounded by the borders of Bara, Parsa and Rautahat districts to the South, Lalitpur, Kavre and Sindhuli to the East, Chitwan district to the West and Kathmandu and Dhading districts to the North. Geopolitically, the district is administratively divided into 4 Electoral constituencies 13 Illakas which consist of 35 VDCs and two municipalities. Municipalities and VDCs are further divided into Wards.

Makawanpur district has the subtropical to Alpine climate. So it is very hot in the summer at plain area and very cold in the winter at mountainous area. The maximum temperature rises up to 34° Celsius and falls down as low as minus 1.6° Celsius. The rainfall is mainly due to the southern-eastern monsoon. The monsoon, generally starts from the mid-June and ends by the mid-October. More than 80% of the annual rainfall takes place between June and September. The average annual rainfall, generally, varies from 1971 mm to 2331.3 mm. Subsistence agriculture farming, mainly traditional agriculture is the main source of occupation and livelihood of the majority of the population. Makawanpur district is well known for religious, historical, tourism, rafting (Indrasarobar), trekking and expedition.

The district is served by surface transport facilities linking the district with the national strategic road network through Mahendra Highway, Tribhuvan Rajpath, Sisneri-Kulekhani-Bhainse and Pharping Kulekhani roads etc. The network of feeder roads, district roads and village roads are increasing significantly in the district. However, district and village roads are mostly in poor condition that requires upgrading/rehabilitation and proper maintenance. The district inventory identified around 1154 km of roads, including 335.14 km of strategic roads, 240 km urban roads and 578.84 km of rural roads. In coordination with the DRCC and DDC, 16 existing rural roads with a length of 270.14 km were identified as making up the district road core network (DRCN), and the remaining rural roads were classified as village roads. The total rural road inventory survey was not under the scope of this assignment so; these road statistics were obtained from previous DTMP report. However, selected DRCNs were tracked using GPS to identify their length, width and existing condition along with necessary major structures in this study. The SRN and existing DRCN roads link up 34 VDCs and a total of 83.16 km roads have to be further constructed including 1 completely new DRCN to link up all the VDCs with district headquarters. As a result, total DRCN road networks will be 17 with 353.30 km length to connect all VDCs and former 8 VDCs those were recently either merged to Hetauda municipality or declared as new municipality. Out of these 353.30 km roads under DRCN, around 69 km is in all-weather, about 201 km roads are fair-weather while remaining 83.16 km roads have to be constructed new. After the end of DTMP 5-year period; 62.72 km earthen road upgraded to all-weather gravel standard, while 24.27 km gravel road will be upgraded to black top. During that period, all the existing DRCN roads (270.14 km) will be conserved.

Table ES1: Summary of total road networks in Makwanpur district

Road Class	Total length	Black Top	Gravel	Earthen
Strategic roads	335.14	193.67	100.77	40.70
Urban roads	240.00	112.00	99.00	29.00
Rural roads	578.84		69.16	509.68
Total	1,153.98	305.67	268.93	579.38

Annual conservation cost of all the DRCN roads (16nos.) with 270.14 km length is estimated to NPR 86,964 thousands based on the first year, and will be updated in the ARMP based on actual annual maintenance needs as determined in the annual road condition survey. For the full five-year period the conservation costs will come to NPR 434,821 thousands. An analysis of the road network identified the need for improvement of all the DRCN roads in order to bring them to a maintainable all-weather standard and provide them with a proper road surface in light of existing traffic volumes. The required improvements and their estimated costs are listed below.

Table ES2: Summary of improvement cost of DRCN road

Improvement type	Requirement	Cost (NPR)
Bridges	735 m	445,250,000
Slab culverts	237 m	35,550,000
Causeways	384 m	38,400,000
Hume pipes	98 units	1,078,000
Masonry retaining walls	0 m ³	-
Gabion retaining walls	4786 m ³	11,965,000
Lined drains	0 m	-
Widening	0 m	-
Rehabilitation	0 km	-
Gravelling	200.98 km	502,437,500
Blacktopping	57.14 km	342,816,000
New construction	83.16 km	622,950,200
Total		2,000,446,700

The available budget for the road sector for the coming five years (fiscal year 2071/72 to 2075/76) is estimated to be NPR 995,124 thousands. Allocation to the district road core network was set at 95% of the total road sector budget, which was subsequently allocated firstly to the annual maintenance needs, secondly to the improvement needs and lastly to new construction. This budget is insufficient to cover all the estimated costs of improvements and new construction. However, it allows all conservation requirements to be covered throughout the DTMP period. Regarding the improvement, a total of 62.72 km earthen road upgraded to gravel with all-weather while nearly 24.27 km gravel road upgraded to black top. The remaining improvement works and new construction works will be carried out in the next DTMP.

The length of all-weather maintainable DRCN roads under the responsibility of DDC increases from 69.16 km to 107.61 km during first DTMP period. VDC headquarters with direct access to SRN is 21 with 57% district population. Similarly, VDC headquarters with access to all-weather DRCN roads will increase from 3 to 8 while the percentage of the district population with such access will be increased by 15% during first DTMP period.

Abbreviations

AAMP	Annual Asset Management Plan
ARMP	Annual Road Maintenance Plan
BT	Black Top
DDC	District Development Committee
DIM	District Inventory Map
DOLIDAR	Department of Local Infrastructure Development and Agriculture Road
DOR	Department of Road
DRCN	District Core Road Network
DTICC	District Transport Infrastructure Coordination Committee
DTMP	District Transport Master Plan
DTPP	District Transport Perspective Plan
GIS	Geographical Information system
GPS	Global Positioning System
GON	Government of Nepal
GR	Gravel
Km	Kilometre
SNRTP	Strengthening National Rural Transport Project
LRBP	Local Road Bridge Project
MLD	Ministry of Local Development
NPR	Nepali Rupees
PCU	Passenger Car Unit
RAP	Rural Access Programme
RBN	Roads Board Nepal
RTI	Rural Transport Infrastructure
SSRN	Statistics of Strategic Road Network
SWAp	Sector Wide Approach
VDC	Village Development Committee
VPD	Vehicle per Day

Table of Contents

Foreward	i
Acknowledgement.....	i
Executive summary	iii
Abbreviations.....	v
Table of Contents.....	vi
List of Tables.....	vii
List of Figures	vii
Annexes	vii
1. Introduction	1
2. District Road Core Network (DRCN).....	3
2.1 Total Road Network	3
2.2 National Highways and Feeder Roads.....	3
2.3 District Road Core Network	3
2.4 Village Roads.....	6
3. District Transport Perspective Plan (DTPP)	9
3.1 Conservation	9
3.2 Improvement.....	10
3.2.1 Rehabilitation.....	10
3.2.2 Gravelling	11
3.2.3 Cross Drainage	12
3.2.4 Protective Structures	12
3.2.5 Widening	13
3.2.6 Black Topping	14
3.3 New Construction	14
3.4 District Transport Perspective Plan	15
4. Cost Estimation.....	18
4.1 Conservation	18
4.2 Improvement.....	20
4.3 New Construction	22
4.4 DTPP Costs.....	23
5. Ranking	23
5.1 Conservation	23
5.2 Improvement.....	25
5.3 New construction	25
6. District Transport Master Plan (DTMP)	26
6.1 Five Year Projected Financial Resources	26
6.2 Budget Allocation.....	26
6.3 DTMP Outputs.....	30
6.4 DTMP Outcome.....	30
Annexes	32

List of Tables

Table 2.1.1	Road length in Makawanpur district (km).....	3
Table 2.2.1	National highways and feeder roads in Makawanpur district (km)	3
Table 2.3.1	Road length in Makawanpur District (km)	4
Table 2.3.2	District road core network in Makawanpur district (km)	5
Table 3.1.1	Conservation requirements.....	10
Table 3.2.1	Rehabilitation.....	11
Table 3.2.2	Sections of the district road core network requiring gravelling.....	11
Table 3.2.3	required cross drainage structures	12
Table 3.2.4	Required protective structures	13
Table 3.2.5	Widening.....	13
Table 3.3.1	Sections of the district road core network requiring new construction.....	14
Table 3.4.1	District Transport Perspective Plan.....	16
Table 4.1.1	Standard unit costs for conservation	18
Table 4.1.2	Estimated conservation costs for the first year (NPR ‘000)	19
Table 4.2.1	Standard unit costs for improvement activities	20
Table 4.2.2	Cost estimate for improvement measures (NPR ‘000)	21
Table 4.3.1	Standard unit costs for new construction	22
Table 4.3.2	Cost estimate for new construction (NPR ‘000)	22
Table 4.4.1	DTTP costs (NPR ‘000)	23
Table 5.1.1	Ranking of conservation works (NPR ‘000)	24
Table 5.2.1	Ranking of improvement works (NPR ‘000).....	25
Table 5.3.1	Ranking of new construction works (NPR ‘000).....	25
Table 6.1.1	Estimated funding levels (roads) for next five years (in NPR ‘000)	26
Table 6.2.1	Investment plan.....	28
Table 6.3.1	DTMP output	30

List of Figures

Figure 1	Map of Nepal Indicating MakawanpurDistrict	2
Figure 2	Total Road Inventory Map of Makawanpur District	7
Figure 3	District Road Core Network (DRCN) map.....	8
Figure 4	District Transport Perspective Plan (DTTP)	17
Figure 5	District Road Sector Budget Allocation	27
Figure 6	District Transport Master Plan (DTMP)	31

Annexes

Annex 1:	DDC Letter
Annex 2:	Traffic Data
Annex 3:	Population Served
Annex 4:	Level of Access
Annex 5:	Photographs
Annex 6:	Location of Proposed Interventions
Annex 7:	Overall Road Inventory
Annex 8:	Projection Parameters

1. Introduction

Makawanpur district is located in Narayani zone of Central Development Region and it covers an area of 2418 square kilometres within latitude 27°10' N to 27°40'N and longitude 84°41'E to 85°31'E. Makawanpur district is surrounded by the borders of Bara, Parsa and Rautahat districts to the South, Lalitpur, Kavre and Sindhuli to the East, Chitwan district to the West and Kathmandu and Dhading districts to the North. Makawanpur district has the Subtropical to Alpine climate. So it will be very hot in the summer at plain area and very cold in the winter at mountainous area. The maximum temperature rises up to 34 degree Celsius and falls down as low as minus 1.6 degree Celsius. There are 5 Rivers and 41 Streams/Kholas. Some major rivers are; Rapti Khola, Bagmati River, Manahari khola, Lothar khola and Bakaiya Khola. Makawanpur district is well known for religious, historical and tourism. Many places are religious, historical importance. Bhutandevi Temple and Churiyamai Temple are the most famous temples of the district

Major occupation in the district is agriculture. But this has shifted with high youth force migration due to social conflict and unemployment problem. About 52.83% of people are being involved in agriculture as subsistence livelihood and 30.66% in service and 16.51% in others.

The living standard of rural people could not be improved despite of the top priority given to the agriculture sector due to the lack of rural infrastructures such as roads, market canters, electrification and communication etc.

Geopolitically, the district is administratively divided into 4 Electoral constituencies 13 Illakas which consist of 35 VDCs and two municipalities including new municipality established in 2014. The district is served by surface transport facilities linking the district with the national strategic road network through Mahendra Highway, Tribhuvan Rajpath, Sisneri-Kulekhani-Bhainse and Pharping Kulekhani roads etc. The network of feeder roads, district roads and village roads are increasing significantly in the district. However, district and village roads are mostly in poor condition that requires upgrading/rehabilitation and proper maintenance. The DDC Makawanpur has given its highest priority on rural roads. As a result, a total of 578.84 km of rural roads has been already constructed. Except nearly 70 km, all rural roads are earthen type with fair-weather and concern is focused to upgrade the rural roads from fair weather to all weather standards.

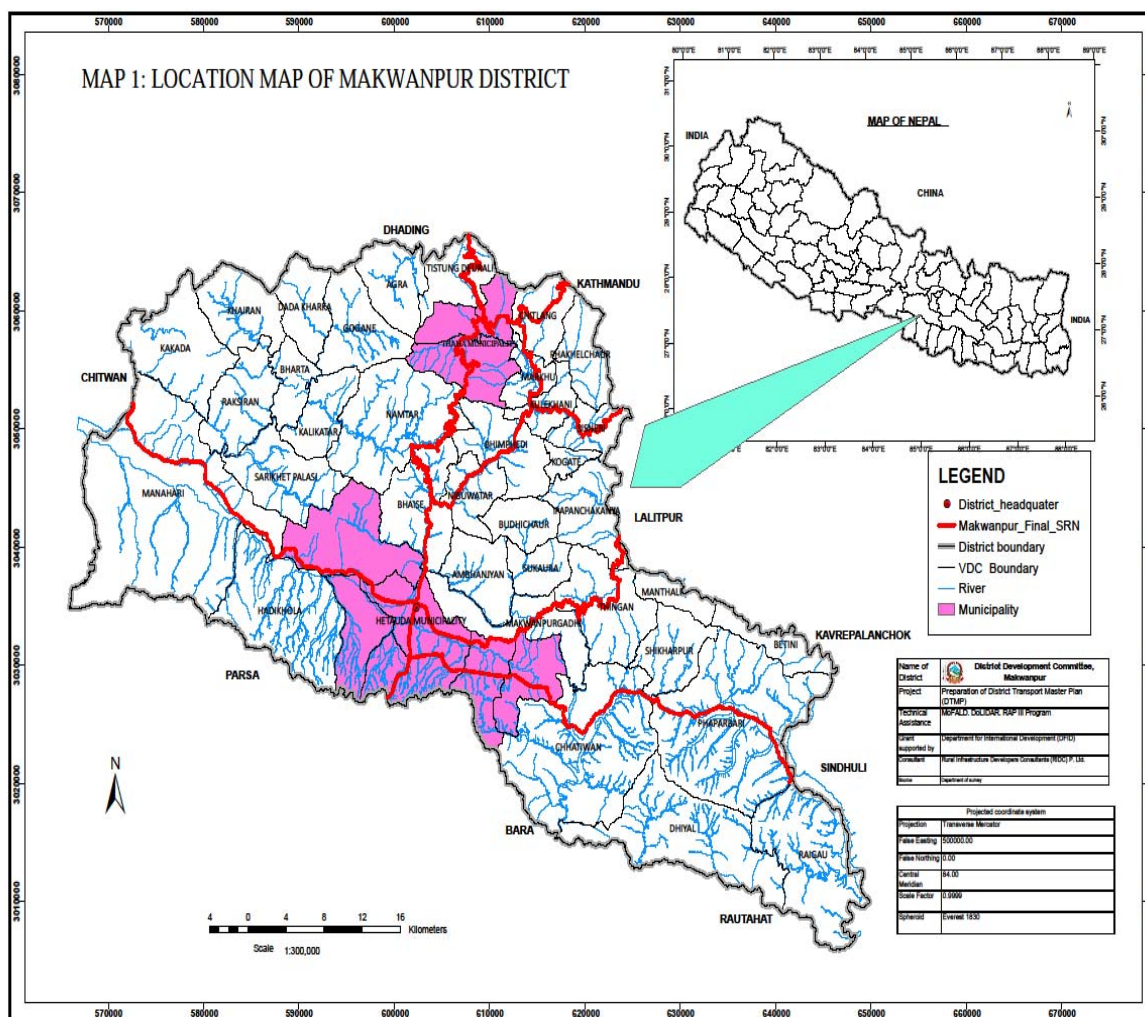
The district has 239,076 (Ha) total lands out of which 167,453 (Ha) is forest land, 40,842 (Ha) cultivated land, 18,815 hectares is non-cultivated land, 3,136 hectares is pasture land and 8,830 hectares is other land. Northern part of the Makawanpur district is famous for different type of herbs. Almost 120 types of herbal plants can be found in the district. *Allo*, *Sisno*, *Lokta*, Bamboo, *Amliso*etc. are the other important herbs plant of this district.

Bhutandevi Temple, Pashupati Temple and Churiyamai Temple are the major religious places of Makawanpur District. Trikhanda Bhainse, Narayan temple of Sisneri, Bansagopal temple of Makawanpur Gadhi, Banaskhandi temple of Hetauda-2, Punyakshetra Hetauda-11 and Rajdevi temple of Hatiya are other famous pilgrimage sites of the district. Buddhist stupa and Lama's monasteries are found in many places of this district where devotees visit and pray in devotion.

'Urgen Yangkhel Lenga Bauddha Gumba' at Bhainse Chuniya is newly established Buddhist monastery to teach Buddhism.

Some famous tourism areas are Makawanpurgadhi, Chisapanigadhi, Sahid smarak of Hetauda, Daman View Tower and Indrasarobar of Kulekhani.

Figure 1 Map of Nepal indicating Makawanpur District



According to National Population Census 2011, the total population of the Makawanpur district is 420,477 which comprises of 206,684 male and 213,793 female. According to the National population census 2001 (CBS), total populations of the district was 392,604 of which male population was 199,144 and female population was 193,460. There were 86,117 households in the district with an average household size of 4.88(CBS). The population density per sq. km. is 173.89 with an average growth rate in population is recorded at 2.24 % per annum. Literacy rate of the district is 63.4% whereas female literacy rate is 53.9% and male literacy rate is 72.6%. Different ethnic caste is found in Makawanpur district. Majorities are Tamang (47.65%) and followed by Brahman/Chhetri (25.28%), Newar (6.81%), Magar (4.54%), Chepang (3.94%), and others Kami, Rai, Thakuri and Gurung are 2.69%, 2.08%, 0.66% and 0.88% respectively. Actually all the caste is used communicating common Nepali language. Major festivals celebrated are Dashain, Tihar, Phagupurnima, Sivaratri, Losar and Christmas etc.

2. District Road Core Network (DRCN)

This chapter gives an overview of the existing roads in Makawanpur district, distinguishing between strategic roads and rural roads. It goes on to identify those rural roads that make up the district road core network (DRCN) that will form the basis for this DTMP. The remaining rural roads are classified as village roads.

2.1 Total Road Network

Makawanpur district has an estimated road network of 1153.98 kilometres, including 335.14 km of strategic roads managed by DOR, 240 km urban roads and 578.84 km of rural roads managed by Makawanpur DDC and the VDCs. All the strategic roads and urban roads are all weather roads whereas almost of the rural roads have an earthen surface and fair-weather. The total rural road inventory survey was not under the scope of this assignment so; these road statistics were obtained from previous DTMP report. However, selected DRCNs were tracked using GPS to identify their length, width and existing condition along with necessary major structures in this study. A map of the total road network in Makawanpur district is shown in Figure at the end of this chapter.

Table 2.1.1 Road length in Makawanpur district (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic roads	335.14	193.67	100.77	40.7
Urban roads	240.00	112.00	99.00	29.00
Rural roads	578.84		69.16	509.68
Total	1,153.98	305.67	268.93	579.38

2.2 National Highways and Feeder Roads

Makawanpur district has three highways and five feeder roads totalling to 335.14 km length.

Table 2.2.1 National highways and feeder roads in Makawanpur district (km)

Code	Name of Road	Total length	Black Top	Gravel	Earthen
H01	Mahendra Highway	50.58	50.58		
H02	Tribhuwan Rajpath	89.39	89.39		
F120	Kanti Rajpath	50.20	13.50	19.00	17.70
F019	Bhainse-Bhimphendi (NEA road)	12.00	12.00		
F020	Kunchhal-Kulekhani (NEA road)	20.57		20.57	
F057	Ratamate-Raigaun (Dharan-Chatara)	61.20		61.20	
F121	Pakhelchaur-Kulekhani Road	9.00			9.00
F180	Taukhal-Chitlang-Chandragiri-Thankot Road	14.00			14.00
F122	Bhimphedi-Kulekhani (NEA road)	15.00	15.00		
F022	Chhaimale-Kulekhani Road	13.20	13.20		
Total		335.14	193.67	100.77	40.70

Source: SSRN 2011/12, DOR

2.3 District Road Core Network

As part of the preparation of this DTMP, the District Road Core Network (DRCN) was identified together with the DRCC and DDC. This DRCN is the minimum network that allows all VDC headquarters to be connected with the strategic road network and the district headquarters, either directly or through other VDCs. In the selection of the DRCN roads, account was taken of the road

conditions and the existing traffic levels. The identified DRCN roads were subsequently provided with road codes according to national standards.

The resulting District Road Core Network of this district is shown in Figure at the end of this chapter. The DRCN consists of 16 existing district roads with a total length of 270.14 km. The remaining 308.70 km of existing rural roads are not considered to be DRCN roads and are classified as village roads under the responsibility of the VDCs. A complete list of the DRCN roads and their characteristics is provided in Table 2.3.

Table 2.3.1 Road length in Makawanpur district (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic road network	335.14	193.67	100.77	40.70
Highways	139.97	139.97		
Feeder roads	195.17	53.70	100.77	40.70
Urban roads	240.00	112.00	99.00	29.00
Rural Roads	578.84	-	69.16	509.68
District road core network	270.14	-	69.16	200.98
Village roads	308.70	-		308.70
Total	1,153.98	305.67	268.93	579.38

Table 2.3.2 District road core network in Makawanpur district (km)

Code	Name of Road	Total length	Black Top	Gravel	Earthen	All weather	Fair weather	Name Settlements on Road
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani-Chalti (Agrakhola Road)	25.11			25.11	-	25.11	Pulkomukh, Indrayanichaur, Phatbazar, Fedigaon, Chisapani, Chalti, Agra Khola
31DR002	Gogane - Kalikatar Road	11.08				-	11.08	Gogane, Kalikatar
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54		11.54		11.54	-	Daman, Dandabas, Baikuntha, Khairang, Kankada
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	10.88			10.88	-	10.88	Manahari, Rupachuri, Siladhuni, Silinge
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	19.78			19.78	-	19.78	Gairigaon, Pakani, Dadakharka, Bharta, Chainpur, Manahari
31DR006	Simpani - Sarikhet Road	12.01			12.01	-	12.01	Simpani - Sarikhet
31DR007	Chuniya – Namtar –Kalikatar-Bharta-Khairang Road	28.50			28.50	-	28.50	Chuniya , Namtar, Kalikatar, Bharta, Khairang
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.27		17.96	6.32	17.96	6.32	Pashupatinagar, Padampokhari, Handikhola, Rajaiya
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.31		15.31		15.31	-	Kulekhani, Phakhel, Humanebhanjyang
31DR010	Bhimphedi – Kogate – Ipa Deurali-Sisneri Road	24.36		24.36		24.36	-	Bhimphedi, Kogate, Ipa Deurali, Sisneri
31DR011	Pandrang – Ichung - Budhichaur Road	8.08			8.08	-	8.08	Pandrang, Budhichaur
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	17.56			17.56	-	17.56	Samaripul, Dumrekuna, Sukaura
31DR014	Thingan – Manthali – Betini – Bhorleni Road	9.52			9.52	-	9.52	Thingan, Manthali, Betini, Bhorleni
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.36			17.36	-	17.36	Hattisude, Shikarpur, Phaparbari
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.61			4.61	-	4.61	Pangdure, Tinbhangale, Raigaon
31DR017	Phaparbari – Raigaon – Canteen Road	30.17			30.17	-	30.17	Phaparbari, Raigaon – Canteen
Total		270.14	-	69.16	200.98	69.16	200.98	

2.4 Village Roads

A total of 308.70km of remaining roads that do not form part of the identified district road core network (DRCN) are classified as village roads and are under the responsibility of concerned VDCs of the district. These are roads of a lower importance that do not form the main link between the VDC headquarters and the district headquarters or strategic road network. Instead they provide additional access to other parts of the VDCs.

On an average each VDC will thus be responsible for about 9 km of village roads. It is recommended that the VDCs shall organise maintenance workers to carry out the emergency and routine/recurrent maintenance of these roads to ensure their accessibility. Any upgrading or new construction of village roads falls outside the scope of this DTMP and is the responsibility of the VDCs.

Funding for these roads will mainly come from the VDC grants. Some district funding will also be allocated to the village roads (see also chapter 6). However, this district funding will be mainly for maintenance, especially emergency maintenance and routine/recurrent maintenance to keep these roads passable. Any additional funding, if available may be utilised for this purpose.

Figure 2 Total Road Inventory Map of Makawanpur District

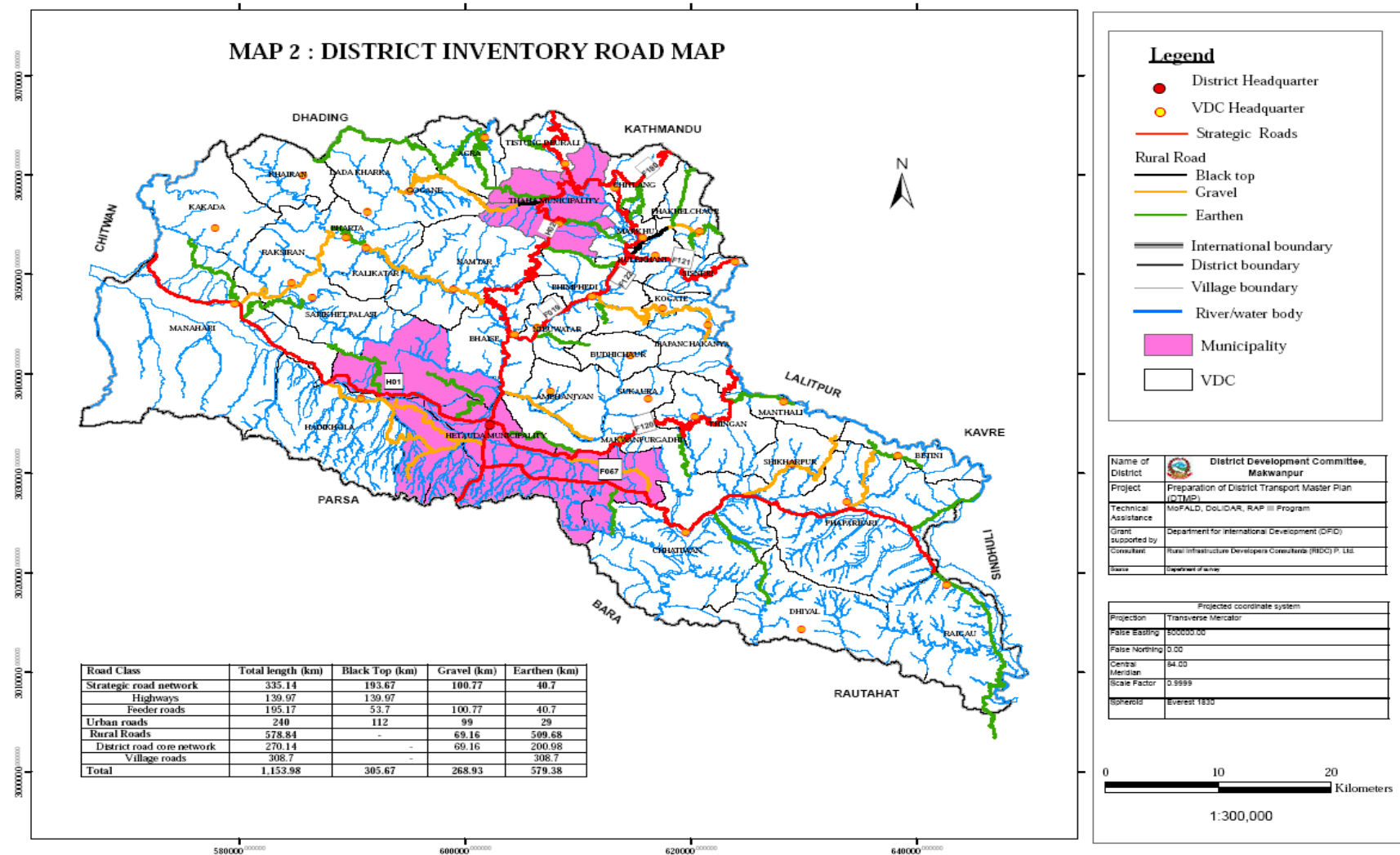
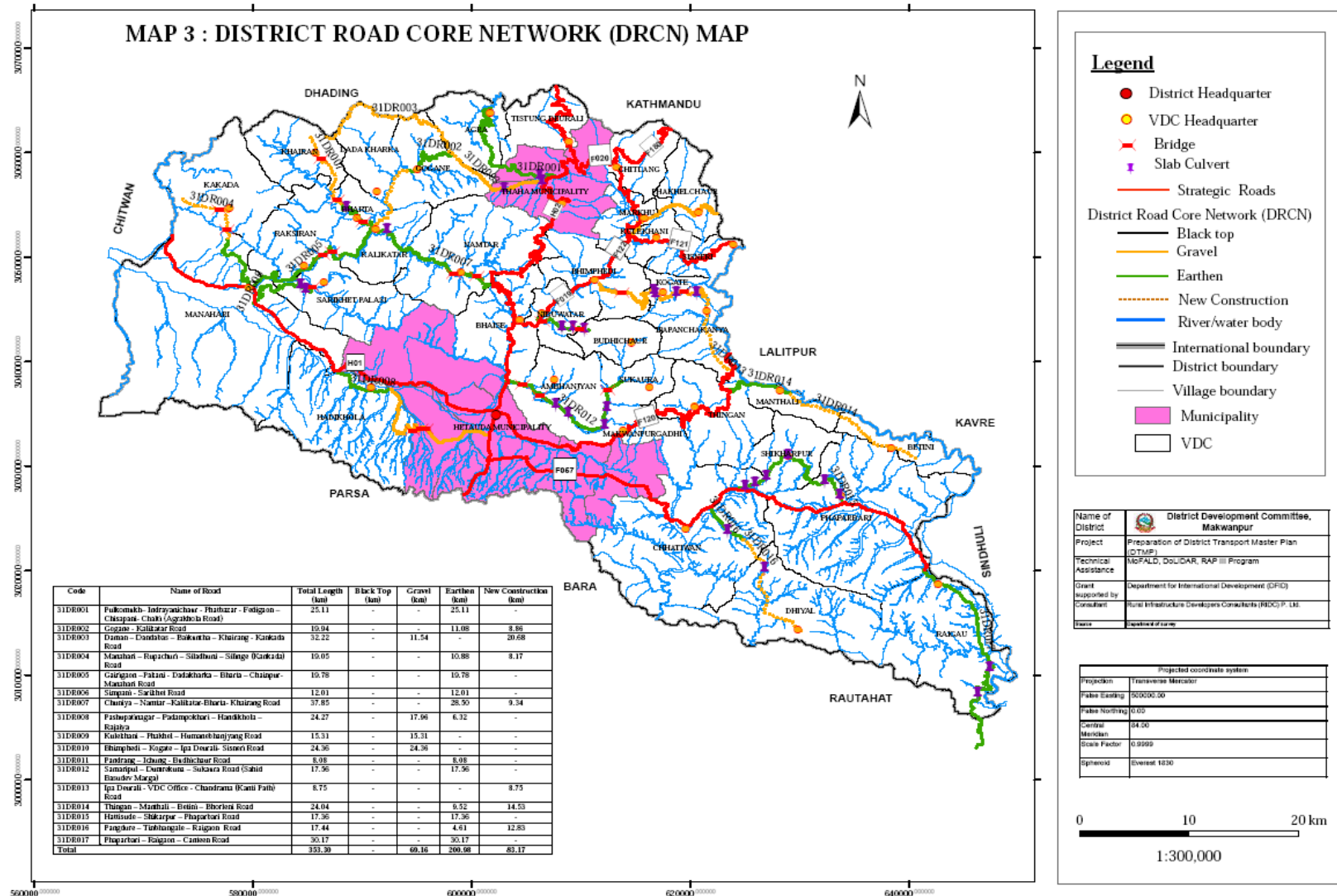


Figure 3 District Road Core Network (DRCN) Map



3. District Transport Perspective Plan (DTPP)

This chapter looks at the required interventions regarding conservation, improvement and new construction of the district road core network. It provides a complete list of all works required in the DRCN, which together form the District Transport Perspective Plan (DTPP). For the works forming part of the DTPP, chapter 4 will subsequently provide cost estimation, while chapter 5 will rank the works according to priority and chapter 6 will select those priority works that can be carried out in the next 5 years and thus form part of the District Transport Master Plan (DTMP).

3.1 Conservation

Conservation refers to the actions required to repair a road and keep it in good and passable condition. For DTMP planning purposes standard costs per kilometre for each maintenance type are applied to the entire district road core network, whereby for certain maintenance type's distinction is made according to the surface type of the road. Identification of the actual maintenance requirements of each road is made annually in the ARMP. Conservation activities include:

1. Emergency maintenance - Basic repairs aimed at removing landslides and repairing damage to the road that inhibit the proper use of the road and make it impassable. This mainly takes place during and after the rainy season. A provisional lump-sum is reserved for the entire district road core network based on the network length. Allocation to specific road sections is based on the actual need for clearing landslides or repairing washouts and cuts in the road.
2. Routine maintenance - General maintenance of the road aimed at preventing damage by ensuring the proper working of the different road elements (retaining walls, drainage system, carriageway, etc.) and cutting vegetation. This is carried out each year on a more or less continuous basis. Routine maintenance is required for the entire district road core network. The specific requirements for routine maintenance are determined on an annual basis through the road condition survey and defined in the ARMP.
3. Recurrent maintenance - Repairs of minor damage to the road surface and road structures to bring them back to good condition. This is generally carried out once or twice a year. Recurrent maintenance is required for the entire district road core network, whereby distinction is made according to the surface type. The specific requirements for recurrent maintenance are determined on an annual basis through the road condition survey and defined in the ARMP.
4. Periodic maintenance - Larger repairs to the road largely aimed at renewing the road surface through re-gravelling, resealing or overlays. It is generally carried out with several years interval. Although periodic maintenance is only required for specific sections of the district road core network, a lump sum allocation is made for the entire district road core network based on average annual requirements, distinguishing between different surface types. The specific periodic maintenance requirements are determined on an annual basis through the annual road condition survey and defined in the ARMP.

The length of roads to be included under each conservation type for the first year is indicated below. This is basically the entire district road core network in as far as it does not require rehabilitation.

Table 3.1.1 Conservation requirements

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)
31DR001	25.11	25.11	25.11	25.11
31DR002	11.08	11.08	11.08	11.08
31DR003	11.54	11.54	11.54	11.54
31DR004	10.88	10.88	10.88	10.88
31DR005	19.78	19.78	19.78	19.78
31DR006	12.01	12.01	12.01	12.01
31DR007	28.50	28.50	28.50	28.50
31DR008	24.27	24.27	24.27	24.27
31DR009	15.31	15.31	15.31	15.31
31DR010	24.36	24.36	24.36	24.36
31DR011	8.08	8.08	8.08	8.08
31DR012	17.56	17.56	17.56	17.56
31DR014	9.52	9.52	9.52	9.52
31DR015	17.36	17.36	17.36	17.36
31DR016	4.61	4.61	4.61	4.61
31DR017	30.17	30.17	30.17	30.17
Total	270.14	270.14	270.14	270.14

3.2 Improvement

Improvement refers to actions required to improve a road to bring it to a maintainable all-weather standard. It includes the following actions, which for Makwanpurare described in more detail in the subsequent sections.

1. Rehabilitation - Significant repairs required to bring a very poor road back to a maintainable standard. This does not include any changes to the original surface type.
2. Gravelling - Placement of a gravel layer to make it all-weather and ensure that the road remains passable during the rainy season.
3. Cross drainage - Placement of suitable cross-drainage structures with the aim of making the road all-weather and ensuring that the road remains passable even during the rainy season
4. Protective structures - Placement of retaining walls and lined side drains to avoid excessive damage to the road during the rainy season and bring it to a maintainable standard.
5. Blacktopping - Placement of a blacktop layer in roads with traffic volumes exceeding 50 passenger car units (PCU) to reduce damage to the road surface
6. Widening - Increase of the road width in roads with traffic volumes exceeding 500 passenger car units (PCU) to ensure the proper flow of traffic.

3.2.1 Rehabilitation

No rehabilitation needs were identified in the district road core network.

Table 3.2.1 Rehabilitation

Code	Name of Road	Total length (km)	Rehabilitation (km)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani-Chalti (Agrakhola Road)	25.11	
31DR002	Gogane - Kalikatar Road	11.08	
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54	
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	10.88	
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	19.78	
31DR006	Simpani - Sarikhet Road	12.01	
31DR007	Chuniya – Namtar –Kalikatar-Bharta- Khairang Road	28.50	
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.27	
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.31	
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	24.36	
31DR011	Pandurang – Ichung - Budhichaur Road	8.08	
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	17.56	
31DR014	Thingan – Manthali – Betini – Bhorleni Road	9.52	
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.36	
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.61	
31DR017	Phaparbari – Raigaon – Canteen Road	30.17	
Total		270.14	-

3.2.2 Gravelling

As the entire district road core network needs to be brought to an all-weather status, gravelling of the road surface is required for all the earthen sections in the DRCN. This district concerns the total of 353.30 km of DRCN roads including 83.16 km of new construction.

Table 3.2.2 Sections of the district road core network requiring gravelling

Code	Name of Road	Total length (km)	Gravelling (km)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani-Chalti (Agrakhola Road)	25.11	25.11
31DR002	Gogane - Kalikatar Road	11.08	11.08
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54	-
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	10.88	10.88
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	19.78	19.78
31DR006	Simpani - Sarikhet Road	12.01	12.01
31DR007	Chuniya – Namtar –Kalikatar-Bharta- Khairang Road	28.50	28.50
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.27	6.32
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.31	-
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	24.36	-
31DR011	Pandurang – Ichung - Budhichaur Road	8.08	8.08
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	17.56	17.56
31DR014	Thingan – Manthali – Betini – Bhorleni Road	9.52	9.52
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.36	17.36
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.61	4.61
31DR017	Phaparbari – Raigaon – Canteen Road	30.17	30.17
Total			200.98

3.2.3 Cross Drainage

The need for cross drainage was identified for the different DRCN roads. A total length of 685m bridge, 237 m slab culverts, 384 m cement concrete causeways and 98 pipe culverts were identified as being required.

Table 3.2.3 Required cross drainage structures

Code	Name of Road	Bridge (m)	Slab culvert (m)	CC Causeway (m)	Stone Causeway (m)	Pipe culvert (units)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani-Chalti (Agrakhola Road)		10	36		5
31DR002	Gogane - Kalikatar Road					4
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road		12	18		10
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	50		45		8
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	60				6
31DR006	Simpani - Sarikhet Road	50	12	63		9
31DR007	Chuniya – Namtar –Kalikatar-Bharta-Khairang Road	155	10	88		5
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	120				4
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road					
31DR010	Bhimphedi – Kogate – Ipa Deurali-Sisneri Road	100	36	54		6
31DR011	Pandrang – Ichung - Budhichaur Road	70	26	30		5
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	100	40			5
31DR014	Thingan – Manthali – Betini – Borleni Road			8		7
31DR015	Hattisude – Shikarpur – Phaparbari Road		59	24		5
31DR016	Pangdure – Tinbhangale – Raigaon Road		16			9
31DR017	Phaparbari – Raigaon – Canteen Road		16	18		10
Total		685	237	384	-	98

3.2.4 Protective Structures

Based on the road survey carried out in Makwanpur, the following retaining walls were identified as being required to ensure the protection of the district road core network.

Table 3.2.4 Required protective structures

Code	Name of Road	Masonry walls (m3)	Gabion walls (m3)	Lined drain (m)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani-Chalti (Agrakhola Road)		700	
31DR002	Gogane - Kalikatar Road		256	
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road		200	
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road		800	
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road		250	
31DR006	Simpani - Sarikhet Road		300	
31DR007	Chuniya – Namtar –Kalikatar-Bharta- Khairang Road		480	
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya		100	
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road			
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road		475	
31DR011	Pandrang – Ichung - Budhichaur Road		125	
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)		300	
31DR014	Thingan – Manthali – Betini – Bhorleni Road			
31DR015	Hattisude – Shikarpur – Phaparbari Road		600	
31DR016	Pangdure – Tinbhangale – Raigaon Road			
31DR017	Phaparbari – Raigaon – Canteen Road		200	
Total		-	4,786	-

3.2.5 Widening

Widening of the district road core network in Makawanpur is required only in specific locations to bring it up to the minimum standard and to ensure sufficient space in the curves. Additional widening to a higher standard is not required because traffic volumes remain very low.

Table 3.2.5 Widening

Code	Name of Road	Total length (km)	VPD	Widening (m)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani-Chalti (Agrakhola Road)	25.11	6.00	
31DR002	Gogane - Kalikatar Road	11.08	-	
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54	14.00	
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	10.88	-	
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari	19.78	7.00	
31DR006	Simpani - Sarikhet Road	12.01	2.00	
31DR007	Chuniya – Namtar –Kalikatar-Bharta- Khairang Road	28.50	5.00	
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.27	15.00	
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.31	36.00	
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	24.36	6.00	
31DR011	Pandrang – Ichung - Budhichaur Road	8.08	-	
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	17.56	31.00	
31DR014	Thingan – Manthali – Betini – Bhorleni Road	9.52	-	

Code	Name of Road	Total length (km)	VPD	Widening (m)
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.36	3.00	
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.61	5.00	
31DR017	Phaparbari – Raigaon – Canteen Road	30.17	7.00	
Total				-

3.2.6 Black Topping

An analysis of the traffic data for the different roads making up the district road core network shows that about 57 km road network require blacktopping.

Table 3.2.6 Blacktopping

				PCU>	100
Code	Name of Road	Total length (km)	Blackt op (km)	Traffic (PCU)	Blacktop ping (km)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani- Chalti (Agrakhola Road)	25.11	-	19	-
31DR002	Gogane - Kalikatar Road	11.08	-	-	-
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54	-	41	-
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada)	10.88	-	-	-
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Mandira Road	19.78	-	18	-
31DR006	Simpani - Sarikhet Road	12.01	-	5	-
31DR007	Chuniya – Namtar –Kalikatar-Bharta- Khairang Road	28.50	-	18	-
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.27	-	102	24.27
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.31	-	101	15.31
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	24.36	-	16	-
31DR011	Pandrang – Ichung - Budhichaur Road	8.08	-	-	-
31DR012	Samaripul – Dumrekuna – Sukaara Road (Sahid Basudev Mandira)	17.56	-	102	17.56
31DR014	Thingan – Manthali – Betini – Bhorleni Road	9.52	-	-	-
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.36	-	12	-
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.61	-	16	-
31DR017	Phaparbari – Raigaon – Canteen Road	30.17	-	20	-
Total					57.14

3.3 New Construction

New construction of DRCN roads is required to connect the remaining VDC headquarters. A list of proposed roads for new construction is provided below. These roads provide access to 9 VDC HQs that do not currently have road access.

Table 3.3.1 Sections of the district road core network requiring new construction

Code	Name of Road	New VDCs	Existing length	New length	Bridge (m)
31DR001	Pulkomukh–Indrayanichaur - Phatbazar - Fedigaon–Chisapani-Chalti(Agrakhola Road)		25.11		
31DR002	Gogane - Kalikatar Road	Kalikatar	11.08	8.86	

Code	Name of Road	New VDCs	Existing length	New length	Bridge (m)
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	Dadakharka, Khairang, Kankada	11.54	20.68	
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	Kankada	10.88	8.17	25
31DR005	Gairigaon – Pakani - Dadakharka – Bharta – Chainpur- Manahari Road		19.78		
31DR006	Simpani - Sarikhet Road		12.01		
31DR007	Chuniya – Namtar – Kalikatar-Bharta- Khairang Road	Khairang	28.50	9.34	25
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya		24.27		
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road		15.31		
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road		24.36		
31DR011	Pandrang – Ichung - Budhichaur Road		8.08		
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)		17.56		
31DR014	Thingan – Manthali – Betini – Bhorleni Road	Betini	9.52	14.53	
31DR015	Hattisude – Shikarpur – Phaparbari Road		17.36		
31DR016	Pangdure – Tinbhangale – Raigaon Road	Diyal, Raigaon	4.61	12.83	
31DR017	Phaparbari – Raigaon – Canteen Road		30.17		
31DR013	Ipa Deurali - VDC Office - Chandrama (Kanti Path) Road	Ipapanchakanya	-	8.75	
Total		7 VDCs	270.14	83.16	50

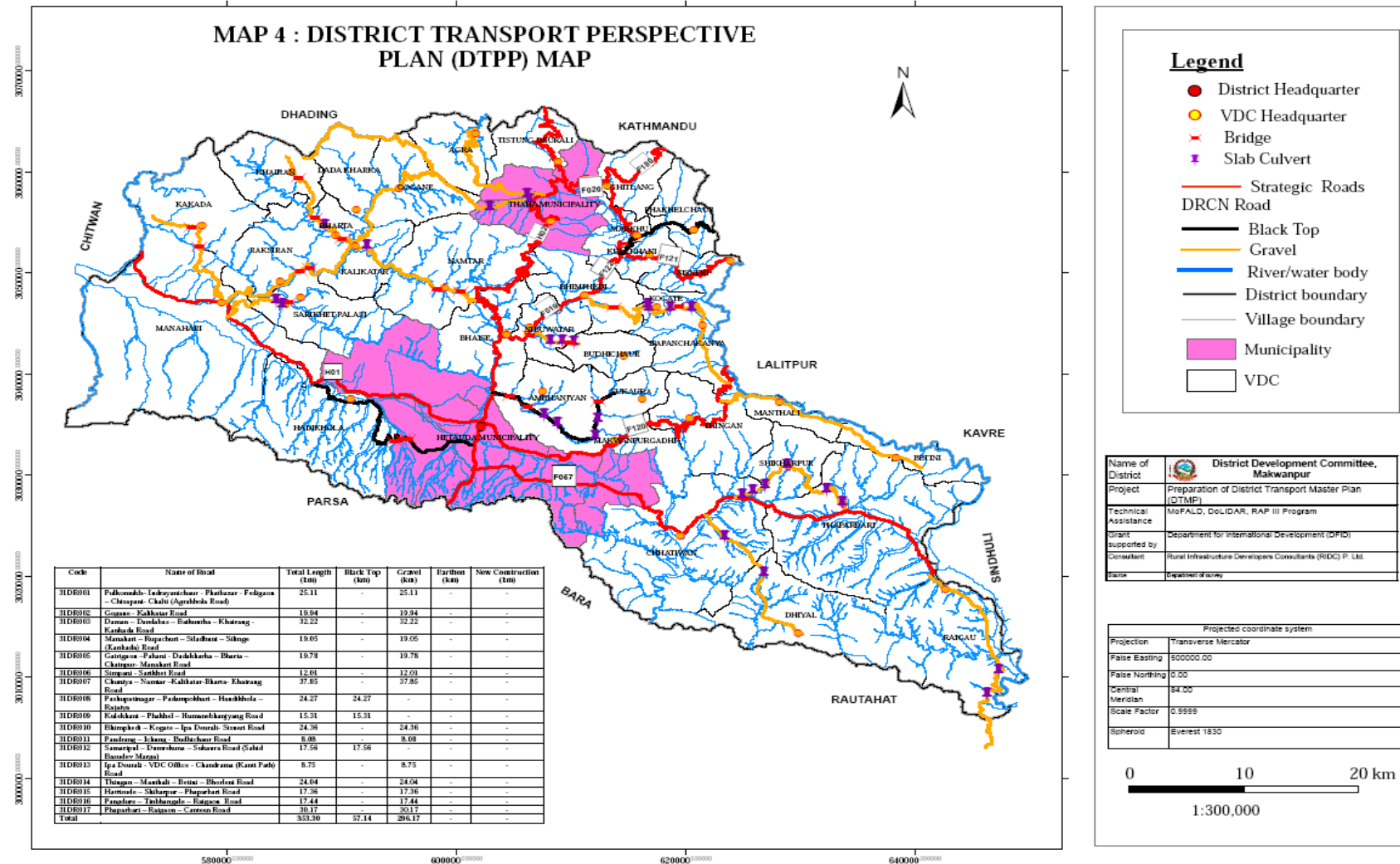
3.4 District Transport Perspective Plan

The DTPP foresees bringing the entire existing district road core network to maintainable all-weather status, and expanding it to provide access to an additional 7 VDC headquarters. For this purpose, 57.14 km will be black topped, 200.98 km will be gravelled and a number of different cross drainage and protective structures will be constructed. In addition, 83.16 km of new road will be constructed to maintainable all-weather gravel standard providing access to 7 additional VDC HQs. The district road core network will subsequently consist of 353.30 km of maintainable all-weather roads. The following table lists the required interventions, while the proposed network is shown in the DTPP map.

Table 3.4.1 District Transport Perspective Plan

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)	Rehabilitation (km)	Gravelling (km)	Blacktopping (km)	Widening (m)	Bridge (m)	Slab culvert (m)	CC Causeway (m)	Stone Causeway (m)	Pipe culvert (units)	Masonry walls (m3)	Gabion walls (m3)	Lined drain (m)	New construction (km)
31DR001	25.11	25.11	25.11	25.11	-	25.11	-	-	-	10	36	-	5	-	700	-	-
31DR002	11.08	11.08	11.08	11.08	-	11.08	-	-	-	-	-	-	4	-	256	-	8.86
31DR003	11.54	11.54	11.54	11.54	-	-	-	-	-	12	18	-	10	-	200	-	20.68
31DR004	10.88	10.88	10.88	10.88	-	10.88	-	-	50	-	45	-	8	-	800	-	8.17
31DR005	19.78	19.78	19.78	19.78	-	19.78	-	-	60	-	-	-	6	-	250	-	-
31DR006	12.01	12.01	12.01	12.01	-	12.01	-	-	50	12	63	-	9	-	300	-	-
31DR007	28.50	28.50	28.50	28.50	-	28.50	-	-	185	10	88	-	5	-	480	-	9.34
31DR008	24.27	24.27	24.27	24.27	-	6.32	24.27	-	120	-	-	-	4	-	100	-	-
31DR009	15.31	15.31	15.31	15.31	-	-	15.31	-	-	-	-	-	-	-	-	-	-
31DR010	24.36	24.36	24.36	24.36	-	-	-	-	100	36	54	-	6	-	475	-	-
31DR011	8.08	8.08	8.08	8.08	-	8.08	-	-	70	26	30	-	5	-	125	-	-
31DR012	17.56	17.56	17.56	17.56	-	17.56	17.56	-	100	40	-	-	5	-	300	-	-
31DR014	9.52	9.52	9.52	9.52	-	9.52	-	-	-	-	8	-	7	-	-	-	14.53
31DR015	17.36	17.36	17.36	17.36	-	17.36	-	-	-	59	24	-	5	-	600	-	-
31DR016	4.61	4.61	4.61	4.61	-	4.61	-	-	-	16	-	-	9	-	-	-	12.83
31DR017	30.17	30.17	30.17	30.17	-	30.17	-	-	-	16	18	-	10	-	200	-	-
31DR013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.75
Total	270.14	270.14	270.14	270.14	-	200.98	57.14	-	735	237	384	-	98	-	4,786	-	83.16

Figure 4: District Transport Perspective Plan



4. Cost Estimation

For the cost estimation, use has been made of standard costs for the different activities required. For the conservation activities this results in an estimation of annual costs, while for improvement and new construction activities this result in an estimation of the total costs required.

4.1 Conservation

The costs of the required conservation measures have been calculated using the following standard costs. These standard costs have been applied to the entire district road core network, whereby distinction is made based on the surface type in the case of recurrent and periodic maintenance. It must be noted here that the standard costs for periodic maintenance are the average annual costs, but that the cost for applying periodic maintenance in a specific section every several years will be higher (the cumulative cost of several years). The estimated costs for the first year are presented below, while the costs for subsequent years will vary slightly as road surface types change as a result of improvements. Detailed cost estimations for the actual maintenance needs in any given year will be presented in the ARMP.

Table 4.1.1 Standard unit costs for conservation

Activity	Unit	Unit cost (NPR)
Emergency maintenance	km	24,000
Routine maintenance	km	16,000
Recurrent maintenance (blacktop)	km	400,000
Recurrent maintenance (gravel)	km	320,000
Recurrent maintenance (earthen)	km	200,000
Periodic maintenance (blacktop)	km	160,000
Periodic maintenance (gravel)	km	200,000

For the first year the estimated costs for conservation of the DRCN come to NPR 86,964 thousands. Based on this cost for the first year, the costs for conservation of the DRCN for the next 5 years are estimated at NPR 434,821 thousands. These costs will change slightly as the roads are improved and the standard conservation costs change. This will be updated in the ARMP on an annual basis.

Table 4.1.2 Estimated conservation costs for the first year (NPR ‘000)

Code	Total length (km)	Blacktop (km)	Gravel (km)	Earthen (km)	Emergency maintenance	Routine maintenance	Recurrent maintenance (blacktop)	Recurrent maintenance (gravel)	Recurrent maintenance (earthen)	Periodic maintenance (blacktop)	Periodic maintenance (gravel)	Total first year cost	Total 5-year cost
31DR001	25.11	-	-	25.11	603	402	-	-	5,023	-	-	6,027	30,137
31DR002	11.08	-	-	11.08	266	177	-	-	2,217	-	-	2,660	13,301
31DR003	11.54	-	11.54	-	277	185	-	3,693	-	-	2,308	6,462	32,312
31DR004	10.88	-	-	10.88	261	174	-	-	2,176	-	-	2,611	13,056
31DR005	19.78	-	-	19.78	475	316	-	-	3,956	-	-	4,747	23,736
31DR006	12.01	-	-	12.01	288	192	-	-	2,403	-	-	2,883	14,416
31DR007	28.50	-	-	28.50	684	456	-	-	5,701	-	-	6,841	34,204
31DR008	24.27	-	17.96	6.32	583	388	-	5,747	1,263	-	3,592	11,572	57,862
31DR009	15.31	-	15.31	-	367	245	-	4,898	-	-	3,061	8,572	42,860
31DR010	24.36	-	24.36	-	585	390	-	7,794	-	-	4,871	13,639	68,197
31DR011	8.08	-	-	8.08	194	129	-	-	1,616	-	-	1,939	9,696
31DR012	17.56	-	-	17.56	421	281	-	-	3,511	-	-	4,213	21,066
31DR014	9.52	-	-	9.52	228	152	-	-	1,903	-	-	2,284	11,420
31DR015	17.36	-	-	17.36	417	278	-	-	3,471	-	-	4,165	20,826
31DR016	4.61	-	-	4.61	111	74	-	-	921	-	-	1,105	5,527
31DR017	30.17	-	-	30.17	724	483	-	-	6,034	-	-	7,241	36,206
Total	270.14	-	69.16	200.98	6,483	4,322	-	22,132	40,195	-	13,832	86,964	434,821

4.2 Improvement

The costs of the required improvement measures have been calculated using the following standard costs. These standard costs have been applied to the identified improvement requirements presented in the previous chapter.

Table 4.2.1 Standard unit costs for improvement activities

Activity	Unit	Unit cost (NPR)
Rehabilitation	km	920,000
Widening	m	2850
Gravelling	km	2,500,000
Blacktopping	km	6,000,000
Bridge construction	m	650,000
Slab culvert construction	m	150,000
CC Causeway construction	m	100,000
Stone Causeway construction	m	11,500
Pipe culvert placement	unit	11,000
Masonry wall construction	m ³	11,000
Gabion wall construction	m ³	2,500
Lined drain construction	m	1,150

The resulting estimated costs come to NPR 1,377,497 thousands as indicated in the table below.

Table 4.2.2 Cost estimate for improvement measures (NPR ‘000)

Code	Total length (km)	Rehabilitation	Widening	Graveling	Blacktopping	Bridges	Slab culverts	CC causeways	Stone causeways	Pipe culvert	Masonry walls	Gabion walls	Lined drains	Total cost
31DR001	25.11	-	-	62,785	-	-	1,500	3,600	-	55	-	1,750	-	69,690
31DR002	11.08	-	-	27,710	-	-	-	-	-	44	-	640	-	28,394
31DR003	11.54	-	-	-	-	-	1,800	1,800	-	110	-	500	-	4,210
31DR004	10.88	-	-	27,200	-	16,250	-	4,500	-	88	-	2,000	-	50,038
31DR005	19.78	-	-	49,450	-	39,000	-	-	-	66	-	625	-	89,141
31DR006	12.01	-	-	30,033	-	32,500	1,800	6,300	-	99	-	750	-	71,482
31DR007	28.50	-	-	71,258	-	104,000	1,500	8,800	-	55	-	1,200	-	186,813
31DR008	24.27	-	-	15,790	145,644	78,000	-	-	-	44	-	250	-	239,728
31DR009	15.31	-	-	-	91,842	-	-	-	-	-	-	-	-	91,842
31DR010	24.36	-	-	-	-	65,000	5,400	5,400	-	66	-	1,188	-	77,054
31DR011	8.08	-	-	20,200	-	45,500	3,900	3,000	-	55	-	313	-	72,968
31DR012	17.56	-	-	43,888	105,330	65,000	6,000	-	-	55	-	750	-	221,023
31DR014	9.52	-	-	23,793	-	-	-	800	-	77	-	-	-	24,670
31DR015	17.36	-	-	43,388	-	-	8,850	2,400	-	55	-	1,500	-	56,193
31DR016	4.61	-	-	11,515	-	-	2,400	-	-	99	-	-	-	14,014
31DR017	30.17	-	-	75,430	-	-	2,400	1,800	-	110	-	500	-	80,240
Total	270.14	-	-	502,438	342,816	445,250	35,550	38,400	-	1,078	-	11,965	-	1,377,497

4.3 New Construction

For new construction, the following standard costs have been applied to estimate the costs involved.

Table 4.3.1 Standard unit costs for new construction

Activity	Unit	Unit cost (NPR)
Track opening	km	4,600,000
Gravelling	km	2,500,000
Bridge construction	m	650,000

The resulting estimated costs for new construction come to NPR 622,950 thousands.

Table 4.3.2 Cost estimate for new construction (NPR '000)

Code	Name of Road	New length (km)	Opening up (NPR)	Gravelling (NPR)	Bridges (NPR)	Total cost (NPR)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani- Chalti (Agrakhola Road)	-	-	-	-	-
31DR002	Gogane - Kalikatar Road	8.86	40,747	22,145	-	62,892
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	20.68	95,142	51,708	-	146,849
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	8.17	37,582	20,425	16,250	74,257
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	-	-	-	-	-
31DR006	Simpani - Sarikhet Road	-	-	-	-	-
31DR007	Chuniya – Namtar –Kalikatar-Bharta-Khairang Road	9.34	42,982	23,360	16,250	82,592
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	-	-	-	-	-
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	-	-	-	-	-
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	-	-	-	-	-
31DR011	Pandrang – Ichung - Budhichaur Road	-	-	-	-	-
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	-	-	-	-	-
31DR014	Thingan – Manthali – Betini – Bhorleni Road	14.53	66,824	36,318	-	103,142
31DR015	Hattisude – Shikarpur – Phaparbari Road	-	-	-	-	-
31DR016	Pangdure – Tinbhangale – Raigaon Road	12.83	59,013	32,073	-	91,086
31DR017	Phaparbari – Raigaon – Canteen Road	-	-	-	-	-
31DR013	Ipa Deurali - VDC Office - Chandrama (Kanti Path) Road	8.75	40,255	21,878	-	62,132
Total		83.16	382,545	207,905	32,500	622,950

4.4 DTPP Costs

The total costs for the District Transport Perspective Plan come to NPR 2,435.268 million as indicated in the table below.

Table 4.4.1 DTPP costs (NPR ‘000)

Code	Conservation	Improvement	New construction	Total
31DR001	30,137	69,690	-	99,827
31DR002	13,301	28,394	62,892	104,587
31DR003	32,312	4,210	146,849	183,371
31DR004	13,056	50,038	74,257	137,351
31DR005	23,736	89,141	-	112,877
31DR006	14,416	71,482	-	85,897
31DR007	34,204	186,813	82,592	303,609
31DR008	57,862	239,728	-	297,590
31DR009	42,860	91,842	-	134,702
31DR010	68,197	77,054	-	145,250
31DR011	9,696	72,968	-	82,664
31DR012	21,066	221,023	-	242,089
31DR014	11,420	24,670	103,142	139,232
31DR015	20,826	56,193	-	77,019
31DR016	5,527	14,014	91,086	110,627
31DR017	36,206	80,240	-	116,446
31DR013	-	-	62,132	62,132
Total	434,821	1,377,497	622,950	2,435,268

5. Ranking

The ranking of the required interventions determines the order in which they will be carried out. This ranking is done separately for conservation, improvement and new construction. Ranking is done according to the cost per person served, whereby the costs are the estimated costs of the previous chapter. However, the ranking based on these criteria has been modified with the consultation with DTO/DDC and other stakeholders during DTMP workshops to make more practical and implementable. For the calculation of the population served, use is made of the population data for the VDCs linked by the road concerned.

5.1 Conservation

Ranking of roads for conservation is based on the total conservation costs per person served by the road. This ranking of roads will be updated each year in the ARMP based on the actual cost estimates for the year concerned. An example ranking is provided in the table below based on standard costs for the first year.

Table 5.1.1 Ranking of conservation works (NPR '000)

Code	Total length (km)	1. Emergency	2. Routine	3. Recurrent (paved)	4. Recurrent (gravel)	5. Recurrent (earth)	6. Periodic (blacktop)	7. Periodic (gravel)	Total cost (NPR '000)	Population served	Cost/person (NPR)
31DR004	10.88	261	174	-	-	2,176	-	-	2,611	27,824	94
31DR015	17.36	417	278	-	-	3,471	-	-	4,165	22,672	184
31DR014	9.52	228	152	-	-	1,903	-	-	2,284	10,383	220
31DR016	-	111	74	-	-	921	-	-	6,027	26,692	226
31DR003	11.54	277	185	-	3,693	-	-	2,308	6,462	25,641	252
31DR002	-	266	177	-	-	2,217	-	-	2,660	10,068	264
31DR017	30.17	724	483	-	-	6,034	-	-	7,241	27,144	267
31DR007	28.50	684	456	-	-	5,701	-	-	6,841	21,097	324
31DR008	24.27	583	388	-	5,747	1,263	-	3,592	11,572	35,501	326
31DR006	12.01	288	192	-	-	2,403	-	-	2,883	8,391	344
31DR012	17.56	421	281	-	-	3,511	-	-	4,213	10,431	404
31DR001	25.11	603	402	-	-	5,023	-	-	6,027	13,439	448
31DR005	-	475	316	-	-	3,956	-	-	6,462	10,741	602
31DR011	8.08	194	129	-	-	1,616	-	-	1,939	2,085	930
31DR010	24.36	585	390	-	7,794	-	-	4,871	13,639	12,461	1,095
31DR009	15.31	367	245	-	4,898	-	-	3,061	8,572	7,493	1,144

The allocation of maintenance funding will follow a specific sequence indicated below, and will be applied to the road ranking as defined in the ARMP. This will be of particular importance where funding is insufficient to cover all conservation costs.

1. Emergency maintenance
2. Routine maintenance
3. Recurrent maintenance paved roads
4. Recurrent maintenance gravel roads
5. Recurrent maintenance gravel roads
6. Periodic maintenance blacktop roads
7. Periodic maintenance gravel roads

5.2 Improvement

In the case of improvement activities, ranking is again based on the basis of the total cost per person served. The resulting order of the roads is shown in the table below. In the case of roads requiring blacktopping, the improvement of the road has been split into two phases. The first phase includes all improvements to bring the road to a maintainable all-weather standard (gravelling, widening, cross drainage and protective structures), while the second phase only includes the blacktopping. This has been done to avoid unnecessarily delaying the improvement of such roads to all-weather gravel standard due to the additional cost of blacktopping (increasing the cost per person served).

Table 5.2.1 Ranking of improvement works (NPR '000)

Code	Total length (km)	Gravelling (km)	Blacktopping (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
31DR003	11.54	-	-	4,210	25,641	164
31DR016	4.61	4.61	-	14,014	26,692	525
31DR004	10.88	10.88	-	50,038	27,824	1,798
31DR014	9.52	9.52	-	24,670	10,383	2,376
31DR002 (II)	11.08	11.08	-	28,394	10,068	2,820
31DR017	30.17	30.17	-	80,240	27,144	2,956
31DR001 (I)	25.11	25.11	-	69,690	13,439	5,186
31DR010	24.36	-	-	77,054	12,461	6,184
31DR008 (III)	24.27	6.32	24.27	239,728	35,501	6,753
31DR005	19.78	19.78	-	89,141	10,741	8,299
31DR006	12.01	12.01	-	71,482	8,391	8,519
31DR007 (IV)	28.50	28.50	-	186,813	21,097	8,855
31DR009	15.31	-	15.31	91,842	7,493	12,257
31DR012	17.56	17.56	17.56	221,023	10,431	21,189
31DR011	8.08	8.08	-	72,968	2,085	34,996

5.3 New construction

For the roads proposed for new construction, ranking is also according to the cost per person served by the new road. The resulting ranking is indicated in the table below.

Table 5.3.1 Ranking of new construction works (NPR '000)

Code	Length (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
31DR001	-	-	13,439	-
31DR005	-	-	10,741	-
31DR006	-	-	8,391	-
31DR008	-	-	35,501	-
31DR009	-	-	7,493	-
31DR010	-	-	12,461	-

Code	Length (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
31DR011	-	-	2,085	-
31DR012	-	-	10,431	-
31DR015	-	-	22,672	-
31DR017	-	-	27,144	-
31DR004	8.17	74,257	27,824	2,669
31DR016	12.83	91,086	26,692	3,412
31DR007	9.34	82,592	21,097	3,915
31DR003	20.68	146,849	25,641	5,727
31DR002	8.86	62,892	10,068	6,247
31DR014	14.53	103,142	10,383	9,934
31DR013	8.75	62,132	2,497	24,883

6. District Transport Master Plan (DTMP)

The District Transport Master Plan (DTMP) that covers the next five years is prepared based on the projected financial resources available and the prioritized transport interventions as listed in the DTPP. Year-wise targets are prepared for the different roads and intervention types.

6.1 Five Year Projected Financial Resources

The projected financial resources for the next five years are estimated by considering all possible funding sources. The funding levels are based on the existing trend of funding. An annual increase in funding of 10% is assumed for all funding sources. The total district budget for the road sector is NPR 995.124 million for the five-year period.

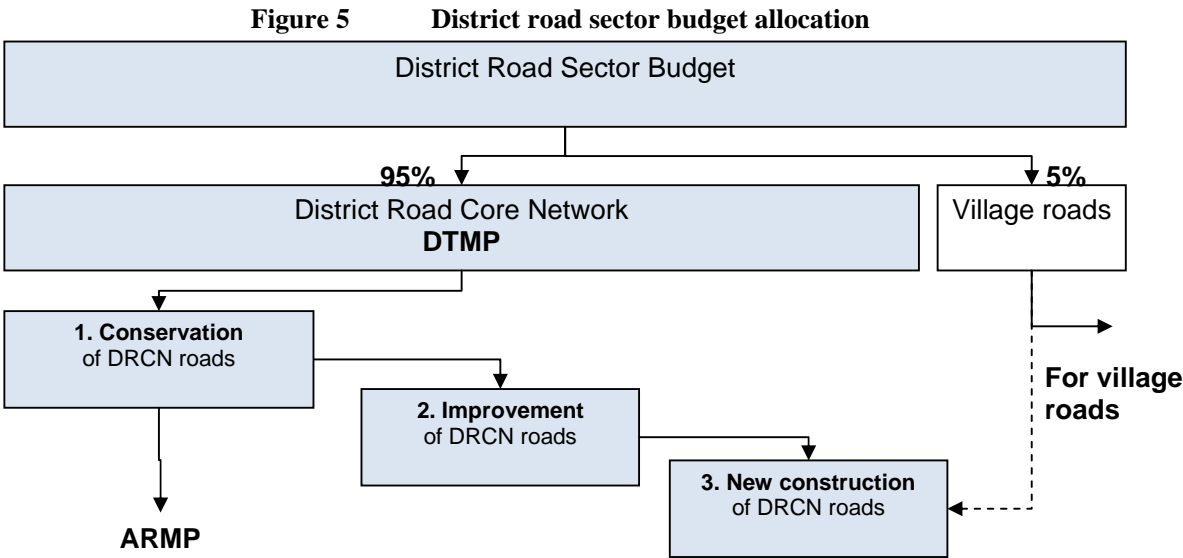
Table 6.1.1 Estimated funding levels (roads) for next five years (in NPR '000)

Funding source	2071/72	2072/73	2073/74	2074/75	2075/76
Local Transport Sector wide Programme	11,000	12,100	13,310	14,641	16,105
SNRTP	30,000	100,000	110,000	121,000	133,100
Road Board Nepal	3,000	3,300	3,630	3,993	4,392
DDC Grant	5,000	5,500	6,050	6,655	7,321
RCIW	6,000	6,600	7,260	7,986	8,785
SNRTP - DDC fund	2,000	2,200	2,420	2,662	2,928
DDC Fund	15,000	16,500	18,150	19,965	21,962
VDC grant for DTMP road (15% of development budget of 36 VDCs)	12,900	14,190	15,609	17,170	18,887
Members of Parliament	0	0	0	0	0
People's Contribution (20%)	16,980	32,078	35,286	38,814	42,696
Total	101,880	192,468	211,715	232,886	256,175
Grand total	995,124				

6.2 Budget Allocation

The distribution of the available district road sector budget is indicated in the figure below. 95% of the total budget is reserved for the district road core network. The remaining 5% is to be used by the DDC for the village roads, giving priority to emergency maintenance and routine/recurrent maintenance. Alternatively, this 5% may be used for the new construction of DRCN roads where this is considered a priority by the district. The 95% of the district road sector budget for the DTMP is

allocated firstly to conservation, secondly improvement, and any remaining funding is allocated to new construction.



Based on this distribution of the estimated budget, the available annual budget for each intervention type and the resulting district road core network length by surface type can be calculated. The results are shown in the following table.

Table 6.2.1 Investment plan

Item				Year															
Fiscal year				2071/72			2072/73			2073/74			2074/75			2075/76			
Total budget				101,880			192,468			211,715			232,886			256,175			
Village roads				5,094			9,623			10,586			11,644			12,809			
Core road network budget (DTMP)				96,786			182,845			201,129			221,242			243,366			
Core network length (km)				270.14			270.14			270.14			270.14			270.14			
Blacktop (km)				-			-			0.65			11.03			23.31			
Gravel (km)				69.16			73.00			104.88			97.20			88.11			
Earthen (km)				200.98			197.14			164.61			161.91			158.71			
Conservation (NRs)				86,964			88,191			98,627			99,907			101,421			
Emergency				6,483			6,483			6,483			6,483			6,483			
Routine				4,322			4,322			4,322			4,322			4,322			
Recurrent (blacktop)				-			-			259			4,410			9,325			
Recurrent (gravel)				22,132			23,358			33,562			31,105			28,196			
Recurrent (earthen)				40,195			39,428			32,922			32,382			31,742			
Periodic (blacktop)				-			-			104			1,764			3,730			
Periodic (gravel)				13,832			14,599			20,976			19,440			17,623			
Improvement	Cost	BT	GR	9,822	BT	GR	94,654	BT	GR	102,502	BT	GR	121,335	BT	GR	141,945	BT	GR	
31DR003	4,210	-	-		-	-		-	-		-	-		-	-		-	-	
31DR016	14,014	-	4.61		-	-		-	-		-	-		-	-		-	-	
31DR004	50,038	-	10.88		-	-		-	-		-	-		-	-		-	-	
31DR014	24,670	-	9.52		-	-		-	-		-	-		-	-		-	-	
31DR002	28,394	-	11.08	9,822	-	3.83	18,572	-	7.25	-	-	-		-	-		-	-	
31DR017	80,240	-	30.17		-	-		-	-		-	-		-	-		-	-	
31DR001	69,690	-	25.11		-	-	69,690	-	25.11	-	-	-		-	-		-	-	
31DR010	77,054	-	-		-	-		-	-		-	-		-	-		-	-	
31DR008	239,728	24.27	6.32		-	-	6,391	0.65	0.17	102,502	10.38	2.70	121,335	12.29	3.20	9,500	0.96	0.25	
31DR015	56,193	-	17.36		-	-		-	-		-	-		-	-		-	-	
31DR005	89,141	-	19.78		-	-		-	-		-	-		-	-		-	-	
31DR006	71,482	-	12.01		-	-		-	-		-	-		-	-		-	-	
31DR007	186,813	-	28.50		-	-		-	-		-	-		-	-	132,446	-	20.21	
31DR009	91,842	15.31	-		-	-		-	-		-	-		-	-		-	-	
31DR012	221,023	17.56	17.56		-	-		-	-		-	-		-	-		-	-	
31DR011	72,968	-	8.08		-	-		-	-		-	-		-	-		-	-	
Total improvement				9,822	-	3.83	94,654	0.65	32.53	102,502	10.38	2.70	121,335	12.29	3.20	141,945	0.96	20.46	

Construction	Cost	GR	-	GR	-	GR	-	GR	-	GR	-	GR
31DR001	-	-	-	-	-	-	-	-	-	-	-	-
31DR005	-	-	-	-	-	-	-	-	-	-	-	-
31DR006	-	-	-	-	-	-	-	-	-	-	-	-
31DR008	-	-	-	-	-	-	-	-	-	-	-	-
31DR009	-	-	-	-	-	-	-	-	-	-	-	-
31DR010	-	-	-	-	-	-	-	-	-	-	-	-
31DR011	-	-	-	-	-	-	-	-	-	-	-	-
31DR012	-	-	-	-	-	-	-	-	-	-	-	-
31DR015	-	-	-	-	-	-	-	-	-	-	-	-
31DR017	-	-	-	-	-	-	-	-	-	-	-	-
31DR004	74,257	8.17	-	-	-	-	-	-	-	-	-	-
31DR016	91,086	12.83	-	-	-	-	-	-	-	-	-	-
31DR007	82,592	9.34	-	-	-	-	-	-	-	-	-	-
31DR003	146,849	20.68	-	-	-	-	-	-	-	-	-	-
31DR002	62,892	8.86	-	-	-	-	-	-	-	-	-	-
31DR014	103,142	14.53	-	-	-	-	-	-	-	-	-	-
31DR013	62,132	8.75	-	-	-	-	-	-	-	-	-	-
Total new construction			-	-	-	-	-	-	-	-	-	-
Remaining budget			-	-	-	-	-	-	-	-	-	-

3 DTMP Outputs

Based on the investment plan presented above, all DRCN roads will be conserved for the duration of the DTMP period. A further 62.72km improved to gravel standard from earthen and 24.27 km gravel road improved to black top standard inclusive of cross drainage and protective structures required to make them maintainable all-weather roads. The remaining earthen and gravel roads at the end of the DTMP period will be improved in the next DTMP. The same goes for the new construction of 83.16 km road which will only take place after the existing DRCN roads have been improved to maintainable all weather standards (some of these roads may be constructed through VDC funding).

Table 6.3.1 DTMP output

Conservation	Improvement gravel	Improvement blacktop	New construction
270.14	62.72	24.27	-

Of the total DTMP budget, NPR 475.11million will be spent on conservation and NPR 470.258 million on improvement. This will use up the entire DTMP budget for the five-year period.

6.4 DTMP Outcome

As a result of the activities planned in this DTMP, the percentage of all-weather maintainable DRCN roads increases by 14% from 69.16 km to 107.61km.

Table 6.4.1 Outcome road length

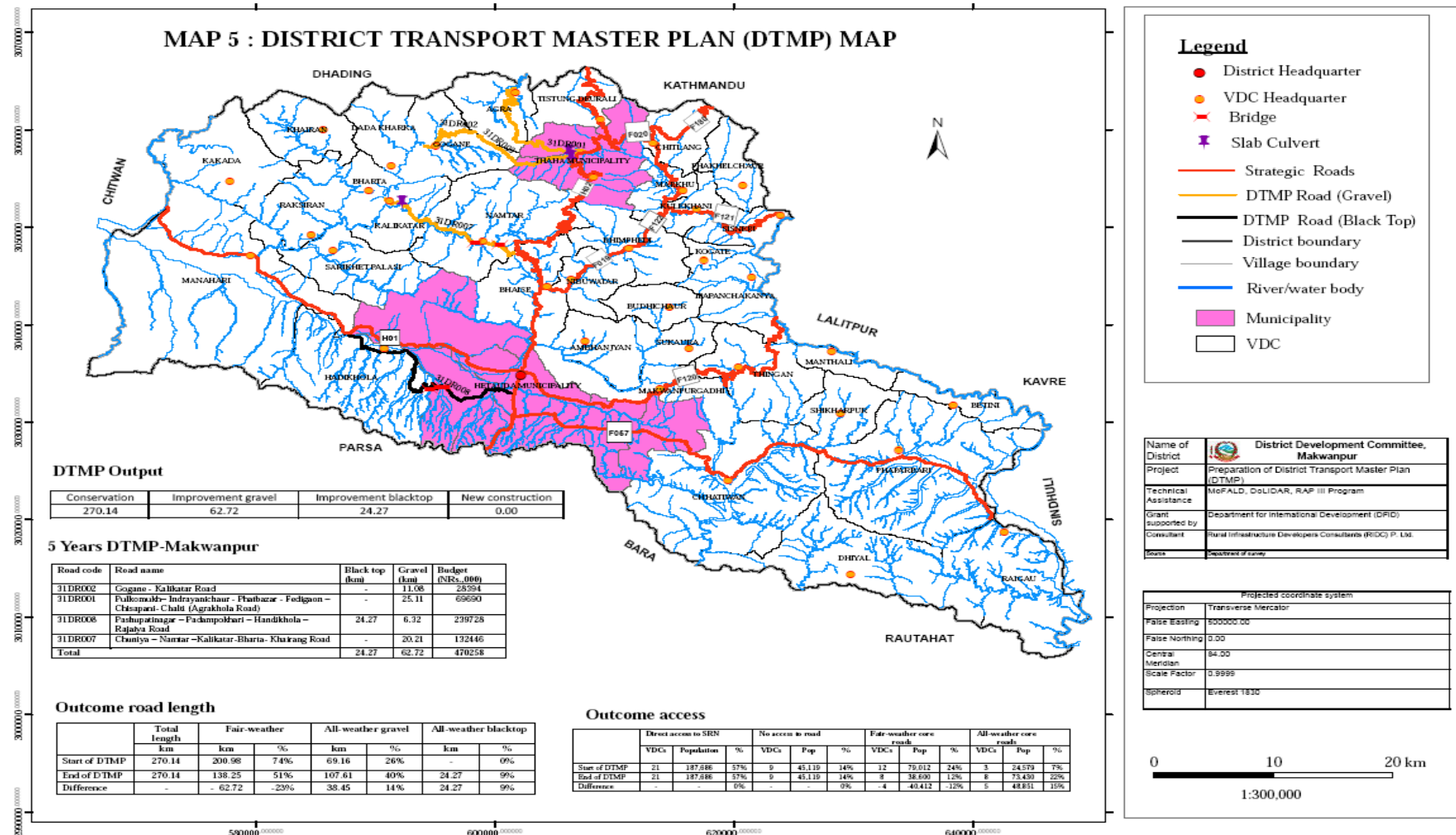
	Total length	Fair-weather		All-weather gravel		All-weather blacktop	
	km	km	%	km	%	km	%
Start of DTMP	270.14	200.98	74%	69.16	26%	-	0%
End of DTMP	270.14	138.25	51%	107.61	40%	24.27	9%
Difference	-	- 62.72	-23%	38.45	14%	24.27	9%

The number of VDC headquarters with direct access to the SRN is 21 with 57% district population. Similarly, the number of VDC headquarters with access to all-weather DRCN roads and district population with access to the all-weather DRCN roads will increase 3 to 8 and 24,579 to 73,430 respectively. The number of VDC headquarters with no access to DRCN roads will remain at 9, while the percentage of the district population with no access to DRCN roads will remain at 14%.

Table 6.4.2 Outcome access

	Direct access to SRN			No access to road			Fair-weather core roads			All-weather core roads		
	VD Cs	Population	%	VD Cs	Population	%	VD Cs	Population	%	VDCs	Population	%
Start of DTMP	21	187,686	57%	9	45,119	14%	12	79,012	24%	3	24,579	7%
End of DTMP	21	187,686	57%	9	45,119	14%	8	38,600	12%	8	73,430	22%
Difference	-	-	0%	-	-	0%	- 4	- 40,412	12%	5	48,851	15%

Figure 6 District Transport Master Plan (DTMP)



Annexes

Annex 1: DDC Letter




प.सं. ०७०/०७१
च.नं. २६६०

मिति :- २०७१/०२/०८

विषय: कार्यासम्पादन भएको बारे

श्री टिम लिडर
ग्रामिण यातायात पुर्वाधार क्षेत्रगत कार्यक्रम, ललितपुर

प्रस्तुत विषयमा यस मकवानपुर जिल्लाको जिल्ला यातायात गुरुयोजना तयारी पार्ने क्रममा खटिई आएका परामर्शदाता संस्था आर.आई.डि.सी प्रा.लि. का परामर्शदाताहरुबाट कार्य सम्पादन शर्तनामा तथा निर्देशिका बमोजिम मुख्य जिल्ला सडक संजाल छनौट गोष्ठी तथा छनौट भएका सडकहरुको फिल्ड अध्ययन कार्य सम्पादन र ड्राफ्ट प्रतिवेदन प्रस्तुती गोष्ठी सम्पन्न भएको ब्योहोरा अवगत गराईन्छ ।


(गोकर्ण प्रसाद शर्मा)
स्थानीय विकास अधिकारी

Annex 2: Traffic Data

Code	Total Length (km)	Motorcycle	Car-Jeep-Minibus	Tractor	Truck-Bus	PCU	VPD
31DR001	25.11	10		5	1	19	6
31DR002	11.08					-	-
31DR003	11.54	10		10	4	41	14
31DR004	10.88					-	-
31DR005	19.78			5	2	18	7
31DR006	12.01	2		2		5	2
31DR007	28.50	8		3	2	18	5
31DR008	24.27	35	12	18	9	102	39
31DR009	15.31	38	14	12	11	101	37
31DR010	24.36	3		5	1	16	6
31DR011	8.08					-	-
31DR012	17.56	16		15	16	102	31
31DR014	9.52					-	-
31DR015	17.36	7		2	1	12	3
31DR016	4.61	3		3	2	16	5
31DR017	30.17	3		5	2	20	7
Total	270.14						

Annex 3: Population Served

		Populati on	Road																	SRN
#	VDC/municip ality		31DR001	31DR002	31DR003	31DR004	31DR005	31DR006	31DR007	31DR008	31DR009	31DR010	31DR011	31DR012	31DR014	31DR015	31DR016	31DR017	31DR013	
1	Agara	7,836	x		x															
2	Ambhanjyang	6,906												x						
3	Bajrabarahi	7,675																	x	
4	Basamadi	17,130																	x	
5	Betini	3,351													x					
6	Bhaise	6,717																	x	
7	Bharta Pundyadevi	4,169					x		x											
8	Bhimfedi	5,440										x							x	
9	Budhichaur	2,085											x							
10	Chitlang	5,029																	x	
11	Churiyamai	14,274											x						x	
12	Daman	8,439			x														x	
13	Dandakharka	4,021			x															
14	Dhiyal	5,945															x			
15	Fakhel	4,524									x									
16	Pharbari	16,776														x		x	x	
17	Gogane	5,345		x	x															
18	Handikhola	18,415								x										
19	Hatiya	13,099																	x	
20	Hurnamadi	6,615																	x	
21	Ipa Panchakanya	2,497										x							x	
22	Kalikatar	4,723		x					x											
23	Kankada	7,840				x														
24	Khairang	3,389							x											
25	Kogate	1,279										x								
26	Kulekhani	2,969									x								x	
27	Makwanpurgad hi	12,806																	x	
28	Manahari	19,984				x													x	
29	Manthali	2,762													x					
30	Markhu	3,071																	x	
31	Namtar	8,816							x											
32	Nibuwatar	4,259																	x	
33	Padam Pokhari	17,086								x										
34	Palung	5,603	X																x	
35	Raigaun	10,368																x		
36	Raksirang	6,572					x													
37	Sarikhet Palase	8,391						x												
38	Shikharpur	5,896														x				
39	Shreepur Chhatiwan	20,747															x		x	

District Transport Master Plan (DTMP) of Makawanpur District

		Populati on	Road																	SRN
#	VDC/municip ality		31DR001	31DR002	31DR003	31DR004	31DR005	31DR006	31DR007	31DR008	31DR009	31DR010	31DR011	31DR012	31DR014	31DR015	31DR016	31DR017	31DR013	
40	Sisneri Mahadevsthan	3,245										x								x
41	Sukaura	3,525												x						
42	Thingan	4,270													x					x
43	Tistung Deurali	7,041																		x
	Total population	330,930	13,439	10,068	25,641	27,824	10,741	8,391	21,097	35,501	7,493	12,461	2,085	10,431	10,383	22,672	26,692	27,144	2,497	187,686
	Total VDCs/ municipalities	43	2	2	4	2	2	1	4	2	2	4	1	2	3	2	2	2	1	21

Note: Currently there are only 35 VDCs (previously 43) and two municipalities in Makawanpur district. Palung, Daman and Bajrabarahi VDCs has upgraded to **Thaha Municipality** and Hatiya, Haranamadi, Padampokhari, Basamadi and Churiyamai VDCs were merged to Hetauda Sub-Metropolitan City. District Road Core Networks (DRCN) mentioned above were selected prior to establishing new municipality and merging the VDCs to above listed municipalities.

Annex 4: Level of Access

#	VDC/municipality	No access DRCN start DTMP	No access DRCN end DTMP	Fair-weather DRCN start DTMP	Fair-weather DRCN end DTMP	All-weather DRCN start DTMP	All-weather DRCN end DTMP	Direct access to SRN
1	Agara			x			x	
2	Ambhanjyang			x	x			
3	Bairabarahi							x
4	Basamadi							x
5	Betini	x	x					
6	Bhaise							x
7	Bharta Pundyadevi			x	x			
8	Bhimfedi							x
9	Budhichaur	x	x					
10	Chitlang							x
11	Churiyamai							x
12	Daman						x	x
13	Dandakharka	x	x					
14	Dhiyal	x	x					
15	Fakhel					x	x	
16	Faparbari							x
17	Gogane			x			x	
18	Handikhola			x			x	
19	Hatiya							x
20	Hurnamadi							x
21	Ipa Panchakanya			x	x			x
22	Kalikatar			x	x			
23	Kankada	x	x					
24	Khairang	x	x					
25	Kogate			x	x			
26	Kulekhani					x	x	x
27	Makwanpurgadhi							x
28	Manahari							x
29	Manthali			x	x			
30	Markhu							x
31	Namtar			x			x	
32	Nibuwatar							x
33	Padam Pokhari					x	x	
34	Palung							x
35	Raigaun			x	x			
36	Raksirang	x	x					
37	Sarikhet Palase	x	x					
38	Shikharpur			x	x			
39	Shreepur Chhatiwan							x
40	Sisneri Mahadevsthan							x
41	Sukaura	x	x					
42	Thingan							x
43	Tistung Deurali							x
	Total population	45,119	45,119	79,012	38,600	24,579	73,430	187,686
	Total VDCs	9	9	12	8	3	8	21

Note: Currently there are only 35 VDCs (previously 43) and two municipalities in Makawanpur district. Palung, Daman and Bajrabarahi VDCs have upgraded to **Thaha Municipality** and Hatiya, Haranamadi, Padampokhari, Basamadi and Churiyamai VDCs were merged to Hetauda Sub-Metropolitan City. District Road Core Networks (DRCN) mentioned above were selected prior to establishing new municipality and merging the VDCs to above listed municipalities.

Annex 5: Photographs



DRCN Workshop



Existing road View



Pushpalal Park



Draft Report Presentation

Annex 6: Location of proposed interventions

Road code	Road Name	Length (km)	Start chainage (km) or X-coordinate	End chainage (km) or Y-coordinate	Rehabilitation (km)	Gravelling (km)	Blacktopping (km)	Widening (m)	Bridge (m)	Slab culvert (m)	CC Causeway (m)	Stone Causeway (m)	Pipe culvert (units)	Masonry walls (m ³)	Gabion walls (m ³)	Lined drain (m)
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani- Chalti (Agrakhola Road)	25.114	0	25+114		25.114				10	36		5		700	
31DR002	Gogane - Kalikatar Road	11.084	0	11+084		11.084							4		256	
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54	0	11+540		0				12	18		10		200	
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	10.88	0	10+880		10.88			25		45		8		800	
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	19.78	0	19+780		19.78			60				6		250	
31DR006	Simpani - Sarikhet Road	12.013	0	12+013		12.013			50	12	63		9		300	
31DR007	Chuniya – Namtar –Kalikatar-Bharta-Khairang Road	28.503	0	28+503		28.503			160	10	88		5		480	
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.274	0	24+274		6.316	24.274		120				4		100	
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.307	0	15+307			15.307									
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	24.356	0	24+356					100	36	54		6		475	
31DR011	Pandrang – Ichung - Budhichaur Road	8.08	0	8+080		8.08			70	26	30		5		125	
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	17.555	0	17+555		17.555	17.555		100	40			5		300	
31DR014	Thingan – Manthali – Betini – Bhorleni Road	9.517	0	9+517		9.517					8		7			
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.355	0	17+355		17.355				59	24		5		600	
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.606	0	4+606		4.606				16			9			
31DR017	Phaparbari – Raigaon – Canteen Road	30.172	0	30+172		30.172				16	18		10		200	
Total		270.14				200.975	57.136		685	237	384		98		4786	

Annex 7: Overall Road Inventory

Road code	Road Name	Length (km)	Start chainage (km) or XY-coordinate	End chainage (km) or XY-coordinate	Surface Type: Black Top	Surface Type : Gravel	Surface Type : Earth	All Weather	Fair Weather	Condition - Good/ Fair	Condition - Poor	Condition - Temporarily Impassable	Condition - Permanently Impassable
31DR001	Pulkomukh– Indrayanichaur - Phatbazar - Fedigaon – Chisapani- Chalti (Agrakhola Road)	25.114	0	25+114			25.114	0	25.114		25.114		
31DR002	Gogane - Kalikatar Road	11.084	0	11+084			11.084	0	11.084		11.084		
31DR003	Daman – Dandabas – Baikuntha – Khairang - Kankada Road	11.54	0	11+540		11.54		11.54	0	11.54			
31DR004	Manahari – Rupachuri – Siladhuni – Silinge (Kankada) Road	10.88	0	10+880			10.88	0	10.88			10.88	
31DR005	Gairigaon –Pakani - Dadakharka – Bharta – Chainpur- Manahari Road	19.78	0	19+780			19.78	0	19.78			19.78	
31DR006	Simpani - Sarikhet Road	12.013	0	12+013			12.013	0	12.013		12.013		
31DR007	Chuniya – Namtar –Kalikatar-Bharta- Khairang Road	28.503	0	28+503			28.503	0	28.503		28.503		
31DR008	Pashupatinagar – Padampokhari – Handikhola – Rajaiya	24.274	0	24+274		17.958	6.316	17.958	6.316	17.958	6.316		
31DR009	Kulekhani – Phakhel – Humanebhanjyang Road	15.307	0	15+307		15.307		15.307	0	15.307			
31DR010	Bhimphedi – Kogate – Ipa Deurali- Sisneri Road	24.356	0	24+356		24.356		24.356	0		24.356		
31DR011	Pandrang – Ichung - Budhichaur Road	8.08	0	8+080			8.08	0	8.08			8.08	
31DR012	Samaripul – Dumrekuna – Sukaura Road (Sahid Basudev Marg)	17.555	0	17+555			17.555	0	17.555		17.555		
31DR014	Thingan – Manthali – Betini – Borleni Road	9.517	0	9+517			9.517	0	9.517			9.517	
31DR015	Hattisude – Shikarpur – Phaparbari Road	17.355	0	17+355			17.355	0	17.355				17.335
31DR016	Pangdure – Tinbhangale – Raigaon Road	4.606	0	4+606			4.606	0	4.606		4.606		
31DR017	Phaparbari – Raigaon – Canteen Road	30.172	0	30+172			30.172	0	30.172			30.172	
	Village Roads:												
31VR001	Bastipur-Ratmate-Phurkechaur	28.00	0	28+000			28.00		28.00			28.00	
31VR002	Phaparbari-Bhorleni	15.00	0	15+000			9.00		15.00			15.00	
31VR003	Chuchhekhola-Phurkechaur	10.00	0	10+000			10.00		10.00			10.00	

District Transport Master Plan (DTMP) of Makawanpur District

31VR004	Mahalaxmipul - Dovan - Deurali	10.00	0	10+000			10.00		10.00			10.00	
31VR005	Damgade - Mahadevbeshi	15.00	0	15+000		2.00	13.00		15.00			15.00	
31VR006	Golmoth-Phaparbari-Deurali	10.00	0	10+000			10.00		10.00			10.00	
31VR007	Phaparbari-Betini -Andheri	10.50	0	10+500			10.50		10.50			10.50	
31VR008	Gothkhola-Thali-Kantirajpath	11.00	0	11+000		6.00	5.00		11.00			11.00	
31VR009	Markhu-Bhedapharm-Chitlang	7.00	0	7+000			7.00		7.00			7.00	
31VR010	Markhu-Kharka - Chitlang	11.00	0	11+000			11.00		11.00			11.00	
31VR011	Damki -Mathillo Suping-Budhichaur	10.00	0	10+000			10.00		10.00			10.00	
31VR012	Nawalpur-Basamadi-Sarikhet	30.00	0	30+000			30.00		30.00			30.00	
31VR013	Daman-Sera	15.00	0	15+000		5.00	10.00		15.00			15.00	
31VR014	Ramdhuni-Tikauli-Ratanpur (Bara)	13.00	0	13+000		10.00	3.00		13.00			13.00	
31VR015	Piple-Makranchuli-Shikharkateri	9.50	0	9+500			9.500		9.50			9.50	
31VR016	Tistung-Liti-Tasarpu	8.00	0	8+000		3.50	4.50		8.00			8.00	
31VR017	Bastipur-Kuwapani- Sarikhet (Mukti Marg)	16.20	0	16+200			16.20		16.20			16.20	
31VR018	Phakhel-Sisneri (Tekar)	9.00	0	9+000		4.00	5.00		9.00			9.00	
31VR019	Brindaban-Charghare-Ramantar	10.00	0	10+000		10.00			10.00			10.00	
31VR020	Bajara-Barahi-Tasar	2.50	0	2+500			2.50		2.50			2.50	
31VR021	Buddhachowk-Pantale	4.00	0	4+000			4.00		4.00			4.00	
31VR022	Hetauda-Manakamana Dhading	7.00	0	7+000			7.00		7.00			7.00	
31VR023	Kharanga-Bhawar-Sarikhet	5.00	0	5+000			5.00		5.00			5.00	
31VR024	Kunchhak-Karkichhap	3.00	0	3+000			3.00		3.00			3.00	
31VR025	Makranchuli-Manakamana	3.00	0	3+000			3.00		3.00			3.00	
31VR026	Padampokhari-Sikreni	3.00	0	3+000			3.00		3.00			3.00	
31VR027	Padampokhari-Simpani	3.00	0	3+000			3.00		3.00			3.00	
31VR028	RaptiPul-Bhairab Dada	3.00	0	3+000			3.00		3.00			3.00	
31VR029	Shikharpur-Phaparbari	8.00	0	8+000			8.00		8.00			8.00	
31VR030	Shreepur-Juina	6.00	0	6+000			6.00		6.00			6.00	
31VR031	Phakhel-Kodokhoriya-Chitlang	5.00	0	5+000			5.00		5.00			5.00	
31VR032	Chaughada-Chisapani	4.00	0	4+000			4.00		4.00			4.00	
31VR033	Tistung-Sisneri	4.00	0	4+000			4.00		4.00			4.00	
Total		578.84			0	109.661	463.175	69.161	509.675	44.805	129.547	387.129	17.335

Annex 8: Map Projection Parameters

Global Positioning System (GPS) tracking survey was conducted to track the existing road networks and other road related infrastructures within road networks using WGS 1984 geographical co-ordinate system. Finally all map features were projected in to modified UTM co-ordinate system using following projection parameters;

Projected coordinate system	
Projection	Transverse Mercator
False Easting	500000.00
False Northing	0.00
Central Meridian	84.00
Scale Factor	0.9999
Spheroid	Everest 1830