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,

KATHMANDU

VOLUME-I

(MAIN REPORT)

AUGUST 2013

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FOREWORD

It is my great pleasure to introduce this revised District Transport Master Plan (DTMP) of Kathmandu district which was concurred by the district stakeholder's meeting held on 5 Feb 2013, passed by DDC Board Meeting on 5 May 2013 and approved by the DDC Board meeting on 1 July 2013. Based on the DTMP Guideline 2012, all together 39 District Road Core Network (DRCN) aiming to connect all Village Development Committee (VDC) headquarters with the district headquarter, either directly or through strategic road network (SRN) have been selected. By bringing the DRCN to a maintainable and all-weather standard, year-round access to all VDCs Centers can be ensured.

I believe this document will be helpful to materialize Rural Transport Infrastructure Sector Wide Approach (RTISWAp) through sustainable planning, resources mobilization, implementation and monitoring of the road development. The document is anticipated to generate substantial employment opportunities for rural people through conservation, improvement and new construction activities of the existing road network. DRCN plays an important role to strengthen and promote overall economic growth of the district through established and improved year round transport services reinforcing intra and inter-district linkages. It is most crucial to expand DRCN in a planned way as per the DTMP recommendations by considering the framework of available resources in DDC. This document will help to manage fund and time. Furthermore, this document will be supportive in avoiding prevailing duplication in resources allocation in road network development by considering basket fund approach.

I would, firstly like to express my gratitude to RTI Sector Maintenance Pilot for financial and technical support. Secondly, my thanks go to Mr. Mahesh Aryal, Chief District Engineer, Khagendra Dahal, Senior Divisional Engineer, Mr. Chuda Raj Dhakal, Engineer, Mr. Saligram Devkota, Engineer, Mr. Bhisma Kumar Malla, Planning officer, Mr. Sarad Shrestha, Sub-Engineer and other DDC/ DTO staff for their valuable efforts in the process of producing this document for their continuous dedication and hard-work in bringing this DTMP document to this stage. My special thanks go to all the representatives of political parties, who provided constructive feedbacks and valuable support in preparing this document successfully.

Last but not least, I would like to express my heartfelt gratitude to Ministry of Federal Affairs and Local Development (MoFALD) and Department of Local Infrastructure Development and Agriculture Road (DOLIDAR/MoFALD) for providing valuable suggestions and cooperation to produce this report. Any pioneering and constructive suggestions regarding this document will be highly appreciated.

.....

Prem Raj Joshi
Local Development Officer
Kathmandu
Local Development Officer

ACKNOWLEDGEMENT

This DTMP Final Report for Kathmandu District has been prepared on the basis of DOLIDAR's DTMP Guidelines for the Preparation of District Transport Master Plan 2012.

We would like to express our sincere gratitude to RTI Sector Maintenance Pilot and DOLIDAR for providing us an opportunity to prepare this DTMP. We would also like to acknowledge the valuable suggestions, guidance and support provided by DDC officials, DTO Engineers and DTICC members and all the participants present in various workshops organized during the preparation this DTMP without which this report would not be in the present form. At last but not the least, we would also like to express our sincere thanks to all the concerned who directly or indirectly helped us in preparing this DTMP.

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EXECUTIVE SUMMARY

Kathmandu District is located in Bagmati Zone of the Central Development Region of Nepal. It borders with Bhaktapur and Kavrepalanchowk district to the East, Dhading and Nuwakot district to the West, Nuwakot and Sindhupalchowk district to the north, Lalitpur and Makwanpur district to the South. The district has one metropolitan city, one municipality and fifty-seven VDCs, ten constituency areas. The total area of the district is 395 km^2. The district lies partly in the plain and partly in the hills. The lowest elevation point is 1262 meter and the highest elevation point is 2732 meter from mean sea level. The maximum temperature of the district is 32°C and minimum 2°C, annual rainfall of the district is 176 mm. Kathmandu is the capital city of Nepal where most of the corporate offices and industries are located. Tourism is one of the main industries of the district.

The district inventory identified just over 1078.29 km of roads, including 267.79 km of strategic roads and 713.24km of rural roads. In coordination with the DTICC and DDC, 39 rural roads with a length of 209.52 km (excluding new construction roads of length 2.54 km) were identified as making up the district road core network (DRCN), and the remaining 503.72 km were classified as village roads. The existing SRN roads link up 22 VDC headquarters and existing DRCN roads connects remaining 28 VDC headquarters. The DRCN road of 82.51 km black top, 57.70 km gravel and 69.31 km earthen is identified, which is as shown in table below:

Road Class	Total length	Black Top	Gravel	Earthen
Strategic road network	267.79	171.09	25.40	71.30
Urban roads	97.26	79.30	1.00	16.96
District road core network	209.52	82.51	57.70	69.31
Village roads	503.72	91.25	113.62	298.85
Total	**1,078.29**	**424.15**	**197.72**	**456.42**

Annual conservation costs for the entire district road core network are estimated at NPR 108.573 million 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. Total conservation costs for the five-year DTMP period are estimated at NPR 542.867million. An analysis of the road network identified the need for improvement of most of the core road network 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

Improvement type	Requirement		Cost (NPR)
Bridges	0	m	-
Slab culverts	20	m	3,000,000
Causeways	167	m	16,700,000
Hume pipes	163	units	1,630,000
Masonry retaining walls	1437	m^3	14,370,000
Gabion retaining walls	7249	m^3	18,122,500
Lined drains	147520	m	147,520,000
Widening	15050	m	376,250,000
Rehabilitation	12.619	km	10,095,200
Gravelling	70.028	km	154,061,600
Blacktopping	102.217	km	582,636,900
New construction	2.539	km	15,741,800
Total			**1,340,128,000**

The available budget for the road sector for the coming five years (fiscal year 2070/71 to 2074/75) is estimated to be NPR 1315.698 million. Allocation to the district road core network was set at 80% 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. The estimated costs for conservation and improvement only come to NPR 105.2558 million. In addition there is a very large village road network and it was decided to allow a greater allocation to support the conservation and improvement of these roads.

The DTMP allocation allows the entire district road core network to be maintained for the full five years and all required improvement works to be carried out but due to the insufficient fund eight different roads couldn't take under this DTMP. At the end of the DTMP period the thirty one district road core network will be in maintainable all-weather condition with the appropriate road surface. The core road network will then consist of 60% blacktop roads and 18% gravel roads, all with protective and cross drainage structures in place (100% maintainable and all-weather). Access to the SRN or to all-weather DRCN roads will increase from 28 to 34 VDCs and from 36% to 40% of the district population.

ABBREVIATIONS

DDC	District Development Committee
DIM	District Inventory Map
DOLIDAR	Department of Local Infrastructure Development and Agriculture Road
DOR	Department of Road
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
LGCDP	Local Governance and Community Development Programme
MLD	Ministry of Local Development
PCU	Passenger Car Unit
RAP	Rural Access Programme
SWAp	Sector Wide Approach
VDC	Village Development Committee

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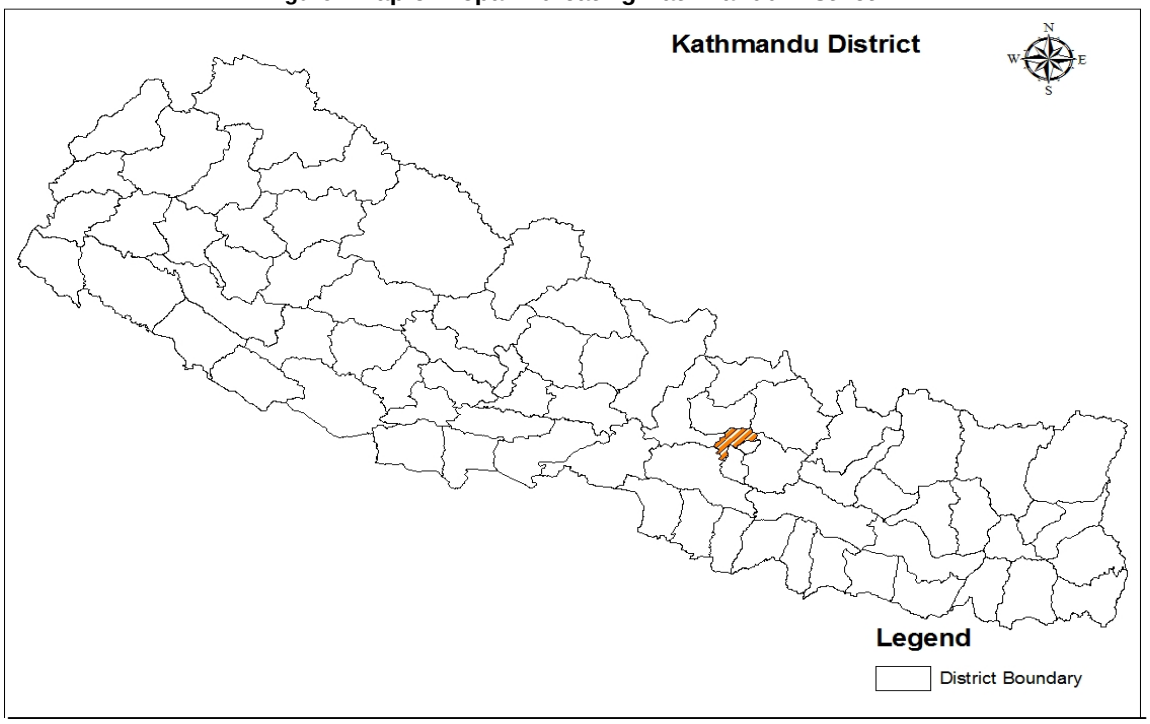
1. INTRODUCTION

Kathmandu District is located in Bagmati Zone of the Central Development Region of Nepal. It borders with Bhaktapur and Kavrepalanchowk district to the East, Dhading and Nuwakot district to the West, Nuwakot and Sindhupalchowk district to the north, Lalitpur and Makwanpur district to the South. The district has one metropolitan city, one municipality and fifty-seven VDCs, ten constituency areas. The total area of the district is 395 km^2. The district lies partly in the plain and partly in the hills. The lowest elevation point is 1262 meter and the highest elevation point is 2732 meter from mean sea level. The maximum temperature of the district is 32°C and minimum 2°C, annual rainfall of the district is 176 mm. Kathmandu is the capital city of Nepal where most of the corporate offices and industries are located. Tourism is one of the main industries of the district.

Figure 1 Map of Nepal Indicating Kathmandu District.



According to the National Census 2011 projection, the total population of the district is 1744240 comprising 831239 female (48%) and 913001 male (52%) residing in 436344 households. Kathmandu district has an average population density of around 4415.8 people per square km. The average family size is 4. The average literacy rate is about 86.3%. Kathmandu *district is multi caste society where the people belong to different caste live in. The different castes found in the district are Newar, Brahmin, Chhetri, Gurung, Tamang, Malla, Thakuri, Damai, Kami, Sarki, etc.* The common language is Nepali followed by Newari. The district has major access to the Tribhuvan Rajpath (Highway) (Kathmandu-Dhading) in west part and Araniko Highway (ARM) in east part. Total 267.79 km (228.24 km Feeder and 89.55 km Highway) connects to the different part of the district and adjoining districts. The Kathmandu outer Ring Road (39km) and Kathmandu-Terai Fast-track (11km section) is on the planning, which will pass through majority VDCs of Kathmandu and also linking them to the district headquarter and to other districts respectively.

2. DISTRICT ROAD CORE NETWORK (DRCN)

This chapter gives an overview of the existing roads in Kathmandu 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

Kathmandu district has an estimated road network of 1078.29 kilometres, including 267.79 km of strategic roads managed by DOR, 713.24 km of rural roads managed by Kathmandu DDC and 97.26 km urban road managed by Municipality. Most of the strategic roads are Blacktop and most of the rural roads are gravel and earthen surface. A map of the total road network in Kathmandu district is shown in Figure 2 at the end of this chapter.

Table 2.1.1 Road length in Kathmandu District (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic roads	267.79	171.09	25.40	71.30
Urban roads	97.26	79.30	1.00	16.96
Rural roads	713.24	173.76	171.32	368.16
Total	**1,078.29**	**424.15**	**197.72**	**456.42**

2.2 NATIONAL HIGHWAYS AND FEEDER ROADS

Kathmandu district has three highways Tribhuvan Rajpath (TRP), Araniko Rajmarg (ARM), Kathmandu Ring road and twenty nine feeder roads totalling 267.79km. The Kathmandu outer Ring Road (39km) and Kathmandu-Terai Fast-track (11km section) is on the planning by DOR which is 50 km.

Table 2.2.1 National Highways and Feeder Roads in Kathmandu District (km)

Code	Description	Total length	Black Top	Gravel	Earthen
F021	Kathmandu - Trisuli - Dhunche - Rasuwagadhi	**17.05**	17.05	-	-
F022	Balkhu - Dakchhinkali	**22.39**	22.39	-	-
F025	Lainchaur - Maharajgunj - Budhanilkantha	**9.39**	9.39	-	-
F026	Chabahil - Sankhu - Jhule - Chautara	**25.43**	12.78	3.00	9.65
F027	Jorpati - Sundarijal	**7.13**	7.13	-	-
F075	Kalimati - Sitapaila - Bhimdhunga - Dharke	**10.10**	4.10	-	6.00
F076	Ringroad - Tinpipale - Okarpauwa - Kolpu	**8.00**	-	-	8.00
F077	Budhanilkantha - Kakani - Kaulethana (F21)	**12.20**	4.00	-	8.20
F078	Shobhabhagwati - Nishangaun - Halchok - Narayanthan	**6.10**	3.50	-	2.60
F079	Thulo Bharyang (Ring Road) - Raniban Post	**2.40**	-	-	2.40
F080	Balaju - Nepaltar - Sangla Bazar	**11.80**	1.50	6.00	4.30
F081	Baniyatar - Lainchaur	**4.00**	4.00	-	-
F082	Samakhosi - Tokhagaun-Dandagaun-Gurje-Tadi-Gangate	**17.00**	5.00	4.50	7.50
F083	Kapan - Mandikatar - Hadigaun (Bulbule)	**4.50**	-	-	4.50
F084	Chuchchepati - Kapan - Gamcha	**7.80**	5.00	-	2.80
F085	Mahankal - Atterkhel	**2.50**	-	-	2.50

Code	Description	Total length	Black Top	Gravel	Earthen
F086	Jadibuti (ARM) - Thimi - Sallaghari	**2.30**	2.30	-	-
F087	Pepsikola - Gothatar	**3.50**	3.00	0.50	-
F088	Gokarna - Jorpat i- Gothatar	**3.60**	3.60	-	-
F089	Pepsikola - Karkigaun	**6.40**	-	6.40	-
F092	Thimi - Mulpani - Gokarna	**4.10**	4.10	-	-
F095	Mulpani - Changunarayan - Phedigaun	**1.50**	-	-	1.50
F096	Nagarkot - Sankhu	**3.85**	-	1.00	2.85
F101	Manohara Bridge (RR) - Sankhamu-Teku-Balkhu (RR)	**1.50**	1.50	-	-
F103	Jayanepal - Bhaisepati - Tikabhairab	**3.00**	3.00	-	-
F104	Khasibajar - Kirtipur - Tinthana	**10.70**	10.20	-	0.50
F105	Nagdhunga -Tankeswor	**11.00**	3.00	2.00	6.00
F121	Pharping - Kulekhani	**3.00**	3.00	-	-
F180	Ganeshman Marg (Thankot-Markhu)	**6.00**	2.00	2.00	2.00
H02	Tribhuvan Rajpath (TRP)	**14.16**	14.16	-	-
H03	Araniko Rajmarg (ARM)	**4.39**	4.39	-	-
H16	Kathmandu Ringroad	**21.00**	21.00		-
	Total	**267.79**	**171.09**	**25.40**	**71.30**

2.3 DISTRICT ROAD CORE NETWORK (DRCN)

As part of the preparation of this DTMP, the District Road Core Network (DRCN) was identified together with the DTICC 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 in Kathmandu district is shown in Figure 3 at the end of this chapter. The DRCN consists of 39 district roads with a total length of 209.52km excluding new construction road about 2.54km which is extended section of existing DRCN roads. The remaining 503.72 km of existing rural roads are not considered to be DRCN roads and are classified as village roads under the responsibility of the VDCs. out of 209.52km DRCN road, 140.21 km is all weather and 69.31 km is fair weather. Total road length in the district is presented in table 2.3.1 and the complete list of the DRCN road and their characteristics is provided in table 2.3.2.

Table 2.3.1Total road length (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic road network	**267.79**	**171.09**	**25.40**	**71.30**
Highways	39.55	39.55	-	-
Feeder roads	228.24	131.54	25.40	71.30
Urban roads				
Kathmandu & Kritipur Municipality	97.26	79.30	1.00	16.96
District road core network	**209.52**	82.51	57.70	69.31
Village roads	**503.72**	91.25	113.62	298.85
Total	**1,078.29**	**424.15**	**197.72**	**456.42**

Table 2.3.2 District road core Network in Kathmandu District (km)

Code	Description	Total length	Black Top	Gravel	Earthen	All weather	Fair weather
27DR001	Ramcheebhanjayang_Chaimale VDC Office_Road	0.68	-	-	0.681	-	0.68
27DR002	Pharping_Talku Hanumane_Road	9.99	8.044	1.946	-	9.99	-
27DR003	Pharping Village Road	1.15	-	1.152	-	1.15	-
27DR004	Chalnakhel_Katuwaldaha_Road	8.90	0.811	4.454	3.631	5.27	3.63
27DR005	Khahare_Bosan_Champadevi_Road	2.84	1.437	-	1.402	1.44	1.40
27DR006	Satungal_Matatirtha_Deurali_Makwanpur_Road	9.26	2.919	0.788	5.557	3.71	5.56
27DR007	Ganeshman Shanti Marga(Thankot-Chitlang Bhanjyang)	5.38	1.789	1.808	1.784	3.60	1.78
27DR008	Mahadevsthan_Matatirtha_Machhegaun_Road	3.38	2.179	1.204	-	3.38	-
27DR009	Thankot_Balambu_Dahachowk_Road	3.36	3.359	-	-	3.36	-
27DR010	Tinthana_Kritipur_Road	2.11	-	2.114	-	2.11	-
27DR011	Naya Naikap_Purano Naikap_LinkRoad	0.96	0.959	-	-	0.96	-
27DR012	Kalanki_Ghampedol_Badbhanjyang_Road	8.55	8.554	-	-	8.55	-
27DR013	Badbhnjyang_Dahachowk_Bhimdhunga_Road	8.62	-	1.435	6.114	1.44	6.11
27DR014	Miteri Marga(Dahachowk)	3.96	-	-	2.484	-	2.48
27DR015	Kalanki_suchatar_Bhimdhunga_Road	7.44	3.361	4.078	-	7.44	-
27DR016	Sitapaila_Ramkot_Bhimdhunga_Road	6.79	6.792	-	-	6.79	-
27DR017	Bhimdhunga_Ghatte Khola_Ramkot(Phasku)_Ghumti_Road	5.28	-	-	5.281	-	5.28
27DR018	Sitapaila_Adeshwar_Setogumba_Dadagaun_Road	3.65	1.833	1.173	0.642	3.01	0.64
27DR019	Halchowk_Narayanthan_Road	3.40	3.403	-	-	3.40	-
27DR020	Phulbarigate_Phuyalthok_Chogaun_Road	2.41	1.718	0.691	-	2.41	-
27DR021	PuranoGujeswari_Bohoratar_Dhitalthok_Tinpiple_Road	6.29	0.249	3.873	2.165	4.12	2.17
27DR022	Manamaizu_Sesmati_Dharmasthali_Kavresthali_Road	3.48	3.48	-	-	3.48	-
27DR023	Forth Village Road(Jitpurphedi_Sangla_Jhor)	6.47	-	3.039	3.43	3.04	3.43
27DR024	Manamaiju_Futung_Sangla_Jagat_Gurjebhyangyang_Road	5.77	-	3.286	2.486	3.29	2.49
27DR025	Samakhusi chowk_Tokhagaun_Jhor_Gurjebhngyang_Road	7.05	7.046	-	-	7.05	-

Code	Description	Total length	Black Top	Gravel	Earthen	All weather	Fair weather
27DR026	Basundhara Chowk_Dhapasi VDCRoad	0.70	0.699	-	-	0.70	-
27DR027	Neuro Hospital_Basundhara(Alternative) _Road	1.67	1.058	-	0.607	1.06	0.61
27DR028	Hattigaunda_Khadakbhadrakali_T okha_Road	0.41	0.41	-	-	0.41	-
27DR029	Budhanilkantha_Chapali_Chunikh el_Kapan VDC_Road	5.35	3.152	0.826	1.368	3.98	1.37
27DR030	Gokarna_Baluwa_Piple-Tare Bhir_Narayanthan_Road	10.96	1.717	0.627	8.617	2.34	8.62
27DR031	NayapatiChowk_Sarki House_Mulpani_Road	2.23	0.383	1.847	-	2.23	-
27DR032	Kageswori_Ringroad	8.90	4.124	4.78	-	8.90	-
27DR033	Sundarijal 8-Mahankal-Mulkharka-Chisapani Road	11.47	-	1.484	9.985	1.48	9.99
27DR034	Sundarijal_Alapot_Road	1.50	0.413	-	1.088	0.41	1.09
27DR035	Loktantrik-Sahid Marga(Bramhakhel_Gagal-Shivapuri)	7.99	1.134	2.506	4.354	3.64	4.35
27DR036	Sankhu_Bajrayogini_Gumarchowk _Chaukibhyang_Road	10.28	0.286	2.36	7.632	2.65	7.63
27DR037	Sankhu_Palubari_Nagarkot_Road	10.06	1.411	8.65	-	10.06	-
27DR038	Jarsinghpauwa_Kartike_Nagarkot _Road	3.58	-	3.579	-	3.58	-
27DR039	Jarsingpauwa_Chapbhanjyang(sin dhupalchowk)_Road	9.79	9.789	-	-	9.79	-
	Total	**209.52**	**82.51**	**57.70**	**69.31**	**140.21**	**69.31**

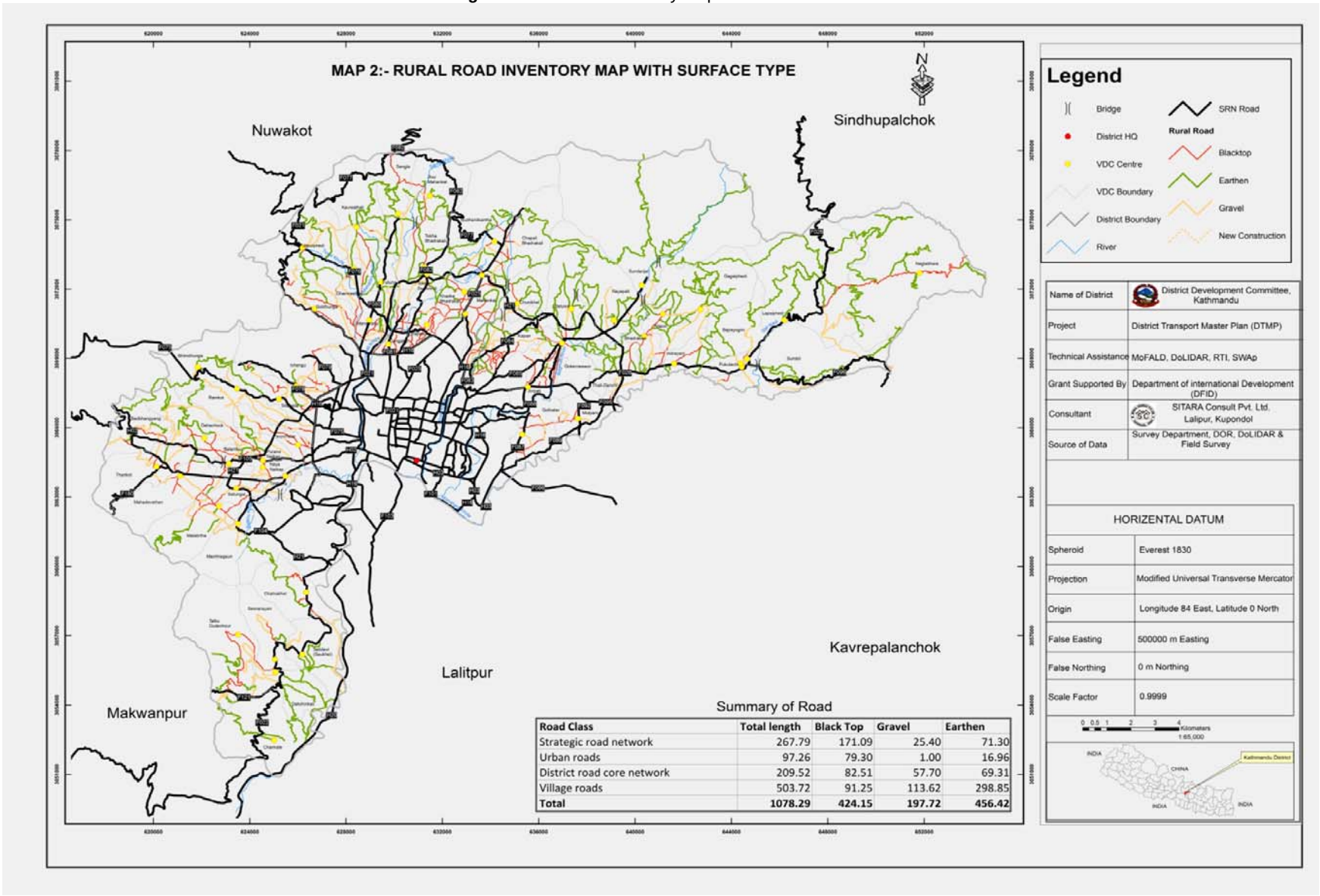
2.4 VILLAGE ROADS

The 503.72km 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 the 57 VDCs in Kathmandu 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 average each VDC will thus be responsible for 8.61 km of village roads. It is recommended that the VDCs organise maintenance worker to carry out the emergency and routine/recurrent maintenance of these roads to ensure they remain accessible. 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. However, this district funding will be mainly for maintenance, especially emergency maintenance and routine/recurrent maintenance to keep the village roads open.

Figure 2 Total Road inventory map of Kathmandu District



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District road core network	209.52	82.51	57.70	69.31
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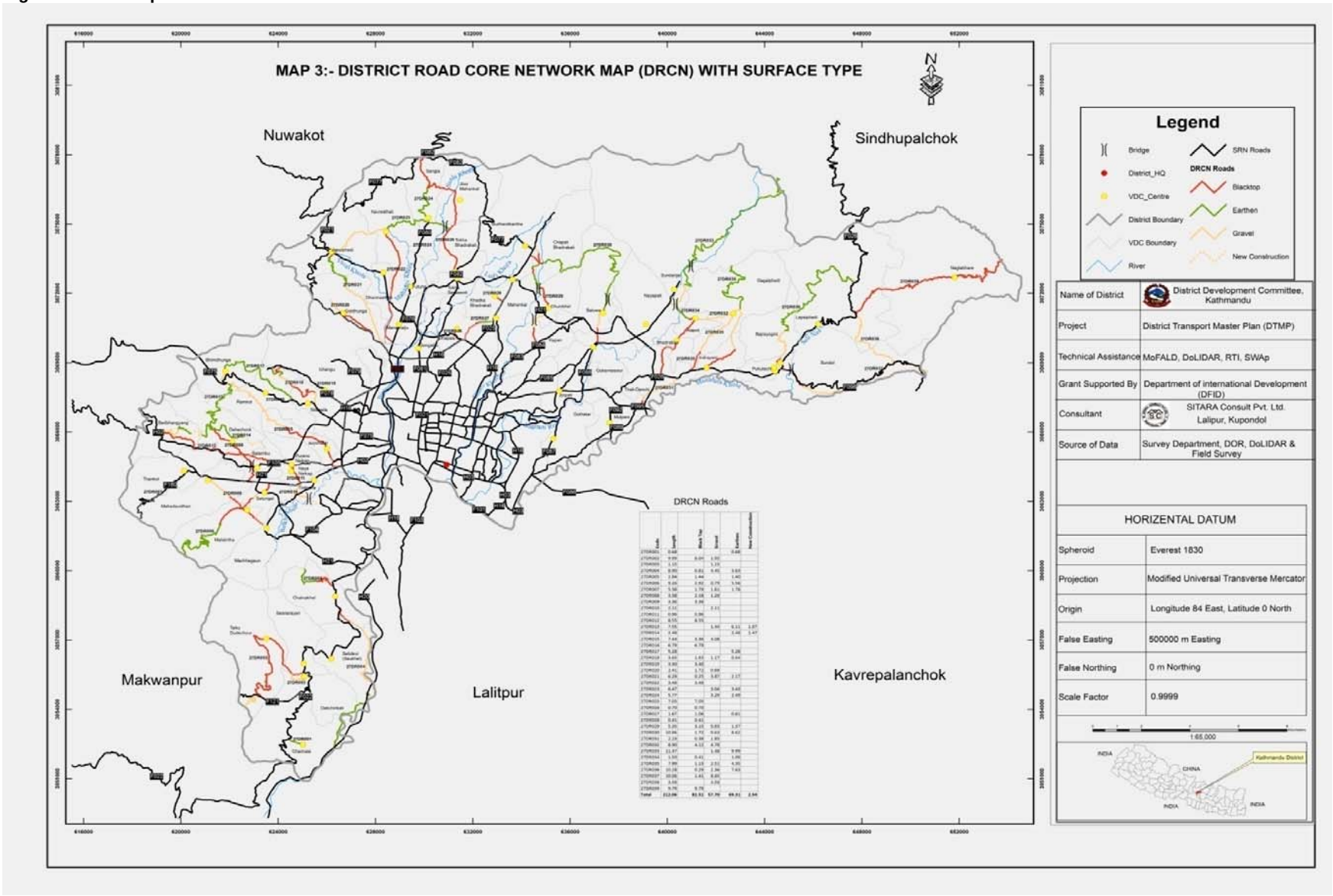
Figure 3DRCN map of Kathmandu District



3. REQUIRED INTERVENTIONS

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 core district road network, whereby for certain maintenance type's distinction is made according to the surface type of the road. Identification of the actual maintenance following conservation activities is distinguished: requirements of each road are done in the ARMP on an annual basis.

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. 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 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)
27DR001	0.68	0.68	0.68	0.68
7DR002	9.99	9.99	9.99	9.99
27DR003	1.15	1.15	1.15	1.15
27DR004	8.90	8.90	8.90	8.90
27DR005	2.84	2.84	2.84	2.84
27DR006	9.26	9.26	9.26	9.26
27DR007	5.38	5.38	5.38	5.38
27DR008	3.38	3.38	3.38	3.38
27DR009	3.36	3.36	3.36	3.36
27DR010	2.11	2.11	2.11	2.11
27DR011	0.96	0.96	0.96	0.96
27DR012	8.55	8.55	8.55	8.55
27DR013	7.55	7.55	7.55	7.55
27DR014	2.48	2.48	2.48	2.48
27DR015	7.44	7.44	7.44	7.44
27DR016	6.79	6.79	6.79	6.79
27DR017	5.28	5.28	5.28	5.28
27DR018	3.65	3.65	3.65	3.65
27DR019	3.40	3.40	3.40	3.40
27DR020	2.41	2.41	2.41	2.41
27DR021	6.29	6.29	6.29	6.29
27DR022	3.48	3.48	3.48	3.48
27DR023	6.47	6.47	6.47	6.47
27DR024	5.77	5.77	5.77	5.77
27DR025	7.05	7.05	7.05	7.05
27DR026	0.70	0.70	0.70	0.70
27DR027	1.67	1.67	1.67	1.67
27DR028	0.41	0.41	0.41	0.41
27DR029	5.35	5.35	5.35	5.35
27DR030	10.96	10.96	10.96	10.96
27DR031	2.23	2.23	2.23	2.23
27DR032	8.90	8.90	8.90	8.90
27DR033	11.47	11.47	11.47	11.47
27DR034	1.50	1.50	1.50	1.50
27DR035	7.99	7.99	7.99	7.99
27DR036	10.28	10.28	10.28	10.28
27DR037	10.06	10.06	10.06	10.06
27DR038	3.58	3.58	3.58	3.58
27DR039	9.79	9.79	9.79	9.79
Total	**209.517**	**209.517**	**209.517**	**209.517**

3.2 IMPROVEMENT

Improvement refers to actions required to improve the road to bring it to a maintainable all weather standard. It includes the following actions, which for Kathmandu are 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 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 100 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

Rehabilitation needs were identified in the district road core network.

Table 3.2.1 Sections of the district road core network requiring rehabilitation

Code	Description	Total length (km)	Rehabilitation (km)
27DR002	Pharping_Talku Hanumane_Road	9.99	0.145
27DR006	Satungal_Matatirtha_Deurali_Makwanpur_Road	9.264	0.85
27DR007	Ganeshman Shanti Marga(Thankot-Chitlang Bhanjyang)	5.381	0.47
27DR008	Mahadevsthan_Matatirtha_Machhegaun_Road	3.383	0.45
27DR009	Thankot_Balambu_Dahachowk_Road	3.359	0.12
27DR011	Naya Naikap_Purano Naikap_LinkRoad	0.959	0.195
27DR012	Kalanki_Ghampedol_Badbhanjyang_Road	8.554	0.275
27DR015	Kalanki_Syuchatar_Bhimdhunga_Road	7.439	2.14
27DR016	Sitapaila_Ramkot_Bhimdhunga_Road	6.792	2.3
27DR018	Sitapaila_Adeshwar_Setogumba_Dadagaun_Road	3.648	0.26
27DR019	Halchowk_Narayanthan_Road	3.403	0.07
27DR020	Phulbarigate_Phuyalthok_Chogaun_Road	2.409	1.32
27DR021	PuranoGujeswari_Bohoratar_Dhitalthok_Tinpiple_Road	6.287	0.1
27DR024	Manamaiju_Futung_Sangla_Jagat_Gurjebhyangyang_Road	5.772	0.015
27DR025	Samakhusi chowk_Tokhagaun_Jhor_Gurjebhngyang_Road	7.046	0.05
27DR026	Basundhara Chowk_Dhapasi VDCRoad	0.699	0.26
27DR027	Neuro Hospital_Basundhara(Alternative)_Road	1.665	0.082
27DR028	Hattigaunda_Khadakbhadrakali_Tokha_Road	0.41	0.073
27DR029	Budhanilkantha_Chapali_Chunikhel_Kapan VDC_Road	5.346	0.475
27DR032	Kageswori_Ringroad	8.904	2.019
27DR035	Loktantrik-Sahid Marga(Bramhakhel_Gagal-Shivapuri)	7.994	0.345
27DR037	Sankhu_Palubari_Nagarkot_Road	10.061	0.605
Total		118.76	12.619

3.2.2 GRAVELLING

Gravelling of the road surface is required for the earthen sections in the district road core network. For Kathmandu district this concerns a total of 69.308 km as can be seen in the table below.

Table 3.2.2 Sections of the district road core network requiring gravelling

Code	VDCs	Total length (km)	Gravelling (km)
27DR001	Ramcheebhanjayang_Chaimale VDC Office_Road	0.681	0.681
27DR004	Chalnakhel_Katuwaldaha_Road	8.896	3.631
27DR005	Khahare_Bosan_Champadevi_Road	2.839	1.402
27DR006	Satungal_Matatirtha_Deurali_Makwanpur_Road	9.264	5.557
27DR007	Ganeshman Shanti Marga(Thankot-Chitlang Bhanjyang)	5.381	1.784

27DR013	Badbhnjyang_Dahachowk_Bhimdhunga_Road	7.549	6.114
27DR014	Miteri Marga(Dahachowk)	2.484	2.484
27DR017	Bhimdhunga_Ghatte Khola_Ramkot(Phasku)_Ghumti_Road	5.281	5.281
27DR018	Sitapaila_Adeshwar_Setogumba_Dadagaun_Road	3.648	0.642
27DR021	PuranoGujeswari_Bohoratar_Dhitalthok_Tinpiple_Road	6.287	2.165
27DR023	Forth Village Road(Jitpurphedi_Sangla_Jhor)	6.469	3.43
27DR024	Manamaiju_Futung_Sangla_Jagat_Gurjebhyangyang_Road	5.772	2.486
27DR027	Neuro Hospital_Basundhara(Alternative)_Road	1.665	0.607
27DR029	Budhanilkantha_Chapali_Chunikhel_Kapan VDC_Road	5.346	1.368
27DR030	Gokarna_Baluwa_Piple-Tare Bhir_Narayanthan_Road	10.961	8.617
27DR033	Sundarijal 8-Mahankal-Mulkharka-Chisapani Road	11.469	9.985
27DR034	Sundarijal_Alapot_Road	1.501	1.088
27DR035	Loktantrik-Sahid Marga(Bramhakhel_Gagal-Shivapuri)	7.994	4.354
27DR036	Sankhu_Bajrayogini_Gumarchowk_Chaukibhyang_Road	10.278	7.632
Total			**69.308**

3.2.3 CROSS DRAINAGE

The need for cross drainage was identified for the different DRCN roads. A total of 5 slab culverts with a total length of 20m, 36 causeways with a total length of 167m, and 163 pipe culverts were identified as being required (see table below). For the bridges, slab culverts and causeways, and other interventions are provided in **Annex 3**.

Table 3.2.3 Required cross drainage structures

Code	Description	Slab culvert (m)	CC Causeway (m)	Pipe culvert (units)
27DR002	Pharping_Talku Hanumane_Road	-	-	2
27DR004	Chalnakhel_Katuwaldaha_Road	-	8	4
27DR005	Khahare_Bosan_Champadevi_Road	-	-	4
27DR006	Satungal_Matatirtha_Deurali_Makwanpur_Road	-	-	5
27DR007	Ganeshman Shanti Marga(Thankot-Chitlang Bhanjyang)	-	-	2
27DR008	Mahadevsthan_Matatirtha_Machhegaun_Road	-	-	2
27DR009	Thankot_Balambu_Dahachowk_Road	-	-	2
27DR010	Tinthana_Kritipur_Road	-	-	3
27DR012	Kalanki_Ghampedol_Badbhanjyang_Road	5	-	1
27DR013	Badbhnjyang_Dahachowk_Bhimdhunga_Road	-	14	25
27DR014	Miteri Marga(Dahachowk)	-	13	4
27DR015	Kalanki_Syuchatar_Bhimdhunga_Road	-	9	6
27DR016	Sitapaila_Ramkot_Bhimdhunga_Road	-	-	3
27DR017	Bhimdhunga_Ghatte Khola_Ramkot(Phasku)_Ghumti_Road	-	13	9
27DR018	Sitapaila_Adeshwar_Setogumba_Dadagaun_Road	-	-	1
27DR019	Halchowk_Narayanthan_Road	-	4	1
27DR021	PuranoGujeswari_Bohoratar_Dhitalthok_Tinpiple_Road	-	6	2
27DR023	Forth Village Road(Jitpurphedi_Sangla_Jhor)	-	5	5
27DR024	Manamaiju_Futung_Sangla_Jagat_Gurjebhyangyang_Road	5	-	4
27DR030	Gokarna_Baluwa_Piple-Tare Bhir_Narayanthan_Road	-	7	11
27DR031	Nayapati Chowk_Sarki House_Mulpani_Road	-	-	2
27DR033	Sundarijal 8-Mahankal-Mulkharka-Chisapani Road	6	20	35
27DR034	Sundarijal_Alapot_Road	-	-	1
27DR035	Loktantrik-Sahid Marga(Bramhakhel_Gagal-Shivapuri)	-	8	4
27DR036	Sankhu_Bajrayogini_Gumarchowk_Chaukibhyang_Road	-	55	23
27DR037	Sankhu_Palubari_Nagarkot_Road	4	-	-
27DR038	Jarsinghpauwa_Kartike_Nagarkot_Road	-	-	2
27DR039	Jarsingpauwa_Chapbhanjyang(sindhupalchowk)_Road	-	5	-
Total		**20**	**167**	**163**

3.2.4 PROTECTIVE STRUCTURES

Based on the road survey carried out in Kathmandu, 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

Road	Total length (km)	Masonry walls (m^3)	Gabion walls (m^3)
27DR001	0.681	0	15
27DR002	9.99	12	90
27DR004	8.896	0	24
27DR005	2.839	0	45
27DR006	9.264	155	586
27DR007	5.381	75	185
27DR010	2.114	0	18
27DR013	7.549	46	130
27DR014	2.484	82	170
27DR015	7.439	0	40
27DR017	5.281	0	110
27DR019	3.403	27	100
27DR021	6.287	0	807
27DR022	3.48	0	30
27DR023	6.469	88	365
27DR024	5.772	56	145
27DR025	7.046	0	280
27DR029	5.346	63	125
27DR030	10.961	0	70
27DR032	8.904	60	0
27DR033	11.469	95	350
27DR035	7.994	10	272
27DR036	10.278	0	470
27DR037	10.061	30	118
27DR038	3.579	98	136
27DR039	9.789	540	2568
Total	**172.756**	**1437**	**7249**

3.2.5 WIDENING

Widening of the core district road network is not required in Kathmandu as the traffic volumes are still well below the 100 vehicles per day. But due to insufficient funding these roads may not be widened. The priority of these roads comes after the conservation and improvement other DRCN roads.

Table 3.2.5 Sections of the district road core network requiring widening

Code	Description	Total length (km)	Widening (m)
27DR014	Miteri Marga(Dahachowk)	2.48	1950
27DR030	Gokarna_Baluwa_Piple-Tare Bhir_Narayanthan_Road	10.96	5800
27DR036	Sankhu_Bajrayogini_Gumarchowk_Chaukibhyang_Road	10.28	7300
Total		**23.72**	**15050**

3.2.6 BLACKTOPPING

An analysis of the traffic data for the different roads making up the district road core network (see **Annex 1**) shows that there are 23 roads that are eligible for blacktopping (traffic volume exceeds 100 PCU). The total length for blacktopping is 102.217 km.

Code	VDCs	Traffic (PCU)	Total length (km)	Blacktopping (km)
27DR002	Pharping_Talku Hanumane_Road	185	9.99	1.946
27DR003	Pharping Village Road	120	1.152	1.152
27DR006	Satungal_Matatirtha_Deurali_Makwanpur_Road	145	9.264	6.345
27DR008	Mahadevsthan_Matatirtha_Machhegaun_Road	122.5	3.383	1.204
27DR010	Tinthana_Kritipur_Road	161.5	2.114	2.114
27DR013	Badbhnjyang_Dahachowk_Bhimdhunga_Road	110	7.549	7.549
27DR014	Miteri Marga(Dahachowk)	282.5	2.484	2.484
27DR015	Kalanki_Syuchatar_Bhimdhunga_Road	172.5	7.439	4.078
27DR017	Bhimdhunga_Ghatte Khola_Ramkot(Phasku)_Ghumti_Road	160	5.281	5.281
27DR018	Sitapaila_Adeshwar_Setogumba_Dadagaun_Road	260	3.648	1.815
27DR020	Phulbarigate_Phuyalthok_Chogaun_Road	175	2.409	0.691
27DR021	PuranoGujeswari_Bohoratar_Dhitalthok_Tinpiple_Road	247	6.287	6.038
27DR023	Forth Village Road(Jitpurphedi_Sangla_Jhor)	161.5	6.469	6.469
27DR027	Neuro Hospital_Basundhara(Alternative)_Road	243.5	1.665	0.607
27DR029	Budhanilkantha_Chapali_Chunikhel_Kapan VDC_Road	220	5.346	2.194
27DR030	Gokarna_Baluwa_Piple-Tare Bhir_Narayanthan_Road	260.5	10.961	9.244
27DR031	Nayapati Chowk_Sarki House_Mulpani_Road	119.5	2.23	1.847
27DR032	Kageswori_Ringroad	230	8.904	4.78
27DR034	Sundarijal_Alapot_Road	205	1.501	1.088
27DR035	Loktantrik-Sahid Marga(Bramhakhel_Gagal-Shivapuri)	115	7.994	6.86
27DR036	Sankhu_Bajrayogini_Gumarchowk_Chaukibhyang_Road	290.5	10.278	9.992
27DR037	Sankhu_Palubari_Nagarkot_Road	125	10.061	8.65
27DR038	Jarsinghpauwa_Kartike_Nagarkot_Road	145	3.579	3.579
Total			**129.988**	**96.007**

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 2 VDC HQs that do not currently have road access. This list is not complete, however, and additional new construction is required to connect all 2 VDC headquarters currently without all weather road access. But due to insufficient funding these roads may not be constructed before conservation and improvement of other DRCN Roads.

Table 3.3.1 Section of the district core network requiring new construction

Code	Description	New VDCs	Existing length	New length	Bridge (m)
27DR013	Badbhanjyang_Dahachowk_Bhimdhunga_Road	Badbhanjyang	7.55	1.07	-
27DR014	Miteri Marga(Dahachowk)	Dahachowk	2.48	1.47	-
Total			**10.03**	**2.54**	

3.4 DISTRICT TRANSPORT PERSPECTIVE PLAN

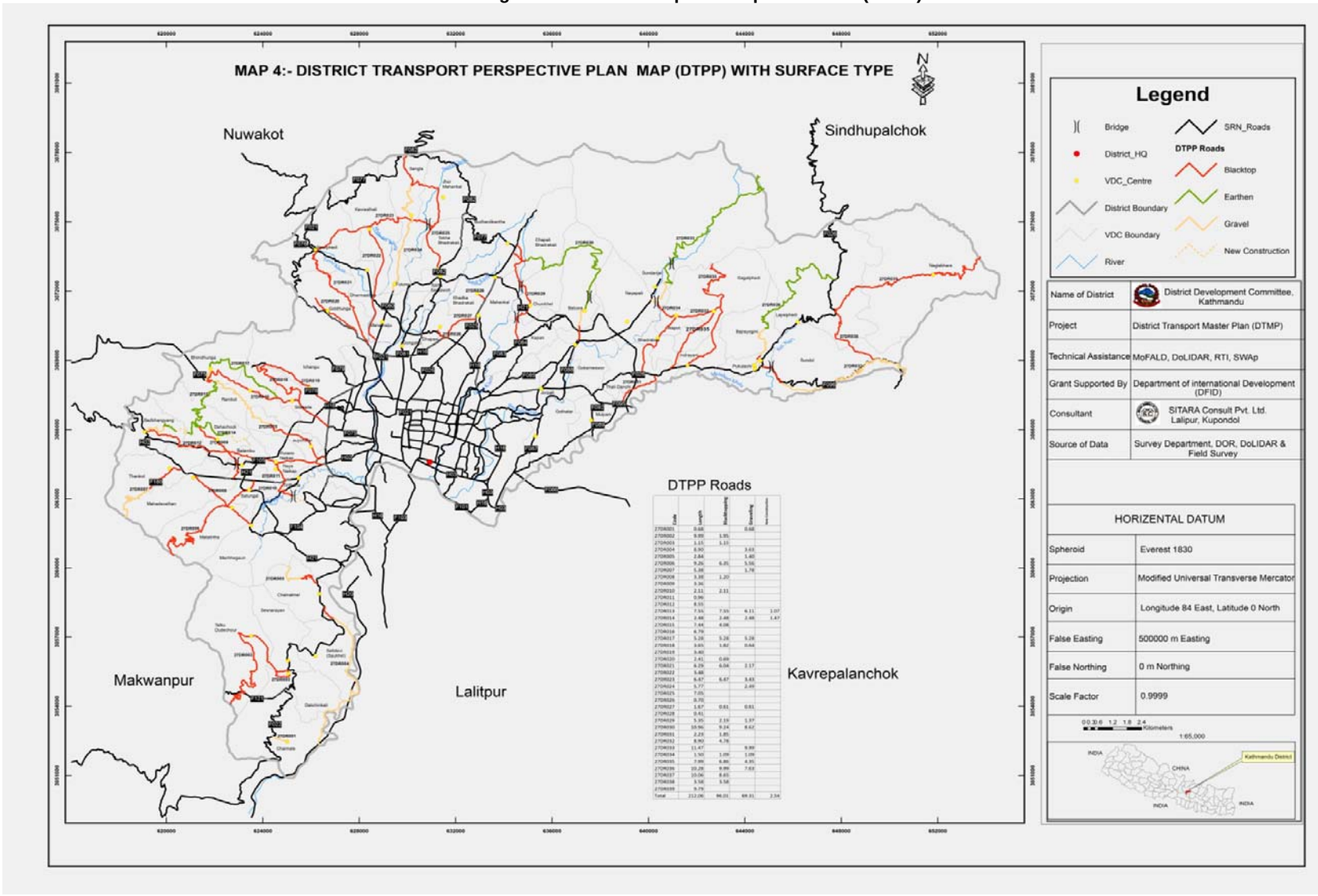
The DTPP foresees bringing the entire existing district road core network to maintainable all-weather status by graveling and constructing a number of different cross drainage and protective structures. In addition, 96.01km will be blacktopped in light of the existing traffic volume. The district road core network will subsequently consist of 209.52 km of maintainable all-weather roads. The following table lists the required interventions, while the proposed network is shown in the DTPP map in

Table 3.4.1 District Transport Perspective Plan

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)	Gravelling (km)	Blacktopping (km)	Bridge (m)	Slab culvert (m)	CC Causeway (m)	Pipe culvert (units)	Masonry walls (m3)	Gabion walls (m3)
27DR001	0.68	0.68	0.68	0.68	0.68	-	-	-	-	-	-	15.00
27DR002	9.99	9.99	9.99	9.99	-	1.95	-	-	-	2.00	12.00	90.00
27DR003	1.15	1.15	1.15	1.15	-	1.15	-	-	-	-	-	-
27DR004	8.90	8.90	8.90	8.90	3.63	-	-	-	8.00	4.00	-	24.00
27DR005	2.84	2.84	2.84	2.84	1.40	-	-	-	-	4.00	-	45.00
27DR006	9.26	9.26	9.26	9.26	5.56	6.35	-	-	-	5.00	155.00	586.00
27DR007	5.38	5.38	5.38	5.38	1.78	-	-	-	-	2.00	75.00	185.00
27DR008	3.38	3.38	3.38	3.38	-	1.20	-	-	-	2.00	-	-
27DR009	3.36	3.36	3.36	3.36	-	-	-	-	-	2.00	-	-
27DR010	2.11	2.11	2.11	2.11	-	2.11	-	-	-	3.00	-	18.00
27DR011	0.96	0.96	0.96	0.96	-	-	-	-	-	-	-	-
27DR012	8.55	8.55	8.55	8.55	-	-	-	5.00	-	1.00	-	-
27DR013	7.55	7.55	7.55	7.55	6.11	7.55	-	-	14.00	25.00	46.00	130.00
27DR014	2.48	2.48	2.48	2.48	2.48	2.48	-	-	13.00	4.00	82.00	170.00
27DR015	7.44	7.44	7.44	7.44	-	4.08	-	-	9.00	6.00	-	40.00
27DR016	6.79	6.79	6.79	6.79	-	-	-	-	-	3.00	-	-
27DR017	5.28	5.28	5.28	5.28	5.28	5.28	-	-	13.00	9.00	-	110.00
27DR018	3.65	3.65	3.65	3.65	0.64	1.82	-	-	-	1.00	-	-
27DR019	3.40	3.40	3.40	3.40	-	-	-	-	4.00	1.00	27.00	100.00
27DR020	2.41	2.41	2.41	2.41	-	0.69	-	-	-	-	-	-
27DR021	6.29	6.29	6.29	6.29	2.17	6.04	-	-	6.00	2.00	-	807.00
27DR022	3.48	3.48	3.48	3.48	-	-	-	-	-	-	-	30.00
27DR023	6.47	6.47	6.47	6.47	3.43	6.47	-	-	5.00	5.00	88.00	365.00
27DR024	5.77	5.77	5.77	5.77	2.49	-	-	5.00	-	4.00	56.00	145.00

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)	Gravelling (km)	Blacktopping (km)	Bridge (m)	Slab culvert (m)	CC Causeway (m)	Pipe culvert (units)	Masonry walls (m3)	Gabion walls (m3)
27DR025	7.05	7.05	7.05	7.05	-	-	-	-	-	-	-	280.00
27DR026	0.70	0.70	0.70	0.70	-	-	-	-	-	-	-	-
27DR027	1.67	1.67	1.67	1.67	0.61	0.61	-	-	-	-	-	-
27DR028	0.41	0.41	0.41	0.41	-	-	-	-	-	-	-	-
27DR029	5.35	5.35	5.35	5.35	1.37	2.19	-	-	-	-	63.00	125.00
27DR030	10.96	10.96	10.96	10.96	8.62	9.24	-	-	7.00	11.00	-	70.00
27DR031	2.23	2.23	2.23	2.23	-	1.85	-	-	-	2.00	-	-
27DR032	8.90	8.90	8.90	8.90	-	4.78	-	-	-	-	60.00	-
27DR033	11.47	11.47	11.47	11.47	9.99	-	-	6.00	20.00	35.00	95.00	350.00
27DR034	1.50	1.50	1.50	1.50	1.09	1.09	-	-	-	1.00	-	-
27DR035	7.99	7.99	7.99	7.99	4.35	6.86	-	-	8.00	4.00	10.00	272.00
27DR036	10.28	10.28	10.28	10.28	7.63	9.99	-	-	55.00	23.00	-	470.00
27DR037	10.06	10.06	10.06	10.06	-	8.65	-	4.00	-	-	30.00	118.00
27DR038	3.58	3.58	3.58	3.58	-	3.58	-	-	-	2.00	98.00	136.00
27DR039	9.79	9.79	9.79	9.79	-	-	-	-	5.00	-	540.00	2,568.00
Total	**209.52**	**209.52**	**209.52**	**209.52**	**69.31**	**96.01**	**-**	**20**	**167**	**163**	**1,437**	**7,249**

Figure 4 District Transport Perspective Plan (DTPP)



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. 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/km)
Emergency maintenance	km	30,000
Routine maintenance	km	20,000
Recurrent maintenance (blacktop)	km	500,000
Recurrent maintenance (gravel)	km	400,000
Recurrent maintenance (earthen)	km	250,000
Periodic maintenance (blacktop)	km	200,000
Periodic maintenance (gravel)	km	250,000

For the first year the estimated costs for conservation of the DRCN come to NPR 123.064 million. Based on this cost for the first year, the costs for conservation of the DRCN for the next 5 years are estimated at NPR 631.611 million. 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	Routine	Recurrent (blacktop)	Recurrent (gravel)	Recurrent (earthen)	Periodic (blacktop)	Periodic (gravel)	Total annual cost	Total 5-year cost
27DR001	0.68	-	-	0.68	20	14	-	-	170	-	-	204	1,022
27DR002	9.99	8.04	1.95	-	300	200	4,022	778	-	2,011	487	7,797	38,987
27DR003	1.15	-	1.15	-	35	23	-	461	-	-	288	806	4,032
27DR004	8.90	0.81	4.45	3.63	267	178	406	1,782	908	-	1,114	4,653	23,266
27DR005	2.84	1.44	-	1.40	85	57	719	-	351	-	-	1,211	6,055
27DR006	9.26	2.92	0.79	5.56	278	185	1,460	315	1,389	-	197	3,824	19,121
27DR007	5.38	1.79	1.81	1.78	161	108	895	723	446	-	452	2,785	13,924
27DR008	3.38	2.18	1.20	-	101	68	1,090	482	-	-	301	2,041	10,206
27DR009	3.36	3.36	-	-	101	67	1,680	-	-	-	-	1,847	9,237
27DR010	2.11	-	2.11	-	63	42	-	846	-	-	529	1,480	7,399
27DR011	0.96	0.96	-	-	29	19	480	-	-	-	-	527	2,637
27DR012	8.55	8.55	-	-	257	171	4,277	-	-	-	-	4,705	23,524

Code	Total length (km)	Blacktop (km)	Gravel (km)	Earthen (km)	Emergency	Routine	Recurrent (blacktop)	Recurrent (gravel)	Recurrent (earthen)	Periodic (blacktop)	Periodic (gravel)	Total annual cost	Total 5-year cost
27DR013	7.55	-	1.44	6.11	226	151	-	574	1,529	-	359	2,839	14,194
27DR014	2.48	-	-	2.48	75	50	-	-	621	-	-	745	3,726
27DR015	7.44	3.36	4.08	-	223	149	1,681	1,631	-	-	1,020	4,703	23,516
27DR016	6.79	6.79	-	-	204	136	3,396	-	-	-	-	3,736	18,678
27DR017	5.28	-	-	5.28	158	106	-	-	1,320	-	-	1,584	7,922
27DR018	3.65	1.83	1.17	0.64	109	73	917	469	161	-	293	2,022	10,109
27DR019	3.40	3.40	-	-	102	68	1,702	-	-	-	-	1,872	9,358
27DR020	2.41	1.72	0.69	-	72	48	859	276	-	-	173	1,429	7,143
27DR021	6.29	0.25	3.87	2.17	189	126	125	1,549	541	-	968	3,498	17,488
27DR022	3.48	3.48	-	-	104	70	1,740	-	-	-	-	1,914	9,570
27DR023	6.47	-	3.04	3.43	194	129	-	1,216	858	-	760	3,156	15,782
27DR024	5.77	-	3.29	2.49	173	115	-	1,314	622	-	822	3,046	15,230
27DR025	7.05	7.05	-	-	211	141	3,523	-	-	-	-	3,875	19,377
27DR026	0.70	0.70	-	-	21	14	350	-	-	-	-	384	1,922
27DR027	1.67	1.06	-	0.61	50	33	529	-	152	-	-	764	3,820
27DR028	0.41	0.41	-	-	12	8	205	-	-	-	-	226	1,128
27DR029	5.35	3.15	0.83	1.37	160	107	1,576	330	342	-	207	2,722	13,611
27DR030	10.96	1.72	0.63	8.62	329	219	859	251	2,154	-	157	3,968	19,842
27DR031	2.23	0.38	1.85	-	67	45	192	739	-	-	462	1,504	7,518
27DR032	8.90	4.12	4.78	-	267	178	2,062	1,912	-	-	1,195	5,614	28,071
27DR033	11.47	-	1.48	9.99	344	229	-	594	2,496	-	371	4,034	20,172
27DR034	1.50	0.41	-	1.09	45	30	207	-	272	-	-	554	2,768
27DR035	7.99	1.13	2.51	4.35	240	160	567	1,002	1,089	-	627	3,684	18,421
27DR036	10.28	0.29	2.36	7.63	308	206	143	944	1,908	-	590	4,099	20,495
27DR037	10.06	1.41	8.65	-	302	201	706	3,460	-	-	2,163	6,831	34,155
27DR038	3.58	-	3.58	-	107	72	-	1,432	-	-	895	2,505	12,527
27DR039	9.79	9.79	-	-	294	196	4,895	-	-	-	-	5,384	26,920
Total	**209.52**	**82.51**	**57.70**	**69.31**	**6,286**	**4,190**	**41,255**	**23,080**	**17,327**	**2,011**	**14,425**	**108,573**	**542,867**

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	800,000
Widening	m	25,000
Gravelling	km	2,200,000
Blacktopping	km	5,700,000
Bridge construction	m	600,000
Slab culvert construction	m	150,000
CC Causeway construction	m	100,000
Stone Causeway construction	m	10,000
Pipe culvert placement	unit	10,000
Masonry wall construction	m^3	10,000
Gabion wall construction	m^3	2,500
Lined drain construction	m	1,000

The resulting estimated costs come to NPR 1324.386 million as indicated in the table below. Most of this cost (nearly NPR 582,637,000) is for blacktopping.

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

Code	Total length (km)	Rehabilitation	Widening	Gravelling	Blacktopping	Bridges	Slab culverts	CC causeways	Stone causeways	Pipe culvert	Masonry walls	Gabion walls	Lined drains	Total cost
27DR001	0.68	-	-	1,498	-	-	-	-	-	-	-	38	681	**2,217**
27DR002	9.99	116	-	-	11,092	-	-	-	-	20	120	225	6,660	**18,233**
27DR003	1.15	-	-	-	6,566	-	-	-	-	-	-	-	966	**7,532**
27DR004	8.90	-	-	7,988	-	-	-	800	-	40	-	60	7,919	**16,807**
27DR005	2.84	-	-	3,084	-	-	-	-	-	40	-	113	2,759	**5,996**
27DR006	9.26	680	-	12,225	36,167	-	-	-	-	50	1,550	1,465	7,295	**59,432**
27DR007	5.38	376	-	3,925	-	-	-	-	-	20	750	463	3,730	**9,263**
27DR008	3.38	360	-	-	6,863	-	-	-	-	20	-	-	2,290	**9,533**
27DR009	3.36	96	-	-	-	-	-	-	-	20	-	-	1,500	**1,616**
27DR010	2.11	-	-	-	12,050	-	-	-	-	30	-	45	2,000	**14,125**
27DR011	0.96	156	-	-	-	-	-	-	-	-	-	-	750	**906**
27DR012	8.55	220	-	-	-	-	750	-	-	10	-	-	360	**1,340**
27DR013	7.55	-	-	13,451	43,029	-	-	1,400	-	250	460	325	7,549	**66,464**
27DR014	2.48	-	48,750	5,465	14,159	-	-	1,300	-	40	820	425	2,250	**73,209**
27DR015	7.44	1,712	-	-	23,245	-	-	900	-	60	-	100	6,489	**32,506**
27DR016	6.79	1,840	-	-	-	-	-	-	-	30	-	-	4,292	**6,162**
27DR017	5.28	-	-	11,618	30,102	-	-	1,300	-	90	-	275	4,931	**48,316**
27DR018	3.65	208	-	1,412	10,346	-	-	-	-	10	-	-	2,040	**14,016**
27DR019	3.40	56	-	-	-	-	-	400	-	10	270	250	1,930	**2,916**
27DR020	2.41	1,056	-	-	3,939	-	-	-	-	-	-	-	1,260	**6,255**
27DR021	6.29	80	-	4,763	34,417	-	-	600	-	20	-	2,018	5,217	**47,114**
27DR022	3.48	-	-	-	-	-	-	-	-	-	-	75	-	**75**
27DR023	6.47	-	-	7,546	36,873	-	-	500	-	50	880	913	4,719	**51,481**
27DR024	5.77	12	-	5,469	-	-	750	-	-	40	560	363	4,319	**11,513**
27DR025	7.05	40	-	-	-	-	-	-	-	-	-	700	6,000	**6,740**
27DR026	0.70	208	-	-	-	-	-	-	-	-	-	-	473	**681**
27DR027	1.67	66	-	1,335	3,460	-	-	-	-	-	-	-	1,485	**6,346**
27DR028	0.41	58	-	-	-	-	-	-	-	-	-	-	215	**273**
27DR029	5.35	380	-	3,010	12,506	-	-	-	-	-	630	313	3,086	**19,924**
27DR030	10.96	-	145,000	18,957	52,691	-	-	700	-	110	-	175	8,741	**226,374**
27DR031	2.23	-	-	-	10,528	-	-	-	-	20	-	-	2,700	**13,248**
27DR032	8.90	1,615	-	-	27,246	-	-	-	-	-	600	-	3,344	**32,805**
27DR033	11.47	-	-	21,967	-	-	900	2,000	-	350	950	875	9,890	**36,932**
27DR034	1.50	-	-	2,394	6,202	-	-	-	-	10	-	-	1,340	**9,945**
27DR035	7.99	276	-	9,579	39,102	-	-	800	-	40	100	680	7,881	**58,458**
27DR036	10.28	-	182,500	16,790	56,954	-	-	5,500	-	230	-	1,175	8,978	**272,128**
27DR037	10.06	484	-	-	49,305	-	600	-	-	-	300	295	7,551	**58,535**
27DR038	3.58	-	-	-	-	-	-	-	-	20	980	340	2,700	**4,040**
27DR039	9.79	-	-	1,584	55,797	-	-	500	-	-	5,400	6,420	1,230	**70,931**
Total	**209.52**	**10,095**	**376,250**	**154,062**	**582,637**	**-**	**3,000**	**16,700**	**-**	**1,630**	**14,370**	**18,123**	**147,520**	**1,324,386**

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)
Opening up	km	4,000,000
Gravelling	km	2,200,000
Bridge construction	m	600,000

The resulting estimated costs for new construction come to NPR 15.742 million.

Table 4.3.2 Sections of the district road core network requiring new construction

Code	Description	New VDCs	Existing length	New length	Bridge (m)	Total Cost
27DR013	Badbhnjyang_Dahachowk_Bhimdhunga Road	Dahachwok	7.55	1.07		**6,609**
27DR014	Miteri Marga(Dahachowk)	Balambu	2.48	1.47		**9,133**
Total			**10.03**	**2.54**	**-**	**15,742**

4.4 DTPP COSTS

The total costs for the District Transport Perspective Plan come to NPR 1846.041 million as indicated in the table below.

Table 4.4.1 DTPP costs (NPR '000)

Code	Conservation	Improvement	New construction	Total
27DR001	1,022	2,217	-	3,238
27DR002	38,987	18,233	-	57,220
27DR003	4,032	7,532	-	11,564
27DR004	23,266	16,807	-	40,073
27DR005	6,055	5,996	-	12,051
27DR006	19,121	59,432	-	78,553
27DR007	13,924	9,263	-	23,187
27DR008	10,206	9,533	-	19,739
27DR009	9,237	1,616	-	10,853
27DR010	7,399	14,125	-	21,524
27DR011	2,637	906	-	3,543
27DR012	23,524	1,340	-	24,864
27DR013	14,194	66,464	6,609	87,267
27DR014	3,726	73,209	9,133	86,067
27DR015	23,516	32,506	-	56,021
27DR016	18,678	6,162	-	24,840
27DR017	7,922	48,316	-	56,237
27DR018	10,109	14,016	-	24,125
27DR019	9,358	2,916	-	12,274
27DR020	7,143	6,255	-	13,398
27DR021	17,488	47,114	-	64,602
27DR022	9,570	75	-	9,645
27DR023	15,782	51,481	-	67,262
27DR024	15,230	11,513	-	26,743
27DR025	19,377	6,740	-	26,117

Code	Conservation	Improvement	New construction	Total
27DR026	1,922	681	-	2,603
27DR027	3,820	6,346	-	10,166
27DR028	1,128	273	-	1,401
27DR029	13,611	19,924	-	33,535
27DR030	19,842	226,374	-	246,216
27DR031	7,518	13,248	-	20,766
27DR032	28,071	32,805	-	60,876
27DR033	20,172	36,932	-	57,104
27DR034	2,768	9,945	-	12,713
27DR035	18,421	58,458	-	76,878
27DR036	20,495	272,128	-	292,622
27DR037	34,155	58,535	-	92,690
27DR038	12,527	24,440	-	36,967
27DR039	26,920	13,550	-	40,470
Total	**542,867**	**1,287,405**	**15,742**	**1,846,014**

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. For the calculation of the population served, use is made of the population data for the VDCs linked by the road concerned. This data is presented in **Annex 2**.

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)
27DR028	0.41	12	8	205	-	-	-	-	226	28,758	8
27DR026	0.70	21	14	350	-	-	-	-	384	31,406	12
27DR027	1.67	50	33	529	-	152	-	-	764	42,167	18
27DR029	5.35	160	107	1,576	330	342	-	207	2,722	79,160	34
27DR001	0.68	20	14	-	-	170	-	-	204	4,216	48
27DR031	2.23	67	45	192	739	-	-	462	1,504	22,988	65
27DR011	0.96	29	19	480	-	-	-	-	527	7,944	66
27DR018	3.65	109	73	917	469	161	-	293	2,022	26,668	76
27DR019	3.40	102	68	1,702	-	-	-	-	1,872	24,425	77
27DR008	3.38	101	68	1,090	482	-	-	301	2,041	25,345	81
27DR020	2.41	72	48	859	276	-	-	173	1,429	16,174	88
27DR030	10.96	329	219	859	251	2,154	-	157	3,968	43,672	91
27DR021	6.29	189	126	125	1,549	541	-	968	3,498	27,839	126
27DR016	6.79	204	136	3,396	-	-	-	-	3,736	29,583	126
27DR017	5.28	158	106	-	-	1,320	-	-	1,584	11,674	136
27DR010	2.11	63	42	-	846	-	-	529	1,480	9,726	152
27DR009	3.36	101	67	1,680	-	-	-	-	1,847	11,359	163
27DR022	3.48	104	70	1,740	-	-	-	-	1,914	11,304	169
27DR003	1.15	35	23	-	461	-	-	288	806	4,755	170
27DR012	8.55	257	171	4,277	-	-	-	-	4,705	27,628	170
27DR034	1.50	45	30	207	-	272	-	-	554	3,159	175
27DR014	2.48	75	50	-	-	621	-	-	745	4,036	185
27DR015	7.44	223	149	1,681	1,631	-	-	1,020	4,703	25,086	187
27DR032	8.90	267	178	2,062	1,912	-	-	1,195	5,614	25,687	219
27DR007	5.38	161	108	895	723	446	-	452	2,785	12,047	231
27DR006	9.26	278	185	1,460	315	1,389	-	197	3,824	16,434	233
27DR023	6.47	194	129	-	1,216	858	-	760	3,156	13,531	233
27DR038	3.58	107	72	-	1,432	-	-	895	2,505	10,448	240
27DR013	7.55	226	151	-	574	1,529	-	359	2,839	10,730	265

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)
27DR004	8.90	267	178	406	1,782	908	-	1,114	4,653	17,584	265
27DR005	2.84	85	57	719	-	351	-	-	1,211	4,365	277
27DR036	10.28	308	206	143	944	1,908	-	590	4,099	12,638	324
27DR024	5.77	173	115	-	1,314	622	-	822	3,046	8,414	362
27DR035	7.99	240	160	567	1,002	1,089	-	627	3,684	8,894	414
27DR025	7.05	211	141	3,523	-	-	-	-	3,875	8,064	481
27DR033	11.47	344	229	-	594	2,496	-	371	4,034	8,085	499
27DR039	9.79	294	196	4,895	-	-	-	-	5,384	10,149	530
27DR002	9.99	300	200	4,022	778	-	2,011	487	7,797	7,613	1,024
27DR037	10.06	302	201	706	3,460	-	-	2,163	6,831	4,819	1,418
Total	**209.52**	**6,285.51**	**4,190.34**	**41,254.50**	**23,080.00**	**17,327.00**	**2,011.00**	**14,425.00**	**108,573.35**	**698,574.00**	**9,438.42**

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.

Table 5.2.1 Ranking of improvement works (NPR '000)

Code	Total length (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
27DR022	3.48	75	11,304	7
27DR028	0.41	273	28,758	10
27DR026	0.70	681	31,406	22
27DR012	8.55	1,340	27,628	49
27DR011	0.96	906	7,944	114
27DR019	3.40	2,916	24,425	119
27DR009	3.36	1,616	11,359	142
27DR027	1.67	6,346	42,167	150
27DR016	6.79	6,162	29,583	208
27DR029	5.35	19,924	79,160	252
27DR008	3.38	9,533	25,345	376
27DR020	2.41	6,255	16,174	387
27DR018	3.65	14,016	26,668	526
27DR001	0.68	2,217	4,216	526
27DR031	2.23	13,248	22,988	576
27DR007	5.38	9,263	12,047	769
27DR025	7.05	6,740	8,064	836

Code	Total length (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
27DR004	8.90	16,807	17,584	956
27DR032	8.90	32,805	25,687	1,277
27DR015	7.44	32,506	25,086	1,296
27DR039	9.79	13,550	10,149	1,335
27DR024	5.77	11,513	8,414	1,368
27DR005	2.84	5,996	4,365	1,374
27DR010	2.11	14,125	9,726	1,452
27DR003	1.15	7,532	4,755	1,584
27DR021	6.29	47,114	27,839	1,692
27DR038	3.58	24,440	10,448	2,339
27DR002	9.99	18,233	7,613	2,395
27DR034	1.50	9,945	3,159	3,148
27DR006	9.26	59,432	16,434	3,616
27DR023	6.47	51,481	13,531	3,805
27DR017	5.28	48,316	11,674	4,139
27DR033	11.47	36,932	8,085	4,568
27DR030	10.96	226,374	43,672	5,184
27DR013	7.55	66,464	10,730	6,194
27DR035	7.99	58,458	8,894	6,573
27DR037	10.06	58,535	4,819	12,147
27DR014	2.48	73,209	4,036	18,139
27DR036	10.28	272,128	12,638	21,533

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 construction works (NPR '000)

Code	Length (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
27DR013	1.07	6,609	10,730	616
27DR014	1.47	9,133	4,036	2,263

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, except for VDC funding where an annual increase of 10% is expected and the funds from the members of parliament which are expected to remain constant for the 5-year period. For RRRSDP an increase of 10% is expected after the first year, followed by an annual increase of 10%. The total district budget for the road sector is NPR 1315.698 million for the five-year period.

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

Source of Budget	Fiscal Year				
	2070/71	2071/72	2072/73	2073/74	2074/75
DDC level Road	46,700	51,370	56,507	62,158	68,373
DDC Non conditional internal source	1,291	1,420	1,562	1,718	1,890
DDC internal source other program	7,900	8,690	9,559	10,515	11,566
Local Transport Infrastructure sect oral Program	23,400	25,740	28,314	31,145	34,260
Development Program based on people's participation	12,400	13,640	15,004	16,504	18,155
Local level Motorable bridge	5,000	5,500	6,050	6,655	7,321
RRR-SDP	102,817	113,099	124,409	136,849	150,534
RAIDP	1,000	1,100	1,210	1,331	1,464
Road Board Nepal	15,000	16,500	18,150	19,965	21,962
Total	**215,508**	**237,059**	**260,765**	**286,841**	**315,525**
Grand total	**1,315,698**				

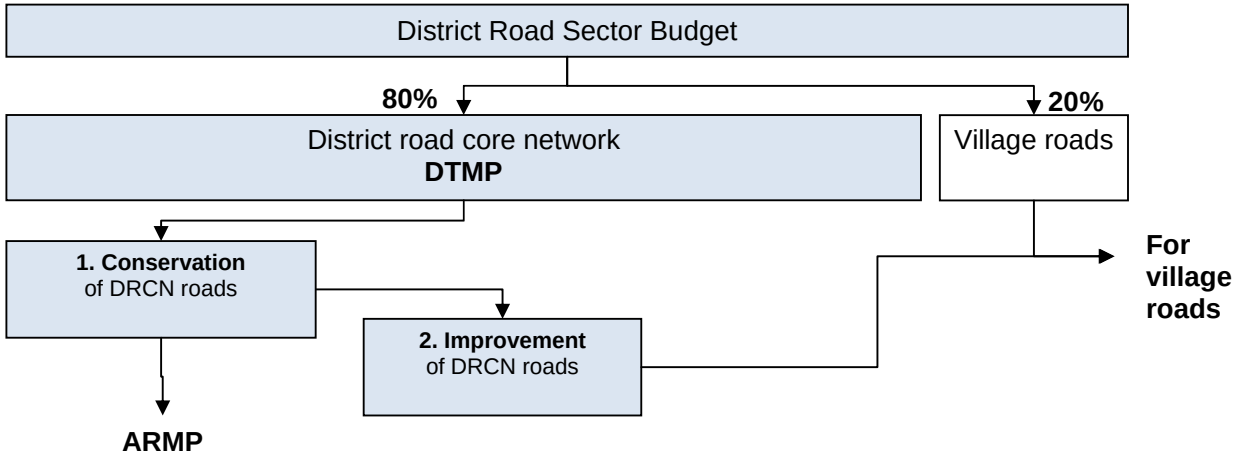
6.2 DISTRIBUTION OF BUDGET

The distribution of the available district road sector budget is indicated in the figure below. The total district budget for the road sector, 80% is initially reserved for the district road core network and its allocation is further detailed in this DTMP. The remaining 20% can be used by the DDC at its own discretion to provide additional funding for village roads. Alternatively the expansion of the district road core network can be contemplated.

The reason for the low allocation to the DRCN is the fact that the DRCN is already complete and much already has a maintainable all-weather standard. The required budget for the conservation and improvements (NPR 1919.016 million) is far higher than the foreseen district level road sector budget for the next 5 years. In addition, the size of the village road network is very large and requires significant funding to conserve and improve it. An allocation of 80% will therefore be insufficient for the improvement of all the DRCN roads within the five year DTMP period with sufficient funds for conservation, while leaving 20% amount for the village roads. The total budget will be insufficient for the improvement of eight different DRCN roads which can only be brought to all weather condition by increasing the road sector budget.

The 80% of the district road sector budget for the DTMP is allocated firstly to conservation and any remaining funding is allocated to improvement. Any remaining funds later on in the DTMP period can be used for village roads or alternatively for the expansion of the DRCN.

Figure 5 District road sector budget allocations



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	2070/71	2071/72	2071/72	2072/73	2074/75
Total budget	215,508	237,059	260,765	286,841	315,525
Village roads	43,102	47,412	52,153	57,368	63,105
Core road network budget (DTMP)	**172,406**	**189,647**	**208,612**	**229,473**	**252,420**
Core network length (km)	**209.52**	**209.52**	**209.52**	**209.52**	**209.52**
Blacktop (km)	82.51	86.46	90.87	99.73	111.30
Gravel (km)	57.70	55.72	57.32	49.20	43.68
Earthen (km)	69.31	67.33	61.33	60.60	54.54
Conservation (NPR '000)	**122,466**	**123,456**	**124,916**	**126,812**	**129,698**
Emergency	6,286	6,286	6,286	6,286	6,286
Routine	4,190	4,190	4,190	4,190	4,190
Recurrent (blacktop)	41,255	43,230	45,434	49,863	55,648
Recurrent (gravel)	23,080	22,290	22,930	19,679	17,472
Recurrent (earthen)	17,327	16,833	15,331	15,149	13,636

Periodic (blacktop)				16,502			17,292			18,173			19,945			22,259		
Periodic (gravel)				14,425			13,931			14,331			12,299			10,920		
Improvement	**Cost**	**BT**	**GR**	**49,342**	**BT**	**GR**	**65,595**	**BT**	**GR**	**81,937**	**BT**	**GR**	**102,063**	**BT**	**GR**	**122,010**	**BT**	**GR**
27DR022	75	-	-	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR028	273	-	-	273	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR026	681	-	-	681	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR012	1,340	-	-	1,340	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR011	906	-	-	906	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR019	2,916	-	-	2,916	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR009	1,616	-	-	1,616	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR027	6,346	0.61	0.61	6,346	0.61	0.61	-	-	-	-	-	-	-	-	-	-	-	-
27DR016	6,162	-	-	6,162	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR029	19,924	2.19	1.37	19,924	2.19	1.37	-	-	-	-	-	-	-	-	-	-	-	-
27DR008	9,533	1.20	-	9,103	1.15	-	430	0.05	-	-	-	-	-	-	-	-	-	-
27DR020	6,255	0.69	-	-	-	-	6,255	0.69	-	-	-	-	-	-	-	-	-	-
27DR018	14,016	1.82	0.64	-	-	-	14,016	1.82	0.64	-	-	-	-	-	-	-	-	-
27DR001	2,217	-	0.68	-	-	-	2,217	-	0.68	-	-	-	-	-	-	-	-	-
27DR031	13,248	1.85	-	-	-	-	13,248	1.85	-	-	-	-	-	-	-	-	-	-
27DR007	9,263	-	1.78	-	-	-	9,263	-	1.78	-	-	-	-	-	-	-	-	-
27DR025	6,740	-	-	-	-	-	6,740	-	-	-	-	-	-	-	-	-	-	-
27DR004	16,807	-	3.63	-	-	-	13,427	-	2.90	3,380	-	0.73	-	-	-	-	-	-
27DR032	32,805	4.78	-	-	-	-	-	-	-	32,805	4.78	-	-	-	-	-	-	-
27DR015	32,506	4.08	-	-	-	-	-	-	-	32,506	4.08	-	-	-	-	-	-	-
27DR039	13,550	-	-	-	-	-	-	-	-	13,246	-	-	304	-	-	-	-	-
27DR024	11,513	-	2.49	-	-	-	-	-	-	-	-	-	11,513	-	2.49	-	-	-
27DR005	5,996	-	1.40	-	-	-	-	-	-	-	-	-	5,996	-	1.40	-	-	-
27DR010	14,125	2.11	-	-	-	-	-	-	-	-	-	-	14,125	2.11	-	-	-	-
27DR003	7,532	1.15	-	-	-	-	-	-	-	-	-	-	7,532	1.15	-	-	-	-
27DR021	47,114	6.04	2.17	-	-	-	-	-	-	-	-	-	47,114	6.04	2.17	-	-	-
27DR038	24,440	3.58	-	-	-	-	-	-	-	-	-	-	15,479	2.27	-	8,962	1.31	-
27DR002	18,233	1.95	-	-	-	-	-	-	-	-	-	-	-	-	-	18,233	1.95	-
27DR034	9,945	1.09	1.09	-	-	-	-	-	-	-	-	-	-	-	-	9,945	1.09	1.09
27DR006	59,432	6.35	5.56	-	-	-	-	-	-	-	-	-	-	-	-	59,432	6.35	5.56
27DR023	51,481	6.47	3.43	-	-	-	-	-	-	-	-	-	-	-	-	25,438	3.20	1.69
27DR017	48,316	5.28	5.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

27DR033	36,932	-	9.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR030	226,374	9.24	8.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR013	66,464	7.55	6.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR035	58,458	6.86	4.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR037	58,535	8.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR014	73,209	2.48	2.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27DR036	272,128	9.99	7.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total improvement				**49,342**	**3.95**	**1.98**	**65,595**	**4.41**	**6.01**	**81,937**	**8.86**	**0.73**	**102,063**	**11.57**	**6.05**	**122,010**	**13.89**	**8.34**
Construction	**Cost**		**GR**	**-**	**GR**		**-**	**GR**		**-**	**GR**		**-**	**GR**		**-**	**GR**	
27DR001	-		-	-	-		-	-		-	-		-	-		-	-	
27DR002	-		-	-	-		-	-		-	-		-	-		-	-	
27DR003	-		-	-	-		-	-		-	-		-	-		-	-	
27DR004	-		-	-	-		-	-		-	-		-	-		-	-	
27DR005	-		-	-	-		-	-		-	-		-	-		-	-	
27DR006	-		-	-	-		-	-		-	-		-	-		-	-	
27DR007	-		-	-	-		-	-		-	-		-	-		-	-	
27DR008	-		-	-	-		-	-		-	-		-	-		-	-	
27DR009	-		-	-	-		-	-		-	-		-	-		-	-	
27DR010	-		-	-	-		-	-		-	-		-	-		-	-	
27DR011	-		-	-	-		-	-		-	-		-	-		-	-	
27DR012	-		-	-	-		-	-		-	-		-	-		-	-	
27DR015	-		-	-	-		-	-		-	-		-	-		-	-	
27DR016	-		-	-	-		-	-		-	-		-	-		-	-	
27DR017	-		-	-	-		-	-		-	-		-	-		-	-	
27DR018	-		-	-	-		-	-		-	-		-	-		-	-	
27DR019	-		-	-	-		-	-		-	-		-	-		-	-	
27DR020	-		-	-	-		-	-		-	-		-	-		-	-	
27DR021	-		-	-	-		-	-		-	-		-	-		-	-	
27DR022	-		-	-	-		-	-		-	-		-	-		-	-	
27DR023	-		-	-	-		-	-		-	-		-	-		-	-	
27DR024	-		-	-	-		-	-		-	-		-	-		-	-	
27DR025	-		-	-	-		-	-		-	-		-	-		-	-	
27DR026	-		-	-	-		-	-		-	-		-	-		-	-	
27DR027	-		-	-	-		-	-		-	-		-	-		-	-	
27DR028	-		-	-	-		-	-		-	-		-	-		-	-	

27DR029	-	-	-	-	-	-	-	-	-	-	-	-
27DR030	-	-	-	-	-	-	-	-	-	-	-	-
27DR031	-	-	-	-	-	-	-	-	-	-	-	-
27DR032	-	-	-	-	-	-	-	-	-	-	-	-
27DR033	-	-	-	-	-	-	-	-	-	-	-	-
27DR034	-	-	-	-	-	-	-	-	-	-	-	-
27DR038	-	-	-	-	-	-	-	-	-	-	-	-
27DR039	-	-	-	-	-	-	-	-	-	-	-	-
27DR013	6,609	1.07	-	-	-	-	-	-	-	-	-	-
27DR014	9,133	1.47	-	-	-	-	-	-	-	-	-	-
Total new construction			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Remaining Budget			**-**		**-**		**-**		**-**		**-**	

6.3 DTMP OUTPUTS

Based on the investment plan presented above, most of the DRCN roads will be conserved and improved to the maintainable all-weather standard with a surface type appropriate to their traffic volume by the end of the DTMP period. A total 209.52 km of DRCN roads (the entire DRCN) will be conserved for the full DTMP period, while 23.11km will be upgraded from earthen to gravel standard and 42.67 km will be upgraded from gravel to blacktop standard.

Table 6.3.1 DTMP output

Conservation	Improvement gravel	Improvement blacktop
209.52	23.11	42.67

Of the total DTMP budget, NPR 631.611 million will be spent on conservation and NPR 420.947million on improvement. NPR 263.140 million will be available for other VRCN roads.

6.4 DTMP OUTCOMES

As a result of the activities planned in this DTMP, the percentage of all-weather maintainable DRCN roads increases by 11% from 140.21 km to 163.31km, bringing the most of the DRCN to a maintainable all-weather standard. The percentage of the network with a blacktop standard will be increased from 82.51km (39%) to 125.18 km (60%).

Table 6.4.1 Standard of DRCN roads

	Total length	Fair-weather		All-weather gravel		All-weather blacktop	
	km	km	%	km	%	km	%
Start of DTMP	209.52	69.31	33%	57.70	28%	82.51	39%
End of DTMP	209.52	46.20	22%	38.13	18%	125.18	60%
Difference	-	- 23.11	-11%	- 19.57	-9%	42.67	20%

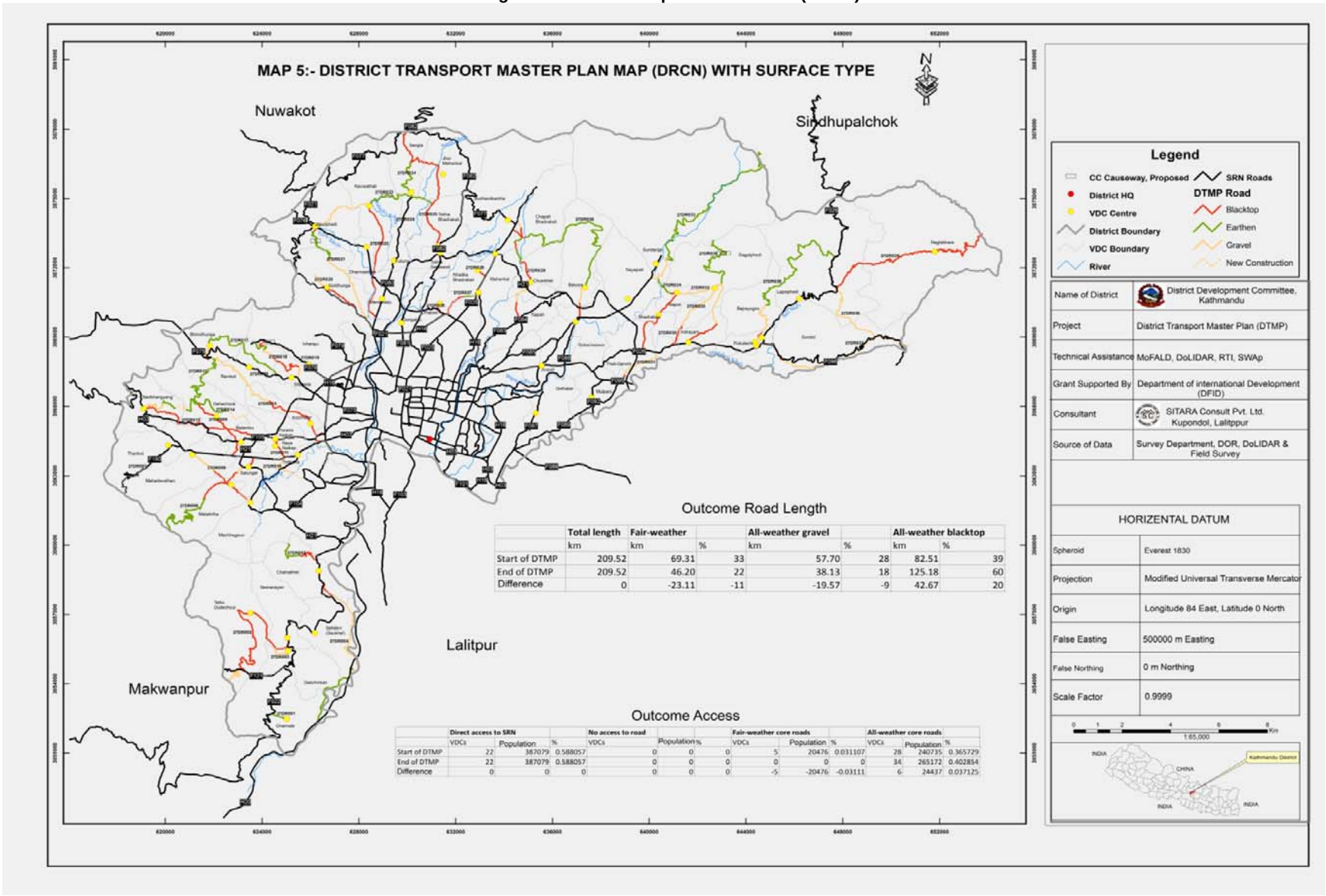
The number of municipalities and VDC headquarters with access to the SRN or all-weather DRCN roads will increase from 50 to 56 and the district population with access to the SRN or all-weather DRCN roads will increase from 96% to 99%.

Table 6.4.2 Population with access to road network

	Direct access to SRN			Access to fair-weather DRCN roads			Access to all-weather DRCN roads		
	VDCs	Population	%	VDCs	Population	%	VDCs	Population	%
Start of DTMP	22	387,079	59%	5	20,476	3%	28	240,735	37%
End of DTMP	22	387,079	59%	0	-	0%	34	265,172	40%
Difference	-	-	0%	- 5	- 20,476	-3%	6	24,437	4%

In addition to the above, 20% of the district level road sector budget will be allocated to village road conservation and improvement. In years 4 and 5 of the DTMP there will be DTMP funding remaining, which can also be allocated to village roads. This will lead to a significant improvement in village road conditions.

Figure 6District Transport Master Plan (DTMP)



	Total length	Fair-weather		All-weather gravel		All-weather blacktop	
	km	km	%	km	%	km	%
Start of DTMP	209.52	69.31	33	57.70	28	82.51	39
End of DTMP	209.52	46.20	22	38.13	18	125.18	60
Difference	0	-23.11	-11	-19.57	-9	42.67	20

	Direct access to SRN			No access to road			Fair-weather core roads			All-weather core roads		
	VDCs	Population	%	VDCs	Population	%	VDCs	Population	%	VDCs	Population	%
Start of DTMP	22	387079	0.588057	0	0	0	5	20476	0.031107	28	240735	0.365729
End of DTMP	22	387079	0.588057	0	0	0	0	0	0	34	265172	0.402854
Difference	0	0	0	0	0	0	-5	-20476	-0.03111	6	24437	0.037125

ANNEX 1 TRAFFIC DATA

Code	Total Length (km)	Motorcycle	Car-Jeep-Minibus	Tractor	Truck-Bus	PCU
27DR001	0.68	20	10	10	15	**100**
27DR002	9.99	50	20	10	30	**185**
27DR003	1.15	40	20	10	15	**120**
27DR004	8.90	25	15	5	10	**78**
27DR005	2.84	20	10	5	10	**70**
27DR006	9.26	40	35	15	15	**145**
27DR007	5.38	50	15	5	10	**90**
27DR008	3.38	65	20	5	15	**123**
27DR009	3.36	140	30	0	20	**180**
27DR010	2.11	85	35	2	20	**162**
27DR011	0.96	130	25	5	30	**220**
27DR012	8.55	250	60	10	35	**345**
27DR013	7.55	40	20	5	15	**110**
27DR014	2.48	175	65	15	25	**283**
27DR015	7.44	45	20	15	25	**173**
27DR016	6.79	150	20	0	40	**255**
27DR017	5.28	70	5	0	30	**160**
27DR018	3.65	200	30	5	30	**260**
27DR019	3.40	270	55	5	45	**380**
27DR020	2.41	150	40	0	15	**175**
27DR021	6.29	120	65	5	28	**247**
27DR022	3.48	300	65	10	35	**375**
27DR023	6.47	175	22	2	12	**162**
27DR024	5.77	100	2	0	10	**92**
27DR025	7.05	200	45	0	25	**245**
27DR026	0.70	300	150	5	100	**710**
27DR027	1.67	235	38	2	21	**244**
27DR028	0.41	220	70	3	7	**214**
27DR029	5.35	150	45	0	25	**220**
27DR030	10.96	125	58	20	25	**261**
27DR031	2.23	75	12	5	15	**120**
27DR032	8.90	170	35	5	25	**230**
27DR033	11.47	70	15	5	10	**100**
27DR034	1.50	100	25	5	30	**205**
27DR035	7.99	90	20	5	10	**115**
27DR036	10.28	155	55	15	32	**291**
27DR037	10.06	80	5	20	10	**125**
27DR038	3.58	150	20	5	10	**145**
27DR039	9.79	40	20	10	20	**140**
Total	**209.52**					

ANNEX 2 POPULATION SERVED

	VDC	Population	27DR001	27DR002	27DR003	27DR004	27DR005	27DR006	27DR007	27DR008	27DR009	27DR010	27DR011	27DR012	27DR013	27DR014	27DR015	27DR016	27DR017	27DR018	27DR019	27DR020	27DR021	27DR022	27DR023	27DR024	27DR025	27DR026	27DR027	27DR028	27DR029	27DR030	27DR031	27DR032	27DR033	27DR034	27DR035	27DR036	27DR037	27DR038	27DR039	SRN
1	Aalapot	3,159																																X		X						
2	Baad Bhanjyang	3,779												X	X																											
3	Bajrayogini	4,333																																				X				
4	Balambu	7,323									X			X																												X
5	Baluwa	5,467																														X										
6	Bhadrabas	2,388																																X								
7	Bhimdhunga	2,915													X		X	X	X																							
8	Budanilkantha	15,421																													X	X										X
9	Chalnakhel	4,365				X	X																																			X
10	ChapaliBhadrakali	10,827																													X	X										X
11	Chhaimale	4,216	X			X																																				
12	Dahachok	4,036									X			X	X	X																											
13	Chunikhel	4,449																													X	X										
14	Daanchhi	11,246																															X	X								X
15	Daxinkali	4,755		X	X	X																																			
16	Dhapasi	31,406																										X	X													
17	Dharmasthali	6,530																					X	X																		X
18	Futung	4,792																								X																
19	Gagalphedi	5,533																																X	X		X					
20	Gokarneswor	7,508																														X										X
21	Goldhunga	16,174																				X	X																			
22	Gonggabu	54,410																																								X
23	Gothatar	26,169																																								X
24	IchangNarayan	24,425																			X																					

	VDC	Population	27DR001	27DR002	27DR003	27DR004	27DR005	27DR006	27DR007	27DR008	27DR009	27DR010	27DR011	27DR012	27DR013	27DR014	27DR015	27DR016	27DR017	27DR018	27DR019	27DR020	27DR021	27DR022	27DR023	27DR024	27DR025	27DR026	27DR027	27DR028	27DR029	27DR030	27DR031	27DR032	27DR033	27DR034	27DR035	27DR036	27DR037	27DR038	27DR039	SRN
25	Indrayani	3,361																																X			X					X
26	Jhormahankal	4,103																									X															
27	Jitpurphedi	5,135																					X		X																	X
28	Jorpati	84,567																																								X
29	Kabhresthali	4,774																						X	X																	
30	Kapan	48,463																													X											X
31	KhadkaBhadrakali	10,761																											X	X											
32	Lapsephedi	5,629																																				X		X	X	
33	Machhegaun	3,849								X																															
34	Mahadevathan	15,514								X																															
35	Mahankal	17,997																												X											X
36	Manmaiju	40,416																																							X
37	Matatirtha	5,982						x		x																															
38	Mulpani	11,742																															X								X
39	Naglebhare	4,520																																						X	
40	NaikapNayaBhanjyang	7,944											X	X																											
41	NaikapPuranoBhanjya	4,546												X																											
42	Nayapati	7,257																																							X
43	Pukhulachhi	2,676																																				X			
44	Ramkot	8,759															X	X	X	X																					
45	Sangla	3,622																							X	X															
46	Satikhel	4,248				X																																			X
47	Satungal	10,452						X																																	
48	Seuchatar	13,412															X																								
49	Sheshnarayan	3,855																																							X

	VDC	Population	27DR001	27DR002	27DR003	27DR004	27DR005	27DR006	27DR007	27DR008	27DR009	27DR010	27DR011	27DR012	27DR013	27DR014	27DR015	27DR016	27DR017	27DR018	27DR019	27DR020	27DR021	27DR022	27DR023	27DR024	27DR025	27DR026	27DR027	27DR028	27DR029	27DR030	27DR031	27DR032	27DR033	27DR034	27DR035	27DR036	27DR037	27DR038	27DR039	SRN
50	Sitapaila	17,909																X		X																						
51	Sundarijal	2,552																																	X							X
52	Suntol	4,819																																					X	X		
53	Talkududechour	2,858		X																																					
54	Thankot	12,047							X																																	
55	Tinthana	9,726										X																														X
56	TokhaChandeswori	3,961																									X															X
57	TokhaSarswoti	5,152																																								
	Total population	**658,234**	4,216	7,613	4,755	17,584	4,365	16,434	12,047	25,345	11,359	9,726	7,944	27,628	10,730	4,036	25,086	29,583	11,674	26,668	24,425	16,174	27,839	11,304	13,531	8,414	8,064	31,406	42,167	28,758	79,160	43,672	22,988	25,687	8,085	3,159	8,894	12,638	4,819	10,448	10,149	387,079
	Total VDCs/municipalities	**57**	**1**	**2**	**1**	**4**	**1**	**2**	**1**	**3**	**2**	**1**	**1**	**5**	**3**	**1**	**3**	**3**	**2**	**2**	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**2**	**4**	**5**	**2**	**5**	**2**	**1**	**2**	**3**	**1**	**2**	**2**	**22**

Source: 2011 Census

ANNEX 3 LOCATION OF PROPOSED INTERVENTIONS

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 (m3)	Gabion walls (m3)	Lined drain (m)
27DR01	Ramcheebhanjayang_Chaimale VDC Office_Road	0.681	0+000	0+681		0.68	-				0				15	681
27DR002	Pharping_Talku Hanumane_Road	9.99	0+000	9+990	0.145	-	1.95				0		2	12	90	6660
27DR003	Pharping Village Road	1.152	0+000	1+152		-	1.15				0					966
27DR004	Chalnakhel_Katuwaldaha_Road	8.896	0+000	8+896		3.63	-				8		4		24	7919
27DR005	Khahare_Bosan_Champadevi_Road	2.839	0+000	2+839		1.40	-				0		4		45	2759
27DR006	Satungal_Matatirtha_Deurali_Makwanpur_ Road	9.264	0+000	9+264	0.85	5.56	6.35				0		5	155	586	7295
27DR007	Ganeshman Shanti Marga(Thankot-Chitlang Bhanjyang)	5.381	0+000	5+381	0.47	1.78	-				0		2	75	185	3730
27DR008	Mahadevsthan_Matatirtha_Machhegaun_ Road	3.383	0+000	3+383	0.45	-	1.20				0		2			2290
27DR009	Thankot_Balambu_Dahachowk_Road	3.359	0+000	3+359	0.12	-	-				0		2			1500
27DR010	Tinthana_Kritipur_Road	2.114	0+000	2+114		-	2.11				0		3		18	2000
27DR011	Naya Naikap_Purano Naikap_LinkRoad	0.959	0+000	0+959	0.195	-	-				0					750
27DR012	Kalanki_Ghampedol_Badbhanjyang_Road	8.554	0+000	8+554	0.275	-	-			5	0		1			360
27DR013	Badbhnjyang_Dahachowk_Bhimdhunga_ Road	7.549	0+000	7+549		6.11	7.55				14		25	46	130	7549
27DR014	Miteri Marga(Dahachowk)	2.484	0+000	2+484		2.48	2.48	1950			13		4	82	170	2250
27DR015	Kalanki_Syuchatar_Bhimdhunga_Road	7.439	0+000	7+439	2.14	-	4.08				9		6		40	6489
27DR016	Sitapaila_Ramkot_Bhimdhunga_Road	6.792	0+000	6+792	2.3	-	-				0		3			4292
27DR017	Bhimdhunga_Ghatte Khola_Ramkot(Phasku)_Ghumti_Road	5.281	0+000	5+281		5.28	5.28				13				15	681
27DR018	Sitapaila_Adeshwar_Setogumba_Dadagaun_Road	3.648	0+000	3+648	0.145	0.64	1.82				0		2	12	90	6660
27DR019	Halchowk_Narayanthan_Road	3.403	0+000	3+403		-	-				4					966
27DR020	Phulbarigate_Phuyalthok_Chogaun_Road	2.409	0+000	2+409		-	0.69				0		4		24	7919
27DR021	PuranoGujeswari_Bohoratar_Dhitalthok_Tinpiple_Road	6.287	0+000	6+287		2.17	6.04				6		4		45	2759
27DR022	Manamaizu_Sesmati_Dharmasthali_Kavresthali_Road	3.48	0+000	3+480	0.85	-	-				0		5	155	586	7295
27DR023	Forth Village Road(Jitpurphedi_Sangla_Jhor)	6.469	0+000	6+469	0.47	3.43	6.47				5		2	75	185	3730

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 (m3)	Gabion walls (m3)	Lined drain (m)
27DR024	Manamaiju_Futung_Sangla_Jagat_Gurjebhyangyang_Road	5.772	0+000	5+772	0.45	2.49	-				0		2			2290
27DR025	Samakhusi chowk_Tokhagaun_Jhor_Gurjebhngyang_ Road	7.046	0+000	7+046	0.12	-	-				0		2			1500
27DR026	Basundhara Chowk_Dhapasi VDCRoad	0.699	0+000	0+699		-	-				0		3		18	2000
27DR027	Neuro Hospital_Basundhara(Alternative)_Road	1.665	0+000	1+665	0.195	0.61	0.61				0					750
27DR028	Hattigaunda_Khadakbhadrakali_Tokha_Road	0.41	0+000	0+410	0.275	-	-			5	0		1			360
27DR029	Budhanilkantha_Chapali_Chunikhel_Kapan VDC_Road	5.346	0+000	5+346		1.37	2.19				0		25	46	130	7549
27DR030	Gokarna_Baluwa_Piple-Tare Bhir_Narayanthan_Road	10.961	0+000	10+961		8.62	9.24	1950			7		4	82	170	2250
27DR031	Nayapati Chowk_Sarki House_Mulpani_Road	2.23	0+000	2+230	2.14	-	1.85				0		6		40	6489
27DR032	Kageswori_Ringroad	8.904	0+000	8+904	2.3	-	4.78				0		3			4292
27DR033	Sundarijal 8-Mahankal-Mulkharka-Chisapani Road	11.469	0+000	11+469		9.99	-				20		9		110	4931
27DR034	Sundarijal_Alapot_Road	1.501	0+000	1+501	0.26	1.09	1.09				0		1			2040
27DR035	Loktantrik-Sahid Marga(Bramhakhel_Gagal-Shivapuri)	7.994	0+000	7+994	0.07	4.35	6.86				8		1	27	100	1930
27DR036	Sankhu_Bajrayogini_Gumarchowk_ Chaukibhyang_Road	10.278	0+000	10+278	1.32	7.63	9.99				55					1260
27DR037	Sankhu_Palubari_Nagarkot_Road	10.061	0+000	10+061	0.1	-	8.65				0		2		807	5217
27DR038	Jarsinghpauwa_Kartike_Nagarkot_Road	3.579	0+000	3+579		-	3.58				0				30	0
27DR039	Jarsingpauwa_Chapbhanjyang (sindhupalchowk)_Road	9.789	0+000	9+789		-	-				5		5	88	365	4719
Total		**209.517**			**12.619**	**69.31**	**96.01**	**15050**	**0**	**20**	167	**0**	**163**	**1437**	**7249**	**147520**