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,

BHAKTAPUR

VOLUME-I

(MAIN REPORT)

AUGUST 2013

Submitted by SITARA Consult Pvt. Ltd. for the District Development Committee (DDC) and District Technical Office (DTO), Bhaktapur 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.

Government of Nepal
Ministry of Federal Affairs and Local Development
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Bhaktapur

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FOREWORD

It is my great pleasure to introduce this revised District Transport Master Plan (DTMP) of Bhaktapur district which was concurred by the district stakeholder's meeting held on 5 Feb 2013 and 9 Apr 2013 and approved by the DDC board meeting on 3 July 2013. Based on the DTMP Guideline 2012, all together 11 District Road Core Network (DRCN) aiming to connect all Village Development Committee (VDC) Centers with the district headquarter, either directly or through strategic road network (SRN) has 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 is very essential in lobbying the donor agencies through central government to attract fund gap. 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. Ganesh Lal Koju, Chief District Engineer, Mr. Bishnu Dev Yadav, Engineer, Mr Manish Aryal, Engineer, Mrs .Sarita Upadhya , 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 thank goes to all the representatives of political parties, who played crucial role in providing constructive feedbacks and valuable support in preparing this document successfully.

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

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Rajendra Kumar K.C.
Local Development Officer

स्थानीय विकास अधिकारी

ACKNOWLEDGEMENT

This DTMP Final Report for Bhaktapur 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

Bhaktapur District is located in Bagmati Zone of the Central Development Region of Nepal. It borders with Kavrepalanchowk district to the East, Kathmandu and Lalitpur district to the West, Kathmandu and Kavrepalanchowk to the north and Lalitpur district to the South. The district has two municipalities, sixteen VDCs, nine Ilakas and two constituency areas. The total area of the district is 119 km^2. The district lies partly in the *plain* and partly in the *hills*. The lowest elevation point is 1372 meter and the highest elevation point is 2166 meter from mean sea level. The main occupation of people in the district is agriculture. People in the district are also engaged in waving, woodcarving, metal crafts, clay work, stone carving pottery business and other different types of business as their source of income.

The district inventory identified just over 313.39 km of roads, including 115.09 km of strategic roads and 192.30 km of rural roads. In coordination with the DTICC and DDC, 11 rural roads with a length of 21.15 km were identified as making up the district road core network (DRCN), and the remaining 171.15 km were classified as village roads. The existing SRN roads link up 11 of the 16 VDC headquarters and remaining 5 VDC headquarters are connected by DRCN. Out of the 21.15 km DRCN roads,12.88 km road is black top,5.37 km road is gravel and 2.90 km road is earthen.

Road Class	Total length	Black Top	Gravel	Earthen
Strategic road network	115.09	81.50	23.59	10.00
Urban roads	6.10	6.10	-	-
District road core network	21.15	12.88	5.37	2.90
Village roads	171.05	22.98	40.42	107.65
Total	**313.39**	**123.46**	**69.38**	**120.55**

Annual conservation costs for the entire district road core network are estimated at NPR 12.250 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 61.250million. 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	0	m	-
Causeways	6	m	600,000
Hume pipes	8	units	80,000
Masonry retaining walls	325	m^3	3,250,000
Gabion retaining walls	450	m^3	1,125,000
Lined drains	6625	m	6,625,000
Widening	1700	m	42,500,000
Rehabilitation	1.7	km	1,360,000
Gravelling	2.9	km	6,380,000
Blacktopping	7.92	km	45,144,000
New construction	-	km	-
Total			**107,064,000**

The available budget for the road sector for the coming five years (fiscal year 2070/71 to 2074/75) is estimated to be NPR 205.004 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 73.892million. 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 94% blacktop roads and 4% 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 7 to 14 VDCs and from 14% to 15% 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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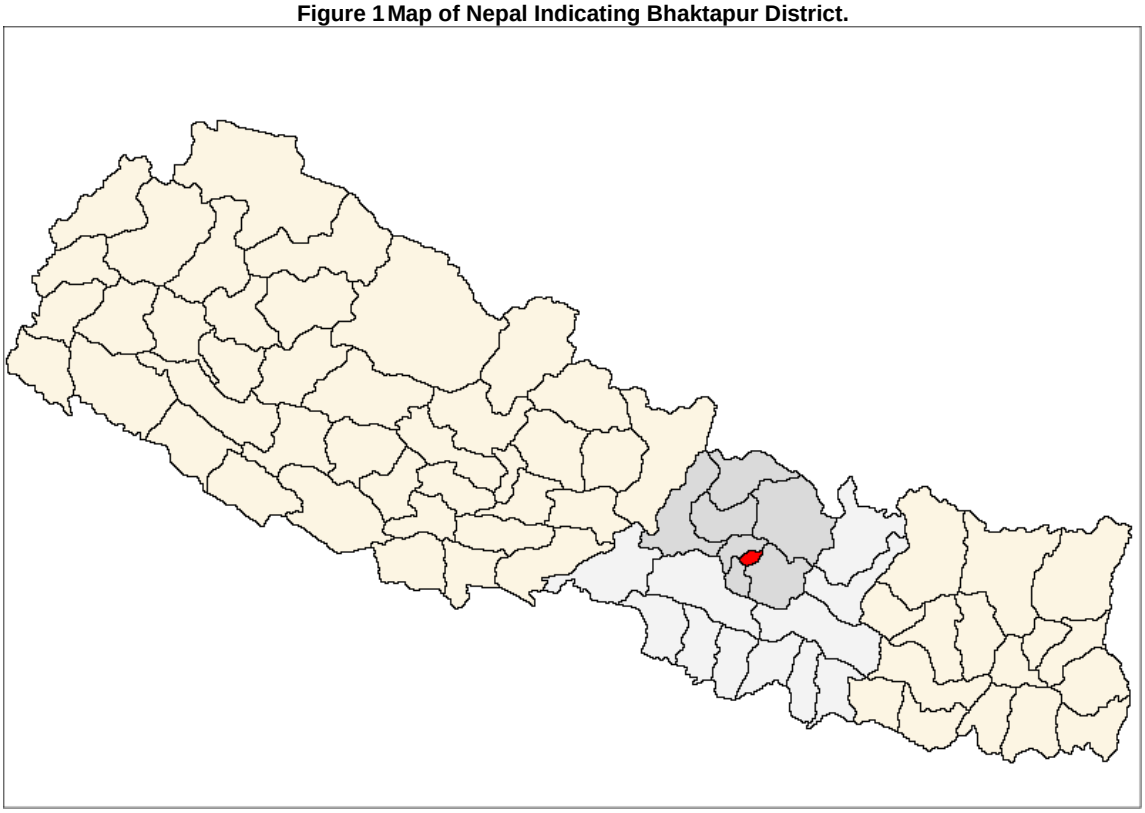
1. **INTRODUCTION**

Bhaktapur District is located in Bagmati Zone of the Central Development Region of Nepal It borders with Kavrepalanchowk district to the East, Kathmandu and Lalitpur district to the West, Kathmandu and Kavrepalanchowk to the north and Lalitpur district to the South. The district has two municipalities, sixteen VDCs, nine Ilakas and two constituency areas. The total area of the district is 119 km^2. The district lies partly in the *Plain* and partly in the *hills*. The lowest elevation point is 1372 meter and the highest elevation point is 2166 meter from mean sea level. The mean temperature of the district is 15.1 degree and the average rainfall in the district is 1715 mm. The main occupation of the people in the district is agriculture. People in the district are also engaged in waving, woodcarving, metal crafts, clay work, stone carving pottery business and other different types of business as their source of income.

Figure 1 Map of Nepal Indicating Bhaktapur District.



According to the National Census 2011 projection, the total population of the district is 3, 04,651 comprising 1,49,767 female (49%) and 1,54, 884 male (51%) residing in 68,636 households. Bhaktapur district has an average population density of around 2560.10 people per square km. The average family size is 4.44. The average literacy rate is about 81.7% Bhaktapur district has multi ethnic composition with Newar, Brahmin, Chhetri, Gurung, Tamang, Malla, Thakuri, Damai, Kami, Sarki, etc. The common language is Nepali followed by Newari

Although accessibility to Bhaktapur is limited, this is improving rapidly. The district has access to the Araniko Highway (Kathmandu-Sindhupalchwok) which is currently being upgraded to bituminous standard six lane by DOR. Total 115.09 km feeder roads between adjoining district headquarters and Bhaktapur are also being upgraded to bituminous standard by DOR. The Bhaktapur outer Ring Road is on the planning, which will pass through majority VDCs of Bhaktapur and also linking them to the district headquarter.

2. DISTRICT ROAD CORE NETWORK (DRCN)

This chapter gives an overview of the existing roads in Bhaktapur 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

Bhaktapur district has an estimated road network of 319.39 kilometres, including 115.09 km of strategic roads managed by DOR, 192.2 km of rural roads managed by Bhaktapur DDC and 6.10 km urban road 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 Bhaktapur district is shown in Figure 2 at the end of this chapter.

Table 2.1.1 Road length in Bhaktapur District (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic roads	115.09	81.50	23.59	10.00
Urban roads	6.10	6.10	-	-
Rural roads	192.20	35.86	45.79	110.55
Total	**313.39**	**123.46**	**69.38**	**120.55**

2.2 NATIONAL HIGHWAYS AND FEEDER ROADS

Bhaktapur district has only one highway, Araniko Rajmarg (ARM), and other feeder roads totalling 115.09 km, which is shown in table below:

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

Code	Description	Total length	Black Top	Gravel	Earthen
H0304	Manohara bridge-Sallaghari	**5.34**	5.34		
H0305	Sallaghari-Hanumante Culvert	**3.64**	3.64		
H0306	Hanumante Culvert-Sanga	**5.14**	5.14		
F09301	Sallaghari (Bhaktapur)-Duwakot(KVRR)	**5.50**	5.50		
F09601	Nagarkot-Kattike	**0.50**		0.50	
F09802	Adikarigaun-Nagarkot	**3.00**			3.00
F09801	Kamalbinayak-Sudal-Adikarigaun	**7.00**			7.00
F10001	Sallaghari (ARM)-Katunje-Sumlingtar(KVRR)	**1.34**		1.34	
F09901	Trolly bus(ARM)-Suryabinayak-Chamelidanda(KVRR)	**6.00**		6.00	
F09503	Changunarayan-Phedigaun	**8.50**		8.50	
F08602	Sinamangal-Manohara-Thimi-Sallaghari	**5.00**	5.00		
F09701	Chyamasingh-Amaldol	**3.25**		3.25	
F09801	Kamalbinayak-Sudal-Adikarigaun	**2.00**		2.00	
F09701	Chyamasingh-Amaldol	**3.72**	3.72		
F09401	Byasi (Bhaktapur)-Changunarayan	**5.80**	5.80		
F09001	Thimi (SOS)-Lokanthali (ARM)	**3.35**	3.35		
F09101	Kausaltar-Balkot-Sirutar-Biruwa(KVRR)	**4.00**	4.00		
F10001	Sallaghari (ARM)-Katunje-Sumlingtar(KVRR)	**2.66**	2.66		
F09901	Trolly bus(ARM)-Suryabinayak-Chamelidanda(KVRR)	**4.50**	4.50		

Code	Description	Total length	Black Top	Gravel	Earthen
F09101	Kausaltar-Balkot-Sirutar-Biruwa(KVRR)	**2.00**		2.00	
F09502	Phuyalgaun-Changunarayan	**2.83**	2.83		
F09503	Changunarayan-Phedigaun	**1.17**	1.17		
F09002	Lokanthali (ARM)-Dharmeshwar	**1.65**	1.65		
F02802	Army camp-Nagarkot	**18.60**	18.60		
F02801	Bhaktapur-Army camp	**4.40**	4.40		
F09201	Thimi (ARM)-Bode-Karkigaun(KVRR)	**4.20**	4.20		
Total		**115.09**	**81.50**	**23.59**	**10.00**

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 Bhaktapur district is shown in Figure 3 at the end of this chapter. The DRCN consists of 11 district roads with a total length of 21.15 km. The remaining 171.15 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 total 21.15 km DCRN roads, 18.25 is all weather and 2.90 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	**115.09**	**81.5**	**23.59**	**10**
Highways	14.12	14.12	0	0
Feeder roads	100.97	67.38	23.59	10
Urban roads	**6.10**	**6.1**	**0**	**0**
District road core network	**21.15**	**12.88**	**5.37**	**2.9**
Village roads	**171.05**	**22.98**	**40.42**	**107.65**
Total	**313.39**	**123.46**	**69.38**	**120.55**

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	Char Dabota Chowk_ Balkot VDC	**0.15**	0.06	0.09	0	0.15	-
27DR002	Shankdhar Chowk_ Gamcha Road	**2.10**	2.1	0	0	2.10	-
27DR003	Byasi_Jhaukhel VDC_Road	**2.10**	2.1	0	0	2.10	-
27DR004	Aadarsa bus stand_ Sipadol VDC_Road	**3.00**	0.7	2.3	0	3.00	-
27DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	**4.50**	4.1	0.4	0	4.50	-
27DR006	Sainik School(Kharipati)_Chaling	**2.45**	1.4	0.85	0.2	2.25	0.20

Code	Description	Total length	Black Top	Gravel	Earthen	All weather	Fair weather
	VDC office_Road						
27DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	**3.70**	0.9	1.25	1.55	2.15	1.55
27DR008	Jorpati_Chipol VDC_Road	**1.35**	0.7	0.4	0.25	1.10	0.25
27DR009	Palase_Nankhel VDC_road	**1.15**	0.7	0	0.45	0.70	0.45
27DR010	Pipalbot_Nagarkot VDC_Road	**0.25**	0	0	0.25	-	0.25
27DR011	Kharkapul _Tathali VDC _Road	**0.40**	0.12	0.08	0.2	0.20	0.20
Total		**21.15**	**12.88**	**5.37**	**2.90**	**18.25**	**2.90**

2.4 VILLAGE ROADS

The 171.15 km 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 18 VDCs in Bhaktapur district. These are roads of a lower importance that do not form the main link between the VDC centres 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 9.50 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 Bhaktapur District

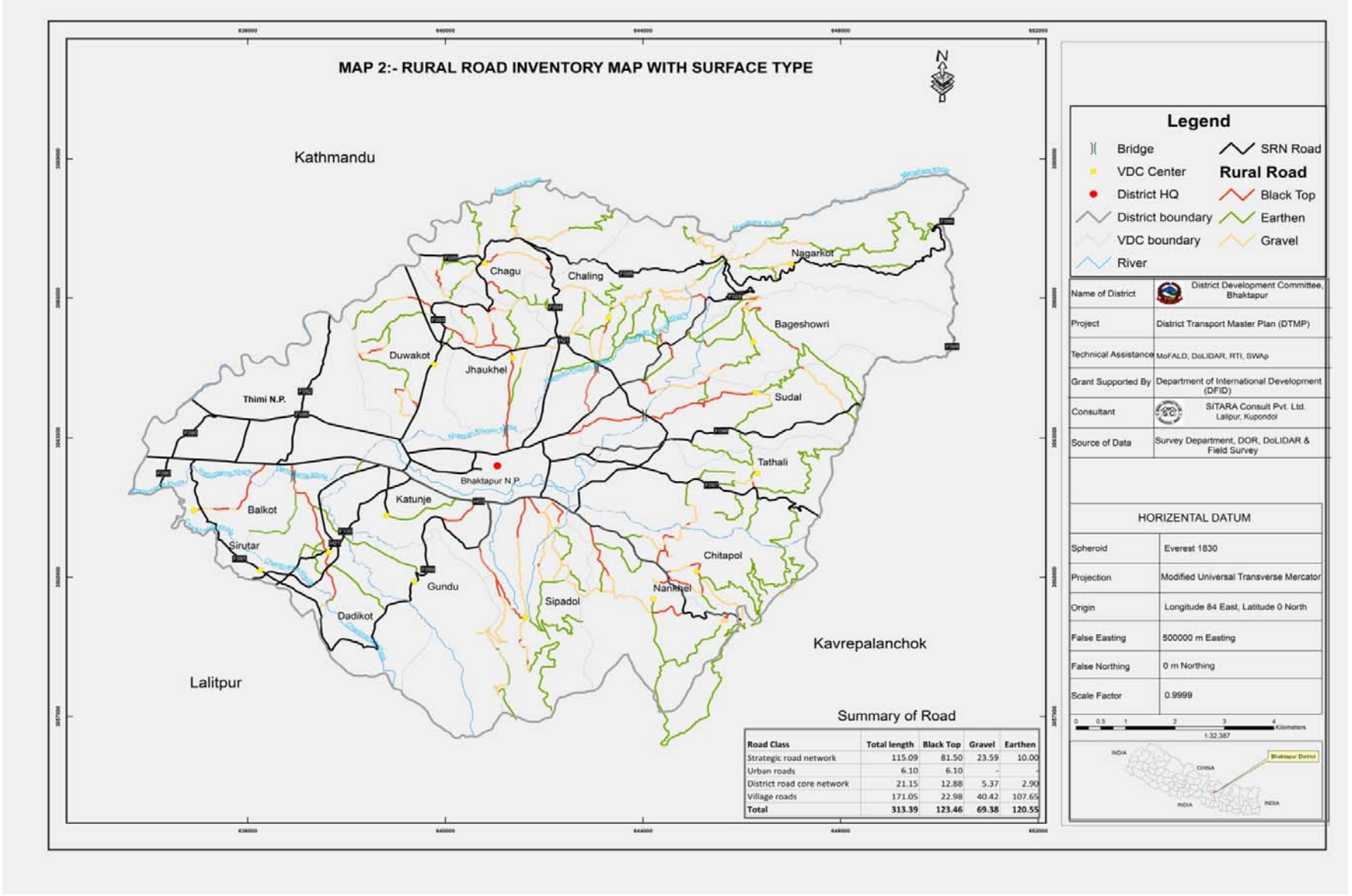
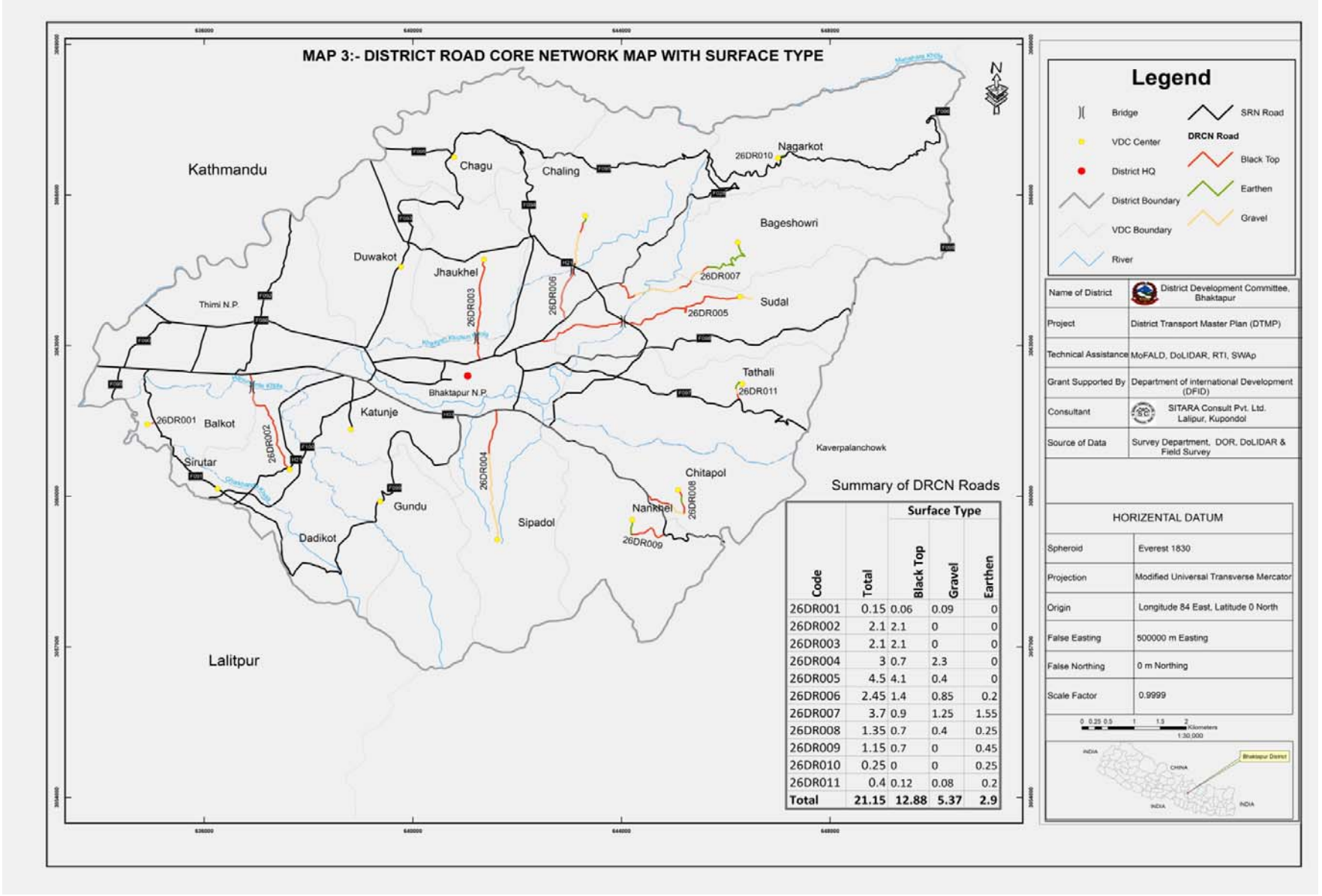


Figure 3 DRCN map of Bhaktapur District



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	0.15	0.15	0.15	0.15
7DR002	2.10	2.10	2.10	2.10
27DR003	2.10	2.10	2.10	2.10
27DR004	3.00	3.00	3.00	3.00
27DR005	4.50	4.50	4.50	4.50
27DR006	2.45	2.45	2.45	2.45
27DR007	3.70	3.70	3.70	3.70
27DR008	1.35	1.35	1.35	1.35
27DR009	1.15	1.15	1.15	1.15
27DR010	0.25	0.25	0.25	0.25
27DR011	0.40	0.40	0.40	0.40
Total	**21.15**	**21.15**	**21.15**	**21.15**

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 Bhaktapur 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)
26DR001	Char Dabota Chowk_ Balkot VDC	0.15	-
26DR002	Shankdhar Chowk_ Gamcha Road	2.10	-
26DR003	Byasi_Jhaukhel VDC_Road	2.10	-
26DR004	Aadarsa bus stand_ Sipadol VDC_Road	3.00	0.70
26DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	4.50	1.00
26DR006	Sainik School(Kharipati)_Chaling VDC office_Road	2.45	-
26DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	3.70	-
26DR008	Jorpati_Chipol VDC_Road	1.35	-
26DR009	Palase_Nankhel VDC_road	1.15	-
26DR010	Pipalbot_Nagarkot VDC_Road	0.25	-
26DR011	Kharkapul _Tathali VDC _Road	0.40	-
Total		**21.15**	**1.70**

3.2.2 GRAVELLING

Gravelling of the road surface is required for the earthen sections in the district road core network. For Bhaktapur district this concerns a total of 2.90 km as can be seen in the table below.

Table 3.2.2 Sections of the district road core network requiring gravelling

Code	Name of Roads	Total length (km)	Gravelling (km)
26DR001	Char Dabota Chowk_ Balkot VDC	0.15	-
26DR002	Shankdhar Chowk_ Gamcha Road	2.10	-
26DR003	Byasi_Jhaukhel VDC_Road	2.10	-
26DR004	Aadarsa bus stand_ Sipadol VDC_Road	3.00	-
26DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	4.50	-
26DR006	Sainik School(Kharipati)_Chaling VDC office_Road	2.45	0.20
26DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	3.70	1.55
26DR008	Jorpati_Chipol VDC_Road	1.35	0.25
26DR009	Palase_Nankhel VDC_road	1.15	0.45
26DR010	Pipalbot_Nagarkot VDC_Road	0.25	0.25
26DR011	Kharkapul _Tathali VDC _Road	0.40	0.20
Total		**21.15**	**2.90**

3.2.3 CROSS DRAINAGE

The need for cross drainage was identified for the different DRCN roads. A total of 1 causeway with a total length of 6m, and 8 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)
26DR001	Char Dabota Chowk_ Balkot VDC	-	-	-
26DR002	Shankdhar Chowk_ Gamcha Road	-	-	-
26DR003	Byasi_Jhaukhel VDC_Road	-	-	-
26DR004	Aadarsa bus stand_ Sipadol VDC_Road	-	-	-
26DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	-	-	-
26DR006	Sainik School(Kharipati)_Chaling VDC office_Road	-	-	-
26DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	-	6	7
26DR008	Jorpati_Chipol VDC_Road	-	-	1
26DR009	Palase_Nankhel VDC_road	-	-	-
26DR010	Pipalbot_Nagarkot VDC_Road	-	-	-
26DR011	Kharkapul _Tathali VDC _Road	-	-	-
Total		**-**	**6.00**	**8.00**

3.2.4 PROTECTIVE STRUCTURES

Based on the road survey carried out in Bhaktapur, 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)
26DR001	0.15	-	-
26DR002	2.10	-	-
26DR003	2.10	-	-
26DR004	3.00	-	-
26DR005	4.50	-	-
26DR006	2.45	-	-

26DR007	3.70	200	300
26DR008	1.35	-	-
26DR009	1.15	100	100
26DR010	0.25	25	50
26DR011	0.40	-	-
Total	**21.15**	**325.00**	**450.00**

3.2.5 WIDENING

Widening of the core district road network is required in Bhaktapur as the traffic volumes are still above 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)
26DR001	Char Dabota Chowk_ Balkot VDC	0.15	-
26DR002	Shankdhar Chowk_ Gamcha Road	2.10	-
26DR003	Byasi_Jhaukhel VDC_Road	2.10	-
26DR004	Aadarsa bus stand_ Sipadol VDC_Road	3.00	-
26DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	4.50	-
26DR006	Sainik School(Kharipati)_Chaling VDC office_Road	2.45	-
26DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	3.70	1,200
26DR008	Jorpati_Chipol VDC_Road	1.35	-
26DR009	Palase_Nankhel VDC_road	1.15	500
26DR010	Pipalbot_Nagarkot VDC_Road	0.25	-
26DR011	Kharkapul _Tathali VDC _Road	0.40	-
Total		**21.15**	**1,700.00**

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 8 roads that are eligible for blacktopping (traffic volume exceeds 100 PCU). The total length for blacktopping is 7.92 km.

Table 3.2.6 Sections of the district road core network requiring widening

Code	Name of Roads	Traffic (PCU)	Total length (km)	Blacktopping (km)
26DR001	Char Dabota Chowk_ Balkot VDC	185	0.06	0.09
26DR002	Shankdhar Chowk_ Gamcha Road	397	2.10	-
26DR003	Byasi_Jhaukhel VDC_Road	158	2.10	-
26DR004	Aadarsa bus stand_ Sipadol VDC_Road	114	0.70	2.30
26DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	202	4.10	0.40
26DR006	Sainik School(Kharipati)_Chaling VDC office_Road	120	1.40	0.70
26DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	250	0.90	2.80
26DR008	Jorpati_Chipol VDC_Road	119	0.70	0.65
26DR009	Palase_Nankhel VDC_road	275	0.70	0.45
26DR010	Pipalbot_Nagarkot VDC_Road	101	-	0.25
26DR011	Kharkapul _Tathali VDC _Road	105	0.12	0.28
Total		**2,023.50**	**12.88**	**7.92**

3.3 NEW CONSTRUCTION

No New construction of DRCN roads is required to connect the remaining VDC headquarters.

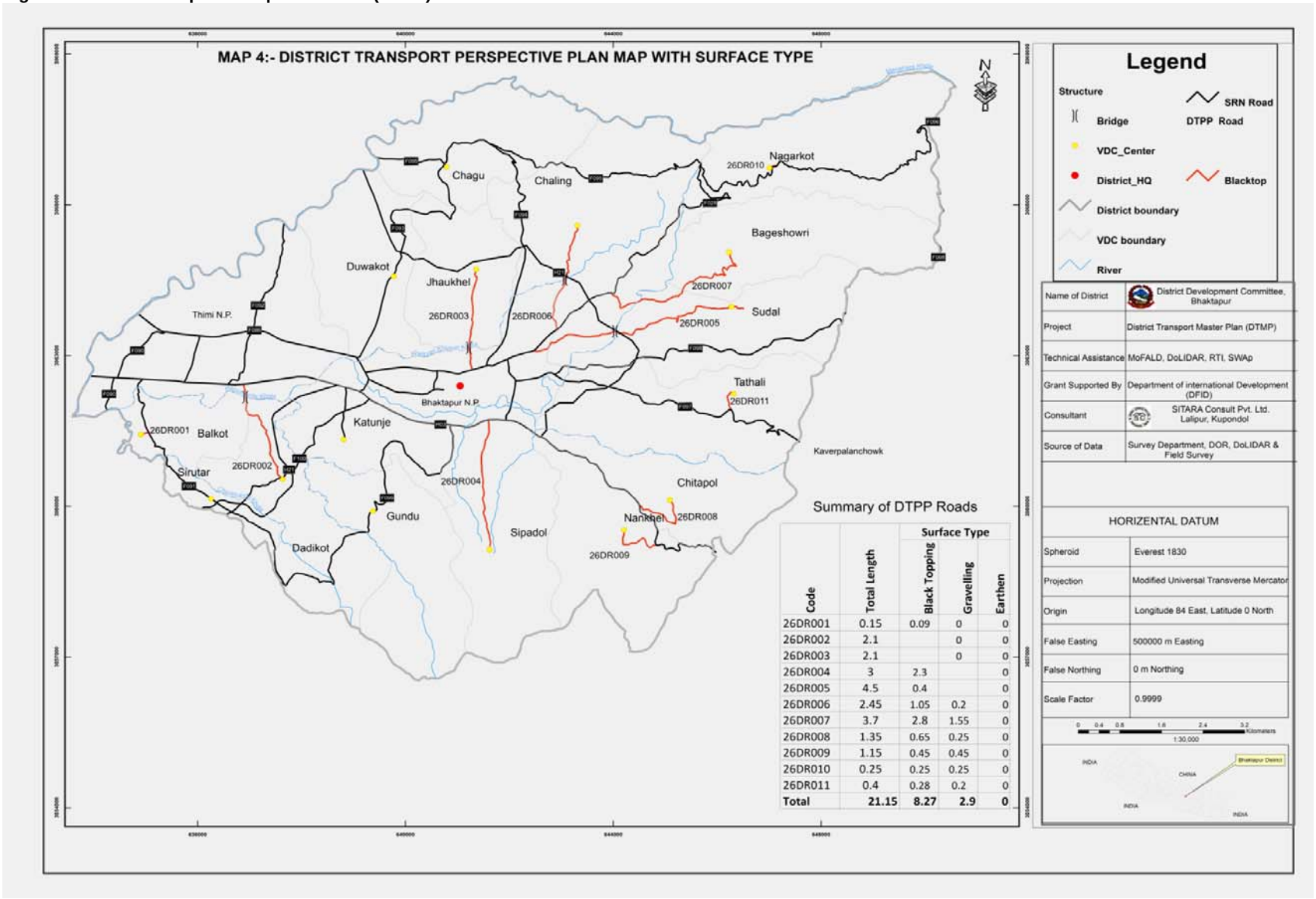
3.4 DISTRICT TRANSPORT PERSPECTIVE PLAN

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, 7.92 km will be blacktopped in light of the existing traffic volume. The district road core network will subsequently consist of 21.15 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)
26DR001	0.15	0.15	0.15	0.15	-	0.09	-	-	-	-	-	-
26DR002	2.10	2.10	2.10	2.10	-	-	-	-	-	-	-	-
26DR003	2.10	2.10	2.10	2.10	-	-	-	-	-	-	-	-
26DR004	3.00	3.00	3.00	3.00	-	2.30	-	-	-	-	-	-
26DR005	4.50	4.50	4.50	4.50	-	0.40	-	-	-	-	-	-
26DR006	2.45	2.45	2.45	2.45	0.20	0.70	-	-	-	-	-	-
26DR007	3.70	3.70	3.70	3.70	1.55	2.80	-	-	6.00	7.00	200.00	300.00
26DR008	1.35	1.35	1.35	1.35	0.25	0.65	-	-	-	1.00	-	-
26DR009	1.15	1.15	1.15	1.15	0.45	0.45	-	-	-	-	100.00	100.00
26DR010	0.25	0.25	0.25	0.25	0.25	0.25	-	-	-	-	25.00	50.00
26DR011	0.40	0.40	0.40	0.40	0.20	0.28	-	-	-	-	-	-
Total	**21.15**	**21.15**	**21.15**	**21.15**	**2.90**	**7.92**	**-**	**-**	**6.00**	**8.00**	**325.00**	**450.00**

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 12.250 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 61.250 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	0.15	0.06	0.09	-	5	3	30	36	-	12	23	**108**	**540**
27DR002	2.10	2.10	-	-	63	42	1,050	-	-	525	-	**1,680**	**8,400**
27DR003	2.10	2.10	-	-	63	42	1,050	-	-	-	-	**1,155**	**5,775**
27DR004	3.00	0.70	2.30	-	90	60	350	920	-	-	575	**1,995**	**9,975**
27DR005	4.50	4.10	0.40	-	135	90	2,050	160	-	-	100	**2,535**	**12,675**
27DR006	2.45	1.40	0.85	0.20	74	49	700	340	50	-	213	**1,425**	**7,125**
27DR007	3.70	0.90	1.25	1.55	111	74	450	500	388	-	313	**1,835**	**9,175**
27DR008	1.35	0.70	0.40	0.25	41	27	350	160	63	-	100	**740**	**3,700**
27DR009	1.15	0.70	-	0.45	35	23	350	-	113	-	-	**520**	**2,600**
27DR010	0.25	-	-	0.25	8	5	-	-	63	-	-	**75**	**375**
27DR011	0.40	0.12	0.08	0.20	12	8	60	32	50	-	20	**182**	**910**
Total	**21.15**	**12.88**	**5.37**	**2.90**	**634.50**	**423.00**	**6,440.00**	**2,148.00**	**725.00**	**537.00**	**1,342.50**	**12,250.00**	**61,250.00**

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 107.064 million as indicated in the table below. Around 45 million out of this total cost 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	0.15	-	-	-	513	-	-	-	-	-	-	-	150	**663**
27DR002	2.10	-	-	-	-	-	-	-	-	-	-	-	-	**-**
27DR003	2.10	-	-	-	-	-	-	-	-	-	-	-	-	**-**
27DR004	3.00	560	-	-	13,110	-	-	-	-	-	-	-	1,300	**14,970**
27DR005	4.50	800	-	-	2,280	-	-	-	-	-	-	-	-	**3,080**
27DR006	2.45	-	-	440	3,990	-	-	-	-	-	-	-	2,300	**6,730**
27DR007	3.70	-	30,000	3,410	15,960	-	-	600	-	70	2,000	750	1,450	**54,240**
27DR008	1.35	-	-	550	3,705	-	-	-	-	10	-	-	800	**5,065**
27DR009	1.15	-	12,500	990	2,565	-	-	-	-	-	1,000	250	200	**17,505**
27DR010	0.25	-	-	550	1,425	-	-	-	-	-	250	125	225	**2,575**
27DR011	0.40	-	-	440	1,596	-	-	-	-	-	-	-	200	**2,236**
Total	**21.15**	**1,360.00**	**42,500.00**	**6,380.00**	**45,144.00**	**-**	**-**	**600.00**	**-**	**80.00**	**3,250.00**	**1,125.00**	**6,625.00**	**107,064.00**

4.3 NEW CONSTRUCTION

No new construction is needed for DRCN road networks.

4.4 DTPP COSTS

The total costs for the District Transport Perspective Plan come to NPR 168.314 million as indicated in the table below.

Table 4.4.1 DTPP costs (NPR '000)

Code	Conservation	Improvement	New construction	Total
27DR001	540	663	-	1,203
27DR002	8,400	-	-	8,400
27DR003	5,775	-	-	5,775
27DR004	9,975	14,970	-	24,945
27DR005	12,675	3,080	-	15,755
27DR006	7,125	6,730	-	13,855
27DR007	9,175	54,240	-	63,415
27DR008	3,700	5,065	-	8,765
27DR009	2,600	17,505	-	20,105
27DR010	375	2,575	-	2,950
27DR011	910	2,236	-	3,146
Total	**61,250**	**107,064**	**-**	**168,314**

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)
26DR001	0.15	5	3	30	36	-	12	23	108	15,881	7
26DR010	0.25	8	5	-	-	63	-	-	75	4,571	16
26DR011	0.40	12	8	60	32	50	-	20	182	5,698	32
26DR009	1.15	35	23	350	-	113	-	-	520	5,509	94
26DR008	1.35	41	27	350	160	63	-	100	740	5,619	132
26DR002	2.10	63	42	1,050	-	-	525	-	1,680	11,629	144
26DR007	3.70	111	74	450	500	388	-	313	1,835	12,639	145
26DR003	2.10	63	42	1,050	-	-	-	-	1,155	7,721	150
26DR006	2.45	74	49	700	340	50	-	213	1,425	8,129	175
26DR005	4.50	135	90	2,050	160	-	-	100	2,535	12,639	201
26DR004	3.00	90	60	350	920	-	-	575	1,995	9,876	202

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)
26DR002	2.10	-	11,629	-
26DR003	2.10	-	7,721	-
26DR001	0.15	663	15,881	42
26DR005	4.50	3,080	12,639	244
26DR011	0.40	2,236	5,698	392
26DR010	0.25	2,575	4,571	563
26DR006	2.45	6,730	8,129	828
26DR008	1.35	5,065	5,619	901
26DR004	3.00	14,970	9,876	1,516
26DR009	1.15	17,505	5,509	3,178
26DR007	3.70	54,240	12,639	4,291

5.3 NEW CONSTRUCTION

No new construction is needed for DRCN road network of Bhaktapur district.

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 205.004million 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 Fund	9,000	9,900	10,890	11,979	13,177
Government of Nepal Fund	12,300	13,530	14,883	16,371	18,008
Road Bord of Nepal	4,600	5,060	5,566	6,123	6,735
RRRSDP	6,300	7,560	9,072	10,886	13,064
Total	**32,200**	**36,050**	**40,411**	**45,359**	**50,984**
Grand total	**205,004**				

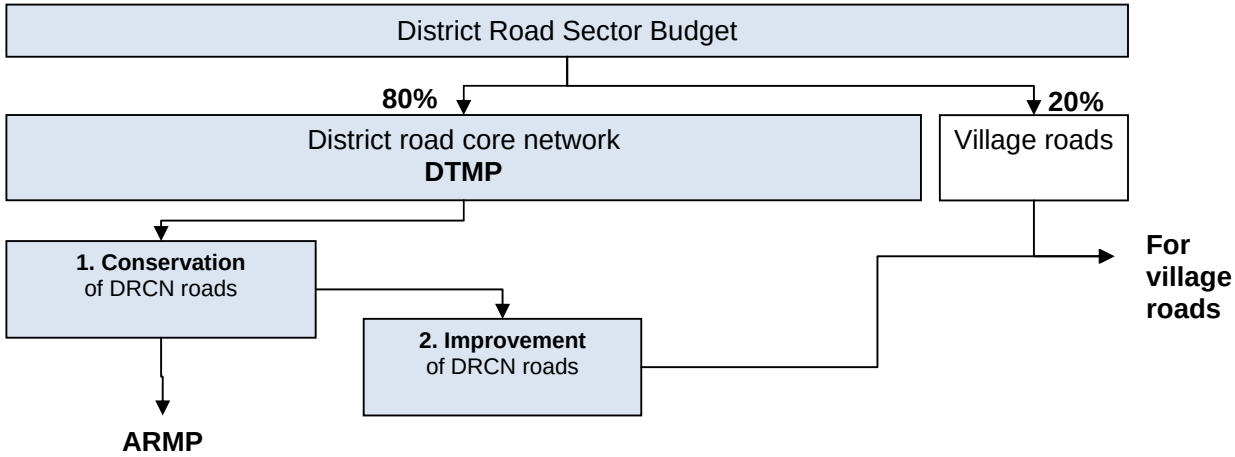
6.2 DISTRIBUTION OF BUDGET

The distribution of the available district road sector budget is indicated in the figure below. Of 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 180.956 million) is slightly 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 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 slightly insufficient for the improvement of one DRCN road which can only bring to all weather condition by increasing the budget source.

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	32,200	36,050	40,411	45,359	50,984
Village roads	6,440	7,210	8,082	9,072	10,197
Core road network budget (DTMP)	**25,760**	**28,840**	**32,329**	**36,287**	**40,787**
Core network length (km)	**21.15**	**21.15**	**21.15**	**21.15**	**21.15**
Blacktop (km)	12.88	14.20	16.08	17.75	18.61
Gravel (km)	5.37	4.58	3.07	1.60	1.33
Earthen (km)	2.90	2.36	2.00	1.80	1.21
Conservation (NPR '000)	**14,289**	**14,570**	**14,809**	**14,974**	**15,250**
Emergency	635	635	635	635	635
Routine	423	423	423	423	423
Recurrent (blacktop)	6,440	7,102	8,039	8,877	9,303
Recurrent (gravel)	2,148	1,833	1,229	640	532
Recurrent (earthen)	725	591	500	449	304

Periodic (blacktop)				2,576			2,841			3,216			3,551			3,721		
Periodic (gravel)				1,343			1,146			768			400			332		
Improvement	**Cost**	**BT**	**GR**	**11,471**	**BT**	**GR**	**14,270**	**BT**	**GR**	**17,520**	**BT**	**GR**	**21,313**	**BT**	**GR**	**25,537**	**BT**	**GR**
26DR002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26DR003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26DR001	663	0.09	-	663	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-
26DR005	3,080	0.40	-	3,080	0.40	-	-	-	-	-	-	-	-	-	-	-	-	-
26DR011	2,236	0.28	0.20	2,236	0.28	0.20	-	-	-	-	-	-	-	-	-	-	-	-
26DR010	2,575	0.25	0.25	2,575	0.25	0.25	-	-	-	-	-	-	-	-	-	-	-	-
26DR006	6,730	0.70	0.20	2,917	0.30	0.09	3,813	0.40	0.11	-	-	-	-	-	-	-	-	-
26DR008	5,065	0.65	0.25	-	-	-	5,065	0.65	0.25	-	-	-	-	-	-	-	-	-
26DR004	14,970	2.30	-	-	-	-	5,392	0.83	-	9,578	1.47	-	-	-	-	-	-	-
26DR009	17,505	0.45	0.45	-	-	-	-	-	-	7,942	0.20	0.20	9,563	0.25	0.25	-	-	-
26DR007	54,240	2.80	1.55	-	-	-	-	-	-	-	-	-	11,750	0.61	0.34	25,537	1.32	0.73
Total improvement				**11,471**	**1.32**	**0.54**	**14,270**	**1.88**	**0.36**	**17,520**	**1.68**	**0.20**	**21,313**	**0.85**	**0.58**	**25,537**	**1.32**	**0.73**
Construction	**Cost**	**GR**		**-**	**GR**		**-**	**GR**		**-**	**GR**		**-**	**GR**		**-**	**GR**	
27DR001	-	-		-	-		-	-		-	-		-	-		-	-	
27DR002	-	-		-	-		-	-		-	-		-	-		-	-	
27DR003	-	-		-	-		-	-		-	-		-	-		-	-	
27DR004	-	-		-	-		-	-		-	-		-	-		-	-	
27DR005	-	-		-	-		-	-		-	-		-	-		-	-	
27DR006	-	-		-	-		-	-		-	-		-	-		-	-	
27DR007	-	-		-	-		-	-		-	-		-	-		-	-	
27DR008	-	-		-	-		-	-		-	-		-	-		-	-	
27DR009	-	-		-	-		-	-		-	-		-	-		-	-	
27DR010	-	-		-	-		-	-		-	-		-	-		-	-	
27DR011	-	-		-	-		-	-		-	-		-	-		-	-	
Total new construction				**-**	**-**		**-**	**-**		**-**	**-**		**-**	**-**		**-**	**-**	
Remaining Budget				**-**			**-**			**-**			**-**			**-**		

6.3 DTMP OUTPUTS

Based on the investment plan presented above, all 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 21.15 km of DRCN roads (the entire DRCN) will be conserved for the full DTMP period, while 2.42 km will be upgraded from earthen to gravel standard and 2.42 km will be upgraded from gravel to blacktop standard.

Table 6.3.1 DTMP output

Conservation	Improvement gravel	Improvement blacktop
21.15	2.42	7.04

Of the total DTMP budget, NPR 73.892 million will be spent on conservation and NPR 90.112 million on improvement. NPR 41.001 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 12% from 18.25 km to 20.67 km, 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 12.88 km (61%) to 19.92 km (94%).

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	21.15	2.90	14%	5.37	25%	12.88	61%
End of DTMP	21.15	0.48	2%	0.74	4%	19.92	94%
Difference	-	- 2.42	-11%	- 4.63	-22%	7.04	33%

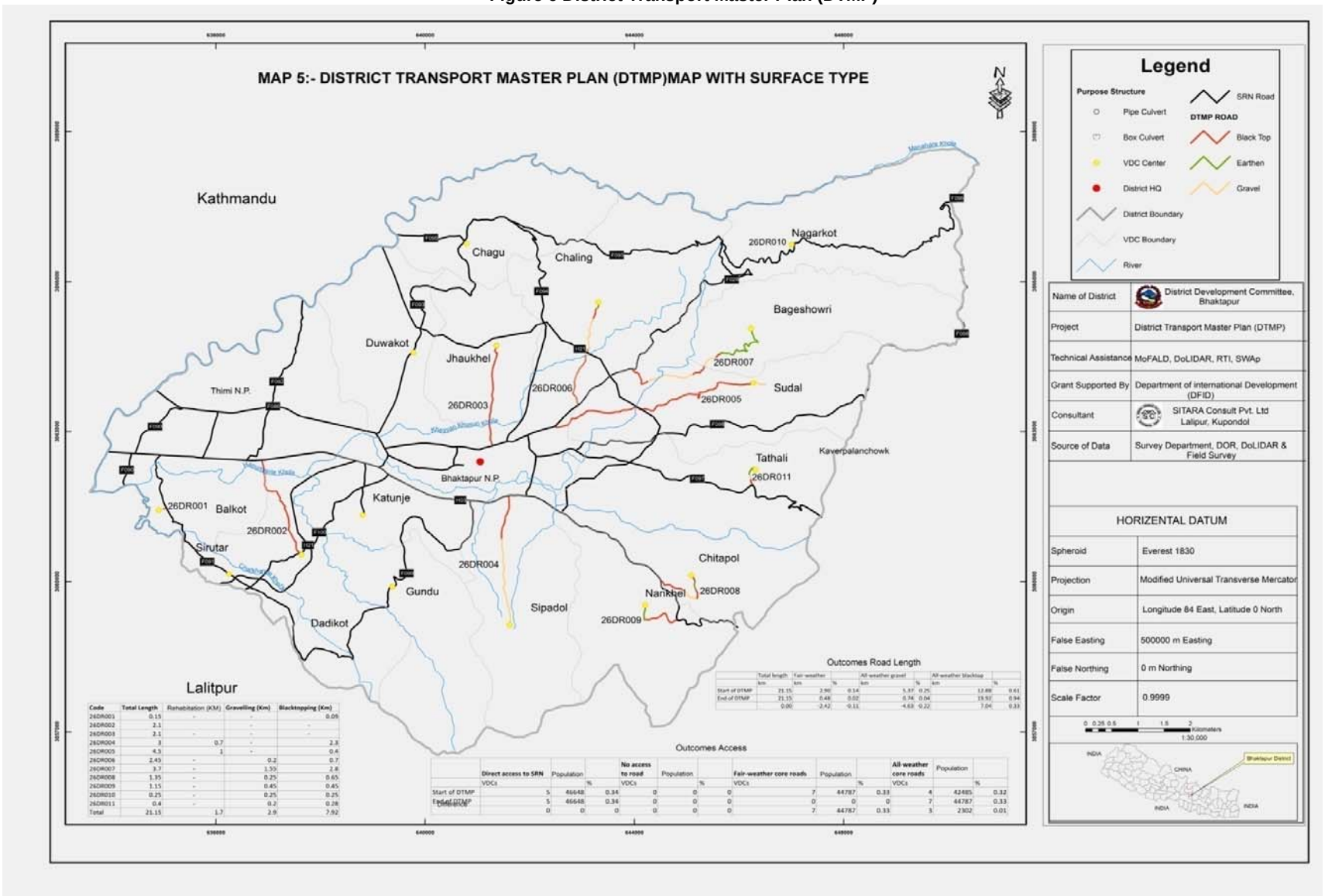
The number of municipalities and VDC headquarters with access to the SRN or all-weather DRCN roads will increase from 32 to 33 and the district population with access to the SRN or all-weather DRCN roads will increase from 67% to 68%.

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	5	46,648	35%	7	44,787	33%	4	42,485	32%
End of DTMP	5	46,648	35%	0	-	0%	7	44,787	33%
Difference	-	-	0%	- 7	- 44,787	-33%	3	2,302	2%

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 6 District Transport Master Plan (DTMP)



ANNEX 1 TRAFFIC DATA

Code	Total Length (km)	Motorcycle	Car-Jeep-Minibus	Tractor	Truck-Bus	PCU
27DR001	0.15	200	25	20	5	**185**
27DR002	2.10	225	62	37	37	**397**
27DR003	2.10	125	25	17	9	**158**
27DR004	3.00	150	13	7	3	**114**
27DR005	4.50	175	42	18	9	**202**
27DR006	2.45	100	20	17	4	**120**
27DR007	3.70	80	30	30	30	**250**
27DR008	1.35	75	25	22	3	**119**
27DR009	1.15	150	50	65	5	**275**
27DR010	0.25	150	2	12	0	**101**
27DR011	0.40	55	5	18	9	**105**
Total	**21**	**1485.00**	**299.00**	**263.00**	**114.00**	

ANNEX 2 POPULATION SERVED

S.N.	VDC	Population	27DR001	27DR002	27DR003	27DR004	27DR005	27DR006	27DR007	27DR008	27DR009	27DR010	27DR011	SRN
1	Bageshori	5,619					X		X					
2	Balkot	11,629	X											
3	Changunarayan	10,461												
4	Chhaling	5,689						X						X
5	Chitapol	7,721								X				
6	Dadhikot	19,497		X										
7	Duwakot	4,571												
8	Gundu	5,509												X
9	Jhaukhel	9,876			X									X
10	Katunje	4,790												X
11	Nagarkot	7,254										X		
12	Nankhel	5,698									X			
13	Sipadol	5,619				X								
14	Sirutar	11,629												X
15	Sudal	10,461					X		X					
16	Tathali	5,689											X	
	Total population	**133,920**	**15,881**	**11,629**	**7,721**	**9,876**	**12,639**	**8,129**	**12,639**	**5,619**	**5,509**	**4,571**	**5,698**	**46,648**
	Total VDCs/municipalities	**16**	**1**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**5**

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)
27DR001	Char Dabota Chowk_ Balkot VDC	0.15	0+000	0+150	-	-	0.09	-	-	-	-	-	-	-	-	150
27DR002	Shankdhar Chowk_ Gamcha Road	2.10	0+000	2+100	-	-	-	-	-	-	-	-	-	-	-	-
27DR003	Byasi_Jhaukhel VDC_Road	2.10	0+000	2+100	-	-	-	-	-	-	-	-	-	-	-	-
27DR004	Aadarsa bus stand_ Sipadol VDC_Road	3.00	0+000	3+000	0.70	-	2.30	-	-	-	-	-	-	-	-	1,300
27DR005	Bhatkeko pati_Bhaktapur_Nagarkot_Road	4.50	0+000	4+500	1.00	-	0.40	-	-	-	-	-	-	-	-	-
27DR006	Sainik School(Kharipati)_Chaling VDC office_Road	2.45	0+000	2+450	-	0.20	0.70	-	-	-	-	-	-	-	-	2,300
27DR007	Bhadrakali_Naya health post_Bageshwori VDC_Road	3.70	0+000	3+700	-	1.55	2.80	1,200	-	-	6	-	7	200	300	1,450
27DR008	Jorpati_Chipol VDC_Road	1.35	0+000	1+350	-	0.25	0.65	-	-	-	-	-	1	-	-	800
27DR009	Palase_Nankhel VDC_road	1.15	0+000	1+150	-	0.45	0.45	500	-	-	-	-	-	100	100	200
27DR010	Pipalbot_Nagarkot VDC_Road	0.25	0+000	0+250	-	0.25	0.25	-	-	-	-	-	-	25	50	225
27DR011	Kharkapul _Tathali VDC _Road	0.40	0+000	0+400	-	0.20	0.28	-	-	-	-	-	-	-	-	200
Total		21.15			1.70	2.90	7.92	1,700	-	-	6	-	8	325.00	450	6,625