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, **Saptari**

Vol I Main Report

November 2014

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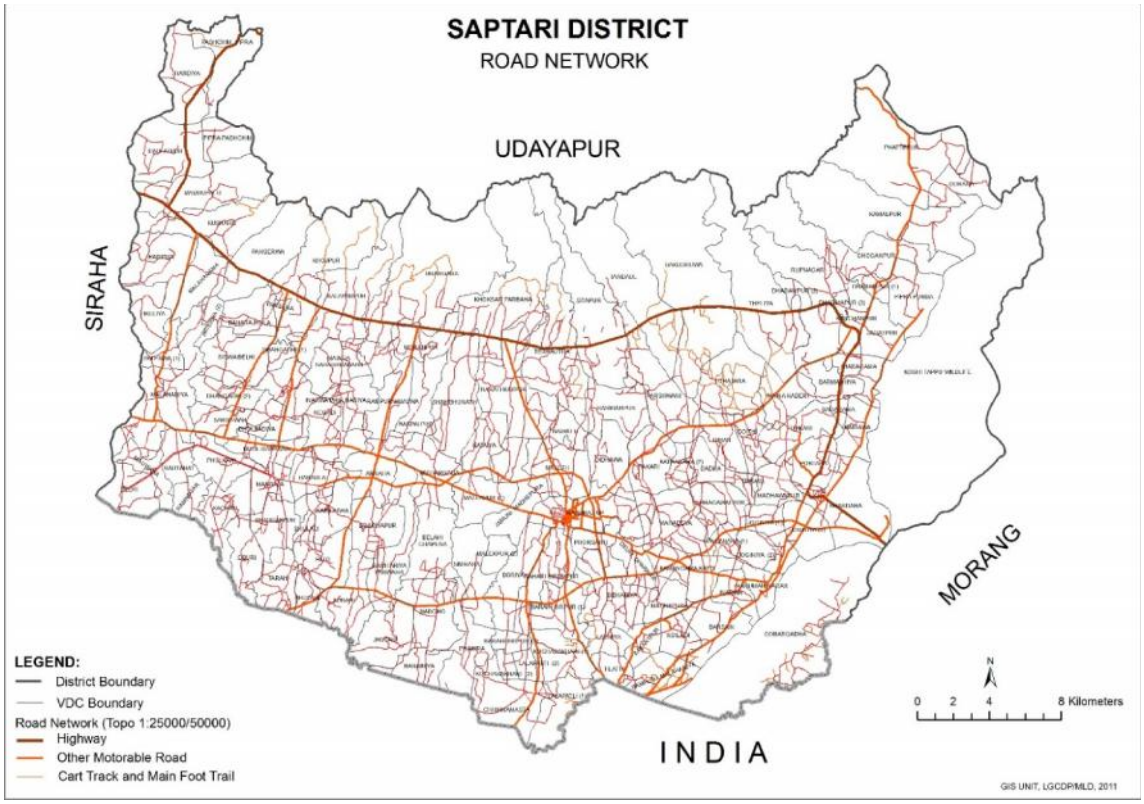
DISTRICT TRANSPORT MASTER PLAN
SAPTARI DISTRICT



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

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

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Team Leader
GOEC Nepal Pvt. Ltd.,
Buddhanagar, Kathmandu

EXECUTIVE SUMMARY

Saptari district is located in Sagarmatha zone of Eastern Development Region and it covers an area of 1363 square kilometer within latitude 26°25' N to 26°47'N and longitude 86°28'E to 87°07'E. Saptari district is surrounded by the borders of north state of India, Bihar to the South, Sunsari to the East, Siraha to the West & Udaypur to the north. Geopolitically, the district is administratively divided into 5 Electoral constituencies 17 Illakas which consist of 99 VDCs and three municipality. Each VDC is divided into 9 Wards. Saptari district has contained highest numbers of VDCs among all 75 districts in Nepal.

The district inventory identified around 780 km of roads, including about 242 km of strategic roads and 534 km of rural roads. In coordination with the DTICC and DDC, 26 rural roads with a length of 277.23 km were identified as making up the district road core network (DRCN) from existing road, and the remaining 256.75 km were classified as village roads. The existing DRCN roads linked up all 114 VDC headquarters. Most of the DRCN roads are gravel and only 95.54 km as earthen i.e. fair-weather roads.

Road Class	Total length	Black Top	Gravel	Earthen
Strategic road network	246.50	135.00	65.50	46.00
District road core network	277.23	2.82	178.87	95.54
Village roads	256.76	-	42.50	214.26
Total	**780.49**	**137.82**	**286.87**	**355.80**

Annual conservation costs are estimated at NPR 95.528 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. For the full five-year period the conservation costs will come to NPR 477.638 million. An analysis of the road network identified the need for improvement of all the DRCN roads in order to bring them to a maintainable all-weather standard and provide them with a proper road surface in light of existing traffic volumes. The required improvements and their estimated costs are listed below.

SN	Improvement type	Requirement		Cost (NPR)
1	Bridges	205	m	123,000,000
2	Slab culverts	90	m	13,500,000
3	Causeways	75	m	7,500,000
4	Hume pipes	40	units	400,000
5	Masonry retaining walls	0	m^3	-
6	Gabion retaining walls	1239	m^3	3,097,500
7	Lined drains	0	m	-
8	Widening	0	m	-
9	Rehabilitation	59.23	km	47,384,000
10	Gravelling	95.54	km	210,188,000
11	Blacktopping	188.75	km	1,075,875,000
12	New construction	-	km	-
	Total			**1,480,944,500**

The available budget for the road sector for the coming five years (fiscal year 2070/71 to 2074/75) is estimated to be NPR 829.52 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. This budget is insufficient to cover all the estimated costs of conservation, improvement and new construction. However, it allows all conservation requirements to be covered throughout the DTMP period and some improvement works to be completed before the end of the DTMP period. The remaining improvement works will be carried out in the next DTMP. No new DRCN construction required in the district.

Within the DTMP period 23.75 km of gravel will be black topped and 49.14 km earthen roads will be gravelled and brought to a maintainable all-weather standard. Number of VDC headquarters with access to all-weather DRCN roads or the SRN will increase from 41 to 83, while the percentage of the district population with such access will increase from 35% to 74%.

ABBREVIATIONS

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

CONTENTS

TABLES

FIGURES

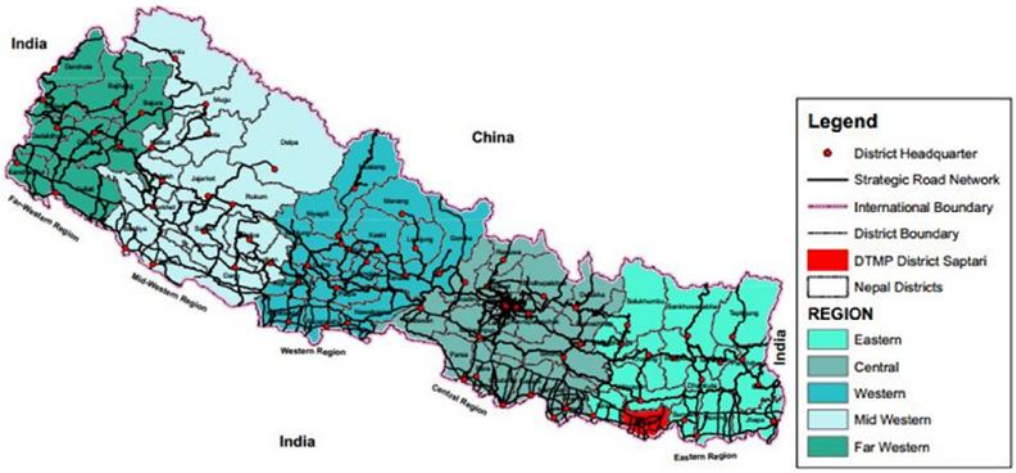
1. INTRODUCTION

Saptari district is located in Sagarmatha zone of Eastern Development Region and it covers an area of 1363 square kilometer within latitude 26°25' N to 26°47'N and longitude 86°28'E to 87°07'E. Saptari district is surrounded by the borders of north state of India, Bihar to the South, Sunsari to the East, Siraha to the West & Udaypur to the north. Geopolitically, the district is administratively divided into 5 Electoral constituencies 17 Illakas which consist of 99 VDCs and three municipality. Each VDC is divided into 9 Wards. Saptari district has contained highest numbers of VDCs among all 75 districts in Nepal.

Saptari district has the subtropical climate. So it will be very hot in the summer and very cold in the winter. The maximum temperature rises up to 46.11 degree Celsius and falls down as low as 7.22 degree Celsius. The rainfall is mainly due to the southern-eastern monsoon. The monsoon, generally starts from the mid of June and ends by the mid of October. More than 80% of the annual rainfall takes place between June and September. The average annual rainfall, generally, varies from 1588.9 mm to 2096.3 mm.

Saptari district is well known for religious, historical and tourism. Many places are religious, historical importance. Chhinamasta Temple and Kankalini Temple are the most famous temples of the district.

Figure 1 Location of the district



Saptari district has no air transport service to complement the surface transport facilities. Inner and inter district mobility and as such the development activities fully depend on expansion of rural road network within the district. In Saptari district, the existing transport system constitutes the strategic roads (highways and feeder road), district and village roads, and trail bridges. Strategic roads within the district are all weather and play vital role in the overall transportation system of the district rural road network within the district. All weather transport facilities through East West Highway (Mahendra Rajmarg), Kadmaha-Siswari Bridge, Rupani-Rajbiraj-Kunauli, Bhardaha-Inarwa-Rjbiraj, Phattepur-Kanchanpur-Rabiraj, Kathauna-Pato (IB), Kalyanpur-Barsain-Subrapatti, Trafficchok-Bainiya (IB) feeder roads have been providing in district.

2. DISTRICT ROAD CORE NETWORK (DRCN)

This chapter gives an overview of the existing roads in Saptari 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

Saptari district has an estimated road network of 780.49 kilometers, including 246.50 kilometers of strategic roads managed by DOR and 533.99 kilometers of rural roads managed by Saptari DDC and the VDCs. Most of the strategic roads have bituminous and gravel surface and only 46 km is earthen. Unlike rural roads are 42% all-weather (black top and graveled) and 58% earthen (fair weather roads). A map of the total road network in Saptari district is shown in Figure 2 at the end of this chapter.

Table 2.1.1 Total road length (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic roads	246.50	135.00	65.50	46.00
Urban roads	-	-	-	-
Rural roads	533.99	2.82	221.37	309.80
Total	**780.49**	**137.82**	**286.87**	**355.80**

2.2 NATIONAL HIGHWAYS AND FEEDER ROADS

Saptari district has three highways and six feeder roads. H01 (Kadmaha to Koshi Bridge section of MRM), H09 (Kadmaha Chowk to Siswari Bridge section of MRM-Udayapur Gaight), H17 (Rajbiraj to Balan Nadi section of postal road), F003 (Rajbiraj-Bhardaha), F004 (Rupani-Rajbiraj-Malhaniya), F064 (Phattepur-Rajbiraj-Chhinamasta), F065 (Kathauna-Pato, F066 (Kalyanpur-Barsain-Subhrapatti) and F187(MRM Trafficchok-Baniiya). These roads serves as inter district connection, connecting three districts Sunsari, Udayapur and Siraha. Highways are mostly bituminous surface except postal road.

The study team has found Saptari district in a relatively better transport situation. This district has an easy surface transport connection with major market and commercial cities namely Itahari, Biratnagar in the east, Lahan in the west. However, most of the rural roads are in poor condition and need to be improved /upgraded for safe and reliable journey.

Table 2.2.1 National Highways and Feeder Roads (km)

Code	Description	Total length	Black Top	Gravel	Earthen
H01	Mahendra Raj Marg (Kadmaha to Koshi Bridge)	59.04	59.04	-	-
H09	Kadmaha Chowk-Siswari Bridge	12.11	12.11	-	-
H17	Rabiraj-Balan Nadi (Postal)	25.00	2.00	14.00	9.00
F003	Bhardaha-Inarawa-Rajbiraj	19.49	19.49	-	-
F004	Rupani(MRM)-Rajbiraj-Malhaniya-Kunauli	21.36	21.36	-	-
F064	Phattepur-Kanchanpur-Rajbiraj-Chhinmasta	54.00	21.00	17.00	16.00
F065	Kathauna(MRM)-Pato(IB)	16.50	-	16.50	-
F066	Kalyanpur-Barsain-Subhrapatti	18.00	-	18.00	-
F187	Traffic chok(MRM)-Baniniya(IB)	21.00	-	-	21.00
	Total	**246.50**	**135.00**	**65.50**	**46.00**

2.3 DISTRICT ROAD CORE NETWORK

As part of the preparation of this DTMP, the District Road Core Network (DRCN) was identified together with the 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. Road codes has been assigned to village roads also (village roads data as available in existing DTMP and data provided by DDC/DTO during study).

The resulting District Road Core Network in Saptari district is shown in figure 3 at the end of this chapter. The DRCN selected from existing rural roads covers all 114 VDCs (reduced to 99 with 3 new municipality). The DRCN consists of 26 district roads with a total length of 277.23 km and no new roads are necessary, since almost all VDCs are accessible by existing road. The remaining 256.76 km of existing rural roads are not considered to be DRCN roads and are classified as village roads under the responsibility of the VDCs (see also section 2.3). Two third of DRCN roads are all-weather and one third are currently earthen roads and are considered fair-weather (see Table 2.3.1). A complete list of the DRCN roads and their characteristics is provided in Table 2.3.2.

Table 2.3.1 Total road length (km)

Road Class	Total length	Black Top	Gravel	Earthen
Strategic road network	**246.50**	**135.00**	**65.50**	**46.00**
Highways (3 Nos.)	96.15	73.15	14.00	9.00
Feeder roads (6 Nos.)	112.85	61.85	51.50	37.00
Urban roads	-	-	-	-
District road core network	**277.23**	2.82	178.87	95.54
Village roads	**256.76**	-	40.91	215.85
Total	**780.49**	**137.82**	**286.87**	**355.80**

Table 2.3.2 District road core network (km)

S.N	Code	Description	Total length	BT	GR	ER	All weather	Fair weather
1.	15DR001	Kusaha-Belhi Sadak	16.33	-	16.33	-	16.33	-
2.	15DR002	Kadkhona-Rautahut Sadak	16.93	-	12.60	4.33	12.60	4.33
3.	15DR003	Kharchuiya-Fulkai-Kachan Deuri Sadak	20.98	-	10.00	10.98	10.00	10.98
4.	15DR004	Kalyanpur-Inarwa-Phulbariya-Banaula Banauli Barahi kusaha sadak	19.62	-	7.50	12.12	7.50	12.12
5.	15DR005	Kathaunapato-Aurahi Sadak*	17.81	-	17.81	-	17.81	-
6.	15DR006	Jharuwa chowk- Jhutaki Sadak	21.50	-	21.50	-	21.50	-
7.	15DR007	Rupani-Katiya-Malekhpur-fakira-Chhinamustaha-Lalpatti-Lokram sadak	29.97	-	28.00	1.97	28.00	1.97
8.	15DR008	Hariharpur-Pakari-Bisariya-Tilathi Sadak	23.17	-	15.00	8.17	15.00	8.17
9.	15DR009	Portaha-Bakhdhuwa Sadak	22.44	-	11.00	11.44	22.44	-
10.	15DR010	Rajbiraj Govindapur Sadak dekhi Barahi birpur jodne sadak	12.72	-	-	12.72	-	12.72
11.	15DR011	Mainakaderi-Rupani Road	6.04	-	-	6.04	-	6.04
12.	15DR012	Mauhli pul dekhi purba biarawa gabisa bhawan samma	1.22	1.22	-	-	1.22	-
13.	15DR013	Rampur Jamuha-Basalpur Sadak	2.88	-	-	2.88	0.00	2.88
14.	15DR014	Kathuana Patoko Amarlati chowk dekhi purba Brahmapur gabisa hudai Gamariya Prabaha hudai western canal samma	4.08	-	-	4.08	0.00	4.08
15.	15DR015	Bhardaha-Dadaha-Pakari Sadak	12.11	-	12.11	-	12.11	-
16.	15DR016	Portaha Bakdhuwa sadak ko Argitol dekhi Paschim Chandra Canal hudai Trikaul Gabisa hudai Goithi Bhavan samma	7.49	-	7.49	-	7.49	-
17.	15DR017	Rajbiraj Hanuman nagar sadak ko Jhalahi tol dekhi dakshin Western canal samma	2.57	-	2.57	-	2.57	-
18.	15DR018	Jandaul-Kusaha Sadak	5.68	1.60	1.58	2.40	3.18	2.50

S.N	Code	Description	Total length	BT	GR	ER	All weather	Fair weather
19.	15DR019	Rajbiraj Hanumannagar sadak ko Mansapur chowk dekhi -d. canal bank hudai Ko Barsain Gabisabhawan Samma	3.24	-	3.24	-	3.24	-
20.	15DR020	Mahuli Lauhajara Hanumannagara Sadak	10.31	-	5.00	5.31	5.00	5.31
21.	15DR021	Topa chowk to Uttar Mahadeva Gabisa Bhwan hudai Bhagwatpur Gabisa Bhawan samma	5.00	-	3.00	2.00	3.00	2.00
22.	15DR022	Rupnagar-Kanchanpur-Pathari-Pademara Sadak	4.14	-	4.14	-	4.14	-
23.	15DR023	Rajbiraj pump canal Padariya chowk dekhi Uttar Dighuwa Gabisa Bhawan Hudai- Bhagwatpur Gabisa bhawan	5.08	-	-	5.08	-	5.08
24.	15DR024	Bishanupur tol dekhi Paschim Itahari Bishnupur Gabisa Bhawan samma sadak	0.47	-	-	0.47	-	0.47
25.	15DR025	Baluwa Chowk dekhi Paschhim Ghoghanpur ga.bi.sa Bhawan samma	1.10	-	-	1.10	-	1.10
26.	15DR026	Andhupatti chowk dekhi Joginiya 2 ko Gabisa Bhawan	4.35	-	-	4.35	-	4.35
		Total	**277.23**	**2.82**	**178.87**	**95.54**	**181.69**	**95.54**

*The parts of following DRCN roads are also mentioned in Department of Roads SSRN-2011/12:
15DR005: Kathaunapato-Aurahi Sadak (17.81 km) as F065: Kathauna (MRM)-Pato (IB) = 16.50 km

This results in the reduction of DRCN length to **260.73 Km** (277.23-16.50)

2.4 VILLAGE ROADS

Apart from the district road core network, a summary of village roads was prepared from the source of previous DTMP. The 256.76 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 99 VDCs (previously 114) and 3 Municipalities (previously 1) in Saptari 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 99 VDCs and 3 Municipalities will thus be responsible for 2.52 km of village roads. It is recommended that the VDCs organise maintenance workers 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 Rural Road Inventory Map

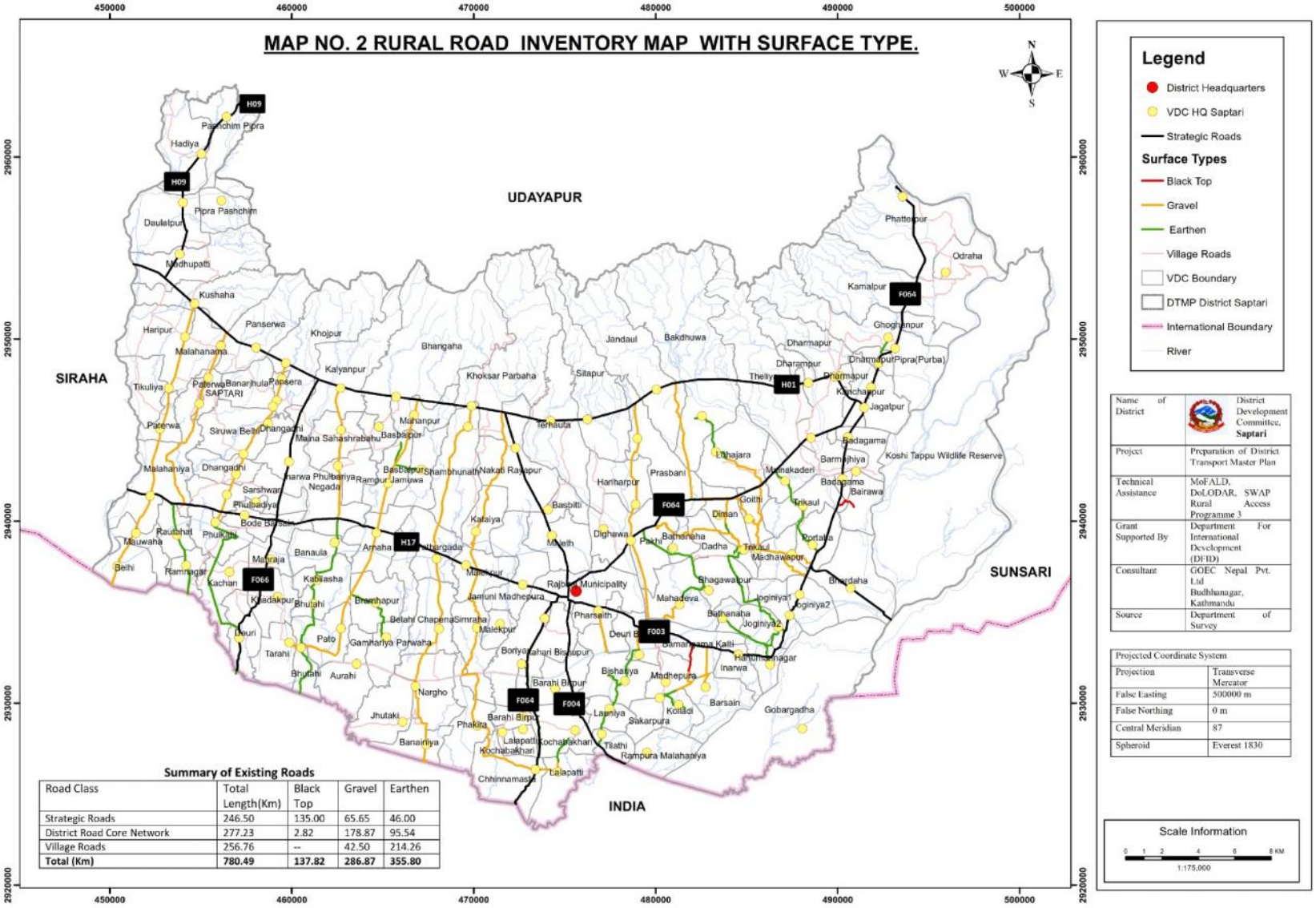
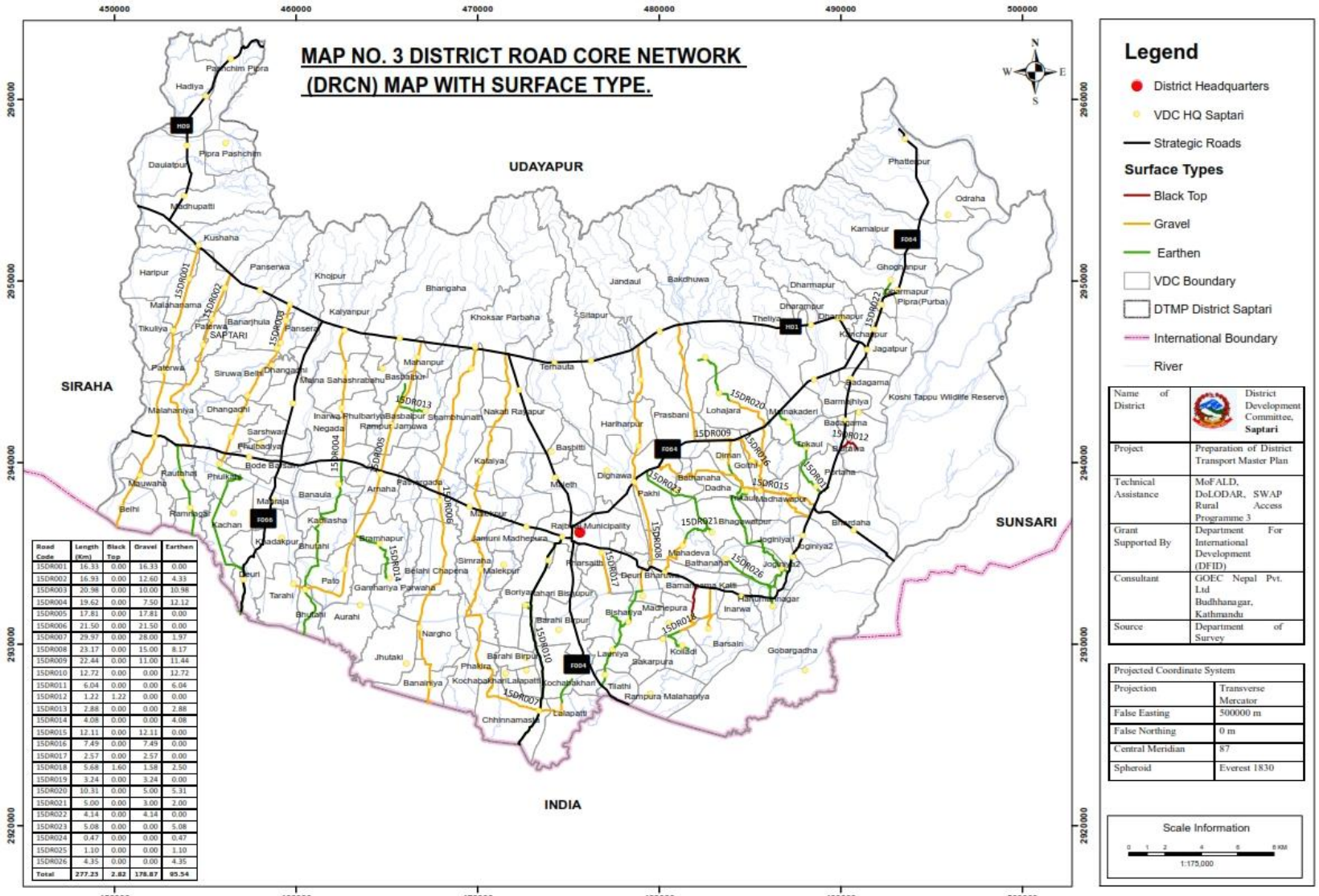


Figure 2 District Road Core Network (DRCN) Map



Road Code	Length (Km)	Black Top	Gravel	Earthen
15DR001	16.33	0.00	16.33	0.00
15DR002	16.93	0.00	12.60	4.33
15DR003	20.98	0.00	10.00	10.98
15DR004	19.62	0.00	7.50	12.12
15DR005	17.81	0.00	17.81	0.00
15DR006	21.50	0.00	21.50	0.00
15DR007	29.97	0.00	28.00	1.97
15DR008	23.17	0.00	15.00	8.17
15DR009	22.44	0.00	11.00	11.44
15DR010	12.72	0.00	0.00	12.72
15DR011	6.04	0.00	0.00	6.04
15DR012	1.22	1.22	0.00	0.00
15DR013	2.88	0.00	0.00	2.88
15DR014	4.08	0.00	0.00	4.08
15DR015	12.11	0.00	12.11	0.00
15DR016	7.49	0.00	7.49	0.00
15DR017	2.57	0.00	2.57	0.00
15DR018	5.68	1.60	1.58	2.50
15DR019	3.24	0.00	3.24	0.00
15DR020	10.31	0.00	5.00	5.31
15DR021	5.00	0.00	3.00	2.00
15DR022	4.14	0.00	4.14	0.00
15DR023	5.08	0.00	0.00	5.08
15DR024	0.47	0.00	0.00	0.47
15DR025	1.10	0.00	0.00	1.10
15DR026	4.35	0.00	0.00	4.35
Total	277.23	2.82	178.87	95.54

3. DISTRICT TRANSPORT PERSPECTIVE PLAN (DTPP)

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

3.1 CONSERVATION

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

1. Emergency maintenance - Basic repairs aimed at removing landslides and repairing damage to the road that inhibit the proper use of the road and make it impassable. This mainly takes place during and after the rainy season. A provisional lump sum is reserved for the entire district road core network based on the network length. Allocation to specific road sections is based on the actual need for clearing landslides or repairing washouts and cuts in the road.

2. Routine maintenance - General maintenance of the road aimed at preventing damage by ensuring the proper working of the different road elements (retaining walls, drainage system, carriageway, etc.) and cutting vegetation. This is carried out each year on a more or less continuous basis. Routine maintenance is required for the entire district road core network. The specific requirements for routine maintenance are determined on an annual basis through the road condition survey and defined in the ARMP.

3. Recurrent maintenance - Repairs of minor damage to the road surface and road structures to bring them back to good condition. This is generally carried out once or twice a year. Recurrent maintenance is required for the entire district road core network, whereby distinction is made according to the surface type. The specific requirements for recurrent maintenance are determined on an annual basis through the road condition survey and defined in the ARMP.

4. Periodic maintenance - Larger repairs to the road largely aimed at renewing the road surface through re-gravelling, resealing or overlays. It is generally carried out with several years interval. Although periodic maintenance is only required for specific sections of the district road core network, a lump sum allocation is made for the entire district road core network based on average annual requirements, distinguishing between different surface types. The specific periodic maintenance requirements are determined on an annual basis through the annual road condition survey and defined in the ARMP.

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

Table 3.1.1 Conservation requirements

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)
15DR001	16.33	16.33	16.33	16.33
15DR002	16.93	16.93	16.93	16.93
15DR003	20.98	20.98	20.98	20.98
15DR004	19.62	19.62	19.62	19.62
15DR005	17.81	17.81	17.81	17.81
15DR006	21.50	21.50	21.50	21.50

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)
15DR007	29.97	29.97	29.97	29.97
15DR008	23.17	23.17	23.17	23.17
15DR009	22.45	22.45	22.45	22.45
15DR010	12.72	12.72	12.72	12.72
15DR011	6.04	6.04	6.04	6.04
15DR012	1.22	1.22	1.22	1.22
15DR013	2.88	2.88	2.88	2.88
15DR014	4.08	4.08	4.08	4.08
15DR015	12.11	12.11	12.11	12.11
15DR016	7.49	7.49	7.49	7.49
15DR017	2.57	2.57	2.57	2.57
15DR018	5.58	5.58	5.58	5.58
15DR019	3.24	3.24	3.24	3.24
15DR020	10.31	10.31	10.31	10.31
15DR021	5.00	5.00	5.00	5.00
15DR022	4.14	4.14	4.14	4.14
15DR023	5.08	5.08	5.08	5.08
15DR024	0.47	0.47	0.47	0.47
15DR025	1.10	1.10	1.10	1.10
15DR026	4.35	4.35	4.35	4.35
Total	**277.23**	**277.23**	**277.23**	**277.23**

3.2 IMPROVEMENT

Improvement refers to actions required to improve a road to bring it to a maintainable all-weather standard. It includes the following actions, which for Saptari 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 and lined side drains to avoid excessive damage to the road during the rainy season and bring it to a maintainable standard.
5. Blacktopping - Placement of a blacktop layer in roads with traffic volumes exceeding 50passenger 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

The rehabilitation works are required in the constructed gravel road for keeping the surface as in condition without changing the original surface condition and the following 5 road, 59.23 km length of district core network (DRCN) were identified for rehabilitation works.

Table 3.2.1 Sections of the district road core network requiring rehabilitation

Code	Description	Total length (km)	Rehabilitation (km)
15DR001	Kusaha-Belhi Sadak	16.33	16.33
15DR002	Kadkhona-Rautahut Sadak	16.93	12.60

Code	Description	Total length (km)	Rehabilitation (km)
15DR005	Kathaunapato-Aurahi Sadak	17.81	17.81
15DR016	Portaha Bakdhuwa sadak ko Argitol dekhi Paschim Chandra Canal hudai Trikaul Gabisa hudai Goithi Bhavan	7.49	7.49
15DR020	Mahuli Lauhajara Hanumannagara Sadak	10.31	5.00
Total		**68.95**	**59.23**

3.2.2 GRAVELLING

As the entire district road core network needs to be brought to an all-weather status, gravelling of the road surface is required for all the earthen sections in the DRCN. For Saptari, this concerns 95.54 km new proposed and totalling to 274.41 km of DRCN roads.

Table 3.2.2 Sections of the district road core network requiring gravelling

Code	Description	Total length (km)	Gravelling (km)
15DR002	Kadkhona-Rautahut Sadak	16.93	4.33
15DR003	Kharchuiya-Fulkai-Kachan Deuri Sadak	20.98	10.98
15DR004	Kalyanpur-Inarwa-Phulbariya-Banaula Banauli Barahi kusaha sadak	19.62	12.12
15DR007	Rupani-Katiya-Malekhpur-fakira-Chhinamustaha-Lalpatti-Lokram sadak	29.97	1.97
15DR008	Hariharpur-Pakari-Bisariya-Tilathi Sadak	23.17	8.17
15DR009	Portaha-Bakhdhuwa Sadak	22.44	11.54
15DR010	Rajbiraj Govindapur Sadak dekhi Barahi birpur jodne sadak	12.72	12.72
15DR011	Mainakaderi-Rupani Road	6.04	6.04
15DR013	Rampur Jamuha-Basalpur Sadak	2.88	2.88
15DR014	Kathuana Patoko Amarlati chowk dekhi purba Brahmapur gabisa hudai Gamariya Prabaha hudai western canal samma	4.08	4.08
15DR018	Jandaul-Kusaha Sadak	5.58	2.40
15DR020	Mahuli lauhajara hanumannagara sadak	10.31	5.31
15DR021	Topa chowk to Uttar Mahadeva gabisa bhwan hudai bhagwatpur gabisa bhawan samma	5.00	2.00
15DR023	Rajbiraj pump canal Padariya chowk dekhi Uttar Dighuwa Gabisa Bhawan Hudai- Bhagwatpur Gabisa bhawan	5.08	5.08
15DR024	Bishnupur tol dekhi Paschim Itahari bishnupur gabisa bhawan samma sadak	0.47	0.47
15DR025	Baluwa Chowk dekhi Paschhim ghoghanpur ga.bi.sa Bhawan samma	1.10	1.10
15DR026	Andhupatti chowk dekhi Joginiya 2 ko gabisa bhawan	4.35	4.35
Total		**190.72**	**95.54**

3.2.3 CROSS DRAINAGE

The need for cross drainage was identified for the different DRCN roads. The total length of 205 m bridge, 90 m total length of slab culvert, 75 m total length of cement concrete causeway and 40 units of pipe culvert were identified as being required.

Table 3.2.3 Required cross drainage structures

Code	Description	Bridge (m)	Slab culvert (m)	CC Cause way (m)	Stone Cause way (m)	Pipe culvert (units)
15DR001	Kusaha-Belhi Sadak	-	6	-	-	2
15DR002	Kadkhona-Rautahut Sadak	-	6	-	-	1
15DR003	Kharchuiya-Fulkai-Kachan Deuri Sadak	-	6	-	-	2
15DR004	Kalyanpur-Inarwa-Phulbariya-Banaula Banauli Barahi kusaha sadak	-	-	-	-	-
15DR005	Kathaunapato-Aurahi Sadak	30	6	-	-	-

Code	Description	Bridge (m)	Slab culvert (m)	CC Cause way (m)	Stone Cause way (m)	Pipe culvert (units)
15DR006	Jharuwa chowk- Jhutaki Sadak	-	12	-	-	3
15DR007	Rupani-Katiya-Malekhpur-fakira-Chhinamustaha-Lalpatti-Lokram sadak	50	-	15	-	2
15DR008	Hariharpur-Pakari-Bisariya-Tilathi Sadak	25	6	-	-	3
15DR009	Portaha-Bakhdhuwa Sadak	-	12	15	-	3
15DR010	Rajbiraj Govindapur Sadak dekhi Barahi birpur jodne sadak	-	-	-	-	-
15DR011	Mainakaderi-Rupani Road	-	-	-	-	-
15DR012	Mauhli pul dekhi purba Biarawa Gabisa Bhawan samma	-	-	-	-	-
15DR013	Rampur Jamuha-Basalpur Sadak	-	12	-	-	3
15DR014	Kathuana Patoko Amarlati chowk dekhi purba Brahmapur gabisa hudai Gamariya Prabaha hudai western canal samma	-	-	-	-	2
15DR015	Bhardaha-Dadaha-Pakari Sadak		12	30		3
15DR016	Portaha Bakdhuwa sadak ko Argitol dekhi Paschim Chandra Canal hudai Trikaul Gabisa hudai Goithi Bhavan samma	50		15		1
15DR017	Rajbiraj Hanuman nagar sadak ko Jhalahi tol dekhi dakshin Western canal samma	-	-	-	-	-
15DR018	Jandaul-Kusaha Sadak					2
15DR019	Rajbiraj Hanumannagar sadak ko Mansapur chowk dekhi -d. canal bank hudai Kobarsain Gabisabhawan Samma	-	-	-	-	2
15DR020	Mahuli Lauhajara Hanumannagara sadak	-	-	-	-	1
15DR021	Topa chowk to Uttar Mahadeva gabisa bhwan hudai bhagwatpur gabisa bhawan samma	-	-		-	-
15DR022	Rupnagar-Kanchanpur-Pathari-Pademara Sadak	-	-	-	-	1
15DR023	Rajbiraj pump canal Padariya chowk dekhi Uttar Dighuwa Gabisa Bhawan Hudai- Bhagwatpur Gabisa bhawan	25	-	-	-	2
15DR024	Bishnupur tol dekhi Paschim Itahari bishnupur gabisa bhawan samma sadak	-	6	-	-	2
15DR025	Baluwa Chowk dekhi Paschhim ghoghanpur ga.bi.sa Bhawan samma	-	6	-	-	2
15DR026	Andhupatti chowk dekhi Joginiya 2 ko gabisa bhawan	25	-	-	-	3
Total		**205**	**90**	**75**	**-**	**40**

3.2.4 PROTECTIVE STRUCTURES

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

Table 3.2.4 Required protective structures

Code	Description	Masonry walls (m^3)	Gabion walls (m^3)	Lined drain (m)
15DR001	Kusaha-Belhi Sadak	-	24	-
15DR002	Kadkhona-Rautahut Sadak	-	20	-
15DR003	Kharchuiya-Fulkai-Kachan Deuri Sadak	-	24	-
15DR004	Kalyanpur-Inarwa-Phulbariya-Banaula Banauli Barahi kusaha sadak	-	10	-

Code	Description	Masonry walls (m^3)	Gabion walls (m^3)	Lined drain (m)
15DR005	Kathaunapato-Aurahi Sadak	-	150	-
15DR006	Jharuwa chowk- Jhutaki Sadak	-	20	-
15DR007	Rupani-Katiya-Malekhpur-fakira-Chhinamustaha-Lalpatti-Lokram sadak	-	200	-
15DR008	Hariharpur-Pakari-Bisariya-Tilathi Sadak	-	100	-
15DR009	Portaha-Bakhdhuwa Sadak	-	30	-
15DR010	Rajbiraj Govindapur Sadak dekhi Barahi birpur jodne sadak	-	15	-
15DR011	Mainakaderi-Rupani Road	-	10	-
15DR012	Mauhli pul dekhi purba biarawa gabisa bhawan samma	-	10	-
15DR013	Rampur Jamuha-Basalpur Sadak	-	32	-
15DR014	Kathuana Patoko Amarlati chowk dekhi purba Brahmapur gabisa hudai Gamariya Prabaha hudai western canal samma	-	12	-
15DR015	Bhardaha-Dadaha-Pakari Sadak	-	50	-
15DR016	Portaha Bakdhuwa sadak ko Argitol dekhi Paschim Chandra Canal hudai Trikaul Gabisa hudai Goithi Bhavan samma	-	200	-
15DR017	Rajbiraj Hanuman nagar sadak ko Jhalahi tol dekhi dakshin Western canal samma	-	10	-
15DR018	Jandaul-Kusaha Sadak	-	12	-
15DR019	Rajbiraj Hanumannagar sadak ko Mansapur chowk dekhi -d. canal bak hudai kobarsain gabisabhawan samma	-	12	-
15DR020	Mahuli lauhajara hanumannagara sadak	-	12	-
15DR021	Topa chowk to Uttar Mahadeva gabisa bhwan hudai bhagwatpur gabisa bhawan samma	-	10	-
15DR022	Rupnagar-Kanchanpur-Pathari-Pademara Sadak	-	12	-
15DR023	Rajbiraj pump canal Padariya chowk dekhi Uttar Dighuwa Gabisa Bhawan Hudai- Bhagwatpur Gabisa bhawan	-	120	-
15DR024	Bishnupur tol dekhi Paschim Itahari Bishnupur gabisa bhawan samma sadak	-	20	-
15DR025	Baluwa Chowk dekhi Paschhim ghoghanpur ga.bi.sa Bhawan samma	-	24	-
15DR026	Andhupatti chowk dekhi Joginiya 2 ko Gabisa Bhawan	-	100	-
Total		**-**	**1239**	**-**

3.2.5 WIDENING

An analysis of the traffic data for the different roads making up the district road core network shows that there is no roads that are eligible for widening to a higher standard.

Table 3.2.5 Sections of the district road core network requiring widening

Code	Description	Total length (km)	Widening (m)
Total			

3.2.6 BLACKTOPPING

For Black topping in plain area, traffic volume exceeding 150 PCU for the different roads in district core network are suitable. The blacktopping of these roads will be treated as a second phase of

improvement after they have been gravelled. In Saptari, following 9 roads are eligible for blacktopping and further traffic survey should be conducted to get exact traffic data and subsequent blacktopping needs accordingly in future and the results to be incorporated while preparing ARAMP.

Table 3.2.6 Sections of the district road core network requiring blacktopping

Code	Description	Total length (km)	Black top (km)	Traffic (PCU)	Blacktopping (km)
15DR001	Kusaha-Belhi Sadak	16.33		240	16.33
15DR002	Kadkhona-Rautahut Sadak	16.93		252	16.93
15DR003	Kharchuiya-Fulkai-Kachan Deuri Sadak	20.98		315	20.98
15DR004	Kalyanpur-Inarwa-Phulbariya-Banaula Banauli Barahi kusaha sadak	19.62		272	19.62
15DR005	Kathaunapato-Aurahi Sadak	17.81		220	17.81
15DR006	Jharuwa chowk- Jhutaki Sadak	21.50		268	21.50
15DR007	Rupani-Katiya-Malekhpur-fakira-Chhinamustaha-Lalpatti-Lokram sadak	29.97		272	29.97
15DR008	Hariharpur-Pakari-Bisariya-Tilathi Sadak	23.17		203	23.17
15DR009	Portaha-Bakhdhuwa Sadak	22.45		186	22.45
Total		**188.75**			**188.75**

3.3 NEW CONSTRUCTION

New construction of DRCN roads is not required as such all the VDC centres are linked with the identified district road core network and/or Strategic road.

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

Code	Description	New VDCs	Existing length, km	New length, km	Bridge (m)
Total					

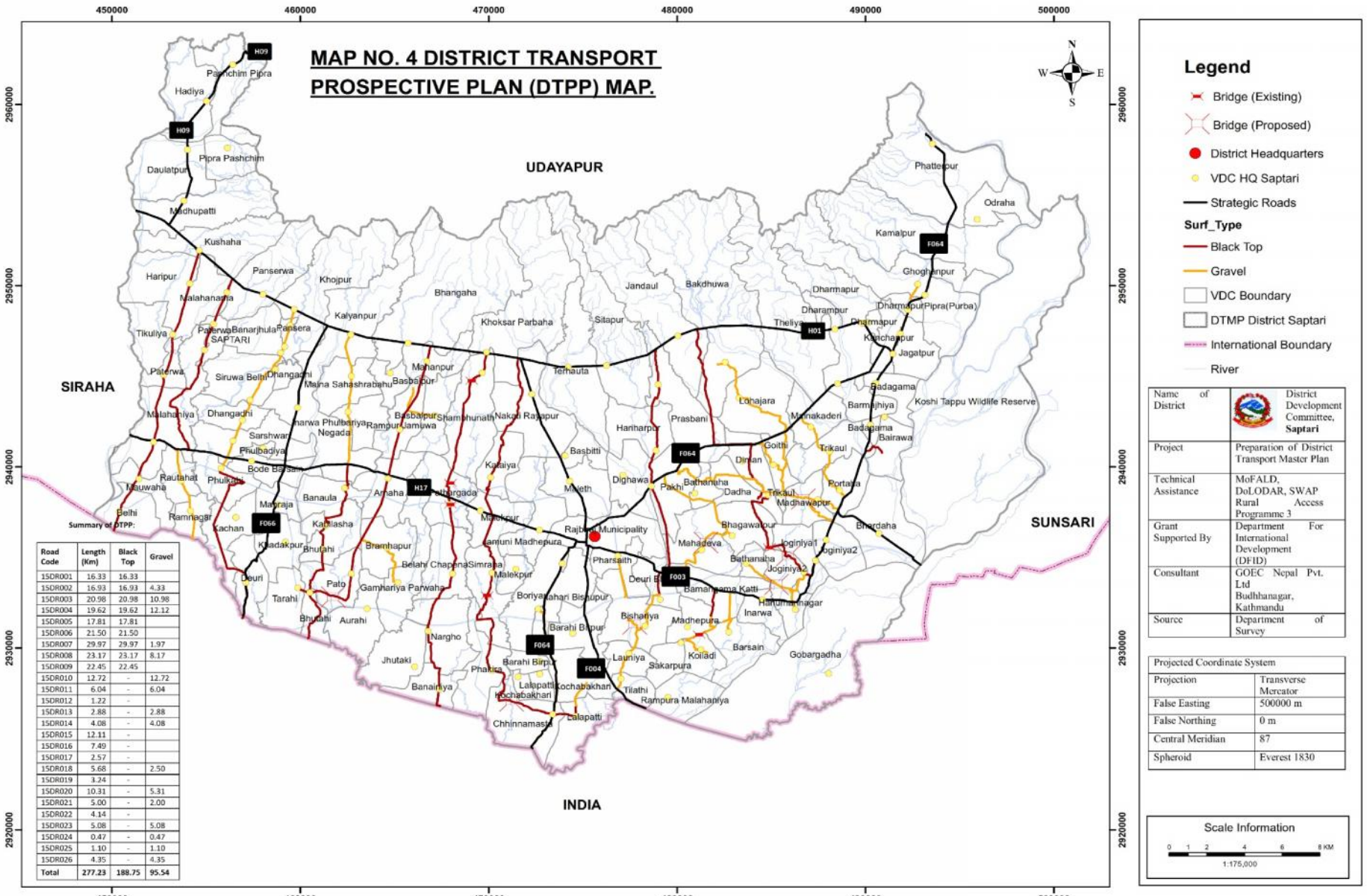
3.4 DISTRICT TRANSPORT PERSPECTIVE PLAN

The DTPP foresees bringing the entire existing district road core network to maintainable all-weather status, and provide access to all VDC headquarters. For this purpose, 188.75 km will be blacktopped, 95.54 km will be gravelled, 59.23 km will be rehabilitated and a number of different cross drainage and protective structures will be constructed for providing all weather access to all VDC headquarters. The district road core network will subsequently consist of 277.23 km of maintainable all-weather roads. The following table lists the required interventions, while the proposed network is shown in the DTPP map in figure 4.

Table 3.4.1 District Transport Perspective Plan

Code	Emergency maintenance (km)	Routine maintenance (km)	Recurrent maintenance (km)	Periodic maintenance (km)	Rehabilitation (km)	Gravelling (km)	Blacktopping (km)	Widening (m)	Bridge (m)	Slab culvert (m)	CC Causeway (m)	Stone Causeway (m)	Pipe culvert (units)	Masonry walls (m3)	Gabion walls (m3)	Lined drain (m)	New construction (km)
15DR001	16.33	16.33	16.33	16.33	16.33	-	16.33	-	-	6.00	-	-	2	-	24	-	-
15DR002	16.93	16.93	16.93	16.93	12.60	4.33	16.93	-	-	6.00	-	-	1	-	20	-	-
15DR003	20.98	20.98	20.98	20.98	-	10.98	20.98	-	-	6.00	-	-	2	-	24	-	-
15DR004	19.62	19.62	19.62	19.62	-	12.12	19.62	-	-	-	-	-	-	-	10	-	-
15DR005	17.81	17.81	17.81	17.81	17.81	-	17.81	-	30.00	6.00	-	-	-	-	150	-	-
15DR006	21.50	21.50	21.50	21.50	-	-	21.50	-	-	12.00	-	-	3	-	20	-	-
15DR007	29.97	29.97	29.97	29.97	-	1.97	29.97	-	50.00	-	15.00	-	2	-	200	-	-
15DR008	23.17	23.17	23.17	23.17	-	8.17	23.17	-	25.00	6.00	-	-	3	-	100	-	-
15DR009	22.45	22.44	22.44	22.45	-	11.44	11.00	-	-	12.00	15.00	-	3	-	30	-	-
15DR010	12.72	12.72	12.72	12.72	-	12.72	-	-	-	-	-	-	-	-	15	-	-
15DR011	6.04	6.04	6.04	6.04	-	6.04	-	-	-	-	-	-	-	-	10	-	-
15DR012	1.22	1.22	1.22	1.22	-	-	-	-	-	-	-	-	-	-	10	-	-
15DR013	2.88	2.88	2.88	2.88	-	2.88	-	-	-	12.00	-	-	3	-	32	-	-
15DR014	4.08	4.08	4.08	4.08	-	4.08	-	-	-	-	-	-	2	-	12	-	-
15DR015	12.11	12.11	12.11	12.11	-	-	-	-	-	12.00	30.00	-	3	-	50	-	-
15DR016	7.49	7.49	7.49	7.49	7.49	-	-	-	50.00	-	15.00	-	1	-	200	-	-
15DR017	2.57	2.57	2.57	2.57	-	-	-	-	-	-	-	-	-	-	10	-	-
15DR018	5.58	5.58	5.58	5.58	-	2.50	-	-	-	-	-	-	2	-	12	-	-
15DR019	3.24	3.24	3.24	3.24	-	-	-	-	-	-	-	-	2	-	12	-	-
15DR020	10.31	10.31	10.31	10.31	5.00	5.31	-	-	-	-	-	-	1	-	12	-	-
15DR021	5.00	5.00	5.00	5.00	-	2.00	-	-	-	-	-	-	-	-	10	-	-
15DR022	4.14	4.14	4.14	4.14	-	-	-	-	-	-	-	-	1	-	12	-	-
15DR023	5.08	5.08	5.08	5.08	-	5.08	-	-	25.00	-	-	-	2	-	120	-	-
15DR024	0.47	0.47	0.47	0.47	-	0.47	-	-	-	6.00	-	-	2	-	20	-	-
15DR025	1.10	1.10	1.10	1.10	-	1.10	-	-	-	6.00	-	-	2	-	24	-	-
15DR026	4.35	4.35	4.35	4.35	-	4.35	-	-	25.00	-	-	-	3	-	100	-	-
Total	**277.23**	**277.23**	**277.23**	**277.23**	**59.23**	**95.54**	**188.75**	**-**	**205**	**90**	**75**	**-**	**40**	**-**	**1239**	**-**	**-**

Figure 4 District Transport Prospective Plan (DTPP) Map



4. COST ESTIMATION

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

4.1 CONSERVATION

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

Table 4.1.1 Standard unit costs for conservation

Activity	Unit	Unit cost (NPR/km)
Emergency maintenance	km	30,000
Routine maintenance	km	20,000
Recurrent maintenance (blacktop)	km	200,000
Recurrent maintenance (gravel)	km	150,000
Recurrent maintenance (earthen)	km	100,000
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 95.528 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 477.638 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)	Black top (km)	Gravel (km)	Earthen (km)	Emergency	Routine	Recurrent (blacktop)	Recurrent (gravel)	Recurrent (earthen)	Periodic (gravel)	Total annual cost	Total 5-year cost
15DR001	16.33	-	16.33	-	490	327	-	2,450	-	-	7,349	36,743
15DR002	16.93	-	12.60	4.33	508	339	-	1,890	433	-	6,320	31,598
15DR003	20.98	-	10.00	10.98	629	420	-	1,500	1,098	250	6,147	30,735
15DR004	19.62	-	7.50	12.12	589	392	-	1,125	1,212	6,625	5,193	25,965
15DR005	17.81	-	17.81	-	534	356	-	2,672	-	-	8,015	40,073
15DR006	21.50	-	21.50	-	645	430	-	3,225	-	-	9,675	48,375
15DR007	29.97	-	28.00	1.97	899	599	-	4,200	197	-	12,896	64,478
15DR008	23.17	-	15.00	8.17	695	463	-	2,250	817	-	7,976	39,878
15DR009	22.44	-	11.00	11.44	673	449	-	1,650	1,144	2,750	6,666	33,330
15DR010	12.72	-	-	12.72	382	254	-	-	1,272	500	1,908	9,540
15DR011	6.04	-	-	6.04	181	121	-	-	604	-	906	4,530
15DR012	1.22	1.22	-	-	37	24	244	-	-	-	305	1,525
15DR013	2.88	-	-	2.88	86	58	-	-	288	-	432	2,160
15DR014	4.08	-	-	4.08	122	82	-	-	408	-	612	3,060
15DR015	12.11	-	12.11	-	363	242	-	1,817	-	4,083	5,450	27,248
15DR016	7.49	-	7.49	-	225	150	-	1,124	-	3,150	3,371	16,853

Code	Total length (km)	Black top (km)	Gravel (km)	Earthen (km)	Emergency	Routine	Recurrent (blacktop)	Recurrent (gravel)	Recurrent (earthen)	Periodic (gravel)	Total annual cost	Total 5-year cost
15DR017	2.57	-	2.57	-	77	51	-	386	-	2,500	1,157	5,783
15DR018	5.58	1.60	1.58	2.40	170	112	320	237	250	1,875	1,486	7,430
15DR019	3.24	-	3.24	-	97	65	-	486	-	4,453	1,458	7,290
15DR020	10.31	-	5.00	5.31	309	206	-	750	531	5,375	3,047	15,233
15DR021	5.00	-	3.00	2.00	150	100	-	450	200	7,000	1,650	8,250
15DR022	4.14	-	4.14	-	124	83	-	621	-	3,750	1,863	9,315
15DR023	5.08	-	-	5.08	152	102	-	-	508	-	762	3,810
15DR024	0.47	-	-	0.47	14	9	-	-	47	-	71	353
15DR025	1.10	-	-	1.10	33	22	-	-	110	-	165	825
15DR026	4.35	-	-	4.35	131	87	-	-	435	-	653	3,263
Total	**277.23**	**2.82**	**178.87**	**95.54**	**8,317**	**5,545**	**564**	**26,831**	**9,554**	**44,718**	**95,528**	**477,638**

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	2,500
Gravelling	km	2,000,000
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 1480.945 million as indicated in the table below.

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

Code	Total length (km)	Rehabilitation	Gravelling	Blacktopping	Bridges	Slab Culvert	CC causeways	Pipe culvert	Gabion walls	Total cost
15DR001	16.33	13,064	-	93,081	-	900	-	20	60	107,125
15DR002	16.93	10,080	9,526	96,501	-	900	-	10	50	117,067
15DR003	20.98	-	24,156	119,586	-	900	-	20	60	144,722
15DR004	19.62	-	26,664	111,834	-	-	-	-	25	138,523
15DR005	17.81	14,248	-	101,517	18,000	900	-	-	375	135,040
15DR006	21.50	-	-	122,550	-	1,800	-	30	50	124,430
15DR007	29.97	-	4,334	170,829	30,000	-	1,500	20	500	192,183
15DR008	23.17	-	17,974	132,069	15,000	900	-	30	250	181,223
15DR009	22.44	-	25,168	127,908	-	1,800	1,500	30	75	156,481
15DR010	12.72	-	27,984	-	-	-	-	-	38	28,022
15DR011	6.04	-	13,288	-	-	-	-	-	25	13,313

Code	Total length (km)	Rehabilitation	Gravelling	Blacktopping	Bridges	Slab Culvert	CC causeways	Pipe culvert	Gabion walls	Total cost
15DR012	1.22	-	-	-	-	-	-	-	25	25
15DR013	2.88	-	6,336	-	-	1,800	-	30	80	8,246
15DR014	4.08	-	8,976	-	-	-	-	20	30	9,026
15DR015	12.11	-	-		-	1,800	3,000	30	125	4,955
15DR016	7.49	5,992	-	-	30,000	-	1,500	10	500	38,002
15DR017	2.57	-	-	-	-	-	-	-	25	25
15DR018	5.58	-	5,500	-	-	-	-	20	30	5,550
15DR019	3.24	-	-	-	-	-	-	20	30	50
15DR020	10.31	4,000	11,682	-	-	-	-	10	30	15,722
15DR021	5.00	-	4,400	-	-	-	-	-	25	4,425
15DR022	4.14	-	-	-	-	-	-	10	30	40
15DR023	5.08	-	11,176	-	15,000	-	-	20	300	26,496
15DR024	0.47	-	1,034	-	-	900	-	20	50	2,004
15DR025	1.10	-	2,420	-	-	900	-	20	60	3,400
15DR026	4.35	-	9,570	-	15,000	-	-	30	250	24,850
Total	**277.23**	**47,384**	**210,188**	**1,075,875**	**123,000**	**13,500**	**7,500**	**400**	**3,098**	**1,480,945**

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	2,000,000
Bridge construction	m	600,000

No new construction of road is needed for Saptari as such all VDCs have been already accessed and linked by existing roads.

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

Code	Description	Length (km)	Opening up	Gravel	Bridges	Total cost
Total						

4.4 DTPP COSTS

The total costs for the District Transport Perspective Plan come to NPR 1,958.582 million as indicated in the table below.

Table 4.4.1 DTPP costs (NPR '000)

Code	Conservation	Improvement	New construction	Total
15DR001	36,743	107,125	-	143,868
15DR002	31,598	117,067	-	148,665
15DR003	30,735	144,722	-	175,457
15DR004	25,965	138,523	-	164,488
15DR005	40,073	135,040	-	175,113
15DR006	48,375	124,430	-	172,805
15DR007	64,478	207,183	-	256,661
15DR008	39,878	166,223	-	222,101
15DR009	33,330	156,481	-	189,811
15DR010	9,540	28,022	-	37,562
15DR011	4,530	13,313	-	17,843

Code	Conservation	Improvement	New construction	Total
15DR012	1,525	25	-	1,550
15DR013	2,160	8,246	-	10,406
15DR014	3,060	9,026	-	12,086
15DR015	27,248	4,955	-	32,203
15DR016	16,853	38,002	-	54,855
15DR017	5,783	25	-	5,808
15DR018	7,430	5,550	-	12,980
15DR019	7,290	50	-	7,340
15DR020	15,233	15,722	-	30,955
15DR021	8,250	4,425	-	12,675
15DR022	9,315	40	-	9,355
15DR023	3,810	26,496	-	30,306
15DR024	353	2,004	-	2,357
15DR025	825	3,400	-	4,225
15DR026	3,263	24,850	-	28,113
Total	**477,638**	**1,480,945**	**-**	**1,958,582**

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 1**.

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)
15DR024	0.47	14	9	-	-	47	-	-	71	4,849	15
15DR025	1.10	33	22	-	-	110	-	-	165	5,864	28
15DR010	12.72	382	254	-	-	1,272	-	-	1,908	54,209	35
15DR014	4.08	122	82	-	-	408	-	-	612	10,818	57
15DR012	1.22	37	24	244	-	-	-	-	305	4,597	66
15DR011	6.04	181	121	-	-	604	-	-	906	13,585	67
15DR026	4.35	131	87	-	-	435	-	-	653	9,500	69
15DR023	5.08	152	102	-	-	508	-	-	762	10,033	76
15DR022	4.14	124	83	-	621	-	-	1,035	1,863	17,629	106
15DR017	2.57	77	51	-	386	-	-	643	1,157	10,635	109
15DR013	2.88	86	58	-	-	288	-	-	432	3,151	137
15DR004	19.62	589	392	-	1,125	1,212	-	1,875	5,193	35,176	148
15DR008	23.17	695	463	-	2,250	817	-	3,750	7,976	49,961	160
15DR016	7.49	225	150	-	1,124	-	-	1,873	3,371	19,860	170
15DR001	16.33	490	327	-	2,450	-	-	4,083	7,349	36,476	201
15DR003	20.98	629	420	-	1,500	1,098	-	2,500	6,147	26,516	232
15DR015	12.11	363	242	-	1,817	-	-	3,028	5,450	22,231	245
15DR019	3.24	97	65	-	486	-	-	810	1,458	5,458	267
15DR021	5.00	150	100	-	450	200	-	750	1,650	5,807	284
15DR002	16.93	508	339	-	1,890	433	-	3,150	6,320	22,216	284
15DR020	10.31	309	206	-	750	531	-	1,250	3,047	9,923	307
15DR018	5.68	170	114	320	237	250	-	395	1,486	4,723	315
15DR005	17.81	534	356	-	2,672	-	-	4,453	8,015	24,833	323
15DR006	21.50	645	430	-	3,225	-	-	5,375	9,675	28,884	335
15DR009	22.44	673	449	-	1,650	1,144	-	2,750	6,666	19,426	343
15DR007	29.97	899	599	-	4,200	197	-	7,000	12,896	37,563	343

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

1. Emergency maintenance
2. Routine maintenance
3. Recurrent maintenance paved roads
4. Recurrent maintenance gravel roads
5. Recurrent maintenance gravel roads

6. Periodic maintenance blacktop roads
7. Periodic maintenance gravel roads

5.2 IMPROVEMENT

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

Table 5.2.1 Ranking of improvement works (NPR '000)

Code	Total length (km)	Gravelling (km)	Blacktopping (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)
15DR022	4.14	-	-	40	17,629	2
15DR017	2.57	-	-	25	10,635	2
15DR012	1.22	-	-	25	4,597	5
15DR019	3.24	-	-	50	5,458	9
15DR015	12.11	-	-	4,955	22,231	223
15DR024	0.47	0.47	-	2,004	4,849	413
15DR010	12.72	12.72	-	28,022	54,209	517
15DR025	1.10	1.10	-	3,400	5,864	580
15DR021	5.00	2.00	-	4,425	5,807	762
15DR014	4.08	4.08	-	9,026	10,818	834
15DR011	6.04	6.04	-	13,313	13,585	980
15DR018	5.68	2.50	-	5,550	4,723	1,175
15DR020	10.31	5.31	-	15,722	9,923	1,584
15DR016	7.49	-	-	38,002	19,860	1,913
15DR026	4.35	4.35	-	24,850	9,500	2,616
15DR013	2.88	2.88	-	8,246	3,151	2,617
15DR023	5.08	5.08	-	26,496	10,033	2,641
15DR001	16.33	-	16.33	107,125	36,476	2,937
15DR008	23.17	8.17	23.17	181,223	49,961	3,627
15DR004	19.62	12.12	19.62	138,523	35,176	3,938
15DR006	21.50	-	21.50	124,430	28,884	4,308
15DR007	29.97	1.97	29.97	192,183	37,563	5,116
15DR002	16.93	4.33	16.93	117,067	22,216	5,269
15DR005	17.81	-	17.81	135,040	24,833	5,438
15DR003	20.98	10.98	20.98	144,722	26,516	5,458
15DR009	22.44	11.44	22.44	156,481	19,426	8055

5.3 NEW CONSTRUCTION

Since there is no need of new construction, ranking is also absent.

Table 5.3.1 Ranking of construction works (NPR '000)

Code	Length (km)	Total cost (NPR '000)	Population served	Cost/person (NPR)

6. DISTRICT TRANSPORT MASTER PLAN (DTMP)

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

6.1 FIVE YEAR PROJECTED FINANCIAL RESOURCES

The projected financial resources for the next five years are estimated by considering all possible funding sources. The funding levels are based on the existing trend of funding. An annual increase in funding of 10% is assumed for all funding sources. The total district budget estimated for the road sector is NPR 829.5 million for the five-year period.

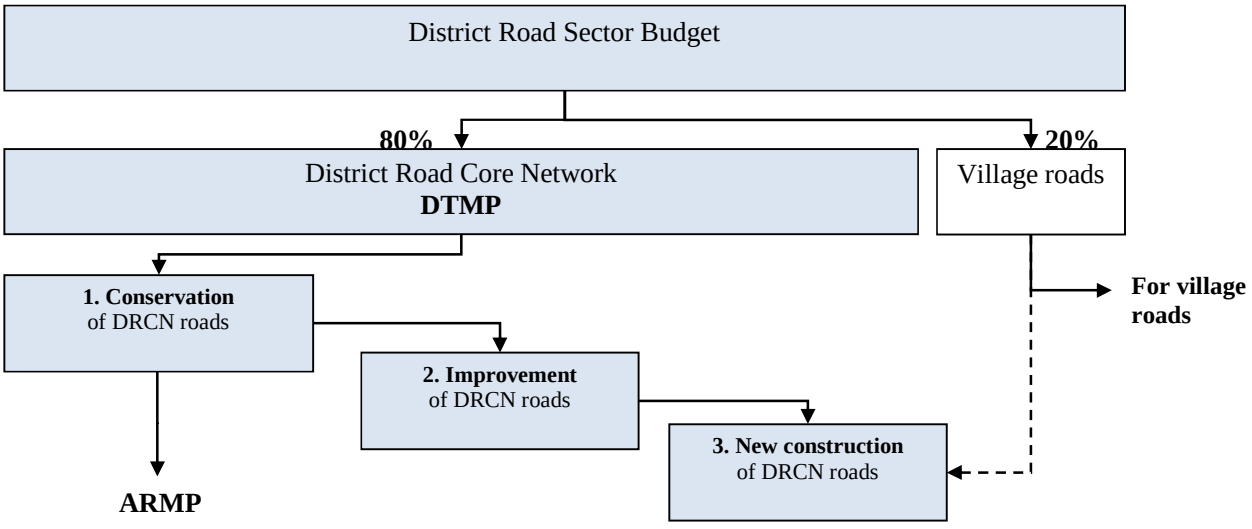
Table 6.1.1 Estimated funding levels (roads) for next five years (in NPR '000)

Funding source	2070/71	2071/72	2072/73	2073/74	2074/75
DDC Grant (30% of Total)	2,320	2,552	2,807	3,088	3,397
VDC Grant (30% of Total)	40,169	44,186	48,605	53,465	58,812
RAIDP	40,450	44,495	48,945	53,839	59,223
RTISWAP	15,950	17,545	19,300	21,229	23,352
Road Boards	4,000	4,400	4,840	5,324	5,856
Central Roads	1,200	1,320	1,452	1,597	30,128
Fund of Members of Parliaments (10% of total)	500	550	605	666	35,474
People's contribution (20%)	20,918	23,010	25,311	27,842	30,807
Total	**125,507**	**138,057**	**151,863**	**167,050**	**247,049**
Grand total	**829,526**				

6.2 BUDGET ALLOCATION

The distribution of the available district road sector budget is indicated in the figure below. Due to the low number of village roads, 80% of the total budget is reserved for the district road core network. The remaining 20% is to be used by the DDC for the village roads, giving priority to emergency maintenance and routine/recurrent maintenance. Alternatively, this 20% may be used for the new construction of DRCN roads where this is considered a priority by the district. The 80% of the district road sector budget for the DTMP is allocated firstly to conservation, secondly improvement, and any remaining funding is allocated to new construction.

Figure 3 District road sector budget allocation



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 DTMP investment plan

Item				Year														
Fiscal year				2070/71			2071/72			2072/73			2073/74			2074/75		
Total budget				125,507			138,057			151,863			167,050			247,049		
Non-DRCN roads				25,101			27,611			30,373			33,410			49,410		
DRCN budget				**100,405**			**110,446**			**121,491**			**133,640**			**197,639**		
Core network length (km)				**277.23**			**277.23**			**277.23**			**277.23**			**277.23**		
Blacktop (km)				2.82			2.82			2.82			2.82			2.82		
Gravel (km)				178.87			194.12			213.09			217.12			220.30		
Earthen (km)				95.54			80.29			61.32			57.29			49.01		
Conservation (NPR '000)				**59,754**			**61,843**			**63,176**			**63,578**			**65,991**		
Emergency				8,317			8,317			8,317			8,317			8,317		
Routine				5,545			5,545			5,545			5,545			5,545		
Recurrent (blacktop)				564			564			564			564			1,585		
Recurrent (gravel)				26,831			29,119			31,964			32,568			33,044		
Recurrent (earthen)				9,554			8,029			6,132			5,729			4,901		
Periodic (blacktop)				-			564			-			-			1,585		
Periodic (gravel)				8,944			9,706			10,655			10,856			11,015		
Improvement	**Cost**	**BT**	**GR**	**40,652**	**BT**	**GR**	**49,058**	**BT**	**GR**	**58,767**	**BT**	**GR**	**69,233**	**BT**	**GR**	**131,568**	**BT**	**GR**
15DR022	40	-	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR017	25	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR012	25	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR019	50	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR015	4,955	-	-	4,955	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR024	2,004	-	0.47	2,004	-	0.47	-	-	-	-	-	-	-	-	-	-	-	-
15DR010	28,022	-	12.72	28,022	-	12.72	-	-	-	-	-	-	-	-	-	-	-	-
15DR025	3,400	-	1.10	3,400	-	1.10	-	-	-	-	-	-	-	-	-	-	-	-
15DR021	4,425	-	2.00	2,131	-	0.96	2,294	-	1.04	-	-	-	-	-	-	-	-	-
15DR014	9,026	-	4.08	-	-		9,026	-	4.08	-	-	-	-	-	-	-	-	-
15DR011	13,313	-	6.04	-	-	-	13,313	-	6.04	-	-	-	-	-	-	-	-	-
15DR018	5,550	-	2.50	-	-		5,550	-	2.50	-	-	-	-	-	-	-	-	-
15DR020	15,722	-	5.31	-	-	-	15,722	-	5.31	-	-	-	-	-	-	-	-	-
15DR016	38,002	-	-	-	-	-	2,699	-	-	35,303	-	-	-	-	-	-	-	-
15DR026	24,850	-	4.35	-	-	-	-	-	-	23,012	-	4.03	1,838	-	0.32	-	-	-
15DR013	8,246	-	2.88	-	-	-	-	-	-	-	-	-	8,246	-	2.88	-	-	-
15DR023	26,496	-	5.08	-	-	-	-	-	-	-	-	-	26,496	-	5.08	-	-	-
15DR001	107,125	16.33	-	-	-	-	-	-	-	-	-	-	33,481	5.10	-	73,644	11.23	-
15DR008	166,223	23.17	8.17	-	-	-	-	-	-	-	-	-	-	-	-	58,004	7.42	2.61
15DR004	138,523	19.62	12.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR006	124,430	21.50	-	-		-	-		-	-	-	-	-	-	-	-	-	-
15DR007	207,183	29.97	1.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR002	117,067	16.93	4.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR005	135,040	17.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR003	144,722	20.98	10.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15DR009	156,481	22.44	11.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total improvement				**40,652**	**-**	**15.25**	**48,603**	**-**	**18.97**	**58,315**	**-**	**4.03**	**70,061**	**5.10**	**8.28**	**131,648**	**18.64**	**2.61**
Construction	**Cost**	**GR**			**GR**			**GR**			**GR**			**GR**			**GR**	
None	-	-		-	-		-	-		-	-		-	-		-	-	

6.3 DTMP OUTPUTS

Based on the investment plan presented above, all DRCN roads will be conserved for the duration of the DTMP period. A further 23.75 km will be improved to blacktop standard and 49.14 km will be improved to gravel standard. All of these roads will also receive the cross drainage and protective structures required to make them maintainable all-weather roads. The remaining 204.26 km gravel road and 46.40 km earthen roads at the end of the DTMP period will be improved in the next DTMP.

Table 6.3.1 DTMP output

Conservation	Improvement gravel	Improvement blacktop	New construction
277.23	49.14	23.75	-

Of the total DTMP budget, NPR 314.34 million will be spent on conservation and NPR 349.28 million on improvement. This will use up the entire DTMP budget for the five-year period.

6.4 DTMP OUTCOME

As a result of the activities planned in this DTMP, the percentage of all-weather maintainable DRCN roads increases by 9% from 181.69 km to 230.83 km, with 17% (46.40 km) remaining fair weather.

Table 6.4.1 Standard of DRCN roads

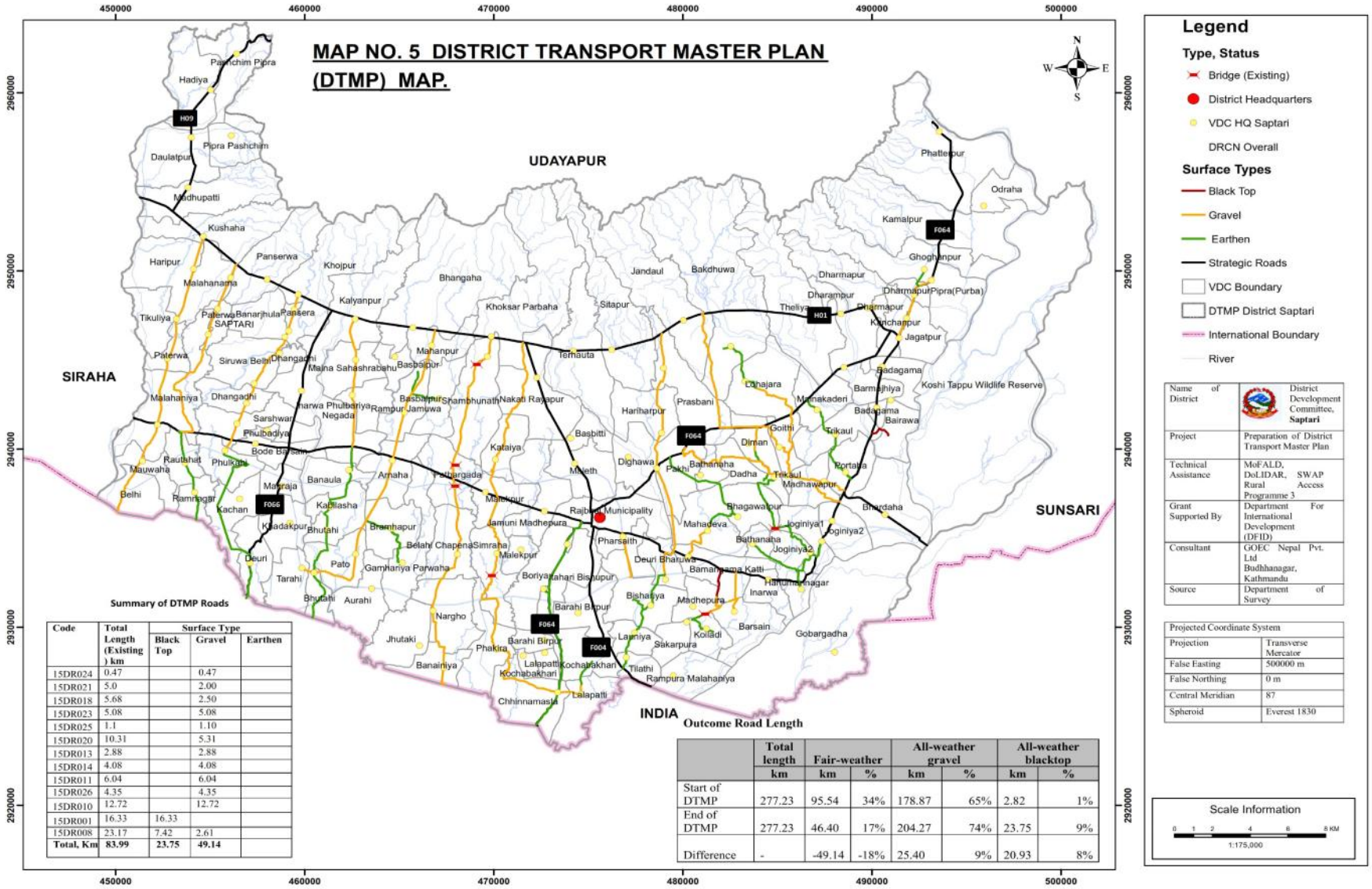
	Total length	Fair-weather		All-weather gravel		All-weather blacktop	
	km	km	%	km	%	km	%
Start of DTMP	277.23	95.54	34%	178.87	65%	2.82	1%
End of DTMP	277.23	46.40	17%	204.26	74%	23.75	9%
Difference	-	-49.14	-18%	25.39	9%	20.93	8%

The number of VDC headquarters with access to the SRN or all-weather DRCN roads will increase from 41 to 83 and the district population with access to the SRN or all-weather DRCN roads will increase from 35% to 74%.

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			No access to DRCN		
	VDCs	Population	%	VDCs	Population	%	VDCs	Population	%	VDCs	Population	%
Start of DTMP	40	260,568	41%	40	233,468	37%	41	222,676	35%	0	-	0%
End of DTMP	40	260,568	41%	0	-	0%	83	460,089	74%	0	-	0%
Difference	-	-	0%	-40	-233,468	-37%	42	246,407	39%	-	-	0%

Figure 5 District Transport Master Plan (DTMP)



Summary of DTMP Roads

Code	Total Length (Existing) km	Surface Type		
		Black Top	Gravel	Earthen
15DR024	0.47		0.47	
15DR021	5.0		2.00	
15DR018	5.68		2.50	
15DR023	5.08		5.08	
15DR025	1.1		1.10	
15DR020	10.31		5.31	
15DR013	2.88		2.88	
15DR014	4.08		4.08	
15DR011	6.04		6.04	
15DR026	4.35		4.35	
15DR010	12.72		12.72	
15DR001	16.33	16.33		
15DR008	23.17	7.42	2.61	
Total, Km	**83.99**	**23.75**	**49.14**	

Outcome Road Length

	Total length	Fair-weather		All-weather gravel		All-weather blacktop	
	km	km	%	km	%	km	%
Start of DTMP	277.23	95.54	34%	178.87	65%	2.82	1%
End of DTMP	277.23	46.40	17%	204.27	74%	23.75	9%
Difference	-	-49.14	-18%	25.40	9%	20.93	8%

Name of District	District Development Committee, **Saptari**
Project	Preparation of District Transport Master Plan
Technical Assistance	MoFALD, DoLIDAR, SWAP Rural Access Programme 3
Grant Supported By	Department For International Development (DFID)
Consultant	GOEC Nepal Pvt. Ltd Budhhanagar, Kathmandu
Source	Department of Survey

Projected Coordinate System	
Projection	Transverse Mercator
False Easting	500000 m
False Northing	0 m
Central Meridian	87
Spheroid	Everest 1830

ANNEXES

ANNEX 1 TRAFFIC DATA

Code	Description	Total length (km)	Motor -cycle	Car- Jeep- Minibus	Tractor	Truck- Bus	PCU
15DR001	Kusaha-Belhi Sadak	16.33	120	40	30	20	**240**
15DR002	Kadkhona-Rautahut Sadak	16.93	112	44	32	22	**252**
15DR003	Kharchuiya-Fulkai-Kachan Deuri Sadak	20.98	134	48	36	32	**315**
15DR004	Kalyanpur-Inarwa-Phulbariya-Banaula Banauli Barahi kusaha sadak	19.62	124	46	30	26	**272**
15DR005	Kathaunapato-Aurahi Sadak	17.81	104	40	24	20	**220**
15DR006	Jharuwa chowk- Jhutaki Sadak	21.50	120	48	28	26	**268**
15DR007	Rupani-Katiya-Malekhpur-fakira-Chhinamustaha-Lalpatti-Lokram sadak	29.97	152	52	32	20	**272**
15DR008	Hariharpur-Pakari-Bisariya-Tilathi Sadak	23.17	130	38	22	14	**203**
15DR009	Portaha-Bakhdhuwa Sadak	22.44	124	36	20	12	**186**
15DR010	Rajbiraj Govindapur Sadak dekhi Barahi birpur jodne sadak	12.72	68	24	16	10	**130**
15DR011	Mainakaderi-Rupani Road	6.04	40	20	10	6	**84**
15DR012	Mauhli pul dekhi purba biarawa gabisa bhawan samma	1.22	12	4	2	0.8	**17**
15DR013	Rampur Jamuha-Basalpur Sadak	2.88	16	4.8	2.4	1.2	**22**
15DR014	Kathuana Patoko Amarlati chowk dekhi purba Brahmapur gabisa hudai Gamariya Prabaha hudai western canal samma	4.08	26	10	3.2	2	**37**
15DR015	Bhardaha-Dadaha-Pakari Sadak	12.11	80	30	12	8	**126**
15DR016	Portaha Bakdhuwa sadak ko Argitol dekhi Paschim Chandra Canal hudai Trikaul Gabisa hudai Goithi Bhavan samma	7.49	70	24	10	4.8	**98**
15DR017	Rajbiraj Hanuman nagar sadak ko Jhalahi tol dekhi dakshin Western canal samma	2.57	56	12	4	14	**104**
15DR018	Jandaul-Kusaha Sadak	5.58	36	7.2	3.6	1.2	**37**
15DR019	Rajbiraj Hanumannagar sadak ko Mansapur chowk dekhi -d. canal bak hudai kobarsain gabisabhawan samma	3.24	24	8	2.4	0.8	**28**
15DR020	Mahuli lauhajara hanumannagara sadak	10.31	40	12	4	1.2	**45**
15DR021	Topa chowk to Uttar Mahadeva gabisa bhwan hudai bhagwatpur gabisa bhawan samma	5.00	22	4	2.4	0.8	**23**
15DR022	Rupnagar-Kanchanpur-Pathari-Pademara Sadak	4.14	20	4	2.4	0.8	**22**
15DR023	Rajbiraj pump canal Padariya chowk dekhi Uttar Dighuwa Gabisa Bhawan Hudai- Bhagwatpur Gabisa bhawan	5.08	32	5.6	3.2	1.2	**33**
15DR024	Bishnupur tol dekhi Paschim Itahari bishnupur gabisa bhawan samma sadak	0.47	8	2	1.6	0.4	**11**
15DR025	Baluwa Chowk dekhi Paschhim ghoghanpur ga.bi.sa Bhawan samma	1.10	8	2.4	1.6	0.4	**11**
15DR026	Andhupatti chowk dekhi Joginiya 2 ko gabisa bhawan	4.35	18	3.2	2.8	0.8	**21**
Total		**277.23**					

ANNEX 2 POPULATION SERVED

ANNEX 3 LOCATION OF PROPOSED INTERVENTIONS

ANNEX 4 OVERALL ROAD INVENTORY

ANNEX 5 DATA COLLECTION AND GIS PROCESSING

A. DATA COLLECTION PROCESS

As mentioned in DTMP Guidelines 2012, the data collection procedure has been conducted. Some of the general data such as district area, population, hydrological and metrological data, SRN status has been collected from secondary sources like Central Bureau of Statistics Nepal, Profile of Nepal 2013 and DoR Publications. For Primary data collection, i.e. Existing Road Inventory; GPS (model C60s and C62s) and Motorcycle has been used. Further for DRCN (new roads), Topographic maps (1:25000) in hard copy and soft copy with aid of Google Earth has been used.

B. GIS PROCESSING FOR MAP PREPARATION

The map preparation process is governed by the field work and field work is ruled by the proper adjustment in GPS. For setting the GPS, we have followed the following steps

1. Set the GPS for units and time
2. For position, select USER UTM Grid defined from the list for grid and define the properties as below:

Latitude of origin	E87
Scale factor	0.9999
False easting	500000 Meter
False northing	0 Meter
Select Datum	WGS84

After collection of the data in waypoint and track format, it is imported to computer by DNR Garmin Software and exported in KML and GPX format. The KML or GPX data is added to ARC GIS 9.3 and exported to Shape file. Added Shape file of Track is edited and append in ***Road_Inventory.shp*** whose property is given below,

Projected Coordinate System:	UTM-87
Projection:	Transverse_Mercator
False_Easting:	500000.00000000
False_Northing:	0.00000000
Central_Meridian:	87.00000000
Scale_Factor:	0.99990000
Latitude_Of_Origin:	0.00000000
Linear Unit:	Meter
Geographic Coordinate System:	GCS_Everest_1830
Datum:	D_Everest_Adj_1937
Prime Meridian:	Greenwich
Angular Unit:	Degree

Now, for transferring the ***Road_Inventory.shp*** does not require to transform in Google Earth format, it will directly overlay above the Google Earth with some minimum error. But for remaining general shape file, they should be transformed from Topo to Google Earth.

ANNEX 6 PHOTOGRAPHS