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,

Jhapa
February 2013

Prepared by the District Technical Office (DTO) for Jhapa 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
It is my great pleasure to introduce this District Transport Master Plan (DTMP) of Jhapa district especially for district road core network (DRCN). I believe that this document will be helpful in backstopping to Rural Transport Infrastructure Sector Wide Approach (RTI SWAp) through sustainable planning, resources mobilization, implementation and monitoring of the rural road sub-sector development. The document is anticipated to generate substantial employment opportunities for rural people through increased and reliable accessibility in on-farm and off-farm livelihood diversification and commercialization and industrialization of agriculture sector. In this context, rural road sector will play a fundamental role to strengthen and promote overall economic growth of this district through established and improved year round transport services reinforcing intra and inter-district linkages.

Therefore, it is most crucial in executing rural road networks in a planned way as per the District Transport Master Plan (DTMP) by considering the framework of available resources in DDC comprising both internal and external sources. Viewing these aspects, DDC Jhapa has prepared the DTMP by focusing most of the available resources into upgrading and maintenance of the existing road networks. This document is also been assumed to be helpful in lobbing and fascinating the donor agencies through central government towards generating needy resources through basket fund approach. Furthermore, this document will be supportive in avoiding pervasive duplication approach in resources allocation under the rural road network development sector of this district.

I would, firstly like to express my gratitude to Ministry of Local Development (MoLD) Department of Local Infrastructure Development and Agriculture Roads (DoLIDAR), Central as well as district team of RTI-Sector Maintenance Pilot and all entire technical experts.

Any creative and constructive suggestions regarding this document will be highly appreciated.

Lalmani Ojha
Local Development Officer
District Development Committee
Jhapa, Nepal
ACKNOWLEDGEMENTS

District Transport Master Plan (DTMP) of Jhapa District has been prepared with support from UK AID/DFID, Technical Assistance by RTI Sector Maintenance Pilot and close coordination with DoLIDAR.

We would like to express our gratitude to Mr Lalmani Ojha, Local Development Officer (LDO), Er. Rajesh Prasad Ghimire, Chief District Engineer, Er. Sushil Shrestha and Shrawan Chaudhary, DTO Engineers, DTO Sub-Engineers and other DDC and DTO staff for their valuable suggestions and co-operation for the preparation of this report.

We would also like to thank Er. Bhupendra Bahadur Basnet, Director General of DoLIDAR, members of the DOLIDAR Technical Committee, including Er. Ganga Bahadur Basnet, Coordinator, Er. Jeevan Guragain and Er. Kumar Thapa (SDE-DoLIDAR) Er. Krishna Bahadur Katwal (Engineer-DoLIDAR), and Mr. Manoj Krishna Shrestha, RTI Planning and Infrastructure Specialist, as well as Serge Cartier Van Dissel, RTI Rural Roads Engineering Specialist, Mr. Michael Green, RTI Team Leader and all of whom were instrumental in shaping the new, “slim “ version of the DTMP.

While preparing DTMP, the valuable inputs & suggestions were concisely documented and prepared by Er. Krishna Sharan Dhungana, RTI Pilot District Asset Management Engineer and Mr. Parshuram Shrestha, RTI Pilot Sub Asset Management Engineer. The authors are grateful to all the political leaders, line agencies, NGOs and local people who have rendered their valuable assistance to the team during the preparation of the DTMP.
EXECUTIVE SUMMARY

Jhapa District is located in Mechi Zone of the Eastern Development Region of Nepal. It borders with West Bengal (India) to the East, Morang district to the West, Ilam district to the North and Bihar (India) to the South. The district has 3 municipalities (Bhadrapur, Damak and Mechinagar) and 47 VDCs. The total area of the district is 1,606 km$^2$. The lowest elevation point is 58 meter which is the lowest point of Nepal and highest elevation point is 500 meter above sea level. The current population of the district is 633,042 and the average population density is around 394 people per square km. The district headquarter in is connected by feeder road to the East-West Highway at Birtamod, and the district is also connected to the Hill parts of the eastern region of Nepal. This district is the gateway to India for the Eastern Development Region of Nepal.

The district inventory identified just more than 2,000 km of roads, including 217km of strategic road network, 790 km of urban road network, 209 km of district road core network (DRCN) and 792km of village road network. Of the core district road network, 17% is black topped, 80% has a gravel surface and 3% has an earthen surface, resulting in 96% being considered all-weather and only 4% fair weather.

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Total length</th>
<th>Black Top</th>
<th>Gravel</th>
<th>Earthen</th>
</tr>
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<tr>
<td>Strategic road network</td>
<td>216.60</td>
<td>139.92</td>
<td>39.68</td>
<td>37.00</td>
</tr>
<tr>
<td>Urban roads</td>
<td>790.72</td>
<td>70.01</td>
<td>352.79</td>
<td>367.92</td>
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<tr>
<td>District road core network</td>
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<td>36.53</td>
<td>164.46</td>
<td>8.01</td>
</tr>
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<td>Village roads</td>
<td>791.72</td>
<td>19.63</td>
<td>596.10</td>
<td>175.99</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,008.04</strong></td>
<td><strong>266.09</strong></td>
<td><strong>1,153.03</strong></td>
<td><strong>588.92</strong></td>
</tr>
</tbody>
</table>

Annual conservation costs for the entire district road core network are estimated at NPR 139 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 695 million. 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>
<thead>
<tr>
<th>Improvement type</th>
<th>Requirement</th>
<th>Cost (NPR)</th>
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</thead>
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<tr>
<td>Bridges</td>
<td>264 m</td>
<td>79,200,000</td>
</tr>
<tr>
<td>Slab culverts</td>
<td>20 m</td>
<td>3,000,000</td>
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<tr>
<td>Causeways</td>
<td>30 m</td>
<td>3,000,000</td>
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<tr>
<td>Hume pipes</td>
<td>35 units</td>
<td>444,220</td>
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<tr>
<td>Masonry retaining walls</td>
<td>2167.5 m$^3$</td>
<td>22,206,038</td>
</tr>
<tr>
<td>Gabion retaining walls</td>
<td>410 m$^3$</td>
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</tr>
<tr>
<td>Lined drains</td>
<td>0 m</td>
<td>-</td>
</tr>
<tr>
<td>Widening</td>
<td>0 m</td>
<td>-</td>
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<tr>
<td>Rehabilitation</td>
<td>0 km</td>
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</tr>
<tr>
<td>Gravelling</td>
<td>7.01 km</td>
<td>15,422,000</td>
</tr>
<tr>
<td>Blacktopping</td>
<td>129.67 km</td>
<td>739,119,000</td>
</tr>
<tr>
<td>New construction</td>
<td>- km</td>
<td>79,200,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>942,616,258</strong></td>
</tr>
</tbody>
</table>

The available budget for the road sector for the coming five years (fiscal year 2069/70 to 2073/74) is estimated to be NPR 1,150 million. Allocation to the district road core network was set at 90% of the total budget in light of the fact that no new construction is required and the estimated costs for conservation and improvement only come to NPR 1,558 million. In
addition there is a very large village road network and it was decided to allow a greater allocation to support the conservation and improvement of these roads.

The DTMP allocation allows the entire district road core network to be maintained for the full five years and all required improvement works to be carried out. At the end of the DTMP period the entire district road core network will be in maintainable all-weather condition with the appropriate road surface. The core road network will then consist of 36% blacktop roads and 64% 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 43 to 50 VDCs and municipalities and from 87% to 100% of the district population. In years 4 and 5 there will be funding left over which may be allocated to the village road network.
**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>DDC</td>
<td>District Development Committee</td>
</tr>
<tr>
<td>DOLIDAR</td>
<td>Department of Local Infrastructure Development and Agriculture Road</td>
</tr>
<tr>
<td>DOR</td>
<td>Department of Road</td>
</tr>
<tr>
<td>DTICC</td>
<td>District Transport Infrastructure Coordination Committee</td>
</tr>
<tr>
<td>DTMP</td>
<td>District Transport Master Plan</td>
</tr>
<tr>
<td>DTPP</td>
<td>District Transport Perspective Plan</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographical Information system</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GON</td>
<td>Government of Nepal</td>
</tr>
<tr>
<td>LGCDP</td>
<td>Local Governance and Community Development Programme</td>
</tr>
<tr>
<td>MFALD</td>
<td>Ministry of Federal Affairs and Local Development</td>
</tr>
<tr>
<td>RTI SWAp</td>
<td>Rural Transport Infrastructure Sector Wide Approach</td>
</tr>
<tr>
<td>SWAp</td>
<td>Sector Wide Approach</td>
</tr>
<tr>
<td>VDC</td>
<td>Village Development Committee</td>
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</tbody>
</table>
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1. INTRODUCTION

Jhapa District is located in Mechi Zone of the Eastern Development Region of Nepal. It borders with West Bengal (India) to the East, Morang district to the West, Illam district to the North and Bihar (India) to the South. The district has 3 municipalities (Bhadrapur, Damak and Mechinagar) and 47 VDCs. The total area of the district is 1,606 km². The annual rainfall is about 2,000 mm and maximum temperature is recorded 42º C in summer and 10ºC in winter. The lowest elevation point is 58 meter which is the lowest point of Nepal and highest elevation point is 500 meter from mean sea level. The entire district lies in the Terai. Jhapa district is famous for different cash crops, tea, horticulture and livestock.

Figure 1 Location of the district

According to the Census 2001, the total population of the district is 633,042 comprising 318,415 female (51%) and 314,627 male (49%) residing in 156,500 households. The average household size is 4.1 persons. Jhapa district has an average population density of around 394 people per square km (2009). The district population growth rate is 1.8%. Immigration is rapidly increasing day to day from rural areas to this district. Life expectancy of the people is 58 years (female 56 and male 61 - 2009). The average literacy rate is about 67% (58% female and 75% male are literate).

This district has multi ethnic composition; majorities are Brahmin, Chetri, Rajbanshi, Limbu, Rai, Tamang, Kami, Damai. In terms of religion, Hindus are 80%, Buddhist 14% and other 6%. The main languages are is Nepali (58%) followed by Rajbansi (13%), Limbu (5%), Santhali (4%) and Maithali (3%) and other (17%).

The district headquarter Chandragadi is connected by black-topped feeder road to the East-West Highway at Birtamod, and the district is also connected to the Hill parts of the eastern region of Nepal. This district is the gateway to India for the Eastern Development Region of Nepal. District and rural roads are in poor condition and require upgrading, rehabilitation and proper maintenance.
2. DISTRICT ROAD CORE NETWORK (DRCN)

This chapter gives an overview of the existing roads in Jhapa 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

Jhapa district has an estimated road network of just over 2,000 kilometres including strategic roads, urban roads and rural roads.

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Total length (m)</th>
<th>Black Top</th>
<th>Gravel</th>
<th>Earthen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic roads</td>
<td>216.60</td>
<td>139.92</td>
<td>39.68</td>
<td>37.00</td>
</tr>
<tr>
<td>Urban roads</td>
<td>790.72</td>
<td>70.01</td>
<td>352.79</td>
<td>367.92</td>
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<tr>
<td>Rural roads</td>
<td>1,000.72</td>
<td>56.16</td>
<td>760.56</td>
<td>184.00</td>
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<tr>
<td>Total</td>
<td>2,008.04</td>
<td>266.09</td>
<td>1,153.03</td>
<td>588.92</td>
</tr>
</tbody>
</table>

2.2 NATIONAL HIGHWAYS AND FEEDER ROADS

Jhapa district has 3 national highways and 5 feeder roads totalling just over 200 km. The majority (65%) are black topped, followed by gravel (18%) and earthen surfaces (17%). These roads are managed by the Divisional Road Office of the Department of Roads based in Damak.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Total length (m)</th>
<th>Black Top</th>
<th>Gravel</th>
<th>Earthen</th>
</tr>
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<tbody>
<tr>
<td>H01</td>
<td>Mawa-Damak-Birtamod-Kakarbhitta (East-West Highway - MRM)</td>
<td>54.75</td>
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<tr>
<td>H07</td>
<td>Kechana-Jhapa chowk-Baire chowk (MRM)-Charali</td>
<td>56.00</td>
<td>31.32</td>
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<td>H17</td>
<td>Ratuwa river - Bhadrapur (Postal Road)</td>
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<td>33</td>
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<td>F001</td>
<td>Birtamod (MRM) - Chandragadhi</td>
<td>12.53</td>
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<td>F002</td>
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<td>F158</td>
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<td>Total</td>
<td></td>
<td>216.60</td>
<td>139.92</td>
<td>39.68</td>
<td>37.00</td>
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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, the road surface type 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 Jhapa district is shown in Error! Reference source not found. at the end of this chapter. The DRCN in Jhapa district consists of a total of 17 district roads with a total length of 209 km. The remaining 792 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). Of the DRCN, 17% is black topped, 80% has a gravel surface and 3% has an earthen surface, resulting in 96% being considered all-weather and only 4% as fair weather (see Error! Reference source not found.). A complete
list of the DRCN roads and their characteristics is provided in Error! Reference source not found..

Table 2.3.1 Total road length (km)

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Total length</th>
<th>Black Top</th>
<th>Gravel</th>
<th>Earthen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic road network</td>
<td>216.60</td>
<td>139.92</td>
<td>39.68</td>
<td>37.00</td>
</tr>
<tr>
<td>Highways</td>
<td>158.75</td>
<td>86.07</td>
<td>39.68</td>
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<tr>
<td>Feeder roads</td>
<td>57.85</td>
<td>53.85</td>
<td>-</td>
<td>4.00</td>
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<tr>
<td>Total roads</td>
<td>790.72</td>
<td>70.01</td>
<td>352.79</td>
<td>367.92</td>
</tr>
<tr>
<td>Urban roads</td>
<td>218.22</td>
<td>15.49</td>
<td>141.27</td>
<td>61.46</td>
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<tr>
<td>Bhadrapur municipality</td>
<td>218.22</td>
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<td>141.27</td>
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<td>Mechinagar municipality</td>
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<td>200.00</td>
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<tr>
<td>District road core network</td>
<td>209.00</td>
<td>36.53</td>
<td>164.46</td>
<td>8.01</td>
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<tr>
<td>Village roads</td>
<td>791.72</td>
<td>19.63</td>
<td>596.10</td>
<td>175.99</td>
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<td>Total</td>
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<td>266.09</td>
<td>1,153.03</td>
<td>588.92</td>
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</table>
Table 2.3.2  District road core network (km)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<th>Black Top</th>
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<th>Earthen</th>
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<th>Fair weather</th>
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<td>04DR001</td>
<td>Gauradaha-Maharanijhoda-Swamichowk-Kohabara-Juropani</td>
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<td>04DR002</td>
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<td>11.00</td>
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<td>11.00</td>
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<td>Garamani-Haldibari</td>
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<td>7.00</td>
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<td>19.00</td>
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</tr>
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<td>17.00</td>
<td></td>
<td>19.00</td>
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</tr>
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</tr>
<tr>
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<td>2.54</td>
<td>2.46</td>
<td>2.54</td>
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</table>

2.4 VILLAGE ROADS

The 792 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 47 VDCs in Jhapa district. These are roads of a lower importance that do not form the main link between the VDC headquarters and the district headquarters or strategic road network. Instead they provide additional access to other parts of the VDCs.

On average each VDC will thus be responsible for 16.85 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 (see also chapter 6). However, priority will be given to the use of this district funding for maintenance, especially emergency maintenance and routine/recurrent maintenance to keep the village roads open.
Figure 2 Total road inventory map

<table>
<thead>
<tr>
<th>Code</th>
<th>Total</th>
<th>Surface Type</th>
</tr>
</thead>
</table>

ILAM

MORANG

INDIA (West Bengal)

INDIA (Bihar)

VDC HQ
District HQ
District boundary
VDC boundary
Waterway
SRN road
Blacktop road
Gravel road
Earthen road
Figure 3. District Road Core Network (DRCN) map
3. DISTRICT TRANSPORT PERSPECTIVE PLAN (DTPP)

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

3.1 CONSERVATION

Conservation refers to the actions required to repair a road and keep it in good and passable condition. For DTMP planning purposes standard costs per kilometre for each maintenance type are applied to the entire core district road network, whereby for certain maintenance types distinction is made according to the surface type of the road. Identification of the actual maintenance requirements of each road is done in the ARMP on an annual basis. The following conservation activities are distinguished:

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Emergency maintenance (km)</th>
<th>Routine maintenance (km)</th>
<th>Recurrent maintenance (km)</th>
<th>Periodic maintenance (km)</th>
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<td>11.00</td>
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<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td><strong>209</strong></td>
<td><strong>209</strong></td>
<td><strong>209</strong></td>
</tr>
</tbody>
</table>

### 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 Jhapa 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 150 passenger car units (PCU) to reduce damage to the road surface.
6. **Widening** - Increase of the road width in roads with traffic volumes exceeding 500 passenger car units (PCU) to ensure the proper flow of traffic.

### 3.2.1 REHABILITATION

No rehabilitation needs were identified in the district road core network.
3.2.2 GRAVELLING
Gravelling of the road surface is required for the earthen sections in the district road core network. For Jhapa this concern a total of 8 km as can be seen in the table below.

### Table 3.2.1: Sections of the district road core network requiring gravelling

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Total length (km)</th>
<th>Gravelling (km)</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
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</tr>
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<td>0.43</td>
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<tr>
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<td>Pathariya-Gherabari</td>
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<td>2.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>35.00</strong></td>
<td><strong>7.01</strong></td>
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</tbody>
</table>

3.2.3 CROSS DRAINAGE
The need for cross drainage was identified for the different DRCN roads. A total of 4 bridges with a total length of 132m, 4 slab culverts with a total length of 20m, 5 causeways with a total length of 30m, and 35 pipe culverts were identified as being required (see table below). For the bridges, slab culverts and causeways, the location in GIS coordinates is provided in Annex 3.

### Table 3.2.2: Required cross drainage structures

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Bridge (m)</th>
<th>Slab culvert (m)</th>
<th>CC Causeway (m)</th>
<th>Stone Causeway (m)</th>
<th>Pipe culvert (units)</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td></td>
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<td>4</td>
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<td><strong>30</strong></td>
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<td><strong>35</strong></td>
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3.2.4 PROTECTIVE STRUCTURES
Based on the road survey carried out in Jhapa, the following retaining walls were identified as being required to ensure the protection of the district road core network.

### Table 3.2.3: Required protective structures

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Masonry walls (m³)</th>
<th>Gabion walls (m³)</th>
<th>Lined drain (m)</th>
</tr>
</thead>
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<td>Gauradaha-Maharanijhoda-Swamichowk-Kohabara</td>
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<td>Code</td>
<td>Description</td>
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<td>Gabion walls (m³)</td>
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<td></td>
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<td>410</td>
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</table>

### 3.2.5 WIDENING

Widening of the core district road network is not required in Jhapa as the traffic volumes are still well below the 500 vehicles per day.
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 12 roads are eligible for blacktopping (traffic volume exceeds 150 PCU). The total length need to be blacktopping is 129.67 km.

<table>
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<th>Description</th>
<th>Total length (km)</th>
<th>Blacktop (km)</th>
<th>Traffic (VPD)</th>
<th>Blacktopping (km)</th>
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3.3 NEW CONSTRUCTION

New construction of DRCN roads is not required in Jhapa district as all VDC headquarters are already connected to the SRN or to the existing DRCN.
3.4 DISTRICT TRANSPORT PERSPECTIVE PLAN

The DTPP foresees bringing the entire existing district road core network to maintainable all-weather status by graveling the remaining 8km of earthen roads and constructing a number of different cross drainage and protective structures. In addition, 75.32 km will be blacktopped in light of the existing traffic volume. The district road core network will subsequently consist of 209 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

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<th>Routine maintenance (km)</th>
<th>Recurrent maintenance (km)</th>
<th>Periodic maintenance (km)</th>
<th>Rehabilitation (km)</th>
<th>Gravelling (km)</th>
<th>Blacktopping (km)</th>
<th>Widening (m)</th>
<th>Bridge (m)</th>
<th>Slab culvert (m)</th>
<th>CC Causeway (m)</th>
<th>Stone Causeway (m)</th>
<th>Pipe culvert (units)</th>
<th>Masonry walls (m3)</th>
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Figure 4 District Transport Perspective 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. 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

<table>
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<th>Activity</th>
<th>Unit</th>
<th>Unit cost (NPR/km)</th>
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<td>Routine maintenance</td>
<td>km</td>
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<tr>
<td>Recurrent maintenance (blacktop)</td>
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<td>Recurrent maintenance (gravel)</td>
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<td>Recurrent maintenance (earthen)</td>
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<td>Periodic maintenance (blacktop)</td>
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<td>Periodic maintenance (gravel)</td>
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</table>

For the first year the estimated costs for conservation of the DRCN come to NPR 139 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 695 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)

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<th>Blacktop (km)</th>
<th>Gravel (km)</th>
<th>Earthen (km)</th>
<th>Emergency</th>
<th>Routine</th>
<th>Recurrent (blacktop)</th>
<th>Recurrent (gravel)</th>
<th>Recurrent (earthen)</th>
<th>Periodic (blacktop)</th>
<th>Periodic (gravel)</th>
<th>Total annual cost</th>
<th>Total 5-year cost</th>
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### 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.

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<td>Gravelling</td>
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<td>Slab culvert construction</td>
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<td>CC Causeway construction</td>
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<td>Lined drain construction</td>
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The resulting estimated costs come to NPR 863 million as indicated in the table below. Most of this cost (nearly NPR 739 million) is for blacktopping.

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<th>Gravelling</th>
<th>Blacktopping</th>
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<td>20</td>
<td>800</td>
<td>-</td>
<td>-</td>
<td>200</td>
<td>-</td>
<td>900</td>
<td>2,000</td>
</tr>
<tr>
<td>04DR007</td>
<td>1.00</td>
<td>-</td>
<td>-</td>
<td>1,100</td>
<td>-</td>
<td>10</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>300</td>
<td>630</td>
</tr>
<tr>
<td>04DR008</td>
<td>0.50</td>
<td>-</td>
<td>-</td>
<td>510</td>
<td>-</td>
<td>5</td>
<td>150</td>
<td>-</td>
<td>-</td>
<td>50</td>
<td>-</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>04DR009</td>
<td>0.25</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>-</td>
<td>2</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>-</td>
<td>20</td>
<td>50</td>
</tr>
</tbody>
</table>

The total annual cost is NPR 5,400 and the total 5-year cost is NPR 26,000.
### Table 4.3.1 Cost estimate for new construction (NPR '000)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Length (km)</th>
<th>Opening up</th>
<th>Gravelling</th>
<th>Bridges</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>04DR001</td>
<td>Gauradaha-Maharanijhoda-Swamichowk-Kohabara-Juropani</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>21,000</td>
<td>21,000</td>
</tr>
<tr>
<td>04DR006</td>
<td>Ghailadubba-Dangibari-Chakchaki-Rajgadh</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>40,200</td>
<td>40,200</td>
</tr>
<tr>
<td>04DR012</td>
<td>Kakarvitta-Bahundangali</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>18,000</td>
<td>18,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>79,200</td>
<td>79,200</td>
</tr>
</tbody>
</table>

### 4.3 NEW CONSTRUCTION

Four numbers of bridges are proposed as new construction. The total costs for the new construction come to NPR 79 million as indicated in the table below.

### Table 4.4.1 DTPP costs (NPR ‘000)

<table>
<thead>
<tr>
<th>Code</th>
<th>Conservation</th>
<th>Improvement</th>
<th>New construction</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>04DR001</td>
<td>61,098</td>
<td>33,554</td>
<td>21,000</td>
<td>115,652</td>
</tr>
<tr>
<td>04DR002</td>
<td>57,090</td>
<td>82,933</td>
<td>-</td>
<td>140,023</td>
</tr>
<tr>
<td>04DR003</td>
<td>49,000</td>
<td>25</td>
<td>-</td>
<td>49,025</td>
</tr>
<tr>
<td>04DR004</td>
<td>31,500</td>
<td>51,900</td>
<td>-</td>
<td>83,400</td>
</tr>
<tr>
<td>04DR005</td>
<td>4,500</td>
<td>7,003</td>
<td>-</td>
<td>11,503</td>
</tr>
<tr>
<td>04DR006</td>
<td>14,000</td>
<td>22,813</td>
<td>-</td>
<td>36,813</td>
</tr>
<tr>
<td>04DR007</td>
<td>35,000</td>
<td>40,827</td>
<td>40,200</td>
<td>116,027</td>
</tr>
<tr>
<td>04DR008</td>
<td>38,500</td>
<td>63,390</td>
<td>-</td>
<td>101,890</td>
</tr>
<tr>
<td>04DR009</td>
<td>40,190</td>
<td>37,060</td>
<td>-</td>
<td>77,250</td>
</tr>
<tr>
<td>04DR010</td>
<td>19,633</td>
<td>3,338</td>
<td>-</td>
<td>22,971</td>
</tr>
<tr>
<td>04DR011</td>
<td>20,930</td>
<td>14,364</td>
<td>-</td>
<td>35,294</td>
</tr>
<tr>
<td>04DR012</td>
<td>94,500</td>
<td>154,468</td>
<td>-</td>
<td>248,968</td>
</tr>
<tr>
<td>04DR013</td>
<td>60,150</td>
<td>81,540</td>
<td>-</td>
<td>141,690</td>
</tr>
<tr>
<td>04DR014</td>
<td>60,868</td>
<td>85,973</td>
<td>18,000</td>
<td>164,840</td>
</tr>
<tr>
<td>04DR015</td>
<td>65,000</td>
<td>97,125</td>
<td>-</td>
<td>162,125</td>
</tr>
<tr>
<td>04DR016</td>
<td>30,640</td>
<td>53,014</td>
<td>-</td>
<td>83,654</td>
</tr>
<tr>
<td>04DR017</td>
<td>12,420</td>
<td>34,088</td>
<td>-</td>
<td>46,508</td>
</tr>
<tr>
<td>Total</td>
<td>695,018</td>
<td>863,416</td>
<td>79,200</td>
<td>1,637,634</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>04DR005</td>
<td>3.00</td>
<td>90</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td>750</td>
<td>-</td>
<td>-</td>
<td>900</td>
<td>26,028</td>
<td>35</td>
</tr>
<tr>
<td>04DR006</td>
<td>4.00</td>
<td>120</td>
<td>80</td>
<td>-</td>
<td>1,600</td>
<td>-</td>
<td>-</td>
<td>1,000</td>
<td>2,800</td>
<td>28,333</td>
<td>99</td>
</tr>
<tr>
<td>04DR017</td>
<td>5.00</td>
<td>150</td>
<td>100</td>
<td>-</td>
<td>984</td>
<td>635</td>
<td>-</td>
<td>615</td>
<td>2,484</td>
<td>16,759</td>
<td>148</td>
</tr>
<tr>
<td>04DR016</td>
<td>9.00</td>
<td>270</td>
<td>180</td>
<td>-</td>
<td>3,428</td>
<td>108</td>
<td>-</td>
<td>2,143</td>
<td>6,128</td>
<td>40,027</td>
<td>153</td>
</tr>
<tr>
<td>04DR004</td>
<td>9.00</td>
<td>270</td>
<td>180</td>
<td>-</td>
<td>3,600</td>
<td>-</td>
<td>-</td>
<td>2,250</td>
<td>6,300</td>
<td>35,504</td>
<td>177</td>
</tr>
<tr>
<td>04DR007</td>
<td>10.00</td>
<td>300</td>
<td>200</td>
<td>-</td>
<td>4,000</td>
<td>-</td>
<td>-</td>
<td>2,500</td>
<td>7,000</td>
<td>35,920</td>
<td>195</td>
</tr>
<tr>
<td>04DR011</td>
<td>7.00</td>
<td>210</td>
<td>140</td>
<td>2,380</td>
<td>896</td>
<td>-</td>
<td>-</td>
<td>560</td>
<td>4,186</td>
<td>17,437</td>
<td>240</td>
</tr>
<tr>
<td>04DR002</td>
<td>16.00</td>
<td>480</td>
<td>320</td>
<td>1,090</td>
<td>5,528</td>
<td>-</td>
<td>545</td>
<td>3,455</td>
<td>11,418</td>
<td>26,028</td>
<td>439</td>
</tr>
<tr>
<td>04DR010</td>
<td>7.00</td>
<td>210</td>
<td>140</td>
<td>3,245</td>
<td>204</td>
<td>-</td>
<td>-</td>
<td>128</td>
<td>3,927</td>
<td>7,511</td>
<td>523</td>
</tr>
<tr>
<td>04DR008</td>
<td>11.00</td>
<td>330</td>
<td>220</td>
<td>-</td>
<td>4,400</td>
<td>-</td>
<td>-</td>
<td>2,750</td>
<td>7,700</td>
<td>14,037</td>
<td>549</td>
</tr>
<tr>
<td>04DR001</td>
<td>18.00</td>
<td>540</td>
<td>360</td>
<td>355</td>
<td>6,500</td>
<td>260</td>
<td>142</td>
<td>4,063</td>
<td>12,220</td>
<td>20,828</td>
<td>587</td>
</tr>
<tr>
<td>04DR015</td>
<td>19.00</td>
<td>570</td>
<td>380</td>
<td>1,000</td>
<td>6,800</td>
<td>-</td>
<td>-</td>
<td>4,250</td>
<td>13,000</td>
<td>16,252</td>
<td>800</td>
</tr>
<tr>
<td>04DR003</td>
<td>14.00</td>
<td>420</td>
<td>280</td>
<td>-</td>
<td>5,600</td>
<td>-</td>
<td>-</td>
<td>3,500</td>
<td>9,800</td>
<td>12,121</td>
<td>809</td>
</tr>
<tr>
<td>04DR012</td>
<td>27.00</td>
<td>810</td>
<td>540</td>
<td>-</td>
<td>10,800</td>
<td>-</td>
<td>-</td>
<td>6,750</td>
<td>18,900</td>
<td>22,897</td>
<td>825</td>
</tr>
<tr>
<td>04DR009</td>
<td>13.00</td>
<td>390</td>
<td>260</td>
<td>3,540</td>
<td>2,368</td>
<td>-</td>
<td>-</td>
<td>1,480</td>
<td>8,038</td>
<td>7,486</td>
<td>1,074</td>
</tr>
<tr>
<td>04DR013</td>
<td>18.00</td>
<td>540</td>
<td>360</td>
<td>1,900</td>
<td>5,680</td>
<td>-</td>
<td>-</td>
<td>3,550</td>
<td>12,030</td>
<td>8,543</td>
<td>1,408</td>
</tr>
<tr>
<td>04DR014</td>
<td>19.00</td>
<td>570</td>
<td>380</td>
<td>3,755</td>
<td>4,596</td>
<td>-</td>
<td>-</td>
<td>2,873</td>
<td>12,174</td>
<td>8,617</td>
<td>1,413</td>
</tr>
</tbody>
</table>

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. Periodic maintenance blacktop roads
6. 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>
<thead>
<tr>
<th>Code</th>
<th>Total length (km)</th>
<th>Total cost (NPR '000)</th>
<th>Population served</th>
<th>Cost/person (NPR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04DR003</td>
<td>14.00</td>
<td>25</td>
<td>12,121</td>
<td>2</td>
</tr>
<tr>
<td>04DR005</td>
<td>3.00</td>
<td>7,003</td>
<td>26,028</td>
<td>269</td>
</tr>
<tr>
<td>04DR010</td>
<td>7.00</td>
<td>3,338</td>
<td>7,511</td>
<td>444</td>
</tr>
<tr>
<td>04DR006</td>
<td>4.00</td>
<td>22,813</td>
<td>28,333</td>
<td>805</td>
</tr>
<tr>
<td>04DR011</td>
<td>7.00</td>
<td>14,364</td>
<td>17,437</td>
<td>824</td>
</tr>
<tr>
<td>04DR007</td>
<td>10.00</td>
<td>40,827</td>
<td>35,920</td>
<td>1,137</td>
</tr>
<tr>
<td>04DR016</td>
<td>9.00</td>
<td>53,014</td>
<td>40,027</td>
<td>1,324</td>
</tr>
<tr>
<td>04DR004</td>
<td>9.00</td>
<td>51,900</td>
<td>35,504</td>
<td>1,462</td>
</tr>
<tr>
<td>04DR001</td>
<td>18.00</td>
<td>33,554</td>
<td>20,828</td>
<td>1,611</td>
</tr>
<tr>
<td>04DR017</td>
<td>5.00</td>
<td>34,088</td>
<td>16,759</td>
<td>2,034</td>
</tr>
<tr>
<td>04DR002</td>
<td>16.00</td>
<td>82,933</td>
<td>26,028</td>
<td>3,186</td>
</tr>
<tr>
<td>04DR008</td>
<td>11.00</td>
<td>63,390</td>
<td>14,037</td>
<td>4,516</td>
</tr>
<tr>
<td>04DR009</td>
<td>13.00</td>
<td>37,060</td>
<td>7,486</td>
<td>4,951</td>
</tr>
<tr>
<td>04DR015</td>
<td>19.00</td>
<td>97,125</td>
<td>16,252</td>
<td>5,976</td>
</tr>
<tr>
<td>04DR012</td>
<td>27.00</td>
<td>154,468</td>
<td>22,897</td>
<td>6,746</td>
</tr>
<tr>
<td>04DR013</td>
<td>18.00</td>
<td>81,540</td>
<td>8,543</td>
<td>9,545</td>
</tr>
<tr>
<td>04DR014</td>
<td>19.00</td>
<td>85,973</td>
<td>8,617</td>
<td>9,977</td>
</tr>
</tbody>
</table>

5.3 NEW CONSTRUCTION

No new construction works are required.
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 20% is assumed for all funding sources, except the funds from the members of parliament which are expected to remain constant for the 5-year period. It is assumed that donor’s contribution starts from 070/071 with annual increment of 20 million every year. Seventy percent of cost needed for bridge construction is expected from RTI SWAp Bridge Component in three years. The people’s contribution is expected 15% of total funding. The total district budget for the road sector is NPR 1,150 million for the five-year period.

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

<table>
<thead>
<tr>
<th>Funding source</th>
<th>069/70</th>
<th>070/071</th>
<th>071/072</th>
<th>072/73</th>
<th>073/74</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLD’s grant</td>
<td>54,000</td>
<td>64,800</td>
<td>77,760</td>
<td>93,312</td>
<td>111,974</td>
</tr>
<tr>
<td>DDC Internal Budget</td>
<td>10,080</td>
<td>12,096</td>
<td>14,515</td>
<td>17,418</td>
<td>20,902</td>
</tr>
<tr>
<td>Internal Revenue</td>
<td>8,400</td>
<td>10,080</td>
<td>12,096</td>
<td>14,515</td>
<td>17,418</td>
</tr>
<tr>
<td>Fund of Members of Parliaments</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>VDC</td>
<td>13,200</td>
<td>15,840</td>
<td>19,008</td>
<td>22,810</td>
<td>27,372</td>
</tr>
<tr>
<td>RRRSDP</td>
<td>500</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LGCDDP</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DFID</td>
<td>10,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RBN</td>
<td>2,880</td>
<td>3,456</td>
<td>4,147</td>
<td>4,977</td>
<td>5,972</td>
</tr>
<tr>
<td>Donor’s contribution</td>
<td>0</td>
<td>20,000</td>
<td>40,000</td>
<td>60,000</td>
<td>80,000</td>
</tr>
<tr>
<td>RTI -SWAp Bridge Project</td>
<td>18,430</td>
<td>18,430</td>
<td>18,430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People’s Contribution</td>
<td>17,109</td>
<td>23,955</td>
<td>30,143</td>
<td>36,969</td>
<td>41,796</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>131,169</strong></td>
<td><strong>183,657</strong></td>
<td><strong>231,100</strong></td>
<td><strong>283,431</strong></td>
<td><strong>320,434</strong></td>
</tr>
</tbody>
</table>

**Grand total**                         |        |         |         |         | **1,149,791** |

6.2 BUDGET ALLOCATION

The distribution of the available district road sector budget is indicated in the figure below. Of the total district budget for the road sector, up to 90% is initially reserved for the district road core network and its allocation is further detailed in this DTMP. The remaining 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 high allocation to the DRCN is the fact that the DRCN need more funding in conservation and improvement. The required budget for the conservation and improvements (NPR 1,558 million) is lower 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 up to 90% will therefore allow the improvement of the DRCN to be easily completed within the five year DTMP period but in case of eligibility of black topping is considered as 150 PCU. If eligibility of black topping is considered as 100 PCU (which is general practice), there is significant budget gap in improvement. There is not sufficient budget for conservation and bridge construction.
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.

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>
<thead>
<tr>
<th>Item</th>
<th>Fiscal year</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2067/68</td>
</tr>
<tr>
<td>Total budget</td>
<td>131,169</td>
<td>183,657</td>
</tr>
<tr>
<td>Village roads</td>
<td>13,117</td>
<td>18,366</td>
</tr>
<tr>
<td>Core road network budget</td>
<td>118,052</td>
<td>165,292</td>
</tr>
<tr>
<td>Core network length (km)</td>
<td>209.00</td>
<td>209.00</td>
</tr>
<tr>
<td>Blacktop (km)</td>
<td>34.53</td>
<td>34.53</td>
</tr>
<tr>
<td>Gravel (km)</td>
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22
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 209 km of DRCN roads (the entire DRCN) will be conserved for the full DTMP period, while 9 km will be upgraded from earthen to gravel standard and 40.44 km will be upgraded from gravel to blacktop standard.

<table>
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Of the total DTMP budget, NPR 704 million will be spent on conservation and NPR 330 million on improvement. There will be the huge budget gap of NPR 603 million for remaining conservation as well as cross drainages construction work (New construction).

6.4 DTMP OUTCOME

As a result of the activities planned in this DTMP, the percentage of all-weather maintainable DRCN roads increases by 4% from 201 km to 209 km, bringing the entire DRCN to a maintainable all-weather standard. The percentage of the network with a blacktop standard will be increased from 34.53 km (17%) to 75 km (36%).

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<td>End of DTMP</td>
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<tr>
<td>Difference</td>
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The number of municipalities and VDC headquarters with access to the SRN or all-weather DRCN roads will increase from 43 to 50 and the district population with access to the SRN or all-weather DRCN roads will increase from 87% to 100%.

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<tr>
<td>VDCs</td>
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<td>Start of DTMP</td>
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<td>End of DTMP</td>
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<td>Difference</td>
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**Figure 6 District Transport Master Plan (DTMP) map**

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Legend:
- **VDC HQ**
- **District HQ**
- **District boundary**
- **VDC boundary**
- **Waterway**
- **SRN road**
- **Blacktop road**
- **Gravel road**
- **Bridge for construction**
- **Causeway for construction**
- **Slab culvert for construction**
### ANNEX 1  TRAFFIC DATA

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# ANNEX 1 POPULATION SERVED

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<td>18 Gauradaha</td>
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<td>25 Juropani</td>
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<tr>
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</tr>
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<td>28 Khajurgachhi</td>
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<td>VDC/Municipality</td>
<td>Population</td>
<td>DRCN roads</td>
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<td>04A003R</td>
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</tr>
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</tr>
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<td>Surunga</td>
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<td>Tagandubba</td>
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<td>Topgachchi</td>
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<td><strong>Total VDCs/municipalities</strong></td>
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Source: Add source
## ANNEX 2  LOCATION OF PROPOSED INTERVENTIONS

<table>
<thead>
<tr>
<th>Road code</th>
<th>Description</th>
<th>Rehabilitation (km)</th>
<th>Gravelling (km)</th>
<th>Blacktopping (km)</th>
<th>Widening (m)</th>
<th>Bridge (m)</th>
<th>Slab culvert (m)</th>
<th>CC Causeway (m)</th>
<th>Stone Causeway (m)</th>
<th>Pipe culvert (units)</th>
<th>Masonry walls (m3)</th>
<th>Gabion walls (m3)</th>
<th>Lined drain (m)</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>04DR001</td>
<td>Gauradaha-Maharanijhoda-Swamichowk-Kohabara-Juropani</td>
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<td>969</td>
<td>100</td>
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<tr>
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<td>Route Description</td>
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<td>Elev</td>
<td>Decl</td>
<td>STA</td>
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<td>Decl</td>
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