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ATTACHMENT

Transport Infrastructure Map 1: 125,000; District Transport Plan, Kabhre District

FOREWORD

APPROVAL SHEETS

DISTRICT ROAD COORDINATION COMMITTE

1	Mr. Krishna Prasad Sapkota	:	DDC Chairperson	:	Chairperson
2	Mr. Karma Singh Lama	:	DDC Vice Chairperson	:	Member
3	Mr. Ms Sita Katila	:	DDC Member (women Representative)	:	Member
4	Mr. Kumar Thapa	:	DDC Member	:	Member
5	Mr. Ram Hari Subedi	:	DDC Member	:	Member
6	Mr. Suresh Shrestha	:	DDC Member	:	Member
7	Mr. Karna Lama	:	DDC Member	:	Member
8	Mr. Bhim Poudel	:	DDC Member	:	Member
9	Mr. Ashok Bayinju	:	Mayor, Dhulikhel Municipality	:	Member
10	Mr. Surendra Bahadur Bade	:	Mayor, Banepa Municipality	:	Member
11	Mr. Saptakaji Bhddhacharya	:	Mayor, Panauti Municipality	:	Member
12	Mr. Dilip shrestha	:	President of District Chamber of Commerce & and Industry	:	Member
13	Mr. Rabindra Sipakhan	:	DDC Member (Agricultural Unit Co-ordinator)	:	Member
14	Mr. Prem Bahadur Timalsina	:	VDC Chairperson, Dhunkharka VDC		Member
15		:	Programme Officer, Infrastructure Development/DDC		Member
16		:	Planning Officer , DDC		Member
17	Mr. Puspa Raj Bajgain	:	DDC/DRSP Engineer	:	Member
18	Ms. Anita Adhikari	:	Women development Officer		Member
19	Mr. Ananda Raj.Dhakal	:	Local Development Officer	:	Member Secretary

DISTRICT TECHNICAL TEAM

1	Mr Shree Krishna Piya	:	Engineer / DoLIDAR
2	Mr. Puspa Raj Bajgain	:	Engineer /DRSP
3	Mr. Ram Udgar Das	:	Overseer /DRSP
4	Mr. Tanka Gautam	:	Overseer /DRSP

ABBREVIATIONS AND ACRONYMS

APP	Agricultural Perspective Plan
CBS	Central Bureau of Statistics
DDC	District Development Committee
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DoR	Department of Roads
DRCC	District Road Coordination Committee
DRF	District Road Fund
DRSP	District Roads Support Programme
DTMP	District Transport Master Plan
DTPP	District Transport Perspective Plan
FfW	Food for Work
FY	Fiscal Year
HMG	His Majesty's Government
IEE	Initial Environmental Examination
IZI	Inner Zone of Influence
km^2	Square Kilometre
LDO	Local Development Officer
LGP	Local Governance Programme
LRCC	Local Road Coordination Committee
MDWP	Melamchi Drinking Water Project
MoLD	Ministry of Local Development
msl	Metres Above Sea Level
NGO	Non Government Organisation
NPC	National Planning Commission
NRs	Nepalese Rupees
OZI	Outer Zone of Influence
PSU	Programme Support Unit
RCIW	Rural Community Infrastructure Works
SDC	Swiss Agency for Development and Cooperation
UG	Users' Group
UNCDF	United Nation Community Development Fund
VDC	Village Development Committee
YPO	Yearly Plan of Operation

1. INTRODUCTION

1.1 Background

Kavrepalanchowk is the third largest district and one of the eight districts of Bagmati zone, located in the Central Development Region of Nepal. It borders with Kathmandu, Lalitpur and Bhaktapur districts in the west; Ramechhap and Dolakha districts in the east; Sindhupalchowk district in the north and Sindhuli and Makawanpur districts in the south. The district headquarter Dhulikhel is located at Dhulikhel Municipality and connected with Arniko and Dhulikhel-Bardibas (under construction from the assistance of JICA) highways.

Kavrepalanchowk district is predominantly rural with an average population density of about 274 persons per square kilometre. The district belongs to one of the densely populated among hill districts of Nepal. Banepa, Dhulikhel and Panauti municipality are the larger urban centres. The population growth rate is about 1.72 % per annum. The general information of the district is presented in Table 1.1

General Information of the District

Population 2001	385,672
Population growth % Per annum	1.72
Regional /Urban centre	Kathmandu
Length of existing roads (km.)	723.6
• Black topped	76.6
• Gravelled	61.0
• Earthen	586.0
Area of district (sq./km.)	1404.86
Area of Agricultural land (sq./km.)	616.49
Area of forest/scrub land (sq./km.)	738.01
Area of grassland (sq.km.)	37.51
Others areas (sq. km.)	12.85
Road density (pop/km of road)	533
Road density (Agricultural land sq km /km of road)	0.85

Source: Digitised data, DRSP, May 2002; Periodic Plan, DDC Kavrepalanchowk, 2001 and Draft Population Census, 2001

TABLE 1.1

The total area of the district is 1404.86 sq. km[1]. The distribution of the land resource base indicates that about 52.5 percent of total area is under forest/scrub and about 43.9 percent of total area is under agriculture.

The DDC of Kavrepalanchowk has realised that the provision of enhanced access through district roads to areas with resource potentials will have a positive impact on the social and economic development of the district. As a result the DDC has given high priority to the preparation of the District Transport Master Plan/District Transport Perspective Plan (DTMP/DTPP).

District Roads Support Programme (DRSP) has given a high priority for the maintenance of existing roads in addition to the construction of new roads. Additionally, the programme has been providing technical support to district to prepare district transport master plan and district and long-term transport perspective plan.

[1] *This finding is based on the data digitised with the use of Auto Cad software and compiled with the use of Arc View GIS software version 3.2 at PSU.*

During the Programme Orientation and Vision Sharing Workshop in December 1999, Kavrepalanchowk, together with 4 other districts of the Central Region and one district from the Eastern Region, qualified for support through the District Roads Support Programme (DRSP). This support takes the form of capacity building as well as planning, implementation and maintenance of district roads. The programme is co-financed by the Swiss Agency for Development and Cooperation (SDC), His Majesty's Government of Nepal (HMG) and the participating districts.

1.2 Objectives and Rationale of the DTMP/DTPP

One of the major factors for slow development of social and economic structures in Kavrepalanchowk district is lack of adequate transport infrastructure. The objective of the DTMP/DTPP is to facilitate access to areas with resource potentials and to guide the spatial arrangement of rural settlements, market and service centres of the district through developing a road network that reduces the aggregate transportation cost and minimises environmental impacts.

The implementation of the DTMP/DTPP will minimise the existing current ad-hoc practices of making investments on road and transport sector based on short-term considerations. These plans will provide the basis for Kavrepalanchowk district to plan and implement new construction or upgrade and maintain existing district roads. In addition they will provide HMG and donors a rational basis to decide on future investments towards the improvement of the district transport situation.

The DTMP determines the transport development plans for the 5-year period, starting in the FY 2001/2002. The DTPP reflects the perspectives of the district for the next 20 years.

1.3 Methodology

The different phases and procedures of the methodology for preparing the DTMP and the DTPP are elaborated in Volume I "Methodology". The methodology is an integral part of the Kavrepalanchowk DTMP/DTPP. It describes in detail the individual steps of the planning cycle and provides the basis for prioritisation and decision-making process. The methodology and scoring system were approved by the District Road Coordination committee (DRCC) of Kavrepalanchowk district during the district consultation workshop in September 2000.

The separate parameters have been used for the prioritisation of new roads and roads for rehabilitation that is explained in detail in the methodology (refer to section 3.7 and 3.9, Volume I). This methodology has been used for the prioritisation of new roads and existing roads for rehabilitation proposed by the district to be considered under the five years DTMP.

The DTMP has been prepared in a participatory manner. It started with the formation of the DRCC and has continued with the involvement of the most important stakeholders of the district throughout the entire development process.

The chronology of events in the course of DTMP / DTPP development can be summarised as follows:

Chronology of events in DTMP/DTPP development

Date	Achievement	Participants/ Ownership	Remarks
November 1999	Formation of District Road Coordination Committee (DRCC)	DDC Kavrepalanchowk DRSP/PSU	Workshop in Kavrepalanchowk
December 1999	Hire of District Technical Team (1 engineer and 2 overseers)	DDC Kavrepalanchowk	
December 1999	Kavrepalanchowk District agreed to participate in the District Road Support Programme	DDC Chairman DDC LDO DoLIDAR SDC DRSP/PSU	DRSP Programme Orientation and Vision Sharing Workshop in Kathmandu
May to December 2000	Status and analysis of the strategic road network and the district road network	District Technical Team DRSP/PSU	Collection of primary and secondary data in the district and with concerned HMG departments
April 2000	Preliminary selection of road corridors for DTMP considerations.	DRCC DRSP/PSU	Workshop in Kavrepalanchowk
September 2000	Development and approval of scoring system. Finalisation of criteria for prioritisation.	DRCC DRSP/PSU	Workshop in Kavrepalanchowk
December 2000	Regional synchronisation of DTMP roads in consultation with the neighbouring district and HMG stakeholders.	Members of: NPC DoR DoLIDAR SDC DRSP/PSU	One day workshop in Kathmandu
January 2000	Prioritization of the DTMP roads for Training Road Maintenance/Rehabilitation	DDC/DRSP	Meeting at Kavrepalanchowk
February 2002	Finalization of road corridors for DTMP study	DDC/DRSP	Meeting at Kavrepalanchowk
October 2001-Junly 2002	Collection of data and analysis of individual road corridors. • Demography • Agriculture • Economic structure and central services • Trade flow • District Priority • Construction Costs • Environment • Social	DDC/DRCC District Technical Team DRSP/PSU	Data collection in Kavrepalanchowk and Kathmandu
2002	Presentation of DTMP findings and guidelines for DTPP data collection to the VDCs	All VDC Chairman of the district Ilaka Members DDC/DRCC DRSP/PSU	Workshop in Kavrepalanchowk

2002	Collection of proposal from VDCs for DTPP	VDC Chairman /Vice Chairman & Ilaka Members	Workshop in Kavrepalanchowk
June 2002	Analysis of expected funds available for road construction and maintenance works in the next five years.	DDC, PSU	Consultation meetings with HMG Departments , Potential donor agencies and DDC
	Presentation of draft DTMP/DTPP to DDC & DRCC	DDC/DRCC District Technical Team DRSP/PSU	DRCC Meeting in Kavrepalanchowk
	Approval of Draft DTMP by DDC	DDC/DRCC	DRCC Meeting in Kavrepalanchowk
	Approval of Draft DTMP and DTPP by the District Council.	DDC, DRSP/PSU	District Council Meeting in Kavrepalanchowk
	Final editing of approved DTMP/DTPP		DRSP/PSU
	Endorsement by MoLD Endorsement by NPC		

TABLE 1.2

2. DISTRICT INVENTORY/ DISTRICT PROFILE ANALYSIS

The purpose of this chapter is to give a general overview of the Kavrepalanchowk District. Emphasis has been given to issues related to transport planning. The information provided here underlines and illustrates the findings and conclusions of the analysis regarding prioritisation and decision-making.

2.1 Physical and Meteorological Characteristics

2.1.1 Location

The district lies between the north latitudes of 27º20' and 27º85' and the eastern longitudes of 85º24' and 85º49'. Dhulikhel, the district headquarters is approximately 31 km east of Kathmandu. The district borders with Sindhupalchowk, Dolakha, Ramechhap, Kathmandu, Bhaktapur, Lalitpur, Makawanpur and Sindhuli districts.

2.1.2 Geo-Physical Aspects

The main part of the district lies in the hills and mountain between Mahabharat Lekh and lesser leading to agro-climatic variations in different pockets of the district. The topographical setting of the district is made up of undulated terrain, tars, lowland areas and riverbanks. The altitude ranges from 318 m to 3,018 m above sea level (msl).Geographically the district can be divided into two major geophysical settings the mountain land and plateau. About 80 percent of the total landmass of the district fall under the mountain region and rest 20 percent belong to plain valley and plateau.

The river network is distributed over the whole district. The three major rivers with sources within the district are Indrawati, Sunkoshi and Bagmati. The Sunkoshi and Indrawati river acts as a border to the northern district, Bagmati and Kokhajor river to the southern districts and Sunkoshi river to the eastern districts.

2.1.3 Political Division of the District

The district is divided into three electoral constituencies; 15 Ilakas and 87 Village Development Committees (VDCs) and 3 Municipalities, namely Banepa, Dhulikhel and Panauti.

2.1.4 Climate

Due to different geo-physical conditions the climate varies from sub-tropical to temperate. The climate of the district changes according to the altitude. It is hot along the bank of river. The climate is sub-tropical in the middle mountain and cool temperate in the high mountain region. The average maximum and minimum temperature of the district is 28 ^{0C} and 9 ^{0C} respectively. The average annual rainfall in the district is 1,785 mm.

2.2 Economic Activities

Agriculture is the major source of income and employment in the district. The agriculture alone directly or indirectly provides employment for over about 92 percent of the economically active population. However, according to the district profile, the total district populations are categorized as follow (Table 2.1) based on their major occupation:

Occupational Structure of the District Population

SN	Occupational category	Percentage of Population
1	Agriculture (including livestock and fishing)	78.3
2	Wage labour	9.06
3	Trade and business	2.94
4	Technical service an and other services	3.77
5	Transport service sector	0.75
6	Industry and other alternate enterprises	0.45
7	Others	4.7

Source: District Profile of Kavrepalanchowk DDC, 2001

TABLE 2.1

The economy of the district is supported by formal sector employment like teaching, civil service, tourism and by informal sector employment like agricultural labor, porter and remittance from seasonal migration to Kathmandu, Terai and Indian cities for non-farm labor. Tourism industry is also one of the main income sources of the district which provides employment to the considerable number of people. The main tourism sites within the districts are Nagarkot, Dhulikhel and Namo Boudha.

2.3 Demographic and Social Characteristics

2.3.1 Demography

According to the draft 2001 population census, the total population of the district is 385,672 with 188,947 male and 196,725 female populations. There are about 70,509 households and settlements randomly scattered over the district. The average household size is 5.5. The average population growth rate is 1.9 percent and population density is 275 inhabitants per sq. km. The overall demographic features of the district is presented in Table 2.2

Demographic Characteristic of the District

Characteristics	1991 census	2001 census
Total population:	324,329	385,672
Male	159,784	188,947
Female	164,545	196,725
Economically active population	148,706	176,832
Male	77,418	92,061
Female	71,288	84,771
Total households	56,633	70,509
Average household size	5.7	5.5
Population density per sq.km	232	275

Source: Nepal District Profile, 2002 and Draft Population Census Report, 2001

TABLE 2.2

A review of population in the district indicates that population in the high mountain region has been decreasing. Migration from high hills to southern areas like Panchkhal, Panauti, Banepa, and Dhulikhel is in increasing trend. This is particularly due to concentration of public services, opportunities and facilities like transportation, schools, electricity and communication. Therefore, Population density is considerably lower in the northern mountain region in comparison to the middle hills. The main population concentration within the district is in three municipalities of Dhulikhel, Banepa and Panauti. Similarly, the highly populated VDCs are mainly Panchkhal, Mahadevsthan Mandan, Nala, Kusadevi and Machhegaun.

2.3.2 Social Aspects

The comparatively low economic activity in the district is reflected by a relatively high percentage of the population living below the subsistence level. According to 1997 ICIMOD Relative Indicators of Development district has a rank of 33 out of 75 districts for overall development Index, while it is ranked 42 in terms of Poverty Deprivation and Infrastructural Development Indices. Furthermore, it is estimated that more than 50 percent of the total population in the district are unable to produce sufficient food from their own-farm resources, and large share of population have to purchase food from their off-farm income mainly accrued from off-farm labouring and remittances. A huge number of economically active populations from the poor households, therefore, seek non-farm/off-farm employment as daily wage-workers within and outside of the district for their sustenance.

2.3.3 Health Aspects

The district has three district level hospitals located at Dhulikhel and Banepa municipality, and more than 90 health posts/sub-health posts. Eight private nursing homes and one homeopathic clinic are operating in the district. Additionally, there are five Ayurvedic Dispensaries scattered in different

places of the district. Even though numbers of health offices are set up in different places of the district, they are mostly concentrated in the urban areas, and people in the remote village are still not getting required health services. According to 1991 census report, there was one health facility for every six rural VDCs and covers 82 square km of area in the district. Average population covered by a health facility is 9,023 persons per hospital bed; and 19,107 per health facility (all type).

The situation with respect to health personnel (under HMG) shows that in 1991 the doctor population ratio was 1:324,819. The ratio for ANM and HA was 1:14,765 and 1:23,201 respectively. In terms of AHW/VHW, the health workers at the grass roots level, the ratio was 1:2,776. Although Kathmandu serves as the centre for curative health services, the figures shown above indicates that the availability of health services at the local level in inaccessible areas of Kavrepalanchowk appears to be very poor.

2.3.4 Religious Activities

Hinduism and Buddhism are the major religions in the district however people observed different other religions like Islam, Jain, Christian etc. Of the total population about 60 percent observed Hindu religion and 38 percent is Buddhist. There are many religious places scattered in the district. Amongst, Palanchowk Bhagawati, Nala Bhagawati, Chandeshwori Bhagawati, Madanbas gumba, Indreshowor Mahadev, Dhaneshwor Mahadev are mostly known places of destination for Hindu and Buddhist pilgrims. Thousands of pilgrims from different parts of the district and adjoining districts visit there every year. Those religious spots have enhanced the potential of developing tourism industry in the district.

2.4 Service Centres and Services

2.4.1 Overview

The main service centres provide most of the economic facilities and public and private services in the district. They have been identified based on the criteria outlined in Vol. I, Chapter 3.7.3.

The construction of Arniko highway and Dhulikhel-Bardibas highway has promoted the growth of market centres along the highway. Banepa, Dhulikhel, Panauti and Panchkhal are major and dense service/market centre of the eastern part of the district (refer to map 2).

Banepa is one of the largest market centres of the district where as Dhulikhel is the district headquarters and stands as the major service centre of the district. After the construction of Arniko highway and the feeder road from Banepa to Panauti; Dhulikhel, Banepa, Panauti, Dolalghat and Panchkhal market centres grew up rapidly. Similarly, it is expected that after the completion of Dhulikhel-Bardibas highway more market centres will be developed along the highway. There are many others market/service centres scattered in the district. The main market/service centres including their estimated population are compiled in the following Table 2.3.

Main Market/Service Centres

Main Market/Service Centre	Population (2001)
Banepa	15,822
Panauti	25,563
Dhulikhel	11,521
Dolalghat	390
Khopasi	850
Dapcha	320
Nala	160
Narayansthan	150
Panchkhal (Tamaghat)	350

Source: Annex 3.3.1

TABLE 2.3

2.4.2 Description of Main Service Centres

There are more than 30 major, medium and minor service/market centres scattered through out the district. Amongst them Banepa, Dhulikhel, Panauti, Dolalaghat, Sanga, Nala, Khopasi etc are considered major service/market centres of the district. The distribution pattern of service/market centres indicate that most of them are located along the road corridors due to favorable transport facilities and other basic infrastructure like electricity and communication.

Banepa

Banepa lies 25 km east of Kathmandu along the Arniko highway. It is linked with Kathmandu valley nearby and the Tibetan border in the north by the Arniko highway and will link with eastern part of Nepal after the completion of Dhulikhel-Bardibas highway. This municipality is the main economic centre of Kavre district and had a total population of 15,822 in 2001. Historically, Banepa served as a trading centre for the eastern hill area and the Kathmandu valley. At present, it is primarily a trading and service centre.

The opening of the Lamosangu-Jiri road in 1984 which connected Banepa to more areas of eastern Nepal has helped Banepa's economy. But the most important of all recent developments is the fact that smaller traders and small industries have begun relocating from Kathmandu to Banepa because of Kathmandu's deteriorating urban condition, high rents and restriction on truck (heavy) traffic.

Dhulikhel

Dhulikhel is the district headquarters that lies 30 km east of Kathmandu along the Arniko highway. The under construction Dhulikhel-Bardibas highway also starts from the service/market centre where it connects with Arniko highway. It was designated as Nagarpalika (Municipality) in 1987. The municipality covers an area of approximately 1,087 hectares supporting a population of about 11,521 in 2001. The main settlements are concentrated in Dhulikhel Bazaar and Shreekhanadapur.

Historically, Dhulikhel used to be a very important trade centre handling a great deal of commercial trade between Kathmandu valley and the eastern hill districts. At present, Dhulikhel is the administrative headquarter of Kavrepalanchowk district, and a centre of education and business activities for neighbouring settlements. Because of the ridge location and the beautiful panorama of the Himalaya peacks visible from the area, Dhulikhel has emerged as a major tourist destination adjacent to the Kathmandu valley. There are at present many standard tourist resort-hotels and more are on the pipeline.

Panauti

Panauti is located 33 km east of Kathmandu and is a traditional site of Kavrepalanchowk district. It is the third municipality of the district with the total population of 25,563 in 2001. It has an access through Banepa-Panauti- Khopasi feeder road. This is one of the main market/service centres of the southern belt and serves 20 VDCs of the district. Daily consumable goods and agricultural products are bought and sold in this market centre. The agriculture products are being easily exported to the Kathmandu valley though Banepa-Khopasi feeder road. It has a service of basic infrastructure like electricity, health post, bank, public telephone etc.

Khopasi

Khopasi is Located at the end point of Banepa-Khopasi feeder road. Khopasi is also one of the traditional settlements of Newar communities. It lies at about 10 km south-east from Banepa Bazaar and primarily a commercial centre. Khopasi market centre is traditionally known as collection centre of various agricultural products of the south-east region of the district. It has basic services of school, telephone, electricity, health post etc. It has a potential to develop as a tourist site for a day sight-seeing that is close to Kathmandu valley.

Nala

Nala is also one of the traditional sites and categorized as a service centre of the district. It is close to Banepa that has an access with a district road. Nala is popular for its potato production and known as collection centre of many agricultural products for the north-west part of the district.

Dolalaghat

Dolalaghat market centre is situated on the bank of Indrawati river and along the Arniko highway. It lies 56 km east of Kathmandu city. The Dolalghat market centre was emerged after the construction of Arniko highway that provides services to the 9 northern VDCs of the district. It has some groceries, tea stall and hotels. The market is well known in the district as a place of exporting fruits and vegetables produced within the vicinities. It is popular as a picnic spot for the Kathmanduites.

Panchkhal

Panchakhal is located 45 km north-east of Kathmandu and 15 km north of Dhulikhel along the Arniko highway. It is one of the largest fertile valleys of the district. Panchkhal Bazaar is well known place for its agricultural products particularly vegetables, fruits and dairy products. The agricultural products are easily being exported to nearby market centres and Kathmandu valley via the Arniko highway. Due to irrigation facility, fertile alluvial soil and warm climate Panchkhal area is well know for its agricultural production within and outside the district.

2.5 Existing Transport and Communication Situation

2.5.1 Accessibility

The backbone of the transport system in the district has continued to be the Arniko highway, which connects the Kathmandu valley with the Northern border. The ongoing construction of Dhulikhel-Bardibas highway will also have a major impact in the overall development of the district that connects valley with the eastern part of Nepal. On the whole as compared to other areas of Bagmati zone, Kavre district by virtue of the past investments in road transport and its small size seems to be in a relatively favorable condition regarding road transport (refer to map 3). This does not however mean that further investments in road development are not needed. The access situation regarding the southern parts are likely to remain difficult compared to the northern part of the district although the southern part has greater likelihood on account of terrain for developing seasonal road connections.

At present, the district has 76.6 km blacktopped, 61 km gravelled and about 586 km earthen road. Although, there are many roads under construction and re-construction at village, district level and from other sources, only few are motorable. The overall road networks existed within the district is summarised in Table 2.4

Inventory of Transport Linkages

Reference No.	Road Corridor	Length (km)	Remarks
H3	Arniko highway	38.0	Motorable
H6	Dhulikhel-Bardibas highway	22.0	Under construction
F24	Satdobato-Phulchowki	1.0	Not Motorable
F29	Banepa-Panauti-Khopasi	10.0	Motorable
F30	Panchkhal-Helambu	11.0	Motorable
24A001R	Banepa-Rabi Opi-Panchkhal	14.2	Motorable
24A002R	Rabi OPI-Devitar-Anaikot	7.00	Motorable
24A004R	Chandeswori-Sumara Bhanjyang-Tusal Nala	4.7	Motorable
24A005R	Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	14.00	Partially motorable
24A006R	Banepa-Nala-Bhaktapur	5.5	Motorable
24A007R	Nasiksthan-Sanga-Tukucha Nala	4.50	Motorable
24A008R	Sanga Tukucha Nala-Mahadev Pokhari	7.20	Partially motorable
24A009R	Nagarkot-Rohini Bhanjyang-Nala Pul Bajar	11.00	Partially motorable
24A010R	Nayagaun-Rohini Bhanjyang-Naldum	9.20	Motorable
24A011R	Kattike Bhanjyang-Halde-Sipaghat	8.5	Not motorable
24A012R	Hinguwapati-Naldum-Nagarkot	25.1	Partially motorable
24A013R	Kuntabesi-Baluwapati-Naldum	12.10	Motorable
24A014R	Phedi-Timalsinagau-Kotang	10.60	Motorable
24A015R	Lamidanda-Anaikot-Manegaun	9.10	Motorable
24A016R	Dolalghat-Haldebesi- Hinguwapati	9.7	Partially motorable

Reference No.	Road Corridor	Length (km)	Remarks
24B017A	Dolalghat-Jyamdi	9.0	Partially motorable
24B017A	Hinguwapati-Chandeni-Jyamdi	4.9	Partially motorable
24A018R	Pachaskilo-Jyamdi	7.00	Motorable
24A019R	Lamidanda-Sathighar Bhagwati-Pachuwarghat	18.30	Motorable
24A020R	Tamaghat-Bohredovan-Kot Timal	20.60	Partially motorable
24A021R	Tinpiple-Baluwa-Bhadabari-Bohoredovan	9.00	Partially motorable
24A022R	Patlekhet-Kalche-Tinpiple	8.90	Motorable
24A026R	Raspot (Dolalghat)-Birta Deurali-Gothpani	19.00	Partially motorable
24A027R	Dolalghat-Raspot-Kolanti-Danda Kharka	19.4	Partially
24A030R	Dolalghat-Madankundari-Dovantar	42.2	Partially motorable
24A031R	Dumre(Bhumlutar)-Simthali	16.5	Partially motorable
24A034R	Chaubas-Lakuribhanjyang-Bekhsimal	6.0	Partially motorable
24A035R	Gumati Bhanjyang-Kilpu	8.3	Partially motorable
24A036R	Pokhari Chauri-Chauri Khola	7.20	Partially motorable
24A040R	Bhakundebesi-Kot Timal-Mechhe	29.0	Motorable
24A047R	Goganpani-Thasigaun	4.0	Partially motorable
24A052R	Dapcha-Pipaltar-Mahadevtar	10.0	Partially motorable
24A053R	Bhakundebesi(Tallo-Hatiya)-Barbot Khaski Rosi	4.60	Motorable
24A054R	Kavrebhanjyang-Dapcha-Kakare-Rosi	15.6	Partially motorable
24A055R	Dapcha-Bhakundebesi	5.00	Motorable
24A057R	Phulbari-Bhakundebesi	9.10	Motorable
24A063R	Milche-Bankhu	-	Under Construction
24A064R	Khopasi-Taldhunga	47.0	Partially motorable
24A068R	Khopasi(Chalal)-Dhungkharka-Chyamrangbesi	23.0	Motorable
24A069R	Panauti-Mulpi-Bhumidanda	6.00	Partially motorable
24A070R	Ryale-Panauti-Namobudda	19.40	Partially motorable
24A071R	Ryale (Manedovan)-Lakuri Bhanjyang	4.80	Partially motorable
24A073R	Sanga-Asapuri-Kusadevi	9.00	Partially motorable
24A074R	Sanga--Aasapur-Kusadevi (Nayagaun)	12.00	Partially motorable
24A075R	Bhaisepati-Mahendrajyoti-Panauti	7.50	Partially motorable
24A076R	Banepa-Ugratara-Baikibas	2.10	Motorable
24A077R	Banepa-B.P. Marga	7.90	Motorable
24A078R	Sankhu (Dahaltar)-Shreekhandapur	7.90	Motorable

Source: Annex 3.01

TABLE 2.4

The existing road networks within the district are in varying condition that is further deteriorating in the absence of due maintenance and rehabilitation works. Interventions are limited to emergency repairs and many of these roads become inaccessible during the rainy season. The financial and technical constraint of the DDC is the other reason for not being able to maintain the existing road networks. However, the DDC has given the high priority for the maintenance and rehabilitation works for the existing roads to bring them back in the operational condition during the course of DTMP preparation.

2.5.2 Communication Infrastructure

As far as the communication infrastructure in the district is concerned, postal service is the major means of communication. At present, almost every VDC has postal services and there are 27 VHF and /or MARTS telephone systems in the district. Telecommunication, which is considered the most efficient means of communication, is still far below the district requirement, and only three municipalities and 27 VDCs have cable based telephone services. The main constraints for balanced communication systems in the district are to rugged and difficult geography of the district, lack of complementary infrastructure like roads and electricity.

2.6 Agricultural Profile

Agriculture is the main source of income in the Kavrepalanchowk district and about 78% of the population are dependent on it for their livelihood.

The overall agricultural production pattern of the district is characterised by a high subsistence production and a relatively moderate surplus production. Despite the varied climatic opportunities for growing different high value and export potentials crops like large cardamom, ginger, oranges etc., the agricultural production system is still subsistence in nature and market integration is indeed very limited particularly confined in vegetable and dairy sectors.

A review of irrigation facilities in the district shows that only about 13 percent of the total cultivated land has irrigation facilities throughout the year. Although there are many sources of water, expansion of irrigation infrastructure in the district is quite difficult due to remoteness and difficult terrain. Due to the inadequate irrigation facilities it is very difficult to accelerate agricultural production and productivity.
The lack of irrigation facilities during winter season is still perceived to be a major bottleneck for winter and off-season farming. Therefore, upland and rainy season farming is the predominant farming practice in the district. The cropping pattern of Bari land, which covers the main area of cultivated land, is maize-millet. Paddy-wheat, paddy-maize, paddy-paddy are the major cropping patterns on irrigated Khet land.

2.6.1 Agricultural Production and Potential

The production system in the district is subsistence in nature with low level of input and output. Rice, maize, millet, wheat, oilseed and potato are the major subsistence crops. Looking at the climatic and edaphic variations, the district has immense potential for off-season vegetable production, citrus and other fruits, bee keeping, spices crops, potato and potato seed production etc.

In spite of the favourable agro-climatic conditions in the district and very high cropping intensity (area of temporary crops divided by arable land), the income of farmers is rather low. The main reasons for this are the low percentage of land available for cultivation as well as the lack of adequate road network that leads to relatively high transportation cost of agricultural production. Moreover, lack of irrigation and unavailability and/or high cost of fertilisers are other factors impeding the growth and development of the agricultural sector.

The main crops of the district are maize, rice, millet, wheat and oilseed. Potato and barley are produced in the high hills as staple crops and large volumes of potato are exported to Kathmandu every year. Cereals production is confined in the river basin and the high hills and mountain regions are insufficient in food grain production. Looking at the current scenario of agricultural production and potential the following areas are identified as most prominent areas of developing agricultural development pocket areas.

Agricultural Development Pocket Areas in the District

Sector	Sub-sector	Potential Pocket Areas
Cereals	Rice	Mahadevsthan, Koshidekhs, Bhakunde, Panchkhal, Sankhu, Nala, Khopasi
	Wheat	Nala, Khopani, Banepa, Dapcha, Snakhu, Manahdevsthan
	Maize	All VDCs
Pulses	Blackgram	Mahadevsthan, Anekot, Saping, Panchkhal, Bhumlutar, Koshidekha, Kattike deurali
	Peas	Khopasi, Banepa, Panuti, Sunthan, Dhungkharka, Dhulikhel
Cash crops	Tea	Anekot, Khanalthok, Khaksibesi
	Coffee	Chauri, Kattike deurali, Pokhari, Kharelthok
	Oilseeds	Dhilikhel, Khopasi, anekot, Sankhu, Dapcha, Fulbari
	Peanuts	Jaisitho, Daraune pokhari
Vegetables	Tomato	Panchkhal, Baluwa, Mahadevsthan, Dolalghat
	Potato	Thuloparsel, Banepa, Khopasi, Nala, Dapcha
	Onion and Garlic	Jaisithok, Daraune pokhari

Fruits	Oranges/Mandarin	Sankhu, Sunthan, Dapcha, Sarada Batase, Nala
	Apple	Dhungkharka, Chyasikharka Narayansthan, Naldum, Kalati Bhumedanda,
	Lime	Sankhu, Sunthan, Dapcha, Methinkot, Mechhe
	Jack fruits	Panchkhal, Baluwa, Mahadevsthan
Spices	Ginger	Anekot, Deupur, Sarsyukharka
	Chilli	Dapcha, Daraune pokhari, Sikhar ambote
	Cardamom	Ryale, Kusadevi, Malpi, Khopasi, Nala
	Turmeric	Ryale, Kusadevi, Malpi, Nala
	Cumin	Mangaltar, Mechhe
Fisheries		Anekot
Medicinal herbs		Dapcha,, Dhunkharka, Bhugdeu, Mahadevtar, sisakhani, Phalametar, Gokule, Chyamrang besi, Chyasikharka, Bhimkhori

Source: District Profile of Kavrepalanchowk (1993)

TABLE 2.5

Future investments on new roads and rehabilitation of existing roads will facilitate the provision of services and agricultural inputs such as seed, fertilisers etc. Further, it will provide access to markets for agricultural products and an economic access to different services. As a consequence the income of farmers from cash crops will substantially increase due to reduction in transportation cost from their farm to the road. This will lead to a gradual substitution of traditional subsistence farming by cash crop production. Looking at the present land use pattern and the climatic variability of the district, there is still opportunity to transforming low productive subsistence agriculture to market oriented high-input agricultural production systems through diversification and intensification of existing cropping systems. The district is endowed with varieties of climatic zones starting from warm sub-tropical like climate along the river basin to temperate and cold in the high altitude zone. This prevailing heterogeneity in the distribution of agricultural resource base in the district has provided the district with comparative advantage of growing varieties of crops with high demand.

2.7 Industrial Profile

Although the district is close to Kathmandu valley, it doses not hold significant number of large-scale factories and industry except some tourism, hatcheries, plastic and carpet industries. However, the district is enrich with number of small and cottage industries but particularly home-based, and are concentrated mostly in the in urban areas. Of the total cottage and small-scale industries agro-based industries outnumbered the other sectors of industries. In the high hill areas, *Radi/Pakhi* weaving is a traditional industry. Weaving and knitting industries are prominent industries in the district after the ago-based industries. According to DDC profile (2001) there are altogether 2,356 medium/large industries registered in the district but only 800 industries are being renewed and assumed to be under operation. The different types of the industries registered in the district are shown in Table 2.6.

Number of Industries Registered in the District

S.N.	Type of Industries	Number Registered
1.	Service Related	829
2	Tourism	54
3	Agro and Forest-based	17
4	Hydropower	3
5	Production Related	1,453
	Total	**2,356**

Source: District Profile, Kavrepalanchowk (2001)

TABLE 2.6

2.8 Trends and Dynamics Observed

Main trends observed are related to the demographic dynamics in the district. As in many northern districts in the country, in and out migration has almost stabilised substantially. The reason for this stabilisation can be explained by the fact of increased population pressure and heightened land price in the cities and Terai. However, after the opening of Arniko high way in late seventies the flow of inputs

in the district has increased leading to a variety of goods being sold in the local market. The general consumption level has been increased to some extent. Since the local employment and economic opportunities within the district could not meet the demand for cash, the process of seasonal migration in the search of off-farm employment has further escalated.

Another important development trend observed is in the use of natural resources is the conversion of pasture land into forest and changes in the practice of livestock feeding from open grazing to stall feeding. Because of increased population in the district, a decreasing trend of per capita natural resource endowment such as land, forest etc. has been observed. This increased population size has further exerted on the land use pattern that has increased the cropping intensity in per unit of cultivated land. After the opening of strategic road network in the district, the import of commodities required for household commodities has increased substantially while the overall export from the district has not been significant. This is primarily due to the location of agricultural potential pockets still far from the reach of motorable roads.

2.9 Export Potentials

Due to its proximity to Kathmandu the district has enormous potential of exporting both agro-based and non-agro-based products. Fruits, vegetables, dairy milk and poultry are the important agri-products with significant export potential. The district has therefore envisioned agricultural sector as a leading sector of the district development. Other than agricultural products, Non-Timber Forest Products (NTFPs) like *Chirato, Lokta* and other herbs like *Jatamasi, Kudki, Sugandhwal* etc are exporting from the district to Kathmandu every year. Sunkoshi watershed areas are the most prominent places of producing NTFPs in the district.

2.10 District Priorities

The district has given due priority in the balanced development of different sectors to improve the overall socio-economic condition of the district. Transportation is one of the high priority sectors of Kavrepalanchowk district. Therefore, the district has given due emphasis on new construction, maintenance and rehabilitation of the existing district roads. The district has made its strategic vision to provide road access to each and every VDC in the next fifteen years.

Road corridors for consideration in DTMP were selected based on the presentation of existing scenario, survey findings and recommendations of the DRCC. A series of workshops and discussions were organized with DRCC and DDC to finalise the list of the road corridors to include in DTMP study. DRCC and DDC have proposed six road corridors for new construction and sixteen existing road corridors for the purpose of rehabilitation. The final list of the road corridors proposed for the detail DTMP study is summarized in Table 2.7.

Proposed DTMP Roads

Transport Linkages / Corridors	Reference No.	Proposed for	Total (km)	Existing * (km)
Bohoredovan-Timalbesi	24A024R	New Construction	7.1	1.3
Timalbesi-Thulo Parcel-Sallyani	24A037R	New Construction	15.0	5.0
Katunje-Bankhu	24A047R	New Construction	27.9	-
Shankhu-Shikharambote	24A060R	New Construction	24.7	-
Milche-Bankhu	24A063R	New Construction	56.0	28.0
Khopasi-Taldhunga	24A064R	New Construction	69.0	47.0
Banepa-Panauti-Khopasi	F29	Rehabilitation	10.0	10.0
Banepa-Rabi OPI-Panchkhal	24A001R	Rehabilitation	14.2	14.2
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	24A005R	Rehabilitation	14.0	14.0
Sanga-Tukucha Nala-Mahadev Pokhari	24A008R	Rehabilitation	8.20	8.20
Nagarkot-Rohini Bhanjyang-Nala Pulbajar	24A009R	Rehabilitation	11.0	11.0
Hinguwapti-Naldum-Nagarkot	24A012R	Rehabilitation	25.1	25.1
Sathighar Bhagwati-Timalbesi	24A019R	Rehabilitation	10.0	10.0
Tamaghat-Bohredovan-Kot Timal	24A020R	Rehabilitation	20.6	20.6
Tinpiple-Baluwa-Bhedabari-Bohoredovan	24A021R	Rehabilitation	9.0	9.0
Dolalghat-Madankudari-Dovantar	24A030R	Rehabilitation	42.2	42.2
Pokhari Chauri-Chauri Khola	24A036R	Rehabilitation	7.2	7.2

Bhakundebesi-Kot Timal-Mechhe	24A040R	Rehabilitation	29.0	29.0
Kabrebhanjyng-Dapcha-Kakare-Rosi	24A054R	Rehabilitation	15.6	15.6
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	24A068R	Rehabilitation	23.0	23.0
Panauti-Mullpi-Bhumidanda	24A069R	Rehabilitation	6.0	6.0
Ryale (Manedovan)-Lakuri Bhanjyng	24A071R	Rehabilitation	4.8	4.8
Bhaisepati-Mahendrajyoti-Panauti	24A075R	Rehabilitation	7.5	7.5
Banepa-B.P. Marga	24A077R	Rehabilitation	7.9	7.9

** The existing roads are of varying standard*
Source: Annex 3.01

TABLE 2.7

Banepa-Panauti-Khopasi and Banepa-B.P.Marga road corridors originally proposed for the rehabilitation are of black-topped and graveled standard and is already being initiated for the rehabilitation from the district. Therefore, these two road corridors are dropped from the DTMP list.

Kavrepalanchowk district has given a high priority for the maintenance and rehabilitation of existing road network in order to bring them up in the motorable condition. However, some new road corridors have also been identified and proposed for the construction in the area of relatively less road accessibility.

The majority of the road corridors proposed for the new construction lies in the southern part of the district where the road facilities is lower compared to the northern part. A brief description of each road corridors proposed for new construction by DRCC, DDC and based on the general assessment for the purpose of detail DTMP study is outlined hereunder.

Katunje-Bankhu

The total length of this road corridor is about 27.9 km. It starts from Gogan Pani that lies in the under construction Dhulikhel-Bardibas highway. The end point of this corridor connects with Milche-Bankhu corridor that is also proposed for new construction and is under construction by RCIW. It will basically provide access to the VDCs located in the south-east of the district where the motorable road access does not exist.

Shankhu-Shikharambote

The proposed Shankhu-Shikharambote road corridor will connect Shikharambote and other southern VDCs with the existing Kavrebhanjyang-Dapcha-Kakare-Rosi road corridor that is linked with Dhulikhel-Bardibas highway. The total length of this rural road is about 24.7 km. The major agriculture product of the people living on the influence zone of this road corridor is potato, herbs and dairy farming. The construction of this road corridor will provide better access to export agriculture product to Banepa and Kathmandu valley through Arniko highway.

Bohoredovan-Timalbesi

The total length of the proposed Bohredovan-Timalbesi road corridor is about 7.1 km. This road corridor will connect existing Tamaghat-Bohredovan-Kot Timal road with the proposed Timalbesi-Thulo Parcel road corridor. The major local agro-based product of the area is potato and sweet orange. There are also few dairy farms within this area, which can improve the socio-economic condition of the district if it could be exported to the service/market centre.

Khopasi-Taldhunga

The proposed Khopasi-Taldhunga road corridor will provide access to the VDCs located in the south-west of the district where the motorable road access does not exist. The construction of this road will link north-west region of the district with the market/service of Khopasi that has a direct connection with Banepa and Kathmandu valley through Banepa-Panauti-khopasi road and Arniko highway. The total length of this corridor is about 60.0 km and is under construction by RIDP. At present, 47.0 km of total length is already being constructed and traffic is under operation in the completed section.

Milche-Bankhu

This is one of the most important road corridors in the context of Kavrepalanchowk district that links the southern part pf the district to the highway and other service/market centres within the district. It

provides access mainly to Milche, Saldhara, Salmechakhal, Ghartichhap and Bankhu Chaur VDCs and connects with Khopasi-Taldhunga and Katunje-Bankhu road that further linked with highway and service/market centre. The total length of the proposed corridor is about 56.0 km and is under construction by RCIW. The track opening of the whole corridor is already completed and full width construction is ongoing.

Timalbesi-Thulo Parcel-Sallyani

The total length of the proposed Timalbesi-Thulo Parcel-Sallyani road corridor is about 15.0 km and 5.0 km of the initial section is already completed. This is the extension of the existing Sathighar-Bhagwati-Timalbesi road corridor that is connected with Arniko highway at Lamidanda. The traffic is operated during the dry season from Lamidanda to Timalbesi. The remaining section of the proposed road corridor is under construction by DRSP under RCIW expanded programme. The completion of this corridor will connect eastern region of the district with major highway and service/market centre and further provide access to Kathmandu valley.

The DRCC and DDC also proposed 18 existing road corridors (refer to Table 2.7) for rehabilitation/reconstruction to include in detail DTMP study. The majority of the existing road corridors proposed for rehabilitation lie in the northern part of the district that is linked with the highway or feeder road within the district. The existing roads are constructed as a fair weather standard road that is opened for the traffic during the dry season. These existing road corridors are rapidly deteriorating due to lack of maintenance, landslides and inadequate design and construction measures.

3. INDICATORS FOR DISTRICT TRANSPORT PLANNING FOR NEW CONSTRUCTION ROADS

As mentioned in Methodology (Volume I), the indicators for district transport planning prioritisation for new construction of roads reflect basically the existing situation within a discrete area of influence of a particular road corridor. The selected road corridors for the purpose of new construction of Kavrepalanchowk district have been compiled in Table 2.7. The ranking of individual road corridors was done following the approved scoring system.

3.1 Demography

Following the Methodology (Vol. I), chapter 3.7.1, the population along the different road corridors have been divided into two categories: population located in the inner and outer zone of influence. Whilst the inner zone of influence (IZI) as per definition comprises the total area left and right of the road corridor within 5 km and the outer zone of influence (OZI) consists the area between 5 and 15 km. The zones of influence are reflected in the thematical Map no. 5.

The majority of the road corridors do not have OZI due to the road corridors proposed for new construction or existing road corridors being close to each other. Therefore, the OZI is overlapped with the IZI of the nearest road corridor (refer to map 5). The scoring of the individual road corridor based on population density is compiled in Table 3.1 and the most important/extreme linkages related to population are described below:

Score of Proposed Roads Based on Demographic Characteristics

Road Corridor	Length (km)	Total Pop. IZI	Total Pop. OZI	IZI Pop/km	OZI Pop/km	Scoring		Total Score (10)	Transformed Score (10)
						IZI (6)	OZI (4)		
Katunje-Bankhu	27.9	11,000	0	394	0	3.8	0.0	3.8	**5.6**
Shankhu-Shikharambote	24.7	13,288	0	538	0	6.0	0.0	6.0	**10.0**
Bohoredovan-Timalbesi	7.1	1,066	0	150	0	1.0	0.0	1.0	**1.0**
Khopasi-Taldhunga	69.0	16,910	0	282	0	2.0	0.0	2.0	**2.1**
Milche-Bankhu	56.0	14,730	728	263	13	1.7	4.0	5.7	**9.5**
Timalbesi-Thuloparcel-Sallyani	15.0	7,258	0	484	0	5.2	0.0	5.2	**8.3**

Source: Annex 3.1

TABLE 3.1

The proposed **Shankhu-Shikharambote** road corridor will provide service to maximum number of population per km of road length from IZI comprising of thirteen VDCs of Kavrepalanchowk district. It is a very densely populated corridor compared to the others. Consequently, this corridor is ranked first from demographic aspects with a maximum score of 10.0.

Milche-Bankhu road corridor is ranked second from demographic aspects with a total score of 9.5 out of 10. This corridor mainly received the score from OZI where the other corridors do not have OZI due to overlapping with IZI of nearest road.

Timalbesi-Thuloparcel-Sallyani road will provide service to maximum population of 7,258 in its IZI from ten VDCs of Kavrepalanchowk district (refer to map 5). This corridor does not have OZI because the IZI of other roads overlap with its OZI area. It will mainly serve the eastern part of the Kavrepalanchowk and neighbouring district. The total length of this road corridor is about 15.0 km, and has received a total score of 8.3.

The remaining road corridor provides service only to a small number of populations and received the low score from demographic aspects. All the remaining road corridors serve only to the population within IZI due to OZI being overlapped with the nearest road corridor.

3.2 Agricultural Resources / Potentials

The scoring related to agricultural resources and potentials was carried out based on the area of land available for agriculture located in the inner and outer zone of influence of the different road corridors. As per definition the agricultural area within 5 km from both sides of the road corridor is within the IZI and the area between 5 and 15 km belongs to the OZI. The scoring of the individual road corridors based on above factor (Vol. I, 3.7.2) is compiled in Table 3.2 and the most important/ extreme linkages related to agricultural resources and potentials described below:

Score of Proposed Roads Based on Agricultural Resource Base

Road corridor	Length (km)	Cultivated land area in IZI, (ha/km)	Cultivated land area in OZI, (ha/km)	Score		Total Score (15)	Transformed Score (15)
				IZI (10)	OZI (5)		
Katunje-Bankhu	27.9	77	0	6.0	0.0	6.0	**7.8**
Shankhu-Shikharambote	24.7	115	0	10.0	0.0	10.0	**14.7**
Bohoredovan-Timalbesi	7.1	20	0	1.4	0.0	1.4	**1.7**
Khopasi-Taldhunga	69.0	64	0	4.7	0.0	4.7	**5.5**
Milche-Bankhu	56.0	69	5	5.2	5.0	10.2	**15.0**
Timalbesi-Thuloparcel-Sallyani	15.0	93	0	7.6	0.0	7.6	**10.6**

Source: Annex.3.2

TABLE 3.2

Milche-Bankhu road corridor has been assigned a maximum score of 15 and has a high priority from the agricultural perspective due to comparatively large area of cultivated land within the inner and outer zone of influence.

Shankhu-Shikharambote road corridor is ranked second from the agricultural development perspective with a total score of 14.7 out of 15. It mainly received the score from IZI area which has 115 hectare of available cultivated land per km of road length.

Timalbesi-Thuloparcel-Sallyani road corridor ranked third most important linkage from the agriculture development perspective. The total available cultivated land under IZI area is 93 hectares per km of road length. This corridor mainly passes through vegetable pocket area (Saldhara and Salmechakal), orange pocket area (Ghartichaap, Banakhuchaur), and traditional herbs producing areas.

Investments in transport will facilitate the provision of services like credit and agricultural inputs such as seed, fertilisers. It will provide access to services for agricultural products and an economic access to different services. As a consequence the income of farmers from cash crops will substantially increase due to reduction in transport cost from their farms to the road. This will lead to a gradual substitution of traditional subsistence farming by cash crop production.

There are opportunities in the district for transforming low productive subsistence agriculture to service oriented high-input and high-output agricultural production systems through diversification and intensification of existing cropping pattern. The district is endowed with varieties of climatic zones starting from warm sub-tropical like climate along the river basin to cold temperate in the high altitude zone. Due to difference in climatic and edaphic condition and great heterogeneity in the distribution of agricultural resource base in the district described in terms of potential pocket areas

for growing different crops with comparative advantage there are opportunities to grow both temperate as well as tropical crops. A complex set of farming can be practised after investments on transport.

There is a high potential for increased production of vegetables, potato and for intensification of production of other crops. An improved district road network will allow more economical transportation of the products to the Kathmandu valley and other parts of the country through the existing Arniko highway and under construction Dhulikhel-Bardibas highway.

3.3 Economic Structure and Service Centres

The concentration of economic and social activities are at the major trading centres; Dhulikhel, Banepa and Panauti. These market/service centres are located along the Arniko highway. The services like health, education, communication and electricity are much more concentrated at Dhulikhel and Banepa. The other major service/market centres in the district are Khopasi, Dolalghat, Panchkhal, Dapcha, Nala and Narayansthan that are scattered over the district.

Based on the information collected during the field survey (Annex 3.3) a review of functions and services of service centres at the centre itself and in its catchment area has been carried out. Evaluation of the data applying the methodology described in Vol. I, 3.7.3 was carried out to determine the weightage of market/service centres. The scores for the road corridors have been derived from these weightage using the methodology given in Vol. I, 3.7.3 that are summarized in the Table 3.3.

Score of Proposed Roads Based on Services Provided by Existing Service Centres

Road Corridor	Market/ Service Centres	Market/ Service Centres' Weightage	Total Weightage	Length (km)	Weightage per km of Road	Total Score (10)	Transformed Score (10)
Katunje-Bankhu	Dapcha	36.9	67.5	27.9	2.4	**3.4**	**3.4**
	Narayansthan	30.6					
Shankhu-Shikharambote	Panauti	91.3	128.2	24.7	5.2	**10.0**	**10.0**
	Dapcha	36.9					
Bohoredovan-Timalbesi	Panchkhal	34.4	34.4	7.1	4.8	**9.2**	**9.2**
Khopasi-Taldhunga	Khopasi	53.8	145.1	69.0	2.4	**3.4**	**3.4**
	Panauti	91.3					
Milche-Bankhu	Khopasi	53.8	53.8	56.0	1.0	**0.0**	**1.4**
Timalbesi-Thuloparcel-Sallyani	Dolalghat	46.9	46.9	15.0	3.1	**5.1**	**5.1**

Source: Annex 3.3

TABLE 3.3

The evaluation of the data indicates that the district headquarter Dhulikhel provides the maximum number of economic facilities and government services to district population. As a consequence **Dhulikhel** receives the maximum score of 97.5 out of 100 (see Table 3.3) followed by **Banepa, Panauti** and **Khopasi**. These service centres are located in the southern region of the district along the highway and strategic road and provide service to the inner plain area.

Shankhu-Shikharambote road corridor has received the maximum score of 10.0 due to service of Panauti, one of the main service/market centres of the district. Since the final score is calculated by dividing the total weightage of service/market centre by the length of the road there is a chance that the short length with bigger service centres will have higher scores.

This road corridor is followed by **Bohredovan-Timalbesi** and **Timalbesi-Thuloparcel-Sallyani** road with the scores of 9.2 and 5.1 respectively.

3.4 Trade Flow / Predicted Changes

Most of the household commodities like kerosene, salt, cloth, rice etc. are transported to the main service/market centres from Kathmandu through Arniko Highway and strategic road. Further the imported commodities are transported to the various parts of the district from main service/market centres by the means of vehicle, porter etc. Banepa and Dhulikhel service/market centre serves the western and north-western part of the district, Panchkhal and Dolalghat serves the northern part and Panauti and Khopasi serves the eastern and southern part of the district.

The trade flows within Kavrepalanchowk district are reflected in map no. 7. The total transport cost of commodities was calculated based on the findings from the field survey. The flow of commodities included the flow in both directions from origin to destination and vice versa.

Generally, goods and commodities are transported by porters on the proposed road corridors throughout the year. On some proposed road corridors like Khopasi-Taldhunga and Timalbesi-Thuloparcel-Sallyani vehicles are also used to transport the commodities till the constructed section and further transported by means of porter.

Following the section 3.7.4 of Methodology, the scores for trade flow has been assigned based on average transport cost per km and are presented in the Table 3.4.

Scores of Proposed Roads Based on Volume of Trade Flow

Road Corridor	Length (km)	Trade volume (Ton/Year)					Total Trade volume (ton/yr)	Average Transport cost (Rs/ton/km)	Yearly Average Transport cost (Rs/km/yr)	Total Score (15)	Transformed Score (15)
		Porter	Mule/ horse	Mini-Truck	Bus	Other					
Katunje-Bankhu	27.9	720					720	54	38,710	**4.7**	**4.7**
Shankhu-Shikharambote	24.7	510					510	53	26,842	**0.0**	**2.6**
Bohoredovan-Timalbesi	7.1	765					765	85	64,648	**15.0**	**15.0**
Khopasi-Taldhunga	69.0	540					540	75	40,500	**5.4**	**5.4**
Milche-Bankhu	56.0	495					495	71	35,357	**3.4**	**3.4**
Timalbesi-Thuloparcel-Sallyani	15.0	900					900	67	60,000	**13.2**	**13.2**

Source: Annex 3.4

TABLE 3.4

Along the proposed **Bohredovan-Timalbesi** road corridor commodities are transported by vehicles from Panchkhal service/market centre till Bohredovan and further transported by porters. Panchkhal is located in the northern part of Kavrepalanchowk district (refer to map 7) and provides service to substantial population of the district. Due to the high trade volume (765 ton/year) and the average transport cost (Rs 85/ton/km) the total transportation costs per year along this corridor is also higher and thus receives the maximum score of 15.

Timalbesi-Thuloparcel-Sallyani road corridor, which provides the access to the western part of the district, has received the second highest score based on the total transport cost per km. The commodities are transported by mini-truck up to the constructed section during the dry season and porters along this corridor. The trade flow is high due to the operation of the mini-truck in the initial section of the corridor from Timalbesi to other 5 km. The average transport cost per ton per km of road length is Rs 67. The total score received by this corridor is 13.2 and ranked second based on the volume of trade flow.

Khopasi-Taldhunga road corridor, which provides the access to the southern part of the district and is also the main route to the slate mine at Salmechakal VDC from Khopasi service/market centre Although this corridor does not transport the high trade volume, it receives the significant score due to difficult alignment and high transport rate of commodities. The average transport cost per ton per km of road length is Rs 75 that is the second most expensive after the Bohredovan-Timalbesi road corridor. The total score received by this corridor based on the total transport cost per km is 5.4 out of 15.0 and ranked as third.

The scores received by other three road corridors based on the total transport cost per km of road length are relatively low that ranges from 2.6 to 4.7.

3.5 Development Potential

Other resources and activities along the individual road corridors, which are beyond the agricultural sector as described in 3.7.5 Volume I, are described and rated as development potentials. The main resources and activities are tourism development, agricultural and horticultural intensification, hydropower development, development of industry, market and service centres development etc., which may have synergetic development impact due to road construction, are considered under the heading of development potential.

There are few areas with distinct development potentials. However, the survey carried out with district representatives identified the following potentials (see annexes 3.5.1 to 3.5.8) with a high significance on the respective road corridors. Based on the survey the proposed road corridors have been related to their significance to development potential. The score of proposed road corridors based on their significance to development potentials is summarized below in Table 3.5.

Scores of Proposed Roads Based on Development Potentials

Proposed roads	Length (km)	Total Weightage	Total Score (5)	Transformed Score (5)
Katunje-Bankhu	27.9	5.4	3.3	**3.3**
Shankhu-Shikharambote	24.7	4.6	1.4	**1.4**
Bohoredovan-Timalbesi	7.1	4.0	0.0	**1.2**
Khopasi-Taldhunga	69.0	6.1	5.0	**5.0**
Milche-Bankhu	56.0	5.3	3.1	**3.1**
Timalbesi-Thuloparcel-Sallyani	15.0	5.5	3.6	**3.6**

Source: Annex 3.5

TABLE 3.5

Khopasi-Taldhunga road corridor will promote the construction and tourism industry in the district. This proposed corridor has also high potential for growth of market centres along the road corridor and exporting timber forest, fisheries and livestock farming products. Khopasi is one of the main service/market centres from where most of the commodities are exported to the southern part of the district. Therefore, this proposed road corridor receives the maximum score of 5.0 based on development potentials within and influence zone of road corridor.

Timalbesi-Thuloparcel-Sallyani road corridor has high potential for expansion and growth of service/market centres within and influence zone of road corridor and tourism industry. This road corridor has also potential of development of agro-based industries and export of timber and non-timber products. The total score of this proposed road corridor is 3.6 and ranked second from the development potential aspects.

Katunje-Bankhu road corridor has high potential of producing potato, collecting herbs, and promoting business and commerce within and influence zone of road corridor. This road will also

promote the trade of mines (slates and magnetises), livestock farming, trade flow and timber products that can be exported to Panauti, Banepa and Kathmandu valley via Arniko highway. As a consequence this road corridor ranked third with the total score of 3.3.

The other road corridors have relatively lower development potentials and consequently receive the low score ranging from 1.2 to 3.1 in comparison to the above high ranked road corridors.

3.6 District Priorities

A preliminary selection of road corridors was made based on the preliminary survey data and the recommendations by the DRCC and also on the recommendations made during VDC and Ilaka level workshop in June 2000 workshop at Sindhupalchowk. A consensus was reached about the priorities during a first workshop in Kathmandu in December 2000. These priorities were ranked between 0 and 5 and the list was finalised as shown in Table 3.6.

Scores of Proposed Roads Based on District Priorities

Proposed roads	Total Marks given	Total Score (5)	Transformed Score (5)
Katunje-Bankhu	4.0	2.5	**2.5**
Shankhu-Shikharambote	3.0	0.0	**1.9**
Bohoredovan-Timalbesi	5.0	5.0	**5.0**
Khopasi-Taldhunga	5.0	5.0	**5.0**
Milche-Bankhu	4.0	2.5	**2.5**
Timalbesi-Thuloparcel-Sallyani	4.0	2.5	**2.5**

Source: Annex 3.6

TABLE 3.6

The district has clearly prioritised two main road corridors **Khopasi-Taldhunga** in the southern part, which is being constructed by RIDP and **Bohoredovan-Timalbesi** in the western part of the district.

3.7 Tentative Construction Costs of Proposed Roads

The initial construction cost estimate covers the total cost for the new construction and reconstruction cost of existing to a maintainable standard of the individual road linkages. The rating of the whole corridor is done based on the average construction cost per kilometre of the section proposed for new construction. Consequently, the lowest costs, i.e. cheapest road linkages get the highest scores.

Initial estimate of new roads proposed for construction are prepared on the basis of preliminary data collected at the time of walk over survey of the proposed road corridor. The estimate includes the cost for labour, local construction materials, imported materials and transportation costs. For roads where construction is already in progress by RIDP or UNCDF construction costs incurred to date is taken into consideration and the total cost projected for the completion of the road construction. For Milche–Bankhu currently under construction by RCIW the information on the cost estimate provided by the project was much below acceptable values, thus average of all other roads proposed for construction has been taken into account in order to access the ranking on construction costs.

From the estimates arrived at Bohredovan–Timalbesi road currently under construction by UNCDF, which is built along the banks of the Jikhu khola is ranked highest with the cost per km at Rs 1,520,000. Khopasi–Taldhunga road currently under construction by RIDP following difficult rocky areas is ranked as the lowest, which is estimated to cost Rs 2,500,000 per km.

The table presented below is the summary of an initial cost estimate and the engineering rating:

Summary of Initial Cost and Engineering Rating of Proposed Roads

Road Corridor	Length (km)	Total Cost (NRs)	Cost per km (NRs)	Engineering Rating	
				Total Score (20)	Transformed Score (20)
Katunje-Bankhu	27.9	65,286,000	2,340,000	3.3	**3.3**
Shankhu-Shikharambote	24.7	45,201,000	1,830,000	13.7	**13.7**
Bohoredovan-Timalbesi	7.1	10,792,000	1,520,000	20.0	**20.0**
Khopasi-Taldhunga	69.0	172,500,000	2,500,000	0.0	**3.1**
Milche-Bankhu *	56.0	128,800,000	2,300,000	4.1	**4.1**
Timalbesi-Thuloparcel-Sallyani	15.0	32,700,000	2,180,000	6.5	**6.5**

Source: Annex 3.7

Note: Since the detail estimate/actual construction cost is not available, average cost per km for the district is taken into consideration

TABLE 3.7

From the analysis it is observed that **Bohredovan-Timalbesi** road corridor is the most economical and hence has achieved the highest score of 20.0. The other road corridors that appeared in the top three positions are **Shankhu-Shikharambote** and **Timalbesi-Thuloparcel-Sallyani** with the scores of 13.7 and 6.5 respectively.

The above table indicates that the ongoing construction of Khopasi-Taldhunga and Milche-Bankhu seems to be expensive compared to the other roads due to difficult terrain and additional structures.

3.8 Environmental Issues / Predicted Impacts

During the walkover survey carried out by the District Technical Team the preliminary environmental profile of the road corridor and potential environmental implications of the proposed road were assessed. Besides the description of the profile of the road link, water bodies, topography, geology, vegetation, socio-economic, etc. also have been described. Out of all the aspects, the significance of negative environmental impacts has been considered and rated in Table 3.8.

The following summary describes the environmental aspects of the individual road corridors proposed for new construction.

a) Katunje - Banku

The initial point of the proposed road alignment, Katunje is located at an altitude of 800m and rises to 1860m at the proximity of km 11+000 and further descends gradually to an altitude of 620m. Khani khola and Burlne khola are major perennial spring fed rivers along the proposed alignment. Gope khola is another river which is minor in nature. All rivers are fordable during the dry season and bridges will be required only for the purpose of all weather road. Steep rock slopes exists at km 10+000 (approx.) for a length of 130m, which needs to be avoided at the time of finalisation of the alignment. A community forest along the proposed road corridor exists at km 8+000 – 13+000 and 23+000 – 28+400.

b) Sankhu – Sikharambote

The 14 km of the proposed road is mostly situated at river/lower valley. The altitude of the alignment varies between 1000m to 1500m. Rosi khola, Sisne khola, Panighat khola and Khahare khola are the rivers that need to be crossed by the proposed road. The former two rivers are perennial, spring fed while the latter two dry up during the winter, however all rivers are passable during the dry season. Steep rocky slopes exist at the proximity of 3+800, 7+900 and 8+600 for lengths of 100m, 50m and 250m respectively. At 3+800 there exists a landslide for a length of 100m. Careful alignment selection needs to be taken into account in

order to avoid the rocky slopes and landslide areas. Flood prone areas also exist along the proposed road alignment where retaining wall and toe walls need to be proposed at the time of design. Fertile land along the alignment is less than 20% of the total road length.

Amongst the six roads proposed for new construction two roads mentioned above are the only ones where no work has been started. The other four roads namely, Bohredovan – Timalbesi, Khopasi – Taldhunga, Milche – Bankhu and Timalbesi – Thuloparsel – Sallyani included in the preparation of the DTMP are roads where construction is already in progress. As laid out in the procedure of preparation of DTMP assessment of the environmental mitigation measures and technical aspects of proposed new road construction could lead to rejection if the mitigation measures were serious and huge investments would be involved. For roads where construction is in progress rejection due to environmental mitigation factors is not applicable, hence the walk over survey along roads where construction is already in progress was not been carried out. However for the purpose of determining the environmental rating of the roads information was collection from the projects. The summary of the environmental rating form is tabulated in the Table below.

Score of Proposed Roads Based on Predicted Environmental Impacts

Road Corridor	Length (km)	Environmental Rating					
		Minimum	Significant	Serious	Score	Total Score (10)	Transformed Score (10)
Katunje-Bankhu	27.9	33	4	0	6	2.5	**2.5**
Shankhu-Shikharambote	24.7	32	4	0	5	0.0	**2.1**
Bohoredovan-Timalbesi	7.1	33	3	0	6	2.5	**2.5**
Khopasi-Taldhunga	69.0	33	3	0	6	2.5	**2.5**
Milche-Bankhu	56.0	35	1	0	8	7.5	**7.5**
Timalbesi-Thuloparcel-Sallyani	15.0	36	0	0	9	10.0	**10.0**

Source: Annex 3.8

TABLE 3.8

In conclusion, indications from the initial environmental walk over survey show that there could be significant environmental effects along some of the road corridors (See Table 3.8). However, it was found that none of the roads included in DTMP selection needed substantial environmental measures. In order to ascertain the environmental effects, detailed environmental examination of the proposed road alignment will need to be carried out before construction begins.

3.9 Social Issues and Transformations

Better access to areas with resource potentials through improved transport infrastructure is expected to enhance economic growth and open up better opportunities also to the poorest social strata in the district. Therefore by means of this indicator road corridors in areas with the highest density of people living in poverty will get highest priority. In order to identify households living below the poverty line a food sufficiency survey conducted by DDC in the proposed road corridors was considered. The results are compiled in Table 3.9.

Population in Poverty in the Influence Area of the Proposed Road and Score of Roads

Road Corridor	Length (km)	Total Pop. of IZI+OZI	Total Ultra Poor Pop. of IZI+OZI	Total Poor Pop. of IZI+OZI	Pop. Per km road length		Score			Transformed Score (10)
					UP	P	UP (6)	P (4)	Total (10)	
Katunje-Bankhu	27.9	11,002	1,045	6,361	37	228	2.3	2.8	5.1	**4.0**
Shankhu-Shikharambote	24.7	13,293	1,668	7,235	68	293	6.0	4.0	10.0	**10.0**
Boredovan-Timalbesi	7.1	1,066	136	551	19	78	1.1	0.7	1.8	**1.4**
Khopasi-Taldhunga	69.0	16,910	3,061	10,343	51	172	4.0	1.8	5.7	**4.8**
Milche-Bankhu	56.0	15,460	2,035	8,410	36	150	2.1	1.3	3.5	**2.7**
Timalbesi-Thuloparsel-Sallyani	15.0	7,259	747	3,217	50	214	3.8	2.5	6.3	**5.5**

Note: P = Poor, UP = Ultra Poor; Pop. = Population
Source: Annex 3.9

TABLE 3.9

With the largest population of ultra poor and poor per km of road **Shankhu-Shikharambote** road corridor received the highest score of 10.0 followed by **Timalbesi-Thuloparcel-Sallyani** and **Khopasi-Taldhunga** with the score of 5.5 and 4.8 respectively. The score of other road corridors are ranging from 1.4 to 4.0.

3.10 Aggregation of Scores from all Nine Scoring Indicators

The total scoring of all indicators per road corridor has been compiled in Table 3.10. The rating of the individual indicators is explained in the respective chapters. The overall finding of the scoring exercise is that roads located in the inner plain areas receive a higher priority over roads located in the hills. The construction cost of roads in the inner plain is lower and less environmental mitigation measures have to be considered.

Prioritisation of Individual Road Corridors for New Construction

Road Corridor	Parameters Used for the Prioritisation of Road Corridors for New Construction and Their Corresponding Scores										
	Demography (10)	*Agriculture (15)*	*Service Centres (10)*	*Trade flow (15)*	*Dev't Potential (5)*	*District Priority (5)*	*Construction Cost (20)*	*Environment (10)*	*Social Aspects (10)*	*Total Score (100)*	*Rank*
Katunje-Bankhu	5.6	7.8	3.4	4.7	3.3	2.5	3.3	2.5	4.0	**37.1**	**5**
Shankhu-Shikharambote	10.0	14.7	10.0	2.6	1.4	1.9	13.7	2.1	10.0	**66.3**	**1**
Boredovan-Timalbesi	1.0	1.7	9.2	15.0	1.2	5.0	20.0	2.5	1.4	**57.1**	**3**
Khopasi-Taldhunga	2.1	5.5	3.4	5.4	5.0	5.0	3.1	2.5	4.8	**36.8**	**6**
Milche-Bankhu	9.5	15.0	1.4	3.4	3.1	2.5	4.1	7.5	2.7	**49.1**	**4**
Timalbesi-Thuloparsel-Sallyani	8.3	10.6	5.1	13.2	3.6	2.5	6.5	10.0	5.5	**65.4**	**2**

Source: Annex 3.10

TABLE 3.10

The findings of the scoring system indicate that three roads namely Shankhu-Shikharambote, Timalbesi-Thuloparcel-Sallyani and Bohredovan-Timalbesi have top priorities for the construction. A comparison of findings among these roads indicates that scores of Shankhu-Shikharambote, Timalbesi-Thuloparcel-Sallyani and Bohredovan-Timalbesi are higher in comparison to other roads. Their scores are 66.3, 65.4 and 57.1 respectively.

The overall scoring system also reflects that the ongoing construction of Khopasi-Taldhunga and Milche-Bankhu road corridors appears in the least priority due to its high construction cost, low trade flows, environmental impacts, social aspects etc. However, it is expected that these corridors

will be continued for the construction from RIDP and RCIW where the major parts has already been completed. The most significant part of both road corridors is that it is located in the southern part of the district where the road density is very low. These road corridors will provide link to the southern VDCs of district with the existing highways or major market/service centres.

The importance, advantage and other details of top priorities road corridors are explained briefly in the following sections:

Shankhu-Shikharambote

The total score of this road corridor is 66.3 and ranked first. This corridor has received a maximum score from agriculture land availability (14.7), construction cost (13.7), demographic aspects (10.0), social aspects (10.0), and market/service centres (10.0). The construction of this corridor will open up access to the service/market centres from large agricultural producing area in the south-east region via Dhulikhel-Bardibas highway. It will reduce the transport cost of agricultural exports to market centres at Dhulikhel and Banepa located on Arniko Highway that can be further exported to Kathmandu valley. It will also promote the export of herbs and potato from pocket areas with surplus production. This road corridor will serve a large number of populations from the south-east and north-west region of Kavrepalanchowk and Sindhuli districts.

Timalbesi-Thuloparcel-Sallyani

The proposed Timalbesi-Thuloparcel-Sallyani road corridor is under construction under the RCIW expanded program with the technical assistance from DRSP. The initial section of 5.0 km from Timalbesi has already been completed and further construction work is ongoing. It provides service to one of the poor and food deficit region of the district. It has been assumed that about 90% of population from this region are very poor. This road corridor has the maximum score from trade flow (13.2), agricultural land availability (10.6), environmental aspects (10.0), and demographic aspects (8.3). This corridor is ranked second with the total score of 49.4.

The major agricultural products of this region are potato, tomato, mango, vegetables etc. The people residing far from the service/market centre could not receive a good price of their products due to inaccessibility. After the construction of this corridor, the socio-economic condition of the people will substantially improve. They will be able to sell their cash crops and livestock products from the area to the market for the better price. It will provide access to the eastern part of the district to market/service centre at Dolalghat and Arniko highway through the existing roads from Timalbesi. This corridor will also help to promote the tourism industry in the district. There are potential tourism sites in the east and north-east part of the district that will be more accessible after the construction of this corridor.

Bohredovan-Timalbesi

The total length of Bohredovan-Timalbesi road corridor is about 7.2 km and is under construction with the assistance from UNCDF. The initial section of 1.3 km from Bohredovan has already been completed. This corridor is ranked third with the total score of 57.1 out of 100.0. The maximum score received from different aspects are construction cost (20.0), trade flow (15.0), market/service centre (9.2) and district priority (5.0). It has been in the top priority of the district. This corridor has a potential of being used as an alternative route to Kathmandu for population from eastern region of the district. They would not require detouring to Dolalghat anymore to reach Kathmandu and can use existing Bohredovan-Tamaghat road that is linked with the Arniko highway.

The completion of this corridor will provide better access to export agriculture product to the main service/market centre Panchkhal of the district via the existing Bohredovan-Tamaghat road that has a direct link with Arniko highway and further it can be exported to Kathmandu valley. The major local agro-based products of the area are potato, tomato, vegetables and dairy farming.
The score of other three road corridors are ranging from 36.8 to 49.1 and have low priority compared to the corridors explained above.

Apart from the above list, the district has informed that various new construction works for different road corridors are also under construction from different sources. The road corridors that are not included in the proposed list for the new construction but the construction work are going on from different sources are not entitled for the detail study and analysis. However, these road corridors are considered and included in the implementation plan in the course of DTMP period. A list of the road corridors where the new construction work is going on are presented in Table 3.11.

List of the Additional Roads for New Construction

Road Corridor	Total Length (km)	Completed (km)
Dolalghat-Saping-Simthali	16.9	3.0
Bhakundebesi-Bohredovan	9.0	6.0
Dolalghat-Kolati-Birta Deurali	20.0	10.0
Dolalghat-Timalbesi	7.3	2.0
Khopasi-Kavrebhanjyang-Khawa	13.0	-
Ryale-Suryabinayak	8.0	-
Dhulikhel-Kasi Bhanjyang-Basuki-Nagarkot	18.0	-
Kamidnada-Mahankal-bhugdev-Shikharambote	8.8	-
Katunje-Rosipul-Shikharambote-Narayantar	15.0	-
Bhakundebesi-Syampati	6.2	-
Bhimkhori-Walting-Budhakhani	15.2	-

TABLE 3.11

Although, the district has provided the list of the additional new construction road as above, it is found that only for first four road corridors have initiated the construction works during the survey carried out by DDC/DRSP technician. Therefore, the road corridors where the construction works has already been initiated will only be considered in the implementation plan.

4. PARAMETERS USED FOR PRIORITISATION OF EXISTING ROADS FOR REHABILITATION

For the purpose of prioritisation of the existing road corridors for rehabilitation and maintenance a separate scoring system different than new construction road is considered which is elaborated in the Methodology (refer to Chapter 3.9, Volume I). The scoring system for rehabilitation and maintenance is broadly based on DoLIDAR manual 'Approach for the Development Approach of Department of Local Infrastructure and Agricultural Roads (DoLIDAR). However, some more indicators like traffic movement (volume) and agricultural export are also used.

4.1 Demography

The absolute number of people living within the combined IZI and OZI of the road corridor is considered as the indicator for this parameter as outlined in the Methodology (refer to Chapter 3.9.1). The maximum score of 10 is assigned for this indicator, and scoring is done based on the total number of people living per km of road length. In the case of partial section of the total road corridor required for the rehabilitation, the total number of people living within the whole corridor and total length of the road is considered for the scoring purpose. It is evident that the people within the whole corridor will be benefited after the rehabilitation of the poor section.

The scoring of the individual road corridor/section based on the total population served is compiled in Table 4.1.

Scoring of Proposed Roads for Rehabilitation Based on Demographic Characteristics

Road Corridor	Length km	Total Population within IZI	Total Population within OZI	Total Population	Population per km of Road Length	Total Score (10)	Transformed Score (10)
Rohini Bhajyang-Nala Pulbazaar	11.0	4,825	0	4,825	439	1.5	**1.5**
Sanga-Tukucha Nala-Mahadev Pokhari	8.2	4,654	0	4,654	568	2.7	**2.7**
Higuwapati-Naldum-Nagarkot	25.1	17,062	0	17,062	680	3.8	**3.8**
Sathighar Bhagwati-Timalbesi	10.0	3,886	0	3,886	389	1.0	**1.0**
Pokhari Chauri-Chauri Khola	7.2	4,323	0	4,323	600	3.0	**3.0**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	9.0	3,941	0	3,941	438	1.5	**1.5**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	23.0	10,747	0	10,747	467	1.7	**1.7**
Panauti-Mulpi-Bhumidanda	6.0	7,903	0	7,903	1,317	10.0	**10.0**
Ryale (Manedovan)-Lakuri Bhanjynag	4.8	1,451	0	1,451	302	0.1	**0.1**
Bhaisepati-Mahendrajyoti-Panauti	7.5	6,058	0	6,058	808	5.1	**5.1**
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	14.0	6,313	0	6,313	451	1.6	**1.6**
Banepa-Rabiopi-Panchkhal	14.2	15,307	0	15,307	1,078	7.7	**7.7**
Dolalghat-Madankudari-Dovantar	42.2	12,125	0	12,125	287	0.0	**0.1**
Bhakundebesi-Kottimal-Mechhe	29.0	16,350	0	16,350	564	2.7	**2.7**
Tamaghat-Bohredovan-Kot Timal	20.6	8,046	0	8,046	391	1.0	**1.0**
Kavrebhanjyang-Dapcha-Kakare-Rosi	15.6	10,229	0	10,229	656	3.6	**3.6**

Source: Annex 4.1

TABLE 4.1

The evaluation of the data indicates that the **Panauti-Mulpi-Bhumidanda** road corridor serve the highest number of population per km of road length within the influence zone and consequently receives the maximum score of 10 and ranked first. The other two road corridor namely **Banepa-Rabiopi-Panchkhal** and **Bhainsepati-Mahendrajyoti-Panauti** ranked second and third with the

total score of 7.7 and 5.1 respectively

4.2 Agricultural Exports

The road corridors are prioritised based on the volume of agricultural exports that are transported along the road or road corridor if the road is closed or in bad condition as outlined in Chapter 3.9.2 of Methodology (Volume I). For the purpose of comparison between different road corridors the volumes of the various agriculture exports including livestock are converted to cash values at local prices. The maximum score of 10 is assigned for this indicator and scoring is done based on the total value of agricultural product exported per km of road length. The total volume transported along the whole corridor is considered for the purpose of scoring even in the case of partial section of a road corridor is required for the rehabilitation.

The scoring of the individual road corridor/section based on the total value of agricultural product exported is compiled in Table 4.2.

Scoring of Proposed Roads for Rehabilitation Based on Values of Agricultural Products Export

Road Corridor	Length (km)	Total Export Value Based on Farm-gate Price (Rs 000)	Value of Agricultural Product per km of Road Length (Rs000)	Total Score (10)	Transformed Score (10)
Rohini Bhajyang-Nala Pulbazaar	11.0	12,260	1,115	2.8	**2.8**
Sanga-Tukucha Nala-Mahadev Pokhari	8.2	6,350	774	1.8	**1.8**
Higuwapati-Naldum-Nagarkot	25.1	14,970	596	1.3	**1.3**
Sathighar Bhagwati-Timalbesi	10.0	15,360	1,536	4.1	**4.1**
Pokhari Chauri-Chauri Khola	7.2	3,400	472	0.9	**0.9**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	9.0	22,220	2,469	6.9	**6.9**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	23.0	14,480	630	1.4	**1.4**
Panauti-Mulpi-Bhumidanda	6.0	20,970	3,495	10.0	**10.0**
Ryale (Manedovan)-Lakuri Bhanjynag	4.8	1,000	208	0.1	**0.1**
Bhaisepati-Mahendrajyoti-Panauti	7.5	7,760	1,035	2.6	**2.6**
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	14.0	18,400	1,314	3.4	**3.4**
Banepa-Rabiopi-Panchkhal	14.2	35,610	2,508	7.0	**7.0**
Dolalghat-Madankudari-Dovantar	42.2	7,320	173	0.0	**0.1**
Bhakundebesi-Kottimal-Mechhe	29.0	18,870	651	1.4	**1.4**
Tamaghat-Bohredovan-Kot Timal	20.6	39,750	1,930	5.3	**5.3**
Kavrebhanjyang-Dapcha-Kakare-Rosi	15.6	19,290	1,237	3.2	**3.2**

Source: Annex 4.2

TABLE 4.2

The evaluation of the data indicates that the **Panauti-Mulpi-Bhumidanda** road corridor exports the highest value of agricultural products per km of road length and consequently receives the maximum score of 10 and ranked first. The major agricultural products exported from this corridor are potato, Tomato and milk. Likewise, **Banepa-Rabiopi-Panchkhal** and **Tinpiple-Baluwa-Bhedabari-**

Bohredovan road corridors are ranked second and third with the total score of 7.0 and 6.9 respectively.

4.3 Market / Service Centres

The same methodology is employed to gather information, analyse the data and scoring system as that used for new road comparisons (refer to Volume I, 3.7.3). The maximum score of 10 is assigned for this indicator and scoring is done based on the weightage of the service/market centres that is located within IZI and OZI. The total length and service/market centre within IZI and OZI of that corridor is considered for the scoring purpose even in the case of the partial section proposed for rehabilitation.

The scoring of the individual road corridor/section based on the weightage provided by service/market centres per km of road length is summarized in Table 4.3.

Scoring of Proposed Roads for Rehabilitation Based on Services Provided by Existing Market and Service Centres

Road Corridor	Market/ Service Centres	Market/ Service Centres' Weightage	Total Weightage	Length (km)	Weightage per km of Road	Total Score (10)	Transformed Score (10)
Rohini Bhajyang-Nala Pulbazaar	Nala	38.8	38.8	11.0	3.5	1.0	**1.0**
Sanga-Tukucha Nala-Mahadev Pokhari	Nala	38.8	38.8	8.2	4.7	1.5	**1.5**
Higuwapati-Naldum-Nagarkot	Nala	38.8	38.8	25.1	1.5	0.2	**0.2**
Sathighar Bhagwati-Timalbesi	Dolalghat	46.9	46.9	10.0	4.7	1.5	**1.5**
Pokhari Chauri-Chauri Khola	Dolalghat	46.9	46.9	7.2	6.5	2.3	**2.3**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	Panchkhal	34.4	34.4	9.0	3.8	1.1	**1.1**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	Khopasi	53.8	53.8	23.0	2.3	0.5	**0.5**
Panauti-Mulpi-Bhumidanda	Panauti	91.3	91.3	6.0	15.2	5.9	**5.9**
Ryale (Manedovan)-Lakuri Bhanjynag	Panauti	91.3	91.3	4.8	19.0	7.5	**7.5**
Bhaisepati-Mahendrajyoti-Panauti	Banepa	95.0	186.3	7.5	24.8	10.0	**10.0**
	Panauti	91.3					
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	Nala	38.8	38.8	14.0	2.8	0.7	**0.7**
Banepa-Rabiopi-Panchkhal	Banepa	95.0	129.4	14.2	9.1	3.4	**3.4**
	Panchkhal	34.4					
Dolalghat-Madankudari-Dovantar	Dolalghat	46.9	46.9	42.2	1.1	0.0	**0.1**
Bhakundebesi-Kottimal-Mechhe	Dhulikhel	97.5	128.1	29.0	4.4	1.4	**1.4**
	Narayansthan	30.6					
Tamaghat-Bohredovan-Kot Timal	Panchkhal	34.4	119.4	20.6	5.8	2.0	**2.0**
	Narayansthan	30.6					
Kavrebhanjyang-Dapcha-Kakare-Rosi	Dhulikhel	97.5	128.1	15.6	8.2	3.0	**3.0**
	Dapcha	30.6					

Source: Annex 4.3

TABLE 4.3

The assessment of the service provided by the existing market/service centres along the road and its influence zone indicates that the **Bhainsepati-Mahendrajyoti-Panauti** road corridor receives the maximum score of 10. The two main service/market centres of the district Banepa and Panauti is located along its influence zone. The **Ryale (Manedovan)-Lakuri Bhanjyang** and **Panauti Mulpi-Bhumidanda** road corridors are ranked second and third with a score of 7.5 and 5.9 respectively.

4.4 Traffic Volume

One of the main parameter for the prioritisation of the existing roads for the rehabilitation purpose is the traffic volume operating on the particular road. Most of the district roads proposed for rehabilitation is fair weather earthen road and not open for traffic throughout the year. Therefore, the annual average daily traffic (AADT) is calculated based on the average daily traffic (ADT) multiplied by the number of days the road is open for traffic. The passenger car unit (PCU) assigned for each mode given in DoLIDAR's "Approach for the Development of Rural and Agricultural Roads" as outlined in the Methodology (refer to chapter 3.9.4, Vol. I) is also considered to derive the AADT. Since traffic volume is taken as one of the key parameters for assessing the relative importance of the road, the highest score of 25 is assigned. The road with highest AADT expressed in terms of PCU receives the highest score.

The scoring of proposed roads for rehabilitation based on traffic volume is compiled in Table 4.4.

Scoring of Proposed Roads for Rehabilitation Based on Traffic Volume

Road Corridor	No. of Days Road is Open for Traffic per Year	Average Daily Traffic (ADT)						Annual Average Daily Traffic (AADT) in TC	Total Score (25)	Transformed Score (25)
		Bus	Mini-bus	Truck	Mini-truck	Tractor	Others			
Rohini Bhajyang-Nala Pulbazaar	240			6				5,760	3.8	**3.8**
Sanga-Tukucha Nala-Mahadev Pokhari	0							-	0.0	**0.0**
Higuwapati-Naldum-Nagarkot	210			4				3,360	2.2	**2.2**
Sathighar Bhagwati-Timalbesi	270	10		8				19,440	12.8	**12.8**
Pokhari Chauri-Chauri Khola	240	4		2				5,760	3.8	**3.8**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	240			4				3,840	2.5	**2.5**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	240	10		12				21,120	13.9	**13.9**
Panauti-Mulpi-Bhumidanda	180			14				10,080	6.6	**6.6**
Ryale (Manedovan)-Lakuri Bhanjynag	180			6				4,320	2.8	**2.8**
Bhaisepati-Mahendrajyoti-Panauti	180			14				10,080	6.6	**6.6**
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	210	10		10				16,800	11.1	**11.1**
Banepa-Rabi OPI-Panchkhal	240			8				7,680	5.1	**5.1**
Dolalghat-Madankudari-Dovantar	300	16		6				26,400	17.4	**17.4**
Bhakundebesi-Kottimal-Mechhe	240			6				5,760	3.8	**3.8**
Tamaghat-Bohredovan-Kot Timal	365	8		18				37,960	25.0	**25.0**
Kavrebhanjyang-Dapcha-Kakare-Rosi	240	14		6				19,200	12.6	**12.6**

Source: Annex 4.4
Note:
PCU: Passenger Car Unit

TABLE 4.4

The data analysis of the AADT along the proposed road corridors indicates that the **Tamaghat-Bohredovan-Kottimal** road corridor receives the highest score of 25.0. It is opened for the regular bus service and truck for transporting passenger and commodities from Tamaghat along the Arniko highway to Kottimal and eastern part of the district throughout a year. An average of 8 busesand 18 trucks (mini) is operating back and forth per day along this corridor. The pavement surface is in satisfactory condition that requires minimum rehabilitation measures in certain stretch. Similarly, **Dolalghat-Madankundari-Dovantar** and **Khopasi (Chalal)-Dhunhkharka-Chyamrangbesi** road corridors are ranked second and third with a score of 17.4 and 13.9 respectively where the regular

passenger buses and trucks are operated for a 300 and 240 days in a year

Although, the **Sanga-Tukucha Nala-Mahadevpokhari** road corridor is proposed for the rehabilitation that is in a poor condition and traffic is not operating along the corridor, it is therefore recommended for re-alignment or major re-construction.

4.5 Rehabilitation Cost

The other important parameter for the prioritisation of roads for rehabilitation is the estimated cost for rehabilitation. The initial rehabilitation cost estimate covers the total costs for the reconstruction cost of existing road to a maintainable standard of the individual road corridor (section). The maximum score of 25 is assigned for this parameter and the scores are distributed proportionately as the cheapest road corridors (sections) per km of road length get the highest score.

The scoring of the individual road corridor/section based on the reconstruction cost per km of road length is summarized in Table 4.5.

Scoring of Proposed Roads for Rehabilitation Based on Rehabilitation Cost

Road Corridor	Length (km)	Total Rehabilitation Cost(NRs)	Cost per km (NRs)	Engineering Rating	
				Score (25)	Transformed Score (25)
Rohini Bhajyang-Nala Pulbazaar	11.0	3,744,000	520,000	13.5	**13.5**
Sanga-Tukucha Nala-Mahadev Pokhari	8.2	12,090,000	620,000	8.5	**8.5**
Higuwapati-Naldum-Nagarkot	25.1	8,930,000	470,000	16.0	**16.0**
Sathighar Bhagwati-Timalbesi	10.0	6,600,000	600,000	9.5	**9.5**
Pokhari Chauri-Chauri Khola	7.2	3,780,000	630,000	8.0	**8.0**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	9.0	13,720,000	490,000	15.0	**15.0**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	23.0	18,200,000	650,000	7.0	**7.0**
Panauti-Mulpi-Bhumidanda	6.0	8,680,000	310,000	24.0	**24.0**
Ryale (Manedovan)-Lakuri Bhanjynag	4.8	8,120,000	290,000	25.0	**25.0**
Bhaisepati-Mahendrajyoti-Panauti	7.5	11,200,000	400,000	19.5	**19.5**
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	14.0	19,180,000	685,000	5.3	**5.3**
Banepa-Rabi OPI-Panchkhal	14.2	14,280,000	510,000	14.0	**14.0**
Dolalghat-Madankudari-Dovantar	42.2	22,120,000	790,000	0.0	**4.6**
Bhakundebesi-Kottimal-Mechhe	29.0	12,600,000	450,000	17.0	**17.0**
Tamaghat-Bohredovan-Kot Timal	20.6	15,680,000	560,000	11.5	**11.5**
Kavrebhanjyang-Dapcha-Kakare-Rosi	15.6	14,448,000	516,000	13.7	**13.7**

Source: Annex 4.5

TABLE 4.5

The above data indicates that the **Ryale (Manedovan)-Lakuri Bhanjyang** road corridor is ranked best with the score of 25.0. The rehabilitation cost per km length of road for this section is the cheapest one. It requires only minor rehabilitation measures to keep it under operational condition. Similarly, **Panauti-Mulpi-Bhumidanda** and **Bhainsepati-Mahendrajyoti-Dovantar** road corridors are ranked second and third with the score of 24.0 and 19.5 respectively.

Although, the Nala-Kashi Bhanjyang-Nayagaun-Kuntabesi road is proposed as a single corridor for the rehabilitation purpose, it has been found that there is only track exists at Kashi Bhanjyang-Nayagaun section and new construction should be carried out. Therefore, this corridor has to further divide into three sections as Nala-Kashi Bhanjyang, Nayagaon-Kuntabesi and Kashi Bhanjyang-Nayagaon. The first two are the existing road and could be considered for the rehabilitation and the later one for the new construction. The Nala-Kashi Bhanjyang corridor has already been

rehabilitated with the support from DRSP during the 058/59 fiscal year.

4.6 Maintenance Costs

The last parameters considered for the prioritisation of the existing roads for rehabilitation is based on the maintenance cost score. The maintenance cost score is determined by taking different criteria into account as described in the Methodology (refer to chapter 3.9.6, Vol.I). The maximum score of 20.0 is assigned to the road corridor that required the low maintenance cost.
The details of the scoring based on maintenance cost required for individual road corridor/section is compiled in Table 4.6.

Summary of Maintenance Cost of Existing Road Corridors/Sections

Road Corridor	Length (km)	Weighted Maintenance Cost Score	Total Score (20)	Transformed Score (20)
Rohini Bhajyang-Nala Pulbazaar	11.0	17	12.0	**12.0**
Sanga-Tukucha Nala-Mahadev Pokhari	8.2	11	0.0	**5.9**
Higuwapati-Naldum-Nagarkot	25.1	17	12.0	**12.0**
Sathighar Bhagwati-Timalbesi	10.0	15	8.0	**8.0**
Pokhari Chauri-Chauri Khola	7.2	19	16.0	**16.0**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	9.0	15	8.0	**8.0**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	23.0	15	8.0	**8.0**
Panauti-Mulpi-Bhumidanda	6.0	20	18.0	**18.0**
Ryale (Manedovan)-Lakuri Bhanjynag	4.8	20	18.0	**18.0**
Bhaisepati-Mahendrajyoti-Panauti	7.5	18	14.0	**14.0**
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	14.0	16	10.0	**10.0**
Banepa-Rabi OPI-Panchkhal	14.2	18	14.0	**14.0**
Dolalghat-Madankudari-Dovantar	42.2	18	14.0	**14.0**
Bhakundebesi-Kottimal-Mechhe	29.0	19	16.0	**16.0**
Tamaghat-Bohredovan-Kot Timal	20.6	21	20.0	**20.0**
Kavrebhanjyang-Dapcha-Kakare-Rosi	15.6	19	16.0	**16.0**

Source: Annex 4.6

TABLE 4.6

The data analysis to determine the maintenance cost score point out that the road corridor/section that has minor difficulty in the road alignment, water management system, maintenance of existing structures, pavement type etc. requires the low maintenance cost and receives the high score. Therefore, **Tamaghat-Bohredovan-Kottimal** road corridor receives the maximum score of 20.0 and ranked first. Likewise, **Panauti-Mulpi-Bhumidana** and **Ryale (Manedovan)-Lakuri Bhanjyang** road corridors ranked second with the score of 18.0 and **Pokharichauri-Chaurikhola, Bhakundebesi-Kottimal-Mechhe** and **Kavrebhanjyang-Dapcha-Kakare-Rosi** road corridors ranked third with the score of 16.0.

The **Sanga-Tukucha Nala-Mahadev Pokhari** road corridor originally proposed for rehabilitation passes through difficult terrain as well as it has difficulty in the maintenance of existing structures and poor water management system. Therefore, it is being deteriorated rapidly and not in the operating condition which needs a major re-construction works or re-alignment.

4.7 Aggregation of Scores from Six Scoring Indicators for Rehabilitation

The total scoring of all indicators per road corridor/section proposed for rehabilitation is compiled in Table 4.7. The rating of the individual indicators is explained in the respective chapters. The overall findings of the scoring exercise is that road where the seasonal traffic is being operated with the minimum maintenance measures, which requires low rehabilitation cost and has a higher export potentials receives a high priorities.

Summary of Overall Prioritisation of Existing Roads for Rehabilitation

Road Corridor	Length (km)	Parameters Used for the Prioritisation of Proposed Existing Roads for Rehabilitation							
		Demography (10)	Agricultural Exports (10)	Service/ Market Centres (10)	Traffic Volume (25)	Rehabilitation Cost (25)	Maintenance Cost (20)	Total Score (100)	Rank
Rohini Bhajyang-Nala Pulbazaar	11.0	1.5	2.8	1.0	3.8	13.5	12.0	**34.6**	**13**
Sanga-Tukucha Nala-Mahadev Pokhari	8.2	2.7	1.8	1.5	0.0	8.5	5.9	**20.4**	**16**
Higuwapati-Naldum-Nagarkot	25.1	3.8	1.3	0.2	2.2	16.0	12.0	**35.5**	**11**
Sathighar Bhagwati-Timalbesi	10.0	1.0	4.1	1.5	12.8	9.5	8.0	**36.9**	**9**
Pokhari Chauri-Chauri Khola	7.2	7.0	0.9	2.3	3.8	8.0	16.0	**38.0**	**8**
Tinpiple-Baluwa-Bhedabari-Bohoredovan	9.0	1.5	6.9	1.1	2.5	15.0	8.0	**35.0**	**12**
Khopasi (Chalal)-Dhungkharka-Chyamrangbesi	23.0	1.7	1.4	0.5	13.9	7.0	8.0	**32.5**	**14**
Panauti-Mulpi-Bhumidanda	6.0	10.0	10.0	5.9	6.6	24.0	18.0	**74.6**	**1**
Ryale (Manedovan)-Lakuri Bhanjynag	4.8	0.1	0.1	7.5	2.8	25.0	18.0	**53.6**	**3**
Bhaisepati-Mahendrajyoti-Panauti	7.5	5.1	2.6	0.0	6.6	19.5	14.0	**47.8**	**6**
Nala-Kashi Bhanjynag-Nayagaun-Kuntabesi	14.0	1.6	3.4	0.7	11.1	5.3	10.0	**32.0**	**15**
Banepa-Rabi Opi-Panchkhal	14.2	7.7	7.0	3.4	5.1	14.0	14.0	**51.1**	**5**
Dolalghat-Madankudari-Dovantar	42.2	0.1	0.1	0.1	17.4	4.6	14.0	**36.3**	**10**
Bhakundebesi-Kottimal-Mechhe	29.0	2.7	1.4	1.4	3.8	17.0	16.0	**42.3**	**7**
Tamaghat-Bohredovan-Kot Timal	20.6	1.0	5.3	2.0	25.0	11.5	20.0	**64.8**	**2**
Kavrebhanjyang-Dapcha-Kakare-Rosi	15.6	3.6	3.2	3.0	12.6	13.7	16.0	**52.1**	**4**

Source: Annex 4.7

TABLE 4.7

The findings of the scoring system indicate that five road corridors namely **Panauti-Mulpi-Bhumidanda, Tamaghat-Bohredovan-Kot Timal, Ryale (Manedovan)-Lakuri Bhanjyang, Kavrebhanjyang-Dapcha-Kakare-Rosi** and **Banepa-Rabi Opi-Panchkhal** appears in the top priorities list for the rehabilitation. A comparison of findings among these roads indicates that scores are higher with respect to other roads. Their individual scores are 74.6, 64.8, 53.6, 52.1 and 51.1 respectively. Basically, the road sections/corridors where the traffic is regularly operating at the existing situation except in monsoon season requires less rehabilitation measures and maintenance cost and appeared in the top rankings in the prioritisation process. The scores of other less priority road sections/corridors are in the range of 20.4 to 47.8.

Apart from the above list, the district has informed that various rehabilitation works for different road corridors are also going on from different sources. The road corridors that are not included in the proposed list for the rehabilitation works but the rehabilitation work are going on from different sources are not entitled for the detail study and analysis. However, these road corridors are considered and included in the implementation plan in the course of DTMP period. A list of the road corridors where the rehabilitation work is going on are presented in Table 4.8

List of the Additional Roads for Rehabilitation

Road Corridor	Length (km)
Dolalghat-Haldebesi-Higuwapati	13.0
Gumati Bhanjyang-Kilpu	8.3
Sanga-asapuri-Kusadevi	9.0
Kolati-Dhadkharka	10.4
Phedi-Timalsinagaun-Kolang	10.6
Dapcha-Bhakundebesi	6.0
Chaubas-Lakuri Bhanjyang-Bekhsimal	7.0
Dolalghat-Jyamdi Deurali-Chendeni-Mahadevsthan	13.9

TABLE 4.8

5. FUNDING SOURCES FOR THE DTMP IMPLEMENTATION

5.1 Potential Funding Sources

Details of the anticipated resources available for DTMP implementation are collected by the PSU from the districts, HMG and donors. Ongoing rural road/rural access programmes are also consulted with regard to future plans for expansion or curtailment. The most likely sources of funding are listed as follows:

- HMG/N
- DDC resources
- VDC resources
- National Road Board
- Donors

Following an investigation by PSU amongst potential funding agencies of the Kavrepalanchowk DTMP implementation the following sources were identified:

a) DoLIDAR

Under the Agricultural Perspective Plan (1995/2015) DoLIDAR has allocated Rs 4.5 millions to the agricultural road sector during the FY 58/59. Based on past experience it can be assumed that this amount will increase by 15% in the average annually.

b) DoR/MoLD

DoR/MoLD provides a special grant for village and district road development to the district. According to the annual budget of HMG/N, DoR/MoLD had allocated total of Rs 14.8 million for 058/59 fiscal year. For the purpose of projecting the tentative budget for next four years, the average budget allocated for last seven years has been taken in the consideration. Based on the study of the past trend it is expected that the DoR/MoLD budget for district road construction and maintenance will likely to be increased by 15 % every year.

c) DDC

There are basically two sources of funding within the district.

- DDC block grants are coming into the district from MoLD for general development activities (development grant) and for the road sector (rural road grant). It is expected that Kavrepalanchowk district will reserve 25 % of the total block grant including development and road sector grants for the district road activities. This will amount to Rs 3.35 million per year. It is not expected that the block grant will increase significantly over the years to come.
- DDC internal funds in Kavrepalanchowk are mainly generated through taxes and royalties. Out of DDC's internal sources, Rs 1.2 million is expected to go into transport. An annual increase of 10 % is expected. Internal sources will be further increased by royalties from hydropower project, which is located within the district.

d) VDC

Each VDC receives a block grant of Rs 500,000 every year. Out of this total grant Rs 200,000 goes to internal human resources management. About 15 % of the remaining grant, which amounts to Rs 2.9 million, is expected to be used for district roads in VDCs through which the road passes. No increase in this contribution is expected.

e) Constituency Development Fund

At present each MP receives Rs. 1 million as a block grant for their constituency. Kavrepalanchowk district has three constituencies and it is expected that about 10% of this grant will be allocated to the transport sector. This will amount to Rs 0.3 million per year.

f) DRSP/SDC

The budget allocated by the DRSP for the implementation of DTMP is about Rs.8.1 million in the current fiscal year 058/59. The tentative budget forecasted for the implementation phase is about Rs 8.1, 10.9, and 5.3 million for fiscal year 059/60, 060/61 and 061/62, and 062/63 respectively.

g) Rural Community Infrastructure Works (RCIW)

The RCIW programme under MoLD has been implemented in Kavrepalanchowk district over the last four years. RCIW grant includes food-for-work and small cash component for purchasing construction materials. Discussions with RCIW authorities indicated that the budget of Rs 23.8 million has been allocated for FY 058/59 where 90 and 10 percent will be used or the physical and administrative works respectively. DRSP will provide technical assistance to RCIW to implement the construction programme from the next fiscal year 059/60 and RCIW will provide rice and cash component that amounts to 9.8 million for the next four years.

h) Rural Infrastructure Development Programme (RIDP)

The RIDP programme under MoLD has been implemented in Kavrepalanchowk district with the ADB assistance over the last five years. A brief discussions with RIDP authorities indicated that the budget of Rs 79.5 million has been allocated for FY 058/59 where 70 percent has been used for road works and remaining 30 percent has been used for the administrative and other infrastructure works. The major part of the road corridor has already been completed and two bridges and road construction along the hard rock area and structure works is yet to be constructed. The programme is planned to be completed within the next two years. RIDP authorities indicated that the budget allocation is likely to be same as previous years Rs 79.5 million for next two years and about 70 percent will be used for the road construction works.

The district will have to identify and acquire other additional funding sources to finance the ambitious implementation of road construction and maintenance works, as identified in the District Transport Master Plan.

5.2 Budget Forecast for DTMP Implementation

Based on the above sources, discussion with different agencies and analysis carried out by PSU a tentative budget perspective for the next four years can be made as shown in Table 5.1.

Budget Forecast (Rs '000) for DTMP Implementation (059/60-062/63)

Sources	058/59	059/60	060/61	061/62	062/63
DoLIDAR		5,175	5,951	6,844	7,871
DoR/MoLD		8,545	9,826	11,300	12,995
DDC block grant		3,350	3,350	3,350	3,350
DDC internal fund		1,227	1,350	1,485	1,634
VDC block grant		2,936	2,936	2,936	2,936
Constituency Devt. Fund		300	300	300	300
DRSP (SDC fund)		8,110	10,958	10,958	5,316
RCIW/MoLD		9,796	9,796	9,796	9,796
RIDP/MoLD		55,650	55,650	-	-
Total		**95,089**	**100,117**	**46,969**	**44,197**

TABLE 5.1

As mentioned in the previous section, with the present funding allocations to the district and the VDCs, not all plans can be realised. It is therefore of the utmost importance other sources of funding

can be secured such as bilateral or multilateral donors for example the Asian Development Bank, World Bank etc.

In view of the limited resources the recommendation is to concentrate on roads under the DTMP, and to use funds that have already been secured on them.

5.3 Matching of Resources on High Ranked DTMP Roads

This Section describes the implementation plan of Kavrepalanchowk DTMP roads and allocates the tentative budget (Table 5.1) to different components of the individual road corridors according to priorities given in Table 3.10 and 4.7. The implementation plan also considered the additional road corridors (Table 3.11 and 4.8) where the construction work is ongoing from different sources. At this stage the estimated resources are matched with the highest ranked DTMP roads and roads that has been already initiated the construction works. The construction and rehabilitation costs are already estimated (refer to Section 3.7 and 4.5) so the number of highest ranked road links to be completed over the DTMP period is determined. The actual cost and estimates of the additional road corridors where the construction works is going on from different sources are not available from the district. These corridors constructed on ad-hoc basis and without proper planning and design. Therefore, the construction cost of these corridors has been taken from the other road corridors that are similar in the alignment, terrain and geology considered in detail DTMP study.

DTMP carries out a thorough investigation and analysis of the availability of resources for road construction, rehabilitation and maintenance over the DTMP period. The investigation includes meetings with key individuals at district and central level with relevant HMG ministries and departments, and with donors. Past funding trends are analysed and projected forward where necessary. Thus the total estimate of transport resources over the five-year period is determined. A number of construction, rehabilitation and maintenance activities have already been initiated. These activities are all initiatives in the framework of this DTMP and will be continued over the coming years. Following the priorities given to the individual corridors the physical and financial planning over the DTMP planning period 58/59 to 62/63 has been compiled in Table 5.2. It reflects allocated/committed funds for defined activities and eventual annual surpluses/deficits. Though the present forecast shows a huge deficit, the implementation plan has been prepared with provision of completing all high ranked (first sections) of DTMP roads. Eventually surplus/deficits will have to be deducted or added from allocated DTMP road budgets. The changes in the implementation plan will have to be sanctioned during the annual meetings of the Kavrepalanchowk District Council.

Physical and Financial Plan for DTMP Roads

Roads by priority	Length (km)	Current year [2]	DTMP Implementation Year			
		058/59	059/60	060/61	061/62	062/63
Likely available budget (Rs 000)			***42,702***	***46,538***	***48,902***	***46,728***
1. Timalbesi-Thuloparcel-Sallyani	15.0					
New Construction (Rs 000)		10,900	12,208	13,673		
Physical output (Km)		5.0	5.0	5.0		
Periodic Maintenance (Rs 000)			280	627	1,054	1,180
Routine Maintenance (Rs 000)			67	151	253	283
Sub-total		***10,900***	***12,555***	***14,451***	***1,307***	***1,463***
2. Khopasi-Taldhunga (RIDP)	69.0					
New Construction (Rs 000)			30,800	34,496		
Physical output (Km)		47.0	11.0	11.0		
Periodic Maintenance (Rs 000)			2,632	3,638	4,847	5,429
Routine Maintenance (Rs 000)			632	873	1,163	1,303
Sub-total		-	***34,064***	***39,007***	***6,010***	***6,732***

[2] Fiscal Year 2001/2002

Roads by priority	Length (km)	Current year [2]	DTMP Implementation Year			
		058/59	059/60	060/61	061/62	062/63
3. Milche-Bankhu (RCIW)	56.0					
New Construction (Rs 000)			12,880	14,426	16,157	18,095
Physical output (Km)		36.0	5.0	5.0	5.0	5.0
Periodic Maintenance (Rs 000)			2,016	2,572	3,231	4,012
Routine Maintenance (Rs 000)			484	617	776	963
Sub-total		-	***15,380***	***17,614***	***20,164***	***23,071***
4. Bohredovan-Timalbesi (UNCDF)	7.1					
New Construction (Rs 000)			5,107	5,339	-	-
Physical output (Km)		1.3	3.0	2.8		
Periodic Maintenance (Rs 000)			73	270	499	559
Routine Maintenance (Rs 000)			17	65	120	134
Sub-total		-	***5,197***	***5,673***	***618***	***693***
5. Panauti-Mulpi-Bhumidanda	6.0					
Rehabilitation (Rs 000)			2,083	-	-	-
Physical output (Km)			6.0			
Periodic Maintenance (Rs 000)		-	-	376	421	472
Routine Maintenance (Rs 000)		-	-	90	101	113
Sub-total		-	***2,083***	***467***	***523***	***585***
6. Tamaghat-Bohredovan-Kottimal	20.					
Rehabilitation (Rs 000)			3,763	3,512	-	-
Physical output (Km)		9.6	6.0	5.0		
Periodic Maintenance (Rs 000)		-	538	978	1,447	1,621
Routine Maintenance (Rs 000)		-	129	235	347	389
Sub-total		-	***4,430***	***4,726***	***1,794***	***2,010***
7. Rvale (Manedovan)-Lakuri Bhanjyang	4.8					
Rehabilitation (Rs 000)			1,559	-	-	-
Physical output (Km)			4.8			
Periodic Maintenance (Rs 000)		-	-	301	337	378
Routine Maintenance (Rs 000)		-	-	72	81	91
Sub-total		-	***1,559***	***373***	***418***	***468***
8. Shankhu-Shikharambote	24.					
New Construction (Rs 000)			-	-	7,713	8,639
Physical output (Km)					3.0	3.0
Periodic Maintenance (Rs 000)			-	-	-	236
Routine Maintenance (Rs 000)			-	-	-	57
Sub-total		-	-	-	***7,713***	***8,931***
9. Katunje-Bankhu	27.					
New Construction (Rs 000)			-	-	9,863	11,046
Physical output (Km)					3.0	3.0
Periodic Maintenance (Rs 000)			-	-	-	236
Routine Maintenance (Rs 000)			-	-	-	57
Sub-total		-	-	-	***9,863***	***11,339***
10. Kavrebhanjyang-Dapcha-Kakare-Rosi	15.					
Rehabilitation (Rs 000)			1,907	-	-	-

Roads by priority	Length (km)	Current year [2]	DTMP Implementation Year			
		058/59	059/60	060/61	061/62	062/63
Physical output (Km)		12.3	3.3			
Periodic Maintenance (Rs 000)		-	689	978	1,096	1,227
Routine Maintenance (Rs 000)		-	165	235	263	295
Sub-total		**-**	***2,761***	***1,213***	***1,359***	***1,522***
11. Banepa-Rabiopi-Panchkhal	14.					
Rehabilitation (Rs 000)			-	-	-	2,407
Physical output (Km)						3.0
Periodic Maintenance (Rs 000)		-	-	-	-	-
Routine Maintenance (Rs 000)		-	-	-	-	-
Sub-total		**-**	**-**	**-**	**-**	***2,407***
12. Dolalghat-Saping_simthali	16.					
New Construction (Rs 000)			1,478	1,656	1,855	2,077
Physical output (Km)		3.0	1.0	1.0	1.0	1.0
Periodic Maintenance (Rs 000)			168	251	351	472
Routine Maintenance (Rs 000)			40	60	84	113
Sub-total		**-**	***1,687***	***1,967***	***2,290***	***2,662***
13. Bhakundebesi-Bohredovan	9.0					
New Construction (Rs 000)			-	-	5,564	-
Physical output (Km)		6.0			3.0	
Periodic Maintenance (Rs 000)			336	376	421	708
Routine Maintenance (Rs 000)			81	90	101	170
Sub-total		**-**	***417***	***467***	***6,086***	***878***
14. Dolalghat-Kolati-Birta Deurali	20.					
New Construction (Rs 000)			2,957	3,312	3,709	4,154
Physical output (Km)		10.0	2.0	2.0	2.0	2.0
Periodic Maintenance (Rs 000)			560	753	983	1,259
Routine Maintenance (Rs 000)			134	181	236	302
Sub-total		**-**	***3,651***	***4,245***	***4,928***	***5,715***
15. Dolalghat-Timalbesi	7.3					
New Construction (Rs 000)			2,218	2,484	4,265	-
Physical output (Km)		2.0	1.5	1.5	2.3	
Periodic Maintenance (Rs 000)			112	220	351	574
Routine Maintenance (Rs 000)			27	53	84	138
Sub-total		**-**	***2,356***	***2,756***	***4,701***	***712***
16. Sanga-Asapuri-Kusadevi	9.0					
Rehabilitation (Rs 000)			-	-	1,812	-
Physical output (Km)		6.0			3.0	
Periodic Maintenance (Rs 000)		-	336	376	421	708
Routine Maintenance (Rs 000)		-	81	90	101	170
Sub-total		**-**	***417***	***467***	***2,335***	***878***
17. Kolati-Dhadkharka	10.4					
Rehabilitation (Rs 000)			-	1,079	1,208	2,030
Physical output (Km)		3.4		2.0	2.0	3.0

Roads by priority	Length (km)	Current year [2]	DTMP Implementation Year			
		058/59	059/60	060/61	061/62	062/63
Periodic Maintenance (Rs 000)		-	190	213	379	582
Routine Maintenance (Rs 000)		-	46	51	91	140
Sub-total		***-***	***236***	***1,343***	***1,679***	***2,752***
18. Phedi-Timalsinagaun-Kotang	10.6					
Rehabilitation (Rs 000)			-	-	-	2,030
Physical output (Km)		7.6				3.0
Periodic Maintenance (Rs 000)		-	426	477	534	598
Routine Maintenance (Rs 000)		-	102	114	128	144
Sub-total		***-***	***528***	***591***	***662***	***2,771***
19. Dolalghat-Jyamdi Deurali-Chendeni-	13.9					
Rehabilitation (Rs 000)			-	-	1,812	-
Physical output (Km)		10.9			3.0	
Periodic Maintenance (Rs 000)		-	610	684	766	1,094
Routine Maintenance (Rs 000)		-	146	164	184	262
Sub-total		***-***	***757***	***848***	***2,762***	***1,356***
Grand Total			**88,078**	**96,207**	**75,211**	**76,946**
Deficit (-) / Surplus (+)			***(+)7,011***	***(+)10,922***	***(-)17,321***	***(-)50,070***

Note: 12 percent annual inflation rate is used while calculating the cost.

TABLE 5.2

During the preparation of this plan it is assumed that the construction of Timalbesi-Thuloparcel-Sallyani corridor will be carried out under the "Expanded RCIW Programme" from the fiscal year 058/59 and onwards. Consequently the required resources will be provided by RCIW for this road while the remaining resources will be allocated for the construction and maintenance of other roads. Furthermore, it is expected that DoR will continue its contribution in the construction of other road for the next five years. Similarly, DoLIDAR will also continue its contribution in the construction of other agriculture and district roads within the district.

During the course of DTMP implementation, if DDC gets additional funding, the remaining roads or road section of road under construction will be constructed based on priorities set out by the DTMP.

6. ORGANISATIONAL AND FINANCIAL ISSUES

6.1 Relevant Institutions in the District

During the initial workshop in September 1999 the DDC Kavrepalanchowk formed the DRCC. The DRCC is an institutionalised advisory body to the DCC with regard to formulating, managing and monitoring district level road and trail policies, rules and regulations.

In December 1999 the district technical team has been formed within the DDC Technical Unit and 1 engineer and 2 overseers were hired by the DDC.

The LRCCs and UGs have already been established where the construction work is under going.

6.2 Budgetary Arrangements and Flow of Funds

Following the agreement between Kavrepalanchowk District, DoLIDAR and DRSP a District Road Fund (DRF) has been established. The DRF will be replenished by contributions from DoLIDAR, DDC block grant, DDC internal funds, VDC block grant, Constituency Development Fund, DoR/MoLD and DRSP. RCIW is another organisation under the Ministry of Local Development involved in district infrastructures development through Food for Work Programme in the district for the last two years

All activities related to the implementation of the DTMP will be financed through the DRF. Expenditure will be made based on approved cost estimates.

6.3 Road Construction, Operation and Maintenance

The district, DRSP and the DDC of Kavrepalanchowk have agreed to apply labour intensive and environment friendly methods throughout the implementation period of the DTMP. The district roads are to be constructed to fair weather standard using local human and material resources either through contractors and/or user groups. For the sake of consistency, it is strongly recommended to apply the same methods also on district roads that are implemented through other programmes.

The basic principle of DTMP implementation is to bring prior to new construction existing roads into maintainable condition. A concept of cyclic maintenance through length workers will be introduced. Local user groups will be responsible for management, coordination and supervision of maintenance work. In order to prevent early damages on the roads during rainy season district roads will be closed to heavy traffic and other traffic will be controlled. Wherever possible the poorest strata of the population and in particular women will be involved in the construction and maintenance process. The principles, concepts and implementation steps for construction and the maintenance are described in detail in the methodology (See Section 1.4, Volume I).

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Attachment

Transport Infrastructure Map 1: 125,000; District Transport Plan, Kavrepalanchowk District