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APPROVAL SHEETS

DISTRICT ROADS COORDINATION COMMITTEE

1	Mr. Ramesh Karki	:	DDC Chairperson	:	Chairperson
2	Mr. Hom Bdr. Lama	:	Representative from Civil Society	:	Member
3	Mr. Bhupal Baral	:	Representative from Civil Society	:	Member
4	Mr. Manik Dhakal	:	Representative from Civil Society	:	Member
5	Mr. Bhuwan Phuyal	:	Representative from Civil Society	:	Member
6	Mr. Falguni Sharma	:	Representative from Civil Society	:	Member
7	Mr. Pani Raj Bamjan	:	DDC Member	:	Member
8	Mr. Bisam Lal Adhikari	:	DDC Member	:	Member
9	Mr. Ram Thapa	:	DDC Member	:	Member
10	Mr. Ramkrishna Shrestha	:	DDC Member and Co-ordinator to Agricultural Sector	:	Member
11	Ms. Padma K. Ghimere	:	Women Representative	:	Member
12	Ms. Sabita Khadka	:	Women Representative	:	Member
13	Mr. Pradip Karuwal	:	NGO Representative	:	Member
14	Mr. Khadga Bdr. Sunuwar	:	NGO Representative	:	Member
15	Mr. Narayan Shrestha	:	Representative of District Chamber of Commerce and Industry	:	Member
16	Mr. Bashu Dev Shrestha	:	Mayor, Kamala Mai Municipality	:	Member
17	Representative	:	Nepali Congress Party	:	Member
18	Representative	:	Nepal Communist Party (UML)	:	Member
19	Representative	:	Rastriya Prajatantra Party	:	Member
20	Representative	:	Nepal Communist Party (ML)	:	Member
21	Representative	:	National People Front, Nepal	:	Member
22	Representative	:	Nepal Communist Party (Marxist)	:	Member
23	Representative	:	United People Front, Nepal	:	Member
24	Mr. Md. Farahat Ali	:	Programme Officer, DDC	:	Member
25	Chief	:	District Agriculture Development Office	:	Member
26	Chief	:	Road Office, Sindhuli	:	Member
27	Mr. Hari Basistha	:	Secretary, DDC	:	Member Secretary

District Technical Team

1	Mr Kapil Dev Thakur	:	Engineer
2	Mr. Laxmi Chaudhary	:	Engineer, DoLIDAR
3	Mr. Juju Ratna Shrestha	:	Overseer
4	Mr. Ashok Yadav	:	Overseer

ABBREVIATIONS AND ACRONYMS

APP	Agricultural Perspective Plan
CBS	Central Bureau of Statistics
CDA	Community Development Adviser
CHF	Swiss Franc
DDC	District Development Committee
DIARS	District Infrastructure and Agricultural and Roads Section
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
DTCC	District Transport Coordination Committee
DTMP	District Transport Master Plan
DTPP	District Transport Perspective Plan
DTS	District Transport Sub Unit
FfW	Food for Work
FY	Fiscal Year
GIS	Geographical Information System
GTZ	German Technical Cooperation
HMG	His Majesty's Government
HRD	Human Resource Development
IEE	Initial Environmental Examination
IRAD	Integrated Research Application and Development
JTS	Jiri Technical School
km^2	Square Kilometre
LDO	Local Development Officer
LGP	Local Governance Programme
LRCC	Local Road Coordination Committee
LRUC	Local Road User Committee
MoLD	Ministry of Local Development
MoU	Memorandum of Understanding
msl	Metres above Sea Level
NGO	Non Government Organisation
NPC	National Planning Commission
NRS	Nepalese Rupees
PDDP	Participatory District Development Programme
P	Poor
ProDoc	Programme Document
PSU	Programme Support Unit
RAP	Rural Access Programme
RCIW	Rural Community Infrastructure Works
SC	Steering Committee
SDC	Swiss Agency for Development and Cooperation
ToR	Term of Reference
UP	Ultra-Poor
VAT	Value Added Tax
VDC	Village Development Committee
YPO	Yearly Plan of Operation

1. INTRODUCTION

1.1 Background

Sindhuli District is located in Janakpur Zone of the Central Development Region of Nepal. It borders on Okhaldhunga and Udayapur districts in the east, Makwanpur, Rauthat, Kavrepalanchowk in the west, Kavrepalanchowk and Ramechhap in the north and Dhanusa, Mohottari and Sarlahi districts in the south.

Sindhuli district is predominantly rural. With an average population density of around 110 persons per square kilometre (km^2) Sindhuli district belongs to the 24 least populated districts in the country. Having a population of approx. 9000 Sindhulimadi being the district headquarter is the largest centre in the district. Population growth lies within the national average of 2-3%. Growth is balanced and migration is relatively low. Whilst the average literacy rate is about 35% but only 5-10% of the women are literate. Approximately 69% of the district area is covered with forest. This explains why merely 20-25% of the district area is under cultivation.

The district headquarter Sindhulimadi is connected to the East-West Highway at Bardibas by a double-lane feeder road. This is the first section of the planned Bardibas-Dhulikhel highway project.

There exist only a few district roads with regular traffic flow. Most of the traffic is still trail based. Since years Sindhuli district has been the gateway from the Terai to the northern districts.

The DDC of Sindhuli 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 and thus has given high priority to the preparation of the District Transport Master Plan/District Transport Perspective Plan (DTMP/DTPP).

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

1.2 Objectives and Rationale of the DTMP/DTPP

One of the major reasons that social and economic structures have not been developed in Sindhuli district is the lack of adequate transport infrastructure. The objective of the DTMP is to facilitate access to areas of the district with resource potentials. It also has 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 roads based on short-term considerations. These plans will provide the basis for Sindhuli 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 2000/2001. 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 Sindhuli

DTMP/DTPP. It describes in detail the individual steps of the planning cycle and provides the basis for prioritisation and decision-making. The methodology and scoring system were approved by the DRCC of Sindhuli district during the district consultation workshop in September 2000.

The DTMP has been prepared in a participatory manner. It started with the formation of the DRCC and has continued, involving 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
September 1999	Formation of District Road Coordination Committee (DRCC)	DDC Sindhuli DRSP/PSU	Workshop in Sindhuli
November 1999	Hire of District Technical Team (1 engineer 2 overseers)	DDC Sindhuli	
December 1999	Sindhuli 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
January 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
February 2000	Preliminary selection of road corridors for DTMP considerations.	DRCC, DRSP/PSU	Workshop in Sindhuli
April to October 2000	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 Sindhuli and Kathmandu
September 2000	Development and approval of scoring system. Finalisation of criteria for prioritisation.	DRCC, DRSP/PSU	Workshop in Sindhuli
September - November 2000	Formation and training of Local Road Coordination Committees (LRCC)	DRSP/PSU	Meetings and workshops in the district
November - January 2001	Coordination with District line agencies for social intervention	DRSP/PSU	Meetings and workshops in the district
December 2000	Analysis of expected funds available for road construction and maintenance works in the next five years.	PSU	Consultation meetings with HMG Departments and potential donor agencies
December 2000	Regional synchronization 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
December 2000	Prioritization of the DTMP roads.	DDC/DRCC	Workshop in Kathmandu
January 2001	Approval of Draft DTMP by DDC	DDC/DRCC	DRCC Meeting in Sindhuli

Date	Achievement	Participants/ Ownership	Remarks
January 2001	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 Sindhuli
January 2001	Collection of proposal from VDCs for DTPP in the VDCs.	VDC Chairman, VDC Vice Chairman, Ilaka Members	Consultation meetings in the VDCs
January 2001	Approval of Draft DTMP and DTPP by the District Council.	DDC, DRSP/PSU	District Council Meeting in Sindhuli
January 2001	Approval of 2001/2002 road rehabilitation and construction works (Yearly Plan of Operation)	DDC/DRCC	District Council Meeting
February 2001	Final editing of approved DTMP/DTPP		DRSP/PSU
	Endorsement by MoLD Endorsement by NPC		

TABLE 1.1

2. DISTRICT INVENTORY / DISTRICT PROFILE ANALYSIS

The purpose of this chapter is to give a general overview of the Sindhuli 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

Sindhuli district is located between the northern latitudes of 26° 55' to 27° 21' and the eastern longitudes of 85° 24' to 86° 22'. The total area of the district is 2491 km^2. Whilst the east-west extension is about 100 km, the north-south distance is approximately 30 km (refer to Map no.1).

2.1.2 Geo-Physical Aspects

The district lies mainly in the inner Terai between Siwalik/Chure and Mahabharat Lekhs. The altitude ranges from 305 m to 2787 m above sea level (msl). The mid to high altitude zones (above 800 msl) cover 38% of the district, the remaining area lies predominately in the inner plain.

The river network is distributed over the whole district. The two major rivers with sources within the district are Kamala, and Marin Khola. They leave the district in the east and the west respectively. The Sunkoshi river acts as a border to the northern district and the Bagmati river to the western districts.

The geological formations of the Chure range are composed of sediments, which alternate in hard and soft strata. The relatively good vegetation cover means that not much erosion has been observed. The Mahabharat Lekh passes east-west through the district. Because of its steep slopes, inherently unstable geology and the harsh climate, occasional landslides occur.

2.1.3 Climate

Due to the different geo-physical conditions the climate varies from warm-tropical over sub-tropical to temperate. Sindhuli district is characterised by heavy rainfall. The annual rainfall varies from 1000 to 2000 mm between Siwalik and Mahabharat ranges. Average annual rainfall in the district is 1420 mm.

2.2 Demographic and Social Characteristics

2.2.1 Demography

Following the latest information of the Central Bureau of Statistics (CBS) the total population of the district is about 275,220 (projection based on 1991 census). The Female and male populations are approximately balanced. There are 47,451 households and settlements are randomly scattered over the district. With a total district area of 2491 km^2 and the average population density amounts to 110 inhabitants/km^2. Although population density in the Mahabharat and Siwalik ranges is considerably lower, in the plain areas it is substantially higher than the average. There are 53 VDCs and one municipality (Kamala Mai) in the district.

The population of Sindhuli district consists of Chhetri and Bhramin, followed by Tamang, Newar, Majhi, Sunuwar, Magar, Rai, Danuwar and a minority of Hau and Thami. As a result, the majority of the people speak Nepali followed by Tamang, Magar, Danuwar, Newar and Majihi.

2.2.2 Social Aspects

The comparatively low overall economic activity in the district is reflected by a relatively high percentage of the population living below the subsistence limit. At present 23 % of the population is living below the poverty line; 16 % of the households have food sufficiency for less than 9 months (poor households), 7% have sufficient food for even less than 3 months (ultra-poor households). In order to maintain their livelihoods, female members of poor and ultra poor

households seek employment as daily wage workers within the district whilst male members generally search for income outside the district in Janakpur, Kathmandu or India. Food scarcity in the district is experienced mainly between the months of February and July.

2.2.3 Health Aspects

Throughout the district people still consult traditional healers. The services of health posts and the hospital in Sindhulimadhi are used only in serious cases. A considerable number of old people suffer from tuberculosis and asthma and pneumonia and malnutrition is widespread among children. The hygiene situation in the district is also unsatisfactory due to lack of sanitary installations.

2.2.4 Religious Activities

There are three major religious areas in Sindhuli district where numerous people gather to celebrate. Fisrtly, Maaisthaan at the junction of Kamala and Gwaaang Khola, Mahadevsthan at the confluence of Sunkoshi and Roshi Khola and lastly Tilange, where the Chnadan Khola and Jirgha Khola meet.

2.3 Service Centres and Services

2.3.1 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.

Sindhulimadi, the district headquarter, is the main service centre of the district. The majority of the population from the district visit Sindhulimadi for official as well as for personnel reasons. Other service centres are scattered over the district. Sindhulimadi provides access to these centres at Chakamake (Lampantar), Chapp (Kapilakot), Hayutar/Bastipur, and Khurkot. These serve the population from the eastern, western, north-western and northern area of the district (refer to map No. 2).

Two other important service centres are Bhiman and Dudhauli, located in the south-eastern part of the district. The main service centres including their estimated population are compiled in the following Table 2.1

Main Service Centres

Main Service Centre	Population (2000)
Sindhulimadi	8,948
Bhiman	1,200
Dakaha	850
Dudhauli	**1600**
Chakmake (Lanpantar)	400
Chhap (Kapilakot)	650
Khurkot	289
Hayutar /Bastipur	425

Source: Annex 3.3.1

TABLE 2.1

2.3.2 Description of Main Service Centres

Sindhulimadi

Sindhulimadi is the district headquarter and is located in Kamalamai Municipality, the only Municipality of Sindhuli district. Its population was about 39,450 in the year 2000. Most of the government offices, the hospital and campuses are situated here. It is connected to Bardibas located on the East West Highway by the Bardibas-Dhulikhel highway.

Dudhauli

Dudhauli is the main service centre of the south-eastern part of the district. It lies near the border of Udayapur and has a weekly market. The population of Duhdauli market is about 1600. It has seasonal access to the East West Highway and the regional centre at Katari through Mirchaya-Katari road. This road allows transportation of commodities between Dudhauli and Katari or to other urban centres of Terai like Janakpur. The Mirchaya-Katari Road is 2 km from Dudhauli but is located on the other side of River Tawa Khola. The Tawa Khola is fordable only during the dry-season.

Bhiman

Bhiman is located 19 km from Bardibas along the Bardibas-Dhulikhel highway. It provides services to the south-eastern part of the district through Bhiman-Dudhauli road. It has a population of about 1200, a weekly market, as well as few government offices.

Dakaha

Dakaha is on Hatpate-Sirthauli road, 7 km south-east of Hatpate. It has a population of about 850 and a weekly market. It is located at the north bank of River Kamala. Although night bus services operate between Kathmandu and Dakaha during the dry season, during the monsoon period Dakaha is inaccessible for vehicles. This is because it lacks a permanent crossing facility over the Kamala River. The ford, which secures at least a seasonal access, is located at a settlement called Ranibas.

Kapilakot

Kapilakot, also referred to as Chhap, is the main service centre in the middle of Sindhulimadi-Pipalmadi trail. It is located on the bank of Marin Khola. It has a population of about 650 and a weekly market. It provides services to VDCs like Kalphriksha, Mahendrajyadi, Kyaneswor, Shanteswary, Netrakali and Pipalmadi.

Chakmake

Chakmake, also referred to as Laupantar is on Bhimsthan-Bahuntilpung road. Its population is about 400 and has a weekly market.

Bastipur

Bastipur, also referred to as Hayutar, is the service centre located at the end of Kusumtar-Bastipur trail. This market centre lies 18 km north-west of Kushumtar.

Khurkot

Khurkot is located on the northern border of the district. The road from Sindhulimadi to Khurkot (part of Bardibas-Dhulikhel highway) is under construction with Japanese assistance. Khurkot lies 39 km north of Sindhulimadi.

2.4 Existing Transport Situation (Roads, Trails, Bridges)

2.4.1 Accessibility

The overall transportation situation in Sindhuli district is deficient with few road connections and a limited number of main trails (refer to map no. 3).

The district headquarter Sindhulimadi is connected to the East-West Highway at Bardibas by a 37 km long double-lane all-weather gravel road. This is the first section of the Bardibas-Dhulikhel highway, which will provide shorter access to the Kathmandu valley with the eastern part of Nepal. This road will not only influence the socio-economic situation of Sindhuli but also of adjacent districts.

Bhiman-Harshahi is one of the few existing district roads with regular traffic flow. Other places are still connected through the traditional trail system with numerous trail bridges. The Sunkoshi river forms a natural border to the northern districts and is crossed by few suspension bridges along main and local trails.

There is a regular bus service from Bardibas to Sindhulimadi, which departs every hour. Additional public transport services exist from Bhiman to Harshahi and Dakaha.

There is no direct air connection to the district. The nearest airport is located in Janakpur, which is 3 hours away from Sindhulimadi by bus.

2.4.2 Main Trading Routes

Before the construction of the East West Highway in the sixties, Sindhulimadi played a significant role in the national trade. It acted as the gateway between Eastern Nepal and Kathmandu. Although its importance declined after the construction of East-West Highway and the Lamosangu-Jiri Road (1983), it continued to be the main trading centre for part of its hinterland, i.e. Ramechhap District.

Since the completion of Sindhulimadi-Bardibas section of Bardibas-Dhulikhel highway, it has become the main trading route within the district and almost all the commodities of Sindhuli district are carried through this road. Sindhulimadi being the main service centre and district headquarter provide services to most of the VDCs in the district. Commodities are exported and imported to different VDCs from Sindhulimadi. VDCs located in the south-eastern part of the district like Dudhauli, Kakurthakur, Ladavir, Arun Thakur are oriented towards the east and are dependent on Mirchaiya-Katari feeder road for services (refer to map no. 3).

2.4.3 Summary of Existing Roads

Bardibas-Sindhulimadi road (a section of Bardibas-Dhulikhel highway) is part of the strategic road network. The Japanese Government is funding for the construction of this 155 km long road. The existing section 1 from Bardibas to Sindhulimadi is a double-lane gravel road. It has been executed in an exemplary way, including proper structures, water management and bioengineering measures.

The situation regarding existing district roads can be summarised as follows:

Summary of existing District Roads

Road Linkages	Road reference No.	Road Category	Length (km)
Dhakrebas-Sindhulimadi	20A001R	Earth road	3.3
Dhura Bazar-Dhungrebas	20A002R	Earth road	1.2
Sindhulimadi (Dhura Bazar)-Dadi	20A003A	Earth road	10.5
Lampantar-Bahuntilpung	20A020A	Earth road	8.3
Dudhauli-Ladavir	20A023A	Earth road	5.0
Dudhauli-Patiyani	20A024R	Earth road	5.0
Bhiman-Nipane-Tandi	20A025R	Earth road	35.6
Hatpate (Ratanpur)-Dakaha	20A027R	Earth road	7.0
Sindhulimadi-Pallo Rampur	20A034A	Earth road	6.0
Jagadi-Chisapani	N.A.	Earth road	3.0

Source: Annex 3.01
N.A.: Not available

TABLE 2.2

The existing condition of most of the above earth roads is rather poor. The roads were constructed in adhoc manner without proper design standard. They are generally operated with difficulty and only during dry season. They need to be rehabilitated to bring them to the maintainable condition.

2.4.4 Trails and Pedestrian Bridges

In the hill areas of the districts and its hinterland the socio-economic activities still largely depend on trail-based transport system consisting of foot trails and mule tracks with reliable river crossings. However, pedestrian bridges cannot cross the large rivers in the plains. These rivers namely Kamala and Marin Khola can only be forded during dry season. As a result, there are few

bridges in the plain areas of the district. Most of the bridges are along the Sunkosi and in the hilly areas of district.

There are 5 main trail bridges over the Sunkoshi and Roshi Khola along the northern district border and some local bridges on village and local trails within the district.

2.5 Agricultural Profile

Agriculture is the main source of income in the Sindhuli district and 98% of the population derive their livelihood from it.

Following the land use analysis of the district (Map no. 6) the existing land resource base in the district has been broadly divided into forest/scrub, grassland, cultivated land and others. A distribution of the land resources among these categories indicates that forest covers most of the area of the district (68.8%) followed by cultivated land (22.7%), grassland (1.5%) and others (7%).

The agricultural production system is subsistence in nature and market integration is very limited. The number of existing irrigation facilities indicate that only a small portion of the cultivated area is under perennial cultivation. Therefore, upland farming is the predominant farming practice in the district. Paddy-wheat, paddy-maize, paddy-paddy are the major cropping patterns on irrigated Khet land. Mono-cropping with paddy is an overwhelming practice on rain-fed Khet land. The cropping pattern of Bari land, which covers the main area of cultivated land, is maize-millet.

Areas along the Kamala and Marin river are important for producing cereals and oil seed crops. Dudhauli, Mahendraladabhir, Tandi, Sirthauli, Harshahi, Kapilakot and Kalpbriskha are the main paddy producing areas in the district. Similarly, Dhudhauli, Sirthauli, Hatpate, Jalkanya produce oil seeds to a large extent. Potato is another important agricultural product of the district. Many VDCs are producing potato in a large scale. Bhadarkali, Siddaashowar, Dandigurase, Ratmata Jhagajholi and Ranibas are known as important pockets of potato production in the district. Pulses like lentil and blackgram are other important cash crops of the district. Sudeshwor, Tinkanya, Nipane, Ranibas are prominent areas of pulses production.

Citrus, particularly Sweet orange (Junar) from Sindhuli are famous in the country. Sweet orange cultivation in the commercial scale was started in the early '80s with technical assistance of Japan under a horticultural development project. At present a large amount of Sweet oranges is exported from the district to different parts of the country (Kathmandu and Terai markets), India and even Bangladesh. Mahadevdanda, Khangsang, Arunthakur, Kakurthakur, Jinakhu, Khurkot, Gwaltar, Lampantar, Bitijor, Ambote, Ratanchura, Bhadrakali, Jalkanya, Ratamata Jhagajholi are the important areas of Sweet orange production. Mandarin orange (Suntala) is another important citrus fruit produced in those areas. Despite the large scale production, farmers are not getting adequate prices for their production due to lack of road transportation network from the areas of production to the market centre. Producers have to carry their products by porters that eventually increase transportation cost and reduce the farm-gate price of the product.

Other important fruits grown in the district are pear and peaches. These are grown in the higher hills but not on a commercial scale. There are some pockets where these fruits are grown and have potential of expanding their areas of production. Ratanchura, Khangsang, Mahadevdanda, Majhuwa, Kusheshwar Dumja, Bhadarkali are major areas producing the temperate fruits in the district VDCs located in the north-eastern part of the district are also known for livestock products.

Different types of medical herbs are available in the large forest areas, which could be a source of income for the district. Herbs could be processed for the production of medicine. However, it is reported that due to lack of transportation facilities medical herbs have so far not been produced on a commercial scale. In spite of the favourable agro-climatic conditions and the very high cropping intensity (area of temporary crops divided by arable land), the income of farmers is rather low. The reasons for this are the low percentage of land available for cultivation, lack of irrigation as well as the lack of adequate road access resulting in comparatively high transportation cost of goods to and from farm to the next road head.

2.6 Industrial Profile

There are only few industrial activities of any significance within the district. Existing cottage industries are wood carving, furniture, brick and tile production, flour and rice mills, and tobacco processing and knitting. These industries are mainly concentrated in the main Service Centres of Sindhulimadi, Chakamake (Lampantar), Chapp (Kapilakot), Hayutar/Bastipur,Khurkot, Bhiman and Dudhauli.

2.7 Trends and Dynamics Observed

Main trends observed are related to the demographic dynamics in the district. As in many southern districts in the country, in-migration from the hill districts has stabilised substantially and the present in/out-migration situation in the district is balanced. The reason for this stabilisation may be the fact that since the 80's pressure on land and consequently the price of land in the Terai has increased to the extent that people from the hill districts cannot afford to settle there anymore.

2.8 District Priorities

Road corridors were selected based on the presentation of existing scenario and survey findings, recommendations of the DRCC and the conclusions of the workshop in Sindhuli in February 2000. During the regional synchronisation workshop in Kathmandu in December 2000 the district priorities were confirmed and included in the DTMP.

Based on assessment of data collected the DRCC meeting recommended the following roads to be considered for inclusion into the DTMP (refer to Map no.4):

Proposed DTMP Roads

Transport Linkages/corridors	Road reference No.	Total Road Length	
		Constructed (km)	Proposed (km)
Sindhulimadi-Kapilakot	20A003A	10.5	18.0
Kapilakot-Pipalmadi	20A007A		32.2
Bastipur-Nepalthok	20A010R		30.0
Kushumtar-Bastipur	20A011R		18.8
Bhimsthan-Bahuntilpung	20A020A		28.2
Sirthauli-Dudhauli	20A024R	5.0	6.2
Bhiman - Nipane	20A025R		15.0
Nipane - Tandi- Dhansari	20A025R		26.5
Hatpate (Ratanpur) - Sirthauli	20A027R	7.0	10.1
Sindhulimadi-Bhimasthan	20A034A	6.0	16.0

Source: Annex 3.01

TABLE 2.3

The DRCC meeting also recommended to upgrade/rehabilitate the linkage Bhiman-Jagadi-Dudhauli over a total length of 40 km.

Kushumtar-Bastipur and Bastipur-Nepalthok are two sections of the proposed Kushumtar-Nepalthok road. Bastipur-Nepalthok road can be constructed only after the construction of 18.8 km Kushumtar-Bastipur road. The alignment of the proposed Kushumtar-Bastipur road passes mainly through the forest area. These roads will provide access to Sindhulimadi and to Nepalthok, the service centre located on the Dhulikhel-Sindhulimadi road as well as to the population living in remote VDCs such as Bhadrakali, Amale Bastipur, Tamajor, Netrakali, Shanteswori. The road passes diagonally through north-western part of the district.

Sindhulimadi-Bhimsthan and Bhimsthan-Bahuntilpung roads are two sections of Sindhulimadi-Bahuntilpung road. This road provides access to the eastern part of Sindhuli district. The road has to be constructed from Sindhulimadi to Bhimsthan before it can be extended to Bahuntilpung. Ilaka has completed construction of 10 km of road from the market at Chakmake towards Bahuntilpung. The constructed road has a high gradient and passes close to a huge landslide called the Setti landslide.

Similarly Sindhulimadi-Kapilakot and Kapilakot-Pipalmadi are separate sections of the proposed Sindhulimadi Pipalmadi road linkage. This road will provide access to the western part of the district headquarter. 9 km of the Sindhulimadi-Kapilakot road has been constructed to Dapidiguransh. This is one of the roads recommended for construction as an agricultural road. The road from Sindhulimadi to Kapilakot will have to be constructed before it can be extended to Pipalmadi.

Hatpate-Sirthauli and Sirthauli-Dudhauli are two components of the road from Hatpate and to Dudhauli. Dudhauli is the main service centre of the south-eastern part of the district. This road provides service to area north of Kamala River.

3. INDICATORS FOR DISTRICT TRANSPORT PLANNING

As mentioned in Methodology (Vol. I), the indicators for district transport planning prioritisation reflect basically the existing situation within a discrete area of influence of a particular road corridor. The selected road corridors for Sindhuli district have been compiled in Table 2.3 above. The ranking of individual road corridors was done following the approved scoring system.

3.1 Demography and Demographic Dynamics

Following the Vol. I, chapter 3.7.1, the population along the different road corridors has 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.

As mentioned above a review of the district indicates that the population density in the areas of the district in the Mahabharat and Siwalik ranges is considerably lower in comparison to plain areas. Consequently this is reflected in the figures of the individual corridors. The scoring of the individual road corridors based on population density is compiled in Table 3.1 and the most important/extreme linkages related to population described below:

The **Sirthauli-Dudhauli** road is located in the inner plain area and serves a total population of 41,193. The linkage serves the maximum population per km of road in its inner and outer zone of influence. It is the most densely populated road corridor in the district. The road ranks first with a combined score of 10.0 for IZI and OZI.

The **Bhimsthan-Bahuntilpung** ranks second followed by **Sirthauli-Dudhauli** that is located in the mid-hill area. This road starts from Kamalamai municipality and passes through VDCs with denser population like Ranichuri and Bhimsthan. It provides services to a considerable population located in the wider catchment area.

Kushumtar-Bastipur road receives the minimum score. The road passes through scarcely populated forest area.

Score of Proposed Roads Based on Demographic Characteristics

Road Corridor	Length (km)	Total Pop. IZI	Total Pop. OZI	IZI	OZI	Score		Total Score	Transformed Score (10)
				(Pop/km)	*(Pop/Km)*	*IZI (6)*	*OZI (4)*	*IZI+OZI*	
Kushumtar-Bastipur	18.8	4,294	0	228	0	0.02	0.00	0.02	0.02
Bastipur-Nepalthok	30.0	13,953	1,422	465	47	0.77	0.12	0.89	0.87
Sindhulimadi-Bhimsthan	22.0	12,465	6,118	567	278	1.08	0.72	1.80	1.78
Bhimsthan-Bahuntilpung	28.2	19,068	20,653	676	732	1.43	1.90	3.33	3.31
Sindhulimadi-Kapilakot	28.5	6,304	2,300	221	81	0.02	0.21	0.23	0.21
Kapilakot-Pipalmadi	32.2	12,872	15,019	400	466	0.56	1.21	1.77	1.75
Hatpate-Sirthauli	17.1	14,985	0	876	0	2.06	0.00	2.06	2.04
Sirthauli-Dudhauli	11.2	23,880	17,313	2,132	1,546	6.00	4.00	10.00	10.00

Source: Annex .3.1

TABLE 3.1

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:

Sirthauli-Dudhauli road has been assigned a maximum score of 15 due to comparatively large areas of cultivated land within both, outer and inner zone of influence followed by **Bhimsthan-Bahuntilpung** linkage with a score of 13.0.

Sindhulimadi-Bhimsthan road corridor ranks third highest with a score of 7.4 due to its large area of land in the IZI of this road corridor.

Kushumtar-Bastipur road receives the least importance because of the minimal area of cultivated land in this forest area.

VDCs in the south-eastern part of the district have favourable agro-climatic conditions similar to plains and are producing paddy, wheat, maize and oil seeds. Examples of these VDCs are Dudhauli, Ladavir, and Hatpate. They are known for their cash crops production. These products are exported through Dakaha-Dudhauli-Khoksa route.

Provision of access to areas with surplus production potentials will substantially trigger agricultural growth within the district. Investments into district roads will enhance access to markets for agricultural products and facilitate the provision of credits and agricultural inputs such as seeds and fertiliser. As a consequence the income of farmers from cash crops will increase by reduction on transport cost.

There are also opportunities in the district for transforming low productive subsistence agriculture to market oriented high output production systems through diversification and intensification of existing cropping patterns.

There is a high potential for increased production of citrus fruits and for intensification of production of other crops. An improved district road network will allow more economical transportation of the products to the southern regional centres over Sindhulimadi-Bardibas road and after completion of the Bardibas-Dhulikhel highway into the Kathmandu valley.

Score of Roads of Proposed Roads Based on Agricultural Resource Base

Road corridor	Length of Roads (Km)	Cultivated land area in IZI, ha/km	Cultivated land area in OZI, ha/km	Score (15)		Total Score (15)	Transformed Score (15)
				IZI (10)	*OZI (5)*		
Kushumtar-Bastipur	18.8	50	0	1.1	0.0	1.1	0.8
Bastipur-Nepalthok	30.0	92	10	2.1	0.1	2.2	1.7
Sindhulimadi-Bhimsthan	22.0	162	89	5.5	1.0	6.5	7.4
Bhimsthan-Bahuntilpung	28.2	231	178	8.8	2.0	10.8	13.0
Sindhulimadi-Kapilakot	28.5	89	15	1.9	0.2	2.1	1.4
Kapilakot-Pipalmadi	32.2	128	140	3.8	1.6	5.4	4.6
Hatpate-Sirthauli	17.1	91	0	2.0	0.0	2.0	1.6
Sirthauli-Dudhauli	11.2	255	442	10.0	5.0	15.0	15.0

Source: Annex.3.2

TABLE 3.2

3.3 Economic Structure and Central Services

The concentration of economic and social activities is located at main market/service centres that are Sindhulimadi, the district headquarter, Bhiman, Dhakaha, Dudhauli, Chakmake (Lampantar), Kapilakot (Chhap), Khurkot and Hayutar. These market/service centres are located along traditional main trail routes and planned and partly existing district roads. Other minor centres such as Jhadajholi, Ratmato and Kushewor Dumja lie on the main trading route to Kathmandu, on the proposed Dhulikhel-Bardibas road.

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. This evaluation of the data indicates that the district headquarter Sindhulimadi provides the maximum number of economic facilities and government services to district population. As a consequence **Sindhulimadi** receives the maximum score of 87.5 out of 100 (see Table 3.3) followed by **Bhiman, Dhakaha** and **Dudhauli**. These service centres are located in the south-eastern region of the district and provide service to the inner plain area. The other centres located the hills like **Chakmake, Chhap and Hayutar** are relatively smaller and. Their scores range from 47.6 to 57.0.

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

Road Corridor	Services Centres	Service centres' weightage	Total weightage	Length of the Road (km.)	Weightage per Km length	Total Score (10)	Transformed Score (10)
Kusumtar-Bastipur	Sindhulimadi	87.5	138.8	18.8	7.4	10.0	10.0
	Hayutar	51.3					
Bastipur-Nepalthok	Hayutar	51.3	51.3	30.0	1.7	0.0	0.1
Sindhulimadi-Bhimsthan	Sindhulimadi	87.5	87.5	22.0	4.0	4.0	4.0
Bhimsthan-Bahuntilpung	Chakmake	47.6	47.6	28.2	1.7	0.0	0.1
Sindhulimadi-Kapilakot	Sindhulimadi	87.5	144.5	28.5	5.1	5.9	5.9
	Kapilakot (Chhap)	57.0					
Kapilakot-Pipalmadi	Kapilakot	57.0	57.0	32.2	1.8	0.1	0.1
Hatpate-Sirthauli	Dakaha	70.1	70.1	17.1	4.1	4.2	4.2
Sirthauli-Dudhauli	Dudhauli	63.2	63.2	11.2	5.6	6.9	6.9

Source: Annex 3.3

TABLE 3.3

3.4 Trade Flow/Predicted Changes

In Sindhuli district most of commodities are transported through the district headquarter Sindhulimadi. The exceptions to this are the centres located in the south-eastern region of the district served by Bhiman-Dudhauli, Hatpate-Sirthauli and Sirthauli-Hatpate linkages.

Generally, goods are transported by porters on trails. Tractors and bullock carts are used during the dry season out of centres like Kapilakot, Pipalmadi, Bahuntilpung and Bhimsthan. Along the proposed road from Kusumtar to Bastipur pedestrians use the Marin riverbed as a trail during the dry season, during monsoon period they follow alternate routes.

Tractors are the preferred means of transport during the dry season along the proposed Sindhulimadi-Bhimsthan and Bhimsthan-Bahuntilpung road. On their way they have to cross

several rivers such as Buka, Gadyauli and Chandaha. During the remaining part of the year porters are used.

Along the proposed road from Sindhulimadi to Kapilakot and from Kapilakot to Pipalmadi, commodities are transported by tractors through Marin Khola riverbed to Pipalmadi VDC. However, during the monsoon period the riverbed of Marin Khola is flooded and goods have to be transported to and from Kapilakot on an alternative route that passes through Hariwan in Sarlahi District. Pipalmadi VDC is located at the end of the proposed Kapilakot-Pipalmadi road. Most of the goods are transported to this VDC from Bagmati Jaysis located on the East West highway or Mahendra highway especially during the monsoon period.

At Ranibas the proposed Bhiman-Dudhauli road crosses Kamala river. Whilst during the dry season vehicles can cross the river but during rainy season porter have to be used.The trade flows within Sindhuli 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.

Average Transport Costs by Different Modes of Transport

Name of road corridor	Length (km.)	Transport Modes	Average rate (Rs/ton/km)
Kushumtar-Bastipur	18.8	Porter	186
Bastipur - Nepalthok	30.0	Porter	167
Sindhulimadi-Bhimsthan	22.0	Tractor Porter	115
Bhimsthan-Bahuntilpung	28.2	Tractor Porter	133
Sindhulimadi-Kapilakot	28.5	Tractor Porter	145
Kapilakot-Pipalmadi	32.2	Tractor Porter	128
Hatpate-Sirthauli	17.1	Mule Tractor Porter Bus Truck	129
Sirthauli-Dudhauli	11.2	Tractor Porter Tyre gada	153

Source: Annex 3.4.1 to 3.4.8

TABLE 3.4.1

Following Volume I, 3.7.4 the scores for trade flow has been assigned based on average transport cost per km and is presented in table 3.4.2.

Sindhulimadi-Kapilakot road corridor, located in the Mahabharat range has the second highest trade volume per year. Generally tractors and porters are carrying out the transport of commodities on this sector. The average transport cost is higher in comparison to Hatpate-Sirthauli road located in the inner Terai but lower than other roads where commodities are carried by porters alone like along the Kusumtar-Bastipur and Bastipur-Nepalthok trail.

However, due to the high trade volume the total transportation costs per year along this corridor is highest and thus receives the highest score.

Hatpate-Sirthauli corridor is the only proposed road for new construction where trucks, tractors, buses as well as mules and porters transport goods and consequently has the maximum trade flow per year. This is one of the roads where the average transport cost has come down due to the movement of a substantial amount of commodities by vehicles. The total transport cost of the proposed road is in the range of Sindhulimadi-Kapilakot corridor and thus receives an equally high score of 14.4.

Goods are transported from **Sindhulimadi to Bhimsthan** by tractors along the riverbed during the dry season. During monsoon, porters maintain the flow of goods along this route which is ranked third.

Along the proposed **Kusumtar-Bastipur** and **Bastipur-Nepalthok** road goods can only be transported by porters. Whilst on Kusumtar-Bastipur trail a considerable trade flow takes place and transport cost are comparatively high (fourth rank) and along the Bastipur-Nepalthok route only small quantities of goods are transported leading to a minimum rank in the scoring to trade flow in the district.

With the construction of Bardibas-Dhulikhel highway as well as the proposed district roads the trade flow to and from the central parts of the district will be partly diverted. In general transportation costs will be decreasing which will give way to the opening of potentials for new economic activities.

Scores of Proposed Roads Based on Volume of Trade Flow

Road Corridor	Length of road (Km)	Trade volume by transport mode (Ton/Year)					Total Trade volume (Ton/Year)	Weighted Average Transport cost Rs/ton/ Km)	Total Transport cost (Rs/Km/ Year)	Total Score (15)	Transformed Score (15)
		Porter	Mule/ horse	Truck	Tractor	Tyre gada					
Kushumtar-Bastipur	18.8	750					750	186	139,500	9.2	9.2
Bastipur-Nepalthok	30.0	183					183	167	30,561	0.0	1.4
Sindhulimadi-Bhimsthan	22.0	504			720		1224	115	140,760	9.3	9.3
Bhimsthan~Bahuntilpung	28.2	504			360		864	133	114,912	7.1	7.1
Sindhulimadi-Kapilakot	28.5	540			900		1440	145	208,800	15.0	15.0
Kapilakot-Pipalmadi	32.2	170			360		530	128	67,840	3.1	3.1
Hatpate-Sirthauli	17.1	183	30	675	675		1563	129	201,627	14.4	14.4
Sirthauli-Dudhauli	11.2	360			105	10	475	153	72,675	3.5	3.5

Source: Annex 3.4

TABLE 3.4.2

3.5 Development Potential

Other resources and activities along the individual road corridors, which are beyond the agricultural sector as described in Vol. I, 3.7.5, are described and rated as development potentials under this heading.

There are few areas with distinct development potentials. However, the survey carried out with district representatives identified the following potentials with a high significance in the respective road corridors:

Along Kusumtar-Bastipur-Nepaltok corridor only livestock farming and non-timber forest products were identified as potential development areas.

Horticultural intensification and non-timber forest product development are potential areas on the proposed Sindhulimadi-Bhimstan-Bahuntilpung road link.

Sindhulimadi-Kapilakot-Pipalmadi road corridor follows partly Marin Khola in the plains with identified development potentials in the areas of fishery, livestock farming and agricultural development. The same assessment has been made for Hatpate-Sirtauli-Dudhauli road.

Based on the survey the proposed road corridors have been rated related to their significance to development potential. Table 3.5 is a summary of scores of proposed roads based on development potential.

Scores of Proposed Roads Based on Development Potentials

Road corridor	Total Weightage	Total Score (5)	Transformed Score (5)
Kushumtar-Bastipur	4.8	5.0	5.0
Bastipur-Nepalthok	4.4	3.9	3.9
Sindhulimadi-Bhimsthan	4.6	4.4	4.4
Bhimsthan-Bahuntilpung	4.7	4.7	4.7
Sindhulimadi-Kapilakot	3.0	0.0	2.4
Kapilakot-Pipalmadi	4.4	3.9	3.9
Hatpate-Sirthauli	4.2	3.3	3.3
Sirthauli-Dudhauli	4.3	3.6	3.6

Source: Annexes 3.5.1 to 3.5.8

TABLE 3.5

3.6 District Priorities

Preliminary selection of road corridors was made based on the preliminary survey data and the recommendations by the DRCC and during the February workshop in Sindhuli. 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 finalised as reflected in Table 3.6. Finally, the priorities were confirmed during the regional synchronisation workshop in December 2000 in Kathmandu.

The district clearly prioritises the three main road linkages Sindhulimadi-Bahuntilpung in the central part of the district and Kushumtar -Nepalthok and Sindhulimadi-Pipalmadi in the West. The road connection Hatpate-Duhauli in the south-eastern part of the district appears to be mainly of local interest.

Scores of Proposed Roads Based on District Priorities

Road Corridors	Total Marks given	Total Score (5)	Transformed Score (5)
Kushumtar-Bastipur	4.0	5.0	5.0
Bastipur-Nepalthok	4.0	5.0	5.0
Sindhulimadi-Bhimsthan	3.0	2.5	2.5
Bhimsthan-Bahuntilpung	3.0	2.5	2.5
Sindhulimadi-Kapilakot	3.0	2.5	2.5
Kapilakot-Pipalmadi	3.5	3.8	3.8
Hatpate-Sirthauli	2.5	1.3	1.3
Sirthauli-Dudhauli	2.0	0	1.0

TABLE 3.6

3.7 Tentative Construction Costs of Proposed Roads

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

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

Summary of Initial Costs and Engineering Rating of Proposed Roads

Road Corridors	Length km.	Total Cost NRs.	Cost per km NRs.	Engineering Rating	
				Total Score (20)	Transformed Score (20)
Sindhulimadi-Bhimsthan	22.0	20,440,000	929,091	15.5	15.5
Bhimsthan-Bahuntilpung	28.2	49,350,000	1,750,000	7.0	7.0
Hatpate-Sirthauli	17.1	10,108,400	590,099	19.1	19.1
Sirthauli-Dudhauli	11.2	5,592,000	499,286	20.0	20.0
Kusumtar-Bastipur	18.8	39,919,600	2,120,000	3.1	3.1
Sindhulimadi-Kapilakot	28.5	17,445,400	611,690	18.8	18.8
Kapilakot-Pipalmadi	32.2	71,139,900	2,210,000	2.2	2.2
Bastipur-Nepalthok	30.0	72,696,800	2,420,000	0.0	2.0

Source: Annex 3.7

TABLE 3.7

Road links ranked best are Hatpate-Sirthauli and Sirthauli-Dudhauli roads. The total project costs for these two roads are comparatively low as the alignment follows the Kamala River in a relatively flat and open terrain requiring less excavation and structures. With similar topographical features Sindhulimadi-Kapilakot road has been ranked next.

Construction costs of road links leading into hilly areas will naturally increase. This is reflected in the lower scores of other road corridors.

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.

a. Kushumtar-Bastipur

This proposed road is approximately 18 km in length wherein the first 8 km follows the bank of the Marin khola. Approximately 60 % of the proposed alignment passes along agricultural land while the rest passes through forests. The dominant tree species in the forests is sal wood. Non-perennial rivers namely Phader khola, Dhanmana khola, Simle khola, Lipe khola and Hadi khola falls along the alignment, all of which are fordable. Management of forest along the alignment that minimise the use of agricultural land will need to be taken into consideration prior to construction.

b. Bastipur-Nepalthok

This is a 30km length road corridor, which is a continuation of the road from Kushumtar - Bastipur. There are a number of spring fed non-perennial rivers along the alignment namely; Chalise khola, Thada khola, Khahare khola, Tamajor khola and Ghyampa khola. Approximately 50% of the alignment passes through forests and the density of population is very low. There are landslides zones, high slope areas susceptible to instability apart from forest areas in the proposed road corridor.

c. Sindhulimadi-Bhimsthan

The total length of this proposed road is 22 km of which the first 6 km is the existing fair weather earthen motorable track. The alignment passes through settlement area, thin forest, pastureland and paddy fields for 6 km, 4 km, 6 km and 6 km respectively. Dhamile khola, Besare khola, Jigra khola and Kumhale khola are the main rivers along the alignment, which are wide but dry up during the dry season and are fordable. Part of the road corridor falls under state forest and agricultural land.

d. Bhimsthan-Bahuntilpung

The proposed road is a continuation of the Sindhulimadi-Bhimsthan road to Bahuntilpung with an added total road length of 28.2 km. About 5 km of the alignment passes through cultivated land while the rest passes through pastureland and forest. Khahare khola and Kagate khola are the major rivers that are spring fed and non-perennial. Necessary precautionary measures are to minimise forestland along the road at the time of alignment selection. There exist two major landslides, the Seti landslide and Lampandanda landslide within the corridor of the proposed road.

e. Sindhulimadi-Kapilakot

The total length of the proposed road is 28 km, with an existing fair weather motorable track of 10.5 km from Sindhulimadi. The proposed road corridor is situated on the northern bank of the Marin river. The initial 10.5 km road mainly passes through settlement area while the rest through forests and cultivated land. There are number of rivers that has to be crossed by the road namely; Dhade khola, Lipu khola, Jhor khola, Marin khola, Kahare khola and Mahaswota khola. The rivers are tributaries to the Marin khola, non-perennial, which dry up in the dry season. It is foreseen that a bridge over Marin khola could be required.

f. Kapilakot- Pipalmadi

This is a continuation of the Sindhulimadi - Kapilakot road. The length of the proposed road is 32.2 km. There is a possibility to align the road along the existing foot trail reducing additional environmental effects. About 60% of the alignment will need to be built over agricultural land while the rest is over pastureland and forest area. Chanduli khola, Sakhati khola, Sindure khola, Tamajor khola and Dhanmana khola are the non-perennial, spring fed rivers that the alignment will have to cross.

g. Hatpate-Sirthauli

The initial 7 km of the total road length of 17.1 km is existing fair weather earthen road. The existing track and the proposed alignment exists on the northern bank of the Kamala river.

Other minor rivers along the alignment are Bichitra khola, Tumor khola, Banka khola and Thakur khola. Being tributaries to the Kamala river these rivers are also wide in nature that are dry during the dry season and are fordable. Majority of the alignment passes through agricultural land.

h. Sirthauli-Dudhauli

This is a continuation of the Hatpate - Sirthauli road, with 6.2 km of new construction and 5 km of existing fair weather earthen motorable track. The alignment follows the northern bank of the Kamala river with non-perennial rivers namely Takaha khola and Kartha khola along its alignment, which are fordable. The proposed alignment mainly passes through settlement areas and agricultural land. However, there are no risks to resettlement but there will be a loss to agricultural land.

In conclusion, from the initial environmental walk-over survey it shows that there could be significant environmental effects along some of the road corridors as shown in the Table 3.8. However, for the purpose of inclusion of the roads for DTMP selection it was found that none of the roads need substantial environmental measures.

Summary of Environmental Rating of Proposed Roads

Road Corridor	Length (km)	Environmental Rating					
		Aspects Not Affected	Sign.	Serious	Score	Total Score (10)	Transformed Score (10)
Sindhulimadi-Bhimsthan	22.0	34	3	0	7	10.0	**10.0**
Bhimsthan-Bahuntilpung	28.2	34	3	0	7	10.0	**10.0**
Hatpate-Sirthauli	17.1	34	3	0	7	10.0	**10.0**
Sirthauli-Dudhauli	11.2	34	3	0	7	10.0	**10.0**
Kusumtar-Bastipur	18.8	30	7	0	3	0.0	**3.0**
Sindhulimadi-Kapilakot	28.5	32	5	0	5	5.0	**5.0**
Kapilakot-Pipalmadi	32.2	33	4	0	6	7.5	**7.5**
Bastipur-Nepalthok	30.0	30	7	0	3	0.0	**3.0**

Source: Annex.3.8

TABLE 3.8

3.9 Social Issues

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.

With the largest population per km of road Sirthauli-Dudhauli corridor combines the biggest number of people living in poverty followed by Bhimsthan-Bahuntilpung and Sindhulimadi-Bhimsthan road links.

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

Road Corridor	Length (km)	Tot. Pop. of IZI+OZI	Tot. Ultra Poor Pop. of IZI+OZI	Tot. Poor Pop. of IZI+OZI	Pop. Per km road length		Score			Transformed Score (10)
					UP	P	UP (6)	P (4)	Total (10)	
Kushumtar-Bastipur	18.8	4,294	145	834	8	44	0.1	0.2	0.3	0.3
Bastipur-Nepalthok	30.0	15,375	656	3,994	22	133	0.4	1.3	1.7	1.4
Sindhulimadi-Bhimasthan	22.0	18,583	1,660	3,009	75	137	1.8	1.3	3.1	2.9
Bhimsthan-Bahuntipung	28.2	39,721	1,937	6,539	69	232	1.6	2.7	4.3	4.1
Sindhulimadi-Kapilakot	28.5	8,604	839	1,792	29	63	0.6	0.3	0.8	0.5
Kapilakot-Pipalmadi	32.2	35,067	2,088	4,838	65	150	1.5	1.5	3.1	2.8
Hatpate-Sirthauli	17.1	10,397	825	1,422	48	83	1.1	0.6	1.6	1.4
Sirthauli-Dudhauli	11.2	28,281	2,588	3,615	231	323	6.0	4.0	10.0	10.0

Note: P = Poor, UP = Ultra poor
Source: Annex 3.9

TABLE 3.9

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.

Based on these findings the DDC recommends the construction of roads from Sindhulimadi to Bhimsthan, Sindhulimadi to Kapilakot and from Kushumtar to Bastipur. The first 6.0 and 10.5 km of Sindhulimadi-Bhimsthan and Sindhulimadi-Kapilakot roads already exist. These sections are Sindhulimadi-Pallo Rampur and Sindhulimadi-Dadi. It is recommended to rehabilitate these sections. Hatpate-Sirthauli and Sirthauli-Dudhauli roads are also recommended for new construction. Bhiman-Harshahi, a component of Bhiman-Dhansari-Tandi road, is one of the few roads existing in the district where there is a traffic flow and thus is recommended for road maintenance and rehabilitation under DTMP.

As mentioned under chapter 4.2, presently acquired funds will not allow realising all roads proposed in the DTMP. In order to secure already made investments, roads (partially) which already exist or are under construction will receive highest priorities for DTMP implementation. Accordingly funds will be allocated to those roads with high priority. Eventual surplus budget will have to be allocated following the priorities given in the scoring of indicators to be included into the YPO and approved during the annual meetings of the District Council.

Prioritisation of Individual Road Corridors

Road Corridor	Parameters Used for the Prioritisation of Road Corridors and Their Corresponding Scores										
	Demography (10)	Agriculture (15)	Service centres (10)	Trade flow (15)	Develop. Potential. (5)	District Priority (5)	Const. Cost (20)	Environment (10)	Social Aspects (10)	Total Score (100)	Rank
A	B	C	D	E	F	G	H	I	J	K	L
										=B+C+D+E+F+G+H+I+J	
Kushumtar-Bastipur	0.1	0.8	10.0	9.2	5.0	5.0	3.1	3.0	0.3	**36.5**	**VI**
Bastipur-Nepalthok	0.9	1.7	0.1	1.4	3.9	5.0	2.0	3.0	1.7	**19.7**	**VIII**
Sindhulimadi-Bhimsthan	1.8	7.4	4.0	9.3	4.4	2.5	15.5	10.0	3.1	**58.0**	**II**
Bhimsthan-Bahuntilpung	3.3	13.0	0.1	7.1	4.7	2.5	7.0	10.0	4.3	**52.0**	**IV**
Sindhulimadi-Kapilakot	0.2	1.4	5.9	15.0	2.4	2.5	18.8	5.0	0.8	**52.0**	**V**
Kapilakot-Pipalmadi	1.8	4.6	0.1	3.1	3.9	3.8	2.2	7.5	3.1	**30.1**	**VII**
Hatpate-Sirthauli	2.1	1.6	4.2	14.4	3.3	1.3	19.1	10.0	1.6	**57.6**	**III**
Sirthauli-Dudhauli	10.0	15.0	6.9	3.5	3.6	1.0	20.0	10.0	10.0	**80.0**	**I**

Source: Annex 3.10

TABLE 3.10

4. FUNDING SOURCES FOR THE DTMP IMPLEMENTATION

4.1 Potential Funding Sources

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

- HMG
- National Road Fund
- DDC resources
- VDC resources
- Donors

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

a) DoLIDAR

Under the Agricultural Perspective Plan 1995/2015 (APP) DoLIDAR is expected to contribute Rs 4.6 millions during the FY 58/59 to the district road sector. Based on past experience it can be assumed that this contribution will increase by at least 15% annually.

b) 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) specifically. It is expected that Sindhuli District reserves 100% of its road grant and 25% of its development grant for district road activities amounting to Rs 2.5 million per year. It is not expected that the block grant will increase significantly over the years to come.

- DDC internal funds in Sindhuli are mainly generated through taxes and royalties. Out of DDC's internal sources 15% are expected to flow into the transport sector amounting to Rs 0.66 million per year. An annual increase of 15% is expected. Internal sources will be substantially increased through the collection of royalties from quarrying for the construction of the Bardibas-Dhulikhel highway project staring in this fiscal year.

c) VDC

VDCs receive a block grant of Rs 500,000. Out of this Rs 200,000 go to internal human resources management. 15% of the remaining grant is expected to be used for district roads in VDCs through which the road passes amounting to total Rs 0.99 million. No increase of this contribution is expected.

d) Constituency Development Fund

Out of the total block grant only about 10%, i.e. Rs 0.30 million can be utilised in the transport sector.

e) DoR/MoLD

DoR/MoLD provides a special grant for village road development to the district, which amounts to Rs 2.616 million in the FY 58/59. This amount is expected to increase 10% annually.

f) DRSP

DRSP budget reserved for DTMP implementation in Sindhuli district is Rs.6.45 million in the current FY and may increase by approximately 15% annually.

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

4.2 Budget Forecast for DTMP Implementation

Based on the above sources a rough budget perspective can be made as compiled in Table 4.1.

As mentioned in the pervious chapter, not all the plans can be realised with the present funding allocations to the district and the VDCs. It is therefore of utmost importance that other sources of funding can be secured such as bilateral donors, Asian Development Bank, World Bank, etc.

In view of the limited resources it is recommended to utilise and concentrate already secured funds on roads under the DTMP.

Budget Forecast (Rs '000) for DTMP Implementation (058/59-062/63)

Sources	Years				
	058/59	*059/60*	*060/61*	*061/62*	*062/63*
DoLIDAR	6,450	12,075	12,075	12,075	12,075
DDC Bloc-grant	4,000	4,600	5,290	6,084	6,996
DDC internal fund	2,500	2,500	2,500	2,500	2,500
Royalty from Sindhuli-Bardibas-Dhulikhel Road Project	660	726	799	878	966
VDC Bloc- grant	1,800	1,800	1,800	1,800	1,800
Constituency Development Fund	990	660	660	660	660
DoR/MoLD	300	300	300	300	300
DRSP	2,616	3,008	3,460	3,979	4,575
Total	**19,316**	**25,669**	**26,883**	**28,276**	**29,873**

TABLE 4.1

4.3. Matching of Resources on High Ranked DTMP Roads

This Section describes the implementation plan of Sindhuli DTMP roads and allocates the tentative budget (Table 4.1) to different components of the individual road corridors according to priorities given in Table 3.10. At this stage the estimated resources are matched with the highest ranked DTMP roads. Construction costs are already estimated (See section 3.7) so the number of highest ranked road links to be completed over the DTMP period is determined. 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 level at 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 4.2. 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 deficits will have to be deducted from allocated DTMP road budgets. The changes in the implementation plan will have to be sanctioned during the annual meetings of the Sindhuli District Council.

Physical and Financial Plan for DTMP Roads

S. No.	Roads by priority	Length of Road (Km)	Current year[1]	DTMP Implementation Year				
			2057/58	2058/59	2059/60	2060/61	2061/62	2062/63
	Likely available budget (Rs 000)			***19,316***	***25,669***	***26,883***	***28,276***	***29,873***
1	**Sirthauli-Dudhauli**	11.2						
	Sirthauli-Patiyani	6.2						
	New Construction (Rs 000)			990	1,478	2,235		
	Physical output (Km)			1.5	2.0	2.7		
	Periodic maintenance (Rs000)				84	220	436	488
	Routine maintenance (Rs 000)				20	53	105	117
	Sub total			***990***	***1,583***	***2,508***	***540***	***605***
	Patiyani-Dudhauli	5.0						
	Rehabilitation (Rs000)			1,500				
	Periodic maintenance (Rs000)				280	314	351	393
	Routine maintenance (Rs 000)				67	75	84	94
	Sub total			***1,500***	***347***	***389***	***436***	***488***
	Total			**2,490**	**1,930**	**2,896**	**976**	**1,093**
2	**Hatpate-Sirthauli**	17.1						
	Dakaha-Sirthauli	10.1						
	New Construction (Rs 000)						4,777	5,457
	Physical output (Km)						5.0	5.1
	Periodic maintenance (Rs000)							393
	Routine maintenance (Rs 000)							94
	Sub total						***4,777***	***5,945***
	Ratanpur-Dakaha	7.0						
	Rehabilitation (Rs000)				3,606			
	Periodic maintenance (Rs000)					439	492	551
	Routine maintenance (Rs 000)					105	118	132
	Sub total				***4,289***	***544***	***610***	***683***
	Total				**4,289**	**544**	**5,386**	**6,628**
3	**Sindhulimadi-Bhimsthan**	22.0						
	Pallo Rampur-Bhimsthan	16.0						
	New Construction (Rs 000)				5,286	5,921	6,631	7,427
	Physical output (Km)				4.0	4.0	4.0	4.0
	Periodic maintenance (Rs000)					251	562	944
	Routine maintenance (Rs 000)					60	67	76
	Sub total				***5,286***	***6,232***	***7,261***	***8,447***
	Sindhulimadi-Pallo Rampur	6.0						
	Rehabilitation (Rs000)			1,560				
	Periodic maintenance (Rs000)				336	376	421	472
	Routine maintenance (Rs 000)				81	90	101	113
	Sub total			***1,560***	***417***	***467***	***523***	***585***
	Total			**1,560**	**5,703**	**6,698**	**7,783**	**9,032**

[1] Fiscal Year 2000/2001

S. No.	Roads by priority	Length of Road (Km)	Current year[1]	DTMP Implementation Year				
			2057/58	2058/59	2059/60	2060/61	2061/62	2062/63
4	**Sindhulimadi-Kapilakot**	28.5						
	Dadi-Kapilakot	18.0						
	New Construction (Rs 000)		2,695	2,849	3,018	3,477	4,003	
	Physical output (Km)		3.5	3.7	3.5	3.6	3.7	
	Periodic maintenance (Rs000)			175	403	671	1,005	1,416
	Routine maintenance (Rs 000)			42	97	161	241	340
	Sub total			***3,066***	***3,518***	***4,309***	***5,248***	***1,756***
	Sindhulimadi-Dadi	10.5						
	Rehabilitation (Rs 000)			3,570				
	Periodic maintenance (Rs 000)				588	659	738	826
	Routine maintenance (Rs 000)				141	158	177	198
	Sub total			***3,570***	***729***	***817***	***915***	***1,024***
	Total			**6,636**	**4,247**	**5,126**	**6,163**	**2,780**
5	**Kushumtar-Bastipur**	18.8						
	New Construction (Rs 000)		8,480	5,936	4,749	7,978	10,425	11,676
	Physical output (Km)		4.0	2.8	2.0	3.0	3.5	3.5
	Periodic maintenance (Rs 000)			200	381	552	829	1,204
	Routine maintenance (Rs 000)			48	91	132	199	289
	Total			**6,184**	**5,221**	**8,662**	**11,452**	**13,168**
6	**Bhiman-Harshahi-Tandi**	35.6						
	Rehabilitation (Rs000)		3,000	1,500	1,500			
	Periodic maintenance (Rs000)			1,000	1,680	2,235	2,501	2,801
	Routine maintenance (Rs 000)			240	403	536	600	672
	Total			**2,740**	**3,583**	**2,771**	**3,101**	**3,473**
	Grand Total			**19,610**	**24,974**	**26,699**	**34,862**	**36,174**
	Deficit (-)/Surplus (+)			**(-) 294**	**(+) 401**	**(+) 585**	**(-) 6,000**	**(-) 12,301**

TABLE 4.2

5. PREPARATION AND PRIORITISATION OF DTPP

The DTPP has a perspective of 20 years. The DTPP is revised every five years when a new DTMP is being prepared according to the rolling plan system (See Section 2 Vol. I).

As outlined in step 17 (Figure 2.1) of the DTMP "Methodology" relevant sections of the draft DTMP along with a map which shows the proposed DTMP roads and existing village, district and strategic roads were distributed to each VDC representative (Chairman & Vice-chairman). Guidelines are also prepared and distributed to assist them in understanding the maps and the sections of draft DTMP, which have been distributed. The guidelines also give details of the procedures for suggesting modifications to the draft DTMP and for formulating proposals for DTPP roads.

In January 2001, the DTMP was presented to representatives of the Ilakas. A DTMP map was distributed to them with the request to complement DTMP with their own priorities for DTPP roads. Immediately before the District Council at the end of January 2001 the same Ilaka members were invited in a workshop to present their proposals, harmonise and prioritise them.

The workshop proposed following roads presented in table 5.1 for the District Transport Perspective Plan (DTPP).

Proposed DTPP roads

Road Reference No.	Road Name	Length (Km)	Remarks
20A007A	Kapilakot-Pipalmadi	32.2	A
20A010R	Bastipur-Nepalthok	30.04	A
20A020A	Bhimsthan-Bahuntilpung	28.2	A
20A004R	Kapilakot-Hariban (Sarlahi)	26.5	A
20A013R	Sindhuligadhi-Taaldhunga (Kavre)	34.6	A
20A016R	Naagasthan-Khurkot	59.6	A
20A017R	Ratanchura-Bahuntilpung	39.7	A
20A021R	Bahuntilpung-Gahunbari	18.3	A
20A023A	Dudhauli-Katari	7.4	A
20A025R	Tandi-Dhansari	5.9	A
20A028R	Ambote-Jinakhu-Jagadi	7.6	A
20A031R	Dakaha-Chisapani	3.4	A
20A033R	Maisthan-Ratanpur	30.9	A
20A005R	Pipalmadi-Karmaiya (Sarlahi)	16.2	B
20A006R	Pipalmadi-Phapdandi	25.4	B
20A008R	Tamajor-Kapilakot (Chhap)	16.23	B
20A009R	Tamajor-Taaldhunga (Kavre)	13.0	B
20A012R	Pipal Bhanjyang-Bhadrakali Khattar	7.85	B

Road Reference No.	Road Name	Length (Km)	Remarks
20A014R	Sitalpati-Ratmate	18.7	B
20A015R	Gaunkharka-Majhuwa	6.53	B
20A018R	Bahuntilpung-Pokhari	12.1	B
20A019R	Balajor-Bahuntilpung	9.8	B
20A022R	Mahadevdanda-Dudhauli	20.4	B
20A026R	Jagadi-Chisapani (Godar)	4.5	B
20A029R	Jarayotar-Kakurthakur	32.6	B
20A030R	Lampantar-Dakaha	11.7	B
20A032R	Jarayotar-Dhalkebar	16.2	B

A: High Priority

B: Others

TABLE 5.1

6. ORGANISATIONAL AND FINANCIAL ISSUES

6.1 Relevant Institutions in the District

During the initial workshop in September 1999 the DDC Sindhuli 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 policy, rules and regulations.

In November 1999 the district technical team has been formed within the DDC Technical Unit and 1 engineer and 2 overseers hired by the DDC. The establishment of LRCC is in process and UG will be formed as soon as construction activities will start.

6.2 Budgetary Arrangements and Flow of funds

Following the agreement between Sindhuli District and DRSP a District Road Fund (DRF) has to be established. The DRF will be replenished by contributions from DoLIDAR, DDC block-grant, DDC internal funds, Royalty from Sindhuli-Dhulikhel Road Project, VDC block-grant, Constituency Development Fund, DoR/MoLD, DRSP and eventually other donors in the transport sector.

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

6.3 Road Construction, Operation and Maintenance

The district, DRSP and the DDC of Sindhuli 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).

LIST OF MAPS

Attachment
Transport Infrastructure Map 1: 125,000; District Transport Plan, Sindhuli District